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Federal Acquisition Network implementation and certification

Clarke, Matthew T.

Monterey, California. Naval Postgraduate School

NAVAL POSTGRADUATE SCHOOL
MONTEREY, CALIFORNIA

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FEDERAL ACQUISITION NETWORK IMPLEMENTATION AND CERTIFICATION

by

Matthew T. Clarke

June 1995

Principal Advisor: Mark W. Stone

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The Federal Acquisition Streamlining Act (FASA) of 1994 requires that the Administration of the Office of Federal Procurement Policy establish a program for the development and implementation of a Federal Acquisition Network (FACNET). The FACNET, an electronic procurement system, is required to be universally available throughout the Government and provide interoperability among its users which includes the Department of Defense. The FASA incentivizes contracting activities by conditioning the use of new simplified acquisition procedures ($100,000 threshold) on an activity's ability to implement and certify their FACNET capability.

Many Army contracting activities already have some form of electronic procurement capability and incorporate its application into their daily procurement activities. However, while the Office of Federal Procurement Policy (OFPP) developed an initial standard for FACNET certification, the actual ability of agencies to achieve the standard remains nebulous. There are many barriers to the full use and certification of the FACNET. This is due in part to lack of detail in the FASA and the Federal Acquisition Regulation (FAR), which has yet to incorporate the FASA amendments. The objective of this research is to identify

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FEDERAL ACQUISITION NETWORK IMPLEMENTATION AND CERTIFICATION

Matthew T. Clarke
Captain, United States Army
B.S., University of Pennsylvania, 1984

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Author: [redacted]
Matthew T. Clarke

Approved by: [redacted]
Mark W. Stone, Principal Advisor

[redacted]
John T. Dillard, Associate Advisor

[redacted]
David R. Whipple, Chairman
Department of Systems Management

ABSTRACT

The Federal Acquisition Streamlining Act (FASA) of 1994 requires that the Administration of the Office of Federal Procurement Policy establish a program for the development and implementation of a Federal Acquisition Network (FACNET). The FACNET, an electronic procurement system, is required to be universally available throughout the Government and provide interoperability among its users which includes the Department of Defense. The FASA incentivizes contracting activities by conditioning the use of new simplified acquisition procedures ($100,000 threshold) on an activity's ability to implement and certify their FACNET capability.

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I. INTRODUCTION

A. BACKGROUND

The past two decades have seen an evolution of increasingly sophisticated uses for computers in both the private and public sectors. Almost on a daily basis new computer technology and applications enter the market. Two such innovations are electronic data interchange (EDI) and electronic commerce (EC). The implementation of electronic data interchange (EDI) technology and subsequent application of electronic commerce (EC) have been practiced by private industry for many years and are quickly becoming the preferred method for exchanging information and conducting business. Through the use of electronic information processing techniques, electronic commerce (EC) enables business transactions to be processed more quickly, more accurately, and at a lower cost than with manual, paper-based, processing systems. One industry analyst predicts that by the end of the decade, EC/EDI will no longer be competitive tools that differentiate one company from the next. They will be a business necessity for survival. (Quinn, 1991, p. 45)

The Department of Defense (DoD) has been slow to react to the technology available in this area. While some form of electronic data interchange has been available in DoD since the 1960's, it was never developed to its true potential. In May 1988, the Deputy Secretary of Defense issued a memorandum stating that EC/EDI was to "become the way of doing business for the Department of Defense (DoD)." In November 1990, Defense Management Report 941 was approved, which directed the development, implementation, and management of a standard DoD EC/EDI system. And while DoD did implement some applications of EC/EDI, it was never fully integrated into the acquisition process.

In a 1993 memorandum, President Clinton focused on acquisition streamlining by recognizing that the utilization of an electronic commerce system to simplify and streamline the procurement process would improve customer service

and cost effectiveness. The Federal Acquisition Streamlining Act (FASA) of 1994 expanded on this idea by requiring the implementation of such a system.

The Federal Acquisition Streamlining Act (FASA) of 1994 contains the most extensive changes in Federal Government Contracting since the Competition in Contracting Act (CICA) was implemented in 1984. This new statute reflects a fundamental shift toward commercial contracting, reduced oversight, and recognition of the changing character of technology underlying the procurement process. With respect to the recognition of ever-increasing technology and its use within the private business sector, the FASA requires procurement agencies to implement a standard electronic commerce system, the Federal Acquisition Network (FACNET), that will be available to all procurement agencies (Government and private), customers and users, research facilities, academic institutions and other institutions. (Lumer, 1994, p. 1)

To enhance the implementation and utilization of this electronic contracting process, FASA provides several incentives for those contracting agencies who achieve full FACNET certification status and integrate its use into their daily contracting activities. The Act also provides several disincentives for those agencies who fail to travel on the "acquisition super highway." The major concern at hand is that while many contracting agencies do incorporate some form of electronic commerce application into their daily activities, and the Office of Federal Procurement Policy (OFPP) has developed an initial standard for FACNET certification, the actual ability of agencies to achieve full certification remains nebulous. There are many barriers to full use of the FACNET in U.S. Army Contracting Activities resulting from legal and statutory requirements, and from a lack of specific guidance in the Federal Acquisition Regulation. In addition, the true impact of the forced movement of Government contracting agencies into a full electronic contracting environment has yet to be explored.

B. OBJECTIVES

The purpose of this research is to examine the implementation and utilization of the Federal Acquisition Network (FACNET) in the Department of Defense, primarily in U.S. Army Contracting Agencies, and to explore possible areas for expansion of FACNET use and development. In addition, this research provides an examination of FACNET fundamentals including:

- FACNET system configurations.
- The requirements of interim certification.
- The potential impact of FACNET on U.S. Army Contracting Agencies.

C. RESEARCH QUESTIONS

Primary Research Question: What are the current applications of the Federal Acquisition Network (FACNET) in U.S. Army Contracting Offices and what barriers must be overcome to allow full utilization (certification) of the FACNET system?

Subsidiary Questions:

1. How will the Federal Acquisition Network be used by DoD and private sector agencies?
2. What problems or barriers face Department of Defense Contracting Agencies in their efforts to achieve FACNET certification?
3. What impact/benefits will Department of Defense Procurement Activities derive from achieving FACNET certification and integrating the system into their procurement functions?
4. What actions must be taken to enhance FACNET implementation in the Department of Defense?

D. SCOPE OF THESIS

The thrust of this thesis is to examine the Federal Acquisition Network applications in the areas of acquisition and contracting in the Department of

Defense (specifically U.S. Army procurement activities). This study investigates the barriers to FACNET certification resulting from the lack of specific regulatory guidance and the impact of FACNET integration on the ability to enhance the acquisition and contracting process. This thesis does not require the use of classified materials and may be categorized as unclassified in nature.

E. METHODOLOGY

The research methodology used in this thesis includes a comprehensive literature review and personal and/or telephonic interviews with appropriate Department of Defense Contracting and Acquisition Agency personnel. The telephonic and personal interviews were used to gain insight into current practices of electronic contracting applications, the issues surrounding implementation of FACNET, and the impact of FACNET implementation on future Government contracting.

F. ORGANIZATION OF STUDY

This thesis is organized to provide the reader with an overview of electronic commerce and the Federal Acquisition Network (FACNET) and its application to U.S. Army Contracting Agencies. To accomplish this objective, Chapter II introduces the reader to the concepts of electronic data interchange (EDI) and electronic commerce (EC) including: what they are, their purpose and relationship to FACNET, the Department of Defense's involvement with EC, and the benefits derived.

Chapter III serves as an introduction to the Federal Acquisition Network, addressing the developmental history, a summary of procurement applications, and the Department of Defense policy for its implementation and use. It discusses the FACNET technical architecture, required hardware, software, and communication connections.

Chapter IV investigates the requirements of the FASA and complications contracting activities face in their efforts to become FACNET certified and implement FACNET into their organizations.

Chapter V analyzes FACNET certification as understood by DoD contracting activities and the impact of FACNET implementation on future U.S. Army Contracting Agency applications based on testimony by experts in the contracting field.

Chapter VI contains a summary of the principal findings of the thesis and offers recommendations for FACNET improvement. In addition, possible areas of future research are presented.

G. LIMITATIONS

This study, as every qualitative study attempting to measure human experiences, is limited by many factors that must be given equitable consideration when reviewing the presented conclusions.

These limitations include:

- The sample size is relatively small, providing the opportunity for misguided interpretations.
- The range of experience of the interviewees is not consistent.
- There is no true quantitative method of measurement capable of measuring the individual responses provided.
- The responses of the interviewees are subject to the interpretation of the researcher.

H. DEFINITIONS AND ABBREVIATIONS

A list of acronyms used within this thesis is presented in Appendix A. Working definitions of terms and concepts is provided in Appendix B.

II. ELECTRONIC COMMERCE AND ELECTRONIC DATA INTERCHANGE OVERVIEW

A. INTRODUCTION

> Properly planned and implemented, electronic data interchange has the potential to restructure markets, re-engineer inefficient manual processes, open up access to new customers, streamline flow of materials throughout an entire value chain, enhance quality across the board, and save millions of dollars. (Thomas P. Colberg, Price Waterhouse)

Communication and information are critical aspects of all organizational functions. In many instances they are the substance from which vital decisions are made. This holds true in both private industry and military service. Therefore, a major goal of both private organizations and the military is to continuously expand their ability to successfully transfer information and improve the effectiveness of their communications.

This continuous drive to improve information management communication effectiveness has prompted the development of many information system tools such as the telephone, photocopying machine, and computer. They have all had a major effect on the techniques used to convey information; however, it is the computer that continues to demonstrate ever-increasing potential. (Meier, 1994, p. 7)

Today, micro-computers or personal computers are found in the majority of business offices. Most managers agree that the effective use of computers promotes increased efficiency and productivity. As the number of computers in organizations increases, the logical chain of events is to connect them or link them with other computer systems within and outside of the organization thus allowing an increased information flow using standardized formats. This standardized communication between computers of different organizations has been termed Electronic Data Interchange and has redefined the methods businesses now use to communicate and compete in the global market. Conducting business

via electronic means is now the norm and those organizations that are unable to make the technological leap are predestined for failure as they will be unable to compete for business. The Department of Defense learned long ago that technical superiority was a requirement for successful combat operations. It has finally learned that the same lessons apply to the business of acquisition. (Meier, 1994, p. 8)

B. STREAMLINING WITH ELECTRONIC COMMERCE

1. Private Practice

Computer information systems now play a vital role in business success. They allow organizations to promote efficient operations, effective management, and competitive advantages through the manipulation and exploitation of information resources. To this end, private industry has come to realize that maintaining a competitive capability requires continuous investment in new computer technology and applications. Two such applications are electronic data interchange and electronic commerce. (Lindholm, 1991, p. 15)

In many industries, EDI has become a necessary business requirement. One IBM vice president said, "EDI is now a 'strategic application' of information systems in many businesses where the message is link up or lose out. Doing business without EDI will soon be like trying to do business without a telephone. No EDI, no business." (Lindholm, 1991, p. 16) Many major organizations have taken this lesson to heart. General Motors proved that point when it made EDI a requirement for thousands of its suppliers, as did many other major corporations. Experts predict that by the end of 1995, over one third of all business documents will involve EDI. In this respect, it is easy to see that EDI may revolutionize data entry in many transaction processing systems while promoting strategic relationships between industry trading partners. (Lindholm, 1991, p. 16)

This increased reliance and insistence on computer technology is also catalyzing major changes in the operating procedures of Federal Government Acquisition Agencies who want to do business with private industry. They have

learned that low technology practices make them incapable of executing efficient business transactions with those organizations where "high tech" is the norm. (Lindholm, 1991, p. 17)

2. Government Oversight Evolution

In the past quarter century, studies sponsored by Congress and the Executive Branch have concluded that the federal procurement/acquisition system was too disparate, complex, detailed, and technical and that the statutory framework needed a major overhaul to make it an efficient and economical system (Commission on Government Procurement Report, 1972). The theme of these and other recent studies has remained constant: too much oversight and statutory regulation hinders the Government's ability to conduct acquisition in an efficient manner.

Section 800 of the Fiscal Year 1991 National Defense Authorization Act (Public Law 101-510) mandated the establishment of an advisory panel (the Section 800 Panel) to codify and simplify acquisition law. In January 1993, the Section 800 Panel issued an 1,800 page report recommending to Congress significant changes to the current defense procurement system. Of the 600 statutes that were selected and reviewed, the advisory panel recommended amending, deleting, consolidating or rescinding over 300. The objective of their efforts was to streamline acquisition statutes, improve access to commercial technologies, and simplify the acquisition process. One of the principal recommendations of the panel was to establish a simplified procurement process through electronic data interchange or electronic commerce systems. (FECAT Final Report, 1994, pp. 1-5 - 1-10)

3. The National Performance Review

In the last few years, many initiatives were undertaken to improve efficiency by making standardized electronic commerce a reality throughout the Federal Government. Significant among these initiatives was the National Performance Review (NPR) which began in March 1993, when President Clinton announced an intensive six month study of the Federal Government headed by Vice

President Gore. The objective of the NPR was to determine how to create a Government that works better and costs less. The NPR report, published in September 1993, identified acquisition as one of the major areas for reform. Within these acquisition reforms was the recommendation to allow agencies to buy where they want through an "electronic market place." (Murphy, 1994, p. 2)

4. President Clinton's Memorandum

In President Clinton's memorandum, "Streamlining Procurement Through Electronic Commerce," issued on October 26, 1993, he noted that moving to an electronic commerce system to simplify and streamline the acquisition process would promote customer service and cost effectiveness. In his memorandum, the President directed the accelerated implementation of electronic commerce across the Executive Branch of the Federal Government. (Murphy, 1994, p. 2)

To these ends, the President set forth the following objectives for electronic commerce: (Clinton, 1994)

- Exchange acquisition information electronically between the private sector and the Federal Government to the maximum extent practicable.
- Provide businesses, including small, small disadvantaged, and women-owned businesses, with greater access to federal acquisition opportunities.
- Ensure that potential suppliers are provided simplified access to the Federal Government EC system.
- Employ nationally and internationally recognized data formats that serve to broaden and ease the interchange of data.
- Use agency and industry systems and networks to enable the Government and potential suppliers to exchange information and have access to federal acquisition data.

To implement EC and to achieve his objectives, the President set forth the following four milestones: (Clinton, 1994)

- By March 1994, define the architecture for a Government-wide EC acquisition system and identify executive departments or agencies responsible for developing, implementing, operating, and maintaining the federal electronic system.

- By September 1994, establish an initial EC capability to enable the Federal Government and private suppliers to exchange standardized requests for quotations (RFQs), quotes, purchase orders, and notice of awards and begin Government-wide implementation.

- By July 1995, implement a full-scale Federal EC system that expands initial capabilities to include electronic payments, document interchange, and supporting databases.

- By January 1997, complete Government-wide implementation of EC for appropriate Federal purchases, to the maximum extent possible.

5. The Federal Acquisition Streamlining Act of 1994

The Federal Acquisition Streamlining Act of 1994 (FASA) began a new age in Federal procurement by rescinding tight controls and strict codes of contracting conduct in favor of a re-engineering process promoting efficiency and common sense. The FASA repealed or substantially modified 225 provisions of law that affect the contracting and acquisition system. (Lumer, 1994, p. 1)

According to Secretary of Defense, William Perry,

> The Federal Acquisition Streamlining Act of 1994, based in great part on the 'Section 800 Panel' report, is the most significant change to laws that govern federal procurement since the passage of the Armed Services Procurement Act of 1947. (Slatkin, 1994, p. 3)

One provision of the FASA mandates that the administrator of the Office of Federal Procurement Policy (OFPP), in consultation with designated Federal

agencies, must establish a program for developing and implementing a Government-wide Federal Acquisition Network (FACNET) over the next five years that agencies will use to conduct Federal procurements by electronic commerce. The FASA mandates January 1, 2000, as the date for full FACNET capability. (NCMA FASA of 1994, p. 199)

6. Streamlining Trends In The Department of the Army

In a speech given to acquisition students at the Naval Postgraduate School on January 30, 1995, the Hon. Gil Decker, Assistant Secretary of the Army, Research, Development, and Acquisition, stressed that the move to acquisition reform was very strong in the U.S. Army. He was very much in favor of streamlining Army Acquisition by removing the ubiquitous red tape and eliminating low value requirements. One of his major goals was the implementation of an Army-wide electronic contracting capability through the Federal Acquisition Network (FACNET) in compliance with the FASA. (Decker, 1995)

C. DEFINITION OF TERMS

1. Electronic Data Interchange

Electronic data interchange is the inter-organizational, computer to computer exchange of business documentation and information in a standardized, machine-processable format. (Emmelhainz, 1993, p. 4)

This definition of electronic data interchange contains a number of key points which distinguish it from other forms of paper or electronic communication: (Emmelhainz, 1993, pp. 4-5)

- Inter-organizational: While EDI technology is equally applicable to exchanging information within organizations, by definition EDI is organization to organization.

