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Signal Support to Theater Operations

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Signal Support to Theater Operations

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Preface

Field Manual Interim 6-02.45 is the Army's doctrine for signal support at the theater level. It is consistent with and expands on the doctrine in Joint Publication 6-0, Field Manual 6-0, Field Manual 3-0, and Field Manual 3-13. It contains joint, Army, and proponent guidelines to support the entire signal spectrum of operations in the contemporary operational environment.

This manual provides a doctrinal foundation for force design, combat development, professional education, and training of signal Soldiers. It establishes the importance of the LandWarNet, not only to the Soldiers' mission at the tactical levels, but also to the vital need at the theater commander's level. This manual provides information to leaders and planners on how signal assets and the LandWarNet support their operations.

This publication applies to the Active Army, the Army National Guard/Army National Guard of the United States, and the United States Army Reserve unless otherwise stated.

The proponent for this publication is the United States Army Training and Doctrine Command (TRADOC). The preparing agency is the United States Army Signal Center, approved by Combined Arms Doctrine Directorate. Send comments and recommendations on Department of the Army Form 2028 directly to: Commander, United States Army Signal Center and Fort Gordon, ATTN: ATZH-IDC-CB (Doctrine Branch), Fort Gordon, Georgia 30905-5075, or via electronic mail to doctrine@gordon.army.mil or signal.doctrine@us.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.

Introduction

This manual is applicable at strategic, operational, and tactical levels of war and pertains to major combat operations, small scale contingencies, Department of Homeland Security, and to a lesser degree, special operations. The content is based on lessons learned from operational experience, combatant commander operational requirements, current and emerging concepts, programmatic initiatives, and the incorporation of new technology. This doctrine examines how the Signal Corps—

- Keeps pace with the Army's transformation.
- Meets joint imperatives for command and control and communications systems.
- Develops and adapts new concepts and designs for employing and protecting the LandWarNet, the Army portion of the Global Information Grid.
- Integrates and employs joint networks.
- Reshapes our organizational structure to meet the imperatives of modularity.
- Meets user requirements in response to the changing role of providing information networks for the Army.

This manual introduces several new organizational constructs that will bridge the gap between the current and objective modular design and make signal organizations relevant across all components: the United States Active Army, Army National Guard, and Army Reserve.

The Army continues transforming to meet new threats by becoming more network enabled, incorporating information technology as a means to ensure joint interoperability, and enabling battle command, intelligence sharing, and effective logistics. It continues evolving to meet the challenges of a new theater of operations. As we become network enabled, as defined by the Joint Staff, we will continue to grow from a voice-reliant environment to one that is almost solely data-centric. The LandWarNet in theater will empower combatant commanders to think better, make faster decisions, and generate and focus decisive combat power more effectively than any adversary. Theater LandWarNet will use extensive data networks to link combatant commanders, organizations, capabilities, and business practices for the explicit purpose of developing and shaping the operational environment and executing meaningful, coherent action.

The Army is spiraling towards being network enabled in an environment that requires investment and experimentation, which will result in changes in Army doctrine, organization, training, materiel, leadership and education, personnel and facilities. The risk for not ensuring a smooth transformation to a jointly focused, network capable force is mission failure. This is all part of the Army evolution to incorporate knowledge-based warfare. The LandWarNet provides infrastructure, knowledge, and Warfighters across the Army to afford combatant commanders' unparalleled ability to defeat threats to this nation and our allies. It includes computers, software, architecture, security, communications, programs, and facilities. It provides processing, storing, transporting, and staging information over a seamless network. It captures emerging capabilities and technologies encompassing all aspects of evolving battle command, communications, information management, and decision support. It includes all Army networks, from sustaining military bases to forward-deployed forces, and aligns Army network goals with those of the Navy and the Air Force. It supports the active component forces, the Army National Guard, and the Army Reserve, from the Soldier in the field to strategic services in the continental United States. The LandWarNet provides the network environment that is a key enabler for ten battle command tenets:

- Commander driven – Battle command that is purpose-oriented and knowledge-based.
- Flexible force tailoring – Command echelons may not be the same as unit echelons.
- Sustained battle command – Resourced for changing and continuous joint operations.
- Unrestricted battle command – Extend the combatant commanders reach anytime, anywhere.
- On-demand collaboration – Teaming commanders and leaders regardless of place and time.
- Singular and seamless – One battle command system.
- Fully integrated – From knowledge bases to forward-deployed.
- Dependability – Unprecedented network performance and quality of service.

- Tailorable battle command – Modular and scaleable to meet dynamic conditions and force sizes.
- Smaller footprint – Dramatically lessens deployed force size without cutting capability.

Army commanders operate in an environment significantly different from the joint commander. The joint commander is in a fixed, well-connected location, as opposed to the Army commander who operates far from any supporting network infrastructure. More importantly, Army combat operations are conducted on the move. Today's Army networks are moving closer to operational requirements being more inherently joint, supporting the geographic combatant commander's networks of choice. The LandWarNet will continue to evolve with a desired end state of meeting the requirements of a continuously evolving Army.

Chapter 1
The Joint Force and Army Networks

The ability to conduct land operations as a part of the joint force is the main focus of today's Army. Using a modular and capabilities-based design, the Army will have greater capacity for a rapid and tailored force that will be more capable of achieving the strategic responsiveness of a full spectrum operation. This will allow combatant commanders (CCDRs) to expand the joint team's ability to deploy rapidly, employ, and sustain forces throughout the global operational environment in any environment. An Army force empowered by joint capabilities and knowledge-networked forces will be the way of the future.

SECTION I – JOINT AND ARMY OPERATIONS

UNDERSTANDING "JOINTNESS"

1-1. Global interests, diffused technology, and adaptive enemies are critical aspects that influence joint operations as outlined in Joint Vision 2020 .

1-2. The overarching focus of Joint Vision 2020 is "full spectrum dominance achieved through the interdependent application of dominant maneuver, precision engagement, focused logistics, and full dimensional protection." Army operations focus on employing combined tactical formations conducting battles and engagements geared toward the destruction of enemy forces. Joint operations generate decisive combat power available from all services on a synchronized timeline with a determined scope and purpose of other military service forces, multinational forces, nonmilitary government agencies, nongovernmental organizations (NGOs), and the United Nations. Joint force commanders (JFCs) conduct unified actions, integrating and orchestrating operations directly with the activities and actions of other military forces and nonmilitary organizations in the operational area.

1-3. Joint forces conduct campaigns and major operations, while the functional and service components of the joint force conduct supported, subordinate, and supporting operations, not isolated or independent campaigns. The joint force increases its total effectiveness without necessarily involving all forces or incorporating all forces equally.

1-4. Joint missions and joint forces drive specific information requirements, procedures, techniques, systems, and capabilities. The goal is to provide rapid information sharing in order to integrate joint force components, allowing them to function effectively to facilitate a common understanding of the current situation – a common operational picture.

1-5. Technological developments, which connect the information systems of partners, will provide the links that lead to improved command and control (C2). Critical to maintaining the tempo of operations which incorporate multi-service and multinational capabilities is the sharing of information needed to develop a common understanding of operational procedures and compatible organizations.

ARMY SUPPORT TO THE JOINT FORCE

1-6. Theater operations are inherently joint and multinational, resulting in the need for greater levels of cooperation between United States (US) forces, other Department of Defense (DOD) components, and governmental, coalition, and host-nation organizations. The Army provides a complete range of force that meets the needs of JFCs, whether by deterring adversaries and potential enemies or by forming the nucleus

of the joint force land component that will prosecute wartime operations. Army Forces provide the Joint Force Commander (JFC) the capability to—

- Deploy quickly into an area of operations (AO).
- Establish and secure lodgments for projecting follow-on forces.
- Sustain the joint force indefinitely.
- Employ airborne and air assault capabilities, which allow JFCs to seize airfields or other important facilities.
- Conduct amphibious operations in conjunction with the Marine and Naval forces.
- Employ Army special operations forces (SOF) which add highly specialized and unique area-focused capabilities to joint forces.

1-7. The development of manageable and coordinated intelligence and communications functions continues to provide significant contributions to joint capabilities. Recent operations in the European, Pacific, and Central Command areas of responsibility (AORs) have contributed to the modernization of the communications and automation management that support these intelligence requirements. This resulted in removing traditional barriers that hampered information and intelligence sharing.

1-8. Central to a theater campaign are those forces employed by the JFC. At the Army's operational level, the senior commander responsible for executing the operational fight, C2 of tactical forces, integration of multiple services, and managing the theater support structure is the Army Service component command (ASCC).

1-9. The ASCC challenge is to shape the military environment and set the conditions for qualified success in the joint operations area (JOA) and the theater in general. Success depends on the ability to communicate across a wide range of agencies and forces using networks that provide links which ultimately allow the ASCC commander to conduct his operational mission and enable subordinate commanders to accomplish their missions.

CHANGES IN THE CONTEMPORARY OPERATIONAL ENVIRONMENT

1-10. The United States can no longer view adversaries through the lens of the Cold War and Warsaw Pact, nor can we judge military operations merely by analyzing an adversary's stage of economic development. Small scale, regional, or local powers may employ extremely advanced military technologies. An adversary's actions require intelligent analysis of fields extending far beyond the traditional battlefield focus. Boundaries between traditional echelons of operations are even more blurred. Current political and technical trends suggest that successful conflict prosecution and termination will depend on multinational commitment, joint operations, and a high professional tolerance for the new forms of conflict.

1-11. The operational environment will continue to be characterized by constant instability. Threats continue to evolve from the familiar conventional formations to those that are more likely to be characterized by—

- No longer clearly presenting themselves in terms of intent, capability, or modes of operation. They will minimize predictability.
- Using irregular military or paramilitary forces and forces forming coalitions of their own to combat US influence.
- An ability to leverage information technology (IT) while engaging in computer and network attacks, electronic warfare (EW), and hostile information operations (IO).
- A range of capability between highly modern conventional armies and simple terrorist actions designed against US interests around the world that either directly or indirectly affects deployment and support of US forces.
- Employing high-tech levels of firepower, protection, and mobility to compete against our state-of-the-art weaponry and precision firepower.
- The ability to change or adapt to the nature of conflicts (especially the political nature) to include multiple, concurrent fights and the combination of different types of threats.

- An increased unpredictability of conflict locations and the sources of opposition. They will use complex terrain and urban environments and disperse forces to offset US capabilities in targeting and precision engagement.
- Offsetting our Warfighting and industrial dominance by exploiting available technologies which are essential to our information and technical superiority.
- Willingness to engage in or exploit weapons of mass destruction (WMD) proliferation.

Note. WMD have made the threat qualitatively different. WMD offer the potential to do extreme damage, both physical and psychological, with a single strike. Many nations are attempting to produce nuclear weapons. The proliferation and acceptance of chemical and biological weapons are growing, because they are relatively inexpensive and easy to produce.

1-12. Generally, antagonists will seek victory against US forces by conducting force-oriented operations that concentrate on prolonging conflict and inflicting unacceptable casualties. They will create conditions designed to defeat US forcible entry operations and use a transition to a defensive framework that avoids decisive battle. They will attempt to preserve their capability and use irregular tactics to erode US public support and cohesion within US coalitions while forming their own coalitions that seek international support.

1-13. Tactically, conflicts will involve an increased use of terrain and urban areas to disperse mechanized and armored units. Enemy forces will concentrate and disperse them as opportunities allow and employ upgraded camouflage and deception techniques in order to reduce exposure to US surveillance, targeting, and precision strike technology.

1-14. Army missions dictate continued preparation for and participation in efforts that span the entire spectrum of conflict. It is essential to understand that Army Forces participate in almost all operations as part of a joint team. CCDRs rely upon Army Forces to conduct sustained land operations as a part of an overall strategy involving land, air, sea, and space forces. The following is the operation construct of full spectrum operations:

- Offensive operations—intend to destroy or defeat an enemy with the purpose of imposing the commander's will on the enemy and achieving decisive victory by focusing on seizing, retaining, and exploiting the initiative.
- Defensive operations—defeat an enemy attack, buy time, economize forces, or develop conditions favorable for offensive operations. Defensive operations preserve control over land, resources, and populations. They retain terrain, guard populations, and protect key resources.
- Stability operations—sustain and exploit security and control over areas, populations, and resources. They employ military capabilities to reconstruct or establish services and support civilian agencies. Stability operations involve both coercive and cooperative actions. They may occur before or after offensive and defensive operations but are accomplished separately, usually at the low end of the range of military operations. Stability operations lead to an environment in which, in cooperation with a legitimate government, the other instruments of national power can predominate.
- Civil support operations— address the consequences of man-made or natural accidents and incidents beyond the capabilities of civilian authorities. Army forces do not conduct stability operations within the United States; under U.S. law, the federal and state governments are responsible for those tasks. Instead, Army forces conduct civil support operations when requested, providing Army expertise and capabilities to lead agency authorities.

1-15. Commanders combine and sequence the types of operations to form their overall operational design for campaigns and major operations. Army Forces conduct full spectrum operations abroad by executing offensive, defensive, and stability operations as part of integrated joint, interagency, and multinational teams. Army Forces within the United States and its territories conduct full spectrum operations by combining offensive, defensive, and civil support operations to support homeland security. Operations at home and abroad occur concurrently at the strategic-level. See Figure 1-1.

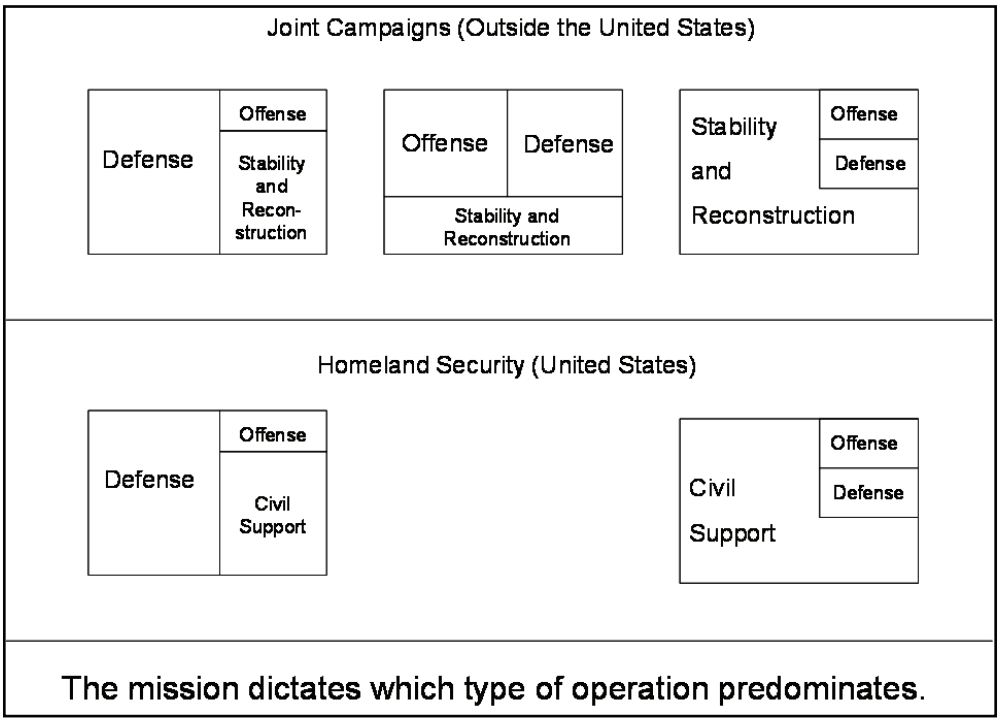

Figure 1-1. Full spectrum operations

1-16. Commanders allocate different proportions of their force to each type of operation during different phases. Large units usually conduct simultaneous offensive and defensive operations abroad, as well as stability operations. Units at progressively lower echelons receive missions that require fewer combinations of them. At lower echelons, units usually perform only one type of operation at a time.

1-17. Today's Army responds rapidly with forces that move quickly and commence operations immediately upon arrival in distant theaters of operation. This expeditionary mindset demands joint-capable forces that can—

- Deploy rapidly into austere theaters with little or no advance materiel buildup.
- Rely on more efficient use of precision strike capabilities requiring even closer coordination and use of strategic and tactical intelligence.
- Integrate and employ land forces immediately with little time to reorganize after deployment.

1-18. With the changes in the operational environment, there is a significant increase in the need for information sharing, collaboration, and information services. Deployed forces depend upon joint and national assets to facilitate a commander's information superiority (IS) and the ability to prosecute offensive IO while actively engaged in defending friendly information. When required, Army Forces develop the situation through maneuvers to identify enemy intentions, mask larger friendly operations, or preclude enemies from improving their information posture. The challenge to leaders and planners at all levels is to maintain information and technological dominance over our adversaries throughout this environment.

1-19. The joint environment, coupled with the demands of network enabled expeditionary operations, significantly increases reliance on accessing the Global Information Grid (GIG). Army tactical and maneuver elements rely on networks to leverage strategic and national capabilities which allow them to deploy into theaters from multiple force projection platforms and fight upon arrival. This complex environment demands that commanders have full network connectivity, complete network synchronization, and consistent standards to access the network immediately and to fight.

Note. A scenario contained in Appendix A depicts the mobilization and projection of US and coalition forces.

SECTION II – THE MODULAR ARMY AND JOINT NETWORKS

MODULARITY

1-20. Joint requirements developed a new mindset of expeditionary warfare, which calls for different combat and support structures that will rapidly deploy into austere theaters with little or no advance materiel buildup. The concept of a modular design will enable these support structures to conduct operations on arrival with other services, multinational forces, or SOF in a joint theater. They are designed to employ communications and automation interoperability.

1-21. This presents a significant change to the Army's post-Cold War organizations. Army Forces began to change in order to be more flexible and responsive. These modular organizations meet the JFC's requirements while reducing organizational turbulence, inefficiency, and slow response times. The Army became more brigade-centric, often disassembling existing unit structures to design purpose-built, permanent combat teams. The focus was on developing modular organizations that could provide a mix of land combat power more easily organized for any combination of Army missions as part of a joint campaign. The redesign produced units that—

- Operate as part of a joint or mulitnational force as the rule, not the exception.
- Are expeditionary in nature, being lighter and more strategically deployable forces.
- Reduce their physical and logistical footprint by increasing reliance on reachback logistics and intelligence support.
- Are more mobile and lethal with an increased area of control and influence, using smaller tactical formations.
- Enable commanders to see first, understand first, and act first, placing IS as an element of combat power.
- Are information and network enabled by leveraging IT at all possible levels.

THE MODULAR ARMY CORPS AND DIVISION

1-22. The most significant advantage of modularization is greater strategic, operational, and tactical flexibility. The numbered ASCC, corps, and division will serve as the following:

- A theater's operational, strategic, and tactical C2.
- A land force and joint support element.
- C2 for a brigade combat team (BCT) or sustainment brigade, which serves as the primary tactical and support elements in a theater

1-23. While conventional thinking is to view these echelons as linear improvements to the original division and corps, they are not. Both higher echelons will be complementary, modular entities designed to employ task-organized forces within integrated joint campaigns.

1-24. The modular numbered Army is organized and equipped primarily as an ASCC for a geographic combatant commander (GCC) or combatant command and serves as the senior Army headquarters (HQ) for a theater. It is a regionally focused, but globally networked, headquarters that consolidated most functions that were performed by the traditional Army and corps levels into a single operational echelon. The ASCC is responsible for—

- Administrative control (ADCON) of all Army serviced assigned forces and installations in the GCC's area of responsibility (AOR).
- Integrating Army Forces into the execution of theater security cooperation plans.

- Providing Army support to joint forces, interagency elements, and multinational forces as directed by the GCC.
- Support to Army, joint, and multinational forces deployed to diverse JOAs.

1-25. The ASCC modular design provides enough capability to execute theater entry and initial phases of a campaign, while providing a flexible platform for Army and joint augmentation as the theater develops. It provides ADCON of all Army personnel, units, and facilities in the AOR. The ASCC is also responsible for providing continuous Army support to joint, interagency, and multinational elements as directed by the GCC, regardless of whether it is also controlling land forces in a major operation.

1-26. The ASCC will command and control a diverse construct of Army subordinate commands and separate functional elements which provide the theater an assigned mix of regionally focused, supporting resources and capabilities to include the following:

- Theater sustainment command.
- Signal Command (Theater) (SC[T]) or Theater Signal Brigade.
- Theater medical command.
- Theater Intelligence Brigade (TIB).
- Civil affairs brigade.
- Battlefield surveillance brigade.
- Theater Fires Brigade.
- Theater MP Command

1-27. An ARFOR commander in a JOA exercises operational control (OPCON) to supporting subordinate units and attachments in the form of brigades, battalions, and elements that were drawn from a "force pool." These units and attachments would provide additional reinforcement through a combination of modular command, control, and support to that JOA and joint task force (JTF). The actual size, composition, and designation are adjusted to the demands of the GCC or ASCC. Refer to Figure 1-2.

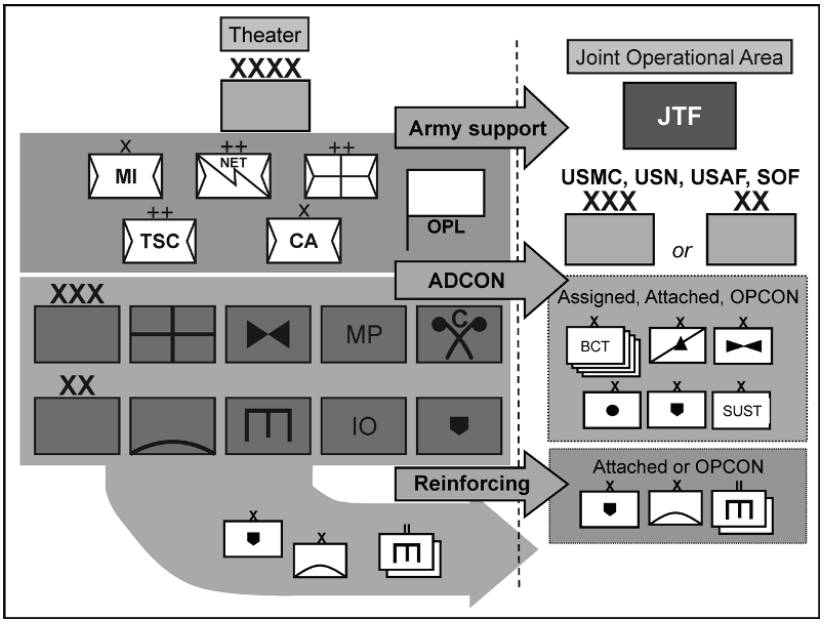

Figure 1-2. ASCC support to JTF and theater forces

1-28. The ASCC may also provide the resources needed for corps or division to stand up as an ARFOR, joint force land component commander (JFLCC), or a JTF HQ. The divisions have self-contained headquarters with deployable command posts supported by division signal companies (DSC), security, and sustainment units. As a completely modular entity, it may command a tailored mix of forces determined by the ASCC and in coordination with the GCC. Refer to Figure 1-3.

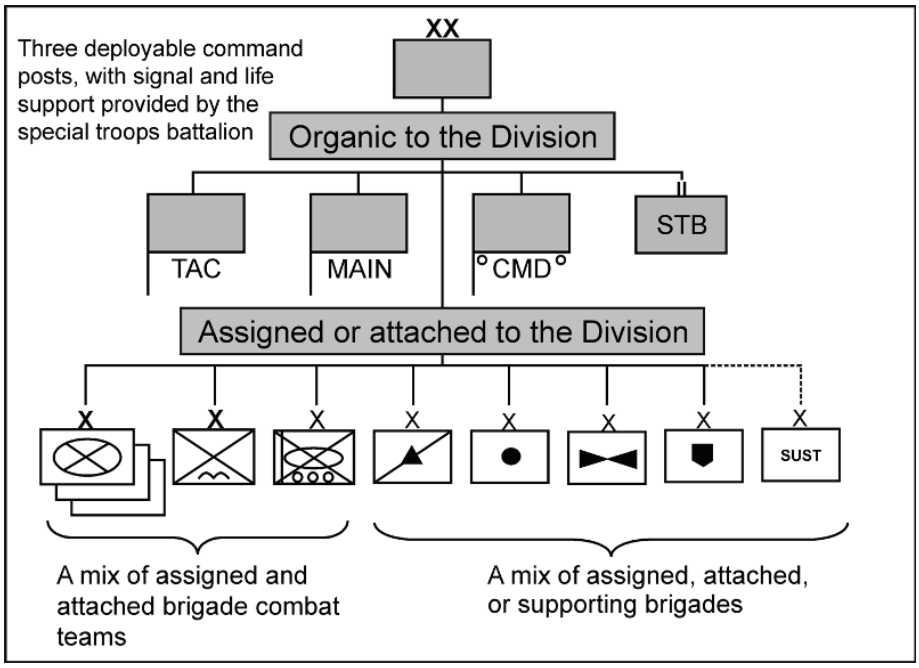

Figure 1-3. Division force structure

JOINT NETWORKS

1-29. The networking of all Joint Force elements creates capabilities for unparalleled information sharing and collaboration, adaptive organizations, and a greater unity of effort via synchronization and integration of force elements at the lowest levels.

1-30. Modular Army signal organizations are designed to be interoperable with all other services to include the network capabilities within the joint information and communication systems (formally known as C4 systems in the joint community) in support of joint operations. The joint communications system must—

- Provide the right information in a useful format to the right place and to the right user at the right time.
- Provide a secure, robust, reliable, and trustable means for the JFC to exercise authority and direct forces.
- Span large geographic areas and a range of conditions, in austere or complex environments, and in all weather conditions.
- Be tactically agile and globally deployable, support tactical operations under highly mobile situations, and support en route, intra-theater, and inter-theater C2.
- Connect superior and subordinate commanders during all phases of an operation and rapidly adapt to changing demands.
- Facilitate interface with governmental and NGOs, local officials, and multinational forces.

1-31. The GIG is the DOD information environment that supports joint communications systems and networks supporting joint operations. Joint Publication (JP) 6.0 defines the GIG as "the globally interconnected, end-to-end set of information capabilities, associated processes and personnel for collecting, processing, storing, disseminating, and managing information on demand to Warfighters, policy makers, and support personnel." The GIG—

- Spans all services and components and includes all owned and leased computing systems, communications, software and applications, data, security services, and other information services necessary to achieve IS.

- Supports all DOD, national security, and related intelligence community missions and functions (strategic, operational, tactical, and business).
- Extends capabilities from all operating locations (bases, posts, camps, stations, facilities, mobile platforms, and deployed sites).
- Provides interfaces to multinational, coalition, non-DOD users, and systems as required.
- Integrates computing platforms, weapons systems, and sensors that exchange information through a globally interconnected network.

1-32. In concept, the GIG (see Figure 1-4) is very much like the Worldwide Web. It exists as a baseline capability and is comprised of information and information services residing on transporting infrastructures and segments. It is described in seven components: warrior, global applications, computing, communications, network operations (NETOPS), information management (IM), and foundation. Authorized users access the GIG and its services either through military or commercial communications or through a series of entry points, e.g., standardized tactical entry point (STEP) and teleport facilities. These points provide information transfer gateways as a means of forming a junction of space-based and terrestrial networks and a connection for strategic or fixed assets and tactical or deployed users. It provides multiple connection paths between information users and information producers and enables effective bandwidth management.

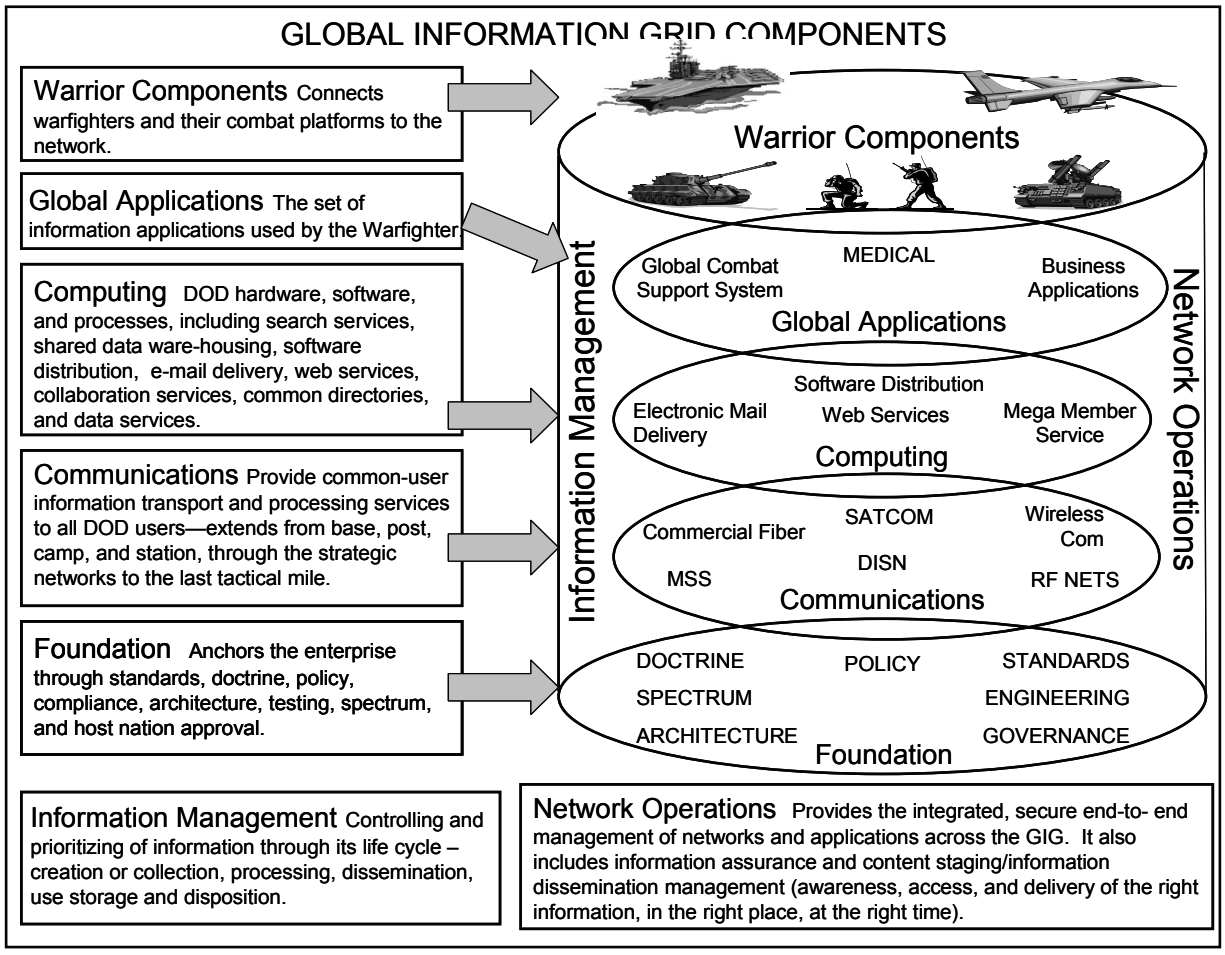

Figure 1-4. Global information grid

SECTION III – CHANGES IN THEATER SIGNAL

ARMY NETWORK OPERATIONAL ENVIRONMENT

1-33. On the battlefield, information systems provide the vital link among tactical, operational, and strategic operations. These are particularly attractive to adversaries because attacks by a foreign power are indistinguishable from hacking or criminal activities at the strategic, operational, or tactical level. The theater signal operational environment that drives theater signal doctrine and force structure includes all of the elements of the larger operational environment which 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 shown in Figure 1-5.

Note. The 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."

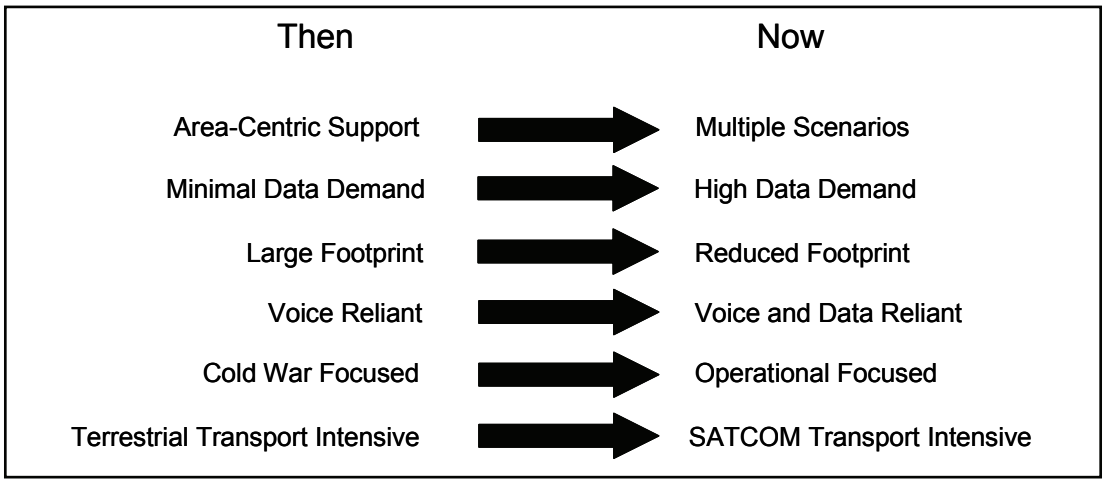

Figure 1-5. Changes in network requirements

1-34. Army networks meet these changes with the ever increasing use of modernized communications resources, emerging technologies, and compatible government off-the-shelf and commercial off-the-shelf (COTS) equipment as part of networks designed to interface with the GIG infrastructure.

1-35. Coalition, multinational, interagency, and commercial networks exist throughout the operational environment but must be fully integrated to "Fight the Network." The DOD's dependence on commercial networks and competing commercial priorities adds additional complexity to planning and execution. These commercial networks may include the communications infrastructure of hostile or occupied territories. The challenges associated with network security in this "mixed" network environment cannot be ignored.

1-36. Joint access to the GIG and its services are provided through STEPs, teleports, and other points of presence (POPs) located in all theaters and coordinated by the ASCC. Joint doctrine and policy must govern operations due to their global interdependence. For example, USCENTCOM reachback occurs through facilities located in the USPACOM, USEUCOM, and continental United States (CONUS). The Army, along with the other services and the Defense Information Systems Agency (DISA), must work in concert to ensure that only the most modern capabilities and systems are fielded to these sites, while maintaining backwards compatibility for servicing those units that have not been fully modernized.

1-37. Theater networks are an extension of the GIG and stability operations and strategic functions for the GCC and ASCC. Theater networks operate continuously and extend horizontally and vertically to enable

simultaneous operations while sustaining Army business lines and reachback to installations and power projection platforms. It is at the ASCC that critical theater resources, e.g., electromagnetic spectrum (EMS) management and satellite access, are allocated and synchronized with the GCC requirements. The theater network, through fixed and deployable formations, delivers Defense Information Systems Network (DISN) services and the Army capabilities that comprise the theater GIG. Additionally, the theater network supports the combatant command's and host nation's unique requirements. In addition to coordinating daily theater operations and the theater signal battle, theater network assets may augment division and BCT operations.

1-38. Tactical users require extensive networks to enable battle command, intelligence, and sustainment operations. They must leverage internal, strategic, and national capabilities and the ASCC to orchestrate the theater network battle. Corps, division, and the BCT will deploy into theaters from multiple force projection platforms. Operation IRAQI FREEDOM lessons learned highlighted initial operational risk from shortfalls caused by lack of interoperability standards. Therefore, this complex environment demands full connectivity, complete synchronization, and consistent worldwide standards to allow immediate access to the fight. Corps, division and the BCT will dynamically maneuver forces and capabilities within the constructs of a joint capable network, and this capability will extend across all tactical echelons.

THEATER NETWORK MISSIONS

1-39. The effect on network elements in a theater of operations is profound, resulting in the theater signal mission expanding significantly. The former doctrine of "install, operate, maintain and protect" no longer captures the necessity to meet new network enabled requirements in the areas of data services, satellite communications (SATCOM) usage, network protection, non-traditional roles and support relationships, increased use of commercial systems, components, and contractor support.

1-40. **Greater Demands for Data Services.** Deployed tactical elements demand the same data services provided in home stations. This includes new applications and requirements for significantly increased bandwidth. Deployed forces must retain this "home station quality" interoperability with the sustaining base for all forms of C2, intelligence, and logistic support.

