IBM APPC Networking Services for Windows SC31-8125-01

Administrator's Guide

Version 1.0

IBM

IBM APPC Networking Services for Windows

SC31-8125-01

Administrator's Guide

Version 1.0

Note

Before using this information and the product it supports, be sure to read the general information under “Notices” on page v.

| **Second Edition (May 1995)**

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About This Book

Networking Services is a software product that supports Advanced Program-to-Program Communications (APPC) in the Microsoft** Windows** 3.1 and Microsoft Windows for Workgroups** 3.1 environments. With Networking Services, communications applications on your workstation can “talk to” partner applications on other systems that support APPC.

This book explains how to:

- Plan for Networking Services
- Configure Networking Services
- Use Networking Services
- Diagnose problem for Networking Services

You may need to refer to other IBM books for more specific information about a particular topic. The “Bibliography” on page X-1 lists information about Networking Services and related products.

Who Should Read This Book

This book is intended for the network administrators who plan for and assist users in installing and configuring Networking Services and in diagnosing problems.

The prerequisites for using this book are:

- Familiarity with the Windows graphical environment when using Windows applications
- Familiarity with SNA networks in general, and your own network in particular.
- Familiarity with workstation communications adapters and related concepts.

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About This Book

Conventions Used in This Book

To help you locate and identify information easily, this book uses the following visual cue and standard text formats:

Type style	Used for
ALL CAPS	Directory names, file names, CPI-C call names, and keywords in the Networking Services network configuration file.
Italics	Titles of books and variables
Monospace	Names of entry fields, action bar items, choices from pull-down menus, and examples and messages displayed by Networking Services.

Terms Used in This Book

Terms used in this book include:

Term	Purpose
Type	Instructs you to type information in an entry field or file. You do not need to press Enter after typing this information.
Workstation	Refers to a programmable workstation.
KB	1024 bytes.
MB	1 048 576 bytes.

Chapter 1. Introducing Networking Services to the Administrator

This chapter presents the following topics:

Topic	Page
Role of Networking Services administrator	1-1
Benefits of Networking Services for the administrator	1-1

Role of Networking Services Administrator

Networking Services administrators are responsible for planning and providing technical support for the installation and operations of Networking Services. The administrator's key responsibilities include:

Ensuring correct setup of all workstations within scope of responsibility by:

- Supplying key information regarding hardware or software needs
- Helping install applications

Helping the user when he calls with:

- Application problems
- Communications program problems
- Simple or initial problem determination or diagnosis.

Benefits of Networking Services for the Administrator

Networking Services provides many benefits to system administrators.

Easy advanced configuration

Requiring the user to specify only a few configuration parameters, Networking Services automatically creates a network configuration file for each user's workstation. For advanced configuration parameters, a system administrator may also use any ASCII text editor to tailor this file to the user's network and application requirements.

Reduced system definition

By connecting to an Advanced Peer-to-Peer Networking* (APPN*) network node, a workstation can connect to any other partner LU supported by the APPN network without specifically configuring connection parameters for each one.

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Greater security

With Networking Services, system administrators can store vital data on secure server or mainframe computers and use communications applications on the Windows workstation to provide data access to those users who need it. Networking Services also provides outgoing conversation security that can be controlled by either the user or the communications application.

Effective use of resources

Because it supports a wide range of workstations, Windows operating environments, and communications adapters, Networking Services helps eliminate the need to purchase additional hardware and software. System administrators can reduce costs by balancing the computing workload among more of the existing computers in the network.

Support of existing programs

Networking Services supports both the CPI-C and EHNAPPC APIs, so a variety of existing applications can be used.

Chapter 2. Planning for Networking Services

This chapter describes the planning information required to prepare a workstation to run Networking Services and to communicate with one or more remote computers. Before you install and run Networking Services, ensure that the workstation meets the following requirements:

Topic	Page
Basic hardware requirements	2-1
Basic software requirements	2-2
Additional requirements for connectivity options	2-3

In addition, this chapter includes information on the following topics:

Topic	Page
Consideration and restrictions	2-13
Converting from Networking Services/DOS to Networking Services for Windows	2-14

Basic Hardware Requirements

Networking Services requires the following hardware:

An IBM Personal Computer, IBM Personal System/2*, or fully compatible system unit with an 80386** or higher microprocessor

A minimum of 4MB of memory

Access to a fixed disk drive or diskettes with a minimum of 2MB of available disk space for the Base feature. The additional disk space you need to install a connection type ranges from 90KB to 560KB. Sample programs and documentation require additional disk space.

A display

A keyboard

A communications adapter card for the connection type you are using.

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Basic Software Requirements

Networking Services requires one of the following:

DOS Version 5.0 or later

Microsoft Windows Version 3.1 or later or Microsoft Windows for Workgroups 3.1 or later running in enhanced mode

A current version of the IBM Local Area Network Support program or its equivalent (needed only for LAN connections)

Note: The Local Area Network Support program diskettes and the *Local Area Network Support Program User's Guide* are included in the Networking Services package. This user's guide includes information on installing the LAN support program.

A current version of the IBM BookManager Library Reader for Windows program or IBM Library Reader program (needed only if you plan to use Networking Services softcopy documentation).

Note: The BookManager Library Reader for Windows program diskettes are included in the Networking Services package. *IBM APPC Networking Services for Windows: Getting Started* includes information on installing the BookManager Library Reader for Windows program.

Additional Requirements for Connectivity Options

Networking Services provides a variety of connectivity options, including the following:

Connectivity Options	Page
Local area network (LAN)	2-3
Twinaxial data link control (TDLC)	2-4
Synchronous data link control (SDLC)	2-5
SDLC over asynchronous communications	2-7
Multi-protocol transport networking (MPTN)	2-12

Local Area Network (LAN)

The Local Area Network Support Program supports a wide variety of communications adapters. The Local Area Network Support Program supports both NDIS and non-NDIS adapters. For configuration samples and more information about configuring NDIS and non-NDIS adapters, refer to the *Local Area Network Support Program User's Guide*, included in this package.

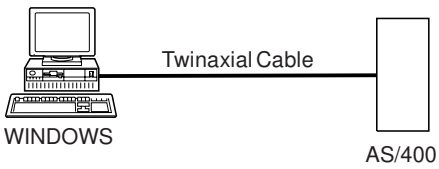
Hardware Requirements: Networking Services uses the Local Area Network Support Program to provide local area network communications. Thus, Networking Services supports all the adapters supported by Local Area Network Support Program. For a complete list of all the adapters supported by Local Area Network Support Program, refer to the *Local Area Network Support Program User's Guide*.

Software Requirements: If you use a local area network, install the Local Area Network Support Program, Version 1.35 or later. Version 1.35 is provided as part of the Networking Services package.

Twinaxial Data Link Control

Twinaxial Data Link Control (TDLC)

You use a twinaxial adapter to connect a workstation directly to an AS/400*, a 5394 controller, or a 5494 controller.



Hardware Requirements: Networking Services requires one of the following twinaxial adapters:

IBM System 36/38 Workstation Emulation Adapter/A
IBM Enhanced 5250 Display Station Emulation Adapter
IBM 5250 Emulation Adapter/A
IBM 5250 Emulation PCMCIA Adapter

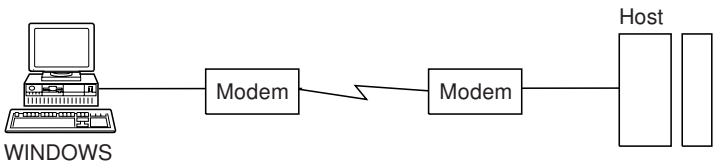
Notes:

1. If your workstation uses Micro Channel* Architecture, use the IBM System 36/38 Workstation Emulation Adapter/A or the IBM 5250 Emulation Adapter/A.
2. If your workstation uses Industry Standard Architecture (ISA), use the IBM Enhanced 5250 Display Station Emulation Adapter.
3. If your workstation uses PCMCIA, use the IBM 5250 Emulation PCMCIA Adapter.

Software Requirements: Networking Services provides its own twinaxial virtual device drivers that interface directly with the twinaxial adapters. No additional software is required. However, for the IBM 5250 Emulation PCMCIA Adapter, the card service enabler must be loaded before starting Windows.

Synchronous Data Link Control (SDLC)

You use a synchronous data link control (SDLC) adapter to connect a workstation to a remote computer over switched lines or nonswitched lines.



Hardware Requirements: Networking Services requires a synchronous modem and one of the following synchronous adapters:

IBM Personal System/2 Multi-Protocol Adapter/A
IBM Multi-Protocol Adapter for ISA Machines

For a list of synchronous modems and associated PIF files, see "PIF Files Provided for SDLC Connections" on page 2-6.

Notes:

1. If your workstation uses Micro Channel Architecture, use the Personal System/2 Multi-Protocol Adapter/A.
2. If your workstation uses the Industry Standard Architecture, use the Multi-Protocol Adapter for ISA machines.

If you use a switched line, you need a modem that is configured to drive Data Set Ready (DSR) once a connection is active. In addition, if you use automatic dial, you need:

A modem that supports V.25bis automatic dial and the V.25bis (1988 version) command set.

A version of the Multi-Protocol Adapter for Micro Channel machines that supports V.25bis automatic dial.

Software Requirements: Networking Services provides its own software for SDLC adapters. No additional software is required.

Synchronous Data Link Control

Modem Initialization Requirements: When you configure an SDLC connection, you must specify a modem type. Networking Services uses a modem initialization file (a PIF file) to initialize the modem. The **Configure** program associates the proper PIF file with the modem you select, as shown in the following table.

In addition, you can create your own modem initialization file, as described in Appendix C, "Customizing Modem Initialization Files" on page C-1.

PIF Files Provided for SDLC Connections:

Use one of the following PIF files for an SDLC connection.

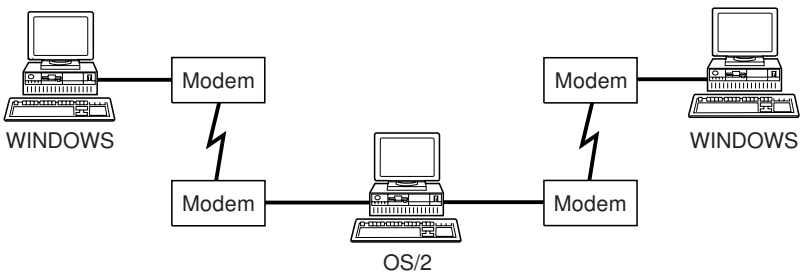
Table 2-1. Modems for SDLC Connections

Modem	PIF File Name
Synchronous Leased Line Modem	SYNCLL.PIF
Synchronous Switched Connection Modem	SYNCSW.PIF

Note: If you do not use a modem, specify the SYNCSW.PIF file and ensure that the null modem is wired as shown in Appendix A, "Null Modem Cabling" on page A-1.

SDLC over Asynchronous Communications

You use SDLC over asynchronous communications to connect a Networking Services workstation to a remote computer over switched lines or nonswitched lines. SDLC over asynchronous communications uses the serial port of your workstation.



Networking Services asynchronous communications uses a hybrid data link that combines aspects of SDLC and asynchronous communications. The data link, known as SDLC over asynchronous, extends an SDLC data link to work across asynchronous communications lines. Traditional SDLC uses an SDLC protocol stack to drive synchronous hardware such as the Multi-Protocol Adapter/A. SDLC over asynchronous communications uses the same SDLC protocol stack to drive asynchronous ports such as COM ports. The SDLC data stream is divided into characters and transmitted using asynchronous "start/stop" communications.

Because SDLC over asynchronous communications defines a new SNA data link, called SNA Phone Connect, your workstation and the remote computer must be equipped to support the data link. In other words, your workstation and the remote computer must have asynchronous ports that are controlled by the same SDLC over asynchronous data link. The following products and services support SDLC over asynchronous communications:

Advantis
Advanced Mobile Phone Services (AMPS)
AS/400
3172 Interconnect Controller
Communications Manager/2 Version 1.11 or later
Networking Services for Windows

Notes:

1. If the remote computer is an AS/400, ensure that an IBM AS/400 ASCII Workstation Controller of device type 2637, 6041, or 6141 is installed on the AS/400.
2. For more information about AMPS cellular networks, see Appendix B, "Using Cellular Services" on page B-1.

Asynchronous Communications

Hardware Requirements: Networking Services requires an asynchronous modem and one of the following asynchronous adapters:

Built-in Serial/Asynchronous Port for IBM Personal System/2
IBM Personal System/2 Multi-Protocol Adapter/A
Personal System/2 Dual Port Asynchronous Adapter/A
Serial/Parallel Adapter
Asynchronous Communications Adapter

For a list of asynchronous modems and associated modem initialization files, see "PIF Files Provided for Asynchronous Connections."

Note: If you use asynchronous communications and a mouse, do not connect the mouse to the serial port being used by Networking Services. Instead, connect the mouse either to a mouse adapter card or to another serial port, if available.

Software Requirements: Networking Services provides its own software for asynchronous communications adapters. No additional software is required.

The Networking Services asynchronous communications Windows virtual device driver (VxD) emulates the communications port of the VxD provided by Windows. Other communications programs that normally use the standard Windows VxD should continue to operate. Some programs do require their own virtual communications port VxD be installed when they operate. For more information, consult the user's guide for your program.

Modem Initialization Requirements: When you configure an asynchronous connection, you must specify a modem type. Networking Services uses a modem initialization file (a PIF file) to initialize the modem. Networking Services provides approximately 75 modem initialization files, which support many external, internal, and PCMCIA modems from various vendors. The **Configure** program associates the proper PIF file with the modem you select, as shown in the tables below.

In addition, you can create your own modem initialization file, as described in Appendix C, "Customizing Modem Initialization Files" on page C-1.

PIF Files Provided for Asynchronous Connections:

Use one of the following PIF files for an asynchronous connection.

Generic Modems for Switched and Nonswitched Connections:

If you are using an asynchronous connection and you are using a modem that is not included in Table 2-3, use one of the following PIF files:

Table 2-2. Generic Asynchronous Modems for Switched and Nonswitched Connections

Modem	PIF File Name
Any Modem Not In Table 2-3	NOTLIST.PIF
Asynchronous Leased Line Modem	ASYNCLL.PIF
Asynchronous Switched Connection Modem	ASYNCSW.PIF
Null Modem	NULMODEM.PIF

Note: If you do not use a modem, specify the NULMODEM.PIF file and ensure that the null modem cable is wired as shown in Appendix A, “Null Modem Cabling” on page A-1.

IBM and Other Manufacturer's Modems for Switched Connections:

Networking Services supports the following modems for asynchronous connections.

