Department of the Army
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Fort Monroe, Virginia 23651-1047

*TRADOC Pamphlet 25-73

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Information Management: Automation

# TRADOC Plan for Reengineering Information Systems Modernization (TPRISM)

**Summary.** This pamphlet describes the U.S. Army Training and Doctrine Command (TRADOC) strategy, from the command viewpoint, for modernizing information systems (IS) used to execute TRADOC's mission. TPRISM provides an integrated description of the command's objective architecture and prescriptive principles and standards to guide local decisions and coordination with external IS providers.

**Applicability.** This pamphlet applies to all TRADOC installations, activities and directors of information management (DOIM) who provide information management services, support and supervision to activities that use, develop or acquire IS (including appropriated and nonappropriated activities).

**Suggested improvements.** The proponent of this pamphlet is the Deputy Chief of Staff for Information Management (DCSIM). Send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) through channels to Commander, TRADOC, 90 Ingalls Road, ATTN: ATIM-I, Fort Monroe, VA 23651-1065. Suggested improvements may also be submitted using DA Form 1045 (Army Ideas for Excellence Program (AIEP) Proposal).

**Availability.** This publication is only available on the TRADOC Homepage at www.tradoc.army.mil.

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# Contents

## 1. Organization of TPRISM

TPRISM provides an overview of many complex projects and topics. Part of its purpose is to provide a framework for understanding how these projects fit together into an interoperable, compatible, integrated and secure architecture and modernization strategy. In this purpose, it is similar to the *Defense Information Infrastructure (DII) Master Plan*. Therefore, TPRISM uses the organizational framework described by the *DII Master Plan* to provide a suitable framework for understanding TRADOC's information architecture, and helps map TRADOC's efforts into the larger DII context. Department of Defense (DoD) partitions the DII into four levels:

Foundation; Program, and Related Technical Activities include policy, standards, architectures, requirements management, and assessment of new technology. Unlike the other layers, the foundation is not equipment. (paras 1-7).

Communications and Computer Infrastructure provide information processing and transport services used by functional area applications and common applications. (paras 8-9).

Common Applications provide cross-functional, cross-organization capabilities, e.g., E-mail and messaging. The DII Common Operating Environment (COE) provides a set of integrated common support services and a corresponding software development environment for functional applications. (para 10).

Functional Area Applications cover all DoD mission areas. These applications depend upon common applications to provide the environment for sharing information among functional communities. These applications also rely upon the information processing and transport capabilities. (para 11).

The first six paragraphs provide a foundation consisting of strategic goals, Commanding General (CG) TRADOC's vision, architecture principles, the policy/process context for IS modernization, an overview of TRADOC's operational architecture (business processes and requirements) and technical architecture (standards). The remaining paragraphs describe the command level view of our system architecture (SA). Systems are grouped into the DII categories of communications and computer infrastructure (the terms "networking" and "platforms" are often substituted), common applications, and functional area applications (often called "mission applications"). Within each of these categories, the discussion normally follows an outline with three topics: baseline SA, objective SA and program management information. The resourcing and management vehicles being used to migrate from the baseline to the objective SA are referred to as programs.

## 2. Overview of Modernization

This paragraph contains TRADOC's goals for information management (IM), DCSIM's vision and short-term emphasis, and an executive summary of TRADOC's IS architecture.

### 2.1. Goals.

Following are TRADOC's strategic goals for IM and technology, with abbreviated statements of objectives. The complete set of objectives can be found at http://www-tradoc.army.mil/dcsrm/cmdplan.htm

Goal 1. Expand TRADOC's common user networking and computing by supplementing the Installation Information Infrastructure Modernization Plan (I3MP) with IM infrastructure upgrades.

• Objective: Provide full operational data capability for TRADOC installations.

• Objective: Identify requirements and implement communication infrastructure to support GCSS-A and facilitate implementation of subsequent GCSS-A modules for TRADOC installations.

Goal 2. Improve the information systems security (ISS) posture within TRADOC.

• Objective: Assess ISS vulnerabilities at each TRADOC installation and improve ISS infrastructure required to protect TRADOC networks in accordance with (IAW) the Army's Information Assurance Program.

Goal 3. Reduce the use of printed materials/documentation within TRADOC.

• Objective: Publish all TRADOC administrative publications (i.e., regulations, circulars, pamphlets, etc.,) in digitized form on the TRADOC Homepage.

Goal 4. Provide adequate Wide Area Networks (WAN) to TRADOC installations and TRADOC schools on non-TRADOC installations.

• Objective: Increase Not Classified but Sensitive Internet Protocol (IP) Router Network (NIPRNET) bandwidth to at least 10 megabyte (MB) (or current plus Distance Learning and identified Tri-Service Infrastructure Management Program Office requirements) on TRADOC installations. Secure IP Router Network (SIPRNET) bandwidth to the level needed to support current and emerging automated IS processing classified information.

• Objective: Procure enterprise management tools for DOIMs to implement management controls of customer bandwidth usage.

Goal 5. Expand electronic recordkeeping TRADOC-wide.

• Objective: Identify, evaluate, and implement automated recordkeeping system for TRADOC users in compliance with the DoD/Department of the Army (DA) Recordkeeping Redesign Process and Army Information Warehouse Initiative.

Goal 6. Develop and institutionalize Standard Levels of Service (SLOS) and cost estimation procedures for IM and information technology (IT) services within TRADOC.

• Objective: Use SLOS and an associated cost model as the primary criteria for building TRADOC Budget Guidance and to build and defend each Program Objective Memorandum (POM) and budget submission to DA Program Managers (PM).

## 2.2. Vision.

Following is CG, TRADOC's vision for the command, as stated in the FY01 Command Plan. Phrases have been underlined to emphasize characteristics of the command that influence the direction of IS modernization. Key among these is the requirement to move information among a wide set of users to develop and disseminate integrated TRADOC products.

**CG's VISION FOR TRADOC**

To prepare the Army for decisive victory in the full range of required joint and coalition operations through:

• Accessing and training the Army's soldiers and leaders and providing disciplined combined arms training environments for units.

• Balanced development of concepts, requirements, and products in doctrine, training, leadership, organizations, materiel, and soldiers.

• Providing readiness infrastructure for training and projecting Army forces.

• Building a command environment that promotes safe, values-based and disciplined operations.

**STAFF PRINCIPALS' VISION**

• Lead the current Army's training effort by sustaining the development of quality soldiers and relevant products. Shape the Army Training XXI training in units and training institutions utilizing information-based technology.

• To be recognized by our customers as the Army's champion for excellence in base operations (BASOPS) support; a caring organization committed to providing bold, integrated solutions to the full range of BASOPS issues.

• A strategically relevant and preeminent, yet affordable, land force for warfighting across the full spectrum now and into the future.

• The Army's doctrine must be systemically tailored to meet the needs of the Army in the 21st century and keep up with the changes occurring in the institution as a whole. Consequently, a holistic view of the Army's doctrinal effort, to include joint and multinational, must be taken to ensure a proper mix and prioritized effort across the force is effected.

The TRADOC IS architecture is a key enabler of mission execution. The command's mission demands an IS architecture to acquire, process, transport, package, and protect the information used and the information generated. TRADOC's IS architecture will be sufficiently robust to enable execution of TRADOC's many processes, and sufficiently flexible to retain utility as reengineering improves our processes. The command's core processes and products will continue to be information based. The IS architecture must meet mission challenges to:

• Support the command's mission, organizational style and goals

• Acquire information from worldwide external sources as well as internal operations and experiments

• Analyze, process and transform information to formulate new concepts, doctrine, organizational designs and material requirements, and to manage the command's business processes and installations.

• Transport information to worldwide destinations

## 2.3. Structure.

The command is organized for decentralized execution at 15 installations and other activities across the continental United States (CONUS), each engaged in coordinated actions with organizations and units throughout the Army and DoD. TRADOC's decentralized organization will continue to drive requirements for distributed information processing and robust information transport capabilities. Access to TRADOC's IS architecture will extend capabilities down to the level of individual users.

## 2.4. TRADOC's architecture: an executive summary.

The current collection of IS capabilities is called the baseline architecture. Comparing the baseline architecture to the vision shows that TRADOC has significant IS modernization tasks ahead. The fixes cannot be made all at once. TRADOC will migrate toward its vision in steps, each providing system configurations with useful, but not total capabilities. These intermediate steps are called target architectures. The final step is called the objective architecture. The objective architecture is usually short of the vision, but it is as far as we can plan within the foreseeable marketplace and resource constraints.

This paragraph is an executive summary of TRADOC's baseline, target and objective SAs. Detailed information is provided in each SA paragraph about individual IS components.

### 2.4.1. Networks.

TRADOC's recent investment strategy has emphasized a flexible, open architecture of distributed components, linked over common user networks. TRADOC has achieved a minimum level of WAN and campus area network (CAN) capabilities at each of its 15 major installations.

TRADOC's WAN usage has shifted largely away from unique long haul circuits toward use of the common user networks collectively managed by DoD as the Defense Information System Network (DISN).

All TRADOC installations have access to the DISN NIPRNET using 5 megabytes per second (Mb/s) or better. TRADOC will need higher bandwidth access to WANs, but not a significantly different architecture. At 14 installations, TRADOC will leverage an Army Medical Command (MEDCOM) program that installs a 45Mb/s circuit in support of telemedicine and other medical data requirements. As a result, access at these TRADOC installations is expandable to 15Mb/s depending on requirements and funding.

Forts Benning, Bliss, Huachuca, Leavenworth, Leonard Wood, and Monroe have a common user SIPRNET architecture. The Global Command and Control System-Army (GCCS-A) program pays for dedicated high capacity SIPRNET connectivity at Forts Benning, Eustis, and Sill, and low capacity SIPRNET connectivity is available at Forts Knox, Rucker, Jackson, and Gordon.

Through a hub and spoke architecture implemented by the TRADOC Deputy Chief of Staff for Intelligence (DCSINT), all installations can access the DISN Top Secret/Sensitive Compartmented Information Joint Worldwide Intelligence Communications System except Carlisle Barracks, Presidio of Monterey, and Forts Jackson, Eustis, and Lee. Access to these classified networks is consistent with functional requirements.

Installations have also achieved minimally required CANs, usually consisting of a 100Mb/s fiber distributed data interface (FDDI) backbone with 10Mb/s connection tails to their highest priority buildings. During the past several years, this FDDI baseline has been augmented with segments using asynchronous transfer mode (ATM), and more recently, Gigabit Ethernet (Gig-E). DCSIM's Fort TRADOC target architecture introduced ATM access for users scheduled for fielding by the PM, Total Army Distance Learning Program (TADLP), and the Deputy Chief of Staff for Training (DCST) Classroom 21st Century (CR XXI) projects. Fort TRADOC has inserted multi-mode fiber with ATM/synchronous optical network (SONET) transport at OC-3 (155 Mb/s) to these targeted training facilities.

Although the baseline is typified by CAN connectivity to high priority user locations, networking has not been universally extended to classroom and action officer level to permit full exploitation of the potential for electronic coordination. Additionally, network security components, at WAN, CAN and local area network (LAN) level, are inadequate to counter realistic threats.

This baseline infrastructure accommodates most data transfer, but does not support projected higher bandwidth requirements for video or distributed simulations. The objective architecture extends the use of ATM into the CAN as required to satisfy TRADOC's operational requirements for distance learning, instructional technology, modeling and simulating, and coordination through video teleconferencing (VTC). ATM is consistent with designs chosen for DISN, telemedicine and the Army's I3MP. As the I3MP evolves, e.g., its recent option for using Gig-E, TRADOC's objective architecture will be modified for consistency with the standards used Armywide. Where options are permitted, trade-offs will be made to fit the solution to our operational requirements. The resulting objective architecture may include a mix of protocols, at the discretion of the installation, to suit operational requirements, technical support and integration requirements and available funds.

LANs also must be continually modernized, inter-networked, and in some cases created, to provide connectivity and capabilities at the locations required by users. However, this modernization continues to be the responsibility of functional organizations since it far exceeds the DCSIM's budget for automation modernization.

TRADOC is upgrading its ISS IAW mandatory Army solutions. CAN architectures have been modified for detecting intrusions and minimizing the less protected "backdoors." Beginning in FY00, firewalls were inserted into the architecture to help counter external threats. TRADOC still needs a more robust suite of security devices and software at CAN, LAN and server levels to detect and counter internal and external threats. The security architecture must be effective to protect TRADOC's information products and automated functional processes, while still allowing TRADOC to realize the benefits of electronically accessible information. Security devices are required to realize the promise of Intranets for command-wide coordination of TRADOC business involving sensitive information.

### 2.4.2. Platforms.

Installations have largely migrated to distributed processing platforms for common user functions and office automation. Most servers are running the Microsoft NT operating system (OS). There are also about 48,000 personal computers (PCs) in use in TRADOC. TRADOC's IM budget is inadequate to provide systematic life cycle replacement of these commercial off-the-shelf (COTS) platforms, and at any time about half are behind the performance specifications for efficiently running common office automation software. HQ TRADOC coordinates with TRADOC DOIMs to issue minimum specifications for ordering new PCs. These minimum specifications help ensure new PCs are supportable, interoperable and capable of running common software applications. Inadequate funds continue to slow TRADOC's migration to new applications, thus prolonging the use of mixed generation office automation packages and impeding free exchange of information products.

### 2.4.3. Common applications.

TRADOC must optimize the density and interoperability of common applications such as E-mail, knowledge management and World Wide Web (WWW) services. TRADOC has a substantial role to play in proliferating and standardizing E-mail for the majority of TRADOC users. Other common coordination capabilities that are used now, but must expand significantly in the target architecture, include:

- dial-up video-teleconferencing (DVTC)
- file transfers that do not reduce information content

- collaborative authoring and staffing tools
- access to knowledge stores and websites
- access to restricted data stores via command and local intranets
- automated records management

Horizontal integration of electronic commerce (EC)/electronic data interchange (EDI) techniques will provide one avenue for implementing common coordination capabilities. EC/EDI will integrate various capabilities into cross-functional capabilities that enable new approaches to TRADOC's business processes.

Information packaging and dissemination capabilities will migrate away from paper toward formats made possible by an emerging critical mass of interoperable IT. Top driven programs, e.g., Defense Reform Initiative, will provide additional impetus and means for using electronic products in TRADOC's doctrinal and training literature programs, and other business and administrative processes.

#### 2.4.4. Mission applications.

The use of DoD and Army standardized mission applications has increased. PMs develop mission applications that move TRADOC closer to an open architecture. These systems may emphasize the optimization of stovepipe functional domains at the expense of the command-wide architecture. As a result, interoperability problems surface during integration into the installations' infrastructure.

Year 2000 (Y2K) deficiencies forced the discontinued use of many TRADOC-developed applications. TRADOC's own installation support modules and many lesser applications are now retired and there is no source in TRADOC for their replacement. The command relies on DoD, Army, and commercial applications. Only the Army Training Support Center (ATSC) remains a significant source of mission application development within TRADOC.

## 3. Architecture Principles

Architecture principles promote an organizational consensus required for achieving an interoperable command-wide architecture. This set of principles underlies DCSIM's direction for modernizing TRADOC's architecture and establishes a context for architecture decisions made throughout the command. Applying these will promote the realization of command-wide capabilities built from local and functionally unique modernization efforts.

### 3.1. Apply total systems fielding concept.

TRADOC does not accept standard (i.e., mandatory use) systems from external PMs prior to planning and obtaining the infrastructure necessary to attain operational capability. TRADOC does not invest its own resources in IS without obtaining all components for a useful operational capability. TRADOC does not invest in the highly visible user application components of systems while neglecting the less visible, common user infrastructure.

### 3.2. Orchestrate modernization actions.

TRADOC coordinates the delivery of IS components to achieve initial operating capability early in the modernization process. Functional proponents minimize the "stove-pipe" approach in developing and fielding IS for improved interoperability. HQ TRADOC tracks and publicizes pending IS actions so that TRADOC DOIMs are aware of external agencies' plans that may affect their installation. TRADOC coordinates with external agencies to resolve issues identified by DOIMs.

### 3.3. Manage modernization as investments.

IS modernization efforts are managed as investments. Within their cost threshold authority, HQ TRADOC and installations will consider the return versus the risk in the approval and resourcing of individual modernization projects. In considering projects for approval and resourcing, the review criteria include:

- *Mission Impact.* How will the IS investment support improved performance in specific outcome-oriented terms? Will it provide a new capability or enhance current capabilities? Does law or executive directive mandate it? Is it required for mission-critical functions? What is the expected magnitude of the improvement in performance?
- *Consistency with Vision.* Does the project provide a capability that is a useful component of the objective operational and SA?
- *Return on Investment.* Is the calculated return on investment within expectations and analytically sound?
- *Modularity.* Is the project properly bounded, or segmented, to make it more executable and minimize risk?
- *Technical Risk.* Can the proposed technology be integrated with existing systems and the infrastructure? Does the project take advantage of proven COTS products? How complex is the SA and software design?
- *Investment Risk.* Is the proposed IS investment affordable, particularly in comparison to the overall IS budget? Will the investment require future operational expenditures that are not affordable? Can the proposed IS investment be funded with the type of money that is appropriate for the acquisition and installation of the components identified? Have all funding types required by the IS investment been identified?
- *Organizational Impact.* Is the organization ready for the structural and procedural impacts of the investment?

### 3.4. Use open standards.

TRADOC's standards profile is based on the open standards selected for Armywide use in the Joint Technical Architecture-Army (JTA-Army). TRADOC will use the standards outlined in the JTA-Army to promote interoperability, rather than mandate vendor specific products. However, TRADOC will use preferred products

lists as necessary to alert users about which products will have DOIM support for maintenance, operations, training, etc. TRADOC adopts the approach to use preferred products because it:

- is consistent with legal and regulatory requirements
- will help create an IT architecture that supports portable, scaleable, and interoperable applications and open information exchanges
- leaves our IT architecture more open for technology insertions as the marketplace changes

### 3.5. Execute distributed responsibilities.

Many organizations play a role in modernizing the architecture. Taskings must be clear to ensure collective decision-making results in effective IM.

#### 3.5.1. Command standardization.

HQ TRADOC enforces compliance with TRADOC's technical architecture for capabilities that are integrated at the enterprise and mission levels. This means that some characteristics of components, or systems, fielded at the installation, local and personal levels are subject to TRADOC command-wide standards. TRADOC's standards profile will be consistent with Army selected standards, as published in the JTA-Army, augmented and tailored as required for TRADOC's mission.

#### 3.5.2. Installation standardization.

Integrated IS capabilities will be in compliance with the installation's technical architecture. Adopt installation standards profiles that ensure seamless interfaces between the installation/building/personal levels and the enterprise/mission levels. ("Seamless" means the interfaces permit continuous electronic transport of information through any combination of networks and platforms in a manner that is transparent to the application and the user. This is achieved through use of standard communications protocols, data interchange formats, and distributed system interfaces.) Installation commanders are authorized to develop lists of supported products (e.g., those for which the DOIM will provide help desk services). However, the level of support will not restrict the use of WAN or CAN assets by any JTA-Army compliant IS.

#### 3.5.3. Commandwide capabilities.

HQ TRADOC DCSIM is the lead for the implementation for networking, platforms and support applications that require integration at the command level.

#### 3.5.4. Mission level capabilities.

HQ TRADOC staff elements, and assigned integrating activities, manage the integration of IS components at the mission level. This includes representing users' interests for DoD/Army PM systems. HQ TRADOC staff elements conduct business process reengineering as necessary to analyze the value of IT insertions in improving TRADOC's mission execution within their areas of proponency.

#### 3.5.5. Installation capabilities.

Installations plan and implement capabilities that are integrated at the installation, building, and personal levels. DOIMs, in coordination with the Installation ISS Managers, integrate planning at this level.

### 3.6. Invest in common user assets.

TRADOC investments will include common user networking and platforms that satisfy multiple missions, vice components designed for particular mission applications. Design reviews for mission specific technology insertions will consider common user assets, and focus on a common user approach versus a stovepipe approach.

### 3.7. Manage human-computer interface (HCI).

TRADOC invests in IS components that promote a common HCI at the personal level workstation. The HCI includes the appearance and behavior of the interface, physical interaction devices, and other human-computer interaction methods that enable the user to effect commands, enter into transaction sequences, and receive displayed information. The predominant type of HCI will be a graphical user interface (GUI) that uses graphical representations of objects (menus, screens, buttons, etc.) to enable human-computer transactions. TRADOC will ensure compliance with Section 508 of the Workforce Investment Act regarding the accessibility of IT for people with disabilities.

### 3.8. Leverage the marketplace.

TRADOC seeks first to satisfy functional requirements using COTS and non-developmental item (NDI) applications. COTS and NDI includes both ready-to-use applications (e.g., commercial E-mail packages and Standard Army Management Information Systems (STAMIS)) and non-procedural tool kits for customizing within a set of capabilities (e.g., spreadsheets and database manipulations). TRADOC will support system application design, development, and maintenance as the Army proponent for training and doctrine. TRADOC will sustain its previously built applications until COTS/NDI replacement components are available, and as long as resourcing allows.

## 4. Modernization Processes.

### 4.1. Information management.

The DCSIM at HQ TRADOC is responsible for staff supervision and command-wide implementation of IM for TRADOC. The DCSIM provides technical expertise to the TRADOC CG, staff, and 15 separate TRADOC Army installation commanders on all aspects of IM, and develops IM policy, plans, programs, and architecture for TRADOC's command-wide IS management.

TRADOC installation commanders direct the command's DOIMs. DOIMs implement IM for all activities on their installation. They provide technical expertise to the installation commander and all tenant activities. They manage their installation's IS architecture, define objectives and plan strategy for modernizing the information infrastructure; and document installation level requirements. DOIMs manage user level requirements for their

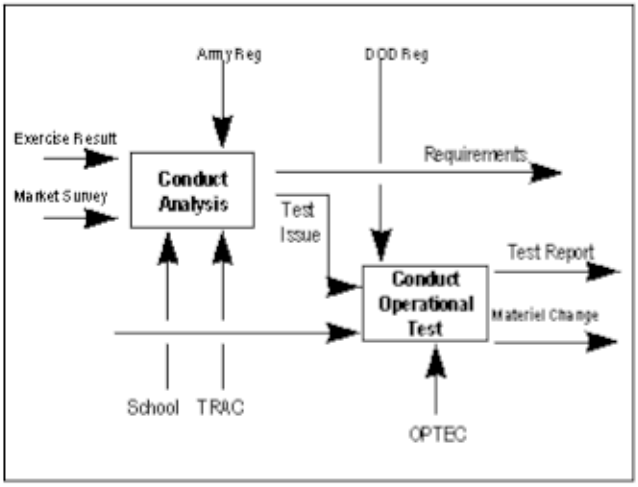
installation within a strategy that keeps its aim on the objective system and technical architectures. They operate installation level IM services. DOIMs chair Information Management Support Committees to review installation level projects and priorities for IS modernization.

### 4.2. IS architecture management.

Architectures provide a framework for portraying the relationships among all entities of a complex system. DoD and Army guidance is to define architecture from three viewpoints: operational, technical, and systems. Each portrays different types of entities and relationships, as illustrated in figure 1.

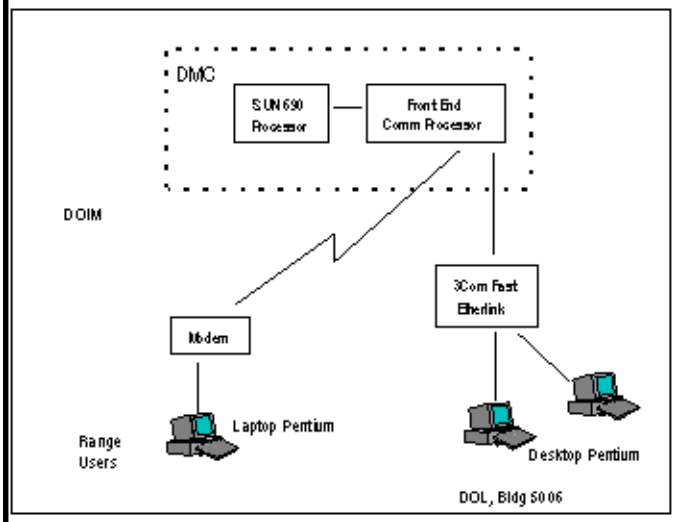
AR 25-1 is the Army's basis for architecture management processes. The Army Enterprise Architecture Guidance Document provides implementation procedures.
It requires coordination of a mandatory set of SA products between centralized designers of Army systems, the MACOMs, and installations that will use them. This coordination is aimed at resolving issues of architectural consistency and responsibilities for providing and operating each component of a system's overall configuration prior to its fielding.

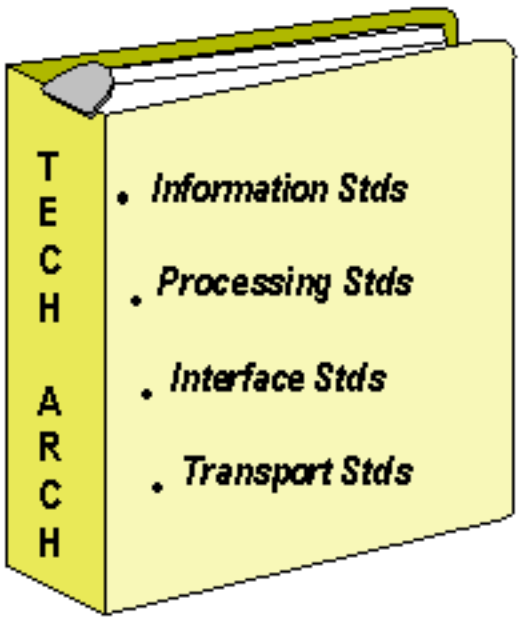
**Architecture:** A framework that portrays relationships among the elements in its view. Army uses three viewpoints for information.




**Operational:** Relationships among missions, functions, information and organizations.

**Technical:** Relationships among engineering standards used to build informaion products and systems.




**System:** Relationships among the systems (processors, software, communications) and organizations.

**Figure 1. Types of architectures**

For TRADOC installations, TRADOC Pam 25-72 provides procedures for implementing architecture management, consistent with AR 25-1.

Two on-going projects will provide a template for future architecture efforts on TRADOC installations. In FY98, Director of Information Systems for Command, Control, Communications and Computers (DISC4) initiated an effort, known as the Installation Information Infrastructure Architecture (I3A), to develop SAs for installations. DISC4 will produce a standard prescriptive view of installations' infrastructure. Besides generic viewpoints of a "typical" installation, DISC4 is also analyzing site specific baseline and target architecture requirements in sufficient detail for determining resource requests for POM submission. In 1999, HQDA expanded the I3A effort to include an Armywide configuration control board (CCB) to advise DISC4. TRADOC DCSIM is a voting member on the board. TRADOC expects any significant changes in direction for installations' SA will be determined in this forum. Its charter includes responsibility for advising DISC4 "on issues directly related to current and future I3A Systems Architectures. The CCB shall:

- Manage engineering changes to the baseline I3A System Architecture.
- Monitor IT systems development and fielding by Joint and Army IT system developers to ensure I3A compliance.
- Manage the technical and operational evolution of the I3A design.
- Ensure the maintenance of end-to-end systems integration, security, and interoperability within the I3A Systems Architecture."

The second project is DCSIM's sponsorship of Information System Architecture Plans (ISAPs). Both I3A and ISAPs use the same architecture principles and tools. The data required for each is compatible, but the ISAPs will provide more detailed site-specific planning than the I3A. ISAPs go beyond the level of architecture definition required for resource estimations to a level sufficiently detailed to enable installations to execute modernization, as funds become available. These ISAPs will serve as the installation's initial Architectural Framework Documents, as required by TRADOC Pam 25-72, and will be input for future versions of TPRISM. DCSIM will use them as a context for analyzing installations' requests for requirements approval and resourcing.

HQ TRADOC Deputy Chief of Staff for Combat Developments (DCSCD) has tasked the Combined Arms Center (CAC) to develop an Armywide command, control, communications and intelligence (C4I) operational architecture, and tasked the U.S. Army Signal Command (USASC) to represent TRADOC on Armywide SA developments. All other schools' Directorates of Combat Developments participate in defining Force XXI architecture and requirements for their area of proponency. These activities and architecture products are outside the scope of TPRISM.

### 4.3. Requirements management.

CG TRADOC is the Army's manager of warfighting requirements. In general, TRADOC executes this responsibility by producing doctrine, organizational designs and materiel requirements; and, by approving requirements for all Army warfighting systems and systems in Acquisition Category (ACAT) I-IIIA. DCSCD executes the mission to approve requirements. Procedures for requirements management are described in TRADOC Pam 71-9. This pamphlet applies Armywide. See particularly paragraph 13-2 for IT considerations. TRADOC DCSIM provides implementing guidance applicable to internal TRADOC IS in TRADOC Pam 25-72. Table 1 summarizes the most important procedures for requirements management.

As the approval authority for warfighting requirements, TRADOC is also the Army's approving authority for all models and simulations (M&S) requirements. The Deputy Chief of Staff for Simulations and Analysis (DCSSA) is the cross-domain coordinator and integrator for M&S requirements. DCSSA is also responsible for execution and functional management for distributed interactive simulation (DIS) user requirements. This M&S requirements approval process is also described in an appendix to TRADOC Pam 71-9. The M&S process includes review by the Requirements Integration Working Group and Council. The Army M&S Master Plan (1995) directed the formation of the three Army level domains as a framework for organizing M&S management: Training, Exercises, and Military Operations

**Table 1**
**Categories for requirements management**

| Criteria | Approver | Documentation | Authority |
|---|---|---|---|
| < $200K in total program costs | Installation level | Installation determined | Installation determined |
| > $200K and < $10M in total program costs | TRADOC DCSIM | Tailored Operational Requirement Document (ORD) | TRADOC Pam 25-72 |
| > $10M in total program costs | TRADOC DCSCD | ORD | TRADOC Pam 71-9 |

(TEMO); Advanced Concepts and Requirements (ACR); and Research, Development, and Acquisition (RDA). Deputy Chief of Staff for Operations (DCSOPS), Army Modeling and Simulation Office, is the single point of contact for the three domains. Domain Managers identify, integrate and coordinate requirements within each domain; evaluate existing capabilities; establish domain priorities; develop and maintain a Domain Management Plan; and develop and maintain Domain Investment Plans. The DCST and DCSCD are the Domain Agents for TEMO and ACR respectively. The TEMO Executive Agent (ADCST-S) manages TEMO domain functions through the TEMO Action Agent staff (National Simulation Center at Fort Leavenworth). The TEMO domain has established a TRADOC Program Integration Office for the Synthetic Training Environment (TPIO-SE) and four TRADOC Project Offices (TPOs): TPO Live, TPO Virtual, TPO Constructive, and TPO Synthetic Theater of War (STOW). The last manages the combat developer and training developer activities for STOW-A.

### 4.4. Resource management.

TRADOC IS modernization requires Other Procurement, Army (OPA) and Operations and Maintenance, Army (OMA) funds. Separate resource management processes apply to these categories. Since projects often require a combination of both OPA and OMA funds, programming and allocation decisions must be integrated to ensure complete funding availability. TRADOC must also analyze each proposal to insert IT to ensure the proposal has adequately accounted for the resources required for common infrastructure upgrades associated with the new capability.

TRADOC Pam 25-72 provides guidance on documenting and processing unfinanced requirements (UFRs) for IS. It is important to understand that UFRs simply state requirements for funds. The local approval and submission of a UFR to HQ TRADOC recognizes the validity of the requirement, but does not ensure or provide funding.

In determining how to allocate TRADOC funds to modernization projects submitted as installation UFRs, DCSIM emphasizes projects that provide new capabilities for an affordable one-time investment, or provide immediately useful capabilities in affordable increments. DCSIM emphasizes well-defined projects in which technical risks have been minimized. DCSIM also considers the command's strategic IM goals and the contribution the project would make toward command-wide achievement of the goals. DCSIM considers the priority given to IM projects by the installation commander in the UFR submission, and the recent history of executing funds as intended for IM projects.

#### 4.4.1. OPA.

Within the overall category of OPA, OPA2 supports IM investment costs of $100K or more. Planning and programming for OPA2 requirements are accomplished via TRADOC's submissions to HQDA's input to the POM. Depending on variable timelines, the Deputy Chief of Staff for Resource Management solicits requirements, usually in the form of UFRs, from throughout the command. Inclusion in the POM is a competitive process. UFRs are subjected to three levels of review (HQ TRADOC, HQDA (DISC4), and HQDA Installation Program Evaluation Group) in the competition to be programmed. HQ TRADOC functional staff integrates installation submissions in their mission areas. DCSIM integrates OPA2 submissions, staffs the action and recommends Chief of Staff approval for submission to HQDA for budgeting.

During FY96-99, the key enabling investment (KEI) process was used to recommend priorities for all programmed, or available, OPA2 funds. GEN Hartzog initiated the KEI process to identify and invest in leap-ahead capabilities. In a command with an information-based mission, leap-ahead capabilities frequently require IS modernization. Although the KEI label is no longer used, a similar oversight process is still used to ensure OPA2 is executed on high priority projects. HQ TRADOC uses a Working Program Resource Advisory Committee and the Senior Program Resource Advisory Committee to review and approve the final budget allocations.

#### 4.4.2. OMA.

OMA funding supports operations, including automation, communications, records management, printing and postage, and low cost (<$100K) acquisitions. OMA pays many types of bills, including salaries, contracts, operations and maintenance, as well as low dollar value acquisitions. HQDA budgets OMA for TRADOC's IM, received in the IM Budget Aggregate Group. Out-year planning for OMA is managed through the Army POM. Installations can submit UFRs to HQ TRADOC to document their high priority unresourced OMA requirements for IM. TRADOC allocates resources to installations based on requirements for IM operations, but for execution, OMA is not fenced for IM use only.

#### 4.4.3. Installation contracts.

Beginning in FY00, allocations to installations were implemented through a contract that states the level of support expected to be provided within the allocation. See figure 2 for FY01 IM services contract.

#### 4.4.4. Standard levels of service (SLOS).

SLOS originated as a way to define common support standards to be provided by all installations to their tenants, and determine the costs associated with those services. It is likely that SLOS will become the foundation for future installation contracts and have a significant impact on how system modernization is prioritized and phased. The SLOS is the standard to be provided to all installation tenants and should be funded as part of the garrison budget. Any service not explicitly mentioned would be considered "above standard" and may require customer funding for accomplishment. The intent is to establish a minimum level of support that all customers can expect and does not vary from installation to installation or MACOM to MACOM.

**ADDENDUM FOR FY00 INSTALLATION CONTRACT - IM**

1. Funds are provided to support the IM services at the FY00 level, except as identified below. Specific IM/technology services to be provided by the funded level are listed in each of the major IMA categories. Other IMA service areas not listed are funded at the same level as provided in the FY00 Appropriations TRADOC Budget Guidance.

**Communications ($X,XXX)**

| SERVICE | LEVEL OF SERVICE (LOS) |
|---|---|
| Official telephone service | Available 7 days X 24 hours |
| Local telephone trunks | .20 grade of service or better (dial tone available in 80% of attempts to dial local, off-post numbers) |
| Long distance costs (DSN/FTS) | 100% of FY01 requirement funded, based on historical usage and continuing rate reductions |
| VTC Facility (Fixed) | Operate 1 facility 5 days per week, 10 hours per day |
| Telecommunications Center | Operate 5 days per week, 8 hours per day |
| Campus area network | OC3 (155Mb/s) to facilities hosting MACOM validated distance learning classrooms and simulation center; same LOS for remainder of CAN as provided in FY00 |

**Automation ($X,XXX)**

| SERVICE | LEVEL OF SERVICE |
|---|---|
| Helpdesk | Operate 5 days a week, 8 hours a day |
| E-mail accounts/systems | Same or higher LOS as FY00; activation of organizational level Defense Message System (DMS) services – Secret and below classified and sensitive but unclassified. |

**Records Management/Publications ($X,XXX)**

| SERVICE | MINIMUM LEVEL OF SERVICE |
|---|---|
| Official Mail Facility | Operate Mail Room 5 days per week, 9 hours per day |
| Admin Printing | 0% of FY01 requirement funded |
| Admin copiers | 0% of FY01 requirement funded |

**Information Management Support Processing Center ($X,XXX)**

| | |
|---|---|
| ASIMS FEP/RJE Maintenance | 100% of FY01 requirement funded (estimated) |
| ASIMS Megacenter Costs | 100% of FY01 requirement funded (estimated) |

2. Funds for following services will be centrally managed at HQ TRADOC and provided at the same level of service as FY00, or as funded by HQDA:

- VTC/DVTC (command sponsored) connectivity, maintenance, and usage
- DA Information Systems Security Program
- TRADOC-generated C-E engineering services by U.S. Army Information Systems Engineering Command
- Wide area network (NIPRNET, SIPRNET) circuits
- Circuit providing connectivity to the DISA Megacenter for ASIMS processing/support

3. Funds are not provided to support the following services:

- PC, server, or software procurement, upgrade, or life cycle replacement (LCR)
- Procurement, expansion, or modernization of installation local area networks (LANs) or campus area networks (CANs)
- Investments that require OPA funding
- Modernization of base radio systems

**Figure 2. FY01 contract for IM services**

Resource requirements are based on a three-component methodology:

- A **Basis** factor, also known in some procedures as a "pacing item"
- An **Algorithm** containing one or more factors and constants as a formula which calculates how much or many of the physical resources are required
- A **Cost Factor** that can be multiplied against the number of resources required resulting in the cost for the activity.

The intent is to use this methodology to estimate and justify resource requirements and describe which activities will not be accomplished if funding is insufficient.

It is not intended to constrain the installation commander or DOIM in any way in the execution of their missions.

Table 2 contains basic information about SLOS. Services and Key Activities are taken from the categories of the Installation Status Report and are also analogous to similar IT Metrics categories (Capability, Attribute). The Standard Level of Service column contains a text explanation of the level of support that is considered to be standard. In some cases, the standard level of service definition applies to all activities within the key activity. SLOS do not capture every activity and cost, only significant ones. A standard 10% has been added to each cost factor (causes resource requirements to include a 10% overage) to account for minor costs not specifically identified.

**Table 2**
**Standard Levels of Service**

| SERVICE | KEY ACTIVITY | STANDARD LEVEL OF SERVICE |
|---|---|---|
| **Telephone (Voice)** | | |
| | Telephone Service | Provide single line telephone service to each user. Achieve 98% reliability. Provide access to integrated services digital network (ISDN), FTS and local trunks. Provide local access with 80% success rate during normal business hours. |
| | Trunked Systems | Provide separate narrow band digital trunking for fire fighting, ambulance/emergency medical, law enforcement, environmental, operations, and range control organizations to include provision and maintenance of base station(s), infrastructure, and handheld units. |
| **VTC** | | |
| | Fixed | Provide a permanent VTC capability installed in a dedicated room or facility available during normal duty hours (40 hrs/wk). Must be capable of supporting multi-point conferencing with classifications up to SECRET and digital file transfer. |
| | Portable | None |
| | Desktop | Provide dial-up VTC (DVTC) capability to all general officers, garrison commanders, [others]. Must be capable of supporting multi-point sessions and provide collaborative white boarding and digital file transfer. Provide sufficient bandwidth to support 12 independent simultaneous off-post 128 Kb/s sessions. Fund equivalent of 1 hr/day of use at DISN Video Services - Global (DVS-G) "on net" rate per sponsored suite. |
| **Network** | | |
| | | Provide a 98% reliable Installation Level Data Transport Network which provides shared 10 Mb/s (minimum) unclassified and classified (as required) connectivity to all required End User Buildings on the installation. Provide adequate WAN access to support electronic mail, web browsing, and Standard Army Management Information Systems. [DA must produce a list of systems to be supported and their bandwidth requirements]. Provide remote dial-in services. |

**Table 2 (contintued)**
**Standard Levels of Service**

| SERVICE | KEY ACTIVITY | STANDARD LEVEL OF SERVICE |
|---|---|---|
| **C2 protect** | | |
| | | Provide intrusion detection services at the installation WAN gateway(s). Provide proxy server(s) to protect installation assets; detect and report malicious and unauthorized activities; provide for recovery and reconstitution of common portions of the installation level network. |
| **Automation** | | |
| | | Support installation level DA and DoD standard systems designated for centralized installation support. Provide E-mail services including host support and account management. Review IT purchase requests. Provide centralized maintenance for IT equipment. |
| **Administrative** | | |
| | Recordkeeping | Conduct triennial records management assistance visits to assess compliance. Provide assistance as required. Provide official mail services to installation/tenants. Provide Freedom of Information Act and Privacy Act request processing. Provide Records Holding services. |
| | Forms Management | Provide access to electronic forms. |
| | Publications Management | Provide access to electronic publications. |

### 4.4.5. Resource availability.

This paragraph provides an overview of resource availability as a constraint on TRADOC's modernization strategy.

Resourcing will remain a limiting factor in the strategy to modernize TRADOC's SA. Most of the resources necessary to implement the objective SA are managed outside TRADOC in DoD and Army program offices such as DISN, Power Projection Command, Control, Communications and Computers Infrastructure (PPC4I), DMS, and STAMIS. DoD and Army have fielded limited capabilities to TRADOC via centrally managed programs. Many of these programs have been reduced in scope or have extended beyond their timeline.

TRADOC's OMA funding for IM does not equal its requirements. The POM figures for FY01-FY07 reflect a significant decrement to the already 'broken' TRADOC IM program. Manpower will have been reduced by 72% during the FY88 - FY07 timeframe. For the past several years, the shortfall has been defrayed through diversion of funds from other TRADOC sources. During FY00, HQDA increased TRADOC's IM OMA, but the command was unable to continue supplementing the IM budget, resulting in an overall $8M reduction from the previous year. Beginning in FY01, DCSIM's strategy for allocating cuts is to spread shortfall generically. This allows installations to determine where to allocate cuts.

At the installation level, as OMA funding declines, it is likely salaries, operations and maintenance will take precedence over life cycle replacements and many required investments will not be made. This situation means substantial portions of our infrastructure, especially at the building and personal levels, are at risk for creeping obsolescence.

Figure 3 shows Program Budget Guidance (PBG) allocation for TRADOC information mission area (IMA) accounts and how that baseline is supplemented by using "other peoples' money" and ISS funds, and diverting TRADOC's own funds from other missions. There are several points about the programming for OMA that will impact IS modernization.

HQDA will decentralize WAN funding, previously centralized in USASC. DCSIM will centrally manage this program for TRADOC. Table 3 shows the projected funding level for TRADOC. The requirements shown for FY03-05 include the transport of distance learning courseware from proponent TRADOC schools to TADLP classrooms. The increases in FY04-05 reflect the additional TADLP classrooms planned for installation in those years as well as the additional number of courses converted to distance learning format.

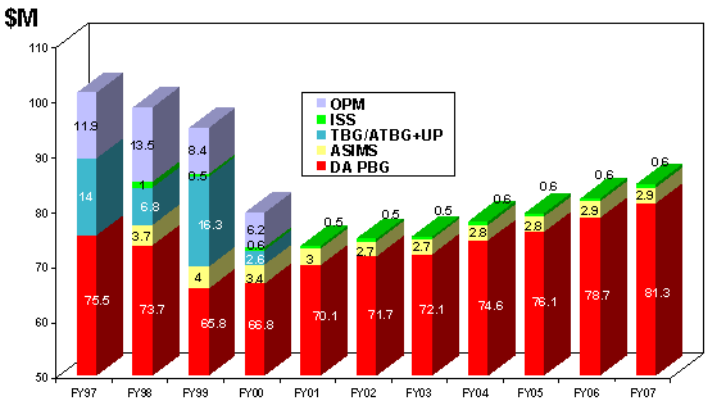



**Figure 3. OMA profile.**

**Table 3**
**WAN Funding ($K)**

| FY | Funded | Requirement | Delta |
|---|---|---|---|
| 00 | 1,312 | 1,840 | -528 |
| 01 | 725 | 1,840 | -1115 |
| 02 | 914 | 1,840 | -926 |
| 03 | 1083 | 3,880 | -2797 |
| 04 | 1071 | 4,429 | -3358 |
| 05 | 1113 | 5,142 | -4029 |

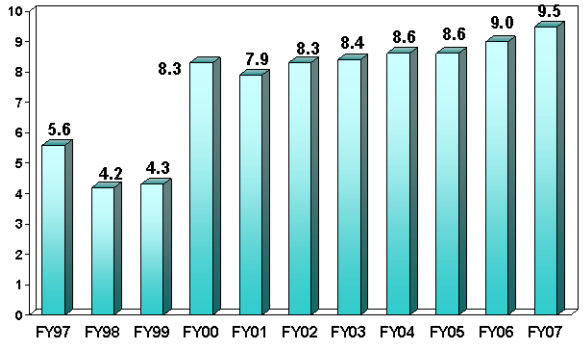



**Figure 4. OPA profile**

Similar to the decentralization of WAN funding, HQDA began decentralizing funds for use of Defense Megacenter data processing services in FY98. Funds allocated for FY99 were adequate to meet expenditures, but decrease by nearly $1M in the DA PBG based on anticipated reductions in processing requirements.

