

UNISYS

**BTOS
TCP/IP
Administration
Guide**

Release 1.1

Priced Item

February 1990
Distribution Code SA
Printed in U S America
41511163-000

UNISYS

**BTOS
TCP/IP
Administration
Guide**

Copyright © 1990 Unisys Corporation
All rights reserved.
Unisys is a trademark of Unisys Corporation

Release 1.1

Priced Item

February 1990
Distribution Code SA
Printed in U S America
41511163-000

NO WARRANTIES OF ANY NATURE ARE EXTENDED BY THE DOCUMENT: Any product and related material disclosed herein are only furnished pursuant and subject to the terms and conditions of a duly executed Program Product License or Agreement to purchase or lease equipment. The only warranties made by Unisys, if any, with respect to the products described in this document are set forth in such License or Agreement. Unisys cannot accept any financial or other responsibility that may be the result of your use of the information in this document or software material, including direct, indirect, special or consequential damages.

You should be very careful to ensure that the use of this information and/or software material complies with the laws, rules, and regulations of the jurisdictions with respect to which it is used.

The information contained herein is subject to change without notice. Revisions may be issued to advise of such changes and/or additions.

About This Guide

Purpose

BTOS TCP/IP is an implementation of a set of network communication architectures called Transmission Control Protocol (TCP) and Internet Protocol (IP). These protocols are generally used together and referred to as TCP/IP. This product allows a BTOS workstation or XE520 with the appropriate hardware to access networks supporting TCP/IP.

BTOS TCP/IP provides the necessary resources and functions to support three network services: Simple Mail Transfer Protocol (SMTP), File Transfer Protocol (FTP), and Telecommunications Network Protocol (TELNET). In order to operate in a SMTP network, you must also use BTOS OFIS Mail (release 1.2 or higher).

BTOS TCP/IP Administration Guide describes the installation, configuration, and maintenance of BTOS TCP/IP. This guide is a companion to the *BTOS TCP/IP FTP and TELNET Operations and Programming Guide*, which describes the operation of the FTP and TELNET services available with BTOS TCP/IP.

Scope

This guide provides the necessary reference information to install, configure, and maintain BTOS TCP/IP. For further information about TCP/IP and its application services refer to the military standards and Request for Comment (RFC) documents listed in "Related Product Information."

Audience

This guide is written for BTOS system administrators who are responsible for installing, configuring, and maintaining BTOS TCP/IP and its associated services. Users of the TCP/IP services should consult the *BTOS TCP/IP FTP and TELNET Operations and Programming Guide* for information on the operation of FTP and TELNET.

Prerequisites

BTOS system administrators must be familiar with the BTOS operating system and master/cluster configurations. They should also be able to interpret the installation parameters associated with BTOS TCP/IP.

How to Use This Guide

This guide is a complete reference for system administrators. Users of the TCP/IP services should consult the *BTOS TCP/IP FTP and TELNET Operations and Programming Guide*.

Organization

This guide consists of seven sections and one appendix:

Section 1. Overview

This section describes the features of BTOS TCP/IP.

Section 2. System Requirements

This section describes the hardware and software requirements of BTOS TCP/IP. Information on RAM and disk usage and the BTOS cluster/master configuration is provided in this section.

Section 3. Software Installation

This section describes how to copy the system files from the release disks to your hard disk.

Section 4. Configuring and Installing BTOS TCP/IP

This section describes procedures for installing BTOS TCP/IP and its related options.

Section 5. Operations Manager

This section describes the installation and functions of the Operations Manager utility.

Section 6. Log Reporter

This section describes the installation of the Log Reporter and shows an example of a log file.

Section 7. TCP/IP Architecture and Protocol

This reference section provides an overview of the background, operation, and protocol of TCP/IP.

Appendix A. Status Codes

This section lists the BTOS status codes returned by the BTOS TCP/IP software. It lists also the TCP/IP protocol-defined status codes returned during the operation of FTP and the status codes written to the SMTP Manager log file.

A glossary, bibliography, and an index follow Appendix A.

Related Product Information

The following documents are published by Unisys Corporation and can be ordered through Corporate Software and Publication Operations.

If you are a system administrator responsible for installing and maintaining BTOS TCP/IP, you should have the following Unisys documentation on hand:

BTOS B-NET II Administration and Operations Guide (relative to release 1.0 or higher)

This guide contains configuration, installation, and troubleshooting information and procedures for B-NET administrators.

BTOS Context Manager II Installation and Configuration Guide (relative to release 3.0 or higher)

This guide contains introductory, procedural, and reference information about BTOS Context Manager II software.

BTOS Hardware Installation Guide

This manual describes the installation of BTOS hardware and supporting peripheral equipment.

BTOS Hardware Network Planning and Installation Guide

This guide helps you plan for connecting Unisys equipment to other Unisys equipment, or to a local area network.

BTOS Indexed Sequential Access Method (ISAM) Operations Reference Manual (relative to release 8.0 or higher)

This guide describes the features and operation of ISAM.

About This Guide

BTOS Intelligent Data Communications Module Systems Software (IDMSS) Operations Guide (relative to release 3.0 or higher)

This guide describes the installation and operation of the intelligent data communications module software.

BTOS OFIS Writer Operations Guide, 2 vols. (relative to release 1.0 or higher)

This two-volume guide describes the operation of BTOS OFIS Writer software, which can be used to edit the configuration files of BTOS TCP/IP.

BTOS OFIS Mail Administration Guide (relative to release 1.2 or higher)

BTOS OFIS Mail Operations Guide (relative to release 1.2 or higher)

BTOS TCP/IP FTP and TELNET Operations and Programming Guide (relative to release 1.0 or higher)

This guide contains information on how to use the BTOS TCP/IP upper layer protocols, FTP and TELNET.

BTOS X.25 Gateway Operations and Programming Guide (relative to release 9.0 or higher)

This guide contains information concerning installing and configuring the BTOS X.25 Gateway.

BTOS II Editor Operations Guide (relative to release 2.0)

This guide describes the features and operation of the BTOS II Editor.

BTOS II Standard Software Operations Guide (relative to release 2.0 or higher)

This guide contains introductory, procedural, and reference information for using the standard features of BTOS II.

BTOS II System Reference Manual, 2 vols. (relative to release 2.0 or higher)

This two-volume reference manual provides details on BTOS II concepts, system processes, functions, and services.

BTOS II System Procedural Interface Reference Manual, 2 vols. (relative to release 2.0 or higher)

This two-volume manual contains information on procedural interfaces available with BTOS II.

BTOS II Language Development Linker and Librarian Programming Guide (relative to release 2.0)

This manual contains information on using the BTOS Linker and Librarian.

BTOS Pascal Compiler Programming Reference Manual (relative to release 6.0 or higher)

This manual contains information on the use of the BTOS Pascal Compiler.

BTOS C Compiler Programming Reference Manual (relative to release 1.1 or higher)

This manual contains information on the use of the BTOS C Compiler.

BTOS II System Status Codes Reference (relative to release 2.0 or higher)

This manual provides information on status codes you may encounter while using BTOS II.

XE500 BTOS Administration Guide (relative to release 7.1 or higher)

This guide contains information on performing system administrator functions for XE500 BTOS software.

XE500 Installation and Implementation Guide (relative to release 7.1 or higher)

This manual contains information on installing and using XEBTOS software.

XE500 BTOS Operations Guide (relative to release 7.1 or higher)

This guide contains information on executing BTOS master commands on the XE500 system.

Note:

Throughout this guide, all references to BTOS guides imply the BTOS or BTOS II guides, depending on your operating system.

Since BTOS TCP/IP is an implementation of existing military standards, the following reference documentation is recommended:

- Internet Protocol MIL-STD-1777
- Transmission Control Protocol MIL-STD-1778
- Simple Mail Transfer Protocol MIL-STD-1781
- File Transfer Protocol MIL-STD-1780
- TELNET Protocol MIL-STD-1782
- Internet Protocol RFC (Request for Comment) 791
- Internet Control Message (ICMP) RFC 792

- Address Resolution Protocol (ARP) RFC 826
- Transmission Control Protocol RFC 793
- Simple Mail Transfer Protocol RFC 821
- File Transfer Protocol RFC 959
- TELNET Protocol RFC 854

The Military Standard documents are available from the Naval Publications and Forms Center, 5801 Tabor Ave., Philadelphia, PA 19120-5099. The RFC documents are available from DDN Information Center, SRI International - EJ291, 333 Ravenswood Dr., Menlo Park, CA 94025.

Notation Conventions

This guide uses the following typographical conventions:

Words that you are to type and that appear on the screen are shown in *italic*.

Parameter names are shown in **bold**.

Keys are shown in uppercase letters; for example, press the **GO** key.

When two keys are to be used together for an operation, they are hyphenated. For example, **SHIFT-RETURN** means that while you hold down the **SHIFT** key, you press the **RETURN** key.

Cluster/master, as used in this guide, refers to the cluster workstations connected to a master BTOS workstation.

If you have a stand-alone workstation, you can follow the installation and configuration instructions for the cluster/master configuration.

Contents

About This Document	v
Section 1. Overview	
Product Description	1-1
Features	1-1
Tasks and Commands	1-3
Section 2. System Requirements	
Hardware	2-1
Software	2-1
RAM and Disk Usage	2-2
System Configurations	2-4
Migration and Coexistence	2-4
Section 3. Software Installation	
BTOS Workstations	3-1
XE520 Systems	3-2
Files Copied to Hard Disk	3-3
Queue Index Entry Created	3-5
Contents of Directories	3-6
Commands Created	3-6
Section 4. Configuring and Installing BTOS TCP/IP	
Prerequisites	4-1
Installation Methods	4-1
Selecting LAN or X.25	4-1
Installing BTOS TCP/IP on a BTOS Workstation Using	
Install Commands	4-2
Installation Steps	4-2
Step 1: Creating the TCP/IP Configuration File	4-2
TCP/IP Configuration File Parameters	4-4

Contents

Rules for Editing the TCP/IP Configuration File	4-8
Executing the Configuration Manager	4-10
Configuration Manager Errors	4-11
Step 2: Installing the Data Link Manager	4-11
Step 2A: Running the Data Link Manager Monitor	4-12
Step 3: Installing the Ethernet Data Link	4-13
Step 4: X.25 Network Gateway Interface Installation	4-14
Step 5: Installing IP and TCP	4-16
Installing IP	4-17
Installing TCP	4-19
Step 6: Installing SMTP Manager, Queue Manager, ISAM, and FTP Server	4-19
Installing the SMTP Manager	4-19
Suggestions for Using SMTP	4-24
Installing Queue Manager	4-24
Installing ISAM	4-26
Installing FTP Server	4-26
Step 7: Running FTP Client and TELNET	4-26
Running FTP Client	4-26
Running TELNET	4-27
Installing TCP/IP on BTOS Workstations	
Using JCL Files	4-27
Creating the JCL File for BTOS Workstations	4-27
Installing BTOS TCP/IP on an XE520	4-28
Installing BTOS TCP/IP on an XE520 Using JCL Files.	4-28
BTOS XE/LAN Relay Installation	4-29
Installing BTOS TCP/IP on an XE520 Using MCDTIO	
Commands	4-32
Deinstallation Options	4-32
Deinstalling the SMTP Manager	4-32
Deinstalling XE LAN Relay Server	4-32
Deinstalling TCP	4-33
Deinstalling IP	4-33
Deinstalling X.25 NGI	4-33
Inability to Deinstall Ethernet Data Link	4-33
Deinstalling DLM	4-33

Section 5. Operations Manager

Invoking the Operations Manager	5-1
Operations Manager Commands	5-2
Abort Command	5-3
Active Status Command	5-4
Full Status Command	5-5

Update Command	5-7
LogXfer Command	5-8
TraXfer Command	5-9

Section 6. Log Reporter

Overview	6-1
Invoking the Log Reporter Program	6-1
Sample Log	6-3

Section 7. TCP/IP Architecture and Protocol

Historical Perspective	7-1
Overview of the TCP/IP Architecture	7-1
TCP/IP Functional Layers	7-2
Information Flow	7-2
TCP Protocol Layer	7-3
IP Protocol Layer	7-3
The Connection Concept	7-4
Connection Example	7-5
Three-Way Handshake	7-6
Error Correction	7-9

Appendix A. BTOS Status Codes and FTP Protocol Codes

Data Link Manager BTOS Status Codes	A-1
TCP and IP BTOS Status Codes	A-3
TELNET BTOS Status Codes	A-5
File Transfer Protocol Network Status Codes	A-5
SMTP Manager Log File Status Codes	A-8
Bibliography	1
Glossary	1
Index	1

(

(

(

Section 1

Overview

Product Description

BTOS TCP/IP is an implementation of two Military Standard network protocols: Transmission Control Protocol (TCP) and Internet Protocol (IP). TCP provides a connection-oriented, end-to-end data transfer that is reliable, ordered, full duplex, and flow controlled. IP provides connectionless data delivery, routing, address mapping, fragmentation, and reassembly of data.

BTOS TCP/IP provides three additional upper layer protocols (ULPs): Simple Mail Transfer Protocol (SMTP) (used with BTOS OFIS Mail), File Transfer Protocol (FTP), and Telecommunications Network Protocol (TELNET).

SMTP is implemented jointly by BTOS TCP/IP and OFIS Mail (release level 1.2 or higher). The SMTP Manager (a component of BTOS TCP/IP) translates between the SMTP format and the OFIS Mail format. Users of BTOS systems use the standard OFIS Mail interface, while users of non-BTOS systems use the standard SMTP interface. The translation of the messages between the two systems is invisible to users.

BTOS TCP/IP and its collection of upper layer protocols enable a BTOS workstation to exchange information with other computers (including BTOS workstations) in local area networks (LANs) or X.25 networks, including the Defense Data Network (DDN) and various other commercial TCP/IP networks.

The Data Link Manager (DLM) is the software component of BTOS TCP/IP that makes possible the use of multiple link layers (including X.25 and LAN, either individually or simultaneously).

The XE/LAN Relay is the software component of BTOS TCP/IP that enables workstations in an XE520 master/cluster configuration to communicate over Ethernet LAN.

Features

This release contains the following features:

Overview

- BTOS TCP/IP Data Link Layer Interface support for connections to 802.3 Ethernet LANs and to X.25 networks (via the BTOS X.25 Gateway). BTOS TCP/IP can operate simultaneously over LAN and X.25. LAN access is provided using standard B25-EN3 hardware. *Note that it is not possible for a BTOS system to transfer data internally (i.e., act as a bridge) between an X.25 and a LAN network.*
- X.25 release level 9.0 access with RS-232 only (not RS-449).
- Compatibility with IMBTOS release level 3.0 or higher.
- Support for operation on an XE520 (with Release Level 7.1 or higher) over X.25. LAN operation is provided through a cluster workstation and XE/LAN Relay Interface software.
- Coexistence with BNet II.
- Compatibility between the X.25 package release level 9.0 and the Data Defense Network (DDN).
- FTP, SMTP, and TELNET support on all standard BTOS configurations.
- TCP/IP coexists with the same data link as BTOS OSI Transport-LAN (BOTL release level 2.0).
- An Operations Manager for system administrators to monitor network connection status information from any BTOS workstation in the system.
- A Data Link Monitor to monitor the operation of your data link layer.
- A Configuration Manager to create configuration files for the ULPs, TCP, and IP.
- The BTOS TCP/IP Log Reporter to allow examination of all TCP connection opens and closes.
- Support for the Internet Control Message Protocol (ICMP) and Address Resolution Protocol (ARP).
- Support for BTOS Pascal and BTOS C when using the TELNET programming interface.

Figure 1-1 shows the configuration of the software elements of BTOS TCP/IP when it is configured for a LAN environment.

Figure 1-2 shows the configuration of the software elements of BTOS TCP/IP when it is configured for an X.25 environment.

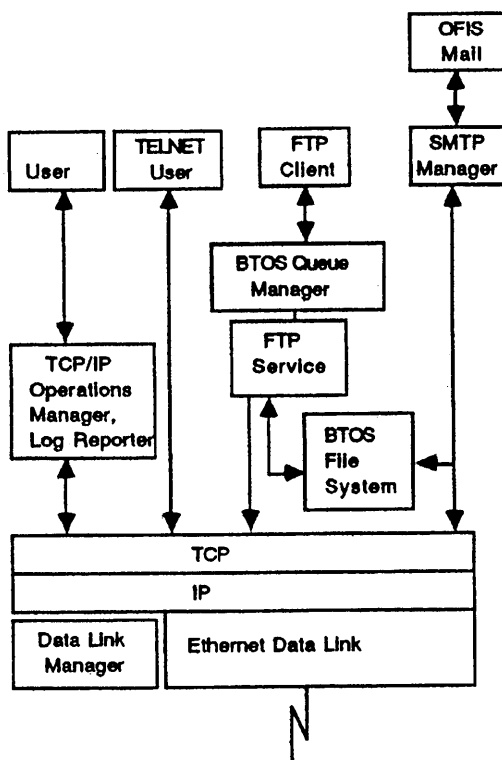


Figure 1 – 1. BTOS TCP/IP LAN Configuration

Note: For more information on this product, read the Release Information File (RIF) on the product disk. You will be prompted to read this file during software installation (see Section 3).

Tasks and Commands

Table 1-1 describes the tasks and corresponding commands relating to installing and configuring BTOS TCP/IP. The order in which these commands are executed depends on your selection of available TCP/IP options and your workstation configuration. The order of executing these commands is described in Section 4.