1-41. **Increased Reliance on SATCOM.** To support modularity designs and capabilities, mobility and battle command systems, tactical elements need to untether from terrestrial transport systems. The capability to fight in a non-contiguos, asymmetrical battlefield within an enclave operational environment will become more the norm than the contiguous battlefield of the Cold War era. These enclaves are, more often than not, beyond line of sight (BLOS) distances from each other and require a quality of service measure of connectivity that is not available in terrestrial systems. SATCOM:

- Enable joint C2, logistics, and support for employed units while incorporating commercial technology insertions and a more flexible and responsive architecture.
- Support the commander's ability to tailor network resources based upon tactical and strategic needs and better facilitate ready interface to the GIG.
- Capitalize on efficiencies gained by specific technology insertions while leveraging commercial EMS management within the network.

1-42. **Protecting Networks and Information.** Protecting the networks that comprise the GIG requires significant efforts of information assurance (IA) and computer network defense (CND), both essential elements of Global Information Grid Network Defense (GND), an integrated task of NETOPS. GND efforts facilitate the availability, integrity, identification, authentication, confidentiality, and non-repudiation of friendly information and information systems while denying access to our adversaries. It provides end-to-end data quality and protects against unauthorized access, damage, or modification. GND incorporates those actions taken to protect, monitor, analyze, detect, and respond to unauthorized activity within DOD information systems and computer networks. GND requires—

- Protection capabilities that include emission security, communications security (COMSEC), computer security, and information security by means of access control, cryptography, network guards, and firewall systems.

- Detection capabilities that include the ability to sense network abnormalities and anomalies, and to employ intrusion detection systems that provide advance warning of possible attack, damage, or unauthorized modification.
- Reaction capabilities that incorporate response operations, as well as other IO necessary to mitigate hostile events and initiate system response. Restorative actions are proven procedures used for restoration of minimum essential systems and networks.

1-43. **Nontraditional Support Relationships.** These are more numerous as the operational environment changes, especially since Army network providers are often the earliest responders in the establishment of a theater of operations. Because many joint and coalition partners may not have adequate organic network equipment, signal command is frequently called upon to provide systems and services for local area and wide-area networks (LANs and WANs) to coalition partners, NGOs, and other service organizations that are not typically part of the traditional Warfighting structure. Coalition local area networks (C-LANs) and coalition wide area networks (C-WANs) operate at both classified and unclassified levels and require special network considerations. Commanders at all levels frequently call upon signal units to accompany and support organizations outside traditional affiliations due to a greater technical capability, geographic proximity, or operational necessity. The result is that theater signal must render support on an anyone, anytime, and anywhere basis.

1-44. **COTS Technology and Commercial Communications**. COTS provisioning is more the norm in ensuring essential network services and support especially in the mission area of theater commercialization. Extensive reliance on COTS technology is, and will continue to be, a permanent reality on the battlefield in contrast to previous concepts that regarded the use of COTS as a temporary condition. Technological trends and economic factors drive the civilian world to leverage IT into savings of manpower, time, and transport. Commanders want the same trade-offs, as well as the increased capability that technology provides. Leased commercial communications are critical to the success of theater networks by meeting the demand for connectivity, bandwidth, and quality of services. 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. The list of Warfighting network services that depend on commercial providers is significant: Force XXI Battle Command-Brigade and Below – Blue Force Tracking (FBCB2-BFT), Movement Tracking System (MTS), Talon Reach, Battle Command on the Move, logistics, medical, engineer, and even bandwidth support to tactical and operations communications systems. There is a degree of risk when considering global projection in that these companies providing bandwidth are often owned by international consortiums which may result in uncertain and potentially vulnerable networks.

1-45. **Commercial Contractor Support.** The use of civilian contract support continues to evolve, from the small populations of highly specialized experts to a more widespread reliance on commercial sector support for technical, administrative, and operational needs. The introduction of commercial contractor support begins almost immediately following deployment in order to free tactical resources throughout the theater and for follow-on deployments. This is especially true in the realms of electronic maintenance, application integration, and system training.

JOINT NETWORK TRANSPORT CAPABILITY – SPIRAL

1-46. The ability to obtain information from the LandWarNet (LWN) and to enable better decisions for precision engagement, maneuver, or IO is vital for the sustainability and expansion of current forces. The overarching focus of the Joint Network Transport Capability-Spiral (JNTC-S) is to transform the Army into a joint network-centric interoperable, knowledge-based warfare. It provides the infusion of commercial technology by moving joint networks to an Internet Protocol (IP) based, IP routing joint architecture in preparation for the Warfighter Information Network-Tactical (WIN-T) transition.

1-47. IP-centric technologies are the focus of the JNTC-S architecture and will continue to be developed and refined to provide the infrastructure for all services currently running on incumbent technologies. New services will be developed around IP. In the near term, before 2010, both current generation and transformed technologies must be supported. Beyond 2010, the migration to full IP technology will be nearing completion, and baseband equipment restructuring to support a homogenous IP environment can begin.

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Chapter 2

Theater Network Support and the LandWarNet

The LWN seeks to enable "one battle command system" as part of "one network" that provides a link from the Soldier to a sustaining base. This is done using tailored software applications that are optimized for the combined arms commander to satisfy the supporting needs of the staff. It will ensure guaranteed response times for capabilities built on distributed applications and data operating under adverse conditions. These conditions facilitate effective planning, synchronizing, and virtually rehearsing full EMS operations, no matter where they are in the operational environment. It will reach across the operational and functional domains (tactics, business, and intelligence), as well as joint, multi-national, and coalition enterprises to enable deployed forces.

SECTION I – PRINCIPLES AND OBJECTIVES

LANDWARNET

2-1. LWN represents the Army's unified, coherent network development effort, providing capabilities that enable the Warfighter today and in the future to succeed in all potential operational environments. LWN consists of the Army's contribution to the global, joint, interagency, operationally-based, always-on IT networking grid. The LWN is the connecting point that makes the Army an integral part of any joint force.

2-2. LWN integrates the Army's Warfighting, business, intelligence, and network domains and provides access to the GIG. LWN consists of all globally interconnected Army IM and information systems capabilities, associated processes, and people that collect, process, store, disseminate, protect, and manage information on demand in support of the Warfighter. LWN is an enabler of all operational phases of the joint fight, from mobilization and deployment to decisive operations and stabilization/reconstruction. LWN integrates Warfighting functions and enhances commander-centric operations by enabling broad dissemination and knowledge of the commander's intent and facilitating the rapid conversion of relevant information into decisions and actions. LWN aligns Army network goals with the Navy's and Marine's FORCEnet and the Air Force's Command and Control Constellation Network (C2 ConstellationNet).

PRINCIPLES

2-3. Theater network support meets user needs by applying "jointness" to systems engineering, planning, deployment, and operation of information services. Joint forces must be networked, linked, and synchronized in time and purpose in order to allow more efficiency in dispersed forces to communicate, maneuver, share information, collaborate, and have a common operating picture. Networked forces have the ability to span operational distances by taking advantage of reachback. Being joint requires near simultaneous collection, processing, and dissemination of information to maintain more relevant and complete situational awareness and to employ the right capabilities in the right place and at the right time. Making this possible requires that theater networks be interoperable, agile, trusted, and shared.

Interoperability

2-4. Interoperability is necessary to facilitate the success of gaining IS for any joint, multinational, or interagency operation. Interoperability is achieved among the command, control, and communications system components that are interchangeable so that information can be exchanged directly and adequately between users.

Commonality

2-5. Commonality makes interoperability more feasible. Equipment and systems are common when they are compatible, and each can be operated and maintained by personnel trained on one system without requiring additional specialized training for the others. Common systems share interchangeable repair parts, components, or subassemblies.

Compatibility

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, evaluation, and operational life cycle of all systems.

Standardization

2-7. Standardization ensures that the broad objectives of the National Communications System (NCS), the GIG, the DISN, and tactical communications systems that use the DISN interface all operate under the same systems and procedural guidelines whenever feasible. Standardization includes minimizing ad hoc field patches for noncompliance, achieving maximum economy from cross-servicing and cross-procurement, permitting emergency supply assistance among services, facilitating functional joint and service communications, and avoiding unnecessary duplication in new technology research and development.

Agility

2-8. Agility is the characteristic of being able to conduct decentralized execution. The speed and accuracy of a commander's actions to address changing situations are key contributors to agility. The network must facilitate and meet the needs of the commander and his decision making processes. Network agility is being able to meet current user needs, under continually changing circumstances and conditions. To be agile, networks must have flexibility, reliability, redundancy, timeliness, and mobility.

Flexibility

2-9. Flexibility allows rapid integration at all levels of joint and service information systems support and is required to meet changing situations and diverse operations with minimal disruption or delay. The connectivity achieved and maintained with flexible systems is particularly important during contingency operations. Flexibility is a necessary adjunct to the other principles of interoperability, survivability, and compatibility.

Reliability

2-10. Reliability ensures that networks 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 and operating procedures; countering computer attacks and electromagnetic interference; and establishing effective logistic support programs.

Redundancy

2-11. 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 or the data that it transports is destroyed, rendered inoperative, or degraded.

Timelines

2-12. Timeliness ensures that the processing and transmission time for warning, critical intelligence, and operation order (OPORD) execution information is compressed. As weapon systems technology shortens the time between warning and attack, so must the lag between information collection and dissemination.

Mobility

2-13. Mobility ensures that the horizontal and vertical flow and processing of information is continuous to support the rapid deployment and employment of joint military forces. Commanders at all levels must have network 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 network systems lighter, more compact, and more useful to commanders.

Trusted

2-14. Trusted networks must be transparent to users, protect the information and services that employ the network, and provide users with confidence in the capability and validity of the information made available by the network. Trusted networks must be survivable, sustainable, and protected.

Survivable

2-15. Survivable networks result through applications and techniques such as dispersal of key facilities, multiplicity of communications nodes, or a combination of techniques necessary for the physical and electrical protection of networks that are critical to the integrity of the infrastructure. While it is not practical or economically feasible to make all networks or elements of a system equally survivable, the degree of survivability for networks supporting C2 functions should be commensurate with the survival potential of the associated command centers. Since networks are crucial enablers for C2, they present a high-value target to the enemy.

Sustainable

2-16. Sustainable networks are able to 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—

- Consolidating functionality of similar facilities.
- Adherence to joint-approved architectures.
- Integrating special purpose and dedicated networks, when possible, into DISN systems.
- Maximum use of the DISN common user subsystems.
- Judicious use of commercial services.

Protected

2-17. Protected communications systems and networks and associated forces are crucial enablers for joint C2, and they present a high-value target to the enemy. IA is the essential element to facilitate the security of information and the communications system. IA is accomplished through information protection, intrusion and attack detection, effect isolation, and incident reaction to restore information and system security. Critical to IA are CND and COMSEC:

- CND encompasses actions taken to protect, monitor, analyze, detect, and respond to unauthorized activity within DOD information systems and networks.
- COMSEC protects terminal devices and transmission media.

Shared

2-18. Shared networks and services allow for the mutual use of information services or capabilities between entities in theater, at all echelons, and across all services and components. Most importantly, shared networks provide for collaboration, rapid dissemination of intelligence and information, and the ability to project decisions based on a common situational understanding of the operational environment as a whole.

OBJECTIVES

2-19. Signal brigades and the LWN serve to meet the information requirements of operational environment users, CCDRs, and JTFs. The LWN extends from the lowest tactical echelons to the highest levels of command. It serves as the essential multiplier necessary to meet information needs in times of war, peacetime operations, or humanitarian relief efforts. In many cases, The LWN will provide the key elements to the responding units in a crisis location. The LWN provides assets to meet the objectives of enabling IS, achieving strategic responsiveness, executing shaping and decisive operations, and implementing post conflict operations.

Information Superiority

2-20. Army operations focus more on breaking down an opponent's will and ability to resist through precision strikes and precision maneuvers, rather than overwhelming the enemy with mass. Smaller, lighter forces employed to meet these challenges require IS for success. The LWN enables the attainment of this critical status by providing the systems, Soldiers, and procedures that give commanders the ability to—

- Focus on building an accurate, current, common picture of the operational area.
- Enhance and share knowledge, understanding, and visualization of the operational environment.
- Improve and sustain the quality and speed of collaboration and decision making.

Strategic Responsiveness

2-21. Army missions are no longer symmetrical in nature or confined to one or two theaters of operation. In transforming, the Army is more prepared to act anywhere on the globe in response to threats to national security or in defense of national interests. The LWN capabilities enable strategic leaders to receive, process, and disseminate information globally. Strategic responsiveness requires leaders to see and understand the significance of situations around the world and then make and disseminate decisions resulting in action. The LWN supports planning, preparation, and execution at all levels in a coordinated manner and synchronized with other forces.

2-22. Strategic responsiveness requires the ability to react quickly and proactively. LWN assets provide worldwide operational voice and data networks both on a day-to-day basis and whenever rapidly deployable forces are needed. LWN assets are maintained in ready and deployable conditions around the world in anticipation of required operations.

Shaping and Decisive Operations

2-23. Shaping operations are operations at any echelon that create and preserve conditions for the success of the decisive operation by disrupting enemy capabilities and forces, or influencing enemy decisions. They occur before or during decisive operations and involve any combination of forces and resources throughout the AO. Information is vital to develop and shape operations. The decisive operation is the focal point around which the entire operation or phase of operations is designed. Complex coordination, collaboration, and preparation are the keys to success in meeting decisive operation objectives. When Army Forces are called upon to undertake missions, the LWN will provide the ability to see and understand the situation and to decide, plan, and execute operations to defeat the threat decisively. The LWN enables the use of precision munitions; synchronization of fires; coordinated, simultaneous strikes; distributed operations; fratricide avoidance; and continuous operations.

2-24. The key to the support of shaping and decisive operations is the ability to provide connectivity in any terrain. Theater network assets will extend the LWN to all command levels at any location including complex and urban terrains. Those signal elements will employ a variety of communications and information system technologies to meet user needs supporting shaping and decisive operations. Network planners must be intimately involved in the planning of all operations in order to bring all available tools to bear in the conduct of decisive operations.

2-25. A signal command provides the network capability to meet the requirements of Army and joint headquarters elements in order to fulfill a variety of command roles. A signal command may augment a tactical unit's organic communications assets to provide the networking capabilities required of expanded headquarters' roles. Augmentation of both staff personnel and network line unit personnel and equipment provides Army headquarters elements with information processing and exchange capabilities tailored for operations.

Stability Operations

2-26. Post-conflict or stability operations require extensive LWN support especially as theater networks move toward commercialization, infrastructure restoration, and sustainment of pre-conflict services. As forces transition from conflict to post conflict, the size, composition, and purpose of Army elements change. Often this causes an increase in the amount and type of information required to support that transition. Combat elements are reduced in size and number, and civil affairs and support elements increase to perform governmental and infrastructure support activities. Network assets continue to provide tailored communications that accommodate the addition and deletion of communications and information systems to support changes in military functions.

SECTION II – END USER SUPPORT FOR THE SOLDIER

HOME STATION SERVICES IN A DEPLOYED ENVIRONMENT

2-27. Theater commanders draw a large number of unique services available from theater LWN, each complimenting joint capability. The pivotal mission of theater networks is the ability to deliver sustained, reliable network services that serve as the fundamental tools in developing situational understanding and IS. The following network services are considered the most essential for enabling battle command with home station quality standards in a theater environment.

NON-SECURE INTERNET PROTOCOL ROUTER NETWORK

2-28. The Non-Secure Internet Protocol Router Network (NIPRNET) is a network of government-owned IP routers used to exchange sensitive Unclassified information; very similar to a civilian Internet service provider. It provides access to specific DOD network services and supports a wide variety of applications such as electronic mail (e-mail), Web-based collaboration, information dissemination, and connectivity to the worldwide Internet. Access to the NIPRNET is obtained through a STEP site or teleport and is then distributed through an unclassified theater network. These gateways also act as routing boundaries for the design and engineering of other IP networks. NIPRNET enables a myriad of other reachback functions from deployed forces to the sustaining base, and lateral collaboration among deployed elements. Significant in the theater is the reliance on NIPRNET services for logistics, maintenance, repair parts, electronic parts, technical manuals, administrative forms, and publications support. NIPRNET is no longer a luxury but a necessity.

SECRET INTERNET PROTOCOL ROUTER NETWORK

2-29. The SECRET Internet Protocol Router Network (SIPRNET) supports critical C2 applications and intelligence functions. It operates in a manner similar to the NIPRNET, but as a secure network. As with the NIPRNET, the SIPRNET provides access to many Web-based applications, as well as the ability to send and receive classified information up to US Secret. These applications and capabilities enable the effective planning and execution of battle plans in a secure environment. The SIPRNET also supports a

wide variety of applications such as secure or classified e-mail, Web-based collaboration, and information dissemination. It enables a myriad of reachback logistic functions from deployed forces to the sustaining base, and lateral collaboration among deployed elements.

C-LAN AND C-WAN

2-30. Coalition networks are created to support coordination and collaboration among US and non-US forces in the operational environment. C-LAN and C-WAN services support planning and execution of operations involving coalition forces. C-LANs and C-WANs operate at both Sensitive but Unclassified 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). The CENTRIXS is a standing classified-capable coalition network.

JOINT WORLDWIDE INTELLIGENCE COMMUNICATIONS SYSTEM

2-31. The Joint Worldwide Intelligence Communications System (JWICS) is important for its ability to provide 24-hour a day Classified, compartmented, point-to-point, or multipoint information exchange involving voice, text, graphics, data, and video teleconferencing (VTC) up to the Top Secret sensitive compartmented information (TS SCI) level. The JWICS initially began as a hub and spoke circuit switched T1 backbone and later evolved to an IP router based mesh network supporting various defense intelligence notice (DIN) requirements for worldwide secure multimedia intelligence communications. The JWICS uses the joint deployable intelligence support system as its primary means of operator interface and display.

SECURE AND NON-SECURE VOICE

2-32. Secure and non-secure voice remains a significant user requirement in all networks. Switched voice service allows connections between and among home station and theater locations. The service includes long-haul switched voice, facsimile, and conference calling. The role of secure voice in operations remains unchanged from its traditional usage, especially in regard to the Defense Red Switched Network (DRSN). This network provides high-quality secure voice, data, and conferencing communications services to the President, SecDef, senior commanders and their staffs, the CCDR, Army commands, other government departments and agencies, and allies. Secure voice connections may also be used for facsimile traffic. More networks are now incorporating and employing secure Voice over Internet Protocol (VoIP) instead of the traditional switched circuit requirements. Non-secure voice provides the essential day-to-day connections used in common, routine business, but also includes requirements to provide connectivity to civilian telephone networks in the sustaining base and host nation. Additionally, the non-secure voice network, Defense Switched Network (DSN), can be extended to joint, allied, and multinational subscribers.

VIDEO TELECONFERENCING

2-33. VTC is a mainstay collaboration tool for both forces in home station and in deployed environments. It provides the best available technical alternative to face-to-face meetings that provide users with human-factor feedback and interaction when they must collaborate from separate locations. VTC also better facilitates online collaboration and coordination with various automation tools and applications.

COLLABORATION PROTOCOL AND SERVICE STANDARDS

2-34. Collaborative protocol and service standards are regulated by T.120 (standard for real-time, multipoint data applications) and H.323 (standard for providing multimedia communication over IP networks). These standards utilize the established theater IP networks and are based upon the classification of the collaboration, which may traverse the theater NIPRNET, SIPRNET, or coalition network. These standards facilitate secure and non-secure VoIP and VTC.

GLOBAL BROADCAST SYSTEM

2-35. The Global Broadcast System (GBS) is significant to theater signal customers and providers because of its ability to alleviate congestion on other networks and to deliver large volumes of data in formats that are not readily supported by other means. Information can be transmitted in large batches (files) and simultaneously sent to multiple users, such as topographic data or large video files. The GBS offers a host of capabilities including:

- **File transfer service.** The GBS supplies a file transfer service for products that require delivery using file transfer protocol. Files are received by the transmit suite (satellite broadcast manager or theater satellite broadcast manager) using file transfer protocol and delivered to the receive suite (receive broadcast manager) end users using file transfer protocol. This service supports both push and pull techniques for file acquisition and distribution.
- **Immediate file delivery.** The GBS provides the capability to send files through GBS without the latency incurred by the scheduling process.
- **Mirrored Web service**. The GBS supplies access to products that are made available using universal resource locator product references. Selected material will be cached at the receive suite for transparent access by end users.
- **IP streaming service**. The GBS supplies a streaming packet service in which the stream input to the satellite broadcast manager at the primary injection point (PIP) is replicated bit for bit at the output of the receive suite.
- **IP to IP Video**. This service supports the transfer of IP multicast data 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.

DEFENSE MESSAGE SYSTEM

2-36. The Assistant Secretary of Defense (SecDef), in a 9 March 1995 memorandum, instructed DOD to migrate all electronic messaging, e.g., the Automatic Digital Network (AUTODIN) and e-mail to the defense message system (DMS). The defense message system-Army (DMS-A) is the Army's replacement to AUTODIN as the DOD mandated system for organizational messaging.

2-37. The DMS program's primary function is to provide a message system that satisfies writer-to-reader (originator-to-recipient) requirements while reducing cost and staffing levels for organizational messaging. It also improves functionality, security, survivability, and availability of organizational messaging services throughout the DOD.

2-38. Because the DMS does not provide a communications network (components are in the Open System Interconnection model's application layer), it relies on the DISN for transport in sustaining base. In tactical and deployed environments, the DMS relies on existing networks for transport. In the future, WIN-T will provide the bulk of tactical communications transport.

2-39. The DMS operates in four separate security domains: Unclassified, Secret, Top Secret, and TS SCI. The DMS Secret domains are implemented similar to the Unclassified domain, but include their own message handling, directory, certificate, service management subsystems, and a separate backbone infrastructure.

Tactical Message System

2-40. The tactical message system (TMS) function is to provide Area Control Center service throughout the Army's tactical environment. Each TMS nomenclature, AN/TYC-24 Version (V) 3, is comprised of two transit cases containing the laptop computers, routers, cables, and ancillary devices; two Cargo high mobility multipurpose wheeled vehicles (HMMWVs); one shelter, a modular command post system or a deployable rapid assembly shelter; and one 2-kilowatt (kW) generator. The TMS replaces the AUTODIN AN/TYC-39 message switches. The TMS provides the DMS writer-to-reader messaging based on Class

4/Hardware token public key infrastructure signed and encrypted message capability. The TMS is an enabler that extends the DMS X.500 address directory services and DMS X.400 message routing into tactical environments to support the Warfighter. The TMS provides a web based message server capability to be accessed by MS Exchange client platforms at the tactical LANs at each echelon. The TMS acts as a gateway to joint, other services, and federal agencies, allies, and sustaining base. The TMS does not provide deployed user-client platforms or mail servers for messaging within the command posts and the tactical operations centers (TOCs) at each echelon (Armies through Brigades and separate Battalions). Existing and emerging end user systems (Battlefield Automation Systems and/or existing computer platforms) must load DMS software and establish interfaces with the TMS platforms.

Messaging Systems

2-41. Messaging systems provide secure e-mail or record traffic electronic messaging for both organizational and individual users. The organizational messaging capability is provided by the DMS.

2-42. **Organizational messaging** capability includes messages and other communications exchanged between organizational elements in support of C2, and warfighting functions. Typically, these messages provide formal direction and establish a formal position, commitment, or response for the organization. Organizational messages require approval for transmission by designated officials of the sending organization and determination of internal distribution by the receiving organization. Because of their official and sometimes critical nature, organizational messages impose operational requirements on the communications systems for capabilities such as precedence, timely delivery, high availability, and reliability. All organizational messages must be signed and encrypted from the time of release to provide audit and non-repudiation in accordance with client and/or server procedures or the Proxy User Agent policy.

2-43. **Individual messaging** is provided by Simple Message Transfer Protocol e-mail. This capability includes working communications between individual DOD personnel within administrative channels, both internal and external to the specific organizational element, including non-DOD users. Such messages do not commit or direct an organization. Individual messages do not require the same level of system management, priority and/or precedence, or assurance (signature and/or encryption) as organizational messages. Individual messaging is accomplished using office automation, for example, Simple Message Transfer Protocol e-mail via the inter-network or intra-network (SIPRNET).

THEATER COMMUNICATIONS INTERFACE WITH DOD NETWORKS

2-44. In order to extend joint capability into the theater of operations, theater network support must be able to connect, interface, and draw LWN services from other DOD global networks. The systems and services provided at the theater level include the essential capabilities that provide commanders the IS they need to execute their mission. Tactical subscribers gain access to these systems and services through further extension of the theater network to smaller tactical nodes:

- **The Automated Message Handling System (AMHS)** increases capabilities for receiving, sorting, and generating text messages for intelligence gathering purposes. The Multifunction Secure Gateway provides legacy AUTODIN connectivity and has an associated AMHS feed specifically designed for this input source. AUTODIN is a worldwide communication network designed for the transmission and receipt of Joint Army, Navy, Air Force publications or Air Campaign Planning packaged United States message text format messages. The AMHS facilitates the routing and processing of these messages by Global Command and Control System-Joint (GCCS-J).
- **The DMS** has replaced AUTODIN with an automated desktop writer-to-reader message system as the DOD message switching standard. The DMS will use the DISN as its transmission medium.
- **The DSN** is the principle common user switched, non-secure voice communications network within DOD. Tactical subscribers usually gain common user, circuit-switched access to DSN through the theater network.

- **The DISN** consists of three IP router networks separated by classification level. These networks are NIPRNET (Unclassified but Sensitive), SIPRNET (Classified up to Secret), and JWICS (for TS and SCI information).
- **The DRSN** provides worldwide secure voice service and conferencing for Classified command, control, and intelligence conversations and data exchange, up to and including TS and SCI.
- **The Global Command and Control System (GCCS)** replaced the Worldwide Military Command and Control System. Using SIPRNET connectivity, it incorporates the core planning and assessment tools required by CCDRs and their subordinate JFCs.

Note. Appendix B has an abbreviated list of those systems that can provide the services described in this chapter.

SECTION III – THEATER NETWORKS

STRATEGIC NETWORKS

2-45. While CCDRs ultimately determine the architectures and nature of joint networks within their respective regions, the GIG is the common thread that links them with interfaces and essential services and capabilities. The DISN cloud extends around the globe and provides services to Soldiers where needed. These services and capabilities are extended to deployed users by the Army's strategic infrastructure that resides in CONUS and in theaters where they exist. The DISN provides the seamless long-haul transport component of the DOD portion of the GIG predicated on constant connectivity and positive control of network resources. The Army's strategic networks are the LWN's backbone: spanning distances, extending bandwidth, and enabling home station quality services to forces in the field.

2-46. The Army's strategic network infrastructure is a segment of the DISN, linking CONUS and outside the continental United States (OCONUS) permanent facilities, which are plugged into the GIG. The strategic segments support sustaining base, long-haul, space, and some deployable tactical communications capabilities. Key elements to extend the GIG's capability through the strategic level to the theater are STEP sites, teleports, and the DISN point of presence (POP).

2-47. The STEP and teleport sites are the strategic layer interface to the tactical signal forces, providing support to the deployed user through connectivity from any 1 of 15 worldwide STEP locations to deployed forces for access to the DISN. The STEP and teleport access is through military SATCOM over the Defense Satellite Communications System (DSCS) with future enhancements to the STEP incorporating the capability to receive and transmit via commercial band satellites. A single STEP site supports one satellite coverage area and acts as a ground mobile forces (GMFs) 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. The 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 elements with continuous global access via multimedia radio frequency (RF). This multimedia RF includes existing military satellite communications (MILSATCOM) systems, specifically super-high frequency (SHF), ultrahigh frequency (UHF), and extremely high frequency (EHF), as well as future Ka-bands, commercial SHF wideband systems in the C, L, and Ku-bands, and high frequency (HF).

2-48. 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 a terrestrial system that provides similar services that are available at a STEP or teleport site. The DISN POP is used to help alleviate the burden on the STEP or teleport sites for satellite access. The DISN POP may be installed and co-located with the JTF HQ and/or component command headquarters. Tactical signal forces in theater may access the DISA POP when available.

STRATEGIC USERS

2-49. An ASCC will receive, equip, marshal, stage, and move units forward to the tactical assembly areas (TAAs) for employment. An ASCC's assigned expeditionary signal battalions' (ESBs') assets support the rapid deployment and initial worldwide communications capability for the various ports of debarkation (PODs), liaison teams, and advanced elements of the ASCC HQ. Follow-on communications will be engineered, installed, operated, and maintained by additional elements of the expeditionary signal battalion (ESB) and theater signal brigades under the management and C2 of the signal command. The signal command uses OPCON and organic elements to install and engineer theater network infrastructure. It includes the internal and external wire communications support, terrestrial multichannel and SATCOM facilities, COMSEC, and electronic maintenance and is responsible for IM within the headquarters. In order 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. A ASCC's signal assets connect to the DISN through various methods and provide reachback capability or split-based operations. These signal assets provide—

- Access to the commercial and host-nation infrastructure, when available.
- Connectivity from the JTF/JFLCC HQ.
- DISN services from a STEP/teleport to the ASCC HQ.
- Connectivity from the JOA main, rear, logistics support activity, and home stations node.
- Connectivity with joint, allied, and coalition forces.

2-50. A JTF is a joint force constituted and so designated by a JTF establishing authority, e.g., SecDef, CCDR, or existing JTF. A JTF may be established in a geographical area or on a functional basis when the mission has a specific limited objective and does not require overall centralized control of logistics. The mission assigned to 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 that are executed unilaterally or in cooperation with friendly nations. US-led JTFs participate as part of a multinational force in most future military endeavors Full Spectrum Operations. A JTF consists of two or more service components, for example, the Army and Air Force. 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 plan, task, and control the assets, given the nature of the operation. For example, ARFOR are often designated as the JFLCC with Marine Corps forces (MARFOR) assigned, and Marine Corps forces can also be designated as the JFLCC with Army Forces assigned.

2-51. When a ASCC is designated to act as a JOA ARFOR, signal command will provide all signal support functions accordingly. When a corps, division, or BCT's HQ is designated to act as a JOA ARFOR, it nominally receives its signal support from its organic brigade signal company. On occasion, signal command may be called upon to provide direct or general support to corps, division, or BCT units acting as ARFOR when needed, in order to—

- Meet shortcomings in technical capabilities or capacities based on changing mission requirements.
- Augment or compliment Army Forces signal capabilities.
- Provide support to additional ASCC assets as they are task organized or OPCON to a corps or division.
- Provide additional connectivity and services using existing theater infrastructure, commercial assets, and the STEP/teleport when needed.

STRATEGIC NETWORK ELEMENTS

2-52. Most signal brigades have strategic and fixed station elements which are organized and highly tailored to the specific requirements of the theaters to which they are assigned. Originally these scenario-based structures worked well during the Cold War. Today we are shifting to a capability-based design.

Note. Chapter 4, Section II addresses strategic and fixed station elements. It also outlines the strategic reorganization of those elements in detail.

TACTICAL NETWORKS

2-53. The fluid nature of modern conflict mandates that signal command and 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. Theater signal forces support to tactical echelons is essential to—

- Extend DISN services from a STEP/teleport site to the AOR and theater.
- Provide DISN connectivity to the JTF and combined joint task force (CJTF) to the GCC, service component headquarters, Air Force forces (AFFOR) and joint force air component commander (JFACC), Navy forces (NAVFOR) and joint force maritime component commander, ARFOR, MARFOR and JFLCC, SOF and combined unconventional warfare task force (CUWTF), and joint special operations task force (JSOTF) HQ.
- Extend services as required to liaison officers (LNOs) at coalition headquarters.
- Extend services as required to unique or remote users.
- Provide access to commercial communications when available to ARFOR and JFLCC forward elements.
- Provide upward connectivity for corps, division, and in some cases BCT networks in order to extend services to lower tactical level users, and to enable reachback for unit tactical Internet connectivity at maneuver brigade and below.
- Support a brigade or BCT special task force.
- Provide reachback common tactical user services and continuity of operations (COOP) facilities.

2-54. Typically, tactical communications are defined as communications systems or networks that enable the exchange of information among mobile, deployed forces in an AO. Tactical communications systems are mobile, deployable, quickly installed or disassembled, secure, and durable. The majority of deployable signal organizations are normally tasked to support organizations that are at the operational level of war. Tactical level requirements at the corps, division, and even BCT may dictate the need to send theater forces well forward of their normal operational level.

2-55. The signal command provides communication and information systems support to an ASCC headquarters, ASCC subordinate units, and as required, to joint and coalition organizations throughout the ASCC AOR. The signal command and its subordinate units install, operate, and defend the Army portion of the joint interdependent theater network, and leverage the extension and reachback capabilities of the GIG to provide joint communication and information systems services to the ASCC commander and the supported GCC. The signal command exercises C2 over a wide variety of other signal organizations in a theater, including multiple theater tactical signal brigades (TTSBs), theater strategic signal brigades (TSSBs), theater NETOPS and security centers, the combat camera (COMCAM) company, and a tactical installation signal company.

Note. Chapter 4, Section III provides a full description of a theater signal command.

CURRENT AND EMERGING NETWORKS

2-56. Operation ENDURING FREEDOM and Operation IRAQI FREEDOM showed that the mobile subscriber equipment (MSE) and Tri-Service Tactical Communications Program (TRI-TAC) systems,

based largely on terrestrial radio relay, were not able to keep pace with fast-moving maneuver forces operating over huge expanses of terrain. The voice switch network was also incapable of handling the increased amount of digital data being passed by automated battle command and business systems. To provide communications support for battle command on the move and at the Quick Halt, a net-centric multipoint satellite network was developed. The Joint Network Node–Network (JNN-N) was integrated into the Army network architecture as an interim to bridge MSE and TRI-TAC systems prior to WIN-T. The JNN-N primarily employs satellite communication links, enabling rapid installation and relocation of communications support as forces maneuver. Using COTS equipment, the JNN-N has introduced IP capabilities to the battlefield and dramatically increased the capacity for moving data at corps, division, brigade, and battalion levels.

2-57. With the advent of the LWN and the increase in SATCOM-based and on-the-move data capable systems, the Army and other services must still employ existing current technology and legacy systems to fill any gaps until the JNTC-S to WIN-T fully fields across all services and all components.

Joint Network Node–Network

2-58. **The JNN-N system** is a suite of communications equipment that is housed at fixed strategic locations and in tactical transportable shelters and associated transit cases. The system will facilitate the resources for the Warfighter to exercise effective control over communication links, trunks, and groups within a deployed network. The JNN-N system consists of three major communications elements:

- Regional Hub Node (RHN).
    - Baseband shelter.
    - Satellite terminals (time division multiple access and frequency division multiple access configurations vary according to hub node type).
- Joint Network Node (JNN).
- Command Post Node (CPN).

2-59. The RHN is an essential part of the JNN-N design. The RHN has the ability to connect to different satellite architectures and allows large bandwidth links to be terminated, allocated, and controlled. The RHN facilitates connection of JNN-N users to the Army's LWN and the GIG. There are four variants of the JNN-N RHN: fixed regional hub node (FRHN), mobile regional hub node (MRHN), tactical hub node (THN), and training hub node.

2-60. The FRHN is the largest of the JNN-N hub node types and can be divided logically into three subcomponents: satellite terminals, baseband services, and NETOPS user services. It will be able to support three concurrent JNN-N equipped division missions. The FRHN will be considered a strategic theater asset and fall under a TSSB. Five FRHNs will be deployed at fixed locations around the globe so that they can provide near worldwide coverage. FHRNs will be able to provide satellite, voice, and data services to support deploying forces as they flow into a theater of operation. To extend DISA services to the Warfighter and provide high bandwidth connectivity to the GIG, each FRHN will be co-located with a DOD gateway.

2-61. The MRHN will be a tactical theater level asset and will provide services in areas where the FRHN has no coverage. MRHN has the capacity to support only one division-sized tactical element. Currently, the MRHN consists of two mobile SATCOM shelters and a mobile baseband shelter mounted on a commercial truck. From its sanctuary location, the MRHN will be capable of interfacing with the DISN POP and legacy Army signal systems.

2-62. The THN is the primary hub node supporting a division and its subordinate units. A THN will be organic to each DSC. THN baseband capabilities are the same as a MRHN. In its current design, the THN consists of two mobile SATCOM shelters and a mobile baseband shelter mounted on a 5-ton family of medium tactical vehicles.