Table 2-3 (Page 1 of 3). IBM and Other Manufacturer's Asynchronous Modems for Switched Connections

Modem	PIF File Name
Apex Freedom 14/96 Data/Fax Laptop Modem	APEX1496.PIF
Apex PCMCIA** Fax/Modem IBP-1414	APEXPCM.PIF
AT&T**Comsphere 3820	ATT3820.PIF
AT&T DataPort	ATTDP.PIF
AT&T KeepInTouch PCMCIA Cellular Data/Fax Modem	ATTKITC.PIF
AT&T KeepInTouch PCMCIA Wired Data/Fax Modem	ATTKIT.PIF
BocaModem 14.4 V.32bis External Modem	BOCA144E.PIF
BocaModem 14.4 V.32bis Internal Modem	BOCA144I.PIF
Complete PC 14400 TurboModem	COMPLETE.PIF
DataRace RediCard Cellular PCMCIA Modem	REDICELL.PIF
DataRace RediCard Wired PCMCIA Modem	DRREDIMI.PIF
DataRace Thinkpad Internal Modem	DRTURBO.PIF
Digicom Eagle Plus V.32	EAGLEP.PIF
GVC FM-144V External Fax Modem	GVCFM144.PIF
GVC SM-96 External Modem	GVCSM96.PIF
Hayes** ACCURA 144 + FAX144 Modem	ACCURA14.PIF
Hayes ACCURA 96 + FAX96 Modem	ACCURA96.PIF
Hayes Optima** 14400 Modem	OPTIMA14.PIF

Asynchronous Communications

Table 2-3 (Page 2 of 3). IBM and Other Manufacturer's Asynchronous Modems for Switched Connections

Modem	PIF File Name
Hayes Optima 9600 Modem	OPTIMA96.PIF
Hayes Optima 28800 Modem	OPTIMA28.PIF
Hayes Ultra 14400 Modem	ULTRA144.PIF
Hayes Ultra 9600 Modem	ULTRA96.PIF
IBM 7851 14.4Kbps Data/Fax Modem	IBM7851.PIF
IBM 7855 Modem	IBM7855.PIF
IBM ASYNC/SDLC V.32 Modem/A	IBMV32A.PIF
IBM High Speed Internal Data/Fax Modem	IBMHSINT.PIF
IBM Microelectronics 14.4/14.4 Data/Fax Modem	IBMTORON.PIF
IBM Mwave* Waverunner Digital Modem	WAVEUNR.PIF
IBM MWave Windsurfer 14400 Modem	WINDSURF.PIF
IBM PCMCIA Data/Fax Modem	IBMPCMCI.PIF
Intel 14.4EX Modem	INT144EX.PIF
Intel** PCFM7600 14.4/14.4 External Modem	INPCFM76.PIF
Intel SatisFAXtion** Modem/400	INTFAX4.PIF
Intel SatisFAXtion Modem/400e	INTFAX4E.PIF
Macronix Fax/Modem	MACRONIX.PIF
Megahertz XJ1144FM PCMCIA Data/Fax Modem	MH144PCM.PIF
Megahertz XJ196FM PCMCIA Data/Fax Modem	MH96PCM.PIF
Microcom** DeskPorte FAST Modem	MICVFAST.PIF
Microcom MicroPorte 4232bis Portable Modem	MICROPRT.PIF
Microcom QX/4232bis Modem	MICROCOM.PIF
Motorola** Codex 3220 Plus	CODX3220.PIF
Motorola Codex 3260 Modem	CODX3260.PIF
Motorola Codex 3261 Fast	CODX326X.PIF
Motorola UDS FasTalk 32bx Modem	FASTALK.PIF
Motorola UDS V.3229 Modem	UDSV3229.PIF
Multitech 1432 Modem	MT1432.PIF
Multitech 1432Mu Modem	MT1432MU.PIF
Multitech 932 Modem	MT932.PIF
NEC** 19632E Intelligent Modem	NEC19632.PIF
Nokia PC Card Cellular Data/Fax Modem	NOKIAC.PIF
Nokia PC Card Wired Data/Fax Modem	NOKIA.PIF
Practical Peripherals FX PS/2 Internal Modem	PPFXPS2.PIF

Table 2-3 (Page 3 of 3). IBM and Other Manufacturer's Asynchronous Modems for Switched Connections

Modem	PIF File Name
Practical Peripherals FXMT Modem	PPFXMT.PIF
Practical Peripherals FXSA Modem	PPFXSA.PIF
Practical Peripherals PM 14400FX Internal Modem	PPPM144.PIF
Practical Peripherals PM 14400FX PKT Modem	PPPM144P.PIF
Racal-Datacom ALM3223 Modem	ALM3223.PIF
Racal-Datacom ALM3226 V.32bis Modem	ALM3226.PIF
Rolm 244 PC Telephone	ROLM244.PIF
SupraFAX V.32bis Modem	SUPRAFAX.PIF
Telebit** T1600 Modem	TBT1600.PIF
Telebit T2500 Modem	TBT2500.PIF
Telebit T3000 Modem	TBT3000.PIF
Telebit Trailblazer Plus Modem	TELEBIT.PIF
Telebit WorldBlazer Modem	WLDBLAZE.PIF
USRobotics Courier HST DS	USRHSTDS.PIF
USRobotics Sportster 14400 Modem	USRSPORT.PIF
USRobotics WorldPort 14400 Modem	USRWPORT.PIF
USRobotics WorldPort 9600 Modem	USRWPRT9.PIF
ViVa 14.4/FAX Modem	VIVA144.PIF
Zenith Data Systems 2000 Laptop Modem	ZEN2000.PIF
ZOOM EVFPV32bis Internal Modem	ZMPV32BI.PIF
ZOOM EVFPV32bis Modem	ZMFPV32B.PIF
ZOOM EVFXV32 Internal Modem	ZMFXV32I.PIF
ZOOM EVFXV32 Modem	ZMFXV32.PIF
ZOOM V.32bis High Speed External Modem	ZOOMV32B.PIF

Multi-Protocol Transport Networking (MPTN)

You use a multi-protocol transport networking (MPTN) link so that programs on your workstation can communicate with programs written for the same communications protocol over links that can use a different transport protocol. For example, you use this link so that a CPI-C program on your workstation can communicate over a TCP/IP network with a CPI-C program on a remote computer.

To use an MPTN link, you must also have an MPTN product installed on your workstation. For example, the IBM AnyNet* APPC over TCP/IP for Windows is an MPTN product.

Hardware Requirements: Networking Services has no additional hardware requirements for MPTN. Refer to the documentation for your MPTN product for its hardware requirements.

Software Requirements: Networking Services requires an MPTN product to be installed on your workstation.

Considerations and Restrictions

Security: Networking Services provides outgoing conversation security, but it does not provide BIND security or incoming conversation security. Networking Services does not verify incoming user IDs or passwords. It is the responsibility of the incoming conversation applications to provide security. It is the responsibility of the user to ensure that adequate security measures have been taken in installing and operating Networking Services in the network.

Communications protocols: Networking Services supports the APPC (LU 6.2) protocol only. If you run communications applications that use other logical unit (LU) types, these applications can either share the LAN adapter with Networking Services or use another communications adapter. In addition, Networking Services is an independent LU type 6.2, physical unit (PU) type 2.1; Networking Services cannot be configured as a dependent LU.

Sharing with other LU types: If your workstation also supports other LU types in addition to the Networking Services LU 6.2, and it connects to a VTAM*, you must create separate PU definitions in VTAM for Networking Services and the other LU type.

Communications adapters: Networking Services uses only one network adapter at a time.

Low-entry Networking Node: Networking Services implements the low-entry networking (LEN) node type of PU 2.1 architecture. With this node type, Networking Services can directly connect to any other LEN node, APPN end node, APPN network node, or SNA subarea boundary function node. By configuring a default link to an APPN network node or an SNA boundary function, you can use the services of these nodes to obtain a connection to any other node in the adjoining network.

Network management: Networking Services does not provide an API to network management facilities. You must use the adjacent link station to report link failures to network management systems. Applications can send workstation alerts to network management systems using APPC.

Contention loser sessions: When a session is activated with another LU, the LUs negotiate for which LU takes the contention winner role, while the other takes the contention loser role. The contention winner has the right to start a conversation without asking permission from the other LU. Networking Services does not support the command to ask for permission. Therefore, ensure that you always have at least one contention winner session with a partner LU. When Networking Services participates in session negotiation on a single-session (no parallel session support), Networking Services always specifies that it is to be the contention winner. Therefore, single-session is not recommended for Networking Services to Networking Services sessions. Because Networking Services does not automatically specify contention winner on parallel sessions, it is also not recommended to use a single parallel session.

DOS APPC applications: Networking Services supports the EHNAPPC API for DOS PC Support/400 applications. Only one DOS PS Support/400 application

should be run at a time in a Windows virtual DOS machine (VDM). PC Support/400 functions, such as shared folders and emulators, are not supported by Networking Services.

Special environments: Networking Services is not supported in the OS/2 VDM or in the WINOS/2 environment.

Converting from Networking Services/DOS to Networking Services for Windows

Networking Services/DOS and Networking Services for Windows cannot coexist in the same directory. If you are converting from Networking Services/DOS to Networking Services for Windows before you install, you need to:

Remove Networking Services/DOS from the path

Remove certain environment variables

Back up the *.NSD files

Delete the files and directories (optional)

If you want to automatically start Networking Services for Windows, use the **Autostart Networking Services** program. This is functionally equivalent to including the NSDSTART command in the AUTOEXEC.BAT.

For more information about how to convert the following from Networking Services/DOS to Networking Services for Windows:

Configuration files—refer to the *IBM APPC Networking Services for Windows: Configuration Parameters Reference for Administrators and Application Programmers*.

Applications—refer to the *IBM APPC Networking Services for Windows: Application Programmer's Reference*.

Chapter 3. Installing and Configuring Networking Services

This chapter presents topics for the administrator to consider as he assists users in installing and configuring Networking Services on their workstations. Specifically, this chapter covers the following topics:

Topic	Page
Networking Services installation information	3-1
Networking Services configuration information	3-3
Example configuration files for connecting to another Networking Services computer over an asynchronous connection	3-5
Where to find additional configuration examples and information	3-9

Networking Services Installation Information

Each user can select to install the following features based upon the user's needs:

Base (required)

Base contains the following programs:

- Autostart Networking Services
- Advanced Operations
- Change Installation
- View Message Log
- Display SNA Sense Data
- Trace

The administrator advises all users to install the base.

One or more connection types

The administrator specifies a connection type in one of the Configuration Worksheets contained in Appendix D, “Networking Services Configuration Worksheets.” The administrator advises the user to install the same connection type.

Tools

Tools contains the following programs:

- Check Connection (APING)
- Send Message (ATELL)
- Transfer File (AFTP)

The administrator helps the user decide whether to install these programs.

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Changes Made by Installing Networking Services

Documentation

Documentation contains the following softcopy books:

- *IBM APPC Networking Services for Windows: Getting Started*
- *IBM APPC Networking Services for Windows: Administrator's Guide*
- *IBM APPC Networking Services for Windows: Application Programmer's Reference*
- *IBM APPC Networking Services for Windows: Configuration Parameters Reference for Administrators and Application Programmers*
- *IBM Multi-Platform APPC Configuration Guide*
- *Local Area Network Support Program User's Guide*

The administrator helps the user decide whether to install these softcopy books.

Application developer's Toolkit

Application developer's Toolkit contains:

- Test CPIC

The administrator helps the user decide whether to install this program.

For instructions about how to install Networking Services, refer to the *IBM APPC Networking Services for Windows: Getting Started* and the online helps provided by the installation program.

Changes Made by Installing Networking Services

The following files are changed when you install Networking Services:

AUTOEXEC.BAT The following changes are made:

The Networking Services/DOS directory, if present, is removed from the PATH statement

The following statement is added to the bottom of AUTOEXEC.BAT:

SET PATH=<Networking Services Directory>; %PATH%

SYSTEM.INI The following statement is added:

[386Enh]
DEVICE=<Networking Services Directory>\VNSWUTIL.386

WIN.INI The following statement is added:

[IBMNSW]
DIR=<Networking Services Directory>\

Networking Services Configuration Information

The administrator is responsible for filling out a Configuration Worksheet for each end user. For a sample of this configuration worksheet, see Appendix D, “Networking Services Configuration Worksheets” on page D-1. Refer the end user to *IBM APPC Networking Services for Windows: Getting Started* for instructions about how to use the Worksheet.

In addition, if customization of any parameters not shown on the Worksheet is required, the administrator should change those parameters by editing the network configuration file, NSD.INI, located in the directory where Windows is installed. If NSD.INI is changed, the administrator is responsible for ensuring that the new NSD.INI file is stored on the user's workstation, and that the user uses the **Configure** program to click on Done so that the new NSD.INI file becomes the new initial configuration. For more information about changing these parameters, refer to the *IBM APPC Networking Services for Windows: Configuration Parameters Reference for Administrators and Application Programmers*.

Changes Made by Configuring Networking Services

The following files are changed when you configure Networking Services, depending on the connection type that you use.

Additional Changes Made When You Configure for ASYNC

Networking Services changes the following files when you configure an SDLC over asynchronous connection:

AUTOEXEC.BAT In addition to the changes shown in “Changes Made by Installing Networking Services” on page 3-2, the following statement is added:

<Networking Services Directory>\DOSBIND

CONFIG.SYS The following changes and additions are made:

FILES=3 Only updates if less than 3
BUFFERS=3 Only updates if less than 3
DEVICE=<Networking Services Directory>\protman.dos /I:<Networking Services Directory>
DEVICE=<Networking Services Directory>\SDLCPD.SYS /M=<Networking Services Directory>
DEVICE=<Networking Services Directory>\NPCMDD.SYS
DEVICE=<Networking Services Directory>\DOSVMAC.SYS
DEVICE=<Networking Services Directory>\WINAMAC.SYS

Changes Made by Configuring Networking Services

SYSTEM.INI In addition to the changes shown in “Changes Made by Installing Networking Services” on page 3-2, the following changes are made:

```
[386Enh]
device= vcd              removed
device=pcmvcd.386        removed
device=vcd.386           removed

DEVICE=<Networking Services Directory>\LDVCD.386
TimeCriticalSection=8
NetHeapSize=16
COMBoostTime=1
COMxFIFO=ON              NOTE 'x' can be 1-4
COMxBuffer=3             NOTE 'x' can be 1-4
```

Additional Changes Made When You Configure for SDLC

The following files are changed when you configure an SDLC connection:

AUTOEXEC.BAT In addition to the changes shown in “Changes Made by Installing Networking Services” on page 3-2, the following statement is added:

```
<Networking Services Directory>\DOSBIND
```

CONFIG.SYS The following changes and additions are made:

```
FILES=3                  Only updates if less than 3
BUFFERS=3                Only updates if less than 3
DEVICE=<Networking Services Directory>\protman.dos /I:<Networking Services Directory>
DEVICE=<Networking Services Directory>\SDLCPD.SYS /M=<Networking Services Directory>
DEVICE=<Networking Services Directory>\NPCMDD.SYS
DEVICE=<Networking Services Directory>\DOSVMAC.SYS
DEVICE=<Networking Services Directory>\MPADD.DOS /M=<Networking Services Directory>
```

SYSTEM.INI In addition to the changes shown in “Changes Made by Installing Networking Services” on page 3-2, the following changes and additions are made:

```
[386Enh]
device= vcd              removed
device=pcmvcd.386        removed
device=vcd.386           removed

TimeCriticalSection=8
NetHeapSize=16
```

Additional Changes Made When You Configure for LAN

The following file is changed when you configure a LAN connection:

SYSTEM.INI In addition to the changes shown in "Changes Made by Installing Networking Services" on page 3-2, the following changes are made:

```
[386Enh]
DEVICE=<Networking Services Directory>\VD8 2.386
VD8 2HEAPSIZE=xx
VD8 2POOLSIZE=yy
```

Note: Networking Services calculates the value of xx for the VD8 2HEAPSIZE based on the value of the maximum frame size parameter (TRMF keyword) specified in the network configuration file, or on the default value of 2048 bytes, if the keyword has not been defined.

