

LandWarNet 2020 and Beyond Enterprise Architecture



Version 1.0

7 August 2013





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Revision History

Revision	Source	Date	Description of Change
V 1.0	SAIS-AOB	7 August 2103	Initial Release





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Executive Summary

The Army of the future will be smaller, more efficient, better trained, and more expeditionary in nature than today's Army. Modernization of the Army's Network (Land Warrior Network (LandWarNet)) is critical to achieving this transformation and for conducting the full range of military operations, including Joint and coalition operations.

Accordingly, the Army developed a plan and methodology for achieving cost-effective IT modernization that will meet the Army's vision of LandWarNet in the future. This plan / methodology is described in three primary documents: the Army Network Strategy, the LWN 2020 and Beyond Enterprise Architecture, and the Integrated Network Plan. These documents are aligned and synchronized to optimize LandWarNet transformation. The Strategy document addresses three time horizons: near-term (FY14-15), mid-term (FY16-19), and long-term (FY20-30). The Enterprise Architecture focuses on the end-state vision in the FY2020 timeframe. The Plan focuses on the Program Objective Memorandum (POM) timeframe (FY16-20).

This document presents the enterprise architecture (EA) envisioned for LandWarNet in the 2020 and beyond timeframe. While not yet fully defined, this enterprise architecture (denoted LWN 2020 EA) shows how the Army's vision and strategic goals, captured in the Army Network Strategy, will be addressed. It specifically addresses the following four strategic goals:

- Integrate Army networks
- Dramatically improve Network defense posture
- Realize efficiencies while improving effectiveness
- Enable Joint interoperability and collaboration with Unified Action Partners.

LWN 2020 EA represents a paradigm change from a segmented, stove-piped approach to IT to a shared, standards-based, approach. LWN 2020 EA is a service-oriented architecture (SOA) centered around three interconnected IT environments: the Enterprise IT Environment, the Installation IT Environment, and the Operational IT Environment. The Enterprise IT Environment provides all common IT services, including long haul data transport, to all Army Users. It also centralizes NetOps and security functionality. The Installation IT Environment provides all IT services that are local to installations, and to Users resident at those installations. Installations are permanent or semi-permanent bases, posts, camps, or stations (B/P/C/S). The

Operational IT Environment provides all IT services to deployed tactical Users. The interconnectivity between these IT environments enables secure, transparent, universal access to all Army data and services regardless of echelon or location.

This document describes LWN 2020 EA at a high level. Its five appendices (listed below) refine particular aspects of the LWN 2020 EA. They are all in development or revision in the FY13 timeframe.

- Appendix A – Technical Standards
- Appendix B – Installation
- Appendix C – Common Operating Environment (COE)
- Appendix D – Deployed
- Appendix E – Enterprise / Joint Information Environment.

Approved By:



Mr. Gary Blohm

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CIO/G-6

1. Introduction

1.1 Background

Secretary of the Army Directive 2013-02¹ states that “The entire network will be treated as a single entity unified from the Global Information Grid (GIG) (renamed the Department of Defense Information Network (DDIN)) to the installation to the farthest tactical edge, and provide integrated capabilities seamlessly from home station, through the enterprise, to the lone dismounted Soldier in the theater.”

Consistent with this directive, LandWarNet can be viewed from two perspectives. One perspective is that LandWarNet is the Army’s IT “system” that provides IT capabilities to all Army users. By definition, LandWarNet encompasses the entire Army network, including IT systems and applications provided by the Warfighting and Business Mission Areas. The term “network” encompasses all of the systems, policies, procedures, personnel, technologies, etc. required to provide IT capabilities to Army users. The network itself is composed of five components: transport, computing, applications, data, and services. Army IT capabilities are provided by LandWarNet systems that individually include one or more of these components. This perspective is consistent with LandWarNet being the Army’s portion of the GIG and is aligned to the DoD Joint Information Environment (JIE).