HQDA allocates funding in the MS4X account specifically for ISS. These funds will be used not only for training required for certifying personnel, but also for some modernization below the investment threshold.

Considering DA's program budget guidance, HQ TRADOC submitted several command-wide IM UFRs to HQDA for consideration in the POM (table 4).

TRADOC's OPA2 allocation increased in FY00 and is expected to hold fairly steady. Still, the available OPA2 has historically (and will continue) to fall short of known requirements. Using installation UFRs and DCSIM's own analysis, estimates of OPA2 requirements for IT modernization exceed $100M. This must be balanced against the available $7M to $9M annually (see fig 4). This gap drives the command to buy only the minimal components required to implement key capabilities command-wide, while remaining on a migration path to the objective SA.

Funds will be allocated from the OPA2 account managed by DCSIM, which is used primarily to satisfy common user requirements. DCSIM continues to emphasize modernizing TRADOC's common user network infrastructure. The availability of this infrastructure is necessary to support all types of functional automation.

**Table 4**
**OMA UFRs submitted to HQDA POM**

| **UFR Title** | **FY 02** | **FY 03** | **FY04** | **FY 05** | **FY 06** | **FY 07** |
|---|---|---|---|---|---|---|
| Personal Computer Life Cycle Replacement | 16,960 | 17,432 | 17,757 | 18,130 | 18,510 | 18,898 |
| Installation IT Management and Automation Requirements | 9,451 | 7,168 | 7,054 | 5,053 | 6,374 | 7,659 |
| Special Circuits | 751 | 765 | 781 | 797 | 814 | 831 |
| Special Services | 1,447 | 1,474 | 1,505 | 1,537 | 1,569 | 1,602 |
| Long Distance Changes | 4,200 | 4,317 | 4,397 | 4,490 | 4,584 | 4,680 |
| Installation Communications Requirements | 1,136 | 569 | 627 | 640 | 654 | 668 |
| BASOPS Printing, Postage and Copiers | 10,479 | 10,770 | 10,972 | 11,202 | 11,437 | 11,676 |
| Installation Records Management Requirements | 100 | 110 | 125 | 135 | 100 | 125 |
| Life Cycle Replacement Servers | 1,610 | 1,686 | 1,721 | 1,757 | 1,794 | |
| Automated Records Management System | 3,600 | 3,769 | 3,848 | 3,929 | 4,011 | |
| Public Key Infrastructure | 2,640 | 2,764 | 2,822 | 2,881 | 2,942 | |
| **TOTAL** | **44,524** | **50,455** | **51,437** | **50,375** | **52,609** | **54,886** |

## 5. Operational Architecture

To ensure the optimal impact, TRADOC's IS modernization strategy is driven by users' operational requirements. An operational architecture helps organize requirements by providing a context of functions, processes and organizational structure. These in turn impact requirements for information exchanges and distributed processing capabilities.

### 5.1. TRADOC's key processes.

TRADOC traditionally uses the following key process to execute its mission: doctrine, training, combat developments (CD), and installation management. Figure 5 represents the functional decomposition of these key processes. A more robust operational architecture will evolve as TRADOC functional staff analyze and document their processes.

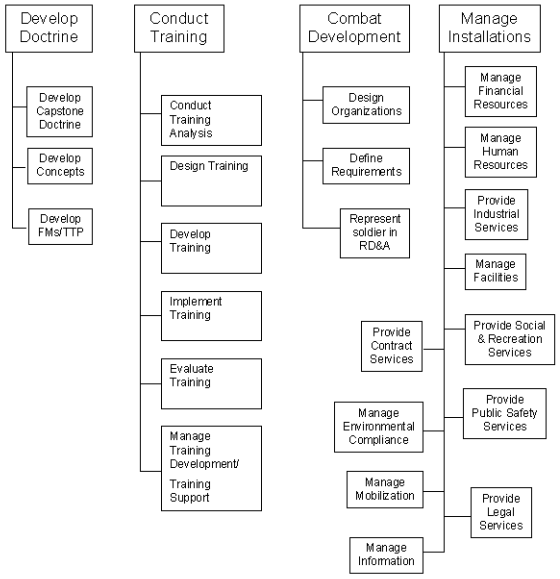



**Figure 5. TRADOC processes**

#### 5.1.1. Doctrine.

TRADOC develops and disseminates the Army's doctrinal literature for all organizations through Echelons Above Corps (EAC). Doctrine is the authoritative guide to how the Army fights and conducts operations. The doctrine process includes developing operational concepts that describe capabilities required for employing Army forces on the battlefield. Such concepts provide the basis for changes in doctrine, organization, training, leader development, and materiel. Doctrine ranges from the high level of principles down to the tactics, techniques, and procedures that describe the "how" of Army operations. Subject matter experts at TRADOC's schools write doctrine. However, TRADOC's doctrinal process must integrate the content of doctrinal and training literature across proponents' functional lines to help create an Army with commonly understood methods. This includes participation in the development of joint doctrine and staff talks with North Atlantic Treaty Organization and American, British, Canadian, and Australian panels and working groups.

#### 5.1.2. Training.

TRADOC's highest priority is to support the Army's near-term readiness by training the load, accessing the force, and providing mission support required to train the load.

TRADOC's training mission includes the analysis of requirements, development of training materials, conduct of institutional training, and support for training throughout the Army and beyond. Specific mission responsibilities are:

- Receive, process, equip, and train initial entry Active Army, Army National Guard (ARNG), and United States Army Reserve (USAR) personnel.

- Train commissioned and warrant officers and enlisted personnel of the Active Army, ARNG, USAR, and other Services; authorized foreign nationals; and Federal civilian personnel.

- Produce commissioned officers through the Senior Reserve Officers' Training Corps (ROTC) and the Officer Candidate School; and manage Junior ROTC and National Defense Cadet Corps programs.

- Establish training missions for, and evaluate annual training performance of, USAR training divisions, separate training brigades and battalions, and USAR reception battalions.

- Serve as DA executive agent for security assistance training provided to international military personnel under U.S. Army sponsorship.

- Serve as the Army executive agent for Combat Training Centers (CTC).

- Analyze, design, and develop training programs and provide training material needed to support individual and collective training and training systems.

- Develop criteria, procedures, methodologies, and techniques for conducting and evaluating training in the schools and units of the Active Army, ARNG, and USAR. This will be done in coordination with other MACOMs and U.S. Total Army Personnel Command (PERSCOM).

- Determine training device requirements, formulate concepts of training device use, and develop training material requirements documentation.

- Develop, disseminate, and monitor the effectiveness of standards of performance and proficiency for individuals, units, crews, and other aggregations.

- Design, produce, and distribute collective and individual training products, delivery systems, and evaluation materials to personnel and units Armywide.

- Develop and prepare for publication and distribution materials to support specialty code, military occupational specialty (MOS), and additional skill identifier sustainment training programs at consolidated training facilities, regional training facilities, and Army area training centers.

Training processes involve coordination of many organizations and individuals. TRADOC's 27 schools use about 8,511 instructors maintaining over 1,615 courses.

### 5.1.3. Combat developments.

As the Army's architect for tomorrow's land warfare, TRADOC must lead the way in defining operational concepts, doctrine, organization, skills and equipment. Combat developments is the integrating process for executing that mission. It includes the following responsibilities:

- Determine required changes to improve the warfighting capabilities and survivability of the force. Approve operational requirements on an Armywide basis.
- Represent the user in the development and acquisition of new or improved Army materiel.
- Operate Battle Labs and plan and conduct warfighting experiments in support of requirements determination.
- Provide combat and training developer input and support to user test and evaluation of materiel systems.

### 5.1.4. Installation management.

Efficient and effective installation management processes ensure TRADOC has the capability to execute its mission. This function encompasses personnel, acquisition, resource management, supply, transportation and other functional areas. TRADOC manages 15 Army installations with 2 million acres of land, 165 million square feet of facilities, $8 billion of inventory, and $29 billion of real property replacement value. Approximately 157,000 people work, train, and live on TRADOC installations. Twelve of the 15 TRADOC installations serve as launch platforms to deploy soldiers beyond the borders of the United States with little advanced notice. TRADOC must provide cost-effective, responsive, and efficient training and readiness support and services including ranges, training facilities, and training areas.

## 5.2. TRADOC's organization.

TRADOC is spread across CONUS on 15 TRADOC managed installations, plus several activities on installations managed by other MACOMs. Each installation has a DOIM, who manages the installation's entire IT architecture and provides IM services. DOIMs typically report to the garrison commander. TRADOC managed installations are:

- Fort Benning, GA
- Fort Bliss, TX
- Carlisle Barracks, PA
- Fort Eustis, VA
- Fort Gordon, GA
- Fort Huachuca, AZ
- Fort Jackson, SC
- Fort Knox, KY
- Fort Leavenworth, KS
- Fort Lee, VA
- Fort Leonard Wood, MO
- Fort Monroe, VA
- Presidio of Monterey, CA
- Fort Rucker, AL
- Fort Sill, OK

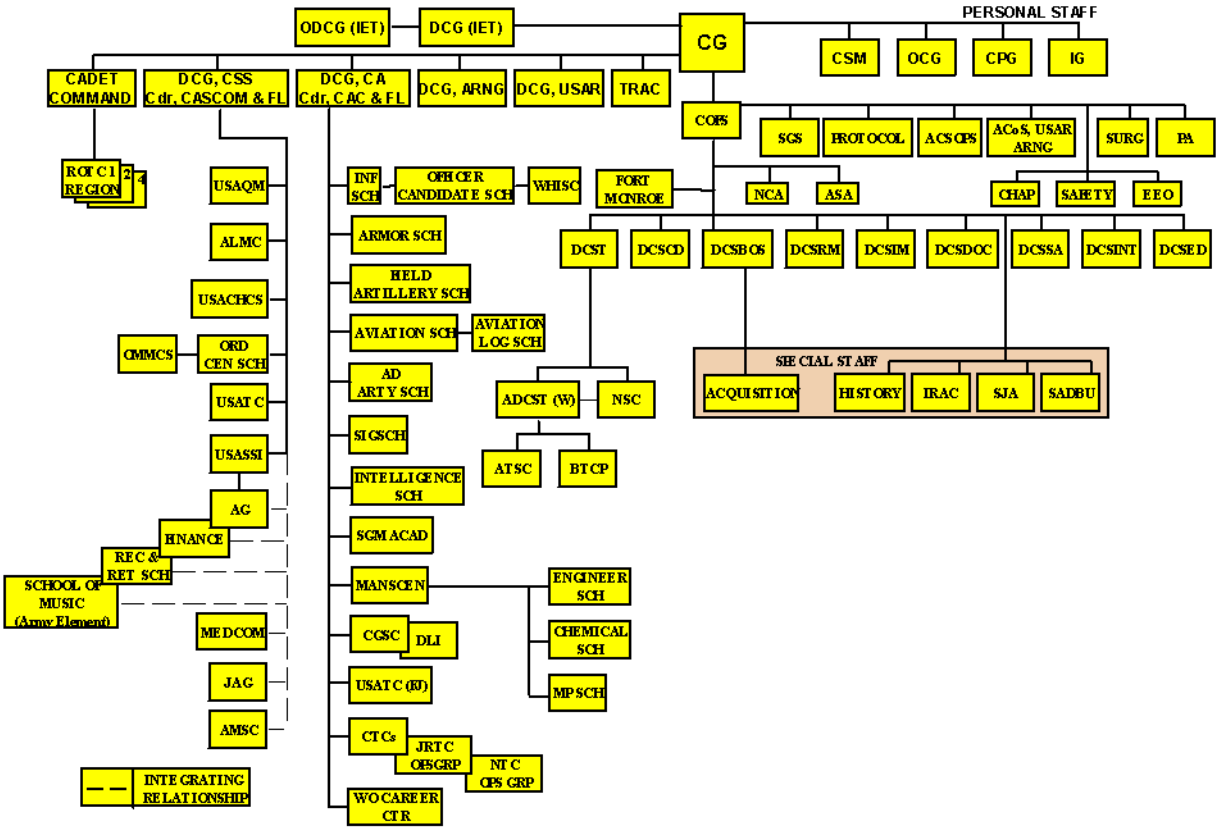



**Figure 6. TRADOC Organization**

TRADOC installations host one or more schools and sometimes other activities. Schools have a particular focus of expertise, often branch specific, and are responsible for producing TRADOC products within their area of expertise, e.g., courseware, materiel requirements and doctrine. HQ TRADOC ensures the branch-specific products are integrated, with assistance from the Combined Arms Center and Combined Arms Support Command. HQ TRADOC has several Deputy Chiefs of Staff (DCS), nearly all at Fort Monroe, each responsible for overseeing the management and integration of a particular set of processes, e.g., DCS for Doctrine, DCS for Combat Developments, DCS for Training, and DCS for Base Operations Support. Figure 6 depicts the HQ staff and schools in TRADOC.

TRADOC also operates the following major subordinate commands to assist with integration and execute specialized missions:

- Combined Arms Support Command (CASCOM)
- Combined Arms Center (CAC)
- TRADOC Analysis CenterTRAC
- US Army Cadet Command

### 5.3. TRADOC's information exchanges.

TRADOC's physically and functionally distributed organization places high demands on our information exchange capabilities. To ensure our products are integrated horizontally among all branches, and daily operations are coordinated across our processes, TRADOC must exchange information:

- horizontally among all installations and activities
- vertically between HQ TRADOC and all installations and activities
- internally at installations, among the activities developing TRADOC products and providing installation support
- externally, from each TRADOC installation to joint and Army organizations, including units, HQDA and other MACOMs
- externally, from each TRADOC installation to the civilian world, e.g., academia and industry

Since TRADOC relies on action officers for process execution and must provide extensive information to all soldiers assigned to TRADOC for training, robust connectivity must extend vertically down to the personal level.

The following paragraphs characterize information exchanges associated with TRADOC's key processes, and the common coordination capabilities required for horizontal integration among processes.

Common coordination capabilities - TRADOC relies on common coordination capabilities (e.g., E-mail and file transfers) available at all installations down to the action officer level. Increasingly, E-mail includes file transfers to exchange formatted documents, spreadsheets, and graphic presentations. TRADOC leadership relies on a robust DVTC network. TRADOC has over 300 DVTC users located on all installations (45 at Fort Monroe). Action officers rely on access to studio-grade VTC facilities (784kb/s), although DVTC or portable VTC equipment will potentially be proliferated in the objective architecture. More coordination will be done using WWW type services, which, given requirements for protecting Army information, will require both Internet and Intranet connectivity down to the action officer level. Coordination of TRADOC products requires the capability to move large compound files and universal ability to read and manipulate the files. Increased use of integrated concept teams will require sophisticated coordination that focuses more on collaborative generation of products than on their post-generation coordination.

Doctrine - TRADOC is moving to electronic means for producing, coordinating, and distributing doctrinal products. TRADOC also seeks to electronically push its branch expertise out to the area of operations to augment commanders' staff in the development of planning alternatives; and to capture lessons learned from on-going operations for future doctrine development. Information exchanges include worldwide common user coordination capabilities, with emphasis on transfers of large compound documents and interaction with units. Doctrinal processes rely primarily on common coordination capabilities.

Training - A fundamental component of reengineering TRADOC is to improve the delivery of training using IS capabilities. CR XXI is the project title for modernizing institutional training. It will incorporate multi-point video teleconferencing, delivery of multimedia interactive courseware, and eventually student participation in distributed simulations and distributed exercises. As the instructional method shifts from its current instructor focus to a student-focused approach, the information exchanges will grow considerably. In student focused instruction, each student may be using a tailored set of instructional material, requiring connectivity to each student, rather than each classroom. There must be libraries of training materials, not necessarily stored at one site, but retrievable using one search from the users' viewpoint. The SA must support the instructional methodology with point-to-point, multi-point, high volume, real time, and high-peak information exchange capabilities. Since CR XXI will include distance learning capabilities that rely on video, information exchange capabilities must have the required capacity. Transfer of video information requires either a guaranteed quality of service (QOS), i.e., exclusive access to a sufficiently sized pipe; or the use of streaming media, i.e., the ability to break the video or audio file into packets. These packets are transferred and stored in the recipient's memory buffer until most or the entire file is available for playing. Training developers' current operational concept calls for the ability to stream video to student workstations (video on demand). As analyzed by the U.S. Army Information Systems Engineering Command (USAISEC), this converts to 3 Mb/s to the desktop counting overhead for the MPEG I.0 video compression standard. Because the operational requirement is for concurrent and independent transmissions, this value is additive for each

workstation. With three facilities per installation and 16 workstations per facility plus the instructor, the maximum load would be 153 Mb/s, although this would only occur where all traffic concurrently converges at a single choke-point on the network, such as the WAN gateway. Bandwidth use at other locations on the network would be less as paths diverged.

CR XXI classrooms at level 3 capability have the same requirement, but there will be 24 workstations. The libraries of training materials, or Digital Training Access Centers (DTAC), requirements are still emerging, but since they deliver video courseware real-time to a global student base, the requirement is unlikely to be any less than the post-Schofield Common User Installation Transport Network (CUITN) standard of 155 Mb/s.

Training also uses M&S, linked to worldwide locations by interactive confederations. Leased circuitry and a closed system of T-1 circuits marginally satisfy the current bandwidth requirements. Inserting adequate capacity into common infrastructure will permit migration away from this stovepipe approach. Bandwidth requirements vary with the number and type of M&S used, but TRAC estimates for the cumulative requirements for M&S, both TEMO and ACR are consistently below 3 Mb/s for any single TRADOC installation.

Combat Developments - CD products are becoming more dynamic. Emphasis on modeling and simulating concepts, prototyping and experimenting with solutions, and evolutionary development all affect the degree and types of information exchanges. Integrated concept teams (ICT) will bring together skills from various locations and disciplines. Electronic collocation will be essential for helping the teams work through the processes involved in the "build a little, test a little, field a little" approach to materiel development. Since much of materiel development is aimed at information dominance, many systems in development are IS. IS lends themselves to increased use of simulators and rapid prototypes, shared by developers across the development community. Members of ICT will also be coordinating extensively with members of integrated product teams (IPT) to continue to represent the soldier's interest throughout the system life cycle. All of this leads to information exchanges down to the action officer level with widespread points internal and external to the command. Content will include VTC sessions, simulation and simulator traffic and collaborative authoring of CD products. CD processes rely primarily on common coordination capabilities augmented by ACR M&S confederations.

Installation management - The characteristics of most information exchange requirements for installation management are not unique from those of other Army installations. Installation management involves many disciplines and processes, e.g., supply, personnel, financial management, facilities engineering, and contracting. It includes processes for supporting power projection. Computer platforms are located in a variety of sites (Defense Megacenters, departmental LAN servers, PCs). Connectivity must support one-time capture/shared use

**Table 5**
**Key IS Requirements**

| TRADOC Process | Key Processing Capabilities | Key Network Connections |
|---|---|---|
| Training | Distance learning (video teletraining, computer-based instruction (CBI), video)<br>Modeling & Simulation<br>Multimedia courseware development<br>Courseware database | Intra-TRADOC<br>National Guard Bureau (NGB)/USAR<br>Units |
| Doctrine | Collaborative authoring<br>Document distribution<br>Full text retrieval<br>Electronic publishing | Intra-TRADOC<br>Joint community Units |
| Combat Developments | Modeling & Simulations<br>Prototype test beds<br>Collaborative planning<br>Electronic coordination<br>Expert systems | Intra-TRADOC<br>Joint community<br>Research, Development & Acquisition community<br>Industry |
| Installation Mgt | High transaction processing<br>Large databases<br>Decision support | Intra-TRADOC<br>Defense Megacenters and other regional services |
| Common coordination capabilities | E-mail<br>File transfers<br>Office automation suites<br>VTC access<br>Internet/Intranet access | World-wide |

for data across platforms and processes. Data transfers range from brief, interactive database query traffic to large database transfers. Connectivity must extend to the point of data collection and use. To enable information exchanges among the many processes and organizations involved in managing installations, connectivity must maximize access to the common user infrastructure. Although not a TRADOC operational mission, TRADOC must support hospitals or clinic complexes on TRADOC posts. MEDCOM estimates 10 Mb/s of guaranteed bandwidth is adequate to support the telemedicine application and other MEDCOM data requirements.

### 5.4. TRADOC's key IS requirements.

Considering TRADOC's key functions and processes, and overlaying its organization and information exchanges, an overview of required information processing capabilities and connectivity emerges (see table 5). Individual projects will include the definition of precise requirements.

## 6. Technical Architecture.

### 6.1. Purpose.

TRADOC aims for joint interoperability by observing a hierarchy of standards profiles. The hierarchy starts with the JTA, applicable to all military organizations, followed by the JTA-Army, which is the Army's implementation of the JTA. The electronic versions of the JTA and JTA-Army provide hot links to sources for many of the standards it cites. Where those profiles permit choices, or fall short of the level of standardization TRADOC requires, TRADOC extends them to meet the command's interoperability requirements. Any TRADOC extensions will be promulgated through TPRISM. TRADOC Pamphlet 25-72 prescribes compliance enforcement procedures for TRADOC activities. Complying with the standards in these technical architectures is insufficient in itself to achieve interoperability. Interoperability requires synchronization among all three architectures: operational, system, and technical. However, standards compliance is clearly a necessary condition.

DoD's JTA, version 3, was approved 15 Nov 99. The current release of the JTA-Army is version 6.0, dated 8 May 00. Version 6.0 updates mandated and evolving emerging standards, and includes Gig-E standards, the CORBA ORB, Automatic Test System standards and Identification of Friends and Foes (IFF) standards. JTA-Army Version 6.0 aligns with JTA Version 3.0, and also adopts the DoD Technical Reference Model, version 1.0, 5 Nov 99 which replaces the Technical Architecture Framework for Information Management (TAFIM) Technical Reference Model. Version 6.0 will continue to be the central source of technical architecture guidance for Army systems.

The JTA-Army is an integrated set of openly published standards for developing IS. Building to the standards profile selected by the JTA-Army improves interoperability of information processing, information transport, information formats, HCIs and information security among all types of Army IS.

The technical architecture constrains the design of particular systems in order to ensure all systems can work together. The fact that the technical architecture lists a standard for a certain capability does not mean that every Army system must provide that capability. Each system has its own standards profile, consistent with the requirements identified in its operational architecture, and the engineering approach identified in its SA. The JTA-Army constrains which standards Army system developers can select for their system specific standards profile.

By implementing well-defined, openly available and consensus-based standards, the Army and TRADOC can leverage the commercial marketplace's investments in new products and assure a migration path into the future. The JTA-Army is based on widely accepted commercial standards and implements the mandatory standards governing interfaces among the services as published in the JTA. By adopting the JTA-Army as the guide for our acquisition decisions, TRADOC will improve the interoperability of its IS with:

- IS employed by other Army MACOMs
- IS employed in tactical units
- IS employed by other Services and DoD agencies
- IS available in the future commercial marketplace.

Migrating toward an open, standards-based architecture is the best approach to create the flexible and robust features and connectivity required in executing our mission. TRADOC's resource constraints preclude investments in large, single vendor solutions, acquired centrally at one time, with all interfaces already designed, engineered and standardized by the vendor. TRADOC must integrate many smaller acquisitions by installations, functional staff, and external activities into a command-wide information capability, with assurance that components have interoperability and can exchange information. To do so requires adherence to technical standards and consistent architectural principles executed through many decentralized decisions. An open systems architecture will improve TRADOC's ability to:

- Interface heterogeneous vendors' systems
- Execute information technology insertions
- Exchange information within TRADOC and with external activities
- Create a consistent user interface across the command
- Contract for maintenance, supplies, and training
- Re-use components in different environments
- Grow or change IS components as TRADOC grows or changes
- Create common security policy and support services

The intent remains to standardize on "standards," not on systems. That is, TRADOC will tolerate various vendors' systems as part of the architecture as long as they conform to the applicable standards, rather than demanding installations or centralized PMs use a particular vendor's products to ensure interoperability. If the JTA-Army and

industry standards are insufficient to ensure heterogeneous systems will interface sufficiently, then selection of a product, documented in the SA, may become necessary for achieving a specific command-wide capability.

There will be some further narrowing of choice through other processes, e.g., the use of pre-existing indefinite delivery indefinite quantity (IDIQ) contract products, mandatory DMS compliance, and Armywide system designs. Also, since installation DOIMs cannot provide maintenance and training support for all vendor products, they may promulgate preferred products lists and restrict support to the preferred products. However, in establishing levels of support, installations will not be so restrictive as to preclude use of WAN or CAN assets by any JTA-Army compliant IS. TRADOC organizations may deviate from preferred products lists, but doing so risks loss of compatibility with other TRADOC systems and reduced DOIM capability to support the non-preferred product.

The remaining discussion highlights key standards selected by the JTA-Army organized into paragraphs about information transport, computer platforms and software applications. It provides an overview of what constitutes architectural compliance in TRADOC, but is not a substitute for the complete JTA-Army.

## 6.2. Information transport.

The JTA-Army adopts widely accepted standards for transporting information. Specifically, it uses the same suite of standards as the Internet and DISN. There are several ways to partition information transport capabilities among hardware and software components. The JTA-Army adopts the architecture used for Transmission Control Protocol/Internet Protocol (TCP/IP). Figure 7 shows how that architecture is partitioned, or layered, and the particular standards JTA-Army cites for each. Use of the TCP/IP suite of standards ensures a large degree of inherent interoperability among the layers.

The networking and access layer is implemented by network system components such as cable plants and switches. Networks may have simple components (e.g., point-to-point links) or have complex internal structures (e.g., a network of packet switches). Routers and computer platforms implement the higher layers shown in figure 7. Routers interconnect two or more networks and forward packets across network boundaries while computer platforms, or hosts, use and exchange data during their execution of application programs.

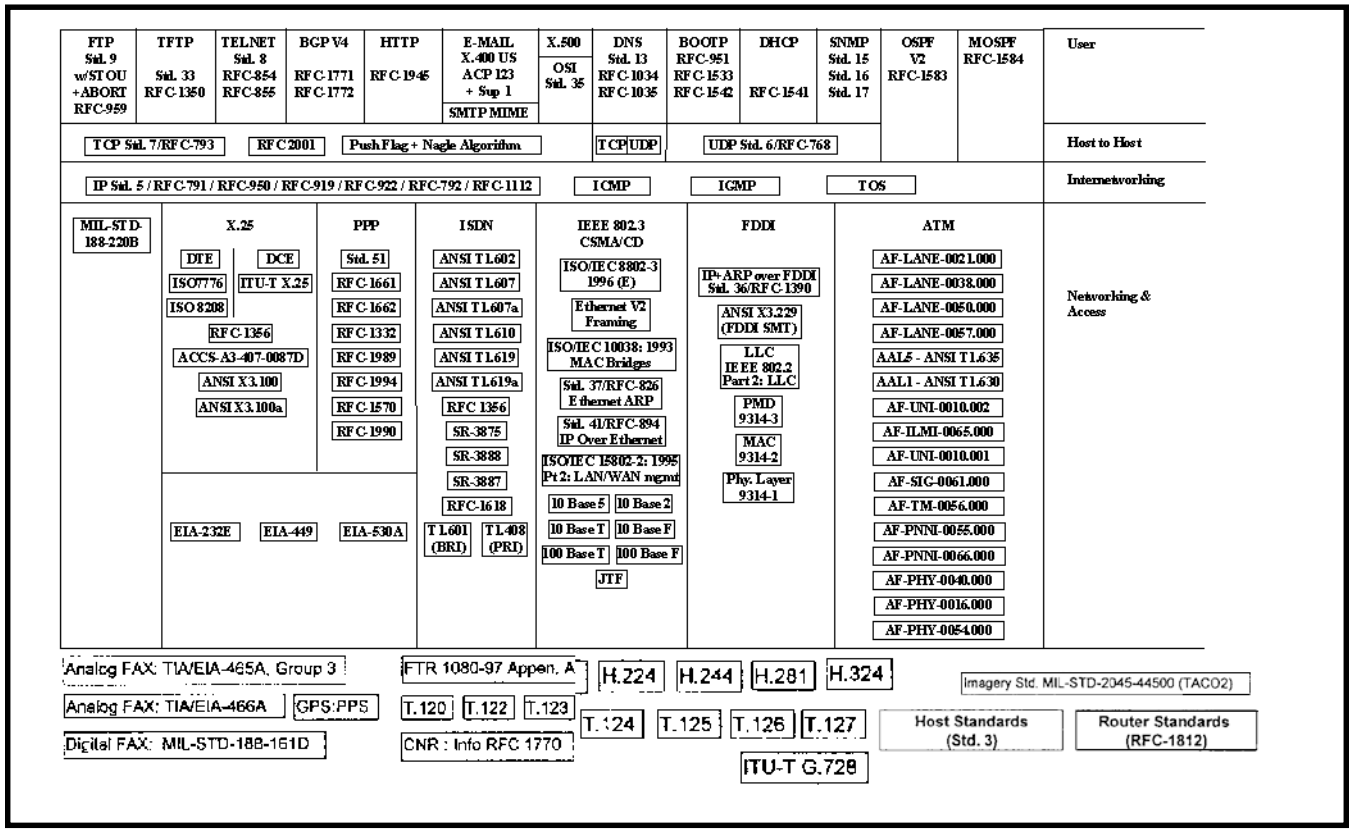



**Figure 7. Standards for information transport**

#### 6.2.1. Networking layer.

The first layer of information transport standardization covers internal networking and external network access. The TCP/IP suite, since it is concerned with inter-networking, does not mandate standards at this layer. The JTA-Army permits several approaches at this level, e.g., ATM FDDI and Ethernet.

This layer contains multiple standards since there are multiple capabilities that must be standardized, e.g., cabling and other electronics, data framing, protocols to establish and maintain electronic links, error detection, synchronization, and flow control of signals. Permitting multiple approaches to standardization at this layer provides options for a range of performance needs, e.g., LANs and CANs. Designers for information transport systems will choose specific network standards based on the requirements for a given application, such as cost and speed-of-service, while ensuring the implemented network has the standardized interfaces required for inter-networking. For implementing ATM across this spectrum, DoD has issued additional guidance in the DoD Defense Information System Network (DISN) Asynchronous Transfer Mode (ATM) System Specification. Version 1.2c was dated 17 April 1998.

Gig-E is an extension to the 10 Mbps and 100 Mbps Institute of Electrical and Electronic Engineers (IEEE) 802.3 Ethernet standards. The 802.3z Gig-E task force developed industry consensus on how to achieve speeds of 1000 Mbps using the 802.3 Ethernet frame format and the CSMA/CD access method. The work addresses backward compatibility with 10BASE-T and 100BASE-T technologies. It was approved by IEEE in June 1998 and is now published as part of the consolidated edition of 802.3, IEEE 802.3-1998.

#### 6.2.2. Internetworking layer.

JTA-Army mandates all networks will be capable of using IP to exchange information with other networks. IP is implemented in hosts and routers. It standardizes how packets of data from one host are sent through one or more routers to another host.

#### 6.2.3. Host to host transport layer.

This layer is implemented in hosts. It keeps track of data packets to make sure all are delivered to the appropriate software application. The JTA-Army mandates either TCP or User Datagram Protocol (UDP) at this layer. TCP provides a reliable, connection-oriented transport service. UDP provides an unacknowledged connectionless datagram service to applications not requiring TCP reliability.

#### 6.2.4. User services layer.

A seamless infrastructure is critical, but generally unseen by the users. The user services layer is the final, nearly unseen, set of services and interfaces that underlie the software applications that users interact with directly.

The standard for official organizational messaging traffic between DoD organizations is the DMS X.400-based suite of military messaging standards defined in Allied Communications Publication (ACP) 123. DMS also a medium assurance messaging service. The requirements for medium assurance messaging are less stringent than organizational messaging and can be met by existing IP-based mail standards. This allows the augmentation of DMS to include the use of the Simple Mail Transfer Protocol (SMTP) for medium assurance messaging.

Above the X.400 services are the E-mail applications users interact with directly. DoD interoperability for E-mail applications is based on conformance with the DMS. DMS is not a specific application. Various vendors can meet DMS compliance. As DoD successfully tests and certifies a set of DMS-compliant products, TRADOC will approve the acquisition of only those E-mail systems that appear on the DoD certified list. Non-compliant E-mail systems can be procured only when a transition path to full DMS compliance is approved by Defense Information Systems Agency (DISA), IAW Chairman of the Joint Chiefs of Staff Instruction 5721.01A, The Defense Message System and Associated Message Processing Systems, 1 May 1999.

Users' software applications interact with many other common networking services to provide mission capabilities. Basic file transfer will be done using File Transfer Protocol (FTP). FTP provides a reliable, file transfer service for text or binary files. Basic remote terminal services will be provided through the telecommunications network (TELNET). TELNET provides a virtual terminal capability so a user can log on to a remote host as if directly connected. HyperText Transfer Protocol (HTTP) will be used for search and retrieval within the WWW. Interoperability using these standardized capabilities are among the most important, but not comprehensive, networking services for TRADOC users.

Simple network management protocol (SNMP) will be used by system administrators as the standard way to interact with the various devices on their networks. The protocol helps plan and manage network operations and identify and resolve networking problems.

### 6.3. Computer platforms.

Platforms encompass the computing hardware, OS, and system support services discussed below.

#### 6.3.1. Hardware.

The JTA-Army does not impose many standardization constraints at the hardware layer. It depends on standardizing the OS and application program interfaces (APIs) to ensure interoperability of Army systems. Hardware specifications, e.g., amount of random-access memory (RAM) and types of ports, are rules for a SA, not the technical architecture. TRADOC has issued specifications for preferred and supported desktop platforms, available in TPRISM. TPRISM also describes specific hardware configurations used for running applications standardized for Armywide use.

#### 6.3.2. Operating systems.

These core services are necessary to operate a computer platform and support application software. They control applications' access to information and the underlying processing hardware. Applications will access OS through either a Win32 application program interface (API) or the standard Portable Operating System Interface (POSIX). For desktop platforms, TRADOC's preferred product, which supports Win32 APIs, is Windows NT Workstation. TRADOC will migrate to Windows 2000, beginning with new acquisitions in 3d Qtr FY01 (although total migration will likely take several years).

#### 6.3.3. Software engineering services.

Software engineering services are the tools used by system developers to develop and maintain software applications. They include programming languages, language bindings and object code linking. When selecting a third generation language for custom development of a software application, the languages permitted by JTA-Army are Ada 95 and C. Coding will adhere to the applicable language standard and avoid vendor extensions. There are no standardization constraints on the selection of fourth generation languages. Language restrictions do not apply to selecting COTS applications.

#### 6.3.4. User interface services.

The JTA-Army's objective is to standardize the user interface among Army applications. Consistent appearance and behavior will promote higher productivity, shorter training time, and reduced development costs. Users today generally think of the HCI as a GUI. A GUI allows users to specify actions by pointing and clicking, or dragging and dropping icons that represent objects being acted upon, e.g., a file or printer. The HCI also controls the appearance of window management services.

Army-developed systems must conform to the HCI design criteria in the DoD Technical Reference Model, version 1.0, 5 Nov 99. Additionally, each approved domain (functional area) within the Army will develop an HCI style guide. These style guides will reflect the consensus on HCI appearance and behavior for a particular domain. A topic associated with HCI style is user interface services. These capabilities, part of the platform's system software, implement the HCI style and control how users interact with the system. Its use was previously limited to the business environment.

#### 6.3.5. Data management services.

Data management services support the definition, storage, and retrieval of data elements from relational database management systems. They provide independent management of data shared by multiple applications.

To support the identification of information and information interchange requirements, JTA-Army and the DoD mandate system developers use the Integrated Definition (IDEF) modeling methodology. DoD Directive 8320.1-M requires IDEF0 (Integrated Definition for Function Modeling) and IDEF1X (Integrated Definition for Information Modeling) as the standard technique to depict required information flow and data elements respectively.) Systems that use databases must base their selection of data elements on an IDEF analysis.

Data management services also support platform-independent file access. The JTA-Army mandates the ANSI Structured Query Language (SQL) standards for systems that use a relational database management system (DBMS).

### 6.4. Software applications.

For software applications, the JTA-Army encourages domain-specific application architectures, with standardized interfaces to lower level components, and a commonality that grows from using the DII COE. In this way, common reusable software and products become the building blocks that are used as-is or extended, if necessary, to meet different operational requirements.

#### 6.4.1. Common operating environment.

The DII COE is both a set of architectural guidelines and standards and a collection of reusable software components built to the standards. Software components in the COE provide capabilities used across functional areas, built for integration in a "plug and play" open architecture. The JTA-Army does not mandate the use of specific COE software products, since implementation decisions belong to the SA, but it does emphasize the principle of software re-use. Software designers will use common support applications from the COE software library to the maximum extent consistent with requirements. The JTA-Army also emphasizes designing toward the COE architectural concept. Fundamental to that concept are segmentation and the use of public APIs. All systems that must be integrated into the DII will segment their applications IAW the DII COE Integration, Runtime Specification, Version 4.1, Aug 2000, and use the public APIs from the COE Baseline Specification 3.1, 29 Apr 97.

#### 6.4.2. Training.

DCST is the TRADOC manager of standards and conventions for designing interactive courseware. Interactive courseware is a type of Interactive Multimedia Instruction. Interactive courseware is also called CBI, computer-based training (CBT), and web-based training. Interactive courseware is computer controlled courseware that relies on trainees' input to determine the pace, sequence, and content of training delivery using more than one type medium to convey the content of instruction. Standards will help ensure the exchange of courseware across users' platforms and interoperability with the General Dennis J. Reimer Training and Doctrine Digital Library (RDL).

#### 6.4.3. Modeling and simulation.

DoD designated the High Level Architecture (HLA) as the standard technical architecture for all DoD simulations. The HLA is a technical architecture that applies to all classes of simulations, including live, virtual and constructive. JTA-Army mandates use of the HLA, as defined in the High Level Architecture (HLA) Architecture Rules, Version 1.3, February 1998. The specification

includes the HLA Rules, the HLA Interface specification and the Object Model Template Specification. The DIS protocols and Aggregate Level Simulation Protocol (ALSP) are approved for use during the transition to the HLA. DIS standards support networked real-time interaction among weapon platform virtual simulations. ALSP helps interconnect distributed constructive simulations into confederations.

### 6.4.4. Office automation.

The JTA-Army does not mandate a suite of office automation applications. As previously discussed, it is inconsistent with the HQDA approach to select specific products as "standards." TRADOC has not mandated a suite either, but has issued a preferred products list covering desktop software, available in table 15. However, standardization must be mandated for file exchange formats. Army must be able to exchange files (e.g., as E-mail attachments) with minimal loss of information. The JTA-Army provides a list of exchange formats for file exchange. Table 6 provides a somewhat more restrictive extract of that list to ensure consistency with the JTA-Army and supportability by TRADOC DOIMs. Acquisition of applications that can import and export these formats will ensure heterogeneous office automation applications can exchange files. While mandating file formats, table 6 does NOT mandate use of specific vendor products since many applications besides the original vendor's can read and write these formats. Applications acquired or developed for the production of documents must be capable of generating the formats listed for the appropriate document type. All organizations must be capable of reading and printing the formats listed for the appropriate document type.

**Table 6**
**Standards for file exchange formats**

| Document Type | Standard Format | File Name Extension (MIME Type) |
|---|---|---|
| Compound Document | Microsoft Office Suite Word | .doc |
| Briefing/ Graphic Presentation | Microsoft Office Suite Powerpoint | .ppt |
| Database | Microsoft Office Suite Access | .dbf |
| Spreadsheet | Microsoft Office Suite Excel | .xls |
| Compression | ZIP file format | .zip |

## 7. System Architecture

SA provides a description, including text or graphics, of specific IT solutions and their inter-relationships. It identifies key nodes, networks, platforms, software, etc., and specifies system and component performance parameters. SA can be integrated at various levels. For example, an installation SA shows how multiple systems at that installation interface and are interoperable, while an individual system's SA describes the internal composition and operations of just one system's components.

SA views are developed to portray evolution over time, beginning with the baseline, or current, situation. Projects to acquire and implement capabilities normally change or add to a baseline SA. Based on priorities and resource constraints, the projects are integrated into logical groups to form time phased target architectures. The target architectures are snapshots of what the architecture is planned to look like at designated milestones. The architecture envisioned to meet all operational requirements is the objective architecture. Migration is the progression of target architectures from baseline to objective, through implementation of prioritized, synchronized, discrete modernization programs or projects.

The baseline architecture for several IS components employed by TRADOC installations is displayed on the DCSIM's architecture page. These displays are graphical representations extracted from a larger database maintained by the DCSIM. The installation SAs are not maintained by DCSIM with the precision or detail DOIMs would have. DCSIM maintains just enough data to assist in making command-wide modernization decisions. DCSIM has not requested installations update their baseline SA data for TPRISM since FY97 because other data collection efforts, I3A and ISAPs, are underway. DCSIM's architecture database and WWW displays will be updated using data extracted from these efforts.

The remaining paragraphs discuss TRADOC's SA using the DII categories: communications infrastructure (para 8), computer infrastructure (para 9), (para 10) and functional area applications (para 11). In these paragraphs, IS components are described from the viewpoints of a baseline, target (if appropriate), and objective SA. Following these integrated overviews, management information is provided about individual programs being used to execute the migration from the baseline to the objective architecture. Management information includes data available to DCSIM about schedules and resources.

## 8. Communications Infrastructure

The communications infrastructure is discussed in the next several paragraphs, subdivided into telephone networks, WANs, CANs, and LANs. There is also a paragraph on how some functional areas employ specific communication assets that run across these network layers.

### 8.1. Telephones.

TRADOC uses the Defense Switched Network (DSN) and Federal Telecommunications System (FTS) as enterprise level voice networks. All TRADOC installations have electronic switches for accessing DSN and FTS, provided by the Army's MACOM Telephone Modernization Program (MTMP). DISA manages the DSN. General Services Administration (GSA) manages the FTS. The DSN provides worldwide unsecured voice service to military subscribers. FTS provides unsecured voice service to all points within CONUS that are outside the DSN, although many DSN subscribers are also on FTS - including all of TRADOC. TRADOC's equivalent of FTS outside continental United States (OCONUS) is International Voice Switched Service. FTS is the equivalent of obtaining routine commercial service. DSN and FTS can also be used for circuit switched data services, and, via Secure Telephone Unit (STU) III instruments, for secure communications.

The STU-III family of devices is no longer in production and only limited quantities are available. Over the next five years, analog STU-III equipment (including 1910SDD's) is scheduled for replacement with secure terminal equipment (STE), a digital encryption unit that maintains cryptographic compatibility with most STU-III's. There will be no centralized funding to replace STU-III's. TRADOC with HQDA funding procured 40 STEs in FY00 for fielding to TRADOC installation.

DoD selected MCIWorldcom as the FTS2001 vendor. FTS2001 is a set of contracts managed by GSA for the Federal Government. Most FTS2000 contracts with AT&T Corporation and Sprint Corporation expire December 2000. DoD's policy is to use the FTS2001 contracts as the primary source of telecommunications services to meet non-command and control requirements. DoD selected MCI for all circuit switched services including voice and data, calling cards, 800 service, and voice on the net services.

The Army's MTMP provides TRADOC installations with telephone switch upgrades. The architecture will be a distributed configuration, with a dial central office (DCO) and area distribution nodes (ADNs) to support user concentrations and remote locations. All MTMP switching upgrades will use ISDN equipment capable of end-to-end digital narrowband integrated services digital network (NISDN). MTMP provides interfaces with existing telephone outside cable plant at ADNs and interfaces with WAN ISDN. The standard user telephone interface will continue to be two-wire analog at a RJ-11 connector for voice communications. Users who need a digital connection should be provided a two-wire NISDN 2B+D U interface at an RJ-11 connector or an NISDN 2B+D S or T interface with two four-pair cables at RJ-45 connectors.

