TC 6-02.1

The United States Army Signal Corps 2019 Training Strategy

July 2019

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This publication supersedes TC 6-02.1, dated 6 July 2018.

Headquarters, Department of the Army

Foreword

For the past 159 years, the mission of the U.S. Signal Corps has always been "getting the message through." From the Wig Wag system, to using balloons, to the employment of satellite communications, the Signal Regiment has a rich history of being innovative in its support to combat operations.

The future of Army combat operations will be unpredictable, complex, and fought across multiple domains. Adversaries continue to develop advanced capabilities to compete or gain an advantage over American Forces. The way we engage in both competition and conflict must evolve to meet these new challenges and the Signal Corps must keep pace through ingenuity and passion for mission.

The strength of the U.S. Army is its people. We must train and develop our Leaders, Soldiers, and Civilians to act with character, competence, and commitment as this will be key to the support to the warfighter in multi-domain operations. The focus of this training strategy is the crews and sections that support Soldiers from sustainment and employment of systems and nodes through the defense of cyberspace. This document provides guidelines for developing leaders, teammates, and communicators that will carry the traditions of the Signal Corps into the future.

"PRO PATRIA VIGILANS"



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Training Circular
No. 6-02.1

Headquarters
Department of the Army
Washington, DC, 11 July 2019

The United States Army Signal Corps 2019 Training Strategy

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Preface

TC 6-02.1 provides guidelines for developing and certifying the proficiency of signal collective tasks in support of maneuver operations.

TC 6-02.1 is for tactical signal crews and sections, their Commanders, and Signal leaders. Commanders and staffs of Army headquarters serving as a joint task force or multinational headquarters should also refer to the applicable joint or multinational doctrine concerning the range of military operations and joint or multinational forces. Trainers and educators throughout the Army will also use this publication.

TC 6-02.1 release is on an accelerated schedule to integrate lessons learned. Future iterations will increase the scope of the document to include other echelons, both strategic and tactical.

Commanders, staffs, and subordinates ensure that their decisions and actions comply with applicable United States, international, and in some cases host-nation laws and regulations. Commanders at all levels ensure that their Soldiers operate in accordance with the law of war and the rules of engagement. (See FM 27-10.)

TC 6-02.1 applies to the Active Army, Army National Guard/Army National Guard of the United States and United States Army Reserve unless otherwise stated.

The proponent of TC 6-02.1 is the U.S. Army Cyber Center of Excellence. The preparing agency is the U.S. Army Signal School. Send comments and recommendations on DA Form 2028 (Recommended Changes to Publications and Blank Forms) to Commander, U.S. Army Cyber Center of Excellence and Fort Gordon, ATTN: ATZH-DT (TC 6-02.1), 506 Chamberlain Avenue, Fort Gordon, GA 3005-5735; by e-mail to usarmy.gordon.signal-schl.mbx.operations@mail.mil.

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Chapter 1
The Operational Challenge

OPERATIONAL CONTEXT

THE EMERGING OPERATIONAL ENVIRONMENT

1-1. The character of war is evolving. War in the emerging operational environment (OE) will be fought against adversaries across **multiple domains,** including the electromagnetic spectrum, and U.S. dominance will not be assured. Adversaries will challenge U.S. force projection via layers of political, military, economic, and cyber standoff and will attempt to divide the Army from its joint and coalition partners. Army forces will have to conduct operations in **dense urban areas** with complex socio-economic structures. Enemy forces will use complex terrain to pose increased threats to force protection, put innocent civilians at risk, and blame collateral damage on the Army.

1-2. Advances in, availability of, and reduction in the cost of technology will continue to lower the barriers to entry into warfare. In previous decades, potential adversaries had to develop expensive technologies, such as armor and artillery capabilities, to challenge the Army. Future competitors may directly affect operations with as little as a computer or a drone. Artificial intelligence, machine learning, nanotechnology, and robotics may simultaneously drive changes in tactics.

1-3. The Army must be prepared to fight a **peer threat** more so now than at any time since the end of the Cold War era. Army units can no longer operate with impunity on the battlefield; whatever the Army can do to its enemies, its enemies can do to the Army. The Army will not enjoy unrestricted access to the electromagnetic spectrum, because civilian emitters will congest it and enemy forces will contest it. Megacities and other man-made structures will interfere with line-of-sight communications. The enemy will have the ability to **contest the space domain**. The Army will not be able to depend on its constellation of communications and positioning, navigation, and timing satellites. The enemy may have precision strike capabilities and will have the capability to target communications systems based on their electronic signature.

1-4. In the future OE, the characteristics of war will be so different from the recent past that its lessons will be counterintuitive to the force. Aspects of the current OE increase the challenges posed by the future operating environment.

Implications of the Emerging Operational Environment



- Dense Urban Areas
  - Congested or contested spectrum
  - Limited line-of-sight
  - Increased Force Protection threat
  - Risk to Civilians
- Contested Space Domain
  - Communications satellites at risk
  - Position, navigation, and timing satellites at risk
- Low Barriers to Entry
  - Proliferation of cyber threats
  - Proliferation of drones
- Near or Full Parity
  - Symmetric capabilities
  - Anti access & area denial
  - Salvo competition
- Hider Finder Competition
  - Electronic countermeasures
  - Emissions control
  - Physical and electronic camouflage
  - Signal role in military deception

THE CURRENT OPERATIONAL ENVIRONMENT

1-5. The Army took advantage of the information technology advancements of the last two decades and added numerous communications and computer systems to its arsenal, which increased both its capabilities and the size, weight, and power requirements of its command posts. The delineations in the responsibility for first line operators to run these systems and for signal Soldiers to integrate them are often blurred. To support

these systems, the Signal Corps relies on a heavy suite of tactical networking equipment for which the end-of-life cycle has been determined, but the replacement has not.

1-6. In the modular brigade combat team (BCT) organization, signal companies fall under the brigade engineer battalion (BEB). In garrison, this organization puts the burden for readiness oversight on a chain of command with limited experience in training signal units.

1-7. Signal sections and units are comprised of a composite of many, unique occupational specialties that focus on one aspect of communications. Operational units must often cross-train their formations to operate organizational equipment and support the warfighter properly.

IMPLICATIONS FOR THE SIGNAL CORPS

1-8. Signal crews and sections will see rapid changes in materiel as the Army turns, fixes, and pivots to the right mission set to enable the future force. Signal training will need to shift from a systems-based focus to a foundational and theory-based approach to reduce the impact of new equipment fielding and develop Signal personnel who can support multiple mission sets.

1-9. The Signal Corps will need to provide support to operations in heavily contested and congested environments. Signal training will need to develop the skills to rapidly deploy equipment in severe conditions without external sources of support. Signal training will need to focus on survivability and protection, developing the confidence in Signal leaders necessary to recommend measured communications plans based on an understanding of risk.

1-10. Leaders in the institutional and organizational domains, including Signal School cadre, signal unit commanders, BEB commanders, battalion or brigade signal staff officer (S-6), assistant chief of staff, signal (G-6), and signal noncommissioned officers (NCO), must instill in Soldiers the skills and confidence they will need for the next war. This training strategy establishes the guidance the Army will use to implement training that develops the tactical-technical competence with Signal crews and sections.

Chapter 2

Foundations

READINESS PRECEPTS

2-1. **Leadership**. The keystone of readiness is empowered leadership, which provides the professional climate, mutual trust, motivation, guidance, and direction to execute training, maintenance, and the employment of capabilities. Leadership and leader presence is required in all aspects of training and maintenance.

2-2. **Training**. Every operation demands competent Soldiers; competence is a direct result of properly planned, resourced, and executed training. Chapter 3 discusses signal training guidelines.

2-3. **Maintenance**. Competent Soldiers are useless on a battlefield if they do not have functioning equipment with which to fight. Chapter 4 discusses communications & electronics (C&E) maintenance guidelines. The relationship of the three precepts to this circular are shown in figure 2-1.

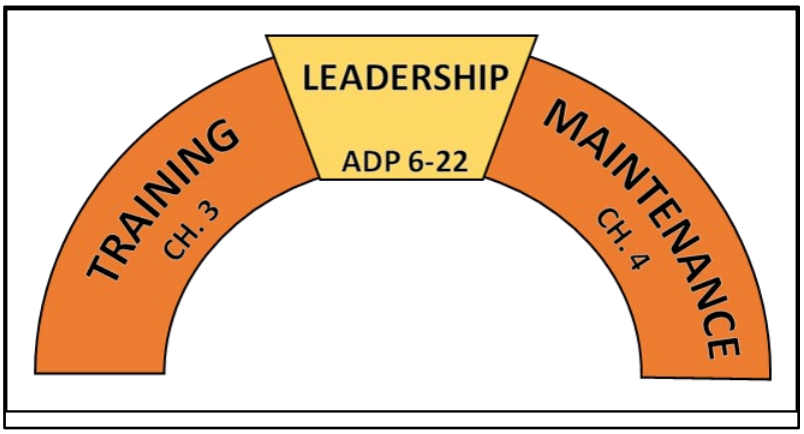


Figure 2-1. Signal readiness precepts

QUALITIES OF THE SIGNAL SOLDIER

2-4. The Signal Corps strives to meet the needs of commanders and warfighters with competent, well rounded, and multi-disciplined signal Soldiers of character, committed to mission accomplishment and living by the Army Ethic. They will embody the following qualities—

- **Leader**. Faced with uncertainty and challenging requirements a signal Soldier is an Army Professional, a leader of character, competence, and commitment. A signal Soldier leads from the front to support the organization and commander. Signal leaders own communication systems and the training of their personnel and are able to coordinate across the staff to take on problem sets in or outside their area of expertise.
- **Teammate**. Signal Soldiers exist to support the operations of warfighting commanders to accomplish the tactical and operational goals of the United States. Signal Soldiers will embrace a team mentality with other Soldiers regardless of military occupational specialty (MOS), branch, or Service.
- **Communicator**. Signal Soldiers understand the fundamental theoretical knowledge that underpins communications and how it supports operations. Signal individual training emphasizes

signal-related concepts and theories over specific systems, creating adaptive and resourceful signal Soldiers.

SIGNAL SUPPORT TO OPERATIONS: "READY NOW"

2-5. The Signal Corps will align training and readiness functions when preparing for current, emerging operations across the conflict continuum (see figure 2-3). As new threats emerge, units must adapt their signal training to the environment and conditions. No longer may units depend solely upon the static signal systems employment methods seen during the recent experiences of counterinsurgency operations.

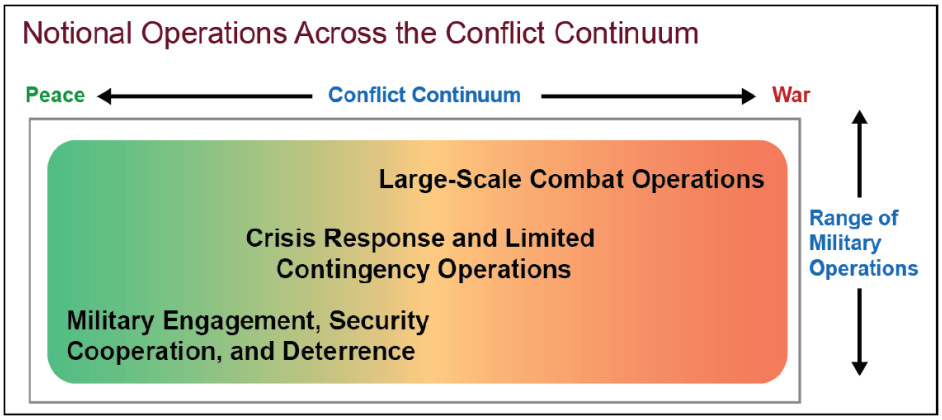


Figure 2-3. Notional operations across the conflict continuum

2-6. The joint phasing model (see figure 2-4 on page 2-3) highlights the distribution of activities normal in each phase of large-scale combat operations. Units must plan and resource signal training that accounts for the communications requirements, constraints, and capabilities necessary to support operations by phase and strategic role (see figure 2-5 on page 2-3).

2-7. During phase I–phase III of large-scale combat or limited contingency operations, units may need to subsist on a much smaller communications footprint or capability than during phase IV and phase V.