- Computer to computer: Once the data are entered into the originator's application, the information flows directly to the receiver's application. The key point is that once entered, the data flow between organizations without human intervention and without paper.

- Business Documentation: Information that is currently found on any business form is appropriate for EDI. Examples of business documents which are exchanged electronically include: purchase orders, invoices, bills of lading, status reports, receipt acknowledgments, and payment information.

- Standardized, Machine-processable format: As discussed, EDI is the electronic exchange of information from one computer to another without human intervention. For this to occur, the data must be precisely formatted to allow computers to both read and understand the information.

EDI is considered by many as the ultimate in source data automation in many transaction processing systems. It involves the electronic transmission of business transaction data over telecommunications links between the computers of trading partners. The data, which represent a series of business transaction documents such as purchase orders, invoices, requests for quotations, and shipping notices, are electronically transmitted using standard document message formats. These formatted transaction data are transmitted over telecommunications links (networks) directly between computers. In addition to direct network links between the computers of trading partners, third party network services (value added networks) are also used. These value-added telecommunications carriers like GE Information Services, IBM, Control Data, and McDonnell Douglas offer a variety of EDI services, including an electronic mailbox for EDI documents (Burch, 1989, p. 16).

Of important note is how EDI differs from other forms of electronic communication. To be called EDI, the electronic transmissions must be electronic, paperless and without human intervention. Therefore, human monitoring is not required. In contrast, facsimiles and electronic mail are both electronic transmissions with the capability to be paperless. Yet they are not considered a form of EDI as human intervention is still required to complete the communication cycle. (Murphy, 1994, p. 1)

Figure 2-1 is an example of EDI execution. In this example, Motorola Codex has EDI links with its supplier, Texas Instruments, for the exchange of a variety of electronic transaction documents. Motorola closes "the business loop" by using electronic funds transfer (EFT) links to its banks so it can make electronic payments to its supplier. (Wilder, 1992, p. 6)

2. Electronic Commerce in the Department of Defense

Electronic commerce (EC) is the integration of electronic data interchange, electronic mail, electronic bulletin boards, electronic funds transfer, and similar techniques into an electronically based system for all business functions, to include procurements and acquisition, contracting, payment, supply management, transportation operations, contract administration, and maintenance operations to name a few. Electronic commerce positions the necessary systems, capabilities, and procedures that will fundamentally alter the business process from a paper-intensive environment to a nearly paperless environment. (Strassman, 1991)

The Electronic Commerce Information Center (ECIC) was established by the Deputy Under Secretary of Defense (Acquisition Reform) to support the DoD commitment to provide a "single face to industry" for electronic commerce. They define electronic commerce as the conduct of business transactions, supporting functions such as administration, finance, logistics, procurement, and transportation, between the Government and private industry, using an integrated automated information environment. (EC/EDI Fact Sheet, 1994)

With respect to this definition, electronic commerce relies on three subsystems. The first subsystem is an electronic market made up by an information distributor or trader, electronic classified advertising, electronic product and corporate profiles, and electronic bulletin boards. The second subsystem is an integrated distributed database with an interorganizational database and electronic reporting programs. The third incorporates EDI transaction sets for accessing, ordering and exchanging technical data. (Drake, 1991)

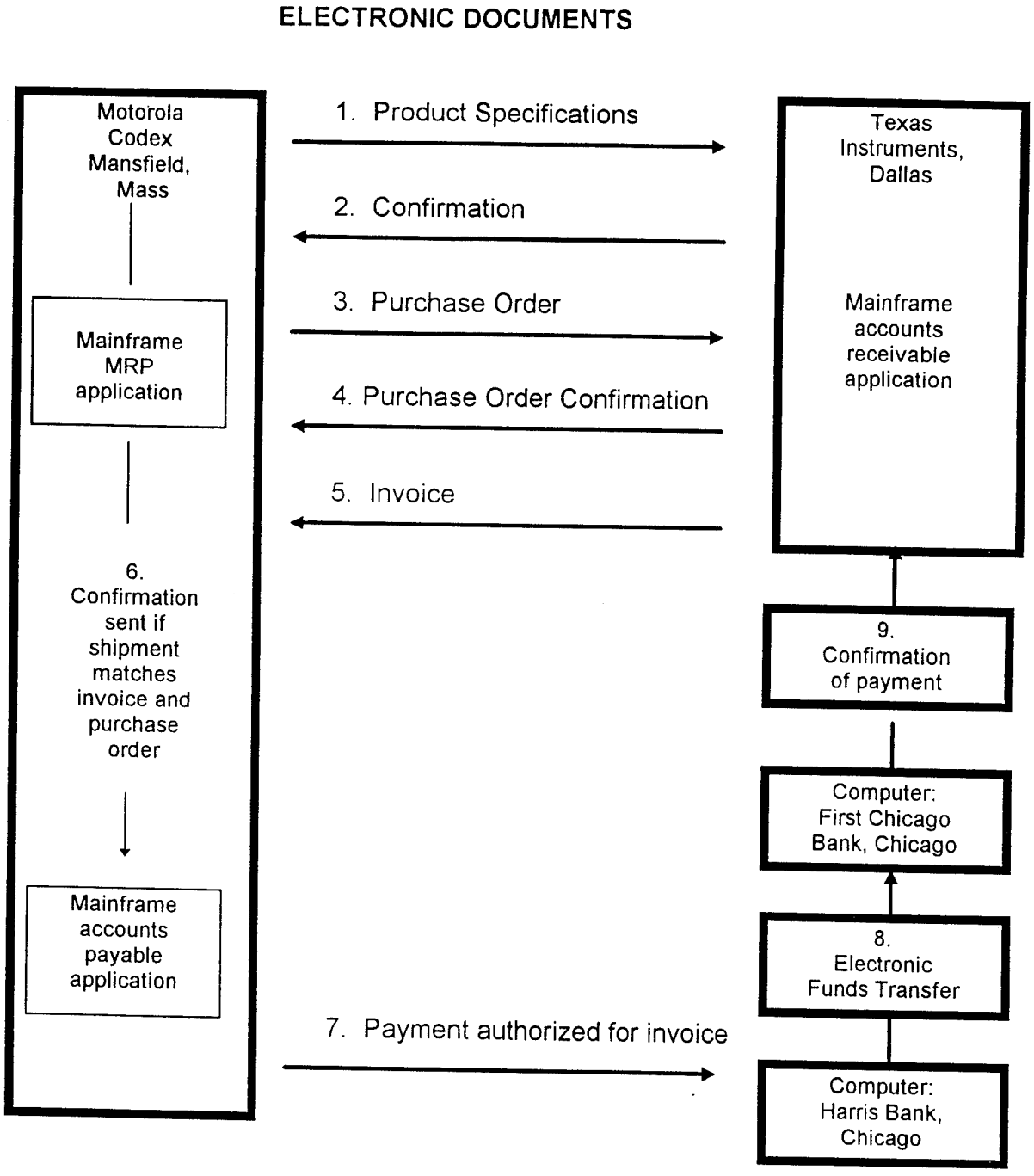


Figure 2-1. **An example of EDI, Motorola Codex uses EDI links to its supplier, Texas Instruments for the exchange of business documents. (Wilder, 1992, p. 6)**

The Department of Defense has already adopted electronic commerce in some of its procurement agencies. Their concept of electronic commerce involves the integration of electronic data interchange, electronic mail, electronic bulletin boards, electronic funds transfer, and related technologies into a comprehensive electronic-based system. The objective of DoD's program is not to just automate existing manual processes, but to implement the necessary systems, capabilities and procedures which will allow DoD activities to fundamentally alter and improve the manner in which they accomplish their business operations. (Hardcastle and Heard, 1990, p. 1-2)

3. Value Added Networks

A value added network (VAN) is a communications network that transmits, receives, and stores EDI messages for trading partners. These networks are typically operated by communications carrier companies called value-added carriers, who are third party vendors leasing communications lines from common carriers. Typically, messages from customers are transmitted in groupings called packets. Value added networks add "value" to their leased communications lines by using communications hardware and software and their expertise to provide packet switching and other data communications services. Value added carriers offer their customers a high quality, relatively low-cost service in return for membership fees and usage charges based on the amount of communications activity. (O'Brien, 1993, p. 194)

Figure 2-2 depicts the EDI process using a VAN. Trading partner A puts an EDI message for trading partner B in the VAN mailbox at a date and time of its choosing. The VAN picks up the message from the mailbox and delivers it to trading partner B's mailbox where it will remain until trading partner B logs on and picks it up. Trading partner B responds to trading partner A in the same fashion. The cycle can repeat itself on a weekly, daily, or even hourly basis as needed. (FECAT Final Report, 1994, p. 3-18)

VANs will have a key role in the Government EC system. At a minimum, the Government will use VANs to communicate business transactions with trading

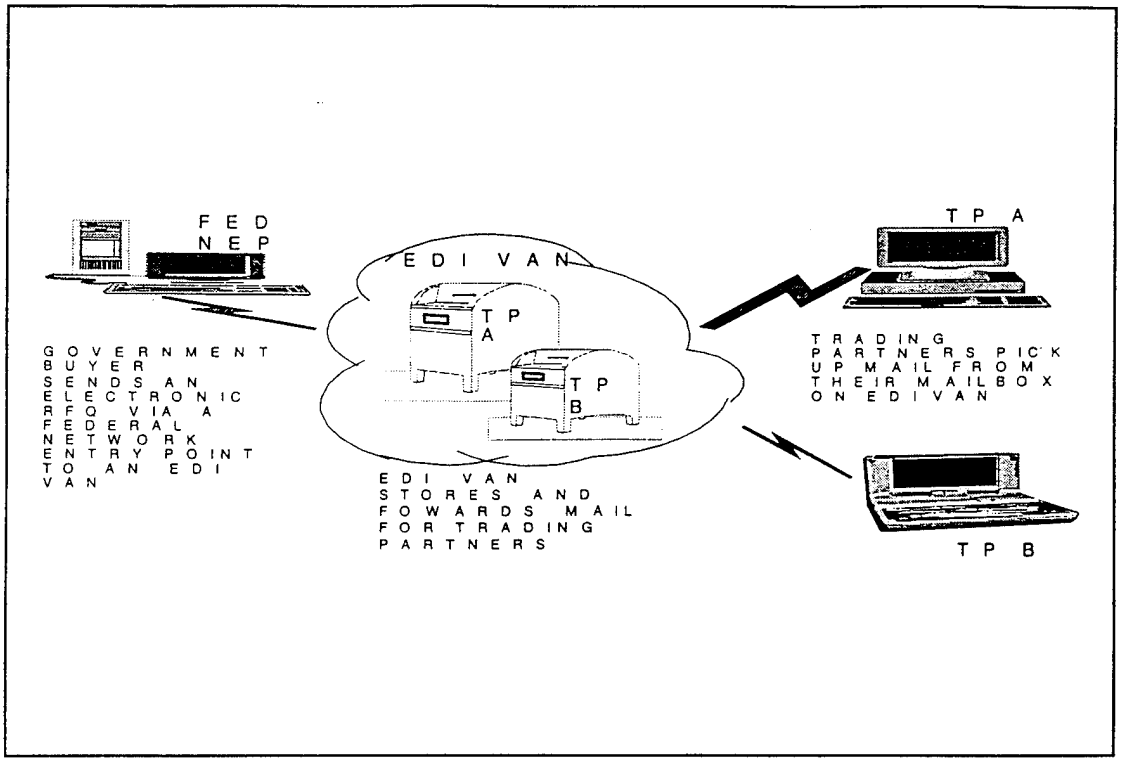


Figure 2-2. EC/EDI Process (FECAT Final Report, 1994, pp. 3-19)

partners. In addition, the Government will use VANs to recruit and educate trading partners and to offer value added services to small businesses that may not be technically proficient. (FECAT Final Report, 1994, p. 3-24)

Government suppliers or trading partners will electronically transfer data through any Government approved (EDI-certified) value added network. In addition, trading partners may become an EDI-certified VAN to act on their own behalf.

Value added networks, similar to telephone calling companies, offer a variety of services tailored to meet the needs of their customer base. The prudent consumer should conduct a market survey to determine exactly which VAN is most capable of satisfying their requirements. The majority of value added networks provide the following services: (O'Brien, 1993, p. 194)

- Translation and conversion services into the format agreed upon by the trading partners.
- Interconnection services to allow customers to deal with trading partners in other networks through gateways.
- Process and forward services in which mailboxes store inbound transactions for the recipient.
- Compliance checking services to determine if transactions are formatted as agreed upon by the trading partners.

Figure 2-3 graphically demonstrates the various services and capabilities provided by value added networks and the typical industry standards or practices they use. (EDI World Magazine, February 1994)

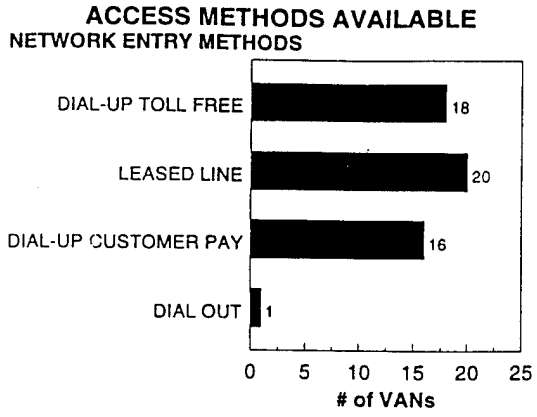
4. Virtual Networks

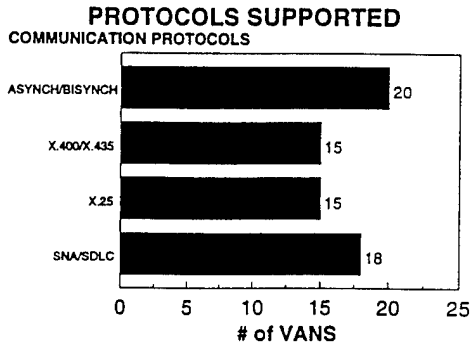
A virtual network is a computer network that provides for a linking of all available Government and industry networks. This allows for any person in the Government virtual connectivity with an industry trading partner. The underlying make up of the virtual network is the combination of private and Government networks linked together. One example of a virtual network is the Internet. Another possible virtual network would include the interconnection of networks from the Department of Defense, Department of Commerce, National Aeronautics and Space Administration, and other Government and private industry networks. (FECAT Final Report, 1994, p. 4-13)

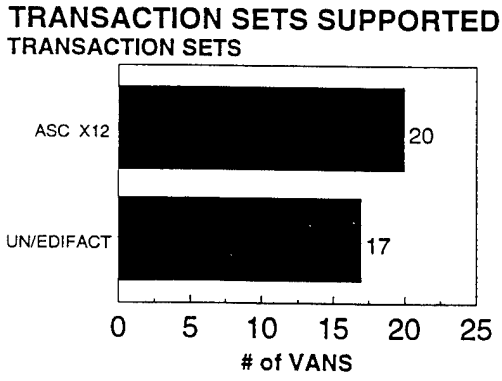
D. EC/EDI FORMAT STANDARDS

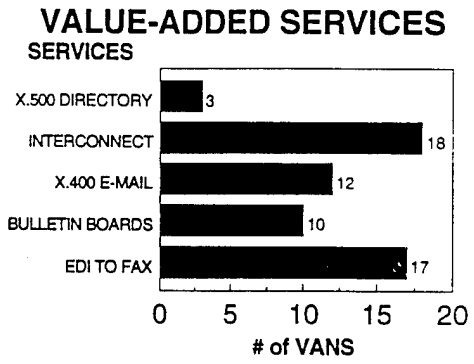
1. Overview

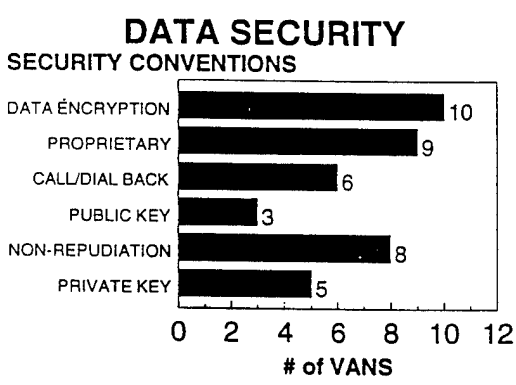
As previously defined, electronic data interchange is the inter-organizational, computer to computer exchange of business documentation and information in a standardized, machine-processable format. Principal to this definition is the requirement and use of standardized, machine-processable formats for data elements. Standardized formats are an essential element to

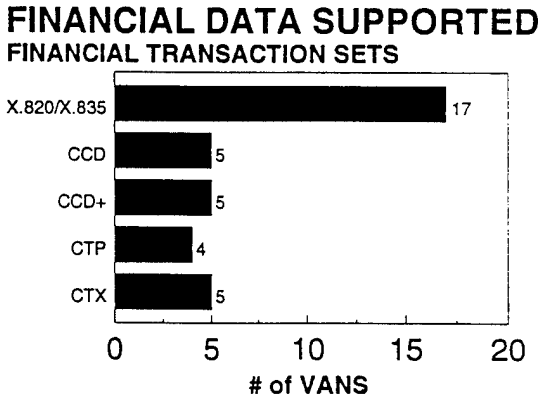












(EDI World magazine, February 1994.)