During FY 99, the MTMP program provided upgrades to non-Y2K compliant telephone switches on many installations Armywide, including most TRADOC installations.

The DA level Digital Switched Systems Modernization Program (DSSMP) plans to keep the Army's telephone switching system's software current and be prepared to make technology insertions. PM is working to establish a centrally funded program to upgrade the software for all Army telephone switches on a yearly basis. If this program is funded, it would establish a regular schedule for yearly software upgrades for all Army switches. HQ TRADOC will attempt to put software upgrades into the POM until the project by PM DSSMP gets fully and permanently funded.

### 8.2. Wide area networks.

WANs interconnect geographically dispersed networks, e.g., CANs and LANs, and servers. In TRADOC, this typically means WANs support inter-installation communications. WAN configurations and components range from a complex structure of switches to simple point-to-point lines.

#### 8.2.1. Baseline architecture.

TRADOC uses DISA's worldwide DISN as its primary enterprise level WAN to connect TRADOC installations, to connect to other military sites, and to provide TCP/IP gateways to the Internet. DISN includes three networks for data traffic:

- NIPRNET for unclassified traffic
- SIPRNET for data up to Secret classification
- Joint Worldwide Intelligence Communications System (JWICS) for Top Secret and Sensitive Compartmented Information

Only the unclassified sub-network, NIPRNET, provides gateways into the Internet. Most TRADOC users will access Internet hosts and services through these NIPRNET gateways, although policy permits waivers for use of commercial Internet service providers in configurations that are not connected to a TRADOC operated CAN or the NIPRNET. It is an Army architectural rule to have no more than two NIPRNET connections for Army users at any one installation.

All TRADOC installations have recently increased access capacity to NIPRNET employing DISN ATM Service (DATMS). Current capacities are as follows: Benning (5Mb/s), Bliss (5Mb/s), Carlisle Barracks (5Mb/s), Eustis (18Mb/s), Gordon (5Mb/s), Huachuca (5Mb/s), Jackson (5Mb/s), Knox (5Mb/s), Leavenworth (5Mb/s), Lee (5Mb/s), Leonard Wood (5Mb/s), Monroe (5Mb/s), Rucker (7Mb/s), and Sill (7Mb/s). Presidio of Monterey will be upgraded to 5Mb/s. No upgrade is planned for Fort McClellan (512 kb/s). All TRADOC installations have SIPRNET access except Forts Gordon, Jackson, and Rucker. TRADOC DCSINT provides JWICS access for all TRADOC installations except Carlisle Barracks, Presidio of Monterey, and Forts Jackson, Eustis, and Lee.

### 8.2.2. Objective architecture.

TRADOC's enterprise level network for data transport will continue to be engineered, managed, and integrated at the DoD level. TRADOC will remain actively involved in the selection of WAN services to suit operational requirements and in the architecture of WAN to CAN interfaces. TRADOC's target architecture will continue the use of the DISN as the primary enterprise level WAN.

DISA continues aggressive upgrades to the DISN. Key programs are reorganizing the NIPRNET regions and Internet gateways and the installation of a CONUS ATM backbone, known as DATMS, leading to a fully meshed network.

NIPRNET redesign Phase I reduces the number of NIPRNET regions from twelve to six (see fig 8). Each regional site will have a Joint Interconnection Service (JIS) router that interconnects CONUS to OCONUS and serves as the exit and entry points to the Federal Interconnection Exchange. Each JIS will be connected to an Internet service provider (ISP) via a DS3, which increases the number of Internet gateways in NIPRNET from 3 to 6. Establishing Internet gateways at each region avoids transport of Internet traffic through the emulated LAN (ELAN) that interconnects the six regions. Only .mil domain traffic will be carried among the six regions.

NIPRNET redesign Phase II will connect the router network with the ATM transmission layer. NIPRNET services will generally continue to be sold as TCP/IP. DISA will not sell native ATM to any agency except those that DISA already supports under a memorandum of agreement, such as the Tri-Service Infrastructure Management Program Office (TIMPO).

DISA's strategy also includes inserting ATM-based and Broadband Integrated Services Data Network (BISDN) technologies into the network. The DISA strategy makes no significant investments in NISDN technology but does provide for users to incorporate NISDN technologies into local private branch exchanges and lease commercial services if this is cost effective. The objective architecture is an integrated, homogeneous, global network using BISDN as the predominant technology for the fixed environment and ATM technology within the deployed environment. BISDN, using ATM, permits high-speed transmission of voice, data, and imagery over a single network and the use of a single switch configuration rather than separate "overlay" networks for each type service. ATM supports "on-demand" assignments of narrow to broadband services. DISA will use technology insertions over a transition period to reach its objective architecture around 2010.

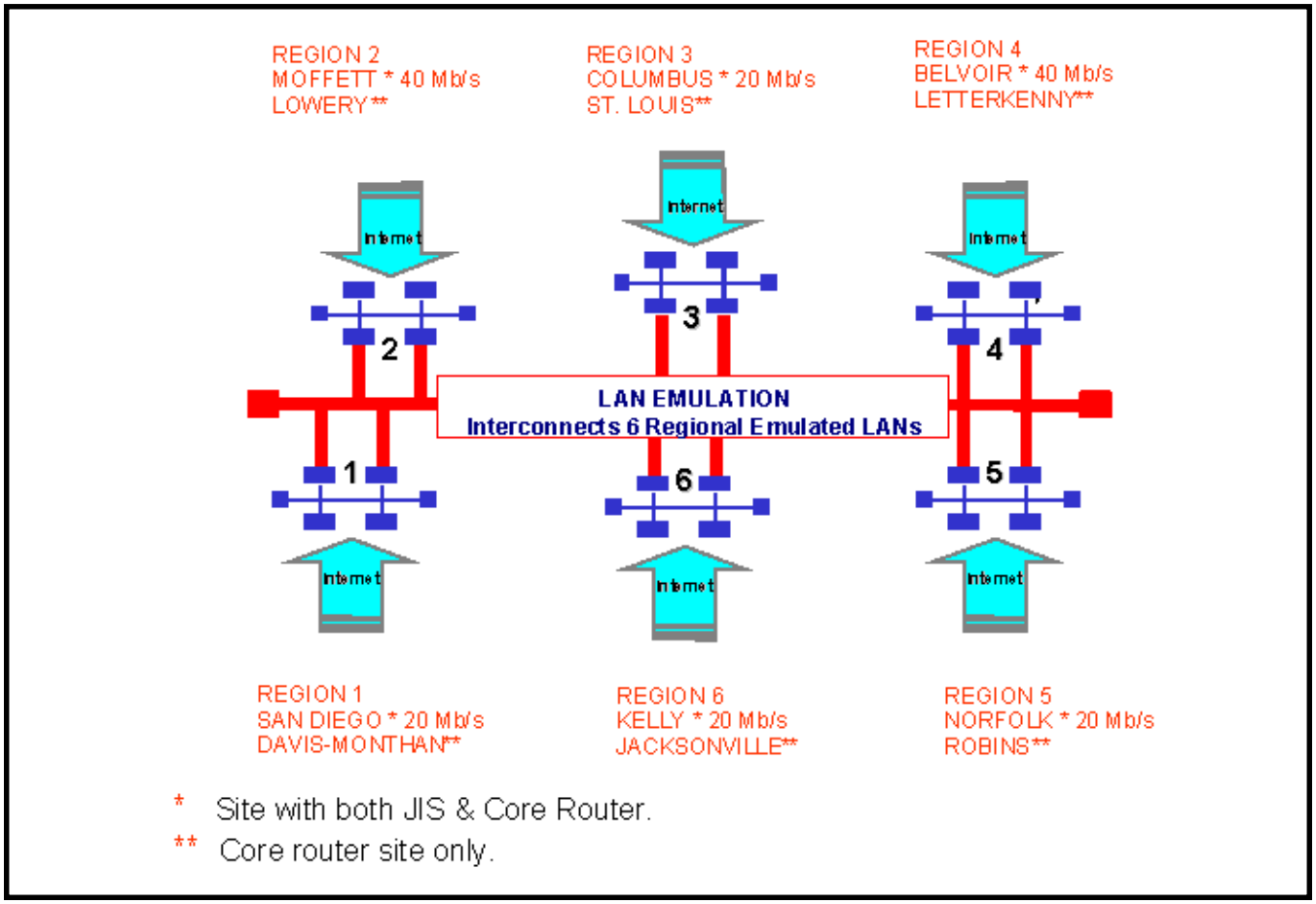



**Figure 8. DISN redesign**

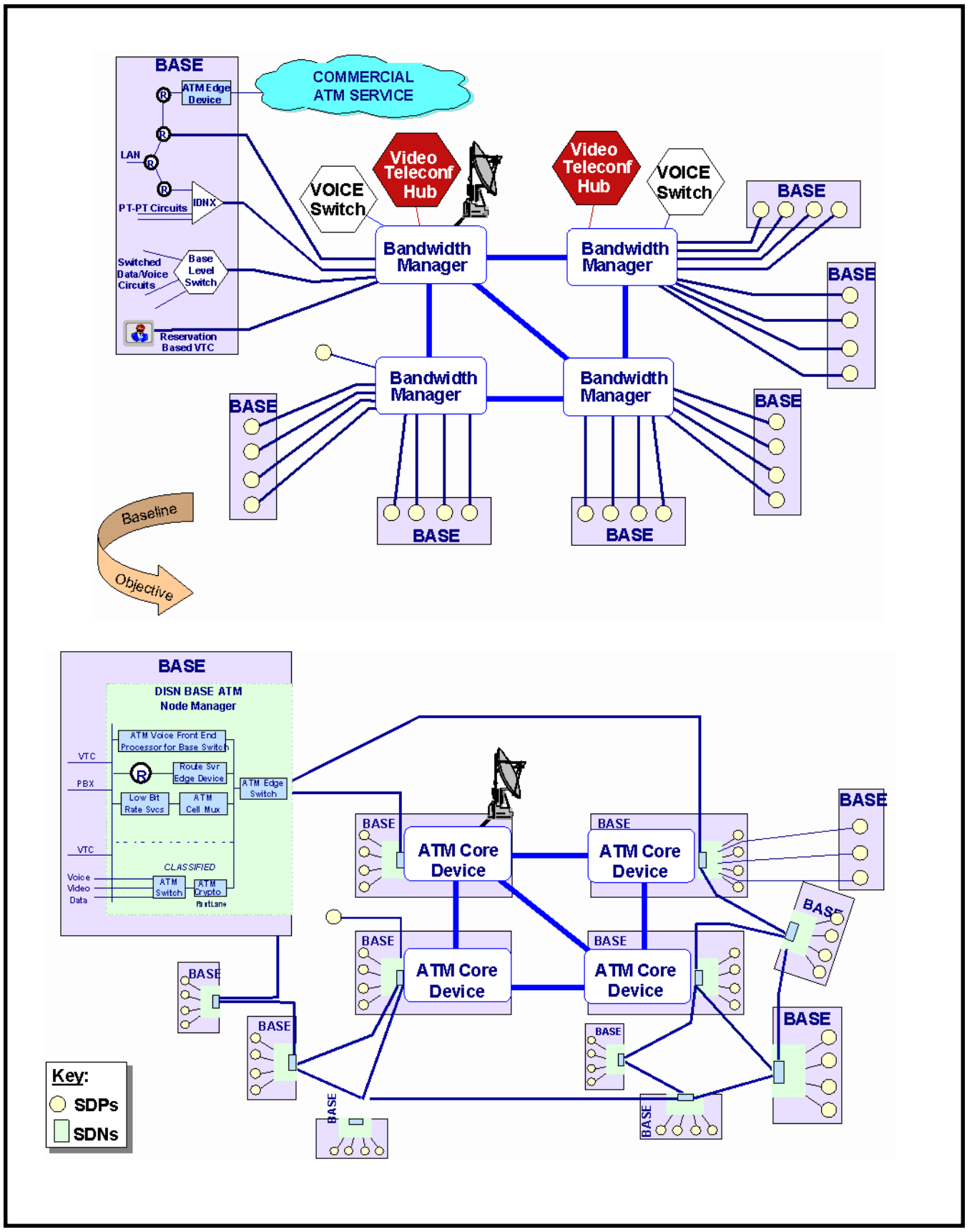



**Figure 9. DISN Migration**

Direct connection through the ATM backbone will bypass lower-capacity links and inefficient router hops. Long-haul traffic will jump quickly through the ATM backbone, then exit at the NIPRNET router closest to its destination. In the near term, traffic traversing the ATM network will consist of both ATM customers directly connected to an ATM switch, and traffic from the IP router networks.

DISA provides an appropriately sized transmission path from installation's service delivery points (SDP) to the nearest bandwidth management device in the backbone. The SDP is the termination point on the installation where a DISN circuit is delivered to the installation demarcation point. In other words, it is the demarcation between DISA's and the installation's responsibilities. DISA's migration strategy at TRADOC installations with a TIMPO presence is that ATM based service delivery nodes (SDNs) will replace SDPs. (See fig 9).

This WAN architecture shifts the emphasis from acquiring and managing network capabilities based on individual circuits, e.g., T-1 circuits, to an approach based on bandwidth capacity. As depicted in figure 10, service based on stovepiped use of multiple dedicated circuits will cost more per unit of data transport capability than common use of high capacity circuits. The networking strategy, applicable at both the WAN and CAN level, is to connect users with common circuits and manage the bandwidth available to all to ensure availability of service.

For WAN services, TRADOC will be charged in 1 to 3 megabit increments for the average use. The circuits, though not necessarily the installations' switch, will be configured to carry more data than DISA charges. This will help installations through peak times in usage. However, when such use begins to become the average rather than a peak, then the charge goes up. This is usually not a matter of installing a new circuit, or swapping a card in a switch, but could be a mere software command to enable the greater capacity on the existing circuit. Ramifications of this new approach include increased emphasis on use of common user WAN access components, so that bandwidth use is distributed among many users, not all of whom are likely to use capacity simultaneously, and who have likely paid for dedicated, but unused, capacity in the past. In this paradigm, bandwidth becomes a dynamically allocated consumable commodity, which must be programmed for in terms of forecasting variable, rather than fixed, costs.

Video services are projected to dominate transmission capacity in the objective architecture. Because of their high data rates and channel utilization requirements, video services will make extremely high demands for network resources. The most significant changes in DISN services will occur with the use of multimedia devices in which voice, data, and imagery services are integrated. These devices will be used for applications such as distance learning, telemedicine, collaboration technology, multi-media data base access, and VTC. These applications require bandwidth on demand, and in many cases, high-speed (hundreds of Mb/s) real-time transfer of information.

Within the DISN migration strategy, AT&T has another contract, DVS-G, to provide dedicated video services including secure and non-secure, point-to-point and multi-point bridging, a reservation/scheduling system, video services management and monitoring, provisioning and user-site network interface equipment. These new circuits were installed at TRADOC installations during CY99. For the Schedule D VTC T-1's, the circuit terminates at the SDP, which is also where the AT&T 740 Multiplexer is located. For the DVTC primary rate interface (PRI), the circuit terminates where the Madge M60 switch is located. Initially, video services will provide H.320 standards-based, unclassified and secure, multi-point services for dedicated and dial-up connections via three CONUS video switching hubs. DVS-G provides interoperability with FTS2000, commercial and tactical networks, both in CONUS and OCONUS. Unlike the network provided under Defense Commercial Telecommunications Network (DCTN), DVS-G does not provide DVTC users direct dial access to FTS2000 and commercial AT&T users. Connectivity to these users is established through a hub.

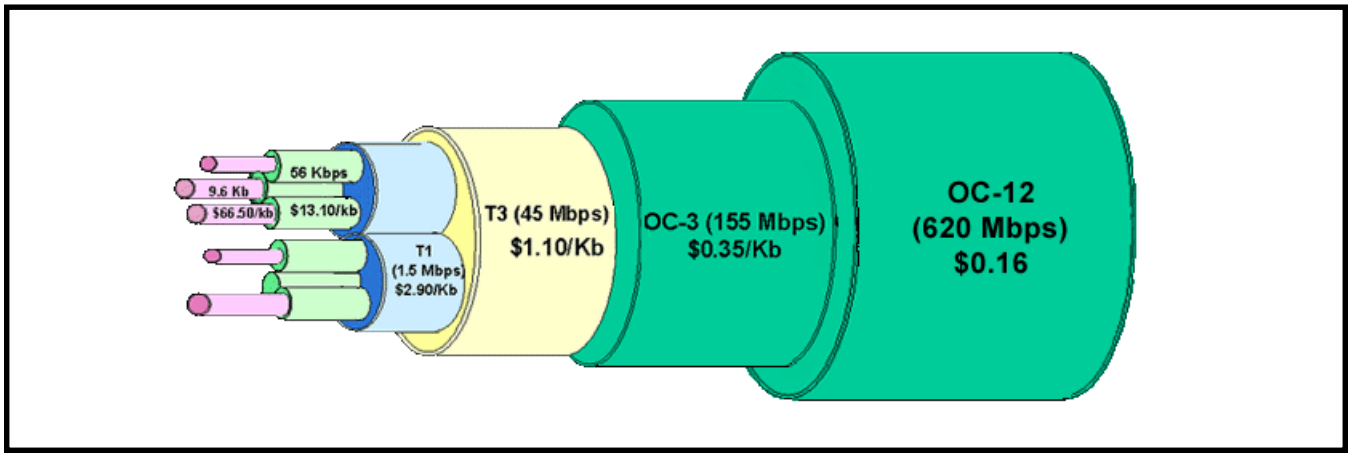



**Figure 10. Economics of bandwidth management**

### 8.2.3. Program management information.

DISN. The initial DISN started in 1992. It integrated a number of independent networks and migrated the Defense Data Network (DDN) to higher-speed, router-based technology. The DISN program can now be viewed as having three segments, each of which offers opportunities for migration that must be kept in synchronization: the transport segment, the network management segment, and value-added services. The transport segment consists of the wide area and LAN switching and transmission systems along with customer premise equipment. The network management segment includes all end-to-end management and control capabilities needed to apply standardized protocols and perform essential functions to prepare information for transfer through the network. The value-added services include standardized DoD directory services and security services that provide confidentiality, data integrity, access, control, authentication, denial of service protection, and incorporation of trust within the network.

DISN circuits were provided originally through the DCTN contract, followed by the DISN Transition Contract (DTC). The DTC was replaced during 1997 by four different contracts to implement the DISN vision. DISA manages the program for DISN's modernization, but TRADOC must plan for installations' access and use of DISN. This is a shared effort between the installations and HQ TRADOC. DISA uses four DISN contracts, clustered by capabilities as follows:

(1) DISN Switched/Bandwidth Manager Services-CONUS (DS/BMS-C). This contract, awarded to MCI Telecommunications Corporation, provides and manages transmission bandwidth managers at selected locations within CONUS that form the long-haul backbone of the DISN transport layer. MCI is responsible for DISN CONUS implementation planning and support activities. Additionally, the DS/BMS-C contract will provide within CONUS the tandem circuit switch backbone element of the DSN, the voice communications service.

(2) DISN Transmission Services-CONUS (DTS-C). DISA awarded DTS-C to AT&T Federal Systems to provide backbone and access area transmission services at T-1 and above bandwidth rates. AT&T will provide wideband fiber-based transmission bandwidth for a DISN CONUS SONET backbone and wideband, generally fiber-based transmission bandwidth connectivity to user locations at approximately 600 DoD user locations in CONUS.

AT&T will provide information transport for the aggregate bandwidth of all SDP in the access area served by each of the Bandwidth Managers. To take advantage of bulk transmission rates, AT&T will bundle the access transmission into SONET for delivery to the Bandwidth Managers. At the customer access locations, transmission bandwidth interfaces at T1, T3, and SONET will be provided. AT&T will team with local access providers as required to accomplish the access area bandwidth requirements.

(3) DVS-G. The DVS-G contractor will provide multipoint dedicated and dial-up video services, as well as a reservation and scheduling system.

(4) DISN Support Services-Global (DSS-G). The DSS-G contract, awarded to Boeing Information Services, provides integration, technical, programmatic, and operations support for the DISN worldwide. The DSS-G contract is the vehicle to support DISA's life-cycle management of the DISN. DISA will order support services from this contract on a delivery order basis with specifically defined performance requirements and schedules. The Army may also acquire support services under this contract through DISA.

Defense Simulation Internet (DSI). The DSI has operated as a standalone network specifically designed for operating distributed M&S among 123 worldwide organizations. TRADOC has used the connectivity to link into worldwide DIS to support analysis, CD, and training.

During FY98, DSI transitioned to a centrally-funded service of DISN. In FY99, the central funding ceased and the connectivity required for M&S became fee-for-service. TRADOC did not renew its subscription to DSI for FY00. TRADOC sites that require WAN support for M&S use available DISA WAN sources, i.e., NIPRNET, and defense research engineering and network, and will "pop-up" temporary circuits as required. Sites will, at their discretion, retain the communications and communications security equipment previously used with DSI.

Looking further out, TRADOC M&S users require WAN support that is characterized by:

- DoD wide connectivity;
- multi-cast and VTC support;
- near real-time QOS;
- guaranteed service from 1 ms to 10 sec;
- cell loss rate near zero;
- the capability to transport classified information; and
- in the case of unclassified confederations, access to the Internet.

Considering these WAN characteristics and available WAN services, TRAC made their recommendations for a WAN architecture to the TRADOC M&S Council Meeting on 5 Feb 98. Their recommendation for the objective architecture was DISN ATM Unclassified services through the NIPRNET and encryption using a KG75 Encryptor. TRAC also recommended a target architecture consisting of DISN ATM Unclassified services through the NIPRNET over dedicated multiple T1 circuits, plus the SIPRNET. Subsequent review of the operational requirements indicates both SIPRNET and JWICS will continue to be required in addition to the NIPRNET.

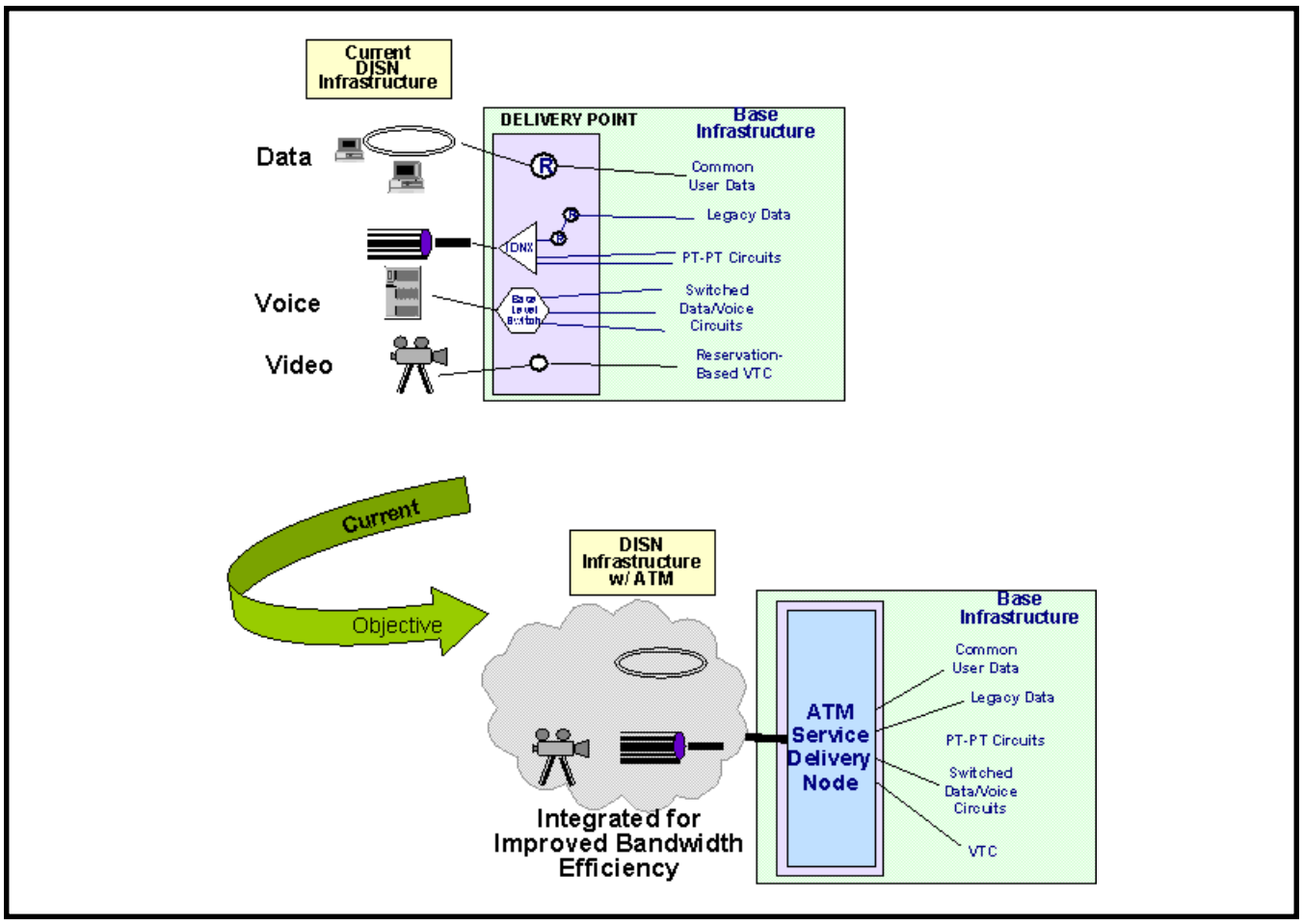



Figure 11. Migration of DISN ATM SDP

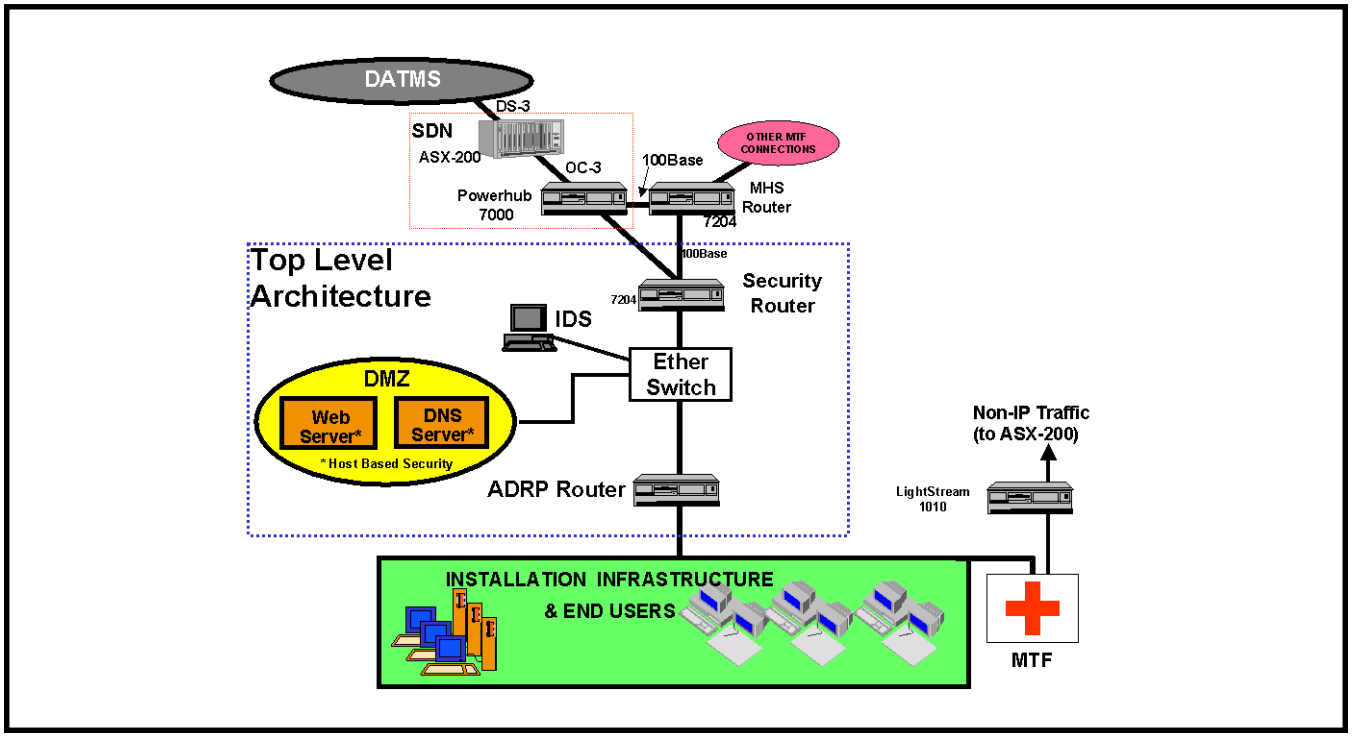



Figure 12. DISN access with TIMPO components

## 8.3. CAN to WAN interfaces.

This paragraph covers the equipment used to interface the DoD and Army enterprise level data networks with the TRADOC operated common user backbone at the installation level, called the CAN.

### 8.3.1. Baseline architecture.

Current requirements are being satisfied using IP. DISA delivers bandwidth to the installations via its backbone DATMS. The connection between the Power Hub 7000 at the service delivery node (SDN) and the installation Cisco 7204 security router in the Top Level Architecture (TLA) is fiber optic Fast Ethernet. TRADOC currently does not have native ATM requirements. Cisco LightStream 1010 multi-level switching is not required in the TLA to interconnect the DISN WAN to the installation CAN. DISA is not providing ATM services to installations. During FY00, TRADOC obtained a minimum of 5 Mb/s of IP bandwidth at each of its installations and existing service provided by NIPRNET was replaced by the connectivity between the SDN and the TLA (see fig 11).

TRADOC's SA must also provide authorized users dial-in access to servers and secure the dial-in access from use by unauthorized personnel. HQDA requires dial-in capabilities use identification and authentication (I&A) system that will authenticate all dial-in operations with a unique USERID and password that is compliant with the remote authentication dial-in user system (RADIUS) standard. The RADIUS software must be configured for accounting logs to show who logged in, when they logged in, and be stored for a year. All I&A servers will be protected with a host-based IDS. If necessary, local terminal servers must be upgraded to be RADIUS compliant. The HQDA message provided specific parameters regarding Cisco terminal servers and Microsoft RAS.

In TRADOC's ISS architecture, the required dial-in system configuration, for use with servers that are also connected to Army/DoD operated networks, is the Terminal Server Access Controller System (TSACS). TSACS provides users dial-in access to communication servers and routers using various protocols: Point-to-Point Protocol (PPP), Compressed PPP (CPPP), Serial Line Interface Protocol (SLIP), Compressed SLIP (CSLIP), TELNET and TN3270. Since TSACS was not initially RADIUS compliant, it was modified by USASC during 1999 with new authentication servers and RADIUS-compliant software.

TSACS equipment is owned by USASC. The local DOIM owns and manages the circuits connected to the TSACS equipment. The primary point of contact for customer support, configuration and management of TSACS is the local DOIM. TSACS' toll free service, controlled and managed by USASC, has 11 network access servers equipped with a total of 528 each 56kb modems. The 11 network access servers, at selected Army sites, are each connected to 2 ISDN PRI lines. TSACS uses the RADIUS-compliant software named "Radiator" on Sun Ultra 10 authentication servers located at these mirror sites in CONUS: Forts Lewis, Monmouth, Riley, Bliss, Stewart, and several OCONUS sites.

Through installation, TRADOC, the Army DISN Router Program (ADRP), and TIMPO efforts, ATM switches are becoming more prevalent in the TRADOC baseline architecture. But given their recent or on-going introduction, ATM interfaces are discussed in the objective architecture paragraph below.

### 8.3.2. Objective architecture.

TRADOC's objective SA for the CAN-to-WAN interface is still being developed. Several external efforts including the DISN, the ADRP (managed by PM Defense Communications), and Army Switched Systems (PM DCASS) and the Military Health Services System (MHSS) (supported by TIMPO) will influence it.

DISA's objective architecture consists of the migration of installations' SDPs to ATM SDNs (see fig 11). DISA will provide, operate and maintain devices in the SDN; Army's responsibilities begin at the TLA.

The ADRP no longer provides CAN connectivity to the WAN. The C2P security router in the TLA provides this connectivity. Configuration control and management of TLA devices is performed by USASC's CONUS - Theater Network Operations and Security Center (C-TNOSC).

TIMPO contracted with DISA to engineer, install, and manage WAN access for the MHSS. Through this program, DISA provides a DS-3 (45 Mb/s) circuit to 14 TRADOC locations. With this circuit, 10 Mb/s are allocated to the medical treatment facility (MTF) and 18 Mb/s are available to the post for other user requirements. See figure 12.

Every major TRADOC installation employs standards based architecture that balances meeting requirements with available funding levels. TRADOC's challenge is to leverage all assets into an integrated architecture optimized to support the largest number of local users as possible within the CAN's capabilities and any Army or DoD network management constraints. TRADOC DCSIM continues to work the architecture with the responsible PMs.

### 8.3.3. Program management information.

ADRP. ADRP is a DA-funded program within the I3MP (formerly PPC4I). PM DCASS, subordinate to the U.S. Army Communications-Electronics Command (CECOM), has overall management responsibility. USAISEC provides the engineering and installation support. Its scope is to provide the means of access from installations' CAN infrastructure to the DoD's enterprise level information transport system.

TIMPO. TRADOC plans to partner with TIMPO and share bandwidth at 14 installations (less Presidio of Monterey ). DISA has agreed to waive the cost of the DS-3 access circuit from the ATM cloud into the installation when more than one paying customer is attached to the ATM network. Each MTF will be considered the installation's first customer. This makes ATM available to the remainder of the installation at a lower cost.

DISA's loading threshold on the DS-3 is set at 28 Mb/s. TIMPO's agreement with DISA calls for a guaranteed bandwidth of 10 Mb/s to each MTF. TRADOC's partnership with TIMPO allocates the remaining 18 Mb/s for satisfying the installation's bandwidth requirements. TRADOC's initial requirement will be satisfied with NIPRNET service at the amount of bandwidth requested. As the combined requirements of the installation and MTF evolve and begin to approach the loading threshold of the DS-3, DISA will provide more bandwidth with either multiple DS-3s or OC-3.

## 8.4. Campus area networks.

A CAN interconnects LANs using a broadband network (often referred to as an installation backbone) covering a geographic area larger than individual LANs, but restricted to a fixed area of the enterprise, i.e., about the size of a college campus, or in TRADOC's case, a military installation. The CAN provides the common data-networking infrastructure for use by all tenants on the installation. The CAN includes cabling (usually single-mode fiber) and network devices (routers, switches, hubs, and bridges) which enable information transport IAW protocols (e.g., FDDI, ATM/SONET, or Gig-E). CANs also include network management components, and, depending on their architecture, may include ADNs that concentrate data from end-user systems within an area of the installation. There is no precise boundary between a LAN and a CAN, but if the function of a component is to provide an inter-network interface into the common user installation level network, then TPRISM categorizes the component as part of the CAN. An example of a CAN component would be the principal hub or switch within a building that provides connectivity for the building's occupants to a distant node external to the building.

Operational requirements for modern Army business practices (e.g., moving training courseware to individual classrooms and students and coordinating TRADOC products at action officer level across functional areas) have driven TRADOC installations to extend CAN connectivity to all users, creating a pervasive data transport system. There can be no "air gaps" between the data source and receiver.

Since 1996, TRADOC has been investing most of its OPA2 in modernizing CANs. TRADOC installations annually submit their requirements, and through negotiation with DCSIM regarding the functional requirement, ability to execute, and fund availability, funds are allocated either to the installation for direct execution, or to PM DDN for execution IAW the installation's requirement. PM DDN can also assist with engineering and planning. TRADOC spent approximately $12M dollars in FY99 and FY00 in this manner to make incremental infrastructure improvements.

### 8.4.1. Baseline architecture.

TRADOC will use ISAP and I3A documentation to depict the baseline SA of CANs at specific installations.

There are three predominant transport environments in TRADOC's baseline for CAN segments: FDDI, Gig-E and ATM. FDDI rings to interconnect user locations carrying TCP/IP traffic are gradually being replaced as installations upgrade low-capacity, shared Ethernet devices with switched fast Ethernet, Gig-E and ATM transport devices.

ATM and Gig-E segments have been inserted into CANs through actions of the installations, TRADOC, and HQDA. PM DDN, under the I3MP program, has upgraded the Fort Bliss CAN using ATM technology and is in the process of upgrading Fort Benning. In FY98, HQ TRADOC began insertions of ATM devices to high priority user locations at other installations to meet schedules for training modernization. Other migration steps toward ATM and Gig-E have occurred through installation level efforts.

Every modernization or expansion of CAN segments at a TRADOC installation, undertaken before I3MP implementation, must be designed as an accelerated portion of the I3MP. It must be fully and completely able to be incorporated and capitalized by that program at the scheduled time for full implementation. Technical assistance can be obtained from USAISEC regarding consistency of planned modernization actions with the architecture for I3MP.

### 8.4.2. Objective architecture.

TRADOC's strategy for interconnecting heterogeneous IS into a CAN is to emphasize a common-user architecture, vice dedicated circuits, employing open interfaces in compliance with standards in the JTA-Army and the Army's I3A SA. Although the JTA-Army includes published standards for FDDI, Ethernet and ATM, the I3A is based on the selection of an ATM or Gig-E approach. TRADOC's own insertions will be based on ATM or Gig-E aimed at high priority and high bandwidth user locations. Table 7 provides an overview of the migration path. The target architecture is being executed through TRADOC's own modernization efforts. The objective architecture requires the upgrades executed by DA's I3MP.

**Table 7**
**CAN migration path**

| Target | Objective |
|---|---|
| Limited ATM or Gig-E backbone at SONET speeds | Full ATM or Gig-E at full SONET speeds |
| Limited access to switched data, video | Full access to switched data, video, voice |
| DISN ATM-U bandwidth as required | NLT 155 Mb/s WAN access (OC3) |
| Able to support:<br>• Full simulation on post<br>• Limited simulation off post<br>• Full video on post<br>• Limited video off post | Able to support:<br>• Full simulation on and off post<br>• Full video on and off post<br>• Virtual reality applications |

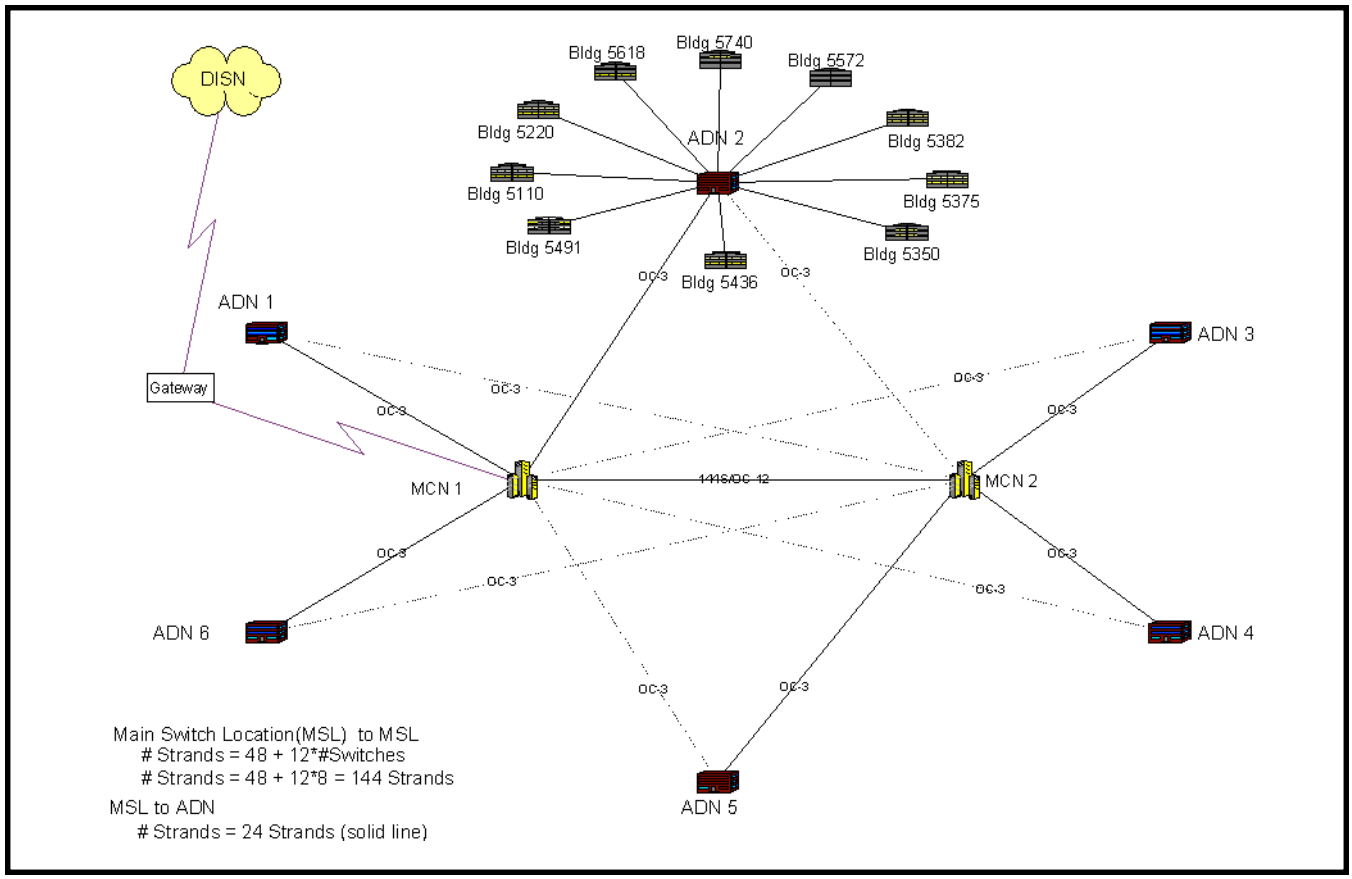



**Figure 13. I3MP CUITN star mesh topology for ADNs**

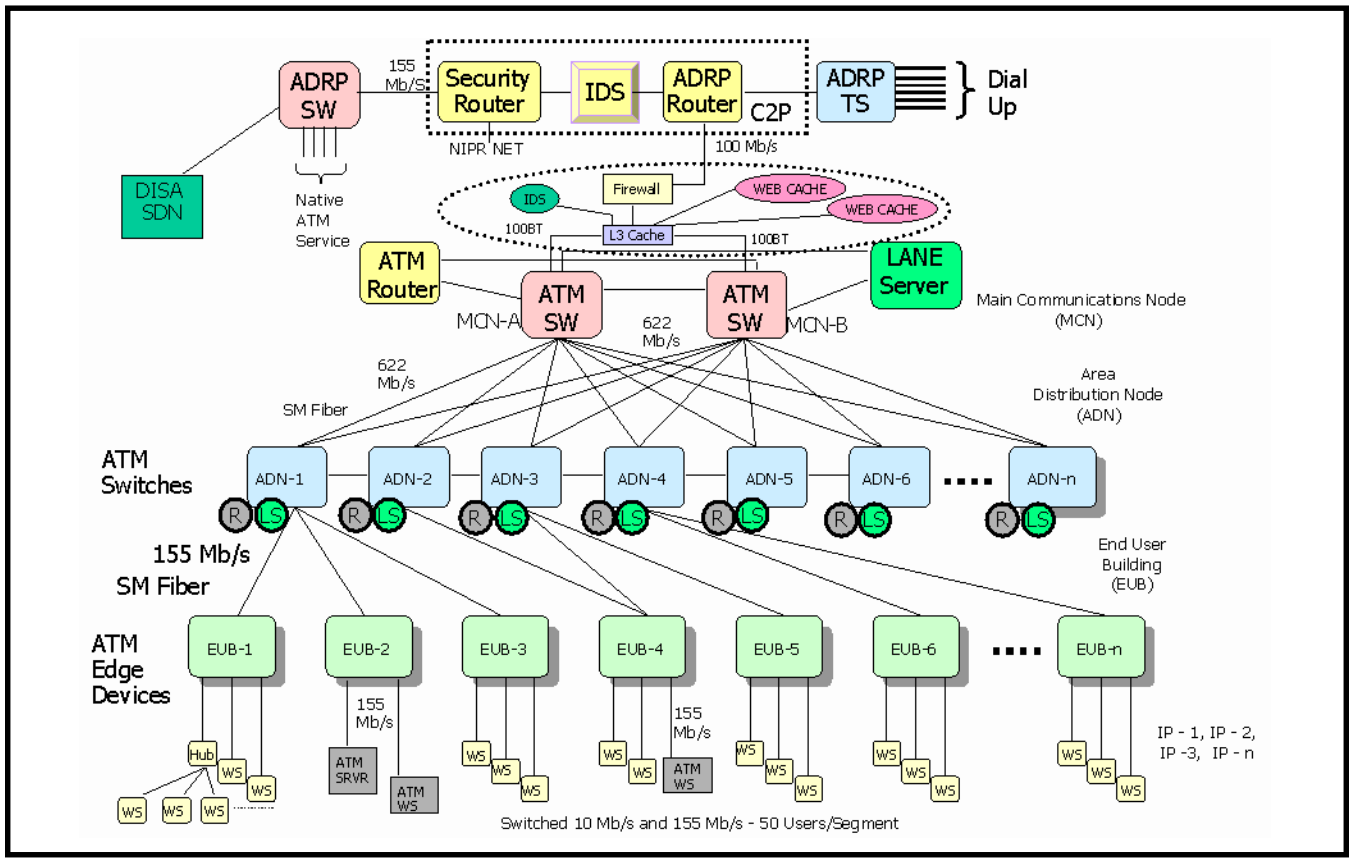



**Figure 14. I3MP CUITN SA using ATM**

The Army's largest provider of networking components and contracting vehicles to installations is the CUITN program, part of the I3MP. Its architecture must influence TRADOC's objective SA, so that TRADOC's own investments will increase our readiness to accept and integrate networking components provided by this program. Due to the rapidly changing IT environment and technology, CUITN has had to make two major, and several minor, modifications to its approved architecture in its six-year history. Even now, CUITN continues to experiment with Ethernet alternatives to its ATM design. One strategy TRADOC has employed for staying abreast of the currently approved architecture is to provide MACOM funding directly to the CUITN PM to execute modernization projects for TRADOC under the CUITN umbrella. This resulted in "CUITN slices" on nearly all TRADOC installations in 1999 and expansions in 2000. Another strategy employable by installations is to use the architectural standards contained in the ISAP's, which are CUITN-compliant, when planning and funding CAN upgrades.

