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THE FINANCIAL IMPACT OF THE DEFENSE MESSAGE SYSTEM (DMS) ON NTCC MONTEREY AND ITS SUBSCRIBERS

by

JoAnn Joganic

June 1990

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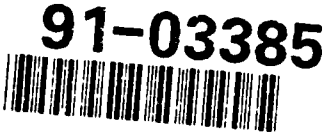

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The Financial Impact of the Defense Message System (DMS) on NTCC Monterey and its Subscribers

by

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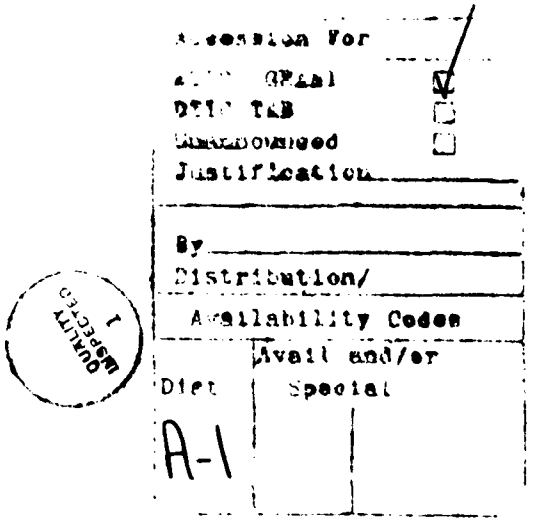
ABSTRACT

The Defense Message System (DMS) is the target communications architecture destined to replace the Automatic Digital Network (AUTODIN). Designed to permit message delivery between office workstations, this system provides DMS managers with the opportunity to cut electronic communication costs and realign assets within a geographical area. This thesis overlays the planned DMS architecture on the Naval Telecommunications Center (NTCC) Monterey, CA, and analyzes the economic impact of DMS on the center and the 17 subscribers it serves. Using a five-year projection and net present value theory, it demonstrates a cost avoidance of $492,899 if the communications center undergoes an equipment upgrade and a $1,885,631 avoidance if the NTCC is closed.



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I. INTRODUCTION

Department of the Navy shore activities receive electronic message service from communications centers located in the same geographic area. These centers currently perform their mission using manpower-intensive distribution systems supported by obsolete computer equipment. By 1995, the present communications network will experience a major architectural redesign that will deliver electronic messages directly to the activities rather than the communications centers. This thesis will examine, from a fiscal perspective, the impact of this change on the Monterey Peninsula by studying the Naval Telecommunications Center Monterey, CA and the 17 activities it serves.

A. BACKGROUND

Since the 1960's, the Department of Navy (DON) has used the Naval Telecommunications System (NTS) to serve as the electronic link for delivery of organizational general service (GENSER) messages (with up to TOP SECRET classification) between the DON shore establishment and other governmental departments worldwide. This communications network consists of the Automatic Digital Network (AUTODIN), the Naval Communications Processing and Routing System (NAVCOMPARS), the Local Digital Message Exchange (LDMX), the Remote Information

Exchange Terminal (RIXT), and the Standard Remote Terminal (SRT).

A Naval Telecommunications Center (NTCC) receives messages for organizations located in its nearby geographical vicinity. Depending on the size of each organization, the NTCC designates it as a protect or a guard subscriber. For each message received over the NTCC's computer circuitry, each subscriber receives copies according to its designation--protect subscribers receive a single copy while the guard subscriber may submit special routing requirements to the third echelon level. The NTCC duplicates and distributes paper copies of messages (also referred to as "traffic") according to the needs of the particular organization and other service directives. The messages are then manually delivered to the subscriber's courier. This method for delivery of administrative organizational traffic is costly in terms of manpower and maintenance of technologically obsolete equipment.

In order to capitalize on current trends in communications, as well as replace obsolete computer equipment, in 1989 the Department of Defense adopted a policy to transition all services from the current communications systems to the Defense Message System (DMS) target architecture [Ref. 1]. The DMS will provide writer-to-reader administrative message communications through use of desktop personal computer workstations. Additionally, it will redefine current message

delivery from its current NTCC-courier concept to delivery directly to the subscriber's workstation. Designers of this system envision that implementation will significantly reduce costs of electronic GENSER communications and will result in closure of most communications centers.

B. OBJECTIVES

This thesis will analyze, from a financial perspective, costs and benefits associated with adopting the DMS definition of administrative message delivery. By examining the administrative message delivery responsibilities of NTCC Monterey, CA, this thesis will address the equipment and support actions necessary to bring this NTCC's 15 protect and two guard commands on-line with the proposed DMS architecture.

C. THE RESEARCH QUESTION

The primary research question addressed by this thesis is: What is the financial impact of the DMS for GENSER message delivery on the Monterey Peninsula? This question will be answered by comparing NTCC Monterey's operating costs over a five-year period against expenditures necessary to implement the DMS on the Peninsula. Included are expenditures necessary to:

- Outfit the NTCC's 17 subscribers with the compatible equipment and software.
- Provide interface equipment and reprogram the Navy's GENSER communications backbone to accept from and deliver to a subscriber's workstation.

- Reroute other communications circuits that currently pass through the NTCC.

D. SCOPE, LIMITATIONS AND ASSUMPTIONS

In addition to introducing a new concept for organizational administrative message delivery, the DMS architecture will also accomplish two major tasks:

- Update equipment for the total GENSER communications network--AUTODIN, NAVCOMPARS, LDMX, RIXT, and SRT.
- Serve as the follow-on system for the Defense Data Network (DDN), which allows individuals to send administrative level information electronically (known as E-Mail).

This thesis will only examine the fiscal impact of DMS implementation on current GENSER message delivery between NTCC Monterey and its subscribers. The monetary ramifications of DMS as a complete replacement project for both the DDN E-Mail and the total GENSER AUTODIN communications network are regarded as an area suitable for further research.

The NTCC has a unique relationship with Fleet Numerical Oceanography Center (FNOC), which requires a high volume of realtime data traffic (2000 messages daily) for its mission. To support this requirement, FNOC has 17 circuits and NTCC personnel perform circuit quality control checks and cryptologic changes. In addition, the NTCC acts as a back-up for FNOC's primary data circuit with the Naval Communication Station Stockton, CA. This thesis addresses the NTCC-FNOC

relationship from a quantitative perspective only[1], for it is difficult to measure qualitative benefits provided by the NTCC.

E. METHODOLOGY

Because the DMS is a new initiative by the Department of Defense, there is little published information on the system. Therefore, the majority of the information regarding the DMS and its effects on the Monterey Peninsula comes from interviews with:

- Program designers and coordinators on staffs in Washington, DC.
- The Officer-in-Charge of NTCC Monterey.
- The senior person or Communications Liaison Officer for each of the 15 protect subscribers.
- The staff officers, department heads, and the Communications Liaison Officer at the two guard subscribers.

F. ORGANIZATION OF THE STUDY

This study is organized into chapters which present the following information:

- Chapter II introduces the current procedures by which NTCC Monterey provides message support to its 17 subscribers and proposes two alternative methods for message delivery under DMS.
- Chapter III addresses the costs associated with all three message delivery techniques.

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[1]When performing the analysis surrounding the closure of the NTCC, this thesis recognizes the costs associated with additional circuits and manpower to replace those services currently performed by NTCC personnel.

- Chapter IV compares the costs of current delivery against the two DMS alternatives by using net present value theory over a five year projection.

- Chapter V highlights the need for further significant study addressing the impact of DMS on the communications network employed by Fleet Numerical Oceanography Center (FNOC).

The Appendix contains a list of both acronyms and other unfamiliar communications terms.

II. ADMINISTRATIVE MESSAGE DELIVERY ON THE MONTEREY PENINSULA

In order to effectively analyze the fiscal implications of electronic message delivery service, it is necessary to understand the procedures employed to deliver general service (GENSER) organizational messages to Naval Telecommunications System (NTS) users on the Monterey Peninsula. This chapter has four sections:

- Section A describes the current method of message delivery on the Peninsula.
- Section B provides essential background on proposed delivery using the Defense Message System (DMS).
- Section C discusses message delivery procedures after a DMS equipment upgrade at Naval Telecommunications Center (NTCC) Monterey.
- Section D examines the prospect of message delivery under DMS without NTCC Monterey.