2-63. The training hub node is located at the US Army Signal Center, Ft. Gordon, Georgia and is supporting training readiness exercises, mission rehearsal exercises, etc., until the CONUS FRHNs are fielded and operational. Once the CONUS FRHNs are fielded, the training hub will primarily support

school house training and be available for the strategic reserve to support Homeland Defense, Homeland Security, and other CONUS/SOUTHCOM missions.

2-64. The JNN-N is designed to interface with current technologies via the JNN. The JNN is deployed at both the division and brigade level. There are typically three JNNs located within the division headquarters to support command and control elements: two at the division main command post (CP) and two at the tactical command post (TAC CP). The TAC CP provides the commander the flexibility to organize continuous full spectrum operations. The employment of the JNN is essentially the same at the brigade, deploying only one JNN at the main and one at the TAC, with the exception of the authorized manning levels, control functions and planning characteristics.

2-65. The JNN capabilities can provide joint and coalition connectivity and allow for interfacing to current networking communications systems through—

- STEP.
- BLOS.
- Line of site (LOS).

2-66. One CPN is normally deployed at the battalion TOC. It can support a separate command group element or TAC CP as the mission requires. It uses TDMA satellite transmission to gain access through the JNN or UHN to the GIG/DISN. The CPN provides voice and data capabilies and is interfaced with equipment that is organic to the unit where the S-6 can exercise control over subordinate unit networks.

2-67. For current network connectivity, the JNN communications platform provides a high-speed wide area network infrastructure that connects the BCT main command post and BCT support battalion command post to joint voice and data networks. The JNN is also interoperable with commercial networks and current force communications networks, i.e., MSE and TRI-TAC. For more detailed information on the JNN-N system, refer to the Field Manual Interim (FMI) 6-02.60.

TRI-TAC, AREA COMMON USER SYSTEM/MSE

2-68. The TRI-TAC and Area Common User System (ACUS)/MSE networks are node-based, digital, circuit-switched voice and data networks supporting tactical users in the theater. MSE is a voice-centric system designed to provide limited on-the-move and limited data capability. MSE also utilizes secure radiotelephone systems to extend the range for on-the-move voice users. By using improvements such as high capacity line-of-sight (HCLOS) and tactical high speed data network, data capability is increased, but the architecture supporting MSE and TRI-TAC does not adequately meet joint needs, tactical mobility, or the requirements developed in modularity.

2-69. MSE is part of a three-tier communications network. It ties into the TRI-TAC tier supporting the theater switched network provided by the TRI-TAC system. MSE also provides combat net radio (CNR) users with an interface to the ACUS via a secure digital net radio interface. This capability links single-channel ground and airborne radio system (SINCGARS) users with telephone subscribers that provide added communications for maneuver units.

2-70. MSE architecture is based on an area node system. Node centers are arrayed from the corps sustainment area forward to the maneuver brigade based on geographic and subscriber density. Node centers provide the entire area network with connectivity and switching capability with some support to command post subscribers. The node centers serve as hubs for the entire nodal system with user extensions coming from the large extension nodes (LENs) and small extension nodes (SENs). The extension nodes provide voice, data, and facsimile communications to area users. SATCOM and LOS UHF radio links provide connectivity among node centers and from node centers to the network extensions. This architecture furnishes all MSE subscribers with automatic switching.

2-71. Mobile subscribers use mobile subscriber radiotelephone terminals (MSRTs) to access the MSE network via a remote access unit. Any subscriber in the network can be called by dialing the subscriber's number, regardless of the location. The mobile subscriber can talk while on the move, as long as one of the users remains in the radio coverage area.

2-72. TRI-TAC is an interoperable communications system that permits communications among all the armed services. TRI-TAC employs more fiber based and SATCOM systems to meet larger bandwidth requirements at theater level. While TRI-TAC shares the same basic principle architecture as MSE, it does not employ mobile subscriber radiotelephone terminal communications systems.

COMBAT NET RADIO

2-73. Traditional echelons above corps (EAC) operations relied little on CNR systems for C2 compared to the voice requirements employed by divisions, brigades, and battalions engaged in the close fight. With asymmetrical warfare and the concept of deploying integrated theater signal battalions (ITSBs) or ESBs to support a corps, division, or BCT, the need for CNR as a viable C2 and communications system still exists. CNR throughout the theater area will see trends as follows:

- Higher reliance on organic HF, SATCOM, very high frequency/frequency modulation, and Joint Tactical Radio Systems.
- More use of commercial systems such as Iridium, international maritime satellite, and Multiband Inter/Intra Team Radios (MBITRs).
- Integration of developing on-the-move capability.

2-74. Range extension for CNR nets, especially SINCGARS, is normally accomplished by retransmission employed at the tactical and operational level by division and legacy corps organizations. Within the theater, there are increasing needs for embedded range extension capabilities to cover extended distances within the JOA. Tactical necessity will see more organic CNR retransmission or SATCOM based range extension. With the advent of the Joint Tactical Radio Systems, meshed nets and range extension will become an embedded capability within each platform versus the requirement to dedicate systems and personnel to provide this service to users transparently.

CNR Supporting Theater Joint/Combined Operations

2-75. Essential to successful CNR operations is the early planning and coordination between all EMS users and agencies employed in the JOA and theater. The ASCC G-6 EMS and systems planners are the primary agents responsible for coordinating and managing theater resources affecting tactical and operational CNR and theater CNR networks. Within the JOA, the responsibility for Army CNR will fall on the senior Army Forces EMS office. This includes the network design and integration of legacy systems such as SINCGARS, HF, and military single-channel SATCOM with commercially available systems such as L-band Iridium and Inter/Intra Team Radio. This planning must be accomplished at the highest level possible to ensure all missions are included. Ideally, representatives from Army, corps, division, and BCT coalition forces and subordinate units should be part of the coordination process to ensure that requirements are adequately met.

2-76. Theater signal operating instructions development must include factors such as types of radios available in subordinate or allied units, cryptographic equipment, key lists, and available frequency allocations for particular areas of operation. The ASCC EMS manager obtains frequency allocations from the combatant command's frequency management office, which coordinates them with the host nation. Coordination must be made with the joint force intelligence directorate (J-2) and joint force operations directorate (J-3) regarding any EW planning.

2-77. Equipment compatibility is a major issue in joint CNR network planning especially for HF and SATCOM systems. The requirements planning must cover frequency hopping and single-channel modes of operation and should address interface between single-channel and frequency hopping radios or lateral placement of compatible radios in coalition command posts.

2-78. The ASCC or senior Army Forces COMSEC office will control cryptographic materials (key lists and devices) in order to ensure interoperability at all levels. Allied forces may need to be augmented with US equipment and personnel for compatibility. Prior coordination is essential to address the accountability, release, distribution, and sensitivity issues regarding coalition use of US crypto material.

2-79. All assigned service components must provide input on their organization and special communications requirements to the ASCC EMS planners early in the planning phase for signal operating instructions development and frequency allocation, which is based on the input received and internal criteria pertinent to the mission.

SECTION IV – SPECIALIZED USER INFORMATION SYSTEMS

THE FEDERATION OF NETWORKS

2-80. Specialized networks and systems provide customers access to, or specifically enhance their ability to perform, specialized missions or tasks through often unique devices, systems or applications. These "stovepipe" networks form a federation of networks and comprise a significant challenge to the LWN. Stovepipes are designed to meet a commander's unique intelligence, operational, and logistics specific requirements. Though not fully integrated under the LWN, these stovepipes operate as a federation of networks until fully integrated into a single contiguous enterprise. Stovepipe network designs normally serve only a narrow community of users or a specific function and have limited or no interoperability with other systems or communities. The Army seeks to avoid developing stovepipe systems because the lack of interoperability hinders a seamless information exchange necessary for network enabled operations, and because they divert resources from providing communications and information services to the Army as a whole. Despite this, some stovepipes were developed in response to bona fide requirements that were not met by common user systems and services provided by the Signal Regiment. The fact that these systems compete effectively for resources and remain in existence testifies to the validity of the requirements they fill. A signal command is expected to provide varying degrees of support to stovepipe systems in the field or will provide interfaces between these systems as necessary. As the Army continues to equip JNN-N throughout its forces, the signal commands will be better equipped to provide those interfaces to today's stovepipes to begin the transformation from the current "federation of networks" to an integrated service network known today as the LWN. The largest segments of the federation of networks are described in paragraph 2-77 through 2-87.

LOGISTICS DATA NETWORK / CSS/VERY SMALL APERTURE TERMINAL

2-81. Logistics Data Network (LOGNET)/CSS/Very Small Aperture Terminal (VSAT) supports tactical and theater forces sustainment requirements by capitalizing on efficiencies gained by specific technology insertion. LOGNET enables a current force sustainment unit to fight as a distinct support entity with direct access to joint NIPRNET networks and logistical information systems. LOGNET is a SATCOM based design that supports the ability to employ multifunctional and tailored C2 capabilities to operational forces regardless of the mission or task organization. The resulting standardization of capabilities delivered through the use of the same COTS communications equipment and technologies as joint, service, and commercial partners enhances the Army's ability to keep pace with constantly evolving commercial IT. Sustainment units operate primarily in an unclassified environment. The business enterprise architecture allows Army logistics and medical units to connect to the DOD NIPRNET both in home station and while deployed by the same means. This dramatically improves continuity of support, flexibility of modular deployment, and reliability of sustainment, and it better enables the logistics community to support more complicated logistical operations at the tactical and operational levels of conflict or war. It also fulfills the Army's Title X requirements of the wartime executive agency, the North Atlantic Treaty Organization's (NATO's) standardization agreements, and the acquisition and cross-servicing agreement requirements for the Army Forces component, JFLCC, or the JTF.

MEDICAL NETWORKS

2-82. Medical Communications for Combat Casualty Care (MC4) is the Army's medical information system in a theater of operations. As the Army component of the Joint Theater Medical Information Program (TMIP), MC4 provides the hardware infrastructure for the TMIP medical functionality software, as well as any software required to ensure MC4/TMIP interoperability with Army C2 and sustainment systems and provides reach to the sustaining base. Although the MC4/TMIP systems currently rely on

medical VSATs for transmission of health care information, in the near future these systems will rely on Army communications systems and networks.

TROJAN SPECIAL PURPOSE INTEGRATED REMOTE INTELLIGENCE TERMINAL

2-83. TROJAN Special Purpose Integrated Remote Intelligence Terminal (SPIRIT) is a critical network enabler for the commander and the intelligence Warfighting function. It is another SATCOM based architecture and is the primary network capability that connects the deployed user to TS SCI WANs including the JWICS and the National Security Agency networks. Later trends will incorporate "tunneling" of TS SCI data over the LWN transport layer. Under this plan, the TS SCI intelligence gateway equipment will be owned, operated, and maintained by those military intelligence and signal personnel that establish and operate the tactical sensitive compartmented information facility (TSCIF) in the BCTs and reconnaissance and target acquisition elements. The TROJAN Network Control Center performs centralized TROJAN SPIRIT network management to include managing the intelligence gateway equipment and associated users in the TSCIF.

BLUE FORCE TRACKING AND JOINT BLUE FORCE SITUATIONAL AWARENESS

2-84. **Blue Force Tracking (BFT)** is a system that provides the Warfighter with a globally responsive and tailorable capability to identify and track friendly forces in assigned areas of operations (in near real time), thereby augmenting and enhancing C2 at key levels of command. The primarily satellite-based architecture of BFT supports a wide variety of joint missions and operations. Major systems contributing to the DOD's BFT capability include the FBCB2-BFT, the MTS, and Talon Reach.

2-85. **FBCB2-BFT** generates and distributes a common view of the operational environment at the tactical and operational levels, identifying and sharing that view with ground vehicles, rotary-wing aircraft, command posts, and Army and joint command centers.

2-86. **MTS** is a system designed for the Army and its vehicle operators for tracking vehicles and communicating while on and off the road. MTS incorporates digital maps in the vehicles and allows two-way satellite messaging thereby allowing the transportation coordinator the ability to “talk” to the driver of any truck, regardless of location.

2-87. **Talon Reach** is a position and status reporting system that marries global positioning system receivers with personal digital assistants (PDAs) and Iridium low Earth orbit SATCOM services to users of the Space-Based BFT Mission Management Center.

2-88. **Space-Based Joint Blue Force Situational Awareness (JBFSA)** is defined as the ability to use BLOS communications to know the position, status, and intent of units on the battlefield. With the incorporation of new processing technology, the Mission Management Center is now able to apply the national collection of broadcasts from remote assets BFT-based JBFSA services (and wartime lessons learned) to JBFSA data from a wide variety of military and commercial Space-Based BFT systems.

THEATER NETWORK CAPABILITIES

2-89. The capabilities that both strategic and tactical networks can be tailored to meet those requirements needed for any contingent operation around the world and in the United States. With adequate planning and support leveraging, the local government and private commercial infrastructure and resource capabilities can also contribute to the success of the mission.

Joint Military Operations

2-90. A signal command is primarily structured, equipped, trained, and employed to support wartime offensive, defensive, and joint C2 to stability operations that include certain contingencies and peacetime military engagements. CCDRs, at the direction of the President or SecDef, may employ US forces to deter war, promote peace, and demonstrate US resolve and capability. A signal command will provide support in order to extend DISN services and link to commercial communications when available, and provide

connectivity to local embassies, air, sea, and rail ports, and other sustaining activities. Such operations include—

- Major Combat Operations.
- Peace Operations.
- Peacetime Military Engagement.
- Limited Intervention..
- Irregular Warfare.

2-91. Theater level network nodes are further categorized as major and extension. Major nodes have larger voice and data packages and can support larger numbers of customers. They also have larger numbers of transmission systems that serve as geographic network hubs supporting numerous extensions in hub-spoke network configurations. Extension nodes have smaller voice switches and data packages designed to support smaller numbers of customers. They also have smaller numbers of associated transmission systems and typically are employed at locations needing less capability than major nodes in the hub role.

2-92. The network equipment sets are scaleable in that the architecture can be easily expanded without reconfiguring the entire network. Extensions can be added to the satellite systems, links can be added to the data systems, and additional voice switching capabilities may be added without interrupting existing service to users.

Department of Homeland Security

2-93. Within CONUS, signal brigades are called upon to provide support to the Department of Homeland Security (DHS) mission in the case of a terrorist attack or natural disaster in the United States. The Army National Guard (ARNG) forces may be ordered to active duty by the governor of their state to provide area communications first responder support, including restoration of communications for federal, state, and municipal authorities to use in crisis coordination. Signal brigades, through assigned ESB assets, can support first responders, the Federal Emergency Management Agency command centers, and crisis response command post locations by extending DISN services from a CONUS STEP or teleport site, or by coordinated interface with the local director of information management (DOIM) from a post, camp, or station allowing access to commercial networks.

Commercialization of Network Assets

2-94. Historically, theater signal planners have leveraged transitioning to commercial networks and infrastructure in order to free up valuable tactical signal assets. Operation Desert Shield, Operation Desert 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. The signal command, in coordination with the JTF and JTF ARFOR, should begin planning to transition the communications network to commercial means as soon as directed by the GCC. Transitioning a communications network to another provider, while ensuring interruption of services to the user is minimized, is a complicated and precise process. Coordination with tactical signal brigades and embedded tactical signal organizations is important in maintaining visibility of the status of contractual negotiations and ensuring requirements are adequately identified and fed into the contract documents. Commercialization can be a long lead-time process and consequently must be a factor in the initial planning process, and whenever possible, should include pre-negotiated commercial contracts for services. Planning factors are identified in the Signal Systems Engineering Design that include, but are not limited to—

- Leased SATCOM.
- Other available commercial infrastructures.
- SIPRNET, NIPRNET, IP addressing, and routing schemes.
- VTC equipment and control mechanisms.
- DISN and commercial access.

- Wiring and cable plans.
- Cellular and satellite telephone capabilities.
- Secure wireless LAN and point-to-point services.

2-95. Early entry communications packages, which are equipment and personnel organized, are designed to support rapid deployment, insertion, and employment into an AO or theater at the discretion of the CCDR and based on political or tactical necessity. These packages are configured in small, medium, and large scales and are highly mobile, fully joint, and DISN capable. The typical content of deployed contingency packages is decided on a case-by-case basis. This is determined by mission, enemy, terrain and weather, troops available and civilian (METT-TC). Most packages always rely on multiband SATCOM, base band data capability, secure VTC, and secure voice while using minimal lift resources. All packages will support initial entry, theater, and strategic links for JTF, JFLCC, or ARFOR and can sustain DISN services until larger, less mobile follow-on support arrives. Space segment and satellite terminal availability allow for up to 8 Mbps bandwidth. See Figure 2-1.

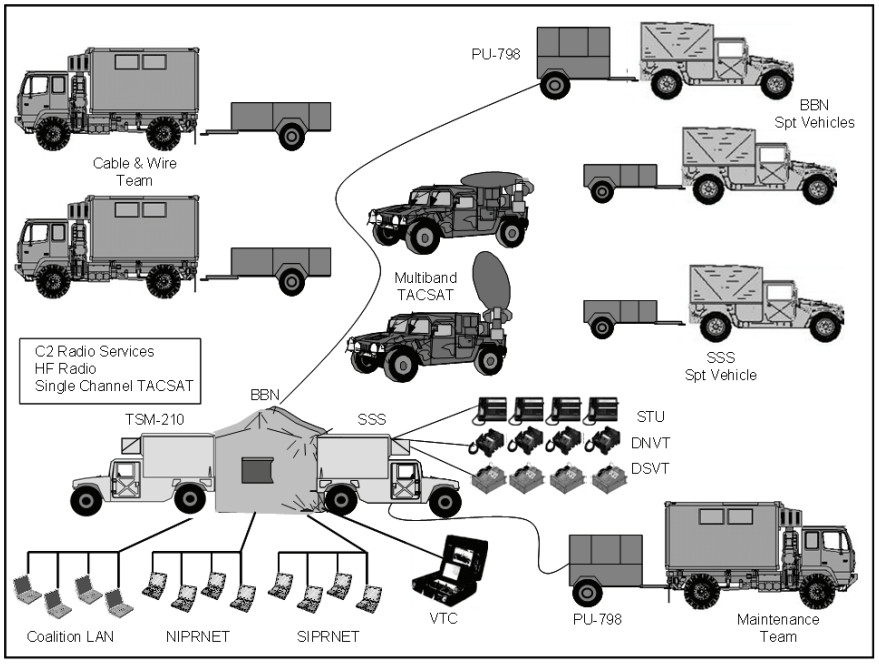

Figure 2-1. Example of an early entry communications package

New Developments

2-96. GBS Theater Injection Point (TIP) will be available under selected theater tactical brigades that are equipped and structured to install, operate, and maintain it. The GBS TIP enables in-theater forces to transmit information via the GBS as opposed to being able only to receive information transmitted by the PIPs. Currently, the Army is testing three GBS TIPs.

2-97. Low Earth orbit Constellations provide an additional capability to the use of military and civilian geostationary satellites 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 which will result in lower bandwidth than that obtained with directional antennas. When directional antennas are used, they 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.

2-98. Airborne relays are another growing development. The increased demand for BLOS bandwidth combined with limitations on the availability of satellites and SATCOM systems may drive adoption of one

or more systems of airborne relays. Other considerations are 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 that spending enough money to put up more satellites will increase that available space segment bandwidth.

2-99. Changes in the allocation of frequencies for SATCOM and advances in the technologies that enable efficient use of RF EMS, 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. Airborne relay concepts include both stationary and non-stationary platforms. Key system design considerations for airborne relay platforms are discussed in the following paragraphs.

2-100. As with satellite systems, non-stationary 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.

2-101. Stationary platforms such as tethered aerostats or high altitude lighter-than-air ships with station keeping capability can be equipped with relays that are compatible with existing multichannel tactical satellite (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 have a dual purpose. 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.

SECTION V – PLANNING THEATER NETWORKS

PLANNING CONSIDERATIONS

2-102. Information systems and networks provide the predominant source from which the Warfighter generates, receives, shares, and utilizes information. Simplicity in planning is maintained by developing simple, coherent rule sets, commander's intent, and leveraging doctrine. The operational environment is also vital to planning a conducive network. The information systems and networks must be of sufficient scale, capacity, reach, and reliability to support the evolving operational and training missions. With all this in mind we must consider the following planning processes before establishing a theater of operations communications network.

JOINT OPERATION PLANNING

2-103. Joint operation planning includes preparing operation plans (OPLANs), concept plans (CONPLANs), campaign plans, and OPORDs. It encompasses the full range of activities required to project power into the JOA and theater of operations. Planning for joint networks is essential in that the GIG is the tool that binds all other actions together and ensures power projections. The GIG and LWN become more central to operational planning to include the following:

- **Mobilization Planning**. Primarily a service and component responsibility, mobilization planning assembles and organizes national resources to support national objectives in time of war and other emergencies.
- **Deployment Planning.** The combatant command, in close coordination with US Transportation Command, conducts deployment planning as a measure necessary to provide lift, embarkation, debarkation, and intra and inter-theater movement of forces.

- **Employment Planning.** Employment planning stipulates how to project and utilize military power to attain specified objectives. Employment planning concepts are developed by CCDRs through their component commands.
- **Sustainment Planning.** Sustainment planning provides and maintains levels of personnel, materiel, and consumables required to sustain operations for the full duration of a campaign, operation, or engagement.
- **Redeployment Planning.** Redeployment planning transfers units, individuals, or supplies deployed in one area, to another location in the area, or to the zone of interior (JP 5-0).

2-104. The joint operation plan (OPLAN) and OPORD format is not the same as the Army tactical OPLAN/OPORD format located in Appendix G of FM 5-0. The joint OPLAN format is designed to address those functions and activities at the operational level of war and provides instruction to synchronize all available land, sea, air, space-based assets, and SOF.

JOINT OPERATION PLANNING AND EXECUTION SYSTEM

2-105. The Joint Operation Planning and Execution System (JOPES) is used to accomplish the task of providing a unified planning system within the DOD to translate policy decisions into plans and orders. The JOPES consists of a contingency and a crisis action planning process.

Deliberate Planning Process

2-106. This process is used primarily in peacetime, when time permits detailed communications system planning and analysis. Deliberate planning is scenario-based for the most probable types of conflict that the US Armed Forces will confront. The five phases are initiation, concept development, plan development, plan review, and supporting plans, which must be completed in sequence and take 18-24 months to finalize. Additionally, all deliberate plans must be reviewed annually. The deliberate planning process depends on the JOPES automated data processing system to produce the time-phased force and deployment data (TPFDD).

Crisis Action Planning Process

2-107. This process is used when a crisis is underway and time is limited. Crisis action planning has six phases: situation development, crisis assessment, course of action (COA) development, COA selection, execution planning, and execution that can be completed out of sequence or omitted as the situation dictates. Crisis action planning may or may not utilize an existing deliberate plan with pre-defined communications system assets. A deliberate plan may require modification as details emerge based on communications system equipment or personnel requirements and their availability. Crisis action planning may be conducted even though deliberate planning has been conducted.

2-108. For additional information on the JOPES, refer to the following publications:

- JP 5-0.
- Chairman of the Joint Chiefs of Staff manual (CJCSM) 3122.01A.
- CJCSM 3122.03B.
- CJCSM 3150.16A.

JOINT NETWORK PLANNING

2-109. Joint network planning and other related mission support activities take place in unison with the activation and subsequent phases of JTF operations. Joint planning guidance, found in Chapter III of JP 6-0, includes the following:

- During the mobilization phase, the JFC is designated, forces are assigned, and G-6 staff begins the assumption of the role as J-6 with phased augmentations.
- During the deployment phase, the joint network plan is completed and published. Network assets incrementally deploy in support of the buildup in the operational area. Initial tactical

communication is global, but with minimal capacity. Decision support should be focused on the on-scene commander.

- In the employment phase, the JTF and the components continue to deploy incrementally. As these assets arrive, they are added to the existing network, dynamically increasing its capacity.
- During sustainment, improvements are continually made to the networks to include work toward commercialization of the theater infrastructure. Changes to the OPLAN are made using the in-place networks as departure points.

2-110. Significant effort is required in network planning for theater operations and the continued operation of the LWN in support of theater forces. The plan must provide details necessary to bring communications system support together. Also, continuous analysis of the performance of the network will identify trends and tendencies that may need to be changed during future operations or mission completion.

2-111. For additional information on joint planning, refer to the following publications:

- CJCSM 6231.07D.
- JP 6-0.

SYSTEM REQUIREMENTS PLANNING

2-112. System requirements for any theater network or LWN segment are mission driven and will also determine the organization and location of forces providing network resources. Capabilities and limitations of all potentially available strategic, operational, and tactical communications systems and equipment, whether they are organic to services and agencies, belong to non-US forces, are commercial, or are provided by a host nation. Typically, the combined system will provide voice, data, and video communications. Early identification of network resources will preclude having information demands outstripping network capabilities and capacity. It is crucial that the JFC identify early communications system requirements that are external to the command or require support from national and host-nation resources, e.g., space-based systems support, Chairman of the Joint Chiefs of Staff (CJCS) controlled assets, joint communications support element, NATO standing communications system equipment pool, and EMS. Multinational communications system planning must include the early establishment and incorporation of multinational networks. Resources need to be identified and planned for accordingly. The guiding criteria should focus on SATCOM, electromagnetic EMS management, and multinational and interagency networks. Appendix B in JP 6-0 addresses specific guidelines necessary for developing joint network plans.

SATCOM PLANNING

2-113. The Joint Staff ensures the distribution and arbitration of on-orbit satellite assets. Chairman of the Joint Chiefs of Staff instruction (CJCSI) 6250.01B establishes a Satellite Communications Operational Manager (SOM) in order to provide a single operational manager for SATCOM systems. Consistent with assigned Unified Command Plan responsibilities, the SOM function was assigned to the United States Space Command and was transferred to USSTRATCOM when the two organizations merged. With the evolution to the CJCS Memorandum of Policy (MOP) 37 and then to CJCSI 6250.01B, the regional satellite communications support centers (RSSCs) have matured into one global satellite communications support center (GSSC) and three RSSCs providing entire spectrum SATCOM planning and management support for all the DOD SATCOM users. The SSCs have transformed over recent years to meet the challenges of SATCOM management. Figure 2-2 shows the SATCOM operational management structure and planning levels.

Note. Chapter 8 in ***The Army Satellite Communications Architecture Book 2003*** addresses Army SATCOM planning in greater detail.

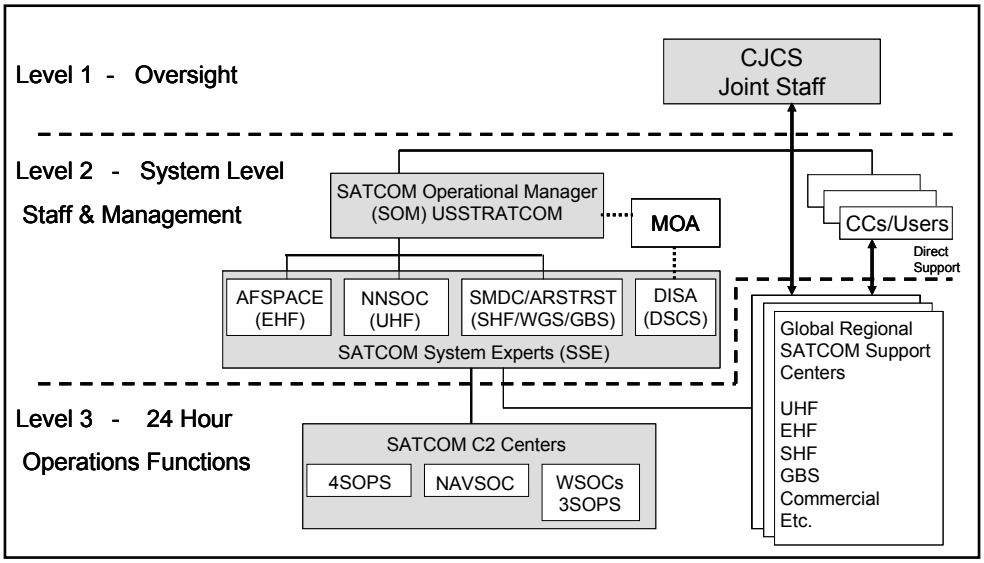

Figure 2-2. SATCOM planning and coordination

2-114. Oversight functions are provided by the Joint Staff J-6 and accomplished primarily by the Joint Communications Satellite Center. The Joint Communications Satellite Center is responsible for ensuring the effective and efficient distribution, allocation, and adjudication of on-orbit satellite assets during all phases of conflict, from peacetime to war, for DOD and non-DOD users.

2-115. The SOM and Satellite Communications Systems Experts (SSEs) form the second level of support, performing staff management functions for SATCOM resources. The SOM and SSEs develop and implement standards, policies, and procedures, while performing daily operational responsibilities for all SATCOM systems. The SOM receives SSE support from within the USSTRATCOM component structure or from external agencies by the use of a memorandum of agreement.

2-116. The third level of support is the GSSC and the RSSCs. The GSSC maintains the global SATCOM system picture and coordinates the activities of the respective RSSCs. It also coordinates between two RSSCs and provides support to any users who are not assigned to an RSSC. The RSSCs assist the combatant commands and other theater users in the daily management of all SATCOM resources available in theater. Additionally, RSSCs coordinate between users for resource sharing and maintenance issues. These agencies provide LWN communications planners, network managers, and SATCOM users a single point of contact for accessing and managing SATCOM assets. Table 2-1 shows associated satellite support centers and the agencies they support.

Table 2-1. SATCOM support structure

Satellite Support Centers	***Supports***
GSSC (Peterson AFB, Colorado)	USNORTHCOM USSTRATCOM USTRANSCOM CJCS SECDEF White House Communication Agency (WHCA) Defense Agencies Authorized non-DOD Users
RSSC-CONUS (MacDill AFB, Florida)	USJFCOM USCENTCOM USSOUTHCOM USSOCOM
RSSC-Europe (Patch Barracks, Germany)	USECOM
RSSC-Pacific (Wheeler AAF, Hawaii)	USPACOM

2-117. Determining SATCOM requirements and obtaining access for real-world deployment is complex and time consuming. Factors to consider when using manual techniques to determine SATCOM requirements include general architecture layout, user requirements, and previous experience with traffic flow and voice requirements. SATCOM planners must obtain a clear and detailed picture of the AO or the respective theater requesting SATCOM support. Planners must pay special attention to where units are located or are moving to and the information requirements that will support their activities. Planners should take into consideration previous modifications, operations, exercises, or deployments, use historical data to measure the recorded information flow, and observe SATCOM usage. Information on past use is helpful in determining system requirements, identifying potential problems, and trends for similar operations and deployments.

2-118. Any change in satellite resources, such as bandwidth or power, requires a change request coordinated with a ground mobile force (GMF) manager at the RSSC and documented with satellite access request modifications. The GMF network controller can approve some changes, like reducing the data rate or changing to a larger antenna. The unit S-3/G-3 may coordinate and submit requirement changes in satellite service for routine operations. These will also be coordinated between the GMF manager and DISA before contacting the GMF network controller.

2-119. Several guidelines are useful in formulating SATCOM plans supporting the LWN. The following are considerations when planning for SATCOM resources:

- What is the mission? Who is the user and what are the information needs?
- What is the duration of the mission and how long is the service required?
- What are the multinational or allied system considerations tied to the network?
- Are there validated requirements to support the mission?
- Do we need to submit requests for SATCOM database numbers?
- What type of traffic requires protected SATCOM links and what could use commercial SATCOM?
- What are the SATCOM priorities for individual links?
- What terminals are required to support the mission?
- Where will the terminals be located? Are there any interoperability issues?
- What potential phasing of communications might we encounter?
- Are there any host-nation agreement problems?
- What is the current operational area communications infrastructure?
- Can we leverage off the current communications infrastructure?
- What is the deployment timeline?
- What types of terrain will interfere with SATCOM access or terminal placement?
- What types of backup communications will be required?

ELECTROMAGNETIC SPECTRUM PLANNING

2-120. Detailed planning and coordination is the key to effective EMS management in any theater at all levels. Under modularity, corps, division, and BCT brigade signal companies and G-6 staff, all have dedicated EMS managers. This provides a robust, interconnected synchronizing structure that allows each combat formation to employ and control frequency as it would any weapon system. Each BCT EMS manager has the responsibility to manage the allocated EMS requirements supporting all emitters, sensors, radars, communications systems, or battlefield systems that rely on frequency use. Any number of systems will directly or indirectly affect the LWN within the BCT. The same is true at Army, corps, and division for the theater as a whole.

2-121. All frequency use must be coordinated before any emitter is activated in order to mitigate or eliminate interference or other negligible effects, and all interested parties must be in agreement before a reliable frequency can be assured. Joint environments complicate this need as coordination is not only necessary between echelons but also between services and components. OCONUS requires even more consideration in the use of the equipment and in regard to emissions effects on host nation and affiliated

territories' EMS requirements. The Military Communications-Electronics Board manages most of the foreign coordination processes through the military area theater combatant command, or in some instances, directly with each nation.

2-122. EMS management is accomplished at every echelon. At the theater level, EMS management becomes even more complex in order to support joint operations. EMS planning requires consideration of employment of all EMS-dependent systems; and EMS-dependent platforms such as unmanned aircraft systems (UASs), IO requirements, EW operations, national and international coordination process used; electromagnetic environmental effects; and electromagnetic compatibility. The following are useful in EMS planning:

- Transmitter and receiver locations.
- Antenna technical parameters and characteristics.
- Number of frequencies desired and separation requirements.
- Nature of the operation (fixed, mobile land, mobile aeronautical, and over water or maritime).
- Physical effects of the AO (ground and soil type, humidity, and topology).
- All EMS-dependent equipment to be employed to include emitters, sensors, UASs, commercially used communications, and local broadcasting usage.
- Start and end dates for use.

***Note*. FMI 6-02.70** addresses spectrum planning in greater detail.

MULTINATIONAL COMMUNICATIONS PLANNING

2-123. Multinational communications system operations may be composed of allied and/or coalition partners. Coalitions can be composed of diverse groups of security and information sharing domains. Multinational forces may have differences in their communications system, language, terminology, doctrine, and operating standards that can cause confusion and interoperability problems in an operational environment. Multinational network system planning and integration is an integral part of joint force planning. Planners must—

- Understand, expect, anticipate, and be prepared to deal with continuous change as requirements are either met or redefined to meet multinational needs.
- Clearly understand the capabilities, limitations, and availability of all strategic, operational, and tactical communications system resources.
- Establish information sharing with non-US and host-nation participants in compliance with joint doctrine and the commanders' direction.
- Identify communications system requirements that exceed the capabilities within the joint or multinational force and coordinate (EMS, equipment, or connectivity) any mitigating actions through appropriate channels when host-nation support is required.
- Ensure communications system capabilities and employment procedures for non-US forces are understood. To enhance multinational operations, provide several options for communications system assets and interoperability.
- Use system-to-system compatibility to ensure interoperability. The United States may have to provide communications system resources to multinational partners to achieve this.
- Establish and manage an interface between incompatible communications systems through a combination of liaison, hardware and software interface, and tactics, techniques, and procedures (TTP).
- Establish basic (voice and data) communication links and ensure unity of effort through the use of TTP and liaison personnel.

Note. For more information on multinational operations see JP 3-16. For more detailed guidance on foreign access, connections, and COMSEC release, see CJCSI 6510.06A, CJCSI 6211.02B, CJCSM 6510.01, and CJCSM 3320.01B.

2-124. Once the JFC establishes the specific C2 organization for a joint or multinational operation, the information exchange requirements (IERs) are established as network planning begins. Minimal coordination considerations for linking multinational networks with the LWN include—

- EMS management and procedures for resolving frequency problems.
- Equipment compatibility.
- Procedural compatibility.
- Cryptographic and information security.
- Routing and data link protocols.
- Use of technical interpreters to ensure that US interests are adequately protected.

2-125. Releasability, a planning consideration, pertains to the US keying material and equipment, and multinational connectivity to the US networks. The operational acceptability and disclosure or release of COMSEC to foreign governments for multinational use will be determined and approved by the National Security Telecommunications and Information Systems Security Committee before entering into discussions with foreign nationals. Commanders and their staffs should be aware of the limitations in sharing classified information with multinational partners, especially information from space platforms or other national assets with multinational partners. The JFC must plan for the additional time and coordination necessary to ensure compliance with established security requirements. The dissemination, disclosure, or release of DOD intelligence information to foreign governments for multinational use is approved only by the Defense Intelligence Agency (DIA), the National Security Council, or the senior intelligence officer in theater, and should not be confused with disclosure of the US keying material or equipment outlined in the previous sentences of this paragraph.