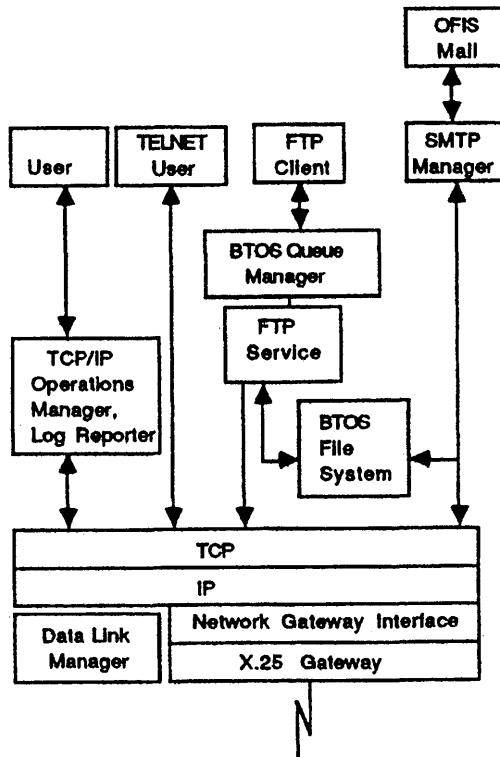


Figure 1 - 2. BTOS TCP/IP X.25 Configuration

Table 1 - 1. Command Summary

Task	Command	See Section
Creation of a configuration file.	TCP/IP Configuration Manager	4
Installation of the Data Link Manager	Install Data Link Manager	4

Table 1 – 1. Command Summary (cont.)

Task	Command	See Section
Installation of the data link layer (i.e., network gateway interface (NGI)) with the X.25 gateway.	Install X.25 NGI	4
Execution of the Data Link Manager Monitor.	Data Link Manager Monitor	4
Installation of the Ethernet data link layer.	Install Ethernet Data Link	4
Installation of the XE/LAN Relay.	Install XE LAN Relay Server	4
Installation of the IP system service.	Install IP	4
Installation of the TCP system service.	Install TCP	4
Installation of SMTP Manager	Install SMTP Manager	4
Installation of FTP Server	Install TCP/IP FTP Server	4 See also <i>BTOS TCP/IP Operations and Programming Guide</i>
Execution of FTP Client	TCP/IP FTP Client	4 See also <i>BTOS TCP/IP Operations and Programming Guide</i>
Execution of TELNET	TCP/IP TELNET	4 See also <i>BTOS TCP/IP Operations and Programming Guide</i>
Monitoring of network status information.	TCP/IP Operations Manager	4, 5

Overview

Table 1 – 1. Command Summary (cont.)

Task	Command	See Section
Retrieval of network log information.	TCP/IP Log Reporter	4, 6
Deinstallation of the TCP system service when the X.25 NGI is installed on the main CPU.	Deinstall TCP	4
Deinstallation of the IP system service.	Deinstall IP	4
Deinstallation of the X.25 NGI interface.	Deinstall X.25 NGI	4
Deinstallation of the XE LAN Relay.	Deinstall XE LAN Relay	4

Section 2

System Requirements

Hardware

BTOS TCP/IP runs on the following equipment:

- All models of the B 26, B 27 (no LAN support), B 28, B 38, and B 39 workstations
- The cluster processor (CP), terminal processor (TP), and file processor (FP) of the XE520

The BTOS TCP system service can be installed on all three boards of the XE520 (TP, CP, and FP). The BTOS IP system service can be installed only on the TP and CP boards of the XE520.

BTOS TCP/IP uses the following communications hardware:

- The B25-IDS intelligent data communication slice module (optional for X.25 networks)
- The B25-EN3 local area network (LAN) module (required for Ethernet LAN networks). The B25-EN3 module will not operate with B 27 workstations.

Software

The following list contains the major pieces of software with which BTOS TCP/IP operates. Items with an asterisk are required for all systems.

Unisys Software	Release Level
BTOS II for workstations*	2.0 or higher
IDMSS on the IDS or LAN module*	3.0 or higher
B-Net II	1.0 or higher

System Requirements

Unisys Software	Release Level
Context Manager II	3.0 or higher
MU2 XEBTOS for XE520 systems*	7.1 or higher
X.25 Gateway for operation over an X.25 network* (Requires BTOS 1.1)	9.0 or higher
BOTL (BTOS OSI Transport LAN) for operation over a Ethernet LAN network	2.0 or higher
OFIS Mail	1.2 or higher
ISAM (Indexed Sequential Access Method)	8.0 or higher
BTOS Pascal Compiler	6.0 or higher
BTOS C Compiler	1.1 or higher

RAM and Disk Usage

A stand-alone, master, or cluster workstation requires a minimum of 1 MB of RAM. At minimum, a 20 MB hard disk is required.

File Name	Disk Size in 512 - byte Sectors (Approximate)	RAM Size (Approximate)
TCP.Run	170	136K
TCP.IP.Run	78	140K
TCP.X25NGI.Run	120	35K
802/3.Run	40	22K plus 1344 per receive buffer

continued

System Requirements

File Name	Disk Size in 512 - byte Sectors (Approximate)	RAM Size (Approximate)
TCP.SMTP.Run	305	202K plus 2K for each line
TCP.FTPServer.Run	184	104K
TCP.FTPClient.Run	172	86K
TCP.FTP.Help	4	1.5K
TCP.TELNET.Run	154	77K
TCP.TELNET.Help	4	2K
TCP.InstallTCP.Run	16	N/A
TCP.InstallIP.Run	30	N/A
TCP.InstallX25NGI.Run	30	N/A
Install802/3.Run	16	N/A
TCP.Deinstall.Run	28	N/A
TCP.LANRelay.Run	36	91K for cluser workstation. 20K for XE 520
TCP.InstallLANRelay.Run	36	N/A
TCP.DeinstallLANRelay.Run	7	N/A
TCP.OpManager.Run	94	48K
TCP.OpManager.Help	3	1.5K
TCP.ConfigMgr.Run	82	N/A
TCP.MakeTELNETConfig.Run	22	N/A
TCP.LogReport.Run	56	28K
TCP/IP.Params	2	N/A
TCP.TelnetTxt.obj	22	N/A
TCP.SamGen.obj	8	N/A
TCP.SamTelnet.obj	14	N/A

continued

System Requirements

File Name	Disk Size in 512 - byte Sectors (Approximate)	RAM Size (Approximate)
TCP.RqLabl.obj	18	N/A
DLM.Run	38	18K
DeinstallDLM.Run	15	6K
DLMMonitor.Run	15	28K

System Configurations

BTOS TCP/IP can be configured for stand-alone, master, or cluster workstations. BTOS TCP/IP provides access to communication over 802.3 or X.25 networks.

There are three basic TCP/IP configurations, although they are not the only ones possible. Table 2-1 describes the basic configurations and lists the appropriate figure.

Refer to “Migration and Coexistence” for restrictions on the hardware and software configuration of BTOS TCP/IP.

Table 2-1. TCP/IP Configurations

Configuration Description	See Figure
TCP/IP on BTOS workstations with Ethernet LAN (requires B25-EN3 module)	2-1
TCP/IP on BTOS workstations or the XE520 with X.25	2-2
TCP/IP on an XE520 with LAN. This requires a cluster workstation with a B25-EN3 module and XE/LAN Relay software. The XE/LAN software is packaged with this product.	2-3

Migration and Coexistence

There are no migration or coexistence issues.

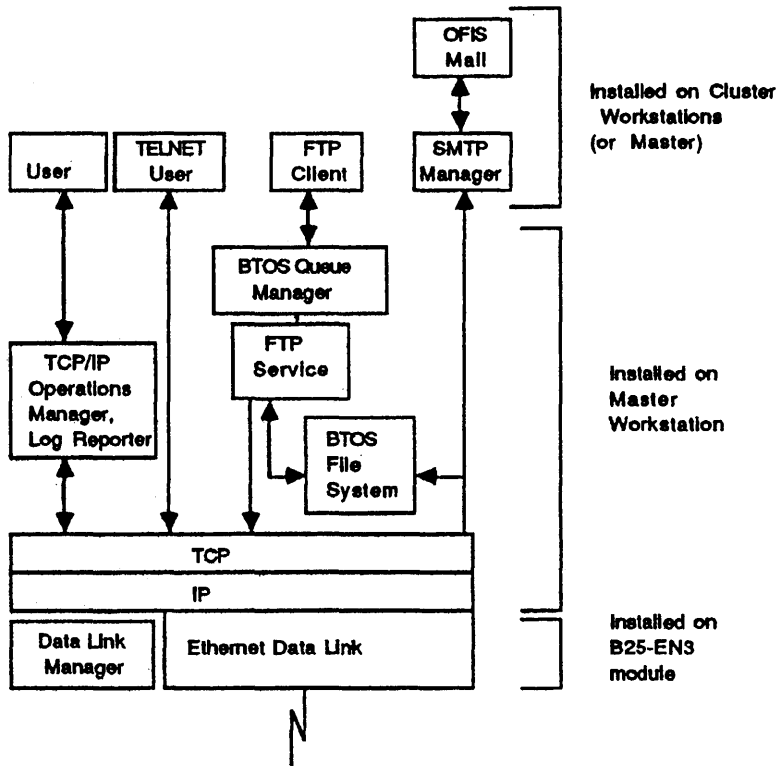


Figure 2-1. BTOS Workstations with LAN

System Requirements

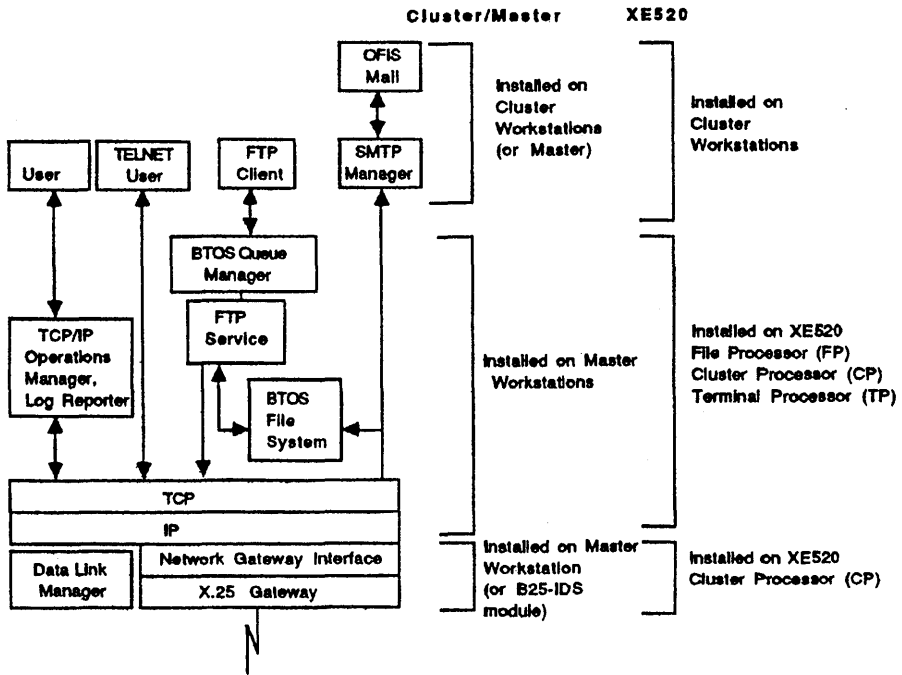


Figure 2-2. BTOS Workstations or XE520 with X.25

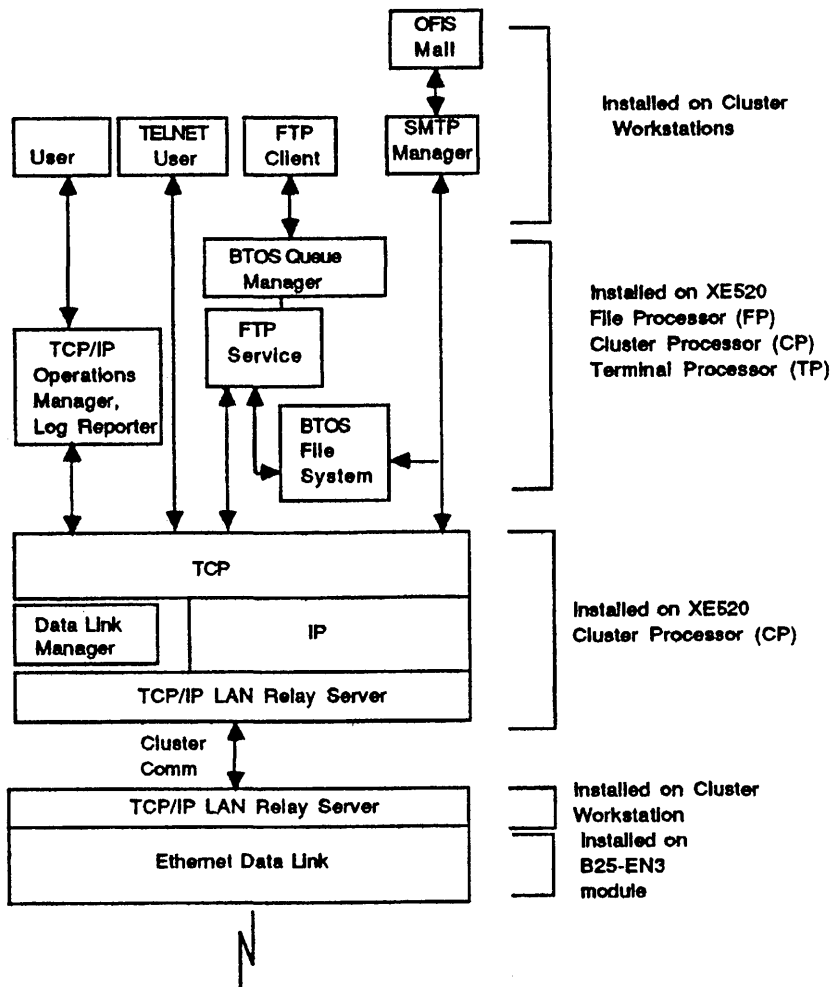


Figure 2-3. XE520 with LAN

System Requirements

BTOS TCP/IP can coexist with BTOS OSI Transport LAN (BOTL 2.0) and BNet II. It can operate in the same LAN network with workstations running BOTL 1.0.

BTOS TCP/IP FTP and TELNET run with Context Manager II using the following parameters:

Run file name	TCP.FTPClient.run	TCP.TELNET.run
Run file version	6	6
Runs in protected mode	yes	yes
Minimum memory required	86K	77K
Maximum memory required	86K	77K
Able to be swapped	yes	no
Needs executive screen	no	no
Loads own font	no	no
Loads own keyboard translation table	no	no
Directly manipulates the video	no	no

If you specify **yes** for the SMTP Manager **Suppress Convert to Sys** parameter, the SMTP Manager will run under the Context Manager without any constraints. It is not a system service in the BTOS sense because it does not serve request codes, but it can not be swapped out of memory through the Context Manager.

Following are restrictions and recommendations for using BTOS TCP/IP with other Unisys software products:

- The XE LAN Relay server must be installed on the XE520 cluster processor. It must also be installed, along with the Ethernet Data Link, on the cluster workstation to which the B25-EN3 LAN module is attached.
- The cluster workstation on which the XE LAN Relay server and the Ethernet Data Link are installed must not be running any other system services or applications.
- TCP/IP coexists with the same data link as BTOS OSI Transport-LAN (BOTL release level 2.0). You only need install the Data Link Manager and the Ethernet LAN Data Link once, either as part of the installation of BOTL or TCP/IP.
- BTOS TCP/IP does not support the 802.5 (Token-Ring) LAN.
- The X.25 gateway must be installed before the installation of the X.25 NGI.
- The BTOS Queue Manager must be installed on the master workstation to support the FTP services.
- TCP/IP must be installed before FTP or the SMTP Manager is installed and before running TELNET.
- TCP, IP, and X.25 NGI can be installed on the IDS. The Ethernet Data Link can be installed only on the B25-EN3 module.
- Configuration parameters control the number of TCP connections available to each of the applications.
- The maximum number of permitted TCP connections is 64. The system administrator may dynamically adjust the number of TCP connections up to the maximum.

System Requirements

SMTP is implemented jointly by BTOS TCP/IP and OFIS Mail (release level 1.2 or higher). The SMTP Manager (a component of BTOS TCP/IP) translates between the SMTP format and the OFIS Mail format. Users of BTOS systems use the standard OFIS Mail interface, while users of non-BTOS systems use the standard SMTP interface. The translation of the messages between the two systems is invisible to users. See the *BTOS OFIS Mail Administration Guide* for information on configuring the SMTP Manager as a communication manager in OFIS Mail. See the *BTOS OFIS Mail Operations Guide* for information on the general operation of OFIS Mail.

Section 3

Software Installation

This section explains how to copy the BTOS TCP/IP software onto a BTOS workstation or an XE520 system. (If you require a more detailed understanding of the software installation process, consult the *BTOS Standard Software Operations Guide*.)

BTOS Workstations

Before you can install BTOS TCP/IP, you must copy BTOS TCP/IP software from the product disk onto the hard disk of your workstation.

Use the following procedure if you plan to run BTOS TCP/IP on a BTOS master or stand-alone workstation.

Note: This product is delivered on more than one disk. Start with the disk labeled 1 and follow the instructions for installing the software. Repeat steps 2, 4, and 5 of the instructions for the second disk. The Release Information File is on the first disk.

1. Power down all cluster workstations.
2. Insert the floppy disk labeled *BTOS TCP/IP* into floppy disk drive [F0].
3. At the Executive command line, type *Software Installation* and press the GO key.
4. You will receive a prompt asking you if you want to read or print the Release Information File (RIF). The RIF contains further information on the product and updates to BTOS TCP/IP, if any. Follow the on-screen instructions.

