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LIGHTWEIGHT TACTICAL CLIENT: A CAPABILITY-BASED APPROACH TO COMMAND POST COMPUTING

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14. ABSTRACT

   The technical terms "thin client" and "light client" are frequently referenced within the U.S. Army as a means by which to describe the future direction of command post computing architecture. However, the tactical capability of fully disconnected operations (a critical Command Post Client requirement) cannot be realized through use of a traditional thin client. It is, therefore, critical to extract key capabilities from the definition of a thin client and propose a new term that is not bound to the thin client terminology. This report opens with two definitions of a thin client: one offered by industry and another by the U.S. Army. The thin client capabilities that meet the needs of a Command Post Client are then extracted from these definitions. These capabilities are paired with tactical capabilities incompatible with thin client architecture. A new term that bundles these capabilities together is proposed: a lightweight tactical client. In order to avoid miscommunication in the future, it is recommended that the term "thin client" be phased out in favor of the new term or an acceptable equivalent.

15. SUBJECT TERMS

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Thick client	Command post computing environment		Command post client		

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INTRODUCTION

The technical terms "thin client" and "light client" are frequently referenced within the U.S. Army as a means by which to describe the future direction of command post computing architecture – namely, a Command Post Client. However, there appears to be a gap between the technical understanding of the term "thin client" as a software application and the perception of a thin client application from an operational standpoint. For example, a requirement of a Command Post Client (ref. 1) is the capability to operate for an extended period of time (48+ hr) while completely disconnected from a network (ref. 2). However, the technical definition of a thin client does not support this requirement, as a thin client leverages architecture designed for server-side data and business logic processing. This processing requires a persistent network connection to an external server. Once disconnected from the network, a true thin client loses its operational capability (essentially acts as a "dumb terminal"). It is, therefore, critical to understand the specific subset of thin client capabilities required of a Command Post Client. Leveraging this understanding, a Command Post Client can be designed in a way that meets the needs of the Command Post Computing Environment (CPCE) while remaining technically feasible.

THIN CLIENT DEFINITIONS

The U.S. Army Chief Information Officer G6 provides definitions for both thick and thin clients that align well with industry definitions. These definitions are in the following paragraphs, and they are followed by industry definitions. However, neither the U.S. Army's nor industry's definition of a thin client allows the full set of required Command Post Client capabilities.

U.S. Army Definition of Thick and Thin Clients (ref. 3)

Thick Client

Thick clients, also called heavy clients, are full-featured computers that are connected to a network. Unlike thin clients, which lack hard drives and other features, thick clients are functional whether they are connected to a network or not. While a thick client is fully functional without a network connection, it is only a "client" when it is connected to a server. The server may provide the thick client with programs and files that are not stored on the local machine's hard drive. It is not uncommon for workplaces to provide thick clients to their employees. This enables employees to access files on a local server or use the computers offline. When a thick client is disconnected from the network, it is often referred to as a workstation.

Thin Client Terminal

The thin client terminal is an end-user device. The thin client terminal will replace user's current desktop personal computer. End-user devices in Thin/Zero Client Computing rely on network access to backend infrastructure for these functions. These virtual user devices, known as thin or zero client devices, have no (or a limited) local hard drive and require a common access card or secure token to log on and operate. Virtualized client applications, backend servers, and data storage are located in the backend infrastructure.

Industry Definition of Thin Client (ref. 4)

A thin client is a client machine that relies on the server to perform the data processing. Either a dedicated thin client terminal or a regular personal computer (PC) with thin client software is used to send keyboard and mouse input to the server and receive screen output in return. The thin client does not process any data; it processes only the user interface (UI).

There are three ways thin clients are used. The first two are traditional thin clients processing only the UI, and the third is a variation that processes the data.

Shared Services (User Interface Processing)

Using shared terminal services software such as Windows® Terminal Services, Windows® Remote Desktop Services, or Citrix® XenApp, users share the operating system and applications in the server with all other users at thin client stations. Although presented with their own desktop, users do not have the same flexibility as they do with their own PC and are limited to running prescribed applications and simple tasks such as creating folders and shortcuts

Desktop Virtualization (User Interface Processing)

Using products such as VMware Desktop Manager, the Virtual Desktop Infrastructure component in Remote Desktop Services and Citrix® XenDesktop, each user's desktop (operating system and applications) resides in a separate partition in the server called a virtual machine. Users are essentially presented with their own PC, except that it physically resides in a remote server in the datacenter. They can modify the desktop and add applications like they could with their own PC ("fat client").