The second perspective focuses on the Army missions and environments that LandWarNet supports; i.e., on the support that LandWarNet provides to the Operating Force and the Generating Force. Both perspectives will be used throughout this document to discuss the end-state IT capabilities as well as to provide context for how those capabilities align with Army operations.

1.2 Purpose

This document and its five appendices define the LandWarNet 2020 and Beyond Enterprise Architecture (LWN 2020 EA). This document presents an overview of LWN 2020 EA structure

¹ Network 2020 and Beyond: The Way Ahead

and its foundational concepts. The appendices provide additional detail on key facets of the LWN 2020 EA. Note that LWN 2020 EA is an objective, or end state, architecture. It will be built out incrementally via Network Capability Sets (NCS) that are planned and implemented over time. Annual NCSs will be defined in the Integrated Network Plan (IPN).

The role of enterprise architecture in the Army's IT architecture development process is described in the DA PAM Army IT Architecture Instructions (Reference 1).

1.3 Scope

The scope of this document is the enterprise architecture of LandWarNet in the 2020 timeframe and beyond. This scope is bounded in time (i.e., the 2020 timeframe), in level of abstraction (i.e., the enterprise level of abstraction), and in domain (i.e., Army IT).

1.4 Audience

This document will inform all LandWarNet stakeholders, including IT investment decision makers across the Enterprise Information Environment, Warfighter, and Business Mission Areas, capabilities managers and integrators in the Training and Doctrine Command (TRADOC), and solution developers and architects in the Office of the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) (ASA(ALT)).

It will be used most directly by the Network Mission Area (NMA) to align network capability sets with the Army's vision and strategic objectives for LandWarNet, by ASA(ALT) as a driver and constraint on the system and system-of-systems architectures, and by TRADOC to influence non-material capability development and synchronization.

1.5 References

1. DA PAM Army IT Architecture Instructions (draft 31 May 2013)
 2. LWN 2020 and Beyond Strategy (draft 31 May 2013) (renamed Army Network Strategy, currently in Staffing))
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2. LWN 2020 EA Drivers

The CIO/G-6 vision for LandWarNet is as follows:

The Network is the key to a smaller, more capable, better trained expeditionary army. LandWarNet 2020 and beyond must enable our army to train as we fight and deploy on little to no notice anytime, anywhere in austere environments. To accomplish this, the Network has to be a single, secure, standards-based environment that ensures access at the point of need and enables global collaboration.

LWN 2020 EA is the overarching approach to satisfying this vision. The two primary sources for LWN 2020 EA requirements are the LWN 2020 and Beyond Strategy and the LandWarNet Initial Capabilities Document (LWN ICD). LandWarNet provides the IT portions of Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities - Policy (DOTMLPF-P) capabilities required to meet Army operational and business needs.

2.1 LandWarNet Strategic Goals

LWN 2020 EA is driven by the LWN 2020 and Beyond Strategy document (Reference 2). This document captures the Army's vision for LandWarNet and its strategic goals. These goals, and their impact on the LWN 2020 EA, are described in the following paragraphs.

2.1.1 Integrate Army Networks

This goal envisions LandWarNet as a single, secure, virtual network. The primary objectives of this goal are to: (a) optimize the functional and physical redundancy and robustness of Army networks, and (b) to provide users with universal access to data and services, subject to IT infrastructure limitations. LWN 2020 EA provides the framework in which network capabilities will be centrally managed and delivered in accordance with desired characteristics.

2.1.2 Dramatically Improve Network Defense Posture

This goal envisions a LandWarNet that is secure from both internal and external cyber threats. LWN 2020 EA consolidates network defense functionality at the enterprise level, which provides defense-in-depth uniformly across LandWarNet. This substantially reduces the vulnerability of the network in cyberspace and simplifies the detection and response to security events and

intrusions, whether from internal or external sources. A Security Classification Guide (SCG) will be developed to inform requirements and architecture to ensure physical, personnel, and network security.

