

IMPLEMENTATION OF CERTIFIED MESSAGE DELIVERY FOR TACTICAL C3I APPLICATIONS IN A BATTLEFIELD INFORMATION SYSTEM

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Abstract. Messaging is an accepted mechanism to implement data dissemination between tactical C3I applications. Certified Message Delivery (CMD) ensures in addition to the ensured delivery of a message by a robust messaging engine, the successful consumption of the message by the recipient application. It also ensures that the status acknowledgement is made available to the sender application for monitoring of data dissemination and re-propagation of messages that failed consumption. There are various ways in which Certified Message Delivery can be implemented. This paper discusses a robust and reliable implementation of CMD in tactical C3I applications in which messaging has been adopted as a mechanism for data dissemination. The implementation is asynchronous, with no blocking at the sender's end. It is based on a network configuration in which there is an application server and database server in the local area network (LAN) of every formation/unit headquarters (HQ), and the LANs of the formation/unit HQs are connected to each other via a wide area network (WAN). Clients existing at every HQ, access the local application server, which in turn accesses the local database server, and there is a messaging server, which is a service that takes care of dissemination of data.

INTRODUCTION

A battlefield information system, like any information system, focuses on helping the user to translate data into meaningful information and thereby assists in making informed decisions in an acceptable time frame.

The functional subsystems, which generally constitute a modern battlefield information system, include operations, logistics, intelligence and terrain. Altogether, they assist the commander by providing him with useful information about the operational situation, available resources, activities of the enemy, and thus aid him in taking appropriate operational decisions in a near-real-time mode [1].

An important feature of this class of information system is dissemination of data. The flow of data in the entire corps zone which typically comprises of corps, division (div), brigade (bde), and battalion (bn) essentially needs a communication mechanism at the application layer of any network protocol. The communication mechanism is responsible for transfer of data or operationally important information from one headquarter (HQ) to another.

Messaging is an accepted mechanism to implement data transfer. Certified Message Delivery ensures, in addition to the delivery of a message by a robust messaging engine, the successful consumption of the message by the recipient application [2]. It also ensures that the status acknowledgement is made available to the sender application for monitoring of data transfer and re-propagation of messages that failed consumption [3].

This paper discusses Certified Message Delivery and its implementation in a battlefield information system.

FLOW OF MESSAGES IN THE BATTLEFIELD

Figure 1 illustrates that the battlefield information systems in tactical formation (fnn)/unit headquarters are typically connected through electronic data channels via a battlefield intranet. Messaging is commonly the adopted communication mechanism and data is disseminated through the messaging service. Typically, the business artifacts that would be

disseminated include master data, reports, orders, plans, returns, demands, approval requests, and responses. At any location, the user connected to the local node of the information system would disseminate one or more of these artifacts after following the business workflow involved in it. Once the user requests the system to disseminate data, the messaging server assumes responsibility of carrying the message and delivering to its intended recipient. The sequence of events in this process is as depicted in Figure 2.

The messaging engine has to necessarily be a robust one with sufficient mechanisms like priority queuing, temporary as well as persistent queues to handle exceptions due to temporary network unavailability, recipient unavailability, and so on. A detailed discussion of the messaging engine is beyond the scope of this paper.

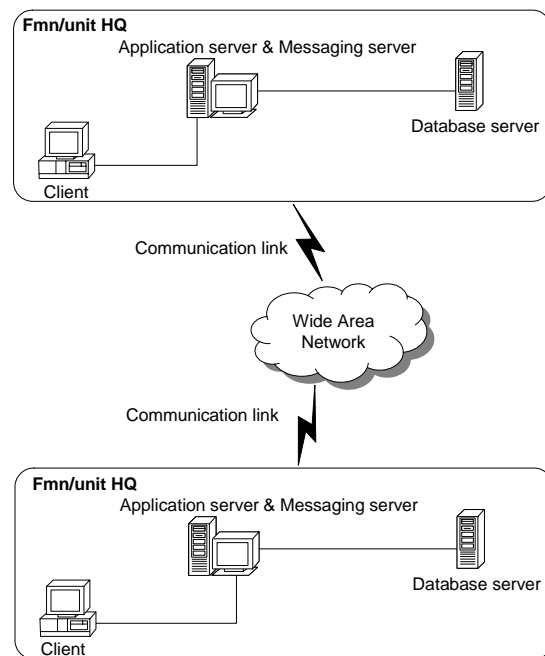


Figure 1. Typical battlefield intranet.

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