
**NONRESIDENT TRAINING COURSE**

**October 1997**


# Information Systems Technician Training Series

## Module 3—Network Communications

## NAVEDTRA 14224

**NOTICE**

**Any reference within this module to "Radioman" or the former "Radioman rating" should be changed to "Information Systems Technician" and the "Information Systems Technician (IT) rating". The subject matter presented relates to the occupational standards for the IT rating.**

**Although the words "he," "him," and "his" are used sparingly in this course to enhance communication, they are not intended to be gender driven or to affront or discriminate against anyone.**

# PREFACE

By enrolling in this self-study course, you have demonstrated a desire to improve yourself and the Navy. Remember, however, this self-study course is only one part of the total Navy training program. Practical experience, schools, selected reading, and your desire to succeed are also necessary to successfully round out a fully meaningful training program.

**COURSE OVERVIEW**: In completing this nonresident training course, you will demonstrate a knowledge of subject mattter by correctly answering questions on the following subjects: Network Administration, LAN Hardware, and Network Troubleshooting.

**THE COURSE**: This self-study course is organized into subject matter areas, each containing learning objectives to help you determine what you should learn along with text and illustrations to help you understand the information. The subject matter reflects day-to-day requirements and experiences of personnel in the rating or skill area. It also reflects guidance provided by Enlisted Community Managers (ECMs) and other senior personnel, technical references, instructions, etc., and either the occupational or naval standards, which are listed in the *Manual of Navy Enlisted Manpower Personnel Classifications and Occupational Standards*, NAVPERS 18068.

**THE QUESTIONS**: The questions that appear in this course are designed to help you understand the material in the text.

**VALUE**: In completing this course, you will improve your military and professional knowledge. Importantly, it can also help you study for the Navy-wide advancement in rate examination. If you are studying and discover a reference in the text to another publication for further information, look it up.

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*Reissued on July 2002 to correct minor discrepancies or update information. No significant change have been made to content.*

Published by
NAVAL EDUCATION AND TRAINING
PROFESSIONAL DEVELOPMENT
AND TECHNOLOGY CENTER

**NAVSUP Logistics Tracking Number**
**0504-LP-026-8630**

## Sailor's Creed

"I am a United States Sailor.

I will support and defend the Constitution of the United States of America and I will obey the orders of those appointed over me.

I represent the fighting spirit of the Navy and those who have gone before me to defend freedom and democracy around the world.

I proudly serve my country's Navy combat team with honor, courage and commitment.

I am committed to excellence and the fair treatment of all."

# CONTENTS

# SUMMARY OF THE RADIOMAN TRAINING SERIES

### MODULE 1

Administration and Security—This module covers Radioman duties relating to administering AIS and communication systems. Procedures and guidance for handling of classified information, messages, COMSEC material and equipment, and AIS requirements are discussed.

### MODULE 2

Computer Systems—This module covers computer hardware startup, including peripheral operations and system modification. Other topics discussed include computer center operations, media library functions, system operations, and troubleshooting techniques. Data file processes, memory requirements, and database management are also covered.

### MODULE 3

Network Communications-This module covers network administration, LAN hardware, and newtwork trobleshooting. Related areas discussed are network configuration and operations, components and connections, and communication lines and nodes.

### MODULE 4

Communications Hardware—This module covers various types of communications equipment, including satellites and antennas. Subjects discussed include hardware setup procedures, COMSEC equipment requirements, distress communications equipment, troubleshooting equipment, satellite theory, and antenna selection and positioning.

### MODULE 5

Communications Center Operations—This module covers center operations, including transmit message systems, voice communications, center administration, quality control, and circuit setup/restorations. Guidelines for setting EMCON and HERO conditions and cryptosecurity requirements are also discussed.

# CREDITS

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**Windows 95** is a registered trademark of Microsoft Corporation.

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# INSTRUCTIONS FOR TAKING THE COURSE

## ASSIGNMENTS

The text pages that you are to study are listed at the beginning of each assignment. Study these pages carefully before attempting to answer the questions. Pay close attention to tables and illustrations and read the learning objectives. The learning objectives state what you should be able to do after studying the material. Answering the questions correctly helps you accomplish the objectives.

## SELECTING YOUR ANSWERS

Read each question carefully, then select the BEST answer. You may refer freely to the text. The answers must be the result of your own work and decisions. You are prohibited from referring to or copying the answers of others and from giving answers to anyone else taking the course.

## SUBMITTING YOUR ASSIGNMENTS

To have your assignments graded, you must be enrolled in the course with the Nonresident Training Course Administration Branch at the Naval Education and Training Professional Development and Technology Center (NETPDTC). Following enrollment, there are two ways of having your assignments graded: (1) use the Internet to submit your assignments as you complete them, or (2) send all the assignments at one time by mail to NETPDTC.

**Grading on the Internet:** Advantages to Internet grading are:

- you may submit your answers as soon as you complete an assignment, and
- you get your results faster; usually by the next working day (approximately 24 hours).