A. CURRENT DELIVERY

Naval Telecommunications Center (NTCC) Monterey CA, located in Building 700 on the Naval Postgraduate School (NPS) Annex, is a component of the Naval Communication Station (NAVCOMMSTA) Stockton, CA, and is tasked to provide communications support to 17 organizations in the Monterey area, including Fleet Numerical Oceanography Center (FNOC) and NPS [Ref. 2]. As shown in Figure 1, the NTCC receives messages for its subscribers through a Standard Remote Terminal (SRT) which is electronically connected to the Automatic Digital

Network (AUTODIN) via the AUTODIN Switching Center (ASC) at Norton Air Force Base, CA.

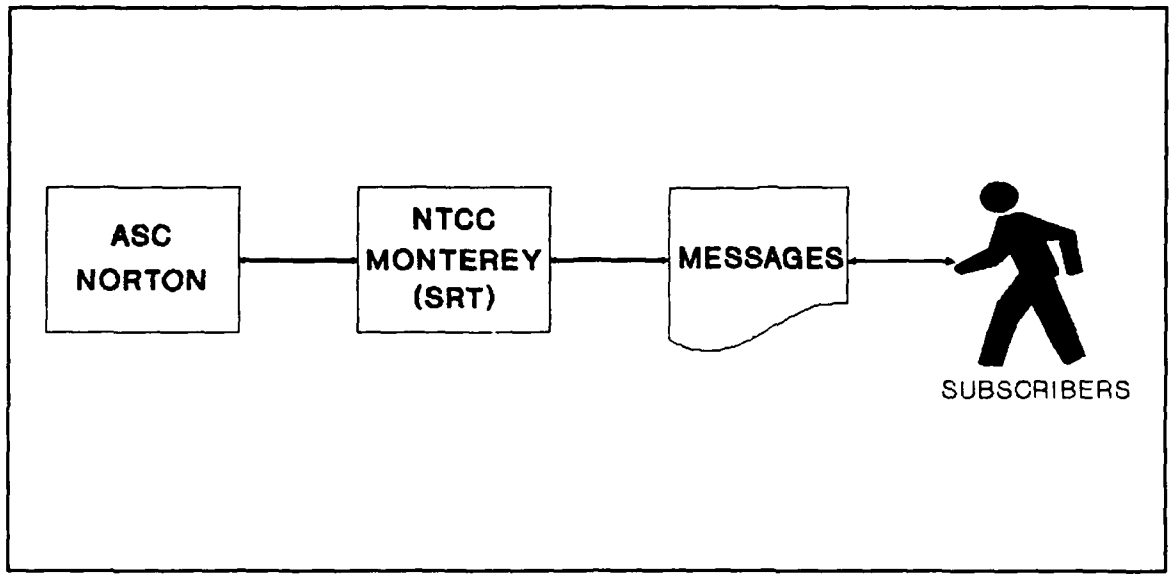

Figure 1. Current Administrative Message Delivery

1. Primary Mission of the NTCC

The NTCC's fundamental mission is to provide over-the-counter service (outgoing transmission, incoming reception, and distribution) for 17 users on the Monterey Peninsula. Messages are received at the NTCC and distributed to subscribers based on information contained in the message heading.[1] Once subscriber delivery is determined, NTCC

[1]Subscribers receive copies if the message heading contains their Plain Language Address (PLA) or if they are a member of an addressed Address Indicating Group (AIG) or Collective Address Designator (CAD).

personnel manually route, reproduce and distribute the messages according to individual agreements with each subscriber. Fifteen subscribers are referred to as "protect commands"[2], for which the NTCC provides one copy of each incoming message addressed to the command, except for the Personnel Support Detachment (PSD) and Naval Oceanographic and Atmospheric Research Laboratory (NOARL). For these two commands, the NTCC provides two copies of each addressed message. The other two users, NPS and FNOC, are "guard commands"; for these, the NTCC manually supports internal routing on incoming traffic down to the third echelon level as prescribed by the user.

2. Additional NTCC Tasking

Besides its responsibilities for subscriber message handling, the NTCC also has additional obligations.

a. Administrative and Supply Requirements

The NTCC must meet administrative guidelines mandated by both its chain-of-command (NAVCOMMSTA Stockton, CA and Commander, Naval Computer and Telecommunications Command, Washington, DC), and its status as an NPS tenant

[2]The 15 protect subscribers are Branch Dental Clinic, Defense Manpower Data Center, Defense Personnel Security Research and Education Center, Defense Resources Management Education Center, Marine Corps Administrative Detachment DLI, Marine Corps Representative NPS, Naval Investigative Service, Naval Medical Administrative Unit, Naval Oceanographic and Atmospheric Research Laboratory, Naval Reserve Center Pacific Grove, Naval Security Group Detachment DLI, Navy Resale Activity, Operating Location A Air Force Global Weather Center, Personnel Support Detachment and Resident Officer in Charge of Construction.

command and a co-tenant with FNOC. Listed below are subsets of these requirements:

- Prepare all outgoing correspondence for consolidation or release by NAVCOMMSTA Stockton.
- Maintain communications files, the Naval Warfare Publications Library, and the message center data base in accordance with Reference 3.
- Formulate the operating target, order supplies, and maintain quarterly funding records.
- Conduct its own urinalysis, physical readiness, welcome aboard/indoctrination, general military/rate training, career counseling, cardio-pulmonary resuscitation, and safety programs.
- Attend quarterly coordination meetings (Officer-in-Charge, Safety, Training) or assist in boards (Sailor-of-the-Quarter, Administrative Separation, Courts Martial, etc.) held at NAVCOMMSTA Stockton. These require at a least a full day away from the NTCC due to travel time.
- Send representatives to Recreation Council/Committee, BEQ/NEX Advisory Boards, NPS Public Works Planning, and other monthly tenant command meetings. [Ref. 4]

b. Alternate Communications Route

To maintain the redundancy required for all military communications, each communications center has a designated alternate route site that can accept traffic in the event of equipment outages. NTCC Monterey and the Telecommunications Center at Fort Ord, CA, provide this primary alternative routing service for each other.

c. Special FNOC Requirements

The NTCC has a unique relationship with FNOC. Because of the high volume of realtime information required for its mission, FNOC has established its own communications

network comprised of 17 circuits, including a direct link to the Local Digital Message Exchange (LDMX) at NAVCOMMSTA Stockton, CA. The NTCC provides three distinct areas of support:

- NTCC personnel maintain a patch and test facility and perform quality control checks, analyze outages and maintain daily cryptologic coverage on these 17 FNOC circuits.
- In the event of lost connectivity on the FNOC-Stockton circuit, the NTCC SRT is the alternate circuit for passing up to 2000 data messages per day (on magnetic tape) destined for FNOC'S AUTODIN Integrated Communications System (AICS).
- NTCC personnel maintain continuity checks for the data traffic that passes between the AICS and LDMX computers.

3. Subscriber Responsibilities

Under current communications instructions, there are only three requirements necessary for a subscriber to partake of the administrative message service provided by NTCC Monterey. [Ref. 5]

a. Outgoing Message Format

Each subscriber must ensure that all outgoing messages are submitted to the NTCC in accordance with Navy directives [Ref. 6]. This includes:

- Drafting an outgoing message with proper Plain Language Addresses (PLAs) found in the Message Address Directory (MAD).
- Providing a Joint Message Form (DD173) in the General Administrative (GENADMIN) format readable by the Optical Character Reader (OCR).
- Ensuring messages are released by proper authority within the subscriber's organization.

If the DD173 contains any procedural flaw which is noticed by the NTCC staff, the subscriber must correct the form and resubmit it to the NTCC at a later time [Ref. 5].

b. Command Courier

In order to send and receive messages through the NTCC, each subscriber must provide couriers to deliver messages between the NTCC and itself.

c. Communications Support Agreements

The communications center and each subscriber must annually review the services offered by the NTCC for message distribution, and validate the subscriber's membership in Address Indicating Groups (AIGs) and Collective Address Designators (CADs). The NTCC provides a standardized agreement that only requires the signature of the user's senior representative. For protect subscribers, the actual time allotted for the review process averages about 30 minutes per year.

For guard subscribers, the process is more complex because each person on the subscriber's message distribution list must validate her/his requirements against the overall command's distribution guidelines which the NTCC uses for manual routing. Based on interviews with NPS and FNOC personnel, this annual procedure takes an average of 15 minutes for each person on the distribution list and requires an additional ten hours for the Communications Liaison Officer to compile the results. [Refs. 7,8]

4. Current System Analysis

The current message delivery system, of which NTCC Monterey is an integral part, provides subscribers with unique opportunities for communications worldwide. Specific positive characteristics include:

- Confidentiality/Security--The system protects the messages according to their security level and sensitivity, and prevents release to unauthorized users.