2-8. Battalion and below echelons conducting maneuvers may primarily rely on tactical radios for voice and data communications systems like Joint Capabilities Release for positioning, navigation, and timing and common operational picture. Organizations can employ downlink systems, such as Global Broadcast System for intelligence feeds, when timing and tempo are crucial for rapid maneuver. Higher echelons have more networks that are static, with a larger range of communications services, but may need to operate at a reduced footprint when displacing.

2-9. Commanders incorporate denied or degraded communications environments during home station training to prepare their formations for the rigors of the projected OE. Additionally, commanders strive to incorporate increased emissions control during training to develop discipline and reduce the risk of detection by threat intelligence assets.

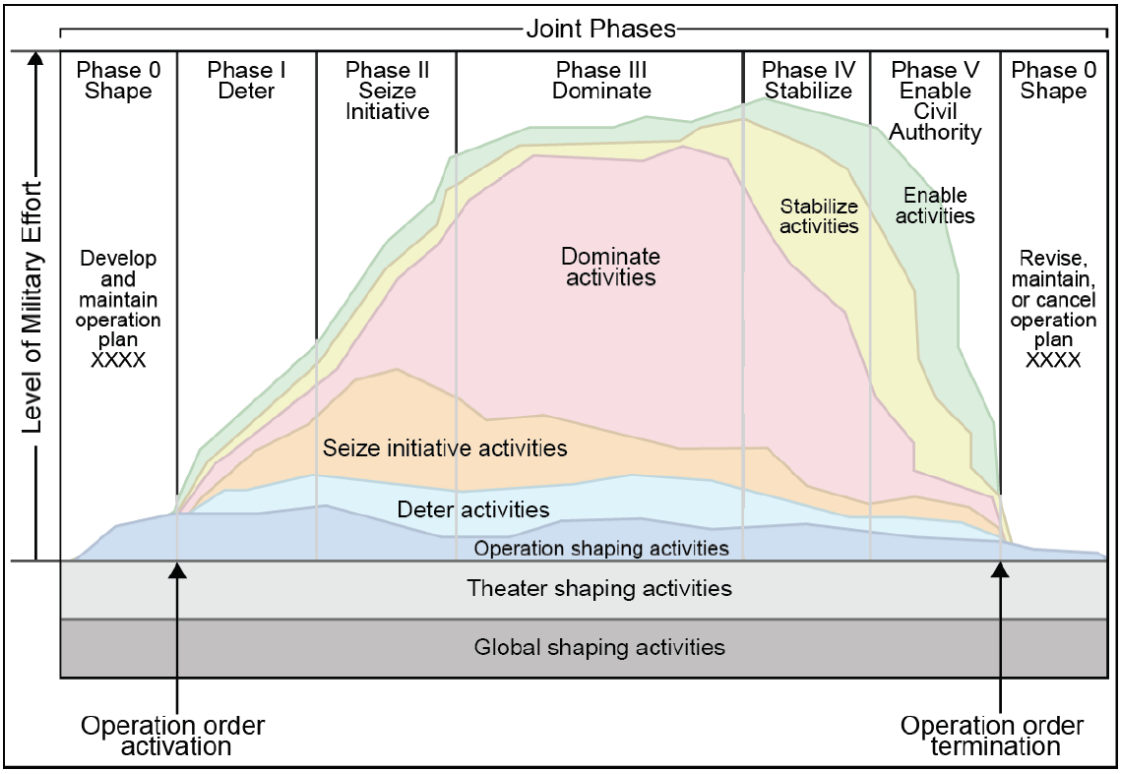


Figure 2-4. Notional large-scale combat joint phasing model



Figure 2-5. Army strategic roles and their relationships to joint phases

UNDERSTANDING THE ELECTROMAGNETIC SPECTRUM

2-10. Understanding the electromagnetic spectrum remains a critical knowledge for the Signal Corps. An understanding of the electromagnetic spectrum facilitates understanding of the cyberspace domain, facilitating cooperation between the signal, cyber, and maneuver branches. Understanding threat capabilities in the different bands of the electromagnetic spectrum empower planners to anticipate challenges to communications support and address them in the primary alternate contingency, and emergency (PACE) communication plan. Appendix B discusses PACE in depth. Figure 2-6 on page 2-4 is a representation of the electromagnetic spectrum.

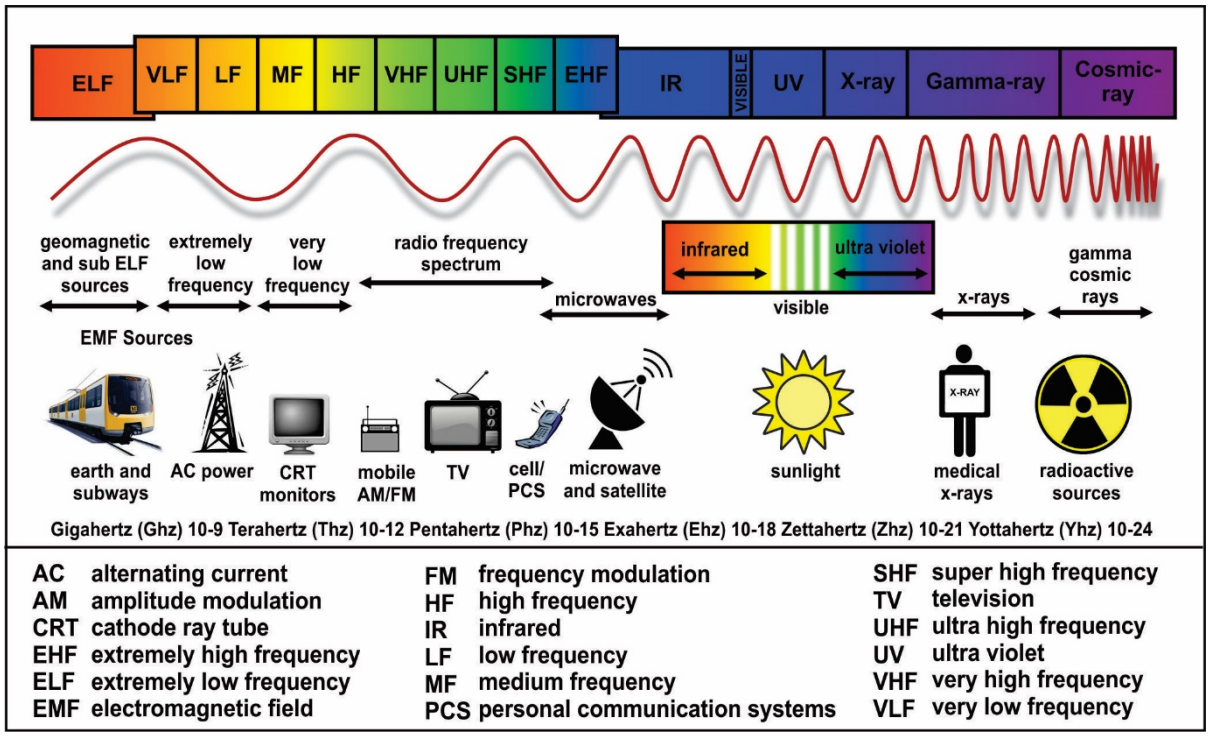


Figure 2-6. The electromagnetic spectrum.

Chapter 3
Signal Training

SIGNAL TRAINING VISION

3-1. Signal training should be a deliberate, continuous, sequential, and progressive process embedded in the unit training plan (UTP). Commanders need to understand the importance of providing enough time and resources for signal training. If commanders and staffs do not provide sufficient training time or exercise their organic capabilities with rigorous, realistic training, they put the overall UTP and mission at risk.

3-2. Signal training is predicated on properly maintained equipment. Consequently, C&E maintenance must be integral to signal training. Commanders should deliberately plan and execute C&E maintenance on a regular basis. Signal training and C&E maintenance is coordinated at all levels over the planning horizon to support unit readiness. For further discussion of C&E maintenance guidelines, refer to Chapter 4.

3-3. The foundation of outstanding signal support is an organization of competent, confident, and cohesive crews and sections. Commanders should emphasize training to build crews and sections that can employ signal systems and nodes, operate independently, and build capability over time. Commanders use the 8-step training model (see figure 3-1) to verify that the major steps to plan and resource signal training has occurred.

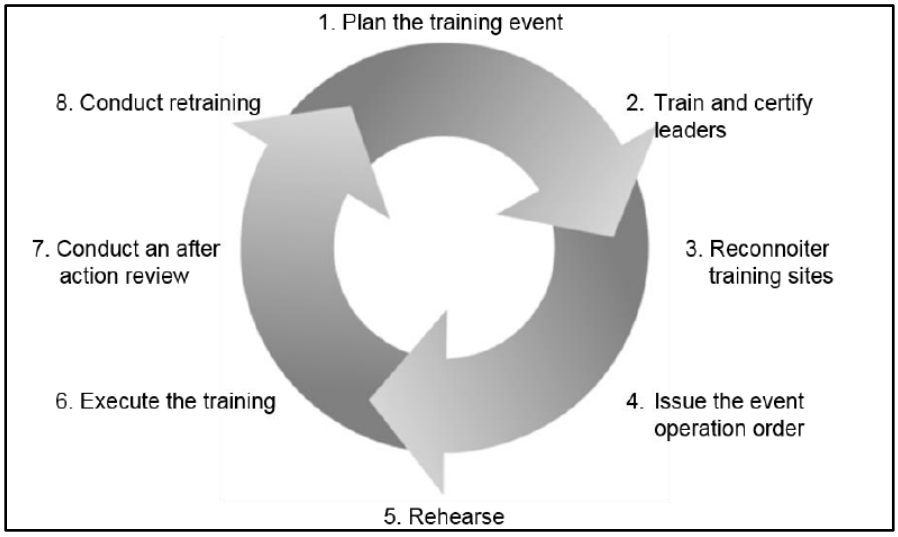


Figure 3-1. 8-step training model

TRAINING IMPLEMENTATION

3-4. Signal training for all branches and MOSs at the individual level begins with initial military training and continues throughout a Soldier's career via individual, organizational, and institutional development (refer to Appendix B for institutional signal training objectives).

3-5. Signal training in the operational domain should be progressive from an individual focus on fundamentals, to a crew focus on operation and maintenance of assigned systems, to a section focus on establishing communication nodes, to the integration with the warfighter.

3-6. The concepts of network, transmission, and radio are the triad of signal support to the warfighter (figure 3-2). Network systems enable units to interconnect and pass information between their mission command information systems (MCIS). Transmission systems allow units to extend networks beyond geographic boundaries. Personnel and vehicular radio systems provide push to talk voice and data communications capabilities to units.

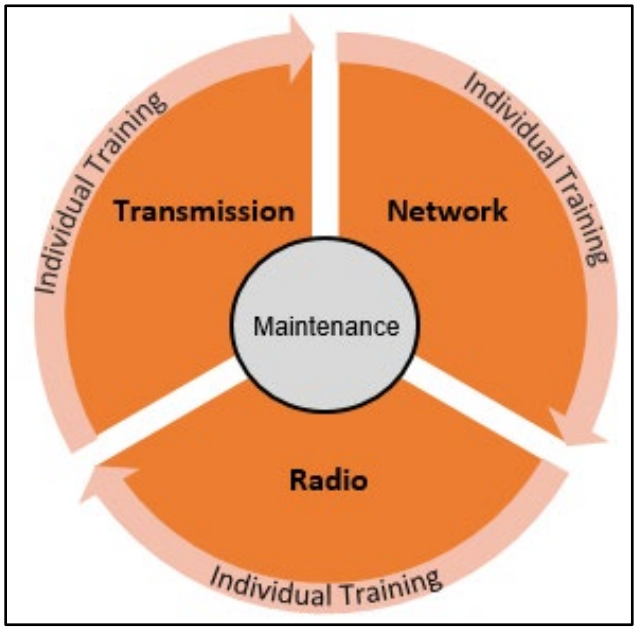


Figure 3-2. Triad of signal support

3-7. To produce certified and validated crews and sections to support warfighting commanders during large-scale combat operations. Units should apply the signal assessment tables (SAT) to communicate, organize, sequence, and resource their individual and collective training requirements.

