



IBM Netfinity ESCON Adapter

Installation Guide

Second Edition (for use with CD version 1.1)

OPTIONS

by IBM

Note: Before using this information and the product it supports, be sure to read the general information under “Notices” on page 205.

Second Edition (February 1999) used with CD Version 1.1

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SAFETY: READ FIRST

Please read the international safety manual included with this adapter prior to attempting any installation.

ABOUT THIS PUBLICATION

This publication provides the information necessary to install and configure the IBM Netfinity ESCON adapter to connect a Netfinity server to an IBM mainframe.

The following terms are used as synonyms for the Netfinity ESCON adapter in this publication and in some software installation screens:

- IBM PCI ESCON Adapter
- PCI ESCON adapter
- ESCON adapter
- adapter

Who Should Use This Publication

This publication is intended for the system administrator of a Netfinity server responsible for configuring the server to communicate with an MVS, VM, or DOS/VSE mainframe.

How to Use This Publication

This publication is organized into distinct chapters based on operating environment. Refer to those chapters specific to the software installed on your server.

What is Included in This Publication

This user's guide contains the following chapters:

Chapter 1. INTRODUCTION - This chapter gives an overview of the Netfinity ESCON adapter implementation.

Chapter 2. INSTALLING THE NETFINITY ESCON ADAPTER - This chapter details installation of the ESCON adapter into a Netfinity server.

Chapter 3. INSTALLING DRIVER SOFTWARE - This chapter details installation of the adapter drivers for both Microsoft's Windows NT Server and Novell's NetWare.

Chapter 4. DEFINING THE ESCON CONFIGURATION – This chapter details configuration of the adapter on the ESCON channel.

Chapter 5. MULTI-PATH CHANNEL + – This chapter provides instruction for installing MPC+ software and for configuring MPC transmission groups on the Netfinity Server.

Chapter 6. TCP/IP DIRECT CONNECT – This chapter covers use of the Netfinity ESCON Adapter for point-to-point connections between the mainframe's TCP/IP stack and Microsoft's TCP/IP on a Windows NT Netfinity server. More specifically, this chapter discusses the installation and configuration of TCP/IP Direct Connect (formerly known as VPPA) software.

Chapter 7. COMMUNICATIONS SERVER FOR WINDOWS NT - This chapter discusses installation of Channel Data Link Control into Communications Server for Windows NT (CS/NT) and configuration of CS/NT to use the Netfinity ESCON Adapter.

Chapter 8. SNA SERVER FOR WINDOWS NT - This chapter details installation of the Channel Data Link Service into Microsoft's SNA Server and the configuration of SNA Server to use the Netfinity ESCON Adapter.

Chapter 9. TCP/IP PASSTHROUGH FOR WINDOWS NT - This chapter details the installation and use of TCP/IP Passthrough for Windows NT with the Netfinity ESCON Adapter.

Chapter 10. NETWARE FOR SAA - This chapter details the configuration of NetWare, NetWare for SAA, and intraNetWare for SAA (v3.0) to use the Netfinity ESCON Adapter.

Chapter 11. TCP/IP PASSTHROUGH FOR NETWARE - This chapter details the installation and configuration of TCP/IP Passthrough for NetWare with the Netfinity ESCON Adapter.

Chapter 12. IMPLEMENTING SAP R/3 – This chapter provides an overview of the System/390 SAP R/3 implementation. It then provides instructions for configuring the appropriate ESCON links to implement the System/390 R3 solution using the Netfinity ESCON Adapter and a Windows NT Netfinity server.

Chapter 13. ADDING AN ADDITIONAL ADAPTER - This chapter covers adding an additional adapter to an existing system.

Chapter 14. MAINFRAME CONFIGURATION - This chapter details how to configure your mainframe for use with the Netfinity ESCON adapter.

Chapter 15. TROUBLESHOOTING – This chapter provides instruction for isolating installation and configuration problems.

Chapter 16. CHLTOOL UTILITY - This chapter details the use of the CHLTOOL utility.

What's New in This Release?

- The MPC+ software has been updated to add support for Communications Server for Windows NT.
- MPC+ now includes support for TCP/IP Point-to-Point communications. This new support allows full TCP/IP communication (via MPC+) between the Windows NT TCP/IP stack and OS/390 version 2 release 5 and above.
- The Virtual Point-to-Point Adapter has been renamed TCP/IP Direct Connect and has been updated to support a new MPCPTP link type in order to accommodate the new MPC+ capabilities.
- The Data Link Control for Communications Server for Windows NT now provides a "MPC Channel Adapter" device type allowing Communications Server to send traffic over a MPC transmission group.
- An update to the CHLTOOL diagnostic utility enhances the capability of several commands.

Chapter 1. INTRODUCTION

The Netfinity ESCON Adapter is a high performance adapter that enables PCI servers to communicate with mainframe systems through direct channel attachment. The adapter acts as a control unit for Enterprise Systems Connections (ESCON); providing high speed throughput and excellent processing efficiencies for applications that require high-speed connectivity between a Netfinity server and a mainframe.

The Netfinity ESCON adapter can be configured to emulate the architecture of many different device controllers. The ESCON adapter includes an onboard Intel 960 processor. The control unit emulations are implemented directly on the 960 processor allowing the server's CPU to focus on data block transfers and not channel interrupt processing. This efficient, interrupt driven structure is utilized to avoid the CPU overhead incurred by traditional operating system approaches. To further enhance processing efficiency, the on-board data buffering capability allows the adapter to respond to channel activity even when the PCI bus is temporarily busy. Data from the channel can be buffered into on-board memory and made available to the PCI bus when it is available. The use of modular firmware routines allows new implementations to be developed quickly and proficiently. Due to the modularity of the ESCON adapter channel and PCI interface routines can be easily modified to adapt to changing hardware and software requirements. The Netfinity ESCON Adapter is designed to accommodate standardized, mainstream channel applications as well as non-standard applications that use proprietary data transfer protocols.

Server Software

The Netfinity ESCON Adapter has been designed to support a wide variety of software operating environments and communications gateways. Software currently supported includes:

- Communications Server for Windows NT
- Novell's NetWare for SAA
- Microsoft's SNA Server for Windows NT
- TCP/IP Direct Connect (formerly known as Virtual Point-to-Point Adapter) (included on CD-ROM version 1.1 and higher)
- Multi-Path Channel + (MPC+) including MPC Point-to-Point and High Speed Access Services (HSAS) (included on CD-ROM version 1.1 and higher)
- TCP/IP Passthrough for NetWare (included on CD-ROM version 1.0 and higher)
- TCP/IP Passthrough for Windows NT (included on CD-ROM version 1.0 and higher)

Hardware Requirements

The Netfinity ESCON Adapter requires a full-length PCI slot. A maximum of two (2) Netfinity ESCON Adapters are supported in a single Netfinity server. A second slot should be left unoccupied in the server for each Netfinity ESCON Adapter installed. Minimum processor and memory requirements are:

- Intel Pentium 133Mhz Processor
- 64 MB RAM

Software Requirements

Windows NT

The supported releases of software are:

- Windows NT Server version 4.0 with a minimum of Service Pack 3 applied
- Communications Server for Windows NT version 6.0x
- SNA Server version 4.0

For High Speed Access Services using MPC+ the following mainframe operating system is required:

- OS/390 Version 2 Release 4

For MPC Point-to-Point connections using TCP/IP Direct Connect the following mainframe operating system is required:

- OS/390 Version 2 Release 5

NetWare

The supported releases of Novell software are:

- NetWare 4.11 with a minimum of Support Pack 5 applied
- NetWare for SAA version 4.0
- intraNetWare for SAA version 3.0

Chapter 2. INSTALLING THE NETFINITY ESCON ADAPTER

Pre-Installation Checklist

This Checklist provides pre-installation considerations, which are prerequisites to actual adapter installation. This checklist will ensure that your site is properly prepared with the proper connection and configuration needed to connect your system to the 9086 ESCON Adapter.

Customer Responsibilities

- Verify equipment against service order, unpack and physically inspect equipment.
- Changes to Mainframe may be required.
- Use Installation Guide and Redbook as reference for these changes (IOCP/HCD, TCP/IP, VTAM)
- Install adapter and cables per Installation Guide.
- Successful diagnostic self-test. (POST)
- Check the IBM Web Site for fixes and software updates at <http://www.pc.ibm.com/support/>.
- Driver install and Configuration setup per Installation Guide.
- Configuration and Maintenance of all system software.
- Training of customer personnel.
- Interface with the technical support center to resolve issues associated with installation

Redbook (SG24-5284) at <http://www.redbooks.ibm.com>

Installation Guide at <http://www.pc.ibm.com/Support>

Fixes and More information at <http://www.pc.ibm.com/support/>

Thank you for ordering IBM NETFINITY's 9086 ESCON Adapter

	Requirements	Comments
Netfinity Hardware Requirements	Minimum CPU and Memory Requirements: Intel Pentium 133Mhz Processor 64Meg RAM Full Length PCI slot. Max of 2 ESCON adapters per Netfinity server. For each ESCON adapter an additional slot left unoccupied. Supported in the following Netfinity Servers: 5000, 5500, 5500-M10, 7000, 7000-M10	
Netfinity Software Requirements	Windows NT Server version 4.0 with a minimum of Service Pack 3 applied. IBM's Communication Server for Windows NT version 6.0x SNA Server version 4.0 NetWare 4.11 with a minimum of Support Pack 5 IntraNetWare for SAA version 3.0 NetWare for SAA version 4.0 Check for all additional ESCON fixes that may be required	Refer to the 9086 User's Guide for details on configuring software. Available at: http://www.pc.ibm.com/support/ Also: Redbook (SG24-5284) at http://www.redbooks.ibm.com http://www.pc.ibm.com/support/
Mainframe Software	MVS OS/390 Version2 Release 4 (for HSAS using MPC+) Includes VTAM V4.3 TCPIP V3.4 or V3.2.x MVS OS/390 Version2 Release 5 (for MPC+) Includes VTAM V4.4 TCPIP V3.4	Refer to the 9086 User's Guide for details on configuring software. Available at: http://www.pc.ibm.com/support/ Also: Redbook (SG24-5284) at http://www.redbooks.ibm.com
ESCON Connection and Cable	ESCON connection to mainframe must be supplied. along with ESCON cable	The ESCON cable supported by IBM are: - LED (multimode) (3-km max distance) 62.5/125 um - LASER (single-mode) (20km max distance) 50/125 um optical fiber cables
TCP/IP / SNA IOCP Definitions for ESCON connections HCD:	TCP/IP: SCTC devices have to be defined for each connection. TCPIP Passthrough, TCPIP Direct Connect, HSAS, MPCPTP require 2-subchannels starting with even address SNA: A 3174 device has to be defined for each PU required, Max of 32 3174 per adapter. HCD: Same as IOCP	Refer to the 9086 User's Guide for details on IOCP definitions. Available at http://www.pc.ibm.com/support/ Also: Redbook (SG24-5284) at http://www.redbooks.ibm.com For instructions on HCD: Refer to OS/390 HCD User's Guide
TCPIP Setup:	Network administrator has to supply required information for Mainframe TCPIP profile setup Version 2.4 and higher may require Open Edition expertise. Network administrator has to supply required information for TCP/IP Direct Connect, HSAS, and MPCPTP on server.	Refer to the 9086 User's Guide for VTAM definitions. Available at http://www.pc.ibm.com/support/ Also: Redbook (SG24-5284) at http://www.redbooks.ibm.com
VTAM Definitions	Mainframe VTAM have to be setup for use with: IBM's Communication Server of NT. Microsoft SNA Server Novell's NetWare for SAA MPC+ for either CS/NT or MPCPTP will require VTAM definitions.	Refer to the 9086 User's Guide for VTAM definitions. Available at http://www.pc.ibm.com/support/ Also: Redbook (SG24-5284) at http://www.redbooks.ibm.com

Adapter Install

ATTENTION! The ESCON adapter can be damaged by Electrostatic Discharge. Before removing the adapter from its protective static bag, please ensure that you are free of static charge. At minimum, you should ground yourself to the system you are using.

The ESCON adapter is a full size PCI adapter measuring 12.283 X 4.2 inches, Figure 2-1. The adapter comes pre-configured and is ready to be installed. There are no jumpers or switches that need setting prior to installation.

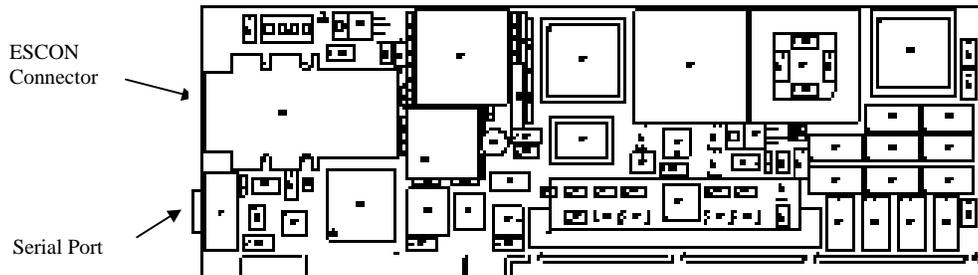


Figure 2-1. Netfinity ESCON Adapter

The following steps should guide you through a successful installation of the adapter.

Step

1. Ensure the Netfinity server is powered down. The ultimate assurance of this fact is to remove the power cable from the rear of the system.
2. Remove the system cover.
3. Determine an available slot for installation of the adapter. The adapter requires a full-length PCI slot.
4. Remove the adapter from its protective anti-static bag. As shown in Figure 2-1, the adapter has two connectors at the card edge; a standard ESCON connector (top) and a serial port connector (bottom). Remove the wrap plug shipped in the ESCON connector and save it for diagnostic purposes.
5. Insert the adapter into the chosen PCI bus slot. Make sure the adapter is fully inserted in the slot. Place a screw through the top of the mounting bracket and securely fasten to the system chassis.
6. Replace the system cover.
7. Plug the ESCON channel cable directly into the top connector. Ensure the cable end is fully inserted into the socket. You should hear a click as the connector locks into place. The serial port is for diagnostics and is not used during normal operation.

Note: IBM supports the following ESCON cable:

- LED (multi-mode) (3km max distance) 62.5/125 um
- LASER (single-mode) (20km max distance) 50/125 um optical fiber cables

8. The following label was included with the option and contains important information that will be needed if service is required:

IBM Netfinity ESCON Adapter

To be serviced by trained and authorized personnel only

Place service call on Machine Type & Model 9086 - 001

When calling for service, please reference machine type "9086" and model 001 for this adapter.

IBM USA Service Personnel only: For assistance call the IBM Network Support Center: Phone: 1-800-426-2472

IBM International Service Personnel: For assistance call your local support number. **Phone number:**

Attach the label to the front of the server in such away that it will not block airflow into the server, but will still be readily visible.

9. Reinstall the power cable, if removed in step 1, and power on the system.

If your system does not boot successfully or does not power on, ensure that you have followed these steps or refer to the appropriate manuals for your particular system referring to adapter installation and power up related troubleshooting.

Chapter 3. INSTALLING DRIVER SOFTWARE

The Netfinity ESCON Adapter includes drivers for both Microsoft's Windows NT Server and Novell's NetWare. This chapter discusses installation of the drivers. Please refer to the section appropriate to your operating environment.

Windows NT Server

The PCI ESCON Adapter driver is always required and provides basic connectivity between the ESCON adapter and Windows NT. The following step-by-step procedure will install the driver into your Windows NT Server.

Step

1. From the Windows NT Server Control Panel, open Network (Figure 3-1).



Figure 3-1. Network ICON on Control Panel

2. From the **Adapters** tab on the **Network** screen, click on the **Add** button (Figure 3-2).

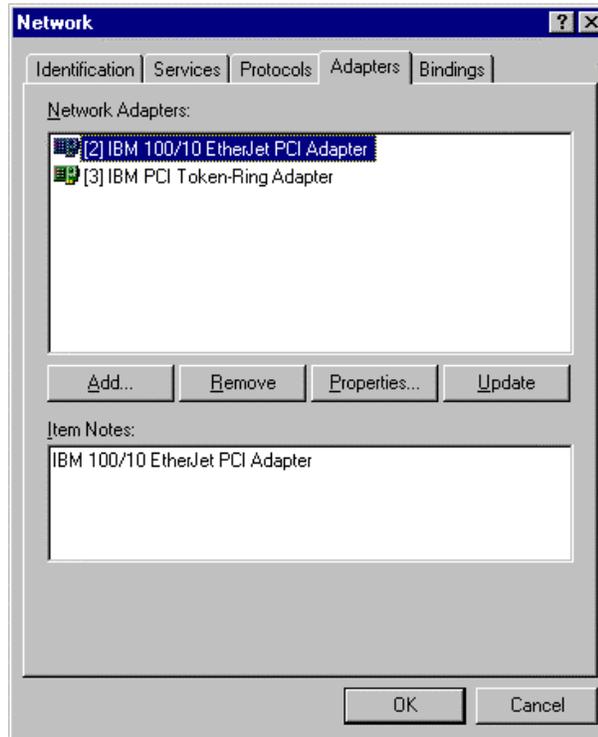


Figure 3-2. Network Screen

3. From the **Select Network Adapter** screen (Figure 3-3), click the **Have Disk...** button.

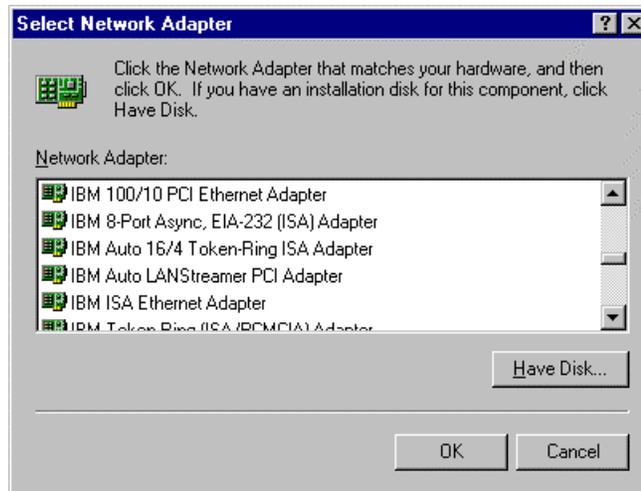


Figure 3-3. Add Network Adapter

4. The **Insert Disk** screen is displayed (Figure 3-4).

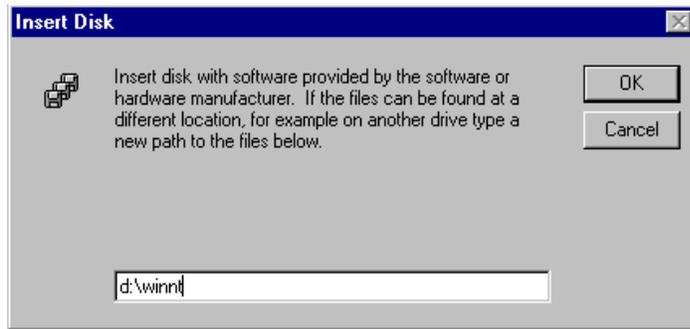


Figure 3-4. Insert Disk Dialog Box

With the CD inserted into the CD-ROM drive point to the **WINNT** directory by entering "**D:\WINNT**" where D is the CD-ROM's drive letter and press **OK**.

5. The **Select OEM Option** dialog box will be displayed (Figure 3-5). Highlight/select the **IBM PCI ESCON Adapter** and click **OK**.

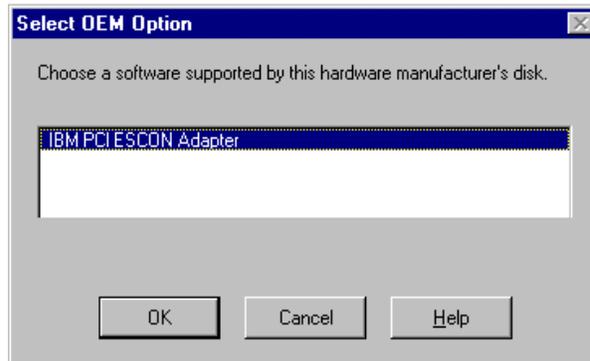


Figure 3-5. Select OEM Option Screen

6. Once the addition procedure is complete, the system will return to the **Network** dialog box. As shown in Figure 3-6, the **PCI ESCON** adapter should now be listed in the **Network Adapters** box. Clicking **OK** will cause the system to configure the network and prompt you to restart the system.

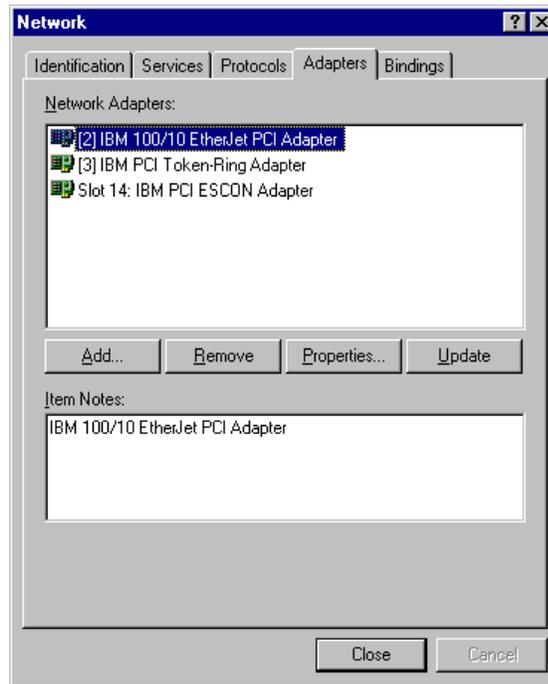


Figure 3-6. Network Settings with Netfinity ESCON Adapter

NetWare

NetWare 4.11 Driver Installation

This section describes installation, loading, and unloading of the ESCON adapter's drivers on a NetWare 4.11 Server.

Included in the installation kit is a CD-ROM containing software to support the adapter. The following procedure assumes your Netfinity server has the CDROM driver (CDROM.NLM) loaded.

STEP

1. Insert the CD into the CD-ROM drive of your Netfinity server. Using the keyboard and monitor attached to the server, mount the CD by entering the following command on the NetWare system console:

CD MOUNT IBMESCON

Note: *NetWare for SAA/intraNetWare for SAA and COMMEXEC must both be down before installing the drivers. Unload NetWare for SAA/intraNetWare for SAA by typing **SAADOWN** at the system console prompt. Type **CSDOWN** to bring down COMMEXEC.*

2. The ESCON adapter's drivers and support programs are installed using Novell's installation utility, INSTALL. To invoke INSTALL type the following command on the NetWare system console:

LOAD INSTALL

INSTALL will display a menu of **Installation Options** (Figure 3-7).

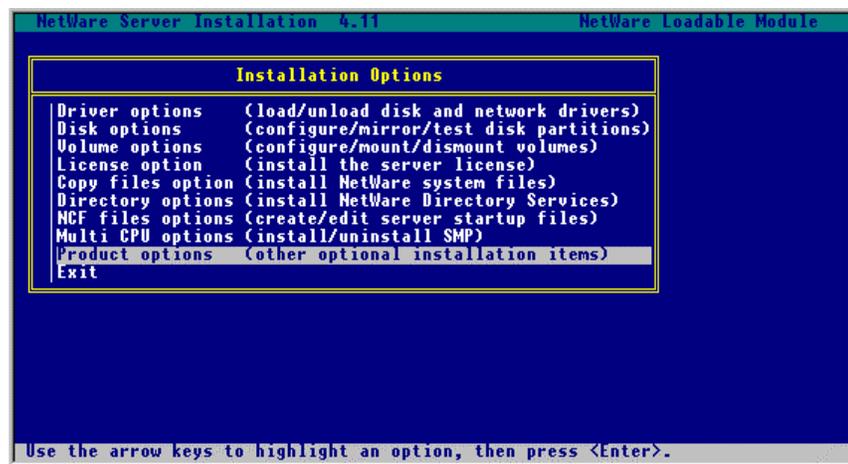


Figure 3-7. Main Menu

- Choose the menu selection “**Product options**” and press **ENTER**. Figure 3-8 will display.



Figure 3-8. Product Options

- Select “**Install a product not listed**” and press the **ENTER** key. A pop-up box (Figure 3-9) will appear allowing you to specify a drive to be used for installation. Press **F3** to enter the path of your CD.



Figure 3-9. Drive Selection Pop-Up

5. A pop-up window appears prompting you for a directory path (Figure 3-10). Enter "ibmescon:\ netware" where "ibmescon" is the volume ID of the installation CD.

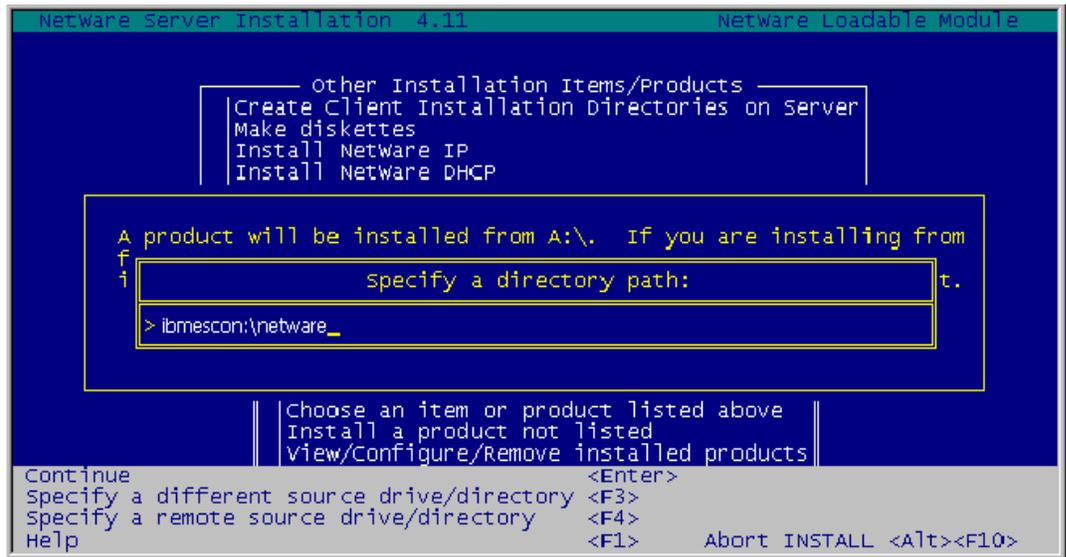


Figure 3-10. Specify a Directory Path

6. A window (Figure 3-11) will appear asking for installation confirmation. Several installation options will be presented. The option to install on the current server will be highlighted. Press the **ENTER** key to accept the option to "Install on this server".



Figure 3-11. Installation Confirmation

7. The installation program will then copy driver and support files into the appropriate sub-directories of the SYS: volume. A status window will show progress (Figure 3-12); periodically updating with names of files being copied.

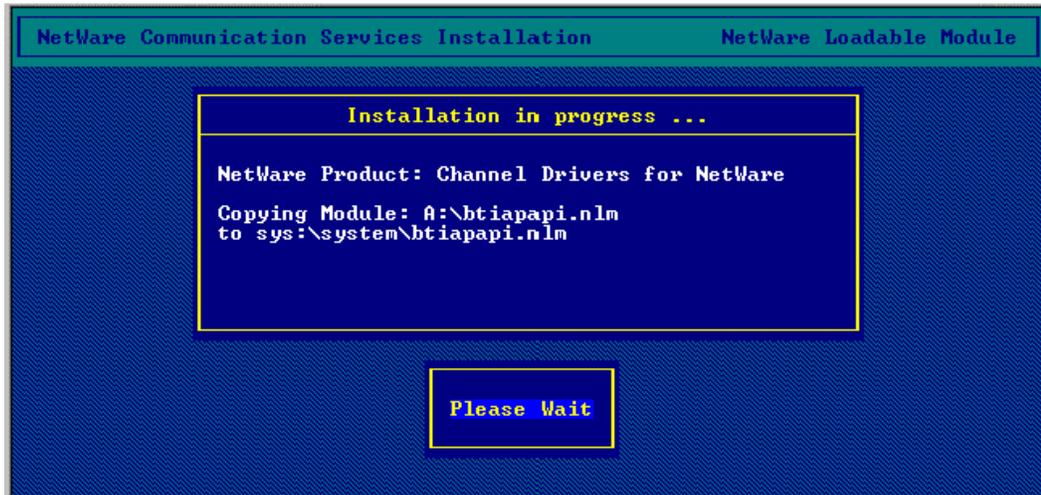


Figure 3-12. Installation in Progress

When the installation is complete, INSTALL will display a completion message (Figure 3-13).



Figure 3-13. Installation Complete

8. Press the **ENTER** key to return to the Install Products screen (Figure 3-14). You may confirm the drivers are installed by highlighting **View/Configure/Remove installed products** and then press the **ENTER** key.

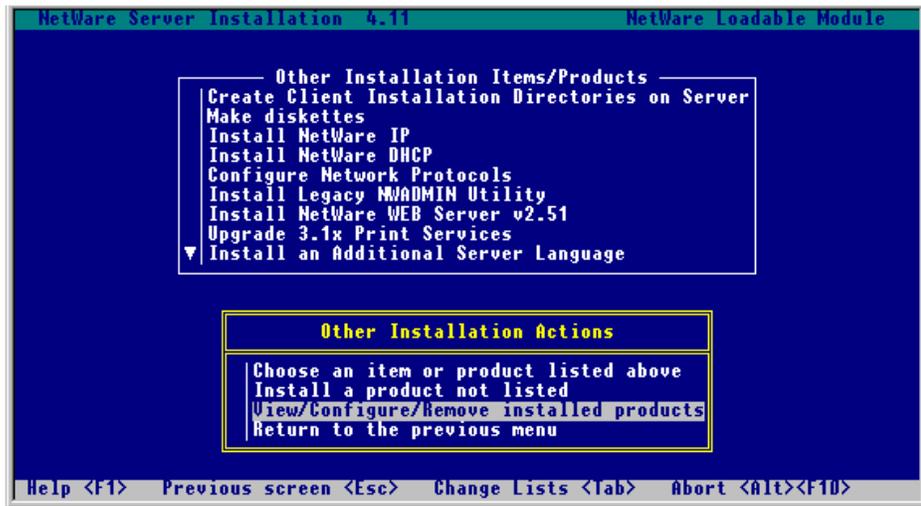


Figure 3-14. Install Products Screen

9. The Channel Drivers for NetWare will be listed in the **Currently Installed Product** list (Figure 3-15).

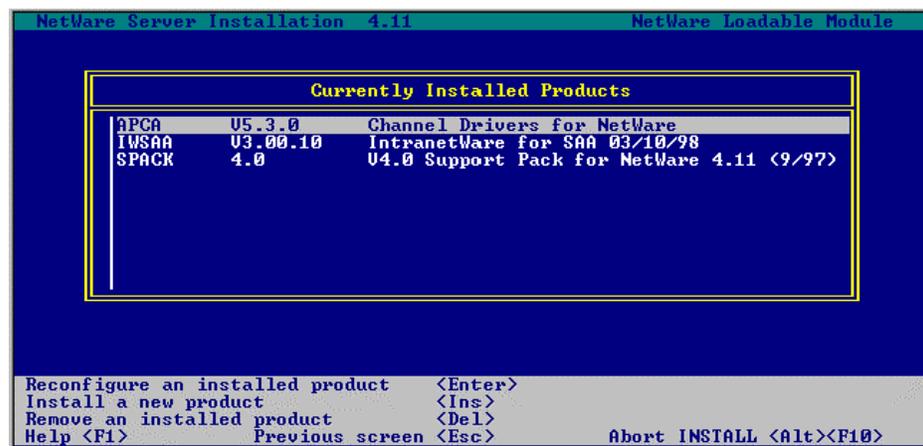


Figure 3-15. Currently Installed Products

10. Once you are satisfied the installation has been successful, the following command will dismount the CD:

CD DISMOUNT IBMESCON /PURGE

Loading the Drivers

There are three NetWare Loadable Modules (NLMs) used with the Netfinity ESCON Adapter:

PBXAAPI.NLM - ESCON Adapter Application Interface NLM

ESCONCFG.NLM - An optional ESCON configuration NLM

BTIPBXA.NLM – ESCON Adapter Driver

The ESCON adapter driver (BTIPBXA.NLM) must be loaded once for each Physical Unit (PU) defined to NetWare for SAA and once for each connection defined to TCP/IP Passthrough.