- Integrity--Subscribers know that the message they have delivered to the NTCC on a DD173 is the same information that is received by the addressed commands.

- Connectivity/Interoperability--The system allows current subscribers to communicate with other organizations in the federal government.

- Guaranteed Delivery--For all messages transmitted from the NTCC, there exists an accountability chain that ensures delivery. For messages that are undeliverable, there are procedures that notify senders of the non-delivery in a timely fashion.

- Timely Delivery--Once the outgoing message reaches the NTCC, the communications system is designed to internally handle the message according to the precedence prescribed by the sender. This guarantees that a message of an immediate and operational nature will process through the system before ones that are routine in nature.

- Survivability--Communications equipment redundancy and the use of alternate communications routes provides a high degree of assurance that the current system will continue as long as the users exist.

- Availability/Reliability--NTCC Monterey provides message center services on a continuous basis.

- Storage and Retrieval Support--Through the use of back-up files, the NTCC stores messages for 60 days and can, therefore, assist its subscribers with message re-addressals or retransmissions. [Refs. 9,10]

Generally speaking, the DON and subscribers have six areas of dissatisfaction with the present mode of communications center operation:

- Extensive Use of Manpower--NTCC Monterey requires a staff of 24 military members to, both, manage the distribution of messages it receives and, also, maintain a 24 hour watch over operational circuits.

- High Equipment Maintenance--The NTCC Monterey SRT is outdated and does not represent state-of-the-art communications technology.

- Message Preparation Support--Subscribers are dissatisfied with the rigidity of DD173 preparation and the inability of the OCRs to read the print font from the subscriber's newer office automation systems.

- Ease of Use--For receiving message traffic, subscribers must rely on couriers for delivery.

- Identification of Addressees--In order to send a message, the subscriber refers to the Message Address Directory (MAD) to obtain the correct PLA for intended addees. For those times when the PLA is not listed in the MAD, the subscriber must coordinate with the NTCC to effect delivery.

- Distribution Determination and Delivery--Maintenance of command routing guides and other support arrangements are time-consuming activities. [Refs. 9,10]

B. DMS COMMUNICATIONS ARCHITECTURE

The Defense Message System (DMS) is the target communications architecture that will deliver administrative message traffic to a subscriber's workstation. DON communicators will spend $1,056,000 in research and development costs to develop the components required to transition the Naval Telecommunications System (NTS) to the DMS [Ref. 11]. Under the current transition plan, designers envision two ways to effect message

delivery. The first involves dedicating a direct encrypted circuit between the subscriber and an LDMX or Personal Computer Message Terminal (PCMT); this is intended for use by high volume subscribers who operate on a 24 hour/day basis with a traffic volume exceeding 700 messages daily. The second method allows organizations to "dial-in" to a Multi-level Mail Server (MMS) using a Secure Telephone Unit Version III (STU-III) as a modem. Because none of the Monterey Peninsula subscribers meet the criteria as an administrative message "high volume user," this study will analyze requirements necessary for the STU-III "dial-in" connectivity.

1. The Basic Configuration

The DMS architecture employs current computer technology to effect organizational message delivery to office workstations using "dial-in" capability. Most of the hardware and software required to implement organization user workstation connectivity are commercially available off-the-shelf (COTS) products. References nine and ten describe the following as key system components:

- Automatic Digital Network (AUTODIN) Subscriber Terminal (AST)--The primary message processor which, from the user's perspective, performs messaging functions similar to the current Local Digital Message Exchange (LDMX) (message routing for outgoing traffic and sorting incoming messages according to user and/or classification).

- Remote Terminal System (RTS)--A COTS message terminal which is dedicated to message handling (both incoming and outgoing) for a select group of users. The RTS, an interface between the AST and the subscribers, replaces

Remote Information Exchange Terminal (RIXT) and Standard Remote Terminal (SRT) hardware.

- Multi-level Mail Server (MMS)--A COTS electronic component connected to either an AST or RTS which stores sorted messages until requested by an authorized user.

- Secure Telephone Unit Version III (STU-III) Automated Access Control System (SACS)-- A COTS automatic device which performs a security check by verifying the user's STU-III connection prior to allowing user access to the MMS.

- STU-III--A COTS desk-top telephone with up to SECRET encryption capabilities, which serves as a secure modem between the user and the MMS.

- GATEGUARD--COTS software which is the Department of the Navy user's interface with the DMS. The GATEGUARD has three functions. First, it acknowledges receipt of all traffic for the user. Second, for outgoing traffic, the GATEGUARD serves as a final verification that the message is properly released. Third, it performs security checks and only permits delivery of classified messages to properly cleared subscriber workstations. For users who wish to segregate unclassified and classified messages, two separate workstations must be equipped with GATEGUARD.

- Message Dissemination System (MDS)--A software package which resides on the organization's Office Automation System (OAS) and terminates the link to a GATEGUARD. It receives incoming and backrouted outgoing messages, prepares messages for OAS presentation, and schedules messages for users through an OAS file transfer vehicle. Users may then view, print, file, route further, or delete the message.

- Message Dissemination Utility (MDU)--A software package provided to subscribers without an OAS. An operator sorts and distributes messages (either on paper or minidisk) based on information provided by the communicators.

- Message Text Format (MTF) Editor--Marine Corps developed software package designed to run on IBM AT/XT class microcomputers that permits a user to create, format, edit, and transmit outgoing messages.

2. Incoming Message Delivery

With the exception of TOP SECRET and other messages that require special handling[3], the AST or RTS electronically sorts messages by user and/or classification, and "stores" them in the MMS. When ready to receive organizational messages, the user connects the GATEGUARD with the MMS by using the STU-III modem. The SACS, located at the AST or RTS site, automatically verifies the connection and allows the MMS connection to download traffic for the user. The user's GATEGUARD acknowledges receipt of the messages. If the user employs a LAN, MDS routes the incoming traffic within the LAN to workstations according to a pre-determined distribution. After viewing the message at the workstation, the user determines the action required on the message, and either prints it, stores it on a diskette or electronically "trashes" the message. Subscribers without LANs use MDU to output the message on paper or diskette and distribute the message through the subscriber's administrative channels.

3. Outgoing Message Delivery

When it is necessary to send an organizational message, an individual uses MTF to draft the message at a workstation. Under DMS design goals, when the message is ready for release, the releaser attaches an electronic

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[3]Current directives [Refs. 3,6] permit special designations on messages which dictate delivery to specific individuals within an organization.

signature to the message at her/his workstation and passes it to GATEGUARD for transmission into the AST or RTS. Once GATEGUARD is joined to the AST or RTS via the STU-III/SACS connection, the GATEGUARD software verifies the electronic signature and releases the message to the AST or RTS[4].

4. Analysis of DMS Architecture

The proposed system maintains all the positive attributes of the current system and addresses the identified shortfalls in the following manner:

- Extensive Use of Manpower--Because it allows for users to receive messages via office workstations, the DMS eliminates the manual message center jobs (routing, reproduction, and distribution) and the need for command couriers.

- High Equipment Maintenance--The hardware design destined to replace the SRT is state-of-the-art technology with COTS products.

- Message Preparation Support--Commands will possess the ability to draft, review, and release messages using office workstations without worrying about the mechanics of DD173 preparation.

- Ease of Use--Commands can receive or send organizational messages without the constraints of courier delivery service.

- Identification of Addressees--The message drafting software provided by the system designers aides the drafter with the requirement for properly spelling PLAs before sending a message.

- Distribution Determination and Delivery--Because subscribers will now control the messaging costs within

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[4]Currently, GATEGUARD software is unable to verify electronic signatures from a LAN. Therefore, in order to enter messages into the communications system, the releaser creates and signs a form at the workstation and transfers the message to a diskette which is used as input for GATEGUARD.

their organization, they will have the freedom to distribute messages as they deem appropriate.

C. DELIVERY WITH NTCC UPGRADE

Figure 2 illustrates the NTCC Monterey message delivery profile after replacing the SRT with an RTS/MMS/SACS hardware combination.