2.1.3 Realize Efficiencies While Improving Effectiveness

This goal recognizes the fact that LandWarNet must continue to support the Army's current and future missions while in a period of diminishing resources. LWN 2020 EA addresses this goal in three ways. First, it provides the mechanism to better inform Army leaders and decision makers throughout the portfolio management process. The underlying assumption behind this approach is that IT investment decisions at all levels can be improved if they are aligned with a consistent end state architecture such as LWN 2020 EA. Second, LWN 2020 EA recognizes and incorporates the use of the best practices in the IT industry. For example, it facilitates the planning for, and investment in, capabilities that provide enduring technology overmatch. Third, LWN 2020 EA provides a vehicle for identifying and reducing duplicative functionality, for eliminating unwarranted competition for resources, and for maximizing the use of existing capabilities.

2.1.4 Enable Joint Interoperability and Collaboration with Unified Action Partners

This goal recognizes the fact that military operations in the future will be joint and coalition-based. The Army is fully supportive of, and is participating in, the Mission Partner Environment (MPE) implementation, and the U.S. Army Coalition Interoperability Assurance and Validation Team, to enable Mission Partner interoperability and collaboration. Therefore, LandWarNet must support non-Army users in an interoperable and collaborative way. LWN 2020 EA achieves this goal by aligning LandWarNet with the DoD Joint Information Environment (JIE) and by standardizing those aspects of LandWarNet that contribute to interoperability and collaboration, such as the development of the Common Operating Environment (COE) and delivery of shared enterprise services. Standardization also applies to the use of common interfaces, policies and procedures, as well as to the use of standardized solutions across systems that are operationally independent.

2.2 Army IT Requirements

DOTMLPF solutions are developed in response to identified and validated mission capability gaps. The cumulative set of IT requirements for LandWarNet, is derived from the materiel solutions that are developed and deployed to support the larger DOTMLPF spectrum.

2.3 Paradigm Shift

The achievement of the above LandWarNet strategic goals requires a paradigm shift in the way that LandWarNet is perceived and designed. This paradigm shift is illustrated in Figure 2-1, and is reflected in LWN 2020 EA.

The current LandWarNet paradigm is to build, operate, and maintain most IT capabilities at the local or command levels. Only shared transport and a limited number of common (i.e., core) services exist at the enterprise level. This paradigm is not consistent with the LandWarNet strategic goals discussed above.

The focus of the new paradigm is to maximize the use of shared resources. Most IT capabilities will be provided at the enterprise level, with exceptions for those with sufficient justification (unique, mission specific, and local) to remain at the command levels. This paradigm shift affects the way IT capabilities are designed, acquired, and managed.