The PM for CUITN uses components that comply with JTA-Army standards to create a CAN based on ATM or Gig-E switching. Vendor claims for Gig-E are that it can provide the affordability and multi-casting capabilities of Ethernet, while eliminating its latency constraints; and provide the QOS and bandwidth availability of ATM, while eliminating its high management overhead. CUITN currently fields dual ATM or Gig-E switches as the heart of the CAN in Main Communications Nodes (MCN's). One MCN is collocated with the existing DCO facility and another is generally placed in a facility that already houses other IS, e.g., a Data Processing Installation (DPI) or an Remote Switch Unit (RSU).. In this way, the MCN will collocate several components for centralized access and management, e.g., a telephone switch, router, DISN gateway and installation level E-mail host(s). The MCNs are interconnected to distributed ADNs via single mode fiber optic, supporting SONET/ATM transmission at optical carrier-3 (OC-3) capacity (155Mb/s), scalable to OC-96 (5 gigabytes per second (Gb/s)) or multiple Gig-E (1 Gb/s [nominal]) links. ADNs concentrate data from building level systems and provide the entry point to the backbone CAN. Small installations require one, two, or three ADN locations for the entire installation. A medium installation has 4 to 15 ADN locations and a large installation has 16 or more.

The MCNs and ADNs are connected in a partially meshed star topology (see fig 13). However, due to the costs of creating fiber runs, (labor and materials for trenching, ducting, manhole development, etc.), this may be the last characteristic of the objective architecture to be realized. The hierarchical aspects of the network are connections from MCN to ADNs, ADN to edge devices in end user buildings (EUB), and edge devices to servers and user workstations. The mesh aspect is ADN to ADN cross-connections for survivability and load leveling. MCN, ADN, and edge devices are equipped with an Intelligent Operation, Administration, and Maintenance capability, but the platform for performing these functions will generally reside at the primary MCN.

Edge devices are used to connect legacy platforms, networks and peripherals to the ATM network. The principal function of an edge device is to perform ATM to IP conversion (cells to packets) and vice versa. Instead of a simple bridging device, intelligent hubs can be used as edge devices. The intelligent hubs provide additional interface options such as Gig-E, Ethernet switching, FDDI, Token Ring bridging, and routing (see fig 14).

The CUITN backbone primarily uses ATM protocols (802.2, AAL 5, LAN Emulation (LANE) 1.0) or Gig-E but will provide access for LANs that use Banyan Virtual Networking System (VINES), Novell IPX, and other protocols. LANE makes the protocol conversions required for the ATM CAN to behave like an Ethernet or Token Ring LAN, thereby enabling integration of existing LANs and the ATM CAN without requiring modifications to the mission applications. LANE provides connectionless broadcast, converts data from packets to ATM cells, and resolves machine address code addresses for specific devices to ATM addresses. In FY 99, the CUITN program added capabilities for Multi-Protocol over ATM (MPOA) which extended the versatility of LAN emulation and allowed for more spontaneity in establishing switched virtual circuits (see fig 15).

Inside the end user buildings (see fig 16), service is extended to user locations by switched 10Mbs/100Mbs Ethernet or is continued as ATM or Gig-E service, depending on the bandwidth requirement and available ports on the hub.

Designs for inserting ATM or Gig-E technology into TRADOC CANs will be consistent with migration to the CUITN SA. To permit phased migration to the objective architecture, CAN expansion projects should consider the following principles in their design, resulting in sound target architectures:

- Provide a 25% growth factor on the ATM or Gig-E ports at the MCN and ADN locations for supported external building connectivity.
- Provide a 25% growth factor on the Ethernet ports for supported internal end-user connectivity.
- Size the ATM or Gig-E switches to accommodate the final number of end user buildings that will be connected to the DCO's/ADN's being installed.
- Provide a single mode link no less than 155Mb/s from all designated end user buildings to the serving ADN/DCO.

Important interoperability considerations when inserting ATM products into existing networks are:

- Interoperability between ATM devices and IP legacy equipment
- Interoperability between ATM devices of different vendors
- Latency characteristics (for video and real-time applications)
- ATM protocols (LANE I, LANE II, MPOA)
- Volume handling (as applies to throughput, scalability, and port density)

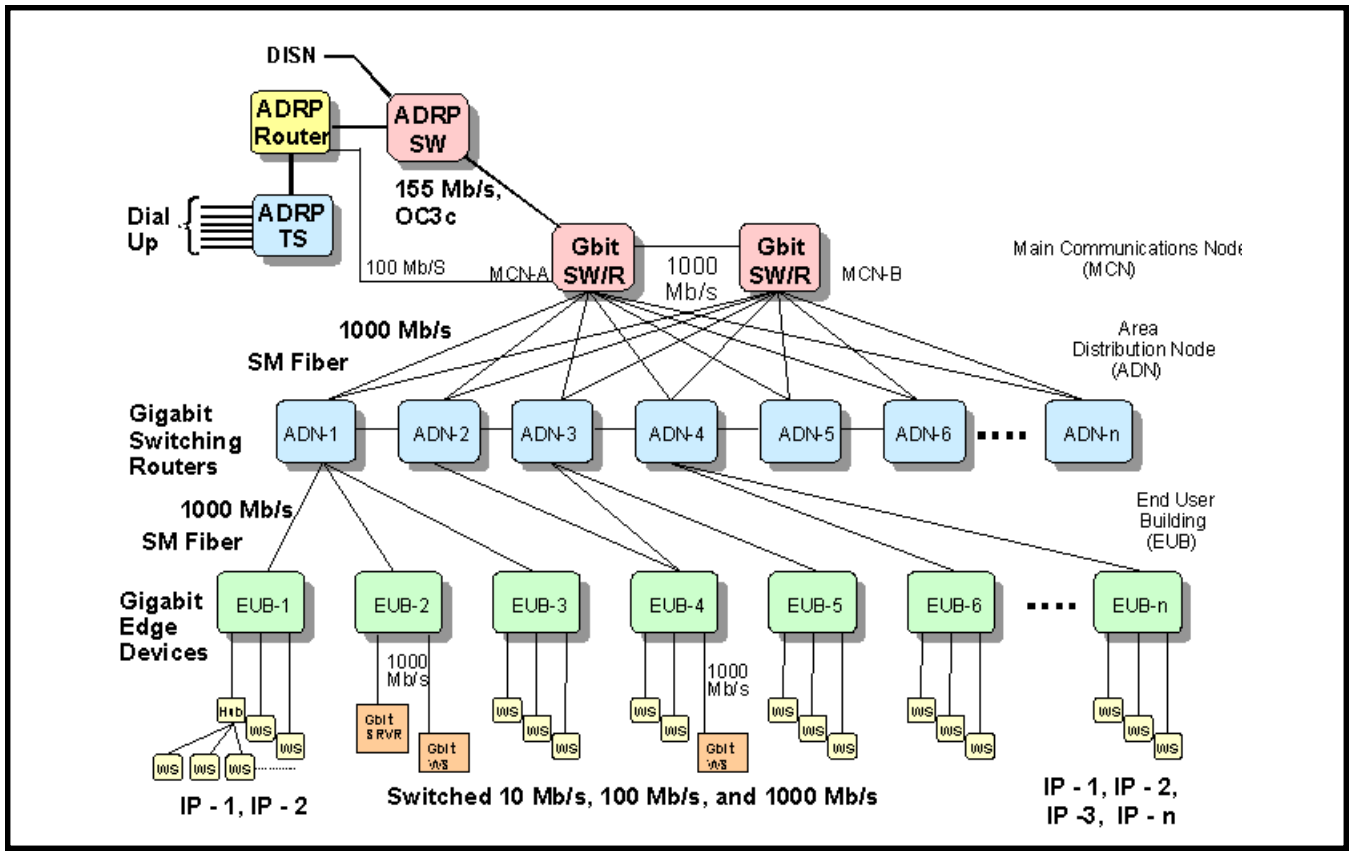



**Figure 15. CAN architecture using IP and Gig-E**

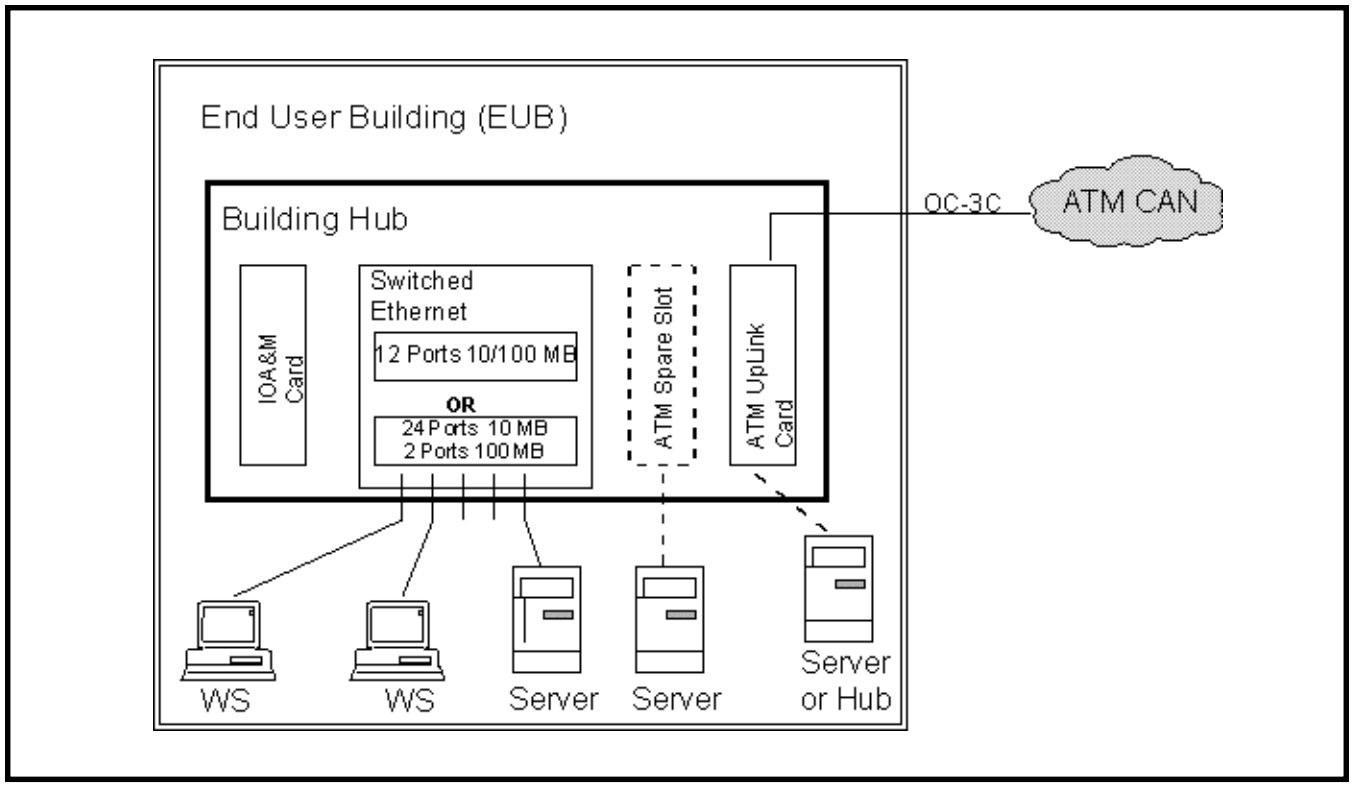



**Figure 16. CUITN building hubs**

The continuing evolution of ATM standards makes it difficult to ensure required interoperability, efficient operations, and network management and trainability between equipment of different vendors. The JTA and the JTA-Army are likely to have several significant changes regarding the standards profile for ATM in their next versions. Therefore, the question arises of a multi- versus single-vendor acquisition strategy for ATM devices. Although most major vendors have reduced interoperability issues to the level where they can be relatively easy to troubleshoot during the on-site installation process, few devices as yet can demonstrate full functionality in a multi-vendor environment "out of the box." If for that reason, or for reasons of supportability, a DOIM insists on a single-vendor solution for his/her installation, DCSIM will support that position. Likewise, if a multi-vendor solution provides required capabilities, integration options, and is the most cost effective from an installation-wide (vice application specific) perspective, then TPRISM's guidance does not preclude its selection. But, regardless of a DOIM's intent to maintain system integrity through use of a single vendor, there are likely to be devices at either end of the installation CAN, (e.g., gateway WAN devices "upstream" and tenant premise devices "downstream"), that will not fit into an installation's single vendor strategy. Despite preferences for one product line over another, DOIMs must consider overall Army and specific tenant mission requirements when reviewing and approving project proposals from either government or contracted engineering sources. The USAISEC Technology Integration Center (TIC) at Fort Huachuca regularly publishes a list of equipment that has passed rigorous tests related to functionality, throughput, and standards compliance. Equipment that has not been successfully tested should not be considered for network use. Selection of products from this list is generally the best approach.

### 8.4.3. Program management information.

Outside Cable Plant Rehabilitation (OSCAR)/CUITN. Achieving the objective architecture for CANs is beyond the scope of TRADOC's available resources and depends instead on fielding through Army managed programs. OSCAR upgrades the cable plant in support of both telephone and data users. CUITN provides an installation backbone (i.e., CAN) data network to interconnect LANs, hosts, and WAN gateways. Both programs are elements of the I3MP, previously the PPC4I. ADRP (described in para 8.3.3.) and the MTMP are other components of I3MP. I3MP defines three different increments for fielding:

• *Initial Critical Capability (ICC)*: backbone to provide the basic infrastructure. Installations need this component to provide connectivity to the users.

• *Minimum Essential Requirements (MER)*: infrastructure to support communications between a specified portion of the users on the installation and the long haul communications. The MER includes the outside plant and data infrastructure components of the I3MP. The outside plant infrastructure includes supporting structures (manhole and duct) and cabling (fiber and copper). The data infrastructure includes data switches, edge devices, associated electronics, and inside building connectivity for point-of-presence hubs to support full mission data transport capability. Premise wiring will be accomplished through customer or system proponent channels.

• *Full Operational Capability*: infrastructure to support communications between all the possible users on the installation and the long haul communications.

The MER phase is equivalent to the previous aims of CUITN. The following components are within the scope of the MER increment:

(1) Electronics for all MER-approved facilities. Electronics will accommodate MCN (formerly the DCO) to MCN, MCN to ADN, ADN to adjacent ADN, and ADN/MCN to selected EUB fiber connections. Note: Single Mode dual window (1310/1550nm) fiber will be the only outside plant fiber optic media installed by the I3MP.

(2) Connectivity from the MCN/Area Distribution Node (MCN/ADN) to each E-mail host.

(3) Connectivity from the MCNs to the Army DISN gateway.

(4) Connectivity from the MCN/ADN to each DPI. (This applies to hosts running multi-user applications supporting multiple LANs/users. This is also perceived to apply to facilities/activities that have significant data transport/connectivity requirements essential to power projection (e.g., hospitals, CTCs, virtual combat environments, and networked battlefield simulators).

(5) Connectivity from the MCN/ADN to the server of each LAN that has a requirement for connectivity external to the building (to access another location via the installation backbone).

(6) Connectivity to buildings housing five or more computers having a requirement for I3A backbone connectivity. Buildings in this category shall be credited as housing a LAN and considered MER qualified.

(7) One user interface card in EUB point-of-presence hubs for the purpose of demonstrating operational functionality. (I3MP is a CAN backbone program that is not intended as the source of building/departmental LAN solutions.)

(8) A 25 percent hot standby growth capability in core backbone electronics (switches/chassis) to support unforeseen/emergency expansion requirements.

The schedule for I3MP is determined by the installation sequence list, as ranked by DA DCSOPS. In recent years, TRADOC's low ranking as power projection platforms has prevented CUITN from fielding much to TRADOC sites. However, since DISC4 restructured the increments in 1999, and obtained additional funding, the fielding schedule in figure 17 now looks more accelerated for TRADOC sites. The majority of TRADOC installations are expected to receive at least the I3MP increment for ICC during FY02-05. The current status of modernization for TRADOC installations is as follows: Fort Bliss is completed, Benning contract has been awarded, Eustis site survey has begun, Sill initial in-brief is completed and Lee is awaiting start of work.

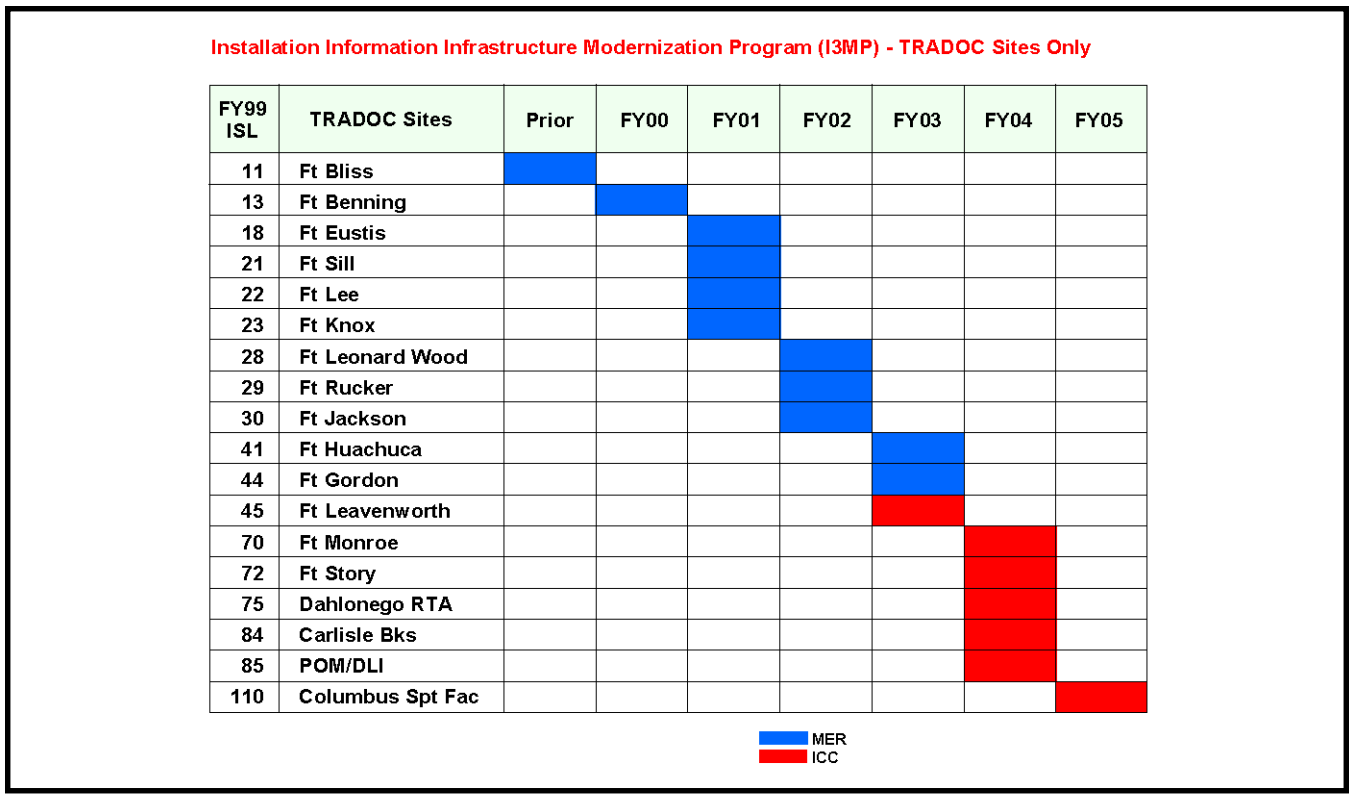



**Figure 17. I3MP implementation schedule**

## 8.5. Enterprise management systems

### 8.5.1. Baseline architecture.

TRADOC does not have a command-wide Enterprise Management System (EMS). EMS will be implemented at installation level, but the baseline architecture contains only scattered examples of true EMS. TRADOC installations employ some EMS-type capabilities available in packages, e.g., Microsoft SMS, that fall short of a full service system.

### 8.5.2. Objective architecture.

All TRADOC installations will employ EMS in the objective architecture. As networks become more complex, widely dispersed, and critical to TRADOC operations, and if IT manpower fails to keep pace, EMS will be critical capabilities to ensure reliable service.

TRADOC will use commercial-off-the-shelf products for EMS. These can include turnkey systems or separate COTS products integrated into an EMS, but will be based on the following capabilities:

- *Configuration Management.* Includes inventory information on hardware, software, and associated supporting data. Includes centralized pushing of software changes to support version control.
- *Network Management.* Capability to monitor the network for potential or impending bottlenecks and congestion.
- *Availability Management.* Includes planning for alternate/redundant connectivity, distribution of routing and switching components, and network monitoring.
- *Service/Helpdesk Management.* Provides information sharing, trouble ticket originating/tracking and contingency back up.
- *Security Management.* Includes detection of intrusions and other information protection infractions.

### 8.5.3. Program management information.

DCSIM is seeking DA funding for procurement of EMS to be employed at installation level within TRADOC. TRADOC is in the process of surveying all TRADOC installations to determine what each installation needs in order of priority, tools, and functionality to support their organization. TRADOC does not plan to mandate the use of a single product command-wide since the capabilities are implemented at installation-level with no centralized MACOM operations center. Solutions are likely to be selected from blanket purchase agreements (BPAs) made available by DA, currently for Computer Associates UniCenter and Tivoli products.

## 8.6. Local area networks.

A LAN interconnects clients and servers within a small geographical area, usually within a building. There is no universally accepted boundary between a LAN segment

and a CAN, but TPRISM uses the term LAN for the network segment connecting collocated end-users, while CAN is the term used for the installation's data backbone network that inter-connects the users' LANs.

#### 8.6.1. Baseline architecture.

In the baseline SA, the coverage and the architecture of LANs varies, with the Ethernet protocol and Microsoft NT and Novell OS predominating. DCSIM has not collected LAN data since the 1997 TPRISM data call, at which time TRADOC operated 236 Novell LANs, 68 NT LANs, 36 Banyan VINES LANs, and 316 LANs with other, or unreported, network OS.

#### 8.6.2. Objective architecture.

Traditional, physically segmented LANs will be phased out of the architecture in favor of a physical architecture in which end user equipment is connected to a primary (building), secondary, or tertiary switch via switched Ethernet or fast Ethernet. Workgroups, previously connected by physical segmented LANs in the past, will be "constructed" by the network administrators using ELAN or virtual LAN technology available in modern networking systems. These new LANs will be more dynamic, flexible, and responsive to user needs and will provide the capability to group users in different disciplines, buildings and possibly installations. The technical architecture provides the required standards and protocols.

Aside from the capabilities standardized in JTA-Army for enterprise-wide interoperability, the SA for LANs is decided at installation level, or lower. USAISEC has compiled useful guidance for local consideration, issued by DISC4 as I3A Implementation Guide, 2 Mar 99.

Select the cable type that suits the distances and bandwidth requirements. Useful, but not exclusive, options include multi-mode optical fiber and twisted pair. Multimode fiber is good for distances up to 1.25 miles. It can be used for data, voice, and video traffic. If ATM or Gig-E (over 100m) service is required all the way to the user level, optical fiber is the required cable type. There are two types of twisted pair cable: unshielded twisted pair (UTP) and shielded twisted pair (STP). The cost of UTP will usually be less than any other cabling. UTP cable is familiar to installers, small in diameter, lightweight, and simple to connect and terminate. The Electronics Industries Association/Telecommunications Industry Association category 5 UTP cable will cost a little more than Category 3 UTP cable, but the extra cost will be worth it over time. Category 5 UTP cable can transmit data at 100 Mb/s. In June 1999, IEEE approved the standard for Gig-E over copper, establishing 1000BaseT for distances of up to 100 meters. Category 3 UTP cable is limited to transmission speeds of 16 megahertz (MHz), does not scale upward, and is rapidly falling into disuse. STP cable is good for applications that require high-speed data rates, but STP cable is considerably more expensive than UTP. Based on the above considerations, TRADOC DCSIM recommends using category 5 UTP to install most LANs in TRADOC facilities and fiber in cases where the end-users require ATM or Gig-E service to the desktop.

TRADOC expects most LANs in the objective architecture will include a cable plant, although wireless technology may find a niche where PC mobility is a major requirement, or in specific applications where network cables are impossible or difficult to install. Wireless technology may also be used to augment or back up wired technology for lower bandwidth applications, but raises issues involving frequency management and security not associated with hard wired technology.

#### 8.6.3. Program management information.

There is no Army or TRADOC managed program to systematically field or upgrade intra-building user connectivity. New programs should include user connectivity in their fielding package, e.g., CR XXI, sized to suit the specific system's operational concept.

### 8.7. Network support for training.

An architectural principle in TRADOC is to use common user networks to satisfy functional requirements for information transport. Distance learning and other training innovations are of sufficient criticality to TRADOC that the combination of WANs, CANs, and LANs to support it merits separate discussion.

TRADOC will employ WANs, CANs, and LANs in support of modernized training processes (fig 18). Until information exchange requirements are solidified, the bandwidth annotations in figure 18 should be interpreted only as notional requirements - not as satisfactory or available solutions. Training modernization programs, e.g., TADLP and CR XXI, will employ common user components of WANs and CANs at training sites. TRADOC has modernized its WAN access and CANs to distance learning sites; fielding began in FY00.

The WAN will be DISN, although DISA's ability to provide the 1.5 Mb/s WAN services, the estimated requirement for each classroom, is uncertain since no other program has had long-haul requirements on such a scale. The CAN will provide connectivity from end-user buildings on an installation to the DISN WAN gateway. Planning, design and funding for CAN components is an installation/MACOM responsibility, which may be augmented by DA-level infrastructure programs, such as CUITN. CAN operational and managerial responsibilities belong to the installation DOIM. The building LAN provides the internal building infrastructure necessary to connect classrooms to each other and to the CAN. For network management and security purposes, there should be only one point of entry per building. CR XXI will be executed from a standard design incorporating a single ATM feed to a classroom device which provides switched 100 Mb/s Ethernet to the desktop. Funding of building LAN components, operation and management responsibilities are a negotiated shared cost between the installation, the CR XXI program, PM TADLP, other building tenants, installations and HQ TRADOC. In classrooms and DTACs, LANs provide connectivity between workstations and an edge device. Funding of components, operation and management of the classroom and DTAC LAN are the responsibility of TADLP or CR XXI programs.

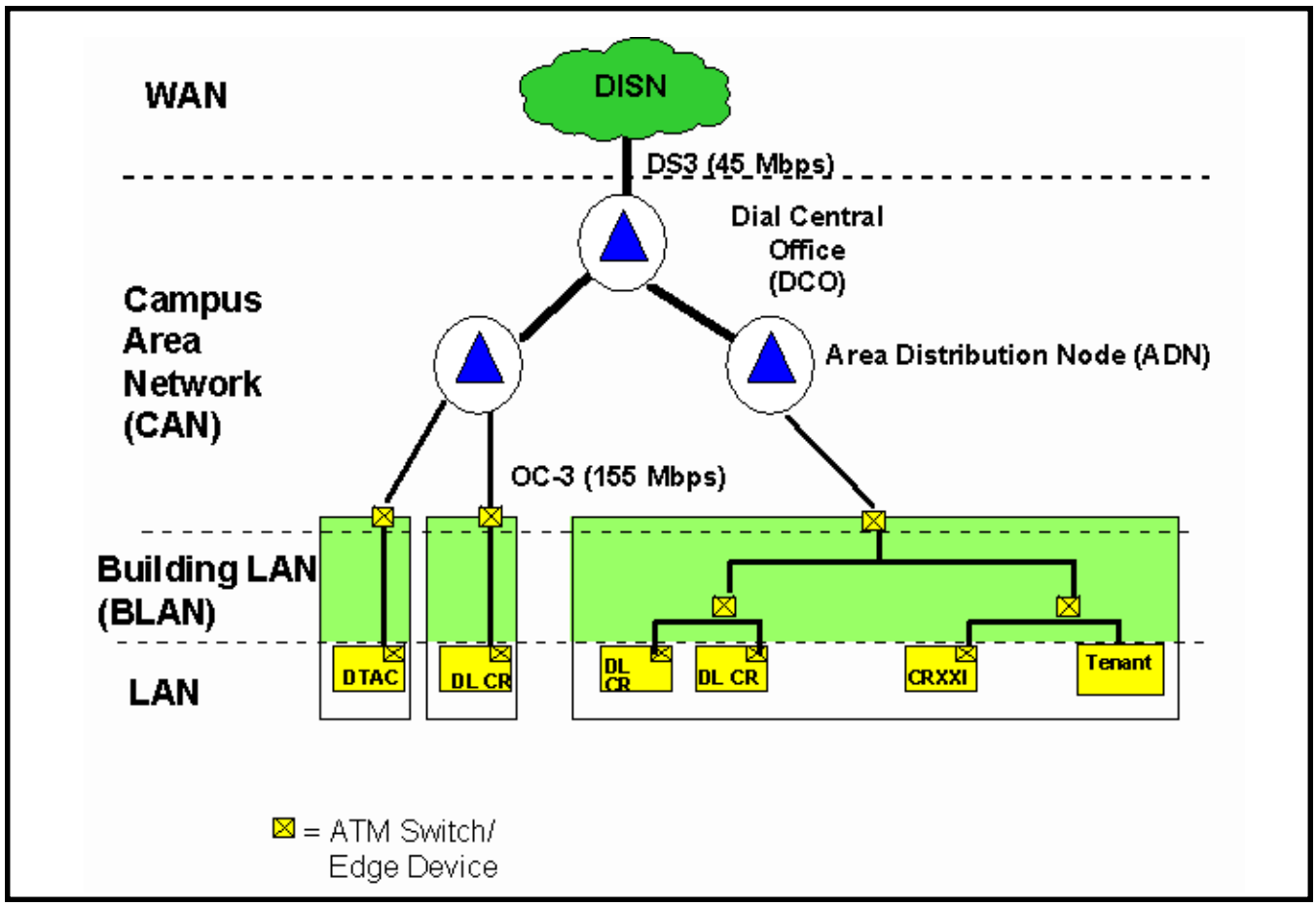



**Figure 18. Notional distance learning networking**

## 9. Computer Infrastructure

TRADOC's computer infrastructure is discussed in the next several paragraphs, subdivided into enterprise, local and personal level platforms. Computing platforms are the hardware and OS software that provides the hardware with its basic capabilities. Platforms also encompass the system support services that are fundamental, though usually transparent to the user, for operation of higher level applications.

### 9.1. Enterprise level platforms.

In TRADOC, the enterprise level means the whole MACOM. This paragraph covers computers that are operated centrally, for use by activities throughout the MACOM, to ensure the availability of standardized capabilities throughout the command.

#### 9.1.1. Baseline architecture.

TRADOC does not operate any enterprise level platforms in the baseline architecture. For such large-scale platforms, TRADOC uses the centralized processing services of the Defense Megacenters (DMCs).

The DMCs provide host standardized DoD and Army applications and other information processing services on a fee-for-service basis. DMCs host a variety of Army and DoD standardized mission applications, e.g., Standard Installation/Division Personnel System (SIDPERS), Standard Army Financial Inventory Accounting and Reporting Systems (STARFIARS), and Standard Financial System (STANFINS), sometimes collectively called the Army Standard Information Management System (ASIMS). DISA's strategy is to increase components' use of these enterprise platforms for operating new standardized systems.

Following considerable consolidation of the services' and DoD agencies' processing power, the number of DMCs has been reduced to 16, with an objective strategy to consolidate to 6. DISA has consolidated all Army processing at the St. Louis MegaCenter. DISA operates the DMCs on a fee-for-service basis, and has both rate-based and full cost recovery services. For a decade, TRADOC has used dedicated long haul circuits and CAN/LAN segments to access ASIMS. International Business Machines (IBM) Corporation mainframe platforms that had been fielded at the installation level by HQ TRADOC, performed interface functions with DMCs. These platforms were pulled out of the architecture during FY99. The applications they ran were retired or replaced by standardized DoD and DA applications. The interface functions, however, had to be continued.

TRADOC fielded components for PC-based remote job entry (RJE) over the NIPRNET, consisting of two PCs with specialized hardware and software to continue producing micro fiche and tape backups, and using high speed printers, while running ASIMS applications hosted at a DMC. Fielding for the RJE equipment was completed 4th Qtr FY97.

During 1997, TRADOC also fielded a communications front-end processor (FEP) for NIPRNET use between TRADOC and DMC platforms. The FEP absorbs the load associated with connecting ASIMS users to the NIPRNET.

Additionally, during 1997, TRADOC fielded 2,874 copies of TN3270E software across the command to support connectivity down to end users' LANs. Since DMCs are equipped with IP routers connected to the NIPRNET, the TN3270 software permits end users to emulate IBM3270 terminals and conduct TELNET sessions with ASIMS applications over the NIPRNET using the IP. The TN3270E variant purchased by TRADOC also supports printing on local devices as an alternative to using the RJE services generally centralized in the DPI.

#### 9.1.2. Objective architecture.

TRADOC has no plan to create its own enterprise level processing platforms in the objective SA. TRADOC has also migrated away from the architectural niche of large standardized general-purpose platforms fielded at installation level. In the objective SA, installations will use a combination of server platforms at the mission and local levels to perform the functions that installation level mainframes have done in the past. The degree of centralization in locating and operating replacement servers is an architectural decision made at each installation. A high degree of centralization, e.g., server farms, would approximate an installation level platform. TRADOC will also continue to use the DMC's platforms to run standard applications designed for this processing environment.

#### 9.1.3. Program management information.

DoD and DA programs for enterprise servers are based on the increased use of the DMCs. TRADOC has no program to create enterprise servers at the MACOM level.

### 9.2. Local level platforms.

Platforms at the local level are generally servers supporting requests for service from multiple users or clients, all linked via communications such as a LAN. There is no standard size for defining a local server, but generally in TRADOC's architecture, local platforms are more powerful and more capable than platforms used at the personal level. The platforms referred to here are typically minicomputers, which simultaneously process multiple applications for multiple users in a networked environment.

#### 9.2.1. Baseline architecture.

TRADOC installations operate a variety of servers, with mixed capabilities, received through many programs. There is little standardization in the baseline architecture for how installations will allocate or configure local servers. Some standardization occurs through centrally designed and procured configurations. However, most servers are acquired locally, using local architecture constraints, to support common functions, e.g., E-mail and office automation.

Program Executive Office Standard Army Management Information System (PEO STAMIS) fielded platforms to installations to host applications developed under two centralized Army programs: the Sustaining Base Information Services (SBIS) and the Installation Transition Processing (ITP) installation support modules (ISMs). SBIS is now concluded and the operation and sustainment of its applications is now also referred to as ISM. The PEO STAMIS selected servers from the IBM reduced instruction set computer (RISC) 6000 series for both programs. SBIS used the IBM RISC 6000 59H/R24 server suite. ITP used the IBM RISC 6000 39H server, which is compatible with the SBIS platform.

PM Hazardous Substance Management System (HSMS)/ ISM, in an effort to reduce servers at installations, has migrated the ITP/ISM applications from their separate 39H platform to the R24 servers. The R24 has 256 MB of system memory and 13.5 gigabyte (GB) of disk storage. The selected suite includes a 5GB internal 8-millimeter (mm) tape drive; a 1.44 MB 3.5-inch disk drive; a 2X compact disk-read only memory (CDROM) drive; and communications adapters for ATM, FDDI, or Ethernet 10Base-T media. Since the PM sizes the platforms to run the applications fielded with the platforms, they are not used for other mission applications.

All installations received ITP platform configurations. TRADOC installations that are power projection platforms (Bliss, Sill, Benning, and Eustis) and power support platforms (Huachuca, Knox, Rucker, Jackson, Leonard Wood, and Lee), plus Fort Leavenworth and Presidio of Monterey, received an SBIS platform configuration.

#### 9.2.2. Objective architecture.

With trends toward distributed applications, increased processing power of platforms, and increased connectivity of users, PMs are increasingly likely to design their systems for operation on a local server, as opposed to a general purpose installation level mainframe. One contrary trend is the use of DoD enterprise level platforms at the DMCs, but for now TRADOC anticipates more local level platforms becoming part of the installations' infrastructure to support both mission applications and common services. The installation's CAN and LANs will interconnect distributed platforms.

Besides the servers fielded to run centrally designed applications, the objective architecture will be influenced by TRADOC installations' and functional users' decisions about the configuration of servers they acquire for themselves. Table 8, compiled by USAISEC for TRADOC, provides recommendations for modernizing server platforms. The table specifies server capabilities. Server sizing will need to be tailored for each individual server implementation based on a detailed network analysis.

**Table 8**
**Recommended server specifications**

| Server Type | Objective |
|---|---|
| **Database Servers** | eight or more hot swappable 64 bit processors<br>800 MHz, or better, processor speed<br>20 GB, or more, of Error Correcting Code (ECC) SDRAM memory capable<br>clustering and/or load balancing compatible<br>fiber channel interface (for connection of backup and shared disk subsystems)<br>500 GB, or more, hard disk space capable<br>disk transfer rate of 80 MB/sec or better<br>Redundant Array of Inexpensive Disks (RAID)5, or better, capable<br>Optical storage hard disk backup (or fiber channel automated distance learning and training (DLT) tape library)<br>double-side, dual-layer digital versatile disk-read only memory (DVD-ROM)<br>a 3.5 inch floppy drive capable of reading both 120MB and 1.44MB diskettes<br>multiple hot swappable power supplies and cooling devices<br>hot-swappable hard disk drives<br>hot-pluggable Peripheral Component Interface (PCI) slots<br>redundant 100Base-T/ATM /Gig-E Network Interface Card (NIC)<br>SNMP remote management capable<br>NT server OS |
| **E-mail server**<br><br>Note: This recommendation exceeds the current DMS E-mail server specification, but reflects current DMS research for more economical E-mail server sizing.<br>four or more 32 or 64 bit hot swappable processors | 500 MHz, or better, processor speed<br>4 GB, or better, ECC SDRAM of memory capable<br>clustering and/or load balancing compatible<br>fiber channel interface (for connection of backup and shared disk subsystems)<br>400 GB, or more, hard disk space capable<br>disk transfer rate of 80 Mb/sec or better<br>RAID 5, or better, capable<br>optical storage hard disk backup (or fiber channel automated DLT tape library)<br>double-side, dual-layer DVD-ROM<br>a 3.5 inch floppy drive capable of reading both 120MB and 1.44MB diskettes<br>dual hot swappable power supplies and cooling devices<br>hot-swappable hard disk drivers<br>hot-plugged PCI slots<br>redundant 100Base-T/ATM NIC/Gig-E NICs<br>SNMP remote management capable<br>NT server OS |
| **Applications servers** | two or more 32 or 64 bit hot swappable processors<br>500 MHz, or better, processor speed<br>4 GB, or better, of ECC SDRAM memory capable<br>clustering and/or load balancing compatible<br>fiber channel interface (for connection of backup and shared disk subsystems)<br>100 GB, or more, hard disk space capable<br>disk transfer rate of 80 MB/sec or better<br>RAID 5, or better, capable<br>optical storage hard disk backup (or fiber channel automated DLT tape library)<br>double-side, dual-layer DVD-ROM<br>a DVD-ROM jukebox capable of supporting ten or more dual-side dual-layer, or better, DVD-ROMs<br>a 3.5 inch floppy drive capable of reading both 120 MB and 1.44 MB diskettes<br>dual hot swappable power supplies and cooling devices<br>hot-swappable hard disk drives<br>hot-pluggable PCI slots<br>redundant 100Base-T/ATM NIC/Gig-E NICs<br>SNMP remote management capable<br>NT server OS |

**Table 8 (continued)**
**Recommended server specifications**

| Server Type | Objective |
|---|---|
| **File and Print servers** | two or more 32 or 64 bit hot swappable processors<br>500 MHz, or better, processor speed<br>4 GB, or better, of ECC SDRAM memory capable<br>clustering and/or load balancing compatible<br>fiber channel interface (for connection of backup and shared disk subsystems)<br>100 GB, or more, hard disk space capable<br>disk transfer rate of 80 Mb/sec or better<br>RAID 5, or better, capable<br>optical storage hard disk backup (or fiber channel automated DLT tape library)<br>double-side, dual-layer DVD-ROM<br>a 3.5 inch floppy drive capable of reading both 120 MB and 1.44 MB diskettes<br>dual hot swappable power supplies and cooling devices<br>hot-swappable hard disk drives<br>hot-pluggable PCI slots<br>redundant 100Base-T/ATM NIC/Gig-E NICs<br>SNMP remote management capable<br>NT server OS |
| **WWW server** | two or more 32 or 64 bit hot swappable processors<br>500 MHz, or better, processor speed<br>4 GB, or better, of ECC SDRAM memory capable<br>clustering and/or load balancing compatible<br>fiber channel interface (for connection of backup and shared disk subsystems)<br>100 GB, or more, hard disk space capable<br>disk transfer rate of 80 Mb/sec or better<br>RAID 5, or better, capable<br>optical storage hard disk backup (or fiber channel automated DLT tape library)<br>double-side, dual-layer DVD-ROM<br>a 3.5 inch floppy drive capable of reading both 120 MB and 1.44 MB diskettes<br>dual hot swappable power supplies and cooling devices<br>hot-swappable hard disk drives<br>hot-pluggable PCI slots<br>redundant 100Base-T/ATM NIC/Gig-E NICs<br>SNMP remote management capable<br>NT server OS |
| **Network Management Server** | two or more 32 or 64 bit hot swappable processors<br>500 MHz, or better, processor speed<br>4 GB, or better, of ECC SDRAM memory capable<br>clustering and/or load balancing compatible<br>fiber channel interface (for connection of backup and shared disk subsystems)<br>100 GB, or more, hard disk space capable<br>disk transfer rate of 80 MB/sec or better<br>RAID 5, or better, capable<br>optical storage hard disk backup (or fiber channel automated DLT tape library)<br>double-side, dual-layer DVD-ROM<br>a 3.5 inch floppy drive capable of reading both 120 MB and 1.44 MB diskettes<br>dual hot swappable power supplies and cooling devices<br>hot-swappable hard disk drives<br>hot-pluggable PCI slots<br>redundant 100Base-T/ATM NIC/Gig-E NICs<br>SNMP remote management capable<br>NT server OS |

#### 9.2.3. Program management information.

There is no TRADOC DCSIM program to modernize servers. Installations acquire servers within their own operating budgets and from external programs managed by functional staff and Army PMs. Although TRADOC DCSIM does not specifically fund or manage a server life cycle replacement program, table 9 (compiled by USAISEC for TRADOC) provides recommended guidelines for scheduling the replacement of assets to meet TRADOC's operational requirements. Recommendations are based on servers using Microsoft Windows NT Server 4.0 OS or better, memory equaling 128MB, and disk storage upgraded to appropriate levels for the resident applications. Recommended hardware requirements for Windows 2000 Servers are described in table 10.