ESCONCFG.NLM is optional and only needs to be loaded if your server is attached to an ESCON director or a mainframe running ESCON Multiple Image Facility (EMIF). Please refer to Chapter 4. In either of these cases, the correct load order for all three NLMs is:

LOAD PBXAAPI

LOAD ESCONCFG

LOAD BTIPBXA (May be loaded multiple times)

If your server is connected directly to a mainframe ESCON port and the mainframe is not running EMIF then you only need to load the ESCON adapter driver as follows:

LOAD BTIPBXA (May be loaded multiple times)

There are no command line arguments for PBXAAPI. Command line arguments for ESCON Configuration (ESCONCFG) are discussed in detail in Chapter 4 beginning on page 24.

There are several command line arguments required on the ESCON adapter driver (BTIPBXA) load statement. These are:

- ***SLOT=n***
- ***UNIT=xx***
- ***FRAME=3174 / 8232***
- ***PU=2.0 / 2.1***
- ***NAME=name***

where ***SLOT=n*** indicates in which hardware slot the adapter is installed for this load statement. This is a required parameter with no default value.

where ***UNIT=xx*** indicates the mainframe control unit address for this host connection. This is a required parameter with no default value. You should obtain this address from the mainframe systems programmer. It is always 2 digits.

where *FRAME=3174 / 8232* indicates the frame type this connection will be using. For NetWare for SAA support, specify *FRAME=3174*. The default value if this parameter is omitted is *3174*.

where *PU=2.0 / 2.1* specifies the type of VTAM Physical Unit to be used for this mainframe connection. The default value if this parameter is omitted is *2.0*.

where *NAME=name* defines a unique name to this connection. This parameter must match the Logical Adapter Name parameter defined in both the NetWare for SAA Data Link Adapter definition and the Dependent PU Profile definition that will use this adapter for its mainframe connection. This is a required parameter with no default value.

Updating AUTOEXEC.NCF

Adapter drivers (NLMs) may be loaded manually at the NetWare system console. However, to ensure that the driver is loaded before any NetWare for SAA PU Profiles are loaded, it is recommended that drivers be loaded by AUTOEXEC.NCF. AUTOEXEC.NCF may be updated using either EDIT.NLM or INSTALL.NLM. Refer to Novell's documentation for complete instructions on editing text files from the server's console.

To load the ESCON adapter driver, add the appropriate LOAD statement(s) to your AUTOEXEC.NCF:

```
LOAD BTIPBXA SLOT=n UNIT=xx FRAME=3174 PU=2.0 NAME=name
```

If you are using NetWare for SAA, be sure to place the adapter LOAD statement(s) prior to the "LOAD COMMEXEC" statement in your AUTOEXEC.NCF file. The following example shows correctly formatted adapter LOAD statements. A complete AUTOEXEC.NCF for NetWare for SAA can be found on page 27.

```
.  
. .  
.  
Load PBXAAPI  
Load ESCONCFG Slot=2 ESCON1.CFG  
Load BTIPBXA Slot=2 Unit=01 Frame=3174  
Name=ESCON1  
Load BTIPBXA Slot=2 Unit=02 Frame=3174  
Name=ESCON2  
. .  
.  
Load COMMEXEC
```

The first time BTIPBXA.NLM is loaded, a message similar to the following will be displayed on the system console:

Loading Module BTIPBXA.NLM
ODI Channel Driver for xxxx
Version x.xxx month day, year

The second and subsequent times a driver is loaded, the following message will be displayed on the system console:

Loading module BTIPBXA.NLM
Previously loaded module was used re-entrantly

Unloading the Driver

Adapter drivers are re-entrant and may have been loaded several times, once for each mainframe host connection. However, if the driver is unloaded, all host connections will be terminated at once. It is not possible to unload a driver for a single connection. Make sure that all NetWare for SAA PU Profiles using the adapter driver are unloaded before unloading the driver itself.

To unload the ESCON adapter driver from memory, type the following command on the server system console:

: UNLOAD BTIPBXA

Chapter 4. DEFINING THE ESCON CONFIGURATION

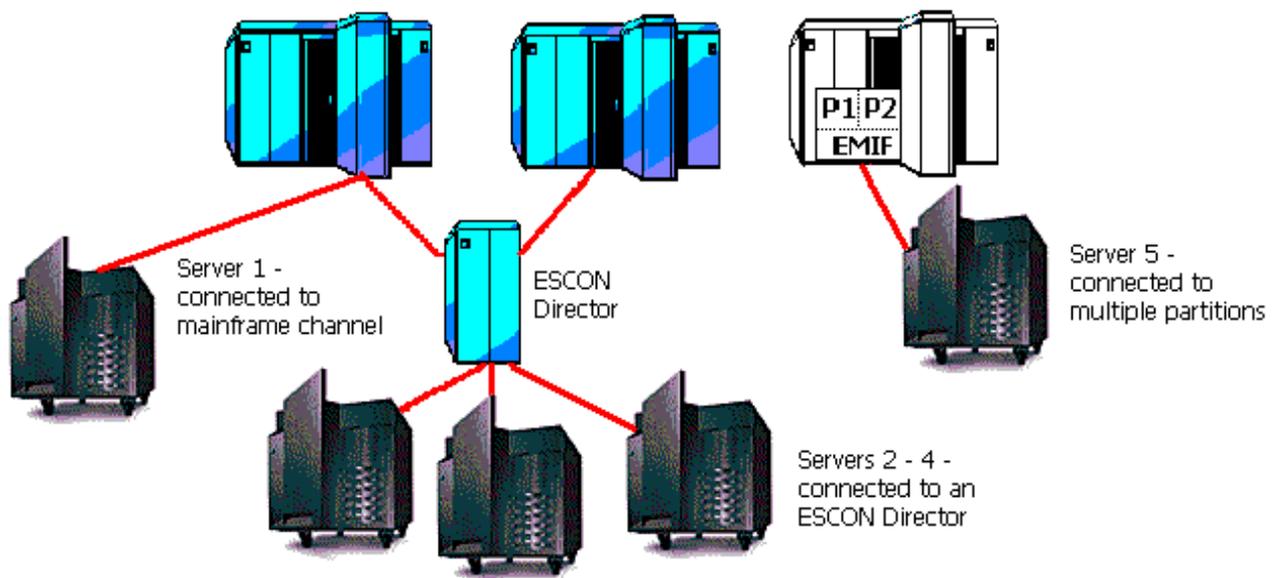


Figure 4-1. ESCON Attached Controllers

Overview

ESCON controllers, including Netfinity servers attached with an ESCON adapter, can be connected to the mainframe in more than one fashion. As shown in Figure 4-1, Server 1 is attached directly to one of the mainframe's ESCON channels. Assuming the mainframe is running a single Logical Partition (LPAR), this is simplest option for connecting to the mainframe; requiring no ESCON configuration on the server. However, connecting the server directly to a mainframe's ESCON channel in this fashion imposes two restrictions:

1. Only a single server can be attached to a mainframe's channel.
2. The server can only communicate directly with that single mainframe.

An ESCON director overcomes these restrictions by attaching multiple "downstream" servers and by supporting multiple ESCON interfaces to multiple mainframes. Again referring to Figure 4-2, Servers 2 - 4 are connected to the director which is then connected to two ESCON channels, one on each of two mainframes.

Some mainframes also support multiple, Logical Partitions (LPARs) running on a single system; logically making the system appear as multiple computers. The ESCON Multiple-Image Facility (EMIF) can be used in those environments to allow sharing of ESCON channel paths across partitions. In Figure 4-1, a single channel path defined between the mainframe and Server 5 can be shared by both LPAR P1 and LPAR P2 using EMIF.

Finally, using both Directors and EMIF, it is possible for a single ESCON server to communicate with multiple Logical Partitions (LPARs) running on multiple mainframes, using multiple ESCON channels.

When attached to an ESCON director, which may be connected to multiple mainframes and Logical Partitions (LPARs), it is necessary to configure the ESCON adapter in order to define how the unit will appear to each of the mainframes and/or logical partitions (LPARs).

The following information may need to be configured for each logical connection that is to be supported across the physical ESCON cable:

Logical Partition Address (LPARS) – This is a hexadecimal number ranging from 0-F identifying the logical partition (LPAR) ID of the partition this connection is to communicate with. This parameter is only required if EMIF is enabled for this channel (in other words the channel path id (CHPID) statement includes the SHARED parameter in the IOCDs). For BASIC mode or LPAR mode non-EMIF, set this field to zero (0). If EMIF is enabled this number must match the LPAR ID assigned in the Logical Partition Definition (LPDEF) frame which appears in LPAR mode after a power on / reset. In LPAR mode the CPU ID contains the LPAR ID as it's fourth character. If running the VM operating system, the "QUERY CPUID" command will display the CPU ID. The fourth character of the CPU ID is the LPAR ID.

Channel Link Address (CH Link Address) – The Channel Link Address is the address of the ESCON director port that connects to the mainframe you want to communicate with. The value range is from 01-FE hexadecimal. In Figure 4-2 the mainframe uses a link address of '02' to communicate with Server 1. Server 1 uses a link address of '01' to communicate with the mainframe. In this example, the CH Link Address in the adapter configuration is set to '01'.

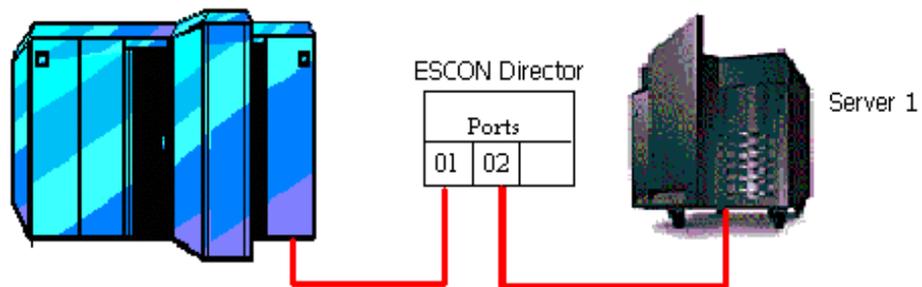


Figure 4-2. Channel Link Addressing

If no director is used, the channel sub-system will assign an arbitrary LINK address (usually 01) for the server to communicate with the mainframe. To ensure the mainframe always selects '01' you should assign '02' to the channel adapter in the IOCDs. Code the LINK parameter in the CNTLUNIT macro in the I/O Configuration Data Set (IOCDs) to be '02' as shown in the following example:

`CNTLUNIT . . . ,LINK=(02) ,`

Then set the channel link address to '01' in the adapter's configuration.

Control Unit Address – This is the control unit address that the LPAR will use to communicate with the controller and the controller will use to identify itself to the LPAR. Control Unit Address is a hexadecimal number ranging from 0-F. This number must match that coded in the CUADD parameter of the CNTLUNIT macro in the IOCDS. Note that CUADD is an optional field in the IOCDS and defaults to zero (0) if not coded.

Device Address – The Sub-Channel or Physical Unit (PU) address for the device, ranging in value from 00-FF hexadecimal. This address should match that coded in the UNITADD parameter of the CNTLUNIT macro in the IOCDS. Sub-channel addresses must be unique across any one adapter.

For MPC+ at least two device addresses must be configured for each MPC transmission group. These device addresses must be coded as UNIT=SCTC in the CNTLUNIT macro in the IOCDS.

For IBM Communications Server (non-MPC+), NetWare for SAA, or Microsoft SNA Server a device address must be configured for each PU configured in the gateway that will use the ESCON adapter. These device addresses must be coded as UNIT=3174 in the CNTLUNIT macro of the IOCDS.

For TCP/IP Direct Connect (non-MPC+) two adjacent device addresses must be defined for each connections. These device addresses must be coded as UNIT=SCTC in the CNTLUNIT macro in the IOCDS.

For TCP/IP Passthrough two adjacent device addresses must be defined for each connection. These device addresses must be coded as UNIT=3088 or UNIT=CTCA in the CNTLUNIT macro in the IOCDS. The first address of the pair must always be even numbered; for example: 12-13, 8A-8B, etc.

Emulation Type – The type of IBM controller that this device (sub-channel address) is to emulate (look like) to the mainframe. Valid types include “MPC” for devices to be used with MPC+, “3174” for SNA PUs (non-MPC), and “GEN” for TCP/IP Direct Connect CTC or TCP/IP Passthrough connections.

The remainder of this chapter discusses how to modify the configuration parameters for your Netfinity ESCON Adapter. The next section is specific to servers based on Microsoft's Windows NT. The section following that, on Page 24, is specific to servers using NetWare, either 3.12 or 4.11. Please refer to the appropriate section.

Windows NT ESCON Configuration

It is not necessary to provide ESCON configuration parameters for device addresses when your adapter is connected to a single channel on a single mainframe without Logical Partition Support. Sub-channel addresses are configured in SNA Server, Communications Server for Windows NT, TCP/IP Passthrough for Windows NT, MPC+, or TCP/IP Direct Connect. That is all that is needed. By default, the adapter will not use ESCON configuration information unless you specifically configure it to do so.

ESCON configuration parameters can be viewed and set through the Windows NT system Control Panel. From the main screen of Control Panel double click the **Network** Icon (See Figure 4-3).



Figure 4-3. Windows NT Control Panel

The **Network** configuration screen (Figure 4-4) will appear.



Figure 4-4. Network Configuration Screen

Select the **Adapters** tab to display the list of installed network adapters (Figure 4-5). The IBM PCI ESCON adapter should be included in the list.

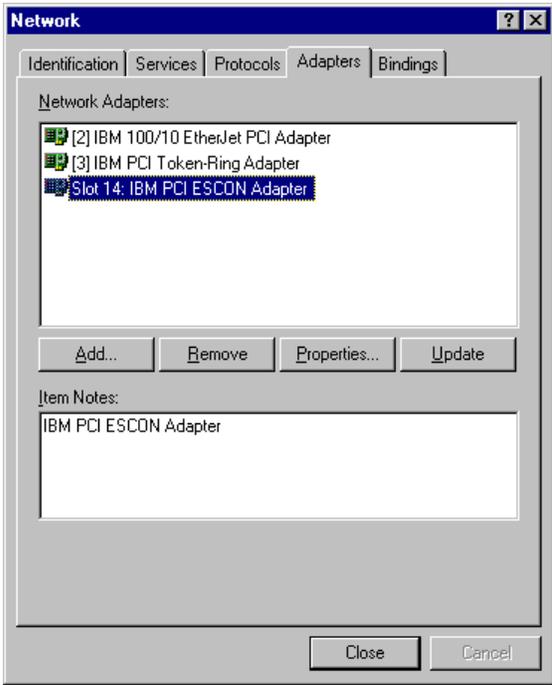


Figure 4-5. Network Adapters List

Selecting the ESCON adapter and clicking **Properties** will bring up the ESCON Configuration Screen (Figure 4-6).

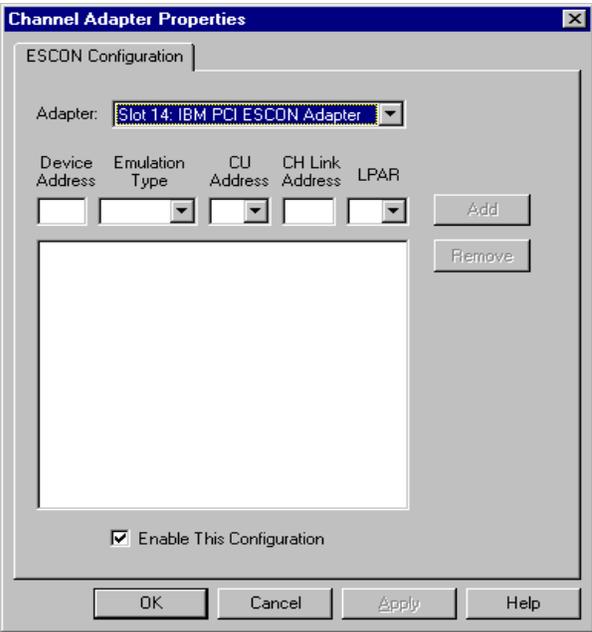


Figure 4-6. ESCON Configuration Screen

To configure a new device, enter in the appropriate values using the field descriptions found on pages 20 through 21 of this manual.

Press **Add** to add the device to the ESCON configuration file.

To remove a previously defined device, highlight the device and then click **Remove**. To edit a previously defined device, simply remove it from the configuration and then add it back in.

Once you have defined an ESCON Configuration, you must enable it. By default the adapter will not use the configuration information defined and will operate in **Basic** mode. To enable the ESCON configuration click the box marked **Enable This Configuration**.

To save a newly created configuration, click **OK**.

NOTE: *ESCON configuration changes do not take effect until the Server has been hard RESET (or Power Off and Power On).*

NetWare ESCON Configuration

It is not necessary to provide ESCON configuration parameters for device addresses when your adapter is connected to a single channel on a single mainframe without Logical Partition Support. Sub-channel addresses are configured in NetWare for SAA and/or TCP/IP Passthrough for NetWare. That is all that is needed. By default, the adapter will not use ESCON configuration information unless you specifically configure it to do so.

Configuring the Netfinity ESCON Adapter in NetWare is a two-step process. First, you must create an ESCON configuration file and store it on a directory that can be accessed by AUTOEXEC.NCF during NetWare startup. Second, you must include a NetWare LOAD command to process the configuration file each time NetWare is brought up.

Creating a Configuration File

You must create a separate ESCON configuration file for each Netfinity ESCON Adapter installed in your NetWare server that you wish to configure.

To assist in creating configuration files, a sample configuration file is provided on the CD. Once adapter drivers have been installed, the sample configuration file (“ESCON.CFG”) will be stored in the adapter’s sub-directory on the system volume (“SYS:CHANNEL”).

The contents of ESCON.CFG are:

```
; Sample ESCON Configuration Definition
; This file is read by ESCONCFG.NLM.
; The syntax for ESCONCFG is as follow:
;   Load ESCONCFG.NLM [SLOT=n] filename
; Invoke ESCONCFG.NLM for each ESCON adapter you want to configure.
;
; The syntax for each entry is as follow:
; ID=Subchannel,EmulationType,CULogicalAddress,ChLinkAddress,CHLogicalAddress
;
; Subchannel is the device address (00-FF)
; EmulationType is ether 3174 or Gen.
;   Use 'Gen' for all Emulation Types other than 3174.
; CULogicalAddress is the Control Unit Logical Address (0-F)
; ChLinkAddress is the Channel Link Address (01-FE)
; CHLogicalAddress is the Channel Logical Address or LPARS (0-F)
;
; Samples entries:

ID=00,3174,1,01,1
ID=01,3174,1,01,1
ID=A4,Gen,1,01,1
ID=A5,Gen,1,01,1
```

As shown, each entry in the configuration file must follow the format:

ID=aa,yyyy,n,xx,z

where:

aa = **Device Address**

yyyy = **Emulation Type**

n = **CU Address**

xx = **CH Link Address**

z = **LPARS**

A complete description of these fields may be found on pages 20 through 21 of this manual

Once the configuration has been defined, save the configuration file to a directory where it can be accessed by AUTOEXEC.NCF.

Processing the Configuration File

An ESCON configuration file is only processed if you specifically request it be processed by loading ESCONCFG.NLM. The LOAD command for loading the configuration program is:

```
LOAD ESCONCFG [SLOT=encoded slot number] <config file name>
```

Typing this command at the NetWare console or including it in AUTOEXEC.NCF will cause ESCONCFG to read the configuration file named on the command line and process it. If no config file name is specified, the default (“SYS:CHANNEL/ESCON.CFG”) will be processed.

To insure the Netfinity ESCON Adapter is correctly configured whenever NetWare is restarted, you should include the LOAD BTIECFG command in the AUTOEXEC.NCF startup control file. The low level device driver for the adapter (PBXAAPI.NLM) must be loaded first and the configuration process must be performed before any connections are opened.

NOTE: *ESCON configuration changes do not take effect until the Server has been hard RESET (or Power Off and Power On). Bringing the NetWare server DOWN and back up without resetting the hardware will cause an ESCON configuration load error when ESCONCFG is executed.*

The following sample shows a properly defined AUTOEXEC.NCF for NetWare for SAA. The LOAD commands load the low level device driver, process an ESCON configuration file name “ESCON1.CFG”, and then load ODI drivers for two device addresses (01 and 02).

```
Set Time Zone = EST5EDT
Set Daylight Savings Time Offset = 1
Set Start Of Daylight Savings Time = (APRIL SUNDAY FIRST 2:00:00 AM)
Set End Of Daylight Savings Time = (OCTOBER SUNDAY LAST 2:00:00 AM)
Set Default Time Server Type = SINGLE
Set Bindery Context = O=BTI
File Server Name NETSHUTTLE
IPX Internal Net 2F7C7B62
Search add sys:system\nwsaa
Search add sys:system\commexec
Search add c:
Set Maximum Packet Receive Buffers=2000
Set Reply to Get Nearest Server=off
Mount all
SYS:ETC\INITSYS.NCF

Load PBXAAPI
Load ESCONCFG Slot=2 ESCON1.CFG
Load BTIPBXA Slot=2 Unit=01 Frame=3174 Name=ESCON1
Load BTIPBXA Slot=2 Unit=02 Frame=3174 Name=ESCON2

Load COMMEEXEC
Load NWSAA
```

Chapter 5. MULTI-PATH CHANNEL+

Included on the Netfinity ESCON Adapter's software CD is optional Multi-Path Channel+ (MPC+) software for Windows NT. This chapter discusses installation and configuration of MPC+ into your Netfinity Windows NT server.

Overview

Multipath Channel + (MPC+) is a high-performance channel protocol used to communicate between systems across Enterprise Systems Connection (ESCON). MPC+ offers a number of advantages over older, more traditional channel protocols including:

- Reduced Mainframe CPU utilization
- Improved ESCON channel utilization
- Improved Fault Tolerance

Additionally, MPC+ can use the group of ESCON subchannels (devices) to concurrently move both TCP/IP and APPN traffic between the mainframe and the server.

MPC+ software provided with the Netfinity ESCON Adapter can be defined as a link option with Communications Server for Windows NT and/or TCP/IP Direct Connect. TCP/IP Direct Connect provides a Network Driver Interface Specification (NDIS) driver allowing Microsoft's TCP/IP protocol stack to communicate in a point-to-point connection with the mainframe TCP/IP protocol stack (see Chapter 6).

Figure 5-1 shows the relationship between the Netfinity ESCON Adapter, MPC+, TCP/IP Direct Connect, Communications Server for Windows NT, and Microsoft's TCP/IP protocol stack. Notice that both CS/NT and TCP/IP Direct Connect can communicate either directly with the Netfinity ESCON Adapter through MPC+. *Note: Netware for SAA, TCP/IP Passthrough for Netware, and Microsoft's SNA Server do not support MPC+ connections.*

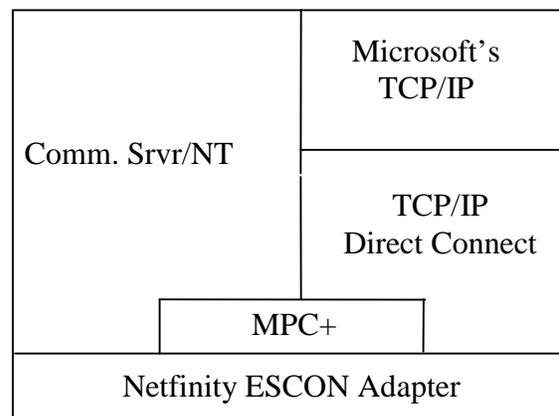


Figure 5-1. MPC+ for Windows NT Software Implementation

MPC+ Installation

The MPC+ software must be installed if you intend to use High Speed Access Services (HSAS), Multi-Path Channel Point-to-Point (MPCPTP) TCP/IP, or MPC+ with Communications Server for Windows NT. For HSAS and MPCPTP, the MPC+ software must be installed before you install TCP/IP Direct Connect (See Chapter 6). MPC+ software is never required and is not supported by TCP/IP Passthrough for Windows NT or Microsoft's SNA Server.

The following step-by-step procedure will install the MPC+ software onto your Netfinity server.

Step

1. From the **Start** menu of your Windows NT Server console, click the **R**un command. The Run dialog box will display (Figure 5-2).



Figure 5-2. Run Dialog Box

2. Type in “d:\winnt\mpc\setup” where **d** is the drive letter assigned to your Netfinity server's CD-ROM drive.
3. Click **OK** to execute the setup program. The Welcome dialog box will display (Figure 5-3).

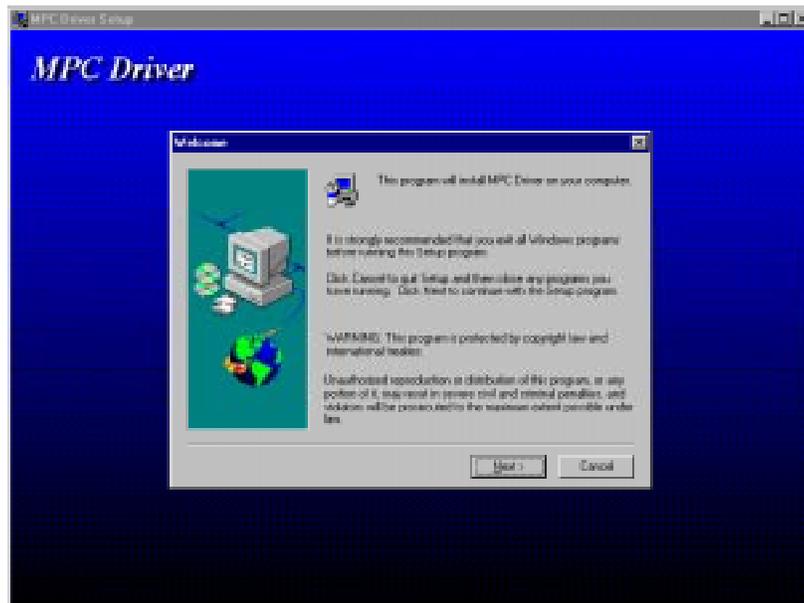


Figure 5-3. MPC Driver Welcome Dialog Box

4. Once you have all programs stopped, click **N**ext to start the installation.



Figure 5-4. Choose Destination Location

- The Choose Destination Location dialog box will display showing the target installation directory (Figure 5-4). Unless you have a specific reason for changing the directory you should allow it to default to “C:\CHANNEL\MPC”. Click **N**ext to continue the install. Progress bars will display while the MPC+ driver is copied to the Netfinity’s hard drive (Figure 5-5).

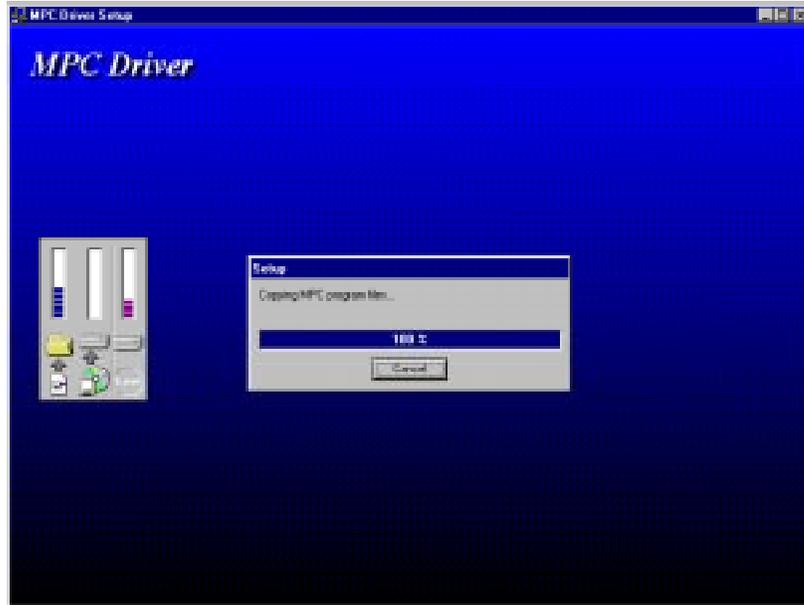


Figure 5-5. Installation Progress

- The Setup Complete dialog box (Figure 5-6) allows you to reboot your server immediately or postpone reboot until later. You must reboot the server before attempting to use the MPC+ driver. Click **F**inish to complete the install.



Figure 5-6. Setup Complete

MPC Transmission Groups

MPC+ uses the concept of a transmission group to communicate across an ESCON channel. A MPC transmission group is a collection of subchannels (ESCON devices) identified by a single name and used to transmit data across one or more channels. A single MPC transmission group will concurrently support both TCP/IP and APPN (Communications Server) traffic. Within the group subchannels are defined as either a Mainframe Read connection or a Mainframe Write connection. Each subchannel sends data in only one direction, reducing set up and turnaround times.

During link definition for TCP/IP Direct Connect (see page 42) or CS/NT (see page 62) you will be given the option to configure MPC. When you select the option to configure MPC the MPC Configuration dialog box is displayed (Figure 5-7). The following step-by-step procedure will define a new MPC transmission group.

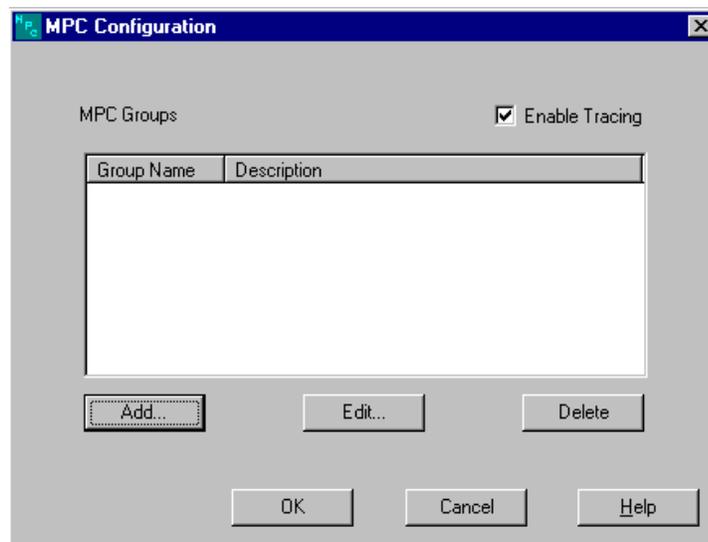


Figure 5-7. MPC Configuration

Step

1. From the MPC Configuration screen (Figure 5-7), click the **Add...** button.
2. The MPC Group Add/Edit screen (Figure 5-8) is used to define a new MPC transmission group. Enter a Group Name and an informational description.