Follow the prompts that appear on the screen to complete the installation.

The necessary files are copied, and the commands to run BTOS TCP/IP are created.

5. Remove the floppy disk and keep it in a secure place.

6. Reboot the workstation.
7. Power up all cluster workstations.

XE520 Systems

When an XE520 system serves as the master processor, you copy BTOS TCP/IP onto the XE520 system.

Use the following procedure if you plan to run BTOS TCP/IP on an XE520 system:

1. Power down all cluster workstations except the one at which you are working.
2. Insert the floppy disk labeled *BTOS TCP/IP* into floppy disk drive [F0].
3. At the Executive command line, type *XESoftware Installation* and press the GO key.
4. You will receive a prompt asking you if you want to read or print the Release Information File (RIF). The RIF contains further information on the product and updates to BTOS TCP/IP, if any. Follow the on-screen instructions.

Follow the prompts that appear on the screen to complete the installation.

The necessary files are copied, and the commands to run BTOS TCP/IP are created.

5. Remove the floppy disk and keep it in a secure place.
6. Reboot the XE520.
7. Reboot the cluster workstation you used to install BTOS TCP/IP. Power up all other cluster workstations.

Files Copied to Hard Disk

The following product files are copied to the [Sys] volume <Sys> directory of your hard disk during software installation, with the exception of RIF.doc and the .obj files. You are given an opportunity to print the RIF file and to copy the .obj files to disk during software installation.

File Name	File Description
<Unisys>TCP.Run	TCP system service
<Unisys>TCP.IP.Run	IP system service
<Unisys>TCP.X25NGI.Run	Interface to X.25 gateway
<Unisys>802/3.Run	Ethernet data link (LAN)
<Unisys>TCP.LANRelay.RUN	XE LAN Relay
<Unisys>TCP.SMTP.Run	SMTP Manager
<Unisys>TCP.FTPServer.Run	FTP Service program
<Unisys>TCP.FTPClient.Run	FTP Client program
<Unisys>TCP.FTP.Help	FTP help messages
<Unisys>TCP.TELNET.Run	TELNET network virtual terminal
<Unisys>TCP.TELNET.Help	TELNET help messages
<Unisys>TCP.InstallTCP.Run	Installs TCP service
<Unisys>TCP.InstallIP.Run	Installs IP system service
<Unisys>TCP.InstallX25NGI.Run	Installs X.25 interface to the X.25 gateway
<Unisys>Install802/3.Run	Installs LAN interface

Software Installation

File Name	File Description
<code><Unisys>TCP.InstallLANRelay.Run</code>	Installs XE LAN Relay
<code><Unisys>TCP.Deinstall.Run</code> Case: TC Case: IP Case: GI Case: MA	Deinstalls TCP system service Deinstalls IP system service Deinstalls X.25 NGI Deinstalls SMTP Manager
<code><Unisys>TCP.DeinstallLANRelay.Run</code>	Deinstalls XE LAN Relay server
<code><Unisys>TCP.OpManager.Run</code>	Operations Manager utility
<code><Unisys>TCP.OpManager.Help</code>	Help messages for Operations Manager
<code><Unisys>TCP.ConfigMgr.Run</code>	Processes BTOS TCP/IP configuration files
<code><Unisys>TCP.MakeTELNETConfig.Run</code>	Makes configuration file for use with TELNET applications
<code><Unisys>TCP.LogReport.Run</code>	Log Reporter utility
<code><Unisys>TCP/IP.Params</code>	Sample configuration file
<code><Unisys>TCP.TelnetTxt.obj</code>	Text message file that is linked into TELNET applications
<code><Unisys>TCP.SamGen.obj</code>	Customized SamGen module that is linked into TELNET applications
<code><Unisys>TCP.SamTelnet.obj</code>	SAM TELNET interface module that is linked into TELNET applications

File Name	File Description
<Unisys>TCP.RqLabl.obj	Transport Service calls module that is linked into TELNET applications
<Unisys>DLM.Run	Data Link Manager
<Unisys>DeinstallDLM.Run	Deinstall Data Link Manager
<Unisys>DLMMonitor.Run	Data Link Monitor
<Sys>RIF.Doc	Release Information File, which contains latest product information updates
<Sys>RIF.Sub	RIF Submit file

Queue Index Entry Created

The queue index file is used by the BTOS Queue Manager to set up and manage disk queues to support BTOS processes like FTP.

During software installation the following queue index entry for FTP is automatically installed into the [Sys]<Sys>Queue.Index file if you accept the default.

```
FTPQueue/[Sys]<Sys>FTPQ.queue/1/100
```

You have the option of declining the default installation and entering the index entries using the BTOS Editor. Whichever option you choose, the queue index entry must be part of the [Sys]<Sys>Queue.Index file, and you should only modify the filespec portion ([Sys]<Sys>FTPQ.Queue) of the entry.

Contents of Directories

Directory	Description
<Sys>	Holds all executable code files, associated help files, and programmatic interfaces.
<TCP/IP.Data>	Holds trace and log files.
<TCP/IP.FTP>	Holds FTP work files.

Commands Created

The following commands are created during software installation:

Command	Description
Install TCP	Installs TCP system service. Runfile: [Sys]<Sys>TCP.InstallTCP.Run
Install IP	Installs IP system service. Runfile: [Sys]<Sys>TCP.InstallIP.Run
Install X.25 NGI	Installs X.25 NGI. Runfile: [Sys]<Sys>TCP.InstallX25NGI.Run
Install Ethernet Data Link	Installs Ethernet Data Link Layer interface. Runfile: [Sys]<Sys>Install802/3.Run
Install SMTP Manager	Installs SMTP Manager. Runfile: [Sys]<Sys>TCP.SMTP.Run
Install TCP/IP FTP Server	Installs FTP Server. Runfile: [Sys]<Sys>TCP.FTPServer.Run
TCP/IP FTP Client	Runs the FTP Client. Runfile: [Sys]<Sys>TCP.FTPClient.Run

Command	Description
TCP/IP TELNET	Runs TELNET. Runfile: [Sys]\(Sys)TCP.InstallTELNET.Run
Install DLM	Installs Data Link Manager. Runfile: [Sys]\(Sys)DLM.Run
Data Link Manager Monitor	Utility that monitors the operation of the data link. Runfile: [Sys]\(Sys)DLMMonitor.Run
TCP/IP Make TelConfig	Runs TELNET configuration utility. Runfile: [Sys]\(Sys)TCP.MakeTELNETConfig.Run
Install XE LAN Relay Server	Installs XE LAN Relay Server. Runfile: [Sys]\(Sys)TCP.InstallLANRelay.Run
TCP/IP Configuration Manager	Utility that generates the TCP/IP file [Sys]\(Sys)TCP.ConfigMgr.sys that is used during installation to supply the configuration information. Runfile: [Sys]\(Sys)TCP.ConfigMgr.Run
TCP/IP Operations Manager	Network monitor utility. Runfile: [Sys]\(Sys)TCP.OpManager.Run
TCP/IP Log Reporter	Network log report generator. Runfile: [Sys]\(Sys)TCP.LogReport.Run
Deinstall TCP	Deinstalls the TCP system service. Runfile: [Sys]\(Sys)TCP.Deinstall.Run Case: TC
Deinstall FTP Server	Deinstalls the FTP system service. Runfile: [Sys]\(Sys)TCP.Deinstall.Run Case: FT

Software Installation

Command	Description
Deinstall IP	Deinstalls the IP system service. Runfile: [Sys]<Sys>TCP.Deinstall.Run Case: IP
Deinstall X.25 NGI	Deinstalls the X.25 NGI. Runfile: [Sys]<Sys>TCP.Deinstall.Run Case: GI
Deinstall SMTP Manager	Deinstalls SMTP Manager. Runfile: TCP.Deinstall.Run Case: MA
Deinstall DLM	Deinstalls the Data Link Manager. Runfile: DeinstallDLM.Run
Deinstall XE LAN Relay Server	Deinstalls the XE LAN Relay. Runfile: [Sys]<Sys>TCP.DeinstallLANRelay.Run

Section 4

Configuring and Installing BTOS TCP/IP

Prerequisites

This section assumes that the BTOS TCP/IP software on the product disks has been loaded onto the hard disk. See Section 3, “Software Installation,” for instructions on loading the system software.

Installation Methods

BTOS TCP/IP can be installed on:

- A BTOS workstation using the install commands. Refer to “Installing BTOS TCP/IP on a BTOS Workstation Using Install Commands.”
- A BTOS Workstation using JCL files. Refer to “Installing BTOS TCP/IP on BTOS Workstation Using JCL Files.”
- An XE520 using JCL files. Refer to “Installing BTOS TCP/IP on an XE520 Using JCL Files.”
- An XE520 using MCDTIO commands. Refer to “Installing BTOS TCP/IP on an XE520 Using MCDTIO Commands.”

Selecting LAN or X.25

This section is organized according to the three ways BTOS TCP/IP can be installed. Within each of the three methods, the instructions for LAN or X.25 are provided. You can select one of the two network access methods or both. In the case of an XE520, the LAN module is installed on a cluster workstation and XE/LAN Relay Interface software is required.

The B25-EN3 and B25-IDS modules require that the IDMSS be installed before starting the installation and configuration of BTOS TCP/IP. BTOS TCP/IP requires that the Intelligent Module Support Program (IMSP) and XBif Server be installed to coordinate the processing done by the intelligent modules on your system. See the *BTOS Intelligent Data Communications Module Data*

Communications Module Systems Software Operations Guide (relative to release 3.0 or higher) for instructions on loading the IDMSS.

Installing BTOS TCP/IP on a BTOS Workstation Using Install Commands

Use this instruction sequence to configure and install BTOS TCP/IP on a cluster, master, or stand-alone BTOS workstation.

A B25-EN3 LAN module and the IDMSS software must be installed before beginning this sequence. The B25-EN3 module is typically installed on the master workstation.

Installation Steps

The installation steps for BTOS TCP/IP follow. The steps include the installation of the SMTP Manager, FTP, and TELNET software, from which you can choose the ones you intend to use. Each step is described in detail following the list.

1. Create a TCP/IP configuration file.
2. Install Data Link Manager.
3. Install Ethernet Data Link. (If you will be using X.25 only, skip to step 4.)
4. Install the X.25 NGI. (If you will be using LAN only, skip to step 5.)
5. Install IP and TCP.
6. Install SMTP Manager and FTP Server
7. Run FTP Client and TELNET.

Step 1: Creating the TCP/IP Configuration File

The Configuration Manager utility, used later in this step, requires a network configuration file. A sample file, SysTCP/IP.Params, was copied to your hard disk during software installation. Edit this file, shown in Figure 4-1, using the BTOS Editor. Modify the parameters to reflect your specific network configuration.

The information in the sample configuration file is grouped under Operation Management and Remote Host Identification. The parameters that are site specific are indicated as such in the file listing. This listing would permit communication with the two remote hosts specified.

A description of each parameter entry and instructions on editing the configuration file follows the sample file.

```

*****
***  OPERATION MANAGEMENT  ***
*****
MaxMaxConn      = 64;
MaxConn         = 16;
FTPConn         = 5; *max # of connections for one FTP Server
LHostName       = HOST1;          *Site specific.
LHostAddr       = 192.140.10.1;   *Site specific.
SpecHostAddr    = 0.0.0.0;        *Site specific.
NetVolume       = !Sys;           *Site specific
Log             = OFF;
ReqTrace        = 0;
*****
***  REMOTE HOST IDENTIFICATION  ***
*****
RemHostName     = HOST2;
RemHostAddr     = 192.140.10.2;
NetType         = 1;               *1 = Ethernet LAN, 2 = X.25

RemHostName     = LOCAL;
RemHostAddr     = 192.140.10.1;
NetType         = 1;

RemHostName     = REMOTE2;
RemHostAddr     = 192.140.10.2;
NetType         = 1;

RemHostName     = HOST3;
RemHostAddr     = 192.140.10.3;
NetType         = 2;

RemHostName     = REMOTE3;
RemHostAddr     = 192.140.10.3;
NetType         = 2;
***** END OF FILE *****

```


TCP/IP Configuration File Parameters

The parameters of the configuration file describe the network environment in which BTOS TCP/IP will operate. The parameter names, permissible values, and functional descriptions are listed as follows.

Network Configuration Parameters

Parameter	Parameter Description
------------------	------------------------------

MaxMaxConn	This parameter specifies the largest number of connections that will be permitted.
-------------------	--

This number must be defined first since it controls the connection management scheme and defines upper limits for other parameters.

This number must be equal to, or greater than, the value of MaxConn. If the MaxMaxConn parameter is greater than the MaxConn parameter, automatic (dynamic) increases in the number of connections are possible.

This parameter can range from 1 to 64, inclusive. The default value is 16.

MaxConn	This parameter specifies the initial maximum number of active connections that will be permitted. This value may be changed dynamically from the BTOS TCP/IP Operations Manager utility.
----------------	--

This parameter can range from 1 through MaxMaxConn. The default is value is 16.

FTPConn	This parameter specifies the maximum number of connections that the FTP Server will support.
----------------	--

This parameter can range from 1 to 5. The default value is 16.

- LHostName** This parameter specifies the name of your local network host. It may contain up to 64 characters from the printable ASCII character set. It may not start with an asterisk (*).
- There is no default for this parameter and it must be specified in the file.
- LHostAddr** This is the network address of your local host.
- The entries for the host address must be made with the following format:
- AAA.BBB.CCC.DDD*
- where *AAA*, *BBB*, *CCC*, and *DDD* must each be an integer ranging from 0 through 255.
- Example: *251.32.000.16*
- There is no default for this parameter and it must be specified in the file.

Configuring and Installing BTOS TCP/IP

SpecHostAddr This parameter specifies the host address. It is used by the ULPs in conjunction with passive opens. This parameter can be in one of the following three formats:

0.0.0.0

This format permits communication from any valid remote host address.

AAA.0.0.0

This address format permits communication only from hosts whose network address is *AAA*. It is the default.

AAA.BBB.CCC.DDD

This address format permits communication only from the host specified by the network address *AAA.BBB.CCC.DDD*.

NetVolume This parameter specifies the network volume. When running the TCP, IP, and FTP servers on a master workstation and an FTP client on a cluster workstation, the cluster workstation's file should specify !Sys as the NetVolume parameter.

Log This parameter enables or disables the logging of TCP/IP connection opens and closes. When this parameter is specified as *ON*, logging is enabled. When this parameter is specified as *OFF*, logging is disabled. The log file created is <TCP/IP.Data>LGYearMonthDay:HourMinute. See Section 5 for instructions on closing the log file and Section 6 for instructions on examining its contents.

The default value for this parameter is *ON*.

ReqTrace This parameter controls the BTOS request/response tracing between the upper layer protocols and the TCP layer. The file created is `(TCP/IP.Data)RQYearMonthDay:HourMinute`. See Section 5 for information on closing the trace file. Its contents can be examined in the BTOS Editor. This feature has value only as a debugging tools. Three possible values are permitted:

- 0: No tracing (the default)
- 1: Tracing of BTOS requests and responses is enabled.
- 2: Tracing of requests, responses, and data portions of messages is enabled.

RemHostName This parameter specifies a remote host name. It can contain up to 64 characters from the printable ASCII character set. It cannot start with an asterisk (*).

RemHostAddr This parameter specifies the address of the remote host and can be gotten from your host system administrator.

The entries for the remote host address must be made with the following format:

AAA.BBB.CCC.DDD

where *AAA*, *BBB*, *CCC*, and *DDD* are each an integer ranging from 0 through 255.

Example: *251.32.000.16*

NetType This parameter specifies the type of network the remote host is on. Each remote host address should have a **NetType** parameter associated with it. The valid types are 1 for LAN networks and 2 for X.25 networks.

A single remote host address can be paired with multiple remote host names. This allows the creation of aliases for a given host system.

Valid examples of a **RemHostName**, **RemHostAddr**, and **NetType** entry in the network configuration are shown in the following listing. Note that the same remote address has a different **RemHostName**, indicating an alias for the same host.

```
RemHostName      = Phila.Com;  
RemHostAddr     = 11.11.0.5;  
NetType         = 2;  
RemHostName     = UnisysPA.Com;  
RemHostAddr     = 11.11.0.5;  
NetType         = 2;
```

Rules for Editing the TCP/IP Configuration File

The TCP/IP Configuration Manager will not create the required files if the network configuration file has syntax errors.

Whether you edit the provided sample TCP/IP.Params file or create a new file, the same rules of syntax apply. The following rules apply to the network configuration file.

1. All statements in the file, except comments, must begin with a reserved word (the parameter name). Following the reserved word is the equals sign (=), a parameter value, and a semicolon (;).

A valid example of the four elements that make up a file line entry is as follows:

```
MaxConn = 15;
```

2. Comment lines begin with an asterisk (*). They can begin a line and continue to the end of the line. Comments can follow a statement semicolon and continue to the end of the line. Comments cannot be inserted inside a line entry. A local or remote host name can contain an asterisk as long as it is not the first character in the name.

Valid examples of comments and a name containing an asterisk are:

```
ReqTrace = 0; *Comment Text  
*Comment Text
```

3. Parameter entry is free format and is not case sensitive.
4. You can create the parameter file using the BTOS Editor or word processing packages like SWP or OFISWriter. The Configuration Manager utility ignores binary formatting control characters inserted by the word processor.

The sample file provided on the release diskettes was created using the BTOS Editor. This file may be edited using SWP or OFISWriter. Once this file has been edited with a word processor, all following edits should be performed with the same word processing package.