Figure 2-3. Standard Commercial Services and Capabilities Provided By VANS (EDI World Magazine, February 1994)

EC/EDI applications as they facilitate the electronic exchange (non-human intervention) of data by providing a uniform process for configuring unstructured data into a standardized configuration or structure. This configuration or standardization of data allows computers to read, understand, process, and transfer data automatically, without the requirement of human assistance after initial input. Standards were developed to ease communication between organizations, with several different standards emerging. These different standards may be classified as: (Hinge, 1988, p. 22)

- Proprietary. Proprietary data standards are those established by individual organizations for communicating with trading partners within a "closed" system. For example, Roadway Express, Inc. has its "E-Z BILL" Shipment information management system which provides bill of lading, shipment status, and claims information to system users.

- Industry-Specific. While proprietary data standards are established by individual organizations, industry-specific standards are set by an industry trade group, to promote intra-industry electronic communication. Examples of industry-specific standards include: 1) Transportation Data Coordinating Committee (TDCC) - Transportation industry, 2) Uniform Communication Standard (UCS) - Grocery industry, and 3) Warehouse Information Network Standards (WINS) - Warehouse industry.

- Cross-Industry. In the United States there is only one inter-industry EDI data format: the American National Standards Institute (ANSI) Accredited Standard Committee X12 (ASC X12) Standard.

- International. While ASC X12 is the standard for EDI in the United States, the standard for use in Europe and in many other parts of the world is the United Nations/EDI for Administration, Commerce, and Transport (EDIFACT). Worldwide, EDIFACT use is increasing and there is consideration for the future development of a universal standard resulting from an alignment between EDIFACT and ASC X12.

The Federal Information Processing Standards (FIPS) Publication 161-1 espouses two families of EDI standards: American National Standards Institute (ANSI) Accredited Standards Committee (ASC) X12, and United Nations Electronic Data Interchange for Administration, Commerce and Transport (EDIFACT). The FIPS Publication 161-1 mandates the use of either ANSI X12 or EDIFACT when Government departments or agencies implement an EC/EDI system. However, ANSI X12 is the predominate standard. (FECAT Final Report, 1994, p. 3-33)

2. ANSI X12

A large variety of industry specific standards for the exchange of electronic information exists. North America has principally accepted ANSI X12 as its standard. Most industry-specific standards are committed to aligning themselves with ANSI X12 (FECAT Final Report, 1994, p. 3-33).

The purpose of the ANSI X12 standard is to provide format specifications for structuring business information (i.e., that information found in conventional business documents) which are to be exchanged through EDI. The ANSI X12 standard addresses such issues as: (Emmelhainz, 1993, p. 54)

- What documents can be transmitted electronically?
- What information must be/can be included in each document?
- What is the required sequence of the information?
- What form of information is acceptable (e.g., number, ID codes, etc.)?
- What is the meaning of specific pieces of information (data elements)?

The ANSI X12 is not a single standard but rather a collection of underlying standards which addresses a large range of business requirements. The ANSI X12 standards consist of: (Hinge, 1988, p. 63)

- Transaction set standards
- Data element dictionary
- Data segment directory
- Transmission control standards

a. Transaction Set Standards

A transaction set is a specific group of data segments that represents a business document. They define the format and context of data used and the information in the set is basically the same as that found on a conventionally printed document (DuChung, 1991, p. 10). There are currently 187 transaction set standards published by ANSI ASC X12 as of January, 1994. The Department of Defense will implement 14 new specific ANSI X12 transaction sets over the next two years, as shown in Figure 2-4. (DoD EC/EDI Fact Sheet ANSI X12 Standards, 1994)

b. Data Element Dictionary

The data element dictionary contains the codes for types of information used in the various transaction documents. The data element dictionary reduces large quantities of information into two-digit codes called data elements. This eliminates the requirement for descriptive information in an electronic document. (DuChung, 1991, p. 11)

c. Data Segment Dictionary

The data segment dictionary defines the particular data segments and elements used in constructing the EDI transaction sets (DuChung, 1991, p. 12).

1. ANSI 840 - Request For Quotation (RFQ)
2. ANSI 843 - Response to an RFQ
3. ANSI 850 - Purchase Order (PO)
4. ANSI 824 - Application Advice
5. ANSI 836 - Contract Award Summary
6. ANSI 838 - Trading Partner Profile
7. ANSI 864 - Text Message
8. ANSI 997 - Functional Acknowledgment
9. ANSI 832 - Price/Sales Catalog
10. ANSI 855 - PO Acknowledgment
11. ANSI 860 - PO Change
12. ANSI 865 - PO Change Acknowledgment
13. ANSI 869 - Order Status Inquiry
14. ANSI 870 - Order Status Report

Figure 2-4. Additional transactions to be phased in as requirements are defined. (EC/EDI Fact Sheet ANSI X12 Standards, 1994)

d. Transmission Control Standards

Transmission control standards establish the formats for the information required to interchange data. Contained within the transmission control standards are data element delimiters, transaction set separators, and

transmission envelope formats which create a hierarchical structure for the transmission of formatted data. (DuChung, 1991, p. 12)

3. EDIFACT

EDIFACT is currently under development by the United Nations Economic Commission for Europe - Working Party (Four) on Facilitation of International Trade Procedures (UN/ECE/WP4) (FECAT Final Report, 1994, p. 33). EDIFACT is very similar to ANSI X12 in both purpose and approach. However there are technical differences which do not allow interoperability between the two. As the global economy expands across more and more boundaries, there may be an implementation shift from the locally accepted ANSI X12 to the internationally accepted EDIFACT. The Government considers EDIFACT as a potential standard for its electronic commerce applications. (FECAT Final Report, 1994, p. 33)

E. HARDWARE AND SOFTWARE REQUIREMENTS

1. Hardware

EC/EDI has no specific hardware configuration requirements. There are many hardware systems available on the commercial market which can easily execute EDI applications. Figure 2-5 presents the four basic systems hardware options for EDI implementation: (Emmelhainz, 1993, p. 87)

- Mainframe Only
- Microcomputer
- PC As A Front-End Processor
- Dedicated EDI Operating System

Each application of EDI technology is unique; situationally dependent on numerous variables such as an organization's commitment to EDI, current and anticipated volume of data to be exchanged via EDI, and budgetary constraints (Meier, 1994, p. 50). The specific hardware configuration employed should be

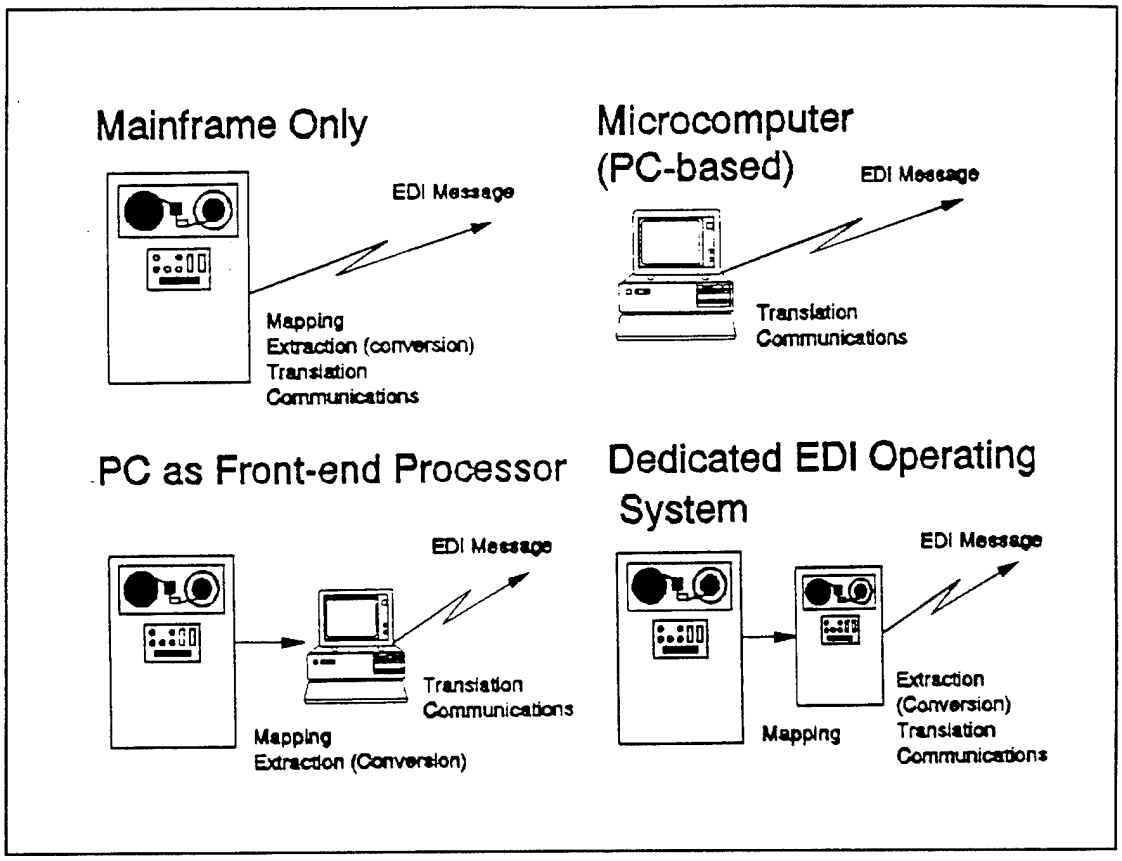


Figure 2-5. EDI System Hardware Options (Emmelhainz, 1993, p. 88)

selected based on an evaluation of the organizational requirements along with consideration of the advantages and disadvantages of each of the four basic configuration options, as depicted in Figure 2-6. (Emmelhainz, 1993, pp. 87-89)

2. Software

EC/EDI software resources include all sets of information processing instructions which direct and control the computer hardware. The software provides the sets of computer instructions which control the data manipulation operations. Software is critical to the translation of unstructured, industry specific, raw data into a structured EDI format (e.g., ANSI X12 or EDIFACT). In addition to the standard related aspects of an EDI system, software is also used to control required communication interfaces such as establishing the speed and

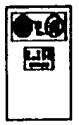
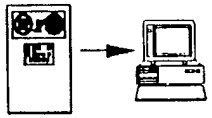
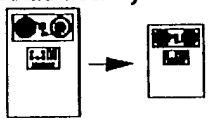
HARDWARE OPTION	ADVANTAGES	DISADVANTAGES
Mainframe 	• Fast transaction processing time • High transaction volume • Eliminates keyboard data re-entry	• Cost and time to establish
Microcomputer 	• "Relatively" inexpensive • Quick to set up • Easy to use • Portability	• Increased possibility of data entry errors • Slower transaction processing • Limited transaction volume
PC: Front-end Processor 	• Not as expensive as mainframe • More volume than PC-based	• Not as inexpensive as PC-based • Not as fast as mainframe
Dedicated System 	• "Fastest" transaction processing times • Highest transaction volumes	• Most "expensive" in terms of total resources required to establish and maintain

Figure 2-6. Hardware Option Advantages and Disadvantages (Emmelhainz, 1993, p. 89)

type of transmission and performing error detection during the data transfer (Meier, 1994, p. 58).

There are a number of software categories associated with an EDI system. These include: (Emmelhainz, 1989, p. 66)

- Database management software: Designed to systematically organize data into files for easy access, retrieval, and maintenance.
- Format/conversion or translation of software: User information input into transaction format (ANSI X12) and then converted to the electronic transmission protocol. It is also capable of converting transmitted data from the communications protocol to the transaction format (ANSI X12).
- Communication software: Controls the data being transmitted via phone lines to and from EDI trading partners.

Figure 2-7 depicts the three primary functions performed exclusively by EDI software: mapping, data extraction (conversion), and translation, with the final function, communications, accomplished through a combination of hardware and software (Emmelhainz, 1993, pp. 80-82).

F. EC/EDI BENEFITS

Many organizations and agencies have conducted EC/EDI benefit analysis studies over the years. The typical benefits identified by these studies fall into the following areas: (Jensen, 1992, p. 26)

- Increased responsiveness and value to customers.
- More information available more quickly resulting in better informed internal and external customers.
- Reduced errors and resultant higher quality and accuracy of information.

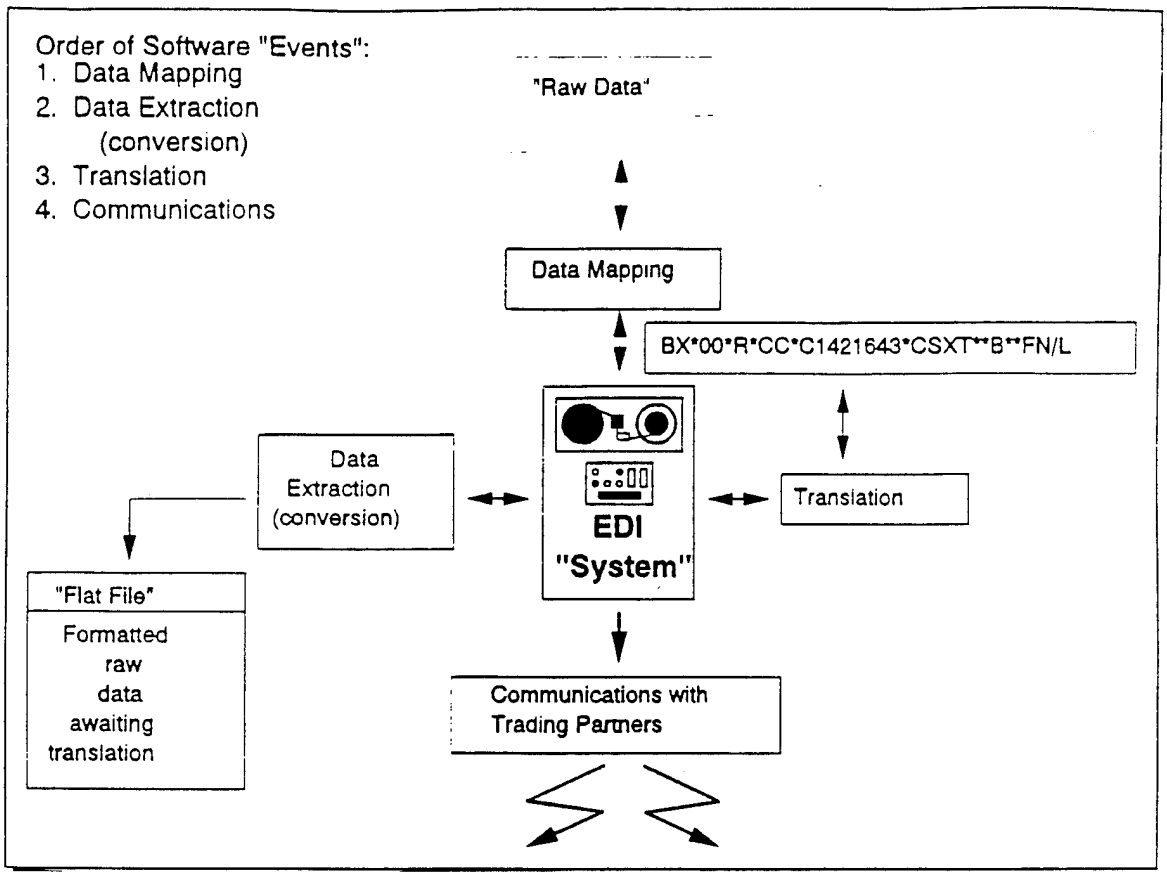


Figure 2-7. Primary EC/EDI Software Functions (Emmelhainz, 1993, p. 82)

- Elimination of repetitive work (e.g., data entry) between trading partners.
- Improved efficiency and reduced costs.

Many organizations view cost of economic benefit as the most critical discrimination for implementing an EC/EDI program. A Department of Veterans Affairs (VA) study provides the following examples of economic benefits realized by some organizations that implemented EDI: (FECAT Final Report, 1994, p. 2-5)

- The VA found that EDI for delivery orders can save an estimated $75 million over 5 years. The VA also found that implementation

of EDI invoices reduces the per invoice costs from $3.48 to $1.55 for a discounted net savings of $12 million (discounted) over 5 years. The VA also found the use of EDI for Government bills of lading (GBLs) would net $388,541 in discounted savings over 5 years; the cost of GBL's would drop from $10.07 to $4.52 each.