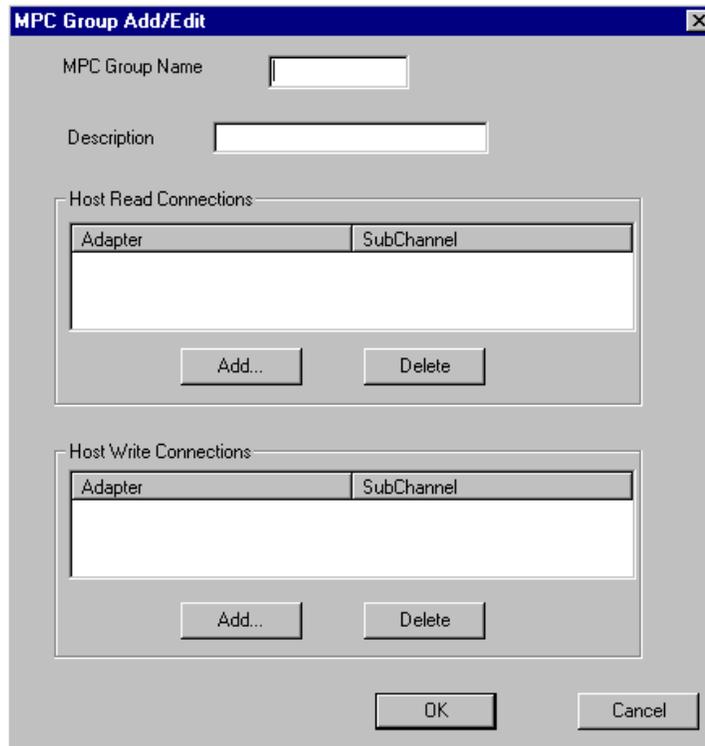


Figure 5-8. MPC Group Add/Edit Screen

- Each MPC group requires at least one subchannel address assigned for Host Read Connections and one subchannel address assigned for Host Write Connections.

To add a subchannel to either the Host Read Connections list or the Host Write Connections list, click the **Add...** button under that list. The Add Connection screen displays (Figure 5-9).

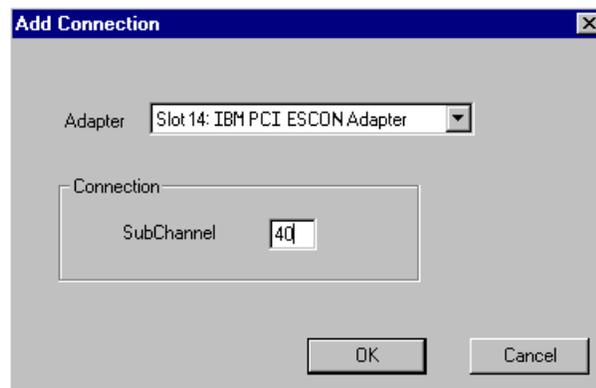


Figure 5-9. Add Connection to MPC Group

- Select the ESCON Adapter you are using and enter a subchannel address defined in the ESCON configuration. Click **OK**.

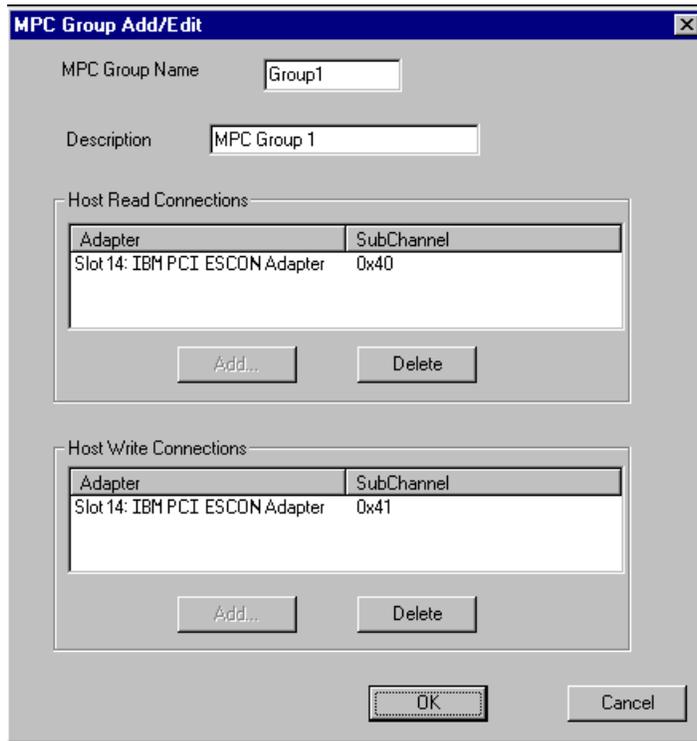


Figure 5-10. Completed MPC Group Definition

5. Once both Read and Write connections have been defined (Figure 5-10), click **OK** to define the group and return to the MPC Configuration screen (Figure 5-11) which now shows the new MPC Group.

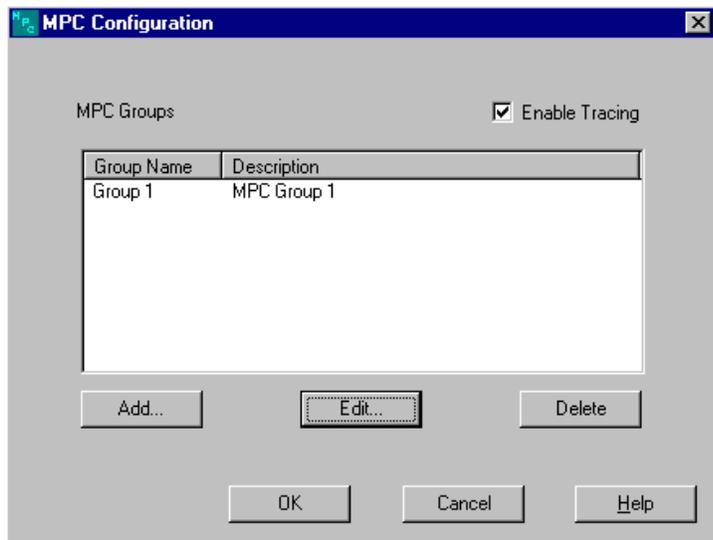


Figure 5-11. MPC Configuration with New Group

Click **OK** to return to the link configuration screen you started from.

Chapter 6. TCP/IP DIRECT CONNECT

Note: TCP/IP Direct Connect was previously known as Virtual Point-to-Point Adapter (VPPA).

TCP/IP Direct Connect software included on the Netfinity ESCON Adapter's CD-ROM is used to provide Point-to-Point TCP/IP communications between the server and the mainframe. TCP/IP Direct Connect is required if you are implementing the System/390 SAP R/3 solution using the Netfinity ESCON Adapter. TCP/IP Direct Connect is not required and does not need to be installed for TCP/IP Passthrough for Windows NT (see Chapter 9), Communications Server for Windows NT (see Chapter 7), or Microsoft's SNA Server (see Chapter 8).

TCP/IP Direct Connect provides an interface compliant with the Network Driver Interface Specification (NDIS). This allows Microsoft's TCP/IP stack to communicate with the Netfinity ESCON Adapter in the same fashion it would use to communicate with any other network interface card (NIC). TCP/IP applications running on the Netfinity server can communicate across the ESCON adapter with peer applications running on the IBM mainframe (Figure 6-1).

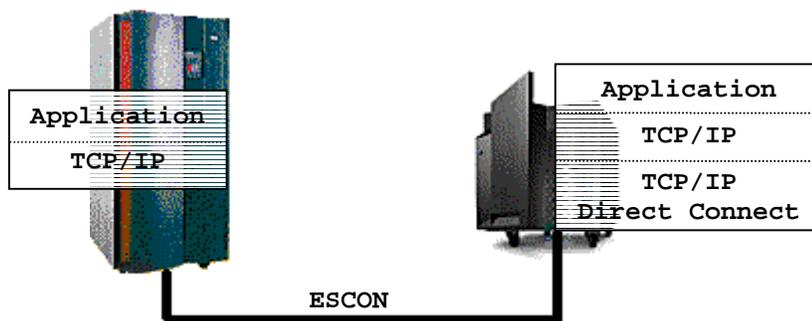


Figure 6-1. TCP/IP Direct Connect

Further, when the Netfinity server's TCP/IP stack is properly configured for IP forwarding, any client in a TCP/IP network can gain immediate access to TCP/IP applications and/or services running on the mainframe (Figure 6-2).



Figure 6-2. Distributed TCP/IP Applications

TCP/IP Direct Connect supports three link types across the ESCON channel: Channel-to-Channel (CTC), High-Speed Access Services (HSAS), or Multi-Path Channel Point-to-Point (MPCPTP).

CTC use two ESCON devices (one for read, one for write) to communicate with legacy mainframe TCP/IP stacks including MVS TCP/IP, VM TCP/IP, Interlink's TCPAccess, and Connectivity Systems' TCP/IP for VSE. These links support full TCP/IP communications between OS/390 and Windows NT.

High-Speed Access Services is a MPC+ link specifically designed to work with the OpenEdition TCP/IP stack provided with OS/390 version 2 release 4 and above. HSAS provides support for applications using Universal Datagram Protocol (UDP). The System/390 SAP R/3 implementation uses HSAS TCP/IP to retrieve data from DB/2 running under OS/390.

Finally, MPCPTP links provide full TCP/IP communications over MPC to OS/390 version 2 release 5 and above.

Installation

TCP/IP Direct Connect is installed as a Windows NT network adapter through the Network ICON in the Windows NT Control panel.

The following step-by-step procedure will install TCP/IP Direct Connect. The PCI ESCON Adapter driver must be installed before TCP/IP Direct Connect (see Page 7). TCP/IP Direct Connect may be installed multiple times if you need multiple link types.

Step

1. From the Windows NT Control Panel invoke Network configuration (Figure 6-3).

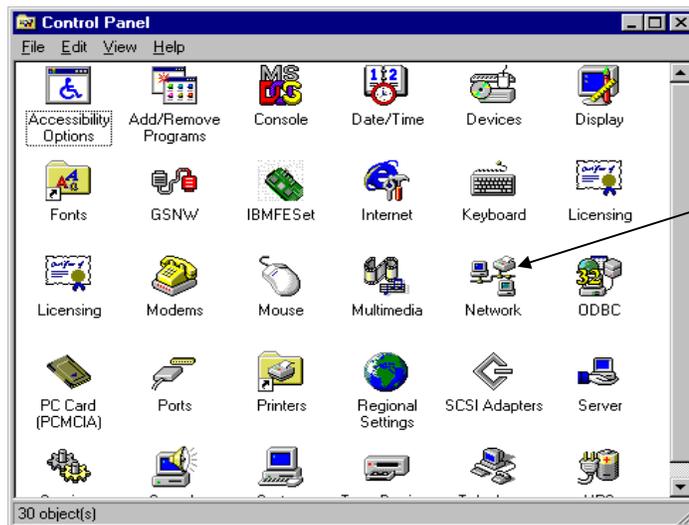


Figure 6-3. Invoking Network Configuration

- Click on the Adapters tab (Figure 6-4). Make sure the IBM PCI ESCON Adapter is listed. If not, you must install the adapter before installing TCP/IP Direct Connect (Refer to Page 7).

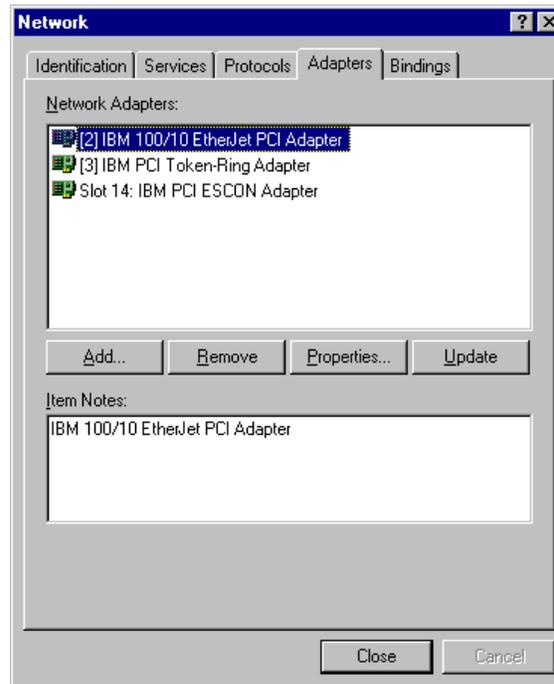


Figure 6-4. Adapter List with ESCON Adapter

- Click the **A**dd button to add a new adapter. The Select Network Adapter dialog box will display a list of adapters included with Windows NT (Figure 6-5).

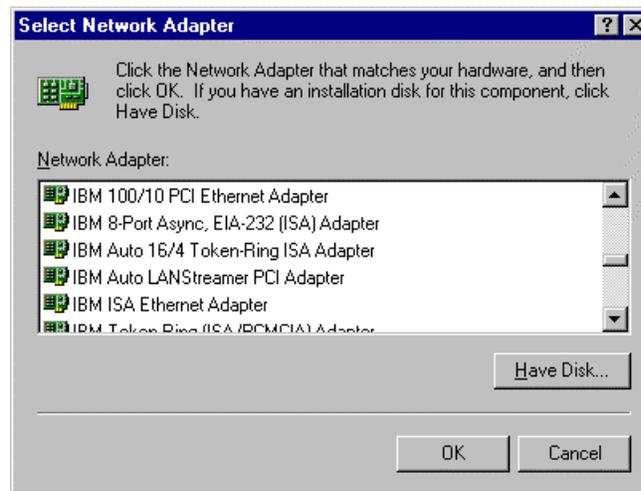


Figure 6-5. Select Network Adapter

- Click the **H**ave Disk button. The Insert Disk dialog box will display (Figure 6-6).

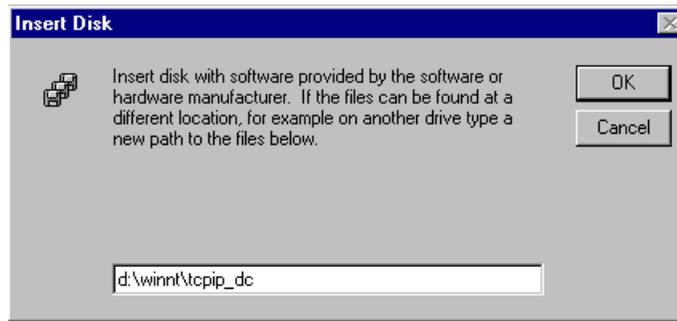


Figure 6-6. Insert Disk

5. Enter “d:\winnt\tcpip_dc” where **d** is the drive letter assigned to your Netfinity’s CD-ROM drive. Click **OK**.
6. The Select OEM Option dialog (Figure 6-7) will display the Virtual Point to Point Adapter. Click **OK** to install the driver.

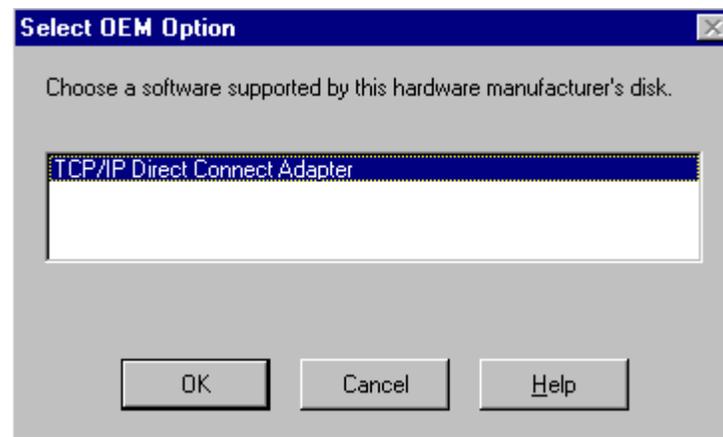


Figure 6-7. Select OEM Option

7. The TCP/IP Direct Connect Properties screen for Channel-to-Channel (CTC) link type (Figure 6-8) will display. If you are defining a MPC+ link skip forward to step 8 of this procedure.

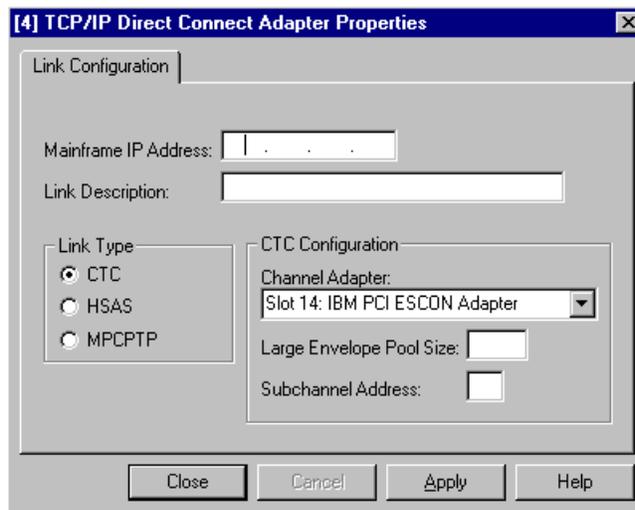


Figure 6-8. TCP/IP Direct Connect Adapter Properties

For CTC Link complete the fields as follows:

Mainframe IP Address – The IP address of the mainframe this connection is to communicate with. This must match the HOME IP address assigned in the TCP/IP Profile.

Link Description – A description of the link being defined.

Channel Adapter – If only one ESCON adapter is installed, that adapter will automatically be selected. If your Netfinity server has more than one ESCON adapter, select the one you want this link defined on.

Large Envelope Pool Size – The Large Envelope Pool Size is defined in the Mainframe's TCP/IP configuration. The value entered in this field must be between 8192 and 65535 and must match the value defined on the mainframe. In the mainframe TCP/IP Profile this value is set with either the LARGEENVELOPEPOOLSIZE or IOBUFFERSIZE parameter depending on the version of TCP/IP in use.

Subchannel Address – A CTC connection uses two subchannel addresses; one for input and one for output. The value entered here is the subchannel address of the first of a pair of addresses that this connection will use. Valid hexadecimal numbers range from 00 to FE (i.e. 40, 21, A0, 13, etc.). The subchannel address immediately following the one defined will be the second in the pair and must also be configured at the mainframe. So, for example, if you define 40 in this field both 40 and 41 must be configured at the mainframe.

After defining the fields click **C**lose to save your values and return to the Network Adapters screen (Figure 6-10).

Skip forward to step 9.

8. Both HSAS and MPCPTP are MPC+ links. HSAS is used for UPD applications such as SAP R/3. MPCPTP is used full TCP/IP communications with OS/390. Click the appropriate radio button based on which service this link is to provide. The TCP/IP Direct Connect Adapter Properties screen will display MPC+ configuration fields (Figure 6-9). (Note: TCP/IP Direct Connect is configured the same for both HSAS and MPCPTP. The example shown here creates a HSAS link).

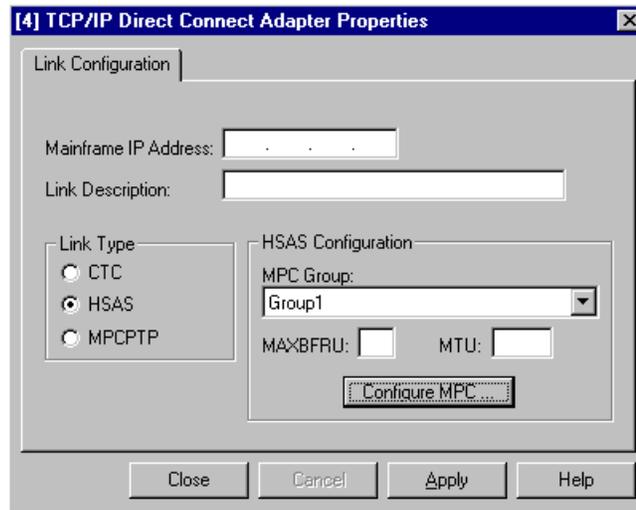


Figure 6-9. HSAS Configuration

Complete the following fields:

Mainframe IP Address – The IP address of the Mainframe. This address must match the source IP address specified on the oeifconfig statement for HSAS (see page 142) or the HOME IP address defined in the TCP/IP Profile for MPCPTP (see page 144).

Link Description – An informational Link description

MPC Group – Identifies which MPC transmission group this link is to use. You must select a group from the list of available groups. If no groups are available this pull-down list will be empty. To define or modify a group, click the **Configure MPC...** button. See Chapter 5 for instructions on configuring a MPC transmission group.

MAXBFRU – The maximum number of 4096 byte buffers to be used. For HSAS it must be set to 9. For MPCPTP the maximum value is 16 and must match the MAXBFRU specified on the VTAM TRLE macro for the MPC group.

MTU – Enter the Maximum Transmission Unit as it appears on your oeifconfig statement for HSAS. For MPCPTP enter the MTU defined by the equation $MTU = (MAXBFRU - 1) * 4096$. If $MAXBFRU = 9$ then $MTU = (9-1) * 4096 = 32768$. If $MAXBFRU = 16$ then $MTU = (16-1) * 4096 = 61440$.

Click **C**lose to save the configuration and return to the Network Adapters list (Figure 6-10).

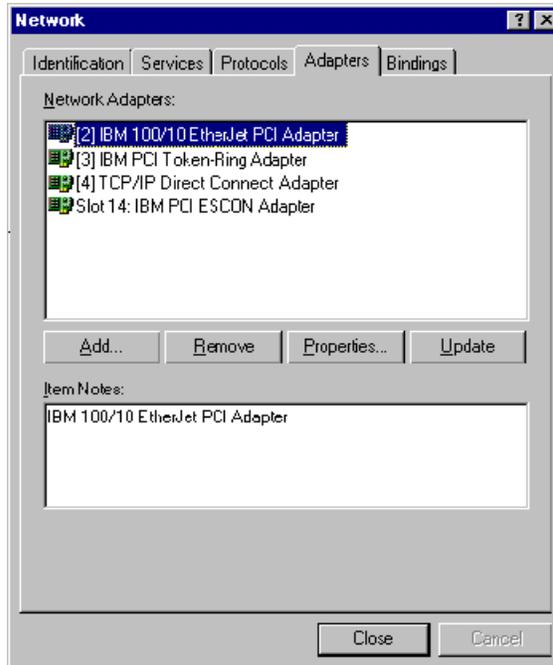


Figure 6-10. Network Adapter List with TCP/IP Direct Connect

9. Click **C**lose to end network configuration. Windows NT will perform an automatic bind process. TCP/IP Direct Connect is bound to Microsoft's TCP/IP stack on the Netfinity server. When Windows NT attempts to perform this bind, the standard Microsoft TCP/IP Properties dialog box will display (Figure 6-11).

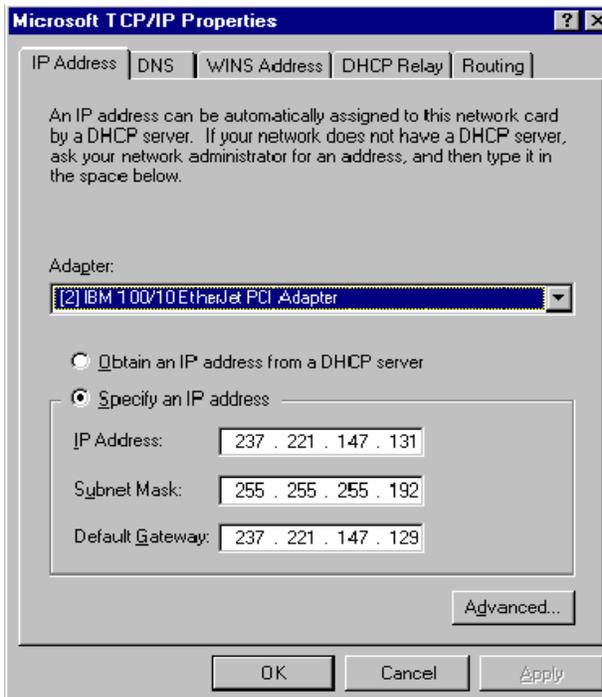


Figure 6-11. TCP/IP Properties

18. Use your mouse to select the TCP/IP Direct Connect Adapter from the list of Adapters bound to TCP/IP (Figure 6-12).

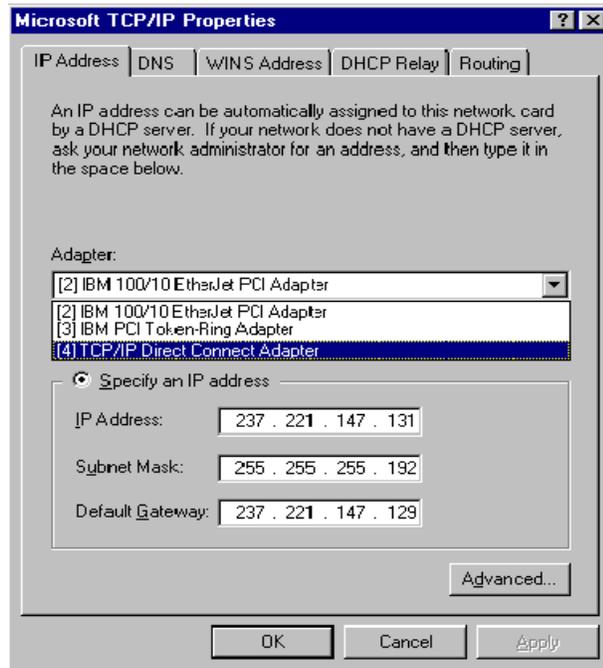


Figure 6-12. Select TCP/IP Direct Connect

19. Enter an IP Address and Subnet Mask; defining the address that the mainframe will use to communicate with the Netfinity server (Figure 6-13). Note that the mainframe IP address and this address must be in the same network (subnet). There is no need to enter a Default Gateway since TCP/IP Direct Connect is a point-to-point connection.

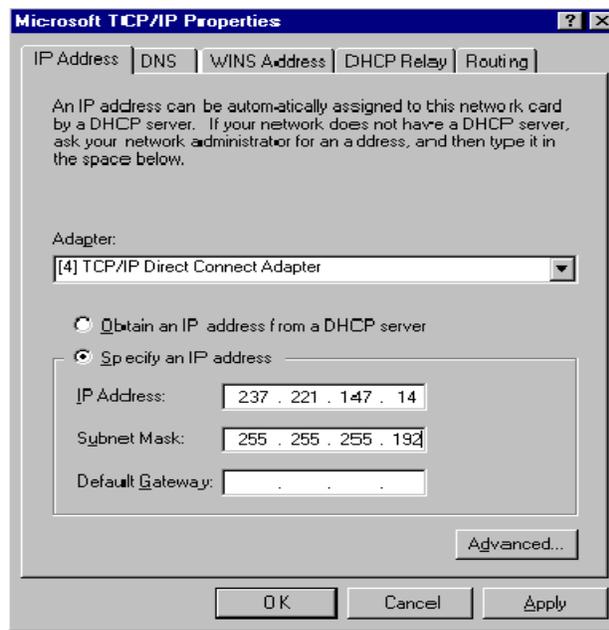


Figure 6-13. Assigning an IP Address to the ESCON Adapter

Finally, if you intend to have Windows NT perform IP forwarding from a network attached to the Netfinity server to the mainframe (see Figure 6-2), the IP address of the mainframe and TCP/IP Direct Connect must be in a *different* network (subnet) from the network adapter(s) in the server. Windows NT only performs routing between IP subnets. Forwarding IP traffic between two adapters on the same subnet is a bridging function not performed by Windows NT TCP/IP.

20. Click **OK**. Windows NT will complete the binding process and prompt you to reboot the server. You must reboot for network changes to take affect.

Installation of TCP/IP Direct Connect is complete.

Chapter 7. COMMUNICATIONS SERVER FOR WINDOWS NT

This chapter discusses installation and configuration of Data Link Control for Communications Server for Windows NT.

In addition to Data Link Control your server will require the PCI ESCON Adapter driver. Installation of this driver is discussed in Chapter 3. If you have not yet installed the adapter driver please go back and do it now.

If you intend to use a MPC transmission group, then you must first install the MPC+ driver as described in Chapter 3.

Once you have completed driver installation you may proceed with installation of Data Link Control.

Installing Data Link Control

Before the Netfinity ESCON Adapter can be configured in Communications Server for Windows NT, Data Link Control must be installed. The following procedure provides step-by-step instructions for completing that installation.

Step

1. DLC drivers are provided on the CD that accompanies each adapter. The drivers are in the sub-directory "WINNT\CSNT". To begin installation execute the Setup program (Figure 7-1).



Figure 7-1. Invoking DLC Driver Install

2. After Setup prepares, the Welcome screen (Figure 7-2) will be displayed. Click on **N**ext to proceed with the installation.

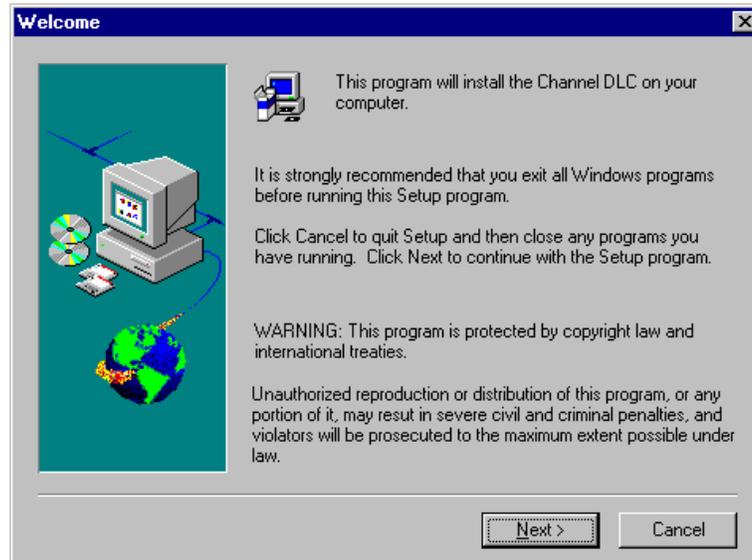


Figure 7-2. Welcome Screen

3. You will be prompted whether you wish to install Configuration Files or Driver and Configuration Files (Figure 7-3). The purpose of this prompt is to allow you to set up an administrator's system that can run the configuration utility but does not have an adapter installed. Driver files are only needed on servers where an adapter is installed. Click **N**ext to continue.

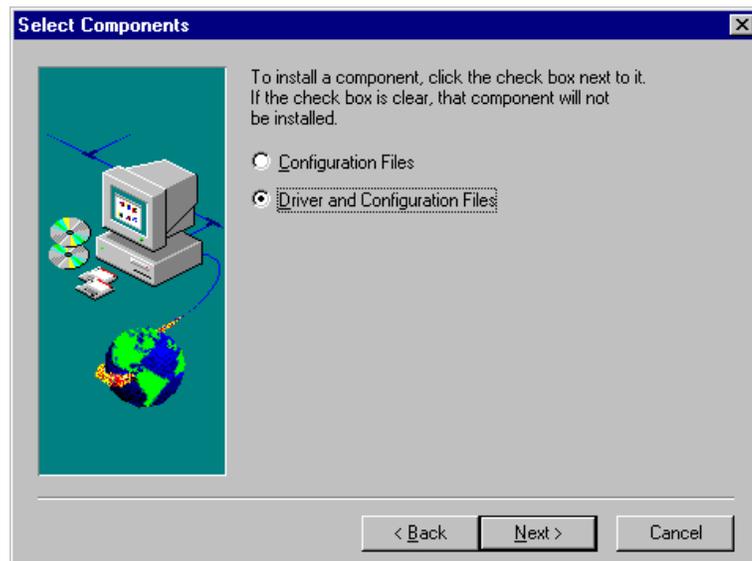


Figure 7-3. Select Components

4. The next screen to display allows you to choose a directory where Data Link Control will be installed (Figure 7-4). The default directory is "C:\Channel\CSNTCDLC". You may use the **B**rowse button to select a different directory. Once the directory is defined to your satisfaction, click on **N**ext to continue the installation.