Additional Changes Made When You Configure for TWINAX

The following file is changed when you configure a twinaxial connection:

SYSTEM.INI In addition to the changes shown in "Changes Made by Installing Networking Services" on page 3-2, the following changes and additions are made:

```
[386Enh]
DEVICE=<Networking Services Directory>\VDNSWQ.386
DEVICE=<Networking Services Directory>\VDTWINX.386
VDNSWQHeapSize=2
```

Additional Changes Made When You Configure for MPTN

No additional changes are made when you configure for an MPTN connection.

Example Configuration Files for Networking Services to Networking Services using SDLC over Asynchronous

The following are example configuration files for connecting a local Networking Services for Windows workstation to a remote Networking Services for Windows workstation using SDLC over asynchronous communications.

The configuration information provided for this example includes:

- Example configuration files for your local Networking Services workstation (in this example, the calling workstation)
- Example configuration files for the remote computer (in this example, the called workstation).

Networking Services to Networking Services

Configuration Files for the Calling Workstation

AUTOEXEC.BAT

```
C:\NSW\DOSBIND
C:\WINDOWS\SMARTDRV.EXE
@ECHO OFF
PROMPT $p$g
PATH=C:\WINDOWS;C:\DOS;C:\
SET TEMP=C:\DOS
C:\DOS\MOUSE.COM
SET PATH=C:\NSW;%PATH%
```

CONFIG.SYS

```
DEVICE= C:\WINDOWS\HIMEM.SYS
FILES=3
BUFFERS=3
DOS=HIGH,UMB
STACKS=9,256
DEVICE=C:\WINDOWS\EMM386.EXE NOEMS X=D8  -DBFF X=CC  -D FF
SHELL=C:\DOS\COMMAND.COM /E:2    /P
LASTDRIVE=Z
DEVICE=C:\NSW\protman.dos /I:C:\NSW
DEVICE=C:\NSW\SDLCPD.SYS /M=C:\NSW
DEVICE=C:\NSW\NPCMDD.SYS
DEVICE=C:\NSW\DOSVMAC.SYS
DEVICE=C:\NSW\WINAMAC.SYS
```

NSD.INI

```
[Configuration]
DLCTYPE=ASYNC
LANGUAGE=2924
STARTPROGRAMLAUNCHER=TRUE
LOCALLUNAME=MYNET.CALLERLU
NODEID= 75
DIRECTORY=C:\NSW\

[REMOTE]
SDLD=ASYNCLNK,  1, , , , ,
SWAD=9,123-456-789
SDMT=PPFXSA
SDLT=SWTPP
ASPN=COM1

[MODES]
SNASVCMG= 512, 7, 2, 1
BLANK= , 3, 8, 4
#BATCH= , 3, 8, 4
#INTER= , 7, 8, 4
QPCSUPP= 1 24, 2, 32, 16

[DEFINETP]
APINGD=C:\NSW\SAMPLES\APINGD.EXE, 12 , 3 , am_started,
ATELLD=C:\NSW\SAMPLES\ATELLD.EXE, 12 , 3 , am_started,
```

Configuration Files for Called Workstation

AUTOEXEC.BAT

```
C:\NSW\DOSBIND
C:\WINDOWS\SMARTDRV.EXE
@ECHO OFF
PROMPT $p$g
PATH=C:\WINDOWS;C:\DOS;C:\
SET TEMP=C:\DOS
C:\DOS\MOUSE.COM
SET PATH=C:\NSW;%PATH%
```

Networking Services to Networking Services

CONFIG.SYS

```
DEVICE= C:\WINDOWS\HIMEM.SYS
FILES=3
BUFFERS=3
DOS=HIGH,UMB
STACKS=9,256
DEVICE=C:\WINDOWS\EMM386.EXE NOEMS X=D8  -DBFF X=CC  -D FF
SHELL=C:\DOS\COMMAND.COM /E:2    /P
LASTDRIVE=Z
DEVICE=C:\NSW\protman.dos /I:C:\NSW
DEVICE=C:\NSW\SDLCPD.SYS /M=C:\NSW
DEVICE=C:\NSW\NPCMDD.SYS
DEVICE=C:\NSW\DOSVMAC.SYS
DEVICE=C:\NSW\WINAMAC.SYS
```

NSD.INI

```
[Configuration]
DLCTYPE=ASYNC
LANGUAGE=2924
STARTPROGRAMLAUNCHER=TRUE
LOCALLUNAME=MYNET.CALLEDLU
NODEID= 75
DIRECTORY=C:\NSW\

[REMOTE]
SDLD=ASYNCLNK,  1, , , , , CALLED
SDMT=PPFXSA
SDLT=SWTPP
ASPN=COM1

[MODES]
SNASVCMG= 512, 7, 2, 1
BLANK= , 3, 8, 4
#BATCH= , 3, 8, 4
#INTER= , 7, 8, 4
QPCSUPP= 1 24, 2, 32, 16

[DEFINETP]
APINGD=C:\NSW\SAMPLES\APINGD.EXE, 12 , 3 , am_started,
ATELLD=C:\NSW\SAMPLES\ATELLD.EXE, 12 , 3 , am_started,
```

Where to Find Additional Configuration Examples and Information

To help you configure for other link connection types, Networking Services provides example configuration files for all connection types supported by Networking Services.

The remote computer may require some configuration as well. For information about configuring the remote computer, see "Where to Find Information for Configuring the Remote Computer" or refer to other product documentation.

Where to Find Example Configuration Files

The EXAMPLES subdirectory of the directory where Networking Services is installed contains sample configuration files for the local workstation. These files cover different connection types and provide examples for configuring Networking Services to coexist with other selected networking products.

You can configure your Networking Services workstation to communicate with a remote computer using one of several different types of communications adapters.

Examples of configuration information needed for your Networking Services workstation is included in the EXAMPLES subdirectory.

Where to Find Information for Configuring the Remote Computer

For information about how to configure other APPC platforms, refer to the *IBM Multi-Platform APPC Configuration Guide*. This book explains the steps to configure each of the platforms covered in the book, and highlights the values that must match among different platforms. The platforms covered by the *IBM Multi-Platform APPC Configuration Guide* are :

AIX SNA Services/6000, Version 1.2

AIX SNA Services/6000, Version 2.1

AS/400

CICS, Version 3.3 or later

Networking Services/DOS

Networking Services for Windows

APPC/MVS on MVS/ESA, Version 4.2 or later

OS/2 2.0 with Communications Manager/2, Version 1.0 or later

APPC/VM on VM/ESA, Version 1.0 or later

Note: A softcopy version of the *IBM Multi-Platform APPC Configuration Guide* is included in the Networking Services package.

For more configuration information for remote computers, refer to appropriate product information.

Configuration Information for Remote Computer

Chapter 4. Using Networking Services Programs

This chapter discusses the Networking Services programs. It tells you what each program does and what options you can customize to meet your particular needs. For more information about a program, refer to the online help for that program.

The following programs are discussed:

Topic	Page
Advanced Operations	4-3
Autostart Networking Services	4-4
Change Installation	4-4
Check Connection (APING)	4-5
Configure	4-6
Display SNA Sense Data	4-7
Send Message (ATELL)	4-7
Test CPIC	4-8
Trace	4-8
Transfer File (AFTP)	4-9
View Message Log	4-10

To use these programs, double-click on their icons in the IBM APPC Networking Services program group.

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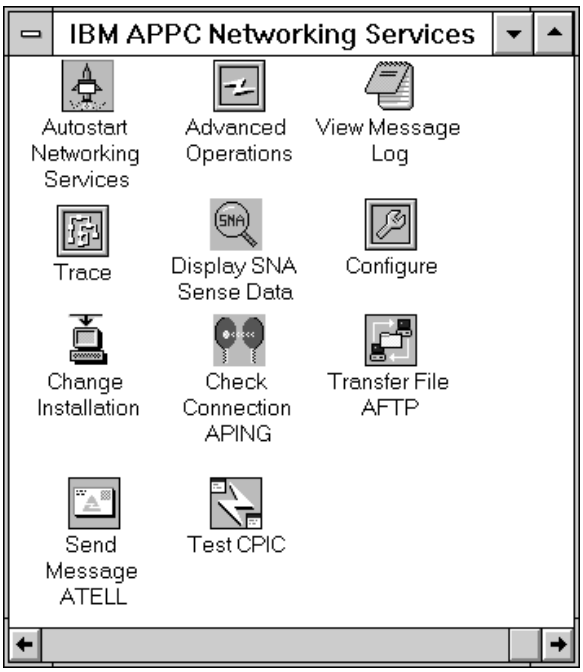

Figure 4-1. Example of the IBM APPC Networking Services Program Group

Advanced Operations

Intended user: Administrator and Application Programmer

Advanced Operations can be used to control Networking Services operation and dynamic configuration, and to display information. **Advanced Operations** allows the user to:

Start, stop, and display information about:

- Networking Services
- Links
- Sessions
- Partner LUs
- Program Launcher

Control which incoming Attaches will be queued

Define, delete, and display modes, CPI-C side information, and TPs

Display and delete queued Attaches

Display help for the error messages in the form of probable cause and suggested recovery information

Important notes:

Changes made using the **Advanced Operations** program have no effect on the network configuration file (NSD.INI). The changes affect only the dynamic configuration information contained in memory.

You may experience a delay when stopping and starting Networking Services, links, sessions, and partner LUs.

For more information about error messages, see “Help for Error Messages” on page 5-1.

Autostart Networking Services

Intended user: End User

Autostart Networking Services is a program that starts Networking Services so it can be used by other applications without further user action. To automatically start Networking Services when Windows is started, drag this icon into the Startup program group.

Important notes:

You may also use the Autostart Networking Services program, after Networking Services is started, to reconnect links that have failed or have been disconnected. Only the links that were configured when Networking Services was started are reconnected. Links that are active are not affected.

Change Installation

Intended user: All

Change Installation is a maintenance program that allows you to selectively install, restore, update, or delete Networking Services programs.

Important notes:

Do not run the **Change Installation** program when Networking Services or any program in the IBM APPC Networking Services program group is active.

If you choose to delete the Base feture, Networking Services cannot delete the installation files. A pop-up window informs you that not all files can be deleted. To delete the installation files, run EPFIDEFI.BAT from the root directory.

Check Connection (APING)

Intended user: All

Check Connection (APING) is a sample CPI-C program that verifies network connections. APING can be used to determine that a connection has been established, to determine a problem, and to perform simple measurements. APING exchanges data packets with a partner computer and times how long the data transfer takes.

Important notes:

Ensure that the APING server program, APINGD, is properly set up on the remote computer. For more information about setting up APINGD, contact IBM's APPC Market Enablement (AME) Group. For more information about contacting AME group, refer to the *IBM APPC Networking Services for Windows: Application Programmer's Reference*.

When you double-click on the **Check Connection (APING)** icon, the program automatically displays the APING Setup window. To get help for the parameters shown in this window, click on Cancel, and then click on Help on the action bar.

The parameter Verify Last Echoed Packet of Each Iteration is not included in the online help. If you check this box, Networking Services does the following:

1. Insert the ASCII characters “a” through “z,” in order, (wrapping to “a” after “z”) into all the packets of an iteration.

   The iteration contains as many packets as the number you specified in the Consecutive field of the APING window.

2. Saves the pattern generated in the last packet.
3. For each iteration, checks to ensure that the pattern returned by the remote computer when it echoes back the last packet of each iteration is the same as the saved pattern.

If you specify a number of iterations greater than 1024, all iterations are displayed as they occur, but only the last 1024 iterations are saved in the display area so that you can scroll back to view them again.

The memory requirements for the APING program is approximately the sum of the following:

- 150KB
- size of packet
- 4KB for each 20 or fewer iterations (up to 208KB for 1024 iterations).

Configure

Intended user: All

Configure is a program that is used to provide required and optional information used by Networking Services to operate. It allows you to enter:

General configuration information

Information specific to a connection type

Mode, side information, and transaction program definitions.

Important notes:

The configuration program first searches for an existing NSD.INI file in the Windows directory and reads in any data contained in it. If none exists, Networking Services copies the sample NSD.INI file from the Networking Services directory.

When the **Configure** program saves the configuration information, the old NSD.INI file is copied to NSD.BAK (which remains in the Windows directory), and a new NSD.INI is created.

You can use the online help in the **Advanced Operations** to get detailed information about configuration parameters. You can also refer to the *IBM APPC Networking Services for Windows: Configuration Parameters Reference for Administrators and Application Programmers*.

The **Configure** program does not save any configuration information until the user clicks on the Done button.

Display SNA Sense Data

Display SNA Sense Data

Intended user: Administrator and Application Programmer

Display SNA Sense Data is a program that displays SNA sense data descriptions and associated explanations. Sense data is an SNA-defined encoding of error information. The sense data is included in some Networking Services error messages.

Send Message

Send Message ATELL

Intended user: All

Send Message (ATELL) is a sample CPI-C program that sends a message to another workstation.

Important notes:

Ensure that the ATELL server program, ATELLD, is properly set up on the remote computer. For more information about setting up ATELLD, contact IBM's APPC Market Enablement (AME) Group. For more information about contacting AME group, refer to the *IBM APPC Networking Services for Windows: Application Programmer's Reference*.

Test CPIC

Intended user: Application Programmer

Test CPIC is a program that uses CPI-C calls to test application program communications logic of the partner program at the remote computer.

Trace

Intended user: Administrator and Application Programmer

Trace is a program that can trace line flows and API communications between your workstation and remote computer. This information is useful for identifying and reporting problems. It is also useful for verifying communications behavior. This facility allows you to:

1. Set up trace parameters
2. Configure trace options
3. Activate the trace
4. Suspend the trace
5. Format the trace output.
6. Resume the trace.

Important notes:

For more information about trace parameters and options, see “Trace Program” on page 5-1.

For annotated sample of various traces, see Appendix E, “Examples of FMTNSD.LOG Trace File Formatted Output” on page E-1.