In addition to receiving grade results for each assignment, you will receive course completion confirmation once you have completed all the assignments. To submit your assignment answers via the Internet, go to:

**http://courses.cnet.navy.mil**

**Grading by Mail:** When you submit answer sheets by mail, send all of your assignments at one time. Do NOT submit individual answer sheets for grading. Mail all of your assignments in an envelope, which you either provide yourself or obtain from your nearest Educational Services Officer (ESO). Submit answer sheets to:

COMMANDING OFFICER
NETPDTC N331
6490 SAUFLEY FIELD ROAD
PENSACOLA FL 32559-5000

**Answer Sheets:** All courses include one "scannable" answer sheet for each assignment. These answer sheets are preprinted with your SSN, name, assignment number, and course number. Explanations for completing the answer sheets are on the answer sheet.

**Do not use answer sheet reproductions:** Use only the original answer sheets that we provide—reproductions will not work with our scanning equipment and cannot be processed.

Follow the instructions for marking your answers on the answer sheet. Be sure that blocks 1, 2, and 3 are filled in correctly. This information is necessary for your course to be properly processed and for you to receive credit for your work.

## COMPLETION TIME

Courses must be completed within 12 months from the date of enrollment. This includes time required to resubmit failed assignments.

## PASS/FAIL ASSIGNMENT PROCEDURES

If your overall course score is 3.2 or higher, you will pass the course and will not be required to resubmit assignments. Once your assignments have been graded you will receive course completion confirmation.

If you receive less than a 3.2 on any assignment and your overall course score is below 3.2, you will be given the opportunity to resubmit failed assignments. **You may resubmit failed assignments only once.** Internet students will receive notification when they have failed an assignment--they may then resubmit failed assignments on the web site. Internet students may view and print results for failed assignments from the web site. Students who submit by mail will receive a failing result letter and a new answer sheet for resubmission of each failed assignment.

## COMPLETION CONFIRMATION

After successfully completing this course, you will receive a letter of completion.

## ERRATA

Errata are used to correct minor errors or delete obsolete information in a course. Errata may also be used to provide instructions to the student. If a course has an errata, it will be included as the first page(s) after the front cover. Errata for all courses can be accessed and viewed/downloaded at:

**http://www.advancement.cnet.navy.mil**

## STUDENT FEEDBACK QUESTIONS

We value your suggestions, questions, and criticisms on our courses. If you would like to communicate with us regarding this course, we encourage you, if possible, to use e-mail. If you write or fax, please use a copy of the Student Comment form that follows this page.

**For subject matter questions:**

E-mail: n311.products@cnet.navy.mil
Phone: Comm: (850) 452-1501
DSN: 922-1501
FAX: (850) 452-1370
(Do not fax answer sheets.)
Address: COMMANDING OFFICER
NETPDTC N311
6490 SAUFLEY FIELD ROAD
PENSACOLA FL 32509-5237

**For enrollment, shipping, grading, or completion letter questions**

E-mail: fleetservices@cnet.navy.mil
Phone: Toll Free: 877-264-8583
Comm: (850) 452-1511/1181/1859
DSN: 922-1511/1181/1859
FAX: (850) 452-1370
(Do not fax answer sheets.)
Address: COMMANDING OFFICER
NETPDTC N331
6490 SAUFLEY FIELD ROAD
PENSACOLA FL 32559-5000

## NAVAL RESERVE RETIREMENT CREDIT

If you are a member of the Naval Reserve, you may earn retirement points for successfully completing this course, if authorized under current directives governing retirement of Naval Reserve personnel. For Naval Reserve retirement, this course is evaluated at 3 points. (Refer to *Administrative Procedures for Naval Reservists on Inactive Duty,* BUPERSINST 1001.39, for more information about retirement points.)

# Student Comments

**Course Title:** *Information Systems Technician Training Series*
*Module 3—Network Communications*

**NAVEDTRA:** 14224 **Date**: _____

**We need some information about you**:

Rate/Rank and Name: _____ SSN: _____ Command/Unit _____

Street Address: _____ City: _____ State/FPO: _____ Zip _____

**Your comments, suggestions, etc**.:

**Privacy Act Statement:** Under authority of Title 5, USC 301, information regarding your military status is requested in processing your comments and in preparing a reply. This information will not be divulged without written authorization to anyone other than those within DOD for official use in determining performance.

NETPDTC 1550/41 (Rev 4-00

## CHAPTER 1

# NETWORK ADMINISTRATION

*Upon completing this chapter, you should be able to do the following:*

- *Describe how to establish communications with remote terminals and monitor system transmissions.*
- *Describe how to start up, monitor, and terminate network processing.*
- *Explain how to change network software configurations and how to analyze network hardware configurations.*
- *Explain how to install and test software and how to perform system restorations.*
- *Explain how to evaluate network requests.*
- *Describe the procedures used to calculate network capacity.*
- *Explain how to determine communications protocols and how to design a network.*

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Welcome to the wonderful world of networking. Networking has opened the world to connectivity. Networking gives an individual the capability to communicate and connect with another individual or another system in order to share resources.