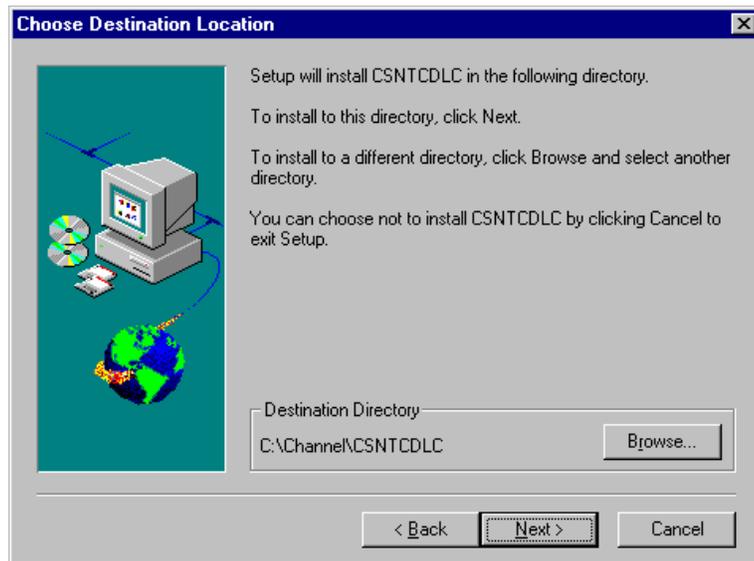


Figure 7-4. Choose Destination Location Screen

5. Progress bars will display during installation (Figure 7-5).

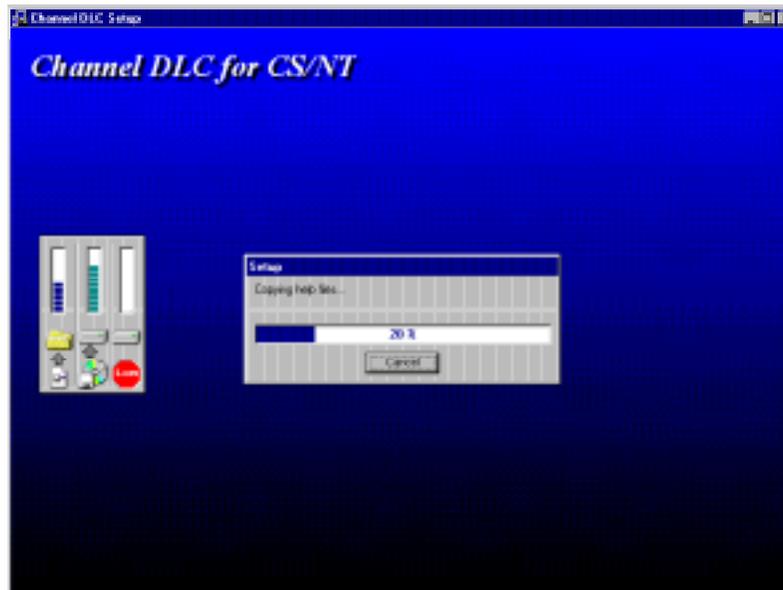


Figure 7-5. Installation Progress

6. Once installation is complete, a Setup Complete screen (Figure 7-6) will display informing you that the system must re-boot for the Channel DLC to take effect and prompting you if you want the re-boot to occur now or not. Select Yes or No and Click on **Finish**.

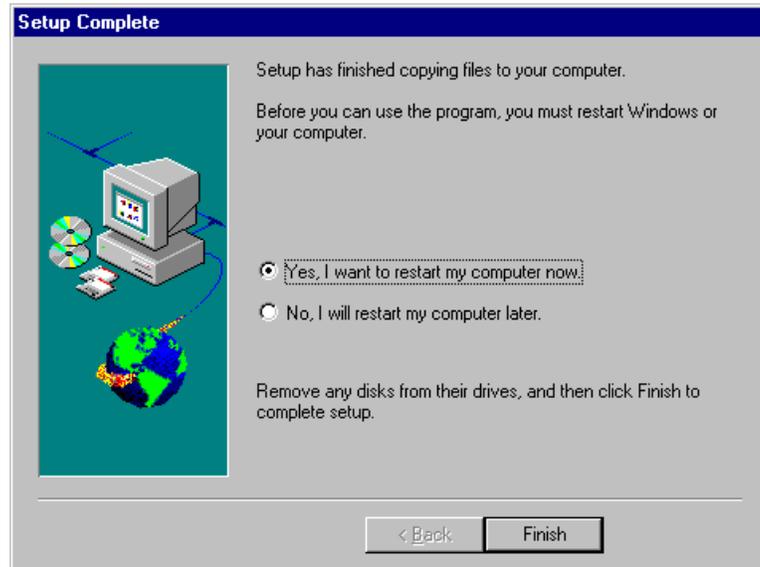


Figure 7-6. Setup Complete

Communications Server Configuration

Before Communications Server can use a new host adapter there are two definitions that must be completed. First, the adapter itself must be defined in the “*Devices*” section of the Definition Hierarchy (Figure 7-7). “*Defining the Adapter*” takes you through a Step-by-Step procedure for completing this definition.

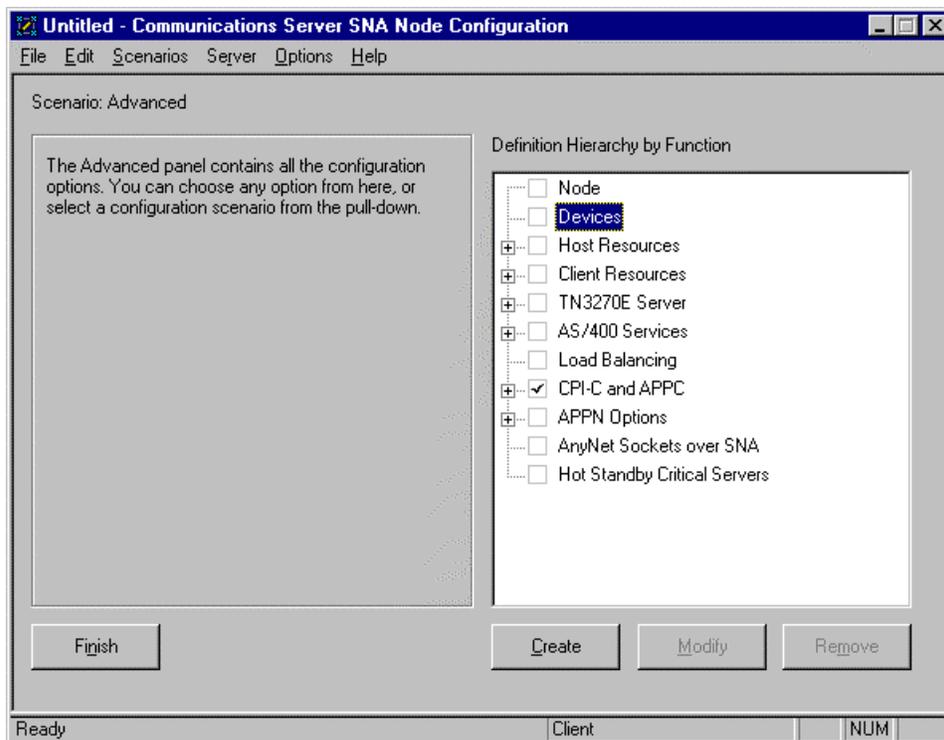


Figure 7-7. Devices Section of the Definition Hierarchy

Second, one or more Host Connections (PUs) must be defined in the Host Resources section of the Definition Hierarchy (Figure 7-8) and associated with the adapter. “*Defining a Host Connection*” provides a Step-by-Step procedure for defining a Channel Host Connection.

This manual does not completely describe configuration of Communications Server for Windows NT. Please refer to the **eNetwork Communications Server for Windows NT** documentation for complete description of setting up a Communications Server.

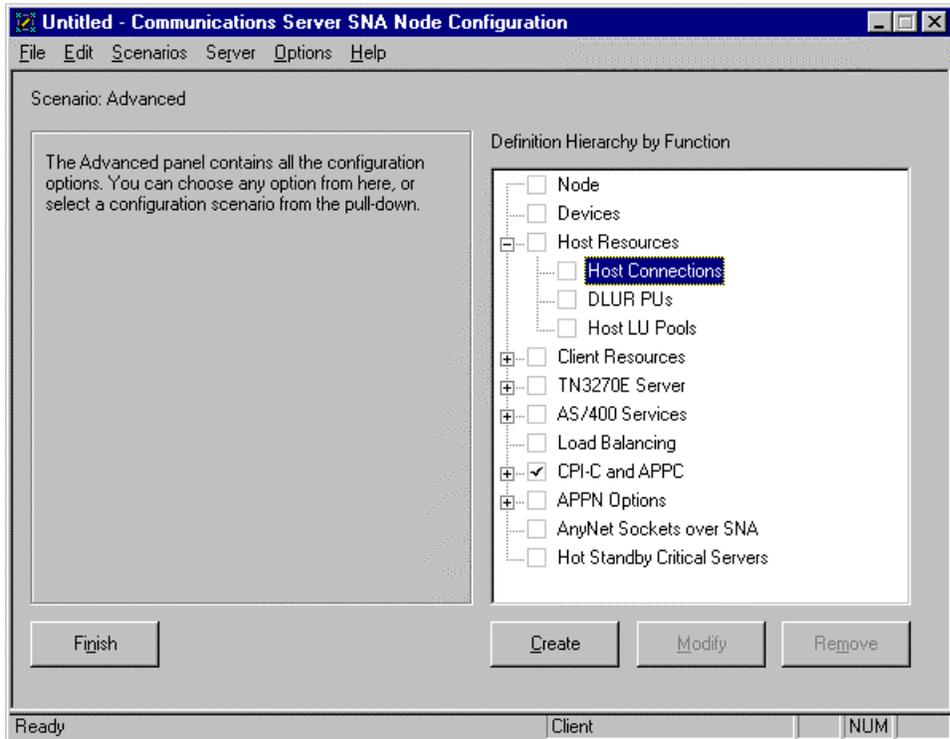


Figure 7-8. Host Connections in Host Resources of Definition Hierarchy

Defining the Adapter

Each adapter to be used by Communications Server must be defined as a device. It may only be defined once. The following procedure covers definition of an adapter.

STEP

1. When you start the SNA Node Configuration utility an automated procedure will prompt you whether to create a new configuration or use an existing one (Figure 7-9).

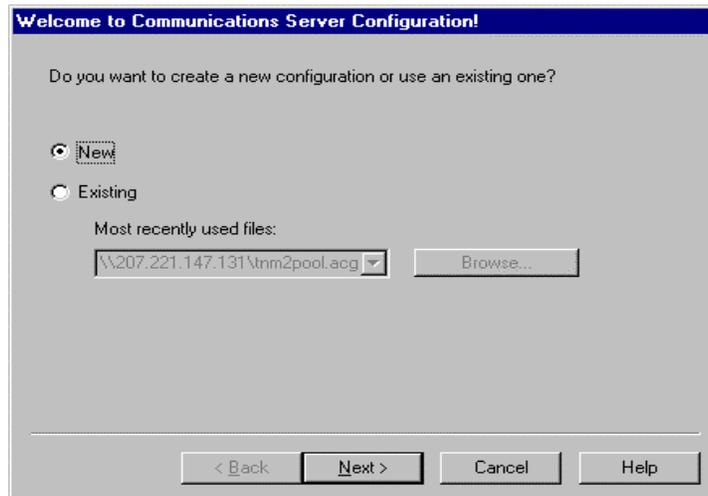


Figure 7-9. Automated Configuration Wizard

For Existing Configurations

If you are adding a second adapter to an existing system or replacing a different type adapter with a channel adapter click the “Existing” radio button, specify a file name, and then click next.

You will be prompted for a configuration scenario (Figure 7-10). Select the scenario that best matches your configuration and click “Finish”.

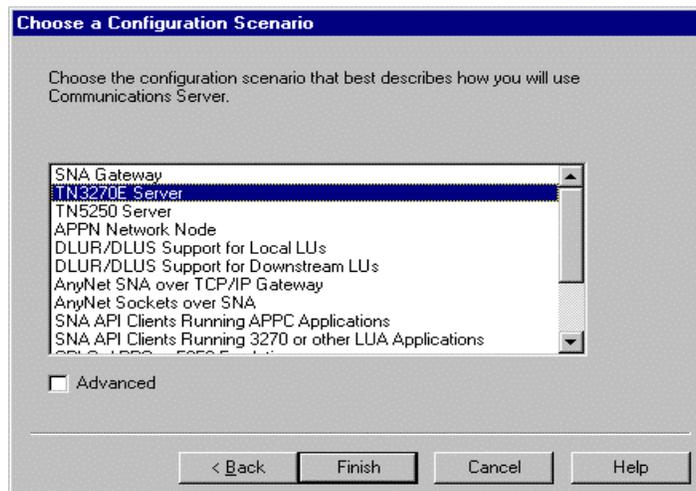


Figure 7-10. Prompt for Configuration Scenario

The configuration scenario will be displayed. Figure 7-11 shows an example of the TN3270 Server scenario.

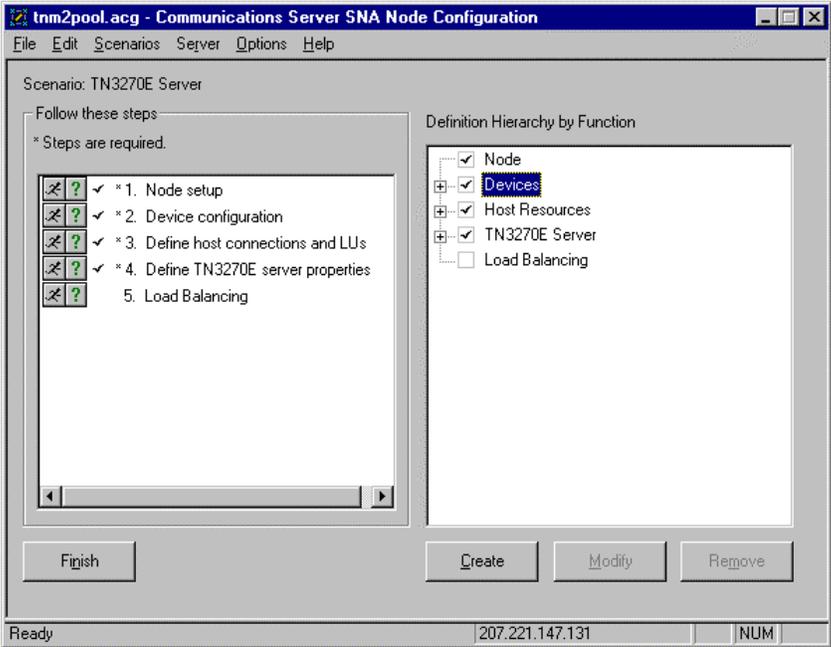


Figure 7-11. TN3270 Server Scenario

For New Configurations

New configurations using channel adapters cannot be defined by the automated procedure. If you are creating a new configuration click the “Cancel” button on the “Welcome to Communications Server Configuration!” dialog (Figure 7-9) to stop automated configuration. The Advanced scenario will display (Figure 7-12).

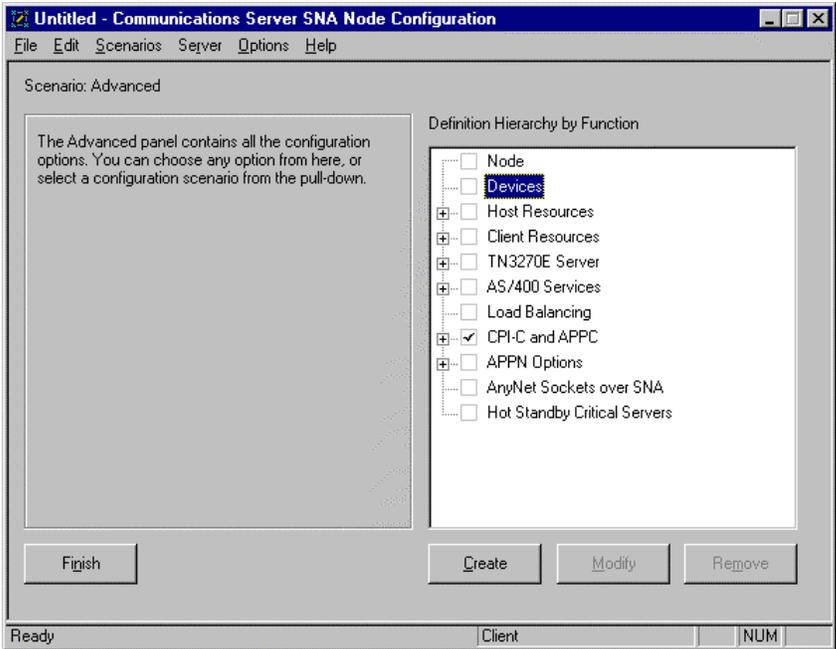


Figure 7-12. Advanced Configuration Scenario

For a new configuration you must define the node before adding a device. Please refer to the “Quick Beginnings” manual that came with Communications Server for detailed information on configuring the node.

2. Once you have a configuration scenario displayed (Figure 7-11 or Figure 7-12) and the node defined you are ready to add the channel adapter to the configuration. Double-click “Devices” in the Definition Hierarchy to invoke device definition. You will be prompted for device type. For standard (non-MPC) connections select “Channel Adapter DLC” (Figure 7-13). For MPC connections select “MPC Channel Adapter”. Click OK.

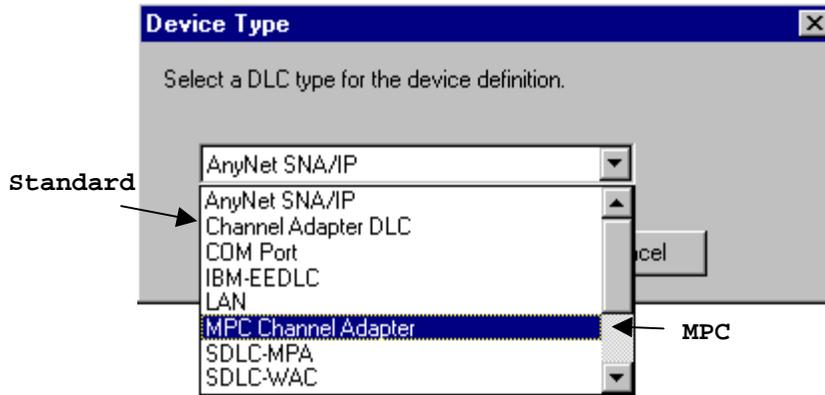


Figure 7-13. Selecting a Channel DLC

The basic information screen will display (Figure 7-14).

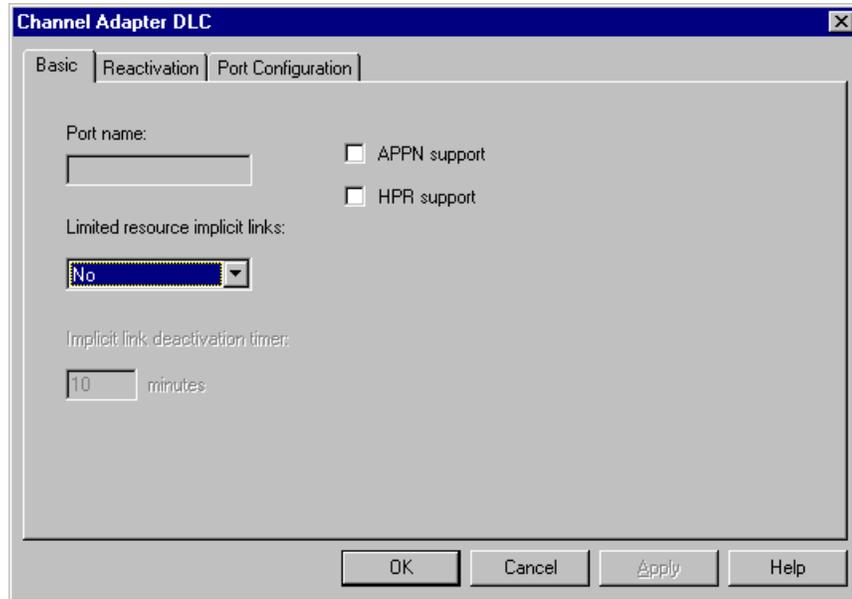


Figure 7-14. Basic Device Configuration Screen

For MPC Channel Adapters there are no active fields on this screen. For standard connections there are three fields that can be set on this screen:

Limited resource implicit links - This field should be set to **No** for channel connections.

APPN support - This check box indicates whether the connection (channel adapter) is to support CP-CP communications between nodes. Set based on your requirements. Note that if **Adjacent CP type** (see page 60) is set to **Host-XID0** or **Host-DEP. LU Only** then APPN support is not used.

HPR support - This check box indicates whether the connection is to support High Performance Routing (HPR). APPN support must also be selected if you intend to use HPR.

3. For standard connections use the mouse to select the Port Configuration tab (Figure 7-15).

Select the adapter you are installing, based on its slot and click **OK**.

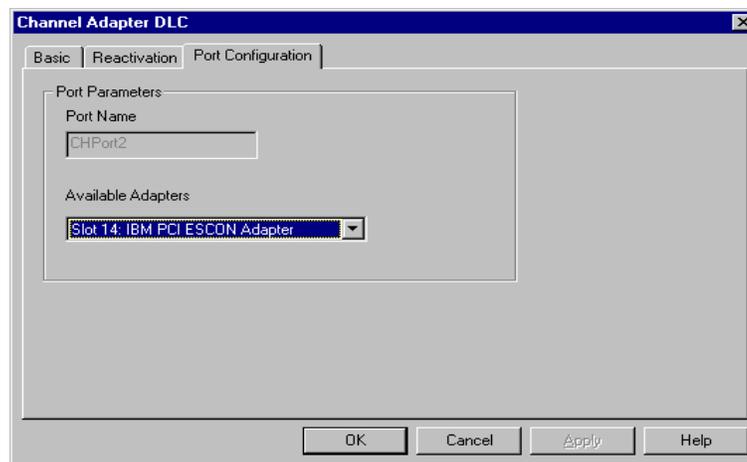


Figure 7-15. Selecting the ESCON Adapter

For MPC connections click **OK** on the Basic screen display.

4. The main configuration screen will be displayed again. The adapter should now appear in the Device Hierarchy on the right side of the screen (Figure 7-16).

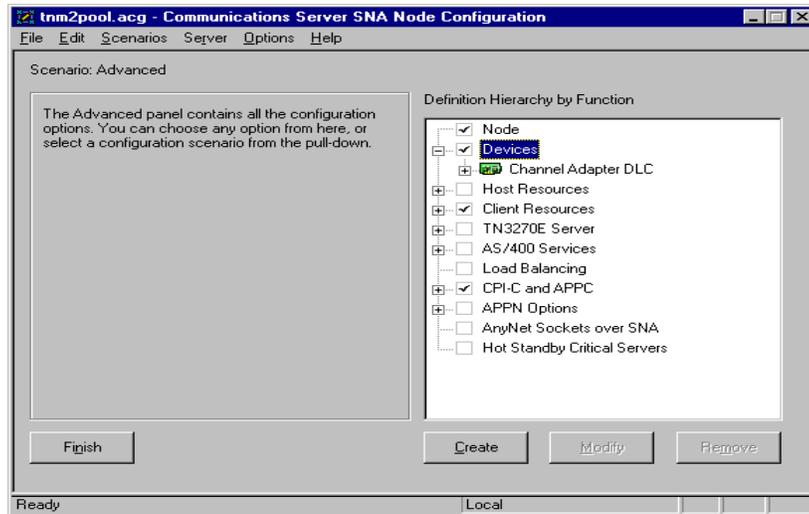


Figure 7-16. Channel Adapter listed under Devices

The adapter is now defined to Communications Server for Windows NT. The following section describes how to define Host Connections (PUs) which use the adapter to communicate with the host.

Defining a Host Connection

This section discusses how to define (connect) a Host Link to a previously defined channel adapter. A Host Link can logically be thought of as the Physical Unit (PU). A maximum of 32 Host Links can be defined to a single adapter.

The following procedure defines a Host Link and connects it to the adapter.

STEP

1. Once Device configuration has been completed (see previous section) double click “Host Connections” in the Host Resources section of the hierarchy (Figure 7-17).

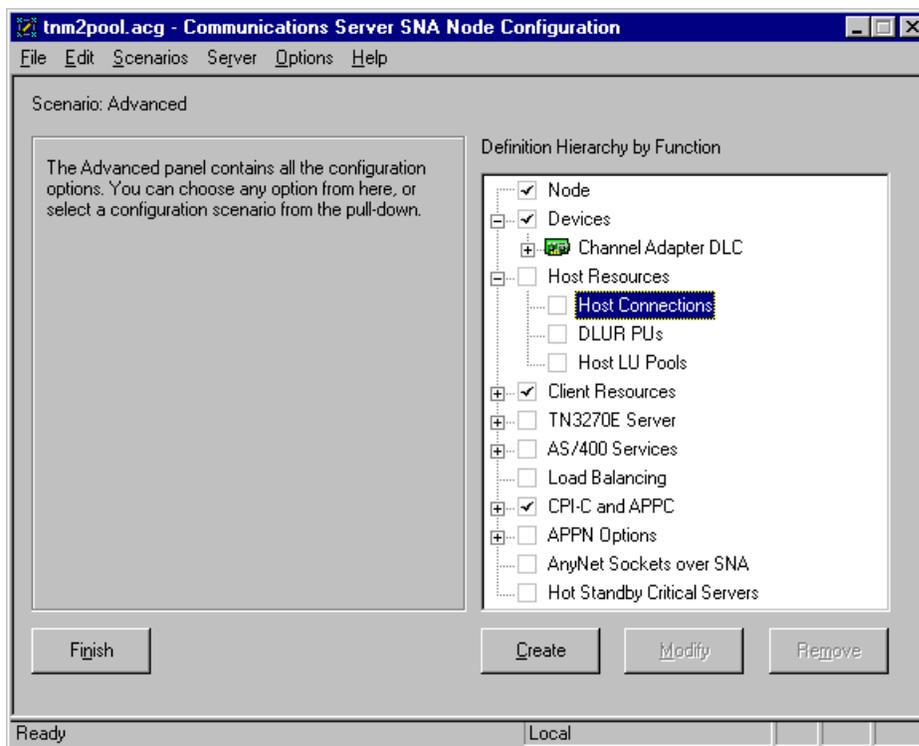


Figure 7-17. Host Connections

If the channel adapter is the only device type defined, configuration will proceed to the Basic screen for the channel adapter (Figure 7-19). If more than one device type has been defined, a Link Type dialog box will display. Select the Channel type and click OK (Figure 7-18).

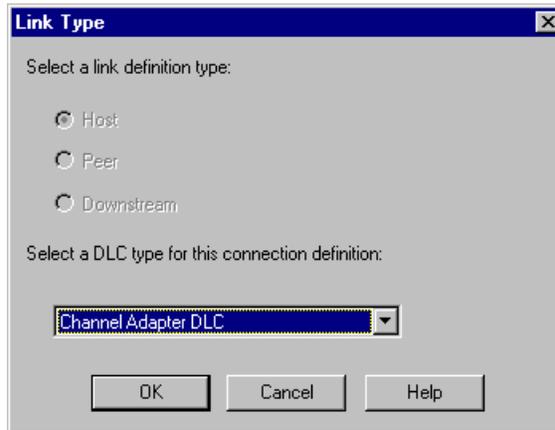


Figure 7-18. Link Type Selection

2. From the Basic host connections screen (Figure 7-19) select the Port name you will to use. Remember that the Port name is unique for each adapter, so selecting a Port name is the same as selecting an adapter. The Local Node ID for the port will display. It will default to the Node Id defined for this Communications Server (defined when configuring the Node). There is no need to change it. Click on the Advanced tab to continue.

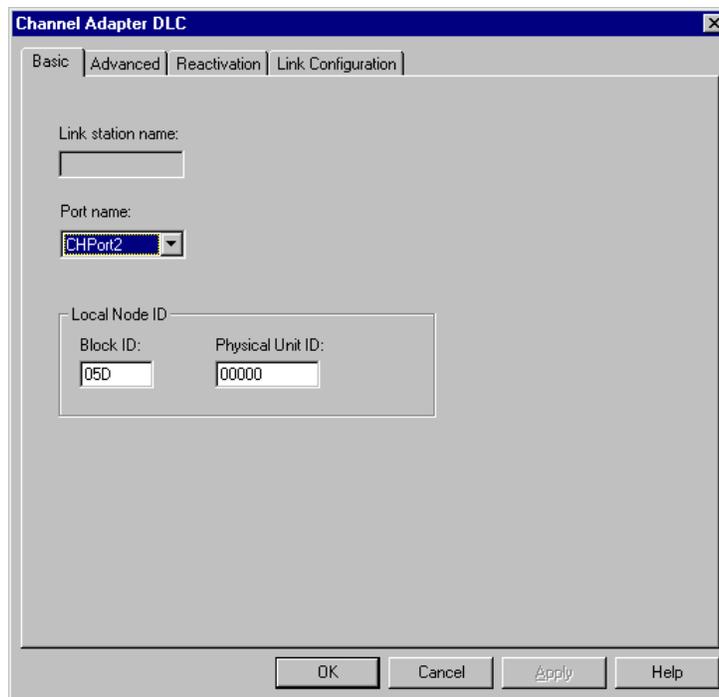


Figure 7-19. Basic Connection Configuration

The Advanced configuration screen will display (Figure 7-20).

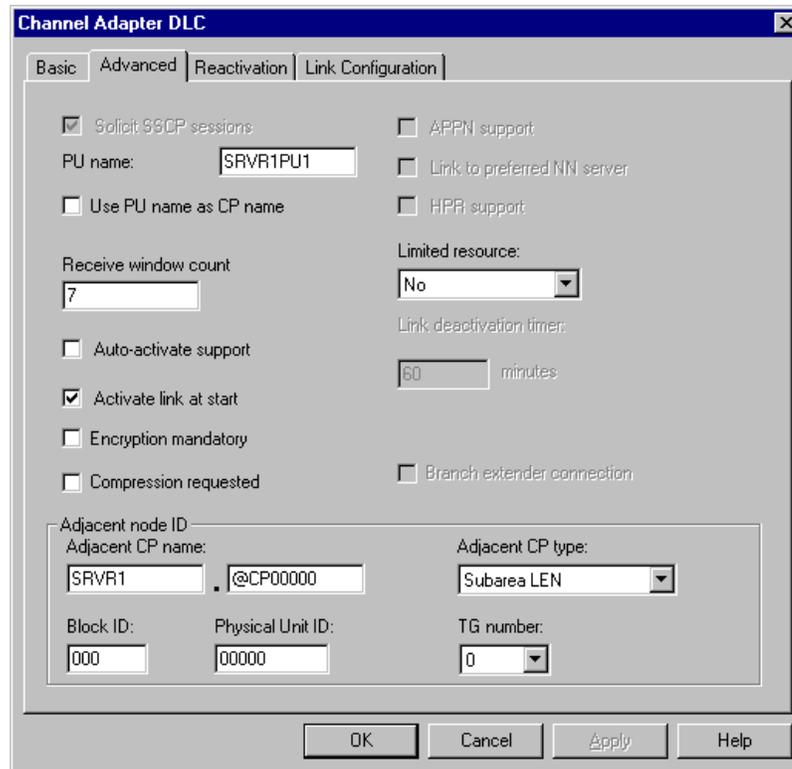


Figure 7-20. Advanced Host Connection Screen

You may define a **PU Name** to this connection. If you do not enter a PU name it will default to the Link name as entered on the Link Configuration screen (Figure 7-21).

The **Receive window count** indicates the number of I-frames that this link can receive before acknowledge must be sent. Any number from 1 to 127 is acceptable. 7 is the default.

The Advanced configuration screen allows you to specify automatic PU activation as follows:

- **Auto-activate Support** - Activates the link automatically on demand. That is, when a workstation attempts to attach the link will be activated. This option is normally used for remote connections. It should not be selected for a channel attachment.
- **Auto-reactivate Support** - Activates the link automatically whenever the adjacent node (the host) attempts to activate the Node. This should be checked to enable automatic restarts from the host.
- **Activate link at start** - Activates the link whenever the Node is started. If this option is not selected, manual activation from the SNA Node Operations screen will be required.