Transfer File (AFTP)

Intended user: All

Transfer File (AFTP) is a sample CPI-C program that distributes files so they can be used among multiple platforms, and archives files that are not usable on a particular platform. Networking Services provides the AFTP client. Server programs are available on other platforms, such as OS/2, MVS, VM, and AIX.

AFTP supports two different types of file transfer:

Text transfer Normal text is transferred with ASCII characters, preserving the format of the text files, such as carriage returns and end-of-file markers.

Binary transfer Programs and other binary files are transferred as a stream of bytes exactly as they appear in the file; no attempt is made to interpret the characters.

Important notes:

Ensure that the AFTP server program, AFTPD, is properly set up on the remote computer. For more information about setting up AFTPD, contact IBM's APPC Market Enablement (AME) Group. For more information about contacting AME group, refer to the *IBM APPC Networking Services for Windows: Application Programmer's Reference*.

Networking Services does not support AFTPD. Therefore, you cannot use the **Transfer File (AFTP)** program when the remote computer is another Networking Services workstation.

When connecting to MVS or VM host remote computers, enter your User ID and password in upper case.

When connecting to a VM host remote computer, ensure that the VM system is at the Ready prompt before you use the AFTP program at the Networking Services workstation.

To maximize performance for sending files to the remote computer, specify a large maximum RU size in the mode definition you use. For example, redefine the #BATCH mode to have the maximum RU size parameter set to 2048.

View Message Log

Intended user: Administrator and Application Programmer

View Message Log uses the Microsoft Windows Notepad to examine the message log file (MSGLOG.NSD). The message log contains errors that Networking Services records during initialization and operations. (The file is in ASCII format and may be viewed with other text editors as well.)

Important notes:

Generally, messages are logged only during initialization (when the LU is started) and when CPI-C calls are used.

Each entry in the message log contains the following information:

- The date and time that the message was logged
- The Networking Services program that created the message
- The message text and its identification number, if applicable.

Networking Services logs each new entry at the bottom of the message log.

Use the online help in the **Advanced Operations** to find the probable cause and suggested recovery information for error messages found in the log.

Chapter 5. Diagnosing Networking Services Problems

Networking Services for Windows provides the following facilities for diagnosing problems:

Error messages

- Online help
- Message log

Trace program

Help for Error Messages

When an error occurs, Networking Services displays a pop-up window that contains a four-character error message number and a one-line description of the error. Networking Services provides the following ways to obtain more information about the error:

Online help information for probable cause and suggested recovery
Message log

Online Help

You can use the the Help function in the **Advanced Operations** program to view probable cause and suggested recovery for any error. To obtain help for the probable cause and suggested recovery for error messages:

Double-click on the **Advanced Operations** icon in the Networking Services program group

Click on Help on the action bar

Click on Error Messages

Click on the error message number about which you want more information.

Message Log

The message log can provide assistance in understanding an error because it shows the order in which an error has occurred. For more information, see “View Message Log” on page 4-10. The **View Message Log** program uses the Windows Notepad to examine the message log file (MSGLOG.NSD).

Trace Program

To use the **Trace** program:

1. Double-click on the **Trace** icon
2. Click on Setup on the action bar
3. Click on Initialize

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This displays a dialog box that has default values for the **Trace** program. You can change these values by typing over them. If more information is needed regarding the settings, click on Help.

4. Click on OK to initialize the **Trace** program
5. Click on Setup on the action bar
6. Click on Configure on the pull-down menu

   This displays a dialog box that is used to select one or more components to be traced and the individual trace options for each component. Be sure that Networking Services is displayed in the product window. When Networking Services is the product, the following components and trace options are available for selection:

Components	Trace Options
CPI-C	API, Advisory, Error
EHNAPPC	API, Advisory
LAN	Line Flows, Connection Errors
NOF	API, Error
SDLC/ASYNC	Line Flows
TWINAX	Line Flows
Program Launcher	Launches, Error

   Components not shown in this list are for use by product Service.

7. Select components from the left-hand list box
8. Select component trace options from the right-hand list box
9. Repeat 7 and 8 if you want to trace more than one component

   For suggestions about which trace options to use for a given problem, see "Suggested Trace Options by Type of Problem" on page 5-3.

10. Click on OK when complete
11. Click on Operation on the action bar
12. Click on Start Trace
13. Recreate the problem
14. Click on Operation on the action bar
15. Click on Suspend Trace
16. Click on Operation on the action bar
17. Click on Format Trace

    The formatted trace information is written to the file name on the path specified in the Initialize step

18. Click on Operation on the action bar

19. Click on Exit.

Suggested Trace Options by Type of Problem

Following are the suggested trace options classified by problem type:

Connection Error based upon the connection type

Components	Trace Options
LAN	Line Flows, Connection Errors
SDLC/ASYNC	Line Flows
TWINAX	Line Flows

Data Flow Anomalies such as missing, duplicated, or out-of-sequence data:

– Based upon connection type

Components	Trace Options
LAN	Line Flows
SDLC/ASYNC	Line Flows
TWINAX	Line Flows

– Based on APIs

Components	Trace Options
EHNAPPC	API
CPI-C	API

Other Diagnostic Data

Other diagnostic data that is important to diagnosing Networking Services problems can be obtained from Dr. Watson.

A Windows General Protection Fault (GPF) requires that the Windows application Dr. Watson be active at the time of the GPF. If Dr. Watson is active, it creates a file named DRWATSON.LOG. This file is located in the directory where Windows is installed. Include the following entries in WIN.INI to allow Dr. Watson to collect sufficient information regarding the GPF:

```
[Dr. Watson]
DisLen=16
DisStack=2
ShowInfo=disassembly errorlog locals paramlog registers stack
SkipInfo=modules tasks 32bitregs information
TrapZero=1
```

General Technical Assistance

For general services that are not platform specific, the IBM APPC Market Enablement (AME) organization provides marketing, development, and technical services for APPC, APPN, and CPI-C. AME maintains several bulletin board systems to support APPC including:

CompuServe** (GO APPC)
OS/2 Bulletin Board System (OS2BBS on IBMLINK)
The Networking Internet server

These bulletin board systems enable you to get up-to-date information on APPC, access sample programs and tools, ask questions, and provide feedback on APPC and related products.

For more information about the IBM AME organization, refer to *IBM APPC Networking Services for Windows: Application Programmer's Reference*.

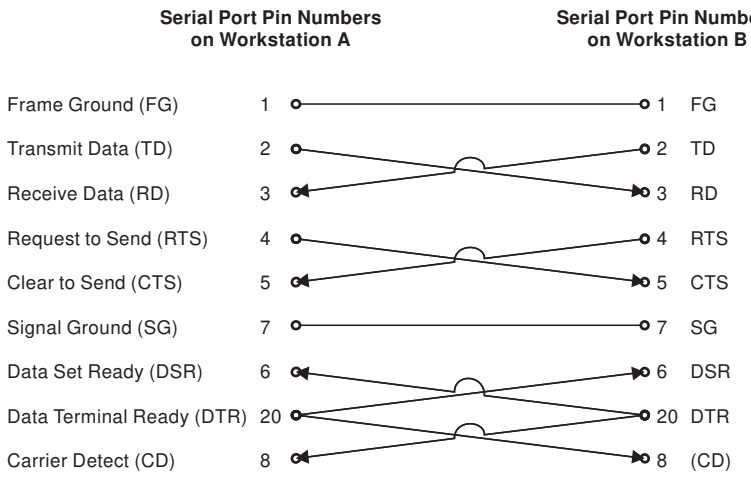
Service for Networking Services

If you have a Networking Services problem that requires service in the U.S., call your IBM Service Representative at 1-800-237-5511.

Outside of the U.S., contact your marketing representative.

Appendix A. Null Modem Cabling

If your workstation does not use a modem, make sure the modem cabling is wired as shown:



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Null Modem Cabling

Appendix B. Using Cellular Services

Networking Services using an SDLC over asynchronous connection can communicate over Advanced Mobile Phone Services (AMPS) cellular networks. The following modems that support switched cellular connections have been tested with Networking Services:

AT&T KeepInTouch PCMCIA Cellular Data/Fax Modem (Model 3762)
DataRace Redicard Cellular PCMCIA Modem.

The modems were tested with the IBM Thinkpad Models 720 and 750 and the Motorola Digital Personal Communicator (DPC) 550 cellular phone.

The Nokia PC Card Wired Data/Fax Modem should also work. This modem is another manufacturer's version of the AT&T KeepinTouch PCMCIA Cellular Data/Fax Modem.

Considerations for AMPS Data Connections

AMPS cellular service is optimized for the transmission of the human voice. AMPS connections sometimes may not be usable for data transmission at the desired data rate. The quality and performance of an AMPS data connection is affected by:

Communication protocols
Modem pools
Bandwidth compression techniques used in the connection.

Communication Protocols

A variety of communication protocols, such as Microcom Networking Protocol** (MNP) Class 10 and TX-CEL**, are used in cellular and wired networks to decrease errors and enhance performance. Some portion of an AMPS cellular connection usually involves a path through a wired network. Optimal effectiveness of the communication protocols requires that the modems at each end of a connection use the same protocol.

Modem Pools

To facilitate the transmission of data over the AMPS service, some service providers use a pool of modems that are optimized for data transmission. Customers access the modem pool by adding a special prefix to the destination telephone number. For information about the availability of the modem pools, their data rates, and the support and uses of the modem pools, contact your service provider.

Bandwidth Compression Techniques

Some AMPS service providers use Adaptive Differential Pulse Code Modulation (ADPCM) or other bandwidth compression techniques. Bandwidth compression can influence the quality of the connection at different data rates. For information about the bandwidth compression and the recommended data rates being used in your AMPS network, contact your service provider.

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How to Set Up for Switched Cellular Communications

Following are instructions to setup the switched cellular communications:

1. Follow the PC manufacturer's instructions on installation and configuration of hardware support for PCMCIA cards. This installation and configuration support includes:

   Device drivers for PCMCIA card
   Socket services
   Resource management

   Note: For the IBM Thinkpad, a set of universal device drivers for the PCMCIA card is available from the IBM PC Company bulletin board. To get a self-extracting file of the set of drivers, TPPCMIA.EXE dated February 15, 1995, call the IBM PC Company bulletin board at 1-919-517-0001.

2. Follow the PCMCIA card manufacturer's instructions for setting up the PCMCIA card for cellular communications.

   Note: For the DataRace card, a utility is included with the card to download specific cellular firmware onto the card.

   For the AT&T card to operate on IBM Thinkpads, files that include specific instructions must be obtained from AT&T Paradyne bulletin board. To get the file, IBM.TXT, with specific instructions, call the AT&T Paradyne bulletin board at 1-813-531-2419.

3. Ensure that the cable and connection between the PCMCIA card and the cellular phone is setup properly. The cellular phone antenna should be extended and as vertical as possible for best transmission results. You can purchase cellular phone holders to aid with the vertical positioning.

4. With Networking Services, use the asynchronous connection type during configuration time using ***Step 1*** of the Configure program to configure the switched cellular connection. In ***Step 2*** of the Configure program, select one of the modems.

   The modem initialization files (PIFs) for:

   AT&T KeepInTouch PCMCIA Cellular Data/Fax Modem (Model 3762)
   DataRace Redicard Cellular PCMCIA Modem
   Nokia PC Card Cellular Data/Fax Modem

   These modems have been set at a maximum operational speed of 4800 bps. If a higher speed than 4800 bps is supported, edit the PCMCIA modem's PIF.

   Notes:

   a. For a list of PIF files, see “PIF Files Provided for Asynchronous Connections” on page 2-8. The AT command set parameter, %B4800, must be removed from the Initialization 1 string.

   b. For more information about editing a PIF file, see Appendix C, “Customizing Modem Initialization Files” on page C-1.

Appendix C. Customizing Modem Initialization Files

A modem initialization file contains the configuration values and modem string information needed to initialize a modem. Networking Services uses modem initialization files in the form of product information files (PIF files).

If you have technical knowledge of modems and you have experience in configuring communications software, you may want to modify a PIF file to perform one or more of the following tasks:

Tasks	Page
General instructions for making any change to a PIF file	C-1
Customize an asynchronous modem's dial string for calling card use or to allow calls outside of your office phone system	C-2
Modify the serial port speed for asynchronous modems	C-5
Create a new PIF file for a modem not in the Select Mode Type panel of Step 2 of the **Configure** program	C-6
What to do if you encounter connection errors	C-8

The instruction manual for your modem contains important information about *AT command set* modem commands, dial modifiers, and default configuration values for your modem. Refer to your modem's manual to complete the tasks described in this appendix.

This appendix also shows an example PIF file on page C-9.

General Instructions for Making Any Change to a PIF File

This section describes the steps to follow when you make any change to a modem initialization file. The remainder of this appendix discusses specific parameters in the modem initialization file that you may want to change.

Use these steps when you make any change to a modem initialization file:

1. From Table 2-1 on page 2-6, Table 2-2 on page 2-9, or Table 2-3 on page 2-9, find the PIF file name for the modem type you are using. Or, if you are creating a PIF file for a modem not listed, find the PIF file name for a similar modem type; use this file as a template.
2. Make a backup copy of the PIF file that you want to customize or that you are using as a template.

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Customizing the Dial String

3. Use any ASCII text editor to change parameters in the PIF file. For example:

   To change your modem's dial string, see “Dial String Parameters to Modify” on page C-3

   To change the serial port speed, see “Serial Port Speed Parameters to Modify” on page C-5

   To create a new PIF file based on a template, see “Parameters to Modify When Creating a New PIF File” on page C-6

4. Save your new PIF file in the PIF subdirectory of the directory where Networking Services is installed.
5. Use the **Configure** program to cause your new PIF file to be stored as part of initial configuration:
   a. Double-click on the **Configure** icon in the IBM APPC Networking Services group window.
   b. Click on Step 2.
   c. Click on the Select Modem Type button in the Remote Configuration panel.
   d. If a pop-up window appears to ask if you want to update your modem list, click on Yes. This causes Networking Services to update the list of modem selections presented in step 5e so that the list includes the title parameter of the new PIF file that you stored in step 4. You will experience a delay while Networking Services is updating the modem list.
   e. From the Select Modem Type panel, scroll through the list and select the modem title that corresponds to the new PIF file you created.
   f. Click on OK.
   g. After you have completed any other required or optional configuration parameters, click on Done.
6. Stop all applications, shut down your workstation, and start it again.

Customizing the Dial String for Asynchronous Modems

You can customize how a modem dials an outgoing call by modifying the dial string in the PIF file. For example, you may want to modify the dial string to automatically access an outside line, or to use your calling card each time you dial out through that modem type. When you change the dial string in the PIF file, remember that the dial string is changed for each call placed through any modem managed by this modem type.