5. Use the following numbering convention in the network configuration file:

Binary Numbers: Only the 1 and 0 digits are permitted. Separating a binary number into fields for readability using the \$ character is permitted. The character *b* must be appended to the binary number.

Hexadecimal Numbers: Only the digits 0 through 9 and letters A through F are permitted. The character *h* must be appended to the hexadecimal number.

Decimal Numbers: The digits 0 through 9 are permitted. No character should be appended to the decimal number. Decimal numbers are the default.

A valid binary, hexadecimal, and decimal number entry is as shown:

```
1001$1111b
9Fh
159
```

6. The RemHostName, RemHostAddr, and NetType fields should be grouped together in the file in the order just mentioned.

A valid listing entry would be:

```
RemHostName = Phila.Com;
RemHostAddr = 11.11.0.5;
NetType = 2;
```

Executing the Configuration Manager

The Configuration Manager is a utility program that enables you to configure BTOS TCP/IP to your unique network configuration. The Configuration Manager processes the network configuration file you created to produce a file ([Sys]\Sys)TCP.Config.Sys) that is read by TCP/IP, SMTP Manager, FTP, and TELNET.

To invoke the Configuration Manager, at the Executive command line type *TCP/IP Configuration Manager* and press the RETURN key.

The following form appears:

```
TCP/IP Configuration Manager
Input File
[Listing File (default = [Sys]\Sys)TCP.Config.lst)]
```

Parameter	Description
Input File	This parameter specifies the name of the configuration file you created in this step. Specify any valid BTOS file name.
[Listing File (Default = [Sys]\Sys)TCP.Config.lst)]	The Configuration Manager generates a listing file of the network configuration file produced for TCP/IP. The default for this parameter is to send the list file to ConfigNet.lst. Specify any valid BTOS device or file specification may be entered for this parameter. If you leave this parameter blank, the list file is sent to ConfigNet.lst

After completing the form, press the GO key to execute the Configuration Manager utility. The Configuration Manager will process the input file to generate the appropriate network file.

A screen message indicates whether any errors in your configuration file have been encountered. No errors in the message indicate a successful generation of SysTCP.Config.Sys. If errors appear, edit the input file to correct the errors, and execute the Configuration Manager again until no errors are encountered.

Configuration Manager Errors

The Configuration Manager parses the input file in two passes. The first pass checks the input file syntax. The second pass, executed only after a first pass has been completed without errors, determines whether parameters in the file are within the permitted ranges. Your input file must survive both passes without error in order for the Configuration Manager to generate the appropriate SysTCP.Config.Sys file.

Syntax errors are caused by the following:

- Omitting semicolons, equal signs, or parameters
- Misspelling reserved words
- Illegally placing comments

Syntax errors encountered in the first pass inhibit the parameter range check. Correct syntax errors in your file and then resubmit the file to the Configuration Manager to determine if any range errors are in your file.

The listing file created by the Configuration Manager contains a list of errors encountered in your file. Use this error listing with the parameter descriptions and syntax rules of step 2 to determine what corrections to make to your input file.

After executing the Configuration Manager successfully, the configuration file SysTCP.Config.Sys that was created will be used in steps 4, 5 and 6.

Step 2: Installing the Data Link Manager

Note: TCP/IP coexists with the same data link as BTOS OSI Transport-LAN (BOTL release level 2.0). If you have already installed the Data Link Manager and the Ethernet LAN Data Link as part of the installation of BOTL, it is not necessary to do so here.

Configuring and Installing BTOS TCP/IP

To install the DLM, type *Install Data Link Manager* and press the RETURN key. The following form appears:

```
Install Data Link Manager
  [Max Data Link Layers (default = 5)]
  [Max Data Link Layer Users (default = 10)]
```

Parameter	Description
[Max Data Link Layers (default = 5)]	Specifies the maximum number of DLLs that can register with the DLL. This parameter can range from 1 through 10.
[Max Data Link Layer Users (Default = 10)]	Specifies the maximum number of users (processes) that can be registered with the DLM. For example, if both TCP/IP and X.25 use this DLM to manage their link layers, the value of this parameter is 2. This parameter can range from 1 through 15.

After completing the form, press the GO key.

For JCL file users, the run file name for this command is SysDLM.Run.

Step 2A: Running the Data Link Manager Monitor

This step is optional. The Data Link Monitor enables you to monitor the operation of your data link layer (DLL). To operate the monitor, follow the on-screen instructions. To execute the monitor, type *Data Link Monitor* and press the RETURN key. The following form appears:

```
Data Link Manager Monitor
  [DLM Node Name (default = Local)]
```

Parameter	Description
[DLM Node Name (default = Local)]	The node name is the BNet node on which the DLM is installed.

After completing the form, press the GO key.

Step 3: Installing the Ethernet Data Link

This step is required if you will be using the LAN interface. If you will be using X.25 only, skip to step 4.

Note: TCP/IP coexists with the same data link as BTOS OSI Transport-LAN (BOTL release level 2.0). If you have already installed the Data Link Manager and the Ethernet LAN Data Link as part of the installation of BOTL, it is not necessary to do so here, provided that you allowed at least 2 receive buffers for TCP/IP when you installed BOTL.

To install the Ethernet data link into the B25-EN3 module, execute the following command, *Install Ethernet Data Link* and press the RETURN key. The following form appears:

```
Install Ethernet Data Link
  [Total Rcv Buffers (Default = 10)]
```

Parameter

Description

[Total Rcv Buffers (Default = 10)]

This parameter determines the total memory required for receive buffers. It is specified in terms of 1-kilobyte buffers. This parameter can range from 2 to 64.

If you are installing more than one software package that uses the EDL, add the number of "Total Rcv Buffers" used by each product and install the EDL using this number.

If you are having performance problems, increase the number of buffers.

(Transmit buffers need not be specified because the buffers used by the applications serviced by the EDL are used.)

After completing the form, press the GO key to invoke the command.

For JCL file users, the run file name for this command is
SysInstall802/3.Run.

There is no deinstall utility for the Ethernet Data Link. It is impossible to deinstall a system service from the single-partition operating system of the B25-EN3.

Step 4: X.25 Network Gateway Interface Installation

If you will be using the Ethernet LAN interface only, skip to step 5.

Note: First install the BTOS X.25 Gateway. See the BTOS X.25 Gateway Operations and Programming Guide (relative to release 9.0).

The NGI provides the services required to interface the IP layer of BTOS TCP/IP to the X.25 gateway. During installation, the Install Network Gateway Interface command uses the TCP/IP configuration file to customize the NGI to your specific network configuration.

You can install the X.25 NGI on a cluster, master, or stand-alone workstation using the Install X.25 command. You can optionally install the X.25 NGI on the IDS module by providing to the appropriate processor ID.

The file NGI.ValidAddress was copied to the Sys volume/directory during software installation. It is a configuration file for mapping Internet addresses to X.25 PDN addresses. Open the file in the Editor and read the instructions at the beginning of the file for a description of its use.

To install the X.25 NGI, at the Executive command line type *Install X.25 NGI* and press the RETURN key. The following form appears:

```
Install X.25 NGI
  [Processor ID (Default = 0)]
  [Max X.25 VCs (Default = 10)]
  [X.25 Network Type (Default = DDN)]
  [DDN Service Type (Default = Standard)]
```

Parameter

[Processor ID (Default = 0)]

Description

The Processor ID is an integer greater than zero (processor 0 is the main CPU). Intelligent module processor numbers are incremental from left to right; the first intelligent module is number 1. If you had an IDS module installed as part of your system and wanted to install the X.25 NGI on that module, you would choose 1 for this parameter.

[Max X.25 VCs (Default = 10)]

This parameter is the total number of virtual circuits you intend to use. The value must match the number of VCs parameter chosen during the installation of the X.25 gateway.

TCP will multiplex its connections to a particular host over a single virtual circuit. For example, if a user wants to connect to host A, the NGI will open a virtual circuit. If another user also wants to connect to host A, NGI will multiplex the connection over the existing virtual circuit.

[X.25 Network Type (Default = DDN)] This parameter is used to identify the type of X.25 network to which the user is connected. *DDN* and *PDN* are the valid entries.

If you are connecting to a DDN network using the 9.0 release of the BTOS X.25 Gateway, choose 0 (not 9) as the *PDN type* parameter during installation of the link and packet installation of the link and packet levels. *PDN type* is described on pages 5-6 and 6-5 of the *BTOS X.25 Gateway Operation and Programming Guide*. You should still accept the default *DDN* as the parameter for the installation of the X.25 NGI.

[DDN Service Type (Default = Standard)]

This parameter specifies the type of service when a DDN network is used. Contact your Network Information Center (NIC) to determine your type of service. *Standard* and *Basic* are the valid entries

For users of JCL files, the run filename is [Sys]*(Sys)*TCP.X25NGI.Run.

After completing the form, press the GO key to install the X.25 NGI.

Step 5: Installing IP and TCP

You can install the IP and TCP software on a cluster, master, or stand-alone BTOS workstation using the Install IP and Install TCP commands.

Descriptions of the Install IP and Install TCP commands follow. After completing the installation of IP and TCP, follow steps 6 and 7, selecting the commands appropriate to the applications that you will be using.

Installing IP

To install the IP system service, at the Executive command line type *Install IP* and press the RETURN key. The following form appears:

```
Install IP
  [Processor ID (Default = 0)]
  [Gateway Internet Address]
  [Address Mask Type (Default = 0)]
```

Parameter	Description
[Processor ID (Default = 0)]	The Processor ID is an integer greater than zero (processor 0 is the main CPU). Intelligent module processor numbers are incremental from left to right; the first intelligent module is number 1. If you had an IDS module installed as part of your system and wanted to install IP on that module, you would choose 1 for this parameter.
[Gateway Internet Address]	This is the Internet address of the Internet gateway system to which connection requests are sent when the destination Internet host does not exist on the local network.

[Address Mask Type (Default = 0)]

This the mask type you should use to determine which connection request should be sent to the internet gateway host specified in the previous parameter. Valid entries are 1, 2, 3, or 4. The default is 0.

In order to route connection requests via a gateway host to systems that are nto on the local network. The mask enables a comparison of the elements of the Internet Address:

An Internet address is divided into 4 elements: aaa.bbb.ccc.ddd

aaa—Network address

bbb—Host address

ccc—IMP address

ddd—Local address

If you specify 1, the local Network Address is compared to the destination Network Address. If it is different, the connection request is sent to the gateway host specified in the previous parameter for transmission to the appropriate network. If you specify 2, the Network and the Host addresses are compared. If either one is different, the request is sent to the gateway host. If you specify 3, the Network, Host, and IMP addresses are compared. If any is different, the request is sent to the gateway host.

After completing the form, press the GO key.

Installing TCP

To install the TCP system service, at the Executive command line type *Install TCP* and press the RETURN key.

The following form appears:

```
Install TCP
  [Processor ID (Default = 0)]
```

Parameter	Description
[Processor ID (Default = 0)]	The Processor ID is an integer greater than zero (processor 0 is the main CPU). Intelligent module processor numbers are incremental from left to right; the first intelligent module is number 1. If you had an IDS module installed as part of your system and wanted to install IP on that module, you would choose 1 for this parameter.

After completing the form, press the GO key.

Step 6: Installing SMTP Manager, Queue Manager, ISAM, and FTP Server

Installing the SMTP Manager

SMTP is implemented in BTOS TCP/IP through OFIS Mail. The SMTP Manager translates between SMTP format and OFIS Mail format for sending and receiving mail messages. Users of OFIS Mail now can access TCP/IP networks in the familiar OFIS Mail format.

You must install OFIS Mail before you install the SMTP Manager. Refer to the *BTOS OFIS Mail Administration Guide* and *BTOS OFIS Mail Operations Guide* for information about configuring the SMTP Manager as an OFIS Mail communication manager.

Note: Due to memory limitations in an XE520 environment, the SMTP Manager should be installed on one of the XE520's cluster workstations. The SMTP Attachment Directory should be on the XE520 along with the Mail Server.

Configuring and Installing BTOS TCP/IP

To install the SMTP Manager, at the Executive command line type *Install SMTP Manager* and press the RETURN key. The following form will appear:

```
Install SMTP Manager
[Name          (Default = SMTP)      ]
[Password      (Default = SMTP)      ]
[Inlines       (Default = 1)         ]
[Outlines      (Default = 1)         ]
[Network Name  (Default = Unknown)   ]
[TCP Node Name (Default = Local)     ]
[Log File      ([Sys]<Sys>TCP.SMTP.LOG]
[Log Level     (Default = 8010)      ]
[Log Size      (Default = 80Kb)      ]
[Suppress Convert to Sys (Default = No) ]
```

Parameter	Description
Name	This parameter specifies the name assigned to the SMTP Manager during its configuration as an OFIS Mail communication manager.
[Password]	This parameter specifies a password for the SMTP Manager. This password must match the password assigned during the configuration of the SMTP Manager as an OFIS Mail communication manager. The default is no password.
[Inlines (Default = 1)]	This parameter specifies the maximum number of TCP/IP connections that can receive mail at any given time. The value specified must be in the range of 0 to 64. If zero is specified, mail cannot be received from the network.

[Outlines (Default = 1)]	This parameter specifies the number of TCP/IP connections that can send mail at any given time. Valid values are 0 and 1. A value of 0 implies that you do not intend to send mail to other hosts. The sum of the Inlines and Outlines parameters cannot exceed 64 or the maximum number of connections that is specified in the MaxMaxConn parameter of the TCP/IP configuration file.
[Network Name (Default = Unknown)]	This parameter is used as the name of the network that the TCP/IP transport service is connected to (for example, ARPA). This value is used in many SMTP messages. If not specified, the value <i>Unknown</i> is used. A maximum of 24 characters is allowed.
TCP Node Name (Default = Local)]	This parameter is the name of the B-Net node where TCP is installed. The default is the local node.
[Log File] (Default = [Sys]\<Sys> TCP.SMTP.LOG)]	This parameter specifies the path and file name that the SMTP Manager will use to log information. Any valid BTOS file name is acceptable. When you specify a log level of 0, logging is disabled. See the Log Level parameter that follows. Information written to the log file is in ASCII format.
[Log Level (Default = 8010)]	This parameter is checked to determine the type of information written to the log file. The default value is 1. A value of 0 disables logging. This parameter must be in the hexadecimal format. The values of log level and their corresponding log file entries are shown in the following table.

Configuring and Installing BTOS TCP/IP

Log Level Values		
Log Level Value (base 16)	Log Level (base 2)	Log File Entry
0001	0000 0000 0000 0001	SMTP commands
0002	0000 0000 0000 0010	TCP/IP SMTP incoming data buffer entries
0004	0000 0000 0000 0100	TCP/IP SMTP outgoing data buffer entries
0008	0000 0000 0000 1000	SMTP Manager state changes
0010	0000 0000 0001 0000	Errors
0020	0000 0000 0010 0000	Mail Giver to Mail Server
0040	0000 0000 0100 0000	Details of mail given to Mail Server
0080	0000 0000 1000 0000	Mail from Mail Server
0100	0000 0001 0000 0000	Details of mail from Mail Server
0200	0000 0010 0000 0000	Major software function calls
0400	0000 0100 0000 0000	Major events (not errors)
0800	0000 1000 0000 0000	Reserved
1000	0001 0000 0000 0000	TCP/IP SMTP Protocol
2000	0010 0000 0000 0000	Decoding of encoded data from remote SMTP Mail Manager
8000	1000 0000 0000 0000	Essential events

The log level values shown in Table 4-2 may be combined to produce log file entries of more than one type. The result of a bit-wise logical *OR* of the debug level values (base 2) for the desired entries can be used for this parameter value to produce a combined logging function.

For example, to record the SMTP commands, SMTP Manager state changes, and Major software function calls you would use a debug level of 0209hex (0000 0010 0000 1001).

Note: Extensive log entries may slow the overall system response of SMTP.

[Log Size
(Default =
80Kb)] This parameter specifies the maximum size of the log file divided by 1024. For example, a value of 20 implies that the maximum log file size is 20 x 1024 or 20,480 bytes. The default size is 80Kb.

When the log file entries exceed the Log size the file entries wrap (are written over).

[Suppress
Convert to Sys
(Default =
No)] This parameter specifies whether the SMTP Manager will become a system service through the BTOS function ConvertToSys.

Valid values are *N* for creation of a system service and *Y* for inhibiting the creation of a system service. If you specify *N*, logging information is written to the log file. If you specify *Y*, logging information is written to the screen as well as the log file. This parameter is useful for testing and debugging a new installation. When you select *Y* for this parameter, you must run the SMTP Manager under Context Manager.

After completing the form, press the GO key.

Note: SMTP Manager errors are written to the log file in the form of status codes. See Appendix A for a listing of these SMTP status codes.

Suggestions for Using SMTP

It is recommended that you use a log level of 9010 for the testing of a new SMTP center. This will allow you to log the flow of messages between your system and remote hosts. After it is working satisfactorily, set it to the default, 8010.

You can use Context Manager to test your new SMTP center, as the following steps explain.

1. Install data link
Install IP
Install TCP
Install Mail Server
Install Context Manager
2. Install the SMTP Manager in one partition by supplying a log level of 9010 and answering *yes* to the Suppress Convert-to-Sys parameter.
3. Install OFIS Mail in another partition.
4. Send mail between the local mail center and a remote mail center. Switch between contexts to watch the interaction. Be patient: the mail server may take a minute or two before it hands a message to the SMTP Manager.
5. When the SMTP Manager is running to your satisfaction, reinstall it as a system service by answering *no* to the Suppress Convert-to-Sys parameter and setting the log level parameter to 8010.