The **Limited resource** field indicates when the link should be de-activated. Since channel connections are not a limited resource, this field should be set to **No**.

The **Adjacent CP type** field is used by the adapter to determine whether to communicate with the host using PU 2.0 or PU 2.1. Setting Adjacent CP type to **Host - XID0** will cause the adapter to communicate with the host as a Physical Unit type 2.0 (PU 2.0). Setting Adjacent CP type to any other value will cause the adapter to communicate with the host as a Physical Unit type 2.1 (PU 2.1).

The default is **Subarea LEN** (PU 2.1).

3. For standard connections click on the **Link Configuration** tab (Figure 7-21).

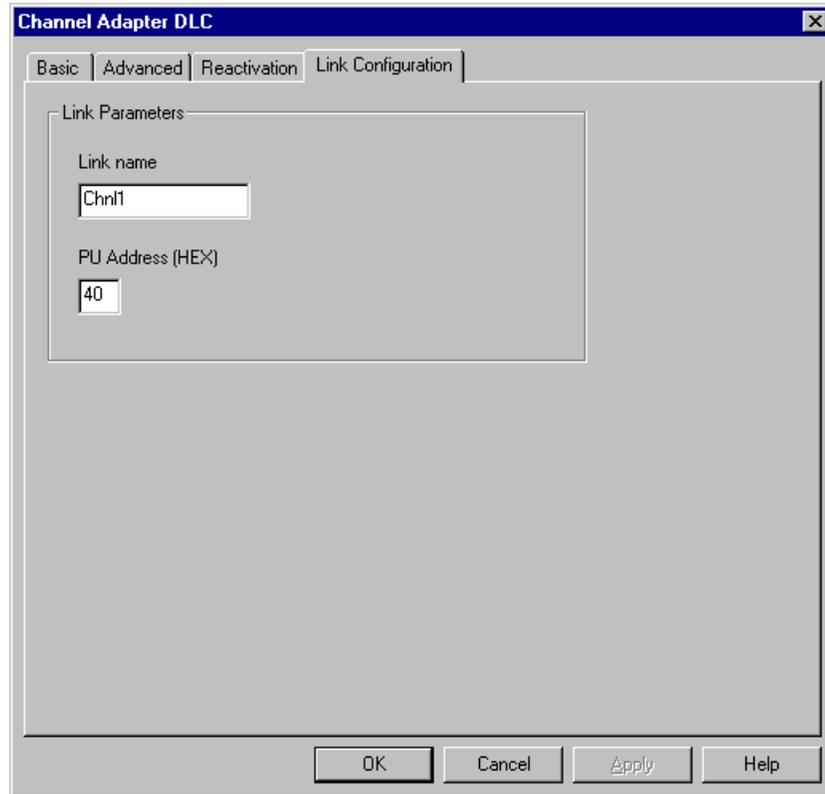


Figure 7-21. Link Configuration

You may enter a link name or allow the system to assign one. Enter the two digit hexadecimal sub-channel address that this connection is going to occupy on the mainframe channel. This address must match the host and ESCON (see Chapter 4) configuration parameters.

Remember that more than one host connection can be defined to an adapter. The PU address (Sub-Channel address) must be unique to this definition.

Once you have entered the correct address, click **OK** to complete the Host Connection definition.

For MPC connections, click on the **MPC Connection** tab (Figure 7-22).

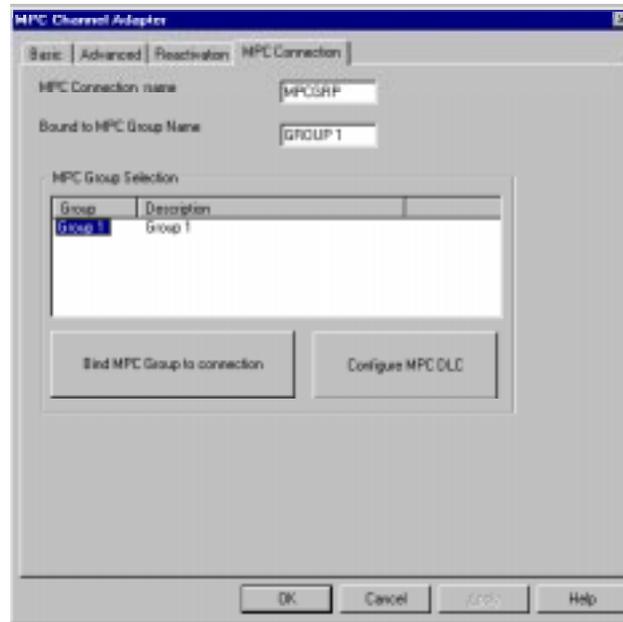


Figure 7-22. MPC Channel Adapter Connection Definition

Enter a MPC Connection name which must be 1-8 characters with no spaces. Point to a group in the MPC Group Selection and double-click on it to bind the MPC Group for this connection. If there are no groups displayed for selection you will have to click **Configure MPC DLC** to define one. See Chapter 5 for specific instructions on defining a MPC transmission group.

Click **OK** to complete the Host Connection definition.

4. When you define a new connection, you will be automatically prompted whether or not you want APPC traffic automatically routed across the connection or not (Figure 7-23). Answer “Yes” if you want Communications Server to create a wildcard (*) partner LU definition which will forward all LAN APPC sessions over this connection.

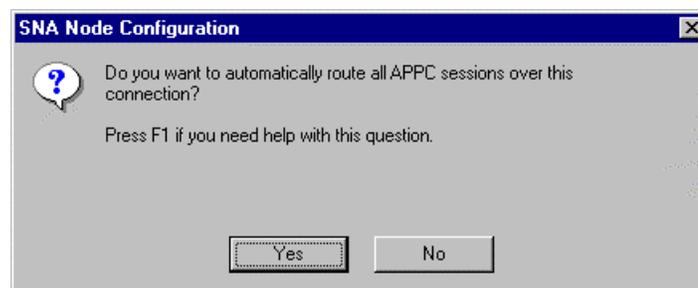


Figure 7-23. APPC Prompt

5. You will now be prompted to create new LUs for this connection (Figure 7-24). Click **Yes** to create a range of LUs for your new host link.

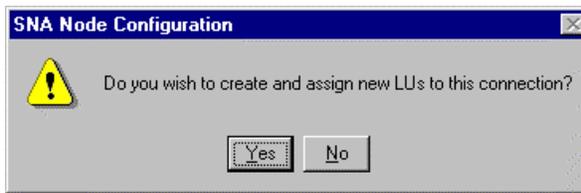


Figure 7-24. Automatic LU Generation for New Connection

6. The Communications Server for Windows NT LU Definition screen is displayed (Figure 7-25). Complete the screen as directed by Communications Server documentation and click OK at the bottom of the screen to create the LUs.

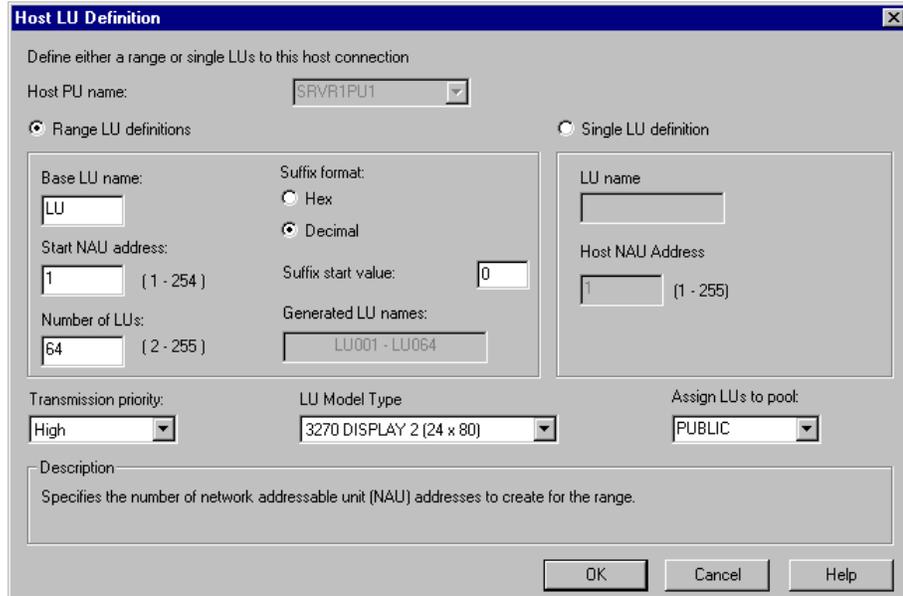


Figure 7-25. LU Definition

7. Verify that the connection now appears in the Host Connections hierarchy (Figure 7-26). Click the Define host connection and LUs again if you wish to define a second Host Link.

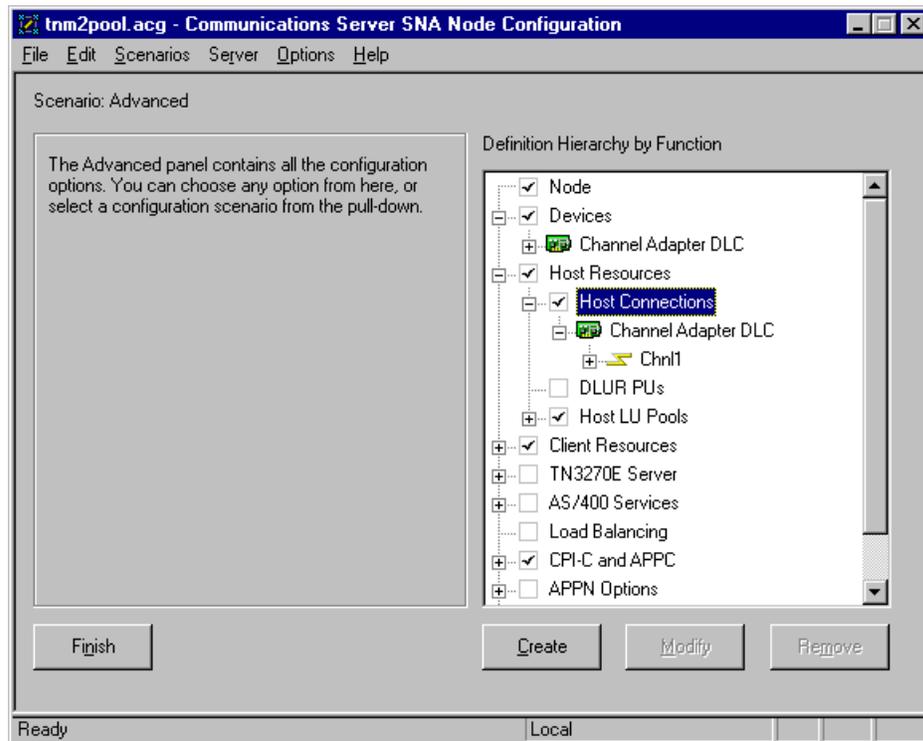


Figure 7-26. Host Links Defined

Once you have defined one or more Host Links to the adapter, your Communications Server is ready to begin communicating with the Host. Make sure you save the configuration before exiting SNA Node Configuration.

Chapter 8. SNA SERVER FOR WINDOWS NT

You must define a Link Service for each Netfinity ESCON Adapter you intend to use with SNA Server. Connections (PUs) are then defined to use the Link Service. The following two sections cover step-by-step how to set up a Link Service and Connection (PU) to use a Netfinity ESCON Adapter.

In addition to the Link Service your server will require the PCI ESCON Adapter driver. Installation of this driver is discussed in Chapter 3. If you have not yet installed the adapter driver please go back and do it now. Once you have completed the installation of the driver proceed with defining a Link Service.

Defining a Link Service

The following section, “*Installation from CD*”, provides a step-by-step procedure for installing Link Services from the CD-ROM that accompanied your adapter. The Link Service software only needs to be installed once.

The section “*Configuring a Link Service*” provides instructions for adding a Link Service to your SNA Server configuration. You will need to configure a Link Service for each ESCON adapter you want to use with SNA Server.

Installation from CD

The following procedure installs the Channel Link Service from CD.

STEP

1. Begin by pressing the **START** button on the Windows NT Server console. Select **Run**. Assuming your CD-ROM is the **d** drive, type **d:\winnt\snasvr\setup** and press **OK**. (Figure 8-1).

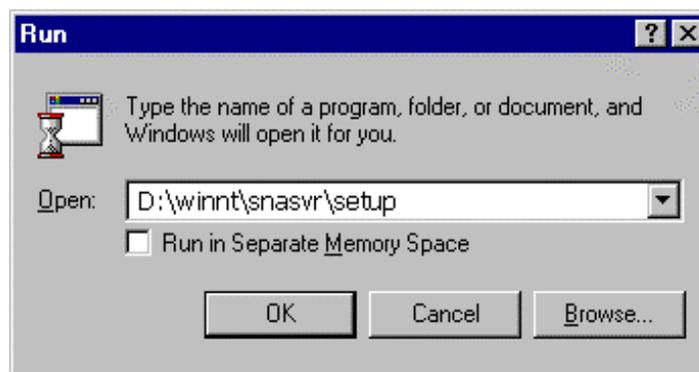


Figure 8-1. Starting Setup to Install a Data Link Service

The InstallShield progress bar will briefly display while setup prepares the InstallShield Wizard (Figure 8-2).

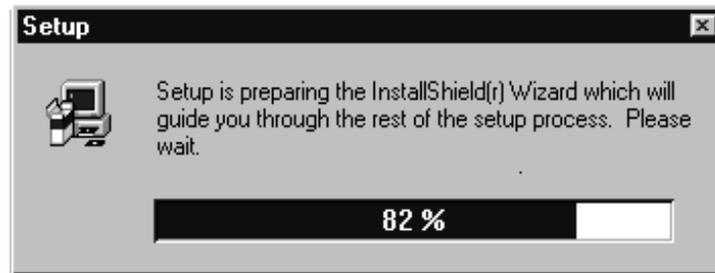


Figure 8-2. Preparing InstallShield Wizard

2. A Welcome dialog box appears (See Figure 8-3). Click **N**ext to proceed to the next dialog screen.

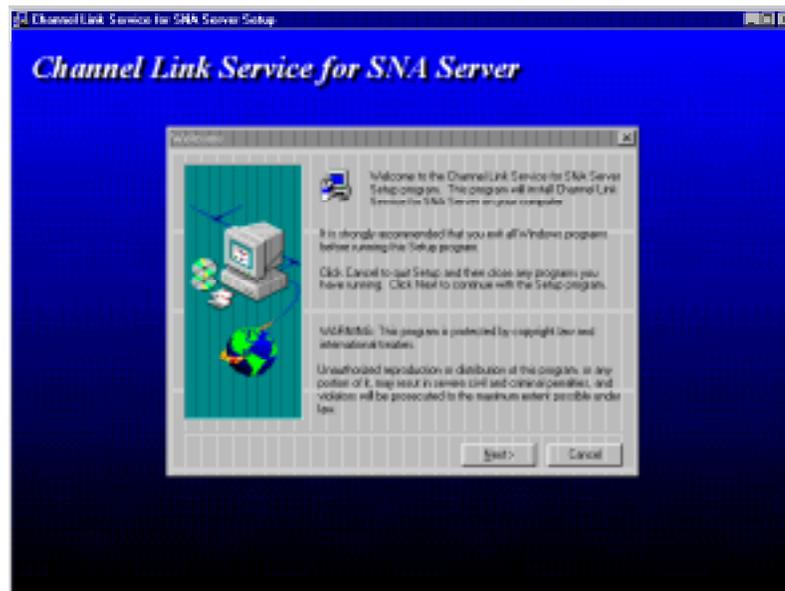


Figure 8-3. Welcome Dialog Box

3. Progress bars will display to show installation progress (Figure 8-4).

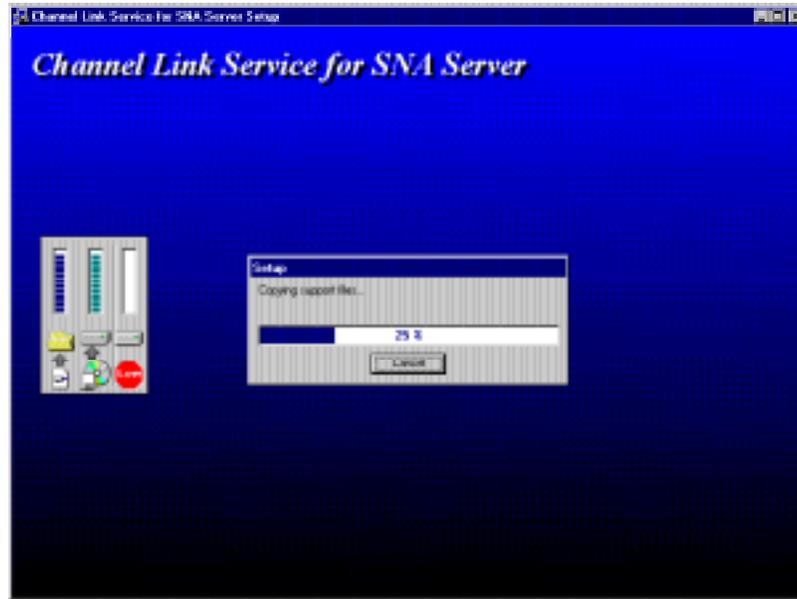


Figure 8-4. Installation Progress Bars

4. When the Setup Complete screen (Figure 8-5) appears, click Finish to end the installation.

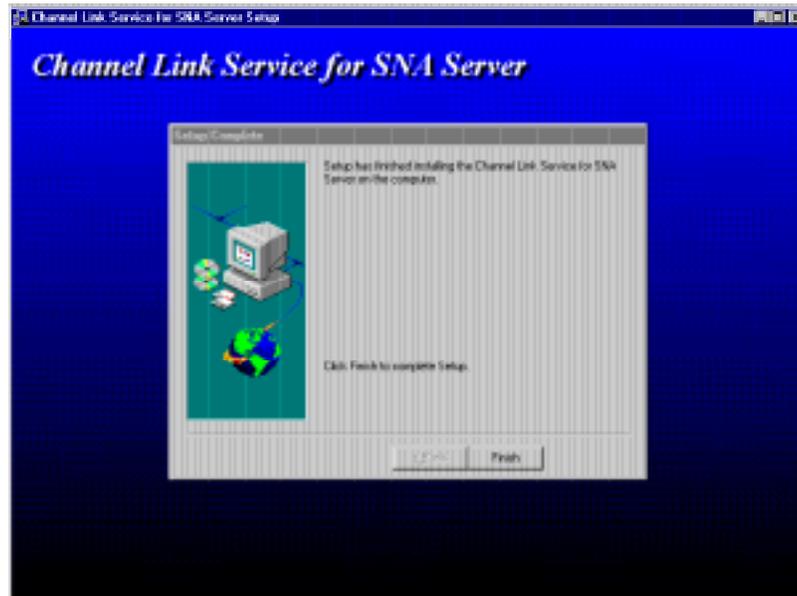


Figure 8-5. Installation Complete

Configuring a Link Service

The following procedure shows how to create a Link Service once the Channel Link Service has been installed on the server.

1. Invoke the SNA Server Manager from Windows NT (Figure 8-6).

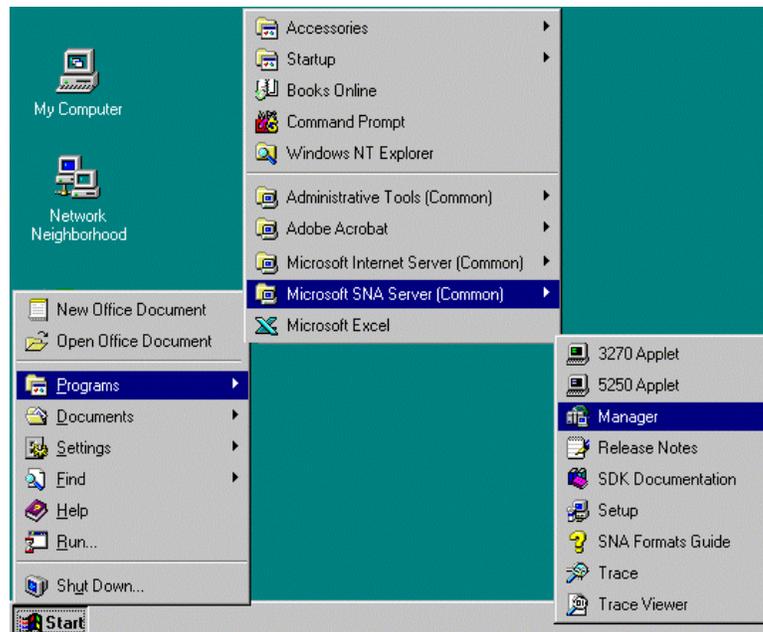


Figure 8-6. Invoking SNA Server Manager

2. From the Insert pull down menu, select Link Service... (See Figure 8-7).

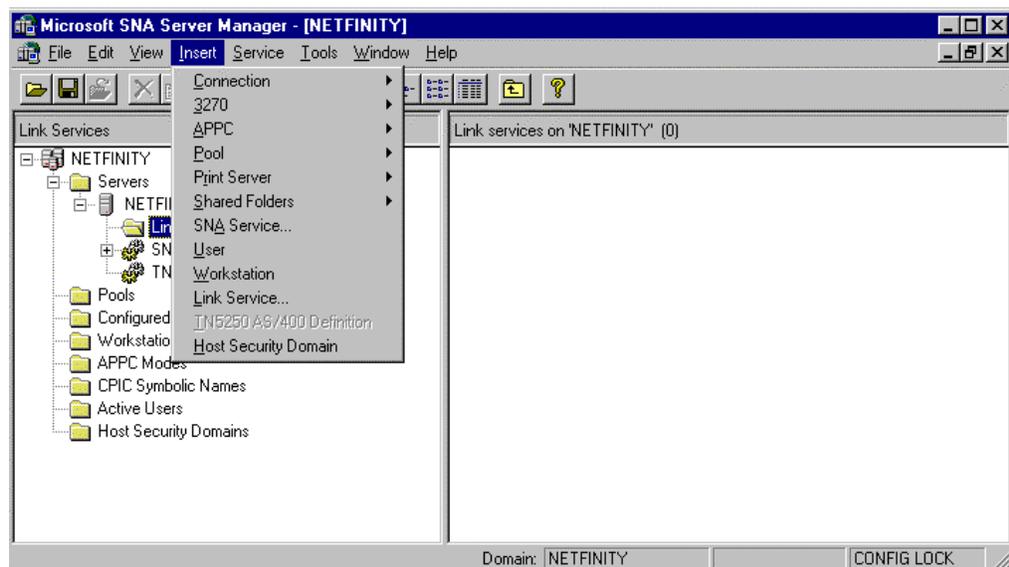


Figure 8-7. Insert Link Service

3. A list of installable link services will appear. Select **Channel Link Service** and click **Add** (Figure 8-8).



Figure 8-8. Select Link Service

4. The Service Properties screen displays (Figure 8-9).



Figure 8-9. Link Service Properties

You may modify the default Service Title assigned to this link service and then select an adapter.

Check “Allow Link Service to be Distributed” if you intend to use the Distributed Link Service capability of SNA Server.

Click **OK** to complete the installation.

Defining Connections

Once a Link Service has been configured you can define up to 32 connections (PUs) to the mainframe using that Link Service.

1. Start SNA Server Manager from Windows NT. If you open the **Link Services** folder you will notice the link service created by the previous procedure (Figure 8-10).

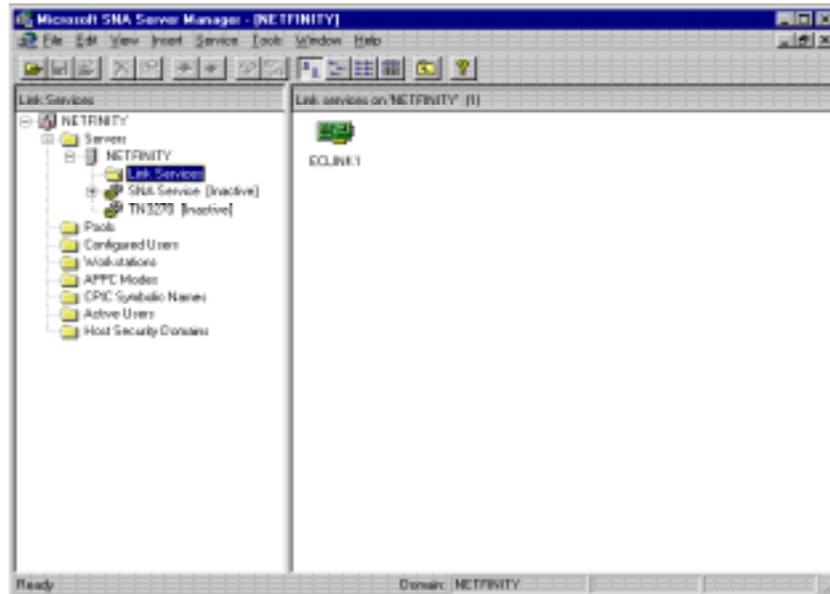


Figure 8-10. ESCON Link Service

2. Using your mouse, menu select **I**nsert, **C**onnection, and **C**hannel as shown in Figure 8-11).

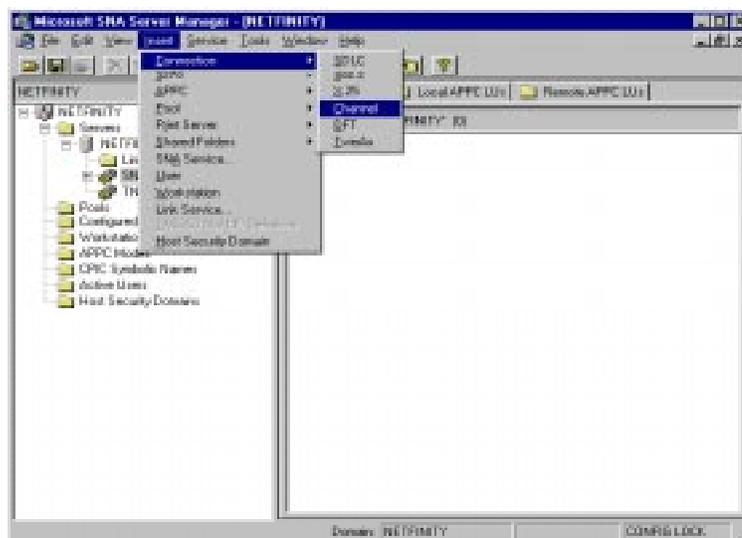


Figure 8-11. Inserting a New ESCON Connection

3. The **Connection Properties** screen (Figure 8-12) will appear. You may change the Connection Name and Comment and set the Activation option. Select a Channel Link Service; connecting this connection to the ESCON adapter. Then click the **Address** tab.

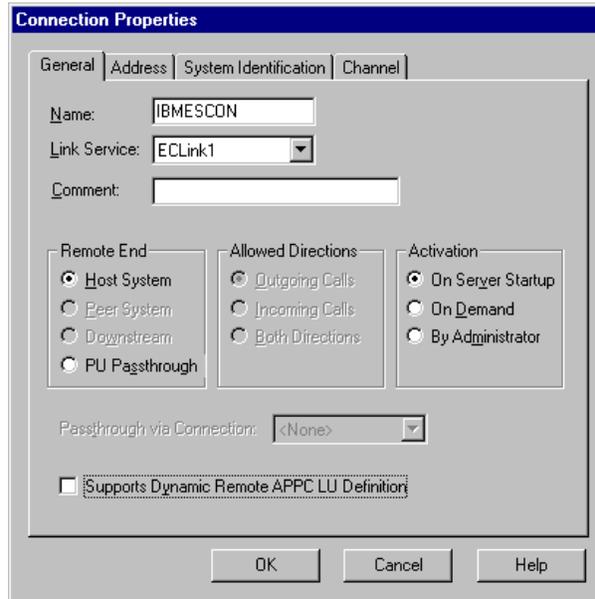


Figure 8-12. Connection Properties

3. The Channel Address dialog box appears (Figure 8-13).

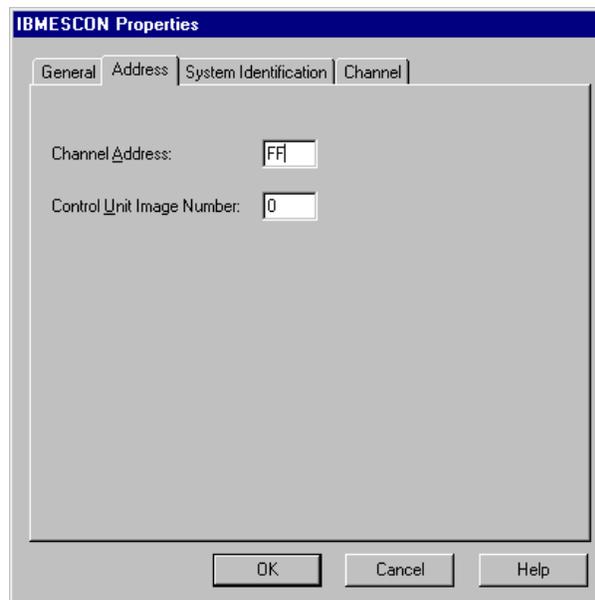


Figure 8-13. Channel Address

Type a two-digit hexadecimal number identifying the subchannel. The range is from 00 through FF; the default is FF. Check with your mainframe system administrator for an appropriate address.

Control Unit Image Number is not used.

5. Click on the **System Identification** tab (Figure 8-14).

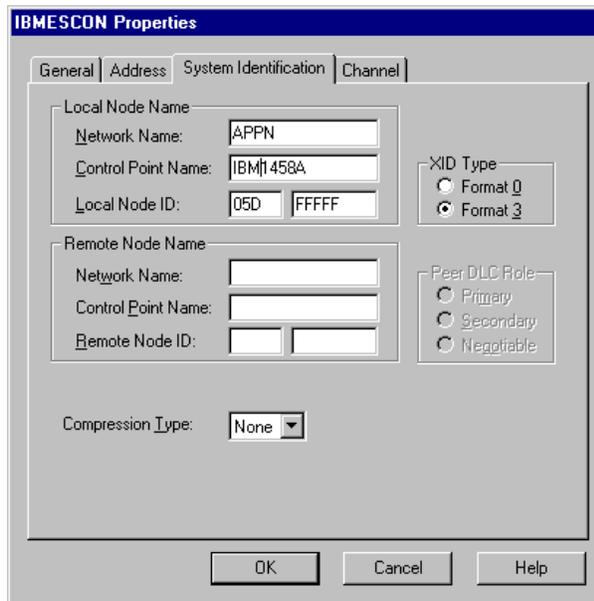


Figure 8-14. System Identification Dialog Box

You may enter a Network Name and Control Point Name.

Select the XID type for SNA Server to send:

Format 0 sends only the Node ID. Use this option only if the host does not support Format 3; most hosts support Format 3.

Format 3 sends up to 100 bytes of identifying information, including the Local Node ID and Control Point Name.

The default is Format 3.

Type the Local Node ID, an eight-digit hexadecimal number that identifies the local system. Type the first three digits (the block number) in the first box and the last five digits (the node number) in the second box. Notify the host administrator of the Local Node ID used for your system. The numbers should match corresponding parameters in the VTAM PU definition: block number should match IDBLK, and node number should match IDNUM. In most cases the default is fine.

Use the same Local Node ID for all connections and link services on a particular server.

Do not use 000 or FFF for the first three digits of the Local Node ID. These values are reserved.

The default for Local Node ID is 05D-FFFFF.