SIGNAL ASSESSMENT TABLES

3-8. Signal formations are organized and equipped with a combination of a multitude of different MOS's and communications systems. These formations have developed signal gunnery tables that support their organization and mission requirements. As a result, each of these organizations has developed a different language, standard, and framework for solving a common problem.

3-9. The maneuver, fires, and effects branches have faced similar problems but have solved them using standardized gunnery tables set at the branch level. This section will introduce SATs as the Signal Regiment's common language and standard framework for training and certifying tactical signal crews and sections. The systems approach to training principles in this publication improve maneuver commander understanding and accountability of training and readiness status, improve training outcomes, and facilitate the proliferation of best practices while safeguarding the flexibility to develop unit training plans to support assigned mission and OE.

3-10. **Key Terms:** The SATs use the doctrinal definitions of the terms crew, section, system, and node as the building blocks of the framework. There is a clear linkage between the terms—crews operate systems, sections consist of crews, and sections establish nodes to support information processing.

3-11. **Battle Focus Training:** The concept of a mission-essential task (MET) provides commanders a process to provide the unit with its battle focus. A standardized mission-essential task list (METL) and reporting allows the Army to assess available capabilities and current unit readiness accurately. If the METL does not support the accomplishment of the assigned mission, commanders have develop additional METs for approval by the next higher commander. Supporting collective tasks support each MET, by identifying complementary or enabling capabilities that are essential to mission accomplishment. Supporting collective

tasks can be common to multiple METs and serve as fundamental building blocks to decisive action capability. Collective tasks have supporting individual tasks that serve as the foundation for completing them. Training and evaluation outlines (T&EO), developed for all current Headquarters, Department of the Army-approved modified tables of organization and equipment (MTOEs), list all collective, supporting collective, and supporting individual tasks. Units may use the METL application within the Army Training Network to access its T&EOs.

3-12. **Role of the Commander:** Commanders hold ultimate responsibility for all their organizations do or fail to do. SATs hold commanders at the company and battalion echelons responsible for ensuring that signal sections meet the training gates to support operations effectively. Commanders accomplish this role by allocating sufficient resources using unit training management.

3-13. **Organizations that effectively implement the SATs—**

- Plan for and protect crew and section integrity.
- Develop unit training plans that reserve windows for crew and section training throughout the cycle.
- Certify leaders early and often.
- Train for effective maintenance of motor and communications equipment.
- Effectively maintain motor and communications equipment used for training.
- Plan training that targets Individual and Collective Tasks.
- Integrate SATs into training briefs and reports.
- Resource training areas, spectrum and satellite requests.

Table I: Individual Training

3-14. During Table I, signal Soldiers will be assigned to systems as part of a crew. This table consists of all of the individual tasks and requirements necessary for the Soldier to be an effective member of a crew. Soldiers will be trained to conduct all of the supporting individual tasks in TE&Os for the system(s) they are assigned. Additionally, they will be trained and resourced for other individual certifications required to perform their tasks to include: any information assurance certification training, weapons training, military driver's training, other Army required training, and unit-based requirements. Leaders train Soldiers on stewardship and maintenance of assigned equipment during this table. When leaders are comfortable with the Soldier's understanding of the Command supply discipline program, they inventory and hand receipt equipment down to the lowest level. Sections also conduct all tasks necessary to train and maintain primary and alternate personnel authorized to handle communications security (COMSEC). Table I will be trained and assessed by their crew chief who will recommend when individuals are prepared to progress to Table II.

Table II: Individual Skills Test

3-15. In Table II, Soldiers will take an individual skills test that certifies their competence on the supporting tasks necessary to run their assigned system(s). In order to complete the skills test, Soldiers must have completed their physical fitness test, qualified on their assigned weapon, certified as applicable for information assurance technical level, and recommended by their crew chief as proficient in their individual supporting tasks. A 25-series staff sergeant or higher NCO grades and certifies Table II.

Table III: Crew Training

3-16. During Table III, crews build proficiency by conducting battle drills that focus on individual and collective skills and equipment readiness. Table III is the crawl phase of the overall section validation (Table VII). During Table III, crews will rehearse and train on their battle drills and T&EO individual and collective tasks. Crews develop and train according to standard operating procedures (SOP) and battle drills during day and night under static conditions. Equipment is hand receipted down to the lowest level. Crews verify that all hand receipted equipment and systems are entered into GCSS-Army (via automated maintenance and accountability documents) with service intervals, develop load plans, and focus training on movement tasks, maintenance operations, and any signal specific training that crew chiefs feel is necessary to be successful

during Table IV crew certification. A crew may only progress from Table III to IV with the recommendation of a sergeant first class within that signal platoon or S-6 section.

Table IV: Crew Certification

3-17. During Table IV, crews are evaluated on the execution of their collective, supporting collective, and supporting individual tasks. The evaluation will, at a minimum, begin with site occupation and will consist of both a day and night iteration. To compete for certification, the crew must have completed an emergency deployment response exercise level I, have completed PMCS and submitted DA Form 5988-E (Equipment Maintenance and Inspection Worksheet) on the assigned system(s) with mechanic verification, ordered any parts required to resolve faults, and issued assigned equipment with hand receipts to the lowest level. Table IV may only be certified by an officer or sergeant first class within that signal platoon or S-6 section.

Table V: Section Training

3-18. During Table V, crews combine into sections to train on collective and supporting tasks necessary to establish their node. Sections rehearse battle drills, and under advanced OE conditions, including day and night training, advanced mission oriented protective posture levels, cyber or electronic attack threats, and casualties. Sergeant's time training progresses to focus on section-level reinforcement training. The section trains simultaneously on all assigned systems. Crews conduct systems cross-training to become proficient on all of the systems within the section. The first line company, battery, or troop commander assesses training progression and recommends to the battalion or squadron commander when the section is prepared to try for section certification. During this table, sections will validate that equipment is grouped in GCSS-Army as a system of systems in coordination with the unit supply team.

Table VI: Section Certification

3-19. The purpose of Table VI is to certify sections as prepared to establish nodes in support of large-scale combat operations. This certification requires sections to complete T&EO collective task requirements within the unit's designated time, operation order, and SOP. Sections complete the evaluation for certification during unit collective training events that include dynamic OE variables. These events should include a network operations cell for reporting. All crews and systems (including the line of sight systems) must certify simultaneously. Evaluators will conclude their evaluations with checks of unclassified and classified web application access and voice and video checks. Battalion and squadron commanders are responsible for certifying the sections. Sections are certified at Table VI prior to participation in warfighter exercises, combat training center rotations, and comparable culminating training events. Sections, at a minimum, should certify as emergency deployment response exercise level II.

Table VII: Section Validation

3-20. Sections must have certified Table VI prior to attempting Table VII. During Table VII, sections integrate with multi-echelon training such as warfighter exercises, combat training center rotations, or brigade field training exercises to provide signal support. Sections should be observed by external evaluators or observer-controller trainers. Sections will be evaluated against the unit's operation order, SOPs, and unit time standards. The evaluation becomes subjectively focused in Table VII on whether the section was able to effectively support the unit commander. Table VII serves as the training bridge that aligns the training of signal sections and crews with unit and staff training on MCIS. The complete systems approach to training framework is outlined in figures 3-3 and figure 3-4, on page 3-6.

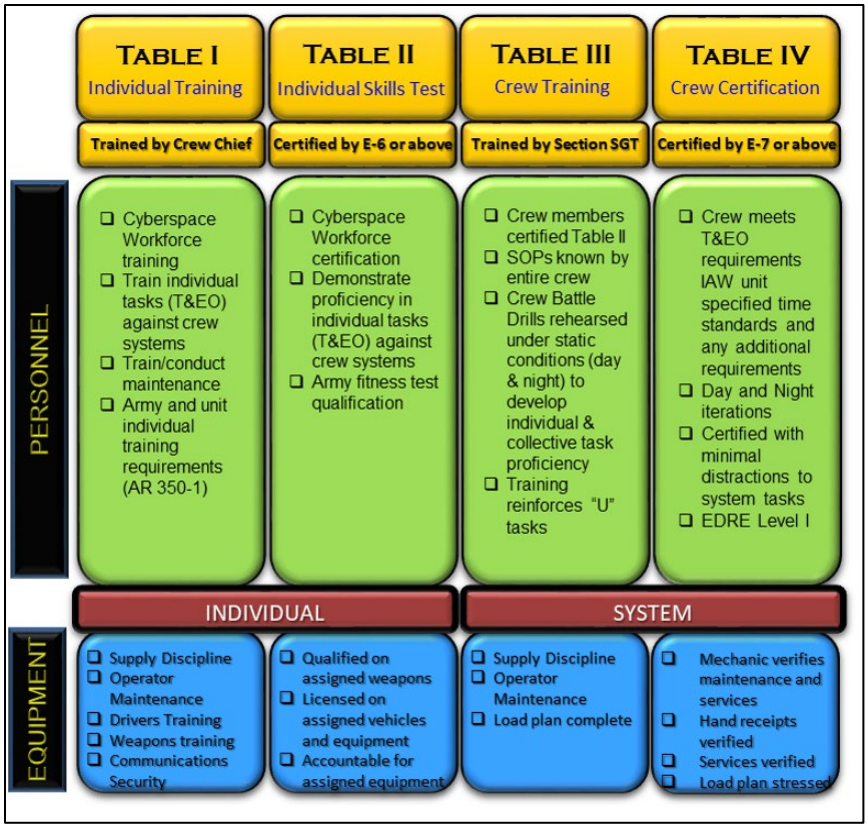


Figure 3-3 Signal Assessment Tables I-IV

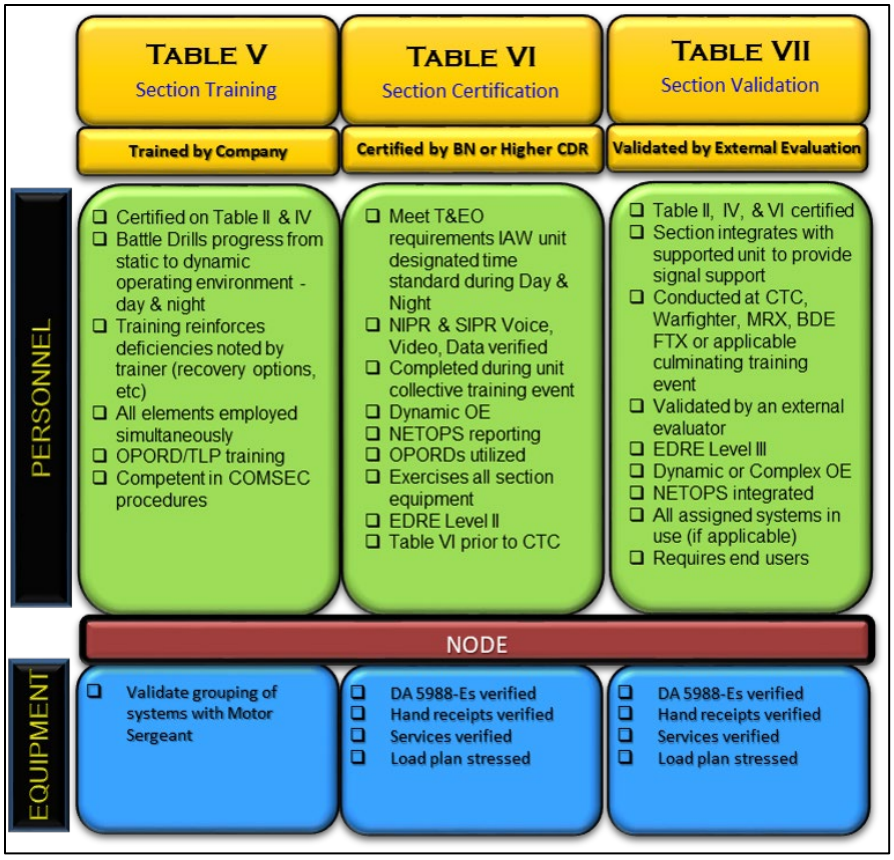


Figure 3-4 Signal Assessment Tables V-VII

Crew Certification Time to Live and Decertification Guidelines

3-21. Rapid change in the personnel and equipment in crews and sections may lead to significant degradation in readiness. To prevent that degradation in readiness and skill sets, the following certification timelines and parameters for decertifying crews are provided—

- Tables I – II will be completed within one quarter of accession to the unit.
- Tables III – IV will be conducted quarterly.
- Tables V – VI will be conducted semi-annually.
- Table VII will be conducted annually.
- Crews are decertified if their manning drops below 74% or the crew chief departs.