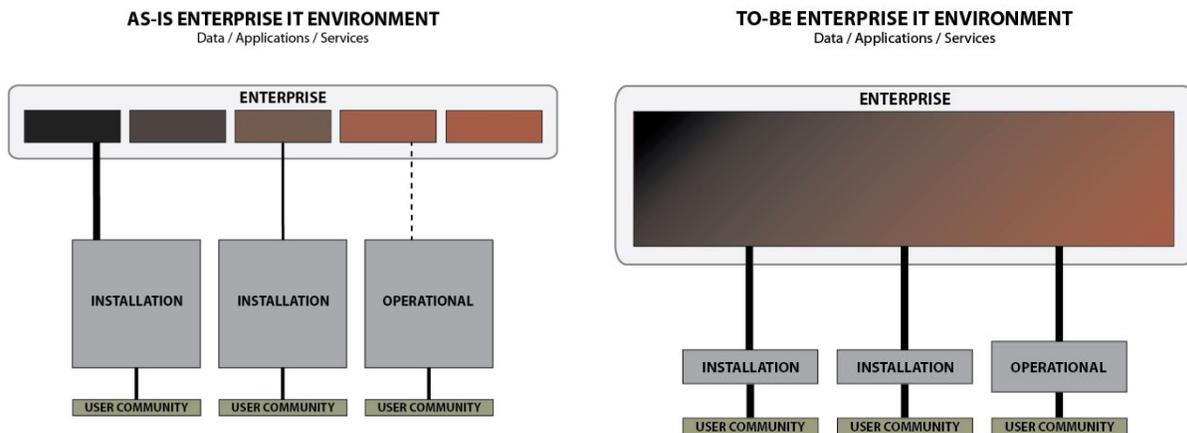


Figure 2-1 LandWarNet Paradigm Shift

3. LWN 2020 and Beyond Enterprise Architecture

Although the vision for LandWarNet is for a single, secure, virtual network, it is not fully planned, acquired, or operated by a single Army organization. Therefore, it is critical for all LandWarNet leaders, decision makers, and architects to have a shared understanding of LWN 2020 EA, and how it will translate to materiel and non-materiel solutions and the missions they support. This document describes LWN 2020 EA from three perspectives: a functional perspective, a system perspective, and an operational perspective. The building blocks of LWN 2020 EA are conceptual entities, since the LWN 2020 EA is an enterprise architecture represented at a high level of abstraction and does not identify specific IT systems.

The functional perspective shows how LWN 2020 is logically partitioned and organized based on mission requirements for IT capabilities. It describes the three IT environments that comprise LWN 2020 EA.

The system perspective describes the key IT capabilities within LWN 2020 EA. These high-level components directly reflect the Army's vision of LWN 2020 and beyond.

The operational perspective describes the service-oriented nature of LandWarNet. It outlines the enterprise-first concept of LandWarNet 2020 and Beyond for providing IT services to users, regardless of location or mission.

3.1 Functional Perspective

3.1.1 Decomposition

A functional perspective of LWN 2020 EA is shown in Figure 3-1. This perspective shows that LWN 2020 EA is decomposed into three IT Environments, each of which represents a unique category of mission functions that LandWarNet supports. These IT environments are the Enterprise IT Environment, the Installation IT Environment, and the Operational IT Environment. This logical grouping of IT capabilities into these three IT environments is based on strategic level considerations. It reflects the long-standing organizational construct of the Army (i.e., Installation IT Environment ~ Generating Force, Operational IT Environment ~ Operating Force) while also recognizing fundamental distinctions between the IT capabilities themselves.

Each IT Environment is then further decomposed into Mission Environments (ME), which represent the physical environments in which Army work is performed, such as office environments, command posts, foxholes, etc. Generically, each IT environment will provide IT capabilities, but these IT capabilities will vary by IT environment, and by the needs of the users within each type of ME. As an example, within Operational IT Environment, the IT capabilities provided in Command Posts will be different from those provided to Dismounted Soldiers.