### 9.3. Personal level platforms.

A personal level platform is the computer used by an individual action officer or student. It has its own processing power, but is often also a client, with software that enables use of distributed applications in a client-server relationship.

#### 9.3.1. Baseline architecture.

Throughout the command, there are about 48,000 PCs. Most are based on Intel processor architecture. TRADOC does not track statistics about PCs at TRADOC installations.

Joint Interoperability and Engineering Organization (JIEO) Report 8300, DoD Minimum Desktop Configuration, dated 1 Aug 97, provides guidance to be used by DoD for acquiring desktop PCs. The minimum configuration is designed largely to meet the requirements of DMS and the GCCS. Using the DoD configuration, DCSIM annually coordinates with DOIMs and issues recommended minimal specifications for acquiring PC configurations in TRADOC. The FY01 configuration is shown in table 11.

This configuration can be supported by TRADOC DOIMs and can be acquired using standard DoD requirement contracts. TRADOC organizations may deviate from this configuration when upgrading or buying new computer hardware and software, but doing so may reduce interoperability and the ability of the DOIM to support the alternative configuration. See table 15 regarding supported desktop software.

**Table 9**
**Recommended server replacement schedule**

| FY | Servers To Delete From Inventory | Minimum Servers To Retain In Inventory | Items To Retain For Two More Years |
|---|---|---|---|
| 2001 | Pentium 200 MHz / Pentium Pro 180 MHz | Pentium Pro 200 MHz with 512K L2 cache | Pentium Pro 200 MHz with 1MB L2 cache |
| 2002 | Pentium Pro 200 MHz with 512K L2 cache | Pentium Pro 200 MHz with 1MB L2 cache | Pentium II 300MHz with 1MB L2 cache |
| 2003 | Pentium Pro 200 MHz with 1MB L2 cache | Pentium II 300MHz with 1MB L2 cache | Pentium II 400MHz class with >1MB L2 cache |
| 2004 | Pentium II 300MHz with 1MB L2 cache | Pentium II 400MHz class with >1MB L2 cache | Pentium II 500MHz class with >1MB L2 cache |
| 2005 | Pentium II 400MHz with >1MB L2 cache | Pentium II 500MHz class with >1MB L2 cache | Pentium III 400MHz class with >1MB L2 cache |

**Table 10**
**Recommended server hardware requirements for Windows 2000**

| | RAM | | Processor | | Disk Space | |
|---|---|---|---|---|---|---|
| | Minimum | Recommended | Minimum | Recommended | Minimum | Recommended |
| Domain Controller | 256MB | 512MB or more | Intel Pentium 600MHz | Intel Pentium II or compatible >800 MHz or higher | 2GB free | 8GB free (SCSI) |
| Server | 256MB | 512MB or more | Intel Pentium 600MHz | Intel Pentium II or compatible 800 MHz or higher | 850MB partition w/650MB free | 2GB free on a 7200 Ultra fast IDE or preferably Ultra-wide SCSI Hard Drive |

**Table 11**
**Minimum Specifications for PC Acquisitions in FY01**

| DoD MINIMUM DESKTOP CONFIGURATION Joint Interoperability and Engineering Organization Report 8300 | TRADOC FY01 PREFERRED AND SUPPORTED MINIMUM DESKTOP HARDWARE CONFIGURATION |
|---|---|
| At least 300 MHz | CPU with processor speed of at least 500 MHz able to natively execute Intel x86 instruction set |
| At least 64 MB RAM expandable to 128 MB | at least 128 MB RAM expandable to 256_MB |
| At least 4 GB hard drive | at least 13 GB hard drive |
| At least 10 Base T | Ethernet LAN interface 10/100 BASE T |
| 1 PCMCIA adapter supporting 2 Type I simultaneously or and 1 Type III alone | 1 PCMCIA adapter supporting 2 Type II simultaneously or 1 Type III alone |
| Video controller – minimum 256 colors, 1024x768 pixels; 4MB memory, upgradable; drivers for operating system | video controller – minimum 256 colors, 1024x768 pixels; 4MB memory, upgradable; drivers for operating system |
| At least 24X CD-ROM reader | at least 24X CD-ROM drive compliant with Revision 1.11 of the Optical Storage Technology Association (OSTA), MultiRead Specifications for CD-ROM, CD-R, CD-R/RW, and DVD-ROM Devices |
| 3.5" floppy drive capable of reading and writing both 1.44MB and 720KB diskettes | 3.5" floppy drive capable of reading and writing both 1.44MB and 720KB diskettes |
| 2-parallel port, 2-serial ports | 1-parallel port, 2-serial ports, 2-USB connections |
| Pointing device with a minimum of two buttons | Pointing device with a minimum of two buttons |
| 17" color monitor, super video graphics adapter (SVGA) | 17" color monitor, SVGA |
| 16-bit sound card (for multimedia applications) and drivers for OS | 16-bit sound card (for multimedia applications) and drivers for OS |
| Expansion slots: 3 PCI | Expansion slots: 3 PCI |
| Speakers: 3 to 5 watts output | Speakers: at least 5 watts output |
| 101 key qwerty keyboard | 101 key qwerty keyboard |
| 512K cache | 512K onboard or 256K integrated cache |

**Table 12**
**Recommended PC replacement schedule**

| Year | Delete from Inventory | Minimum to Retain in Inventory | Items to Retain for Two More Years |
|---|---|---|---|
| 2000 | Pentium 60-90 MHz | Pentium 100-133 MHz | Pentium 233 MHz |
| 2001 | Pentium 100-166 MHz | Pentium 233 MHz | Pentium 300 MHz |
| 2002 | Pentium 233 MHz | Pentium 300 MHz | Pentium 450 MHz |
| 2003 | Pentium 300 MHz | Pentium 450 MHz | Pentium 600 MHz |
| 2004 | Pentium 450 MHz | Pentium 600 MHz | Pentium 750 MHz |
| 2005 | Pentium 233 MHz | Pentium 233 MHz | Pentium 400 |

#### 9.3.2. Objective architecture.

In the objective SA, every action officer in TRADOC will have processing power available, where and when they need it. In a client-server architecture, the primary client device will be a PC, which can take the form of desktops, notebooks, hand-helds or personal assistants. Since the objective SA is one PC per action officer, PCs must be sufficiently robust to run a variety of applications for common capabilities (e.g., word processors, databases, spreadsheets, graphics) as well as supporting client functions for mission-specific applications with the ISS capabilities required for each. PCs will also be the users' tool for accessing network services, e.g., E-mail, file transfer, and the Internet.

The ability to run DII COE-compliant applications, DMS, and use multi-media may prove to be the drivers in specifying objective PC characteristics. With the pace of technology in PCs, it is impossible to recommend specifications beyond the upcoming year (table 11). Table 12 provides recommended guidelines for managing PC assets in the near term architecture to keep pace with TRADOC's operational requirements.

#### 9.3.3. Program management information.

TRADOC must continue to upgrade its PC base, but there is no Army or TRADOC project to do so. The cost exceeds what the DCSIM can centrally fund. Using $1,500 as the unit cost for a PC (with a 2.1 percent inflation factor) and 40,000 PCs as the total population through the next five years, the cost per year for a systematic life cycle replacement program is shown in table 13. The annual progression would extend ad infinitum. Accordingly, although DCSIM reports this annually as a UFR in the IM budget, there is no central program. Activities fund their own upgrades.

**Table 13**
**Estimated Cost for PC Replacement**

| Year | Cost |
|---|---|
| 1 | $16,896,000 |
| 2 | $17,250,816 |
| 3 | $17,612,390 |
| 4 | $17,982,413 |
| 5 | $18,360,883 |

Based on the conclusion of a staff study, DCSIM does not recommend leasing as a cost-effective means of implementing a life cycle replacement program for PCs, except for specialized configurations needed for short periods.

PMs, staff proponents, and other organizations fielding mission applications often assume platforms at the personal level, or the client portion of their system design, are already available for their systems' users as part of TRADOC's installation infrastructures. This is not a valid assumption. PMs need to coordinate with TRADOC sites prior to fielding applications that are dependent on the availability of personal level platforms.

## 10. Common Applications

Common applications provide cross-functional, cross-organization capabilities. The goal is a set of integrated common support services to support all business processes and functional applications. These services are discussed in the paragraphs that follow: OS, information security services, Internet/intranet services, E-mail, messaging, VTC, office automation, publishing, information warehouses, and knowledge management.

### 10.1. Operating systems

#### 10.1.1. Baseline architecture.

TRADOC has not collected statistics on the prevalence of different platform OS or versions. Based on requirements management actions visible at HQ TRADOC, there is a significant base of Microsoft Windows NT, and Windows 95 and 98.

#### 10.1.2. Objective architecture.

TRADOC will migrate its current Microsoft-based systems to Windows 2000 products. The current Windows 2000 family consists of:

- Windows 2000 Professional - Designed to replace Windows NT 4.0 Workstation.
- Windows 2000 Server - Replaces the NT 4.0 Server, uses the Active Directory. Backward compatible (can authenticate NT 4.0 servers and workstations). Provides better networking services and security with the enhanced security Kerberos Server.
- Windows 2000 Datacenter Server - Maximizes the hardware capabilities of high-end servers (more than two processors).
- Windows 2000 Advanced Server - Adds clustering capabilities to the multi-tasking environment.

Microsoft is expected to continue support of Windows NT 4.0 and the Windows 9x OS for several more years, so organizations will likely phase-in the upgrade to Windows 2000 at the server and client level. A mixed environment is technically feasible and probably fiscally required during the migration. Beginning in 3d Qtr FY01, new acquisition of desktop equipment will include Windows 2000 Professional. Table 1 provides recommended hardware requirements for supporting Windows 2000 application.

Still at issue is how to implement Windows 2000's Active Directory (AD). AD uses the existing Domain Name Service (DNS) to manage network traffic and replication. HQDA sponsors a technical working group to plan the implementation of AD. TRADOC DCSIM is a member of that group. USAISEC's TIC is also working on the AD solution for the Army. At this time, DISC4 prohibits implementing a domain controller (no longer a primary domain controller) with Windows 2000 AD. A server or PC running Windows 2000 Server or Professional respectively, without AD enabled, does not violate DISC4's policy. Because Windows 2000 Professional assumes a domain controller already exists, it enables AD by default. It must be turned off manually. The Army's

protected DNS will not support Windows 2000 Server's Dynamic DNS (DDNS) update feature. Activities will ensure DDNS update settings are disabled before installing Windows 2000 (without AD) in a production environment. The DDNS restriction will be removed as the Army Enterprise Directory Architecture is implemented.

### 10.1.3. Program management information

There is no Army or TRADOC program to field or upgrade OS outside those provided with specific functional applications. There is no centralized funding for Windows 2000 migration. Modernization will be achieved in increments affordable within installations' and using organizations' OMA budget. TRADOC has established a website to provide migration and training plans for implementing Windows 2000.

## 10.2. Security services.

The ISS program is the Army's overall approach for securing IS. It encompasses not only the SA, but all policy and procedures for protecting information in IS. Security services embedded in the SA are designed to protect the IS and the information content IAW policy objectives, and to ensure its authenticity, privacy, integrity, and availability. TPRISM, being aimed at system modernization, discusses only the SA aspects of the total ISS program.

### 10.2.1. Baseline architecture.

TRADOC has incorporated ISS into its baseline architecture IAW DA guidance. The ISS architecture is integrated with the Army common-user unclassified network WAN gateway equipment into the installation standard network TLA. TRADOC has implemented intrusion detection systems (IDS), closed its "back-doors" from the Internet, implemented dial-in identification and authentication, and has installed firewalls at several installation-defined high risk points.

In order to meet the DA Network Security Improvement Program (NSIP) direction, all IP traffic entering or leaving the Army installation must pass through the installation TLA equipment. The TLA protects the TRADOC networks through access control list filters on the Army Security Router and monitoring of traffic utilizing the IDS that is connected to the Security Ethernet Switch.

USAISEC regularly assesses TRADOC installations' baseline architecture for ISS vulnerabilities. HQ TRADOC contracted with USAISEC to conduct the assessments on five TRADOC installations each year. All installations have had at least one assessment. Installations were directed to focus on risks with a rating of high and medium.

#### 10.2.1.1. Intrusion detection system.

The CONUS Theater Network Operations and Security Center (C-TNOSC) manages the IDS. The IDS is connected to the C-TNOSC-managed security Ethernet switch for monitoring all IP traffic entering and exiting TRADOC installations from the Army Security Router. All TRADOC sites had their initial IDS equipment operational by 28 Aug 98. COTS products on the COMSEC Support Logistics Agency-maintained Army approved A&I products list are used to monitor potential intrusions from Fort Huachuca. IDS triggered events are coordinated with the Regional Computer Emergency Response Team - CONUS (RCERT-C) and the local DOIMs for appropriate response.

The standard network-based IDS software is Real Secure version 5.0 for NT. The Real Secure engine (sensor) can report to one master console and give views to other consoles. Two platforms are required in the Army configuration - one to host the Real Secure engine and one is the local "view" console. The master console for NIPRNET circuit coverage is located at the C-TNOSC/RCERT. The C-TNOSC/RCERT applies the IDS parameters to the Real Secure engine from the master console. The C-TNOSC/RCERT closely coordinates with the installations to monitor the IDS and refine the initial template to minimize false positive events. The local console is used to provide a local view of the events from the installation's Real Secure engine.

Host-based IDS software (Intruder Alert) packages are utilized to assist in protecting critical devices. The local DOIMs monitor any host-based, as well as additional network-based, IDS systems not located in the TLA.

TRADOC limits NIPRNET connections to two per installation, each coming in through the controlled IDS suite. Platforms are connected to the Internet through the controlled NIPRNET gateways. Direct access to the Internet is permissible only if the platform has no other connection to a military network.

**Table 14**
**Recommended hardware requirements for Windows 2000**

| | RAM | | Processor | | Disk Space | |
|---|---|---|---|---|---|---|
| | **Minimum** | **Recommended** | **Minimum** | **Recommended** | **Minimum** | **Recommended** |
| Workstation | 64MB | 128MB or more | Intel Pentium or compatible 300MHz (single or dual) | Intel Pentium 400MHz or higher | 650MB free | 2GB free |

**10.2.1.2. Network "back-doors".**

DoD manages the approved interconnections between the Internet and DoD networks using gateways on the NIPRNET backbone (see fig 8). HQDA issued architectural guidance to control backdoor access in two messages, SAIS, 051218Z Mar 99, subject: The Army Network Security Improvement Program (NSIP) - Backdoor Connections; and 201300Z May 99, subject: Army Network Security Improvement Program (NSIP): Policy and Guidance To MACOMs and PEOS/PMS and Other Material Developers in Identifying Backdoor Connections. To avoid backdoors, installations will use circuits that are purchased and managed by the Army (referred to as category (CAT) I by HQDA). Backdoor situations can arise several ways as described by HQDA messages:

- CAT II: Network level connections with a commercial ISP. TRADOC requires gateways or platforms that are directly connected to an ISP be disconnected from TRADOC-operated CANs.
- CAT III: Point-to-point connections between installations or between Army and external facilities, e.g., contractors that are also connected to the Internet or NIPRNET.
- CAT IV: Dial-in capabilities not currently using identification and authentication servers. TRADOC requires all unclassified dial-in connections be through the Army TSACS.
- CAT V: Dedicated network circuits that support specific functions with separate connections to the NIPRNET. For these backdoors, ODISC4 coordinates the ISS solution with the proponent for the functional network. Installations' DOIMs are asked for assistance, as required, but are not required to work with the proponents.

**10.2.1.3. Firewalls and guards.**

A firewall is a device or software application that applies a set of rules to determine who is authorized to connect to which machines, and what services they are permitted to use via that connection. Firewalls apply rules based on several different techniques, e.g., packet filtering, client access lists, server access lists, user authentication, and address obfuscation.

Use of firewalls in the baseline architecture is scattered. HQ TRADOC funded several firewalls during FY99-00 for installation-defined high-risk points. HQDA mandates only those firewalls, guards, and specific products procured through a BPA managed by the CECOM Communications Security Logistics Activity. To be listed on the BPA, firewalls must work with one or more of the following OS: NT, Solaris, HP-UX, IBM-AIX, LINUX, or Novell, and work in a TCP/IP environment with migration to ATM and GIGANET network systems. The approved firewalls are:

- Raptor, manufactured by AXENT Technologies, Inc., with a choice of the following OS: HP-UX, Solaris, and WinNT.
- Gauntlet, manufactured by Network Associates, with a choice of the following OS: Solaris, BSD, HP-UX, and WinNT.
- Pix 520, manufactured by Cisco, uses a proprietary OS, interfaces with HP-UX, Solaris, and WinNT.
- Sidewinder, manufactured by Secure Computing Corporation, with Berkley Software Design, Inc., OS.
- Sunscreen SPF 200, manufactured by Sun Microsystems, with Solaris OS.
- Lucent Managed Firewall, manufactured by Lucent Technologies, runs on NT or Solaris.

A guard is a trusted processor that protects a network from a network of a lower classification and allows the higher level network to exchange messages with the lower level network. Guards are used to enforce a security policy that defines acceptable transactions between two networks operating at different sensitivity levels. The objective of Secret and Below Interoperability is to ensure the interoperability for the warfighter is within acceptable risk. HQDA has interpreted this security policy to mean that every installation that has both a SIPRNET and NIPRNET connection will also require a high assurance guard to interconnect the two networks.

The DMS program has developed the DII Guard using the Wang XTS 300 High Assurance Guard (HAG). It will be able to process both DMS and SMTP traffic. The HAG is the only approved guard on the BPA.

**10.2.1.4. Virus protection.**

DISA awarded DoD anti-virus software licenses to McAfee Associates for the full line of AV security products and Symantec Corp for Norton Anti-virus products. Installations use a two-tiered virus checking architecture, one at the server level and one at the user level. DOIMs employ the most current version of DoD-approved products.

**10.2.1.5. ISS tools.**

The Army Computer Emergency Response Team (ACERT) is the security software tool distribution authority for the Army. Tools are available to Army activities through the ACERT Internet site. The Army's strategy is to identify and make available UNIX, WinNT and DOS-based tools that can be easily integrated into IS by local system administrators. Authorized users are able to download software for use on local networks.

**10.2.1.6. Domain name service.**

DNS is a hierarchical, distributed database service that identifies addresses on the Internet and translates between host names and IP addresses (see fig 19). HQDA redesigned the Army's approach to DNS. This redesign is sufficiently complex to warrant its own publication, DNS Implementation Guide, available from DCSIM. TPRISM gives only highlights of the SA. With a few exceptions, modifications to the baseline architecture were completed in FY00.

The Army is using four tiers of support extending from external public interface servers at the C-TNOSC (Tier 0) to optional user-operated servers on installations (Tier 3). The 70 DNS servers in tiers 0-2 (6-Tier 0, 6-Tier 1, and 58-Tier 2) are Sun Ultra SPARC servers. Tier 1 and 2 servers provide authoritative resolution of DNS queries. Theater Network Operation Centers (NOC) will control access to ensure the exchange of authorized DNS data at all tiers. Version control of DNS and DNS IDS software is exercised by theater NOCs in coordination with USASC.

All TRADOC subdomains map to three DNS servers for DNS resolution. One of these must be a Tier 2 DNS server. The Tier 2 server will be the primary/master DNS server for all the Army subdomains. Installations are encouraged to use their regional Tier 2 DNS server. New protected Tier 2 servers are geographically distributed to provide robust, regional DNS support to existing users. The new Tier 2 servers are the authoritative primary servers for designated Army subdomains. The Tier 2 servers can also support Dynamic Host Configuration Protocol (DHCP) to provide dynamic DNS capabilities. All installation-sponsored Tier 2 servers are placed within the demilitarized zone (DMZ) and centrally controlled and monitored by USASC. Each Tier 2 server has standardized intrusion detection software, OS, DNS, and other security enhancements as discussed below:

Tier 3 DNS servers must be on a dedicated machine, running standard DNS and DNS management related processes. The DNS server will not host any other applications or services that are accessible outside the installation infrastructure. The installation must ensure, either through use of a firewall, ACL on the ADRP router, or some other mechanism, that access to any non-DNS related port or IP address on a machine hosting a Tier 3 DNS server is limited to the immediate installation. It must not be visible, available, or advertised outside the installation. This limitation does not apply to those processes necessary to support DNS, NOC security auditing of the Tier 3 server, central monitoring of the server IDS, or any remote management functions agreed upon by the theater NOC and the local installation. DCSIM partially funded caching only servers for Forts Bliss, Gordon, Jackson, Leonard Wood, Monroe, Sill, and Carlisle Barracks. DCSIM fully funded Tier 3 servers for Forts Bliss, Gordon, Knox, Lee, Monroe, Sill, and Presidio of Monterey.

The modifications used the Bay Networks' NetID software product family for DNS, IP Management (IPM), and DHCP services. NetID software was made available to all Army installations through an Armywide licensing agreement. An installation wishing to use DHCP to provide dynamic updates to the primary DNS server must use the NetID DHCP software. The NetID DHCP server interacts with the NetID database to provide dynamic updates to the NetID primary DNS server. When the NetID DHCP server issues an IP address to a host an update is sent concurrently to the primary NetID DNS server and the NetID Server Manager. The NetID Server manager updates the IPM database, which then also sends the updated information to the primary NetID. Local DHCP servers that do not provide dynamic updates to the protected DNS system may be retained but the DNS data will have to be updated manually.

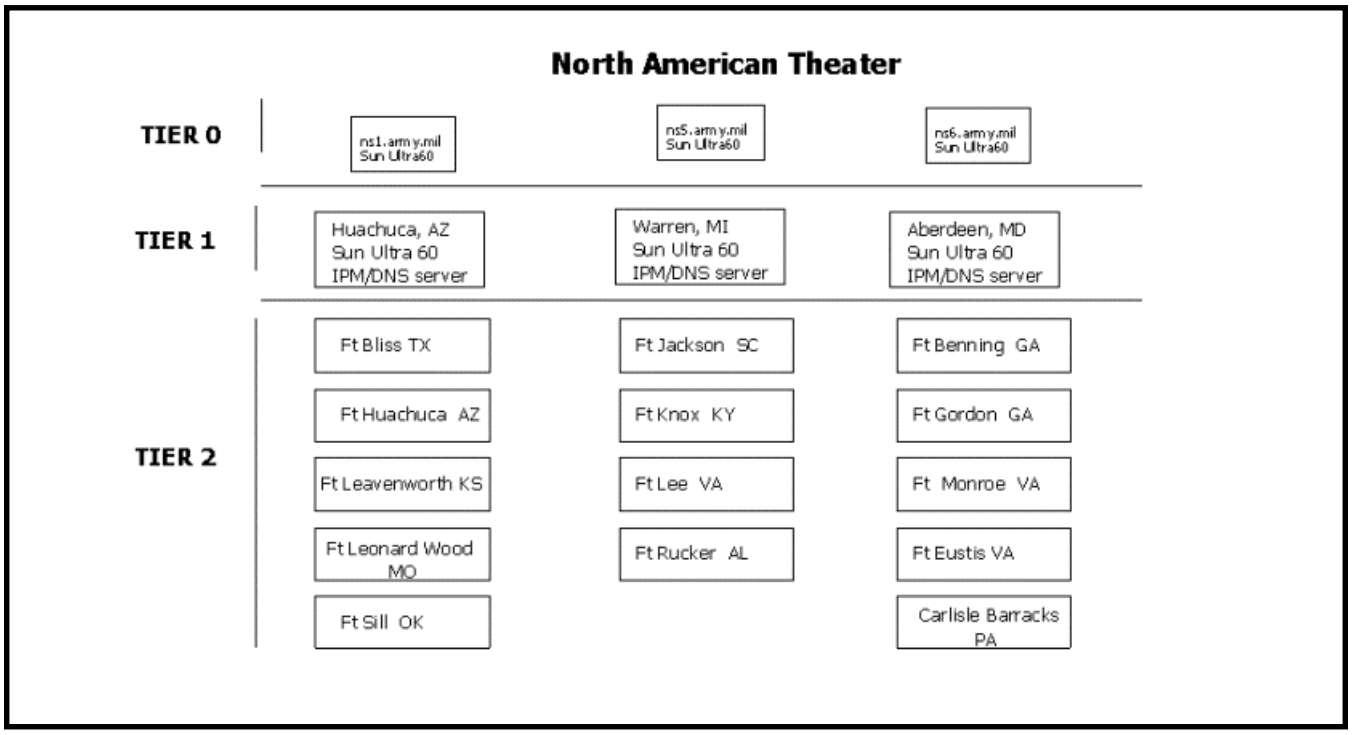



**Figure 19. Hierarchical DNS architecture to serve TRADOC**

## 10.2.2. Objective architecture

To achieve an objective ISS SA, TRADOC will continue to implement HQDA guidance to provide solutions in-depth, i.e., further inside the TRADOC operated networks. The primary program in the target architecture timeframe is to field firewalls for use in the top-level architecture at each installation.

### 10.2.2.1. Intrusion detection system.

USUSASC will continue to manage the IDS at the network level. Installations and functional proponents will determine any requirements for IDS on specific platforms in-depth (fig 20).

### 10.2.2.2. Firewalls and guards.

In the target architecture timeframe, DCSIM will field a firewall to each installation for use in their top-level architecture, primarily to counter external threats. A firewall policy will be issued at MACOM and installation level to ensure application developers and end-users understand the constraints of the ISS environment. Use of firewalls at critical points to enforce ISS policy will increase in the objective architecture. The policy objective is to provide users access to just the minimum protocols and services required to conduct TRADOC business. Only authorized network management monitoring and security data will be allowed to pass through firewalls.

The firewall selected for implementation is the Cisco Pix 520 (Private Internet eXchange (PIX)), a stateful packet filtering firewall. Stateful packet filtering technology provides an enhanced level of security compared with the static packet filtering. The stateful packet filter looks at the same headers as packet filters but can also look into the packet's data where the application protocol appears. Even more important, this technology allows the firewall to dynamically maintain state and context information about past packets. Security decisions can then be based on this state information. For example, the firewall can respond to an FTP port command by dynamically allowing a connection back to a particular port. Because of the capability to retain state information, stateful packet filters permit UDP-based services (not commonly supported by firewalls) to pass through the firewall. For that reason, they are advertised as offering greater flexibility and scalability. Stateful packet filtering technology also allows for logging and auditing and can provide strong authentication for certain services.

The Cisco Pix 520 is a high-speed custom platform, rated up to 170 MBps. The heart of the PIX is a connection-oriented stateful filter, Adaptive Security Algorithm, which also performs the Network Address Translation function. The PIX Firewall is administered from a separate platform referred to as the NT Workstation. The PIX

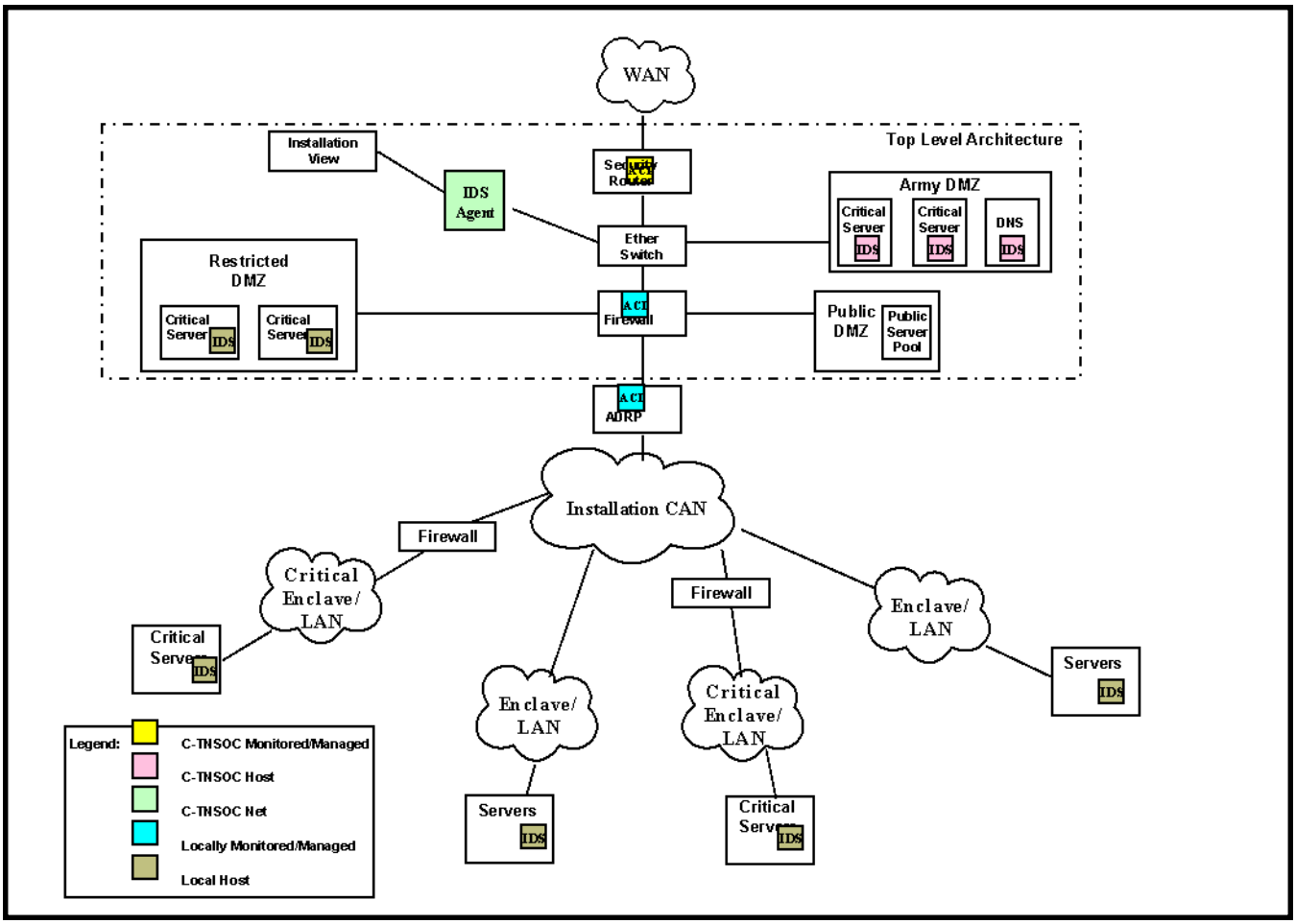



**Figure 20. High level objective architecture for IDS**

provides access control policies, identification and authentication of authorized users, and auditing capability. The firewall detects the occurrence of selected events, gathers information concerning them, and sends that information to the NT Workstation where it is stored.

The firewall will be inserted between the Cisco Switch (2820, 2822, or 2924XL) and the ADRP router. This placement also allows for the implementation of the three-tier DMZ required by HQDA (see fig 21).

Other firewalls may be installed in the objective architecture, particularly at installation-defined high-risk points to improve the in-depth security posture. DOIMs will allow only the C-TNOSC/RCERT access via approved and secure SNMP tools in support of network restoration and incident investigation. Installations must coordinate with the C-TNOSC/RCERT before installing a firewall to ensure continuing interoperability. DCSIM recommends TRADOC installations fully exploit USASC's capabilities available 7 days a week, 24 hours a day - to monitor deeper into CANs than the initial WAN-level access point.

Placement of any firewall will consider the current TRADOC security policy, traffic load, protocols requirements, performance requirements, and location of critical systems and enclaves. Firewalls installed at the border/perimeter area do not allow the user to implement a restrictive policy due to the amount and types of traffic normally associated with the perimeter/border interface. Firewalls installed in front of critical servers or enclaves can improve security-in-depth since their position enables a more restrictive ISS policy.

ISS for networked platforms will use a layered approach, or funneling effect, to increase filtering as requests for data and services move closer to sensitive assets. The points of entry into the CAN from WANs will be minimized to two in order to ensure traffic passes through the controlled ISS architecture. A firewall at the WAN gateway(s) will be the first filter. Servers for WWW, FTP, E-mail and any other network services accessible from the outside world should be placed after the gateway in what is sometimes called a "DMZ," i.e., an analog to a buffer between two forces.

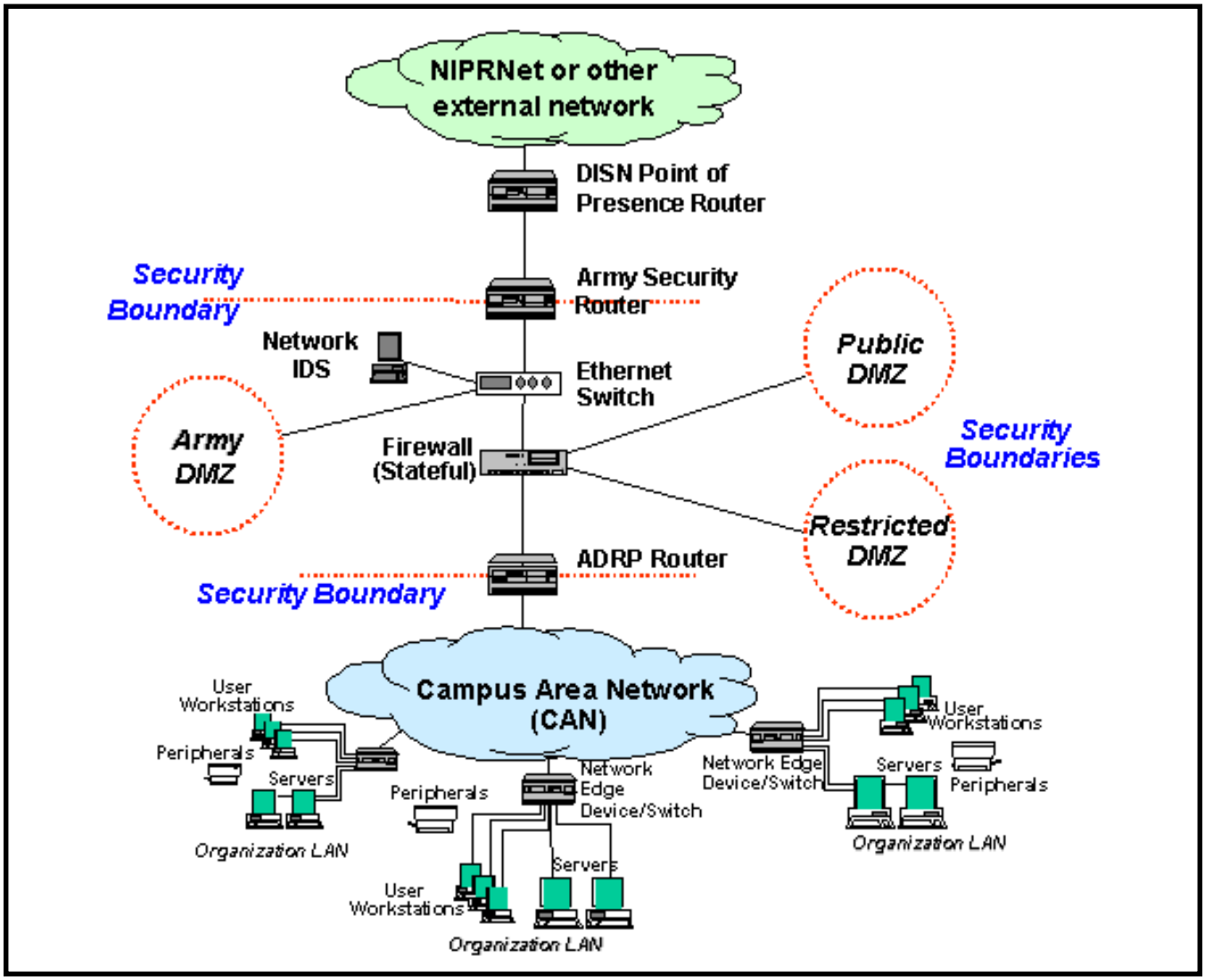



**Figure 21. Firewall placement in the "DMZ" architecture**

In the HQDA approach, three DMZ levels are used:

- Army DMZ - systems that the RCERT-C, C-TNOSC, or Army must have administrative control over, e.g., Army DNS, Real Secure IDS Engine, TSACS Server and NetCache proxy engine.
- Public DMZ - servers/devices with unrestricted access, e.g., public web servers and E-mail gateway.
- Restricted DMZ - servers/devices that have well-defined interface requirements with restricted access to specified users or systems and not intended for access by the general public, e.g., Tier III DNS servers, Exchange servers, Intranet, DHCP Servers and DMS servers.

If an IDS is being used with a firewall, the IDS will be placed behind the firewall (on the protected network segment) to focus the IDS on monitoring the services that were allowed through the firewall. All incoming requests for network services (e.g., TELNET, FTP, HTTP, or RLOGIN), regardless of which host on the internal network will be the final destination, must go through the appropriate proxy on a firewall. Firewalls will require strong authentication before permitting a process to pass through to the protected network. No compilers, editors, communications software, user applications, or any other files or applications are allowed on the firewall other than those directly related to the functioning of the firewall. (This does not preclude using a firewall-like technology in a router.)

**10.2.2.3. Network "back-doors".**

DoD and DA will continue to set strict architectural rules for connections to the Internet. All connections to the Internet must be through the DISA NIPRNET gateways. All other connections that have or may have access to the Internet are considered backdoors. Backdoors are permitted where a direct connection to the Internet is required for operational purposes or in cases where a near-term migration is not feasible. However, for these systems, a waiver must be obtained from DISA. DISA coordinates the waiver process through their Connection Approval Process website. Prior to completing the DISA request for waiver, the proposal must first be approved by the local DOIM and the DCSIM, TRADOC. There are two types of connections for which waivers must be obtained:

- For Internet connections that also provide a connection to the NIPRNET, all connections that can reach the NIPRNET (e.g., through the post/CAN) are considered backdoors and require a waiver.
- Stand-alone Internet connections that have no connection to, and do not threaten the security of, the NIPRNET are permissible, but require a waiver to provide DoD with data on connections throughout DoD.

Modems, both dial in and dial out, are authorized provided they are RADIUS compliant, can authenticate all dial-in operations using I&A servers located within a DMZ, and have a waiver approved by DISA. The TRADOC standard is RADIUS compliant.

### 10.2.3. Program management information.

The Army uses the NSIP as the primary vehicle for ISS architectural changes. Phase I of the NSIP is complete. During phase I, the Army began worldwide monitoring of gateway routers, installing and monitoring IDS and protecting selected servers with security tools. The Army is executing security in depth, phase II of the Army NSIP. The primary focus of phase II is to provide ISS solutions for "backdoors," improve the security posture of the SIPRNET, provide standards and guidance on the use of firewall technologies, implement the Army DNS architecture, and execute an authenticated log-in and password migration plan. DISC4 executes the program in coordination with MACOMs and USASC.

An example of the shared modernization responsibilities is provided by the IDS improvements. While HQDA procured software licenses for the Real Secure IDS, installations were made responsible for costs associated with procuring, installing, configuring, training, and maintaining hardware and software to implement use of IDS consistently with the C-TNOSC/RCERT operational concept. To assist installations in executing this program, HQ TRADOC allocated funds ($8K/installation) to procure PCs, a Cisco hub, Security router and the Ethernet switch required for the configuration.

TRADOC manages some ISS-targeted funds, typically less than $500K per year. These funds are used for mandated ISS training and secure hardware/software devices to improve TRADOC's ISS posture. Installations should keep DCSIM informed of specific requirements to compete for these funds.

## 10.3. Internet and intranet services.

The Internet is a worldwide public network of interconnected servers that provides various services to heterogeneous client platforms. Notable services include file transfers and information searching using hyperlinks (WWW). An intranet is a network limited to servers inside security devices designed to control access to a specific set of users. Servers on an intranet can offer the same type of user services as on the Internet. Network segments may be shared with public networks since the security devices protect access to data and services on the servers.

### 10.3.1. Baseline architecture.

All TRADOC installations have hosts on the Internet used to disseminate information about their activities. See the list of installations on TRADOC's homepage for the URLs for each installation.

To ensure traffic passes through the security architecture, TRADOC platforms interface with the Internet through their installation NIPRNET connection. Availability of Internet services to the action officer level is variable, being dependent in part on the network connectivity at the user location. TRADOC does not keep statistics on the pervasiveness of Internet access at the personal level. The preferred and supported browser at the user level is Microsoft's Internet Explorer.

Internet services have been built into the design of some systems used by TRADOC, e.g., Civilian Personnel Office Modernization (CPO Mod) and RDL, and some processes, e.g., publication of several TRADOC regulations and pamphlets in electronic form only.

TRADOC does not have a command-wide intranet component in the baseline architecture. Restricted access to networked platforms approximates intranets at the local level.

#### 10.3.2. Objective architecture

TRADOC will continue to push information required for effective mission accomplishment through the Internet. External organizations' servers connected to the Internet will continue to provide important data sources and services, including important EC services. PCs and networks available at the action officer level will support Internet/intranet services. Open protocols, e.g., TCP/IP, FTP and HTTP, will enable increased use of shared data among heterogeneous systems. Effective search engines will help identify and package the precise information needed rather than simply pointing to possibly useful sites. Connections to the Internet must be protected as described in paragraph 10.2 (ISS).

Intranet services are distinguished from the baseline's Internet services by their limitation to servers inside a network firewall, as designed by the using organization. Intranets can be integrated at any level (command, installation, etc.), but the key is access purposely controlled to a specific set of users authorized to use the data found on the servers. Intranets will allow TRADOC to electronically share data that cannot be posted on a publicly accessible Internet site, e.g., draft doctrine, system priorities, and meeting schedules. The same kind of information retrieval services, using the same protocols, available on the Internet can be made available on intranets, so that users can locate and pull authorized information using the same skills. End users will use the same platform and software for accessing both the Internet and TRADOC intranets. Implementation of intranets will require network security devices beyond those available in the baseline SA.

#### 10.3.3. Program management information.

TRADOC does not have a program to systematically field or maintain Internet or intranet capabilities. HQ TRADOC has sponsored a program to improve search engine across installation homepages and to provide a user profiling service so notices can be sent automatically when pertinent information is changed on web sites. TRADOC policy on Internet domain management is in TRADOC Reg 25-70. Procedures for managing web site content are in TRADOC Pam 25-70.

### 10.4. E-mail.

#### 10.4.1. Baseline architecture.

TRADOC uses Microsoft Outlook software with Microsoft Exchange server for E-mail and is the command's preferred and supported product for electronic messaging.

#### 10.4.2. Objective architecture.

In the objective SA, TRADOC will use DMS-compliant products as the organizational messaging system, i.e., the replacement for the automated digital network (AUTODIN). Its impact on the architecture for E-mail, or individual messaging, is uncertain but appears to be growing smaller due largely to resource constraints.

The DoD ASD(C3I) stated in a memo to all Services, subject: Electronic Messaging Policy - Implementation Guidance, 9 March 1995, "There will be one, seamless, end-to-end global electronic messaging service within the Department of Defense...All electronic messaging (AUTODIN and legacy electronic mail) within the Department of Defense must migrate to DMS-compliant messaging as rapidly as possible." The memo placed a moratorium on the acquisition of non-compliant messaging systems.

Within the DMS program, DoD has determined open standards are sufficiently mature to tolerate a wide mix of vendors' products and still achieve an acceptable level of interoperability for E-mail. However, extended capabilities of the vendors' packages lack a solid basis in open standards to ensure their interoperability in a heterogeneous environment. To ensure all capabilities are integrated at the command level, both at program initiation and during successive target architectures, selection of a preferred product is the surest course. As mentioned above, TRADOC DCSIM will work with the installations to determine the product(s) that can best ensure required interoperability. The TRADOC FY01 Preferred and Supported Product List shows Microsoft Outlook, which includes Microsoft Exchange, as the preferred vendor package for an office management suite, to include E-mail service.

The DMS objective is to provide a secure and reliable writer-to-reader messaging system. DMS security provides for data integrity, access control, authentication, non-repudiation, and confidentiality for protection against unauthorized access, spoofing, service denial, message alteration, receipt of sent repudiation, and non-delivery.