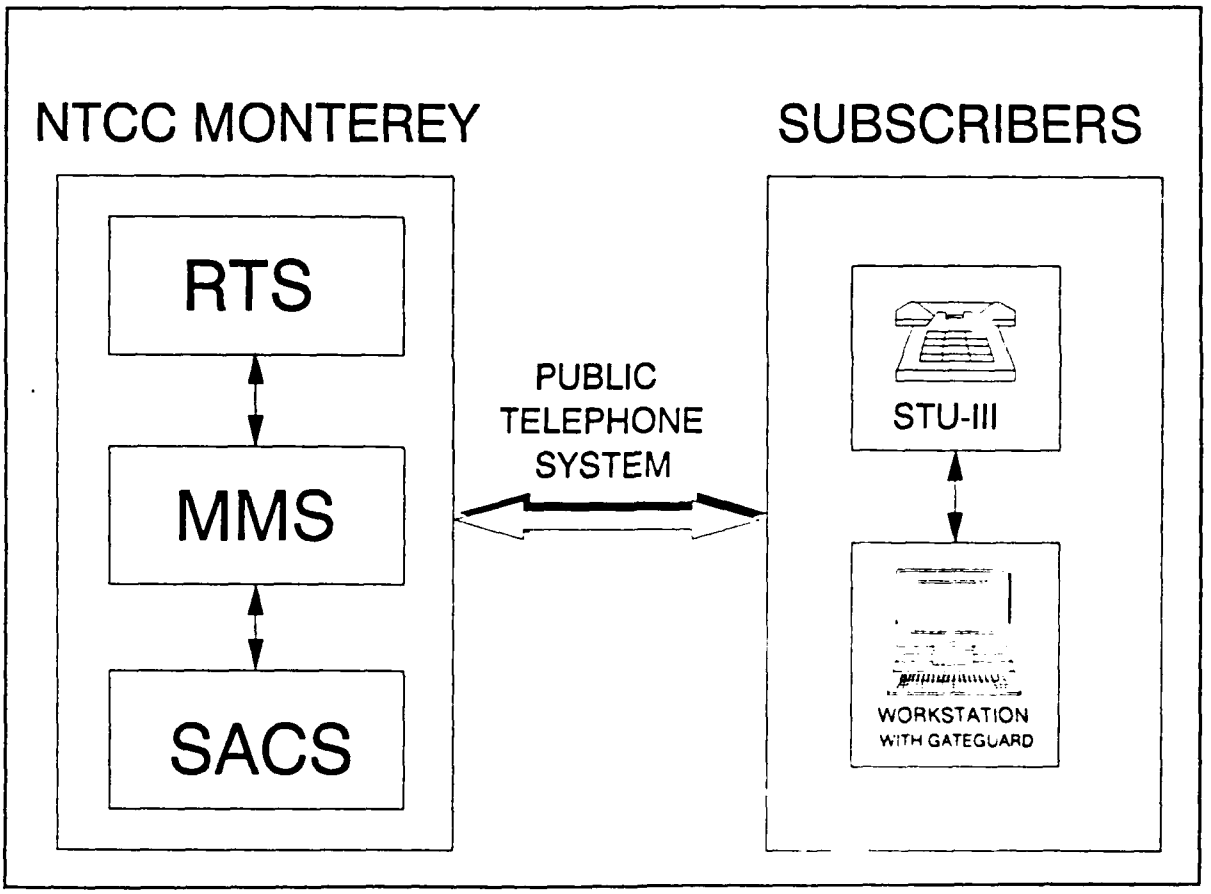

Figure 2. Proposed Message Delivery with NTCC Upgrade

1. Incoming Message Delivery

The NTCC continues to receive messages for its 17 subscribers through its circuit with Norton Air Force Base, CA. The RTS electronically sorts the traffic in the following manner:

- All unclassified messages according to the addressed command.
- SECRET and CONFIDENTIAL messages for NIS, NPS, and FNOC only.
- Any TOP SECRET messages, those designated "Special Handling Required," and any classified messages for the 14 other subscribers.

The first two categories are stored in the MMS. When ready to accept delivery, the subscriber connects with the NTCC using the subscriber's STU-III/GATEGUARD and downloads the traffic. Because the last category requires unique distribution, the RTS prints a copy of each message in the communication center, and then addressed subscribers are notified to dispatch a designated courier to effect delivery.

2. Outgoing Message Delivery

If a subscriber needs to transmit a message, the DMS provides software on the office workstation which permits any member of the subscriber command to draft a message. When it is ready for transmission, however, only specific individuals within the organization have an electronic "signature" recognized by GATEGUARD, which permits the message to pass through the subscriber's STU-III and into the communications circuitry through the NTCC's SACS.

3. Analysis of Upgrade

The equipment upgrade eliminates the majority of the manual message delivery interface required for both the NTCC and the subscribers.

a. Communicator's Perspective

Because there is still the need for restrictive delivery in some message categories, current message delivery procedures require that the NTCC remain on the peninsula. It must, therefore, continue to support the additional administrative and operational tasking outlined above.

b. Subscribers' Perspective

The equipment upgrade has distinct advantages for the subscribers. It virtually eliminates the frustration of outgoing DD173 message preparation and provides message delivery to office workstations or a command LAN without courier requirements. The subscriber still has the administrative requirement to verify membership in AIGs and CADs, and must continue to maintain an internal message routing guide.

D. DELIVERY WITHOUT THE NTCC

The advent of DMS provides unique opportunities for military communicators to reassess the philosophy behind administrative message delivery.

1. Procedural Constraints

There are three overriding reasons associated with the NTCC's primary mission for maintaining an upgraded communications center on the Monterey Peninsula:

- Allows delivery of TOP SECRET messages.
- Delivers classified traffic to those commands who regularly run only an unclassified GATEGUARD.
- Controls delivery of "Special Handling Required" messages for all the subscribers.

Each of these issues can be addressed with procedural solutions, laying the groundwork which supports the closure of NTCC Monterey.

a. TOP SECRET Message Delivery

Personnel assigned to the NTCC possess a TOP SECRET security clearance which permits the communicators to meet the cryptologic requirements necessary to operate within the AUTODIN network. This also allows, if required, delivery of TOP SECRET messages to subscribers. However, because of the administrative nature of the its subscribers, NTCC Monterey has not handled a TOP SECRET message in three years [Ref. 4]. If an overall communications procedural change allowed TOP SECRET message delivery to sporadic recipients by other means (for example, facsimile or temporarily upgraded SACS/STU-III connections), then the need for an active NTCC on the Monterey Peninsula diminishes.

b. Classified Message Delivery

There are three subscribers (FNOC, NPS and NIS) who regularly receive classified messages and would require operating a STU-III/GATEGUARD configuration in a classified mode. Of the other 14 commands, two claim infrequent receipt of classified messages. Current procedures allow, under special circumstances, one command to temporarily accept the communications guard for an afloat command or ship [Ref. 3]. If this were expanded to permit permanent classified guards for shore commands with intermittent classified message reception, then NPS, for example, can receive and manually relay those messages that are occasionally delivered to the other 14 subscribers on the Monterey Peninsula.

c. "Special Handling Required" Message Delivery

Current NTS design allows communicators to view every message destined for delivery and, therefore, protect "Special Handling Required" messages through selective routing and reproduction. Under DMS, however, the communicators have the electronic opportunity to segregate these messages within the MMS. This permits receiving commands to designate a specific GATEGUARD for delivery and assume responsibility for administrative control within the subscriber's own organization.

2. Message Delivery without NTCC Monterey

Given the constraints above, Figure 3 depicts message delivery without a co-located NTCC on the Monterey Peninsula.