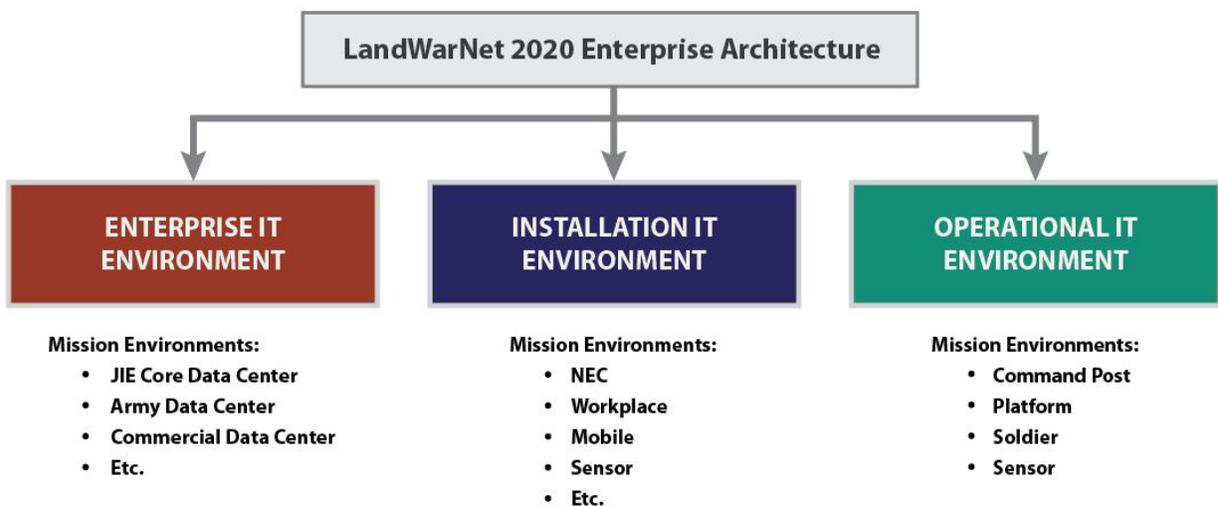


Figure 3-1 Decomposition of LWN 2020 EA Into IT Environments

3.1.2 Enterprise IT Environment

The Enterprise IT Environment (EIE) is the backbone of the LandWarNet. It enables interoperability, and connects users operating throughout the network. The EIE begins at, and connects to, the Installation IT Environment and the Operational IT Environment at appropriate Points of Presence (PoP). Examples of PoPs include Regional Hub Nodes (RHN), Installation as a Docking Station (IADS), and Department of Defense (DoD) Teleport sites. Unlike the other IT environments, the EIE has very few dedicated end-users and is not defined by its physical location as its assets may reside in Army enterprise facilities, Joint facilities such as Defense Information Systems Agency (DISA) Defense Enterprise Computing Centers (DECC), and, in

some instances, commercial facilities. The EIE is generally characterized by high-capacity and always-on transport, and by shared computing. It provides IT services to all users, including the hosting of shared and mission-specific applications. Appendix E (Enterprise) further defines the Enterprise IT Environment.

3.1.3 Operational IT Environment

The Operational IT Environment (OIE) encompasses the portion of LandWarNet that is physically deployable to tactical locations. It directly supports operational units whether they are based (at an installation), deployed, or in training. The OIE begins, and connects to the EIE, through a PoP such as an RHN located in-theater. The OIE may also connect to the IIE directly through IADS. This IT environment is designed to operate in dynamic, less environmentally controllable, and mobile environments, with little or no in-place IT infrastructure. The OIE is generally characterized by disconnected, intermittent, or limited (DIL) communications, frequency-based transport, and local computing capabilities. It consumes limited enterprise services and locally provides and hosts all required applications not otherwise available. Unlike the other IT environments, the OIE usually exists in austere places that do not provide the reliable infrastructure needed for fixed or permanent installations. Appendix D (Deployed) further defines the Operational IT Environment.

3.1.4 Installation IT Environment

The Installation IT Environment (IIE) encompasses the portion of LandWarNet that is physically located on the Army's fixed- and temporary posts, camps, and stations (P/C/S). The IIE begins at the Army-owned portion of the PoP at each P/C/S. The IIE connects to the Enterprise IT Environment and the Operational IT Environment through the IPN and the IADS, respectively. The IIE is generally characterized by reliable transport and by mature and connected computing at all levels. It is a consumer of enterprise network services, provides local network services, and hosts mission-specific applications local to an installation. Appendix B (Installation) further defines the Installation IT Environment.

3.2 Systems Perspective

The systems perspective recognizes that LandWarNet is an integrated set of IT materiel solutions that form the Army's network. LWN 2020 EA defines five components that are the building blocks of the network: transport, computing, applications, services, and data. This section describes LWN 2020 EA in terms of these components.

3.2.1 Transport

LandWarNet is a single, virtual, network that provides universal connectivity between LandWarNet IT systems. In reality, this network includes a complex transport system that is optimized to support individual commands, functions, and locations. In some instances, the transport capability itself is provided by an organization external to the Army, such as when DISA provides high-bandwidth, globally distributed, long-haul communications.