Note: The symbolic name that you use to indentify a remote host (as in Internet address mapping, e.g., UNIX1 192.30.10.1) may not be the same name as used for the remote SMTP entity. Look at incoming mail messages to determine the correct name and verify that it is an entry in the TCP/IP configuration file. If it is not, create an alias entry in the configuration file.

Installing Queue Manager

BTOS Queue Manager is required to process FTP requests.

To install the Queue Manager, at the Executive command line type *Install Queue Manager* and press the RETURN key. The following form appears:

```
Install Queue Manager
  [Use cache?]
  [Maximum number of queues]
```

Parameter	Description
[Use cache?]	<p>If you specify <i>yes</i>, the system installs the Queue Manager with an extra buffer area for caching disk access of queue index entries.</p> <p>The exact size of the buffer depends on the number of queues. The cache is meant to increase the speed of the queue manager.</p> <p>For BTOS TCP/IP FTP operations, select <i>yes</i> for this parameter if disk space is available on your system.</p> <p>The default for this parameter is <i>no</i>.</p>
[Maximum number of queues]	<p>The system allocates buffer space for the number of queues you specify in this parameter. You can specify up to a maximum of <i>300</i> queues.</p> <p>The default is <i>20</i>.</p>

After completing the form, press the GO key.

For further information on the BTOS Queue Manager, refer to the *BTOS II Standard Software Operations Guide*.

The queue index file is used by the BTOS Queue Manager to set up and manage disk queues to support BTOS processes like FTP.

During software installation, described in Section 3, the following queue index entry for FTP is automatically added to the SysQueue.Index file if you accept the default:

```
FTPQueue/[Sys](Sys)FTPQ.queue/1/100
```

You have the option of declining the default installation and entering the index entries using the BTOS Editor. Whichever option you choose, the queue index entry must be part of the SysQueue.Index file. Also, only modify the filespec portion (SysFTPQ.Queue) of the entry.

Installing ISAM

If your files use the BTOS Indexed Sequential Access Method (ISAM) for storing information, then FTP commands on these files require that ISAM be installed. In order to use the ISAM rename and delete functions, the remote system also requires installation of ISAM.

Refer to the *BTOS Indexed Sequential Access Method (ISAM) Programming Reference Manual* (relative to release 8.0 or higher) for instructions.

Installing FTP Server

Installing FTP involves first installing the FTP system service and then the FTP client, which provides the user interface. For information on the operation of FTP, refer to the *BTOS TCP/IP FTP and TELNET Operations and Programming Guide*.

To install the FTP service, at the Executive command line type *Install TCP/IP FTP Server* and press the GO key.

Step 7: Running FTP Client and TELNET

Running FTP Client

To run the FTP Client, at the Executive command line type *TCP/IP FTP Client* and press the RETURN key. The following form appears:

TCP/IP FTP Client

FTP Server Node Name (Default = Local)]

Parameter	Description
[FTP Server Node Name (Default = Local)]	This parameter is the name of the B-Net node where the FTP Server is installed. The default is the local node.

After completing the form, press the GO key.

Note: When you connect the FTP Client to the FTP Server over B-Net, you can only send files that reside on the same volume as the FTP Client. Files that you receive will be stored on the volume on which you have installed the FTP Server.

Running TELNET

To run TELNET, at the Executive command line enter *TCP/IP TELNET* and press the RETURN key. The following form appears:

```
TCP/IP TELNET
  TCP Node Name (Default = Local)]
```

Parameter	Description
TCP Node Name (Default = Local)]	This parameter is the name of the B-Net node where TCP is installed. The default is the local node.

After completing the form, press the GO key.

For information on the operation of TELNET, refer to the *BTOS TCP/IP FTP and TELNET Operations and Programming Guide*.

Installing TCP/IP on BTOS Workstations Using JCL Files

The installation steps covered under “Installing TCP/IP on a BTOS Workstation Using Install Commands” also apply when using JCL files to configure and install TCP/IP.

The JCL file duplicates the installation commands in a script file format. Each installation command line entry has a corresponding JCL file entry in the SysInit.jcl file. This JCL file ensures that BTOS TCP/IP is available at bootup.

Creating the JCL File for BTOS Workstations

You must edit the [Sys](sys)SysInit.jcl file to include an entry for each installation command with the following format:

- Each JCL file entry is preceded by a \$Run, then the run filename of the service to be installed, followed by the parameters separated by commas.
- The order of entry in the file must follow the order of the steps described using the install commands.
- The configuration files described are still required. Follow the previous

discussion, "Installing TCP/IP on a BTOS Workstation Using Install Commands," for an explanation of creating the required configuration files.

- Comments may be entered into the JCL file starting with a semicolon ";", and ending with a line feed.

The general format for an entry into the SysInit.jcl file is as follows:

```
$Run[Sys]<Sys>Filename.Run,parameter1,parameter2,parameter3
```

The example that follows shows a [Sys]<Sys>SysInit.jcl file that configures BTOS TCP/IP for operation over a LAN network. Substitute your parameters for the parameter names.

```
$JOB SYSINIT
$Run[Sys]<Sys>Xbif.Run
$Run[Sys]<Sys>IMSP.Run
$Run[Sys]<Sys>DLM.Run,MaxDLLs,MaxDLL Users
$Run[Sys]<Sys>Install802/3.Run,Total Rcv Buffers
$Run[Sys]<Sys>TCP.InstallIP.Run,Processor ID
$Run[Sys]<Sys>TCP.InstallTCP.Run,Processor ID
$Run[Sys]<Sys>InstallQMGR.Run,Use cache,Max No Queues
$Run[Sys]<Sys>MailServer.Run
$Run[Sys]<Sys>TCP.SMTP.Run, Name, Password, Inlines, Outlines,
    Network Name, TCP Node Name, Log File, Log Level,
    Log Size, Suppress Convert to Sys
$Run[Sys]<Sys>TCP.FTPServer.Run, TCP Node Name
$END
```

Installing BTOS TCP/IP on an XE520

Installing BTOS TCP/IP on an XE520 Using JCL Files.

The installation sequence for the XE520 is the same as that of BTOS workstations using JCL files, except in the case of TCP/IP configured for LAN operation. The B25-EN3 LAN module must be installed on a cluster workstation connected to the XE520. Also, the Data Link Manager, the Ethernet Data Link, and XE/LAN Relay must be installed on the cluster workstation to which the B25-EN3 LAN module is connected. Finally, the XE/LAN Relay must be installed on the CP board of the XE 520.

Note: The cluster workstation on which the XE LAN Relay server and the Ethernet Data Link are installed must not be running any other system services or applications.

Also, it is recommended that for optimum performance you install all TCP/IP system services on the same CP board.

The XE520 uses the [Sys]<Sys>InitXXYY.jcl file at bootup to install the XE520 system services. The XX refers to either CP for the cluster processor or FP for the file processor of the XE520. The YY refers to number of the board (the first board installed is 00, the second 01, etc.) Edit this JCL file to include a line entry for each install command described in “Installing TCP/IP on a BTOS Workstation Using Install Commands.”

The instructions in “Installing TCP/IP on a BTOS Workstation Using JCL Files” apply to the XE520 and will not be repeated here. The only JCL entry not previously mentioned is one for the BTOS XE/LAN Relay. It is described in the following subsection, “BTOS XE/LAN Relay Installation”.

When installing the BTOS X.25 Gateway, add the following entries to the InitFPnn.jcl, InitCPnn.jcl, or InitTPnn.jcl file:

```
$RUN [Sys]<Sys>CreatePartition.Run, xx, NGI (where xx = 38kb minimum)
$RUN[Sys]<Admin>MInstallServer.Run, NGI, [Sys]<Sys>TCP.X25NGI.Run
```

BTOS XE/LAN Relay Installation

The BTOS XE/LAN Relay software must be installed after TCP in the instruction sequence in “Installing TCP/IP on a BTOS Workstation Using Install Commands.” This means you must install the BTOS XE/LAN Relay software as an extra step between steps 4 and 5. (The steps are listed in “Installation Steps” at the beginning of this section.)

If you will be using BTOS TCP/IP with the LAN option, the following line entry must be made to the [Sys]<Sys>InitXXYY.jcl file:

```
$RUN [Sys]<Sys>InstallXELANRelay.Run
```

Install the XE/LAN Relay service first in the XE520 and then on the cluster workstation which has the B25-EN3.

The configuration of the software elements for TCP/IP on an XE520 with the LAN option is shown in Figure 4-1.

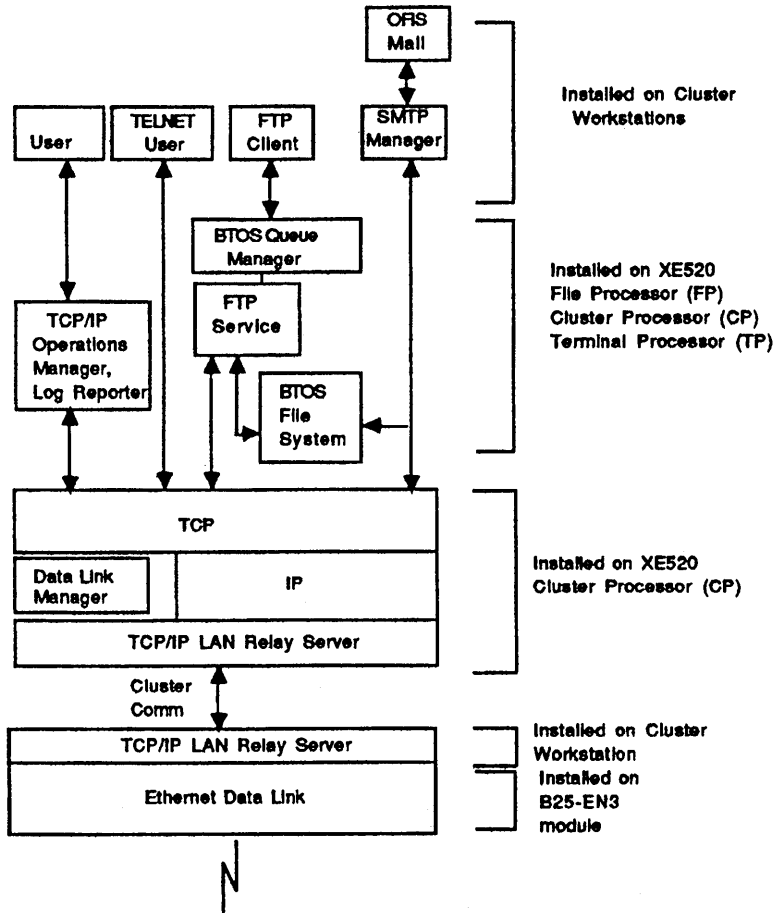


Figure 4 - 1. XE520 with LAN

A sample installation procedure follows that installs TCP/IP with a LAN on an XE520 with cluster workstations.

1. Boot XE520 using these files:

```
[Sys]<Sys>InitFP00.jcl
$ContinueOnError
$RUN[Sys] <Sys>InstallQMgr.Run
$RUN[Sys] <Sys>CreatePartition.Run,200K,MS
```

```
$RUN[Sys] <Admin>MInstallServer.Run,MS,[Sys]<Sys>MailServer.Run  
$RUN[Sys] <Sys>MfAdminAgent.Run  
$END
```

```
[Sys]<Sys>InitCP00.jcl  
$ContinueOnError  
$RUN[!Sys] <Sys>DLM.Run  
$RUN[!Sys] <Sys>TCP.InstallLANRELAY.Run  
$RUN[Sys] <Sys>Sync.Run,1  
$RUN[Sys] <Sys>TCP.InstallIP.Run  
$RUN[Sys] <Sys>TCP.InstallTCP.Run  
$RUN[Sys] <Sys>Sync.Run,2  
$END
```

Note that as in the preceding example you must install the TCP and IP system services on the same XE520 processor board.

The following example shows software being loaded on a second CP board. If there is enough memory on the FP board, you can install the following software there rather than on a second CP board.

```
[Sys]<Sys>InitCP01.jcl  
$ContinueOnError  
$RUN[Sys] <Sys>Sync.Run,2  
$RUN[Sys] <Sys>TCP.FTPServer.Run  
$RUN[Sys] <Sys>TCP.SMTP.Run  
$END
```

2. Boot the cluster workstation with the B25-EN3 module using the following JCL file.

```
$JOB  
$RUN[Sys] <Sys>Xbif.Run  
$RUN[Sys] <Sys>IMSP.Run  
$RUN[Sys] <Sys>Install802/3.Run,10  
$RUN[!Sys] <Sys>TCP.InstallLANRELAY.Run  
$RUN[!Sys] <Sys>Sync.Run,1  
$END
```

Installing BTOS TCP/IP on an XE520 Using MCDTIO Commands

To install the TCP/IP software on the XE520, you can use the Run command (through the XE520 command line interface created by the MCDTIO) from a cluster workstation. You enter the names of the appropriate Run files (listed in Section 3) along with any parameters they require, as in the following example, which deinstalls TCP on a CP board:

```
Run ([Sys]<Sys>TCP.Run,'Deinstall TCP', 'TC')
```

Deinstallation Options

Deinstallation commands are available to remove TCP/IP system services from the memory of workstations without having to reboot.

To remove TCP/IP software from the memory of the XE 520, you must reboot the XE 520.

The following commands can be used when a change in network parameters requires modifying a system service. The system service modification is performed by deinstalling and reinstalling with the new changes. These commands can also be used to permanently remove a system service to free processing resources.

Deinstallation of system services should be performed in the reverse order of installation.

Deinstalling the SMTP Manager

To deinstall the SMTP Manager if you have specified *no* to the installation parameter Suppress Convert To Sys, at the command line type *Deinstall SMTP Manager* and press the GO key. If you specified *yes*, press the ACTION-FINISH keys to end the execution of the SMTP Manager. After deinstalling the SMTP Manager, you must deinstall and reinstall the OFIS Mail Server before reinstalling the SMTP Manager.

Deinstalling XE LAN Relay Server

To deinstall the XE LAN Relay service, at the command line type *Deinstall XE LAN Server* and press the GO key.

Deinstalling TCP

To deinstall the TCP system service, at the command line type *Deinstall TCP* and press the GO key.

Deinstalling IP

To deinstall the IP system service, at the command line type *Deinstall IP* and press the GO key.

Deinstalling X.25 NGI

To deinstall the TCP/IP NGI, at the command line type *Deinstall X.25 NGI* and press the GO key.

Inability to Deinstall Ethernet Data Link

There is no deinstall utility for the Ethernet Data Link. It is not possible to deinstall a system service from a single-partition operating system such as the one that runs on the B25-EN3. You can, however, use the ImBootStrap command described in the *BTOS Intelligent Data Communication Module Systems Software (IDMSS) Operation Guide* to reload the software.

Deinstalling DLM

To deinstall the Data Link Manager, at the command line enter *Deinstall Data Link Manager* and press the GO key.

(

(

(

Section 5

Operations Manager

The Operations Manager is a menu-driven utility provided with BTOS TCP/IP that enables you to monitor and control network connections. This utility can run from any workstation in your configuration.

BTOS TCP/IP and its supporting software must be installed as described in Section 4 before you can run the Operations Manager.

Invoking the Operations Manager

To invoke the Operations Manager, at the Executive command line type *TCP/IP Operations Manager* and press the GO key. A user screen like that shown in Figure 5-1 will appear.

The Operations Manager user screen header specifies the current user name, the date and time, and the software version number of the Operations Manager software.

The menu bar at the bottom of the screen lists the available Operations Manager functions. The function keys F1 through F6 correspond to the six commands shown in Table 5-1.

(The data shown in Figure 5-1 is only an example. Your actual screen data will be different, but the format will be the same.)

User: Shaw		TCP/IP Operations Manager X.Y Wed Jul 19, 1989 5:27 PM				
ACTIVE STATUS						
Time Installed		15:44:07 5/123/1986				
Transport Service Version		2.00				
Max Max Connections		16				
Max Connections		10				
# of Active Connections		2				
Host Buffer Size		512				
Total Msgs Received		1243				
Total Msgs Transmitted		5012				
Total Out Connections		56				
Total In Connections		12				
Handle	State	Bytes Recv	Bytes Sent	Local Port	Remote Port	Remote Hostname/Address
-----	-----	-----	-----	-----	-----	-----
002:001	OPEN	09920	00300	3001	23	Phila.Com
003:002	OPEN	01005	01020	556	21	LA.Com
Abort Active Full Update LogXfer TraXfer						

Figure 5-1. Operations Manager Main Menu

Operations Manager Commands

The Operations Manager command menu and a brief command description are shown in Table 5-1. Following Table 5-1, each command is described in detail.

Table 5-1 Operations Manager Commands

Command	Description
Abort	Aborts an established TCP/IP connection.
Active Status	Shows the network status of all active TCP/IP connections.
Full Status	Provides the same TCP/IP connection information as the Active Status command and includes previously completed (closed) connection information in the screen listing
Update	Increases or decreases the maximum number of TCP/IP connections
LogXfer	Closes the current log file to further entries and opens a new log file
TraXfer	Closes the Trace file to further entries and opens a new trace file.

Commands are executed from the Operations Manager menu by pressing the function key that corresponds with each command. Only function keys F1 through F6 are valid. All other function key entries will return the error message **INVALID SELECTION**.

After selecting a menu item using the function keys, the function screen changes to the command requested. To exit from any command and return to the main menu, press the CANCEL key. To exit the Operations Manager, press the FINISH key and then the GO key.

Abort Command

The Abort command allows you to selectively abort any active TCP/IP connection by simply specifying the connection *handle*. The handle is a unique identifier assigned by the transport service for each TCP/IP connection. The handle for a specific connection can be determined from running either the Active or Full status commands.