- Pacific Telesis (PacTel) eliminated 51 percent of its paper-based systems and lowered its cost per transaction from $78 to $48.

- The Long Island Medical Center reduced its inventory of medical supplies by 25 percent over a 2-year period, while at the same time the number of orders (per year) increased from 22,000 to 35,000.

- The DoD, in its Business Case for Electronic Commerce, identified $1.2 billion in savings by automating 16 most-used forms over a 10-year period. The Defense Management Review Decision 941 identified that $4 million spent in FY92 saved $60 million in FY93. This estimate was considered by many to be extremely conservative.

- The Defense Logistics Agency General Supply Center in Richmond identified $24.5 million in savings with its Paperless Order Processing System (POPS), which eliminated paperwork and reduced inventory and depot costs.

- Texas Instruments implemented EDI in its procurement organization and reengineered its business process, lowering its average cost to process a purchase order from $49.00 to $4.70.

- It costs the Internal Revenue Service an average of $82.00 to process a tax return manually, while it costs an average of $8.75 to process a return electronically.

- The EDI work group convened by HHS in November 1991 concluded that between $4 billion and $10 billion could be saved each year in the administrative costs for the nation's health care system through the use of EDI. The U.S. health care system costs $900 billion, of which $120 billion is for administrative costs.

G. EC/EDI ISSUES

While the implementation of an EC/EDI program allows the derivation of many potential benefits for the implementing organization, it does so with its own specific concerns. High technology applications suffer high technology consequences. The typical potential problem areas fall under the following non-inclusive categories: (Kaven, 1990, p. 196)

1. Security,
2. Compatibility,
3. Capability to Audit Transactions,
4. Integrity of System,
5. Standardization.

The central issue is how the EC/EDI resources will be protected from inappropriate use. Specific areas to be addressed include: (Kaven, 1990, p. 197).

- Risk to security, both in the unauthorized use or tracking of data.
- What are the legal implications of contract in an electronic form?
- How will the cost of errors be handled (liability)?
- What controls and practices need to be developed to handle auditability and accountability?

H. SUMMARY

In the last several years the Government has sponsored several initiatives to streamline the acquisition process and move toward more efficient practices. These initiatives have culminated in the Federal Acquisition Streamlining Act (FASA) of 1994 which modified 225 acquisition related laws. One amendment of

the FASA mandates the use of a Government Electronic Commerce System (FACNET).

This chapter provided a brief examination of electronic commerce (EC) applications and the technology of Electronic Data Interchange (EDI) with respect to the Government's acquisition streamlining attempts. EDI is the computer-to-computer or application-to-application exchange of business documents using a standard electronic format. Electronic Commerce is the integration of EDI, electronic mail, electronic bulletin boards, and electronic funds transfer during the conduct of business. Standards and protocols are critical to the successful transfer or exchange of documentation. The ANSI X12 standards are the most accepted of those available.

Several combinations of computer hardware and software exist of which electronic commerce is capable. The correct system to select must be chosen based on the needs of the user. Of critical importance is the connectivity between trading partners who may wish to establish a direct network or utilize the services of one of the many value added networks provided by communications carrier companies.

The next chapter examines the Federal Acquisition Network (FACNET), as the Government's electronic commerce system. Specific topics include FACNET implementation as prescribed by the FASA and a potential network architecture.

III. FEDERAL ACQUISITION NETWORK OVERVIEW

A. INTRODUCTION

The ability for trading partners to execute electronic commerce is now a reality. On February 17, 1995, the Wells Fargo Bank laid claim to becoming the first U.S. bank to process credit card purchases over the Internet, providing secure payment transactions to the trading partners. However, some cyberspace experts question how significant a role the bank's system will play in the evolution of electronic commerce due to the disparity of standards and technologies that continue to exist. (Eng, 1995, p. D1)

Nevertheless, the electronic marketplace is growing at an incredible rate. It is estimated that by the end of 1995, more than 10,000 companies will be offering information and services for sale over a combination of the Internet and value-added networks (VANs), and by the year 2000, the growth in the number of these companies is expected to exceed one million. Because much of the Government's electronic commerce initiative is beyond the capabilities of the companies as individuals, Government interaction is a requirement, necessary to catalyze a standardized electronic commerce capability. (Verity, 1994, pp. 80-85)

Today, the Federal Acquisition Streamlining Act (FASA) of 1994 requires the transformation of the Government's current paper-driven procurement process into an electronic commerce system that will be widely available across the entire spectrum of customers and users. Title IX, Section 9001 of the FASA requires that the Administrator of the Office of Federal Procurement Policy establish a program for the development and implementation of a Federal Acquisition Network (FACNET) that will be Government-wide and provide interoperability among its users. (FASA, 1994)

This chapter examines the FACNET with respect to the requirements and plans for its implementation. In addition, a potential network architecture for FACNET is explored with relation to the desired capabilities the system will eventually provide to both its public and private users.

B. FEDERAL ACQUISITION NETWORK (FACNET) DEFINED

The Federal Acquisition Network (FACNET) is a group of computers and associated devices (a Federal computer network with procurement databases) allowing readily accessible computer-based acquisition information to Government and private-sector users, including small businesses and individuals interested in conducting business with the Government. The FACNET will provide the median for the Government to conduct electronic commerce with its trading partners. To accomplish its intended mission, the FACNET must execute several multi-level functions for both the Government and private industry: (Lumer, 1994, p. 3)

Government Functions: (FASA, 1994)

- Provide widespread public notice of solicitations for contract opportunities issued by an executive agency.
- Receive responses to solicitations and associated requests for information through the network system.
- Provide public notice of contract awards (including price) through the network system.
- In cases in which it is practicable, receive questions regarding solicitations through the network system.
- In cases in which it is practicable, issue orders to be made through the network system.
- In cases in which it is practicable, make payment to contractors by bank card, electronic funds transfer, or other automated methods.
- Archive data relating to each procurement action made using the network system.

Private User Functions: (FASA, 1994)

- Access notice of solicitations for contract opportunities issued by an executive agency.
- Access and review solicitations issued by an executive agency.

- Respond to solicitations issued by the executive agency.
- In cases in which it is practicable, receive orders from the executive agency.
- Access information on contract awards (including price) made by the executive agency.
- In cases in which it is practical, receive payment by bank card, electronic funds transfer, or other automated means.

General Functions: (FASA, 1994)

- Allow the electronic interchange of procurement information between the private sector and the Federal Government and among Federal agencies.
- Employ nationally and internationally recognized data formats that serve to broaden and ease the electronic interchange of data.
- Allow convenient and universal user access through any point of entry.

As can be seen, the concept of FACNET encompasses much more than simple procurement. It visualizes the development of a true total Government integrated organization, re-engineered to promote streamlined acquisition. When fully developed, the FACNET will allow all acquisition transactions to be processed electronically using integrated application programs that will not only recognize requests, receipt and acceptance of supplies and services, but also provide standard supplier evaluation and processing decisions. Figure 3-1 represents a process model where requirements for supplies and services are identified to a Government purchasing organization, orders are placed with a vendor, material and services are provided to the Government, invoices are

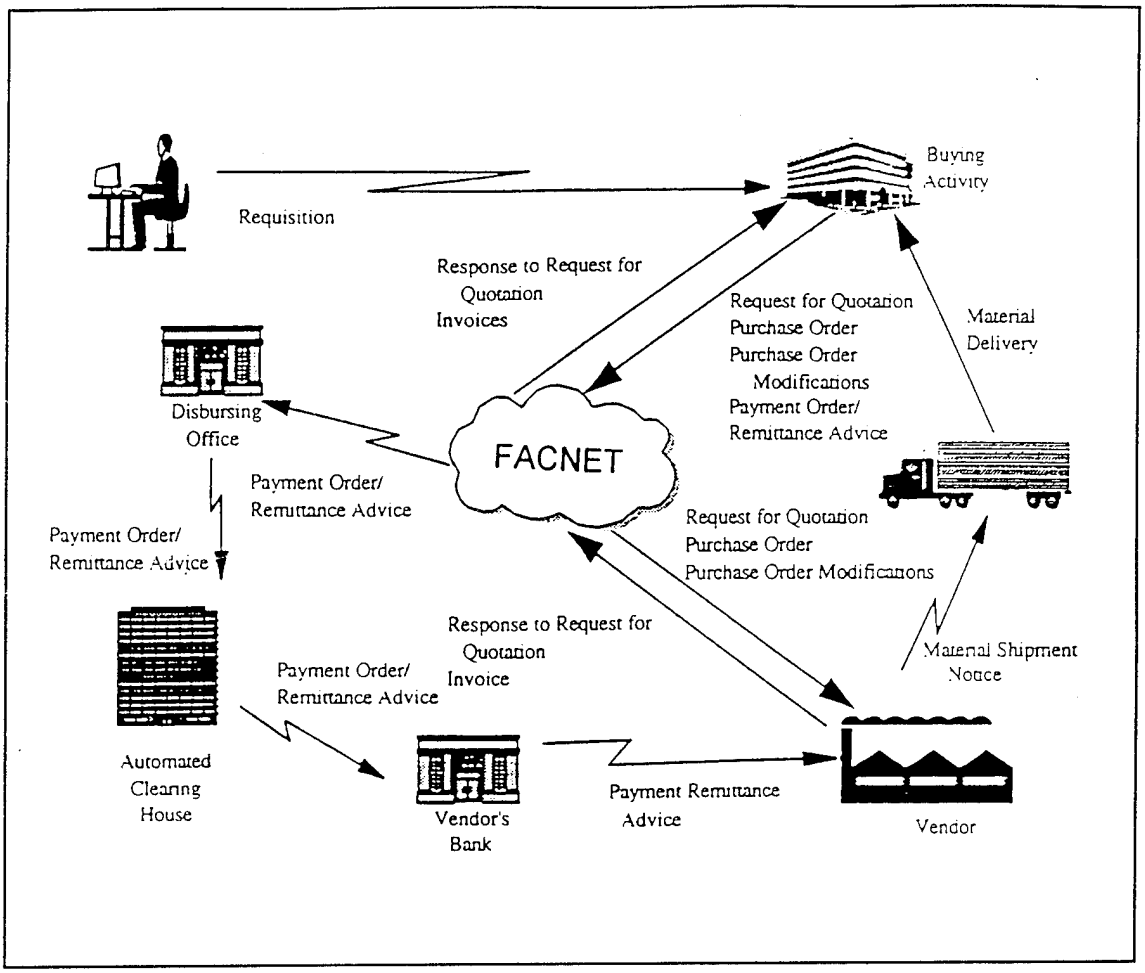


Figure 3-1. FACNET Process Model (FECAT Final Report, 1994, p. 1-8)

compared to receipt information and certified for payment, and funds are disbursed as payment. (FECAT Final Report, 1994, p. 1-8)

C. FASA IMPLEMENTATION REQUIREMENTS

1. General

The Federal Acquisition Streamlining Act of 1994, Senate Bill S1587, House of Representatives Conference Report 103-712, dated August 21, 1994, was signed by President Clinton on October 13, 1994. This Act amends the Office of Federal Procurement Policy (OFPP) Act to add Section 30, requiring the Administrator of OFPP to establish a program for the development and

implementation of a Federal Acquisition Network (FACNET) that will be Government-wide and provide interoperability among its users. This Government-wide FACNET capability is to be implemented no later than January 1, 2000. (FASA, 1994)

2. Responsibilities

The FASA statutory framework is very detailed, technically prolix and complex. In respect to FACNET, the FASA is very clear in mandating specific responsibilities to the multiple agency administrators involved with its implementation: (FASA, 1994)

a. Administrator Federal Procurement Policy

The Administrator OFPP has overall responsibility for the development and implementation of the FACNET. The Administrator shall assign a program manager for the FACNET and shall provide for overall direction of policy and leadership in the development, coordination, installation, operation, and completion of implementation of the FACNET by executive agencies. During the FACNET implementation process, the FASA also requires the Administrator to consult with the heads of appropriate Federal agencies with applicable technical and functional expertise, including the Office of Information and Regulatory Affairs, the National Institute of Standards and Technology, the General Services Administration, and the Department of Defense. (FASA, 1994)

b. Executive Agency Administrators

The head of each executive agency shall provide for implementation of the FACNET with priority on providing convenient and universal access as soon as practicable after the date of the FASA enactment (October 13, 1994). In the case of the Department of Defense, the implementation shall be executed by the Secretary of Defense, acting through the Under Secretary of Defense for Acquisition and Technology, for the Department of Defense as a whole. The Secretaries of Military Departments are not considered "head of an agency" by the FASA for implementation purposes. (FASA, 1994)

The "heads of agencies" are required to consult with the Administrator for Federal Procurement Policy during the implementation process, therefore allowing progress review. In addition, each head of an agency is required to designate an agency official as the program manager responsible for the FACNET implementation for that agency. These agency program managers shall report directly to the senior procurement executive designated for the agency. (FASA, 1994)

c. Federal Acquisition Regulatory Council

The Federal Acquisition Regulatory Council is required to ensure that the Federal Acquisition Regulation (FAR) contains appropriate notice and solicitation provisions applicable to acquisitions conducted through a FACNET capable system. These provisions are to specify the required form and content of notices of acquisitions and the minimum periods for notifications of solicitations and deadlines for the submission of offers under solicitations. (FASA, 1994)

d. Comptroller General

The FASA requires the Comptroller General (General Accounting Office) to provide a report to both the Administrator OFPP and Congress identifying contracts that are not suitable for acquisition through a fully FACNET capable system. The report which is required no later than October 13, 1997 (three years after date of enactment) will examine and identify all classes of contracts in amounts greater than the micro-purchase threshold ($2,500) and less than the simplified acquisition threshold ($100,000) that are not suitable for acquisition through a system with full FACNET capability.

In response to the Comptroller General's report, the Federal Acquisition Regulatory Council may make a determination that an additional class or classes of contracts in amounts greater than the micro-purchase threshold but less than the simplified acquisition threshold are not suitable for acquisition through a fully FACNET capable system. Their determinations are required no earlier than October 13, 1997, and will be presented to both the Administrator of OFPP and to Congress. (FASA, 1994)

3. Implementation

The implementation of the FACNET is a very complicated process that must not be underestimated even with the currently available technical capabilities. The drafters of the Federal Acquisition Streamlining Act of 1994 understood the complexities involved and developed an initial integrated implementation process. The process outlined by the FASA allows for the implementation of FACNET capability in two phases. The first, or "interim" phase requires developing the capability to: (Lumer, 1994, p. 4)

- Provide notice of contracting opportunities, and
- Receive bids and proposals through electronic commerce procedures.

The second, or "full" phase requires developing the capability to use electronic commerce procedures for: (Lumer, 1994, p. 4)

- Processing certain orders,
- Responding to questions about solicitations, and
- Compiling data about the acquisition process.

Section 9001 of the FASA requires that the full FACNET capability be achieved within five years of its enactment.

4. Simplified Acquisition Threshold

The FASA establishes a Government-wide simplified acquisition threshold of $100,000 (increased from $25,000) and requires that the Federal Acquisition Regulation (FAR) Council provide new special, simplified procedures for purchases that are within the threshold. However, the FASA also restricts procurement agencies from using the simplified procedures for contracts over $50,000 until the agency implements and certifies their FACNET capability. Therefore, until an agency implements at least interim FACNET capability, it is

restricted to using the simplified procedures for only those procurements that are less than $50,000. (Hiestand, 1994, p. 26)

When an agency is capable of providing interim FACNET services (e.g., providing notice of contracting opportunities and receiving bids and proposals via electronic commerce procedures), it can raise its threshold for these simplified procedures to $100,000 but must certify full FACNET capability within five years. If the agency fails to implement and certify full FACNET electronic procedures within the five year deadline, its threshold for use of these simplified procedures reverts to $50,000 until the agency implements the full FACNET electronic commerce procedures. (Lumer, 1994, p. 4)

Many agencies are already capable of executing some form of electronic commerce. However, their electronic abilities may not equate to FACNET capability as defined by the FASA. Each procurement agency must prove its FACNET capability in respect to the parameters described in the FASA. The FASA mandates that agency implementation of a FACNET system requires specified certifications for an interim or full FACNET capability rating. The issue is that the exact certification procedures for compliance with the FASA are not well understood. This is a matter of contention and is discussed in detail in Chapter IV.