Browser-based (Data Processing)

This approach uses ordinary PCs connected to the Internet, and applications are executed in the Web browser. Although the user's machine does the data processing, it is thin client computing because the software and data are retrieved from the network. Very little, if anything, is stored locally. If users spend most of their time running Web applications, they are doing thin client computing whether they have a fully loaded PC or not. Figure 1 is a diagram of the thin client architecture described by definition no. 3.
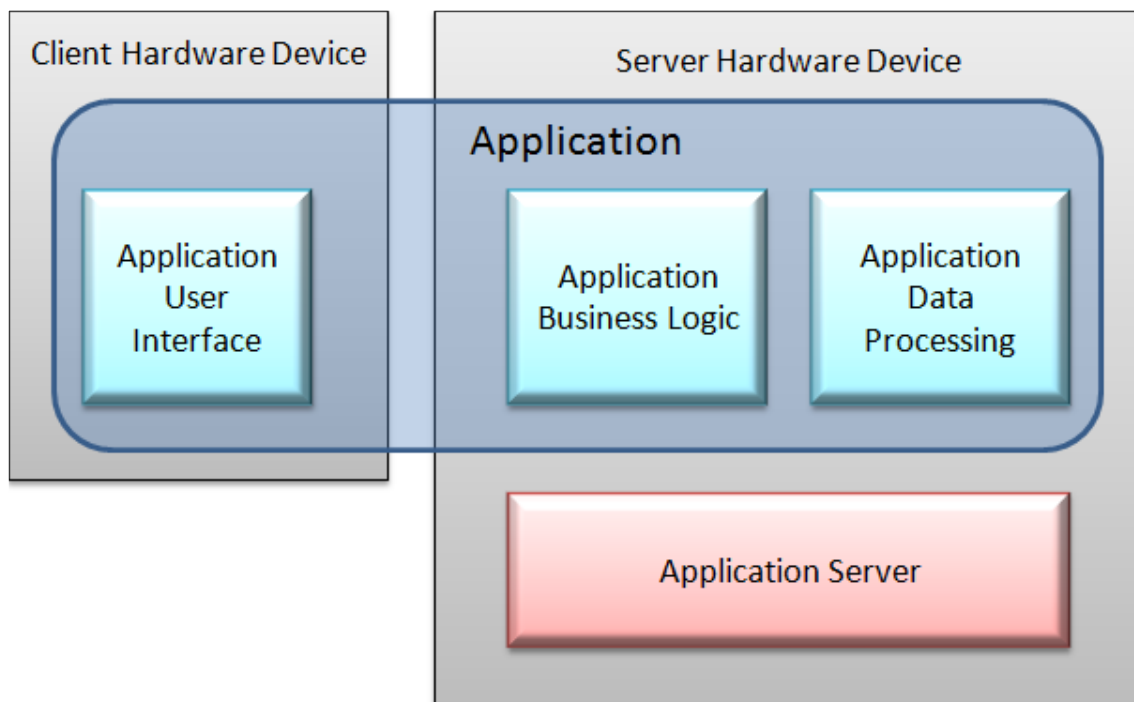

Figure 1
Thin client architecture

CRITICIAL CAPABILITIES

A thin client in the context of command post computing refers to the third industry definition, the browser-based thin client. However, in order to support disconnected operations, the assertion that "very little is stored locally" must be broken. Long-term disconnected operations require local caching of the application data along with a local repository of business-specific data. Thus, a thin client described by either the U.S. Army or industry definition will not satisfy command post computing requirements.

However, thin clients do possess certain capabilities that provide high value to command post computing. Additionally, the element of human perception associated with the term thin client is highly relevant. The following are the critical capabilities of a Command Post Client extracted from the thin client definition and applied to an operational CPCE. They are divided into two primary categories: accessibility and perception.