A key LWN 2020 concept is that the flow of data is managed centrally, but in response to Army policies and operational needs. The transfer of data is optimized, but remains transparent to users regardless of the format, protocol, and or medium changes that may be necessary in the end-to-end flow. It also allows transport resources to be dynamically allocated to better accommodate operational needs.

Another key LWN 2020 EA concept is the consolidation of the multiple physical transport systems that exist today. This implies the minimization of functional redundancy, except as required for performance, responsiveness, and/or continuity of operations.

Finally, LWN 2020 EA requires that global transport capabilities in the Enterprise IT Environment, and hence the services they enable, can be rapidly and efficiently extended to locations that are austere or have little previous Army presence. This is required to better support deployed operational units by providing access to some enterprise services from any location.

3.2.2 Computing

Computing (or data processing) is the execution of applications on specific datasets. The computing component of LWN 2020 EA consists of the hardware and system software (e.g., operating systems) that provide support for application hosting, data processing, and data

storage. Computing capabilities reside in all mission environments, and are based on the specific requirements of particular IT systems. Some IT systems may need to operate in “connected,” “disconnected,” or DIL modes. Computing components are further defined in Appendix C (Common Operating Environment). This appendix defines a family of standardized computing environments (CE) that will be used as appropriate throughout the network. The purpose of the COE is to achieve the benefits of IT hardware standardization in the software development lifecycle.

Additionally, a key LWN 2020 EA concept is that of “thin client.” This concept implies that the CEs embedded in end-user devices (i.e., devices that provide human-to-machine interface) will support the interface, but not the actual execution of mission applications, data processing, or data storage. These capabilities will instead be provided remotely, with the resulting data and information delivered to the end-user device. Although primarily intended for Army users in the Generating Force, “thin client” will be applied as appropriate in the Operating Force.

3.2.3 Applications

An application is a software program that performs a specific function or set of functions. In general, the Army has three categories of applications: mission-specific applications (e.g., logistics), core enterprise applications (e.g., collaboration), and infrastructure related applications (e.g., NetOps).

Foundational, or enterprise-wide, applications are the basis for standardization in LWN 2020 EA. There are two primary approaches to application standardization. First is the consolidation of functionally similar applications (from multiple Army organizations) into a single enterprise application. The intent of this approach is that the Enterprise IT Environment will provide a single application that supports those multiple users. The second approach deals with the case in which the Enterprise IT Environment cannot provide sufficient performance. In this case, a common, standardized, application may be justifiably hosted in, or distributed across, multiple IT environments.

All applications, by LWN 2020 EA direction, will be hosted in the Enterprise IT Environment to the extent possible. This enables the Enterprise IT Environment to achieve the economies of scale associated with general-purpose, shared, computing environments. Only those

applications with sufficient business rationale will be hosted in the Installation IT Environment or the Operational IT Environment.

3.2.4 Services

A key LWN 2020 EA concept is the shift of service management and execution from the local level to the enterprise level, and the adoption of a service-oriented architecture (SOA) approach. For the Army, this requires that the Enterprise IT Environment be built out to support the development and delivery of services for the entire Army user base, regardless of location. The SOA approach requires additional infrastructure that enables users to discover the services that are available to them, and to configure and control LandWarNet to provide the services that users request. Services, as described below, will support the warfighter and business missions of the Army as well as those required to operate, maintain, and defend LandWarNet.

- **Network Services:** These services are centrally delivered in order to support the operate, maintain, secure, and defend functions of network managers and operators. Examples include DISA's provisioning of NIPR or SIPR, ARCYBER's continuous monitoring program (for both defensive and offensive purposes), and the Army's Identity and Access Management (IdAM) service.
- **End-User Services:** These services are delivered to provide common functional capabilities to LandWarNet end-users. Examples of this type of service include DISA's Enterprise E-mail (EE) or Defense Connect Online (DCO), the Army's Enterprise Content Management and Collaboration (ECMC) or Unified Capabilities (UC). Central to the End-User Services objective is the concept of providing a common user experience. This concept implies that each of the services that a user is able to access will have a similar look and feel, and that this will not vary by the user's location (although the set of available services may change).