PIF Sections That Determine the Dial String

The dial string for your modem is made up of the DialPrefix and DialSuffix sections in a PIF file as shown in Figure C-1 on page C-3, in addition to the telephone number parameter that you specify when you use the **Configure** program or the **Advanced Operations** program to request activation of a link. The modem responds to the commands in the DialPrefix before the telephone number is dialed, and to the commands in the DialSuffix after the telephone number is dialed.

```
[DialPrefix]
 Display = D12
 Type = String
 StrLength = 255
 Default = "ATDT"
 Optional = NO
 Help = H12

[DialSuffix]
 Display = D13
 Type = String
 StrLength = 255
 Default = "\CR"
 Optional = NO
 Help = H13
```

Figure C-1. Example Dial Prefix and Suffix Sections of a PIF File

Dial String Parameters to Modify

To modify the dial string for your dialing requirements, follow the steps shown in "General Instructions for Making Any Change to a PIF File" on page C-1, and use the following instructions for step 3 of those instructions:

Modify the DialPrefix and DialSuffix in your modem's PIF file:

1. Refer to the user manual for your modem to determine the dial modifiers to use.
2. Add numbers and dial modifiers at the end of the **Default = "ATDT"** command in the DialPrefix section or at the beginning of the **Default = "\CR"** command in the DialSuffix section, depending on the telephone requirements.
3. Represent the following characters using Networking Services required characters:

Characters	Networking Services Required Characters
carriage return character	\CR
line feed character	\LF
backslash character	\\

Be sure to complete the instructions shown in "General Instructions for Making Any Change to a PIF File" on page C-1.

Customizing the Dial String

Example 1: Customize the Dial String to Make Outside Calls

To dial “9” and wait for a second dial tone, add “9W” to the end of the default DialPrefix string. The “W” dial modifier instructs the modem to wait for a second dial tone before proceeding.

```
[DialPrefix]
 Display = D12
 Type = String
 StrLength = 255
 Default = “ATDT9W”
 Optional = NO
 Help = H12
```

Figure C-2. Modifying a Dial String for Outside Calls

Example 2: Customize the Dial String for Calling Card Use

When using a calling card to make a long distance call, the telephone number is usually preceded by a number identifying the long distance carrier and a 0. Add these numbers to the end of the default DialPrefix string.

Once the telephone number is dialed, the modem must pause to wait for a tone, and then dial the calling card number. The comma (,) dial modifier instructs the modem to pause for 2 seconds. Multiple commas can be used for a longer delay. The commas and the calling card number are added to the beginning of the default DialSuffix string.

```
[DialPrefix]
 Display = D12
 Type = String
 StrLength = 255
 Default = “ATDT1 288 ”
 Optional = NO
 Help = H12


[DialSuffix]
 Display = D13
 Type = String
 StrLength = 255
 Default = “,,512823    1234\CR”
 Optional = NO
 Help = H13
```

Figure C-3. Modifying a Dial String for Calling Card Use

The commands shown in Figure C-3 will cause the modem to dial the long distance carrier identifier (10288), 0, and then to dial the telephone number specified by the telephone number parameter.

After dialing the telephone number, the modem pauses for 4 seconds (2 commas) and then dials the calling card number (51282300001234).

Modifying the Serial Port Speed

The default serial port speed specifies the speed at which data is passed between the serial port and the modem. It is also called the modem-to-computer or DTE line speed. You may need to change the serial port speed if your workstation is a non-FIFO machine, or supports internal data buffering.

PIF Section That Determines Port Speed

The default port speed is specified in the **SerialPortSpeed** section of the PIF file.

Serial Port Speed Parameters to Modify

To change the default serial port speed, follow the steps in "General Instructions for Making Any Change to a PIF File" on page C-1, and use the following instructions for step 3 of those instructions:

Specify a new value for the **Default** keyword in the **SerialPortSpeed** section of the PIF file. If your workstation does not have FIFO buffering change the value for the Default keyword to 9600. Use your modem manual to determine the speed to specify when the modem is using internal data buffering.

Be sure to complete the instructions shown in "General Instructions for Making Any Change to a PIF File" on page C-1.

Figure C-4 shows an example of specifying the default serial port speed to be 19200 bits per second.

```
[SerialPortSpeed]
    Display = D4
    Type = Decimal
    Default = 192
    Range = 12  -1152
    Optional = NO
    Help = H4
```

Figure C-4. SerialPortSpeed Section in a PIF File

Creating a PIF File

Creating a PIF File for a Modem Not in the List

If you are using a modem that is not listed in Table 2-3 on page 2-9, try the following suggestions before you create your own PIF file:

1. Select a similar modem type from Step 2 of the **Configure** program, such as a modem type that:

   Is made by the same manufacturer
   Is compatible with a listed modem type

2. Select one of the generic modem types as shown in Table 2-1 on page 2-6 or Table 2-2 on page 2-9
3. If you have tried steps 1 and 2, and you still encounter a connection error message, create your own PIF file.

PIF Sections to Change When Creating a New PIF File

To create your own PIF file, select a PIF file of a similar modem as suggested in step 1 above. Use this file as a template and consider changing parameters in the following sections:

The first section, which has the modem name enclosed in brackets.

[SerialPortSpeed]

For information about changing the default value in this section, see "Serial Port Speed Parameters to Modify" on page C-5.

[Initialization 1] and **[Initialization 2]**

[FlowControl]

Parameters to Modify When Creating a New PIF File

When you modify a template file, change the following parameters in the indicated PIF file sections. To make these changes, follow the steps shown in "General Instructions for Making Any Change to a PIF File" on page C-1. For step 3 of those instructions, change one or more of the following parameters as appropriate. The values listed here are taken from the example PIF file for the IBM 7855 Modem shown on page C-9.

Parameters in the PIF file's first section:

Change the name of this section to the same 8-character file name that you assign to the **PIF =** parameter.

PIF = IBM7855.PIF

This parameter contains the name of the file you are using as a template. Choose an 8-character file name that is specific to your modem, and use PIF as the file extension, for example PDQMODEM.PIF.

Title = "IBM 7855 Modem"

Choose a title description that is specific to your modem and will be easy for you to recognize in a list of other modems. You can enter up to 60 characters, for example "PDQ Giga Bit Screamer". The opening and closing

quotation marks are required. This title will appear in the list of modem types in the **Configure** program, as described in step 5e on page C-2.

Parameter in the **[SerialPortSpeed]** section:

For information about changing the default parameter in this section, see "Serial Port Speed Parameters to Modify" on page C-5.

Parameters in the **[Initialization1]** and **[Initialization2]** sections:

In the template PIF file, you may need to change the default initialization string to meet the configuration requirements described in the following list. The commands for these configuration requirements can vary from modem to modem. Consult your modem manual for the correct commands for your modem.

AT command set commands are entered on the **Default =** lines of the **[Initialization1]** and **[Initialization2]** sections of the PIF file.

Use Networking Services required characters to represent the following characters in the initialization string.

Characters	Networking Services Required Characters
carriage return character	\CR
line feed character	\LF
backslash character	\\

The following parameters appear either in the **[Initialization1]** or **[Initialization2]** or both. In the example shown in "Example Networking Services PIF File for the IBM 7855 Modem" on page C-9, the following parameters all appear in **[Initialization2]**.

DTR (Data Terminal Ready)

The DTR signal indicates to the modem when the computer is ready to send and receive information. Different modem commands cause the modem to interpret the DTR signal in various ways.

Select the modem command that configures the modem to hang up and enter the command state if the DTR signal turns off. The modem should not respond to incoming calls when the DTR signal is low. Do not configure the DTR command so that the modem resets when an on-to-off transition occurs. For most modems, the correct command is **&D2**.

CD (Carrier Detect)

The CD signal tracks the presence or absence of the carrier signal from the modem on the other end of the line. Some modem manuals refer to the CD as the DCD or RLSD. Modems can be configured to interpret the CD in several ways. Select the CD modem command that causes the modem to track the status of the carrier detect signal. For most modems, this command is **&C1**.

DSR (Data Set Ready)

The DSR is a signal the modem sends to the computer to indicate that the modem is ready to start a dialog. Configure the DSR for your modem to go

from on to off when a connection ends. For most modems, the correct command is **&S1**.

RTS/CTS

Several types of flow control are supported for most modems. RTS and CTS signals support bidirectional hardware flow control. (Some modem manuals refer to CTS as RFS.) Configure your modem so that it supports RTS/CTS flow control. The AT modem command for this feature varies from modem to modem. In Figure C-5, this command is **\Q2**. Also, check to ensure that the **[FlowControl]** section has **Default = "RTS/CTS"**.

Data Buffering

Data buffering prevents loss of data during transmission. It is essential for all communications in which the modem-to-computer (DTE) speed is faster than the modem-to-modem (DCE) speed. Select the data buffering AT command to enable data buffering for your modem. The AT modem command for this feature varies from modem to modem. The example in Figure C-5 has no data buffering parameter.

Automatic Answer

This parameter sets up the modem to automatically answer a call. For most modems, this command is **S0=n**, where n specifies the number of rings before the modem automatically answers the call. In Figure C-5 on page C-9, this command is **S0=2**.

Character Echo

The character echo feature can be configured to display or not display commands received by the modem when it is in the command state. Select the modem command that enables character echo. For most modems, this command is **E1**.

Be sure to complete the instructions shown in "General Instructions for Making Any Change to a PIF File" on page C-1.

What to Do If You Encounter Connection Errors

If you have tried to use a generic PIF file, a PIF file for a similar modem type, or one that you have modified, and you still encounter a connection error message, check your modem to ensure that you are using factory default settings. If not, reset your modem to use the factory default settings.

If none of the configuration methods discussed in this appendix work, change your modem to a modem that is listed in Table 2-3 on page 2-9.

Example Networking Services PIF File for the IBM 7855 Modem

Figure C-5 shows the PIF file for the IBM 7855 modem. PIF files contain multiple sections. Each line in a section has the form: keyword=value.

When you create a PIF file for your modem, you must change certain configuration values in the PIF file you are using as a template. Values you may need to change appear in bold type in Figure C-5.

```
[IBM7855]
DLL = WCLVPCM
Entry = StartVPCM
Autostart = YES
PIF = IBM7855.PIF
Title = "IBM 7855 Modem"

[Strings]
D1 = "Synchronicity"
D2 = "Modem Class"
D3 = "Auto Baud Detect"
D4 = "Serial Port Speed"
D5 = "Flow Control"
D1  = "First Initialization String"
D11 = "Second Initialization String"
D12 = "Dial Prefix String"
D13 = "Dial Suffix String"
D14 = "Success Response String"
D15 = "Failure Response String"
D16 = "Connection Prefix String"
D17 = "Connection Suffix String"
D18 = "Escape String"
D19 = "Hangup String"
D2  = "Ring Back String"
D21 = "Busy String"
D22 = "No Carrier String"
D23 = "No Dialtone String"
D24 = "No Answer String"
D25 = "Voice String"
D26 = "Ring String"
```

Figure C-5 (Part 1 of 7). Sample PIF File for the IBM 7855 Modem

Example Networking Services PIF File

```
H2 = "Select the fastest modulation standard that the modem supports."
H3 = "If Auto Baud Detect is on, then the Port Manager will
   automatically change the serial port speed to match the speed at
   which the modems connect.  If Auto Baud Detect is off, then the
   serial port speed will remain fixed."
H4 = "Enter the speed at which the computer will communicate
   with the modem. This speed may change if Auto Baud Detect is on."
H5 = "Select the type of flow control that is used to limit the
   flow of data between the computer and the modem."
H1  = "This is the first initialization string that is sent
   to the modem."
H11 = "This is the second initialization string that is sent
   to the modem."
H12 = "This is the first part of the string that commands
   the modem to dial a phone number.  The dial prefix string is
   followed by a phone number and the dial suffix string."
H13 = "This string finishes the dial command sent to the modem."
H14 = "The modem returns this response string if a
   command is successful."
H15 = "The modem returns this response string if a
   command is unsuccessful."
H16 = "This is the beginning of a connection response string
   returned by the modem when a connection is successful."
H17 = "This is the end of the connection response string
   returned by the modem."
H18 = "This is the escape sequence that is sent to modem to
   bring the modem back to the command state."
H19 = "This string commands the modem to hang up the phone."
H2  = "The modem returns this response string when it
   detects that the phone is ringing at the remote end."
H21 = "The modem returns this response string if the
   phone is busy at the remote end."
H22 = "The modem returns this response string if the switched
   connection is achieved, but no carrier signal is detected."
H23 = "The modem returns this response string if there is no
   dial tone on the telephone line."
H24 = "The modem returns this response string if the remote
   end did not answer the call."
H25 = "The modem returns this response string if the switched
   connection is achieved, but a person answered the call."
H26 = "The modem returns this response string if an incoming
   call is being received."
```

Figure C-5 (Part 2 of 7). Sample PIF File for the IBM 7855 Modem

```
M1 = “Unspecified”
M2 = “V.22 12   bps”
M3 = “V.22bis 24   bps”
M4 = “V.32 96   bps”
M5 = “V.32bis 144   bps”
M6 = “Proprietary”

ON = “On”
OFF = “Off”

F1 = “None”
F2 = “RTS/CTS”
F3 = “XON/XOFF”

[DialogType]
Type = String
Default = “ATCMD.DDF”
Editable = NO
Paneled = NO

[Synchronicity]
Display = D1
Default = “Asynchronous”
Editable = NO


[ModemClass]
Display = D2
Type = String
Default = “V.32”
Set = M1, M2, M3, M4, M5, M6
SetValues = “Unspecified”,“V.22”,“V.22bis”“V.32”,“V.32bis”,“Proprietary”
Optional = NO
Help = H2

[AutoBaudDetect]
Display = D3
Type = String
Default = “Off”
Set = ON, OFF
SetValues = “On”,“Off”
Optional = NO
Help = H3
```

Figure C-5 (Part 3 of 7). Sample PIF File for the IBM 7855 Modem

Example Networking Services PIF File

[SerialPortSpeed]
Display = D4
Type = Decimal
Default = 192
Range = 12 -1152
Optional = NO
Help = H4

[FlowControl]
Display = D5
Type = String
Default = "RTS/CTS"
Set = F1, F2, F3
Setvalues = "None","RTS/CTS","XON/XOFF"
Optional = NO
Help = H5

[Initialization1]

Display = D1
Type = String
StrLength = 255
Default = "ATI3\CR"
Optional = NO
Help = H1

[Initialization2]

Display = D11
Type = String
StrLength = 255
Default= "ATE1Q V1X4S7=6 S =2\\R2.\\Q2\\X .\\\N3\ \V1&D2&S1&R &C1&IO\CR"
Optional = NO
Help = H11

[DialPrefix]
Display = D12
Type = String
StrLength = 255
Default = "ATDT"
Optional = NO
Help = H12

Figure C-5 (Part 4 of 7). Sample PIF File for the IBM 7855 Modem

```
[DialSuffix]
Display = D13
Type = String
StrLength = 255
Default = "\CR"
Optional = NO
Help = H13

[Success]
Display = D14
Type = String
StrLength = 255
Default = "OK\CR\LF"
Optional = NO
Help = H14

[Failure]
Display = D15
Type = String
StrLength = 255
Default = "ERROR\CR\LF"
Optional = NO
Help = H15

[ConnectPrefix]
Display = D16
Type = String
StrLength = 255
Default = "CONNECT"
Optional = NO
Help = H16

[ConnectSuffix]
Display = D17
Type = String
StrLength = 255
Default = "\CR\LF"
Optional = NO
Help = H17

[Escape]
Display = D18
Type = String
StrLength = 255
Default = "+++"
Optional = NO
Help = H18
```

Figure C-5 (Part 5 of 7). Sample PIF File for the IBM 7855 Modem

Example Networking Services PIF File

```
[Hangup]
Display = D19
Type = String
StrLength = 255
Default = “ATH\CR”
Optional = NO
Help = H19

[RingBack]
Display = D2
Type = String
StrLength = 255
Default = “RING\CR\LF”
Optional = NO
Help = H2

[Busy]
Display = D21
Type = String
StrLength = 255
Default = “BUSY\CR\LF”
Optional = NO
Help = H21

[NoCarrier]
Display = D22
Type = String
StrLength = 255
Default = “NO CARRIER\CR\LF”
Optional = NO
Help = H22

[NoDialtone]
Display = D23
Type = String
StrLength = 255
Default = “NO DIALTONE\CR\LF”
Optional = NO
Help = H23

[NoAnswer]
Display = D24
Type = String
StrLength = 255
Default = “NO ANSWER\CR\LF”
Optional = NO
Help = H24
```

Figure C-5 (Part 6 of 7). Sample PIF File for the IBM 7855 Modem

Example Networking Services PIF File

```
[Voice]
Display = D25
Type = String
StrLength = 255
Default = "VOICE\CR\LF"
Optional = NO
Help = H25

[Ring]
Display = D26
Type = String
StrLength = 255
Default = "RING\CR\LF"
Optional = NO
Help = H26
```

Figure C-5 (Part 7 of 7). Sample PIF File for the IBM 7855 Modem

Example Networking Services PIF File

Appendix D. Networking Services Configuration Worksheets

A configuration worksheet must be completed by the Networking Services administrator before users can configure Networking Services on their workstation.