Accessibility

- Minimize field service representative (FSR) maintenance footprint
    - Installing and configuring the client should not require FSR support

- Administrative access to client machine not required
    - Lightweight install
        - Install not required or client installed without the use of administrative rights
        - A new user without administrative rights should have the ability to connect a laptop or tablet to the network without the client installed and have the ability to use the client within 10 min or less
    - Network updates
        - When updates are pushed, they can be downloaded and applied via the network by a user without administrative rights

Perception

- Perceived as lightweight in terms of central processing unit (CPU), memory, and bandwidth footprint

- Able to operate on a physically light platform (tablet computer, laptop, phone, etc.)
    - Not restricted to such a platform

- Responsive UI

Note the absence of a requirement to process data on the server side or maintain a persistent connection to a server. In fact, these capabilities do not include any architectural requirements at all. These qualities are all operational and/or perceptive in nature. It is important to note that the responsive UI perception requirement may actually rule out some browser-based solutions and almost definitely rules out most terminal-based thin clients.

LIGHTWEIGHT TACTICAL CLIENT

As the previous qualities do not describe a thin client as defined by the U.S. Army or industry, they require a different term – a lightweight tactical client (LTACC).   Such a client is defined by the following criteria:

Lightweight

Capabilities

- Administrative access not required to install and/or operate client
- One-touch install
- Updates delivered via network

Considerations

- Minimal CPU, random-access memory (RAM), bandwidth footprint
- Responsive UI

Tactical

Capabilities

- Supports continuous operations during disconnected, intermittent, and latent states including fully disconnected operations
- Able to operate on a physically light platform (tablet computer, laptop, phone, etc.); not restricted to such a platform

Note that the lightweight considerations require further definition in order to become suitable for development purposes. The architecture of a LTACC is shown in figure 2.
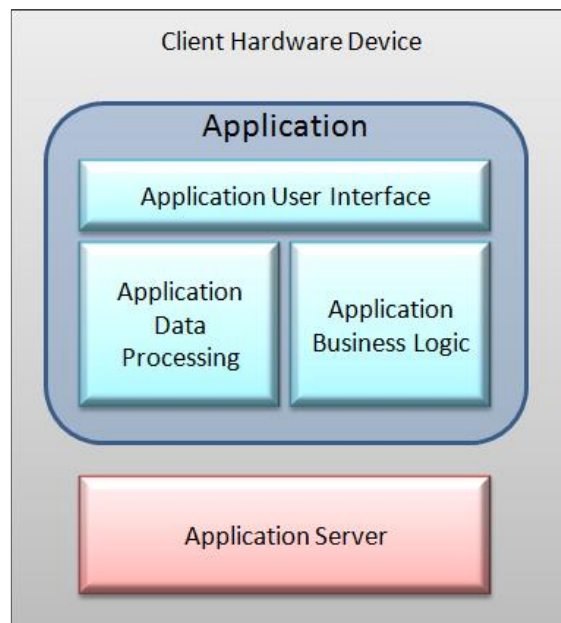

Figure 2
LTACC architecture

A technical option that facilitates disconnected operations is the presence of the application server on the local client machine. This may appear to contradict the "lightweight" nomenclature used in the proposed terminology. However, it should be noted that an application server is extremely lightweight in terms of CPU and RAM usage on most modern machines. The co-location of the application server on the client device is necessary for disconnected operations.

Additionally, when all of these components are placed on the client machine, this diagram resembles a thick client. The term thick client shouldn't be used instead of LTACC, and the thick client terminology should be avoided for similar reasons as the thin client terminology. A LTACC contains a unique set of properties pulled from both thick and thin clients and, therefore, requires separate terminology.

CONCLUSIONS

In order to effectively communicate the requirements of a Command Post Client in the coming decade, a proper definition of such a client must be presented. Historically, the term "thin client" has loosely been applied to describe the needs of a Command Post Client. However, this term is both insufficient and incorrect. Therefore, a definition of a lightweight tactical client (LTACC) is proposed. This definition accurately describes the needs of a Command Post Client by capability rather than by conventional industry or casual terminology.

According to the qualities defined for a LTACC, the following application architectures could be considered acceptable (depending on implementation):

- A browser-based web client served through a locally hosted web server
- A native Android application
- A Windows® application downloadable via network with no installable dependencies

The following application architectures would not be acceptable:

- A browser-based client with a remote web server
- An application installed via a setup file requiring administrative access

Any client application developed for command post computing should be weighed against the qualities of a LTACC defined previously rather than an industry or U.S. Army definition of a thin client.

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