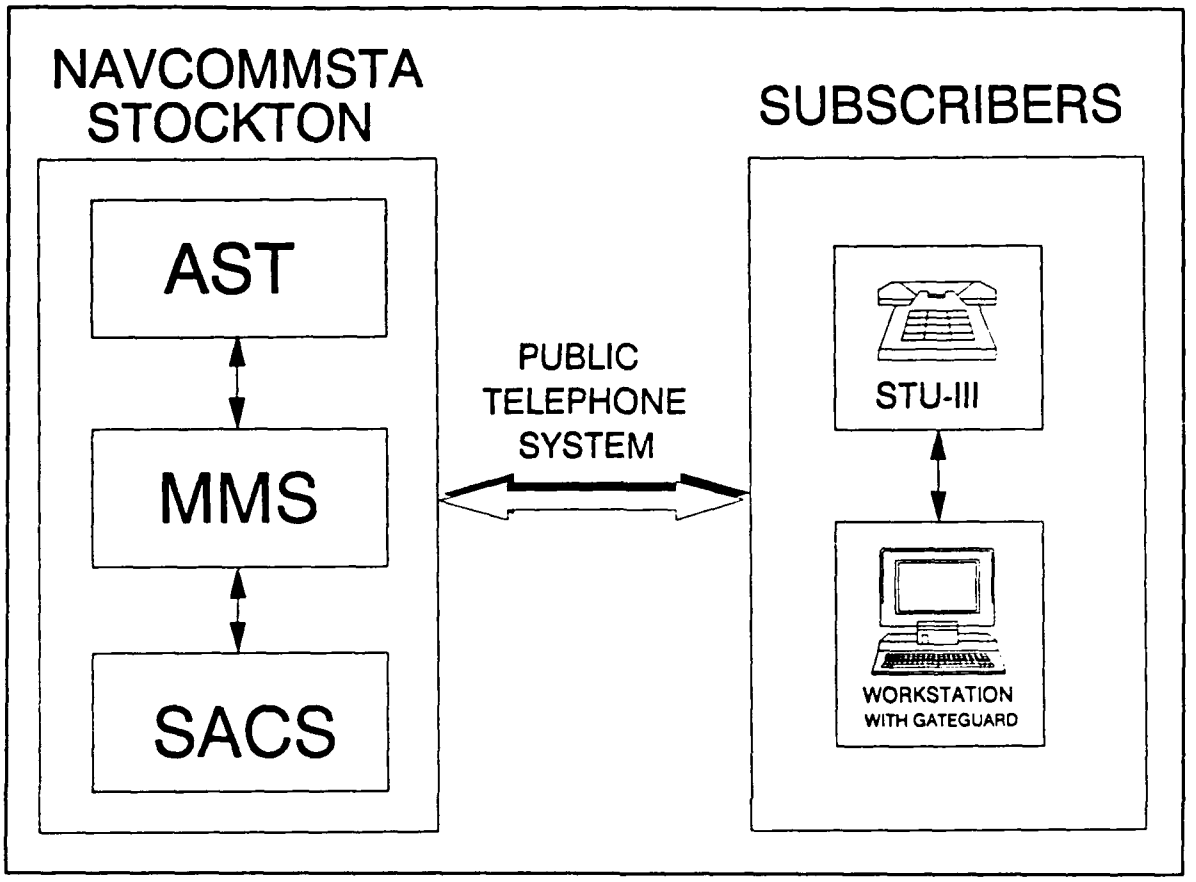

Figure 3. Proposed Message Delivery without NTCC

Since the MMS/SACS interfaces with an AST, the Monterey subscribers can conceivably dial into a nearby AST, for example NAVCOMMSTA Stockton, and download their traffic. NAVCOMMSTA Stockton becomes the communications interface required by Monterey subscribers and the NTCC on the peninsula can close.

3. Analysis of Closure

The DMS provides the technology to realign communications assets since it permits delivery of all messages (up to TOP SECRET) to office workstations.

a. Communicator's Perspective

Because NTCC Monterey is not actively involved in TOP SECRET message delivery, the opportunity exists to close this communications facility and serve the Monterey users through the AST at NAVCOMMSTA Stockton. Although the NTCC's administrative requirements vanishes, there is still a need to meet the special support requirements for FNOC and the Telecommunications Center at Fort Ord, CA.

b. Subscribers' Perspective

Closing the NTCC does not diminish communications service since the subscriber receives message traffic through the same office workstation configuration. The subscriber still has the administrative requirement to verify membership in AIGs and CADs, and must continue to maintain a message routing guide internal to its own organization. However, the need for all message couriers disappears.

E. ANALYSIS OF MESSAGE DELIVERY OPTIONS

This section described the current and proposed alternatives for administrative message delivery on the Monterey Peninsula. The current procedure is manpower-intensive and does not capitalize on the latest advances in communications

technology. As an option, an NTCC equipment upgrade moves the actual message processing into the 21st century, but still requires a tremendous amount of administrative overhead to run the NTCC as a separate communications entity. By altering three procedures, communication system managers can eliminate the need for NTCC Monterey and still provide quality service to its 17 subscribers.

III. COSTS ASSOCIATED WITH ADMINISTRATIVE MESSAGE DELIVERY

The main focus of this study it to conduct an economic analysis in relation to administrative message delivery on the Monterey Peninsula. After introducing message distribution statistics, this chapter examines costs (current, and with/without an upgraded communications center) for both the subscribers and the communicators[1].

A. MESSAGE DISTRIBUTION ANALYSIS

Based on data collected from September 1989 to March 1990, Table I illustrates that Naval Telecommunications Center (NTCC) Monterey distributes approximately 100,128 copies of administrative messages (average length five pages) per year.

To ascertain what percentage of messages went to each subscriber, the NTCC staff examined the communications center's Master File and analyzed the message distribution [Ref. 4]. During the periods 18-24 March and 1-7 April 1990,

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[1]To maintain continuity throughout, costing information derived from the following sources:

Military Pay--Navy Composite Standard Military Rates Table (effective 1 October 1989) from NAVCOMPTNOTE 7041 of 8 November 1989.

Civilian Pay--General Schedule Pay Scale (effective 14 January 1990) with an additional adjustment of 34% to cover retirement, disability, health/life insurance, etc., as promulgated by Federal Personnel Manual Supplements 831-1, 870-1, and 890-1.

Consumables--Customer Supply Center Catalog, GSA Federal Supply Service, Stockton, CA, August 1986.

TABLE I

NTCC MONTEREY ANNUAL MESSAGE DISTRIBUTION

	SEND/RECEIVE	TOTAL PAGES COPIED
1989 September	8,893	40,888
October	9,176	40,888
December	7,006	35,610
1990 January	7,654	37,054
February	8,207	38,216
March	9,130	35,480
Average per month	**8,344**	**38,022**
Average per year	**100,128**	**456,264**

Average message length **5 pages** (38,022/8,344 rounded)

Note: November 1989 data omitted because extended Fleet Numerical Oceanography Center/Naval Communication Station Stockton, CA outage skewed administrative traffic figures.

the NTCC received 4583 messages and distributed 8018 copies of them to the addressed commands. Table II overlays these results on the 100,128 messages from Table I, and projects the yearly copies disseminated to each subscriber. The figures take into account that some low volume subscribers did not receive any message traffic during either of the two one week periods.

TABLE II

ESTIMATED SUBSCRIBER ANNUAL MESSAGE DISTRIBUTION

SUBSCRIBER	NTCC ANALYSIS COPIES	%	PROJECTED MSGS/YR
Branch Dental Clinic	0	00.1	100
Defense Manpower Data Center	0	00.1	100
Defense Personnel Security Research and Education Center	2	00.1	100
Defense Resources Management Education Center	1	00.9	901
Fleet Numerical Oceanography Center*	2,661	33.1	33,143
Marine Corps Administrative Detachment DLI	79	01.0	1,001
Marine Corps Representative NPS	44	00.5	501
Naval Investigative Service	62	00.8	801
Naval Medical Administrative Unit	75	00.9	901
Naval Oceanographic and Atmospheric Research Laboratory	99	01.2	1,201
Naval Postgraduate School	3,632	45.1	45,159
Naval Reserve Center Pacific Grove	77	01.0	1,001
Naval Security Group Detachment DLI	118	01.5	1,502
Naval Telecommunications Center	345	04.2	4,205
Navy Resale Activity	15	00.6	601
Operating Location A Air Force Global Weather Center	14	00.2	200
Personnel Support Detachment	691	08.6	8,611
Regional Officer in Charge Construction	2	00.1	100
TOTAL	**8,018**	**100.0**	**100,128**

* Fleet Numerical Oceanography Center includes messages addressed to FLENUMOCEANCEN DATA.

B. CURRENT DELIVERY EXPENDITURES

In order to support its primary message delivery mission to the 17 subscribers and the other NTCC taskings[2], NTCC Monterey maintains a four section watch rotation. Table III identifies the annual costs in terms of personnel, equipment, and miscellaneous items.

From a subscriber's perspective, there is extensive manpower cost associated with current message delivery. The most prominent is the courier's time required to collect

[2]Additional taskings include chain-of-command and tenant command administrative requirements, alternate communications route for Fort Ord, CA, and circuit coordination for Fleet Numerical Oceanography Center (FNOC).