Users need the information on this worksheet when configuring Networking Services on their workstations. Information is entered on corresponding displays on the workstation. For more information about the configuration parameters needed to fill in the worksheet, refer to the *IBM APPC Networking Services for Windows: Configuration Parameters Reference for Administrators and Application Programmers*.

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Configuration Worksheet for the User

Complete one of the following worksheets that pertains to the connection type for the user.

User's name: _____

Connection type: **Asynchronous (ASYNC)**	
Configuration Parameter	***Data***
Required	
Local LU Name (fully-qualified)	
Modem Type	
Port Name	
Line Type	___ DIALED (Dialed point-to-point) ___ LEASED (Leased point-to-point)
Optional	
Link Name	
Local Station Address	
Telephone Number	
Receive Call	___ Check box ___ Do not check box

User's name: _____

Connection type: **Local area network (LAN)**	
Configuration Parameter	***Data***
Required	
Local LU Name (fully-qualified)	
Optional	
Link Name 1	
Remote LAN Address 1	
Link Name 2	
Remote LAN Address 2	
Link Name 3	
Remote LAN Address 3	
Link Name 4	
Remote LAN Address 4	
Link Name 5	
Remote LAN Address 5	
Link Name 6	
Remote LAN Address 6	

User's name: _____

Connection type: **Synchronous Data Link Control (SDLC)**	
Configuration Parameter	***Data***
Required	
Local LU Name (fully-qualified)	
Modem Type	
Port Name	
Line Type	___ DIALED (Dialed point-to-point) ___ LEASED (Leased point-to-point)
Optional	
Link Name	
Local Station Address	
Telephone Number	
Receive Call	___ Check box ___ Do not check box

User's name: _____

Connection type: **Twinaxial connection (TWINAX)**	
Configuration Parameter	***Data***
Required	
Local LU Name (fully-qualified)	
Optional	
Link Name	
Local Station Address	

User's name: _____

Connection type: **Multi-Protocol Transport Networking (MPTN)**	
Configuration Parameter	***Data***
Required	
Local LU Name (fully-qualified)	
Optional	
Link Name	

Appendix E. Examples of FMTNSD.LOG Trace File Formatted Output

This chapter presents the following trace examples:

Topic	Page
CPI-C API Trace	E-1
Line Flow Trace	E-6
NOF API Trace	E-9
Program Launcher Trace	E-14

All examples assume that you have initialized the **Trace** program. To initialize the **Trace** program, follow the steps in "Trace Program" on page 5-1.

CPI-C API Trace

The following trace is an example of the trace file that is created when you do the following to trace calls to the CPI-C API:

1. Double-click on the **Trace** icon in the IBM APPC Networking Services program group
2. Click on Setup on the action bar
3. Click on Configure on the pull-down menu
4. Select CPI Communications from the Components box
5. Select API from the Trace Options box
6. Click on OK
7. Click on Operation on the action bar
8. Click on Start Trace on the pull-down menu
9. Start a CPI-C program at your workstation

For information about the contents of the fields in the trace, refer to *CPI Communications Specification*. For information about ordering *CPI Communications Specification*, see "Bibliography" on page X-1.

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CPI-C API Trace Example

```
[1] 1 /24 1 : 3:45.39 src=NSWIN, len=32, rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Entering CMINIT
     conversation_ID                = @1437:2C94
     sym_dest_name                    = "ATELLOS2"
     return_code                    = @1437:2C9C

[2] 1 /24 1 : 3:45.55 src=NSWIN, len=2 , rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Leaving CMINIT
     conversation_ID                = #
     return_code                    = CM_OK

[3] 1 /24 1 : 3:45.61 src=NSWIN, len=3 , rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Entering CMSTPN
     conversation_ID                = #
     TP_name                          = "ATELLD"
     TP_name_length                 = 6
     return_code                    = @1437:2C9C

[4] 1 /24 1 : 3:45.61 src=NSWIN, len=2 , rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Leaving CMSTPN
     conversation_ID                = #
     return_code                    = CM_OK

[5] 1 /24 1 : 3:45.61 src=NSWIN, len=3 , rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Entering CMSMN
     conversation_ID                = #
     mode_name                        = "#INTER"
     mode_name_length               = 6
     return_code                    = @1437:2C9C

[6] 1 /24 1 : 3:45.61 src=NSWIN, len=2 , rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Leaving CMSMN
     conversation_ID                = #
     return_code                    = CM_OK

[7] 1 /24 1 : 3:45.61 src=NSWIN, len=24, rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Entering CMSSL
     conversation_ID                = #
     sync_level                     = CM_CONFIRM
     return_code                    = @1437:2C9C

[8] 1 /24 1 : 3:45.61 src=NSWIN, len=2 , rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Leaving CMSSL
     conversation_ID                = #
     return_code                    = CM_OK

[9] 1 /24 1 : 3:45.66 src=NSWIN, len=2 , rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Entering CMALLC
     conversation_ID                = #
     return_code                    = @1437:2C9C
```

CPI-C API Trace Example

```
[1 ] 1 /24 1 : 3:45.99 src=NSWIN, len=2 , rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Leaving CMALLC
      conversation_ID                 = #
      return_code                     = CM_OK

[11] 1 /24 1 : 3:45.99 src=NSWIN, len=28, rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Entering CMEPLN
      conversation_ID                 = #
      partner_LU_name                  = @1437: FE
      partner_LU_name_length          = @1437:2CA
      return_code                     = @1437:2C9C

[12] 1 /24 1 : 3:45.99 src=NSWIN, len=4 , rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Leaving CMEPLN
      conversation_ID                 = #
      partner_LU_name                  = "USIBMNR.NR5 52FI"
      partner_LU_name_length          = 16
      return_code                     = CM_OK

[13] 1 /24 1 : 3:45.99 src=NSWIN, len=24, rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Entering CMSPTR
      conversation_ID                 = #
      prepare_to_receive_type         = CM_PREP_TO_RECEIVE_FLUSH
      return_code                     = @1437:2B2C

[14] 1 /24 1 : 3:45.99 src=NSWIN, len=2 , rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Leaving CMSPTR
      conversation_ID                 = #
      return_code                     = CM_OK

[15] 1 /24 1 : 3:45.99 src=NSWIN, len=24, rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Entering CMSST
      conversation_ID                 = #
      send_type                        = CM_BUFFER_DATA
      return_code                     = @1437:2B2C

[16] 1 /24 1 : 3:45.99 src=NSWIN, len=2 , rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Leaving CMSST
      conversation_ID                 = #
      return_code                     = CM_OK

[17] 1 /24 1 : 3:46. 5 src=NSWIN, len=4 , rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Entering CMSEND
      conversation_ID                 = #
      buffer                          =
    1 226 2 57696E64 6F7773                 <..&.Windows.       >    <......>.?...        >
      send_length                     = 12
       control_information_received = @1437:2B28
      return_code                     = @1437:2B2C
```

CPI-C API Trace Example

```
[18] 1 /24 1 : 3:46. 5 src=NSWIN, len=24, rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Leaving CMSEND
      conversation_ID                    =  #
       control_information_received = CM_NO_CONTROL_INFO_RECEIVED
      return_code                        =  CM_OK

[19] 1 /24 1 : 3:46. 5 src=NSWIN, len=44, rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Entering CMRCV
      conversation_ID                    =  #
      buffer                             =  @1437:2B3
      requested_length                   =  3
      data_received                      =  @1437:2B2
      received_length                    =  @1437:2C6
      status_received                    =  @1437:2B24
       control_information_received = @1437:2B28
      return_code                        =  @1437:2B2C

[2 ] 1 /24 1 : 4: 4.23 src=NSWIN, len=67, rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Leaving CMRCV
      conversation_ID                    =  #
      buffer                             =
    1 22A 2 4F532F32 2 6F722  444F532     <.. .OS/2 or DOS >    <.........?......>
   2846616D 696C792  415 4929                <(Family API).      >    <../_.% ..&...      >
      data_received                      =  CM_COMPLETE_DATA_RECEIVED
      received_length                    =  29
      status_received                    =  CM_SEND_RECEIVED
       control_information_received = CM_NO_CONTROL_INFO_RECEIVED
      return_code                        =  CM_OK

[21] 1 /24 1 : 4: 4.23 src=NSWIN, len=81, rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Entering CMSEND
      conversation_ID                    =  #
      buffer                             =
   54686973 2 69732  612 7465 73742 6D    <This is a test m>    <......../......_>
   65737361 67652 73 656E742  62792 74    <essage sent by t>    <.../.....>... ..>
   68652 41 54454C4C 2E455845 2 7 726F    <he ATELL.EXE pro>    <......<<.......?>
  6772616D  2E                                  <gram.                  >   <../_.                  >
      send_length                        =  53
       control_information_received = @1437:2CA4
      return_code                        =  @1437:2C9C

[22] 1 /24 1 : 4: 4.23 src=NSWIN, len=24, rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Leaving CMSEND
      conversation_ID                    =  #
       control_information_received = CM_NO_CONTROL_INFO_RECEIVED
      return_code                        =  CM_OK

[23] 1 /24 1 : 4: 4.23 src=NSWIN, len=24, rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Entering CMSDT
      conversation_ID                    =  #
      deallocate_type                    =  CM_DEALLOCATE_SYNC_LEVEL
      return_code                        =  @1437:2C9C
```

CPI-C API Trace Example

```
[24] 1 /24 1 : 4: 4.23 src=NSWIN, len=2 , rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Leaving CMSDT
      conversation_ID                 =  #
      return_code                     =  CM_OK

[25] 1 /24 1 : 4: 4.28 src=NSWIN, len=2 , rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Entering CMDEAL
      conversation_ID                 =  @26B7:
      return_code                     =  @1437:2C9C

[26] 1 /24 1 : 4: 4.39 src=NSWIN, len=2 , rec_id= 8 1h, thr_id=5174:1
CPI-C Trc: Leaving CMDEAL
       conversation_ID                =  @1437:2C94 <Not valid>
      return_code                     =  CM_OK
```

Line Flow Trace Example

Line Flow Trace

The following trace is an example of the trace file that is created to trace line flows that occur when you use the ATELL program on a LAN connection:

1. Double-click on the **Trace** icon in the IBM APPC Networking Services program group
2. Click on Setup on the action bar
3. Click on Configure on the pull-down menu
4. Select LAN from the Components box
5. Select Line Flows from the Trace Options box
6. Click on OK
7. Click on Operation on the action bar
8. Click on Start Trace on the pull-down menu
9. Start the ATELL program at your workstation

For information about the contents of the fields in the trace, refer to *Systems Network Architecture Format and Protocol Reference Manual: Architectural Logic*. For information about ordering this manual, see “Bibliography” on page X-1.

```
[1] 1 /21 15: 9:33. 3 src=NSWIN, len=167, rec_id=14 3h, thr_id=1 446:1
   LAN: Line Trace
     <==SEND==          IBMTRNET      Primary                  4   7D44    D9         IFrame
                   TH:2D   1 5                        RH:6B8
   31  13 7 B B D1B3  1  8585 8  1 6 2    <1...............>    <......J...ee....>
              4 23     F E4E2C9C2    <........#.......>    <............USIB>
   D4D5D94B E6C9D3C4 C5D9F131    9 2E2    <...K.......1....>    <MNR.WILDER1....S>
   D5C1E2E5 C3D4C7 9  3 1AF1F C5A FBEF    <................>    <NASVCMG.....E...>
   7C1  4E4 E2C9C2D4 D5D94BE6 C9D3C4C5    <|.........K.....>    <@..USIBMNR.WILDE>
   D9F1 A13   9626CF 281   43     1 E4    <......&.(..C....>    <R1...o.........U>
   E2C9C2D4 D5D94BD5 D9F5F F5 F2C6C96     <......K........ >    <SIBMNR.NR5 52FI->
   18C4AF1F C5A FBEF 7C FE4E2 C9C2D4D5    <........|.......>    <.D..E...@.USIBMN>
   D94BE6C9 D3C4C5D9 F1                          <.K.......            >    <R.WILDER1            >

[2] 1 /21 15: 9:33. 3 src=NSWIN, len=13 , rec_id=14 3h, thr_id=1 446:1
   LAN: Line Trace
     ==RECV==>          IBMTRNET      Primary                  1   5A89  211         IFrame
                   TH:2D   5 1                        RH:EB8
   31  13 7 B B 5 B3  1 18585 81 1 6 2    <1.....P.........>    <......&...eea...>
              14 23      2B   9 2    <........#...+...>    <................>
   E2D5C1E2 E5C3D4C7  2 3 211  5E4E2C9    <................>    <SNASVCMG.....USI>
   C2D4D5D9 4BD5D9F5 F F5F2C6 C9 A13      <....K...........>    <BMNR.NR5 52FI...>
   4BDC2A4  FDC66B7C     6 18 C4AF1FC5    <K. @..k|.. .....>    <... .F,@..-.D..E>
   A FBEF7C  FE4E2C9 C2D4D5D9 4BE6C9D3    <...|........K...>    <...@.USIBMNR.WIL>
  C4C5D9F1                                       <....                  >   <DER1                  >
```