2-126. Factors which enhance achieving multinational interoperability are liaison teams. Establishing a knowledgeable team on structure, capabilities, and communications system operations are often essential to multinational system interface in joint operations. Their importance as a source of both formal and informal information exchange cannot be overstated.

2-127. Standardization of principles and procedures in joint networks is essential. As US forces introduce new technology and become more network enabled, this area of concern is increasingly important. NETOPS, including activities conducted to monitor, control, and protect our networks, must be evaluated, especially in the context of multinational networks.

2-128. Foreign disclosure officers should be appointed early in the planning process at all levels of command directly involved in multinational operations. Establishing disclosure policies are a primary responsibility for these appointed officers so that it is understood what information can be shared with multinational partners. Commanders and planners must consider several factors as they establish multinational communications system architectures:

- What is shared, when, and with whom?
- The mission, intent, and concept of operations (CONOPS). Different phases of a multinational operation necessitate different and distinct levels of communications system support.
- A comprehensive knowledge of the multinational structure and relationships.

DHS AND INTERAGENCY COMMUNICATIONS PLANNING

2-129. **DHS/Defense Communications System.** The disparity of communications systems, use of allocated bandwidth (both civilian and military), and limited interoperable systems hinder the capability of collaborative incident management and response in CONUS. Standing JTFs exist that provide the C2 interface with federal, state, and local authorities. Interfaces include military web portals accessible by non-.mil domains, unclassified defense collaborative tool suite, JTF-owned deployable commercial voice

switching, secure VTC in each governor's office, radio cross-banding so that land mobile radios, TACSAT radios, HF radios, and cell phones can communicate with each other, and links to national laboratories and other subject matter experts. USNORTHCOM DHS units include Joint Forces Headquarters National Capital Region, Joint Task Force Alaska, Joint Task Force Civil Support, Joint Task Force North, Standing Joint Force Headquarters North, Army North, and Air Force North Additionally, each state adjutant general is building an Standing Joint force headquarters with similar communications capabilities. Commanders and communications system planners need to consider the detailed planning and analysis to determine CONUS-based communications system requirements in support of federal, state, and local agencies. The J-6, when required and authorized, must bridge the gap among civilian, DOD, and other government agencies to develop mission oriented communications solutions.

2-130. **Interagency Communications.** Of increasing importance to joint operations is effective connectivity to non-DOD departments and agencies. Previously, only connectivity to the Department of State, DIA, and National Security Agency were essential. In today's environment, connectivity with all departments and agencies may be critical. JFCs need to identify interagency IERs and coordinate connectivity and access as required.

Chapter 3

Network Operations

Crucial to the effective employment and survival of the LWN is the need for successful management and defense as a single, coherent, seamless enterprise. NETOPS is the cornerstone of managing the LWN at strategic, operational, and tactical levels. NETOPS provide integrated visibility and end-to-end collaborative management of systems, services, and applications as part of a joint network environment. It is essential to achieve NETOPS situational awareness in order to allow commanders to manage their networks as they would other combat systems. For signal forces, this also improves the quality and speed of decision making in regards to the employment, protection, and defense of LWN.

SECTION I – NETWORK OPERATIONS IN THE LANDWARNET

NETWORK OPERATIONS GOALS

3-1. NETOPS is defined as those activities conducted to operate and defend the GIG. The goal of Army NETOPS is to provide assured and timely network enabled services across strategic, operational, and tactical boundaries (LWN). These services will support the commanders' entire spectrum of Warfighting, intelligence, and business mission requirements. NETOPS is the essential set of policies, structures, capabilities, techniques, and procedures that ensure that the systems and services provided by signal command provides the highest level of quality of service for the LWN users.

3-2. Properly coordinated and executed in a joint environment, NETOPS will provide the Warfighter with the following desired effects:

- Assured system and network availability provides visibility and control over the system and network resources. These resources are effectively managed and problems are anticipated and mitigated. Proactive actions are taken to ensure the uninterrupted availability and protection of the system and network resources. This includes providing for graceful degradation, self-healing, fail over, diversity, and elimination of critical failure points.
- Assured information protection provides protection for the information passing over networks from the time it is stored and catalogued until it is distributed to the users, operators, and decision makers.
- Assured information delivery provides information to users, operators, and decision makers in a timely manner. The networks are continuously monitored to ensure the information is transferred with the correct response time, throughput, availability, and performance that meet user needs.

NETWORK OPERATIONS PROCESSES

3-3. NETOPS enable signal organizations to operate, manage, defend, and respond to issues which negatively impact the ability to use networks as a combat multiplier. NETOPS processes are defined in three interdependent essential tasks: GIG Enterprise Management (GEM), GND, and Global Content Management (GCM). See Figure 3-1.

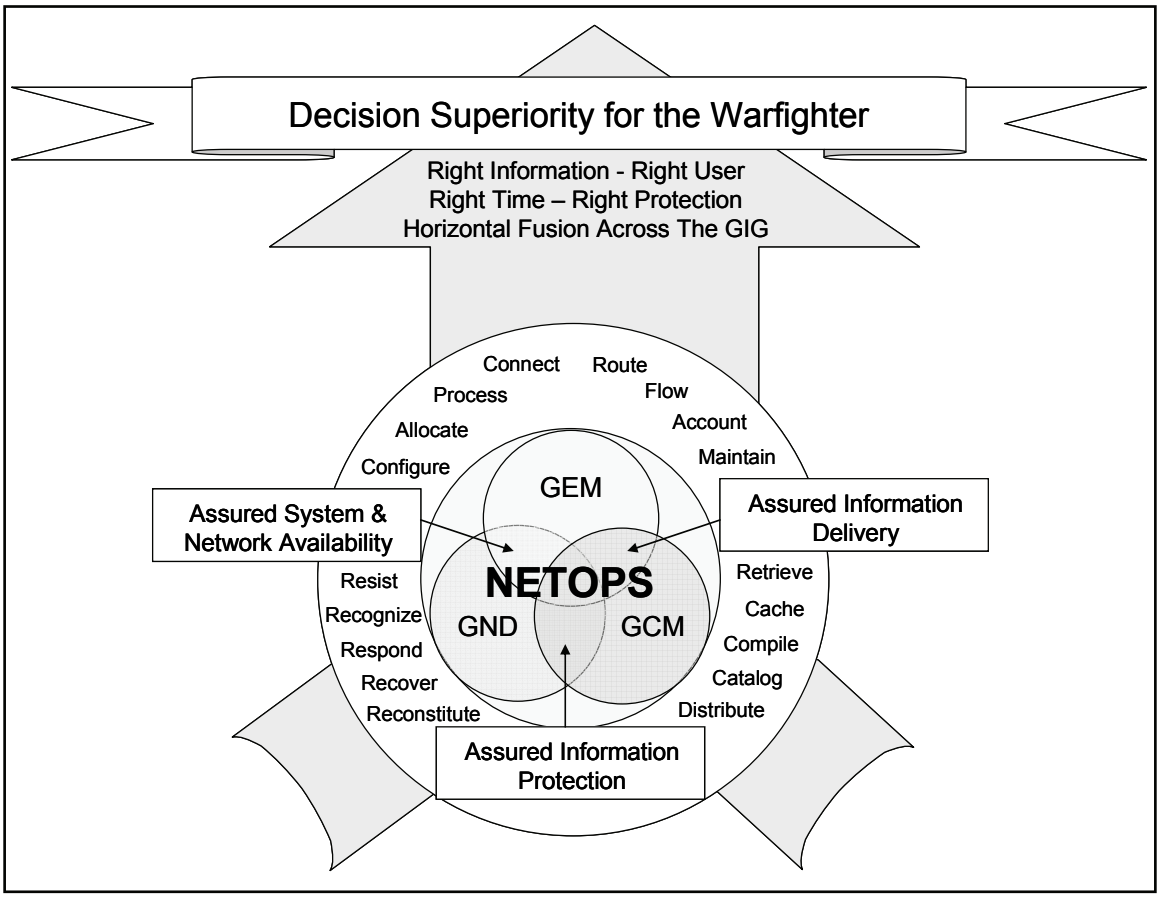

Figure 3-1. NETOPS interdependent essential tasks

NETOPS ESSENTIAL TASKS

3-4. GEM is defined as the technology, processes, and policy necessary to operate effectively the systems and networks that compromise the GIG. This essential task merges the five major IT services with the NETOPS critical capabilities. The following IT services are within the GEM and manage the GIG services and technologies:

- Systems management.
- Enterprise services management.
- Network management.
- SATCOM management.
- EMS management.

3-5. The GND ensures and manages the integrity, viability, availability, identification, authentication, confidentiality, and non-repudiation of friendly information and systems. The following fundamental attributes are an essential element of network protection, which encompasses those prior actions needed for counter attack, intrusion or exploitation of the LWN transport, storage, and operational uses:

- Protection.
- Monitoring.
- Detection.
- Analyzing.
- Responding.

3-6. GCM is defined as the technology, processes, and policy necessary to provide awareness of relevant, accurate information, automated access to newly discovered or recurring information, and timely, efficient and assured delivery of information in a usable format. The following core services are envisioned to be enterprise-wide services used by the entire DOD to ensure information is available to all authorized users:

- Content discovery.
- Content delivery.
- Content storage.

3-7. NETOPS will be addressed in greater detail with the future publication of FMI 6-02.71, *Network Operations*.

SECTION II – MANAGING THE LANDWARNET

3-8. Managing the LWN encompasses a number of different, often overlapping and mutually supporting, organizations, environments, and architectures. Added to that are Army commands, and ASCCs that operate separate networks to support specific facilities located around the world, such as the Army Corps of Engineers, Army Recruiting Command, Army Space and Missile Defense Command/Army Strategic Command, United States Army Intelligence and Security Command (INSCOM), and United States Army Reserve Command (USARC). One challenge to the LWN is that some separate networks create duplication of effort in network management and integration. In the worst case, 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 with mainstream Army networks.

LANDWARNET AWARENESS

3-9. NETOPS requires developing an integrated view of the overall health of the network, providing real-time or near real-time NETOPS situational awareness. This will provide Army commanders and other users information related to the LWN system and transport failure, service attrition or shortfalls, and possible resolutions. Ideally, the NETOPS situational awareness will provide a valuable tool in predictive analysis regarding changes in operational requirements, allocation of LWN resources, preventing network attacks and reducing their related mission impacts, and utilization of limited or critical systems and high priority applications. Developing a useful picture of the LWN status involves the collection of data from various classified and unclassified sources provided by all LWN echelons. These sources provide reportable conditions, network event data, historical records, and data from network management tools and systems. The data is compiled and provided to users much in the same way battle command systems provide commanders the status of forces, logistics, intelligence, and maneuver, enhancing his C2 ability.

INSTALLATION LEVEL

3-10. The objectives of the LWN are to increase effectiveness, promote efficiencies, and increase standardization so that the Army can achieve a more seamless worldwide network. Managing towards these objectives starts at the installation level, which permits users to access authorized network resources regardless of where those resources are or where the users are located. The responsibilities of who manages them differ in CONUS and OCONUS.

Continental United States

3-11. The LWN management at the CONUS installation level is one supporting aspect of the move toward centralized installation management under the Installation Management Command (IMCOM). Previously, installations were owned and managed by the various ASCCs. Installation management is now delegated to the directors of IMCOM regions. Refer to Figure 3-2. The IMCOM is responsible for providing IT services for posts, camps, and stations in CONUS.

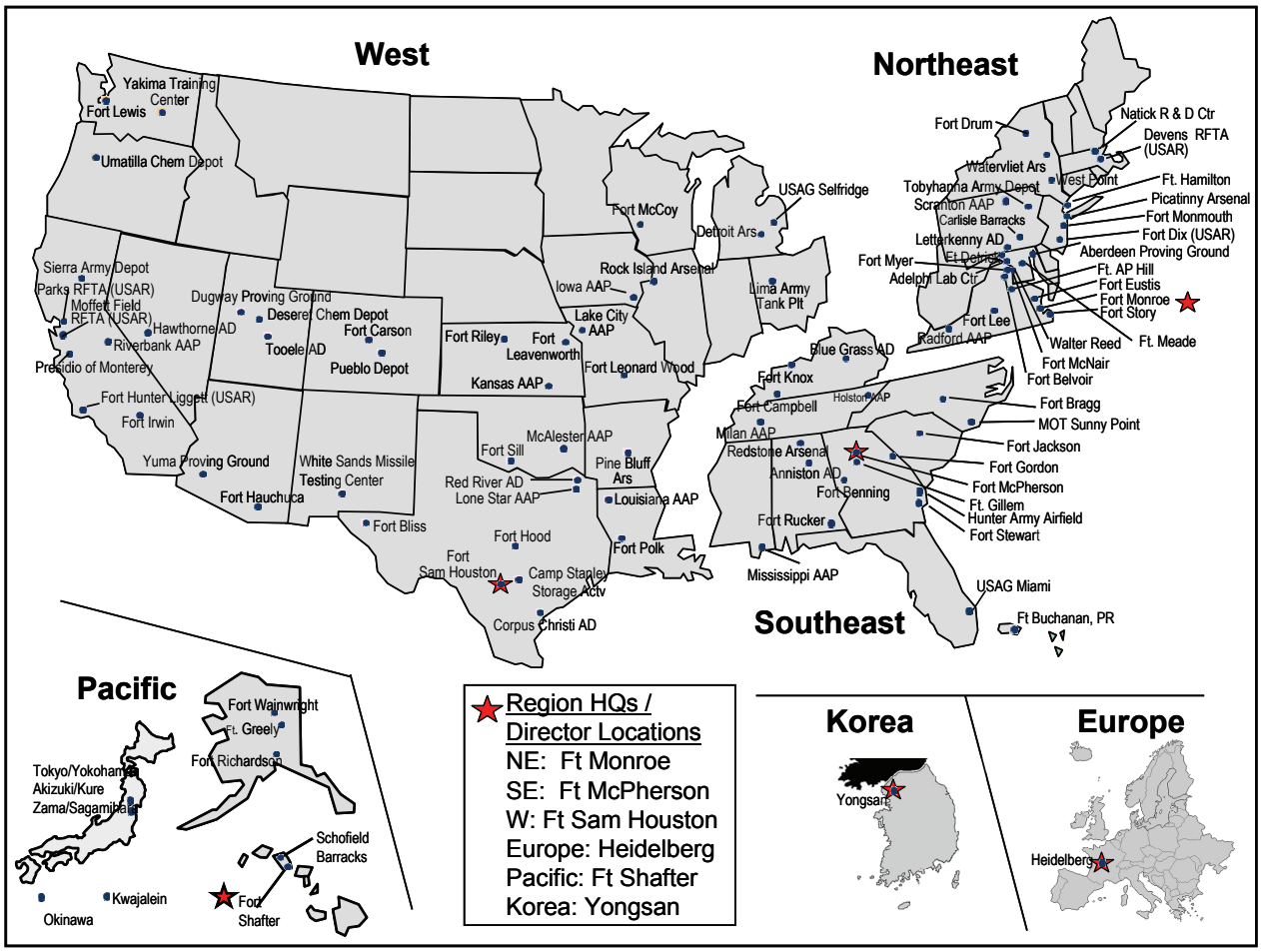

Figure 3-2. IMCOM regions

3-12. LWN installation services are most often viewed as part of the strategic level. These IT services are provided and administrated by local DOIMs. DOIMs are organic elements of the United States Army Garrison (USAG). While DOIMs report directly to their Garrison Commander, Network Enterprise Technology Command (NETCOM)/9th Signal Command (Army) (SC(A)) manages the CONUS DOIMs' technical functions through their regional chief information officer (RCIO), who is co-located with the IMCOM regional HQ.

3-13. NETCOM RCIOs are OPCON to IMCOM region directors and serve as the G-6 for the region. They focus on day-to-day network related issues and develop and enforce network architectures, programs, IT budgets, policies, and standards. There are three CONUS RCIOs located at Fort McPherson, GA; Fort Sam Houston, TX; and Fort Monroe, VA.

3-14. DOIMs support specific installations. While most commands and tenant organizations on Army installations are responsible for the operation and management of their own networks, e-mail servers, and desktops, each installation DOIM is responsible for operation and management of the installation campus network. The DOIM has the responsibility for installation specific IT assets while RCIOs provide technical guidance to the DOIM for the IM services. In this way, standardized basic service levels are provided throughout the enterprise, independent of a user's organization or location.

Outside the Continental United States

3-15. In OCONUS locations, a DOIM is established under the signal battalion/support battalion authorization documents and structured based on command modifications to the standard garrison organization. Though IMCOM is responsible for resource and delivery, the LWN installation IT services are provided for and administrated by these battalions. These signal organizations also operate and manage all common user networks of baseline IT services. These services include (but are not limited to) help desk services, management of e-mail servers, voice services (Secure and Unclassified), VTC services, IA devices, WANs, as well as installation networks and reach back services for deployed forces.

3-16. NETCOM/9th SC(A) manages the OCONUS signal organizations through their respective Theater Network Operations and Security Centers (TNOSCs). TSSBs, TTSBs, and battalions which have a DOIM established under them report to their TNOSC.

3-17. There are three OCONUS RCIOs located in Heidelberg, Germany; Yongsan, Korea; and Fort Shafter, Hawaii, designated from theater signal commands.

3-18. The Army is currently implementing the Single DOIM Concept which will bring the operation and/or management of all common user networks and baseline IT services under USAG. This will eliminate those personnel, both government and contractor, from performing communications system operations of common-user baseline IT services on independent Army networks outside of the DOIM, which are known as "shadow" DOIMs and bring all Army organization and installation networks into the Army Enterprise Infostructure. At the completion of this plan, the IMCOM director will serve as the primary interface between the DOIM and the supported organization(s). IMCOM will manage mission unique systems, advocate for the tenant, and coordinate IT service requirements with the supporting DOIM. NETCOM/9th SC(A) will provide technical support of all required network services for all Army installation and off-installation activities CONUS and OCONUS.

MANAGEMENT IN THE THEATER

3-19. LWN management in theater addresses the GIG as it extends service-controlled assets to users in unit locations, base clusters, and enclaves connected by Army or DISA-controlled network assets in a theater of operations. The complex nature of the GIG in theater requires that all component NETOPS organizations work together closely under the direction of the J-6 to ensure the reliable operation of the GIG.

3-20. At the center of LWN NETOPS is the ability of NETCOM/9th SC(A) to execute through a tiered structure that includes an Army and TNOSCs and regional directors/theater signal commanders. The Army Global Network Operations and Security Center (A-GNOSC) utilizes centralized direction to execute the Army's NETOPS enterprise operations, control, and defense mission. Each TNOSC in their respective theater AOR acts as the single point of contact for Army network services, operational status, reporting, and functionality in the theater and serves as the coordinating agency with other service NETOPS elements operating in the theater. Each TNOSC exercises authoritative enterprise NETOPS guidance over all organizations that operate, connect to or maintain the LWN. Each Geographical Component Command in Europe, Pacific, Korea, Southwest Asia (SWA), and the USSOUTHCOM has OPCON of the TNOSC. NETCOM also operates a CONUS TNOSC. An organization chart is provided in Figure 3-3.

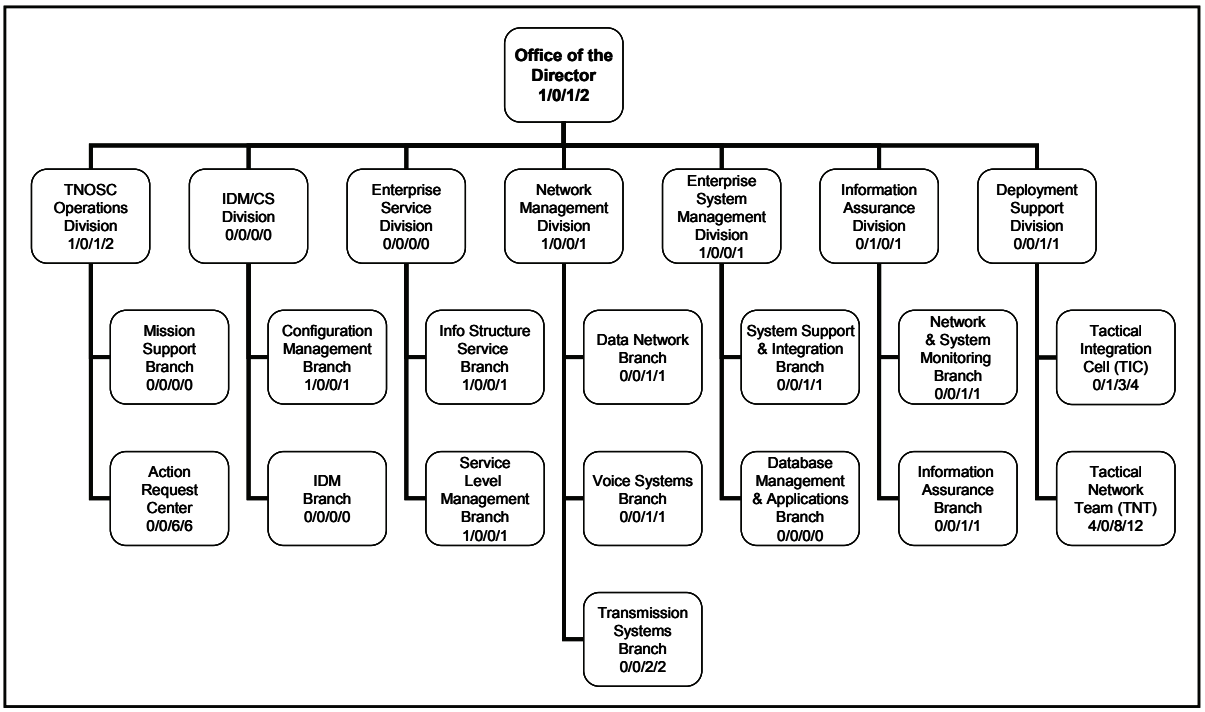

Figure 3-3. Theater NETOPS and Security Center

3-21. TNOSC mission, roles, and responsibilities are as follows:

- To develop and maintain theater NETOPS situational awareness for LWN resources by consolidating input from subordinate, supporting, or other service Network Operations and Security Centers (NOSCs).
- To control performance of technical functions as required under the oversight of the ASCC G-6.
- To provide visibility and status information to the CCDR, the signal command, and the A-GNOSC.
- To exercise configuration control including day-to-day systems management and protection of theater networks, services, and applications.
- To enforce network operating standards and report any configuration violations detected on Army networks.
- To report network status to the combatant command's Theater Network Operations Control Center (TNCC) and the Joint Task Force-Global Network Operations (JTF-GNO) Theater Network Operations Center (TNC). In some cases, the TNOSC may provide visibility to other service component NOSCs.
- To perform and coordinate any network tasks that span the theater or multiple regional director regions ensuring consistent service among regions.
- To serve as the signal command NETOPS center of gravity for all theater issues regarding the LWN.
- To operate in conjunction with its counterpart Regional Computer Emergency Response Team (RCERT) to provide comprehensive CND of assigned networks.
- To execute and enforce LWN policies and procedures promulgated by the Army Chief Information Officer (CIO) through the A-GNOSC.
- To provide information dissemination management (IDM) support for organizations within theater to include the dissemination of LWN health and status to the appropriate organizations and commands within the theater.

- To operate, manage and defend Army-owned, deployed, operational network items, long-haul communications, theater gateways, Army DISN Router Program, and security resources.
- To develop and maintain theater TTP to implement the NETOPS concept of operations to supplement and address theater-unique missions and responsibilities.
- To identify any new physical or logical property that should be addressed in the asset resource management process.
- To establish or augment a JTF Joint Network Operations Control Center (JNCC), JTF ARFOR Network Operations and Security Center (NOSC), and corps and division NOSC to operate, maintain, and defend the JOA as required.
- To provide value-added services to Army Forces in a JOA.

TACTICAL LEVEL MANAGEMENT

3-22. LWN management at the tactical level entails the integrated, coordinated, and standardized set of systems, organizations, applications, and TTP that provide technical oversight of the myriad of unit network resources that comprise the tactical portion of LWN. Tactical networks extend from ASCC deployed forces to the BCT and battalion levels engaged in joint, combined, or single-service task force Warfighting.

3-23. Deployed forces typically access reachback capabilities and applications through theater resources but may directly link to the DISN via a STEP or teleport site. These links to DISN services are operated and managed by the signal command subordinate strategic commands. NETCOM is ultimately responsible for the operation and maintenance of the LWN enterprise and has authority to implement and enforce enterprise policy and provide authoritative direction concerning the techniques, procedures, standards, configurations, designs, devices and systems to accomplish specific functional tasks and missions. This mission is executed globally through the A-GNOSC and in each theater through the signal command and associated TNOSC.

3-24. Below the signal command, Army organizations establish their respective NOSCs and are responsible for implementing and enforcing all NETOPS policies and procedures to their TNOSC. There are TTSBs, TSSBs, ESBs, and corps, division, and brigade organic signal companies that implement NETOPS to leverage the LWN and the GIG.

3-25. NETOPS organizations found in a signal command are designed primarily to provide functional management of assigned network resources used in extending LWN throughout the theater. Corps, division, brigade, and battalion will perform all associated NOSC functions necessary to manage and secure their respective network assets or the aggregate resources assigned to them. They provide NETOPS capabilities and situational awareness to the supported commander and serve as coordinating and reporting points that feed essential information regarding systems, services, and overall infrastructure to the TNOSC.

3-26. JTF ARFOR is the Army organization with direct C2 of all NETOPS in the deployed AO, including all subordinate corps, divisions, and BCTs. The ARFOR NOSC, Tactical Network Team (TNT), works for the JTF JNCC and performs network management under direction of the Army TNOSC. The ARFOR NOSC (TNT) disseminates information to Army elements under its C2 in close coordination with the JTF.

3-27. NETOPS in the corps, division, and BCT are the lowest levels where a significant amount of NETOPS planning, management, and task execution occur. The planning process is iterative and occurs throughout all phases of operations following the military decisionmaking process (MDMP) every time a new mission is received. Operating the network is limited in the early phases of operations and becomes the predominant set of activities as units deploy into theater and begin combat operations. At times deployed NETOPS elements will need to coordinate directly with the TNOSC, but this is always done in coordination with and under the direction of the ARFOR/JTF and their respective NOSC. While this relationship does not affect unit force structure, employment, or C2, it may affect the nature of available LWN services.

3-28. NETOPS at the battalion level is generally limited and requires a combination of planning and operating tasks that occur throughout all phases of operation based on the receipt of mission orders, the subsequent MDMP, and the changing battlefield conditions. The requirements inherent in the configuration, monitoring, management, and reconfiguration of the battalion LAN is executed by the battalion S-6 using Integrated System Control (V)4. The battalion S-6 is responsible for including every system supporting battalion operations in the network architecture databases. The S-6 is also responsible for coordinating with the brigade S-6 and/or higher headquarters G-6 for the development of the network architecture. The network configuration databases used in the execution of the LAN management requirements will be controlled based on mission requirements at the brigade and/or corps/division level.

3-29. Common services and applications management addresses the standardization and consolidation of IT across the enterprise. This allows the Army to 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. 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 information NETOPS team.

SECTION III – JOINT GLOBAL AND JOINT THEATER ORGANIZATIONS

STRATEGIC/JOINT

3-30. The NETOPS hierarchy starts at the JTF-GNO. This USSTRATCOM run organization is the highest level of global NETOPS, GIG control, and management (see Figures 3-4 and 3-5). NETOPS relationships encompass OPCON, orders, reporting, reaction to CND events, and other activities as outlined in the Joint CONOPS for GIG NETOPS in theater.

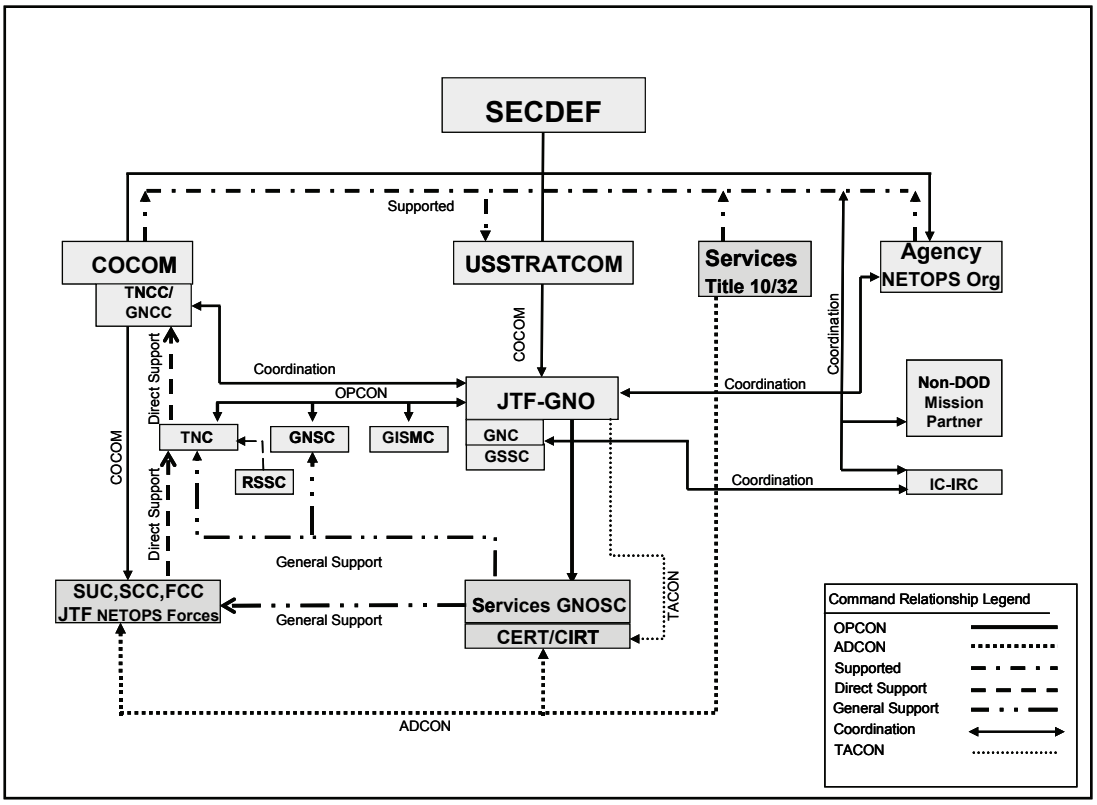

Figure 3-4. Global NETOPS

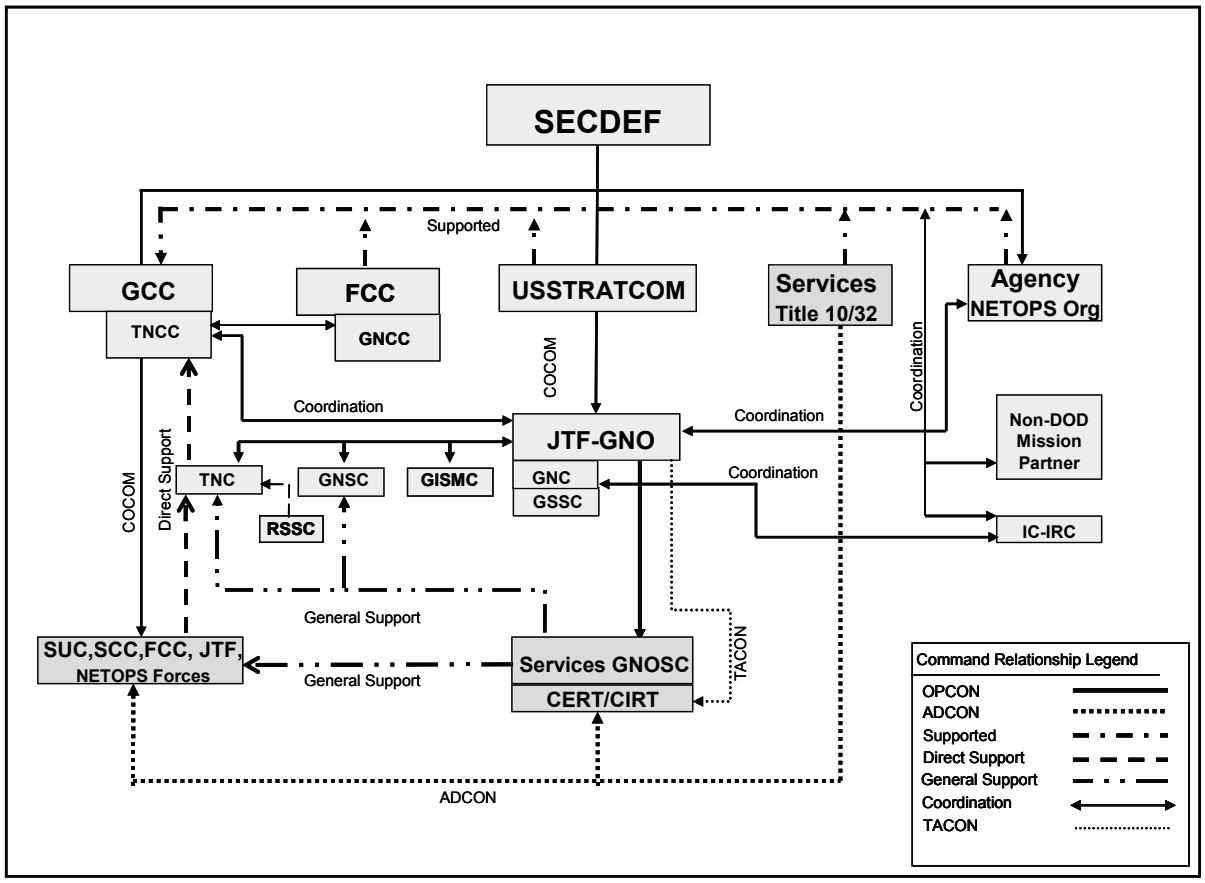

Figure 3-5. Theater NETOPS

GLOBAL NETOPS SUPPORT CENTER

3-31. The Global Network Operations Support Center (GNSC) provides the day-to-day technical operation, control, and management of the portions of the GIG that support global operations but are not assigned to a combatant command. This includes GIG backbone, STEP mission support, services provisioning, network engineering, circuit implementation, and inter-theater connectivity from CONUS to the Pacific, European, Southern, and SWA theaters. The GNSC determines operational impacts of major degradations and outages, and coordinates responses to degradations and outages that affect joint operations, and provides general support to the geographical CCDRs and TNCs and direct support to the functional CCDRs.

GLOBAL NETOPS CONTROL CENTER

3-32. The primary mission of a Global Network Operations Control Center (GNCC) is to advise the functional CCDR and optimize the portion of the GIG resources supporting that commander's assigned missions and operations. To be effective, each GNCC must remain cognizant of all current, future, or contemplated operations in which their portion of the GIG will play a role. Each GNCC will monitor the CCDRs' GIG assets and coordinate with the Global Network Operations Center (GNC) and supporting TNC any mission or operational impacts that are associated with system or network anomalies or resource limitations.

3-33. Additionally, the GNCC has direct liaison authorization with the TNCCs. This authorization gives the GNCCs and TNCCs the ability to coordinate scheduled changes in the GIG or troubleshoot outages.

THEATER NETOPS CONTROL CENTER

3-34. The TNCC is responsible for the CCDR's operation of theater-wide network resources across all involved components and services. The TNCC issues directives to the TNC and component NETOPS organizations to ensure that the theater network supports the theater mission. USSTRATCOM and the JTF-GNO are in support of the theater CCDR and ensure that the GIG is capable of supporting the theater CCDRs' requirements. When there are conflicts or resource contention between CCDRs' requirements, the JTF-GNO will arbitrate resource requirements.

JOINT NETOPS CONTROL CENTER

3-35. The JNCC serves as the NOSC responsible for managing the tactical communications supporting the deployed portion of the JTF. It exercises OPCON and technical management over network service and control centers belonging to deployed components and subordinate commands. The JNCC performs planning, execution, technical, and management functions and provides the appropriate TNCC with NETOPS situational awareness and assessments of mission impact regarding system and network events. Task force elements will provide the JNCC with current (near real-time) situational awareness of network status and potential issues.

ARMY SERVICE COMPONENTS

3-36. The TNOSC is the Army component center of gravity for theater LWN NETOPS, management and control. While each Army functional component, ASCC, or subordinate element may establish systems controls (SYSCONs) or NOSCs for local system and network oversight, the TNOSC is the single point of contact for issues affecting joint interoperability, configuration, security, and operation of the LWN in theater.