TABLE III

ANNUAL OUTLAYS FOR NTCC CURRENT OPERATIONS

Personnel

Position Title	Number Allocated*	Designated Pay Grade	Individual Yearly Rate	NTCC Rate
Officer-in-Charge	1	O-3	$64,335	$64,335
Message Chief	1	E-7	44,152	44,152
Traffic Checker	2	E-6	37,085	74,170
Supervisor	1	E-6	37,085	37,085
Traffic Analyst	1	E-5	30,760	30,760
Message Operator	4	E-5	30,760	123,040
Message Router	3	E-4	25,530	76,590
Message Operator	11	E-3	21,621	237,831
Total Personnel	24			**$687,963**

Equipment Costs		
SRT Lease and Maintenance**	28,272	
Circuit Costs for NTCC Connectivity***	82,236	
Pitney-Bowes Copier	6,500	
Government Vehicle		
Maintenance	100	
Fuel	500	
Rental Vehicle (For trips to Stockton)	640	
Total Equipment Costs		**$118,248**
Miscellaneous		
Operating Target (from NAVCOMMSTA Stockton)	15,250	
General Building Maintenance	1,200	
Total Miscellaneous Costs		**$16,450**
TOTAL OUTLAY FOR NTCC MONTEREY (PER YEAR)		**$822,661**

* Data from Manpower Authorization dated 9 October 1989.

** Reference 12.

*** Monterey-Norton circuit lease, including AUTODIN overhead charge, is $6853 per month. [Ref. 13]

messages from the NTCC. For unclassified message delivery[3], each subscriber falls into one of four courier groupings:

- **NPS COMPOUND**--The NPS Officer of the Day (OOD) makes two trips daily to the NTCC to bring messages for eight subscribers to the Quarterdeck in Herrmann Hall.[4] There, the OOD distributes the messages into special slots for pick up either by Herrmann Hall staff members or by the Guard Mail Clerks for further delivery to other buildings on the campus or other commands. Each daily courier/ distribution cycle takes approximately an hour for the OOD. The Guard Mail clerks require an additional 15 minutes (Monday-Friday) to sort their portion of the messages.

- **FNOC STAFF**--The FNOC administrative staff is primarily located in two buildings at the NPS Annex, and its courier requirements fall into three categories. First, the duty officer sends a representative on an hourly basis to collect any messages from the NTCC. On an average, this takes about five minutes. The second group, staff members in Building 702, dispatch three different departmental couriers (Administrative, Models/ Data, and Field Support) twice during a work day. The third set are located in the same building as the NTCC. When interviewed, all believed their departmental courier time was insignificant for this analysis.

- **ADDITIONAL NPS ANNEX COMMANDS**--There are another two commands co-located with the NTCC at the NPS Annex. Naval Oceanographic and Atmospheric Research Laboratory (NOARL) and Operating Location A Air Force Global Weather Center (OL A) both use administrative staff to collect the messages twice daily (Monday-Friday). These evolutions last an average of 15 minutes.

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[3]With the exception of the NPS, FNOC, and the Naval Investigative Service, all other subscribers rarely receive classified messages. If a classified message is delivered for one of these 14 commands, special arrangements are made for a properly cleared representatives of the addressed command to review the message.

[4]The eight commands are Branch Dental Clinic (DENTAL), Defense Manpower Data Center (DMDC), Defense Personnel Security Research and Education Center (DPSREC), Defense Resources Management Education Center (DRMEC), NPS, Marine Corps Representative NPS (USMC-N), Navy Resale Activity (NRA), and Resident Officer in Charge of Construction (ROICC).

- **OTHER COMMANDS ON THE PENINSULA**--The remaining six[5] subscribers use their own couriers to collect messages from the NTCC. With the exception of the Naval Investigative Service, all trips to the NTCC are made in conjunction with Guard Mail runs to NPS. The additional time required to collect message traffic from the NTCC is approximately 30 minutes. All make one trip each business day, except for the Naval Security Group Detachment DLI, which makes three trips per week. The Naval Investigative Service Resident Agent makes her message runs while enroute to the office. Her incremental time is about 15 minutes.

Table IV summarizes courier costs for the subscribers.

C. NTCC UPGRADE EXPENDITURES

With an NTCC equipment upgrade, both the subscribers and the communications center require initial expenditures in hardware. However, each will realize a decrease in annual outlays.

1. Communications Center Initial Costs

The NTCC must replace its Standard Remote Terminal (SRT) with a combination Remote Terminal System (RTS), Multi-level Mail Server (MMS), and Secure Telephone Unit Version III (STU-III) Access Control System (SACS). This replacement costs $125,484 and includes equipment and installation [Ref.

[5]The six subscribers who use their own couriers are Marine Corps Administrative Unite DLI (USMC-D), Naval Investigative Service (NIS), Naval Medical Administrative Unit (MEDICAL), Naval Reserve Center Pacific Grove (RESERVES), Naval Security Group Detachment DLI (NSGD), and Personnel Support Detachment (PSD).

TABLE IV

ANNUAL OUTLAYS FOR SUBSCRIBERS UNDER CURRENT NTCC OPERATIONS

Courier Category	Courier Pay Grade	Hourly Rate	Time (HRS / YR)*	Courier Costs
NPS COMPOUND				
NPS OOD	O-3/O-4	32.28**	728	$23,500
Mail Clerks	GS-4/ST-5	10.60	65	689
NPS ANNEX				
FNOC-702				
Admin:	GS-4/ST-10	12.17	260	3,163
40/70	E-6	17.83	130	2,318
60/CLO	E-5	14.79	130	1,923
FNOC Duty Rep	E-5	14.79	874	12,926
NOARL	GS-5/ST-1	10.47	130	1,361
OL A	O-4	36.32	130	4,722
OTHER COMMANDS				
MEDICAL	E-5	14.79	130	1,923
NIS	GS-12/ST-3	24.53	65	1,594
NSGD	E-5	14.79	78	1,154
PSD	E-6	17.83	130	2,318
RESERVES	E-5	14.79	130	1,923
USMC-D	E-4	12.27	130	1,595
TOTAL COURIER COSTS (PER YEAR)				$61,109

*NPS OOD 52 weeks * 7 days * 1 hour * 2 trips
Mail Clerks 52 weeks * 5 days * .25 hours * 1 trip
FNOC-702 Admin 52 weeks * 5 days * .50 hours * 2 trips
FNOC Duty Rep 52 weeks * 7 days * .10 hours * 24 trips
NPS ANNEX
(All others) 52 weeks * 5 days * .25 hours * 2 trips
NIS 52 weeks * 5 days * .25 hours * 1 trip
NSGD 52 weeks * 3 days * .50 hours * 1 trip
All OTHER COMMANDS
52 weeks * 5 days * .50 hours * 1 trip

** NPS OOD watchbill is comprised of 25% O-4 and 75% O-5 officers. [Ref. 14]

15].[6] The NTCC must also provide temporary minidisk storage for messages it processes [Ref. 16] at a cost of $756.[7]

2. Subscribers Initial Costs

In order for subscribers to receive messages after the NTCC upgrade, all must have a STU-III and an office workstation (with the capabilities of at least a Zenith-248) equipped with GATEGUARD. Because the system upgrade can segregate messages according to classification, if a subscriber desires delivery of classified message traffic to an office workstation, it must then provide two separate STU-III/GATEGUARD combinations. Only three commands (NPS, FNOC, and NIS) regularly receive classified messages and would require the dual workstations. Of the other 14 commands, only MEDICAL and DPSREC claim to receive classified messages on a sporadic basis, once a month and once a year respectively. On these occasions, the subscriber can send a properly cleared representative to collect the message from the NTCC. Table V identifies organizations which lack STU-III or capable workstations.

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[6]Redundant equipment costs:
RTS--$11,994 MMS--$107,100 SACS--$6,390

[7]Cost is computed based on the following facts:
-- The Master File contains two months worth of messages;
-- An average of 8344 messages are processed per month;
-- Each box of minidisks costs $36 and stores 800 messages.
(((2 * 8344)/800) (rounded up)) * $36 = $756.

TABLE V

INITIAL OUTLAYS FOR SUBSCRIBERS UNDER NTCC UPGRADE

INITIAL COSTS (EQUIPMENT ONLY)*			
	STU-III**	WORKSTATION***	TOTAL
DENTAL	$2,200	$2,500	$4,700
DRMEC	2,200	N/A	2,200
MEDICAL	2,200	N/A	2,200
NRA	2,200	N/A	2,200
OL A	2,200	2,500	4,700
PSD	2,200	N/A	2,200
RESERVE	2,200	N/A	2,200
ROICC	2,200	N/A	2,200
USMC-D	2,200	N/A	2,200
USMC-N	2,200	N/A	2,200
TOTAL INITIAL COSTS	$22,000	$5,000	$27,000

* Although accessing the upgraded communications system is a new requirement for subscribers, the designers envision providing software that permits administrative staff to draft/transmit or download message traffic with a minimum amount (one hour) of training [Ref. 17]. Because this time is negligible, training costs are omitted from Table V.