The end result is to establish communications between two PC computers or two entirely different systems. The process used to reach that point can be done many ways. Once you have established connectivity and are communicating, then you will need to monitor the systems transmission to ensure the two computers are, in fact, communicating successfully. Some of the factors that will have to be taken into consideration are:

- What type of hardware will be needed
- What operating system (OS) will be used
- What applications will be needed
- What type of cabling will be used

### NETWORK OPERATIONS

Networks consist of **nodes** that are interconnected by **links.** These nodes and links usually cover a relatively small geographical area, commonly known as a local area network, ranging from a few feet to a mile. Nodes are the hardware, such as computers, terminals, hard disks, printers, and so on. Links are the communications media, such as twisted-pair wire, coaxial cable, or fiber optic cable that connects the nodes.

Networks are made up of a variety of hardware, network software, connecting cables, and network interface cards combined in any number of ways. And that is perfectly OK. Quite often, we design a network using existing hardware. That is just one of the many reasons why each individual network has its own unique characteristics. The network hardware and software components determine the structure of a network, whether it is a local, metropolitan, or wide area network. Normally, the workstations (PCs) in a LAN are in close proximity to each other, usually within the same building. A metropolitan area network (MAN) consists of PCs that are basewide: one command connected with another command, or one base connected with another base, all via phone lines. A wide area network (WAN) is worldwide: one country connected with another country via satellites, etc.

A network could be made up of 13 PCs, a server with a hard disk, 3 printers, and a plotter. Another network could be made up of 6 PCs (one of which is the network server) and a laser printer. Both are networks. When you connect individual PCs together (via cable), and each PC is allowed access to the other's information and/or resources, you have created a network (see figure 1-1). By connecting PCs in this fashion, you are able to share all sorts of things. Examples are information in files; software, such as word processors, spreadsheet programs, and utilities; and peripheral devices, such as hard disks, printers, plotters, and fax machines.

A network gives you the capability of transferring data, files, programs, you name it, from one PC to another or even from one network to another. You can transfer a report or listing to any printer you desire on the network, provided you have access to the printer. How is that for flexibility? By connecting your PC into a network system, you can execute application programs stored on the server's hard disk without having to worry about disk space or keeping track of diskettes. You can exchange files and programs with other users directly without copying them onto a diskette. Can you begin to see the power and flexibility built into a network system?

## COMMUNICATIONS WITH REMOTE TERMINALS

The ability to connect to the LAN through the use of remote terminals gives you great flexibility, whether it is being able to check your E-mail via a modem or check the status of the LAN by connecting to the network as a remote console. The remote capabilities will increase productivity. The network supervisor can manage the system by establishing communications through a remote terminal.

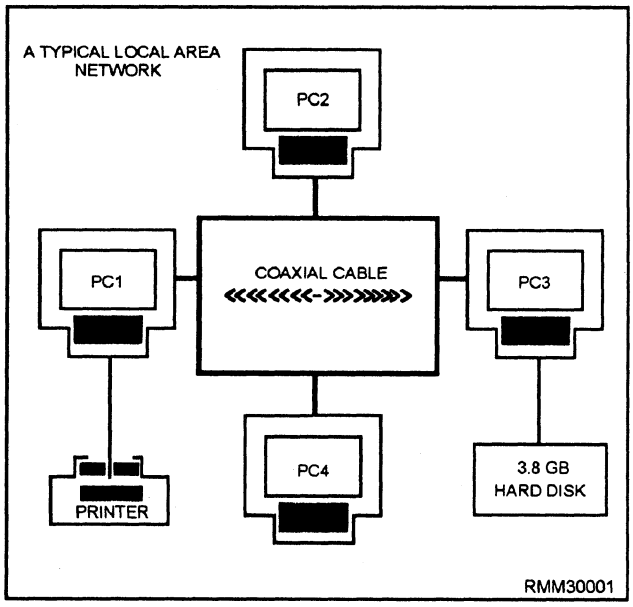


**Figure 1-1.—Connecting PCs to form a local area network.**

### Logins from Remote Locations

Remote access refers to logins from remote locations. These login procedures are accomplished by dialing into an access server (a special modem or computer) and logging in through this server.

The network modems that can be used as remote access servers must have a network interface card (NIC) compatible with the network to which the modem is providing access. Remote connections often require special timing considerations, because many network transactions must happen within a very limited time period.

### Remote Console

A networking utility that enables a network supervisor to manage a server from a workstation or from a remote location using a modem. The supervisor can give commands and accomplish tasks just as if all the commands were being given directly at the server by simulating a direct connection to the server.

## NETWORK STARTUP/SHUTDOWN

Keeping the system running is the most visible aspect of system administration. You're the one they will call when the system has gone down (crashed). We will discuss the normal UNIX booting (startup) and shutdown processes. Shutting down and bringing up a UNIX system is actually very simple.

### System Startup

Every time the system is booted, a series of steps must be performed before the system becomes available to users. Booting is the process of bringing a computer system up and making it ready to use.

The process begins when some instructions stored in ROM are executed which load the program boot from the boot partition into system memory. Boot loads the bootable operating system, which is also called the bootable kernel. The bootable kernel starts the init (initialization) program.

**INIT.—** One of the first things init does is check available memory, Next, it checks out the environment to see what hardware is present. When the kernel is