3.2.5 Data

Data, in the context of LWN 2020 EA, refers to all data, information, and content resident in LandWarNet. While not technically a materiel solution, it is critical to recognize data as the most fundamental component of the network. LandWarNet exists to collect, process, and

disseminate data. Data includes both mission data and non-mission data. The LWN 2020 EA objectives for data are that all data is universally available across LandWarNet, and that the data itself is easily visible, accessible, understandable, trusted, and interoperable by various potential users, subject to appropriate Identity and Access Management (IdAM) requirements.

Of particular importance is the suitability of the data for analysis. The Army Information Architecture (AIA) provides specific direction as to the structure, authenticity, availability, and use of data within LandWarNet.

3.3 Operational Perspective

Overall, LandWarNet in the 2020 timeframe will be service oriented. Army users are able to access IT services at the point of need, where and when they need them, to perform their activities and tasks. The required IT services are provisioned at the enterprise level within the LWN 2020 EA.

Users may, at different times, be physically located in a variety of mission environments, including on installations, in tactical areas-of-operation, at home, etc. Regardless of location, users will have connectivity to LandWarNet through an end-user device. Once connected and authenticated, a user will have access to all available IT services and information to which he is entitled.

LandWarNet will provision those services in a way that is transparent to the user, and in a manner that provides a consistent user experience. The provisioning of services will be governed by service-level agreements (SLA) that are measureable and enforceable.

3.4 Technical Guidance and Standardization

LWN 2020 EA addresses three key technology-related characteristics: technical standards, reference architectures, and technology insertion.

3.4.1 Technical Standards

The design and implementation of the IT systems that comprise LandWarNet are constrained by the technical standards identified in LWN 2020 EA. Technical standards may apply to specific technologies, to specific components, and/or to specific designs. The use of technical

standards helps ensure technical consistency across LandWarNet, promotes interoperability, and reduces costs. The technical standards that are applicable to LandWarNet are identified in Appendix A (Technical Standards).

3.4.2 Reference Architectures

Reference Architectures (RA) are authoritative sources of information about specific subject areas that guide and constrain the instantiations of multiple architectures and solutions. The use of reference architectures eliminates the costs and complexity associated with different, but equivalent, architectures for the same IT functionality. LWN 2020 EA currently identifies six (TBR) enterprise-level Reference Architectures:

- Identity and Access Management (IdAM)
- Network Operations (NetOps)
- Unified Capabilities (UC)
- Thin Client (TC)
- Security Architecture (SA)
- Army Information Architecture (AIA).

3.4.3 Technology Insertion

The solution architectures of the systems that comprise LandWarNet will be designed to facilitate technology insertion. Technology insertion refers to the ability to perform the same functions better with new technologies, and the ability to update current systems to perform new or modified functions. The facilitation of technology insertion is the ability of an architecture to accommodate technology insertion without significant architectural changes. This characteristic will enable LandWarNet to exploit new technologies and commercial breakthroughs more rapidly.

4. Way Ahead

The LWN 2020 and Beyond Strategy, the LWN 2020 and Beyond Enterprise Architecture (LWN 2020 EA) and the Integrated Network Plan are aligned and synchronized to enable the transformation of LandWarNet to enable the Army's vision of a smaller, more efficient, better trained, and more expeditionary force. LWN 2020 EA provides the end state (or "to be") architecture that the Army will use as a guidepost for future development. This end state will be realized through the execution of the Integrated Network Plan.

This document, the LWN 2020 EA, will be revisited periodically to assure that it continues to reflect the Army's LandWarNet strategy and strategic goals, revolutionary advances in IT technology, and changes in the Army's mission and doctrine.