MISSION COMMAND INFORMATION SYSTEMS TRAINING

3-22. The scope of managing MCIS includes installation, operation, maintenance, and troubleshooting. Each functional cell has the primary responsibility to manage their associated MCIS platform. Table 3-4 on page 3-7, lists some of the most common MCIS and their functional leads.

Table 3-1. Common mission command information system and functional cell leads

Mission Command Information System	*Warfighting Function Proponent*	*Signal Support Requirements*
AFATDS	Fires	Systems Integration & Maintain Network FOM
AMDWS	Protection	
AMPS	Protection	
CMD Web	Movement / Maneuver	
CPOF	Movement / Maneuver	
DCGS-A	Intelligence	
EDM	Movement / Maneuver	
EWPMT	Protection	
FBCB2	Movement / Maneuver	
GCCS-A	Movement / Maneuver	
IBCS	Protection	
JBC-P	Movement / Maneuver	
JC-R	Movement / Maneuver	
NETT Warrior	Movement / Maneuver	
OSVRT	Intelligence	
PSDS2	Intelligence	
TAIS	Protection	
TIGR	Intelligence	
UASGCS	Intelligence	

Legend:
AFATDS - Advanced Field Artillery Tactical Data System
AMDWS - Air Missile Defense Warning System
AMPS - Aviation Mission Planning System
CMD Web - Command Web
CPOF- Command Post of the Future
DCGS-A - Distributed Common Ground System-Army
EDM- Air Warrior EDM Tablet PC
EWPMT- Electronic Warfare Planning Management Tool
FBCB2 - Force XXI Battle Command Brigade and Below
FOM - Freedom of Maneuver
GCCS-A - Global Command and Control System-Army;
IBCS - Integrated Air and Missile Defense Battle Command System;
JBC-P - Joint Battle Command-Platform
JC-R - Joint Capability-Release;
OSRVT - One System Remote Video Terminal;
PSDS2 - Persistent Surveillance and Dissemination System of Systems;
TAIS - Tactical Airspace Integration System
TIGR - Tactical Ground Reporting
UASGCS - Unmanned Aircraft Systems Ground Control Station

3-23. Units should integrate MCIS training into the overall UTP in two efforts, the training of mission command digital master gunner (MCDMG) and signal digital master gunner (S-DMG), and the subsequent training of battle staffs at home station by the digital master gunners.

3-24. Units register for the MCDMG Course through ATRRS under the school code of 150, and the course code of: 9E-SI/ASI5C/920-ASI5C(CT). The course takes place at the Mission Command Center of Excellence at Fort Leavenworth, KS.

3-25. Units register for the S-DMG Course through ATRRS under school code of 113, course code of: 531-F75 (CT). The course takes place at the Cyber Center of Excellence on Fort Gordon, GA.

3-26. An MCDMG is a subject matter expert that can operate, maintain, integrate, and train others on MCIS to generate a common operational picture for the commander and battle staff using a unit's integrated system-of-systems command post. An MCDMG will possess the ability to integrate, visualize, and troubleshoot the primary MCIS and will be a leader capable of training and mentoring other unit MCDMGs.

3-27. MCDMGs train their units using the digital training tables found in TC 6-0.

3-28. S-DMGs are 25B or 25U sergeants or above who are masters of the local area network, integrators of Battle Command Common Server, and MCISs that serve as the commander's subject matter experts in the command post.

Chapter 4

Communications and Electronic Maintenance

4-1. Signal training is impossible without attentive maintenance. Organizations do not clearly understand how to conduct preventive maintenance checks and services (PMCS) on and report the status of C&E equipment, resulting in an unclear picture of the true system readiness. Years of over-reliance on contracted field service representatives and logistics assistance representatives coupled with tremendous growth of system density and complexity has eroded Soldier technical skills.

4-2. Signal leaders must oversee and track the maintenance status of all C&E equipment within their purview. Commanders must execute a command maintenance discipline program that includes C&E equipment. Operators must take responsibility for maintaining their assigned C&E equipment—even if the operator is not a signal Soldier.

MAINTENANCE PRECEPTS

4-3. **Maintenance must be a priority in the unit's battle rhythm.** By conducting routine, scheduled maintenance units develop asset visibility and can maximize training time. Units at the battalion level or higher should develop a signed maintenance plan that outlines—the division of responsibilities for all C&E assets, a schedule for performing PMCS, and the procedures to elevate C&E maintenance issues.

4-4. **Stress equipment**. During weekly maintenance, units should place a live load on C&E equipment to stress the system. Signal leaders should endeavor to replicate realistic, rigorous mission environments when conducting maintenance to reveal equipment issues. Commanders should provide a focus of the week or equivalent to increase attention on current challenges, maintenance trends, or preventative topics and conduct checks to restore rigor to the maintenance culture.

Units should conduct C&E Maintenance on a separate day of the week from Motor Maintenance due to the complexity of signal systems

Recommended Template:
Monday: Motor
Tuesday: Communications & Electronics

4-5. **Develop field maintenance procedures**. Maintenance must continue in the field and be incorporated into the unit's tactical standard operating procedures. Developing, validating, and executing field maintenance procedures in advance prevents unnecessary service interruptions. Ordnance electronic systems maintenance warrant officers (948B), maintenance control officers, and support operations officers can assist in developing and proving procedures.

4-6. **Service Equipment.** In addition to routine unscheduled maintenance, certain C&E equipment requires services. Services are maintenance actions performed at specific intervals when equipment, components, and systems are checked, adjusted, lubricated, cleaned, and updated (software) in accordance with the technical manual at level authorized. The scheduling, performance, documentation, and tracking of services in GCSS-Army is essential to extending the lifespan of C&E equipment. Battalion maintenance officers, technicians, sergeants, and their teams can assist in creating service plans as well as forecasting when subsequent services are due to facilitate planning. SMART-T TRANSEC modules and TCN/POP Uninterruptable Power Supply (UPS) are two examples of equipment that units should consider creating service plans to support.

4-7. **Incorporate FSRs and LARs**. Units must be capable of employing and maintaining their C&E equipment without the assistance of FSRs and LARs. However, units should not shy away from capitalizing upon the expertise resident in their FSRs and LARs as part of a sustainment training strategy. FSRs and LARs provide specialized skills that can help develop operator expertise and maintenance competence or prove maintenance plans. Units should centralize the process for requesting assistance through the signal network management technician (255N) and/or the ordnance electronic systems maintenance warrant officer (948B) to provide visibility of support requests and reduce complacency.

ASSET VISIBILITY

4-8. **Tracking maintenance**. Signal leaders should maintain the communications status (COMSTAT) report as a key part of the signal running estimate and supervise C&E maintenance. Organizational equipment status reports (ESR) should mimic the deficiencies found on the COMSTAT. Signal leaders should become proficient at understanding the ESR and using it as a means to track maintenance.

4-9. **Signal System of Systems**. The complex nature of C&E systems requires that they are treated as systems comprised of multiple subsystems. Associated shelter vehicles, generators, and generator trailers must also be coupled as subsystems with the system. In addition to the COMSTAT, C&E readiness must also be reported through two official Army systems of record: the unit status report (USR) and Global Combat Support System-Army (GCSS-Army). To accurately report C&E readiness posture to Headquarters, Department of the Army G-4, G-6, and G-8, units must configure the signal system of systems into GCSS-Army down to the subsystem level. Providing inaccurate historical readiness data results in decreased budgets for operations and maintenance. Readiness reporting criteria updates to the maintenance master data file (MMDF) and the recent completion of an equipment readiness code (ERC) study for signal-centric platforms facilitates improved GCSS-Army reporting. Equipment that is not MMDF-reportable in accordance with AR 700-138 can be identified as significant items on the USR for a limited measure of visibility. S-6s and company commanders should report pacing and critical communications system of systems to the commander and higher headquarters to increase understanding of their mission criticality. Properly reporting improves visibility of maintenance concerns, guides maintenance priorities, and helps to improve overall readiness.

The Signal Corps recommends adopting maintenance status of sub-system as the maintenance status of the overall higher system

If the sub-system is deadlined, the higher system is deadlined

4-10. **Maintenance remediation at the lowest level**. Leaders must properly elevate maintenance faults that cannot be addressed at the operator (-10) level, creating an effective maintenance culture. The C&E maintenance shop will verify faults identified to determine level of maintenance required, reducing unnecessary use of spares and unwarranted evacuation of parts to higher-level maintenance facilities. There are many potential processes for C&E equipment with faults that require evacuation. For example, COMSEC equipment may require processing through a unit's Information Systems Security Program (ISSP) and be tracked by a Standard Form (SF) 153 (COMSEC Material Report). Table 4-1 and Figure 4-1, on pages 4-3 and 4-4 respectively, outline the process flow for the evacuation of equipment.

Table 4-1. Equipment evacuation process

System Category	*Example*	*Evac Type/ Process*	*Tracking Mechanism*	*OPR/POC*
PM Warranty Equipment	WIN-T COEI, HPA for STT, Linkway Modem, LNB, AN/TYQ-155 BCCS, GRRIP AN/PSC-15, UPS	C&E; DA Form 5988-E	GCSS-Army	C&E, CECOM LAR, FSR, SRA
Signal C&E Legacy Equipment (Shelter)	TRC 190 Baseband/Radio, ASIP 1523E, PRC-126, AN/PRC-148 (MBITR), AN/PRC-154, PP-6224, PSN-13 DAGR, CSS-VSAT, TSQ-232 CPP, JRC/JBC-P/BFT, Fiber Optic Cable	C&E; DA Form 5988-E	GCSS-Army	C&E, CECOM LAR, FSR, SRA
COMSEC Equipment	KG 175A, KG 175G, KIV 7, PYQ-10, KG-250	C&E; DA Form 5988-E; Open job in ISSP, request return authorization (RMA)	GCSS-Army, RMA, SF 153	C&E, CSLA NMP
Prime Mover	M1089, M998 Vehicle, JLTV	DA Form 5988-E turned in to BMT	GCSS-Army	BMT
PGEN	10K, 5K, 3K, On Board Generators	DA Form 5988-E turned in to BMT	GCSS-Army	BMT
COTS	Redline Radio AN-80, IP or Wireless Intercom Systems, Inflatable SATCOM Antennas (ISA)	C&E; DA Form 5988-E; CECOM LAR, DSE or FSR w oversight based on equipment type	GCSS-Army	C&E, CECOM LAR, FSR, SRA

Legend:

ASIP – advanced SINCGARS improvement program
BCCS – Battle Command Common Services
BLSE – Brigade Logistics Support Element
BMT – brigade or battalion maintenance technician
CECOM – U.S. Army Communications-Electronics Command
C&E – communications and electronics
COEI – components of end item
COMSEC – communications security
CSLA – Communications Security Logistics Activity
DSE – digital systems engineer
FSR – field support representative
GCSS-Army – Global Combat Support System-Army
GRRIP – Global Rapid Response Information Package
HPA – high power amplifier
ISSP – information systems security program
JBC-P – joint battle command platform
LAR – logistics assistance representative
LNB – low noise block downconverter
OPR – office of primary responsibility
PERRY – percentage of on-hand equipment fully mission capable
PGEN – power generation
PIEMC – percentage pacing item on-hand fully mission capable
PM – program manager
POC – point of contact
SATCOM - satellite communications
SRA – specialized repair activity
STT – Satellite Transportable Terminal;
UPS – uninterruptable power supply
WIN-T – Warfighter Information Network-Tactical

** Notes:
1. At the BCT, your BMT, C&E Maintenance OIC, BLSE Lead, DSE, are your first lines of defense on Non-Standard Maintenance
2. GCSS-Army (AR 750-1, 4-15e: *GCSS-Army will be the principal and comprehensive business automation enabler for the Total Army's (Active Army, National Guard, Army Reserve to include the supporting civilians and contractors) logistics Information Technology (IT) mission area.*