D. POTENTIAL FACNET ARCHITECTURE

1. Overview

Significant changes in technology, economics, and business practices are enabling the rapid development of the computing and communications infrastructure across the United States and much of the world, thereby establishing a new national electronic marketplace between the Federal Government and its trading partners. In this new marketplace, the Government and its trading partners from both large and small companies will meet on equal terms, aided by a wide array of information services that will allow them to broadcast their communications in an effective manner. The Federal Acquisition Network will

provide the medium for this new national marketplace. The Government will browse multimedia catalogs, solicit bids, and place orders. Sellers will respond to bids, schedule production, and coordinate deliveries. However, for these events to occur, the FACNET system and the sets of specifications that define the inter-relationships among the parts of the system must be defined. This definition, or architecture, provides the conceptual framework for relating components, broadly based solutions, and formal descriptions of the components. (FECAT Final Report, 1994, pp. 4-1, I-1)

2. Architecture

Computer technical architecture has been defined in many ways. Perhaps G.M. Amdahl has provided its best conceptual description with his statement that the architecture of a computer system can be defined as its functional appearance to its immediate users (Amdahl, 1964, p. 87). In this respect, a network architecture may be defined as: (GAO/RCED-94-285, 1994, p. 70)

> The underlying structure of a computer network includes hardware, functional layers, interfaces, and protocols (rules) used to establish communications and ensure the reliable transfer of information. Because a computer network is a mixture of hardware and software, network architectures are designed to provide both philosophical and physical standards for enabling computers and other devices to handle the complexities of establishing communications links and transferring information without conflict. Various network architectures exist, among them the internationally accepted seven-layer open systems interconnection model and the International Business Machine (IBM) Systems Network Architecture. Both the open systems interconnection model and the Systems Network Architecture organize network functions in layers, each layer dedicated to a particular aspect of communication or transmission and each requiring protocols that define how functions are carried out. The ultimate objective of these and other network architectures is the creation of communications standards that will enable computers of many kinds to exchange information freely.

Figure 3-2 best demonstrates the aspects of the architecture layers in which operations or functions at one level (layer) build upon other operations or functions at a lower level.

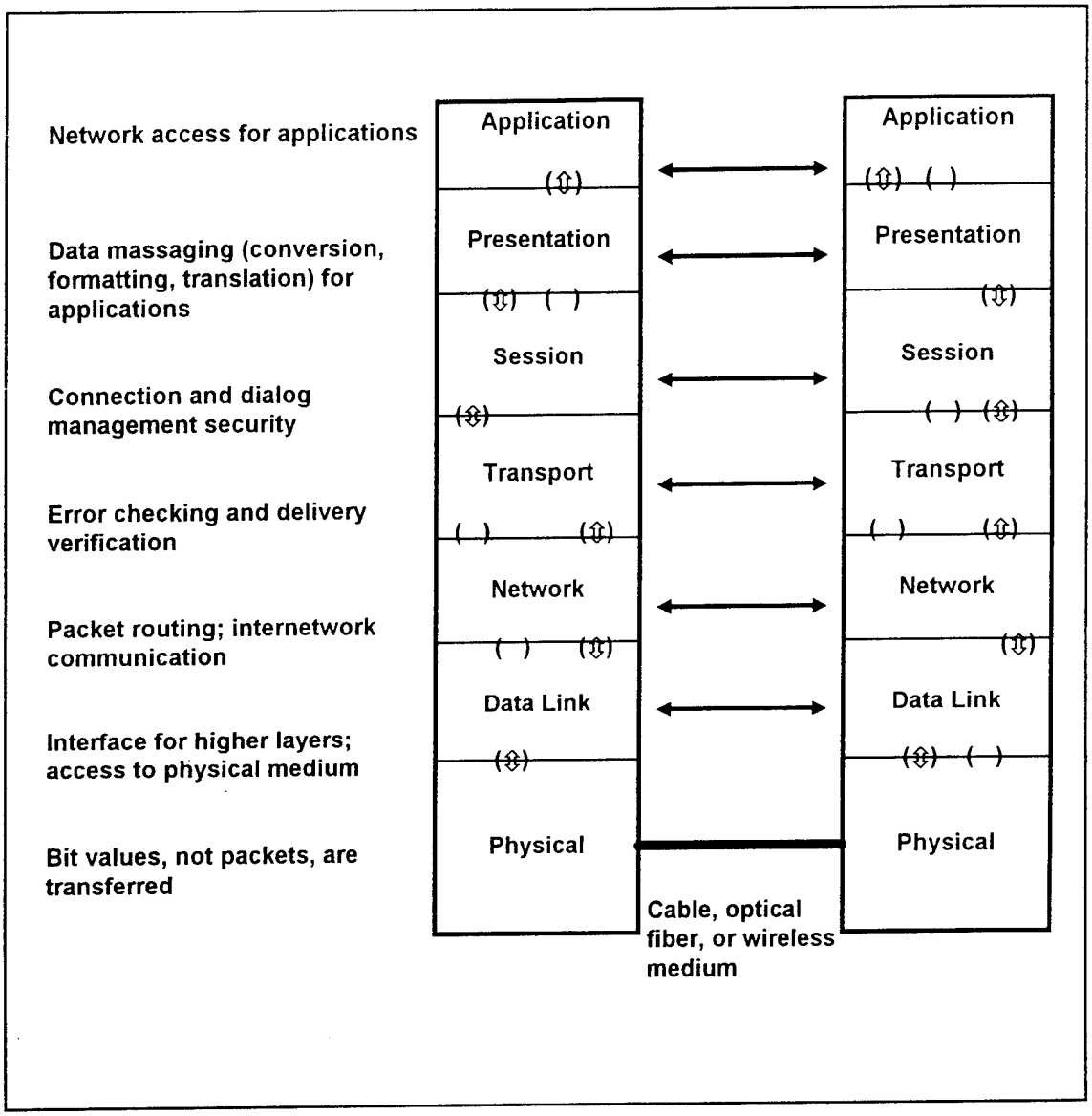


Figure 3-2. Communications Between and Over Layers. (Feibel, 1995, p. 540)

Defining a system architecture only completes half of the requirements. It must be reliable, available and maintainable, all equating to quality. The quality

of the architecture is of critical importance to the overall success of the system. Quality is determined by the accessibility of the various functions. The desired functions must all be available while those undesired should not be encountered. When examining computer systems, an architecture is considered well designed or clean when it meets design characteristics such as consistency, orthogonality, propriety, parsimony, transparency, completeness, generality, and openendedness: (Van de Goor, 1989, pp. 9-14)

- Consistency means that with a partial knowledge of a system the rest can be predicted.
- Orthogonality means that conceptually independent functions are kept separate in their specifications.
- Propriety means the specified functions logically belong to the essential requirements of a system.
- Parsimony means the architecture is economical, in a sense that functions not proper to the system should not be present.
- Transparency means that no implementation aspects are included in a definition at the architectural level.
- Completeness requires that all functions of a given class are provided in the architecture.
- Generality allows functions to be used in a broad range of applications.
- Open-endedness requires that a system should have room for growth.

It is interesting to note that the drafters of the Federal Acquisition Streamlining Act of 1994 considered the FACNET architecture such an important issue, they specifically included their understanding of its definition within Section 9001 of the Act. Within the FASA, the term architecture is defined to mean the conceptual framework that: (FASA, 1994)

1. Uses a combination of commercial hardware and commercial software to enable contractors to conduct business with the Federal Government by electronic means, and

2. Includes a description of the functions to be performed to achieve the mission of streamlining procurement through electronic commerce, the system elements and interfaces needed to perform the functions, and the designation of performance levels of those system elements.

3. Architecture Objectives, Functions and Components

The architecture for the FACNET is still in its concept exploration and definition phase. However, in its final form, the architecture for the FACNET will represent an integrated communication and computing infrastructure composed of standard support services and facilities based on the standards and principles of an open systems environment. The ultimate goal is to evolve to a single interconnected, interoperable standards-based inter-networking environment. This requires a standards-based open systems multiworking environment that recognizes the value of existing infrastructures. The architecture will be based on standards using a hierarchy of open international voluntary standards, national voluntary standards, and proprietary standards eventually incorporating multinational commercial prevalence. All communication devices must eventually interface with the FACNET through a standard set of protocols and interfaces. Common services such as file transfer, directory management, and network management will be provided through a common networking environment. (FECAT Final Report, 1994, pp. 4-6)

a. Objectives

The methods used to pass data between agencies and to more than one trading partner using FACNET are driven by extensive objectives and functional requirements. The objectives of the FACNET architecture may be considered similar to those for electronic commerce in general. They are listed as follows: (FECAT Final Report, 1994, p. 4-9)

- Support FACNET/EC communications between agencies and all trading partners, national as well as international. The architecture must provide inter- and intra-agency communications for the Federal Government and provide the enabling technology that supports the evolution of FACNET and its usage. The communications infrastructure must allow all Federal users access to any trading partner that conducts business with the Government.

- Allow all Federal users access to databases containing trading partner profile information provided during the trading partner registration process.

- Provide a common method for trading partner registration. Because all firms participating in EC/EDI with the Government must register, the design, development and testing of this capability will be a significant Government-wide effort.

- Support security services identified for integration at Federal data centers or gateways, consistent with the requirements of the Computer Security Act of 1987. Trading partner data must be safeguarded now and as FACNET/EC capabilities evolve.

- Present a "single face to industry." Supporting a "single face to industry" can be accomplished using the architectural models described in this chapter. A "single face to industry" means that quality and consistent services are provided to the business community in a standard operating environment so that no matter which agency generates the transaction and no matter where the goods or services are to be delivered, the business community will receive it one way. The FACNET should be implemented such that industry will have some choices but can interface to the Government with the same protocols and ASC X12 transactions regardless of operating environment.

b. Functions

To execute the specific FACNET objectives previously stated, the FACNET architecture must be provided the following conceptual functions: (FECAT Final Report, 1994, p. 4-11)

- An agency process for the preparation and management of contract actions. Such a process could be fully automated or partially automated.

- An EDI translation service that translates agency application data to EDI standardized formats and on receipt of EDI transactions, translates the standardized data to agency application formats.

- A communications service that conveys EDI transactions and other electronic messages among agencies and between the agencies and their trading partners.

c. Components

The Federal Electronic Commerce Acquisition Team recommends an architecture composed of the following fundamental components to allow the full implementation of FACNET: (FECAT Final Report, 1994, p. 3-1)

- A single means of registration to do business electronically with the Federal Government, including a standard trading partner agreement (TPA) defining the trading process and transactions that will be used.

- A single, consistent methodology and syntax for expressing and conveying business data in electronic data interchange (EDI) transactions, i.e., ANSI 12 transaction sets.

- A virtual network linking agency standard transactions to facilities where value-added networks (VANs) or other entities can access and distribute them via a technical infrastructure.

- A standard agreement between the Federal Government and VANs that provides certain technical support to the Government and its trading partners.

4. Objective FACNET Architecture

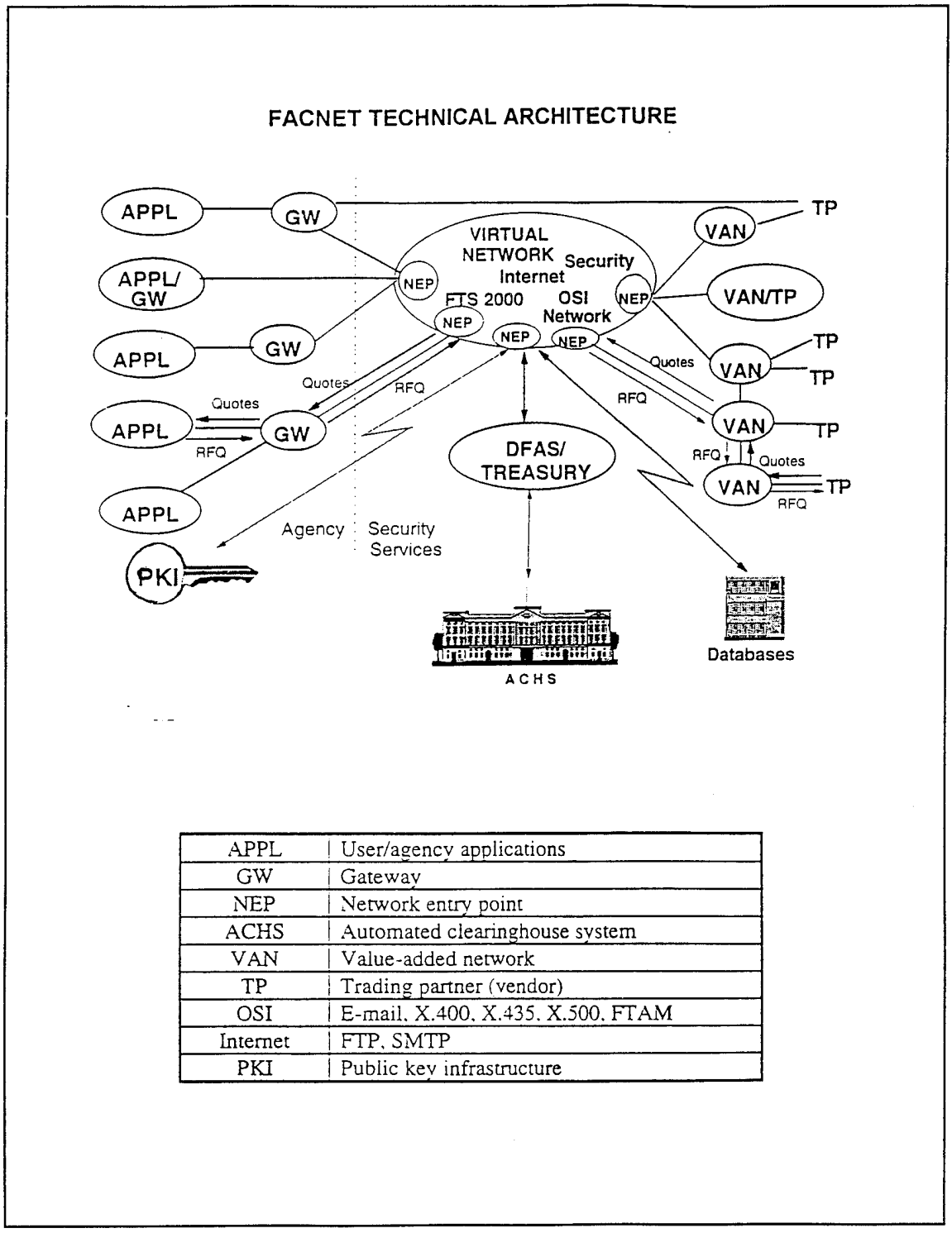
The ultimate goal for the FACNET architecture is to transition to a single interconnected, interoperable, standards-based, inter-networking environment allowing electronic commerce to be free of proprietary agency systems. Acquisition related applications and data are distributed across multiple sites. Network entry points (NEPs) will be established to allow transaction exchange with the value added networks used by trading partners/vendors. The Government NEP

maintains procurement data, VAN agreements, and other capabilities, as well as connections to the VANs and trading partners. Trading partners will send and receive information to and from NEPs via their VAN. Executive procurement agencies will transmit data to the NEPs, which will then forward the data to the appropriate VAN. The FACNET architecture will support all the distribution requirements for transactions sent to each VAN which will then make these public transactions available to all interested subscribers. This process is illustrated in Figure 3-3. (FECAT Final Report, 1994, p. 4-11)

5. Database Requirements

Government procurement agencies must adhere to a vast number of Federal and individual Service specific laws, regulations, specifications, and standards as they execute the procurement process. These include the FAR, DFARS, CICA, and TINA, just to name a few. Vendors conducting business with the Government must also comply with many of the same laws, regulations, and specifications. In order to conduct business, agencies and trading partners must have access to these Government-wide acquisition policies, procedures, and other pertinent information. This requirement holds true for every Government procurement system used, including the FACNET.

The use of the FACNET in support of a paperless environment requires the utilization of a number of acquisition databases. For the FACNET to be an automated system, it must have electronic access (database servers) to information sources such as Federal Acquisition Regulation (FAR), agency-specific FAR supplements, trading partner registrations and agreements, and other acquisition related information contained in various acquisition databases. These acquisition databases must be maintained under two categories. The first category of database contains data available for release to the general public.