3-37. Signal command forces such as theater signal brigades and ESBs must ensure reliable, timely information flow to the JTF ARFOR, TNOSC, and their own commanders in regard to the status of their network forces and LWN systems. Supporting signal brigades should designate a single office within their communications staffs to coordinate with the signal command G-6, JTF ARFOR, and JTF-J6. All related LWN tactical, strategic, and fixed station elements will perform network control and reconfiguration, and act upon the TNOSC enterprise NETOPS guidance and coordinate with relevant C2 hierarchy. Army component strategic and fixed station elements should also formulate and publish plans, orders, and internal operating instructions for the use of their communications systems that address the core requirements to change circuit and routing paths, direct troubleshooting to resolve problems, execute packet-routed network traffic and circuit management functions, and provide status information.

Chapter 4

Theater Operations

Theater operation assets are those signal elements that fall under the signal command of any given theater, as well as those entities that fall under NETCOM that support signal operations for a ASCC AO and above. Those elements include soldiers, systems, equipment, materiel, applications, and facilities apportioned within a theater to install, operate, maintain, and defend LWN capabilities which provide network enabled capability and facilitate IS at strategic, operational, and tactical levels. This chapter discusses the missions, functions, and characteristics of theater operations as they relate to changes fueling the Army transformation and modularity.

LEVERAGING THEATER OPERATION ASSETS

4-1. Theater operation assets are designed to do the "heavy lifting" in extending GIG services to the JFC, ASCC commander, and Army elements operating in theater operational echelons and above. Most often this means installing and operating large-scale, non-mobile network infrastructures, tactical gateways, heavy network systems, nodes and hubs necessary for increased bandwidth, range extension, and theater reachback. Theater operations often provide large-scale connections between tactical networks and the GIG. Theater operations provide a pooled network provisioning capability in general support of tactical forces without organic network support. An ESB's mission is significant in not only installing, operating, maintaining, and defending the LWN at higher levels of command, but also in providing network support to ASCC elements operating at the tactical corps/division levels.

4-2. The primary design of theater operations is to provide the resources and personnel necessary to meet flexible conditions sometimes in austere environments. They meet the requirements for large-scale network and information services for major command posts, installations, facilities, base clusters, and enclaves. Most notably, they provide networks and services supporting large user populations located at—

- JTF, ARFOR, JFLCC, or Theater Army HQ.
- Theater base support and intermediate staging bases.
- Seaports of debarkation (SPODs) and aerial ports of debarkation (APODs).
- TAAs.
- Theater and logistics support centers.
- Logistics operations centers and supporting temporary installations.

PROVIDING "OTHER" SERVICE SUPPORT

4-3. Theater operations also perform a variety of missions to meet specialized requirements. This extends to supporting other services such as NGOs and the DHS.

SUPPORT TO NAVFOR, MARFOR OR AFFOR COMPONENT JTF

4-4. A JTF performing missions having specific, limited objectives or missions of short duration normally dissolves when its purpose is complete. These missions very likely generate very specialized network requirements that cannot be met with organic resources. The JTF must often rely on a signal command to augment those of its service component in order to tie joint network requirements effectively to the GIG and fully integrate service communications links to ARFOR, AFFOR, MARFOR, JSOTF, and NAVFOR. Vital to the JTF mission is the capability of the signal command to provide an in-range

extension of reachback services. Because JTF and combined headquarters are not fixed organizations, network support must be scaled to the requirement based on METT-TC. One aspect of meeting modularity requirements is the ability to "plug and play" signal assets to meet unique or tailored needs.

SUPPORT TO THE DHS

4-5. The mission of the DHS is to prevent terrorist attacks within the United States, reduce America's vulnerability to terrorism, and to minimize damage, mitigate effects, and recover from attacks that do occur. To accomplish this mission, DHS has the authority to mobilize resources of the federal government to include CONUS based signal assets. The foremost role of these assets is to provide LWN capability in support of DHS crisis situations and the interface of Army information systems with government agency information systems. Crisis response operations involve Army tactical elements in a variety of roles. C2 of those elements require flexible, secure communications system networks that are independent of civilian and government networks. Army networked communications provide responders with communications means that are free from the potential degradation posed by threat activity or overuse. They also enable interface with other branches of service to provide joint force capability should the situation require it.

SUPPORT TO SOF

4-6. SOF is a very specific mission that may find signal commands augmenting organic, dedicated SOF signal forces tasked to provide C2 networks and communications systems to a JSOTF, CUWTF or coalition SOF task force. On occasion, SOF must operate in conventional environments or require theater augmentation to meet network requirements. Base operational support to SOF units often calls on signal commands. Particular to this case are Civil Affairs, psychological operations, and SOF engaged in specialized theater missions such as WMD counter proliferation, coalition support, security assistance, foreign internal defense, as well as network links into theater LWN.

SECTION I – MAJOR COMMANDS

NETCOM/9TH SC(A)

4-7. NETCOM/9th SC(A), as a direct reporting unit to Headquarters, Department of the Army (HQDA) CIO/G-6, is the predominant signal force and network service provider related to the Army and Theater LWN enterprise and the GIG. NETCOM/9th SC(A) has authority to implement and enforce enterprise policy and provides authoritative guidance concerning the techniques, procedures, standards, configurations, designs, devices and systems to accomplish specific functional tasks and missions. NETCOM/9th SC(A) has full enterprise level responsibility for all global Army networks and information systems that comprise LWN. NETCOM/9th SC(A) CONUS trained and organized tactical forces are OPCON to US Army Forces Command (FORSCOM), specifically for the purpose of supporting specific national command authority objectives. NETCOM/9th SC(A) delivers IT and common user services and exercises ADCON of service assigned and attached forces in support of the GCC and the ASCC commanders.

4-8. Headquarters, NETCOM/9th SC(A) is comprised of a standard general officer level staff (G-1 through G-4 and G-8) located at Fort Huachuca, Arizona, and an liaison officer (LNO) staff and leadership presence in the National Capital Region working directly with Army CIO/G-6 and other DOD service staffs (see Figure 4-1). The headquarters has the capability to deploy C2 or technical elements and sub-elements to a theater of operations in order to support CCDR requirements directly or to augment subordinate units.

4-9. NETCOM/9TH SC(A) is the single Army authority to operate, control, and defend the Army's infostructure at the enterprise level. It is a global enterprise framework including theater signal commands, brigades, NETOPS and security centers and RCIOs, with the senior Theater-level signal commander serving as the ASCC G-6. It has the authority to implement and enforce enterprise policy and provides authoritative direction concerning the techniques, procedures, standards, configurations, designs, devices and systems to accomplish specific functional tasks and missions. It exercises authoritative enterprise

NETOPS technical direction over all organizations that operate, connect to or maintain the LWN Army's portion of the GIG. NETCOM/9th SC(A), in supporting the CIO/G-6 and serving as a global and theater force provider has the responsibility to—

- Assign operational tasks affecting theater LWN.
- Designate network related objectives to support combatant command requirements.
- Resource operational requirements.
- Provide staff actions in direct support of mobilization requirements.
- Provide deployment or deployment sustainment operations.
- Provide integration oversight for the Active Army and Army Reserve (USAR).
- Provide oversight of training and exercises.
- Provide support to the Homeland Security Operations Center and reachback operations.

4-10. NETCOM also performs the following tasks and functions:

- Executes oversight for centralized configuration and compliance for theater LWN. This requires monitoring and oversight of configuration changes of Army tactical and strategic voice and data infrastructures to ensure interoperability with joint directives.
- Manages the Army Military Affiliate Radio System program.
- Provides engineering support to the ASCC G-6 or signal command as required or when requested.
- Engineers, installs, operates, and maintains data networks in support of JTF, Army, and nongovernmental agencies as required.
- Serves as the proponent for quality assessment, quality control, and assistance control for communications infrastructure, systems, networks, and sub-networks by means of deployed assessment teams.

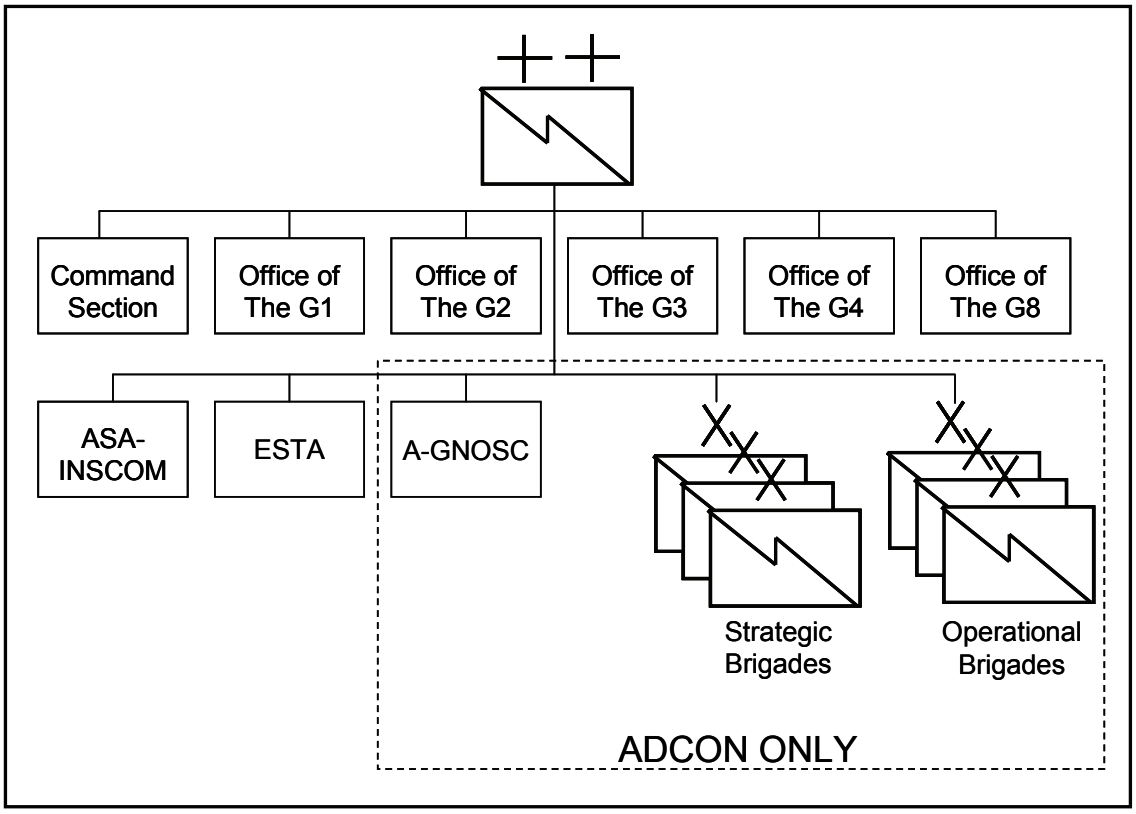

Figure 4-1. NETCOM/9th SC(A) organization

NETCOM MAJOR SUBORDINATE ELEMENTS

4-11. In addition to its command relationship with CONUS and OCONUS signal commands, NETCOM also has direct relationship over several subordinate elements that are vital to the LWN and network enabled capabilities: Enterprise Systems Technology Activity (ESTA), the A-GNOSC, and the Army Signal Activity - United States Army Intelligence and Security Command (ASA-INSCOM).

Enterprise Systems Technology Activity

4-12. ESTA is NETCOM's subordinate and is responsible for engineering, installing, operating, maintaining, and defending enterprise networks throughout the LWN. ESTA develops, implements, and enforces enterprise systems management (ESM) processes and activities required to operate and manage the LWN and Army interface with the GIG. In addition, ESTA—

- Serves the Army CIO/G-6.
- Coordinates external requirements with the HQDA staff and major Army command CIOs.
- Establishes ESM and IA policies and procedures and executes necessary actions to ensure common user services within a secure NETOPS framework across the LWN enterprise.
- Provides operational policy and functional staff oversight for ESM operations to CONUS installation DOIMs and RCIOs.
- Assesses, develops, staffs, and manages ESM functional proponent requirements and service level agreements for the LWN.
- Conducts testing, evaluation, and architectural review of operational architectures to ensure that new systems facilitate technological compliance. Ensures all capabilities fielded within the LWN conform to established standards, practices, and procedures.
- Provides technical expertise to execute long-haul and base communications programs.
- Provides oversight of all Army activities related to the allocation, allotment, and assignment of RF spectrum.

Army Global Network Operations and Security Center

4-13. A-GNOSC is another essential sub-element of NETCOM. Its mission is to develop and disseminate LWN situational understanding by collecting and maintaining near real-time status information on vital LWN resources, networks, information systems, and intra-theater gateways (STEP and teleport). Its primary mission focus centers on LWN operational compliance, management, and defense. The A-GNOSC is integrated with the 1st Information Operations Command (Land) and the Army Computer Emergency Response Team (ACERT) to create a consolidated NETOPS center called A-GNOSC/ACERT TOC. Each TNOSC is integrated with a RCERT.

Compliance

4-14. The A-GNOSC has the authority to ensure implementation of and compliance with approved DOD, Joint, and Army NETOPS policies and procedures. The A-GNOSC also maintains liaison with the Army operations center and the 1st Information Operations Command. The A-GNOSC will ensure compliance with network system standards and operational procedures before any IT resource, network, system, or application is connected to the LWN. A-GNOSC will also participate in reviews, tests, evaluations, and forums affecting information systems development, architectures, applications, and interfaces.

Management

4-15. The A-GNOSC interfaces with the JTF-GNO GNC, all Army TNOSCs, and functional and other service NOSCs in order to provide worldwide operational and technical support across strategic, operational, and tactical levels. It serves to resolve problems affecting network services and operations in two or more theaters and also oversees domain name services (DNS) and IP services provisioning and management for Army Forces.

Defense

4-16. Operating in conjunction with the ACERT, the A-GNOSC plays a major role in a comprehensive and global network defense for the LWN and tactical networks, including monitoring compliance with issued IA vulnerability alerts and directing Army-wide actions.

Army Signal Activity - United States Army Intelligence and Security Command

4-17. ASA-INSCOM falls under the command authority of NETCOM/9th SC(A) and under OPCON of the INSCOM. The ASA-INSCOM commander serves dual roles and is also the INSCOM G-6. ASA-INSCOM's mission is to provide planning, programming, budgeting, engineering, installation, and operational management of secure and non-secure telecommunications to the NSA, HQDA, INSCOM, and NETCOM/9th SC(A).

SECTION II – STRATEGIC AND FIXED STATION ELEMENTS

Strategic and Fixed Station

The terms ***strategic*** and ***fixed station*** describe organizations that do not typically deploy from their home stations and include organizations that provide intra- and/or inter-theater communications. These organizations typically support both power projection and C2 requirements spanning from the Warfighter through the SecDef to the President of the United States. They form the "backbone" of the LWN and are the focal point for installation support and theater extension. Because of the fluid nature of the contemporary operational environment, some theater and strategic organizations find themselves supporting the operational level of war. For this reason, efforts have been made to re-designate all strategic and fixed station organizations as "operational base" signal forces.

Note. The strategic signal organizational structure is in the process of changing. The focus is shifting the current structure from a scenario-based to a capability-based design. The following outlines the new structure and its capabilities.

STRATEGIC SIGNAL BRIGADES

4-18. The mission of a Strategic Signal Brigade is to provide operational base and sustaining signal support (communications, automation, and network management) to maintain the Warfighter in a geographic AOR and to enable power projection platforms required for force projection. These units provide the following:

- Command and control, operations, logistics, and administrative support for all assigned communications assets (earth terminals, microwave systems, COMSEC equipment, fiber optics/cable, etc.).
- Installation, operation and maintenance of tactical interface, and sustaining base and strategic signal support functions (communications, automation, and network management) to sustain the Warfighter in a geographic AOR.
- NETOPS at the installation level.
- Access to the LWN for all Army assets assigned to a geographic area and to tactical Army assets deployed in other theaters.
- Support to the brigade staff that is responsible for planning, coordinating, and supervising the brigade mission area functions.
- Advice to the commanders, staff, and information system users on the capabilities, limitations, and employment of all tactical and non-tactical signal and network assets available to a particular supported command.

- Advice to the supported commanders and staff on IM, automation policy, technical matters, performance, and supervision of system analysis and programming functions on related abilities.
- All-source intelligence assessments and estimates at the operational and strategic levels dealing with enemy capabilities, intentions, and vulnerabilities pertaining to the LWN and to the commander. This also entails predicting the enemy courses of action, producing threat estimates, ensuring proper dissemination of intelligence information and products, and evaluating intelligence products as they relate to the LWN and the GIG.

2D SIGNAL BRIGADE

4-19. This brigade is a subordinate command of NETCOM/9th SC(A) with OPCON vested in United States Army, European Command (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.

21ST SIGNAL BRIGADE

4-20. This brigade is a subordinate command of NETCOM/9th SC(A). 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 to provide visual documentation of US, allied, and hostile forces during combat operations and peacetime training exercises.

160TH SIGNAL BRIGADE

4-21. This brigade is a subordinate command of NETCOM/9th SC(A). The 160th Signal Brigade is OPCON to United States Army Central Command during peacetime. Its command and support relationships can change during wartime. Currently headquartered in SWA, the brigade has extended the LWN to the Warfigher by installing commercial communications facilities and capabilities throughout the United States Central Command (CENTCOM). Their primary mission is to install, operate, and maintain strategic communications in an active theater of war.

516TH SIGNAL BRIGADE

4-22. This brigade is a subordinate command of 311th Signal Command (Theater) (SC[T]) with OPCON vested in the United States Army, Pacific Command (USARPAC). The 516th Signal Brigade's mission is to provide signal support to Pacific Warfighting forces, to provide theater information and communication systems policy and programming functions, and to advise the Commanding General, USARPAC, on resources required by major subordinate commands (MSCs) for C2 and communications system deployable assets.

STRATEGIC BATTALIONS, COMPANIES AND MODULES

4-23. NETCOM/9th SC(A) theater strategic signal battalions and companies provide the Army's worldwide strategic LWN information backbone that can be extended wherever combat forces deploy. These organizations can be found in both a Strategic Signal Brigade and a Tactical Signal Brigade. This seamless information infrastructure is operational 24 hours a day, 7 days a week, 365 days a year. The network is a mix of tactical and commercial systems that capitalize on new and emerging technologies to provide enhanced capabilities to deployed and fixed station Warfighters. NETCOM strategic units stationed in theaters of operation provide operational and strategic communications services to CCDRs and Army Warfighters. The strategic signal force structure is a critical element in enabling joint and expeditionary battle command communications across the full spectrum of operations. The following strategic battalion and company table of organization and equipment designs are based on capability requirements specific to that location's executive agent responsibilities and mission directives that were identified by NETCOM. Figure 4-2 represents the strategic design that is driving the new strategic force structure currently being implemented.

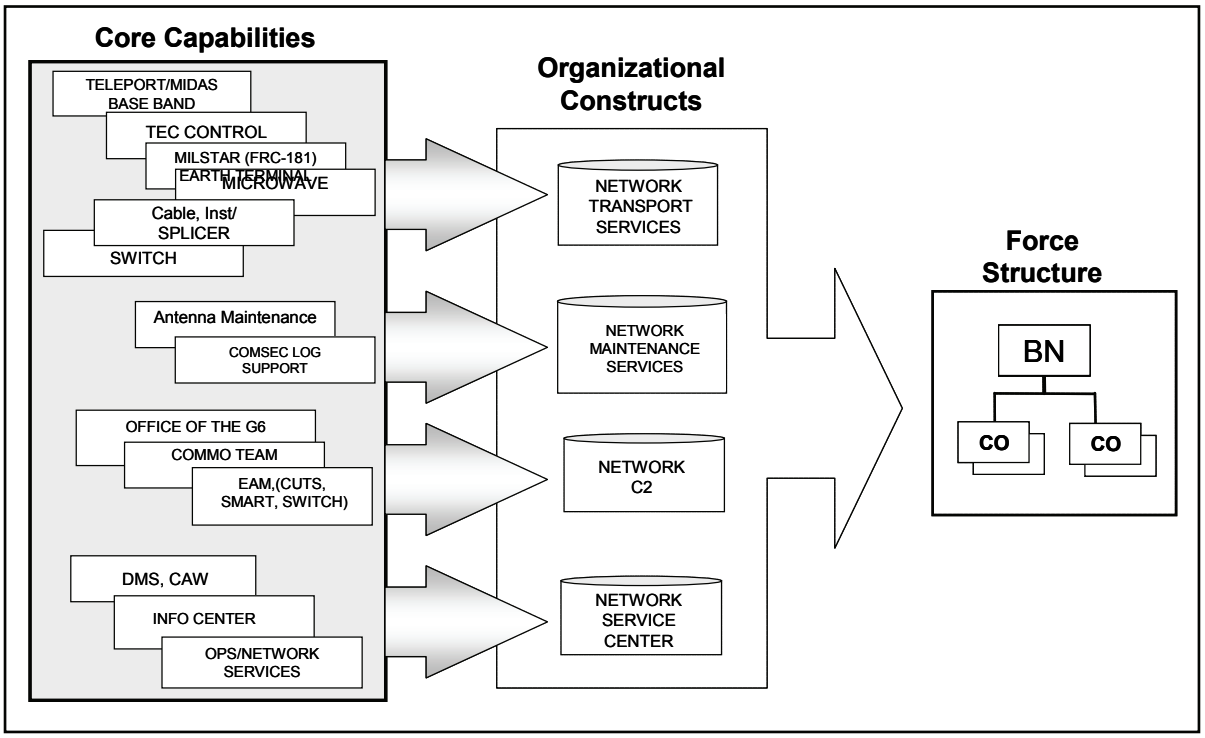

Figure 4-2. Strategic design

Battalion Headquarters

4-24. Battalion Headquarters provides C2, staff planning, and supervision of assigned and attached strategic signal units.

Company Headquarters

4-25. Company Headquarters provides C2 and logistic support for the company. Its operations section is responsible for planning, coordinating, and supervising the operations of all company strategic communication and signal support missions.

4-26. The Network Service Center, Network Transport Services, Network Maintenance Services, and Network Command and Control are organizational constructs that were derived from consolidating like functions and small teams to create a standardized design that is based on a core capability.

Network Service Center

4-27. **NETOPS.** Responsible for planning, coordinating, and supervising the Network Service Center.

4-28. **Network Management Section.** Provides inside/outside plant operation and maintenance on digital telecommunication equipment.

4-29. **Data Network Administration Team.** Provides IA assistance for network systems unique to a geographic region, also LNO to Regional Network Operations and Security Center.

4-30. **Dial Central Office.** Provides inside/outside plant operation and maintenance on voice telecommunication equipment for a geographic region.

4-31. **Dial Service Assistance Switch Operations.** Provide information support and dial assistance for customers in a geographic region.

4-32. **Network Management Team.** Provides technical customer assistance and, as required, dispatches voice/digital touch labor maintainers for a geographic region.

4-33. **Video Telecommunication Hub.** Provides operation and maintenance of commercial Video Telecommunication Hub/Bridge for a geographic region.

4-34. **DMS/COMSEC Team.** Provides DMS organizational/individual electronic messaging and COMSEC material support for customers in a geographic region.

4-35. **Certification Authorization Workstation (CAW) Team.** Provides COMSEC material support and management for customers in a geographic region.

4-36. **DSN Switch (Defense System Network).** Provides operation and maintenance of a commercial and/or tactical electronic switching system for a geographic region.

4-37. **Area Support Team**. Provides installation, operation, and maintenance of commercial communication systems for a geographic region.

Network Transport Services

4-38. **Global Operations.** Responsible for planning, coordinating, and supervising the operations and maintenance of SATCOM terminal sites.

4-39. **SATCOM Terminal Teams.** Provide earth terminal communications as part of the DSCS which is used to establish CCDRs networks, emergency action message (EAM) dissemination, force direction, integrated tactical warning and assessment (ITW&A) reception, and summary transmissions.

4-40. **Baseband Teams**. Provide a tactical interface to the DSCS, which is used to establish CCDRs networks, JTF networks, and EAM dissemination, force direction, and ITW&A reception and summary transmissions.

4-41. **Advanced Baseband Teams.** Provide additional commercial and military bands that provide a tactical interface to the DSCS using teleport as the baseband. Types of advanced baseband include the following: UFG, EHF, C, Ka, and Ku.

4-42. **Automated Technical Control.** Provides an intermediate level of OPCON and technical direction over Defense Communications System (DCS) facilities and systems, as required by DISA. The following identify the two different facility classifications:

- Circuit (V) 1: Technical Control with 100 to 1000 circuits.
- Circuit (V) 2: Technical Control with 1000 + circuits.

4-43. **Microwave Teams.** Provide installation, operation, and maintenance of microwave communications for a geographic area.

4-44. **Cable Install/Splice Teams.** 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 within a geographic area.

Network Maintenance Services

4-45. **COMSEC Log Support Team.** Provides COMSEC custodian functions, COMSEC equipment maintenance, and COMSEC logistics functions to a geographic region.

4-46. **Antenna Maintenance Team.** Supervises the emergency and scheduled maintenance services and quality assurance inspections for antenna and antenna support structure of the Army and other government agencies.

4-47. **Long-Haul Maintenance Team.** Provides electronic equipment maintenance of communication systems, i.e. microwave. The team performs engineering quality control and continuity testing of microwave circuits, trunks, systems, and facilities.

Network C2

4-48. **EAM Systems.** Provide emergency and contingency communications to a region along the entire spectrum of conflict.

4-49. **ASCC/CCDR Communication Team.** Provides communications support in the form of secure frequency modulation radio, UHF TACSAT, record telecommunications message support, and COMSEC equipment maintenance to combatant and/or Army Service Component Commanders.

4-50. **Communications Management Support Team (CMST).** Provides deployable communications support directly to Secret Service agents engaged in protective missions for presidential candidates, visiting dignitaries, and other special events, as directed.

4-51. **Office of the G-6.** Provides plans, operations, staff oversight, and coordination for information and communication systems support to Army, Joint, and Combined Headquarters.

4-52. **MILGROUP COLUMBIA.** Provides supported commander communications assistance in the form of single channel TACSAT, HF radio, secure frequency modulation radio, non-tactical single channel radio, automated information and COMSEC installation, operation, and maintenance (IOM). It also provides signal advice, expertise, and training to non-signal personnel in supported units.

4-53. **JTF BRAVO Honduras**. Provides staff oversight, planning, coordination, management, and command of telecommunications system and information systems support functions support to combat and non-combat Army, Joint, and Combined Headquarters.

SECTION III – SIGNAL OPERATIONS

ORGANIZATIONS FOR THE MODULAR FORCE

4-54. Chapter 1 addresses modular forces and their construct in the Army. In theater, the numbered Army is organized and equipped primarily as the ASCC for a geographical combatant command. To support command, control, telecommunications, and network requirements, the ASCC commander calls upon several modular, multifunctional, scalable units that provide communications network support across theater echelons and spectrum of conflict.

ARMY SERVICE COMPONENT COMMAND G-6

4-55. Theater LWN is greatly dependent on many factors starting with the ASCC G-6. The ASCC G-6 is responsible for all LWN operations within a specified geographical region. The theater G-6 provides LWN support to the geographical combatant command, to Army units operating in the theater in support of the geographical combatant command, and to other services and joint elements as directed by the geographical combatant command and theater army commanders.

4-56. The ASCC G-6 serves as the theater senior signal officer providing network oversight of theater LWN and joint systems under its control. Additionally, the ASCC G-6 develops theater LWN requirements and manages the activities and resources needed to install, employ, and protect all operational and strategic networks supporting the ASCC and its subordinate forces. The ASCC G-6 will also ensure proper integration and protection of all tactical networks employed by maneuver and tactical forces at the corps/division and BCT levels to ensure those tactical commanders have the quality of service they need to prosecute the fight. Some duties of the ASCC G-6 are to—

- Provide and maintain NETOPS situational awareness of the theater LWN environment and network asset availability.
- Maintain network status and provide oversight of NETOPS, changes, threats, and emerging requirements of the theater LWN.
- Provide internal IT support to ASCC headquarters.
- Execute and manage theater EMS management functions.
- Coordinate with host-nation communications authorities.

- Provide oversight of the theater CND posture.
- Oversee theater COMSEC operations to include storage, management, distribution, inspection, and compliance.
- Provide input to the TNCC and JNCC as required.
- Provide theater battlefield EMS management to include allotment, assignment, and control of radio and SATCOM frequencies for units assigned, attached, or OPCON to the ASCC and spectrum issues affecting joint, coalition, and host-nation agency requirements.
- Execute CIO functions for the theater and oversees theater enterprise programs, projects, and initiatives in accordance with Clinger-Cohen Act and AR 25-1.
- Coordinate LWN IA activities with IO Cell, TNOSC, and RCERT and recommend theater information operations condition postures in accordance with G-2/G-3/IO.
- Act as JTF J-6 or JFLCC J-6/ARFOR G-6 as required.

Note. Most theater level signal assets are scheduled for reorganization. It would not be uncommon for the senior signal organization in a theater to be a signal brigade as opposed to a Signal Command (Theater) (SC(T)). These brigade commanders will hold the same responsibilities as a SC(T) commander.

SIGNAL COMMAND (THEATER)

4-57. The SC(T) is the highest level, deployable organization in charge of theater LWN. It is a major subordinate command of NETCOM and operates OPCON of a supported ASCC. The SC(T) is organized, equipped, and manned to plan, engineer, integrate, manage, and defend the Army's portion of the GIG with the mission of operating as the primary network provider for theater LWN. It exercises C2 over strategic and tactical organizations, the TNOSC, visual information (VI) resources, wire and cable and commercial infrastructures, and theater signal maintenance. Total force composition under the C2 of the SC(T) is dependent on METT-TC (Figure 4-3) and the CCDRs' requirements.

4-58. A SC(T) or senior theater signal brigade provides signal support to the ASCC including MCO missions. The SC(T) will command and control multiple theater signal brigades and joint and coalition information signal support elements. ASCC missions that do not involve MCO will usually receive support by a signal brigade rather than a full SC(T).

4-59. The SC(T) HQ is a standard Table of Organization and Equipment design. In order to meet regional or theater-unique METT-TC based requirements and combatant command's daily operational requirements, it may be necessary to provide an augmentation table of distribution and allowances and a Modified Table of Organization and Equipment exception authorization document to tailor the SC(T) to meet selected fixed infrastructure mission requirements.

4-60. The commander of the theater's senior signal organization SC(T) or Signal Brigade (Tactical) serves as the theater G-6. While the SC(T) commander receives mission orders from the ASCC commander, the SC(T) also performs network management through technical channels via HQ NETCOM, the applicable Geographical Combatant Command J-6, and the USSTRATCOM/JTF-GNO for service and global enterprise management, technical compliance, and network defense.

4-61. The SC(T) is dependent upon other organizations for large-scale communication infrastructure architecture engineering support; theater facility engineering support; health services; human resource, finance, and administrative services; troop transportation support; and legal services. The SC(T) is also dependent upon the ASCC for theater COMSEC and EMS managment.

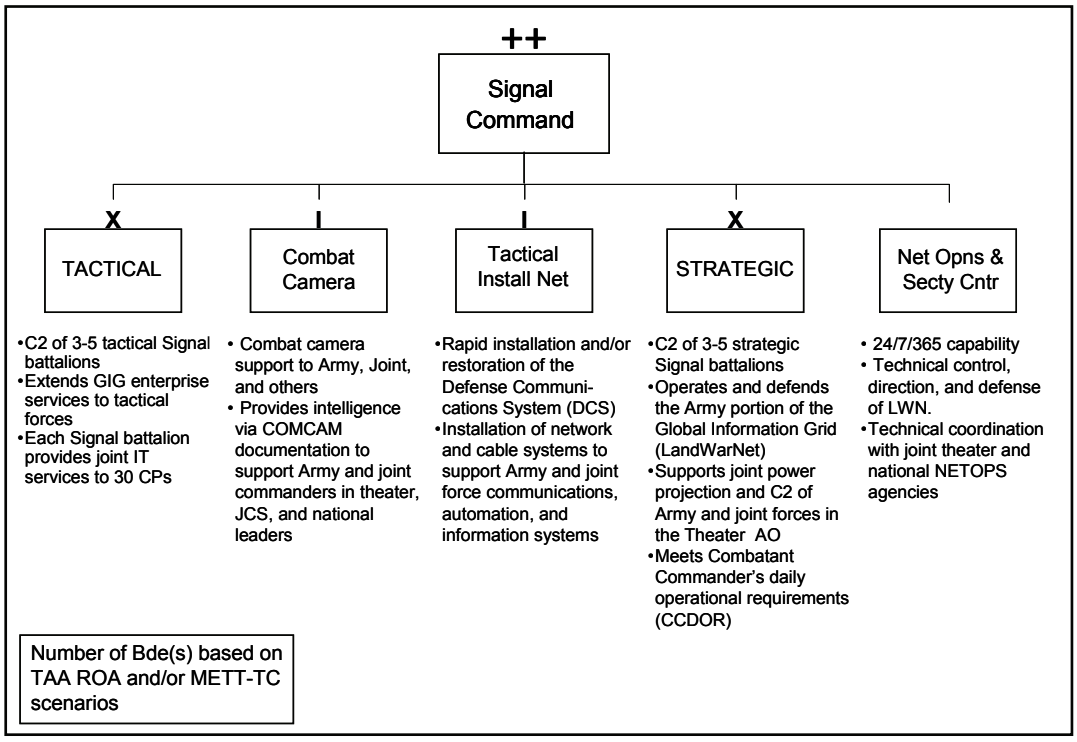

Figure 4-3. SC(T) subordinate elements

4-62. The SC(T)'s mission is also to—

- Provide C2 and supervision for units assigned, attached, and OPCON to the SC(T).
- Provide a staff component for various operational commands including JTF J-6, JFLCC J-6, ARFOR G-6, and corps/division G-6.
- Support early entry mission requirements.
- Provide operational management of signal assets responsible for install, operate, maintain and defend (IOM-D) theater LWN to include centralized management of voice, data, messaging, and VTC capabilities.
- Provide IA management supporting information protection for theater LWN systems.
- Develop policies and procedures for IA support in order to protect, detect, and react to the ACERT strategies as directed by the ASCC G-6.
- When tasked, establish the JNCC with augmentation from other services or provide the Army's portion to the JNCC, once established.
- Provide oversight to the TNOSC.
- Plan, engineer, and manage signal support systems installed by the SC(T) and network interfaces to existing systems installed by joint, combined, and allied units.
- Plan, engineer, and manage requirements for special-purpose communications/information systems.
- Provide planning and staff management of the GMFs/TACSAT Theater SATCOM Monitoring Center and Army GMFs in the theater of operations.
- Work closely with the DISA and ASCC G-6 concerning DISN matters to include coordinating with host-nation communications organizations for planning and using commercial and host-nation assets within theater.
- Provide planning, staff supervision, and coordination of SC(T) logistics, public affairs, and command information programs, inspector general matters, comptroller services concerning programming, budgeting, and controlling funds, and to facilitate engineering support.

- Provide coordination of operations and planning and to evaluate and prepare reports of chemical, biological, radiological, and nuclear activities throughout the SC(T) affecting signal assets.
- Provide theater VI units supporting the ASCC.
- Provide software management for units assigned, attached, or OPCON to the SC(T), to include managing all applications and proprietary software, managing all noncombatant service support software, and advising the ASCC G-6 staff on software and application matters pertaining to NETOPS.

4-63. The SC(T) can expect to deploy any part or the entire organization to meet METT-TC requirements. It will operate in a manner to support LWN requirements in theater, whether as a forward element, operating in sanctuary, or from a power projection platform. It must be able to direct the execution of sustaining base, strategic, and tactical information and communication systems supporting Army, joint, and coalition operations during all phases. Ideally, the SC(T) center of mass will locate where the commander can best exercise C2 over signal assets, influence theater network schemes and architectures, and overall best meet network requirements supporting the ASCC commander or JFC.

5th SC(T)

4-64. This command is OPCON to USAREUR and Seventh Army. The commanding general also serves as the Deputy Chief of Staff, G-6 (CIO) for USAREUR and Seventh Army. The 5th SC(T) 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. The 5th SC(T) is also capable of meeting requirements to support worldwide contingencies in response to the joint staff, HQDA, and NETCOM directives to install, operate, and restore theater tactical communications across the spectrum of conflict.