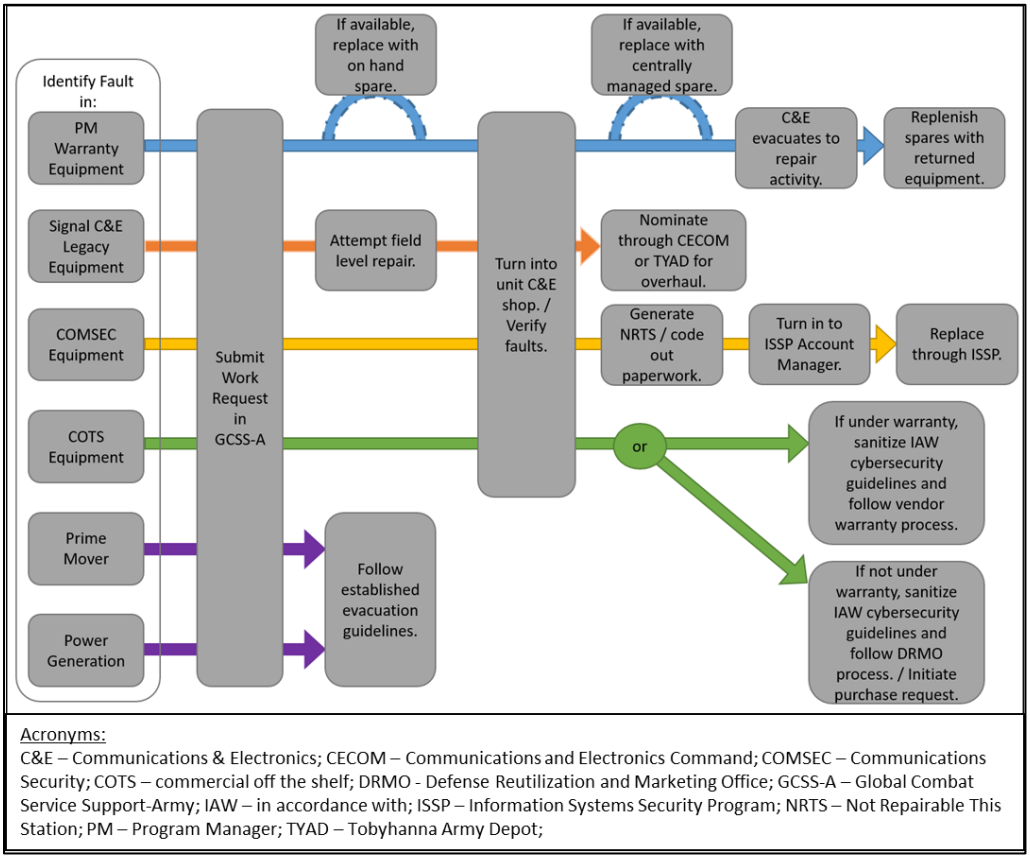


Figure 4-1 C&E equipment evacuation flow

4-11. **Validate the C&E Shop Stock Listing**. The C&E maintenance shop manages the shop stock list (SSL) and bench stock list (BSL) as prescribed by AR 710-2. Signal leaders should continue to monitor the shop and bench stock lists after validation and request changes when trends in consumption change. Signal leaders should also develop a program to manage and check battery use and stock.

4-12. **Order repair parts**. As the advocate for C&E maintenance, the S-6 or company commander should periodically review the document control register or order status report (GCSS-Army or equivalent) to maintain visibility on repair parts order statuses. After a PMCS is finished, crews should follow up until fault resolution, spare replacement, or scheduled service completion.

4-13. **Validate spare components**. The S-6 or commander should conduct an accurate inventory and validation of all spares no less than quarterly. Spares (shop-stock) must be accounted for on a component of end item hand receipt or must be accounted for as shop-stock IAW AR 710-2. Centralized management of spares for mission command or integrated tactical network platforms is normally best executed by the organic C&E maintenance section. Low-density, long-lead time line-replaceable units with mission essential impacts across a brigade or battalion must be intensely managed. Replacement of unserviceable on-board spares must be initiated promptly via the proper organic maintenance source. Prolonged retention of unserviceable spares post-maintenance diagnosis by the signal company can severely delay the overall replacement timeline and decreases readiness across multiple formations.

4-14. Management of spares through the C&E maintenance shop provides data necessary to improve future shop stocks. Maintainers can generate a GCSS-Army supply and demand history for spares, even if replacements are obtained from warranty, vendor exchanges, common hardware system, or the standard Army requisition process.

4-15. Units should collect empirical statistical data for analysis for maintenance trends, systemic parts failures, or line-replaceable unit requisition demand history to build the flexibility required to support missions.

4-16. **Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) Life-cycle Analysis Team (CLAT).** The CLAT program is an AR 750-1 endorsed and fully funded effort to inspect & evaluate select C5ISR systems for depot repair or overhaul. The CLAT program inspects systems in all Army components (with significant potential benefit to components two and three) every four years. The program inspects for physical damage, corrosion, mold, and water intrusion in coordination with unit and CECOM inspections of internal components and inducts systems on a "worst case first" basis. Units should coordinate through their LARs and BLSE to validate proposed inspection cycles, applicable systems, and eligibility requirements.

4-17. Signal leaders across all cohorts must promote the importance of C&E maintenance by highlighting its impact on large-scale combat operations. The better warfighting commanders understand how C&E maintenance impacts their ability to command the more likely they will allocate the time, resources and emphasis needed to improve the C&E readiness posture.

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Chapter 5
Conclusion

5-1. The character of war is changing, and the Army must adapt its training to accomplish its missions in the next war. Soldiers will succeed in future OEs by the way they have trained and maintained their C&E equipment. Leaders will persevere by the way they build effective crews and sections to employ signal capabilities.

5-2. This signal training strategy is the basis for deliberate planning and training of Soldiers, leaders, and units to address the challenges of the next conflict along the precepts of leadership, training, and maintenance. Unit training strategies focusing on these three precepts will transition the force from a unit preparing for planned deployments to units actively ready for a decisive action environment against a near-peer threat.

5-3. This document provides direction for leaders to develop UTPs and maintenance plans that integrate their signal capabilities. These plans must encompass a principle of mission adaptability, with training that fosters critical and creative thinking at all echelons to prepare and develop dynamic leaders.

5-4. It is clear that the employment of the Signal Corps will be fundamentally different in the future than what has sufficed in the past. Training methodologies and leader development must evolve to meet the challenges of tomorrow. By evolving for the future, the Signal Corps will remain ***watchful for the country***.

"PRO PATRIA VIGILANS"

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Appendix A

Training—A Way

A-1. All leaders encounter a similar challenge as they analyze training needs and develop their UTP: how to preserve the training time and resources necessary to develop individual and collective skills prior to supporting higher echelon collective training.

A-2. This challenge is compounded for brigade signal companies and S-6 sections that—

- Are required to support all training events utilizing information networks or MCIS.
- Can inhibit maneuver training objectives without a comparatively high skill competence and equipment readiness.
- Have skill sets and equipment, which are both complex.

A-3. This challenge is now shared by BEB commanders who must balance their training needs and priorities with the direct support relationship between the BCT and its signal company.

A-4. This appendix serves as a guide for BEB commanders and their supporting signal leaders in the battalion and the BCT to set the conditions for successful mission command at the BEB and brigade levels in future collective training events. This appendix will use the standardized METL for the maneuver unit's brigade signal company with the SATs (Chapter 3, Figures 3-3 and 3-4) to illustrate a feasible way to nest signal training with the operational training plan in a resource constrained, high-OPTEMPO environment.

EXAMPLE INFANTRY BRIGADE COMBAT TEAM SIGNAL COMPANY MISSION ESSENTIAL TASK LIST (TOE- 11307R900)

A-5. **MET 1- Provide Network Transmission Path for Brigade Signal Companies (11-CO-9060)**—

- Establish a Satellite Transportable Terminal (STT) (WIN-T Increment 2) (11-CW-6050).
- Establish a High Capacity Line-of-Sight (HCLOS) Radio Terminal AN/TRC-190(V) (11-CW-7022).
- Establish the Secure Mobile Anti-Jam Reliable Tactical Terminal (SMART-T) AN/TSC-154 (11-CW-7173).
- Conduct Troop Leading Procedures for Companies (71-CO-5100).

A-6. **MET 2- Provide Network Switching Services for Brigade Signal Companies (11-CO-9070)**—

- Establish a Tactical Switching Service Node (11-CW-6002).
- Conduct Troop Leading Procedures for Companies (71-CO-5100).

A-7. **MET 3- Provide Tactical Radio Support for Brigade Signal Companies (11-CO-9075)**—

- Conduct Combat Network Radio (CNR) Retransmission (RETRANS) Operations (11-CW-7017).
- Operate a Combat Network Radio (CNR) System (11-CW-8013).
- Conduct Troop Leading Procedures for Companies (71-CO-5100).

A-8. **MET 4- Conduct Expeditionary Deployment Operations in Support of the Offense, Defense, Stability and defense support of civil authorities (DSCA) (55-CO-4830)**—

- Perform Pre-deployment Maintenance Activities (43-CO-4805).
- Perform Deployment Alert Activities (55-CO-4801).
- Conduct Staging Activities (55-CO-4826).
- Plan Unit Deployment Activities Upon Receipt of a Warning Order (55-CO-4828).
- Conduct Unit Redeployment (55-CO-4829).

- Prepare Personnel for Deployment for Companies (71-CO-0004).
- Conduct Troop Leading Procedures for Companies (71-CO-5100).

A-9. The BEB commander, in this example, assumes command following the BCT's redeployment and faces a combat training center rotation at the end of the year. The BEB Commander recognizes that the signal company will be required to support multiple BCT and BEB collective training events and that the focus of the company during these events will be mission support. The BEB commander understands that the BEB staff and signal company must develop a UTP that provides the time and resources necessary to develop and certify skill proficiency outside of BCT and BEB collective events. The BEB commander realizes the number and complexity of signal tasks and equipment and ensures that the staff considers the following in the BEB UTP:

- **Long Range Training Resource Planning—**
  - A satellite access request (SAR) is required for any communications system that includes a satellite terminal. These requests are routed up and through geographic combatant command staff. Consequently, most units require SARs no less than 90 days before a training event.
  - Spectrum management requests for other communications systems or missions may need to be coordinated through multiple echelons depending on the availability of frequencies and the terrain traversed. Requests in forward deployed units may also require the approval of the host nation. Many units require 45-day leads for requests though some, including forward-deployed units, require 90 days or more for host-nation coordination and approval.
  - Requesting resources inside of these timeframes often require letters of lateness from the first O-6 in the chain of command.
- **Routine Maintenance breeds success—**
  - Many communications issues are, at root, maintenance issues.
  - Most communications equipment requires PMCS.
  - PMCS 10-level checks are the responsibility of the assigned operators. Most units have too many systems to be properly maintained by signal Soldiers alone.
  - Routine PMCS by operators builds familiarity and reduces the training burden on commanders and signal Soldiers.
  - Most units have too many communications systems to assume operators are completing them on top of vehicle maintenance in one day.
  - Units may dedicate a second day to C&E maintenance to drive communications readiness or set C&E as a regular maintenance priority of the day during motor maintenance.
  - Commanders may check that the COMSTAT built by Signal leaders matches the unit's ESR & USR to identify whether deficiencies in Signal equipment are being rectified
- **Signal Training and C&E Maintenance Synchronized—**
  - In order for crews and sections to certify on a quarterly basis, both equipment and personnel must be ready.
  - Planners must incorporate a deliberate method to ensure equipment is fully validated weekly, monthly, and quarterly.
  - Planners must synchronize the collective training events with the equipment validation, or the certification will become delayed.
  - The UTP must include both signal training and C&E maintenance to ensure fully ready crews and sections are capable to support the maneuver commander. The SATs provide guidelines for maintenance during crew and section training progression.
- **Mission Command Information System Integration—**
  - Training resources for MCIS (such as the Advanced Field Artillery Tactical Data System) are targeted at the operators.
  - BCTs and battalions with MCIS should appoint one or more battle NCO per key command post or node to be MCDMG and send them to training with the Mission Command Center of Excellence.