Line Flow Trace Example

```
[3] 1 /21 15: 9:33. 3 src=NSWIN, len=7 , rec_id=14 3h, thr_id=1 446:1
   LAN: Line Trace
     <==SEND==          IBMTRNET      Primary                  4   7D44    D9         IFrame
                   TH:2C   1 5     1                    RH: B912
    F 5 2FF    3D       2 6F1          <................>    <......}....1....>
   19121  2           8   4    4   8    <................>    <................>
  7BC9D5E3  C5D94 4                                  <{.....@@              >   <#INTER                  >

[4] 1 /21 15: 9:33. 9 src=NSWIN, len=55, rec_id=14 3h, thr_id=1 446:1
   LAN: Line Trace
     ==RECV==>          IBMTRNET      Primary                  1   5A89  211         IFrame
                   TH:2C   5 1     1                    RH: 391 1
    19121   A          8    4   4      <................>    <................>
   87BC9D5 E3C5D94  4                                <.{.....@@              >    <.#INTER                  >

[5] 1 /21 15: 9:33. 9 src=NSWIN, len=3 , rec_id=14 3h, thr_id=1 446:1
   LAN: Line Trace
     ==RECV==>          IBMTRNET      Primary                  1   5A89  211         IFrame
                   TH:2D   5 1                          RH:83 1
      <buffer size is zero>

[6] 1 /21 15: 9:33. 9 src=NSWIN, len=3 , rec_id=14 3h, thr_id=1 446:1
   LAN: Line Trace
     <==SEND==          IBMTRNET      Primary                  4   7D44    D9         IFrame
                   TH:2C   1 5     1                    RH:83 1
      <buffer size is zero>

[7] 1 /21 15: 9:33.31 src=NSWIN, len=167, rec_id=14 3h, thr_id=1 446:1
   LAN: Line Trace
     <==SEND==          IBMTRNET      Primary                  4   7D44    D9         IFrame
                   TH:2D   1 4                          RH:6B8
   31  13 7 B B D1B3  7  8686 8  7 6 2    <1................>    <......J...ff....>
              4 23     F E4E2C9C2    <........#.......>    <............USIB>
   D4D5D94B E6C9D3C4 C5D9F131    9 27B    <...K.......1...{>    <MNR.WILDER1....#>
   C9D5E3C5 D94 4  9  3 1AF1F C5A1FBEF    <.....@@.........>    <INTER    .....E ..>
   7C1  4E4 E2C9C2D4 D5D94BE6 C9D3C4C5    <|.........K.....>    <@..USIBMNR.WILDE>
   D9F1 A13   A229CF 281   43     1 E4    <......).(..C....>    <R1...s.........U>
   E2C9C2D4 D5D94BD5 D9F5F F5 F2C6C96     <......K........ >    <SIBMNR.NR5 52FI->
   18C4AF1F C5A1FBEF 7C FE4E2 C9C2D4D5    <........|.......>    <.D..E ..@.USIBMN>
   D94BE6C9 D3C4C5D9 F1                            <.K.......              >    <R.WILDER1              >
```

Line Flow Trace Example

```
[8] 1 /21 15: 9:33.31 src=NSWIN, len=13 , rec_id=14 3h, thr_id=1 446:1
   LAN: Line Trace
     ==RECV==>          IBMTRNET      Primary                  1   5A89  211          IFrame
                    TH:2D   4 1                          RH:EB8
   31  13 7 B B 5 B3  7 78686 87 7 6 2    <1.....P.........>    <......&...ffg...>
              14 23       2B   9 2    <........#...+...>    <................>
   7BC9D5E3 C5D94 4   2 3 211  5E4E2C9    <{.....@@........>    <#INTER    .....USI>
   C2D4D5D9 4BD5D9F5 F F5F2C6 C9 A13      <....K...........>    <BMNR.NR5 52FI...>
   48E7 9A3 D53F 2B8     6 18 C4AF1FC5    <H....?.... .....>    <.X.tN.....-.D..E>
   A1FBEF7C  FE4E2C9 C2D4D5D9 4BE6C9D3    <...|........K...>    < ..@.USIBMNR.WIL>
  C4C5D9F1                                          <....                    >   <DER1                    >

[9] 1 /21 15: 9:33.31 src=NSWIN, len=65, rec_id=14 3h, thr_id=1 446:1
   LAN: Line Trace
     <==SEND==          IBMTRNET      Primary                  4   7D44    D9         IFrame
                    TH:2C   1 4     1                    RH: B912
   13 5 2FF    3D1   4  6C1E3 C5D3D3C4    <........@.......>    <......J. .ATELLD>
          1 12FF 1  226 257 696E646F    <.........&.Windo>    <.............>.?>
  7773                                              <ws.                     >   <...                     >

[1 ] 1 /21 15: 9:38.19 src=NSWIN, len=3 , rec_id=14 3h, thr_id=1 446:1
   LAN: Line Trace
     ==RECV==>          IBMTRNET      Primary                  1   5A89  211          IFrame
                    TH:2D   4 1                          RH:83 1
      <buffer size is zero>

[11] 1 /21 15: 9:38.19 src=NSWIN, len=63, rec_id=14 3h, thr_id=1 446:1
   LAN: Line Trace
     ==RECV==>          IBMTRNET      Primary                  1   5A89  211          IFrame
                    TH:2C   4 1     1                    RH: 3912
    2112FF  1 22A 2 4F532F32 2 6F722     <.!.... .OS/2 or >    <.............?..>
   444F532  2846616D 696C792  415 4929    <DOS (Family API)>    <...../_.% ..&..>
                                                    <.                       >   <.                       >

[12] 1 /21 15: 9:38.25 src=NSWIN, len=87, rec_id=14 3h, thr_id=1 446:1
   LAN: Line Trace
     <==SEND==          IBMTRNET      Primary                  4   7D44    D9         IFrame
                    TH:2C   1 4     2                    RH: 3A  1
    3912FF 54686973 2 69732  612 7465    <.9..This is a te>    <............/...>
   73742 6D 65737361 67652 73 656E742     <st message sent >    <..._.../.....>..>
   62792 74 68652 41 54454C4C 2E455845    <by the ATELL.EXE>    <. ........<<....>
   2 7 726F 6772616D 2E                          < program.            >    <...?../_.            >

[13] 1 /21 15: 9:38.25 src=NSWIN, len=3 , rec_id=14 3h, thr_id=1 446:1
   LAN: Line Trace
     ==RECV==>          IBMTRNET      Primary                  1   5A89  211          IFrame
                    TH:2C   4 1  8                       RH:83A
      <buffer size is zero>
```

NOF API Trace

The following trace is an example of the trace file that is created when you do the following to trace calls made to the NOF API:

1. Double-click on the **Trace** icon in the IBM APPC Networking Services program group
2. Click on Setup on the action bar
3. Click on Configure on the pull-down menu
4. Select NOF from the Components box
5. Select API from the Trace Options box
6. Click on OK
7. Click on Operation on the action bar
8. Click on Start Trace on the pull-down menu
9. Start a program on your workstation that uses NOF API verbs

For information about the contents of the fields in the trace, refer to the *IBM APPC Networking Services for Windows: Application Programmer's Reference*.

This example does not show the NOF calls used to display status information, such as NSINFO.

Initializing the LU

The following section of the trace file traces the NOF API calls to initialize the LU.

```
[1] 1 /27 15: 5:12.41 src=NSWIN, len=17, rec_id=1C 1h, thr_id=6294:1
Trc: Entering NSSTART
     Version                    =

[2] 1 /27 15: 5:12.57 src=NSWIN, len=28, rec_id=1C 1h, thr_id=6734:1
Trc: Entering NSDEFMO
     Version                    =
     ModeName                     = "SNASVCMG"
     MaxRU                        = 256
     RcvPacingWin                 = 1
     MaxNegSess                   = 2
     MinNegConWin                 = 1

[3] 1 /27 15: 5:12.63 src=NSWIN, len=28, rec_id=1C 1h, thr_id=6734:1
Trc: Entering NSDEFMO
     Version                    =
     ModeName                     = "BLANK"
     MaxRU                        =
     RcvPacingWin                 = 2
     MaxNegSess                   = 8
     MinNegConWin                 = 4
```

NOF API Trace Example

```
[4] 1 /27 15: 5:12.63 src=NSWIN, len=28, rec_id=1C 1h, thr_id=6734:1
Trc: Entering NSDEFMO
     Version                  =
     ModeName                   =  "#BATCH"
     MaxRU                      =  256
     RcvPacingWin               =  3
     MaxNegSess                 =  8
     MinNegConWin               =  4

[5] 1 /27 15: 5:12.63 src=NSWIN, len=28, rec_id=1C 1h, thr_id=6734:1
Trc: Entering NSDEFMO
     Version                  =
     ModeName                   =  "#INTER"
     MaxRU                      =
     RcvPacingWin               =  7
     MaxNegSess                 =  8
     MinNegConWin               =  4
[6] 1 /27 15: 5:12.63 src=NSWIN, len=211, rec_id=1C 1h, thr_id=6734:1
Trc: Entering NSDEFSI
     Version                  =  1
     SymDestName                =       APING
     PartnerLUName              =  "USIBMNR.NR5 52FI"
     ModeName                   =  "#INTER"
     TPName                     =  "APINGD"
     ConvSecurity               =
     UserID                     =  ""
     Password                   =  "       "

[7] 1 /27 15: 5:12.68 src=NSWIN, len=211, rec_id=1C 1h, thr_id=6734:1
Trc: Entering NSDEFSI
     Version                  =  1
     SymDestName                =       ATELL
     PartnerLUName              =  "USIBMNR.NR5 52FI"
     ModeName                   =  "#INTER"
     TPName                     =  "ATELLD"
     ConvSecurity               =
     UserID                     =  ""
     Password                   =  "       "


[8] 1 /27 15: 5:12.68 src=NSWIN, len=211, rec_id=1C 1h, thr_id=6734:1
Trc: Entering NSDEFSI
     Version                  =  1
     SymDestName                =       AFTP
     PartnerLUName              =  "USIBMNR.NR5 52FI"
     ModeName                   =  "#BATCH"
     TPName                     =  "AFTPD"
     ConvSecurity               =  1
     UserID                     =  ""
     Password                   =  "       "
```

```
[9] 1 /27 15: 5:12.68 src=NSWIN, len=346, rec_id=1C 1h, thr_id=6734:1
Trc: Entering NSDEFTP
     Version                  =
     TPName                     =  "APINGD"
     FileSpec                 =  "D:\NSW\SAMPLES\APINGD.EXE"
     RcvAllocTimeout          =  22675576
     IncAllocTimeout          =  22675576

[1 ] 1 /27 15: 5:12.68 src=NSWIN, len=346, rec_id=1C 1h, thr_id=6734:1
Trc: Entering NSDEFTP
     Version                  =
     TPName                     =  "ATELLD"
     FileSpec                 =  "D:\NSW\SAMPLES\ATELLD.EXE"
     RcvAllocTimeout          =  22675576
     IncAllocTimeout          =  22675576

[11] 1 /27 15: 5:12.74 src=NSWIN, len=16, rec_id=1C 1h, thr_id=6294:1
Trc: Leaving NSSTART
     ReturnCode               =
     WhichParmError           =     h
     Links                    =  FFFFFFFFFFFFh
```

Activating a New Link

The following section of the trace file traces the NOF API calls to establish a LAN connection.

```
[1] 1 /27 15: 5:36.74 src=NSWIN, len=4 , rec_id=1C 1h, thr_id=6294:1
Trc: Entering NSCONLAN
     Version                  =
     LinkName                   =  "LINK5 52"
     RemAddr                    =  "1   5A89211 "
     RemSAP                     =  ""
     ConnRetry                =  2
     ConnTimer                =  1

[2] 1 /27 15: 5:46.86 src=NSWIN, len=1 , rec_id=1C 1h, thr_id=6294:1
Trc: Leaving NSCONLAN
     ReturnCode               =
     WhichParmError           =     h
```

NOF API Trace Example

Activating LU Sessions

The following section of the trace file traces the NOF API calls to activate a session.

```
[1] 1 /27 15: 6:  .85 src=NSWIN, len=92, rec_id=1C 1h, thr_id=6294:1
Trc: Entering NSACT
     Version                  =  1
     LuName                     =  "USIBMNR.NR5 52FI"
     ModeName                   =  "#INTER"
     LinkName                 =  "LINK5 52"
     MinSessions              =  1
     UserID                   =  ""
     Password                 =  "        "
     DefineOnly               =

[2] 1 /27 15: 6:  .96 src=NSWIN, len=22, rec_id=1C 1h, thr_id=6294:1
Trc: Leaving NSACT
     ReturnCode               =
     WhichParmError           =     h
     AllocateRC               =
     SenseCode1               =     h
     SenseCode2               =     h
     ActivatedSessions        =  1
     TotalUserSessions        =  1
     AutoActivateLimit        =  1
```

Deactivating LU Sessions

The following section of the trace file traces the NOF API calls to deactivate a session.

```
[1] 1 /27 15: 6: 8.16 src=NSWIN, len=31, rec_id=1C 1h, thr_id=6294:1
Trc: Entering NSDEACT
     Version                  =
     LuName                     =  "USIBMNR.NR5 52FI"
     Force                    =

[2] 1 /27 15: 6: 8.49 src=NSWIN, len=1 , rec_id=1C 1h, thr_id=6294:1
Trc: Leaving NSDEACT
     ReturnCode               =
     WhichParmError           =     h
```

Disconnecting a Link

The following section of the trace file traces the NOF API calls to detach a LAN connection.

```
[1] 1 /27 15: 6:11.95 src=NSWIN, len=22, rec_id=1C 1h, thr_id=6294:1
Trc: Entering NSDISCON
     Version                  =
     LinkName                  =  "LINK5 52"

[2] 1 /27 15: 6:11.95 src=NSWIN, len=1 , rec_id=1C 1h, thr_id=6294:1
Trc: Leaving NSDISCON
     ReturnCode               =
     WhichParmError           =     h
```

Terminating the LU

The following section of the trace file traces the NOF API calls to terminate the LU.

```
[1] 1 /27 15: 6:21.56 src=NSWIN, len=13, rec_id=1C 1h, thr_id=6294:1
Trc: Entering NSSTOP
     Version                  =
     Force                    =

[2] 1 /27 15: 6:21.56 src=NSWIN, len=31, rec_id=1C 1h, thr_id=6294:1
Trc: Entering NSDEACT
     Version                  =
     LuName                    =  " ALL"
     Force                    =


[3] 1 /27 15: 6:21.56 src=NSWIN, len=31, rec_id=1C 1h, thr_id=6294:1
Trc: Leaving NSDEACT
     ReturnCode               =
     WhichParmError           =     h

[4] 1 /27 15: 6:21.56 src=NSWIN, len=22, rec_id=1C 1h, thr_id=6294:1
Trc: Entering NSDISCON
     Version                  =
     LinkName                  =  " ALL"

[5] 1 /27 15: 6:21.56 src=NSWIN, len=1 , rec_id=1C 1h, thr_id=6294:1
Trc: Leaving NSDISCON
     ReturnCode               =
     WhichParmError           =     h

[6] 1 /27 15: 6:21.56 src=NSWIN, len=1 , rec_id=1C 1h, thr_id=6294:1
Trc: Leaving NSSTOP
     ReturnCode               =
     WhichParmError           =     h
```

Program Launcher Trace Example

Program Launcher Trace

The following trace is an example of the trace file that is created when you do the following to trace the activity of the Program Launcher:

1. Double-click on the **Trace** icon in the IBM APPC Networking Services program group
2. Click on Setup on the action bar
3. Click on Configure on the pull-down menu
4. Select Program Launcher from the Components box
5. Select Launches from the Trace Options box
6. Click on OK
7. Click on Operation on the action bar
8. Click on Start Trace on the pull-down menu
9. Wait for an incoming Attach to be received. This example shows that one Attach was received for the APINGD program. (The remote computer used the APING program.)