** Reference 18.

*** Reference 19.

3. Communications Center Annual Costs

Because the NTCC administrative workload will not diminish, personnel requirements decrease by only three billets. Other reductions include:

- MMS maintenance only ($2779 vice $28,272)--The RTS and SACS units are under a two-year manufacturer's warranty. Because the hardware prices are low, current plans call

to replace defective units outside the warranty period rather than subscribe to a maintenance agreement. [Ref. 15]

- Using Pitney-Bowes copier for NTCC administrative needs only ($273[8] vice $6500). [Ref. 4]

- Operating target adjustments ($9012 vice $15,250).[9] [Ref. 4]

Table VI illustrates communicators' projected yearly expenditures after an NTCC upgrade.

4. Subscribers Annual Costs

A major system change from the subscriber's perspective will be the need to print those messages for which the computer screen image does not meet the informational requirement of the organization.

In order to ascertain the cost of this, each protect and guard command (down to the third echelon level) completed a profile sheet on message use during a random seven-day period. Each person reported the number of messages received per day and reported the message's significance as an ACTION item, an INFO item, or whether it held no importance to the surveyed individual.

Based on the survey results, percentage data were extracted to reflect those messages that would require a paper

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[8]Copier cost * percent of messages from Table II:
$6500 * .042 = $273

[9]$6238 reduction consists of:
Computer Paper--104 vice 364 boxes/year @ $15/box = $3900
Copier Paper--24 vice 104 boxes/year @ $20/box = $1600
Hi-Speed Printer Ribbons--(Requirement eliminated) = $738

TABLE VI

ANNUAL OUTLAYS FOR COMMUNICATORS UNDER NTCC UPGRADE

Position Title	Number Allocated	Designated Pay Grade	Individual Yearly Rate	NTCC Rate
Personnel				
Operating*				
Message Chief	1	E-7	44,152	44,152
Supervisor	1	E-6	37,085	37,085
Message Operator	4	E-5	30,760	123,040
Message Operator	4	E-4	25,530	102,120
Message Operator	7	E-3	21,621	151,347
Administrative**				
Officer-in-Charge	1	O-3	64,335	64,335
Training Petty Officer	1	E-6	37,085	37,085
Supply/Admin	2	E-5	30,760	61,520
Total Personnel	21			**$620,684**
Equipment Costs				
MMS Maintenance			2,779	
Circuit Costs for NTCC Connectivity***			82,236	
Pitney-Bowes Copier			273	
Government Vehicle Maintenance			100	
Government Vehicle Fuel			500	
Rental Vehicle (For trips to Stockton)			640	
Total Equipment Costs				**$86,528**
Miscellaneous				
Operating Target (from NAVCOMMSTA Stockton)			9,012	
General Building Maintenance			1,200	
Total Miscellaneous Costs				**$10,212**
TOTAL OUTLAY FOR NTCC UPGRADE (PER YEAR)				**$717,424**

* Reference 20 establishes this manpower level for operators at the upgraded NTCC.

** Reference 4 identifies these billets to meet the additional administrative and supply requirements described in Chapter II.

*** Monterey-Norton circuit lease, including AUTODIN overhead charge, is $6853 per month. [Ref. 13]

copy (current ACTION messages) and those that would require permanent storage on minidisks for later retrieval (current ACTION and INFO messages). Using the results of the survey[10] and the projected message delivery numbers from Table II, Table VII delineates subscribers' annual costs for message reproduction and permanent minidisk storage.

D. EXPENDITURES FOR NTCC CLOSURE

If the 17 Monterey subscribers are able to use STU-III/ SACS connectivity to send and receive administrative message traffic through a central AST/MMS/SACS configuration at NAVCOMMSTA Stockton, NTCC Monterey's primary mission fades and so does the need to support it as an active NTCC.

1. Communicators Initial Costs

Because NAVCOMMSTA Stockton requires an AST to replace the current LDMX, only an MMS/SACS combination is necessary to permit Monterey subscribers to access the DMS communications network for message transfer. The additional hardware cost is $113,490[11] [Ref. 15]. Cost for temporary minidisk storage

[10]Because of normal low message volume, if a protect subscribers did not receive any messages during the survey period, the author assigned a 100% paper copy requirement ensuring all addressed messages were available if required.

[11]Redundant equipment costs: MMS--$107,100, SACS--$6390.

TABLE VII

ANNUAL OUTLAYS FOR SUBSCRIBERS UNDER NTCC UPGRADE

COMPUTER PAPER AND MINIDISK COSTS*

	(A) Messages (Table II)	(B) Paper Copy %	(C) Disk Copy %	Costs** Paper	Minidisks
DENTAL	100	0	12	$ 0	$36
DMDC	100	100	0	12	0
DPSREC	100	100	0	12	0
DRMEC	901	100	0	24	0
FNOC	33,143	15	74	120	1,116
MEDICAL	901	0	100	0	72
NIS	801	3	82	12	36
NOARL	1,201	5	35	19	36
NPS	45,159	19	50	216	1,044
NRA	601	50	70	12	36
NSGD	1,502	18	100	12	72
OL A	200	0	100	0	36
PSD	8,611	60	95	342	396
RESERVE	1,001	32	96	12	72
ROICC	100	100	0	12	0
USMC-D	1,001	43	88	12	72
USMC-N	501	0	73	0	36
TOTAL PAPER/MINIDISK COSTS (PER YEAR)				$817	$3,060

* Costs are based on the following unit prices:
One-ply computer paper, 2500 sheets per box, $12.
5.25 minidisks, 800 message storage capacity, $36.
Two-ply computer paper, 1500 sheets per box, $19.
(Required for PSD and NOARL only)

** Minidisk costs--(A * C)/800 (rounded up) * $36.
Paper costs--
For NOARL/PSD:
(A * B * 5)/1500 (rounded up) * $19.
For all others:
(A * B * 5)/2500 (rounded up) * $12.

remains the same as for an NTCC upgrade $756[12]. Additional initial outlays include:

- $1200 for connecting an alternate route for Fort Ord's Telecommunications Center[13]. [Refs. 13,21]
- $1000 for establishing an alternate route for the FNOC-Stockton AICS circuit with NAVCOMMSTA San Diego. [Ref. 13]
- $140 for connecting two Pacific Bell "800" numbers for use by subscribers to access the communications system in Stockton. [Ref. 22]

2. Subscribers Initial Costs

The initial costs for subscribers remain the same as shown in Table V.

3. Communicators Annual Costs

Table VIII presents annual outlays necessary to sustain administrative message delivery in this environment. It incorporates:

- Five quality control (QC) operators and a supervising E-7 to monitor the FNOC weather circuits and maintain continuity checks on data traffic. [Refs. 23,24]
- Five operators to oversee the MMS/SACS at NAVCOMMSTA Stockton. [Ref. 20]

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[12]Cost is computed based on the following facts:
-- The Master File contains two months worth of messages;
-- An average of 8344 messages are processed per month;
-- Each box of minidisks costs $36 and stores 800 messages.
(((2 * 8,344)/800) (rounded up)) * $36 = $756

[13]Because it is traditional that each service finance their own circuit costs, the expenditure to support this requirement is treated as an initial outlay to connect the circuit between Fort Ord and McClellan Air Force Base.

TABLE VIII

ANNUAL OUTLAYS FOR PROPOSED NTCC CLOSURE

Position Title	Number Allocated	Designated Pay Grade	Individual Yearly Rate	Total Rate
Personnel				
FNOC				
Supervisor	1	E-7	44,152	44,152
QC Operators	5	E-4	25,530	127,650
NAVCOMMSTA Stockton				
AST Operators	5	E-4	25,530	127,650
Total Personnel	**11**			**$299,452**
Equipment Costs				
MMS Maintenance			2,779	
Circuit Costs (FNOC-San Diego Connectivity)			15,000	
Yearly Charges for "800" Numbers			2,424	
Total Equipment Costs				**$20,203**
TOTAL OUTLAY BASED ON NTCC CLOSURE (PER YEAR)				**$319,655**

- Monthly lease ($1250) for the FNOC-San Diego AICS alternate circuit. [Ref. 13]

- Monthly charge ($202[14]) for the "800" numbers. [Ref. 22]

[14]Charge based on the following criteria:

-- $20 monthly charge per line;
-- Each subscriber will access the communications system for one half hour during each business day;
-- The hourly charge for use during the business day is $9.
2 * ($20 + (18 * .5) * 9) = $202

4. Subscribers Annual Costs

If the NTCC were closed, subscribers overall annual outlays for paper and permanent minidisk storage would remain the same as that displayed in Table VII.