APPL	User/agency applications
GW	Gateway
NEP	Network entry point
ACHS	Automated clearinghouse system
VAN	Value-added network
TP	Trading partner (vendor)
OSI	E-mail, X.400, X.435, X.500, FTAM
Internet	FTP, SMTP
PKI	Public key infrastructure

Figure 3-3. Objective FACNET Architecture (FECAT Final Report, 1994, p. 4-11)

Examples include Commerce Business Daily announcements, requests for proposals, contract award information, and procurement regulations. The second category contains restricted information that may be accessible only to Government procurement agency personnel. Examples of this category of data include contractor proposals and quotes, past performance information, and Government source selection. Government procurement personnel who have a need to know will have access to all databases while potential Government vendors will have access to those databases containing public information. Figure 3-4 provides a possible example of the Government-wide database architecture. These include databases for trading partner registration, agreements, Government regulations, financial information, and small business contract information. (FECAT Final Report, 1994, pp. 4-1 - 4-23)

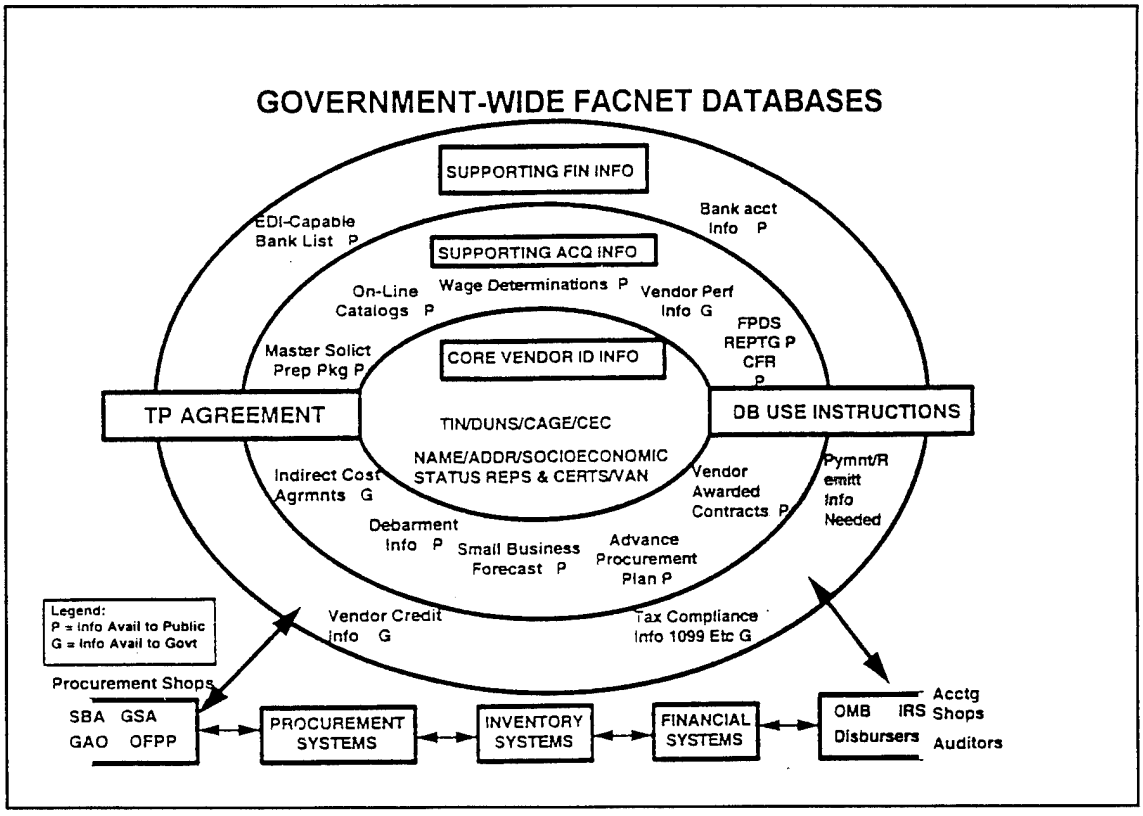


Figure 3-4. FACNET Data Bases (FECAT Final Report, 1994, p. K-6)

E. SUMMARY

This chapter introduced and examined the Federal Acquisition Network (FACNET) in respect to the requirements and plan of its implementation as defined by the Federal Acquisition Streamlining Act (FASA) of 1994. In addition, a possible technical architecture for the FACNET was explored in reference to its potential objectives, functions, components, and database requirements. One section of the Federal Acquisition Streamlining Act (FASA) of 1994 requires the implementation of an electronic commerce system (FACNET) as a means of simplifying the acquisition process. To accomplish this goal, the FASA orders the Administrator OFPP to develop and implement the FACNET such that it will be Government-wide and provide interoperability among its users.

The FACNET is a group of computers and associated devices (a federal computer network with procurement databases) allowing readily accessible computer-based acquisition information to Government and private-sector users, including small businesses. The FASA requires a Government-wide FACNET capability to be implemented no later than January 1, 2000.

The FACNET technical architecture is still in the development phase. However, the technical architecture objective is to create a single interconnected, interoperable, standards-based, inter-networking environment. The FACNET system requires the creation of many acquisition databases which will be grouped in one of two categories. The first category of database will contain public procurement data available to the general public as well as Government procurement personnel. The second category of database will contain Government confidential information and will allow access to only authorized Government procurement personnel.

The next chapter examines the FACNET certification process in an attempt to discern the exact certification procedures for compliance with the FASA.

IV. FACNET CAPABILITY CERTIFICATION

A. INTRODUCTION

The Federal Acquisition Streamlining Act of 1994 requires that the Administrator of the Office of Federal Procurement Policy establish a program for the development and implementation of a Federal Acquisition Network (FACNET). The FACNET, an electronic procurement system, is required to be Government-wide and provide interoperability among its users. (FASA, 1994)

Department of the Army procurement activities are now in the process of implementing FACNET capability in compliance with the FASA. However, the issue at hand is that while many Army procurement activities have some form of electronic procurement capability and do incorporate its application into their procurement activities, there remains uncertainty as to the actual level of FACNET capability they have achieved and the relating procurement actions they are allowed to execute. This is due mostly from lack of detail in the FASA and the Federal Acquisition Regulation (FAR) which has yet to incorporate the FASA amendments.

This chapter examines the FACNET in reference to its capability levels and the certification process as defined by the FASA. The objective is to identify those inconsistencies to FACNET implementation and certification (if they exist) and to examine possible courses of action that may provide solutions or clarifications to the implementation process within the context of the FASA.

B. FACNET CAPABILITY LEVELS DEFINED BY THE FASA

The implementation of the FACNET is a complicated and challenging process. The drafters of the Federal Acquisition Streamlining Act of 1994 understood the complexities involved and developed a phased approached for implementation. Section 9001 of the FASA describes the incorporation of FACNET capability as a two phase implementation process: interim FACNET capability and full FACNET capability. A contracting activity's FACNET capability

level is defined by its ability to execute the various Government functions, private user functions, and general functions which are incorporated into the multi-level functions defining the FACNET. These functions are outlined in Section 9001 of the FASA and were discussed in detail in Chapter III. The two FACNET capability levels (both interim and full) are described in the following sections and outlined in Figure 4-1:

1. Interim FACNET Capability

Section 9001 (30A) of the FASA defines a contracting agency as interim FACNET capable when:

a. With respect to each procurement expected to be in an amount greater than the micro-purchase threshold and not greater than the simplified acquisition threshold, the procuring activity has implemented the following FACNET functions: (FASA, 1994)

Government Functions:

- Provide widespread public notice of solicitations for contract opportunities issued by an executive agency.
- Receive responses to solicitations and associated requests for information through the network system.

Private User Functions:

- Access notice of solicitations for contract opportunities issued by an executive agency.
- Access and review solicitations issued by an executive agency.
- Respond to solicitations issued by the executive agency.

	INTERIM CAPABILITY	FULL CAPABILITY
CONTRACT DOLLAR VALUE	$2,500 ≤ K ≤ $100,000	$2,500 ≤ K ≤ $100,000
CAPABILITY REQUIREMENTS	• Provide notice of contracting opportunities (RFQ's/RFP's) through the network • Receive bids and proposals through the network • Enable private industry to access and review solicitations and respond to solicitations through the network	• Interim capability • Provide public notice of contract awards, issue orders, and archive procurement data • Make payments to contractors via electronic funds transfer • Enable private industry to access contract award information, receive orders from the executive agency, and receive payments via electronic funds transfer • 75% of eligible contracts formed $2,500 ≤ K≤ $100,000) during the last fiscal year were made using the system

Figure 4-1. FACNET Capability Requirements

Note: Contract dollar value threshold drops to $50,000 if full FACNET capability is not achieved by January 1, 2000.

General Functions:

- Allow the electronic interchange of procurement information between the private sector and the Federal Government and among Federal agencies.

b. For each such procurement (except where the head of the procuring activity determines that implementation is not cost effective or practicable) the procuring activity issues notices of solicitations and receives responses to solicitations through a system having those functions.

2. Full FACNET Capability

The FASA defines a procuring activity as fully FACNET capable when: (FASA, 1994)

1. The activity has implemented all Government private user and general FACNET functions, except where the head of the agency determines that implementation is not cost effective or practicable, and

2. More than 75 percent of the eligible contracts in amounts greater than the micro-purchase threshold and not greater than the simplified acquisition threshold entered into by the executive agency during the preceding fiscal year have been made through a system with those functions.

Contract "eligibility" will play a major role in the determination of full FACNET capability due to the percentage requirements (75% of eligible contracts). Within the FASA, "eligible" contracts are defined as: (FASA, 1994)

> A contract is eligible if it is not in any class of contracts determined by the Federal Acquisition Regulatory Council (pursuant to Section 9004 of the Federal Acquisition Streamlining Act of 1994) to be unsuitable for acquisition through a system with full FACNET capability.

This brings to light the first ambiguity with the FACNET implementation process. Until the FAR is rewritten to include a listing of those contracts

unsuitable for acquisition through a FACNET system, there are no guidelines to determine which contracts are eligible and may be included as part of the 75 percent requirement to achieve full capability implementation. Without a revised FAR there is no method to determine which contracts are eligible, and without this determination of eligibility, there is no true way to achieve full FACNET capability or to certify the same. The FASA requires that the Federal Acquisition Regulatory Council determinations of "unsuitable contracts" be made not earlier than three years after the date of enactment of the Act, after consideration of the report of the Comptroller General and final approval by Congressional Committee. (FASA, 1994)

The intent of Congress probably was not to retard the implementation process by three years waiting for a determination on contract eligibility. It seems reasonable that after a deliberate decision was made for FACNET, they would favor a swift implementation of the system and execution of its functions. Therefore, the obvious interpretation is for contracting activities to assume all contract types are eligible for use in the FACNET system based on their discretion.

C. CERTIFICATION REQUIREMENTS

1. Overview

The Federal Acquisition Streamlining Act (FASA) of 1994 was very explicit in mandating the implementation of a Federal Acquisition Network (FACNET) in support of the acquisition reform movement. The FASA also clearly defined what capabilities the system is required to execute and how contracting activities are to implement these capabilities using a phased approach. As a method of oversight and implementation incentive, the FASA requires contracting agencies to certify their level of FACNET capability so that they may receive the accompanying benefits.

2. Incentives to Certify

As resource dollars decline and downsizing initiatives prevail throughout the Government and the industrial base, the concept of incentivizing efficiency has gained prominence as one sure method of achieving optimization of Government resource allocation. Many acquisition reform bills now incorporate some aspect of incentivization to help assuage their acceptance and enforcement by both procurement activities and contractors. In this respect, the FASA was no different as it provides incentives for contracting activities to implement its directives and disincentives for those who fail to reform.

As noted the FASA increased the simplified acquisition threshold to $100,000. However, the FASA also requires that contracting activities implement at least the interim FACNET capabilities before they may use the simplified acquisition threshold. When a contracting activity is able to provide and certify interim FACNET capability (provide widespread public notice of solicitations and receive responses to solicitations), it can then raise its threshold to the $100,000 mark. If the activity does not implement full FACNET capability within five years from the date of the FASA enactment (January 1, 2000), the activity's simplified threshold reverts to $50,000 until it implements and certifies the full FACNET capability. (Lumer, 1994, p. 4)

The FASA provides additional incentives in terms of Commerce Business Daily (CBD) publication requirements. Those contracting activities that are FACNET certified (and use the system) are relieved of the responsibility to provide publication in the CBD 15 days prior to a solicitation for purchases below the simplified acquisition threshold. The FASA also stipulates that, when Government-wide implementation of FACNET capabilities exist, the current requirement to publish notice in the CBD of any procurement 15 days prior to a solicitation is issued, will not apply to any purchase at or below $250,000. (Lumer, 1994, p. 4)

3. Certification Defined By The FASA

The FASA mandates that executive agencies provide certification of the FACNET capability in their procuring activities. As written, the Act identifies three certification levels: Interim, Full, and Government-wide: (FASA, 1994)

a. Interim Certification

When the senior procurement executive of an executive agency or, in the case of the Department of Defense, the Under Secretary of Defense for Acquisition and Technology (USDAT), determines that a procuring activity has implemented interim FACNET capability, the executive or the Under Secretary shall certify to the Administrator of OFPP that such activity has implemented an interim FACNET capability.

b. Full Certification

When the head of an executive agency or USDAT, with the concurrence of the Administrator determines that the executive agency has implemented full FACNET capability, the head of the executive agency shall certify to Congress that the executive agency had implemented a full capability.

c. Government-wide Certification

When the Administrator OFPP determines that the Federal Government is making at least 75 percent of eligible contracts ($2,500 ≤ Contract ≤ $100,000) entered into by the Government during the preceding fiscal year through systems with full FACNET capability, the Administrator shall certify to Congress that the Government has implemented a Government-wide FACNET capability.

Figure 4-2 diagrams the certification requirements as they are presented in the FASA. While on the surface they may seem straight forward in terms of clarity, an in depth investigation brings to light that more questions are created than answered for those contracting activities attempting execution of the directives. This is due to a variety of reasons. First, the certification levels defined by

	Interim Certification	Full Certification	Government-wide Certification
Certification Requirements for Contracting Activities	Interim FACNET Capability	Full FACNET capability 75% of eligible contracts formed by activity ($2,500 ≤ Contract ≤ $100,000) during last fiscal year were made using system	75% of all eligible contracts ($2,500 ≤ Contract ≤ $100,000) formed by the Government during the last fiscal year were made by activities using fully capable FACNET systems
Certification Reporting Authority	Senior procurement executive/ USDAT	Senior procurement executive/ USDAT with concurrence of Administrator OFPP	Administrator OFPP
Certification Approval Authority	Administrator OFPP	Congress	Congress

Figure 4-2. Certification Requirements as Specified by the Federal Acquisition Streamlining Act of 1994

the FASA allow a broad range of interpretation. The exact details of what a contracting activity must accomplish to become FACNET certified are not clearly defined. Since individual contracting activities are responsible for implementing their own FACNET system, this allowance for multiple interpretation of the requirements promotes the development of a system that is not inter-Government compatible. In addition, many contracting activities currently running an existing EDI system may argue that they have achieved interim capability based on their current system's capabilities. The DoD has eleven EDI initiatives such as

APADE, GATEC, SPEDE, and POPS that are currently under investigation for potential EC use. However, only a few have been identified by the EC Process Action Team as having the potential to achieve full FACNET capability. The issue is whether all of the EDI initiatives should be allowed interim certification or only those capable of achieving full certification?

The bottom line is the FASA really has not defined exactly what a contracting activity must accomplish to become FACNET certified and who is to issue the certification. This condition allows two possible courses of action for the implementing contracting activities. They may take the aggressive approach of implementing and certifying based on their own interpretation of the FASA. Or, they may take the passive approach and wait for the possible implementing regulations that may or may not get written in the near future.

D. SUMMARY

This chapter introduced and reviewed the Federal Acquisition Network (FACNET) in respect to its capability levels and certification requirements as outlined by the FASA. The intent was to review the certification requirements defined by the FASA and to identify the potential for inconsistent interpretations of the requirements by individual contracting activities.

The FASA establishes two capability levels, interim and full, and identifies the various Government, private user, and general functions a contracting activity system must accomplish to be capable at each level. In addition, each contracting activity must certify the fact that it has achieved both interim and full FACNET capability levels. The FASA incentivizes FACNET implementation by allowing contracting activities to raise their simplified acquisition threshold to $100,000 once they certify interim capability. However, this threshold reverts to $50,000 if full capability is not achieved by January 1, 2000.

The certification requirements presented by the FASA were reviewed in terms of clarity and ability of contracting activities to execute. It was found that the FASA leaves much room for interpretation of the directions it provides and

may enhance the implementation of a system that is not Government-wide compatible and therefore fails to achieve the objective of a "single face to industry."

The next chapter analyzes the FACNET certification requirements as interpreted by those Department of the Army contacting activities that are currently implementing or will soon implement FACNET. The goal is to establish the level of understanding of the certification requirements within the Department of the Army.

V. ANALYSIS OF FINDINGS

A. INTRODUCTION

The discussion of FACNET capability levels and certification requirements in Chapter IV establishes the fact that the FASA is very much open to interpretation. The certification requirements outlined by the FASA provide no true path for those contracting activities attempting acquisition reform through electronic contracting. As a result, many are left suspended as they wait for detailed guidance, while others forge ahead in what may prove to be an incorrect direction.