Press F1 from the main menu to invoke the Abort command. The next screen prompts you for the handle of the connection you wish to abort. Refer to Figure 5-2 for a sample Abort screen prompt.

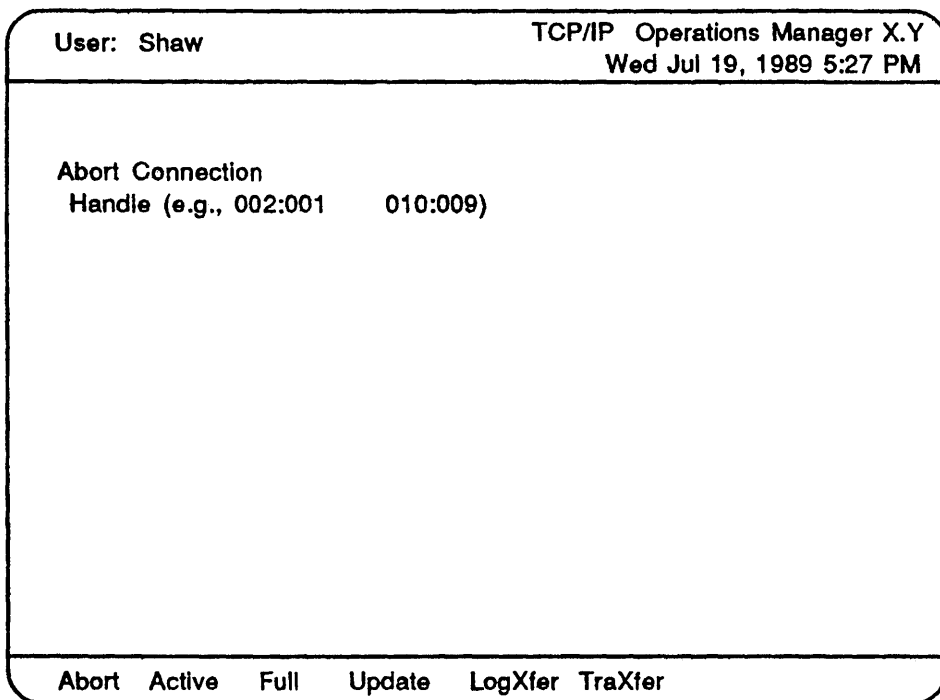


Figure 5-2. Abort Command Screen

Press the CANCEL key to return to the main menu. You can confirm that the connection has been aborted by executing a full status report and *not* seeing the connection listed.

Active Status Command

The Active command displays TCP/IP connection information on active connections. Press F2 from the menu screen to produce a prompt for you to select a range within the 16 possible TCP/IP connections. The default displays from 0 to 15. After you press the GO key, your screen will have the configuration shown in Figure 5-3.

User: Shaw		TCP/IP Operations Manager X.Y Wed Jul 19, 1989 5:27 PM				
ACTIVE STATUS						
Time Installed		15:44:07	5/123/1986			
Transport Service Version		2.00				
Max Max Connections		16				
Max Connections		10				
# of Active Connections		2				
Host Buffer Size		512				
Total Msgs Received		1243				
Total Msgs Transmitted		5012				
Total Out Connections		56				
Total In Connections		12				
Handle	State	Bytes Recv	Bytes Sent	Local Port	Remote Port	Remote Hostname/Address
-----	-----	-----	-----	-----	-----	-----
002:001	OPEN	09920	00300	3001	23	Pentaco.Inc
003:002	OPEN	01005	01020	556	21	Host.A
Abort	Active	Full	Update	LogXfer	TraXfer	

Figure 5-3. Active Status Screen

Full Status Command

The Full Status command lists TCP/IP connection information on active (open) and recently completed (closed) connections.

The amount of time a recently completed connection remains in the Full status report depends on the number of connections permitted in the current configuration and the number of new connections being opened. The Transport Service uses the connection slots in a round-robin fashion and so maintains the historical data on closed connections until new connection demands use the slots from closed connections.

Press F4 from the main menu to invoke the Full Status command. You will be prompted to select a start and stop index range within the 16 possible TCP/IP

Operations Manager

connections. The default displays from 0 to 15. After pressing the GO key, your screen will have the configuration shown in Figure 5-4.

User: Shaw		TCP/IP Operations Manager X.Y Wed Jul 19, 1989 5:27 PM				
FULL STATUS						
Time Installed		15:44:07	5/123/1986			
Transport Service Version		2.00				
Max Max Connections		16				
Max Connections		10				
# of Active Connections		2				
Host Buffer Size		512				
Total Msgs Received		1243				
Total Msgs Transmitted		5012				
Total Out Connections		56				
Total In Connections		12				
Handle	State	Bytes Recv	Bytes Sent	Local Port	Remote Port	Remote Hostname/Address
-----	-----	-----	-----	-----	-----	-----
002:001	OPEN	09920	00300	3001	23	PENTAGON
003:002	OPEN	01005	01020	556	21	Host.A
004:003	CLSD	30000	29910	21	34	Host.B
Abort	Active	Full	Update	LogXfer	TraXfer	

Figure 5 - 4. Full Status Screen

Update Command

The Update command allows you to dynamically change the maximum number of TCP/IP connections. This feature is useful for controlling the load placed on the master during different periods of activity on the network. The number of active connections permitted is a measure of the master workload. A higher number of connections requires a corresponding increase in workstation resources.

Press F4 from the main menu to invoke this command. A screen similar to that shown in Figure 5-5 will appear. This is the prompt for you to change the maximum number of connections.

User: Shaw	TCP/IP Operations Manager X.Y
	Wed Jul 19, 1989 5:27 PM
Update Max Conn	
Max Conn (up to MaxMaxConn)	32
Abort	Active
Full	Update
LogXfer	TraXfer

Figure 5 - 5. Update Screen

The Update command has a built-in protection scheme. If you happen to change the maximum number of connections to a number less than the number of currently active connections, those active connections exceeding the new limit will not be aborted. No new connections will be initiated until the total number of connections goes below the new maximum limit.

LogXfer Command

The Log Transfer command closes the current log file (`<(TCP/IP.Data)LGYearMonthDay:HourMinute`) and automatically opens a new log file. Logging is enabled in the TCP/IP configuration file (See Section 4). You must close the current log file in order to access the information it contains. You can access the closed log file with the Log Reporter utility described in Section 6.

Press F5 from the main menu, to invoke the Log Transfer command,

Press the GO key to transfer the log.

User: Shaw	TCP/IP Operations Manager X.Y Wed Jul 19, 1989 5:27 PM				
Log Transfer Press GO to transfer log.					
Abort	Active	Full	Update	LogXfer	TraXfer

Figure 5 – 6. LogXfer Screen

TraXfer Command

The Trace Transfer (TraXfer) command closes the current trace file ((TCP/IP.Data)RQYearMonthDay:HourMinute) and automatically opens a new trace file. Tracing is enabled in the TCP/IP configuration file (See Section 4). You must close the current trace file in order to access the information it contains. You can examine the contents of the trace file with the BTOS Editor. This trace is for debugging purposes.

Press F6 from the main menu to invoke the Trace Transfer command. A screen appears like that shown in Figure 5-7.

User: Shaw	TCP/IP Operations Manager X.Y Wed Jul 19, 1989 5:27 PM
<p>Trace Transfer</p> <p>Trace ON? (Y/N) Y_</p> <p>Verbose ON? (Y/N) N_</p>	
Abort Active Full Update LogXfer TraXfer	

Figure 5 – 7. TraXfer Screen

From the Trace Transfer command screen you can control the Trace and verbose features. The options and their effects are summarized in Table 5-2.

Table 5-2. Trace Transfer Options

Trace ON?	Select <i>Y</i> to start logging information to the new trace file. Select <i>N</i> to inhibit the trace function.
Verbose ON?	Selecting <i>Y</i> for this option will supply additional trace information to the file when Trace is ON. Selecting <i>N</i> for this option inhibits the additional trace information.

Section 6

Log Reporter

Overview

BTOS TCP/IP provides, within the Transport Service, a facility to record all TCP connection opens and closes to a special log file. To access the information in this log file, you invoke the Log Reporter utility. The Log Reporter processes this special log file into a formatted report file that you can access directly for viewing, printing, or filing.

The formatted report gives you an overview of the network communication activity during the period of time you specify. The user and remote host connection information contained in the report can be used for security purposes.

The TCP/IP configuration file, described in Section 4, provides a Log parameter that you define as *ON* to enable this logging feature. To use the Log Reporter utility, the Log parameter must be set to *ON* in the TCP/IP configuration file. If it is set to *OFF*, logging is disabled and the Log Reporter utility will not transport log file data to process.

Invoking the Log Reporter Program

To invoke the Log Reporter to generate a log report, at the Executive command line type *TCP/IP Log Reporter* and press the RETURN key. The following form appears:

```
TCP/IP LogReporter
Input Name
[Output Name (def LogPrtyymmdd:hhmm)]
[Start Time (e.g., 12:00)]
[Stop Time (e.g., 23:59)]
```

Log Reporter

Parameter	Description
Input Name	The input name specifies the transport log file that will be processed to generate the log report.

The input name requires the same format as the transport log file naming convention, which is as follows:

LGyymmdd:hhmm

Where:

LG	Specifies that the file is a transport log file.
yymmdd	Specifies the date that the BTOS TCP/IP log file was recorded. <i>yy</i> refers to the last two digits of the year. <i>mm</i> is the month (January = 01 through December = 12). <i>dd</i> is the day of the month.
:hhmm	Specifies (using the Military Time convention) the time during the day specified that the first log entry was made, where <i>hh</i> is the hours from 01 to 24 and <i>mm</i> is the minute from 0 to 59.

The next TCP/IP Log Reporter parameter following the Input name is as follows:

[Output Name]	Specifies the name of the log report file to be generated in the current directory (default) or the specified directory. Any valid BTOS file name or BTOS device is acceptable.
---------------	---

The default file name is LogPrtyymmdd:hhmm, where *yymmdd* is the year, month, and day that you invoked this command. The *:hhmm* stands for the current time in the military format, where *hh* is the hours (00 to 24) and *mm* is minutes (0 to 59).

Specify [vid] for this parameter to print the file to the screen.

[Start Time] Specifies the starting (time) reference point for the log report. The format for this parameter is *hh:mm*, where *hh* is the hours in military format (00 to 24), and *mm* is the minutes (0 to 59).

The default (no time specified in the form) is the start time of the transport log. This time is the *hh:mm* suffix of the Input Name parameter.

The restrictions on this parameter are that it must be a valid time in the range from 00:00 through 24:00.

[Stop Time] Specifies the ending (time) reference point for the log report. Any valid time in the range from 00:00 through 24:00 is acceptable.

After completing the form, press the GO key. This creates and writes the log report to the file specified in the Output Name parameter.

Sample Log

Suppose, for example, you had an existing Transport Service log file [Sys]<TCP/IP.Data>LG890120:1345. In order to extract the information from this file you would process this file using the Log Reporter utility.

For this example you might invoke the Log Reporter and fill out the input command as follows:

```
TCP/IP LogReporter
Input Name [Sys]<TCP/IP.Dat>LG890120:1345
[Output Name (def LogPrtyymmdd:hhmm)] [Sys]<TCP/IP.Dat>Rep.File
[Start Time (e.g., 12:00)]
[Stop Time (e.g., 23:59)] 15:30
```

Log Reporter

You would then press GO to create the log report. The following shows what [Sys](TCP/IP.Data)Rep.File might contain.

Date	Time	cHandle	Stat	Term	User	BytexTx	BytesRx	LPort	RPort	Remote Host
890407	15:46	002:001	Opng	0	525			1	0	
890407	15:47	002:001	Clsd	400045	525	0	0	1	0	
890407	18:05	003:002	Opng	400045	525			1	0	
890407	15:05	004:003	Opng	400045	525			0	1	026.000.000.000
890407	15:05	004:003	Clsd	400106	525	0	0	0	1	026.000.000.000
890407	15:06	003:003	Clsd	400045	525	0	0	0	1	026.000.000.000

Table 6-1. Log Report Abbreviations

Heading Acronym	Representing
cHandle	Connection handle
Stat	Connection state
Opng	Opening
Clsd	Closing
Term	Termination code
User	User identification number
BytesTx	Bytes transmitted
BytesRx	Bytes received
LPort	Local port number
RPort	Remote port number
RemoteHost	Remote host address

Section 7

TCP/IP Architecture and Protocol

Most TCP/IP functions are transparent to the end user of applications such as FTP, TELNET, and SMTP, but understanding the protocols underlying an application gives you a better understanding of how the applications themselves work. This section gives a general description of what TCP/IP is and how it works. You can find detailed explanations in the military specifications for TCP/IP listed in the bibliography.

Historical Perspective

The need for computers made by different manufacturers to share resources in a common network has been a driving force in establishing communication standards. When computer equipment manufacturers follow a common communication standard, computers from different vendors can all share information in the network as long as they use the *protocol* of the network. This protocol, outlined in a particular standard, defines the sequence of events and required operations for exchanging information across the network.

Transmission Control Protocol and Internet Protocol (TCP/IP) is a suite of protocols that are used on many military and commercial networks. TCP/IP evolved from research work on the Advanced Research Project Agency Network (ARPANET). Although the Department of Defense (DoD) networks require TCP/IP, many commercial and private networks have also adopted the TCP/IP protocol standard. TCP/IP is also available on many hardware platforms.

Part of the success of TCP/IP is due to the reliability of the communication provided and the tolerance TCP/IP has for operating environments in which different types of data loss and network congestion can occur.

Overview of the TCP/IP Architecture

The architecture of TCP/IP is made up of layers — pieces of software distinguished by functions. Each layer has a specific role in exchanging information in the network and interacts only with the layers directly above and below it. This layered design approach of TCP/IP allows different software

products or applications selective access to those functional layers required to execute the designed task. It also permits vendors to develop products to work at different levels within TCP/IP.

TCP/IP Functional Layers

The four functional layers in the architecture of TCP/IP are described in Table 7-1.

Table 7-1. TCP/IP Functional Layers

	Layer	Function
Highest Level	Upper Layer Protocol (ULP)	This layer contains applications such as FTP, TELNET, and SMTP. This layer uses the next lower layer to access the network.
-	Transmission Control (TCP)	This layer contains the Transmission Control Protocol. This layer converts data streams from more than one application at a time into datagrams for the next lowest (IP) level. Conversely, this layer reassembles datagrams received from the lower layer into data streams for appropriate ULP application.
-	Internet Protocol (IP)	This layer sends and receives datagrams from the network. This layer is concerned only with routing and delivery of each individual datagram. This layer does not see individual datagrams as related.
Lowest Level	Subnetwork Protocol	This is the network medium that physically transmits or receives the data. For BTOS TCP/IP this data link layer is either LAN or X.25.

Information Flow

Information that is sent from one network location to another passes down through each functional layer to the physical network, and then back through in the reverse order, the functional layers at the other location. See Figure 7-1. (Keep in mind that the actual path the information takes may be slightly different. There may be intermediate steps, such as passing through gateways between networks, before the information reaches its final destination.)

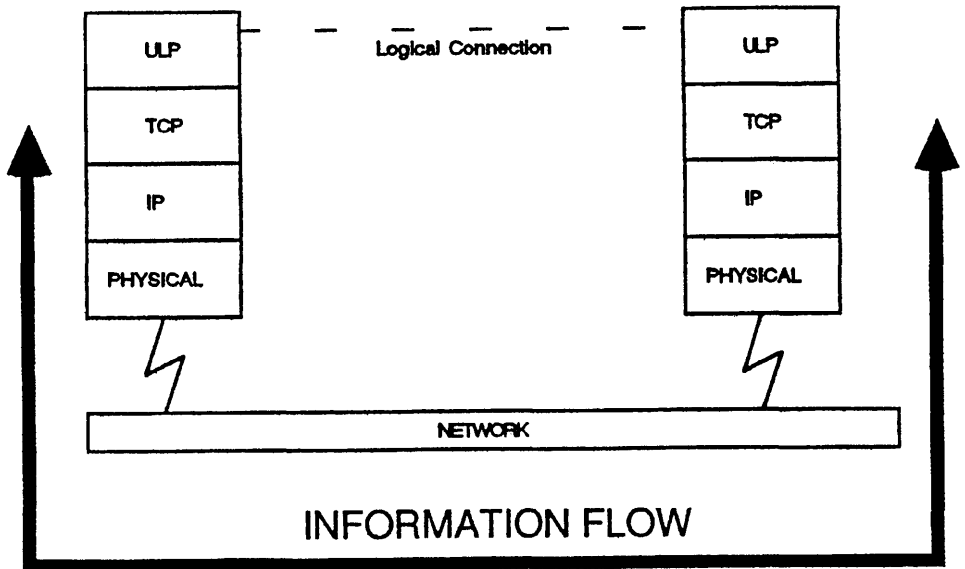


Figure 7 – 1. TCP/IP Information Flow

TCP Protocol Layer

The TCP protocol layer takes data streams from the Upper Layer Protocols, such as FTP, TELNET, and SMTP, and converts these streams into smaller packages of information called datagrams for delivery to the IP layer. Conversely, TCP accepts datagrams from the IP layer, reassembles the data stream in the correct sequence, and delivers the information to the ULP layer.

IP Protocol Layer

The IP layer takes datagrams from the TCP layer and delivers them to the network sublayer. The IP layer also takes datagrams from the network sublayer and delivers them to the TCP layer. Routing and delivery of the datagram are the responsibility of the IP layer. The IP layer is not responsible for ensuring datagrams are delivered, or for any error checking.