6. Click on the **Channel** Tab (Figure 8-15). Set the parameters on the Channel Screen as follows:

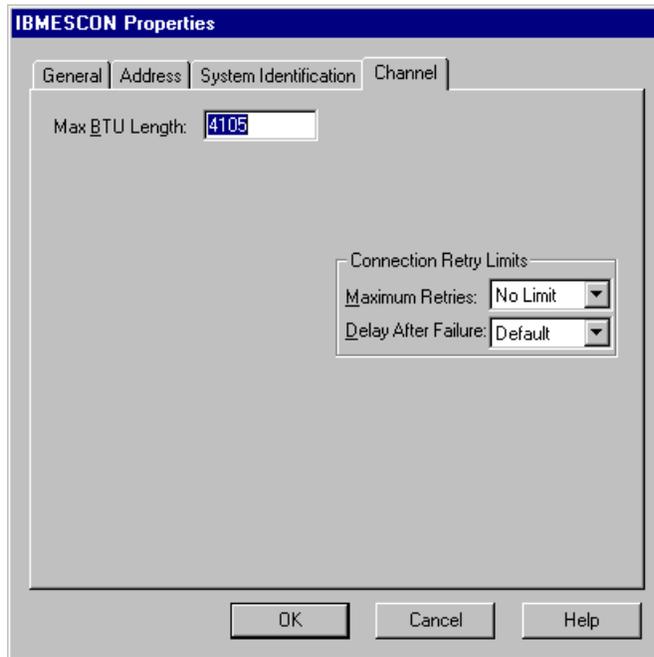


Figure 8-15. Channel Connection Properties

Max BTU Length

Specify the maximum length for the BTU, which is the number of bytes that can be transmitted in a single data-link information frame. A BTU is also called an I-frame.

The range for the Netfinity ESCON adapter is 256 – 8201 for PU type 2.1 connections and 256 – 4105 for PU type 2.0 connections.

Max BTU Length must be less than MAXBFRU (defined for the PU in VTAM) times the VTAM I/O buffer size.

The default is 4105.

Maximum Retries

Select the number of attempts for SNA Server to make when trying to establish the connection. After making this number of attempts, SNA Server makes an entry in the event log and stops trying.

The range is from 1 through No Limit; the default is No Limit.

Delay after failure

Select the length of time for SNA Server to wait between attempts to establish the connection.

The range is from 5 seconds through 255 seconds; the default is 10 seconds.

To accept the settings, choose the OK button.

8. When you return to the SNA Server Manager dialog box, the new Connection will be displayed (See Figure 8-16).

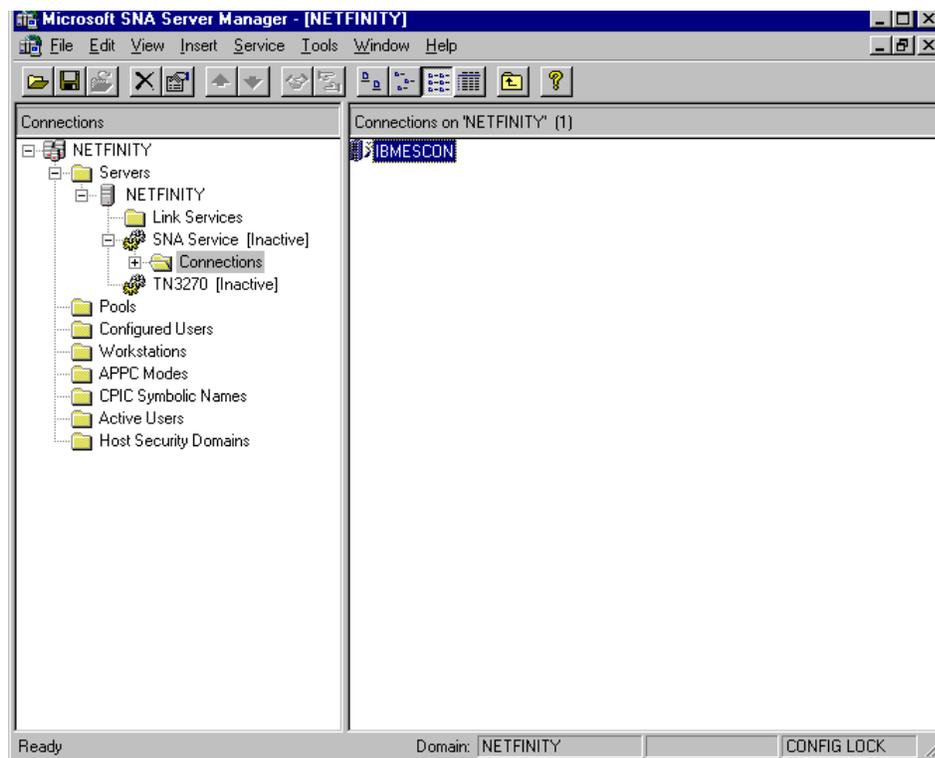


Figure 8-16. Configured Connection

To complete the installation of the adapter you must now define LUs to the Connection(s) and then configure the mainframe to match. Refer to the Microsoft SNA Server Administration Guide for assistance in assigning LUs to the connections you have defined.

Chapter 9. TCP/IP PASSTHROUGH FOR WINDOWS NT

There are two separate software components that must be installed for TCP/IP Passthrough for Windows NT to operate properly:

- PCI ESCON adapter driver
- TCP/IP Passthrough protocol

Installation of the PCI ESCON adapter driver is explained in detail in the section titled “Windows NT Server” in Chapter 3 beginning on page 7. The adapter driver must be installed prior to installing the TCP/IP Passthrough Protocol.

Installing TCP/IP Passthrough Protocol

The following procedure describes installation of TCP/IP Passthrough as a protocol in Windows NT.

STEP

1. To begin the installation, click the Network Icon in the Windows NT Control Panel (Figure 9-1).

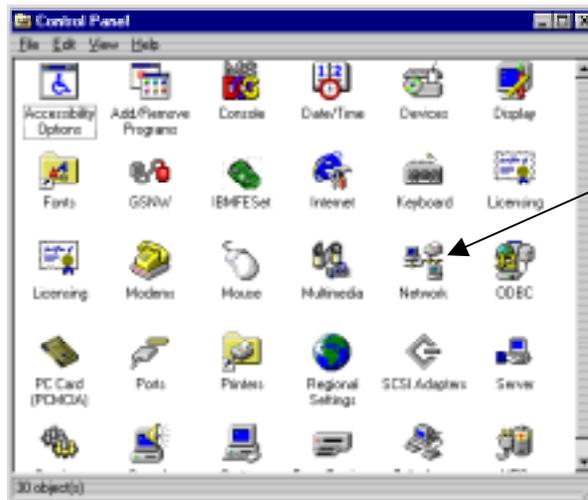


Figure 9-1. Network Icon on Control Panel

2. The Network dialog box will display. Click on the **Protocols** tab (Figure 9-2). Click **A**dd to begin the installation of TCP/IP Passthrough.

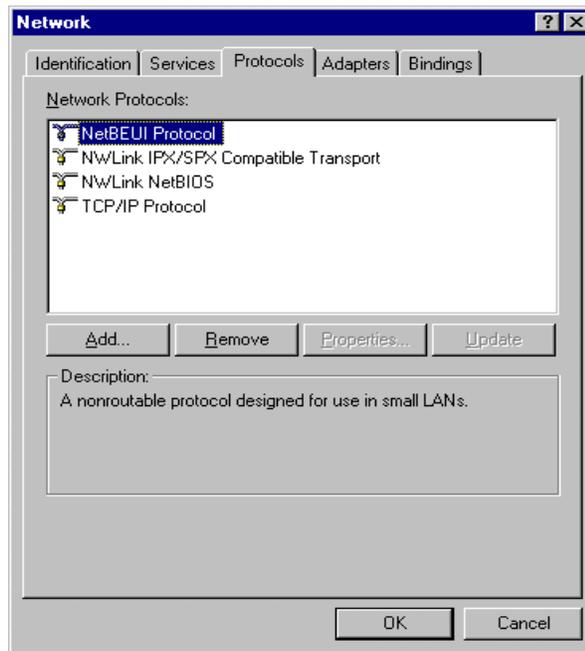


Figure 9-2. Protocol tab on Network Dialog

3. The Select Network Protocol dialog box will display (Figure 9-3). Click on Have Disk... to continue.

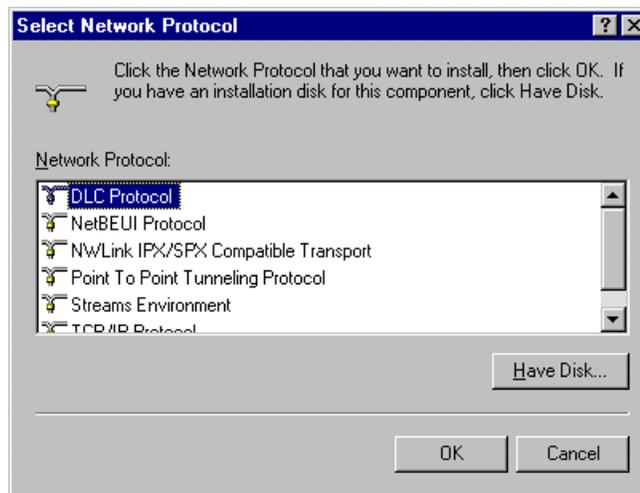


Figure 9-3. Select Network Protocol

4. The Insert Disk dialog will display. Enter the directory for TCP/IP Passthrough for Windows NT ("**d:\winnt\tcpip_pt**" where "d" is the driver letter associated with your CD-ROM) and click OK (Figure 9-4).

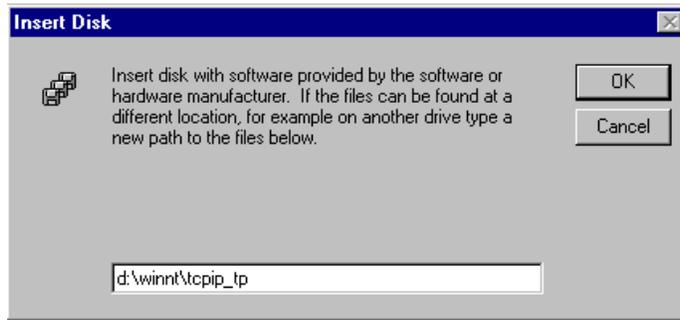


Figure 9-4. Insert Disk

4. The Select OEM Option dialog box will display (Figure 9-5). TCP/IP Passthrough should be selected. Click **OK** to invoke the install.



Figure 9-5. Select OEM Option

5. The system will proceed to install the software. During the install a progress bar will be displayed. At the end of the install a Setup Message box will display indicating successful installation (Figure 9-6). Click **OK** to continue.

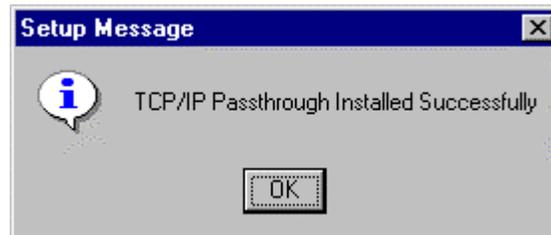


Figure 9-6. Setup Message - Install Successful

6. The Network dialog Protocol page will redisplay (Figure 9-7). You should now see TCP/IP Passthrough on the list of installed protocols.

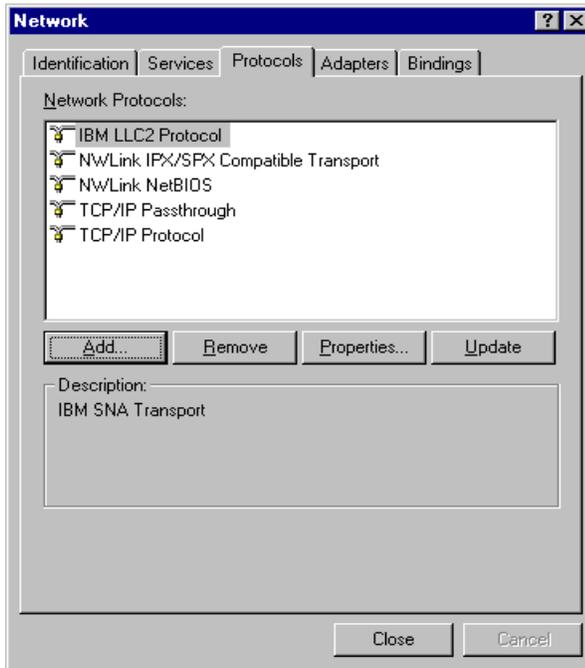


Figure 9-7. Network Protocol list with TCP/IP Passthrough

7. TCP/IP Passthrough requires dedicated LAN adapters. You must disable all other services and protocols bound to LAN adapters that are planned for use with TCP/IP Passthrough. Click on the **Bindings** tab in the Network screen (Figure 9-7). Then select **All Adapters** to display the list of installed adapters in the server. Expand the bindings for any adapter that you plan to use for TCP/IP Passthrough. Highlight and **Disable** all services and protocols bound to the adapter except for TCP/IP Passthrough. Figure 9-8 shows a properly configured LAN adapter.

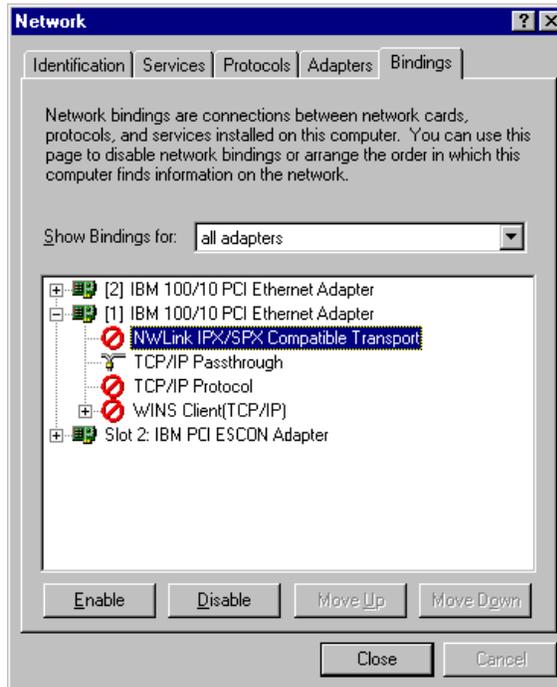


Figure 9-8. Network Bindings for all Adapters

8. Click **Close** to end the installation. The system will begin updating the network bindings. Since TCP/IP Passthrough has not been configured the update will be paused for you to configure TCP/IP Passthrough. The TCP/IP Passthrough properties screen will display (Figure 9-9).

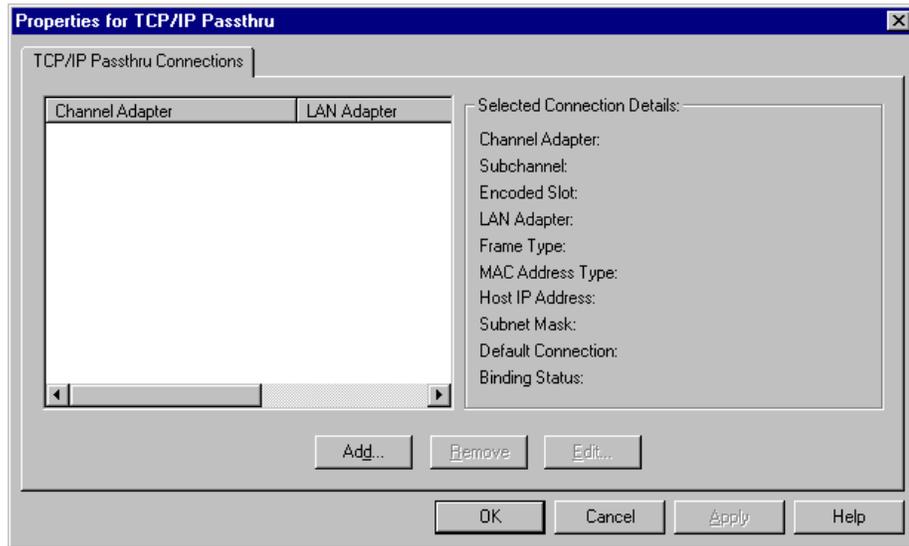


Figure 9-9. TCP/IP Passthrough Configuration

9. Define at least 1 connection as described in “*Configuring TCP/IP Passthrough*”. Click **Save** to save the configuration. Update of the Network Bindings will complete and you will be returned to the Control Panel.

TCP/IP Passthrough installation is complete.

Configuring TCP/IP Passthrough

TCP/IP Passthrough can be re-configured at any point in time after installation but requires a re-boot of the server to implement the change.

STEP

1. From the Windows NT control panel, click the Network icon (Figure 9-10).

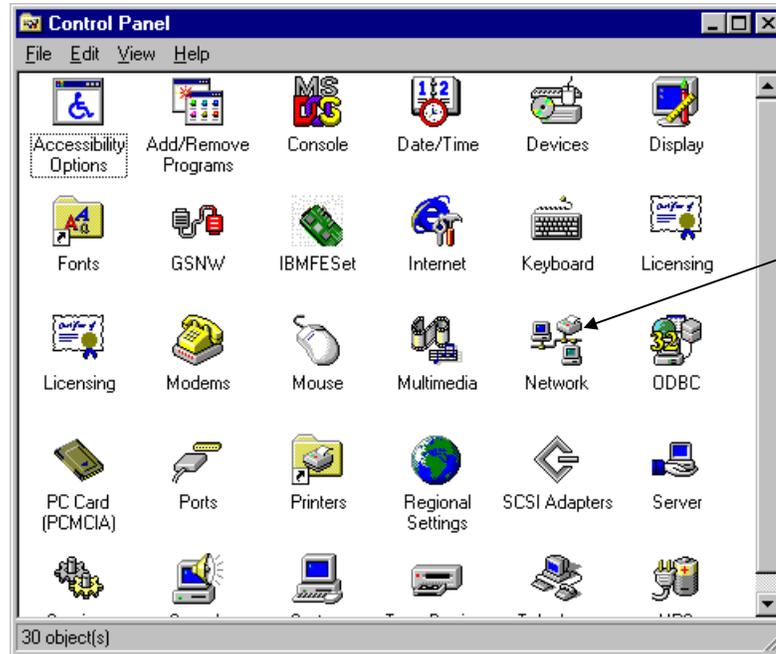


Figure 9-10. Invoking Network Configuration

2. The standard network configuration panel will appear. Click on **Protocols** to display a list of installed protocols (Figure 9-11).

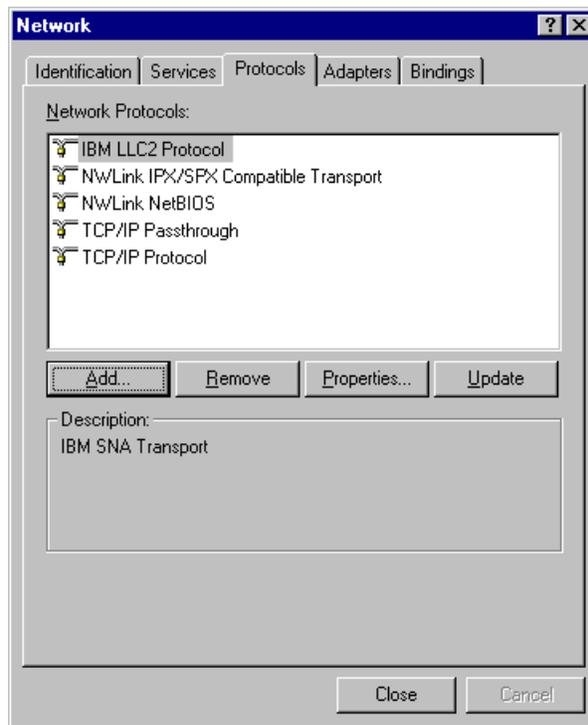


Figure 9-11. Network Protocol Dialog Box

3. Highlight TCP/IP Passthrough and click on Properties to configure TCP/IP Passthrough. The TCP/IP Passthrough Configuration dialog will display (Figure 9-12).

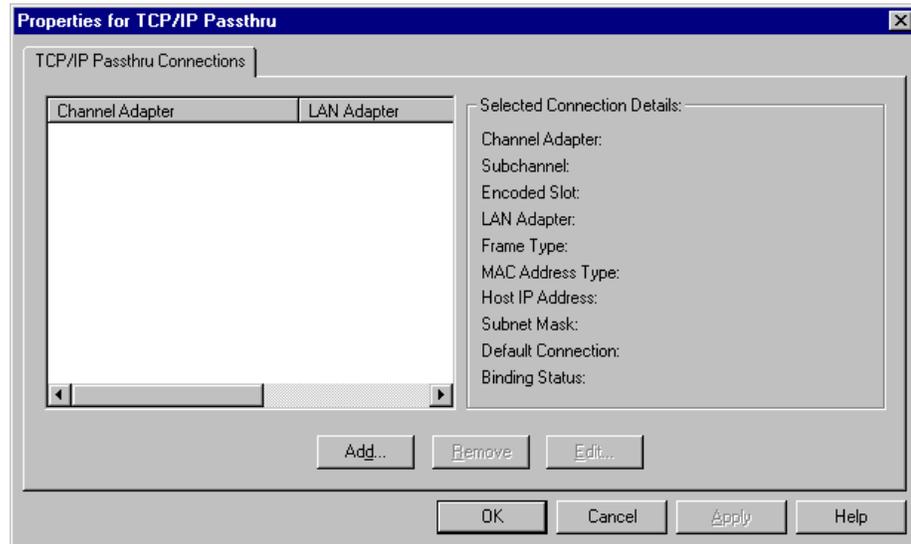


Figure 9-12. TCP/IP Passthrough Configuration

On initial configuration the screen will be empty. Only the **Add...** button will be available to add new connections.

Once connections have been defined, the scroll box on the left side of the screen will display a list of defined connections. You may use your mouse pointer to select a connection for viewing. The right side of the screen will display specific configuration parameters defined for the connection selected (Figure 9-13). The **Remove** and **Edit** buttons will become active on select; allowing you to remove the connection definition or edit configuration information.

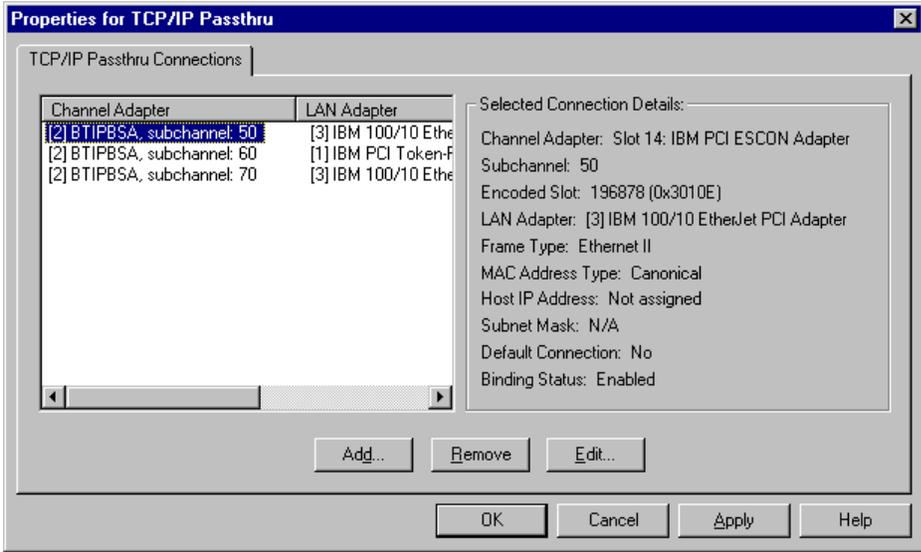


Figure 9-13. Properties Screen with Selected Connection

Adding a Connection

STEP

1. To add a new connection click on the **Add...** button on the TCP/IP Passthrough Properties screen (Figure 9-12). The TCP/IP Passthrough Configuration Screen will display (Figure 9-14).

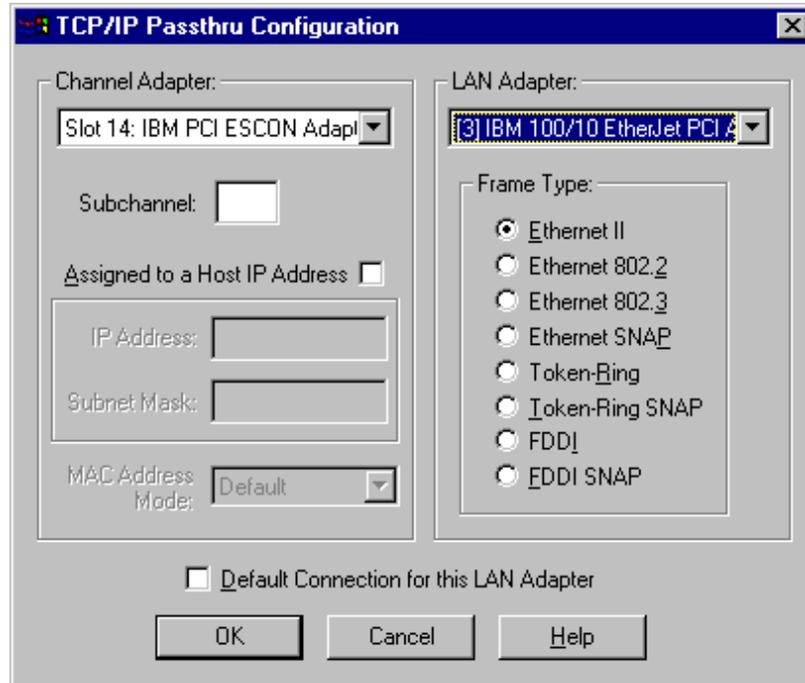


Figure 9-14. New TCP/IP Passthrough Connection Screen

The first channel adapter found in the system will be displayed as the default in the Channel Adapter pull-down selection box. The first LAN adapter found in the system will be displayed in the LAN Adapter selection box.

2. Each TCP/IP Passthrough connection is defined by connecting an ESCON adapter to a LAN adapter and setting configuration parameters for each. Use you mouse to select the ESCON adapter from the available adapters listed.

Configure the following parameters for the Netfinity ESCON Adapter:

Subchannel – The Netfinity ESCON Adapter supports 64 subchannel addresses. Each TCP/IP Passthrough connection requires a pair of subchannel addresses, allowing you to define up to 32 TCP/IP Passthrough connections on a single ESCON adapter. Subchannel is a required parameter. It is a hexadecimal number ranging from '00' to 'FE'. The number must be an even address number (10,12,40,C0, etc.). The number entered is the first address in the pair. For example, setting subchannel to C0 means the connection will use addresses C0 and C1. C1 is unavailable for use by any other connection.

For ESCON channel adapters where EMIF configuration has been used, this number must match the first of a pair of device addresses defined in the adapter's EMIF configuration with an emulation type of either 3088 or CTCA.

For ESCON channel adapters where EMIF configuration is not being used subchannel must match the control unit number defined in the IOCP for the first of a pair of 3088 or CTCA devices.

Assigned to Host IP Address – This check box allows you to filter TCP/IP packets sent to the mainframe. If not checked the connection will pass all IP packets that come in on the LAN adapter to the mainframe. If this field is checked only broadcast packets and packets whose destination address match that specified by **IP Address** and **Subnet Mask** will be sent to the host.

IP Address – The IP address associated with the mainframe TCP/IP stack this passthrough connection is communicating with. This field is only available and required when **Assigned to Host IP Address** has been checked.

Subnet Mask – The Subnet Mask associated with the mainframe TCP/IP stack this passthrough connection is communicating with. This field is only available and required when **Assigned to Host IP Address** has been checked.

MAC Address Mode – This field allows you to specify if the hardware addresses are in Canonical or Noncanonical format. The default option is Noncanonical mode for token-ring adapters, and Canonical mode for FDDI adapters. This field is needed to accommodate the addressing mode options on the host TCP/IP. You must specify what the mainframe is configured for. This field is not available for ethernet adapters.

3. Once the ESCON adapter is configured, use your mouse pointer to select a LAN adapter for this connection from the available pull-down list.

Configure the following parameters for the LAN adapter:

Frame Type – Select the frame type used for the IP traffic on your network. The default and common frame types used for the IP traffic on each media are: Ethernet II frame for Ethernet adapter, Token-ring SNAP frame for Token-ring adapter, and FDDI SNAP frames type for FDDI adapter. Other adapter media may emulate one of the frame types listed here. For example, an ATM adapter may use the Ethernet II frame type for IP traffic. If you are unsure of the type being used check with you network administrator.

Default Connection for a LAN Adapter – Check this box to make this the default connection for the LAN adapter. The default connection receives all IP packets filtered out by other connections on the same LAN adapter using **Assigned to Host IP Address**, **IP Address**, and **Subnet Mask**. There can be only one default connection per LAN adapter. Configuring this connection as the default will overwrite a previously configured default connection.

Assigned to Host IP Address and **Default Connection for a LAN Adapter** can be used together to control IP traffic being sent to the host. As an example, consider a LAN adapter with 2 connections defined for it. The first connection assigns a Host IP address of 237.221.147.43 to the connection. The second connection is defined as the Default for the LAN adapter. When configured in this manner, broadcast messages and traffic destined for 237.221.147.43 are sent to connection 1. Connection 2 receives broadcast messages and all IP packets not for 237.221.147.43. Turning off the Default Connection definition on connection 2 would send all IP traffic to connection 2, but connection 1 would still only receive broadcasts and traffic destined for 237.221.147.43. Turning off Assigned to Host IP Address on connection 1 would cause all traffic to go to connection 1.

4. Once you have configured the connection click **OK** to complete the connection definition and return to the TCP/IP Properties screen. Click **Apply** to save the configuration without exiting the Properties screen. Click **OK** to save the configuration and exit the Properties Screen; returning you to the Microsoft Network Configuration screen.
5. Click **C**lose to exit Network Configuration. You will be prompted to reboot the server. Changes in TCP/IP Passthrough will not take effect until the next time the server is booted.

Deleting a Connection

STEP

1. To delete a connection from the TCP/IP Passthrough configuration simply highlight the connection you wish to delete (as shown in Figure 9-15) and click **Remove**.

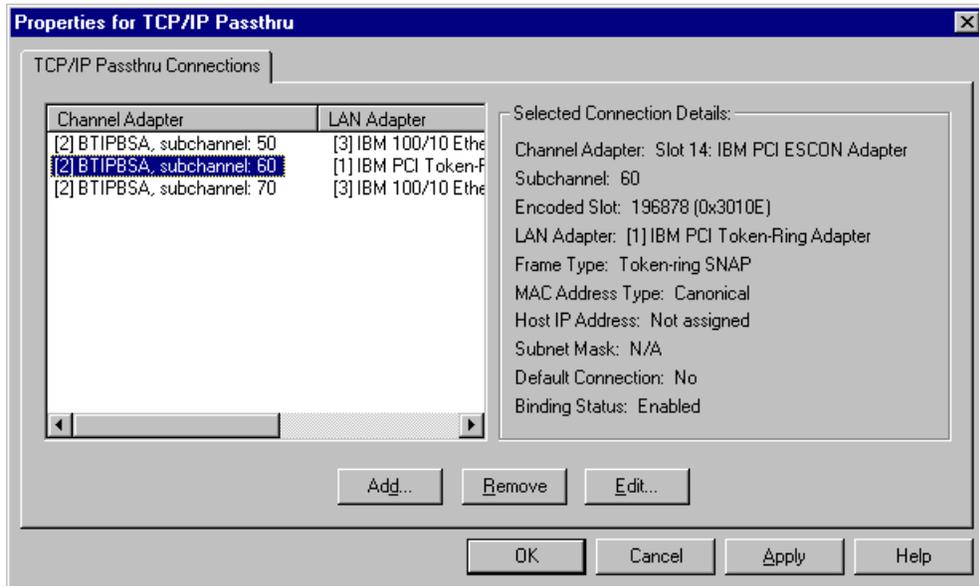


Figure 9-15. Removing a Connection

The connection will immediately be deleted and the screen will be updated showing the change (Figure 9-16).