311th SC(T)

4-65. The 311th is the designated SC(T) for the USARPAC. The 311th SC(T) is a USARC flagged multi-component organization that is under the OPCON of USARPAC. The 311th SC(T) receives ADCON support from both NETCOM/9th SC(A) and the USARC. The commander of the 311th SC(T) is multi-missioned as the Deputy Chief of Staff, G-6 of USARPAC, the RCIO for IMCOM Pacific Region, and the J-6 of the JTF- Homeland Defense.

335th SC(T)

4-66. This command is a multi-component SC(T) (USAR flagged) with the mission to manage telecommunications infrastructure for SWA (South Asia, Middle East, North Africa) in support of the United States Army, Central Command (USARCENT)/3rd Army for US 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 and under the OPCON of CENTCOM. The commander of the 335th serves as the ARFOR G-6 or JTF J-6 of the supported force.

THEATER TACTICAL SIGNAL BRIGADE

4-67. Tactical brigades and battalions extend information network services to the deployed Army HQ and other deployed subordinate organizations allocated to the Army's AO. Tactical units are not organic to a signal command, but are allocated based on mission requirements. Network assets are apportioned to supported units according to METT-TC and the supported unit's specific communications and network requirements.

4-68. The mission of the TTSB is to command and control up to five tactical battalions and any other assigned or attached forces necessary to meet the network support missions in the theater of operations. The TTSB is equipped, manned, and organized to provide C2 functions and staff assistance to the subordinate units, staff supervision, personnel actions and administration, and logistics actions. TTSBs are forces assigned to NETCOM and OPCON to specific supported CCDRs, service component commanders,

or JTF commanders. TTSB contains the normal headquarters and staff elements found in other tactical formations (see Figure 4-4). In addition, the TTSB—

- Conducts systems planning, transport, and infrastructure engineering.
- Develops architecture, design, and integration studies.
- Determines technical circuit characteristics.
- Develops plans for establishing communications systems.
- Provides field support and sustainment support to operational missions in the form of ESBs.
- Can provide a span of control for EAC signal support to JOA.
- Provides passive and value-added services to Army Forces within the JOA, including common user services and COOP facilities.

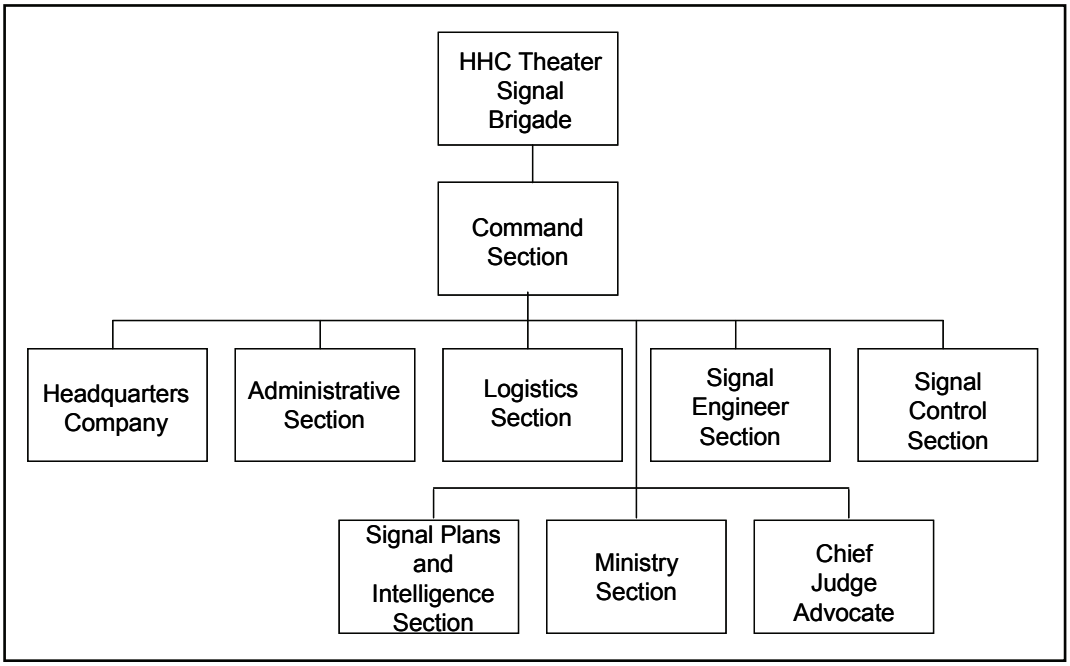

Figure 4-4. Theater tactical signal brigade

Headquarters Company, TTSB

4-69. The S-1 officer is responsible for all human resources and administrative functions in the brigade, to include advising the commander on all human resource related issues and providing legal advice and assistance, supported by personnel of the Judge Advocate General Corps.

4-70. The S-4 officer provides oversight for all and logistics plans and functions for the brigade. This section also advises the brigade commander on all matters pertaining to logistics, transportation, deployment, and maintenance.

4-71. The communications operations section for the brigade (S-3) conducts detailed systems integration and network planning functions for the brigade. This section also is responsible for—

- Determining equipment suitability and adaptability with existing 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.
- Establishing the brigade communications systems control element (CSCE) responsible for keeping network situational understanding and status of current and future needs for rerouting or reconstituting circuits and facilities throughout the communications system.

- Providing effective operational management and responsive SYSCON.
- Taking appropriate actions to optimize the deployed network performance in response to constantly changing network configurations.
- Establishing and maintaining required databases necessary to assist in near real-time control of communications systems and to assist the signal plans and intelligence section in systems planning and engineering.

Note. The majority of the following signal brigades will become a theater's senior signal organization to perform more effectively and efficiently the Service Title 10 functions that support the transformed campaign – quality operating force with joint and expeditionary capabilities.

1st Signal Brigade

4-72. This brigade provides OPCON support to United States Forces, Korea (USFK) and 8th US Army in the Korean theater of operations. The 1st Signal Brigade commander serves a dual role as the 8th Army G-6 with an augmenting staff provided by the 311th SC(T). The 1st Signal Brigade is unique in that it has both tactical and strategic battalions assigned which provide a combat-ready, forward-deployed LWN capability for responsive theater tactical, strategic, and installation signal support to CCDRs, the United Nations Command, Combined Forces Command, USFK, and Warfighters in the 8th Army area across the spectrum of operations. During wartime, the 1st Signal Brigade comes under the OPCON of the 311th SC(T) for the USPACOM or 8th Army AO.

7th Signal Brigade

4-73. This brigade provides OPCON support to USAREUR. It 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

4-74. This brigade is a CONUS based unit that is regionally focused to provide theater level and special tactical requirements to support USCENTCOM, USARCENT, and USPACOM, as required. The 11th Signal Brigade also provides support to worldwide contingencies in response to the joint staff, HQDA, and NETCOM mission directives to install, operate, maintain, and restore LWN systems across any spectrum of conflict to include support to the BCT level, as necessary. The 11th Signal Brigade provides a forward stationing presence using the 54th Signal Battalion in order to meet daily signal and DOIM support in the USCENTCOM AOR.

35th Signal Brigade

4-75. This brigade is a CONUS based unit that is regionally focused to provide theater level and special tactical requirements to support United States Army South (USARSO). The 35th Signal Brigade commander serves a dual role as the USARSO/G-6. The 35th Signal Brigade is also capable of supporting worldwide contingencies in response to the joint staff, HQDA, and NETCOM directives to install, operate, and restore theater tactical communications across the spectrum of conflict.

228th Signal Brigade and the 261st Signal Brigade

4-76. These brigades are ARNG tactical brigades under the command of the ARNG during peacetime. Their mission focus is homeland defense and CONUS contingency requirements. In wartime, the units are under the command of NETCOM and are assigned in accordance with applicable OPLANS.

359th Signal Brigade

4-77. This brigade is an USAR TTSB under the command of the USARC and the 335th SC(T). In wartime, the unit is commanded by NETCOM and is assigned in accordance with applicable OPLANS.

THEATER SIGNAL MAINTENANCE COMPANY

4-78. The Theater Signal Maintenance Company (TSMC) is a one of kind unit that, with its current structure, supports the TTSB as an initial-entry deployer, providing immediate readiness of all ground support equipment to facilitate the critical theater signal mission. It also provides rapid deployable and dedicated general support and limited depot signal support for a theater of operations for the TTSB.

4-79. The 556th TSMC is assigned to the 11th Signal Brigade's 504th Signal Battalion in the garrison environment. The current structure includes a HQ platoon and three maintenance platoons. When deployed, the TSMC supports MCO by employing a dedicated platoon as required (usually one platoon per MCO) to support TTSBs.

4-80. The TSMC's viable mission is to provide dedicated sustainment maintenance and class IX supply support to a theater of operations for TRI-TAC, MSE, computers, and conventional communications-electronics (C-E) end items and components.

4-81. The TSMC provides a maintenance control section for theater unique and common signal assemblages. It also provides a dedicated authorized stockage list and prescribed load list element for common and exclusive theater signal systems that are not necessarily demand supported but require intense control and management for the gaining brigade. The following are its repair and support capabilities:

- Modules, circuit boards/cards for high demand, high usage, and low density theater signal assemblages.
- Automated data processing equipment (including teletype, Tactical Army Combat Service Support Computer System, and associated peripherals).
- HF communications equipment.
- Microwave equipment (including multichannel, TACSAT, and Tropospheric Scatter [TROPO]).
- Fabricates both copper and fiber optic cables for unique applications.
- Communications security equipment (including a specialized support activity for selected controlled cryptographic items).
- Ground support equipment (including power generation units with outputs up to 200 kW, environmental control units, forced air heaters, power-driven decontamination equipment, and gasoline engines).

EXPEDITIONARY SIGNAL BATTALION

4-82. Over the course of the past several years and with the onset of the global war on terror, theater signal has undergone significant change to meet the information demands of CCDRs and joint forces. In step with the Army transition and modularity the integrated theater signal battalion (ITSB) was developed. As designed, these signal assets reside at the Army echelon as a "force pool" and can be deployed across the entire spectrum of conflict in any segment of a theater, while supporting a larger and more diverse customer base. Few signal battalions converted to the ITSB design and provided the theater a modular, multi-capable, deployable unit that met the information and network requirements needed at most levels. Later it was found that the MSE switching and LOS systems employed by the ITSB structure could not provide the data bandwidth requirements of supported units at all echelons. With the introduction of the next generation switch and data systems, it was found that signal battalions can be structured in a way that better enabled employment of network assets to support the increased number of medium and small command posts. These augmentations spurred the concept of an enhanced version of the ITSB that transformed into a modular expeditionary-capable signal formation known today as the ESB.

Note. The ESB is formally known as an integrated theater signal battalion–joint network node (ITSB-J). With the accelerated fielding to equip signal battalions with JNN, the approved naming convention of "ESB" was established.

4-83. While primarily a theater level asset, the ESB may be employed to support a corps/division, BCT, or service component, or coalition headquarters based on METT-TC. Although the ESB is typically assigned to a TTSB, it may be assigned or attached to other higher level organizations as well, or may operate as part of a separate network package supporting specific missions such as Homeland Defense.

4-84. The ESB design simplifies the overall C2 of signal assets. As a modular element, it eliminates the need to task organize from multiple organizations to form a single communications support package, thereby enhancing unit cohesion and deployment planning, supporting "train-as-you-fight" and ensuring faster training for signal leaders in a systems-centric environment. The ESB also simplifies network training requirements by facilitating end-to-end systems level training versus training in single function environments. Each battalion has the capability to link back to the sustaining base, as well as provide other C2 linkages to intra-theater nodes as needed.

4-85. The introduction of next generation switch/data systems and the reduction in the number of large switches has allowed the ESB to be structured in a way that better enables employment of network assets to support the increased number of medium and small command posts. This flexible structure improves the ESB's ability to respond quickly to support missions with precisely sized capabilities down to the team level that minimize the deployed signal footprint. The total support capability of the ESB has grown from 15 to 30 command posts.

4-86. The ESB design, as depicted in Figure 4-5, provides a multifunctional structure that—

- Supports theater elements operating in both theater and corps/division areas.
- Is designed to leverage current equipment for immediate standup while providing a modernization path to incorporate JNTC-S or WIN-T systems as resources become available.
- Is applicable to all Active and Reserve components.
- Is designed for the MCO fight and is capable of executing missions across full spectrum operations.

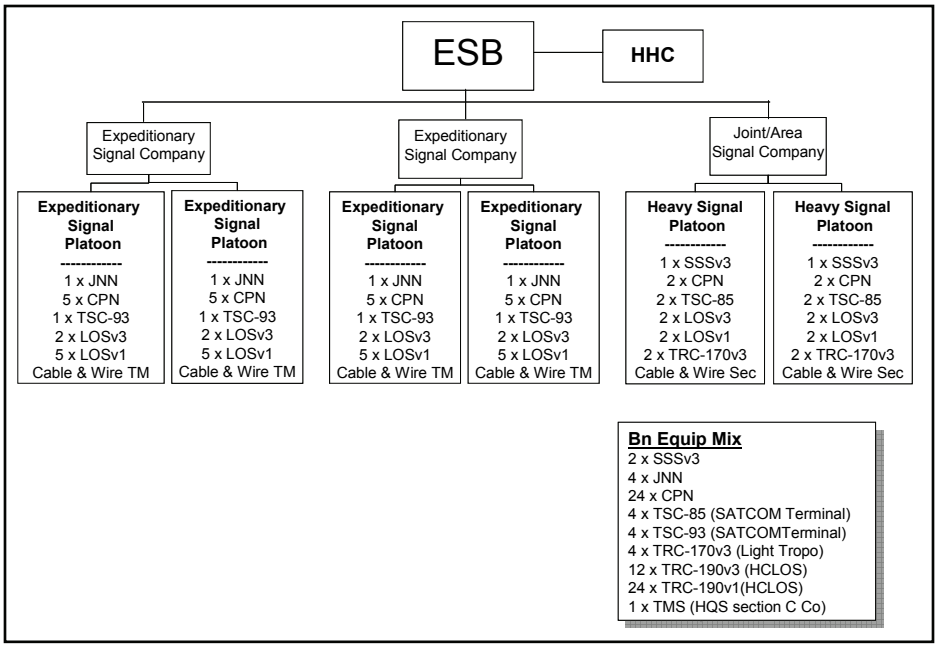

Figure 4-5. The ESB structure

ESB Structure and Functions

4-87. The ESB consists of a battalion headquarters and headquarters company (HHC), two identical Expeditionary Signal Companies, and a Joint/Area Signal Company.

4-88. **Battalion Headquarters**. The ESB HQ staff performs C2, administrative logistics, and force protection functions to support the commander in executing the battalion's mission. The battalion headquarters requires 100 percent mobility (the ability to transport all organic personnel and equipment in a single lift).

4-89. **Headquarters Company**. The battalion headquarters company provides personnel and facilities for C2 and coordination of the company mission. Personnel and equipment are provided for coordination and oversight of company administration, supply, force protection, and field-level maintenance of wheeled vehicles, power generation equipment, C-E equipment, and small arms. The company headquarters provides food service in a field environment. The company requires 100 percent mobility (the ability to transport all organic personnel and equipment in a single lift).

Expeditionary Signal Company

4-90. The Expeditionary Signal Company is designed to provide network services to small and medium command posts. The company consists of a company headquarters and two identical Expeditionary Signal Platoons (ESPs).

4-91. **Company HQ**. The company headquarters provides personnel and facilities for C2 and coordination of the company mission. Personnel and equipment are provided for coordination and oversight of company operations, administration, supply, and force protection functions. Soldiers are provided to conduct field-level maintenance of wheeled vehicles, power generation equipment, C-E equipment, environmental control equipment, and small arms. The company headquarters provides food service in a field environment.

4-92. **ESP.** Each ESP consists of a JNN Team, two LOS V3 Teams, five CPN Teams, five LOS V1 Teams, a TACSAT Terminal Team, and a Cable Team. Typical platoon missions include the installation, operation, and maintenance of communication systems in support of battalion and brigade-level command posts. The platoon may be tasked to dispatch individual teams to separate support missions or to be combined with other teams, platoons, or companies to meet specific mission requirements at any echelon. Normally the LOS V1 teams will only be employed with a CPN.

Joint/Area Signal Company

4-93. The Joint/Area Signal Company is designed to provide network services to medium and large command posts and command post clusters. The company consists of a company headquarters and two identical Heavy Signal Platoons.

4-94. **Company HQ**. The company headquarters provides personnel and facilities for C2 and coordination of the company mission. Personnel and equipment are provided for coordination and oversight of company administration, supply, force protection, and field-level maintenance of wheeled vehicles, power generation equipment, C-E equipment, environmental control equipment, and small arms. The company headquarters provides food service in a field environment. The TMS Section is in the company headquarters.

4-95. **Heavy Signal Platoon**. The Heavy Signal Platoon consists of a Switch Section, two LOS V3 Teams, two CPN Teams, two LOS V1 Teams, two Light TROPO Terminal Teams, two TACSAT Hub Teams, and a Cable Section with two cable teams. With its larger switches and heavier BLOS transmission capabilities, the platoon is suited to support large command posts, command post clusters, or support bases. The platoon can also support battalion- and brigade-level command posts, and may be tasked to dispatch individual teams to separate support missions or to be combined with other teams, platoons, or companies to meet specific mission requirements.

Operational Employment

4-96. The ESB is designed to afford network planners flexibility in configuring resources to meet user requirements precisely. In keeping with modularity principles, the ESB and its signal companies, platoons, and teams may be tailored and task organized so that only the precise package of capabilities needed to satisfy a given mission is deployed. In the same manner, companies, platoons, or teams may be added to an ESB to meet the demands of a particular mission.

4-97. The ESB and its subordinate elements may be tasked to support organizations anywhere in a theater AO, to include army-level units provisioned to division-level support brigades. Network support missions may require a full battalion, a company, or a platoon; however, missions may require the deployment of individual teams to support separate units in widely dispersed locations at every echelon of an operation. Mission orders will normally be issued by the Army G-3 in coordination with the Army G-6 and disseminated to the ESB through the SC(T) HQ and Tactical Signal Brigade HQ.

4-98. In a MCO, mission orders will normally be issued by the theater army G-3 in coordination with the theater army G-6. Mission orders will be disseminated to the ESB through the SC(T) headquarters and Tactical Signal Brigade HQ.

4-99. ESB subordinate companies, platoons, sections, and teams attached to supported units will normally receive logistical support, to include rations, petroleum, oils, lubricants, ammunition, medical care, repair parts, and maintenance services from the supported unit. Support requirements will be specified in the attachment order.

Command Relationships

4-100. ESBs are assigned to Tactical Signal Brigades. Tactical Signal Brigades are assigned to either a SC(T) or to NETCOM/9th SC(A). Tactical Signal Brigades are aligned to support numbered armies (USAREUR/7th Army, USARPAC/8th Army, USARCENT/3rd Army, USARSO/6th Army, and USARNORTH/5th Army).

4-101. When assigned a network support mission, ESBs and subordinate elements will be detached from the parent unit and attached to the supported unit for the duration of the mission.

TACTICAL INSTALLATION AND NETWORK COMPANY

4-102. The Tactical Installation and Network (TIN) Company provides large network infrastructure installation and rapid installation and restoration of the DCS within an Army's AO. Growing from a need to provide responsive and agile advanced network installation services for critical missions, the TIN Company has the capability to restore or install critical pieces of the DCS, which includes the DSN, the DSCS, and the DISN. Thorough planning identifies the necessary work requirements, specific core competencies, an estimated bill of materials, and personnel requirements.

4-103. The TIN Company—

- Provides follow-on tactical support to signal packages for semi-permanent and permanent tactical automation, network installation, and information system support utilizing user provided bills of materials.
- Provides rapid DCS installation and restoration.
- Deploys in support of combatant commands, JTF, JFLCCs, ASCC, and SC(T)s. May be employed to support other service component or coalition headquarters, permanent or semi-permanent enclaves.
- Provides technical expertise to interpret and implement engineering plans for communication systems.
- Advises the supported commander on aspects of network installation to include inside plant, outside plant, LAN installation and initialization.
- Performs quality assurance testing and handoff of installed and restored systems.

- Installs, maintains, and repairs aerial, buried, or underground cable, wire, and fiber optic transmission systems.
- Repairs and maintains indigenous cable, wire, and fiber optic systems, and provides antenna and tower construction and repair.
- Provides LAN installation and cabling using any mix of military and commercial standards and materials.
- Provides automation support to include LAN initialization, network security, DMS, DRSN, SIPRNET, NIPRNET, and VTC.
- Installs or restores the DSCS terminal.
- Installs or restores a strategic to tactical interface path.

4-104. One TIN Company typically deploys to an Army's AO. The company may be attached or OPCON to a SC(T) HQ, an ITSB, ESB or TTSB, an ARFOR or JFLCC G-6/J-6 staff section or under an organization responsible for joint communications until an Army signal headquarters deploys into theater. Platoons, sections, and teams can operate autonomously to support various locations, base clusters, and enclaves. The TIN Company can also deploy tasked organized teams, sections, or platoons to support contingencies in CONUS and OCONUS. The organization structure for a TIN Company is depicted in Figure 4-6.

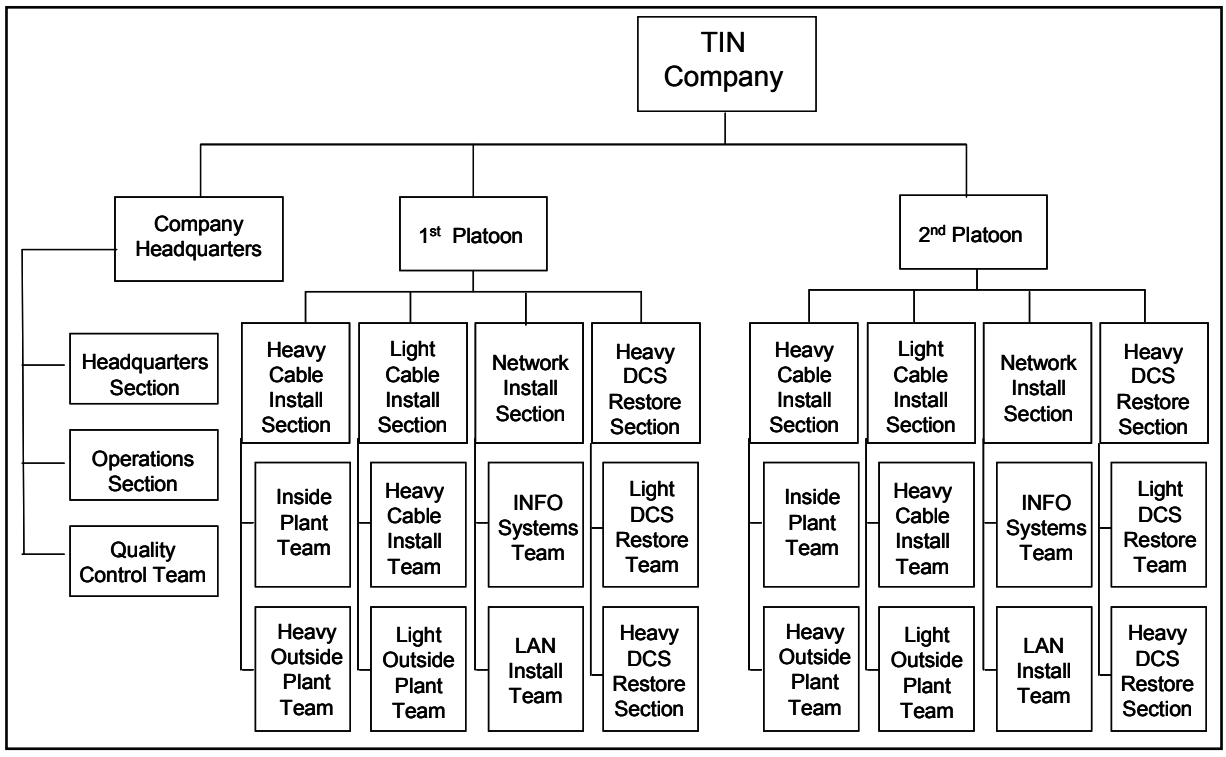

Figure 4-6. Theater TIN Company

COMBAT CAMERA COMPANY

4-105. The COMCAM Company's mission is to provide digital and analog motion and still visual documentation covering armed forces in war, natural disasters, and training activities. COMCAM documentation is an essential battlefield information resource that supports strategic, operational, and tactical mission objectives. It is a fundamental tool for commanders and decision makers that, when utilized properly, is an effective combat multiplier. The operational commander is the release authority for all collected COMCAM images. This authority can be delegated to the appropriate J-3 or G-3. The local command must release the images before they can be transmitted out of the theater. Images must be

transmitted back to the Joint COMCAM Center within 24 hours to meet the mission requirements of the national command authority, Joint Chiefs of Staff, and other military departments. At the theater level, the COMCAM Company is attached to the theater's signal unit and task organized to receive mission direction to the ASCC G-3, with the theater's signal unit providing support. The COMCAM Company provides the following to the theater:

- Staff planning, control, and supervision of company operations including augmenting personnel or materiel assets and liaison to supported units, and other service supported units.
- COMCAM editing for the electronic processing of digital still and motion imagery acquired by documentation teamsor other COMCAM field units located in the theater AO.
- Establishment, operation, and maintenance of COMCAM facilities supporting the theater including the joint collection management tool..
- Operating support facilities to provide tailored still and motion media products, graphics products, narration support, video reports, and COMCAM equipment maintenance.
- Presentation and exploitation of visual imagery in support of operational or intelligence requirements or documentation for historical purposes.

THEATER NETWORK OPERATIONS AND SECURITY CENTER

4-106. The TNOSC operates, manages, and defends the LWN in order to deliver seamless information and communication systems capabilities in support of all in-theater Army entities in its AO. The TNOSC executes its NETOPS responsibilities in coordination with the Army G-6. RNOSCs may execute TNOSC functions on a geographic basis within their AOR under tactical control of the TNOSC. The responsibilities of the TNOSC are to control performance of technical functions of both fixed theater network infrastructure and tactical Army signal units within the theater AOR.

TNOSC Deployment Support Division

4-107. In conjunction with the modular restructuring of the Army, the signal command is undergoing revision in order to support emerging requirements of the new modular force. One such revision is the addition of a new Deployment Support Division (DSD) within the TNOSC. The DSD has the primary responsibility for all TNOSC support to deployed forces. It is comprised of two branches: the Tactical Network Team (TNT) and the Tactical Integration Cell (TIC) as shown (with the other TNOSC divisions) in Figure 4-7.

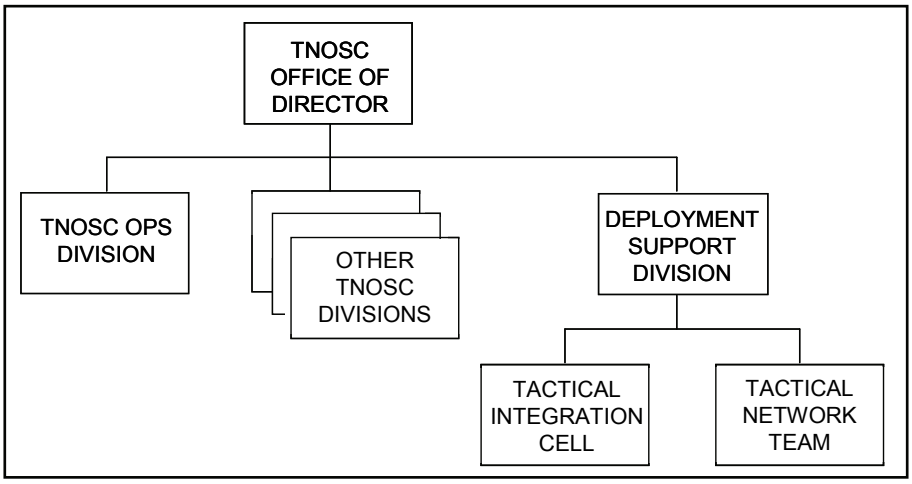

Figure 4-7. TNOSC DSD structure

Tactical Network Team

4-108. The TNT is a fully deployable NETOPS entity (but based on METT-TC it is not necessarily fully or always deployed). The TNT acts as a fully integrated NOSC providing NETOPS functions for the SC(T) commander or signal brigade commander. The TNT will leverage supporting capabilities of the ASCC TNOSC to execute its NETOPS functions. The ARFOR TNT monitors, manages, and controls inter-BCT, division and corps, and EAC information network components.

Tactical Integration Cell

4-109. The TIC is a body of tactical network personnel within the DSD of the TNOSC that is dedicated to the integration and support of NETOPS for tactical units. The TIC provides the following functions:

- Oversight and management of tactical ASCC NETOPS support services, such as the tactical NETOPS systems.
- Supplementary or backup network services in direct support of other network elements as required. These services include storage and directory, as requested by the ARFOR. These functions are value-added services and are not intended to replace critical organic NETOPS assets within the chain of command.
- Technical subject matter expertise upon request to analyze and resolve tactical network problems and incidents.
- Coordination of any required interoperation of ASCC NETOPS systems with tactical NETOPS systems such as e-mail, collaboration, DNS, and directory services.
- Any necessary system interfaces, equipment augmentation, or NETOPS processes to enable standard Army tactical forces to interoperate seamlessly with combatant command's specific requirements and policies.

4-110. The TIC responsibilities also include the formation of temporary Tactical Liaison Teams (TLTs), which are dedicated to the support of a specific tactical unit. The TLT performs a liaison function to the supported unit's NETOPS cell, providing essential integration services between the tactical unit and the respective TNOSC, while also providing valuable technical NETOPS augmentation to the unit's organic NETOPS capability. When supporting a corps/division or corps/division-based command, a TLT typically collocates with corps/division personnel at the tactical Network Service Center. TLT personnel in support of an expeditionary BCT may perform functions from the TNOSC, or may relocate to other locations as missions dictate. Two typical scenarios for these elements are depicted in Figure 4-8 and Figure 4-9.

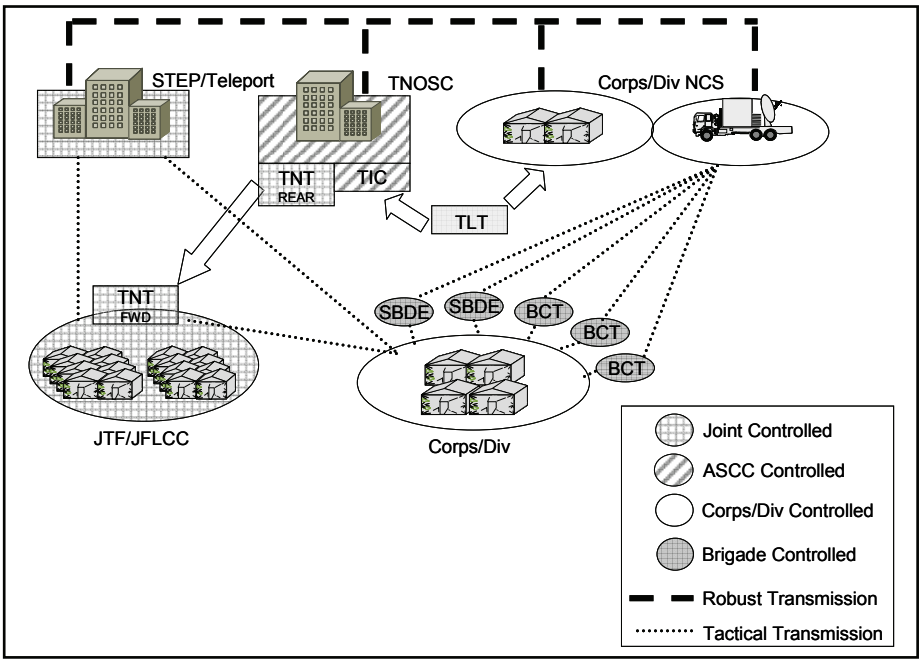

Figure 4-8. TNOSC DSD elements – TNT, TIC, and TLT with corps/division

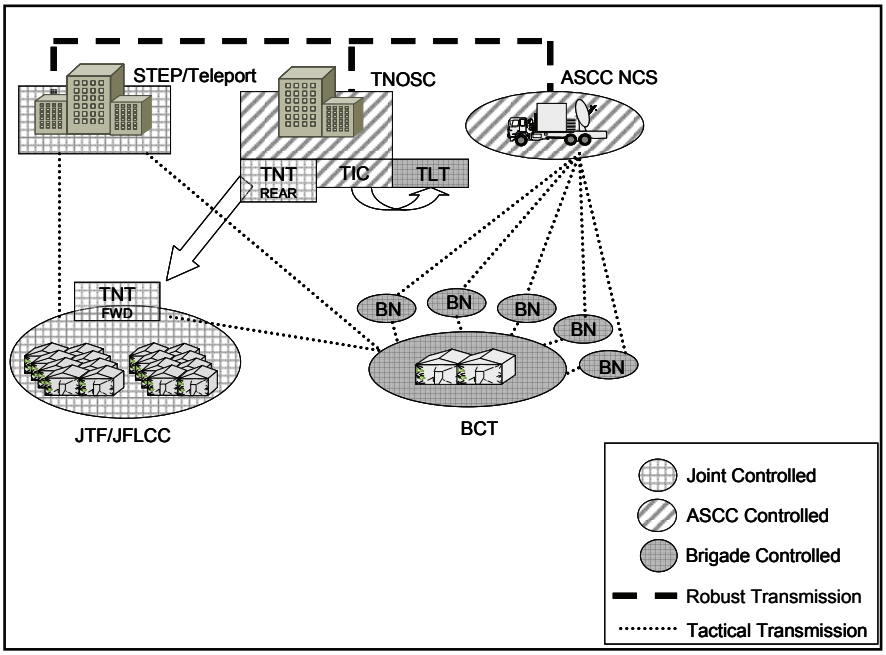

Figure 4-9. TNOSC DSD elements – TNT, TIC, and TLT without corps/division

Appendix A

Notional Deployment Scenario for Signal Support

Planned deployment scenarios establish the geographical and environmental conditions in which a system must be operated and sustained. Different operating environments impose different architectural characteristics on the overall design of that system. These characteristics directly affect the types of signal support required and the environmental conditions under which they must operate.

SECTION I - FORCE PROJECTION

A-1. When diplomatic, economic, and informational instruments cannot achieve national objectives or protect national interests, US leadership may employ military forces to influence a deteriorating and potentially hostile situation, deter potential adversaries, demonstrate US resolve and capability, promote peace, or support other instruments of national power. The general goal of US military operations is to deter war; failing that, the military executes missions with the intent to return situations to a state of peace and conditions favorable to the United States. When the direct applications of military forces are inevitable, the goal is to win decisively, quickly, and with as few casualties as possible, often reacting with little notice. Such crisis response through power projection is one of the essential US strategic principles.

A-2. The scenario contained in this appendix entails the mobilization and projection of US and coalition forces into a friendly country to stage decisive operations against a hostile neighbor who poses a threat to other pro-Western countries in the region.

A-3. Force projection entails the mobilization, deployment, employment, sustaining and redeployment of military forces from CONUS or OCONUS bases. Effective power projection demonstrates US capability to carry out military operations anywhere in the world. Credible power projection rapidly deploys military forces to terminate conflicts quickly with terms favorable to the United States and its allies. Force projection entails the deployment, employment, sustaining, and redeployment of military forces from CONUS or OCONUS bases.

A-4. Throughout all stages of force projection, a paramount need exists for communications and network support to convey information from CONUS installations, supporting bases, and power projection platforms. Force-projection operations follow a general flow of activity, although the phases often overlap in space and time. Commanders and units prepare to deal with multiple activities simultaneously and out of sequence by remaining agile and being prepared to adjust as operational needs dictate. Information is pushed to the forward-most Warfighters through strategic gateways.

SECTION II - CENTRAL ASIA SCENARIO – LIMITED INTERVENTION

OVERVIEW

A-5. Forces hostile to Western governments conduct a coup, supported by a third nation on a common border, overthrowing the legitimate progressive government and forming an antagonistic regime. The threat seeks to attain recognition of the current regime as the legitimate government while maintaining covert ties to the neighboring nation to the south in order to bolster military support. The coup regime seeks also to minimize Western influence, gain greater support of the local populace, and control oil and gas infrastructure. Unconventional and conventional forces conduct cross-border operations with the objective of destabilizing pro-Western neighbors and preparing for possible direct intervention against

these other US friendly nations. Additionally, threat forces are implicated in several terrorist acts in neighboring countries directed specifically against economic interests and government officials.