- BCT and battalion S-6s should appoint one or more signal NCOs per key command post or node to be signal digital master gunners and send them to training with the CCOE.
- The Mission Command Center of Excellence has available resources to assist units in building and developing proficiency in command post operations that effectively integrate MCIS.
- MCIS and associated operators should be included in all communications exercises prior to collective training.

- **Communications Security (COMSEC)—**
  - Most military communications systems require COMSEC.
  - Units should assess the needs of their unit to select and train the appropriate number of hand receipt holders prior to collective training.
- **Cross-Training reduces capability gaps—**
  - The Signal Corps is comprised of Soldiers with many, distinct specialties. Maneuver units are authorized most of these specialties in low density.
  - The SATs require signal Soldiers to certify on all of their assigned systems, regardless of specialty. Cross-training will be a necessary part of training progression.

A-10. Using the signal company's standardized METL, training guidance from the BCT, the SATs (Chapter 3), and the above considerations, the BEB commander—

- Identifies key BCT training events (figure A-1).

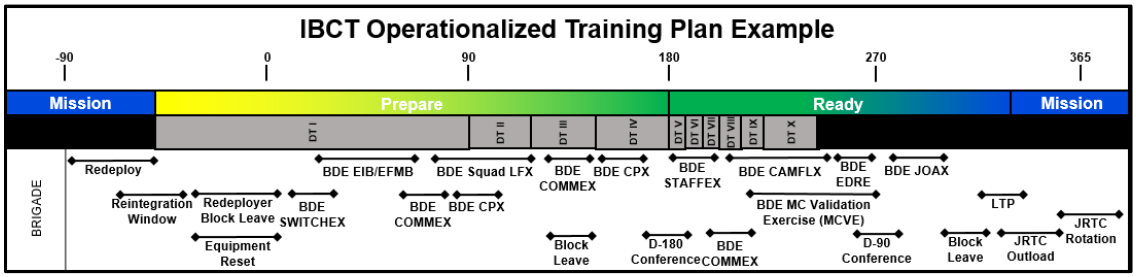


Figure A-1. Notional brigade combat team training events

- Identifies the BEB training events that nest within the BCT's timeline (figure A-2).

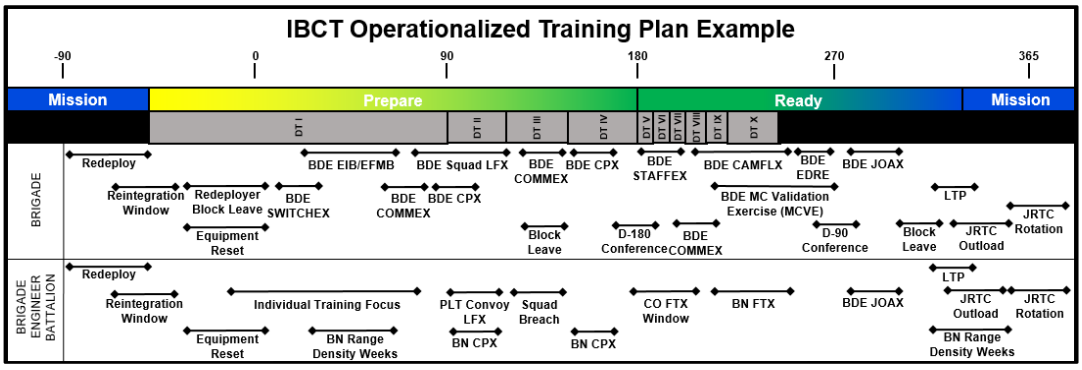


Figure A-2. Notional brigade combat team and brigade engineer battalion training events

- Assesses the task cross-walk conducted by the BEB staff and signal company commander and validate the crew and section tasks necessary to support collective training at the BEB and BCT.
- Directs the staff and signal company to use T&EOs to gain understanding of the time and resources necessary for crew and section training.
- Identifies creative solutions to time and resource scarcity and accepts informed, prudent risk where necessary (figure A-3).

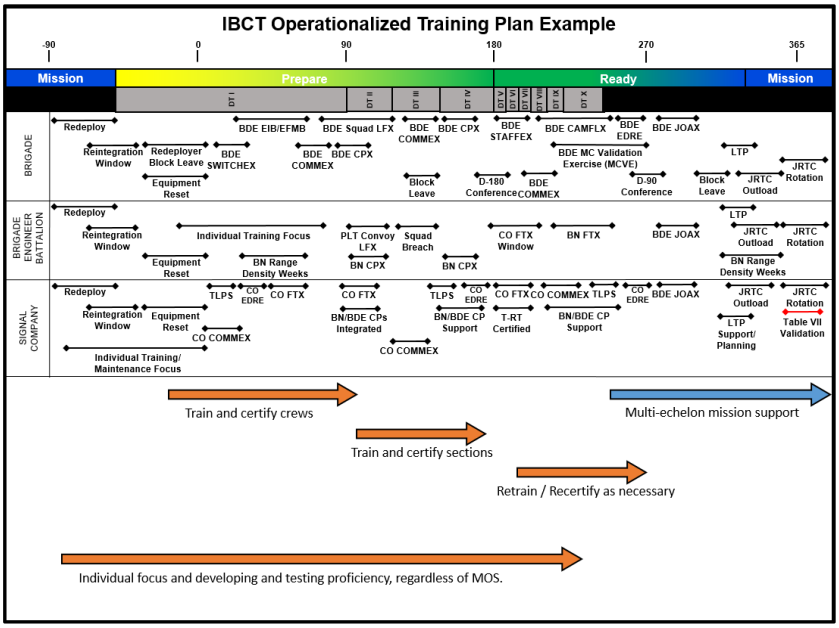


Figure A-3. Notional signal company training analysis

- Develops feasible UTPs for the signal company that supports the needs of the BEB and BCT.

A-11. Using the signal company's standardized METL and training guidance from the BCT, the BEB commander and staff develop a UTP that nests effectively within the BCT's UTP (figure A-5 on page A-5).

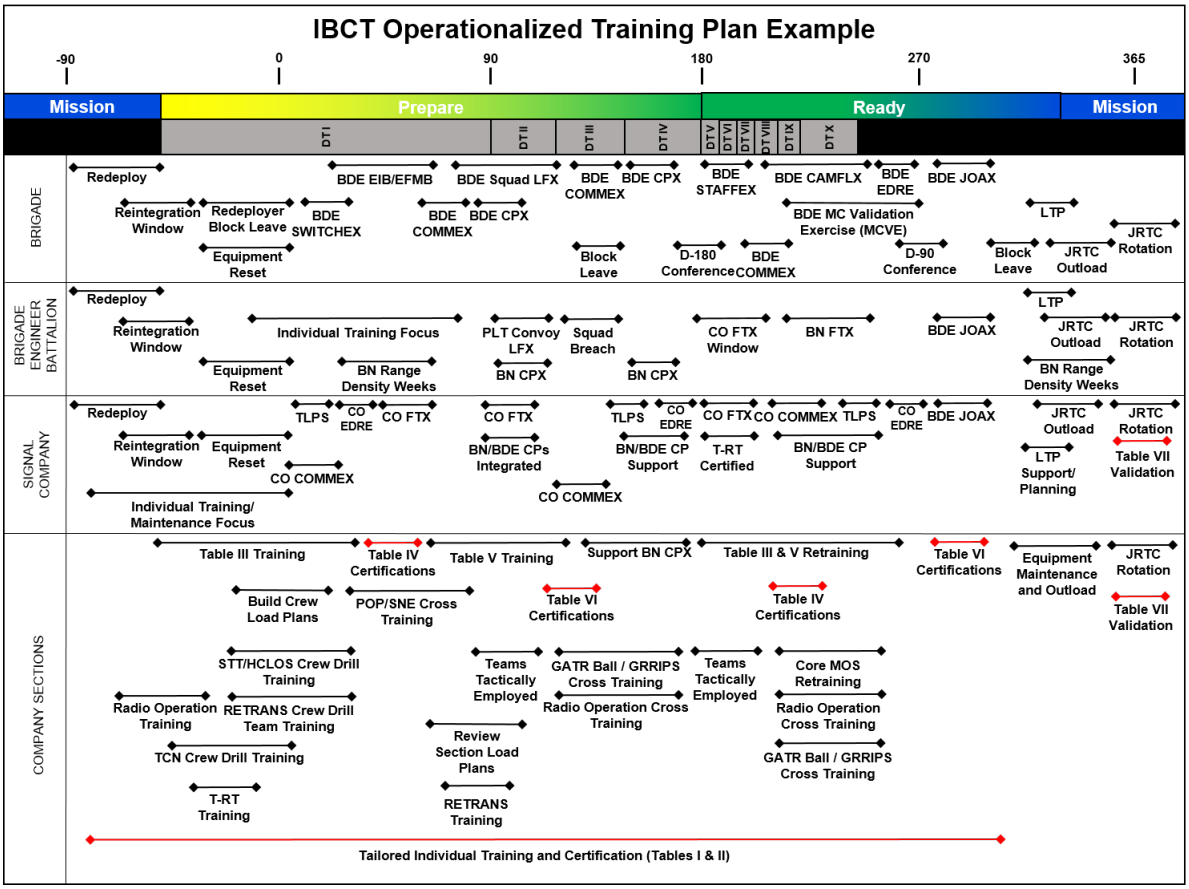


Figure A-4. Example operationalized training plan

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Appendix B

Primary, Alternate, Contingency, and Emergency Plans that Enable Operations

B-1. Communications systems enable commanders to act by connecting them with higher, subordinate, supporting, and supported elements during changing and uncertain conditions. Recognizing that military operations are volatile, uncertain, complex, and ambiguous, the Army has long practiced a primary, alternate, contingency, and emergency (PACE) methodology for use in communications planning. A PACE plan is a key requirement for operational planning. Building a PACE plan is a challenging but crucial practice for planners. This appendix supplements existing doctrine on PACE and serves as a primer for communications planners.

PRIMARY, ALTERNATE, CONTINGENCY, AND EMERGENCY PLANS IN THE OPERATIONS PROCESS

B-2. **Understanding PACE.** Successful PACE planning first requires an understanding of its utility and importance. Leaders may include a PACE plan in any operation at any echelon utilizing any of the doctrinal planning methods. A PACE plan directs the sequential use of communications systems with respect to the warfighting functions, operational phases and transitions, and decisive points.

B-3. A PACE plan provides predictability and redundancy to communications systems in degraded, contested, or congested environments to empower warfighters during all activities of the operations process. The PACE plan is a course of action during planning activities and becomes a directive when included in a signed mission plan or order. Failure to develop a feasible, acceptable, suitable, distinguishable, and complete (FASDC) PACE plan may result in commanders unable to direct forces and make decisions, staff unable to control operations, and Soldiers in contact unable to call for support.

B-4. **PACE Preparation at Home Station.** Effective PACE planning begins at a unit's home station. Commanders and leaders should build an understanding of their organizations authorized and on hand communications equipment to include capabilities and limitations as well as the personnel and logistic requirements necessary to employ and sustain them. Commanders and leaders should develop this understanding through action by employing all of their organized equipment during unit training and rectify equipment deficiencies through the UTP and maintenance or supply programs.

B-5. Employing systems in training allows leaders to identify the systems that most reliably support the unit's organic mission, test different methods of employment, develop running estimates, and refine the unit's tactical SOP. Employing systems in training may also allow leaders to identify gaps in support that may drive a request to change the unit's MTOE or submission of an operational needs statement. Training should progress to include cyber electromagnetic activities components to simulate a denied spectrum and stress unit PACE plans.

B-6. **PACE Planning in MDMP.** PACE planning at battalion or above echelon may require significant coordination and synchronization and may require a dedicated communications planner and supporting staff. Pace planning includes—

- Receipt of Mission. During receipt of mission, the planner updates their running estimates to include the organizational equipment of all units in the order's task organization and gathers the tools necessary to conduct planning. These tools may include current operational COMSTAT reports, communication line of sight analysis tools, current mission command overlays, and maps.
- Mission Analysis. The planner focuses a significant amount of effort into the mission analysis phase of planning. During intelligence preparation of the battlefield (IPB), the planner develops an understanding of effects that terrain and weather will have on the organization's

communications equipment as well as the capacity of threat actors to contest friendly communications. Based on the results of IPB and analysis of the specified and implied tasks, the planner may begin identifying the assets available to build the PACE plan, any possible resource shortfalls, and potential risks to mission. The planner also makes recommendations for commander's planning guidance on command post placement.