IV. FINANCIAL COMPARISON OF COMMUNICATION ALTERNATIVES

This chapter presents an economic analysis associated with implementing DMS on the Monterey Peninsula, examining both proposed implementation schemes (NTCC upgrade and NTCC closure). In order to ascertain the DON cost avoidance, the analysis examines incremental (costs)/savings for both the communicators and the 17 Monterey subscribers.

A. COMPARISON OF FINANCIAL IMPACT

Using the data from Chapter III and net present value (NPV) theory, the following tables evaluate the fiscal ramifications of the two administrative message delivery alternatives for Monterey Peninsula subscribers. As directed by Reference 25, this analysis employs a five year cost projection, constant 1990 dollars, and a 10% discount rate[1].

1. Current Operations Versus NTCC Upgrade

Comparing current NTCC Monterey operations, Table IX presents data depicting a $492,899 NPV cost avoidance after an NTCC upgrade. This avoidance results from three less billets

[1]Since the cash flows for both the communicators and the subscribers accrue in the same yearly amount, the cumulative uniform series multiplier (3.977) is used as the discount factor. This rate assumes uniform cash flows throughout the year and is the the arithmetic average of the beginning and end of the year compound annuity factors found in standard present value tables. [Ref. 25]

TABLE IX

FINANCIAL IMPACT OF NTCC MONTEREY UPGRADE
(1990 CONSTANT DOLLARS)

Year		0	1 -- 5
CURRENT OUTLAYS			
Communicators	(Table III)		($822,661)
Subscribers	(Table IV)		(61,109)
Total Current Outlays			**(883,770)**
PROJECTED UPGRADE OUTLAYS			
Initial Costs			
Communicators		($126,240)	
Subscribers	(Table V)	(27,000)	
Total Initial Costs		**(153,240)**	
Annual Outlays			
Communicators	(Table VI)		(717,424)
Subscribers	(Table VII)		(3,877)
Total Annual Outlays			(721,301)
NET CASH FLOWS		**(153,240)**	**162,469**
PV of Initial Outlays			**($153,240)**
PV of Future Cost Avoidance			**646,139**
NPV OF COST AVOIDANCE FOR NTCC UPGRADE:			$492,899

in the NTCC, decreased hardware maintenance, and reduced costs associated with NTCC message reproduction.

2. Current Operations Versus NTCC Closure

Even with the installation and lease of additional circuits and allowing supplementary personnel for NAVCOMMSTA Stockton and FNOC, Table X illuminates the fiscal consequence of eliminating NTCC Monterey, The $1,885,631 NPV of cost

TABLE X

FINANCIAL IMPACT OF NTCC MONTEREY CLOSURE
(1990 CONSTANT DOLLARS)

Year		0	1 -- 5
CURRENT OUTLAYS			
Communicators	(Table III)		($822,661)
Subscribers	(Table IV)		(61,109)
Total Current Outlays			(833,770)
PROJECTED CLOSURE OUTLAYS			
Initial Costs			
Communicators		($116,586)	
Subscribers		(27,000)	
Total Initial Costs		(143,586)	
Annual Outlays			
Communicators	(Table VIII)		(319,655)
Subscribers	(Table VII)		(3,877)
Total Annual Outlays			(323,532)
NET CASH FLOWS		(143,586)	510,238
PV of Initial Costs			($143,586)
PV of Future Cost Avoidance			2,029,217
NPV OF COST AVOIDANCE FOR NTCC CLOSURE:			$1,885,631

avoidance results from reducing communications personnel by 13 billets, decreasing hardware maintenance, and eliminating miscellaneous costs associated with supporting an active NTCC.

V. CONCLUSIONS, RECOMMENDATIONS AND FURTHER RESEARCH

The Department of Defense is in the process of updating current administrative message delivery worldwide through the adoption of the Defense Message System (DMS) architecture. This change allows the transmission and reception of organizational messages through office workstations. For its part, the Department of the Navy (DON) may use the DMS technology to either upgrade equipment at current Naval Telecommunications Centers (NTCCs) or consolidate communications functions within regional areas.

This thesis primarily examined the fiscal impact of DMS on the Monterey Peninsula's organizational message delivery. It compared subscriber and communicator cost data for current communications operations and both DMS options (NTCC upgrade or closure).

A. CONCLUSIONS

Using NPV analysis over a five-year period, DMS administrative message delivery on the Monterey Peninsula will have the following fiscal impact:

- If DON communicators choose to maintain NTCC Monterey and upgrade its Standard Remote Terminal (SRT) with a hardware configuration consisting of a Remote Terminal System (RTS), Multi-level Mail Server (MMS), and Secure Telephone Unit Version III (STU-III) Access Control System (SACS), the projected NPV of cost savings for the Navy amounts to $492,899 over the five-year period following NTCC upgrade.

- If communications procedures are changed to allow permanent classified communications guard procedures for ashore commands, emergency TOP SECRET message delivery, and subscriber's administrative control of messages that require special handling, then communicators can establish a regional MMS/SACS at NAVCOMMSTA Stockton. Under this plan, the projected NPV of cost savings for the Navy amounts to $1,885,631 over the five-year period following NTCC closure.

B. RECOMMENDATIONS

Without considering the complete impact of DMS on the Fleet Numerical Oceanography Center (which is an area for further research), the option to establish a regional MMS/SACS is the clear choice for serving the future communication needs of subscribers on the Monterey Peninsula from a purely financial perspective. Although its adoption will entail procedural changes, the concept of Monterey regional communications service from NAVCOMMSTA Stockton has significant merit when considering the historical message quantity/sensitivity delivery responsibilities of NTCC personnel.[1]

C. AREA FOR FURTHER RESEARCH

The DMS architecture not only affects organizational messaging, but has significant influence on individual messaging (currently delivered by the Defense Data Network)

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[1]The NTCC delivers a relatively low volume of 8000 messages per month with no TOP SECRET delivery required in the past three years. Of its subscribers, only three (NPS,FNOC, and NIS) regularly receive classified messages or those that require special handling. [Ref. 4]

and data pattern traffic within the AUTODIN system. This impacts on the Fleet Numerical Oceanography Command (FNOC) which relies on a high volume of both types of electronic traffic. Because FNOC maintains its own communications network to support its mission, it appears noteworthy to conduct an in-depth study of the total impact of the DMS architecture on this command.

APPENDIX

GLOSSARY

AICS	Automatic Digital Network (AUTODIN) Integrated Communications System
AIG	Address Indicating Group
ASC	Automatic Digital Network (AUTODIN) Switching Center
AST	Automatic Digital Network (AUTODIN) Subscriber Terminal
AUTODIN	Automatic Digital Network
CAD	Collective Address Designator
COTS	Commercial Off the Shelf
DDN	Defense Data Network
DENTAL	Branch Dental Clinic
DMDC	Defense Manpower Data Center
DMS	Defense Message System
DOD	Department of Defense
DON	Department of the Navy
DPSREC	Defense Personnel Security Research and Education Center
FNOC	Fleet Numerical Oceanography Center
GENADMIN	General Administrative (message type)
GENSER	General Service (message type)
LAN	Local Area Network
LDMX	Local Digital Message Exchange
MAD	Message Address Directory

MEDICAL	Naval Medical Administrative Unit
MMS	Multi-level Mail Server
MDS	Message Dissemination System
MDU	Message Dissemination Utility
MTF	Message Text Format
NAVCOMPARS	Naval Communications Processing and Routing System
NAVCOMMSTA	Naval Communication Station
NIS	Naval Investigative Service
NOARL	Naval Oceanographic and Atmospheric Research Laboratory
NPS	Naval Postgraduate School
NPV	Net Present Value
NRA	Navy Resale Activity
NSGD	Naval Security Group Detachment DLI
NTCC	Naval Telecommunications Center
NTS	Naval Telecommunications System
OAS	Office Automation System
OCR	Optical Character Reader
OL A	Operating Location A Air Force Global Weather Center
OOD	Officer of the Day
OPTAR	Operating Target
PCMT	Personal Computer Message Terminal
PLA	Plain Language Address
PSD	Personnel Support Detachment
RESERVES	Naval Reserve Center Pacific Grove

RIXT	Remote Information Exchange Terminal
ROICC	Resident Officer in Charge of Construction
RTS	Remote Terminal System
SACS	STU-III Access Control System
SRT	Standard Remote Terminal
STU-III	Secure Telephone Unit Version III
USMC-D	Marine Corps Administrative Detachment DLI
USMC-N	Marine Corps Representative NPS

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