This chapter attempts to analyze the basic themes of contracting activity understanding pertaining to FACNET certification. As understood by the researcher, these basic or central themes were developed through numerous interviews and discussions with Army installation contracting personnel with varying levels of involvement and responsibility in FACNET implementation. This variety of involvement was intended to provide a wide perspective of the implementation and certification issues as perceived by Department of the Army contracting activities. A statistical or quantitative analysis of the interviews was not attempted nor desired. There are several reasons for this. First, the FACNET was still in the implementation stage and metrics for its use were not yet developed. Therefore, a qualitative research direction was considered best for providing relevant data. Second, the non-structured interview process allowed interviewees to discuss areas they considered most important as opposed to restricting them on a specific discussion path.

During the interview process, several areas emerged as central themes common to all. This chapter presents these central themes with reference to FACNET capability levels and the certification process as interpreted through interviews with individual Department of the Army contracting activities. The interviews were conducted on a strict basis of anonymity to allow the interviewees complete freedom to voice their beliefs. The population consisted of contracting professionals currently working in TRADOC and FORSCOM Army facilities.

These Army facilities were selected because a large percentage of their contracting actions are of the small purchase category. In addition, specific individuals within the DoD staff were also solicited for their views to gain a broader perspective.

The objectives are first to discover the certification requirements as determined or interpreted by those contracting activities implementing FACNET, and second, to possibly define the "best practices" requirements that may assist Army contracting activities to achieve interim and eventually full FACNET certification and be accepted by OFPP. The final objective is to determine the potential impact contracting activities believe FACNET will have on their day-to-day operations.

B. INTERPRETATION OF FINDINGS

Interviews and discussions on FACNET were conducted with a variety of personnel with varying levels of responsibility and involvement in FACNET implementation. The information gathered was interpreted by the researcher and compiled into basic themes. These basic or central themes were developed by distinguishing the consistent ideas and views interpreted by the researcher during the discussion process. It is the researcher's belief that these central themes consistently represent the actual status of FACNET implementation and certification in DoD contracting activities. The central themes that evolved as common ground among those interviewed are as follows:

- DoD contracting activities don't know what FACNET certification means.
- Regulations governing FACNET and EC/EDI procedures have not caught up with current requirements.
- Standardization problems exist but will be resolved.
- Compatibility problems exist and will continue to exist.
- The initial impact will not be significantly positive.

1. Certification

All of the contracting activities interviewed had knowledge of FASA and FACNET. In addition, every activity had some system in place within their activity that they considered as EDI. What was surprising was the amount of variance in levels of knowledge and understanding of FASA, FACNET, and EDI between the different activities.

Most activities had a reasonable understanding of the contents of the FASA in reference to the simplified acquisition threshold (SAT) and its connection to the FACNET. However, there was a small percentage of activities that did not have an understanding of the connection. One activity insisted that achieving interim FACNET capability would allow them only a $50,000 SAT and once Government-wide FACNET capability was reached, the SAT was raised to $100,000. Another agency believed that the SAT was $100,000 SAT regardless of their FACNET capability.

It was also evident that a clear understanding of EDI was not standard across the board. Every activity interviewed claimed to have an EDI system in place. Most stated that their system had been in place for several years. Less than fifty percent of the activities stated that they used EDI extensively and almost all of those who did use EDI also used a paper system as a back up precaution. Many activities understood the technical requirements necessary for EDI capability, however, it was clear that approximately fifteen percent of the contracting activities did not. For example, one activity considered owning a computer and a fax modem as EDI, while another believed being able to operate an electronic mailbox made them EDI capable.

During the course of the interviews it was discovered that a significant percentage of the contracting activities did not have a conceptual understanding of what the FACNET really is. Most were confused because of the continuous reference to a network. These activities believed that a specific Government network would be established as the FACNET. They thought that they would have a direct link to this network, some agency would serve as network manager,

and some center would be established as the network server. All of these activities were interested in when the network would reach them and how they would hook up to it.

While the FACNET does represent a computer network it is not a physical network such as a local area network, and there is neither a network manager nor server. Connectivity is based on the concept of virtual networking where Government agencies are connected via value added networks, and existing network mediums such as the Internet.

When asked about the requirements of FACNET certification an easily discernible correlation was established linking those activities that had a reasonable definition of FACNET certification and three common accomplishments. Those activities who:

- Understood the requirements of EDI capability,
- Had experience using EDI techniques, and
- Understood the contents of FASA,

believed they had a reasonable understanding of the requirements for FACNET certification. Those activities who failed to accomplish any one of the three actions could not present a thorough understanding of the requirements for certification.

For those contracting activities who understood and used EDI and understood the FASA, the minimum capabilities necessary to achieve interim FACNET certification are considered to be:

- X12 compatibility,
- EFT capability,
- Access to procurement databases,

- Transaction sets for commercial off the shelf items, and
- The ability to send and receive electronically.

Hardware and software requirements were considered important only in terms of compatibility not standardization. Databases were a concern to the activities because it was not clear how these procurement databases would be developed, what information they would provide, and what procedures would be required to eventually connect to them. In addition, the ability for the activity to connect or link with a vendor was considered a critical factor, not how the connection was made. It was also noted that those activities who had an understanding of FACNET certification requirements presented themselves as proactive organizations, continuously seeking training and operational improvement in their EC/EDI capabilities.

Once again, there was a large variance in the levels of understanding of the certification requirements for those activities who did not have a firm grasp of EDI or the FASA. The responses ranged from those activities who could not form a determination without further guidance to those who felt the capability to transmit anything electronically equated to interim FACNET.

A major concern of every activity was the issuance of detailed instructions, DoD specific or Government-wide, on the implementation and certification requirements. An interview with the Director of the DoD Electronic Commerce Program Office revealed that specific instructions for FACNET were still in the working phase with an estimated six month window for release. When queried about certification requirements, the Director discussed X12 compatibility and electronic funds transfer but stressed that the critical factor was the ability to close the Government-vendor loop, where both parties could electronically send and receive procurement documents. (Smith, 1995)

The last issue concerning FACNET certification was the delegation of certification authority. When contracting activities were asked who was allowed to

certify them, they responded with one of four answers: don't know, they can certify themselves, their major command has certification authority, or someone on the OSD staff. The actual certification authority is the Director of the DoD Electronic Commerce Program Office. At the time of the interview, no certifications had been issued.

2. Regulations

As stated previously, a major concern with every contracting activity was the lack of FACNET regulations: those regulations specific to the FACNET and those affected by FACNET implementation. This lack of guidance is considered by the researcher as the greatest cause of implementation delay. For those more cautious contracting activities, the lack of regulations allows them to conduct business as usual and provides them a justified loop hole to delay implementation and possibly still utilize the $100,000 threshold based on the head of agency exception provision where FACNET implementation is determined either not cost effective or practical. For those more motivated activities, the lack of regulations hinders their implementation progress by not providing them clear guidelines and policies to follow. The researcher considers FACNET implementation without the corresponding regulations a critical error on the part of DoD as it allows the potential execution of inconsistent acquisition procedures between different activities, and will not promote the single face to industry objective.

3. Standardization

Every contracting activity interviewed considered standardization a major issue and believed that standardization problems currently existed. The concerns were based on the belief that there is a disconnect between the Government in general and DoD in terms of procedural standards definition. This disconnect promotes the development of interoperability problems not only between DoD and other Government components, but also between DoD and potential vendors. However, almost every activity also believed that any problems in standardization would be quickly resolved.

One example of the type of standardization problem faced by contracting activities is the fact that there are no standardized procedures for trading partner registration. This allows a particular activity the ability to conduct electronic business only with vendors who had previously registered with that particular activity while excluding those vendors who registered with a different activity. This of course, has the potential to exclude competition.

Standardization is a major issue and will continue to remain so. However, the Government's adoption of X12 as a means of establishing uniformity should virtually guarantee the correction and prevention of any standardization problems. An effort must be made by the contracting activities themselves to ensure they are X12 compliant as directed by DoD. Those who are not will be unable to transmit readable data to potential vendors.

4. Compatibility

There was a strong belief held by the contracting activities that compatibility problems exist and would continue to exist into the future. Problems were discussed relating to the incompatibility of some of the vendor computer systems to those operated by the Government. Some automated procurement systems currently used by the Government require extensive modifications to permit interaction with EC/EDI vendors. This is an issue of concern as it is a barrier to full FACNET implementation due to the length of time and funding required to re-engineer or re-configure existing automated systems.

DoD has eleven EC/EDI efforts (automated procurement systems) currently in use. Not all of these systems have the technical and functional capabilities to be considered as FACNET operable. Currently the EC in Contracting Process Action Team (PAT) has selected seven systems, APADE, CATEC, ITIMP, MADES, SACONS-EDI, SPEDE, and DPACS for an in-depth technical analysis to assess their potential for FACNET use. Contracting activities preparing to implement FACNET should review the PAT's assessments when they are released, to validate their EDI system. However, it is the researcher's belief that an automated procurement assessment report should have been completed and

already made accessible to contracting activities thereby preventing additional delays.

5. FACNET Impact

Almost every written document referencing EC/EDI discusses the specific benefits that the user (DoD) will realize once implementation is accomplished. The typical studies that usually assess EC/EDI habitually note the following guarantees for the user. (Monczka and Carter, 1987, pp. 3-9)

- Increased visibility of requirements and requiring activities allowing increased competition.
- Greater buyer productivity.
- Lower prices.
- Reduced lead times.
- Reduced inventories.
- Reduced administrative workload.

In addition, these same studies describe the benefits that the seller receives as:

- Speed of electronic payment.
- Improved requirements definition.
- Increased opportunity to do business with the Government.

Interestingly, none of the activities mentioned any of the above benefits when asked about the potential impact FACNET would have on procurement. Their major responses fell into the following categories:

- FACNET will have minimal impact.
- It will drastically alter the way we do business.
- It will only impact small purchase procedures.

a. Minimal Impact

Several contracting activities stated that the EDI system they were currently using did little to improve their operations and they felt that FACNET would have a similar affect. They based their statement on the fact that the majority of their simplified acquisition threshold purchases are accomplished locally, they still will have to write the solicitation, and there will be no change in oversight procedures. In essence, only the medium in which they purchase will change. The increased simplified acquisition threshold will allow them to broaden the range of their acquisitions but the consensus was that it really only allowed them to catch up to the authority level they should have reached years previously.

b. Altered Business Practices

There was a major concern by many of the contracting activities that, once implemented, FACNET would catalyze several major changes in the current acquisition process. The majority of the activities mentioned the requirements of FAR Part 13 to maximize the use of local vendors. Their concern was once national solicitation became standard due to FACNET implementation, their local vendors may be priced out of business if they operate from a high cost of living area and must compete with vendors from low cost areas. For example, vendors in Hawaii with high local costs may find themselves continuously underbid by vendors on the mainland who are competing for the same solicitation which originated in Hawaii. In this case, the Government receives the benefits of reduced prices but may suffer the consequences of forfeited socio-economic goals.

c. Small Purchases

The majority of the contracting agencies interviewed considered small purchases as the only area of major impact. Here, they said, the Government would receive the benefits of reduced prices and shorter turn-around times. However, they cautioned that the Government must be very careful not to disenfranchise those potential sources that do not operate in a high technology environment. For these small businesses, the requirement now is to have a computer with a modem that can "read" the Government's requirements and send a response that is legible at the other end. Many feel that the message being relayed is to upgrade to electronic business capability or don't do business with the Government.

It is the researcher's opinion that the Government may see test cases of small businesses arguing against the technology/requirements imposed on them to do business with the Government. However, a favorable ruling will probably not be granted for two major reasons. First, computers are now the standard for conducting business both nationally and internationally. Those who fail to advance with the times place themselves in a non-competitive business position. This computer requirement was not generated by the Government but rather by the business community. The Government is only now adhering to what has been the business standard for many years. Second, these small businesses are not truly required to own and operate their own computer or network. They may lease these services from the numerous VANs certified by the Government at a reasonable monthly or annual fee.

One issue that may surface in the future is whether these service fees may be charged to the Government as an allowable cost.

C. LESSONS LEARNED

Several valuable lessons learned emerged from the discussions during the interview process. These lessons reveal a significant range of factors contributing to success in implementing and certifying FACNET capability. While many of

these lessons are very obvious, they seem to have been forgotten or ignored by many of the contracting activities.

1. Command Support and Commitment

It was the researcher's observation that contracting agency command support is a primary factor in the success of FACNET implementation and certification. Unfortunately, not all of the activities shared the same command support intensity. Those activities who did have a strong command support and participation were the same activities who proved most FACNET knowledgeable and capable of implementation. In those activities, the specific areas that most often presented themselves were visible top management commitment to EC/EDI initiatives, funding, and developing personnel resources, and consistent involvement with external activities for assistance and support.

Management involvement, support and commitment are well documented as critical requirements when implementing new strategy in major organizations. This concept is especially relevant for an initiative such as the EC/EDI procedures of FACNET, as contracting strategies and procedures will be developed and emerge for both the Government and private contractors as EC/EDI practices proliferate. The levels of involvement required by management from the various functional areas, internal and external to an activity, will become increasingly more extensive as the unique issues of electronic commerce emerge. It is the researcher's belief that those managers who do not have EC/EDI experience will hinder progress rather than promote it.

2. Training and Education

When implementing FACNET, there is an initial level of expertise that must be acquired in EC/EDI concepts and applications. If this knowledge base is not acquired, the contracting activity's EC/EDI program will never achieve the objectives it is required to accomplish. A training and education program is the key to success. Not surprising, the interview process discerned that the level of expertise between the different contracting activities varied considerably. While some proved very involved and committed to implementing EC/EDI initiatives

within their activities, others demonstrated a complete lack of knowledge. While every activity interviewed claimed to have an EC/EDI system available for use, only those activities that actually made the effort to use the system and trained their employees were capable of demonstrating a conceptual understanding of the capabilities and challenges involved.

There are many methods available to acquire the necessary level of expertise required for successful FACNET implementation to include formal training, EC/EDI seminars and conferences, independent research and networking with other activities who are also implementing EC/EDI. The DoD Electronic Commerce Program Office has taken extensive steps towards the educational support for implementation of EC/EDI by: awarding a contract to develop educational materials and conduct orientation conferences, providing the ability for component activities to participate in educational events, and ensuring that the Defense Acquisition University includes EC/EDI instruction in its curriculum. In addition, the DoD EC Program Office is centrally funding a large portion of the initial EC/EDI training ranging from introductory workshops to detailed instruction. The researcher strongly believes that contracting activities must develop a comprehensive EC/EDI training and education program and take maximum advantage of the training opportunities provided by the DoD EC/EDI Program Office.

3. Incentives

The FASA incentivizes contracting activities by permitting them to use simplified acquisition procedures for solicitations below $50,000 with that increasing to $100,000 when they certify the achievement of interim FACNET capability. The incentive is reinforced by reverting the threshold back to $50,000 if the activity fails to achieve full FACNET capability by January 1, 2000. This incentive approach is one of the smartest aspects of the FASA relating to FACNET implementation.

For years economists have well understood the benefits of using rewards or incentives to encourage efficiency of operations. (Terasawa, 1994) The

Government has realized the benefits of incentivization as well. Commanders of contracting activities should develop incentive programs within their activities to promote an efficient implementation of FACNET. The Government/DoD should consider additional incentives at the macro level to also promote FACNET implementation. Some possible incentives to consider are:

- Terminate publishing the Commerce Business Daily (CBD) in hard copy.
- Remove contracting authority for those activities not FACNET certified or reduce their budget.
- Provide increased training opportunities funded by DoD.
- Reward successful use of the FACNET.

4. Cultural Change

One of the greatest challenges to the successful implementation of FACNET is ensuring its acceptance by Government procurement professionals. A very large percentage of these Government employees have been in the acquisition and contracting business for years and gained their experience using the paper system. Many are very committed to this system. In fact, a large number of the activities interviewed stated that they will continue to run a paper system even after they implement FACNET.

Changing behavior patterns, especially complex patterns is very difficult to accomplish. Yet, this is what the DoD must do if it expects to accomplish acquisition reform. DoD must elicit a cultural change in its procurement personnel from paper system bid boards to electronic networking in order to successfully accomplish FACNET implementation and utilization. This cultural change will require an extensive amount of time and education, and as a result, we will see the use of a dual system in the interim: the FACNET and a manual back up system. (Bolman and Deal, 1991, pp. 368-384)

The issue before DoD is how to accelerate this necessary cultural change. The answer is to increase user awareness of the FACNET through increased training and education, and to establish an incentive program for those who master its applications.

D. SUMMARY

This chapter presented the reader with a wide range of relevant factors to consider and lessons learned during previous implementations of EDI and the initial implementations of FACNET. This chapter represented what the researcher feels is a compilation of the experiences and opinions of DoD contracting activities currently implementing or planning to implement the FACNET. The critical issue of FACNET certification was investigated from a review of the requirements set forth in the FASA and the interpretation of those contracting activities that have a conceptual understanding of EDI. Those activities that are capable of X12 compatibility, EFT, procurement database access, transaction set generation for COTS, and electronically send and receive requirements and offers should be considered interim FACNET certified. The key areas to consider in lessons learned are the requirement for top management support, an understanding of the continuous need for education, the benefits of incentivization, and the requirement to assist in the necessary cultural change process.