- Course of Action Development through Approval. The planner's focus during this phase is to develop a communications support plan for each option developed by the supported warfighter. It is during these phases of MDMP that a planner develops and refines the PACE plan for the operation and integrates the completed PACE plan into key decision products. The planner must take many factors into account; many of the factors are identified during mission analysis but require the context of the supported warfighter's courses of action. Some, but not all of the potential factors, are—
  - Scheme of maneuver through the area of operations.
  - Reporting and coordination requirements by warfighting function.
  - Locations of command posts by phase and during transitions.
  - Controlling command posts by phase and transition criteria.
  - Dispersion of subordinate units two levels down.
  - Current and templated retransmission team locations.
  - Location and expected impact of threat jamming capabilities by time.
  - Effects of weather and solar activity by time.
  - Decisive points and essential tasks by warfighting function and phase.
  - Capabilities of communications equipment.
  - Skill of equipment operators.
  - Readiness of personnel and equipment.
- Taking into account the effects of the operational environment, the scheme of maneuver and other warfighting function tasks, the planner must allocate communication capabilities to each level of the PACE. The planner must make sure that the PACE plan meets all of the screening criteria (FASDC), including—
  - Feasible. Do subordinate units have enough, working systems to be able to implement each level of the PACE plan?
  - Acceptable. Will employment of equipment with long set up times effectively support a command post that displaces frequently?
  - Suitable. Will units have enough redundancy and capability to meet the commander's intent?
  - Distinguishable. Does the Alternate level of the PACE plan rely on the same medium as the Primary level? If that medium is degraded/denied (VHF), what other transmission types could provide redundant communications?
  - Complete. Are the tasks necessary to implement and sustain the PACE plan outlined in the concept of signal support for each proposed (and ultimately the selected) course of action?
- Orders Production. During orders production, the planner focuses on clearly identifying the PACE plan, particularly if it is a change from the PACE normally employed as part of the tactical SOP. The PACE should be simple and concise, with supporting information available in the unit's signal operating instructions and "commo card."

B-7. **PACE Planning in TLP.** At the company or below echelon, PACE is largely developed by the planning efforts of higher headquarters and may be directed. PACE planning in TLP is often conducted by one or a small group of leaders as part of overall planning for the operation. The focus for small unit planners using TLP is to integrate into their higher or supported unit's PACE plan and highlight their communications capabilities and deficiencies to ensure the PACE plan is both feasible and complete.

B-8. **PACE Preparation.** Leaders include a focus on the PACE plan as they execute the preparation activities in the operations process: staging and rehearsals. During staging, leaders follow up on any attachments or detachments of personnel and equipment and conduct inspections and checks of initial sustainment necessary to execute the PACE plan. During rehearsals, leaders validate that warfighting forces

understand the PACE plan and are capable of implementing it. Based on complexity of the operation, leaders should consider a specific rehearsal for the mission command warfighting function. Rehearsals should be coordinated through the chief of staff and S-3 and conducted with participation from all staff elements and subordinate units. Rehearsals should include an element of wargaming to force leaders to think through transitions in the PACE due to changes in conditions or enemy action such as jamming.

B-9. **PACE Execution and Assessment.** During execution of an operation, leaders observe to determine if the PACE plan is supporting execution of the operation and make adjustments as needed.

B-10. Leaders may choose to build and visualize the PACE plan in multiple ways to support the operation. Figure B-1 depicts an example of a unit PACE plan that highlights transitions by phase of an operation. Figure B-2 provides an example PACE plan by unit warfighting function. Figure B-3 provides an example of a PACE plan for a decisive point within an operation (an air assault).

Main or TAC CP could be established in any phase. It is the Commander's decision based on situation, tempo, enemy capabilities, etc. Decision affects PACE.

	Phase I (Joint Phase: Deter) (Army Role: Prevent)		Phase II (Joint Phase: Seize Initiative) (Army Role: Conduct LSCO)		Phase III (Joint Phase: Dominate) (Army Role: Conduct LSCO)		Phase IV (Joint Phase: Stabilize) (Army Role: Consolidate Gains)		Phase V (Joint Phase: Enable Civil Authority) (Army Role: Consolidate Gains)	
	Voice	Data	Voice	Data	Voice	Data	Voice	Data	Voice	Data
P	FM NET (VHF)	STT (Ka)	FM NET (VHF)	SMART-T (X)	FM NET (VHF)	SMART-T (X)	FM NET (VHF)	STT (Ka)	SVOIP	STT (Ku)
A	TACSAT (UHF)	SNAP (X)	TACSAT (UHF)	GRRIPS (BGAN)	TACSAT (UHF)	GRRIPS (BGAN)	TACSAT (UHF)	SNAP (X)	FM NET (VHF)	SNAP (Ka)
C	HF	JBC-P (L)	HF	JBC-P (L)	HF	JBC-P (L)	HF	JBC-P (L)	HF	SNAP (X)
E	IRIDIUM	GRRIPS (BGAN)	IRIDIUM	*	IRIDIUM	*	IRIDIUM	GRRIPS (BGAN)	IRIDIUM	JBC-P (L)

Legend

BGAN: Broadband Global Area Network
FM: Frequency Modulated (Denotes SINCGARS Radio Net [e.g. command net])
GRRIPS: Global Rapid Response Information Package Solution
HF: High Frequency
JBC-P: Joint Battle Command Platform
NIPR: Non-Secure Internet Protocol Router
SINCGARS: Single Channel Ground and Airborne Radio System
SMART-T: Secure Mobile Anti-Jam Reliable Tactical Terminal
SNAP: SIPR/NIPR Access Point
STT: Satellite Transportable Terminal
TACSAT: Tactical Satellite
UHF: Ultra High Frequency
VHF: Very High Frequency
WIN-T: Warfighter Information Network – Tactical
Main CP Established
Main CP Displaced
* No feasible solution

Figure B-1. Example unit PACE by phase of an operation

	Mission Command	Movement and Maneuver	Fires	Sustainment	Intelligence	Protection
P	FM (CMD Net)	FM (O&I Net)	FM (Fires (V) Net)	FM (A&L Net)	FM (O&I Net)	FM (O&I Net)
A	JC-R (Z)	JC-R (Z)	JC-R (Z)	JC-R (Z)	JC-R (Z)	JC-R (Z)
C	TACSAT (X)	HF (Y)	HF (Y)	HF (Y)	HF (Y)	LMR
E	HF (Y)	TACSAT (X)	TACSAT (X)	RUNNER	TACSAT (X)	*

Legend

A&L: Administration and Logistics
CMD: Command
FM: Frequency Modulated (Identify SINCGARS Radio Net [e.g. command net])
HF: High Frequency
JC-R: Joint Capabilities Release
LMR: Land Mobile Radio
O&I: Operations and intelligence
TACSAT: Tactical Satellite
V: Voice
X: Identify uplink/downlink or channel
Y: Identify channel or address
Z: Identify role name or chat room
*: No feasible solution

Figure B-2. Example unit PACE by Warfighting Function

	Long Haul Communications	Ground Communications
P	TACSAT (X)	FM (CMD Net)
A	HF (Y)	TACSAT (X)
C	Iridium	*
E	DTCS (X)	*

Legend

CMD: Command
DTCS: Distributed Tactical Communications System
FM: Frequency Modulated (Identify SINCGARS Net)
HF: High Frequency
TACSAT: Tactical Satellite
X: Identify uplink/downlink or channel
Y: Identify channel or address
Z: Identify role name or chat room
*: No feasible solution

Figure B-3. Example unit PACE by decisive point in operation (air assault)

Appendix C

Signal Coordination

SIGNAL COORDINATION

C-1. Figure C-1 provides a graphical representation of the relationships common for signal leaders in a BCT. The BCT S-6 is the senior signal leader responsible for the BCT's signal staff plan, PACE plan, and signal running estimates. The BCT S-6 mentors and trains junior signal officers and echelons. The BCT signal company commander is responsible for providing trained and ready personnel and equipment to execute signal support for the BCT. The BEB commander is ultimately responsible for the BEB, including the organic signal company.

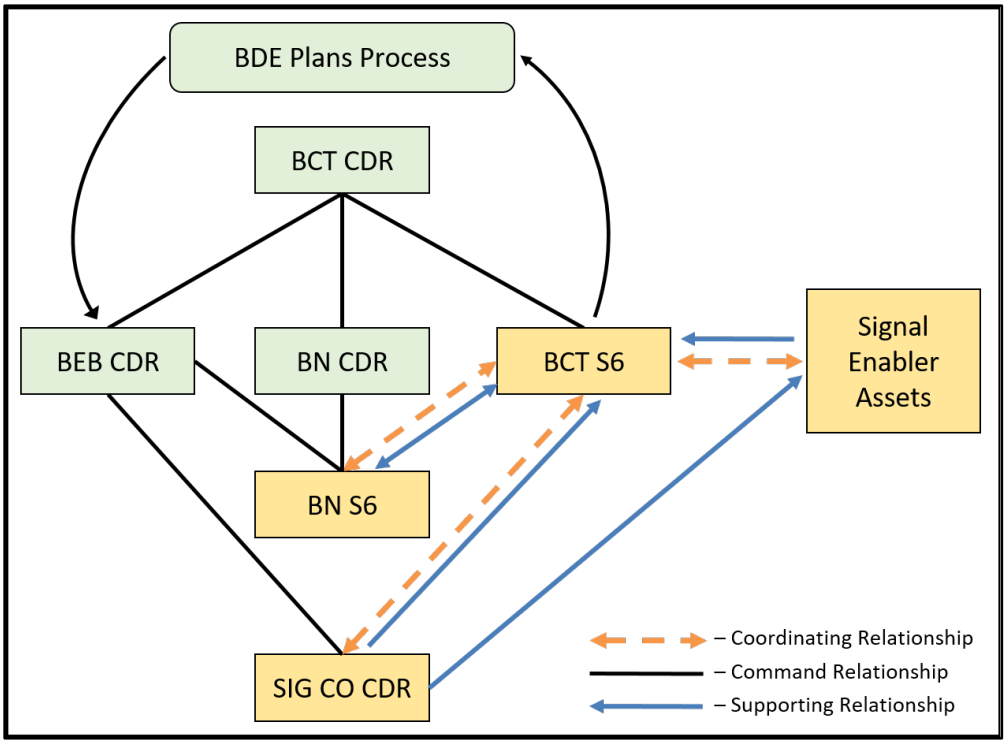


Figure C-1. Brigade combat team signal coordination

C-2. The BCT signal company is organic to, and maintains a command relationship with, the BEB commander but directly supports the BCT during operations. To effectively provide this support, the signal company commander maintains an ongoing support relationship with the BCT S-6.

C-3. The number and nature of these relationships require open lines of communication to prevent confusion when planning and executing signal support to the brigade. This open dialogue should include realistic assessments of the time and resources necessary to train signal crews and sections.

C-4. Depending on conditions, additional signal enabler assets from external sources, such as an expeditionary signal battalion, may be integrated into the BCT network. This support requires direct coordination through the BCT S-6.

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Appendix D
Institutional Training

INSTITUTIONAL DOMAIN (UNITED STATES ARMY SIGNAL SCHOOL)

D-1. The institutional training domain is the Army's formally established training and education system, which primarily includes training base centers and schools that provide initial entry and MOS transition training and subsequent professional military education for Soldiers, military leaders, and Army civilians. Signal institutional training is conducted at Fort Gordon, Fort Meade, various accredited Reserve Component regional training institutes, and through distributed learning tools. This appendix introduces the institutional training provided by the U.S. Army Signal School.