DMS compliant products use electronic messaging (X.400) and directory (X.500) components that have undergone DMS conformance, interoperability and compliance certification by the DISA Joint Interoperability Test Center. To permit non-DMS applications to exchange messages with the DMS operational and security infrastructure, the message functional interpreter will provide the translation from the legacy AUTODIN, SMTP/Multi-Memorandum Distribution Facility, and other non-DMS compliant mail systems.

The DMS application software uses a client-server architecture, meaning modules of DMS run on platforms distributed throughout the SA. Following are the various platform and application components that comprise DMS. Usually, for each component, there are several vendors that have designed compliant products. Similar to the DISN infrastructure, TRADOC will not own all the

components of DMS. TRADOC will own the PCs that run the user agent (UA) software and the servers that run the Subordinate Message Transfer Agent (SMTA) software.

Message Transfer Agents (MTAs): MTAs route messages from the source to its destination. DMS uses three levels of MTAs:

- SMTA: At the local level the SMTA interfaces directly with the UAs and Message Stores (MSs) and routes messages locally or upward within DMS. SMTAs are collocated with the MS at the local user's server.
- Intermediate Message Transfer Agent (IMTA): IMTAs provide base access and switching.
- Backbone Message Transfer Agent (BMTA): BMTAs provide for global message switching. Plans are to install about 50 BMTAs worldwide. Both IMTAs and BMTAs are dedicated to message switching, hosted on HP 9000 Model 800 servers and may be thought of as relays.

Mail List Agent (MLA): Functionally similar to AUTODIN Address Indicating Groups/Collective Address Designators. Manages mailing lists to support the distribution of messages throughout DMS. Messages sent to large groups of users are routed to the MLA where the header of the message is expanded to include the address of each recipient.

Multi-Function Interpreter (MFI): MFIs convert messages from one protocol to another and allow the DMS to share messages with systems that are not X.400 compatible. Within the DMS the MFI functions as the MTA and appears to the AUTODIN as a Mode 1 terminal. For E-mail the MFI acts as a SMTP-to-X.400 gateway.

Certification Authority Workstation: Records information on the Fortezza cards. Recommended Input: used for network security management activities, such as programming the Fortezza cards, loading the key material on the cards, and creating certificates which indicate a user's authorizations and contain public key material.

Management Workstation (MWS): The MWS provides local and remote control and monitoring of the DMS components. It provides configuration, fault, performance, accounting and security management capabilities to support monitoring and control, system administration, and customer service. The MWS interfaces to the DMS components using the SNMP management protocol.

Directory System Agent (DSA): The DMS directory system stores information in a distributed, hierarchical structure known as the Directory Information Tree. Entries describe users, groups or network resources, stored in three formats: X.400, AUTODIN, and SMTP. The Directory User Agent (DUA) is the application that provides the user a means to access information stored in the directory. The DUA is integrated with the UA. DSAs are geographically distributed and are also hierarchically structured into root, global, regional and site DSAs. The site DSA communicates with a network of DSAs to satisfy the DUA's request.

Message Store (MS): Stores messages much like a mailbox. Messages are submitted through the MS. The MS will reside on a server accessed by the UA.

Profiling User Agent (PUA): PUAs provide the features needed to handle profiling and message dissemination of organizational messages. Profiles and distribution information are built for a given organization and activated at the PUA. Upon receipt of a message, the PUA decrypts the message and activates the profile. The profile can trigger searches for key words in the subject area and text, as well as trigger on precedence. If the profile determines a "hit" then the message is disseminated based on the distribution information associated with the profile. The PUA can reduce bandwidth requirements by limiting distribution to a small group of need-to-know individuals.

Base-Level MWS: The Base-Level Management Workstation provides both local and remote control and monitoring of the DMS components. It provides configuration, fault, performance, accounting and security management capabilities to support monitoring and control, system administration, and customer service. The MWS interfaces to the DMS components using the SNMP management protocol.

Microsoft Exchange Server: The Microsoft Exchange Server for DMS is the backbone of the system, providing robust messaging and collaboration features. All DMS Exchange Servers consists of the following components: Microsoft Exchange DMS Server, Microsoft Outlook DMS, Microsoft DMS Active Directory Connector, the X.500 Address Book Provider and the X.500 Address Book Browser. DMS Exchange Servers have all of the features of Microsoft Exchange Server Commercial Edition, as well as the following features:

- support for P42 and P772 messages
- support for Message Security Protocol (MSP for P42 messages) and Allied Communications Publications 127 (ACP 127 for P772 messages)
- complete messaging connectivity with AUTODIN users

User Agent (UA): Desktop GUI application that enables users to create, release and receive messages. It is bundled with the DUA for accessing X.500 directory services.

### 10.4.3. Program management information.

DMS is a DoD-managed program, but responsibilities are distributed. DoD is mostly concerned with designing the program and fielding the infrastructure components, e.g., the message transfer agents and directory service agents. Army has a Project Management Office (PMO) for implementation in the Army.

The DMS program assumes the availability of suitable CAN and LANs and client PCs. DISA will not fund acquisitions of, or upgrades to, CANs or LANs, which are instead identified as a Service/Agency responsibility. The DMS-Army will provide a suite of interconnected DMS

server hardware and software adequate for organizational messaging, i.e., the AUTODIN replacement architecture.

The Army PMO is the focal point for acquiring DMS components. Customers identify requirements and transfer funds to PMO via DD Form 448, Military Interdepartmental Purchase Request. TRADOC has a command-wide off load waiver approving use of the DMS contract. The PMO will also provide guidance on acceptable messaging and directory components and security requirements. DOIMs will prepare any requests for DMS waivers in TRADOC and submit them in writing to DCSIM for further processing. The Army PMO DMS evaluates waivers and makes an approval recommendation to ODISC4. Waivers ultimately must be approved by DISA.

TRADOC will phase DMS implementation as follows:

- Phase one (1 Jan 98 through 31 Dec 1999) installed/upgraded the installation infrastructure to the level needed to support organizational DMS.
- Phase two (1 Jan 2000 through 30 Sep 2004) consists of two elements.
- Upgrading/expanding the installation infrastructure and PCs to the level needed to support individual messaging.
- Fielding non-DMS versions of the PC software available on the DMS contract. Fielding will support the migration to an installation standard E-mail/message product while using lower-cost commercial versions of the DMS software, e.g., Microsoft Exchange.
- Phase three (1 Oct 2004 through 30 Sep 2007) provides DMS-compliant versions of the UA software to individual messagers. Use of DMS-compliant products by all individual messagers is needed to realize command-wide operational benefits of application interoperability.

## 10.5. Messaging

### 10.5.1. Baseline architecture.

AUTODIN was established in the 1960s to meet the DoD operational requirements for a secure messaging service. Operated by DISA, the AUTODIN provides networking services for all security classification levels of messages. AUTODIN is interconnected through a worldwide network of store-and-forward switches. Other AUTODIN components include service and agency automated message handling systems, terminating message facilities (e.g., telecommunications centers (TCCs) and special security office (SSO) message facilities), and routing and addressing directory databases.

AUTODIN will be replaced by DMS in 2001. The schedule is in synchronization with the phased implementation of DMS, the objective messaging system, operating over DISN. To prepare for the shut down of AUTODIN, TRADOC reorganized its architecture for messaging. All TRADOC AUTODIN Mail Servers and Army Standard Electronic Mail Hosts have been replaced with a single Multi-Level Secure Gateway Messaging (MSGS) system located at Site R. The MSGS delivers all incoming unclassified AUTODIN messages directly to TRADOC installation offices via the DISN NIPRNET and installation E-Mail systems. TRADOC TCC operators monitor message delivery of the MSGS through the use of two standard E-Mail boxes called "manual" and "archive." "Archive" receives a copy of every incoming unclassified message for record and/or retrieval. The "manual" mailbox is used to route messages that are unable to be automatically delivered by the MSGS.

During 1998-99, Army migrated the Army Desktop Interface to AUTODIN Host (DINAH) to the Air Force Message Distribution Terminal (MDT). MDTs are Y2K compliant and are supported free of charge by the Air Force MDT Support Center. MDTs offer superior functions for automated message handling. The MDT is used to process all classified traffic and send unclassified outgoing messages.

The Automated Special Security Information System Terminals were relocated to installation SSOs since all top secret-special intelligence traffic being processed supports SSO operations. The TCCs were downgraded to secret high and can use dial-up connections with STU IIIs for message traffic.

DCSIM recommends consolidation of secret-level TCC functions with other secret high operations within the DOIM including secure DMS equipment systems. This will free personnel to operate the DMS components. Consolidation of messaging functions remains to be implemented at several TRADOC installations.

### 10.5.2. Objective architecture.

TRADOC's objective architecture for messaging is to use the organizational messaging capabilities of DMS, discussed as the E-mail architecture replacement. There will be no separately managed messaging system.

### 10.5.3. Program management information.

DMS is the program being used to manage migration. Modifications in TRADOC's architecture to position messaging capabilities for migration to DMS have already been made in the baseline architecture. TRADOC is making progress toward transition to DMS. TRADOC presently has 90 percent of unclassified users and 58 percent of classified users transitioned. At last report, the Army was at 42 percent and 25 percent respectively.

## 10.6. Videoconferencing

### 10.6.1. Baseline architecture.

TRADOC has two different VTC capabilities: room-based VTC and DVTC. All operational costs for both VTC and DVTC are paid for by the DCSIM.

Room-based systems provide the best quality video and have additional support services (e.g., hard-copy output, video recording service). TRADOC has 17 room-based, studio-grade VTC facilities, including one at each TRADOC installation and two at Fort Monroe. VTC facilities can accommodate sessions up to Secret.

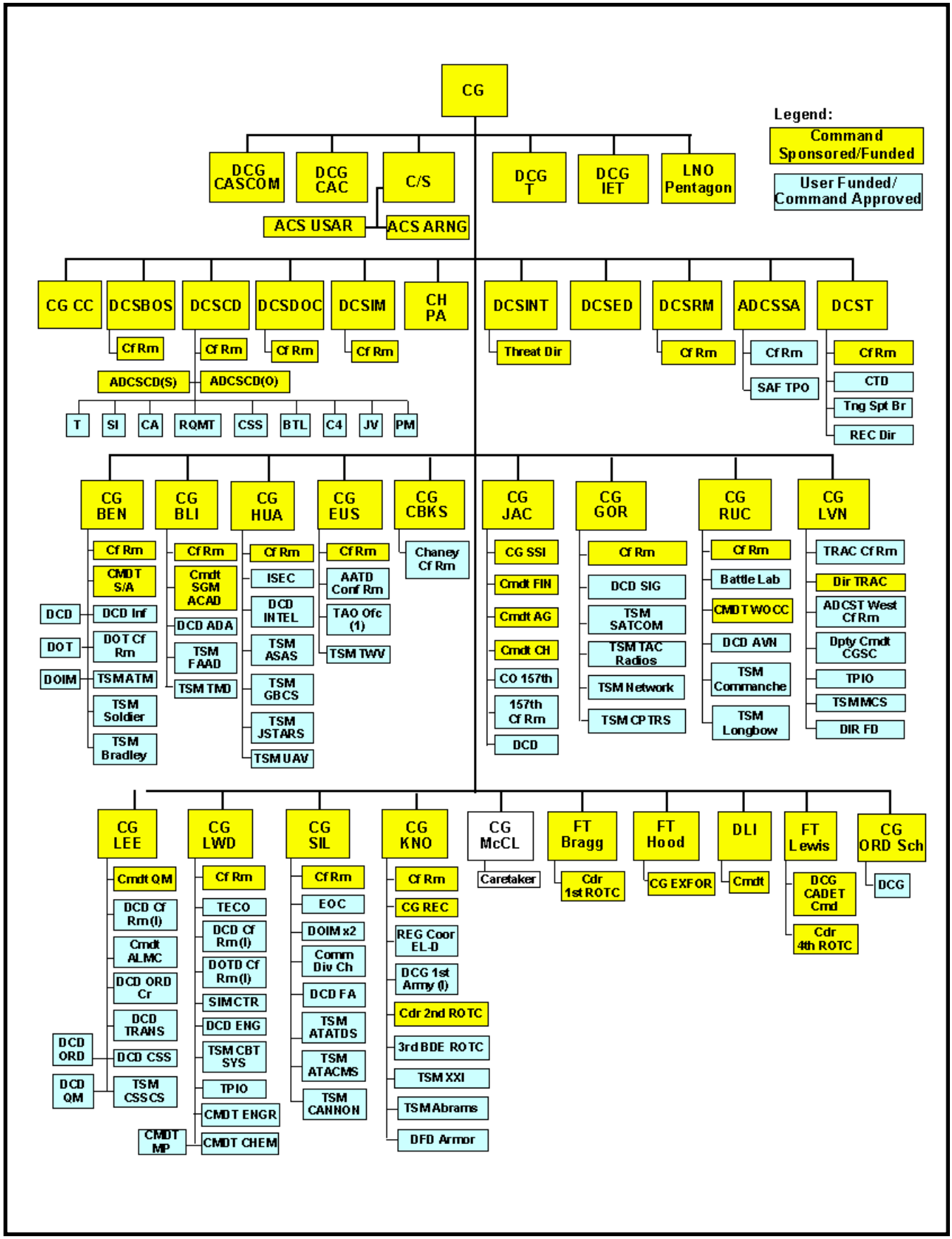



Figure 22. DVTC Distribution

TRADOC installed DVTC equipment to provide another command and control means for CG, TRADOC to his immediate subordinate commanders and HQ staff. However, additional DVTC units are used throughout the command for other purposes, with local or functional funding. In the baseline architecture, of over 300 DVTC units on the network, 69 are command sponsored. Figure 22 shows the distribution of DVTC nodes in the baseline SA.

The DVTCs approved for new acquisitions are the PictureTel 550 with NetMeeting for PC-based systems, and the PictureTel SwiftSite II or Concorde 4500 for non-PC based systems. The command-funded PictureTel Live 50 systems previously fielded remain in use. The PictureTel units will interface to other vendors' systems that conform to the International Telecommunications Union (ITU) H.320 standard for video data. They support data sharing and collaboration on files from other applications, e.g., word processing documents. With DVTC, a single ISDN line is required to provide near real-time video. To support multi-point DVTCs, TRADOC also installed AT&T's Multipoint Control Unit at Fort Monroe. This unit will connect multi-vendor products via the H.320 standard. Each caller dials into the control unit and the multi-point connections are established. Sixteen stations can participate in a multi-point call, or any combination of calls and stations equaling 16.

During FY99, TRADOC made the switch to the DVS-G WAN for the high bandwidth digital circuits required for video traffic. DVS-G subscription includes network management and near-instantaneous troubleshooting, while FTS low bit rate video network does not. Since the DVS-G eliminates the previously available capability of DCTN to dial into another low bit rate video network (FTS, AT&T WorldNet, etc.) with no reservations or operator assistance required, DCSIM installed an FTS low bit rate video circuit at Fort Monroe. This will allow TRADOC users to access DVTC users on other networks.

#### 10.6.2. Objective architecture.

TRADOC will make increased use of DVTCs, linking selected TRADOC offices and personal level users into a command-wide network, with access to users outside the command. Additional nodes will be added to the baseline architecture through distributed acquisitions as network capacity and connectivity make it feasible. The capabilities for sharing applications via standardized, PC-based DVTC workstations will also increase. VTC and DVTC will be enablers for electronic coordination of TRADOC products and electronic collocation as part of new organizational concepts. Proliferation of DVTC components to support communities of users, e.g., combat developers' ICTs and IPTs, will increase. DVTC will also be a necessary enabler of training delivery. The addition of a DVTC upgrade to client's desktop PCs will be at a minimal cost. The greatest cost in implementing DVTC to the desktop is the ISDN line required for transmission. USAISEC recommends a dedicated ISDN line to prevent degradation or outage due to network traffic loading. In the objective architecture, as video over IP and video over IP standards mature, the requirement for a costly dedicated ISDN line will be eliminated by the ability to carry video traffic over the common user data network.

Currently, the many DVTC systems comply with the standard H.320 protocol. In the objective architecture, the DVTC systems will also be standardized to comply with the ITU T.120 protocol for multi-point application sharing. JTA mandates MPEG-1 & 2 video and VTC, mandated VTC001-Rev1 & H.324 (H.320 in VTC001-Rev1).

### 10.7. Office automation

#### 10.7.1. Baseline architecture.

TRADOC uses a variety of COTS products for office automation applications. For the most common applications, e.g., word processing, graphics and spreadsheets, TRADOC generally uses Microsoft Office products. The migration strategy for achieving the objective architecture is based on local agreement with, and enforcement of, a product suite that conforms to the JTA-Army standard file exchange formats, listed in table 6, and to the command-wide supported configuration listed in table 15.

#### 10.7.2. Objective architecture.

In the objective SA, all TRADOC action officers will have a computing platform with access to an office automation suite suited to their tasks. As in the baseline, common office automation capabilities will include word processing, spreadsheets, graphics, and access to network services, e.g., E-mail, scheduling, web browsing and electronic coordination. Heavier use will be made of knowledge management systems (KMS) to integrate the capabilities and data, and open up the tools for more collaborated use. Installations are likely to continue to use a mix of vendors' office automation applications. DOIMs can issue lists of products they will support to supplement or expand the preferences shown in table 15.

#### 10.7.3. Program management information.

There is no Army or TRADOC program to field or upgrade office automation capabilities. Modernization is achieved in increments affordable within installations' and using organizations' OMA budget.

### 10.8. Publishing.

Document Automation and Production Service (DAPS) service centers have assumed responsibility for print plant operations required by TRADOC. Connectivity has been established from installations' CANs to their supporting DAPS service centers. This connectivity enables CAN users to forward files, containing formatted documents, to the DAPS for printing. Additionally, DAPS is investing in WAN connectivity to link its distributed service centers and printing plants. DAPS can use digital files to produce high-quality first-generation copies on their automated printing equipment. To help with the ordering process, DAPS has established websites, (http://www.daps.mil/docaccess/docaccess.asp) which enable EC transactions. Users can fill out a print order, attach print file, and include credit card information as a secure transaction.

**Table 15**
**Supported Office Automation Applications**

| CATEGORY | TRADOC FY01 1-2 Qtr PREFERRED AND SUPPORTED DESKTOP SOFTWARE AND OPERATING SYSTEM | TRADOC FY01 3-4 Qtr AND PREFERRED SUPPORTED DESKTOP SOFTWARE AND OPERATING SYSTEM |
|---|---|---|
| 1. Desktop Client Operating System | Microsoft Windows NT Workstation | Microsoft Windows 2000 Professional |
| 2. IP Protocol Stack (Includes TELNET) | Microsoft | Microsoft |
| 3. Office Suite | Full Suite: Microsoft Office 2000 Professional<br>Word Processing: Word<br>Spreadsheet: Excel<br>Presentations: PowerPoint<br>Data Base: Access<br>Project Management: Project | Full Suite: Microsoft Office 2000 Professional<br>Word Processing: Word<br>Spreadsheet: Excel<br>Presentations: PowerPoint<br>Data Base: Access<br>Project Management: Project |
| 4. Office Management | [1]Microsoft Outlook 2000 | Microsoft Outlook 2000 |
| 5. Internet Browser (Includes FTP and Newsgroups) | [2]Microsoft Internet Explorer 5.0 (128-bit encryption ver.) | Microsoft Internet Explorer 5.0 (128-bit encryption ver.) |
| 6. Forms | FormFlow | FormFlow |
| 7. Multimedia Authoring | Asymetrix Multimedia Toolbook, CBT Edition | Asymetrix Multimedia Toolbook, CBT Edition |
| 8. Anti-Virus Package | McAfee or Norton AntiVirus (DoD License) | McAfee or Norton AntiVirus (DoD License) |
| 9. Desktop DVTC | [3]Picture Tel 550 with NetMeeting | Picture Tel 550 with NetMeeting |
| 10. Group DVTC System | [4]PictureTel Concorde 4500 Meeting H.320 standards with ISDN interface and T.120 support | PictureTel Concorde 4500 Meeting H.320 standards with ISDN interface and T.120 support |
| 1 Must be DMS compliant and/or be upgraded to DMS compliance<br>2 Microsoft IE 5.0 comes complete with Microsoft Office 2000 Professional<br>3 PictureTel 550 with NetMeeting is compatible with Liveshare<br>4 Group DVTC System is compatible with PictureTel 550 | | |

U.S. Army Publishing Agency (USAPA) publishes the Army Electronic Library (AEL) quarterly on a set of CD-ROM. The AEL CD-ROM currently contains over 1,900 forms and 2,000 publications and these numbers will continue to increase. These items are also being converted to a portable electronic format that will allow the publications to be printed with the format and appearance of the original intact. The publications and forms may also be accessed on the WWW (http://www.usapa.army.mil/). Future enhancements will allow on-line browsing of the publications. Since 1 Oct 98, USAPA has not procured paper copies of forms and administrative publications available on the AEL CD-ROM, except for mobilization publications. USAPA will no longer stock or issue paper publications if available on the AEL CD-ROM.

Since the electronic medium is becoming the usual method of publishing, the concept of issuing changes to administrative publications is in transition. During this transition, there will be some publications that are only electronic, some that are only paper, and others that are both. After transition, the Army may need new publishing terms that will alter the definition of a "change." The UPDATE format, established in the mid-1980s, allows for changes to be incorporated into each reprint. This method ensures each printing is complete and provides the reader a summary of changes as a reference. Old material can be crossed out and new material can be underlined or highlighted. This method may be adopted for the electronic environment since it could eliminate the use of changes as separate documents.

In the objective architecture, most TRADOC publishing will be done electronically. This is in keeping with larger DoD and Army trends. DoD has discontinued volume printing of their instructions and regulations and made them available exclusively through the Internet or CD-ROM. TRADOC will implement a similar transition. Getting there will require increased automation capability at the user level and a change both in the way electronically published information is used and in the way it is managed. Smaller scale reproduction will move away from analog, stand-alone copiers as vendors phase out their production and replace them with digital copiers. These will be installed as network devices and will include multiple functions, e.g., scanning, faxing, and printing.

TRADOC and DAPS will combine the capabilities of electronic authoring, digital file transfer, distributed file servers and printing equipment, along with an automated system for submitting and managing print work orders, into new approaches for printing and distributing TRADOC publications.

Print-on-demand. TRADOC organizations will provide files to DAPS for printing. For example, TRADOC service schools will electronically forward student handouts, student texts, and extracts from TRADOC or DA publications. DAPS can scan for digital conversion and use the files to print only the quantities immediately required, then store the files for future use. As this warehousing of data builds, references can be quickly tailored to support any course. As courses are scheduled to begin, schools can request additional printings. TRADOC will save warehouse space, labor, and printing costs, and will improve the currency of printed publications. Moreover, school instructors will have greater flexibility to tailor and time to prepare course materials. The list of TRADOC administrative publications available for print-on-demand can be viewed at http://www-tradoc.army.mil/pod. DA administrative publications can be viewed or downloaded from USAPA's homepage (http://www.usapa.army.mil/). Field Manuals (FMs) and Soldier Training Publications can be viewed or downloaded from the RDL (http://www.adtdl.army.mil/). While departmental publications are not yet available for print-on-demand, they can be downloaded, printed on a network printer, and taken to DAPS for printing in larger quantities.

Distribute and print. DAPS can distribute files electronically among its service outlets. A file provided by a TRADOC organization at one location can be quickly and cheaply sent to many other locations. Printing of the file can occur in many places distant from where it was authored, but closer to the site where the documents will be used. In such cases, DAPS can deliver a finished product to an Installation Mail and Distribution Center for further distribution, or use common carriers such as FedEx or United Parcel Service to deliver to an off-post site. In cases where TRADOC must distribute publications (e.g., schools distribute instructional material to reserve components), TRADOC will save mail and storage costs. This distribute-and-print approach can be combined with print-on-demand to realize more efficiencies for TRADOC and the users of TRADOC products. DAPS will store files of TRADOC products that will be available for print-on-demand at any DAPS outlet by any customer.

Tailored products. Since DAPS will be working from digital input, the output can be tailored as required to suit the immediate requirement. Users can demand any media DAPS is capable of producing, including paper, disks and CD-ROM. Documents can be collated and packaged for specific uses, e.g., course book sets can be assembled from diverse sources and bundled for distribution to individual students. Instructors can tailor course sets even further by requesting relevant chapters from TRADOC regulations or doctrine, and have them collated into a new book for use in a course, with assurance they are using the latest document sources. To support these various services, DAPS is establishing web sites at each installation that will provide the capability for user to obtain billing information, job estimates, and pay for jobs submitted electronically.

### 10.9. Information warehouses.

TRADOC has several IS components designed primarily as data, or information, stores for use by internal and external organizations. The key examples are CAC's Center for Army Lessons Learned (CALL) database for information about combat operations and exercises, and ATSC's RDL (previously Army Doctrine and Training Digital Library (ADTDL)) for training and doctrinal information products. Both are part of the baseline architecture, but continue to evolve.

The CALL Database operations are centrally managed and executed at Fort Leavenworth. The objective of the CALL Database is to enhance the Army's corporate memory by digitizing records from both actual and synthetic operations. Actual operations include material from Desert Storm, Rwanda, Haiti, and Hurricane Andrew. Synthetic operations are mainly those conducted at CTCs. The primary collection and analysis tool is the CALL Collection and Observation Management System (CALLCOMS). It assists Combined Arms Assessment Teams (CAAT) in formulating collection plans, categorizing observations, and identifying trends. It can run on a stand-alone PC for individual observers or from a LAN to better support the massive amount of data collected by a CAAT. All data produced through CALLCOMS is fed directly into the CALL database. Although products will continue to be produced in paper format for some time to come, electronic access and dissemination is the objective architecture. CALL will support four different electronic access capabilities: E-mail, WWW, an on-line document management and retrieval system, and the master database.

Every publication that is produced in paper form is also being produced in multiple electronic forms, including hypertext. CALL is using the WWW for its primary distribution means. Many supporting documents are also available in the Automated Historical Archives System (AHAS), a document management and retrieval system.

AHAS contains the most recent collection of contingency operation documents. It is operated by the CAC Historian and has a collection of over 500,000 pages of documents dealing with topics such as disaster and humanitarian assistance and the Gulf War. For qualified users, CALL will provide direct access to the master CALL database. Access will be through a windowed GUI, allowing the researcher to sort, filter, and retrieve the same data, in its original format, that CALL uses to publish its finished products. The objective architecture capability is information on demand from any authorized user from any PC. All forms of written, video and audio products supported by multiple databases will be available to worldwide tactical operations centers, staff sections, schools and individuals. The CALL Database will access a large volume of information, but will assist the user in tailoring the search and retrieved results to specific information requirements.

The RDL provides worldwide access to a centralized digital repository of training and doctrine knowledge using WWW-type search and retrieval services. The ADTDL, though centrally managed and operated by ATSC at Fort Eustis, will function as a "digital card catalog," providing transparent access to the distributed training products and courseware of all TRADOC schools and therefore will be an important enabler of distance learning. As part of the Warfighter Network (WARNET) initiative of Army Training XXI, RDL is part of the training delivery infrastructure to be used by TADLP for the Total Army School System (TASS).

The RDL will contain approved FMs, Training Circulars, Drills and Officer Foundation Standards (OFS), and Army Correspondence Course Program (ACCP) materials. RDL will also store training scenarios for reuse in developing Mission Training Plans (MTP) and Training Support Packages for unit and institutional training. MTP, OFS, and Soldier Training Publications will be available only as "virtual" hypertext markup language (HTML) documents through RDL. The RDL will eliminate the resource intensive process of distributing doctrinal and training information in printed form. The ACCP will ultimately offer over 2,600 subcourses to enrolled students through the RDL.

## 10.10. Knowledge management systems

### 10.10.1. Baseline architecture.

TRADOC does not have a command-wide KMS that provides knowledge capture tools in the baseline architecture. Various tools (e.g., web-based search engines, and data stores ranging from structured database management systems, to public folders to departmental and personal spreadsheets) approximate some KMS capabilities, but these are not integrated or accessible on a command-wide basis.

### 10.10.2. Objective architecture.

TRADOC's mission requires the capture and reuse of "corporate knowledge," particularly as civilian employee functions are privatized and the assigned military strength decreases. The KMS needs to be built with an open architecture, to increase its functionality, and be scalable, to incorporate any number of users.

The core function of the KMS will be to capture and index information that exists in the organization in various forms (e.g., documents, E-mail and discussion groups) and make it available to all within the organization. Security protocols will prevent unauthorized users from gaining access to restricted data. All tools available through the KMS will be accessible through a standard web browser.

Installation networks and the Internet will provide the communications backbone for a KMS. Utilizing this communications infrastructure, users will be able to access document repositories, collaboration tools and a host of other tools from anywhere in the world at any time of day.

The TRADOC KMS will utilize applications and tools that are compliant with industry standards and protocols and any subset selected by the Army Knowledge On-line (AKO) initiative. This will ensure compatibility with software in the future and a present a minimum of incompatibility issues on deployment. Successful implementation of a KMS is dependent on selection of applications and tools that meet the needs of the command. Among the tools to be considered for integration into the KMS are:

- Document Management. Storage of documents in repositories that can categorize documents based on their content. Provides translation from native document format to a format understood by a web browser (i.e., HTML or extensible markup language (XML)).
- Metadata Generation. Automatically develops data on all documents in the data repositories. This is essential to the success of an effective search engine.
- Search Engine. Provides ability to search through all internal and external data repositories and return matches based on the context of the search query, not on keywords.
- Workflow. A programmable workflow tool will automate the routing of documents through the existing messaging system.
- Collaboration. Allows conduct of text-based chat, multi-user conferencing with voice, video and whiteboarding, and electronic bulletin boards.
- SME Database. Provides a way to find other users with a desired skill or knowledge area.
- Training on Demand. Will integrate tools that allow users to select training on a variety of subjects at the convenience of the user.
- Records Management. Provides electronic record management capability, in compliance with DoD 5015.2-STD (Design Criteria Standard for Enterprise Records Management Software Applications).

#### 10.10.3. Program management information.

TRADOC has not established a product or suite of products on which to base a KMS. TRADOC is in the process of talking with AKO and other DoD agencies which currently use a KMS to determine their best practices and surveying the marketplace to see what tools and applications are available for integration into a KMS. Development and expansion efforts will focus on those offices or installations that express a need for a given tool set. Solutions are likely to be selected from BPAs made available by DA, other DoD agencies, or purchased off existing contracts held by other DoD agencies, if economically beneficial.

KMS is in the concept exploration/definition phase. TRADOC is continuing to assess technology and cooperative opportunities. KMS development and management will be centralized at HQ, TRADOC. The hardware required to support the system would be deployed to regional hubs, as required. The planned locations for the hubs are Forts Sill, Gordon and Monroe.

## 11. Functional Area Applications

Functional area, or mission, applications are designed specifically to execute TRADOC's processes. They generally work in configurations that include and depend upon common applications and infrastructure components discussed in other paragraphs. Applications are employed in all key TRADOC processes, but three major paragraphs will help organize their discussion: training, concepts and requirements, and installation management. There is also an introductory overview about M&S since they can cross several processes.

### 11.1. Models and simulations overview.

M&S applications are most commonly used to support CD, doctrine and training. Detailed information about specific M&S applications is provided in other paragraphs. This paragraph addresses some aspects of M&S with general applicability.

#### 11.1.1. Baseline architecture.

Communication technologies allow for a significant real-time simulation and the ability to create a large environment within which a large number of objects can interact synthetically. Within the M&S community, communication is defined as the planning and implementation of the physical means to move data between electronically linked but geographically separated individual simulations such that they cooperate in a shared representation of space across the spectrum of Army Operations.

Communication technologies are the telecommunications infrastructures (bandwidth requirements, node connectivity, protocol designation and network design) required to support simulations. The major M&S bandwidth uses are data exchange, VTC, DLT, and telemedicine. There is the requirement to be able to communicate within the MACOMs and other Army sites, as well as outside the Army with other Services. This requirement to communicate with many players throughout the DoD necessitates a network that is reliable and adequate to meet M&S requirements.

Information managers need to assess the impact of M&S applications on networking and processing infrastructures to ensure required capabilities are operational:

(1) Impact of M&S requirements on installations' communications environment. Include impact on geographic locations to be linked, network topology, transmission techniques, data transfer rates, gateways, required system use times, type and volume of data to be transmitted and received, time boundaries for transmission, reception and response, peak volumes of data and diagnostic features and security classification.

(2) Impact of proposed and approved modifications on installations' computer processing environment. Include impact on quantity, type and placement of processors, peripherals, and communications interface devices.

The Army categorizes its M&S into three domains that are organized along functional, not organizational, lines since organizations often use a variety of M&S for different missions. The domains provide the framework for Army leadership to coherently oversee the diversity of M&S in the Army. All Army M&S activities fall under the purview of a single domain or are cross-domain, i.e. M&S that have application in two or more domains. The primary focus of the ACR domain is providing strategic direction, force development, and requirements generation and materiel development. The TEMO domain supports individual and collective training, exercises and mission rehearsal. The RDA domain covers analytical capabilities for science and technology thrusts, simulation-based acquisition (SBA), weapon systems developments and test and evaluation. Mapping these domains into TRADOC's processes, combat developers and doctrine developers are the largest users of ACR M&S and trainers use TEMO M&S, but individual applications may be used by more than one set of functional users. Organizations outside TRADOC are the primary users of RDA M&S, e.g., Army Materiel Command (AMC) and PMs. The One Semi-Automated Forces (OneSAF) program and the Simulation and Modeling for Acquisition, Requirements and Training (SMART) program are examples of cross-domain applications. M&S applications used by TRADOC are divided into three types:

- **Constructive**: mathematically oriented tools used across a range of analytical and training purposes. Constructive simulations may be performed either with, or without, human interaction. With human interaction, they are often referred to as "wargaming" simulations and are used for battle staff training or tactics development. Constructive simulations are in widespread use in the Army and in TRADOC, e.g., Brigade/Battalion Battle Simulation (BBS), Corps Battle Simulation (CBS), and Janus.

- **Virtual**: manned simulators interacting within a synthetic environment. Virtual simulations are often associated with crew-served weapons systems and focus on skill development and practice. These simulations closely replicate all or parts of tanks, armored personnel carriers, aircraft, and other equipment and normally require the trainee(s) to immerse into the simulation. These virtual simulations provide an understanding of human reactions, decision processes and man-machine interfaces. They provide a platform for crew training prior to live exercises, tests, or realistic mission rehearsals in preparation for actual combat operations. They can also act as powerful tools used for evaluation of actual system hardware and software within a realistic environment for developmental/prototyping programs. Examples in TRADOC are found in flight simulators at Fort Rucker, tank simulators at Fort Knox, infantry fighting vehicle simulators at Fort Benning, and engineer vehicle simulators at Fort Leonard Wood. Specific virtual simulators include: AH-64 Apache Combat Mission Simulator, Advanced Gunnery Training System, Abrams Full-crew Interactive Simulation Trainer, and Close Combat Tactical Trainer (CCTT).
- **Live**: soldiers and equipment operating together against an actual force for purpose of training or experimentation. Live simulations primarily use simulators to replicate weapons effects. Live simulations can take place almost anywhere the maneuver space is available, but the primary training facilities in the Army are at the National Training Center, the Joint Readiness Training Center, and the Combat Maneuver Training Center. At these facilities, much of the battlefield is instrumented. This class of simulation includes hardware prototypes that are tested on instrumented ranges and can gather data to evaluate interactions and interoperability. Specific examples include: Combat Maneuver Training Center Instrumentation System, Simulated Area Weapons Effects/Multiple Integrated Laser Engagement System, and Joint Readiness Training Center-Instrumentation System.

In the baseline architecture, the protocol for linking M&S is the HLA. In addition, all Army M&S will be compatible with the JTA-Army.

HLA has been developed by DoD to provide a common high-level simulation architecture to facilitate the interoperability of all types of simulations among themselves and with C4I interfaces. The HLA will also facilitate the reuse of M&S as the Army moves into an era of federations of simulations producing synthetic battle environments across all domains. DoD mandates the migration to HLA. This mandate for HLA compliance supersedes all previous requirements for DoD simulations to comply with other simulation standards such as DIS or ALSP. All Army simulations will meet DoD standards. TRADOC is committed to support it.

Each TRADOC M&S has a HLA compliance plan that establishes dates for HLA compliance. Development programs that cannot show an HLA migration plan cannot be continued. Any non-compliant systems, or systems without a waiver as of 1 Oct 2000, will not be allowed to play in M&S confederations.

The JTA has been designated by the Assistant Secretary of Defense for Command, Control, Communications and Intelligence as the single framework to promote the integration of DoD IS. All new DoD IS development and modernization programs, to include M&S, will conform to the JTA. Evolutionary changes to migration systems will be governed by conformance to the JTA. The JTA is maintained by DISA and is available electronically via the DISA on-line Standards Library.

### 11.1.2. Objective architecture.

M&S in the objective architecture will become federations among live, virtual, and constructive simulation systems that realistically portray warfighting operations. The HLA, as prescribed by the Defense Modeling and Simulation Office, will supersede both ALSP and DIS as the protocol for creating federations of systems. The Army's goal is to have all Army M&S HLA compliant by 4th Qtr FY01.

The Army will develop and maintain a smaller, more robust set of M&S, centering on Joint Warfare System (JWARS), Joint Simulation System (JSIMS)/Warfighters' Simulation (WARSIM), Joint Modeling and Simulation System (JMASS), the Army Warfare System (AWARS), Combat XXI, CCTT, and OneSAF, all discussed in other paragraphs. Domains will evolve towards the integrated use of M&S across the areas of acquisition, requirements, and training under the SMART program. The Army will promote commonality, re-use, credibility and interoperability through standards (technical architecture). In the short term, Army will be seeking to improve C4I system to M&S interfaces, synthetic terrain (TRADOC chartered a TRADOC System Manager in 1998 for this application), and threat representations.

Integrated M&S tool suites will support exercise requirements definition, scenario design, database development, exercise control, critical event generation, after action review, and feedback. The distinction among separate M&S applications will blur as the infrastructure and architecture for M&S becomes standardized and M&S developers adopt common standards in which battlefield "objects" are shared among M&S applications. In the objective architecture, distinct M&S applications will persist IAW users' requirements for differing levels of resolution, echelons, functional areas, and human interaction.

### 11.1.3. Program management information.

The Army has established a management structure (fig 23) to help integrate M&S requirements and architecture. TRADOC participates at each level of this structure.

Other paragraphs provide system-specific program management information, i.e., training applications and concepts and requirements applications. The domain agent for the ACR domain is TRADOC DCSCD; for the TEMO domain, TRADOC DCST; and for the RDA domain, the AMC Deputy Commanding General for Acquisition (DCG-A). The CG, TRADOC will review and approve Army M&S requirements. The DCSSA is primary staff element for M&S within TRADOC.

## 11.2. Applications for training

### 11.2.1. Baseline architecture.

Although the categories are not entirely mutually exclusive, training applications can be grouped as follows:

**11.2.1.1. Management information systems.**

ATSC manages a library of training applications used in the baseline architecture. TRADOC schools use many of the applications to conduct institutional training and support their branch training developments. The baseline library includes the applications listed below.

- Army-wide Devices Automated Management (ADAM) - ADAM provides Life Cycle Management (LCM) of training devices, distribution and redistribution, and storage and supply, supporting training support centers worldwide. Materiel Armywide Tracking System (MATS) assumed functionality of ADAM at the start of FY00.

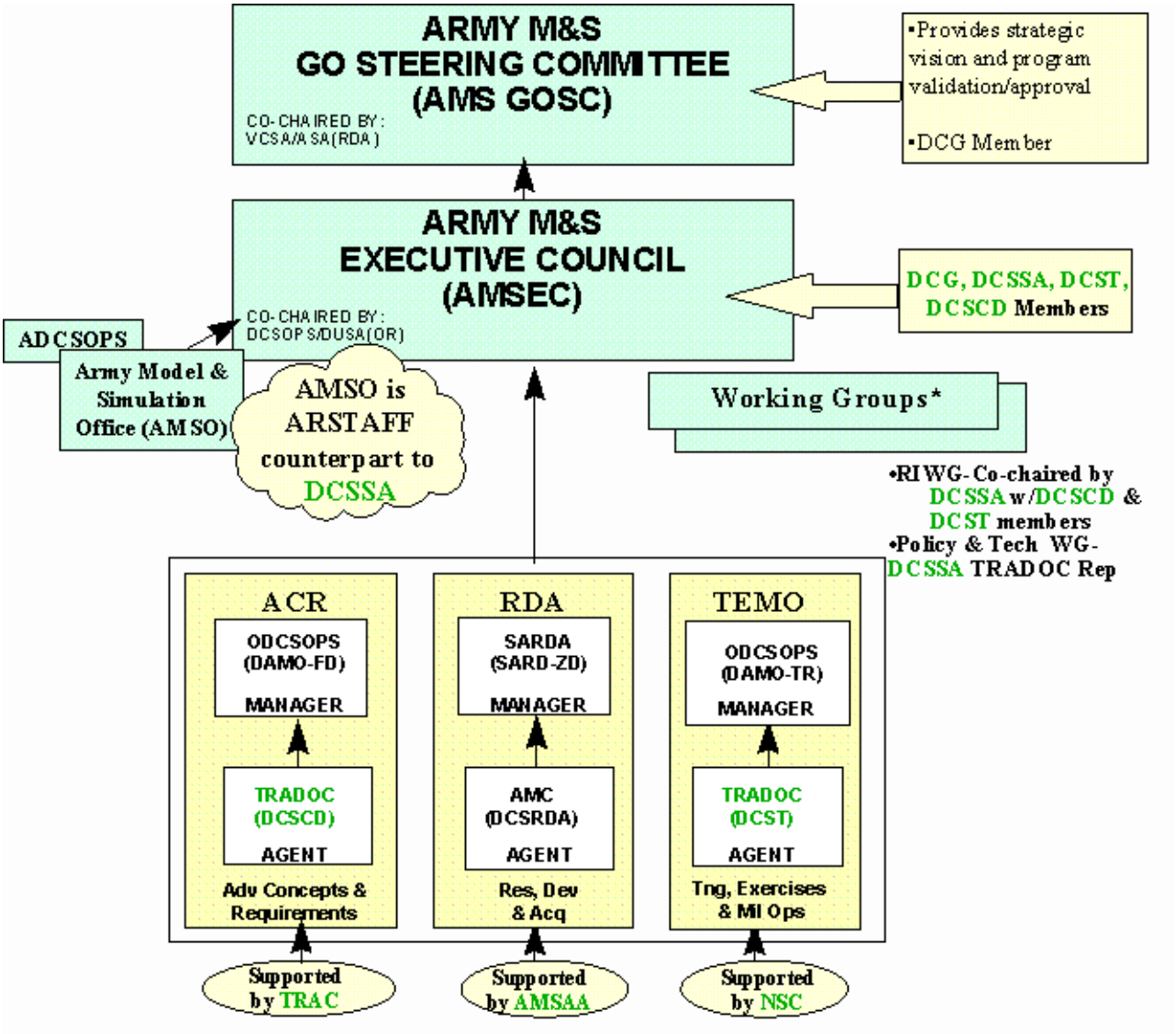



**Figure 23. Army M&S management structure**

• Automated Instructional Management System-Redesign (AIMS-R) - AIMS-R is a training management system for automating resident student information; personnel management, student grades and records, quota control, testing, and scheduling.

• Army Modernization Training Automation System (AMTAS) - AMTAS is a centralized database of all Army New Equipment Training Plans (NETP). The system provides the ability to exchange information with combat, training, and materiel developers, and allows the staffing and approval of new NETPs electronically. AMC is the proponent.

• Battalion-Level Training Model/Training Resource Model - will shortly be removed from the inventory and its processes will be implemented in other systems.

• CALLCOMS - A collection of all plans and observations from training exercises.

• Force XXI Training Database - The Force XXI Training Database is a prototype system consisting of three databases supporting the Force XXI training process that address doctrinal training tasks for Deliberate Attack, mounted brigade level mission organizations, and simulation resource requirements. The training-based architecture includes tracing and tracking of tasks from tactical level BOSs and major brigade level tasks down to platoon level tasks, conditions and standards for a mounted brigade including the brigade's divisional "slice." The organizational architecture includes the normal support elements provided by the division and higher units to brigades engaged in combat operations. The simulation resource requirements architecture identifies simulators and simulations with potential to support training of identified tasks from brigade down to platoon.