The next chapter provides the researcher's conclusions and recommendations as well as an identification of specific FACNET related topics that deserve future research.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY AND CONCLUSIONS

The Federal Acquisition Streamlining Act of 1994 requires that all Government contracting activities implement the Federal Acquisition Network (FACNET), a Government-wide electronic procurement system, by January 1, 2000. However, there are several barriers which hinder the ability of contracting activities to meet their legal requirements of implementing and certifying their FACNET capabilities. These include the inability of contracting activities to understand the technical concepts of the FACNET, the lack of clarity within the FASA, and the lack of specific guidance at the Federal and DoD levels.

While contracting activities have used EDI (the technology base of the FACNET) for years, many have misconceptions of the FACNET due to its intangible aspects. The FACNET is a wide area network which utilizes virtual network principles, similar to the Internet. There is not a specific network that can be diagrammed, managed, nor maintained. In its final form, the FACNET will be a combination of private and Government networks linked together to provide virtual connectivity, and will allow any Government contracting activity to connect to any private industry vendor.

The FASA is very clear in mandating that Government contracting activities implement and certify their FACNET capabilities. However, it is also very vague and non-specific in terms of providing the details of how contracting activities are to achieve these mandates. The resulting problem is that the majority of DoD contracting activities do not know what FACNET certification really means. This is primarily due to the fact that a discrete definition of FACNET certification has never been written. Therefore, contracting activities are now faced with the requirement of complying with the law within FASA specified time limit without the necessary guidelines to direct their actions. As a result, contracting activities

have developed implementation plans based on their own interpretations of FACNET certification capabilities and have lost sight of the potential interoperability problems that will develop as they each execute their individual plans.

Discussions with the Director of the DoD Electronic Commerce Program Office and EDI experienced contracting activities have enabled the development of a suggested list of FACNET capabilities that may equate to interim certification. Those contracting activities who have attained the following capabilities should be considered as interim FACNET functional by the DoD ED Program Office:

- X12 compatibility,
- EFT capable,
- Ability to access procurement databases,
- Capable of developing transaction sets for commercial off the shelf procurement, and
- Ability to send and receive EDI documents.

Since the current use of the FACNET is only for small purchases (those less than the simplified acquisition threshold), many contracting activities debate whether a significant impact on contracting procedures will be seen at the micro level. The major concern is the effect the FACNET and electronic commerce will have on current and future acquisition laws and regulations. For example, FAR 13.106 (B) (3) stresses contracting activities maximize the use of local vendors. While many contracting activities feel a loyalty to support their community, there is a concern that increased competition through national electronic solicitations may force reduced local vendor business. As a result, many activities feel justified in delaying their FACNET implementation until the necessry policy revisions and regulation rewrites are finalized.

The use of electronic procedures is a drastic change from the current "paper process" that Government contracting professionals have always used,

and it creates the possibility for conflict by those forced to change their habitual ways. There is a strong reluctance to develop new skills and change working techniques to align with the new high technology environment of the FACNET. Therefore, Government contracting managers will face additional challenges of redefining the culture of their organizations as they implement their FACNET capabilities.

The time for FACNET implementation is ripe. Technology is in an ever increasing state driven by the requirements and capabilities of private industry. The Government's own reductions in budget and manpower dictates that it must do more with less so that it may keep pace with its industrial suppliers. Electronic commerce is no longer a future application; it is a business standard that the Government must now achieve.

However, the Government (DoD) faces an incredible challenge to be FACNET capable by the January 1, 2000 deadline date. Technology is not the problem. Many complex tasks required for implementation have yet to be completed and many issues must still be resolved. The underlying message is clear: contracting activities must take the initiative to educate themselves on the FACNET and elctronic commerce and coordinate their efforts with those of the DoD EC Program Office. At the same time, DoD must quickly provide the necessary directives allowing the contracting activities to act.

B. ANSWERS TO RESEARCH QUESTIONS

The primary objective of this research was to examine the question:

What are the current applications of the Federal Acquisition Network (FACNET) in U.S. Army Contracting Offices and what barriers must be overcome to allow full utilization (certification) of the FACNET system?

To answer the primary research question, the following subsidiary research questions were asked:

1. **How will the Federal Acquisition Network be used by DoD and private sector procurement agencies?**

Chapter II discussed the concepts of EC/EDI and traced its developmental history in the private sector and DoD. Chapter III discussed the specifics of the FACNET, which when fully implemented, will apply the principles of EC/EDI but allow a much broader scope of capabilities. Expanded connectivity and extensive use of databases will significantly enhance procurement communication and activities between the DoD and its vendors and within the DoD itself.

2. **What problems or barriers face Department of the Army contracting activities in their efforts to achieve FACNET certification?**

Department of the Army contracting activities face several challenges in their efforts to achieve FACNET certification to include:

- Understanding of EC/EDI concepts,
- Understanding of FACNET concepts,
- Understanding of the legal requirements, and
- The resistance to change due to cultural tenacity.

In addition, contracting activities may never achieve full interoperable FACNET implementation unless detailed implementation guidance and governing regulations are provided by DoD and corresponding acquisition laws are revised to incorporate new electronic contracting procedures. In addition, several issues must be resolved in the areas of compatibility, interoperability, and database development.

3. **What benefits may the Department of Defense procurement activities derive from achieving FACNET certification and integrating the system into their procurement functions?**

Consistent with most EC/EDI implementations, the benefits which DoD receives from utilizing the FACNET consist primarily in reductions in the

paper handling and storage costs as well as improved competition and turn-around times for small purchases. Individual contracting activities will have the ability to solicit their requirements at a much quicker rate and to a much larger number of potential offerors. However, while all contracting activities agree that the FACNET will generate benefits, there is a large variance to exactly which benefits will be realized and the potential for negative ramifications.

4. **What actions must be taken to enhance FACNET implementation in the Department of Defense?**

Chapter V discussed this area in some detail. The actions necessary to enhance FACNET implementation are:

- Immediately publish DoD/Government-wide FACNET specific regulations for implementation and certification,
- Stress the development of training and education programs, utilize incentives to the maximum extent, and
- Begin developing programs to help promote the necessary cultural change.

C. RECOMMENDATIONS FOR FURTHER RESEARCH

During the research and interview process, several areas were identified for further research relating to the use of the Federal Acquisition Network. These areas include:

- The FACNET is currently designed to procure only those items and services within the simplified acquisition threshold limit of $100,000. Is it possible to expand its use to procurements that exceed the threshold? What are the implications of such an expansion?
- The research was conducted prior to FACNET implementation. Conduct additional research after FACNET implementation to determine if its acquisition streamlining goals were achieved and what impact the FACNET had on the acquisition process. What effect has the FACNET had on acquisition?

- Network security is a continuous area of concern. Is the FACNET truly capable of protecting proprietary data and confidential information? What impacts have the FACNET had on electronic contract formation?

- Can the FACNET expand into a information system that uses its knowledge about specific acquisition applications to act as an expert consultant to procurement agencies? What impact will an expert system have on the acquisition process?

APPENDIX A. ACRONYMS

AMIS	Acquisition Management Information System
ANSI	American National Standards Institute
ASC	Accredited Standards Committee
ASCII	American Standard Code for Information Interchange
COTS	Commercial Off-The-Shelf
DBMS	Data Base Management System
DoD	Department of Defense
EDI	Electonic Data Interchange
EDIFACT	EDI for Administration, Commerce, and Transport
EFT	Electronic Funds Transfer
FAR	Federal Acquisition Regulation
FASA	Federal Acquisition Streamlining Act of 1994
GAO	General Accounting Office
IT	Information Technology
MIS	Management Information System
NASA	National Aeronautics and Space Administration
OFPP	Office of Federal Procurement Policy
PAT	Process Action Team
PM	Program Manager
TP	Trading Partner(s)
TPA	Trading Partner Agreement

UN	United Nations
VAN	Value-Added Network
VAS	Value-Added Services
VN	Virtual Network
WAN	Wide Area Network

APPENDIX B. GLOSSARY

American National Standards Institute	Organization devoted to development of voluntary standards to enhance productivity and international competition of American industrial enterprises.
ANSI standard	Document published by ANSI that has been approved through the consensus process of public announcement and review. Each of these standards must have been developed by an ANSI committee and must be revisited by that committee within 5 years for update.
area transaction set	Identifies a predefined area within a transaction set (header, detail, summary) containing segments and their various attributes.
ASC X12	Accredited Standards Committee X12 comprises industry members who create EDI standards for submissions to ANSI for subsequent approval and dissemination or for submission to the United Nations Standards Committee for approval of international EDIFACT standards
Bulletin Board System	Computer accessible by other computers for the exchange of information and files. Most are set up by individuals in their homes and allow access to the general computer public.
computer security	Protection of highly valued information such as payroll records or company finance statements. There may be several levels of security related to different levels of information access. The most common form of computer security requires users to employ passwords to access particular areas; the password only allows access to a certain level of information.
configuration	Makeup of computer system, including all internal and external components such as memory, disk drives, keyboard, video, and add-

	on hardware such as a mouse or printer. Some configurations are monitor type, amount of memory, type of memory to use , and which disk drive to use. Also refers to a specific setup of software program to make the best and most efficient use of the system resources.
data	Items of information that have been gathered to be used in some type of process.
data base	Collection of related records containing information to be used for processing. The records are broken down into individual fields that allow for various means of manipulating the data to produce specific, individualized reports. Data bases are used widely for record keeping and data tracking.
direct access storage device	Device enabling direct access to data instead of having to start at the beginning of a data source to read every record until the one needed is found. A disk drive is a DASD unit, whereas a tape drive is not.
EDI translation	Conversion of application data to and from the S12 standard format.
EDI translator	Computer software used to convert application data to and from the X12 standard.
Electronic Bulletin Board	Bulletin board system that can be accessed with a modem for the purpose of exchanging information and acquiring files by downloading. For example, an agency can upload an RFQ to be released to vendors who will be able to download at a specific time in order to respond to the RFQ.
electronic commerce	End-to-end paperless business environment that integrates electronic transfer and automated business systems.
electronic data interchange	Exchange of information without human intervention.

electronic funds transfer	Transfer of funds electronically through the Treasury Fedline Payment System or the automated clearinghouse network.
electronic mailbox	The place where an EDI transmission is stored for pickup or delivery within a third-party service provider's system. Trading partners can also maintain mailboxes within their own domains.
E-mail	Method of exchanging mail messages by way of a computer system. The messages are stored on a mutually shared system and users can send and receive messages at their own convenience.
encryption	Special coding process to make files inaccessible to unauthorized users. This process transforms clear text (data in its original form) into ciphertext (encryption output of a cryptographic algorithm) for security or privacy. A password or private key is needed to decrypt the file for use.
gateway	Link between several computers in a network setup.
interactive	Back-and-forth response of operations, such as when a user enters a question to the computer and the computer responds immediately.
interface	Electronic circuit that monitors the connection between two pieces of hardware to ensure they exchange data properly.
local area network	Grouping of computers connected to a main unit called the server.
machine readable	Input in a format that the computer can read, such as bar codes that are scanned directly into the system to be used in an application. Also refers to the binary information stored onto magnetic media that the computer can access and read into the memory.

modem	Shortened form of modulator/demodulator, a communications device that enables a computer to convert data and send and receive it through regular phone lines. Modems can transfer data at rate of 300 baud to 19,200 baud on leased phone lines. Modems contain such built-in features as automatic phone dialing, auto answering, and redialing capabilities.
modular design	Approach in designing hardware of software in which a project is broken into smaller units, or modules, each of which can be developed, tested and finished independently before being combined with the others to form the final product. Each unit is designed to perform a particular task or function and can then become part of a "library" of modules that can often be reused in other products having similar requirements. In programming, for example, one module might contain instructions for moving the cursor in a window on the screen. Because it is designed as a stand-alone unit that can work with other sections of a program, the same module might be able to perform the same task in another program as well, saving time in the developing and testing phase. The designer must build into each module the necessary means of working with other parts of the product.
network	Group of computers and associated devices connected by means of communications facilities. A network can involve permanent connections, such as cables, or temporary connections made through telephone or other communications links. A network can be as small as a local area network consisting of a few computers or many small and large computers distributed over a vast geographic area to provide computer users with the means of transferring information electronically. Some types of communication are simple user-to-user messages; others, of the type known as

distributed processes, can involve several computers and sharing of workloads or cooperative efforts in performing a task.

network architecture

Underlying structure of a computer network, including hardware, functional layers, interfaces, and protocols (rules) used to establish communications and to ensure the reliable transfer of information. Since a computer network is a mixture of hardware and software, network architectures are designed to provide both philosophical and physical standards for enabling computers and other devices to handle the complexities of establishing communications links and transferring information without conflict. There are numerous network architectures in existence, among them the internationally accepted seven-layer open systems interconnectivity (OSI) model of the International Organization of Standardization (IOS) and IBM's System Network Architecture (SNA). Both the OSI and SNA architectures organize network functions in layers, with each layer dedicated to a particular aspect of communication or transmission and with the use of protocols that define how functions are carried out. The objective of these network architectures is to create communication standards that will enable computers of various kinds to exchange information freely and (to the user) transparently.

network data base

Type of data base in which data records can be linked (related to one another) in more than one way. A network data base is similar to a hierarchical data base in that it contains a progression from one record to another. It differs in being less rigidly structures, since any single record can point to more than one other record and, conversely, can be pointed to by one or more records. A network data base allow more than one path between any two records, whereas a hierarchical data base

	allows only one, from parent (higher-level record) to child (lower-level record).
open architecture	Computer or peripheral design that has published specifications, enabling third parties to develop add-on hardware for an open architecture computer of device. Also refers to a design that provides for expansion slots on the motherboard, allowing the addition of boards to enhance or customize a system.
operating system	Software responsible for controlling the allocation and usage of hardware resources such as memory, central processing units time, disk space, and peripheral devices. The operating system is the foundation on which applications such as work processing and spreadsheet programs are built. Popular operating systems include MS-DOS, the Macintosh OS<OS/2, and UNIX.
security	Protection of a computer system and its data from harm or loss. A major focus of computer security, especially on systems accessed by many people or through communications lines, is the system screening, which denies access to unauthorized users and protects data from unauthorized uses.
standard	Set of detailed technical guidelines used as a means of establishing uniformity in an area of hardware or software development. Computer standards have traditionally developed in either of two ways. The first, a highly information process, occurs when a product or philosophy is developed by a single company and, through success and imitation, becomes so widely used that deviation from the norm causes compatibility problems or limits marketability. This type of de facto standard setting is typified by such products as Hayes modems and IBM PC's. The second type of standard setting is a far more formal process in which specifications are drafted by a cooperative group or committee

	after an intensive study of existing methods, approaches, and technological trends and developments. The proposed standards are later ratified or approved by a recognized organization and are adopted over time by consensus as products based on the standards become increasingly prevalent in the market. Standards of this more formal type are numerous, including the ASCII character set, the RS-232-C, the SCSI interface, and ANSI standard programming languages, such as C and FORTRAN.
trading partner	Party involved in the exchange of EDI transmissions.
trading partner agreement	Agreement between the Government and a trading partner that defines general EDI procedures, terms and conditions, and the EDI transaction sets that will be used.
transaction set	Definition, in the standard syntax, of information of business or strategic significance. Consists of a transaction set header segment, one or more data segments in a specified order, and a transaction set trailer segment.
translation	Act of accepting documents in other than standard format and subsequently translating them into the standard format.
value-added network	Communications network that transmits, receives, and stores EDI messages for EDI trading partners.
virtual	Device or service perceived to be what it is not in actuality. The way in which a virtual device is actually presented or implemented is much different from the device or service the user experiences. For example, a computer user can tread a virtual disk as if it were a physical disk, but a virtual disk is actually a portion of the computer's memory that is used as if it were a disk. Another example is virtual

	memory, which is simulated by paging, caching, and disk storage.
virtual network	Network that provides for a linking of all available Government and industry networks to provide virtual connectivity from any person in the Government to connect to industry to do business electronically.
wide area network	Communications network that connects geographically separated areas.

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   Naval Postgraduate School
   Monterey, CA 93943-5103

8. LTC John T. Dillard (Code SM/Dj) 1
   Naval Postgraduate School
   Monterey, CA 93943-5103

9. Dr. Janet Clarke Richards 1
   5531 Hanauma St.
   Diamondhead, MS 39525

10. Captain Matthew T. Clarke 2
    5531 Hanauma St.
    Diamondhead, MS 39525