The amount of data that a datagram can contain is limited by how much information each TCP layer within the network can handle. Two TCPs exchanging data mutually agree on a datagram size. The units of information in

a datagram are eight bit units called *octets*. The subnetwork may even group octets into packets, as in X.25, and send these into the network.

The Connection Concept

The concept of *connections* is used to further differentiate the TCP and IP layer responsibility. A *connection* is a logical link between two network entities (application programs running on computers) to exchange information.

The TCP layer is referred to as *connection oriented* because it establishes connections, transfers the data, and closes the connections. Within an established connection, the TCP layer verifies the accuracy of delivered information (error checking and recovery from lost data) and acknowledges the receipt of information to the partner TCP layer. The TCP layer also synchronizes the information exchange and maintains the connection as long as it is needed by the applications it supports.

The IP layer is referred to as *connectionless*, because the datagrams it sends or receives contain sufficient network address information for routing and delivery, independent of a specific connection path. The IP layer maintains no specific connections, and it does not verify delivery or acknowledge the receipt of datagrams. The IP layer assumes that the TCP layer will be monitoring the accuracy of the information exchange.

A ULP may request the TCP to establish a *passive* or *active* connection. A *passive* connection request from a ULP instructs the TCP layer to be receptive to connections with other remote ULPs. An *active* connection request tells the TCP to synchronize communications with the specified remote ULP, to permit the exchange of information. Typically an active open is targeted to a passive open.

The passive/active role evolved from earlier versions of communications in which the passive role was taken on by a host computer providing services applications to active remote terminal sites. For most ULP-to-ULP communications the roles are only meaningful in establishing the connection. Once a connection is established and the ULPs are synchronized the role is no longer as important.

Connections that are active, or potentially active, are said to be *open*. Connections that are not active, or potentially active, are said to be *closed*.

Suppose that ULP A wants to establish a TCP/IP connection to send data to ULP B at a remote site in the network. Typically, ULP A would be in the active-open mode and ULP B would be in the passive-open mode.

Since information streams are represented by separate datagrams, TCP/IP provides an encoding method (within each datagram) that the TCP layer uses to reassemble the data stream from its component datagrams.

Connection Example

Suppose two ULPs are going to establish a connection to exchange data. Also suppose the remote ULP has issued a passive open to its TCP layer and is waiting for requests from other ULPs.

This scenario is shown in Figure 7-2. To simplify this example, the lower layer protocol interaction is not shown.

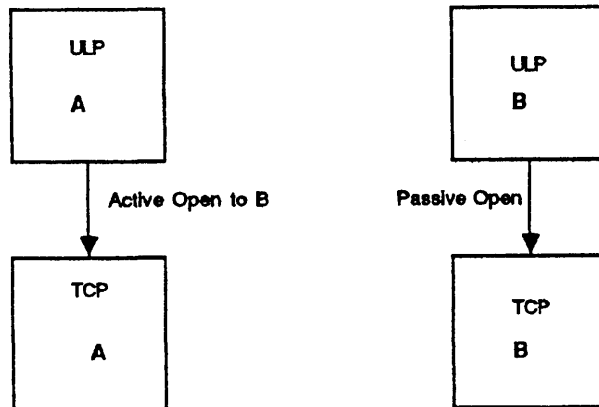


Figure 7 - 2. Before Connection

In order for the TCP to reassemble datagrams into data streams, there must be a way of keeping track of the intended order of the datagrams that are sent. This information is contained in the sequence number embedded in the datagram. The number provides a reference method for the TCP layer to label datagrams for delivery, and to order received datagrams for reassembly.

Within a connection, each TCP keeps track of its own sequence number and that of its partner. But in order to start this scenario, both TCPs must let the other know where to start the sequence count.

The synchronization of the two TCP layers in a connection is established by using a technique called a three-way handshake.

Three-Way Handshake

If a local ULP wants to send data to a remote ULP, the ULP issues an active open request specifying that it wants to connect with the remote ULP. The three-way handshake protocol mechanism initializes the sequence count for each TCP serving the ULPs.

As a result of the local ULP open request, a datagram is sent from the local TCP to the remote TCP with a synchronization request flag set and a starting sequence number. The starting sequence number value can be chosen arbitrarily; for this example it is 100. This scenario is shown in Figure 7-3.

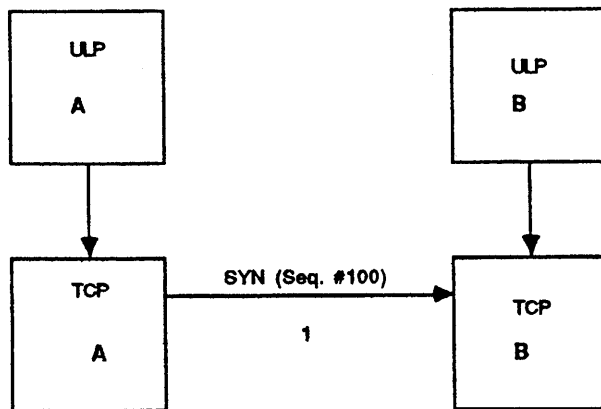


Figure 7 – 3. First Datagram, Sync Request

The remote TCP responds to the datagram by returning its own datagram containing its own sync number. The sync number for the remote ULP in this case is 300. This is shown in Figure 7-4.

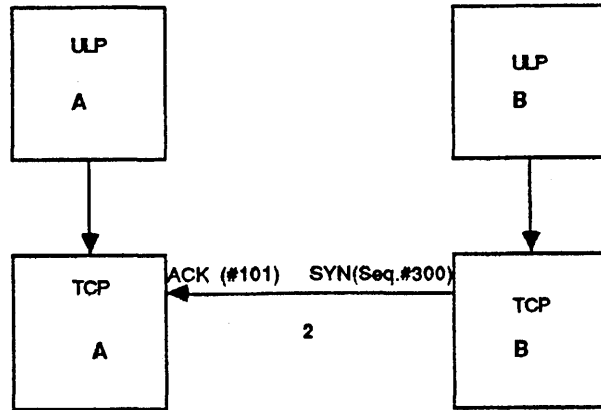


Figure 7 – 4. Second Datagram, Acknowledge

The datagram also contains the sync count that was received *increased by one*. In this way the local ULP can determine if the previous message was received by the remote ULP.

To confirm to the remote TCP that its datagram was properly received, the local ULP responds with a datagram and the 300 sync number increased by one to 301. This makes the third exchange and completes the three-way handshake shown in Figure 7-5.

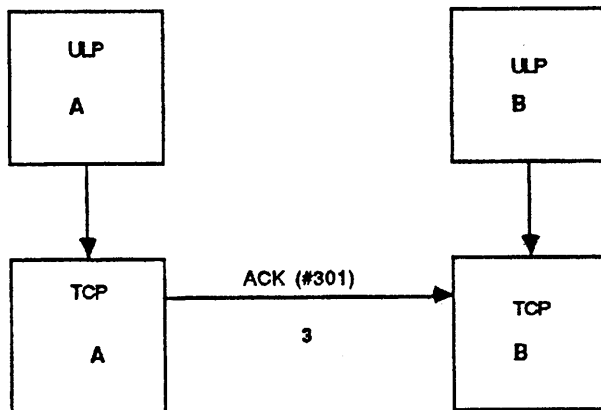


Figure 7-5. Third Datagram, Completed Three - Way Handshake

Error Correction

It is the responsibility of the TCP layer to recover from lost datagrams or datagrams that are damaged in transit by the underlying medium.

Lost segments are accounted for by a mechanism used by TCP called positive acknowledgment with retransmission (PAR). This PAR mechanism repeatedly sends data until the receiving side acknowledges that the datagram has been received intact. There is a designed delay in retransmission to keep the system from being overloaded from superfluous messages.

Each datagram contains a checksum that is used by the TCP layer to confirm that the datagram was not corrupted in transit. If the datagram is corrupted, it is discarded, and the receiving TCP layer will not return an acknowledgment that the datagram was received. No acknowledgment will automatically force the datagram to be resent by the PAR mechanism.

Appendix A

BTOS Status Codes and FTP Protocol Codes

This section lists the BTOS status codes returned by the BTOS TCP/IP software. It lists also the TCP/IP protocol-defined status codes returned during the operation of FTP and the status codes written to the SMTP Manager log file.

Data Link Manager BTOS Status Codes

- | | |
|-------|--|
| 53306 | The DLM has been installed. |
| 53307 | Service is already installed. An attempt was made to install the DLM on a workstation where it was already installed. |
| 53308 | A parameter is invalid. A specified parameter for the DLM installation is invalid (does not have a numeric value as required). Retry with a correct value. |
| 53309 | Invalid Max DLLs value. The value must be in the range 1 to 10. Retry with a correct value. |
| 53310 | Invalid Max DLL Users value. The value must be in the range 1 to 15. Retry with a correct value. |
| 53311 | DLM partition exists. An attempt was made to install the DLM on a system where the partition in which the DLM will execute already exists. Remove the DLM partition and retry. |
| 53312 | Program failed an internal check. Contact your Unisys field representative. |

BTOS Status Codes and FTP Protocol Codes

- 53313 An attempt was made by an application to register with the DLM when the DLM could accept no more DLL Users.
- 53314 Internal error. An application tried to deinstall the DLM with DLLs or DLL Users still registered.
- 53315 Program failed an internal check. Contact your Unisys field representative.
- 53316 Internal error. An application tried to register with the DLM using a name already in use (registered).
- 53317 Program failed an internal check. Contact your Unisys field representative.
- 53318 Program failed an internal check. Contact your Unisys field representative.
- 53319 Program failed an internal check. Contact your Unisys field representative.
- 53320 Program failed an internal check. Contact your Unisys field representative.
- 53321 An attempt was made to deinstall the DLM from a different workstation than the one on which it was installed, or the deinstallation was executed under the Context Manager.
- 53322 An attempt was made use the deinstallation utility on a workstation with a single partition operating system.

TCP and IP BTOS Status Codes

Decimal Value	Meaning
58950	Unable to deinstall in single partition operating system
58951	Program failed an internal check. Contact your Unisys field representative.
58952	Program failed an internal check. Contact your Unisys field representative.
58953	Program failed an internal check. Contact your Unisys field representative.
58954	Program failed an internal check. Contact your Unisys field representative.
58956	Send buffer too large.
58957	Receive message truncated.
58958	No resources for request.
58959	No connection available
58960	No such host name.
58961	No such host address.
58962	Invalid socket for open.
58963	Connection refused by remote host.
58964	No such connection handle.
58965	Program failed an internal check. Contact your Unisys field representative.

BTOS Status Codes and FTP Protocol Codes

Decimal Value	Meaning
58966	Status message that a connection is closed.
58967	Program failed an internal check. Contact your Unisys field representative.
58968	Program failed an internal check. Contact your Unisys field representative.
58969	Program failed an internal check. Contact your Unisys field representative.
58970	Connection aborted by remote host.
58971	Program failed an internal check. Contact your Unisys field representative.
58972	Program failed an internal check. Contact your Unisys field representative.
58973	Bad Security range.
58974	Program failed an internal check. Contact your Unisys field representative.
58975	Security request not allowed.
58976	Connection already exists.

TELNET BTOS Status Codes

Decimal Value	Meaning
59060	Transport Service is not running.
59061	SAM TELNET configuration file not available.
59062	Help file not available.
59063	Received message of invalid size.
59064	System configuration file not available.
59065	Options already in effect.
59066	Received invalid TELNET command.
59067	Received invalid option negotiation.
59068	Subnegotiation too long.
59069	Subnegotiation too short.
59070	Invalid Subnegotiation.
59071	No connection.
59072	Open failure.
59073	Close failure.
59074	Abort failure.

File Transfer Protocol Network Status Codes

The following Military Standard status codes are generated by the network during FTP operation.

BTOS Status Codes and FTP Protocol Codes

Decimal Value	Meaning
110	Restart marker reply. In this case the text is exact and is not left to the particular implementation. It must be sent as follows: MARK yyyy = mmmm Where <i>yyyy</i> is the User-process data stream marker and <i>mmmm</i> is the Server's equivalent marker. Note the spaces between the markers and the equal sign.
119	Terminal is not available. Will try mailbox.
120	Service ready in nnn minutes.
125	Data connection already open. Transfer starting.
150	File status okay. About to open data connection.
151	User not local. Will forward to <user>@<host> .
152	User unknown. Mail will be forwarded by the operator.
200	Command okay.
202	Command not implemented—superfluous at this site.
211	System status or system help reply.
212	Directory status.
213	File status.
214	Help message on how to use the server or the meaning of a particular non-standard command. This reply is useful only to the human user.
215	<scheme> is the preferred scheme.
220	Service ready for new user.

BTOS Status Codes and FTP Protocol Codes

Decimal Value	Meaning
221	Service closing TELNET connection. Logged out if appropriate.
225	Data connection open and there is no transfer in progress.
226	Closing data connection. Requested file action successful.
227	Entering passive mode. h1, h2, h3, h4, p1, p2
230	User logged in—proceed.
250	Requested file action completed successfully.
331	User name okay—need password.
332	Need account for login.
350	Requested file action pending further information.
354	Start mail input—end with <CR><LF>,<CR><LF>
421	Service not available—closing TELNET connection. This may be a reply to any command if the service knows it must shut down.
425	Cannot open data connection.
426	Connection closed—transfer aborted.
450	File busy.
451	Local error in processing.
452	Insufficient storage space on system.
500	Syntax error—command unrecognized.
501	Syntax error in parameters or arguments.

BTOS Status Codes and FTP Protocol Codes

Decimal Value	Meaning
502	Command not implemented.
503	Bad sequence of commands.
504	Command not implemented for that parameter.
530	Not logged in.
532	Need account for storing files.
550	File not found or access denied.
551	Page type unknown.
552	Exceeded storage allocation for current directory dataset.
553	File name not allowed.

SMTP Manager Log File Status Codes

The following status codes are written to the log file specified during the installation of the SMTP Manager (see Section 4), and also to the screen if the installation parameter “Convert-to-Sys” is answered *yes*, that is, if the conversion of the SMTP Manager to a system service is suppressed.

Decimal Value	Meaning
01	Invalid number for size of log file.
02	Invalid number for level of logging.
03	Unable to open log file. Check that there is sufficient disk space.
04	Too many outbound lines (max 64).

BTOS Status Codes and FTP Protocol Codes

Decimal Value	Meaning
05	Too many inbound lines (max 1).
06	Too many lines (max 64).
08	Invalid parameters.
11	No lines specified (minimum 1)
12	Not able to Allocate memory. Check that there is sufficient RAM space.
13	Request Error. A BTOS status code will be reported. See the <i>BTOS II System Status Code Reference Manual</i> .
17	Manager name reported.
18	Password reported.
19	Defense Data Network input reported.
21	Log name, size in kilobytes, log level (hexadecimal) reported.
22	Initialization complete.
23	Number of inbound lines and outbound lines reported.
24	Request (rqcode) reported.
27	TCP/IP read failed. Line number and error reported. Possible SMTP protocol conflict with remote host; check the network and remote SMTP manager is compatible and working correctly.
28	TCP/IP read. Line, state, data reported.

BTOS Status Codes and FTP Protocol Codes

Decimal Value	Meaning
29	TCP/IP read failed. Line number, state, and error reported. Possible SMTP protocol conflict with remote host; check the network and remote SMTP manager is compatible and working correctly.
30	TCP/IP read failed: Line number, state, and error reported. Possible SMTP protocol conflict with remote host; check the network and remote SMTP manager is compatible and working correctly.
31	TCP/IP read failed: Line number, state, and error reported. Possible SMTP protocol conflict with remote host; check the network and remote SMTP manager is compatible and working correctly.
32	TCP/IP read failed: the line number and state state reported is not valid for read. Possible SMTP protocol conflict with remote host; check the network and remote SMTP manager is compatible and working correctly.
33	TCP/IP reply: bad reply format. Line and state reported. Possible SMTP protocol conflict with remote host; check the network and remote SMTP manager is compatible and working correctly.
34	TCP/IP reply: bad character after reply. Line and state reported. Possible SMTP protocol conflict with remote host; check the network and remote SMTP manager is compatible and working correctly.
35	TCP/IP reply: continuation not supported. Line and state reported. Possible SMTP protocol conflict with remote host; check the network and remote SMTP manager is compatible and working correctly.

Decimal Value	Meaning
36	TCP/IP reply: does not have 3 digits. Line and state reported. Possible SMTP protocol conflict with remote host; check the network and remote SMTP manager is compatible and working correctly.
38	TCP/IP Write failed. Line and state reported. Possible SMTP protocol conflict with remote host; check the network and remote SMTP manager is compatible and working correctly.
40	Message facility virtual memory error reported in hexadecimal.
43	Number of times log file wrapped reported.
45	Badly formatted SMTP command. Possible SMTP protocol conflict with remote host; check the network and remote SMTP manager is compatible and working correctly.
46	Recipient name, center, and host reported.
47	SMTP relay not supported.
50	No free control block for line number reported.
53	Not able to install as System Service under Context Manager.
54	TCP/IP Mail Manager installed.
55	TCP/IP Mail Manager failed to install. Error code reported.
56	SMTP Manager unexpectedly received a BTOS status code. Status code reported. See the <i>BTOS II System Status Code Reference Manual</i> .
57	Not able to read system configuration. Check your TCP/IP configuration file.
58	Not able to install on single partition OS.