• General Dennis J. Reimer Training and Doctrine Digital Library (formerly ADTDL) - Already discussed as an information warehouse in · paragraph 10.9. Provides a digital repository of Army doctrine, training knowledge sets, and interactive applications to support training of individuals and units. Accessible through a WWW-type interface on the NIPRNET.

• MATS - MATS automates data collection at the user level concerning usage, maintenance, and inventory data for Training Aids, Devices, Simulators and Simulations (TADSS). Creates summary data in electronic format for data sharing capability with other automated systems using standard DoD and Army communications networks.

• Media Elimination and Design Intelligent Aid (MEDIA) - MEDIA assists the training developer in media, method, site, learning strategy, category of learning, selection, and environmental and safety assessment.

• Program of Instruction Management Module (POIMM) - POIMM provides program management and distribution of program of instruction and course administrative data in electronic format. TRADOC Reg 350-70 covers course administrative data and program of instruction material.

• Range Facility Management Support System (RFMSS) - RFMSS automates range facility management. Allows users to track events from the time of initial request. Also used to track training assets, utilization, and inventory for the Army and U.S. Marine Corps to predict resourcing requirements. Distributes range scheduling information to installation units and higher headquarters.

• Reception Battalion Automated Support System-Redesign (RECBASS-R) - provides automated in-processing for new soldiers through the reception battalion. It assists in updating soldier's personnel records and preparing the forms contained in the individual's 201 and finance files. Data consists of new soldier personnel information.

• Standard Army Training Systems (SATS) - SATS provides an automated training management system designed to enhance the planning assessment and execution of battle-focused training resources. Produces mission essential task lists (METL), training plans, and resourcing reports for individual units. This DA-directed program will ultimately roll up unit readiness from company size units to DA.

• SATS - Training Exercise Development System (TREDS) - SATS-TREDS provides a flexible task-based training exercise planning capability which may be used to select, edit, develop and maintain training exercise materials for any simulation environment. Products include operations orders, maps and overlays, execution matrices, simulation initialization files, and task lists in go/no go format. Special capabilities include a scenario library, training support package generation, multi-echelon, multi-task exercise planning linked to one master event, and task performance codes for various simulation environments.

• Training Ammunition Management Information System (TAMIS) - TAMIS is an automated tool for determining Armywide training ammunition requirements.

• Total Army School Courseware Distribution System (TASCDS) - TASCDS processes TASS courseware requests to make distribution of basis of issue plan. Availability list is published and accessed via ATRRS (Quad Zero Data Base).

• Training Mix Model (TMM) - The TMM is a mathematical programming model that selects a mix of training devices and methods that optimizes the use of training resources that meet a unit's METL (selected ARTEP/MTP/soldier tasks) and resources available to train those tasks (TADSS, field exercises). The results will incorporate constraints and restrictions placed on training, and will examine approach to maximize effectiveness or minimize costs. Currently a stand-alone system.

**11.2.1.2. Models and simulations.**

M&S are also part of TRADOC's baseline environment. These include DIS, (discussed in para 11.1, (M&S Overview), and the Family of Simulations (FAMSIM)).

The FAMSIM is the collective name for many of the M&S applications used in TRADOC's baseline architecture. FAMSIM simulates operations at the tactical, operational, and theater levels. It is a set of constructive models: CBS, BBS, Janus, Tactical Simulation (TACSIM), and Combat Service Support Training Simulation System (CSSTSS).

BBS is used for command post exercise (CPX) training for brigade/battalion commanders/staffs. It is used at corps, in conjunction with CBS, division in conjunction with CBS, and Reserve battle projection centers, as well as TRADOC schools. BBS is a fully distributed system of 5 MicroVax 3100-40s utilizing a LAN to drive a standard configuration of 10 workstations (DEC VT 320 terminals). It uses the Virtual Memory System (VMS) 5.5 OS. In TRADOC, BBS suites are currently employed at Fort Leavenworth, Chemical School, Infantry School, Engineer School, Artillery School, Air Defense Artillery School, Armor School, Aviation School, Academy of Health Sciences, and the Sergeants Majors Academy at Fort Bliss.

CBS is used for training corps commanders and battle staff, major subordinate commands, and major subordinate elements of headquarters of the corps. It exercises command and staff skills in control of joint operations, tactical forces, combined arms forces, maneuver forces, and the combat support and combat service support (CSS) systems in an operational/tactical environment. CBS Version 1.5.3 runs on a network of DEC Virtual Address Extension (VAX) 7620 with the VMS OS. In TRADOC, the only CBS suite is installed at the National Simulation Center (NSC).

Janus is targeted to company/team level training. Janus runs under the UNIX OS on Hewlett Packard 715/50 microcomputers. TRADOC schools have two each eight workstation suites.

The TACSIM is the Army's leading intelligence collection and dissemination model. TACSIM aids in the training of intelligence staff skills from the design of collection requirements to the analysis of raw intelligence. It supports intelligence training from Military Intelligence Battalion through EAC. The TACSIM equipment suite includes DEC ALPHA 1000, VAX 3196, VAX 3140, three SUN SPARC II Ces and SUN SPARC 20. It is used at NSC and the U.S. Army Intelligence Center and School.

CSSTSS is a CSS CPX driver that can be used as a stand-alone simulation or to stimulate exercise play. It can be used for the collective training of CSS commanders and staffs in EAC, Corps, Corps Support Commands, Divisions, and Division Support Commands as well as their subordinate headquarters down to the battalion level. CSSTSS 1.5 is an IBM-based system. It is run on an AMDAHL 5890 computer mainframe fielded at Forts Leavenworth and Lee. Exercises are supported by remote connection to either host.

## 11.2.2. Objective architecture

**11.2.2.1. Management information systems**

In the objective environment, the large library of training applications will be consolidated into several key applications or configurations. To realize that potential, the Army must, through Army Training Information Systems (ATIS) reengineering, develop and field a total Army training system that best enables the soldiers, leaders, and organizations to employ the Army's full capabilities. The Army Training Information Architecture (ATIA) will employ state-of-the art information technologies in a fully-integrated, networked, and internetted training support system to provide realistic, timely, user-responsive, and cost-effective training for units and individuals. The objective Army training system will be an open system capable of continuous improvement through the infusion of emerging technologies and functional requirements and will provide:

- integrated and distributed training information and training management support;
- comprehensive, configurable, content-rich training products and media;
- integrated synthetic training tools and devices; and
- reengineered training processes.

The ATIA will support the entire training domain - from tools to training development to trainin g methods - while maintaining the quality of our battle-focused training paradigm.

ATSC has completed the baseline analysis and the ATIA is in the process of being completed. The architecture completion and subsequent reengineering will enable a consolidation of 20+ legacy systems into 8-10 core systems/configuration by FY04. ATSC is currently building the SA products based on the design concept of nine Automated Information Systems (AISs), each of which is comprised of software segments drawn from as-is and objective ATIA systems. These nine are: 1) Training Analysis; 2) Training Design; 3) Training Development; 4) Training Implementation; 5) Training Evaluation; 6) Training Management; 7) Information Transfer; 8) Digital Library Data Respository; and 9) Common Core Services. These AIS support six user configurations: Training Development Configuration, Individual Training Configuration, Unit Training Management Configuration, Learning Management Configuration, Training Resource Management Configuration, and ATIA Digital Library Services Configuration. All will be redesigned to share data in a client-server architecture and make greater use of shared data and processing capabilities."

- Army-wide System for Automated Training and Doctrine Development (ASATD) - a tool for developing and producing training and doctrine information and products. ASATD supports both the WARRIOR and WARFIGHTER components of Army Training XXI (ATXXI) through its total Army task-based training and doctrine database. This database provides the foundation for both the AIMS-R for institutional training and the SATS for unit training.

- Training and Technical Materials Development (TMDS) - TMDS is a COTS application being considered for implementation to fill a significant void in the training development process. It is NOT yet approved or funded. It is one of several applications being examined. However, this void must be filled by an IS if training institutions are to take advantage of other advances in technology.
- Training and Visual Information Support System (TRAVISS) - TRAVISS is envisioned to provide installation Training and Visual Information Support Centers (T/VISCs) with an automated application that will enhance T/VISC operations and productivity, and improve management capabilities through real-time data availability. TRAVISS was originally an SBIS system and is, therefore, currently unfunded, although its functionality is still a valid requirement. TRAVISS functionality will be incorporated into Training Support Automated Software - Enhanced (TSAMS-E).

**11.2.2.2. Instructional technology.**

In the objective architecture, there will be widespread use of automation by training developers in preparing training materials, including interactive courseware and other distributed learning products. DCST anticipates this function will be accomplished using a suite of COTS tools. For example, the training developer's toolkit might include:

- Integrated Office Automation Suite: (Word Processor, Spreadsheet, and Graphics)
- HTML Editor
- Hypertext Editor
- Multimedia Production Creator (e.g., Toolbook II)
- Graphics Editing Package (e.g., CorelDraw)

Instructors will routinely incorporate automated tools into classroom instruction. Institutional classrooms will be designed to leverage technology although not every classroom will have maximum technological capabilities. Institutional classrooms will harness all the components discussed above (WANs, CANs, LANs, computing platforms, and VTC) to enhance TRADOC's execution of its training mission. There will also be an integrated suite of mission applications unique to the training domain, e.g., computer assisted instruction, automated student response systems, multimedia courseware and, at the highest level of maturity, interactive M&S and virtual reality.

As described in TRADOC Reg 350-70, TRADOC's trainers envision five levels of IS capabilities for institutional training. Each level cumulates the capabilities of the lower levels.

- Level 1, the instructor has a multimedia workstation and controls the pace of the instruction. The workstation will be capable of working with videotapes and cable television access, an electronic white board and projection system. The students will participate in automated response systems.
- Level 2 adds capabilities to move toward student controlled learning. In addition to the instructor's multimedia workstation, students will have individual multimedia workstations connected to the instructor via a LAN. The student response system will be integrated into the student software.
- Level 3 connects both the student and instructor to resources outside the immediate training environment to enable distance learning, e.g., VTC and video teletraining.
- Level 4 allows the student to participate in simulated exercises via interactive access to M&S.
- Level 5, though undefined, will include virtual reality capabilities.

Besides the training development and classroom environments, some additional support nodes will likely be used to support distribution, storage and courseware integration functions. These may be distinct facilities or integrated into classroom configurations. CRXXI plans to field DTACs to TRADOC installations to provide central services for multiple classrooms. DTAC services include connectivity, transfer and storage of proponent training materials, access to dial-in or remote access capability through TSACS and centralized administration and maintenance. The DTAC is the central source for the school's digitized training materials, and the functional proponent's reference center for students anywhere in the Army, so it must be connected to the CAN and have WAN access. DTACs not only contain servers that provide centralized storage of the school's digitized, multimedia training products, but may also provide partitioned, temporary, local storage for the TADLP facilities' non-resident students.

**11.2.2.3. Models and simulations.**

In the M&S group of training applications, the Combined Arms Tactical Trainer (CATT), a family of virtual simulators, will be the key component. CATT will be geographically dispersed at TRADOC schools and tactical units. CATT will provide commanders, up to battalion task force level, the opportunity to train in a realistic, force-on-force, virtual battlefield environment. CATT uses a combination of manned simulators, workstations, semi-automated forces, and DIS technology, for proficiency and sustainment training of selected individual, crew, collective, staff, and combined arms tasks. By linking functional modules, combined arms exercises can be accomplished using CATT. Linkage is facilitated by use of DIS technology in all CATT modules. The five CATT modules are:

- The Close Combat Tactical Trainer.
- The Aviation Combined Arms Tactical Trainer.
- The Air Defense Combined Arms Tactical Trainer.
- The Fire Support Combined Arms Tactical Trainer (Phase II).
- The Engineer Combined Arms Tactical Trainer.

CATT uses many IS components which can be grouped into two categories - manned simulators and the CATT core environment. The manned simulators are vehicle and weapon system simulators. As proponents assess their task-based training requirements, manned simulators will exhibit the required fidelity to train individual, crew, collective, and combined arms tasks. The CATT core environment consists of elements common to all proponent modules, e.g., semi-automated forces (SAF), terrain databases, rapid database generation tools, and the Standard Army After Action Review System (STAARS). SAF allows a single operator to create and control the actions of a number of virtual combatants. Each SAF entity (tank, helicopter, etc.) or small unit executes realistic battlefield behaviors in response to the operator's controls.

Migration to the CATT modules will be phased, with the CCTT being fielded first. CCTT will train more than 80 percent of the Armor, Cavalry and Mechanized Infantry Platoon and Company/Team collective tasks. CCTT is the first fully DIS-compliant training system and consists of networked, manned vehicle simulators for the M1A1, M1A2, M2/3A2, FIST-V, M113A3, and the High Mobility Multipurpose Wheeled Vehicle. These work in combination with SAF and STAARS.

CSSTSS will continue to be used in the objective architecture (see fig 24). Its functionality was described as part of the baseline architecture. CSSTSS architecture will be brought into conformance with WARSIM standards.

### 11.2.3. Program management information

#### 11.2.3.1. The Army Distance Learning Program.

TADLP is an Armywide program under Office of the Secretary of Defense (OSD) oversight being administered by the PM TADLP, an office of PEO STAMIS. Its scope covers non-resident individual and collective training. It includes active duty, USAR, and ARNG soldiers and civilians. Classrooms are located on Army installations (including TRADOC), USAR and ARNG centers and armories, in CONUS and OCONUS.

The TADLP funds the internal distance learning classroom, its associated internal LAN, and the WAN circuit costs at TADLP sites. It does not fund the connectivity from the WAN to the classroom, i.e., the common user CAN and building cable plant. Of the 745 projected TADLP classrooms, a third will be located on installations/sites scheduled for CAN modernization by the CUITN program. However, at projected funding levels, CUITN will not provide the necessary upgrades to TRADOC CAN's in time to meet the PM TADLP's classroom fielding schedule. To help accelerate network readiness within TRADOC, DCSIM has been using the Fort TRADOC program. The model for Fort TRADOC has been made available to planners in other MACOM's for use in developing plans and costs for modernizing their own communication infrastructure to support distance learning users. That architecture was discussed in paragraph 8, and depicted in figure 18.

#### 11.2.3.2. Classroom XXI.

CR XXI is a TRADOC program for modernizing resident training at TRADOC schoolhouses for students formally registered in Officer Education System/Non-commissioned Officer Education System. The CRXXI operational concept includes distance learning functionality, but the program is not a part of TADLP. This project fields, or upgrades, institutional training classrooms and equipment, to include the supporting networks and DTACs.

DCST is the TRADOC lead for CR XXI, as well as the umbrella Army Training XXI program, and associated enabling programs such as TADLP and WARNET. DCST will assist schools with requirements determination, monitoring schools' planning for command wide consistency, programming requirements, and developing an equipment procurement list to support implementation, which they will provide to CR XXI developers via the WWW. DCSIM assists with integrating common user network capabilities with CR XXI requirements, and

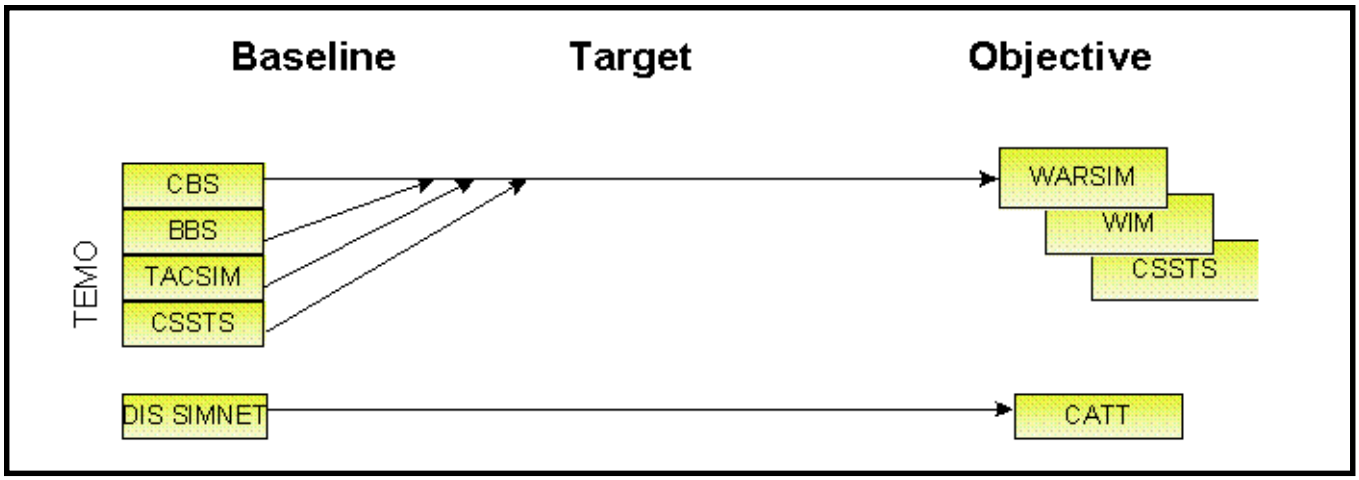



**Figure 24. Migration of TEMO M&S Applications**

assists DCST with information technology issues. Installations and schools develop their own action plans IAW DCST guidance. U.S. Military Academy at West Point and USAISEC provide technical assistance.

Through the Fort TRADOC initiative, TRADOC is modernizing its CAN segments for clusters of training buildings in preparation for CR XXI operations. The following TRADOC installations have not been fielded pilot classrooms and DENTAC capabilities to date: Fort Bliss, Rucker, Jackson, Presidio of Monterey (DLI), Leonard Wood and Redstone Arsenal.

**11.2.3.3. Army Training Information Management Program (ATIMP).**

ATIMP is a DA, DCSOPS program for which ATSC is the Executive Agent to accomplish responsibilities outlined in AR 25-1. ATIMP is the management infrastructure through which all ATIS are managed and coordinated into the integrated and mutually supporting ATIA. ATIMP provides TRADOC with management tools to identify, validate, and satisfy existing and possible future information requirements, thus providing a systemic approach for justifying and acquiring future resources. ATIMP coordinates change management to ensure all related requirements are considered prior to implementing changes in training IS. The basis for all training IM efforts by ATIMP is the ATIA.

**11.2.3.4. M&S for TEMO.**

The TEMO Executive Agent (Assistant Deputy Chief of Staff for Training-Simulations), through the TEMO Action Agent staff (National Simulation Center at Fort Leavenworth), manages TRADOC's TEMO domain functions. The TEMO domain has established a TPIO-SE and four TTPOs: TPO Live, TPO Virtual, TPO Constructive, and TPO STOW. This last project aims to develop a suite of hardware and software that can be used to create and support links among WARSIM, CCTT, Combat Training Center Objective Instrumentation System, OneSAF and interfaces with tactical C4I systems.

PM WARSIM in STRICOM is developing WARSIM 2000. WARSIM 2000 is the Army's objective M&S application for command and staff training. It will train Army battle staffs at all echelons, from Battalion to EAC. In the target architecture, WARSIM will integrate M&S applications using ALSP and will be DIS compliant. WARSIM 2000's design will allow command posts to interact with the simulation using their table of organization and equipment (TOE) equipment so that they can train in the field, not just in simulation centers. Several baseline battle staff simulations will remain in the architecture until replaced by WARSIM 2000. WARSIM 2000 is presently in the Engineering and Manufacturing Development (EMD) Acquisition Phase I. Initial operational capability is scheduled for April 01 with full operational capability in Dec 04.

PM CATT in STRICOM is the materiel developer for the CATT suite of M&S applications. The first low rate initial product application was successfully tested and fielded .to Forts Knox and Benning in FY99. The Army Test and Evaluation Command at Fort Benning in 3d Qtr FY00 conducted a follow-on test and evaluation.

The Army has not yet designated the OneSAF combat and materiel developers. A TRADOC Special Project Office has been established to design the system requirements, development methodology, and timeline prior to assigning a combat developer for the program in FY01. The US Army Model and Simulation Analysis Agency, Aberdeen Proving Ground, Maryland, is the lead for the early OneSAF development efforts.

## 11.3. Applications for doctrine and CD

### 11.3.1. Baseline architecture.

For processes associated with its doctrine and CD missions, TRADOC relies largely on the capabilities provided by common applications, e.g., E-mail and DVTC are used extensively to coordinate positions, and office automation tools are used to generate products from briefings to finished concepts.

Unique applications used to support these TRADOC missions include M&S that generally fall within the M&S domain called ACR. The primary user of ACR M&S is TRAC at Fort Leavenworth, typically in support of requirements definition or concept development. ACR M&S operators typically use SUN, Hewlett Packard or Silicon Graphic workstations connected to VAX or Cray platforms that run the applications. Specific applications represent various echelons with different degrees of resolution as depicted in figure 25.

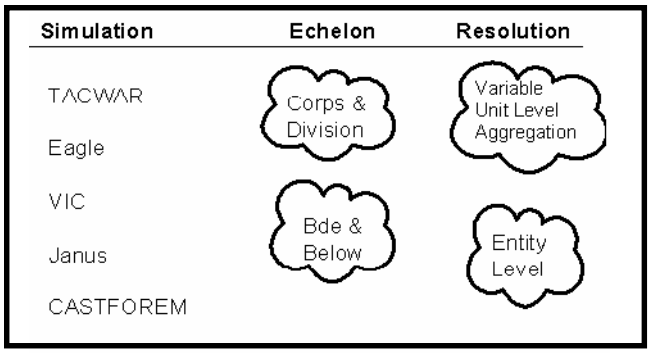



**Figure 25. ACR M&S**

Tactical warfighter (TACWAR) models theater joint and combined operations, including ground combat, air combat, logistics, command and control, and chemical warfare. Users include TRAC, the Army War College, and various warfighting commands.

Eagle models corps and division in joint and combined scenarios. It includes command and control, maneuver, direct and indirect fires, helicopter warfare, air defense, and intelligence fusion.

Vector-in-Commander (VIC) models corps operations with a theater slice, in a joint context. Operations include maneuver, fire support, command and control, engineering, air defense, CSS, and chemical warfare.

Users include TRAC, Engineer School, Artillery School, and Intelligence School.

The Combined Arms and Support Task Force Evaluation Model (CASTFOREM) is a high resolution model used for representing direct and indirect fires, maneuver, fixed wing aircraft and helicopters, information operations, and limited combat service support. Combat XXI will replace CASTFOREM and migrate CASTFOREM to object oriented programming language and HLA compliance.

### 11.3.2. Objective architecture.

Simulators that can be reconfigured will be virtual, man-in-the-loop applications that can be rapidly reconfigured to represent, to varying levels of fidelity, current and future configurations of a given vehicle or weapon system platform. These simulators will use a common core object-oriented software architecture but will have modules specialized for representing specific systems, e.g., tracked and wheeled ground vehicles; rotary wing aircraft; command, control, communication, computer and intelligence systems; or dismounted infantry soldiers. The Battle Labs' simulators that can be reconfigured will be interoperable with the CCTT and compliant with the HLA standards.

JWARS will be the Army's Joint Task Force model providing a range of representations and levels of resolution for military planning, force assessment, system effectiveness and trade-off analyses and concept and doctrine development. It will be a closed-form, constructive simulation used throughout the DoD and Services. JWARS will not be interactive, support real-time mission execution, or linked directly to real-world systems. Its target platform is a Sun SPARC server using Solaris OS with Ethernet network interfaces.

AWARS will merge VIC and Eagle and become the operational land warfare representation in JWARS. The migration toward the objective architecture for JWARS and other ACR applications is depicted in figure 26. Planning for the objective architecture is based on 2005 for full operational capability.

OneSAF will be a simulation driver for computer generated forces. It will be able to represent a full range of operations and systems from individual combatant and platform level to brigade level.

### 11.3.3. Program management information

#### 11.3.3.1. Advanced concept research tool.

DCSCD has established a plan to meet battle labs' requirements for a research tool under a program called the Advanced Concept Research Tools (ACRT) that defines use of off-the-shelf programs to fill the interim requirement. ACRT commercial prototypes are being procured now by STRICOM's PM for the Combined Arms Assessment Network to upgrade simulation capability at the battle labs and core DIS facilities.

#### 11.3.3.2. Joint warfare system.

In November 1995, the JWARS Office was established to develop JWARS. The JWARS Office is under direction of the Director, Program Analysis and Evaluation within OSD. JWARS will replace several ACR domain applications. JWARS will be HLA compliant. It will be developed incrementally in blocks, corresponding to prioritized functional requirements. JWARS development is in the prototype stage. A proof-of-concept test bed has been designed and is being implemented. IOC for the initial JWARS applications is planned for 2001.

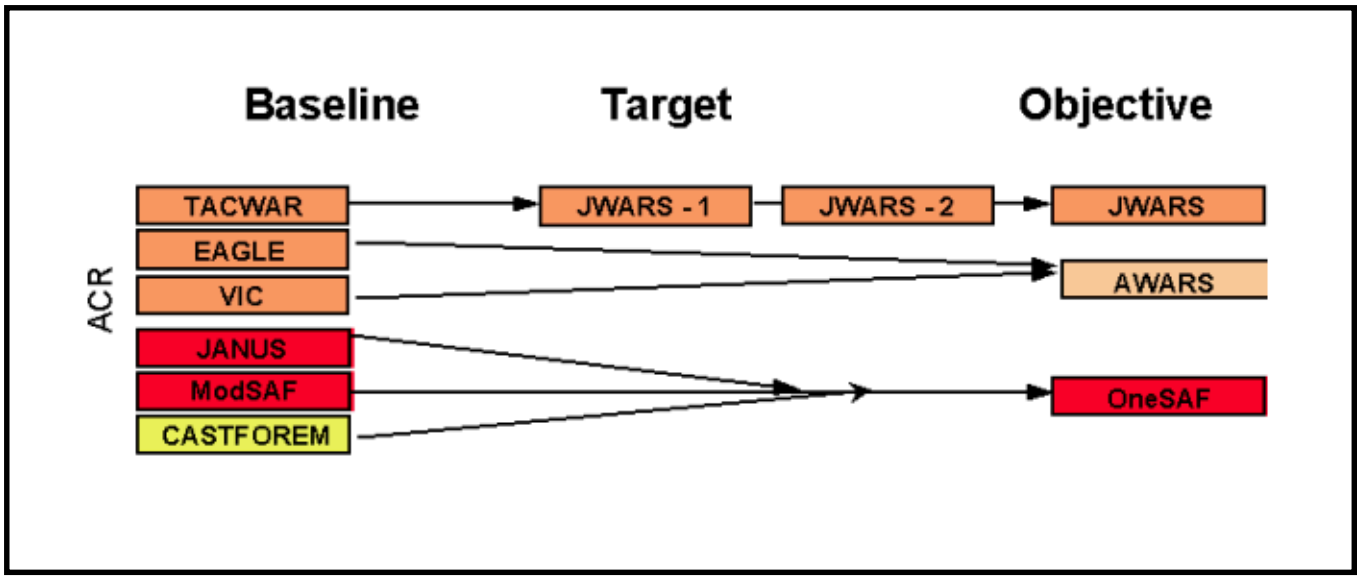



**Figure 26. Migration of ACR M&S Applications**

#### 11.3.3.3. OneSAF.

OneSAF will replace the current SAF's used within the M&S domains. The program will be developed/integrated starting with ModSAF 4.0. Incremental builds resulted in the delivery of OneSAF version 1.0 on 31 Aug 00.

#### 11.3.3.4. Joint Modeling and Simulation System (JMASS).

JMASS is a DoD program to develop collaborative use of simulation technology, integrated across acquisition phases and programs, to support a SBA process. The DoD common engineering/engagement model system and model set will provide a standard for model component developers. Tools within the system would support model development, simulation development and analysis. Highlights of the DoD JMASS requirements document are to:

- Create a software architecture to develop and configure engineering/engagement models, execute simulations and post process data.
- Provide tools to support computer aided development, configure system and environment, execute simulations and interface to legacy tools.
- Establish standards that include guidelines for DoD JMASS compliant models, tools to implement the compliant models, model-to-model and model-to-system, tool-to-system interfaces, guidelines and tools for porting legacy models to DoD JMASS, and man-machine interface modeling.
- Provide M&S reuse library of DoD JMASS compliant models.

## 11.4. Applications for installation management

### 11.4.1. Baseline architecture.

Installation management is a diverse set of processes and systems. This mission area includes human resource management, financial resource management, industrial services, facilities management, and all other processes executed by the garrison commander (see fig 5). It is also the TRADOC mission area with the longest automation history. As a result, the baseline architecture contains many applications, from a variety of programmatic sources, supporting a diverse set of functional processes.

STAMIS are a key element in the baseline architecture. They are standardized for use Armywide. Some, collectively known as ASIMS applications, are run on platforms at a DMC. Others run on local platforms that are in varying stages of migration toward JTA-Army conformance. Some STAMIS are maintained in both centralized and decentralized architectures.

Several PEO STAMIS applications, collectively called DA ISMs, released for centralized processing on Sun 690 platforms at the DMCs as ITP ISMs, have now been migrated to a IBM RS/6000 R24 AIX server fielded to installations for decentralized processing. Several modules from the discontinued SBIS have also been fielded for use at installation level.

TRADOC still employs some installation-unique applications, developed by TRADOC DOIMs for local operations. These applications support mission requirements unique to specific installations. Historically, most were developed to run on the installation-level IBM mainframes that are now out of the baseline architecture. That platform reduction and Y2K problems have significantly reduced the number of unique applications maintained by installations to less than twenty. Several activities, e.g., Cadet Command and USAREC, also maintain unique applications.

The Community and Family Support Center (CFSC), a HQDA field operating activity, manages the development and fielding of a suite of PC-based Morale, Welfare, Recreation (MWR) applications called Morale Welfare Recreation Management Information System (MWRMIS). DCSBOS has identified the user locations for MWRMIS, together with CAN connectivity status at those locations. Table 16 reveals significant gaps in connectivity. In the baseline architecture, installations are using several communication techniques, e.g., Pairgain modems, to get around this gap and implement the operational concept. Still, the lack of connectivity is illustrative of the need for infrastructure improvements, especially in functional areas outside training.

**Table 16**
**Connectivity status of MWRMIS**

| | Buildings | Activities | Platforms |
|---|---|---|---|
| Activity connected | 33 | 53 | 198 |
| Bldg only connected | 5 | 8 | 16 |
| No connectivity | 271 | 299 | 965 |

Figure 27 is a list of baseline applications used in TRADOC to support installation management processes. Table 17 categorizes the applications IAW the functional decomposition given in figure 5.

**Manage Financial Resources**

| | |
|---|---|
| DbCAS | STANFINS |
| NAFMIS | STARFIARS |

**Manage Human Resources**

| | | | | |
|---|---|---|---|---|
| ACAP XXI | ACIPS | AIMS-R | AORS | ARCIS |
| ATRRS | CHPLACE | CHTrain | DCII | DCPDS |
| DEERS | DENTRAD | EDAS | FMBS | FORCAST |
| INPROC | KEYSTONE | KEYVIEW | MIKE-MIS | MOBLAST |
| OUTPROC | PERSLOC | PPI Suite | PRISM | RAPS |
| RDMS | RECBASS-R | RECLAS | REQUEST | RETAIN |
| ROAMS | SIDPERS3 | STARS II | STRAMS-E | TLMS |
| TOPMIS | TRANSPROC II | TRAPS | | |

**Provide Industrial Services**

| | | | | |
|---|---|---|---|---|
| ACIFS | ACIIPS-R | AFMIS | ASIS | CFM |
| DES REQVAL | DPAS | EMIS | FACTS | FAS |
| FS2000 | GCSS-ARMY | HSMS | ILAP | JHCS |
| SAAS-MOD | SAMS-I/TDA | SARSS | SPBS-R* | TAMIS |
| TCACCIS | TC-AIMS II | TOPS | UIT | ULLS |

* To be replaced by DPAS in Garrison and GCSS-A for maneuver units.

**Manage Facilities**

| | | | | |
|---|---|---|---|---|
| ARMS | ASIP | BRIDGER | BUILDER | DSERTS |
| EIS | EPR | EQR | ISR | HQRADDS |
| HRAP | I-EIS | IFS | PAX-DD1391 | JOC PDS |
| MAR | Painter | PAVER | RAILER | PAX-ECONPAK |
| PAX-PC | PAX System | PC DIRnet | | ROOFER |
| PAXMAIL | SHIP | SWARS | | |
| RPLANS | | | | |

**Provide Social and Recreation Services**

| | | | | |
|---|---|---|---|---|
| ALPMS | CATERMATE | CDSAMS | CIAO | FMBS |
| FOODTRAK | GOLFTRAC | INFORM | RECTRAC | SMIRF |
| SNACS | TLMS | | | |

**Provide Contracting Services**

| | | |
|---|---|---|
| Prweb | SAACONS | SPS |

**Provide Public Safety Services**

| | | |
|---|---|---|
| HSMS | MPMIS | SAFETY |

**Figure 27. Baseline Application for Installation Management**

Table 17
Categories of baseline applications by TRADOC functional process

| System | Source | Description |
|---|---|---|
| **Manage Financial Resources** | | |
| **Database Commitment and Accounting System (DbCAS)** | DoD SYSTEM | Extracts and organizes data from STANFINS to track fund obligation status. Will migrate to Defense Joint Accounting System. |
| **Non-Appropriated Funds Management Information System (NAFMIS)** | TRADOC | Provides access to consolidated TRADOC MWR billeting NAF financial performance, budget, manpower, and installation demographic information. |
| **Standard Finance System (STANFINS)** | DA STAMIS | Supports accounting at Army installations and General Ledger control over all resources. STANFINS provides disclosure of the financial results of all activities; information required for all management purposes; data to serve all budgetary purposes and a means for integrating Army financial data with related data in the accounts of the Treasury Department. STANFINS is run as an ASIMS application. This application will migrate to Defense Joint Accounting System. |
| **Standard Financial Inventory Accounting and Reporting System (STARFIARS)** | DA STAMIS | Interactive system to record financial, inventory, accounting and other financial system to support CONUS Army installations and comparable overseas commands for the Defense Business Operating Fund, formerly retail stock fund, used to finance retail-level inventory. Provides accounting support for the acquisition of wholesale-level material. Interfaces with standard supply systems as well and the general accounting system. STARFIARS-MOD has been adopted as a DoD migration system to replace STARFIARS and STANFINS. |
| **Manage Human Resources** | | |
| **Active Orders Retrieval System (AORS)** | ARPERCEN | Allows active duty Personnel Service Division/Personnel Service Centers and mobilization processing sites to access and retrieve active duty orders for Reserve personnel processing at their installation. |
| **Army Career and Alumni Program XXI(ACAP XXI)** | DA ISM | Integrated/interactive multimedia application consisting of 8 modules Automates and provides single file operation supporting both a staffed site as well as computer aided access sites. |
| **Army Career Alumni Program Management Information System (MIKE-MIS)** | DA STAMIS | Named for Transition Action Officer who wrote program. System supports full range of business processes used by the Transition Service Office in preparing soldiers for transition. |
| **Army Company Level Information System (ARCIS)** | DA-DCSPER | Support routine Company level business processes such as duty roster, alert rosters, promotions, etc. Does not interface with higher HQs. |
| **Army Recruit Quota System (REQUEST)** | DA STAMIS | Processes reservations, confirmations of ARNG assignments for reserve component soldiers. |
| **Army Training Requirements and Resources System (ATRRS)** | DA STAMIS | System of record for all Army training classes. Trainee MILPOs update system and report soldiers' availability for assignment for follow-on training or first permanent duty station. |

Table 17 (continued)
Categories of baseline applications by TRADOC functional process

| System | Source | Description |
|---|---|---|
| **Manage Human Resources (cont.)** | | |
| **Automated Casualty Information Processing System (ACIPS/ACIPS LGT)** | DA-CASUALTY | Casualty and Memorial Affairs Operation Center, CACs and MACOMs can access information on soldier casualties worldwide. Provides means for accurate and timely preparation/submission of casualty reports, interfaces with SIDPERS-3, provides management reports and maintains casualty/mortuary data. |
| **Automated Instructional Management System - Redesign (AIMS-R)** | STAMIS | Manages student records, schoolhouse administration and academic records management. |
| **Defense Civilian Personnel Data System (DCPDS)** | DA STAMIS | System of record of all civilian employees. Updates to database create documentation of personnel actions, notices, and reports. Personnel data interfaces electronically with payroll system (Defense Civilian Pay System). |
| **Defense Criminal Investigative Information System (DCII)** | DoD SYSTEM | Allows user to verify status of Entrance National Agency Checks from a central index of clearance and investigative information. |
| **Defense Eligibility and Enrollment System (DEERS)** | DoD SYSTEM | System of record for all soldiers regardless of status (retired, active, USAR) and their family members. Database used to confirm entitlements for military/civilian health care, post exchange/commissary privileges, etc. RAPIDS terminals produce machine-readable ID cards. |
| **Dental Readiness System (DENTRAD)** | DA ISM | Provides automated support to dental clinics. Dental status information includes in-processing, examinations, pantographic information, treatments and soldier dental record location. |
| **Enlisted Distribution and Assignment System (EDAS)** | DA STAMIS | Provides on-line access to the Enlisted Master File located at PERSCOM. User access allows view of individual records, SQL queries, and report generation. User now has on-line update capability for soldier semi-centralized promotion board actions. |
| **Financial Management Budget System (FMBS)** | DA CFSC | Manages MWR budgets at activity, installation, and MACOM level. |
| **Forcast** | DA STAMIS | Automated snap shot of current and future authorization documents. |
| **Inprocessing (INPROC)** | DA ISM | Provides standardized procedures for ensuring soldiers and family members are in-processed at the installation efficiently with as few delays as possible, while ensuring an opportunity to meet all soldier readiness and casualty operations requirements. |
| **Keystone** | DA STAMIS | Personnel retention processing system. Fielding coincides with SIDPERS3. |
| **Keyview Database Storage System** | DA STAMIS | Read-only access to Keystone Database (eligibility rosters, confirmed reservations and statistical reports). |
| **Mobilization Blast (MOBLAST)** | FORSCOM | Allows FTP and pre-position of USAR/ARNG unit personnel files to mobilization station. New system that shows potential. |
| **Outprocessing (OUTPROC)** | DA ISM | Provides standardized procedures for ensuring soldiers out-process the installation. Automated questionnaire, scheduling and on-line pre-processing capabilities can reduce time required and number of stations a soldier must physically process. |

Table 17 (continued)
Categories of baseline applications by TRADOC functional process

| System | Source | Description |
|---|---|---|
| **Manage Human Resources (cont.)** | | |
| **Personnel Locator (PERSLOC)** | DA ISM | Automated tracking of all installation military and civilian personnel including phone numbers and office titles. Also assists in misdirected mail by automating list of forwarding addresses and printing of address labels. |
| **Personnel Process Improvement (PPI) Suite** | DA STAMIS | Automates initiation and processing of personnel-related actions, e.g., position/personnel actions, classification, and training. Also provides electronic access to personnel-related data and reports to organization managers. |
| **Personnel Readiness Information Management System (PRISM)** | FORSCOM | Provides readiness information based on information from EDAS and FORCAST. |
| **Reception Battalion Automated Support System - Redesign (RECBASS-R)** | TRADOC ISM | System automates the in-processing requirements of new soldiers into the Army. |
| **Reclassification (RECLAS)** | DA STAMIS | Force alignment module. Process change in MOS. |
| **Replacement Operations Automated Management System (ROAMS)** | DA STAMIS | Sub-system of PERNET. On-line tracking and manifesting of soldiers processing at mobilization stations, CONUS replacement centers, and individual deployment sites. |
| **Reserve Data Base Management System (RDMS)** | ARPERCEN | Provides real-time information on USAR personnel. |
| **Retain** | DA STAMIS | Interactive, personnel management information system which provides automated capability to process reenlistment, extension and assignment transactions. |
| **Retired Army Personnel System (RAPS)** | DA DCSPER | Master file of names and addresses for all Active and USAR retired Army personnel or their widow/widower. |
| **Software for Total Army Retention System II (STARS II)** | DA STAMIS | Retention contracts data and generation of DD Form 4. |
| **Standard Installation/Division Personnel System - 3 (SIDPERS3)** | DA STAMIS | Next generation military personnel data system of record. Provides for electronic update of EDAS/TOPMIS and the DA ISMs within 24 hours of user input. Expanded to contain approximately 1400 data elements. SIDPERS-3 has modules for accounting, assignments, promotions, orders and pay. Its architecture is a Pentium MX server running SCO UNIX and the Informix DBMS. |
| **Student/Trainee Automated Management System - Enhanced (STRAMS-E)** | DA STAMIS | Sub-System of ATRRS which allows user to effect reservations for a soldier for attendance at PLDC. Allows on-line query by SSN to determine status of seats or class vacancies. |
| **Time Labor Management System (TLMS)** | DA CFSC COTS | Manages time and attendance for NAF employees. Generates DA Form 4850 and supports electronic transfer of data from installations to DFAS. Provides various labor and payroll reports to managers. Supports use of tracking employees through use of time clocks. |
| **Total Officer Personnel Management Information System (TOPMIS)** | DA STAMIS | Provides on-line access to the Officer Master File located at PERSCOM. User access allows view of individual records, SQL database queries, and report generation. |
| **TRADOC Retired Army Personnel System (TRAPS)** | TRADOC-RMD/AG | On-line database of all retired Army personnel supported by the TRADOC installation. Database contains only those individuals supported by the installations Retirement Services Office (created based on ZIP code) |

| System | Source | Description |
|---|---|---|
| **Manage Human Resources (cont.)** | | |
| **Transition Processing II (TRANSPROC II)** | DA ISM | Users can identify soldiers scheduled for transitioning, prepare documents for separation, publish separation, retirement or REFRAD orders; certificates; and DD Form 214. System sends DFAS transactions and user may generate SIDPERS strength transactions. |
| **Provide Industrial Services** | | |
| **Ammunition Surveillance Information System (ASIS)** | | Provides ammunition accountability in TRADOC. |
| **Army Food Management Information System (AFMIS)** | DA STAMIS | Standard system that supports both operational and management requirements in the day-to-day administration of Army Food Management Program. Includes modules for Automated Headcount (AHC), the Dining Facility Operations (DFO), the Installation Food Adviser (IFA), and the Troop Issue Subsistence Activity (TISA). The TISA, IFA, and DFO modules were developed and fielded on the AT&T 3B2600GR RISC minicomputer. AFMIS presently serves 54 Army installation users worldwide. This application will be replaced by Food Service 2000 (FS2000), but is still operational in a modified state. |
| **Automated Central Issue Facility System (ACIFS)** | DA | Provided precise management of Organization Clothing and Industrial Equipment (OCIE) in Central Issue System. Interactive System. Key entry of data from terminals. Provides audit trail and necessary reports (being replaced by DA ITP/ISDM ACIFS) |
| **Automated Clothing Initial Issue Point System Redesign (ACIIPS-R)** | TRADOC | Processes issues, receipts, manager update and retrieval, inventory, catalog changes and status. Includes automated computation of stock levels and replenishment requests. |
| **CONUS Freight Module (CFM)** | | Information management system for procurement of commercial freight transportation services. |
| **Defense Property Accounting System (DPAS)** | DoD | DoD approved migration system for all real and personal property. Projected to be replacement for Army standard system SPBS-R-I/TDA once Army functionality incorporated. |
| **Distribution Execution System REQVAL (DES REQVAL)** | | Official system for validation of requisitions for major items by divisions, and separate brigades, MACOM Supply Support Activities, and AMC commodity commands. Provides visibility of equipment on hand. |
| **Executive Management Information System (EMIS)** | HQDA DCSLOG | Provides ability to track and analyze maintenance data in support of the Integrated Sustainment Maintenance and Single Stock Fund programs, using maintenance and supply data. |
| **Financial and Air Clearance System (FACTS)** | DOD STAMIS | FACTS will be used to book air movement of cargo, provide in-transit visibility of shipments, maintain a checkbook balance of transportation funds, provide a query tool for transportation and budget management and a transportation and budget forecasting model. |
| **Food Service 2000 (FS2000)** | DA STAMIS | Standard system that supports both operational and management requirements in the day-to-day administration of the Army Food Management Program. This system replaces the current legacy system - Army Food Management System (AFMIS). |