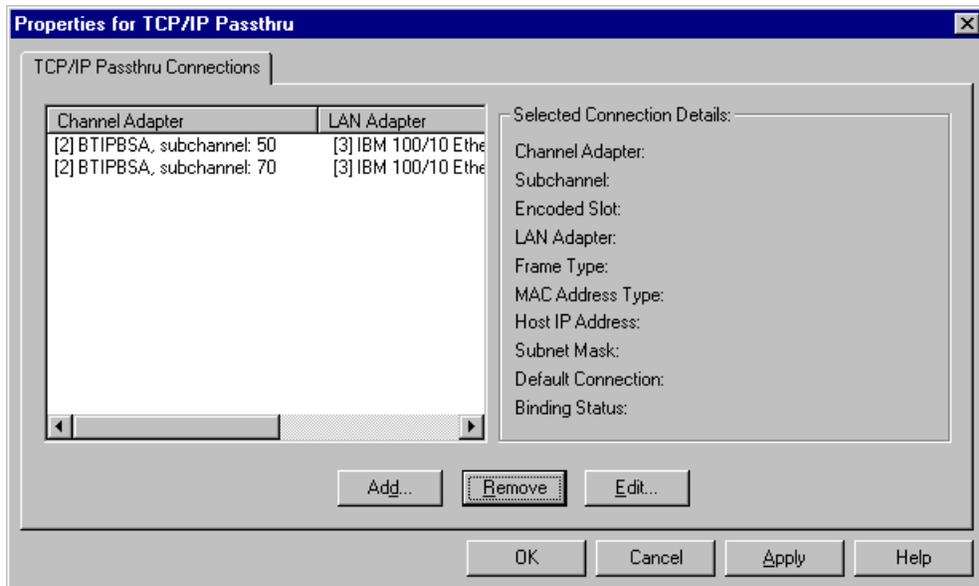


Figure 9-16. Updated Properties Screen After Delete

2. Click **A**pply to save the configuration without exiting the Properties screen.
Click **O**K to save the configuration and exit the Properties Screen; returning you to the Microsoft Network Configuration screen.
3. Click **C**lose to exit Network Configuration.

Deleting the connection from TCP/IP Passthrough does not delete the sub-channel definitions from either the ESCON configuration of the mainframe's Input/Output Configuration (IOCP).

Edit a Connection

STEP

1. To edit an existing TCP/IP Passthrough connection highlight the connection on the TCP/IP Passthrough Properties Screen (Figure 9-17) and click on **E**dit...

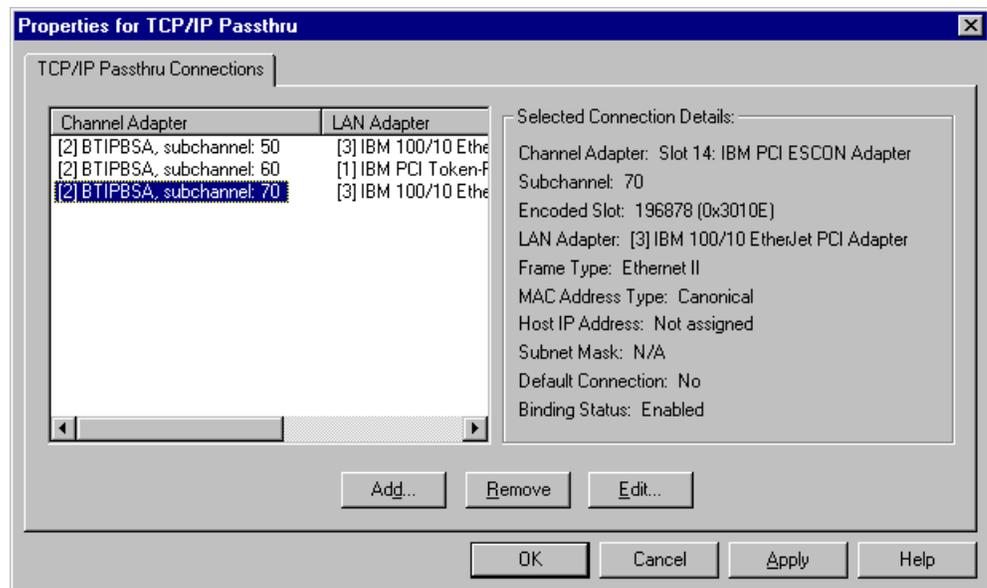


Figure 9-17. Edit a Connection

The TCP/IP Passthru Configuration screen (Figure 9-18) will be displayed for the highlighted connection.

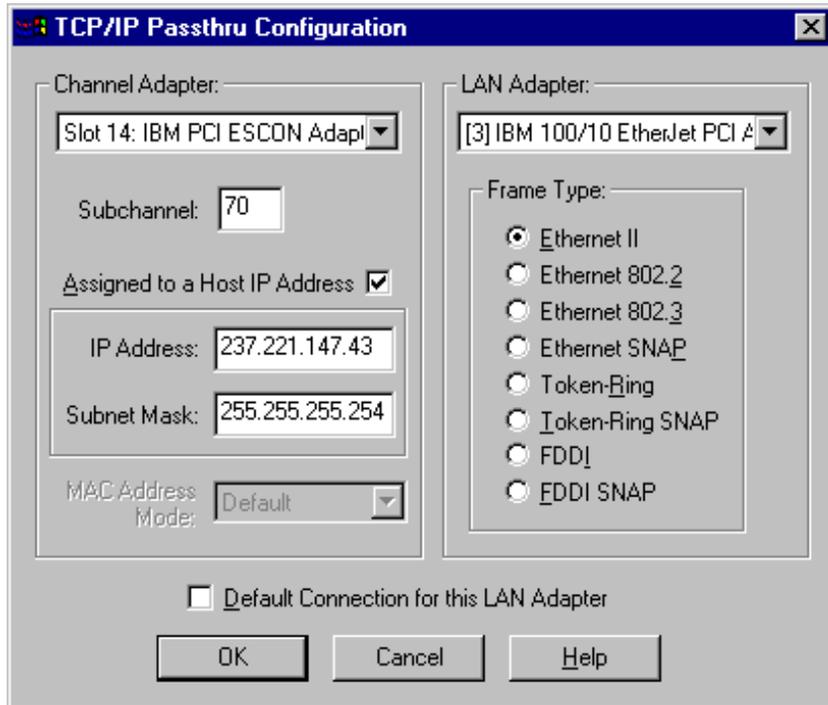


Figure 9-18. Edit a Connection - Configuration Screen

For a complete description of fields on this configuration screen, please refer to the section titled “**Adding a Connection**” on page 83 of this manual.

2. Once you have changed the fields to your satisfaction click **OK** to end the edit. The TCP/IP Passthru Properties screen will be re-displayed (Figure 9-19). Confirm your change on the right side of the display.

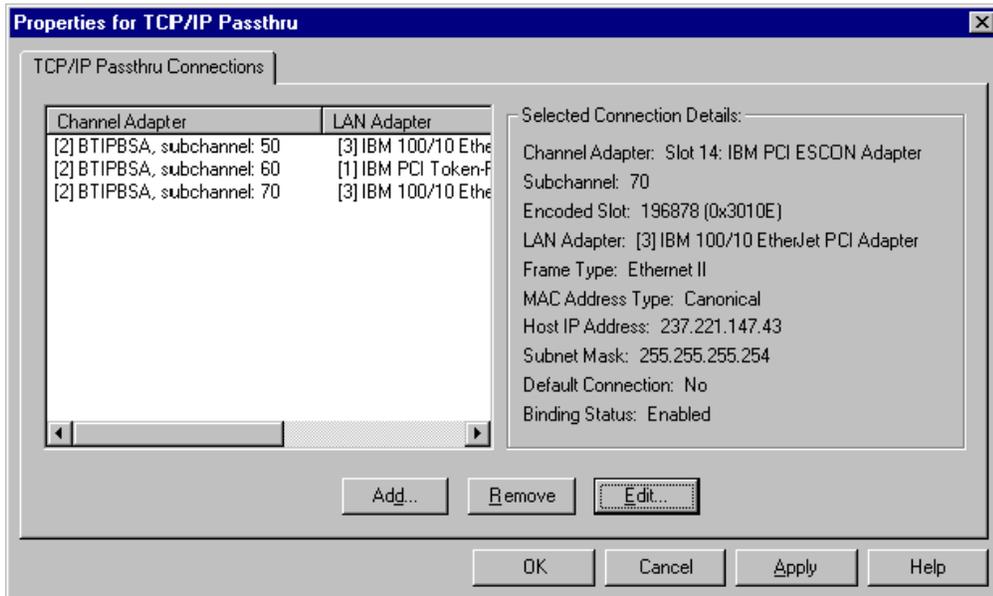


Figure 9-19. Properties Display Confirms Edits

3. Click **Apply** to save the configuration without exiting the Properties screen. Click **OK** to save the configuration and exit the Properties Screen; returning you to the Microsoft Network Configuration screen.
4. Click **Close** to exit Network Configuration.

If you haven't changed the sub-channel addresses (or if the new addresses are already configured in the ESCON and mainframe configurations), you may invoke your changes by varying the link online. However, if you need to add new sub-channel addresses to the server's ESCON configuration (see Chapter 4) a server reset will be required.

Chapter 10. NETWARE FOR SAA

This chapter covers configuration of NetWare for SAA version 4.0 or intraNetWare for SAA version 3.0 to make use of a Netfinity ESCON Adapter. It is assumed that the user is familiar with NetWare for SAA Management utilities provided with NetWare for SAA and has a general understanding of how to configure NetWare for SAA. Topics covered in this chapter are specific to use of an ESCON adapter. Please see appropriate Novell documentation for further details of NetWare for SAA management.

NetWare for SAA is a full APPN network node. NetWare for SAA supports a variety of configuration scenarios including:

- 3270/LUA Emulation
- 5250 Emulation
- TN3270(E) Emulation
- TN5250 Emulation
- APPN/APPC
- Downstream Links

The Netfinity ESCON Adapter may be configured for use in any of these scenarios except for 5250 Emulation and TN5250 Emulation which are specific to AS/400 environments.

The Netfinity ESCON Adapter is recognized by NetWare for SAA as a *custom data link adapter*. As such the following NetWare for SAA server configuration tasks may need to be completed based on the scenario being defined:

- Configure Data Link Adapter (Always required)
- Configure Host Links (Required for 3270/LUA Emulation, TN3270(E) Emulation, and Downstream Links)
- Configure Custom Peer Links (Required for APPN/APPC)

Completion of each of these tasks will be discussed in this chapter. Configuration of NetWare for SAA version 4.0 and intraNetWare for SAA version 3.0 is mostly the same. Therefore, most of the configuration screens included below are from version 4.0. Version 3.0 screens are also included where necessary for clarity.

It is assumed that the adapter has already been defined to the NetWare operating system via the “LOAD BTIxxxx SLOT=n UNIT=xx NAME=nnnn” statement in the NetWare AUTOEXEC.NCF. This statement “registers” the adapter with NetWare as an ODI device during server boot up. The “NAME” that is assigned to the adapter in the “LOAD” statement provides a logical connection for NetWare applications such as NetWare for SAA to communicate with the adapter. The syntax of the “Load BTIxxxx” statement is described in Chapter 3 of this manual in the section titled “*Loading the Drivers*” on page 16.

It is important to note that each NetWare for SAA connection (i.e., each individual VTAM PU) requires a unique “LOAD BTIxxxx” statement in the AUTOEXEC.NCF, and also a unique Custom Data Link Adapter definition with a corresponding PU Profile definition. As an example, a NetWare for SAA server configured for three VTAM PU’s will require three “LOAD BTIxxxx” statements in the NetWare AUTOEXEC.NCF, three NetWare for SAA Data Link Adapter definitions and three NetWare for SAA PU Profiles.

Configure Data Link Adapters

The Configure Data Link Adapter task is used to define the ESCON adapter to NetWare for SAA and link it to a specific LOAD command (and therefore sub-channel address) defined in AUTOEXEC.NCF.

For new configurations you will first need to complete the “Configure the Node” task (refer to appropriate Novell documentation). The following process will then successfully define a Netfinity ESCON Adapter to NetWare for SAA. For simplicity, a 3270/LUA scenario is being used for demonstration.

STEP

1. From the main configuration screen, double click **Data Link Adapters** under Definition Hierarchy by Function. (Figure 10-1).

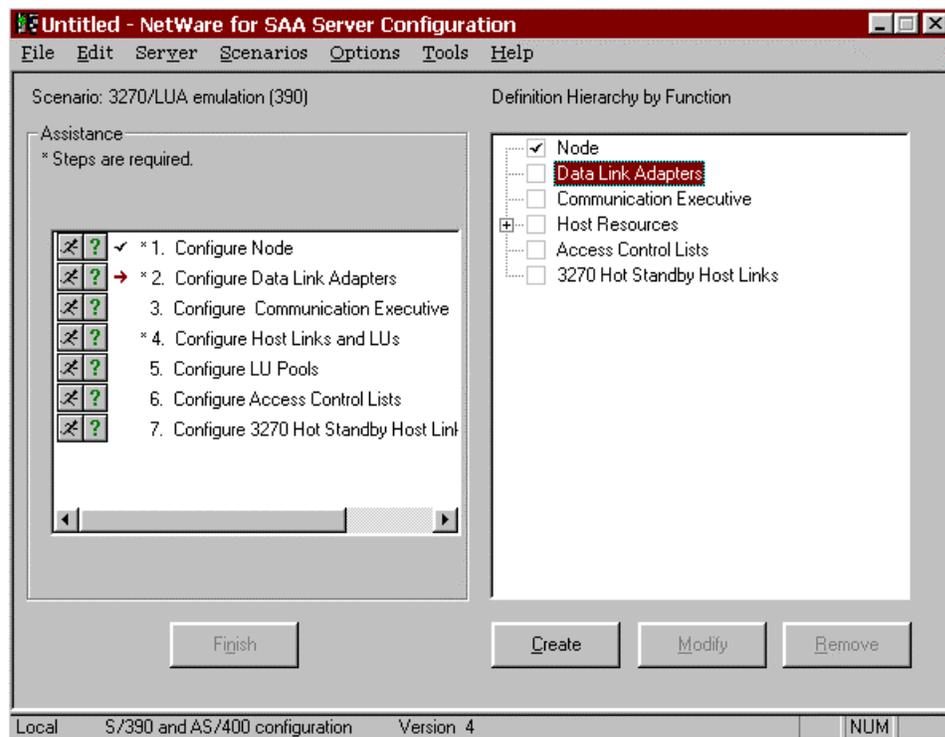


Figure 10-1. Version 4 Main Configuration Screen

The **Adapter DLC Type** pop-up (Figure 10-2) will appear. Highlight **Custom** and click **OK**.

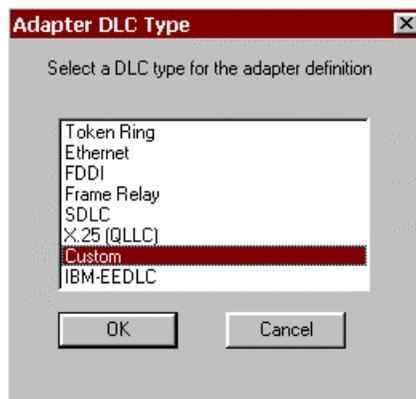


Figure 10-2. Specify Adapter Type

For intraNetWare for SAA version 3.0, select **Configure Data Link Adapters** under Configuration options. Then scroll down and select **Custom** under Adapters (Figure 10-3). Click **New...**

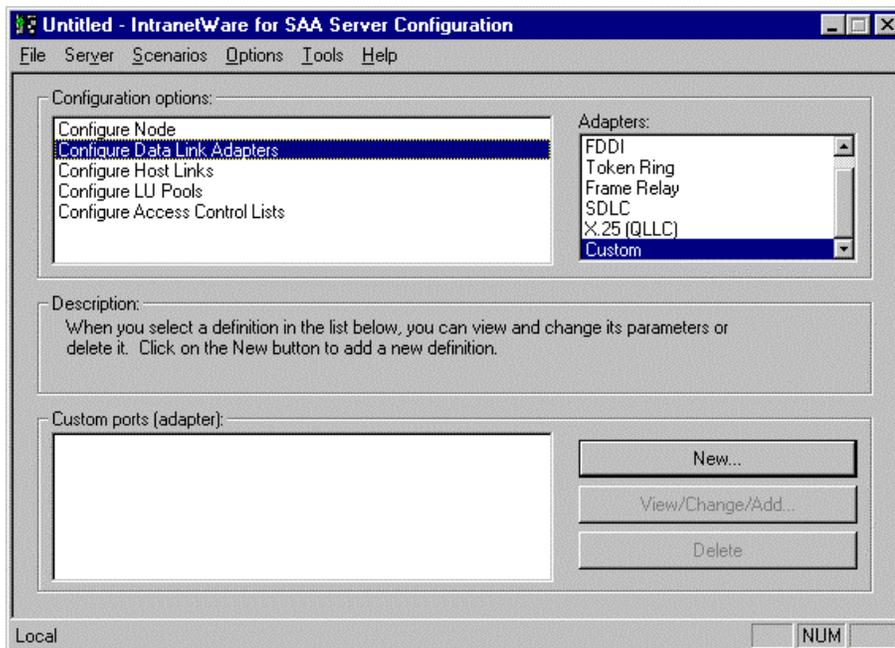


Figure 10-3. Version 3 Main Configuration Screen

3. The **Configure a Custom Adapter** dialog will appear (Figure 10-4). Note that the **Reactivation** tab is new in version 4.

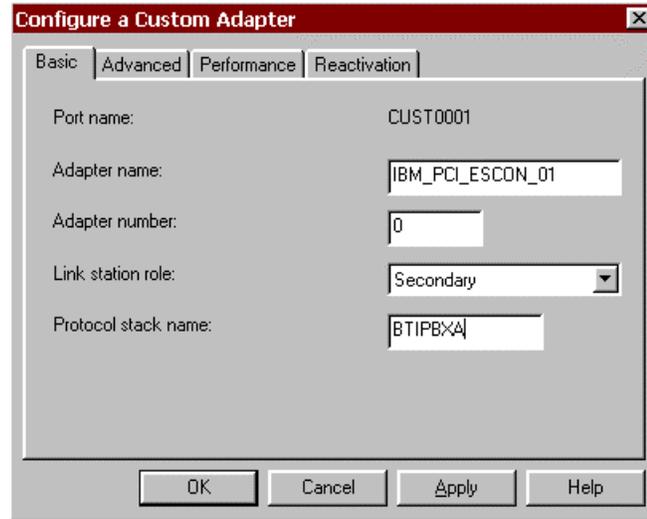


Figure 10-4. Configure a Custom Adapter

The following fields are displayed and must be configured on the **Basic** tab:

- **Adapter name:** Enter the name you wish to assign to this Custom Data Link Adapter. This can be any combination of alpha-numeric and special characters, up to a maximum of 17 characters. Spaces are not allowed. This name must match the **name** which is specified on the “LOAD BTIxxxx SLOT=n UNIT=xx NAME=**name**” parameter in the AUTOEXEC.NCF of the NWSAA Server (see sections “Loading the Drivers” and “Updating AUTOEXEC.NCF” beginning on page 16).

- **Adapter number:** This field defines the unique number that a local Transaction Program (TP) must present for NetWare for SAA to identify the adapter and create the connection between the local TP and the partner LU in the remote node.

Enter any decimal number from 0 to 255. The logical adapter number must be unique within a link type.

Note: *Because all Netfinity ESCON Adapters use the same link type (CUSTOM), you must assign a unique logical adapter number to each adapter you define.*

- **Link station role:** The link station role this adapter is to assume when communicating to the host. This parameter must be set to **Secondary** for ESCON adapters.
- **Protocol Stack Name:** Specify the name of the adapter driver, enter **btipbxa** for the ESCON adapter.

3. Once all fields are defined, continue by clicking the **Advanced** tab (Figure 10-5).

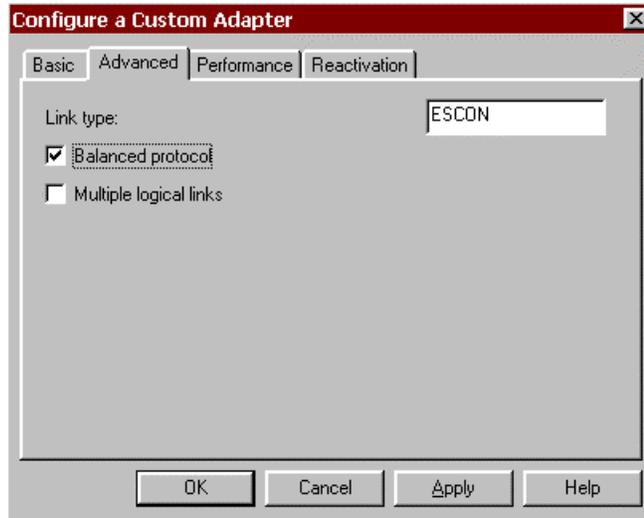


Figure 10-5. Completed Configure a Custom Adapter Advanced Screen

Complete the fields as follows:

- **Link Type:** A text string defining type to the custom data link. Enter "ESCON".
 - **Balanced protocol:** This parameter **must** be enabled for the ESCON adapter. Check this box to enable Balanced Protocol.
 - **Multiple logical links:** This box **must not** be checked for the ESCON adapter.
4. After completing the Advanced screen, click the **Performance** tab (Figure 10-6).

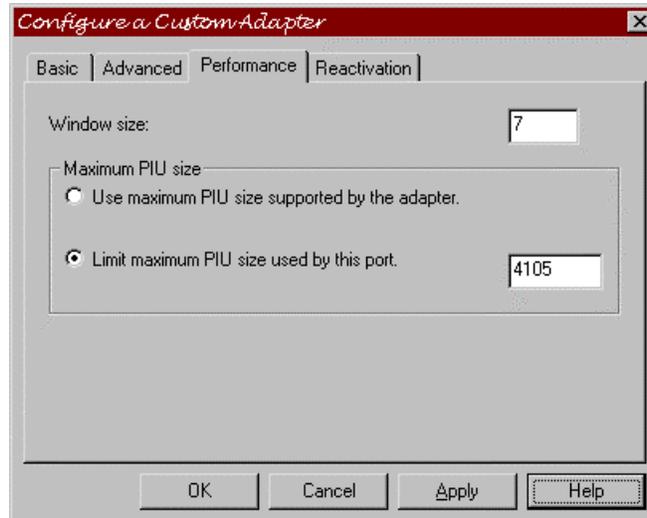


Figure 10-6. Completed Performance Screen

The following fields are available from this screen:

- **Window Size:** Specifies the maximum number of Information (*I*) frames that may be received from the host at once. The default of 7 provides the best performance for the ESCON adapter.
 - **Use the adapter default for maximum PIU size:** This check box should not be used with the Netfinity ESCON Adapter.
 - **Override adapter default maximum PIU size:** This check box should be clicked to display a box for entering a maximum PIU size. A setting of 4105 is recommended for the Netfinity ESCON Adapter PIU size.
5. For version 4 and above, click the **Reactivation** tab (Figure 10-7). A link may fail to start or fail after a successful start for a variety of reasons. You may set automatic reactivation parameters for the ESCON adapter so that it will automatically attempt to restart following a failure. The following fields are used to control reactivation:

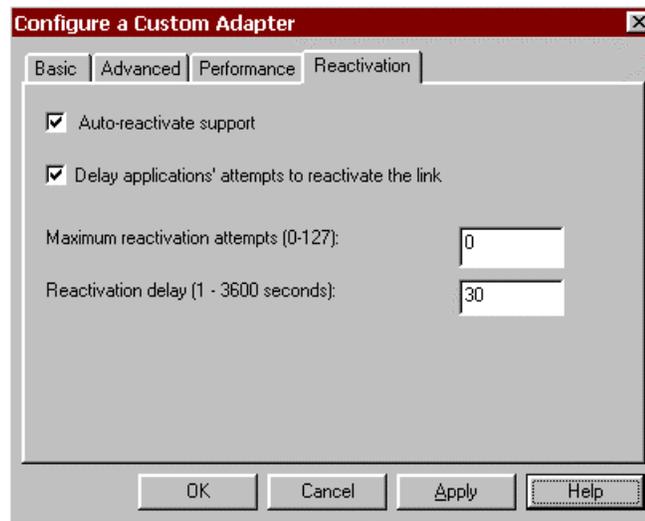
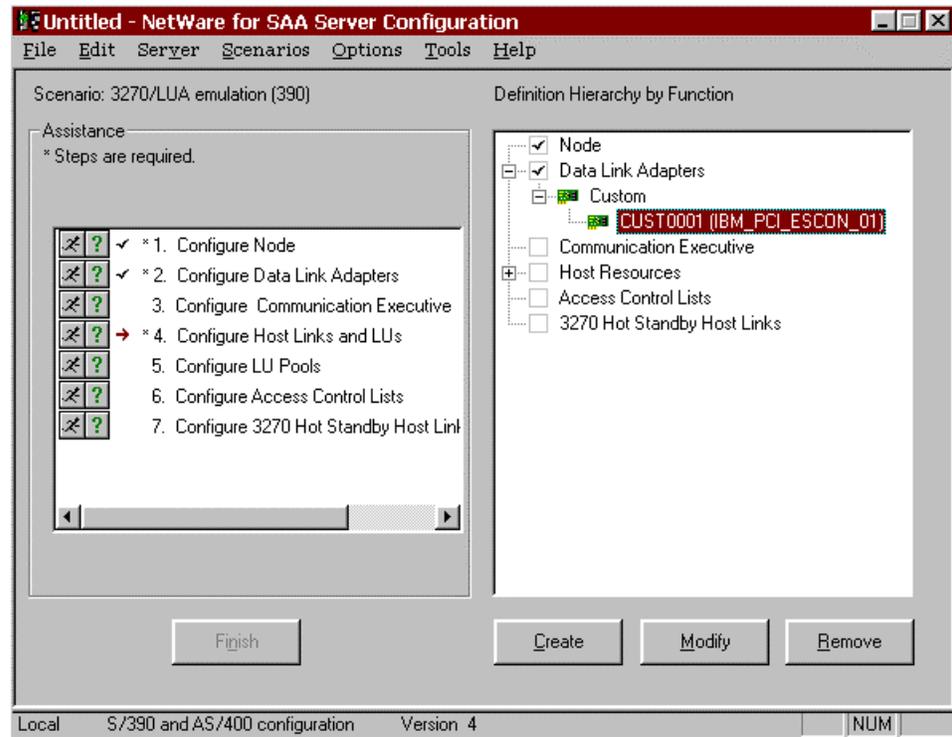


Figure 10-7. Reactivation Dialog

- **Auto-reactivate support:** This check box controls whether or not automatic reactivation is attempted or not. When checked (the default), auto-reactivate will be attempted based on options specified in the remaining fields on this dialog.
- **Delay applications' attempts to reactivate the link:** Specify whether reactivation attempts are to be delayed or not. When checked (the default), reactivation will be delayed based on the Reactivation delay entered.
- **Maximum reactivation attempts:** This field specifies the maximum number of reactivation attempts to processed. The range is 0-127. Entering 0 causes an unlimited number of attempts.

- **Reactivation Delay:** Specifies the number of seconds to wait (delay) between attempts to reactivate the link. The range is 1 – 3600. The default is 30 seconds.
6. Click **OK** to save the newly defined adapter definition.

Figure 10-8. Custom Adapter List



The NetWare for SAA Server Configuration main screen will re-display (Figure 10-8). The adapter you have defined will now appear under Custom Data Link Adapters.

Figure 10-9 shows the adapter listed in version 3 Server Configuration.

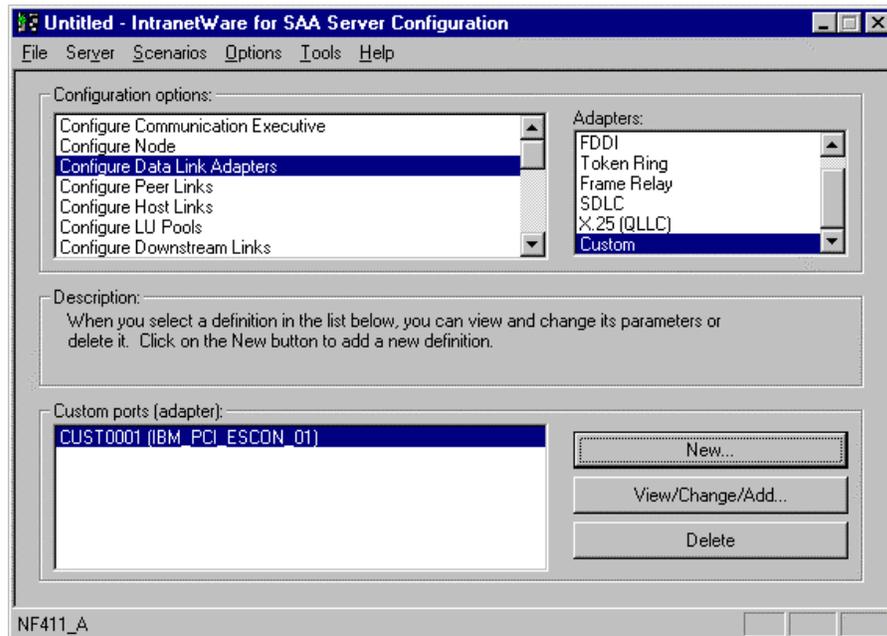


Figure 10-9. Version 3 Custom Adapters

Keep in mind that you will need to define a Custom Data Link Adapter for **each** Physical Unit (PU) you intend to define to NetWare for SAA. The control unit address (sub-channel address) used by the PU is defined on the LOAD statement in AUTOEXEC.NCF. The Custom Data Link Adapter definition points to the LOAD statement via the Adapter Name field, which must match the NAME parameter on the LOAD statement.

Repeat the Configure Data Link Adapters task for each LOAD you have defined.

Configure Host Links

The Configure Host Links task is required for 3270/LUA Emulation, TN3270(E) Emulation, and Downstream Links scenarios in NWSAA Server Configuration.

Once you have completed the Configure Data Link Adapters task, the following procedure will define a Host Link.