BTOS Status Codes and FTP Protocol Codes

Decimal Value	Meaning
59	Installation successful.
60	Open failed. Check your configuration file, and make certain that you have adequate disk and RAM space.
61	Read failed. Check your configuration file, and make certain that you have adequate disk and RAM space.
62	Write failed. Check your configuration file, and make certain that you have adequate disk and RAM space.
65	Scan fail reading date or word element in SMTP message. Possible SMTP protocol conflict with remote host; check the network and remote SMTP manager is compatible and working correctly.
66	Expected encoded key word from remote BTOS SMTP. Possible SMTP protocol conflict with remote host; check the network and remote SMTP manager is compatible and working correctly.
67	Too Many 'To' elements for available storage. Check your configuration file, and make certain that you have adequate disk and RAM space.
68	No 'To' element found in mail message body. Check your configuration file, and make certain that you have adequate disk and RAM space.

Bibliography

- BTOS B-NET II Administration and Operations Guide* (relative to release 1.0 or higher)
- BTOS Context Manager II Installation and Configuration Guide* (relative to release 3.0 or higher)
- BTOS Hardware Installation Guide*
- BTOS Hardware Network Planning and Installation Guide*
- BTOS Indexed Sequential Access Method (ISAM) Operations Reference Manual* (relative to release 8.0 or higher)
- BTOS Intelligent Data Communications Module Systems Software (IDMSS) Operations Guide* (relative to release 3.0 or higher)
- BTOS OFIS Writer Operations Guide*, 2 vols. (relative to release 1.0 or higher)
- BTOS OFIS Mail Administration Guide* (relative to release 1.2 or higher)
- BTOS OFIS Mail Operations Guide* (relative to release 1.2 or higher)
- BTOS TCP/IP FTP and TELNET Operations and Programming Guide* (relative to release 1.0 or higher)
- BTOS X.25 Gateway Operations and Programming Guide* (relative to release 9.0 or higher)
- BTOS II Editor Operations Guide* (relative to release 1.0)
- BTOS II Standard Software Operations Guide* (relative to release 1.0 or higher)
- BTOS II System Reference Manual*, 2 vols. (relative to release 1.0 or higher)
- BTOS II System Procedural Interface Reference Manual*, 2 vols. (relative to release 1.0 or higher)
- BTOS II Language Development Linker and Librarian Programming Guide* (relative to release 1.0)

Bibliography

BTOS Pascal Compiler Programming Reference Manual (relative to release 6.0 or higher)

BTOS C Compiler Programming Reference Manual (relative to release 1.1 or higher)

BTOS II System Status Codes Reference (relative to release 1.0 or higher)

XE500 BTOS Administration Guide (relative to release 7.1 or higher)

XE500 Installation and Implementation Guide (relative to release 7.1 or higher)

XE500 BTOS Operations Guide (relative to release 7.1 or higher)

The Military - Standard documents are available from the Naval Publications and Forms Center, 5801 Tabor Ave., Philadelphia, PA 19120-5099.

The RFC documents are available from DDN Information Center, SRI International - EJ291, 333 Ravenswood Dr., Menlo Park, CA 94025.

File Transfer Protocol. MIL-STD 1780, September 1983.

Internet Protocol. MIL-STD 1777, August 1983.

Simple Mail Transfer Protocol. MIL-STD 1781, August 1983.

TELNET Protocol. MIL-STD 1782, August 1983.

Transmission Control Protocol. MIL-STD 1778, August 1983.

Internet Protocol RFC (Request for Comment) 791

Internet Control Message (ICMP) RFC 792.

Address Resolution Protocol (ARP) RFC 826.

Transmission Control Protocol RFC 793.

Simple Mail Transfer Protocol RFC 821.

File Transfer Protocol RFC 959.

TELNET Protocol RFC 854.

Glossary

A

Advanced Research Project Agency Network (ARPANET)

A Department of Defense Agency that did the early research work on TCP/IP.

ARPANET

See Advanced Research Project Agency Network.

B

BOTL

See BTOS OSI Transport LAN.

BTOS OSI Transport LAN (BOTL)

A Unisys software product that enables peer-to-peer communication among Unisys workstations over a LAN.

C

connectionless

A description of a communications protocol involving message delivery that provides destination information (address information) but does not specify a required route, only an end point. This protocol assumes that some higher level protocol will be handling the connection responsibility. IP is an example of a connectionless protocol.

connection-oriented

A description of a communications protocol that is responsible for establishing, maintaining, verifying the integrity, and closing logical connections used to exchange information. TCP is an example of a connection-oriented protocol.

D

Datagram

The fundamental message unit exchanged at the IP protocol level.

Glossary

Data Link Manager (DLM)

A Unisys software product that provides the interface between data link users (applications) and data links.

DDN

See Defense Data Network.

Defense Data Network (DDN)

A collection of military networks used in the Department Of Defense.

DLM

See Data Link Manager.

E

EDL

See Ethernet Data Link.

Ethernet Data Link (EDL)

A data link layer protocol used with BTOS TCP/IP for accessing 802.3 networks.

F

File Transfer Protocol

A TCP/IP upper layer protocol that provides the ability to exchange files across the TCP/IP network.

FTP

See File Transfer Protocol.

I

IDS

See Intelligent data communications slice.

Intelligent data communications slice (IDS)

A Unisys hardware module that provides network interfaces and allows off-loading of communications responsibilities from the host system CPU.

IDMSS

See Intelligent Data Communications Module System Software.

Intelligent Data Communications Module System Software (IDMSS)

A Unisys software package that makes a BTOS intelligent hardware module

(such as a B25-IDS or B25-EN3) a functional part of a system. It is the dedicated operating system of the intelligent hardware modules.

IMSP

See Intelligent Module Support Program.

Intelligent Module Support Program (IMSP)

A system service included with IDMSS that initializes the intelligent modules and installs their operating systems and support files.

Internet Protocol (IP)

A protocol that supports the TCP protocol by sending and receiving network datagrams.

IP

See Internet Protocol.

L

LAN

See Local Area Network.

LAN Module

An intelligent Unisys hardware module (B25-EN3) that provides the interface to Ethernet networks.

Local Area Network (LAN)

A data communications network of multiple nodes using peer-to-peer protocol over moderate distances.

N

Network Gateway Interface (NGI)

A Unisys software product that interfaces the IP layer and the X.25 Data Link Layer.

NGI

See Network Gateway Interface.

Q

Queue Manager

A Unisys BTOS operating system service that manages disk queues. It is used by FTP.

S

Simple Mail Transfer Protocol (SMTP)

A ULP of TCP/IP that provides the ability to send or receive mail messages in the network. The BTOS TCP/IP implementation of this protocol uses a SMTP Manager that interfaces OFIS Mail and TCP/IP. *See* SMTP Manager.

Simple Mail Transfer Protocol Manager (SMTP Manager)

A translation interface that converts from the BTOS OFISmail format and the TCP/IP SMTP mail format. The mail gateway enables OFISmail users access to the TCP/IP network within the familiar BTOS OFISmail format. *See* SMTP Manager.

SMTP Manager

See Simple Mail Transfer Protocol Manager.

System Service

A system service is an operating system process that services and responds to requests from client processes. In BTOS TCP/IP, all the executable software with the exception of the FTP Client and TELNET are system services.

T

TCP

See Transmission Control Protocol.

TCP/IP

Transmission Control Protocol/ Internet Protocol.

Telecommunications Network (TELNET)

A ULP of TCP/IP that provides a standard method of interfacing terminal devices and terminal oriented processes.

TELNET

See Telecommunications Network.

Transmission Control Protocol (TCP)

A network protocol responsible for connection establishment, maintenance, data verification, and relinquishment.

U

ULP

See Upper layer protocol.

Upper Layer Protocol (ULP)

In the TCP/IP suite of protocols, upper layer protocols are applications that use the services of TCP/IP. Examples of upper layer protocols are FTP, SMTP, and TELNET.

X

XBif

An operational element of the BTOS operating system that synchronizes the processing of the intelligent modules on your system: main CPU, IDS, and LAN.

Index

A

Address Resolution Protocol (ARP),
1-2

B

BOTL, 1-2, 2-2, 4-13
B-Net II, 2-2, 4-21, 4-26, 4-27
BTOS, 2-1

C

commands, 3-6
configuration, 2-4
Configuration Manager, 4-10
Context Manager, 2-2, 2-8

D

Data Link Manager (DLM), 1-1, 4-11
Data Link Manager Monitor, 4-12
Defense Data Network (DDN), 1-1
deinstallation, 4-32— 4-33
Directory, 3-6

E

error codes, A-1 — A-12
Ethernet Data Link, 1-1, 4-13

F

File Transfer Protocol (FTP), 1-1,
4-26
files, 2-2, 3-3

H

hosts, 4-3

I

Indexed Sequential Access Method
(ISAM), 2-2, 4-26
installation
 Software Installation, 3-1 — 3-2
 installation (running) the software),
 4-1 — 4-33
Internet Control Message Protocol
(ICMP), 1-2
Intelligent Data Communication Slice
(IDS) module, 2-1
Intelligent Data Communication
Module System Software
(IDMSS), 2-1, 4-1
Internet Protocol (IP), 1-1, 7-1 — 7-10

J

Job Control Language (JCL) files,
4-27—4-30

L

Local Area Network (LAN)
(Ethernet), 1-1, 2-2, 4-1, 4-13
Log Reporter, 1-2, 4-6, 5-8, 6-1 — 6-4

M

memory requirements (See *system requirements*)
MCDTIO commands, 4-32

O

OFIS Mail, 1-1, 2-2, 4-19, 4-24
Operations Manager, 1-2, 4-3,
5-1 — 5-10

P

Pascal, 1-2, 2-2

Q

Queue Index, 3-5
Queue Manager, 2-9, 4-4

R

Release Information File (RIF), 1-4,
3-1

S

Simple Mail Transfer Protocol
(SMTP), 1-1
SMTP Manager, 4-19
Software Installation
on BTOS workstations, 3-1
on XE520 systems, 3-2
system requirements
hardware, 2-1
software, 2-1

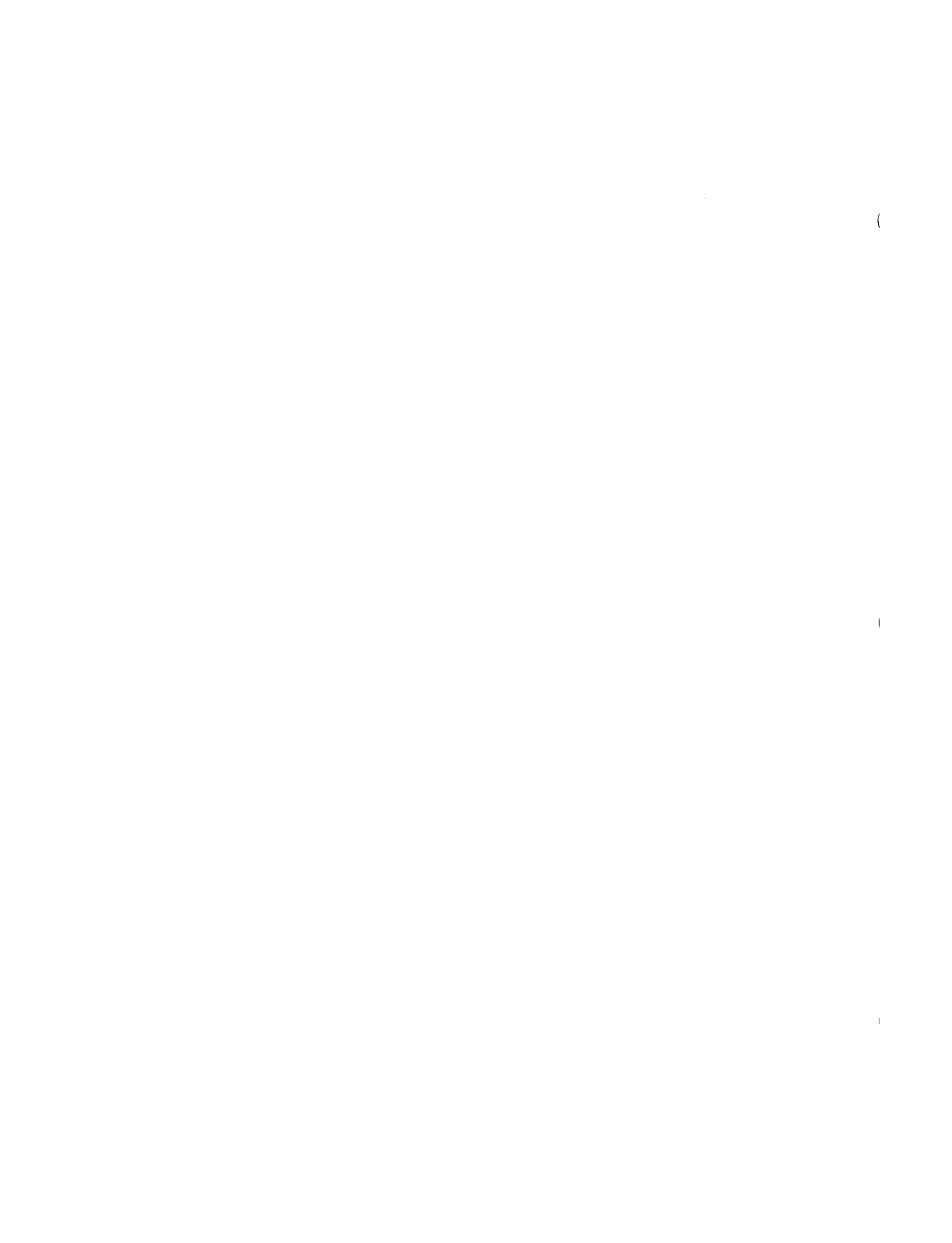
T

Trace, 4-6
Transmission Control Protocol (TCP),
1-1, 7-1 — 7-10
TELNET, 1-1, 4-26

X

X.25, 1-2, 2-2, 4-1
X.25 Network Gateway Interface
(NGI), 4-14, 4-33
xbif, 4-1
XE 520, 2-2, 3-2, 4-28 — 4-32
XE/LAN Relay, 1-2, 4-1, 4-29 — 4-31

NOTES



NOTES

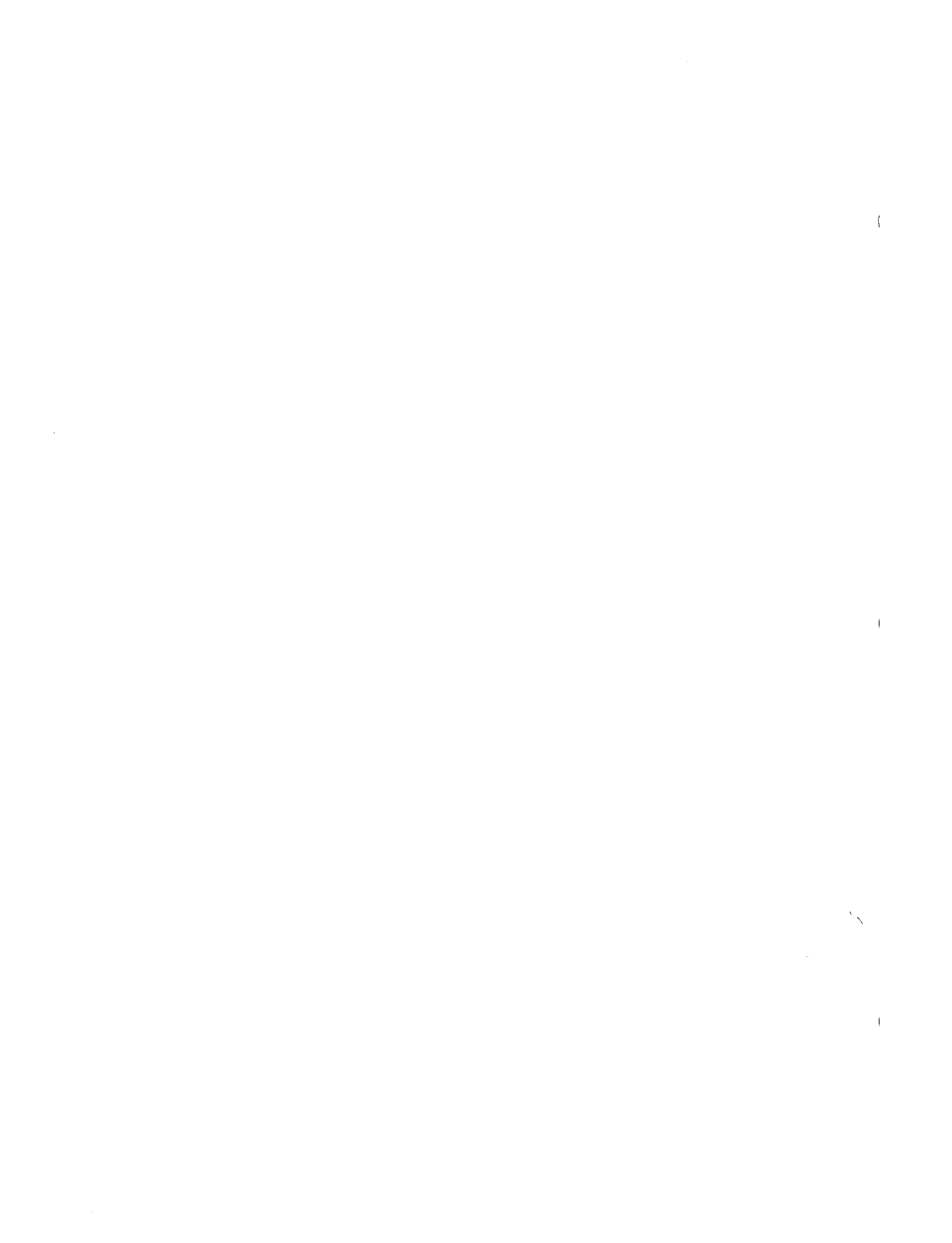
NOTES

{

{

{

NOTES



NOTES

(

(

(

NOTES