A-6. The SecDef deploys a carrier group offshore of the friendly nation as a show of resolve and notifies the Geographical Combatant Command of national intent to prevent further adverse regional influence by the coup regime. The SecDef directs the GCC to prepare OPLANs to conduct contingency operations in the region against the coup regime. The GCC forms a JTF with the following objectives:

- Isolate the threat center of gravity.
- Defeat enemy forces.
- Seize key economic regions to prevent exploitation, capture or destruction by threat forces.
- Seize the capital region in order to destabilize the coup regime.
- Reinstate the friendly government.
- Stabilize the region.
- Deter invasion or further intervention by bordering threat nation.

A-7. The JTF intent is to employ Army and other components to establish control quickly of key terrain in theater, defeat enemy forces, and transfer control of key facilities and population to legitimate government authorities. The actual force structure and deployment of theater signal and supported forces into a theater is determined on a case-by-case basis by METT-TC. The following notional sequence provides a basis for understanding the process of developing signal capability in a theater and its relationship to organizational structure. Army Forces are comprised of a mixture of infantry BCTs with airborne and air assault capability, Stryker Brigade Combat Teams, and Heavy Brigade Combat Teams. Theater supporting forces are modular sustainment elements.

SECTION III - PLANNING PHASES

MOBILIZATION – DAILY OPERATIONS AND THE ROAD TO WAR

A-8. Significant actions performed before mobilization are—

- Directed by the SecDef to conduct military operations, CCDRs conduct collaborative planning with joint and multinational forces to coordinate, refine, and modify strategies and OPLANS.
- Combatant commands disseminate military objectives, intelligence, and resource guidance and determine the strategic end state to subordinate elements and ASCCs.
- Orders issued to alert, mobilize, and deploy forces to the JOA.
- Services conduct OPLAN analysis and virtual rehearsals.

A-9. Upon notification of the probability of combat operations or other requirements, CCDRs will leverage the LWN and the GIG to facilitate deliberate military and joint planning, collaboration, dissemination of orders, tactical force deployment and sustainment, and the mobilization and deployment preparation of reserve forces. These requirements complement the normal day-to-day training, readiness, intelligence, logistics, and support conducted through high throughput strategic networks and DOIM supported segments of the LWN.

A-10. The signal command and NETCOM establish support and contingency packages that provide communications for those units without sufficient organic communications equipment, those needing augmentation, or those elements needing specialized network capability. These network support packages form a significant portion of the theater network and theater access to the GIG and are tailored to specific requirements to provide a mixture of immediate tactical and commercial voice, data via the GCCS, NIPRNET, SIPRNET, and VTC.

PREDEPLOYMENT

A-11. During normal peacetime operations, the Army prepares its units for force projection missions. This requires organizing, training, equipping, and leading them. Key to this effort is both readiness and collective deployment training with the US Navy and United States Air Force (USAF) controlled lift

assets. Strategic networks link installations, training and simulation centers, support centers, and the myriad daily operational requirements necessary to conduct joint and interagency training programs and exercises. The GIG enables service component staffs and joint staffs to collaborate, plan, and refine. The LWN supports these CCDR daily operational requirements by providing NIPRNET and SIPRNET capability that spans the globe.

A-12. When Army Forces are alerted for force-projection missions via joint crisis action procedures, timely and accurate portrayal of JFC requirements gives Army Forces maximum time to plan for deployment and employment. Based on forces available and the needs of the JFC, the Joint Chiefs of Staff allocate forces for the mission. At an appropriate time, signal elements are allocated to a theater commander. These elements may be apportioned in deliberate theater contingency plans. Depending on theater requirements and the projected force structure, the signal command may be alerted to provide C2 over LWN signal assets.

A-13. During the pre-deployment phase, network planners must understand and plan for the complexity of joint, combined, and tactical network deployment and management needed to support the mission. They must have a clear understanding of the density of command posts, subscribers, and automation networks in order to ensure that plans adequately meet requirements and facilitate proper network management. This requires adequate planning, engineering, and resourcing of the requisite nodes, transport links, STEP or teleport interfaces, network management centers, C2 relationships, and data management structures needed to support the theater network. See Figure A-1.

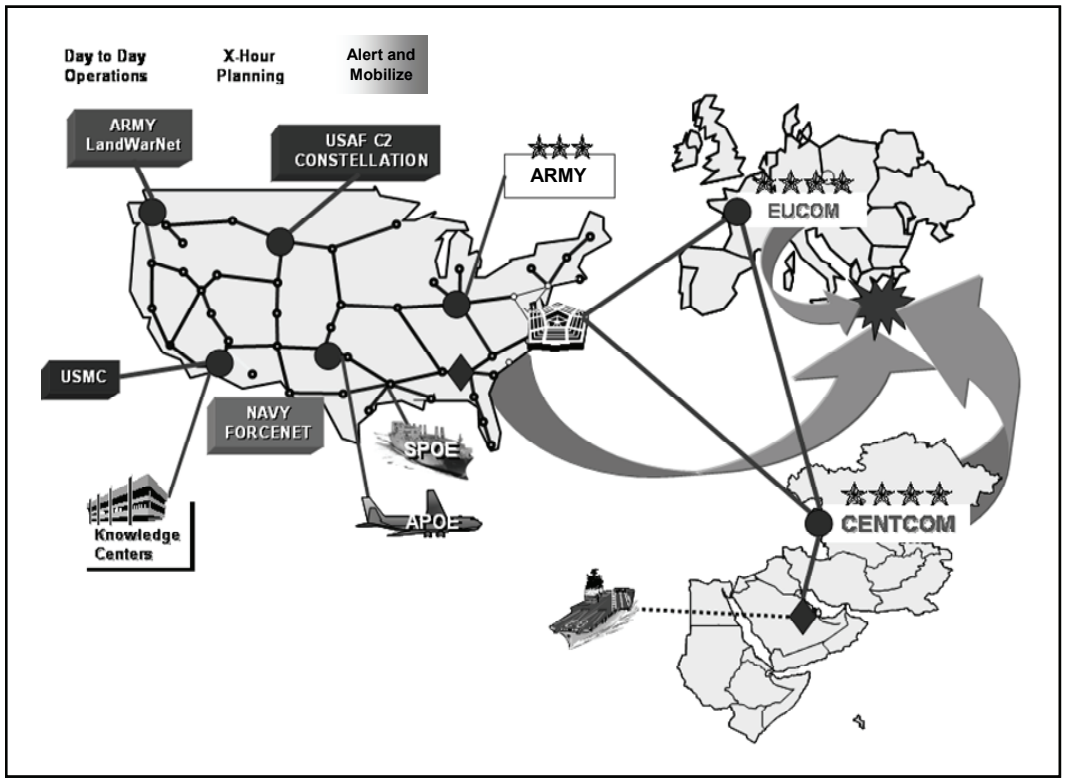

Figure A-1. Mobilization phase - GIG supports CCDRs' daily operational requirements

A-14. This stage also includes establishing and finalizing C2, intelligence, and logistical relationships among the services of the joint force and the early resolution of Army unit deployment sequences in relation to the movement of other services forces. Early determination of the sequencing of signal elements into the JOA solidifies the TPFDD and determines the time required to deploy the force and subsequently the theater network.

DEPLOYMENT–INITIAL ENTRY (FORT TO PORT)

A-15. Significant actions executed during initial entry are—

- Units begin deployment to JOA.
- United States Marine Corps (USMC) 41st Marine Expeditionary Brigade (MEB) and 11th Airborne BCT conduct early entry operations to establish and secure SPODs, APODs, and TAAs.
- Combined Arms Support Command sustainment elements begin theater opening operations.
- SOF are employed to provide strategic reconnaissance, conduct direct action missions against critical hostile infrastructure, and conduct unconventional warfare operations.

A-16. The signal community provides contingency packages for deployment and early entry. As needed, they provide additional forces required to IOM-D networks supporting initial entry of forces into the theater of operations. Refer to Figure A-2. To support large-scale deployment and lodgments, signal elements deploy from CONUS or another supporting theater. The initial opening and entry into the theater may involve a forced entry or simple debarkation of forces into a secure SPOD/aerial port of debarkation (APOD):

- Network contingency packages serve as first entry forces to support the JTF, JFLCC, or ARFOR as required. Contingency packages will be based on needs for network IOM-D supporting the JFC. Size and composition depends on subscriber numbers, command post locations, and METT-TC factors. Generally, this includes network infrastructure necessary to support Theater Army HQ, semi-permanent bases, SPODs and APODs, assembly and staging areas, Theater Support Bases, lines of communication, and temporary installations.
- COMCAM teams deploy into specific areas of interest to provide VI.
- The A-GNOSC directs the deployment of a TNT which serves as a C2/NETOPS package to initiate theater network control and GIG reachback through supporting theater strategic STEP and teleport. See Figure A-3.

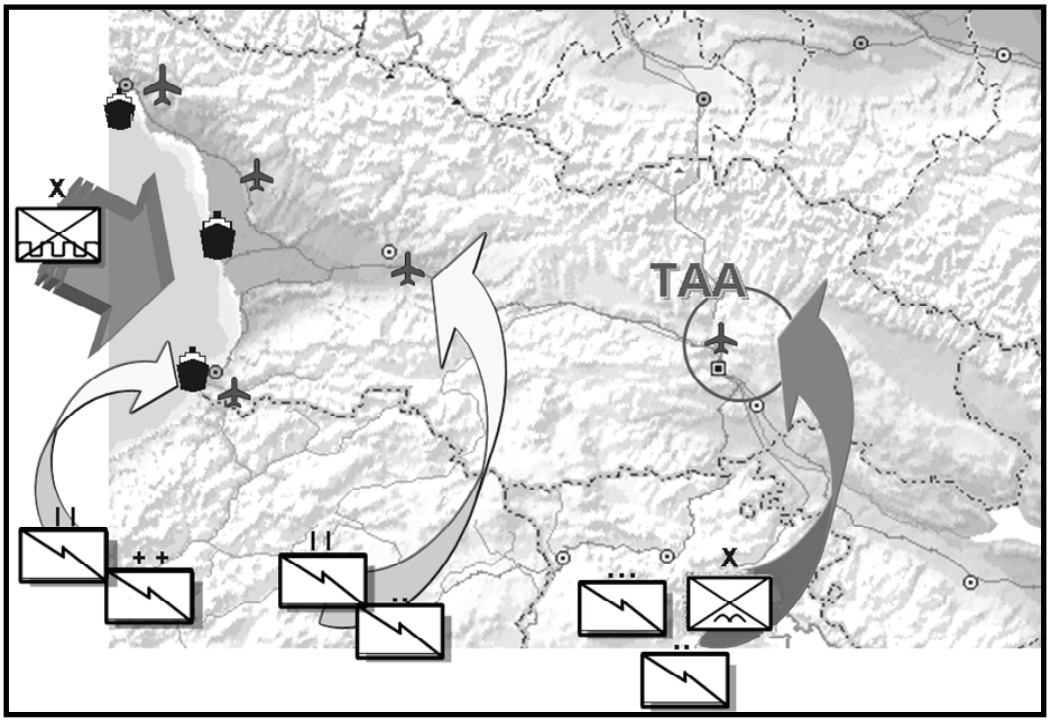

Figure A-2. Deploy to theater

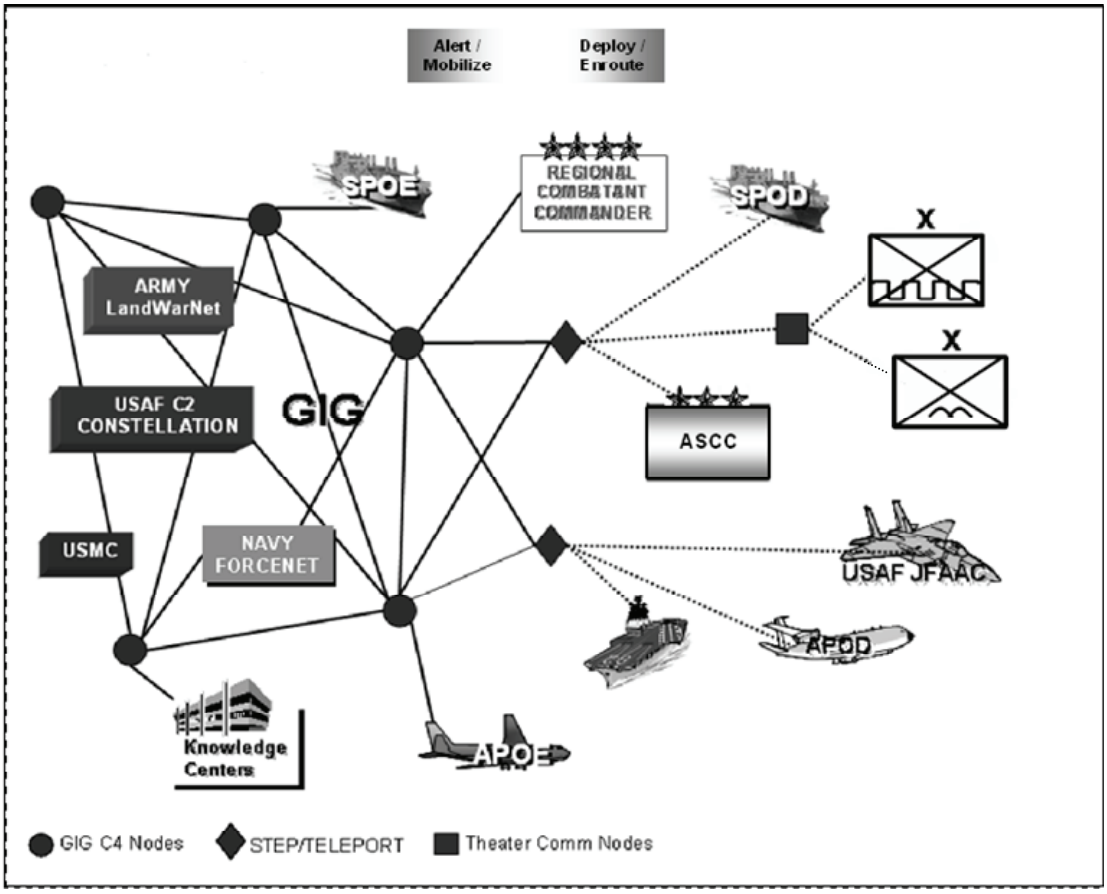

Figure A-3. Deployment phase – extending the GIG into the JOA

A-17. Deployment into the theater of operations may entail simultaneous movement of tactical and operational-level headquarters and logistical C2. Forcible entry operations may be required to gain access to the AO during the entry phase. Airborne, air assault, SOF, and Marine Corps units will be the primary ground forces for use in forcible entry situations.

A-18. In addition, it allows for the reception and employment of early reinforcing units, logistics packages, and security. Throughout the deployment, signal units must maintain the flexibility to reconfigure units and adjust deployments should the needs of the JFC change while the deployment is in progress. This is particularly important during the entry phase since the situation may rapidly change.

EMPLOYMENT-THEATER SHAPING AND BUILDING COMBAT POWER

A-19. Significant actions performed during employment are—

- Theater sustainment command establishes theater support base.
- ASCC establishes JTF HQ at TAA.
- Army Forces units arrive and conduct reception, staging, onward movement, and integration (RSOI) and tactical movement to TAA.
- 41st MEB conducts security operations for SPODs and joint support areas.
- AFFOR establishes JFACC and begin operations to prevent hostile air and theater ballistic missile attacks, neutralize Integrated Air Defense Systems, and gain and maintain theater air and space superiority.

A-20. Following initial deployments, the commander's focus changes to building rapidly his Warfighting capabilities and combat power (see Figure A-4). The proper sequencing of forces contributes significantly to the stabilization of the situation and allows for rapid buildup of capabilities. This enables the JFC to conduct decisive operations as early as possible. Further deployment will likely continue throughout the entry phase, until the conclusion of the operation. It is essential to retain the initiative throughout this phase. Additionally, the commander will begin shaping the operational environment by employing precision systems, air power, SOF, and other combat power to unbalance threat forces and the regime's center of gravity.

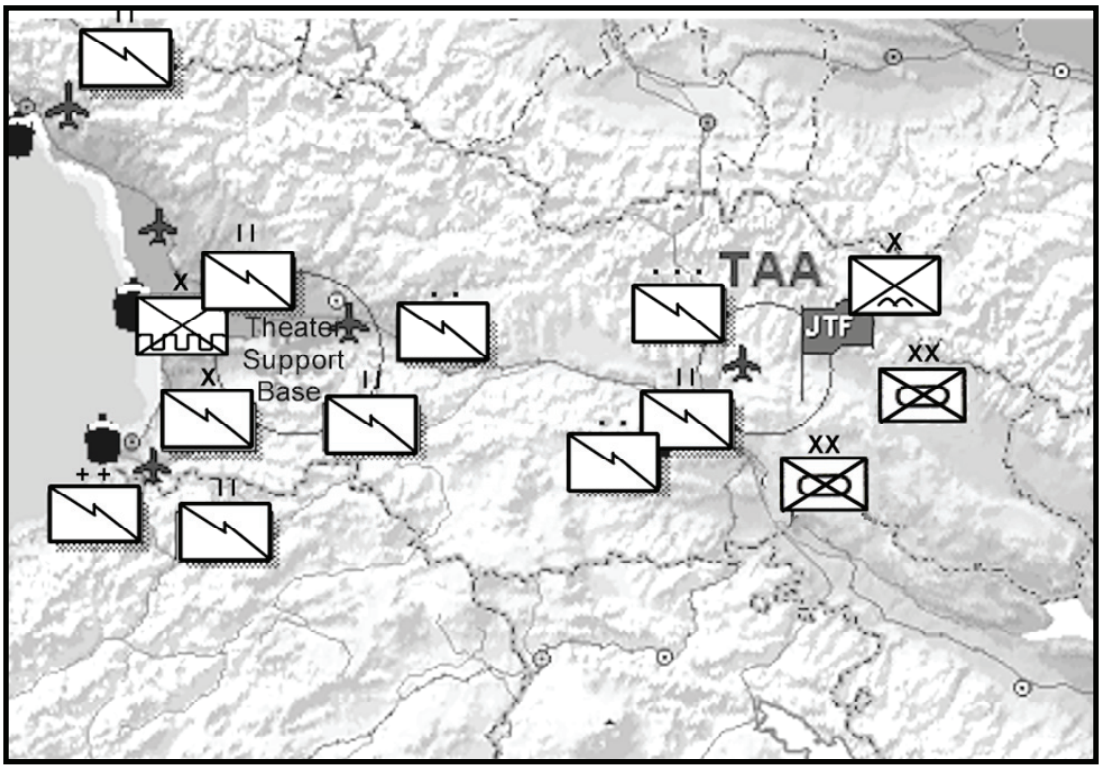

Figure A-4. Shaping RSOI and force projection to build combat power in the JOA

A-21. Signal elements continue TPFDD and installing and expanding theater networks in ports, airfields, and TAA. ESB elements provide cable and wire, SATCOM, TROPO systems, multichannel LOS systems, and additional voice and data switching to augment contingency packages. In some cases, the contingency package will be left in place or missions shifted to provide support to the ASCC/JTF once on the ground. Signal elements provide tactical network nodes and theater gateways to support tactical connection to GIG services (see Figure A-5):

- ESBs OPCON to 41st MEB for joint C2 network requirements for the SPOD and sustainment area security mission.
- The ESB supports the SPOD, APOD, and TAA.
- Contingency package OPCON to support JTF forward, BCT liaison teams, and JSOTF support area.
- The TTSB deploys to provide C2 to ESB units. Signal command deploys early en route to provide tactical teleport and J-6 staff augmentation (as required) and to control technical functions of theater LWN.
- The signal command deploys elements necessary to maintain NETOPS capability and continuous NETOPS situational awareness, and C2 of assigned or OPCON signal elements. The deployed signal command will monitor and track network outages, serious incident reports, recurring reports, requests from higher HQ, and all deployment statuses. As needed, the signal

command will also provide LNOs to interface between the Army level Watch Team/Crisis Action Team, the GCC, TNCC, and the DISA Regional NOSC. The deployed signal command will serve as the central focal point of the signal command battle staff and will also maintain status of deployed personnel and equipment movements, as well as track theater LWN force protection condition and information operations condition postures.

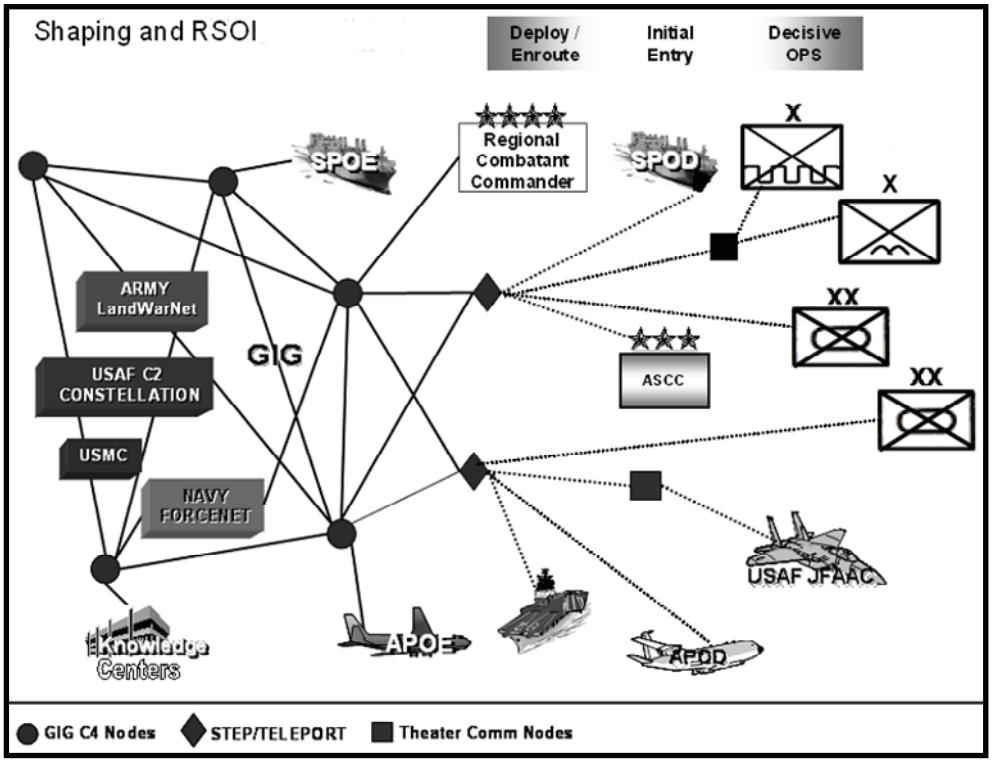

Figure A-5. Employment phase – tactical integration, establishing theater hubs, teleports, and gateways

A-22. The size and composition of the deployed signal command will be based primarily on METT-TC. Most importantly the signal command will meet the needs of the ASCC and signal command commander's perception of providing the most flexible and responsive center of gravity for supporting the LWN in the theater of operations. As more signal elements deploy to the theater, it is possible to see the entire signal command deploy to the JOA.

DECISIVE OPERATIONS (INTERMEDIATE OBJECTIVE)

A-23. Significant actions taken for intermediate objectives are—

- A division conducts offensive operations to destroy hostile forces in the Northern sector.
- Two BCTs conduct offensive operations to secure the Southern sector and establish the forward operations base.
- Coalition forces screen the Northern boundary and secure the Northern international border.

A-24. Commanders will always look for an opportunity to conduct decisive operations (see Figure A-6) in order to achieve the desired end state as rapidly as possible. In many situations, the Army conducts deployment, entry, decisive operations, and transition to future operations nearly simultaneously. Army Forces will continue to interact closely with elements of the other services, US governmental agencies, and frequently with forces from allied nations.

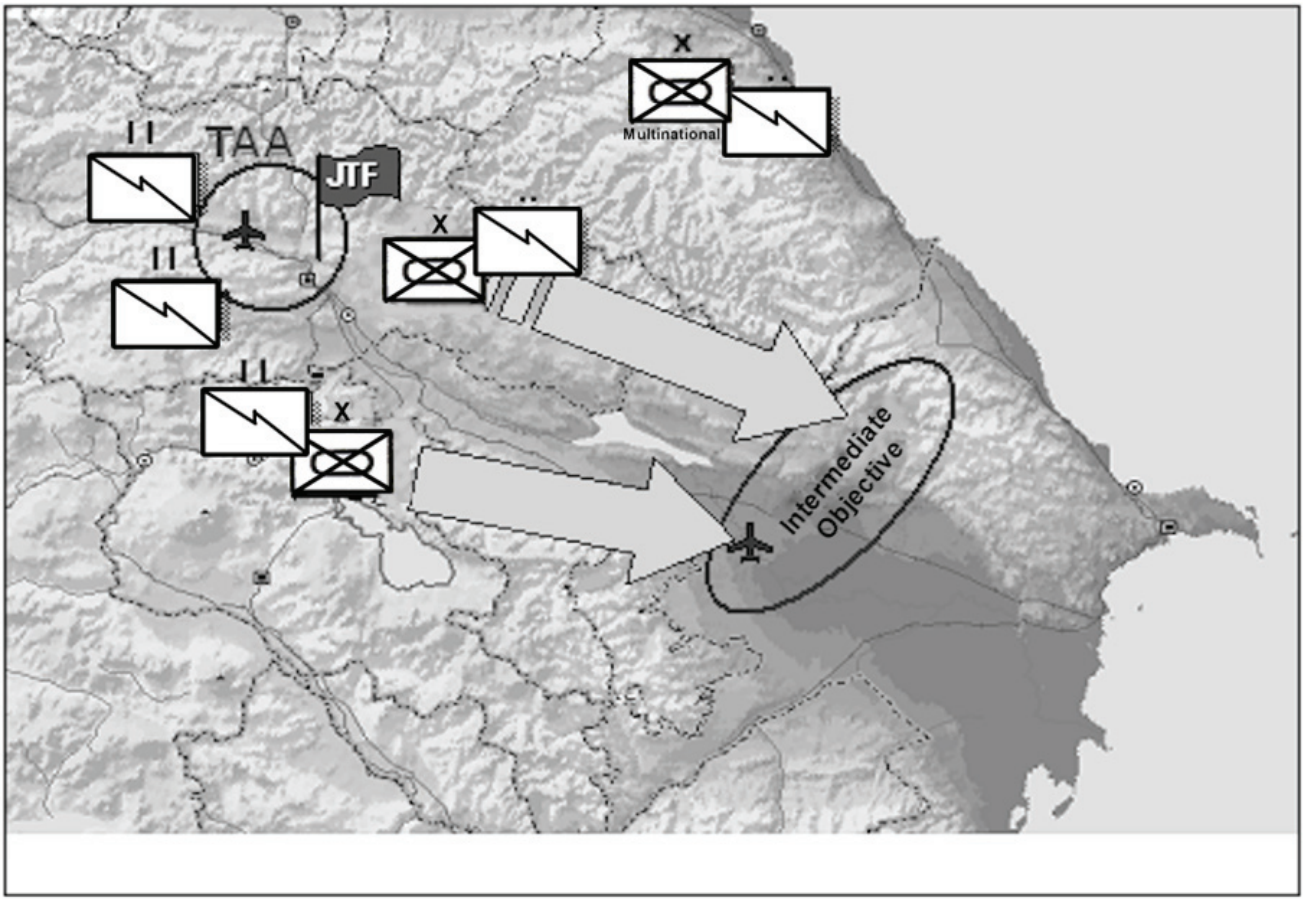

Figure A-6. Offensive operations to seize key terrain, secure lines of communication, and affect enemy center of gravity

A-25. During decisive combat operations, signal elements continue to support the JTF HQ and all theater elements in the joint AO. Contingency packages are employed to provide coalition forces and LNO teams with network services (see Figure A-7). As the ASCC "force pool" deploys forward to support corps/division and BCT operations, signal elements are OPCON to corps/division tactical network formations in order to support those increased LWN requirements. Tactical hubs are emplaced well forward to support combat unit LWN services and offload transport requirements from strategic networks. The ESB is OPCON to two corps or divisions to support attached and OPCON ASCC sustainment elements in a direct support mission to two corps or divisions during combat operations. The ESB continues to support the SPOD, APOD, Theater Support Base, TAA, and JTF HQ. Planning for transition to contractor support begins in order to free tactical signal assets as quickly as possible for follow-on or future missions.

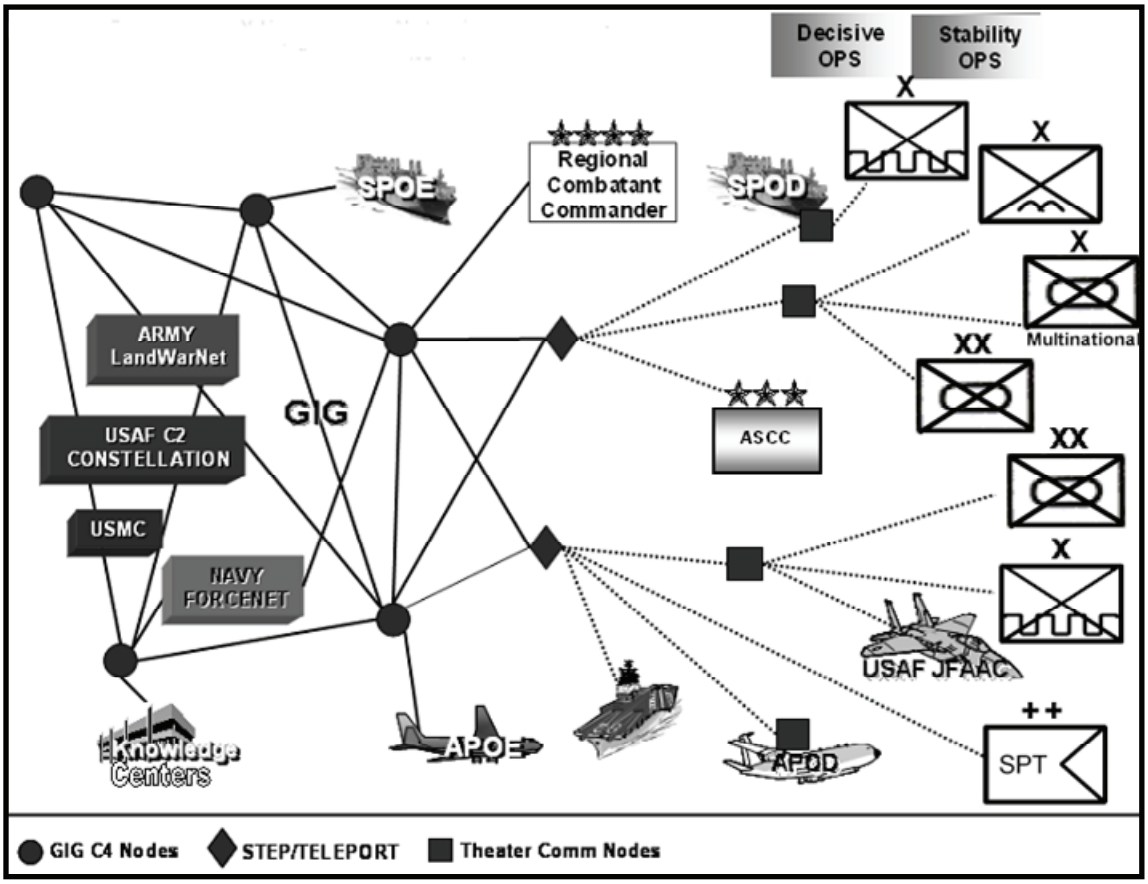

Figure A-7. Sustainment phase – extending GIG services to tactical organizations and echelons, LNOs, joint and coalition, broaden network access, NETOPS

DECISIVE OPERATIONS (FINAL OBJECTIVES)

A-26. Significant actions taken for final objectives are—

- A division conducts offensive operations to destroy hostile forces and seize the capital region (threat center of gravity).
- Two BCTs secure the forward operations base.
- Coalition forces screen the Northern boundary, secure the Northern international border, and deny the area to hostile forces.
- 2nd MEB conducts amphibious operations to seize key economic regions, block Southern egress routes, and secure the area for joint logistics over-the-shore (JLOTS).
- Theater sustainment command establishes the Regional Support Group at the forward operating base.

A-27. Decisive combat operations continue with signal elements supporting the SPOD, APOD, TAA, JTF HQ, and coalition liaisons. The TIN Company installs wiring and networking equipment to support JTF HQ, upgrades TAA networks, and installs the network infrastructure at the Forward Theater Support Base. The ESB is operationally controlled to support ASCC elements in direct support for the main effort of the corps. The ESB supports 2nd MEB operations and JLOTS. The TIN and ESB support the forward operating base and theater sustainment command. The TIN begins the process of coordinating commercialization of TAA (see Figure A-8).

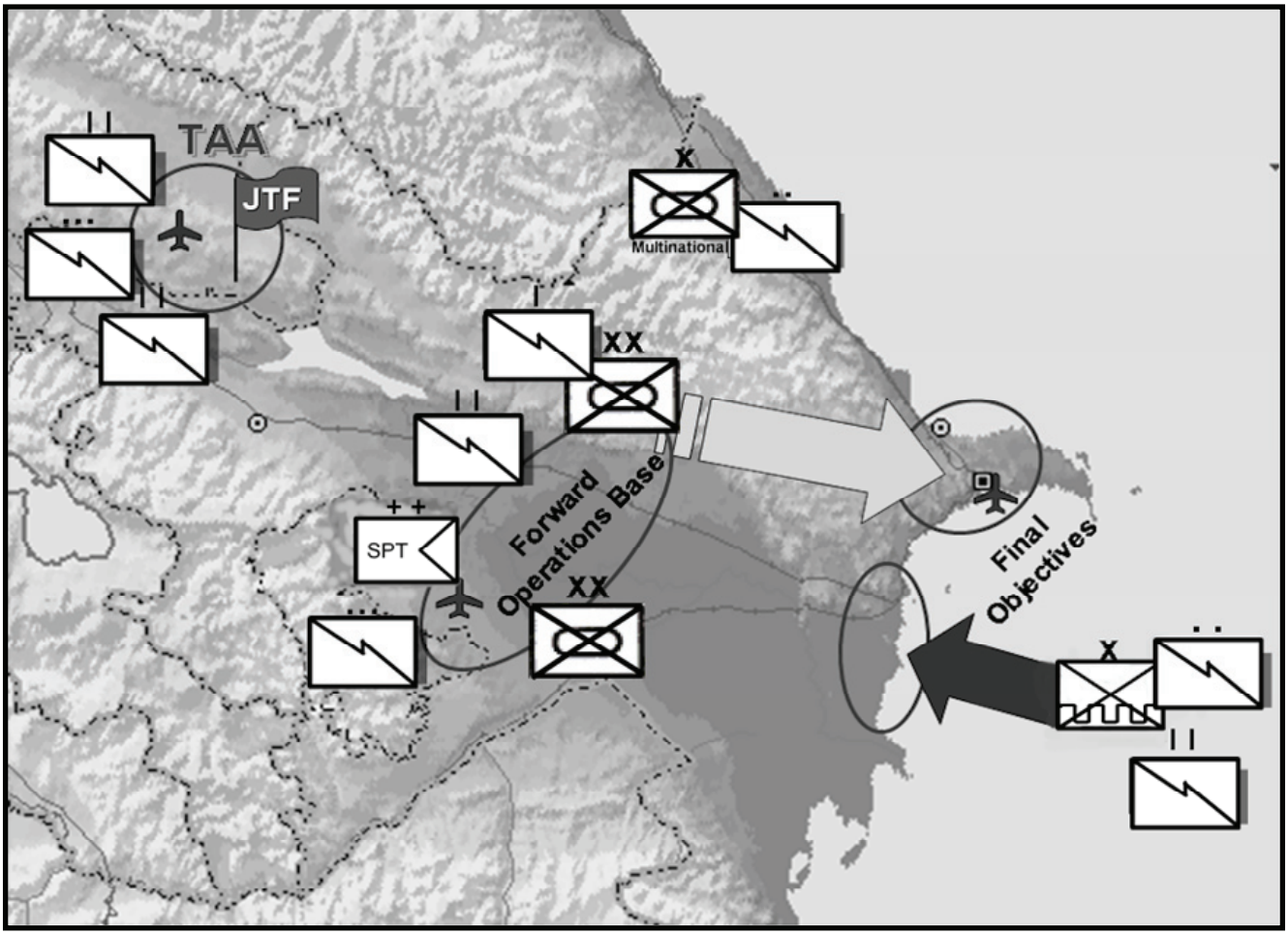

Figure A-8. Attack to seize capital and key facilities in Southern region, restore friendly government

STABILITY OPERATIONS

A-28. This phase of force projection operations focuses on the activities that occur following the cessation of the open conflict. The emphasis is to restore order, minimize confusion following the operation, reestablish national infrastructure, and prepare forces for redeployment. In these situations, decision makers balance political, economic, and information elements of power with military means to ensure that the host nation is able to sustain the strategic objectives accomplished during decisive operations.