**Table 17 (continued)**
**Categories of baseline applications by TRADOC functional process**

| System | Source | Description |
|---|---|---|
| **Provide Industrial Services (cont.)** | | |
| **Fuel Automated System (FAS)** | DOD STAMIS | FAS is a COTS product used for fuel inventory management. It records commitments/obligations and tracks the inventory. Due to SSF implementation, FAS will utilize a bridge "special legacy program" to accommodate direct customer billing. The proponent for this system is Defense Energy Support Center. The Army counterpart is Army Petroleum Center. |
| **Global Combat Support System - Army (GCSS-Army)** | DA/DOD STAMIS | The objective for GCSS-A is to support all CSS disciplines to include manning, arming, fixing, fueling, moving, and sustaining soldiers and their systems. GCSS-A will merge multiple legacy system functions into single multifunctional applications, retaining the essential functionality of current logistics STAMIS and other specified IS. The end state capability of GCSS-A will provide the Army an integrated system at all force levels of CSS. Units will employ GCSS-A in garrison at installations and in the field. |
| **Hazardous Substance Management System (HSMS)** | DoD | Standard DoD automated hazardous substances tracking system developed by the Defense Environmental Security Corporate Information Management Program Management Office. |
| **Integrated Logistics Analysis Program (ILAP)** | | Decision Support System integrating supply, maintenance, and financial data from a multitude of sources, to include SARSS, DCAS, STARFIARS, STANFINS, FEDLOG, and eventually the Executive Management Information System (EMIS). This system is being fielded Armywide, and will be used by logistics and resource management personnel at HQ TRADOC and TRADOC installations. PC-based application. HQ TRADOC DCSBOS centrally funded ILAP equipment. Fielded during 1997-1998. |
| **Joint Hazard Classification System (JHCS)** | DoD | The official DoD hazard classification database of ammunition and explosives. Contains data for all Services. Specifies handling, transportation, labeling requirements. |
| **Standard Army Ammunition System - Modified (SAAS-MOD)** | DA STAMIS | Combines current SAAS-1 - ¾ databases with user accessing only required software. Mod including Windows for more effective/efficient data processing.<br>Provides capability to receive IWARS data directly from the SAAS - 4 and reduce man-hours by 100 per month.<br>Will merge into the GCSS-A. |
| **Standard Army Maintenance System for Installations/TDA (SAMS-I/TDA)** | DA STAMIS | Automated system with application and utility programs designed for table of distribution and allowance (TDA) maintenance operations to include maintenance and repair parts management plus other related shop and management control functions. SAMS-I/TDA runs on a HP 9000-750 minicomputer with PC terminals.<br>Will merge into the GCSS-A. |
| **Standard Army Retail Supply System-Objective (SARSS-O)** | DA STAMIS | Multi-level supply management and stock control system designed to operate in peacetime or wartime. Operates at every level of supply from DSU/GSU through TAMMC for Army in field and from warehouse through installation supply division in garrison environment. Will merge into the GCSS-A. |

| System | Source | Description |
|---|---|---|
| **Provide Industrial Services (cont.)** | | |
| **Standard Property Book System - Redesigned (SPBS-R)** | DA STAMIS | Interactive property accounting and management system that operates at installation/TDA level. Performs property accountability functions, automates hand receipts, updates CBS-X and produces variety of equipment management reports. Operates in both centralized and decentralized mode, in two environments, MS-DOS and VirtuOS. SPBS-R does not run correctly under Windows 3.1, Windows for Workgroups or Windows NT. |
| **Training Ammunition Management Information System (TAMIS)** | | |
| **Transportation Coordinator Automated Command & Control Information System (TCACCIS)** | DA STAMIS | Automated RC/AC deployment execution system. Supports day-to-day operations and crisis situations. |
| **Transportation Coordinator Automated Information Management System II (TC-AIMS II)** | DA STAMIS | Integrates joint and multiservice logistics and command control systems (C2S) to provide seamless data handoff throughout the mobilization, deployment, employment, and redeployment phases of any joint operations. |
| **Transportation Operational Personal Property System (TOPS)** | DoD | Automated Transportation Control System. Supports day-to-day operations and crisis situations. Assist in counseling, scheduling movement of HHG, dependent/ civilian travel and transport of POVs/house trailers. Provides on-line/remote scheduling. |
| **Unique Item Tracking (UIT)** | | A tracking system for serialized items, e.g., weapons. |
| **Unit Level Logistics System (ULLS)** | DA STAMIS | Automates procedures for managing unit-level repair parts (PLL) and The Army Maintenance Management System (TAMMS). The ULLS platform is a Zenith 486 Dx4/100 using the MS-DOS 6.22 or higher OS. Will merge into the GCSS-A. |
| **Manage Facilities** | | |
| **Army DEIS Data System (HQRADDS)** | DA | Accessed through the HQRADDS website. Collects Army energy consumption and cost data and feeds the Defense Utilities and Energy Reporting System (DUERS), a DoD system. |
| **Army Stationing Installation Plan (ASIP)** | DA | Database containing information on TOE/TDA unit/ organization stationing. |
| **Automated Review Management System (ARMS)** | DA | Consolidates and electronically forwards comments on major projects to the Corps of Engineers offices. |
| **Bridge Analysis System (BRIDGER)** | DA | Utility system analysis program. Based on condition assessment, program provides maintenance and repair strategy and cost estimates. |
| **Building Analysis System (BUILDER)** | DA | Utility system analysis program. Based on condition assessment, program provides maintenance and repair strategy and cost estimates. |
| **DD 1391 Processor (PAX-DD1391)** | DA | Part of the PAX System. Automated DD Form1391 preparation, submission and management. |

Table 17 (continued)
Categories of baseline applications by TRADOC functional process

| System | Source | Description |
|---|---|---|
| **Manage Facilities (cont.)** | | |
| **Defense Sites Environmental Restoration Tracking System (DSERTS)** | DOD | Application designed to track environmental cleanup activities at DoD sites and provides information for the Defense Environmental Restoration Program reporting and management. Site history and funding parameters are included. |
| **Economic Analysis Package (PAX ECONPAK)** | DA | Part of the PAX System. Prepares economic analysis of DD Form 1391 projects and automatically enters its data into the electronic form. |
| **Environmental Program Requirements Report (EPR)** | DOD | System to identify and track execution of environmental projects. Also used to develop and defend budget requirements. |
| **Environmental Quality Report (EQR) DOD** | | Used to collect measures of merit data for DoD, DA, commands, and installations. The data contributes to the Annual Environmental Quality Report to Congress, the Quarterly Army Performance Review for the Secretary of the Army, and various other mandatory reports. |
| **Executive Information System (EIS)** | DA | Provides Windows-based graphical representation of IFS-M and financial data. |
| **Housing and Operations Management System (HOMES3)** | DA STAMIS | Maintains Family Housing and UPH inventory and occupancy data; furniture inventory; off-post housing listings, assignments and terminations; and produces housing documentation. The system has evolved from a centralized mainframe-based system to a distributed mini-computer based system with computers located at each installation's housing office. HOMES operates on a variety of platforms, running UNIX, XENIX or HP-UX. Composed of five modules: Family Housing, Furnishings Management, Billeting, System Administration and Headquarters Homes. |
| **Housing Relocation Assistance Program (HRAP)** | DA | Contains housing information for all Army installations. Includes rosters, waiting time for housing, and sample off-post housing information. Includes home purchase information. |
| **Installation Executive Information System (I-EIS)** | DA | Provides installations Windows-based access to IFS data. Displays information and queries existing data. |
| **Integrated Facilities System (IFS)** | DA | Army system of record for real property. Maintains financial and work data for DPW. Interfaces with STANFINS. Modules for supply and contract management. The system is operated and maintained on locally controlled minicomputer networks each composed of a UNISYS 5000/95 or UNISYS 6000 minicomputer at each DPW site with a network of EVEREX 486 microcomputers. The network uses TCP/IP protocols. Approximately 120 sites use IFS-M. There is also an ASIMS version. |
| **Installation Status Report (ISR)** | DA | System is designed to give installations, MACOMs, and HQDA commanders and senior leaders a macro-level overview of the infrastructure, environmental, and services status of Army installations. |
| **JOC Proposal Development Software (JOC-PDS)** | DA | Used by JOC contractor to develop work proposals for delivery orders. |

| System | Source | Description |
|---|---|---|
| **Manage Facilities (cont.)** | | |
| **Maintenance and Repair (MAR)** | TRADOC | Stores information and performs project management on all Real Property Maintenance and Repair projects at each TRADOC installation. |
| **Painting Analysis System (PAINTER)** | DA | Covers paints and coatings, removal and disposal of hazardous materials. |
| **Pavement Analysis System (PAVER)** | DA | Utility system analysis program. Based on condition assessment, program provides maintenance and repair strategy and cost estimates. |
| **PAX - PC PAXMAIL** | DA | PC Planning and Execution System Mail (part of PAX System) |
| **Planning and Execution System (PAX System)** | DA | Umbrella system. Modules include PAXMAIL, DD 1391 Processor, ECONPAK, CAPCES and others. |
| **Rail Analysis System (RAILER)** | DA | Utility system analysis program. Based on condition assessment, program provides maintenance and repair strategy and cost estimates. |
| **Real Property Planning and Analysis System (RPLANS)** | DA | System to translate existing or future mission, population, and equipment into TOE/TDA space allowances and compare to real property assets. Generates construction and M&R costs based upon stationing. |
| **Roofing Analysis System (ROOFER)** | DA | Utility system analysis program. Based on condition assessment, program provides maintenance and repair strategy and cost estimates. |
| **Single Host Integrated Platform (SHIP)** | DA | System by which installations electronically upload housing reports to DA database. |
| **Solid Waste Army Reporting System (SWARS)** | DA | System to track solid waste disposal and reduction measures at Army installations. Federal agencies are required by Executive Order to reduce solid waste. System is designed to assist in tracking accomplishment of established goals. |
| **Provide Social and Recreation Services** | | |
| **Army Lodging Property Management System (ALPMS)** | DA CFSC COTS | Manages room inventory, reservations, registrations, and cashiering. Keeps track of room folios, balances, and generates numerous reports. |
| **Catering Management (Catermate)** | DA CFSC COTS | Manages catering operations and room reservations. |
| **Child Development Services Automated Management System (CDSAMS)** | DA CFSC | Manages installation child development services (CDS). Maintains record of children and sponsors enrolled in CDS program. Track payment and daily use of day care centers. Maintains waiting lists for services. Provides CDS management reports. |
| **CIAO** | DA CFSC COTS | Point of Sale system for full service clubs. |
| **Financial Management Budget System (FMBS)** | DA CFSC | Manages MWR budgets at activity, installation, and MACOM level. |
| **Food Tracking System (Foodtrak)** | DA CFSC COTS | Manages MWR food services to include inventory, cost of goods, recipe and menu item pricing and analysis. Generates management reports. |

Table 17 (continued)
Categories of baseline applications by TRADOC functional process

| System | Source | Description |
|---|---|---|
| **Provide Social and Recreation Services (cont.)** | | |
| **Golf Course Tracking System (Golftrac)** | DA CFSC COTS | Manages MWR golf course data. Tracks tee times, number of rounds played, tournament pairings, pro shop inventory and Point of Sales for pro shop and snack bar. Generates management reports. |
| **Integrated NAF Financial Operating Reports for Finance (INFORM)** | TRADOC | Interfaces with TLMS, FMBS, and Rectrac to produce a daily financial report for a NAF activity. |
| **Recreation Tracking (Rectrac)** | DA CFSC COTS | Manages MWR activity usage, Point of Sales, inventory, tour and travel reservations and ticketing, equipment rentals and facilities reservations. Maintains league scheduling, tournaments, and membership. Provides management reports. |
| **Standard Management Information Reports for Finance (SMIRF)** | DA CFSC COTS | Database of current and 5 year prior actual accounting data as processed by NAF Financial Services. |
| **Standard NAF automated contracting system (SNACS)** | DA CFSC COTS | Supports the entire spectrum of NAF contracting. |
| **Time Labor Management System (TLMS)** | DA CFSC COTS | Produces electronic time card on NAF employees for submission to payroll office. Also produces numerous costs reports and schedules. |
| **Provide Contract Services** | | |
| **PRWeb** | DOD STAMIS | PRWeb is a paperless, electronic web-based system used by all activities on an installation for submitting purchase requests for services and supplies to the Standard Procurement System. |
| **Standard Army Automated Contracting System (SAACONS)** | DA | Supports the entire spectrum of contracting functions, contract document processing, preparation of purchase orders, tracking all contractual actions and preparing management reports. SAACONS serves approximately 210 sites. SAACONS will be replaced by Standard Procurement System (SPS). TRADOC is using a semi-centralized architecture, with three SAACON host sites (Gordon, Eustis, and Sill) supporting 12 client sites. SAACONS can run on a variety of hosts, including the UNISYS 5000 or 6000 series and HP 9000/750. |
| **Standard Procurement System (SPS)** | DoD | DoD-wide Automated Contracting System - Replaces Army SAACONS systems. |
| **Provide Public Safety Services** | | |
| **Hazardous Substance Management System (HSMS)** | DoD | Tracks hazardous items (cradle to grave) at an installation. |
| **Military Police Management Information System (MPMIS)** | DA STAMIS | Supports full range of Military Police operations. Running on Intel-based PCs. Modules include the Registration and Access Control System and Security Management System. |
| **Safety** | DA ISM (SBIS) | Automated tracking system to assist installation in areas of hazard identification, risk management and loss control management. System provides standardization for hazard identification, evaluation and a higher reliability of risk information at all levels of command. |

### 11.4.2. Objective architecture.

Conformance with the JTA-Army, DoD DII and Y2K readiness has necessitated many recent and on-going changes in the baseline architecture. TRADOC develops and maintains few of the replacement systems in the target architecture. TRADOC instead coordinates with DoD and HQDA functional and PMs to ensure replacement systems are available.

Since most PMs for installation management applications are in external organizations, TRADOC must integrate the mission applications into its infrastructure. This means ensuring the processing and information exchanges required to implement the functional process are supported with network connectivity at the LAN, CAN, and WAN levels and that platforms are distributed as necessary to provide processing power at the users' locations. TRADOC must work with external PMs to insert new application into available infrastructure, identify gaps in the infrastructure, and plan modernization required to fill the gaps.

In our vision, TRADOC will employ a standardized library of installation management applications, built on a common operating environment, with well-encapsulated modules that maximize the reuse of common capabilities and shared data. Each installation will have an integrated logical database populated with standardized database schemata and data elements. As necessary, HQ TRADOC will have the MACOM version of the database.

This vision is beyond the capabilities of applications that are currently planned and funded for the objective architecture. Figure 28 depicts the migration path for applications used in the baseline SA. If an application is missing from these figures, no migration to a replacement system is planned or known to TRADOC.

The GCSS-A comes closest in concept to the vision. The objective for GCSS-A is to support all CSS disciplines to include manning, arming, fixing, fueling, moving, and sustaining soldiers and their systems. GCSS-A will merge multiple legacy system functions into single multifunctional applications, retaining the essential functionality of current logistics STAMIS and other specified IS.

The end state capability of GCSS-A will provide the Army an integrated system at all force levels of CSS. Units will employ GCSS-A in garrison at installations. The objective is to streamline IM for CSS applications through shared data and system components. Automatic identification technology devices will automate input of source data and provide one-time data entry for automatic distribution where needed. The system will have a modular design. Users will have only the mission applications needed to perform the tasks at their location. The GCSS-A will operate in a distributed computing environment that supports split-base operations where some system components and data are maintained in base support locations and linked to forward elements through available telecommunications.

The PM plans to re-use baseline platforms and communications infrastructure as part of GCSS-A. As required, COTS/NDI client workstations and servers will be centrally procured using IDIQ or BPA contracts. Current planning is for use of Microsoft Windows NT as the OS.

Another integrated system that is a part of the objective architecture is the CPO Mod. Processes and organization for civilian personnel management have recently undergone considerable change. The Army has established 10 geographic regions worldwide (7 in CONUS). Each region includes a Civilian Personnel Operations Center (CPOC) to provide personnel processing functions that do not require face-to-face contact between service provider and customer, and about 120 worldwide installation-level Civilian Personnel Advisory Centers (CPACs) that serve as part of the management team and provide advice to the commanders. The reorganization of civilian personnel services requires a new approach to automation.

CPO Mod is the Army's implementation of the Defense Civilian Personnel Data System (DCPDS) Modernization Program. The baseline, or legacy, version of DCPDS is mainframe-based. A target architecture will be used to replace the legacy DCPDS. It is based on 10 interim applications called the Personnel Process Improvement (PPI) Suite. The objective architecture will be based on the federalized version of Oracle's HR (Human Resources) software and will replace the PPI Suite.

CPO Mod will interface with other systems, such as payroll, to share information vertically and horizontally. It must be accessible to managers, supervisors, and employees for information update and retrieval. It will incorporate electronic forms processing and coordination capability for customer organizations and the personnel office. Network servers, among other tasks, provide electronic processing of personnel action requests, requests for training, position descriptions, position applications, reduction-in-force actions, and retirement applications.

Networking is an integral part of the solution to provide personnel offices and other serviced agencies with applications to perform tasks. The regional CPOC database will contain information on all employees serviced within the respective region and will be the "database of record" for personnel transactions. Application and database software that support most facets of human resource processing will operate on the CPOC and CPAC servers, linking to client workstations that provide the user with GUI for using the application tools.

Modernization includes workstations and servers, and LAN components (boards, hubs, cables, and routers). Specific configurations will be determined on a site-by-site basis. The primary sources for hardware are standard Government contracts. In general, it is envisioned that a LAN will be used to support functional applications requirements, running TCP/IP over Ethernet. Connectivity will be provided to existing LANs, WANs, or dedicated circuits. A variety of modern software tools will be incorporated in the DCPDS Modernization program. Workstations will be equipped with office automation software for processing, database interaction, presentations, and the commercial tools required to link users on a network. Client/server applications will be developed with GUIs and will include on-line transaction processing, electronic

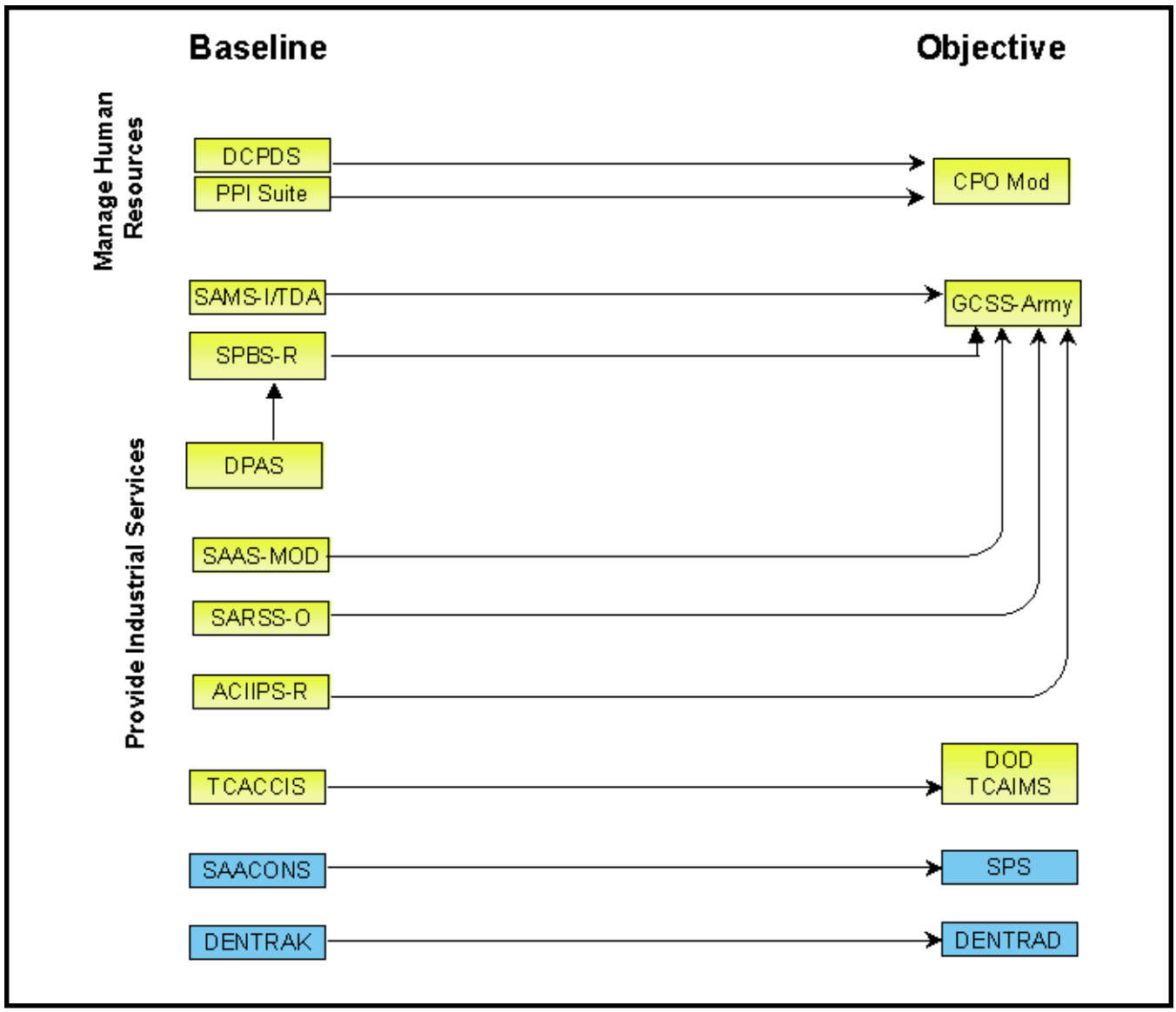



**Figure 28. Migration of installation management applications**

processing for personnel action requests, automated generation of position descriptions, automated applicant screening, and electronically generated training requests. Applications will include extensive use of electronic forms and imaging technology to reduce paper in personnel processing.

## 11.4.3. Program management information

### 11.4.3.1. Standard Army Management Information Systems (STAMIS).

HQDA has historically resourced and overseen the development of STAMIS. Since establishment of PEOs, the PEO STAMIS is normally the developer. Each STAMIS application is typically a separate program with its own program/product/project manager, budget and schedule. Refer to table 17 for applications managed as STAMIS.

### 11.4.3.2. SBIS modules.

Prior to 1998, SBIS was a significant application development effort. Few applications were fielded. One of its applications was AIMS-R. AIMS was developed by DCST and fielded to TRADOC schools from 1984 to 1987. During its life cycle, SBIS sustained AIMS and planned its redesign. TRADOC ATSC has resumed development and fielding responsibilities.

### 11.4.3.3. MWRMIS.

The CFSC, a HQDA field operating activity, manages the development and fielding of MWRMIS. CFSC secures a memorandum of instruction/memorandum of understanding with gaining installations' Directors of Community Activities prior to fielding. MWRMIS applications are fielded as they are available. Applications within MWRMIS program are as follows.

- Army Lodging Property Management System (ALPMS) - The replacement for HOMES in NAF Billeting and Guest House operations, fielded to all TRADOC installations. Application handles room inventory, reservations, and Point of Sales. Program is loaded on an Installation Central HP-UNIX server and connectivity to buildings is via installation CAN or Pairgain.

- Catering Management (Catermate) and Food Tracking System (Foodtrak) - Applications developed by System Concepts, and fielded at various Clubs and Snack Bars throughout TRADOC. Catermate manages catering operations and room reservations, and Foodtrak is an extensive inventory system that interfaces with Rectrac. Both applications can reside on a stand-alone PC or on a file server.

- Child Development Services Automated Management System (CDSAMS) - A UNIX and DOS system located at CDS activities throughout TRADOC. Y2K patches and compliant hardware were fielded and funded by DA in Dec 99. New Windows-based application will be deployed in 1st Qtr FY01. Communications between installation buildings will be funded by DCA and could utilize Pairgain or any other on-line communication solution available at installation.

- CIAO - A Windows-based Point of Sale application written by CacheBox for full service (sit down menu ordering) dining operations. DA will provide site license for the software and installations will be responsible for the hardware. Fielding will be accomplished as funding becomes available to those installations that meet the "full service" operation requirement. Application is loaded on an activity NT file server.

- Financial Management Budget System (FMBS) - Supports all MWR/NAF activities and fielded at each TRADOC installation. Application resides on the Novell file server and each installation NAF activity connects to the server (Ethernet, pairgain, or dialup) to input budget. Installation data is consolidated and sent via FTP or modem to our CFAD Novell file server. DOS-based application will be converted and fielded during FY 00/01.

- Golf Course Tracking System (Golftrac) and Recreation Tracking (Rectrac) - Applications developed by Vermont Systems and track recreation, usage, rental, and Point of Sales data for MWR activities. Golftrac is at all our Golf courses, and Rectrac has been fielded to various activities throughout TRADOC. DOS based application resides at NAF activity on Novell servers, or on DCA Novell server, depending on installation connectivity. Fielding of Windows version started in FY00 with a FY01 completion date

- Integrated NAF Financial Operating Reports for Managers (INFORM) - TRADOC-developed Windows-based management information systems (MIS) program. Fielded to various NAF activities in TRADOC. Interfaces with Rectrac, FMBS, and TLMS to give a daily financial picture of an activity. Program can be loaded stand-alone or on a file server.

- Standard Management Information Reports for Finance (SMIRF) - Windows-based application generates reports of actual accounting data as processed by NAF Financial Services. Fielded at all TRADOC installations. Application can be loaded stand-alone or on a file server.

- Standard NAF Automated Contracting System (SNACS) - A Windows-based contracting (BPAs, purchase orders) application written by Compusearch that replaces the non-Y2K DOS version. All TRADOC installations using DOS version have been upgraded. Fielding to remaining installations was completed in FY00. Application resides on DCA Novell file server and all NAF activities connect to the database via installation CAN or Pairgain.

- Time Labor Management System (TLMS) - Y2K ready Windows version fielded to all TRADOC installations. This application allows for electronic transfer of time cards for NAF employees from DCA to DFAS Red River NAF Financial Services. Application currently resides on PCs at each activity and at the central Novell file server at each installation DCA. Consolidation of activity files occurs at the main file server for modem transmission to Red River payroll office.

**11.4.3.4. Defense Civilian Personnel Data System Modernization Program.**

The DCPDS Modernization Program is a multi-year DoD initiative to replace legacy DCPDS. The Air Force is the executive agent for developing and sustaining the modernized DCPDS.

CPO Mod is the Army's implementation of the DCPDS Modernization Program. The Project Officer (PO) for Civilian Personnel Regionalization (CPR), under PEO STAMIS, is responsible for system fielding to Army installations. PO CPR will field DCPDS Modernization hardware, software, and necessary communications devices to CPOCs, CPACs, and DOIMs, but only functional software to installation supervisors and managers. Approved program funding supports only direct personnel operations (e.g., CPOCs/CPACs). It does not provide funding for the communications, training, hardware, or hardware maintenance needed by installation-level managers to interact with the system.

**11.4.3.5. TRADOC applications.**

HQ TRADOC has stopped maintaining the inventory of TRADOC ISMs. All have been retired or replaced in functional processes by other standardized systems. There are still several TRADOC-unique systems, e.g., ACIIPS-R and MAR, maintained by TRADOC with DCSBOS as their functional proponent.

TRADOC DCSBOS is working an application called the DCSBOS Geo-Based Corporate Database to integrate management level functional data across the varied processes in installation management. It will support achievement and monitoring of DCSBOS strategic goals for base operations.

**11.4.3.6. Global Combat Support System-Army.**

GCSS-A is the key program in the Army's implementation of the GCSS, a DoD program. Unlike standard DoD "systems," GCSS is based on cooperative development of corporate guidance and decentralized execution by DoD components. The Director for Logistics, J4, is the functional proponent for GCSS. The Assistant Deputy Undersecretary of Defense (Logistics) participates in GCSS management, representing other functional OSD staff. DISA is the technical architect, providing common services and technical direction. CINCs, Services, and Defense agencies define requirements and acquisition programs.

PM, GCSS-A, subordinate to PEO STAMIS, is the Army's materiel developer. CASCOM is responsible for defining the GCSS-A installation strategy and operational architecture. HQ TRADOC approved the ORD on 5 Feb 97. Major Automated Information Systems Review Committee approval has been obtained for development of Tier I and concept exploration of Tiers II and III.

Tier I will include the functionality of existing logistics STAMIS. The initial operational capability will modernize and integrate the supply, property, and maintenance functionality of the logistics STAMIS and all system variants of ULLS, SARSS-O, SPBS-R, SAAS-MOD, and SAMS-I/TDA, and the key features of ILAP. The resulting products will be six modules of GCCS-Army:

- Supply/Property that will integrate supply operations and property accountability in all units.
- Maintenance that integrates ground, aviation, and water equipment maintenance operations at all levels.
- Ammunition Supply Point integrates Class V management and operations at ammunition supply points.
- Supply Support Activity integrates supply management and operations at the supply support activity.
- Integrated Materiel Management integrates supply, property, ammunition, and maintenance management in the materiel management center.
- Management that will integrate all the above information, as well as data exchange with other CSS Joint automated systems.

Tier II will integrate the wholesale and retail levels of CSS and begins fielding in 3d Qtr FY 04. Tier III will include joint functions and will be achieved by 3d Qtr FY 06.

# Appendix A
# References

**Section I**
**Referenced Publications**

DoD Directive 8320.1-M
Data Administration Procedures

DoD 5015.2-STD
Design Criteria Standard for Enterprise Records Management Software Applications

DoD Human-Computer Interface Style Guide

AR 25-1 Army Information Management

TRADOC Pam 25-72
Requirements Documentation for Information Systems for TRADOC Organizations and Installations

TRADOC Pam 71-9 Requirements Determination

Allied Communications Publication 123

Chairman of the Joint Chiefs of Staff Instruction 5721.01A The Defense Message System and Associated Message Processing Systems

DNS Implementation Guide (cited in para 10.2.1.6) (available from DCSIM)

**Section II**
**Referenced Forms**

DD Form 448
Military Interdepartmental Purchase Request

# Appendix B
# Integrated Fielding Schedules

Refer to the electronic DCSIM fielding schedule for Gantt charts showing known dates for activities in the various programs discussed in TPRISM.

# Glossary
# Acronyms

| | |
|---|---|
| ACIIPS-R | Automated Clothing Initial Issue Point System Redesign |
| ACR | advanced concepts and requirements |
| AD | active directory |
| ADN | area distribution node |
| ADRP | Army DISN Router Program |
| ADTDL | Army Doctrine and Training Digital Library |
| AIMS-R | Automated Instructional Management System-Redesign |
| AIS | Automated Information System |
| AKO | Army Knowledge On-line |
| ALSP | Aggregate Level Simulation Protocol |
| AMC | Army Materiel Command |
| API | application program interface |
| ARNG | Army National Guard |
| ARPA | Advanced Research Projects Agency |

| | |
|---|---|
| ASIMS | Army Standard Information Management System |
| ATIA | Army Training Information Architecture |
| ATIS | Army Training Information System |
| ATM | asynchronous transfer mode |
| ATSC | Army Training Support Center |
| AUTODIN | automatic digital network |
| BASOPS | base operations |
| BBS | Brigade/Battalion Battle Simulation |
| BISDN | broadband integrated services data network |
| BLRSI | Battle Lab Reconfigurable Simulator Initiative |
| BPA | blanket purchase agreement |
| C4I | command, control, communication and intelligence |
| C-TNOSC | CONUS-Theater Network Operations and Security Center |
| CAC | Combined Arms Center |
| CALL | Center for Army Lessons Learned |
| CALLCOM | CALL Collection and Observation Management System |
| CAN | campus area network |
| CAT | category |
| CATT | Combined Arms Tactical Trainer |
| CBI | computer-based instruction |
| CBS | Corps and Below Simulation |
| CBT | computer-based training |
| CCB | configuration control board |
| CCTT | Close Combat Tactical Trainer |
| CD | combat developments |
| CD-ROM | compact disk-read-only memory |
| CECOM | U.S. Army Communications-Electronics Command |
| CG | commanding general |
| COE | common operating environment |
| CONUS | continental United States |
| COTS | commercial off-the-shelf |
| CPO Mod | Civilian Personnel Office Modernization |
| CPX | command post exercise |
| CR XXI | Classroom 21st Century |
| CSSTSS | Combat Service Support Training Simulation System |
| CTC | combat training center |
| CUITN | Common User Installation Transport Network |
| DA | Department of the Army |
| DAPS | Document Automation and Production Service |
| DATMS | Defense Information System Network Asynchronous Transfer Mode Service |
| DBMS | database management system |
| DCO | dial central office |
| DCPDS | Defense Civilian Personnel Data System |
| DCSCD | Deputy Chief of Staff for Combat Developments |
| DCSIM | Deputy Chief of Staff for Information Management |
| DCSINT | Deputy Chief of Staff for Intelligence |
| DCSOPS | Deputy Chief of Staff for Operations |
| DCSSA | Deputy Chief of Staff for Simulations and Analysis |
| DCST | Deputy Chief of Staff for Training |
| DCTN | Defense Commercial Telecommunications Network |
| DDN | Defense Data Network |
| DHCP | Dynamic Host Configuration Protocol |
| DII | Defense Information Infrastructure |
| DIS | distributed interactive simulation |
| DISA | Defense Information Systems Agency |
| DISC4 | Director of Information Systems for Command, Control, Communications and Computers |
| DISN | Defense Information System Network |
| DLT | distance learning and training |
| DMC | Defense Megacenter |
| DMS | Defense Message System |
| DMZ | demilitarized zone |
| DNS | Domain Name Service |
| DoD | Department of Defense |
| DOIM | Director of Information Management |
| DPI | Data Processing Installation |
| DSI | Defense Simulation Internet |
| DSN | Defense Switched Network |
| DTAC | digital training access center |
| DUA | Directory User Agent |
| DVD-ROM | digital versatile disk-read only memory |
| DVS-G | DISN Video Services - Global |
| DVTC | dial-up video teleconferencing |
| EAC | Echelons Above Corps |
| EC/EDI | electronic commerce/electronic data interchange |
| ELAN | emulated local area network |
| EMS | Enterprise Management System |
| EUB | end user building |
| FAMSIM | Family of Simulations |
| FDDI | fiber distributed data interface |
| FEP | front end processor |
| FTP | file transfer protocol |
| FTS | Federal Communications System |
| GB | gigabyte |
| Gb/s | gigabyte per second |
| GCCS | Global Command and Control System |

| | |
|---|---|
| GCSS-A | Global Combat Support System-Army |
| Gig-E | Gigabit Ethernet |
| GSA | General Services Administration |
| GUI | graphic user interface |
| HCI | human-computer interface |
| HLA | High Level Architecture |
| I3A | Installation Information Infrastructure Architecture |
| I3MP | Installation Information Infrastructure Modernization Program |
| I&A | identification and authentication |
| IAW | in accordance with |
| ICC | initial critical capability |
| ICT | integrated concept team |
| IDIQ | indefinite delivery indefinite quantity |
| IDS | intrusion detection system |
| IEEE | Institute of Electrical and Electronic Engineers |
| IM | information management |
| IMA | information mission area |
| IOC | initial operation capability |
| IP | Internet protocol |
| IPT | integrated product team |
| IPX | Internetwork Packet Exchange |
| IS | information system |
| ISAP | Information System Architecture Plan |
| ISDN | integrated services digital network |
| ISM | installation support module |
| ISP | Internet service provider |
| ISS | information systems security |
| IT | information technology |
| ITP | Installation Transition Processing |
| ITU | International Telecommunications Union |
| JMASS | Joint Modeling and Simulation System |
| JSIMS | Joint Simulation System |
| JTA | Joint Technical Architecture |
| JWARS | Joint Warfare System |
| JWICS | Joint Worldwide Intelligence Communication System |
| KEI | key enabling investment |
| KMS | knowledge management system |
| LAN | local area network |
| LANE | LAN emulation |
| LOS | level of service |
| M&S | models and simulations |
| MACOM | major Army command |
| MAR | maintenance and repair |
| MB | megabyte |
| Mb/s | megabytes per second |
| MCN | main communications node |
| MDT | Message Distribution Terminal |
| MEDCOM | Army Medical Command |
| MER | minimum essential requirements |
| METL | mission essential task list |
| MHSS | Military Health Services System |
| MHz | megahertz |
| MIS | management information system |
| MMFO | multi-mode fiber optic |
| MOS | military occupational specialty |
| MPOA | Multi-Protocol over ATM |
| MS | Message Store |
| MTA | message transfer agent |
| MTMP | MACOM Telephone Modernization Program |
| MWRMIS | Morale, Welfare, Recreation MIS |
| MWS | Management Workstation |
| NDI | non-developmental item |
| NGB | National Guard Bureau |
| NIPRNET | not classified but sensitive IP router network |
| NISDN | narrowband integrated services digital network |
| NOC | network operation center |
| NSC | National Simulation Center |
| NSIP | Network Security Improvement Program |
| OC | optical carrier |
| OCONUS | outside continental United States |
| ORD | operational requirements document |
| OMA | operations and maintenance, Army |
| OneSAF | One Semi-Automated Forces |
| OPA | other procurement, Army |
| OS | operating system |
| OSCAR | outside cable plant rehabilitation |
| OSD | Office of the Secretary of Defense |
| PBG | Program Budget Guidance |
| PC | personal computer |
| PEO STAMIS | Program Executive Office Standard Army Management Information System |
| PERSCOM | U.S. Total Army Personnel Command |
| PIX | private internet exchange |
| PM | program manager |
| PM DCASS | PM Defense Communications, and Army Switched Systems |
| PMO | Project Management Office |
| POM | Program Objective Memorandum |
| PPC4 | IPower Projection Command, Control, Communications and Computer Infrastructure |
| PPP | point-to-point protocol |
| PRI | primary rate interface |
| PSP | power support platform |

| | |
|---|---|
| QOS | quality of service |
| RA | Regular Army |
| RADIUS | remote authentication dial-in user system |
| RAID | Redundant Array of Inexpensive Disks |
| RAM | random-access memory |
| RCERT-C | Regional Computer Emergency Response Team-CONUS |
| RDA | research, development and acquisition |
| RDL | General Dennis J. Reimer Training and Doctrine Digital Library |
| RECBASS-R | Reception Battalion Automated Support System-Redesign |
| RFC | request for comment |
| RISC | reduced instruction set computer |
| RJE | remote job entry |
| SA | system architecture |
| SAF | semi-automated forces |
| SATS | Standard Army Training Systems |
| SBA | simulation based acquisition |
| SBIS | Sustaining Base Information Services |
| SDN | service delivery node |
| SDP | service delivery point |
| SIPRNET | secure internet protocol router network |
| SLOS | standard levels of service |
| SMART | Simulation and Modeling for Acquisition, Requirements and Training |
| SNMP | simple network management protocol |
| SONET | synchronous optical network |
| SQL | standard query language |
| SSO | special security office |
| STAMIS | Standard Army Management Information System |
| STE | secure terminal equipment |
| STOW | synthetic theater of war |
| STP | shielded twisted pair |
| STU | secure telephone unit |
| TACWAR | tactical warfighter |
| TADLP | Total Army Distance Learning Program |
| TADSS | Training Aids, Devices, Simulators and Simulations |
| TAFIM | Technical Architecture Framework for Information Management |
| TAMIS | Training Ammunition Management Information System |
| TASS | Total Army School System |
| TCC | telecommunications center |
| TCP/IP | transmission control protocol/internet protocol |
| TDA | table of distribution and allowance |
| TELNET | telecommunications network |
| TEMO | training, exercises and military operations |
| TIC | Technology and Integration Center (Fort Huachuca) |
| TIMPO | Tri-Service Infrastructure Management Program Office |
| TLA | Top Level Architecture |
| TOE | table of organization and equipment |
| TPIO-SE | TRADOC Program Integration Office for Synthetic Training Environment |
| TPO | TRADOC project offices |
| TPRISM | TRADOC Plan for Reengineering Information System Modernization |
| TRAC | TRADOC Analysis Center |
| TRADOC | Training and Doctrine Command |
| TRAVISS | Training and Visual Information Support System |
| TSACS | Terminal Server Access Controller System |
| UA | user agent |
| UDP | User Datagram Protocol |
| UFR | unfinanced requirement |
| USAISEC | Information Systems Engineering Command |
| USAR | United States Army Reserve |
| USASC | U.S. Army Signal Command |
| UTP | unshielded twisted pair |
| VAX | Virtual Address Extension |
| VIC | Vector in Commander |
| VTC | video teleconferencing |
| WAN | wide area network |
| WARSIM | Warfighters' Simulation |
| WWW | World Wide Web |
| Y2K | year 2000 |

## Terms

**area distribution node (ADN)** - concentrates the data from end-user systems and lower level networks and provides their entry point into a higher level network, i.e., CAN.

**campus area network (CAN)** - interconnects LANs using a broadband network (often referred to as an installation backbone) covering a geographic area larger than that of the individual LANs, but usually restricted to a geographic region about the size of a campus or military installation. The CAN includes cabling (usually single-mode fiber) and network devices (routers, gateways, and bridges) which enable information transport IAW protocols (e.g., FDDI or ATM/Synchronous Optical Net (SONET)). If the function of a component is to provide an inter-network interface into the common user installation level network, then it is categorized as part of the CAN.

**client** - a computer, often a PC at the action officer level, that makes requests for services (e.g., for a database record) to a server. The server, often a higher performance computer, fills those requests and sends the result via a network. Since the client and server must cooperate, both follow standardized protocols.

**edge device** - an interface device connecting legacy platforms, networks and peripherals to an ATM network.

**hub** - Hubs are networking devices to connect a group of circuits at one point on a network, and typically include a chassis, power supplies, management and host modules. Hubs are often repeaters, bridges or routers. Hubs enable single point management functions, e.g. changing connections. Hubs can come bundled with various degrees of capabilities, e.g., an intelligent hub will communicate network management information to a network administrator's workstation. Hubs can be employed at all levels of networking, i.e., WAN, CAN, LAN.

**information management** - creation, use, sharing, and disposition of information as a resource critical to the effective and efficient operation of functional activities. The structuring of functional processes to produce and control the use of data and information within functional activities, IS, and computing and communication infrastructures.

**instructional technologies** - typically integrated suites of COTS products, used to enable new techniques for training development and delivery, e.g., interactive courseware development tools, distance learning, and student/instructor groupware. M&S used as in training exercises, military operations rehearsal, and training devices. These include equipment simulators and simulations for command post exercises.

**Internet** - a worldwide public network of interconnected servers. The servers provide various services to heterogeneous client platforms. Notable services include file transfers and information searching using hyperlinks (WWW).

**Intranet** - a network limited to servers inside security devices designed to control access to a specific set of users. Servers on Intranets can offer the same type of user services as on the Internet. Network segments may be shared with public networks since the security devices protect access to data and services on the servers.

**legacy systems** - systems that are candidates for phase-out, upgrade, or replacement. Generally, legacy systems are in this category because they do not comply with standards.

**local area network (LAN)** - interconnects clients and servers within a small geographical area, usually within a building. There is no universally accepted boundary between a LAN segment and a CAN, but TPRISM generally uses the term LAN for the network segment among collocated end-users, while CAN is the term used for the installation's data backbone network that interconnects the users' LANs.

**management information systems (MIS)** - databases used to support training analysis, development, evaluation and management processes. These are typified by large databases and high transaction volumes. Example capabilities include managing correspondence courses, scheduling classrooms and equipment, and maintaining student records.

**platform** - the entity of DoD's Technical Reference Model that provides processing and communication services through a combination of hardware and software.

**router** - interconnects two or more networks and passes data packets between them. A router performs two distinct functions: route processing and packet switching. Route processing determines the next hop, i.e., where to forward a packet that is received. Routers exchange connectivity information with other routers to determine network addresses and adapt to changes. Packet switching is the actual forwarding of a received packet on the basis of the source and destination addresses of the packet, and the next hop routing information in the router. A number of other packet-level functions (such as filtering) may also be performed during the forwarding operation.

**server** - a host or computer that processes and shares information with other servers through communications media. A server generally executes aspects of application programs used by a group of users, although there are a variety of other server capabilities, e.g., data storage. A server can also act as a router.

**service delivery point** - a combination of physical, electrical/optical, functional, procedural, protocol, and service characteristics which establish an interface between DISN equipment and DISA-designated customer premise equipment. DISA will provide service via a SDP that defines the demarcation between the DISN and customer responsibilities.

**switch** - provides a bridge, or connection, among multiple networks.

**wide area network (WAN)** - interconnect geographically-dispersed CANs and servers. WANs can range from complex structures of switches to simple point-to-point lines.

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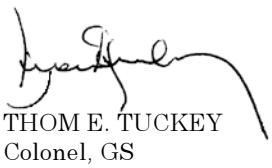

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