For more information about the Program Launcher, refer to the *IBM APPC Networking Services for Windows: Application Programmer's Reference*.

```
[1] 1 /21 15:44:19.54 src=NSWIN, len=36, rec_id=3   h, thr_id=6878:1
     File spec and parameters    = "D:\NSW\SAMPLES\APINGD.EXE"
    conv_handle                  =  2A5F:
    WinExec  handle              =  24D6h
```

Bibliography

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Publications

To order IBM publications, contact your IBM marketing representative or IBM authorized dealer.

Where to Find Networking Services Information

For information on Networking Services for Windows, refer to the following publications:

IBM APPC Networking Services for Windows: Getting Started, SC31-8124

IBM APPC Networking Services for Windows: Administrator's Guide, SC31-8125

IBM APPC Networking Services for Windows: Application Programmer's Reference, SC31-8126

IBM APPC Networking Services for Windows: Configuration Parameters Reference for Administrators and Application Programmers, SC31-8138.

Where to Find Related Information

Networking Services supports the Common Programming Interface for Communications (CPI-C). For more information on CPI-C, refer to either of the following:

CPI Communications Reference, SC26-4399. This book contains the CPI-C specifications as well as appendices on various IBM operating environments that support CPI-C, and an extensive bibliography of related publications for each of these environments.

CPI Communications Specification, SC31-6180. This book also contains the CPI-C specifications. It is the result of the CPI-C Implementers' Workshop, a group of both IBM and non-IBM product implementers.

For information on APPC publications, classes, platforms, and applications offered by IBM and other companies, refer to *The APPC Resource Book*, G325-0055.

For information on Systems Network Architecture (SNA) and APPC, refer to the following publications:

Program-to-Program Communication in System Application Architecture (SAA) Environments, GG24-3482

Systems Network Architecture Technical Overview, GC30-3073

Systems Network Architecture Formats and Protocol Reference Manual: Architectural Logic, SC30-3112

SAA/LU 6.2: Distributed Networks and Applications by John J. Edmunds (McGraw-Hill, 1992, ISBN 0-07-019022-4).

For information on registering network identifiers (NETIDs), refer to *Registration Process for SNA Netids: User's Guide for SNA Network Registry*, ZZ27-7425.

For information on APPC and APPN implementations, refer to the following publications:

APPC and CPI-C Product Implementations GG24-3520. This book shows how different products implemented LU 6.2 and compares the different product implementations with the LU 6.2 architecture.

APPN Architecture and Product Implementations, GG24-3669. This book contains a tutorial on APPN, as well as an overview of the various product implementations.

For information on APPC programming, refer to the following publication:

PC Support/400: Application Program Interface Reference, SC41-8254

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Bibliography

For information on Client Access/400 for Windows 3.1, refer to the following publications:

Client Access/400 for Windows 3.1: Getting Started, SC41-3530

Client Access/400 for Windows 3.1: API and Technical Reference, SC41-3531

For information on APPC Application Suite, refer to the following publications:

APPC Application Suite Administration, SC31-6533

APPC Application Suite Programming Reference, SC31-6534

APPC Application Suite User's Guide, SC31-6532

For information on BookManager Library Reader for Windows, refer to the following publications:

BookManager Library Reader for Windows: User's Guide (softcopy only)

BookManager Library Reader for Windows: Online Reference (softcopy only)

BookManager Library Reader for Windows: Quick Reference, SC34-3067.

For information on factors that affect Networking Services performance on a LAN, refer to *AS/400 Communications: Local Area Network Guide*, SC41-0004.

For information on synchronous data link control (SDLC), refer to *Synchronous Data Link Control Concepts*, GA27-3093.

For information on International Standards Organization (ISO) standards, contact:

American National Standards Institute
1430 Broadway
New York, NY 10018

Configuration Information for Other Platforms: For detailed information about configuring platforms other than Networking Services, refer to the following publications:

AIX SNA Services/6000

- *AIX SNA Services/6000 Reference*, SC31-7014
- *Using AIX SNA Services/6000*, SC31-7002

APPC/MVS

- *MVS/ESA Planning: APPC Management*, GC28-1110

APPC/VM

- *VM/ESA Connectivity Planning, Administration, and Operation*, SC24-5448

APPC and APPN

- *IBM Multi-Platform APPC Configuration Guide*, GG24-4485

AS/400*

- *AS/400 Communications APPC Guide*, SC41-8189
- *AS/400 Communications APPN Guide*, SC41-8188
- *AS/400 Programming: Control Language Reference*, SC41-0030
- *AS/400 Programming Reference Summary*, SC21-8076

CICS/ESA*

- *CICS/ESA: Resource Definition (Online)*, SC33-0666
- *CICS/ESA: System Definition Guide*, SC33-0664

OS/2

- *Communications Manager/2 APPC Programming Guide and Reference*, SC31-6160
- *Communications Manager/2 Configuration Guide*, SC31-6171
- *Communications Manager/2 Installation, Configuration and Administration*, SBOF-4386

Glossary

This glossary defines terms and abbreviations used in this book. If you do not find the term you are looking for, refer to the index or to the *IBM Dictionary of Computing*, SC20-1699.

A

action bar. The highlighted area at the top of a panel that contains the choices available in the application program.

activate. (1) To make an object, program, system, or device available for use. (2) To make a link for a communication session active.

active. (1) Operational. (2) Pertaining to a file, page, or program that is in main storage or memory, as opposed to a file, page, or program that must be retrieved from auxiliary storage. (3) Pertaining to a node or device that is connected or is available for connection to another node or device.

adapter. (1) A piece of hardware that connects a computer and an external device. (2) See *communication adapter*.

Advanced Program-to-Program Communication (APPC). (1) The general facility characterizing the LU 6.2 architecture and its various implementations in products. (2) Sometimes used to refer to the LU 6.2 architecture and its product implementations as a whole, or an LU 6.2 product feature in particular, such as an *APPC application program interface*.

American National Standard Code for Information Interchange (ASCII). The standard code with a coded character set consisting of 7-bit coded characters (8 bits including parity check), used for information interchange among data processing systems and data communication systems. The ASCII set consists of control characters and graphic characters.

API. Application program interface.

application. A program or set of programs that perform a task.

application program interface (API). A formally-defined programming language interface between a system control program or a licensed program and the user of a program.

ASCII. American National Standard Code for Information Interchange.

asynchronous. Data transmission in which transmission of a character or block of characters can begin at any time but in which the bits that represent the character or block have equal time duration. Contrast with *synchronous*.

B

buffer. (1) A routine or storage used to compensate for a difference in rate or flow of data, or time or occurrence of events, when transferring data from one device to another. (2) An area of storage that is temporarily reserved for use in performing an input/output operation, into which data is read or from which data is written.

C

client. (1) A user. (2) A functional unit that receives shared services from a server.

communication. The transmission and reception of data.

communication adapter. A circuit card with associated software that enables a processor, controller, or other device to be connected to a network.

communications port. (1) An access point for data entry or exit to or from a communication device such as a terminal. (2) On a personal computer, a synchronous or asynchronous serial port to which a modem can be attached. Synonymous with *port*.

communications line. The physical link, such as wire or a telephone circuit, that connects one or more workstations to a communications control unit or that connects one control unit to another.

Communications Manager/2. A component of OS/2 that lets a workstation connect to a remote computer and use the resources of that computer as well as the resources of other personal computers to which the workstation is attached. Communications Manager provides APIs so that users can develop their own applications.

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Glossary

configuration. (1) The arrangement of a computer system or network as defined by the nature, number, and the chief characteristics of its functional units. More specifically, the term configuration may refer to a hardware configuration or a software configuration. (2) The devices and programs that make up a system, subsystem, or network.

CPI-C. Common Programming Interface for Communications.

D

default. An alternative value, attribute, or option that is assumed when none has been specified.

E

end user. The ultimate source or destination of application data flowing through an SNA network. An end user can be an application program or a workstation operator.

Ethernet. A 10-megabit baseband local area network that allows multiple stations to access the transmission medium at will without prior coordination, avoids contention by using carrier sense and deference, and resolves contention by using collision detection and transmission. Ethernet uses carrier sense multiple access with collision detection (CSMA/CD).

F

file. A set of related records treated as a unit.

K

KB. Kilobyte.

L

LAN. Local area network.

leased line. See *nonswitched line*.

line flow. A recording of the bytes exchanged by a pair of link stations.

line trace. The ability to log online diagnostic information.

link. (1) In computer programming, the part of a computer program, in some cases a single instruction or an address, that passes control and parameters between separate portions of the computer program. (2) In computer programming, to provide a link. (3) In SNA, the combination of the link connection and the link stations joining network nodes.

Note: A link connection is the physical medium of transmission for example, a telephone wire or a microwave beam. A link includes the physical medium of transmission, the protocol, and associated devices and programming; it is both logical and physical.

local. Residing on the user's node or workstation.

local area network (LAN). (1) Two or more computing units connected for local resource sharing. (2) A network in which communications are limited to a moderate-sized geographic area such as a single office building, warehouse, or campus, and that do not extend across public rights-of-way.

local LU. Local logical unit.

logical unit (LU). A port providing formatting, state synchronization, and other high-level services through which an end user communicates with another end user over an SNA network.

logical unit 6.2 (LU 6.2). A particular type of SNA LU that provides a connection between resources and transactions programs running on different network nodes. These logical units interact with each other as peers. See *APPC*.

low-entry networking. A capability in type 2.1 nodes allowing them to be directly attached to one another using peer-to-peer protocols and allowing them to support multiple and parallel sessions between logical units.

LU. Logical unit.

LU 6.2. Logical unit 6.2.

M

MB. Megabyte.

message log. In Networking Services, an ASCII text file named MSGLOG.NSD. This file contains error messages and informational messages logged by Networking Services.

modem. A device that converts digital data from a computer to an analog signal that can be transmitted on a telecommunication line and converts the received analog signal to digital data for the computer.

N

NDIS. Network driver interface specification.

network. A group of nodes and the links interconnecting them.

nonswitched line. A telecommunication line on which connections do not have to be established by dialing. Contrast with *switched line*.

P

parameter. (1) A variable that is given a constant value for a specified application and that may denote the application. (2) An item for which the operator specifies a value or for which the system provides a value. (3) A name in a procedure that is used to refer to an argument passed to that procedure.

partner logical unit. In Systems Network Architecture (SNA), the remote participant in a session.

path. (1) The route used to locate files on a disk or diskette, consisting of a drive and directories. (2) In the IBM Token-Ring Network, a route between any two nodes. (3) In a data base, a sequence of segment occurrences from the root segment to an individual segment. (4) In SNA, the series of path control network components (path control and data link control) that are traversed by the information exchanged between two NAUs. A path consists of a virtual route and its route extension, if any.

peer-to-peer. The communication between two SNA LUs that is not managed by a host. Commonly used when referring to LU 6.2 nodes.

port. A port represents a physical connection to the link hardware. A port is sometimes referred to as an adapter. There may be one or more ports controlled by a single DLC process.

protocol. (1) A specification for the format and relative timing of information exchanged between communicating parties. (2) The set of rules governing the operation of functional units of a communication system that must be followed if communication is to be achieved. (3) In SNA, the meanings of, and the sequencing rules for, requests and responses used for managing the network, transferring data, and synchronizing the states of network components.

S

SDLC. Synchronous Data Link Control.

sense data. In SNA, a set of data sent with a negative response, indicating the reason for the response.

server. (1) On a local area network (LAN), a data station that provides facilities to other data stations. (2) A computer that shares its resources with other computers on the network.

SNA. Systems Network Architecture.

SNA network. The part of a user-application network that conforms to the formats and protocols of Systems Network Architecture. It enables reliable transfer of data among end users and provides protocols for controlling the resources of various network configurations. The SNA network consists of network accessible units; boundary function, gateway function, and intermediate session routing function components; and the transport network. An SNA network can use subarea protocols or APPN protocols or both.

switched line. A telecommunication line in which the connection is established by dialing. Contrast with *nonswitched line*.

synchronous. In data communication, a method of transmission in which the sending and receiving of characters are controlled by timing signals. Contrast with *asynchronous*.

synchronous data link control (SDLC). A discipline for managing synchronous, code-transparent, serial-by-bit information transfer over a link connection. Transmission exchanges may be duplex or half-duplex over switched or nonswitched links. The configuration of

the link connection may be point-to-point, multipoint, or loop. SDLC conforms to subsets of the Advanced Data Communication Control Procedures (ADCCP) of the American National Standards Institute and High-Level Data Link Control (HDLC) of the International Standards Organization.

Systems Network Architecture (SNA). The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through the networks and controlling the configuration and operation of networks.

The purpose of the layered structure of SNA is to allow the ultimate origins and destinations of information to be independent of, and unaffected by, the way in which the specific SNA network services and facilities used for information exchange are provided.

T

TDLC. Twinaxial data link control.

token-ring. A network with a ring topology that passes tokens from one attaching device to another; for example, the IBM Token-Ring Network.

trace. (1) A record of data that provides a history of events that occurred in a system. (2) The process of recording the sequence in which the statements in a program are executed and, optionally, are the values of the program variables used in the statements.

twinaxial. See *twinaxial data link control*.

twinaxial data link control (TDLC). A communications function that allows personal computers, attached to the workstation controller by way of twinaxial cable, to use APPC.

V

V.25 bis automatic dialing. A modem with the capability to switch into data mode automatically after dialing for the initial connection.

W

workstation. A terminal or personal computer, usually one that is connected to a mainframe or within a network, at which a user can run applications.

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