A-29. The cessation of the open conflict may be permanent or interrupted by the resumption of hostilities. Therefore, units must rapidly consolidate, reconstitute, train, and otherwise prepare to remain in theater should the fighting resume. During this time, security remains a paramount concern to prevent isolated enemy individuals or forces from bringing harm to the force. Particular emphasis should be placed on signal units, who themselves may be isolated and may be prime targets for attack.

A-30. Signal elements IOM-D theater networks to support JTF, JLOTS, 2nd MEB, and coalition forces in stability operations. Large scale commercialization begins throughout the JOA as combat forces begin redeployment. Theater network evolves from stability operations to incorporate commercialization interface with the host nation and coalition to provide robust and capable networks to support the nongovernmental organization, the state department and other governmental agencies, and the United Nations and emerging government requirements. Large network enclaves support redeployment of US forces to return to CONUS or another theater (see Figure A-9).

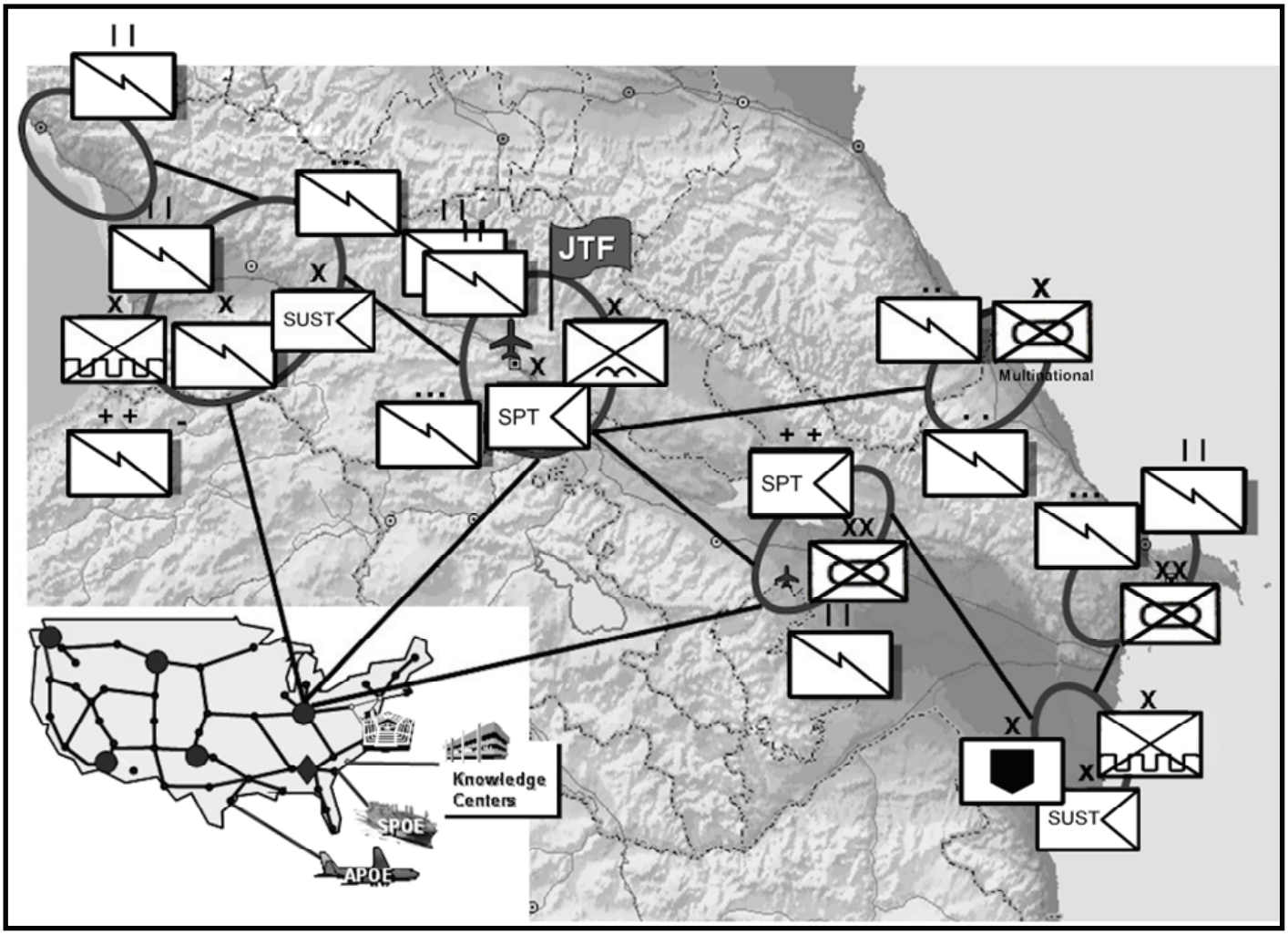

Figure A-9. Redeployment phase – stability operations and restoring friendly government, commercialization and restoration

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Appendix B

Theater LandWarNet Equipment Overview

This appendix discusses some of the signal equipment used by theater signal elements to extend the LWN and joint capability to theater operations. This appendix is in no way complete and should be used only as a brief overview. With the advent of WIN-T newer and improved systems will become available for fielding.

SECTION I - SATELLITE COMMUNICATIONS TERMINALS

B-1. The use of space as a strategic communication layer presents joint forces with several enhanced information-based capabilities on the battlefield. SATCOM allows widely separated users to communicate with each other directly from numerous sites that are far beyond the range of terrestrial LOS transport systems. The Army uses SATCOM primarily for voice and data, but it is rapidly developing in other application areas to include imagery, VTC, and global broadcast. Mobility and flexibility on the battlefield and broadcast capability to deployed units throughout an entire theater of operations are unique satellite capabilities that cannot be equaled by terrestrial methods. SATCOM is the fulcrum of joint communications.

SATCOM TERMINALS AN/TSC-85B(V)2, AN/TSC-85B(V)1, AND AN/TSC-85C(V)1

B-2. The AN/TSC-85 terminals (see Figure B-1) 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 non-secure traffic. The terminals are intended for either point-to-point or multipoint operations 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, and chemical, biological, and radiological (CBR) alarm.

Figure B-1. AN/TSC-85B(V)2

SATCOM TERMINALS AN/TSC-93B(V)2 AND AN/TSC-93C(V)1

B-3. 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 non-secure 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 a communications set, field telephones, and CBR alarm. These terminals are used as a communications link via satellite with the AN/TSC-85 or another AN/TSC-93. Figure B-2 shows an AN/TSC-93B with an 8-foot antenna.

Figure B-2. AN/TSC-93B

SATCOM TERMINAL AN/TSC-143 TRI-BAND

B-4. The AN/TSC-143 (see Figure B-3) is cutting edge military-commercial SATCOM consisting of non-developmental items, COTS, and government furnished equipment. It is configured on a heavy high mobility multipurpose wheeled vehicle (HMMWV) (M1097) and is C-130 roll on and off capable. 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 AN/TSC-85B/93B systems and DSCS gateway terminals at the RF level through the modems and at the multiplex level through the tactical satellite signal processor (TSSP) and integrated digital network exchange. It is capable of entering commercial gateways using C and Ku bands. The AN/TSC-143 is deployable worldwide and operates with any of the following satellites: DSCS, NATO, International Telecommunications Satellite Organization (INTELSAT), European Telecommunication Satellite Organization, Pan American Satellite Organization, Skynet 4, Spanish communications satellites HISPASAT, and domestic satellites (Spacenet and GSTAR). The AN/TSC-143 stores the corresponding uplink and downlink bands and data rate parameters for these satellites within its database. The AN/TSC-143 allows accurate satellite tracking by incorporating a beacon receiver that is compatible with all commercial and defense payload beacon signals. The terminal meets the certification requirements of the DSCS and INTELSAT, allowing operation with other users on the satellites and 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 a STU III for control in DSCS applications.

Figure B-3. AN/TSC-143

SATCOM AN/TSC-156 PHOENIX

B-5. The AN/TSC-156 terminal (see Figure B-4), also known as the Phoenix, is a transportable multi-channel TACSAT communications terminal operating in the SHF band. Its mission is to provide flexible, mobile, high capacity, extended-range communications connectivity using military and commercial satellite space segments. The Phoenix may interface with other strategic networks via STEPs or strategic assets. The Block 2 Phoenix will be designated the AN/TSC-156A and adds the capability of using a fourth band known as Ka-band, which will be available on the Wideband Gapfiller Satellite. Ka-band will allow higher throughput so the Phoenix Block 2 terminal has added components to provide more throughput. The addition of the fourth band adds redundant Ka-band high power amplifiers, quad band converters, and the use of a sub-reflector and new feed assembly. The two additional Ka-band high power amplifiers will be permanently mounted on the sides of the antenna backbone. The sub-reflector and feed assembly will be mounted when using Ka-band and will be stored on the terminal when not in use. The AN/TSC-156 is slated to replace the current AN/TSC-85/93 at corps and above.

Figure B-4. AN/TSC-156 Phoenix

FLYAWAY TRI-BAND SATELLITE TERMINAL AN/USC-60A

B-6. The AN/USC-60A flyaway tri-band satellite terminal (see Figure B-5) is a COTS tri-band terminal. It is small, lightweight, and highly transportable, employing a tripod mounted 2.4-meter antenna system. Operating in a modular architecture, the AN/USC-60A terminals easily accommodate expansions such as a digital video, digital voice/fax transmission, secure communications, and network control. Flyaway tri-band satellite terminal is easy to set up and is integrated, contained, and transported in rugged transit cases that 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. Flyaway tri-band satellite terminal is an affordable and proven SATCOM facility, certified for DSCS II/III and INTELSAT operation. Flyaway tri-band satellite terminal also operates over—

- NATO IV.
- European Telecommunication Satellite Organization.
- Pan American Satellite Organization.
- Domestic Satellite Organization.

Figure B-5. AN/USC-60A

SECTION II - LOS AND BLOS COMMUNICATIONS – UHF AND SHF RADIO SYSTEMS

AN/TRC-173 AND AN/TRC-173A UHF RADIO TERMINAL SETS

B-7. The AN/TRC-173 (see Figure B-6) and AN/TRC-173A operate as digital multichannel LOS radio systems or cable terminals and can terminate up to two links comprising 7 to 32 channels each at 32 kilobits per second (kbps) per channel or 7 to 64 channels each at 16 kbps per channel. The AN/TRC-173 series of LOS systems are the backbone of tactical TRI-TAC inter-nodal communications and links to smaller extension nodes.

Figure B-6. AN/TRC-173

AN/TRC-173B UHF RADIO TERMINAL SET

B-8. The AN/TRC-173B radio terminal set (see Figure B-7) provides radio termination and multiplexing for extension 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 employs a smaller shelter than earlier models. Utilizing two M1097 HMMWVs rather than one 5-ton truck for tactical transport allows this high mobility digital group multiplex assemblage (HMDA) aircraft roll-on roll-off capability for delivery where needed.

Figure B-7. AN/TRC-173B

AN/TRC-174 AND AN/TRC-174A RADIO REPEATER SETS

B-9. 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 a short-range wideband radio. The AN/TRC-174 replaces the AN/TRC-110 and AN/TRC-152.

AN/TRC-174B RADIO REPEATER SET

B-10. The AN/TRC-174B radio repeater set (see Figure B-8) 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 8- 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 employs a smaller shelter than earlier models. Utilizing two M1097 HMMWVs rather than one 5-ton truck for tactical transport allows this HMDA aircraft roll-on roll-off capability for delivery where needed.

Figure B-8. AN/TRC-174B

AN/TRC-138A SHF RADIO REPEATER SET

B-11. The AN/TRC-138A is a tactical communications assemblage with multiple system deployment. It provides a 576-channel short-range wideband radio "downhill" radio link to a nodal AN/TRC-175 radio terminal, or serves as a repeater to further extend LOS (40 kilometers or 25 miles) microwave links (24- to 144-channel) between two external AN/TRC-138 sets. It also provides the capability as a radio/cable terminal to terminate up to 72 to 144 low speed channel systems (40 kilometers or 25 miles). The AN/TRC-138A can terminate three PCM/digital group multiplexer systems and is compatible with TRI-TAC systems.

AN/TRC-138C SHF RADIO REPEATER SET

B-12. 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 bottom of the hill and the top of hill 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 digital group multiplexer (36 to 144 channels) multichannel systems to satisfy operational requirements. The AN/TRC-138C employs a smaller shelter than earlier models. Utilizing two M1097 HMMWVs rather than one 5-ton truck for tactical transport allows this HMDA aircraft roll-on roll-off capability for delivery into the area where needed.

TROPO SATELLITE SUPPORT RADIO AN/GRC-239 (SHF)

B-13. The Tropospheric Scatter-Satellite Support Radio (TSSR) AN/GRC-239 (see Figure B-9) is a self-contained, lightweight (45 pounds) field tunable, full-duplex, LOS microwave radio system that can be quickly set up to interconnect TRI-TAC equipment and GMF satellite terminals. It is ideal for extending communications from a main site, hub, or headquarters to an isolated or remote service component; for

remoting high-powered radiators such as TROPO radios (TRC-170), satellite ground terminals; for linking larger TRI-TAC shelters, such as the AN/TTC 39 switches, to large communication nodes or command centers; or as a substitute for cable links employing modems or fiber optic systems. The AN/GRC-239 is intended for rapid deployment and is characterized by short set up and teardown times, and reliable operation under adverse environmental conditions. It is comprised of two electronic units including the RF assembly and the base band assembly. The RF assembly can be mounted on a lightweight 50' mast that is an integral part of the system, with either 1' or 2' diameter high gain antennas. The AN/GRC-239 can carry digital traffic with a 3 Vp-p conditioned diphase waveform as described in the TRI-TAC initial capabilities document. Bandwidth ranges from 0.072 to 4.608 Mbps or 6.144 Mbps pseudo non-return-to-zero (NRZ) signal when operating with the AN/TAC-1 fiber optic system, or when employed with the DR-MUX up to four commercial T1 (1.544 Mbps) signals. The TSSR supports interchangeable analog or digital order wire.

Figure B-9. AN/GRC-239

SECTION III - TROPO SYSTEMS

B-14. TROPO transmission systems use high-powered amplifiers to bounce radio signals off the troposphere providing over-the-horizon or BLOS communications links. While other forms of tactical field communications are limited to a 30- to 50-mile operational radius due to the horizon, TROPO enables a unit to broadcast a microwave signal up to 150 miles. Although TROPO is not as versatile as SATCOM, TROPO is a proven technology that has the potential to support selected links and reduce the demand for scarce satellite bandwidth. Despite being cumbersome and long to assemble and employ, TROPO offers "big pipe" advantages for communications with excellent range and bandwidth without having to rely on scarce or costly SATCOM resources. The two types of Army TROPO systems are the V2 Heavy and V3 Light. The V2 Heavy assemblages and microwave dishes are large and best suited for theater level employment with user nodes or enclaves which are not expected to move frequently. V3 Light systems are more mobile and faster to set up and are typically employed at the division and brigade levels.

AN/TRC-170(V) RADIO TERMINAL SET

B-15. 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 inter-nodal and

extended range (skip node) communications. The AN/TRC-170(V)2 (see Figure B-10) replaces the AN/TRC-132 TROPO. The AN/TRC-170(V)3 (see Figure B-11) replaces the AN/TRC-112/121 TROPO.

Figure B-10. AN/TRC-170(V)2 Heavy TROPO

Figure B-11. AN/TRC-170(V)3 Light TROPO

SECTION IV - SWITCHING AND DATA TERMINAL CENTERS

AN/TTC-56 SINGLE SHELTER SWITCH

B-16. The AN/TTC-56 single shelter switch (SSS) (see Figure B-12) is a downsized, improved, mobile tactical digital circuit switch that includes a packet switch and a packet gateway designed to replace the AN/TTC-39D circuit switch. The AN/TTC-56 interfaces with DSN, NATO, commercial and tactical telephone switches, switchboards, and various subscribers' telephones. 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. The SSS signal interface provides inputs for multi-conductor and coaxial cable connections made at the signal entry panel which 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.

Figure B-12. AN/TTC-56 SSS

B-17. 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.

Note. It is possible to connect a much larger number of subscriber loops to the AN/TTC-56. Different units have experienced varying degrees of success in doing so.

AN/TTC-48(V)2 SEN SWITCH

B-18. The SEN switch (see Figure B-13) is an attended mobile communications system comprised of an S-250(A)/E shelter transported on a M-1037 HMMWV that provides switching, multiplexing, and COMSEC equipment which supports secure digital communications, automatic local secure switching, and wire subscriber access to MSE networks. 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. Specially configured SEN switches interface with an AN/TTC-39D and operate at 32 kbps data rate. Theater level SEN switches are equipped with a digital nonsecure voice terminal (DNVT) TA-1042 rather than the TA-1035/U used in division MSE SEN systems. The SEN switch also has provisions to access directly 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. Power is provided by a PU-753/M, 10 kW, trailer-mounted, diesel generator set.

Figure B-13. AN/TTC-48(V)2 SEN

AN/TTC-58(V) BASE-BAND NODE

B-19. The AN/TTC-58(V) base-band node (BBN) (see Figure B-14) is being developed to address urgent CCDR requirements for quality of bandwidth at a tactical data capability standard. Current requirements are often met by ad hoc packages of COTS equipment, which the Army wholesale supply and maintenance system does not fully support. The AN/TTC-58(V) provides a highly mobile self-contained single data package that will serve as the backbone of the conversion of theater tactical signal forces to the ITSB or ESB structure. 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 B-14. AN/TTC-58(V) BBN

AN/TTC-59 JNN

B-20. The JNN (see Figure B-15) is a lightweight modular shelter mounted on an M1113 HMMWV. Its equipment also includes several transit and transport cases that are not shelter mounted. It tows a trailer-mounted diesel engine-generator set that provides 10 kW primary operating power for the system. The JNN is a suite of communications equipment to exercise effective control over the communication links, trunks, and groups within a deployed network. The JNN provides capabilities to interface those sources with satellite and terrestrial transmission resources to establish a robust network. This network incorporates a SATCOM backbone and updated routing and switching equipment to provide higher bandwidth and more mobile communications and enables the network to interoperate with strategic networks and joint tactical networks.

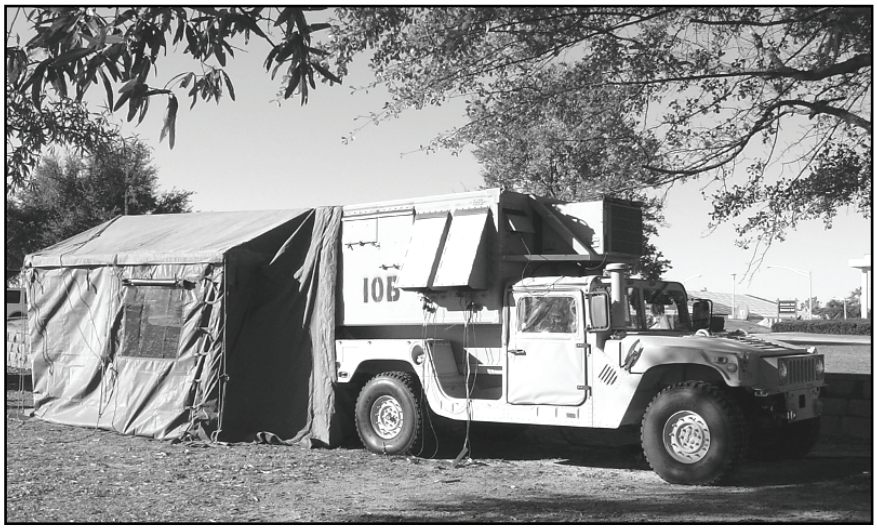

Figure B-15. AN/TTC-59 JNN

SECTION V - MISCELLANEOUS SYSTEMS AND COMPONENTS

ENHANCED SATELLITE HUB MULTIPLEXER SHM-1337

B-21. The Enhanced Satellite Hub Multiplexer, Model SHM-1337, is a direct replacement for the TD-1337 and provides enhanced multiplexer features per MIL-STD-188-168 and is interoperable with the current TD-1337 multiplexers installed in the AN/TSC-85C, AN/TSC-93C, and AN/TSC-143 TACSAT terminals. It provides multiplexer features per MIL-STD-188-168 and is interoperable with legacy TSSP multiplexers. The SHM-1337 has two standard operating modes which are selectable from the front panel:

- Enhanced mode - Supports fully connected mesh networks with up to seven nodes, multiplexes 12 user groups into a single aggregate stream, and is interoperable with legacy and enhanced multiplexers.
- Legacy mode - Interoperable with and replaces the legacy TD-1337, TSSP.

B-22. The SHM-1337supports up to 12 active user ports using hub (nodal) configuration (one multiplexer, six demultiplexers operating 16 kbps secure digital voice orderwire. It supports point-to-point, hub-spoke, mesh and hybrid networks with bit error rate monitoring capability, and provides aggregate interfaces (enhanced and current) to satellite terminals using balanced or unbalanced NRZ, conditioned diphase, bipolar, and T-Carrier 3 (T1)/European Basic Multiplex Rate (E1).

PROMINA® 800 AND PROMINA® 400 MULTISERVICE ACCESS PLATFORM

B-23. The Promina 800 and 400, as shown in Figure B-16, are COTS components that serve as a communications hub or extension multiplexer. As a multi-service access platform, the Promina 800 allows varied types of communications systems and media to connect to DISN services and serves as a network hub. Typical customers would be a CCDR/JTF size headquarters. The Promina 400 normally supports remote spokes in a typical hub-spoke network configuration. The Promina high-speed shelf and multiple extended expansion shelves accommodate redundant alternating current/direct current power supplies, common processor, interconnect modules, switching equipment, up to 16 standard interfaces, applications, and trunk modules.

B-24. Promina systems support—

- Local voice subscriber loops, voice processing and switching, data, video, fax, and modem.
- IP LAN and integrated service digital network, as well as asynchronous transfer mode and frame relay networking.
- Imaging traffic.
- Advanced bandwidth management and multi-protocol routing and bridging.

Figure B-16. Promina 400 and Promina 800

TIME DIVISION MULTIPLEXER AN/FCC-100

B-25. The AN/FCC-100 (see Figure B-17) is a rack-mountable, stand-alone unit used to perform multiplexing, de-multiplexing, timing, synchronizing, framing, monitoring, and alarm reporting. It 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). This multiplexer normally supports remote spokes and JTF extensions and uses AN/TSC-93C or TROPO/LOS radios as a transmission medium.

Figure B-17. AN/FCC 100

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Glossary

SECTION I – ACRONYMS AND ABBREVIATIONS

3SOPS	3d Space Operation Squadron
4SOPS	4th Space Operation Squadron
ACERT	Army Computer Emergency Response Team
ACUS	Area Common User System
ADCON	administrative control
AFFOR	Air Force forces
AFSPACE	United States Space Command Air Force
A-GNOSC	Army Global Network Operations and Security Center
AO	area of operations
AOR	area of responsibility
APOD	aerial port of debarkation
APOE	aerial port of embarkation
ARFOR	Senior Army Headquarters
ARNG	Army National Guard
ARSTRAT	Army Forces Strategic Command
ASA-INSCOM	Army Signal Activity - United States Army Intelligence and Security Command
ASCC	Army Service component command
AUTODIN	Automatic Digital Network
BBN	base-band node
BCT	brigade combat team
BDE	brigade
BFT	Blue Force Tracking
BLOS	beyond line of sight
BN	battalion
C2	command and control
C2 ConstellationNet	Command and Control Constellation Network
CA	civil affairs
CAW	Certification Authorization Workstation
CBR	chemical, biological, and radiological
CCDR	combatant commander
CDR	commander
C-E	communications-electronics
CENTCOM	United States Central Command
CENTRIXS	Combined Enterprise Regional Information Exchange System
CIO	Chief Information Officer
CJCS	Chairman of the Joint Chiefs of Staff

CJCSI	Chairman of the Joint Chiefs of Staff instruction
CJCSM	Chairman of the Joint Chiefs of Staff manual
CJTF	combined joint task force
C-LAN	coalition local area network
cmd	command
CMST	Communications Management Support Team
CND	computer network defense
CNR	combat net radio
co	company
COA	course of action
COCOM	combatant command (command authority)
COMCAM	Combat Camera
COMSEC	communications security
CONOPS	concept of operations
CONPLAN	concept plan
CONUS	continental United States
COOP	continuity of operations
COTS	commercial off-the-shelf
CP	command post
CPN	Command Post Node
CS	content staging
CSCE	communications systems control element
CSS	Combat Service Support
CUWTF	combined unconventional warfare task force
C-WAN	coalition wide-area network
DA	Department of the Army
DCS	Defense Communications System
DHS	Department of Homeland Security
DIA	Defense Intelligence Agency
DIN	defense intelligence notice
DISA	Defense Information Systems Agency
DISN	Defense Information Systems Network
DIV	division
DMS	defense message system
DMS-A	defense message system-Army
DNS	domain name services
DNVT	digital nonsecure voice terminal
DOD	Department of Defense
DOIM	director of information management
DRSN	Defense Red Switched Network
DSC	division signal company

DSCS	Defense Satellite Communications System
DSD	Deployment Support Division
DSN	Defense Switched Network
DSVT	digital subscriber voice terminal
EAC	echelons above corps
EAM	emergency action message
EHF	extremely high frequency
e-mail	electronic mail
EMS	electromagnetic spectrum
ESB	expeditionary signal battalion
ESM	enterprise systems management
ESP	expeditionary signal platoon
ESTA	Enterprise Systems Technology Activity
EW	electronic warfare
FBCB2-BFT	Force XXI battle command-brigade and below – Blue Force Tracking
FCC	functional combatant commander
FM	field manual
FMI	field manual interim
FORSCOM	United States Army Forces Command
FRHN	fixed regional hub node
G-1	Assistant Chief of Staff, Personnel
G-2	Assistant Chief of Staff, Intelligence
G-3	Assistant Chief of Staff, Operations and Plans
G-4	Assistant Chief of Staff, Logistics
G-5	Assistant Chief of Staff, Plans
G-6	Assistant Chief of Staff, Command and Control (C2) and Information Management
G-8	Assistant Chief of Staff, Resource Manager
GBS	Global Broadcast Service
GCC	geographic combatant commander
GCCS	Global Command and Control System
GCCS-J	Global Command and Control System-Joint
GCM	Global Content Management
GEM	GIG Enterprise Management
GIG	Global Information Grid
GISMC	Global Information Grid Infrastructure Service Management Center
GMF	ground mobile force
GNC	Global Network Operations Center
GNCC	Global Network Operations Control Center
GND	Global Information Grid Network Defense
GNSC	Global Network Operations Support Center

GSSC	global satellite communications support center
HCLOS	high capacity line-of-sight
HF	high frequency
HHC	headquarters and headquarters company
HMDA	high mobility digital group multiplex assemblage
HMMWV	high mobility multipurpose wheeled vehicle
HQ	headquarters
HQDA	Headquarters, Department of the Army
IA	information assurance
IC-IRC	Intelligence Community – Incident Response Center
IDM	information dissemination management
IM	information management
IMCOM	Installation Management Command
INSCOM	United States Army Intelligence and Security Command
INTELSAT	International Telecommunications Satellite Organization
IO	information operations
IOM-D	install, operate, maintain and defend
IP	internet protocol
IS	information superiority
IT	information technology
ITSB	integrated theater signal battalion
ITSB-J	Integrated Theater Signal Battalion – Joint Network Node
ITW&A	integrated tactical warning and assessment
J-2	intelligence directorate of a joint staff
J-3	operations directorate of a joint staff
JBFSA	Joint Blue Force Situational Awareness
JCS	Joint Chiefs of Staff
JFACC	joint force air component commander
JFC	joint force commander
JFLCC	joint force land component commander
JLOTS	joint logistics over-the-shore
JNCC	Joint Network Operations Control Center
JNN	Joint Network Node
JNN-N	Joint Network Node–Network
JNTC-S	Joint Network Transport Capability – Spiral
JOA	joint operations area
JOPES	Joint Operation Planning and Execution System
JP	Joint Publication
JSOTF	joint special operations task force
JTF	joint task force
JTF-GNO	Joint Task Force-Global Network Operations

JWICS	Joint Worldwide Intelligence Communications System
kbps	kilobits per second
kW	kilowatt
LAN	local area network
LNO	liaison officer
LOGNET	Logistics Data Network
LOS	line of site
LWN	LandWarNet
MARFOR	Marine Corps forces
MC4	Medical Communications for Combat Casualty Care
MCO	major combat operations
MDMP	military decisionmaking process
MEB	Marine Expeditionary Brigade
METT-TC	mission, enemy, terrain and weather, troops available and civilian
MI	military intelligence
MILSATCOM	military satellite communications
MOA	memorandum of agreement
MOP	Memorandum of Policy
MP	military police
MRHN	mobile regional hub node
MSE	mobile subscriber equipment
MTS	Movement Tracking System
NATO	North Atlantic Treaty Organization
NAVFOR	Navy forces
NAVSOC	Naval Special Operations Command
NCS	National Communications System
NETCOM	Network Enterprise Technology Command
NETOPS	network operations
NIPRNET	Non-Secure Internet Protocol Router Network
NNSOC	Naval Network and Space Operations Command
NOSC	Network Operations and Security Center
NRZ	non-return-to-zero
OCONUS	outside the continental United States
OPCON	operational control
OPLAN	operation plan
OPORD	operation order
PCM	pulse code modulation
PIP	primary injection point
POP	point of presence
RCERT	Regional Computer Emergency Response Team
RCIO	regional chief information officer

RF	radio frequency
RHN	regional hub node
ROA	restricted operations area
RSOI	reception, staging, onward movement, and integration
RSSC	regional satellite communications support center
S-1	personnel staff officer
S-2	intelligence staff officer
S-3	operations staff officer
S-4	logistics staff officer
SATCOM	satellite communications
SBDE	support brigade
SC(A)	Signal Command (Army)
SC(T)	Signal Command (Theater)
SecDef	Secretary of Defense
SEN	small extension node
SHF	super-high frequency
SINCGARS	single-channel ground and airborne radio system
SIPRNET	SECRET Internet Protocol Router Network
SOF	special operations forces
SOM	Satellite Communications Operational Manager
SPIRIT	Special Purpose Integrated Remote Intelligence Terminal
SPOD	seaport of debarkation
SPOE	seaport of embarkation
SSE	Satellite Communications Systems Expert
SSS	single shelter switch
STB	special troops battalion
STEP	standardized tactical entry point
STU	secure telephone unit
SUC	sub-unified command
sust	sustainment
SWA	Southwest Asia
SYSCON	systems control
TAA	tactical assembly area
TAC	tactical command post
TACON	tactical control
TACSAT	tactical satellite
THN	tactical hub node
TIB	Theater Intelligence Brigade
TIC	Tactical Integration Cell
TIN	Tactical Installation and Network
TIP	Theater Injection Point

TLT	Tactical Liaison Team
TMIP	Theater Medical Information Program
TMS	tactical message system
TNC	Theater Network Operations Center
TNCC	Theater Network Operations Control Center
TNOSC	Theater Network Operations and Security Center
TNT	Tactical Network Team
TOC	tactical operations center
TPFDD	time-phased force and deployment data
TRI-TAC	Tri-Service Tactical Communications Program
TROPO	Tropospheric Scatter
TS SCI	top secret sensitive compartmented information
TSC	theater sustainment command
TSCIF	tactical sensitive compartmented information facility
TSMC	theater signal maintenance company
TSSB	theater strategic signal brigade
TSSP	tactical satellite signal processor
TSSR	tropospheric scatter-satellite support radio
TTP	tactics, techniques, and procedures
TTSB	theater tactical signal brigade
UAS	unmanned aircraft system
UHF	ultrahigh frequency
US	United States
USAF	United States Air Force
USAG	United States Army Garrison
USAR	Army Reserve
USARC	United States Army Reserve Command
USARCENT	United States Army, Central Command
USAREUR	United States Army, European Command
USARPAC	United States Army, Pacific Command
USARSO	United States Army South
USCENTCOM	United States Central Command
USEUCOM	United States European Command
USFK	United States Forces, Korea
USMC	United States Marine Corps
USN	United States Navy
USNORTHCOM	United States Northern Command
USPACOM	United States Pacific Command
USSOUTHCOM	United States Southern Command
USSTRATCOM	United States Strategic Command
V	Version

VI	visual information
VoIP	Voice over Internet Protocol
VSAT	very small aperture terminal
VTC	video teleconferencing
WAN	wide-area network
WGS	wideband global satellite system
WIN-T	Warfighter Information Network-Tactical
WMD	weapons of mass destruction
WSOC	wideband satellite communications operations center

SECTION II – TERMS

coalition

An ad hoc arrangement between two or more nations for common action (JP 1-02).

continuity of operations (COOP)

The degree or state of being continuous in the conduct of functions, tasks, or duties necessary to accomplish a military action or mission in carrying out the national military strategy. It includes the functions and duties of the commander, as well as the supporting functions and duties performed by the staff and others acting under the authority and direction of the commander (JP 1-02).

electronic warfare (EW)

Any military action involving the use of electromagnetic and directed energy to control the EMS or to attack the enemy (JP 1-02).

foreign humanitarian assistance

Programs conducted to relieve or reduce the results of natural or manmade 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. Foreign humanitarian assistance provided by US forces is limited in scope and duration. The foreign 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 foreign humanitarian assistance. Foreign humanitarian assistance operations are those conducted outside the US, its territories, and possessions (JP 1-02).

full spectrum operations

A combination of offense, defense, and stability or civil support operations (FM 3-0).

information environment

The aggregate of individuals, organizations, and systems that collect, process, or disseminate information, including the information itself (JP 1-02).

information operations (IO)

IO is the integrated employment of the core capabilities of EW, computer NETOPS, PSYOP, military deception, and operations security, in concert with specified supporting and related capabilities (JP 1-02) to affect or defend information and information systems and to influence decision making.

information superiority (IS)

The capability to collect, process, and disseminate an uninterrupted flow of information while exploiting or denying an adversary's ability to do the same (JP 1-02). The degree of dominance in the information domain which permits the conduct of operations without effective opposition (FM 1-02).

information system

The entire infrastructure, organization, personnel, and components that collect, process, store, transmit, display, disseminate, and act on information (JP 1-02).

infostructure

The underlying hardware and software that supports a large-scale computer system or network (information + infrastructure).

lines of operations

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 (FM 1-02).

multinational operations

A collective term to describe military actions conducted by forces of two or more nations, usually undertaken within the structure of a coalition or alliance (JP 1-02).

operational environment

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.

peace operations

A broad term that encompasses peacekeeping operations and peace enforcement operations conducted in support of diplomatic efforts to establish and maintain peace (JP 1-02).

reachback

The process of obtaining products, services, and applications, or forces, or equipment, or material from organizations that are not forward deployed (JP 1-02).

time-phased force and deployment data (TPFDD)

The JOPES database portion of an OPLAN; it contains time-phased force data, non-unit related cargo and personnel data, and movement data for the OPLAN, including the following: a. In-place units; b. Units to be deployed to support the OPLAN with a priority indicating the desired sequence for their arrival at the port of debarkation; c. Routing of forces to be deployed; d. Movement data associated with deploying forces; e. Estimates of non-unit-related cargo and personnel movements to be conducted concurrently with the deployment of forces; and f. Estimate of transportation requirements that must be fulfilled by common-user lift resources as well as those requirements that can be fulfilled by assigned or attached transportation resources (JP 1-02).

Warfighter

Any individual, regardless of rank or position, who is responsible for making operational decisions which result in the use of military force. This includes everyone from the President, deciding whether or not to commit troops to battle, to the individual soldier, airman or marine deciding whether or not to fire.

weapons of mass destruction (WMD)

Weapons that are capable of a high order of destruction and/or of being used in such a manner as to destroy a large number of people. WMD can be high explosives or nuclear, biological, chemical, and radiological weapons, but exclude the means of transporting or propelling the weapon where such means is a separable and divisible part of the weapon (JP 1-02).

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