UNITED STATES ARMY SIGNAL SCHOOL BRANCHES

D-2. The Signal School provides initial military training, advanced training, and skills training for both officers and enlisted Soldiers. Initial military training provides an orderly transition from civilian to military life. Advanced training includes professional development courses for commissioned, warranted, and noncommissioned officers using both TRADOC directed and Signal Corps specific curricula. Skills training includes courses that teach Soldiers specialized courses of instruction to prepare them for unique roles or tasks. A brief introduction to the Signal School branches and courses follows.

Signal Enlisted Development College

D-3. The Signal Enlisted Development College (SEDC) trains, educates, and develops multi-disciplined and mission ready Signal Initial Entry Training (IET) and Advanced Individual Training (AIT) students within the Signal 25-series Military Occupational Specialties (MOSs) 25S, 25P, 25Q, 25N, 25U, 25C, 25L, and 25B across the Active, Guard, and Reserve Components. SEDC inspires Soldiers to willingly assume and carry out their responsibilities as technical operators, tactical warriors, and future leaders.

- 25S1O - Satellite Communications Systems Operator-Maintainer, 15 weeks
- 25S ASI 7D - Satellite Communications Systems Operator-Maintainer, 11 weeks 1 day
- 25S ASI 7E - Satellite Communications Systems Operator-Maintainer, 11 weeks
- 25S ASI 1C - Satellite Systems/Network Coordinator, 17 weeks 4 days
- 25P1O – Microwave Systems Operator Maintainer Common Core, 10 weeks 1 day
- 25Q1O – Multichannel Transmission System Operator Maintainer, 15 weeks
- 25N1O - Nodal Network Systems Operator-Maintainer, 25 weeks 1 day
- 25U1O – Signal Support Systems Specialist, 20 weeks
- 25U ASI J2 – Antenna Installation Course (Tower School) 13 weeks 1 day
- 25C1O – Radio Operator Maintainer, 12 weeks 4 days
- 25L1O – Cable Systems Installer Maintainer, 10 weeks 2 days
- 25B1O – Information Technology Specialist, 19 weeks 3 days
- Special Qualification Identifier I – Basic Installer Course, 6 weeks

Foundation Training (Signal Soldier Common Core)

D-4. Common core training and education is the combination of common military tasks, common leader tasks, and directed or mandated tasks for specific courses, grade or skill levels, or organizational levels regardless of branch, career management field, or program.

D-5. Based on feedback from signal commanders' lessons learned and best practices, the signal training developers identified common tasks required by every signal initial entry soldier. These topics are now collectively referred to as signal foundation training.

Signal Leader Development College

D-6. The Signal Leader Development College provides signal leaders with continued sequential and progressive training and education to produce adaptive leaders—steeped in the profession of arms—that are technically and tactically competent, confident, and capable of leading and enabling commanders to conduct operations with joint, inter-organizational, and multinational partners. Course descriptions include—

- Signal Basic Officer Leader (SBOLC) Course, 16 weeks—
  - The SBOLC mission is to graduate competent, accountable leaders who are able to leverage technical platforms in order to deliver tactical communications to the warfighter, enabling mission command.
- Signal Captains Career Course (SCCC), 20 weeks—
  - The SCCC equips leaders with signal technical and tactical knowledge, skills and abilities to be agile and adaptive in leading company-sized units and executing the role of the battalion S-6 in support of unified land operations to win in a complex world.
- Signal Captains Career Course—Reserve Component (SCCC-RC) —
  - The SCCC-RC course consists of four phases that provide students the skills, knowledge, and abilities to perform critical signal officer tasks. The Reserve Component course is designed to achieve the same outcomes as the SCCC course.
    - Phase 1: Signal Common Core Distance Learning
    - Phase 2: Signal Common Core (2-week resident course)
    - Phase 3: Mid-Level Learning Continuum Common Core Distance Learning
    - Phase 4: Mid-Level Learning Continuum Common Core (2-week resident course)
- Brigade S-6 Course, 2 weeks (SI6N)—
  - The Brigade S-6 course provides signal officers the instruction required for assignment as a brigade S-6. This includes the relationships between the brigade S-6 and the BEB, the brigade signal company, and the division G-6. It provides an executive overview of systems organic to a BCT, cybersecurity, and cyberspace operations discussion. The course culminates with a capstone exercise.
- Battalion S-6 Course, 5 weeks 2 days (SI6B)—
  - The battalion S-6 course provides signal officers the instruction required for assignment as a battalion S-6. Instruction includes the capabilities, limitations, and employment of signal- and user-owned equipment as it supports the warfighter. The course culminates with a capstone exercise.
- P943 Course (during Command and General Staff College), 5 days at Fort Leavenworth.
- P920 Course (FT Gordon Satellite Command and General Staff College prerequisites), DL.
- 25D3O Course, Cyber Network Defender, 8 weeks.
- 25E3O Course, Electromagnetic Spectrum Manager, 10 weeks 3 days.
- Warrant Officer Basic (23 weeks 4 days weeks) and Advance Course for 255N (17 week 4 days), Network Technician.
- Warrant Officer Basic (32 weeks) and Advance Course for 255A (13 weeks 4 days), Information Systems Technician.
- Warrant Officer Advanced Course for 255S, Information Protection Technician, 25 weeks.
- Signal Warrant Officer Intermediate Level Education Course, 4 weeks 4 days.

Cyber Center of Excellence Noncommissioned Officer Academy

D-7. The mission of the Cyber Center of Excellence Noncommissioned Officer Academy (CNCOA) is to prepare NCOs for success through development of a rigorous technical and tactical academic training

program. The CNCOA educates the NCO through the Army learning model employing experiential learning, enabling the NCO to lead Soldiers with competence and confidence in an ever changing and unpredictable cyberspace domain. The CNCOA courses include—

- Basic Leaders Course.
- Advanced Leader Course-Skill level 3—
  - The advanced leader course consists of both the structured self-development II course (prerequisite) and the MOS-specific resident course.
  - These courses provide NCOs selected for promotion to staff sergeant an opportunity to acquire the technical and tactical skills needed to lead at the squad and platoon levels.
- Senior Leader Course-Skill level 4—
  - The senior leader course consists of both the structured self-development III course (prerequisite) and the MOS-specific resident course.
  - These courses provide NCOs selected for promotion to sergeant first class an opportunity to acquire the technical and tactical skills needed to lead at the platoon and company levels.

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Glossary

The glossary lists Army, multi-Service, or joint, and other selected acronyms.

SECTION I – ACRONYMS AND ABBREVIATIONS

ASI	additional skill identifier
BCT	brigade combat team
BEB	brigade engineer battalion
C&E	communications and electronics
COMSEC	communications security
FSR	field service representative
G-6	assistant chief of staff, signal
GCCS	global command and control system
HF	high frequency
ITN	Integrated Tactical Network
LAR	logistics assistance representative
MCDMG	mission command digital master gunner
MCIS	mission command information system
MET	mission-essential task
METL	mission-essential task list
MOS	military occupational specialty
PACE	primary, alternate, contingency, and emergency
PERRY	percentage of on-hand equipment fully mission capable
PIEMC	percentage pacing item on hand fully mission capable
PMCS	preventive maintenance checks and services
PME	professional military education
S-6	battalion or brigade signal staff officer
SAT	signal assessment tables
S-DMG	signal digital master gunner
SINCGARS	single-channel ground and airborne radio system
SMART-T	Secure, Mobile Anti-jam Reliable Tactical Terminal
T&EO	training and evaluation outline
TRADOC	United States Army Training and Doctrine Command
UHF	ultrahigh frequency
USR	unit status report
UTP	unit training plan
VHF	very high frequency
WIN-T	Warfighter Information Network-Tactical

SECTION II – TERMS

None.

References

REQUIRED PUBLICATIONS

These documents must be available to the intended users of this publication.

ADP 1-02. *Terms and Military Symbols*. 14 August 2018.

DOD Dictionary of Military and Associated Terms. May 2019.

RELATED PUBLICATIONS

Most Army doctrinal publications are available online: https://armypubs.army.mil/.

JOINT AND DEPARTMENT OF DEFENSE PUBLICATIONS

None.

ARMY PUBLICATIONS

ADP 6-22. *Mission Command*. 1 August 2012.

AR 350-1. *Army Training and Leader Development*. 10 December 2017.

AR 700-138. *Army Logistics Readiness and Sustainability*. 23 April 2018.

AR 710-2. *Supply Policy Below the National Level*. 28 March 2008.

AR 750-1. *Army Materiel Maintenance Policy*. 3 August 2017.

FM 27-10. *Law of Land Warfare*. 18 July 1956.

TC 6-0. *Training the Mission Command Warfighting Function*. 21 December 2017.

OTHER PUBLICATIONS

Handbook #17-20. Army Center for Army Lessons Learned (CALL). *Radio and System Operators Handbook*. August 2017. (Requires DOD-approved certificate login using e-mail certificate) https://call2.army.mil/toc.aspx?document=17531.

RECOMMENDED READINGS

Chairman of the Joint Chiefs of Staff Instructions are available at: https://www.jcs.mil/Library/CJCS-Instructions/.

Department of Defense issuances are available at: https://www.esd.whs.mil/dd/dod-issuances/.

Joint doctrinal publications are available at: https://www.jcs.mil/Doctrine/Joint-Doctrine-Pubs/.

ADP 3-0. *Operations*. 6 October 2017.

ADP 6-0. *Mission Command*. 17 May 2012.

ADP 7-0. *Training*. 29 August 2018.

ADRP 1. *The Army Profession*. June 2015.

ADRP 1-03. *The Army Universal Task List*. 2 October 2015.

ADRP 3-0. *Unified Land Operations*. 6 October 2017.

AR 25-1. *Army Information Technology*. 25 June 2013.

AR 25-2. *Army Cybersecurity*. 4 April 2019.

AR 220-1. *Army Unit Status Reporting and Force Registration – Consolidated Policies*. 15 April 2010.

ATP 4-33. *Maintenance Operations*. 14 April 2014.

ATP 5-19. *Risk Management*. 14 April 2014.

ATP 6-02.53. *Techniques for Tactical Radio Operations*. 7 January 2016.

ATP 6-02.60. *Techniques for Warfighter Information Network-Tactical*, 3 February 2016.

ATP 6-02.70. *Techniques for Spectrum Management Operations*. 31 December 2015.

ATP 6-02.71. *Techniques for Department of Defense Information Network Operations*. 30 April 2019.

CJCSI 6211.02D. *Defense Information Systems Network (DISN) Responsibilities*. 24 January 2012.

DODD 5144.02. *DOD Chief Information Officer*. 19 September 2017.

DODD 8140.01. *Cyberspace Workforce Management*. 31 July 2017.

DODI 8530.01. *Cybersecurity Activities Support to DOD Information Network Operations*. 27 July 2017.

DODM 8570.01-M. *Information Assurance Workforce Improvement Program.* 10 November 2015.

FM 3-0. *Operations*. 6 October 2017.

FM 3-12. *Cyberspace and Electronic Warfare Operations*. 11 April 2017.

FM 6-02. *Signal Support to Operations*. 22 January 2014.

FM 6-22. *Leader Development*. 30 June 2015.

FM 7-0. *Train to Win in a Complex World*. 5 October 2016.

JP 3-0. *Joint Operations*. 17 January 2017.

JP 3-12. *Cyberspace Operations*. 5 February 2013.

JP 3-13.1(R). *Electronic Warfare*. 8 February 2012.

JP 6-0. *Joint Communications System*. 10 June 2015.

PRESCRIBED FORMS

This section contains no entries.

REFERENCED FORMS

Unless otherwise indicated, DA Forms are available on the Army Publishing Directorate (APD) site at: https://armypubs.army.mil.

DA Form 2028 (Recommended Changes to Publications and Blank Forms).

DA Form 5988-E. (Equipment Maintenance and Inspection Worksheet*)*.

Standard Form (SF) 153 (COMSEC Material Report). Available through servicing COMSEC Account.

WEBSITES

Combined Arms Training Strategy. (Requires DOD-approved certificate login using e-mail certificate) https://dtms-prt.army.mil/atnportalui/cats/.

Standardized Mission Essential Task Lists. (Requires DOD-approved certificate login using e-mail certificate) https://atn.army.mil/dsp_DA_Standardized_METL.aspx.

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TC 6-02.1

11 July 2019

By Order of the Secretary of the Army:

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