STEP

1. Click the “Running Man” next to **Configure Host Links and LUs** (Figure 10-10).

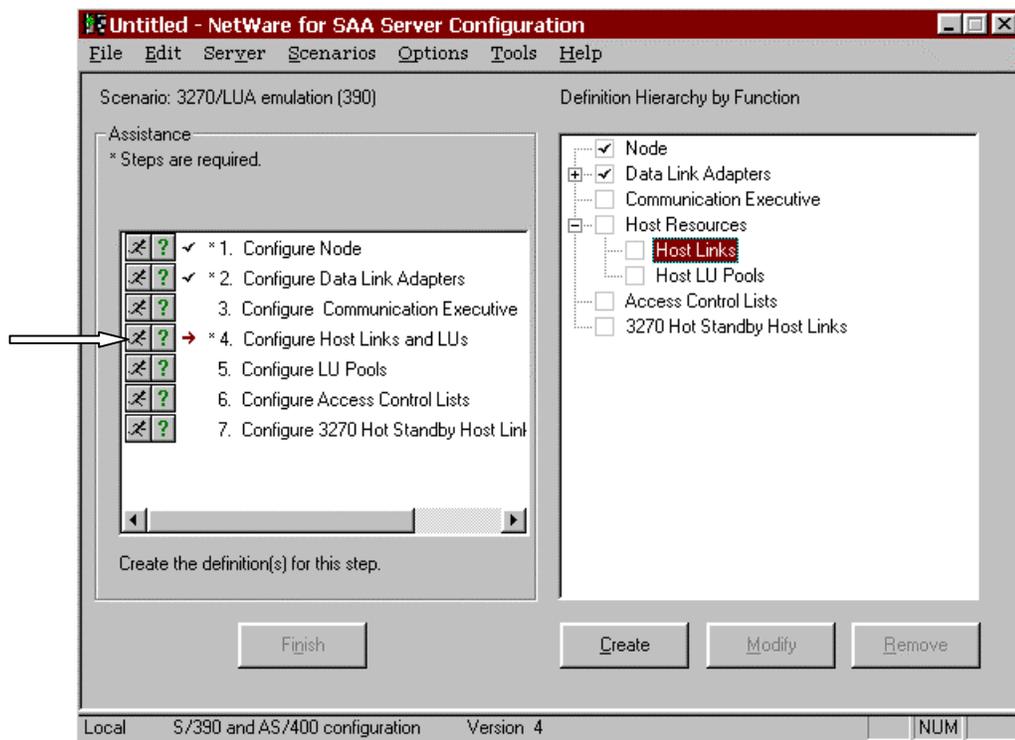


Figure 10-10. Start a Host Link Configuration

In intraNetWare for SAA version 3, highlight **Configure Host Links** in the **Configuration Options** box (Figure 10-11). Click **View/Change/Add...**

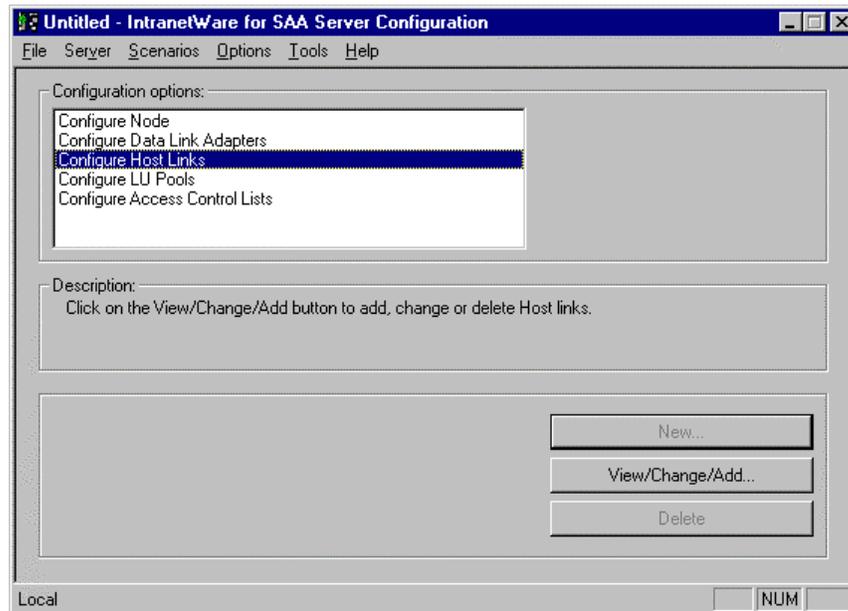


Figure 10-11. Select Configure Host Links

The **Configure Host Links** screen will display (Figure 10-12). Click **Create Host Links...**

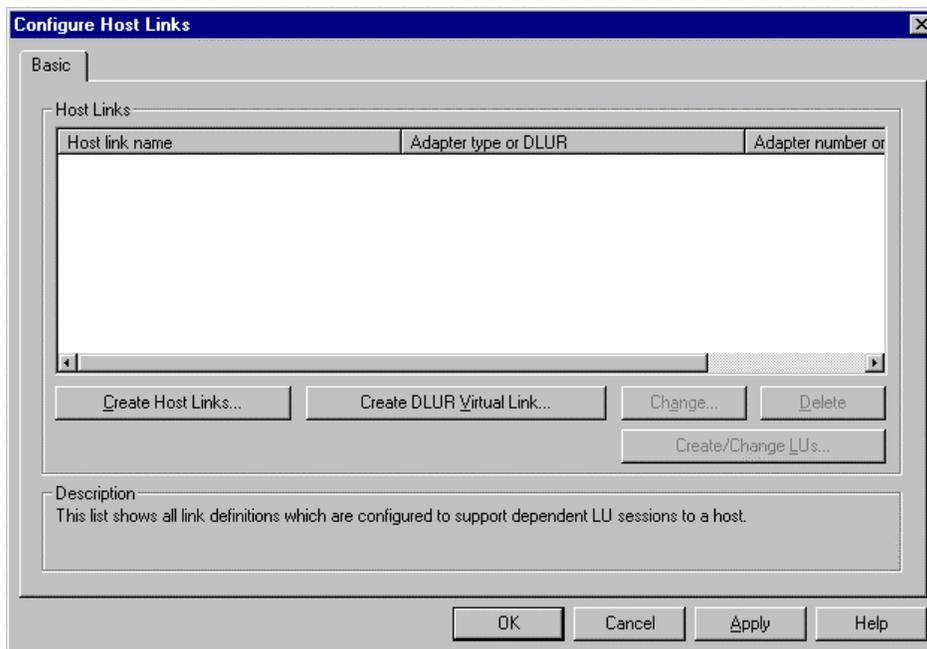


Figure 10-12. Configure Host Links

2. A Link Type dialog will prompt you for the link type. Select **Custom** and then click **OK**.

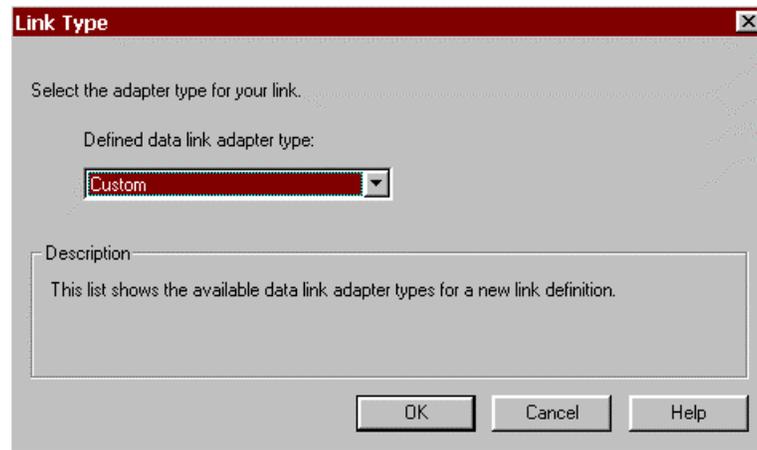


Figure 10-13. Link Type

3. The **Configure a Custom Host Link** screen will display (Figure 10-14). Note that the **Reactivation** tab is new to version 4 of the configuration utility.

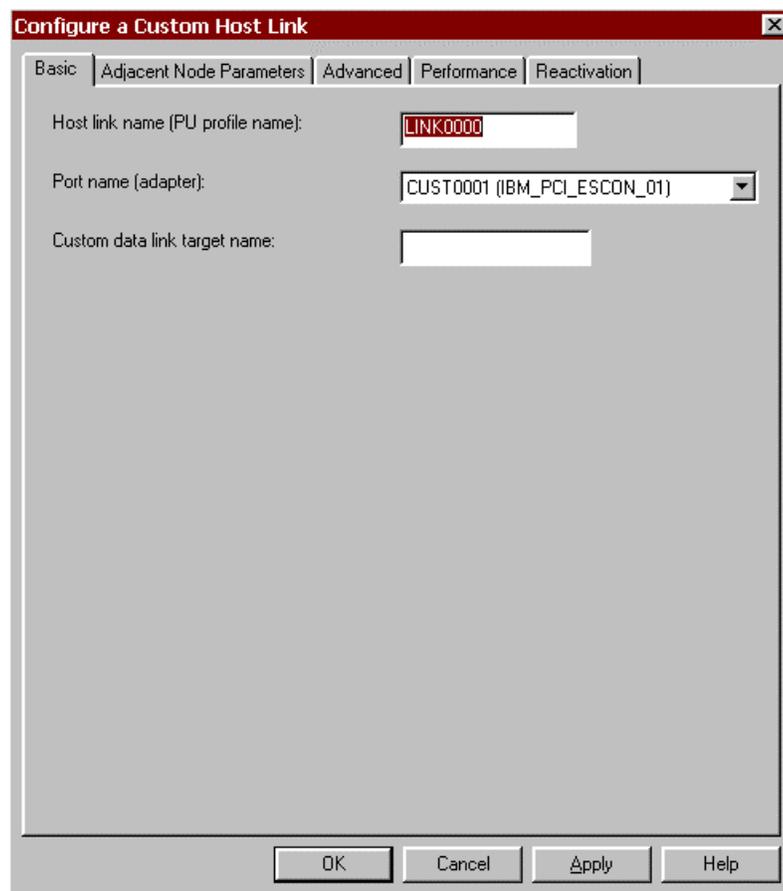


Figure 10-14. Configure a Custom Host Link - Basic

The following fields appear on the **Basic** tab:

- **Host link name(PU profile name):** A default name will be automatically assigned by the system. You may accept the default, or enter your own name up to eight (8) characters in length. Host link name is the PU Profile or Service Name required by an IPX (QEL/MU) client emulator.
- **Port name (adapter):** By default the first custom data link adapter defined will be displayed. Select the adapter you wish to associate with this Host Link (PU) from the pull-down list. Keep in mind that the ESCON adapter associates the PU to the sub-channel address used to communicate with the host.
- **Custom data link target name:** This optional field, which allows you to assign a symbolic address to the adapter, is used in NWSAA informational messages. It can be up to 16 characters long. It is recommended you enter the VTAM PU name in this field.

4. Click the **Adjacent Node Parameter** tab (Figure 10-15) to continue.

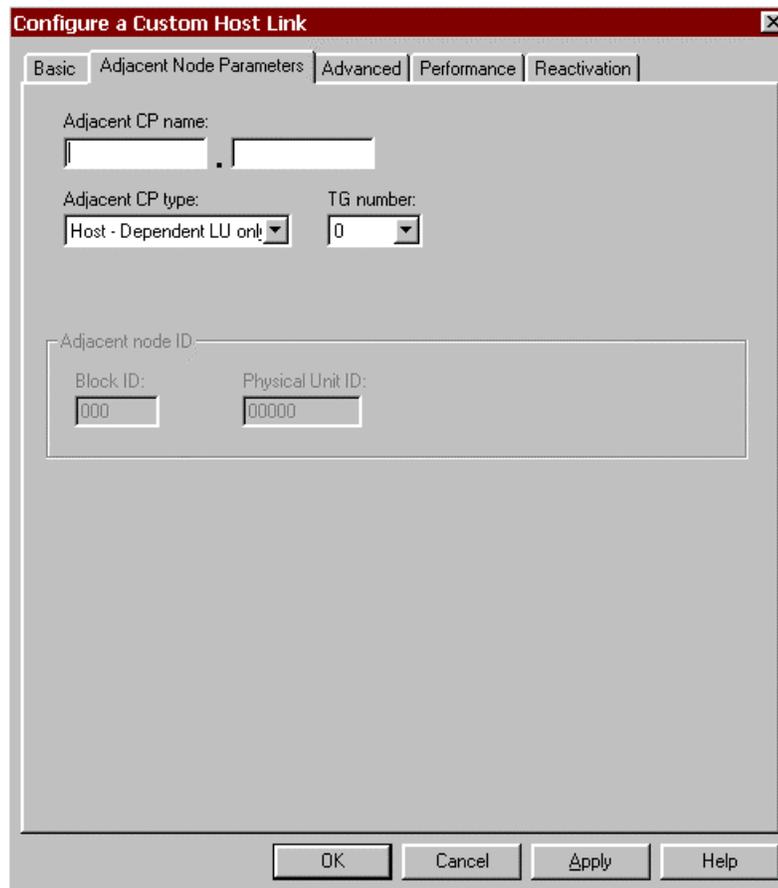


Figure 10-15. Configure a Custom Host Link - Adjacent Node Parameters

The following fields appear on the **Adjacent Node Parameters** tab:

- **Adjacent CP name:** Identifies the Control Point (CP) name of the host. If this field is entered the name must match that defined on the host or a connection will not be established. Leave the field blank to avoid checking.
- **Adjacent CP type:** Identifies the CP type of the host. If you plan to only support LU0 - LU3 traffic across this adapter, use of the default of **Host – Dependent LU only (Host - XID3** in version 3). The default requires XID=YES to be coded in the VTAM PU definition. If your host does not support XID3, then use **Host - XID0** for LU0 – LU3 traffic. If you plan APPN traffic then use either **End Node** or **Network Node**.
- **TG number:** A Transmission Group is a group of links between nodes that appears as a logical link. TG number identifies the transmission group this link belongs to. Any number from 0 to 20 may be entered. However, if a non-zero is entered it **must** match the number assigned on the adjacent node. Entering 0 will cause the TG number to be negotiated when the link is activated. Normally you should leave TG number at 0.

- **Adjacent Node ID:** If Adjacent CP type is set to Back-Level LEN, these fields become available. Some Back-Level LEN nodes do not send CP Node ID. These fields allow you to specify the ID of the remote node. Normally these fields are not required.

5. Click the **Advanced** tab (Figure 10-16):

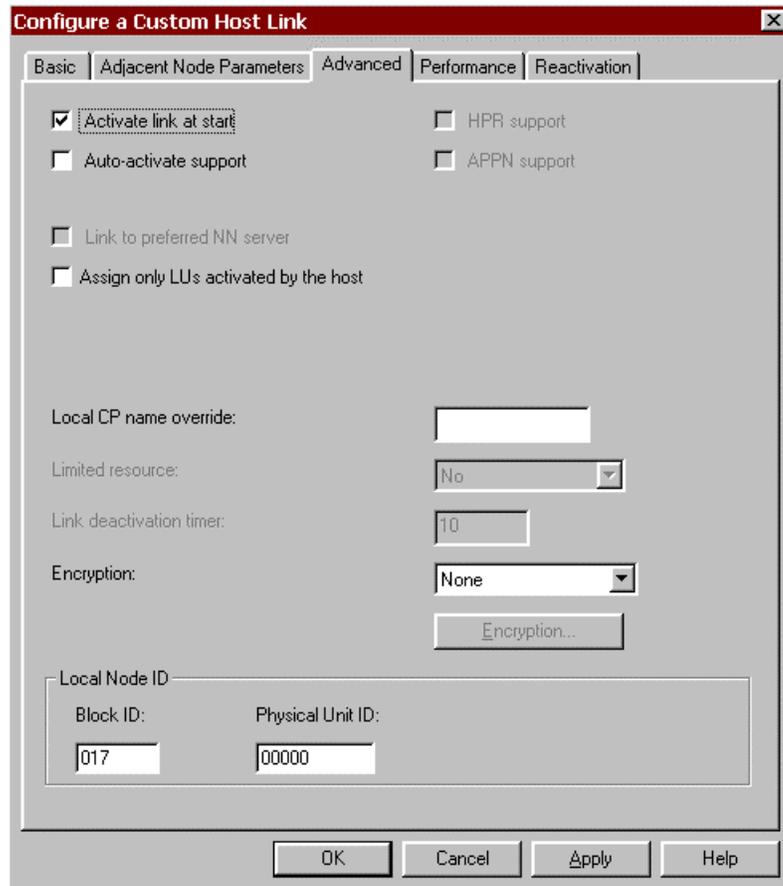


Figure 10-16. Configure a Custom Host Link - Advanced

The fields on the **Advanced** tab are:

- **Activate link at start:** This check box tells NetWare for SAA whether or not to automatically activate this communications link at startup. For a dedicated link, such as ESCON, this check box should **always** be checked.
- **HPR support:** This check box specifies if the link is to support High Performance Routing or not. It is only available for CP types of End Node, Network Node, or Learn.
- **APPN support:** This check box specifies if the link supports APPN or not. It is only available and is automatically checked for CP types of End Node, Network Node, and Learn.

- **Auto-Activate Support:** This check box specifies if the link should be automatically activated when needed by a session. For a dedicate link such as ESCON, which is auto-activated at startup, there is normally no need to specify Auto-Activate Support. Note that this support cannot be selected with APPN support.
- **Auto-reactivate support:** (version 3 only) This check box specifies whether or not the link can be automatically re-activated if it becomes inactive. Re-activation will only be attempted once. If the re-activate fails, the link will remain inactive.
- **Link to preferred NN server:** This check box is only applicable if the CP type is set to End Node. It is used to identify this link as the link to the preferred Network Node server. It is normally cleared.
- **Assign only LUs activated by the host:** This check box tells NetWare for SAA to only assign LUs which are active at the host. Selecting this option prevents workstations from being assigned to an inactive LU. This box should be checked for ESCON connections.
- **Local CP name override:** This field is always enabled for CP types of Host - XID0 and Host - XID3, but is **not required**. If specified this name flows on the XID and allows connection with non-APPN hosts.
- **Limited resource:** This check box is enabled if Auto-activate support is selected. There is no need to select Auto-activate support for the ESCON adapter so this field is not enabled.
- **Link deactivation timer:** If Auto-activate support is checked and the Limited resource is defined to be **Inactivity**, then this field specifies a time (in minutes) after which the link will be de-activated if inactive. Since the ESCON adapter is a dedicated resource, you should not select Auto-activate support and this field will be disabled.
- **Local Node ID: Block ID and Physical Unit ID** provide the local node id that flows in the XID3. The Block ID identifies the product type in an SNA network and is a 3-digit hexadecimal number. Physical Unit ID is a 5 digit hexadecimal number that may be used to identify the PU. You should allow Block ID to default to 017. You may allow Physical Unit ID to default to 00000 or enter a unique 5-digit hexadecimal number.

6. Click the **Performance** tab (Figure 10-17).

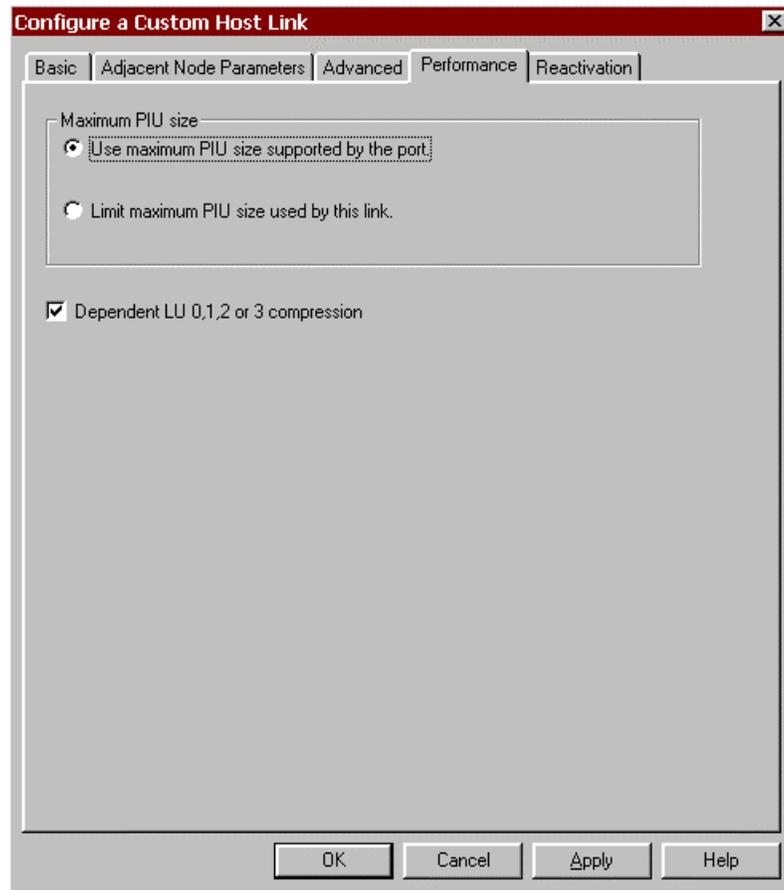


Figure 10-17. Configure a Custom Host Link - Performance

The fields on the **Performance** tab are:

- ***Use maximum PIU size supported by the port:*** Select this check box to allow this link to use the maximum PIU size specified for the adapter.
- ***Limit maximum PIU size used by this link:*** Selecting this button will display a box in which you may enter a maximum PIU size to be used with this PU. This value cannot exceed the maximum PIU size entered for the adapter (port).
- ***Dependent LU 0,1, 2, or 3 compression:*** Checking this box enables data compression for these LU types.

7. If you are using NetWare for SAA version 4, click the **Reactivation** tab (Figure 10-18).

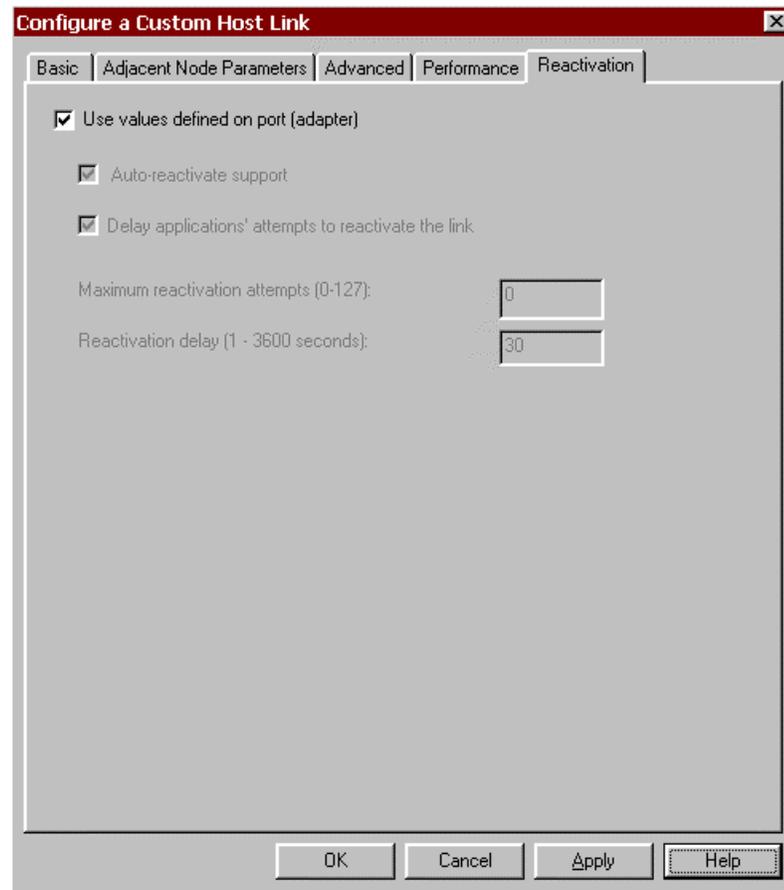


Figure 10-18. Reactivation Parameters

A link may fail to start or fail after a successful start for a variety of reasons. You may set automatic reactivation parameters for the ESCON adapter so that it will automatically attempt to restart following a failure. The following fields are used to control reactivation:

- ***Use values defined on port (adapter)***: When selected this check box turns off all other reactivation settings on this dialog box and uses those set for the adapter. De-select this check box to set parameters specific to the link.
- ***Auto-reactivate support***: This check box controls whether or not automatic reactivation is attempted or not. When checked (the default), auto-reactivate will be attempted based on options specified in the remaining fields on this dialog.
- ***Delay applications' attempts to reactivate the link***: Specify whether reactivation attempts are to be delayed or not. When checked (the default), reactivation will be delayed based on the Reactivation delay entered.

- **Maximum reactivation attempts:** This field specifies the maximum number of reactivation attempts to processed. The range is 0-127. Entering 0 causes an unlimited number of attempts.
 - **Reactivation Delay:** Specifies the number of seconds to wait (delay) between attempts to reactivate the link. The range is 1 – 3600. The default is 30 seconds.
8. Click **OK** to complete the Host Link definition. You will be prompted as to whether or not you wish to assign LUs to this link (Figure 10-19).

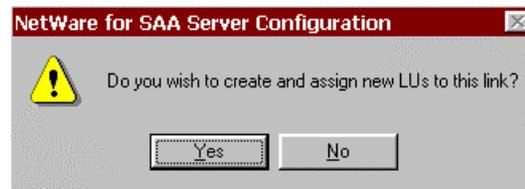


Figure 10-19. LU Prompt

9. Click **Yes** to define LUs. The *Create a range or single LUs for host link* screen will be displayed, allowing you to define LUs. There is nothing unique to the Netfinity ESCON Adapter when defining LUs. Please refer to either the online help or Novell's documentation for information on using this screen. The following example shows how to set up 32 public LUs named LU001-LU032 (Figure 10-20).

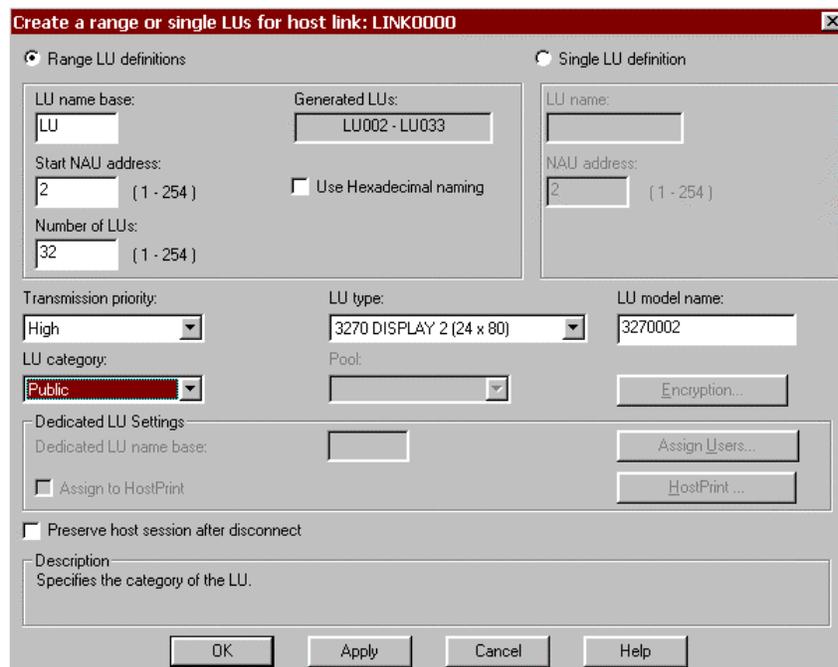


Figure 10-20. Create a range or single LUs for host link

10. Click **OK** to create the LUs. The *Assigned LUs* screen will display (Figure 10-21).

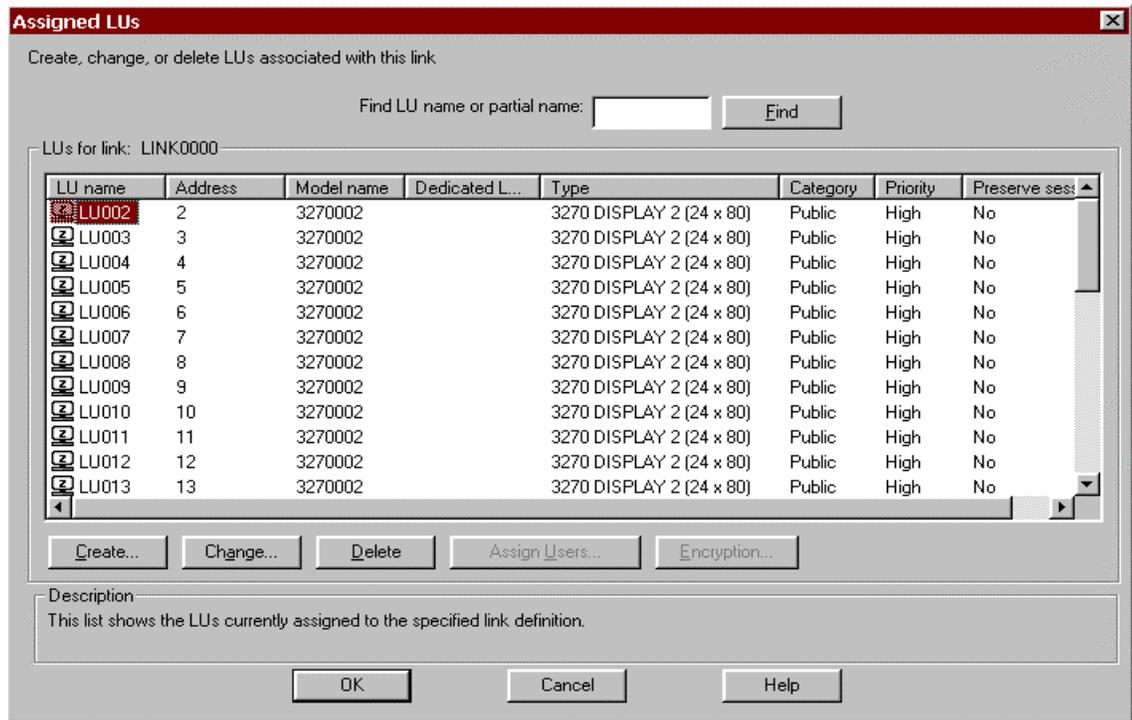


Figure 10-21. Assigned LUs

- Click **OK** to accept the LU definitions and complete the Host Link definition. The *Configure Host Links* screen will re-appear (Figure 10-22). The Host Link you have just defined will be displayed.

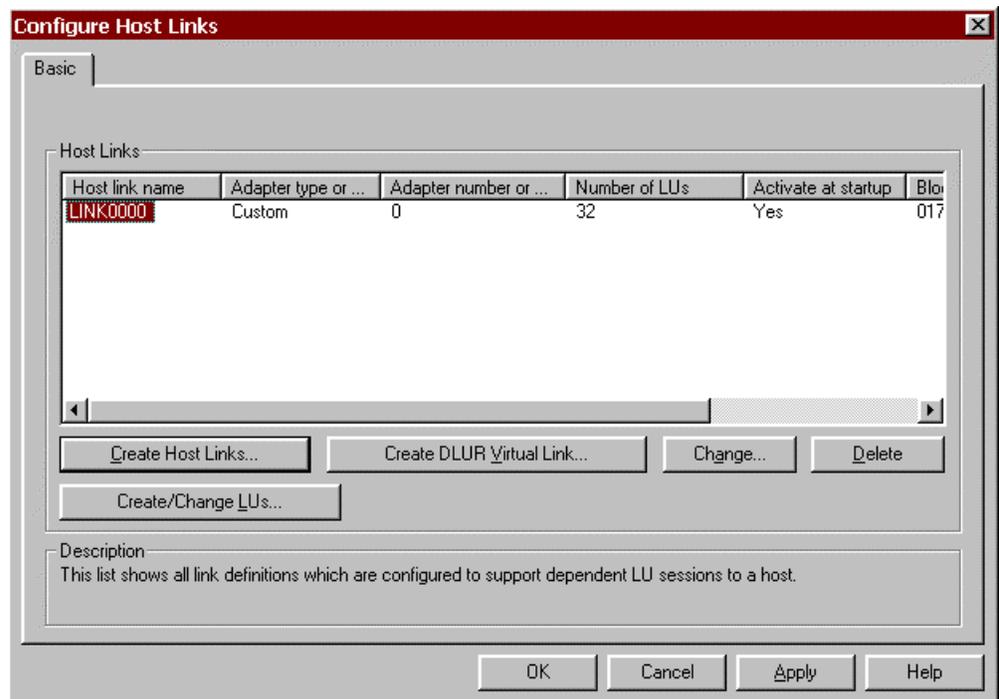


Figure 10-22. Configure Host Links with Newly Created Link0000

- You may create additional links if you need to. Click **OK** to end Configuring Host Links.

Configure Peer Links

When you elect to configure an APPN/APPC scenario within NWSAA Server Configuration, you will be required to configure peer links. Before you can configure a peer link you must first configure the node and the data link adapter. Refer to Novell documentation if you need assistance configuring the node. Refer to the section "**Configure Data Link Adapters**" on page 92 for assistance defining an ESCON adapter as a Custom Data Link Adapter in NetWare for SAA.

The following procedure will configure a peer link.

STEP

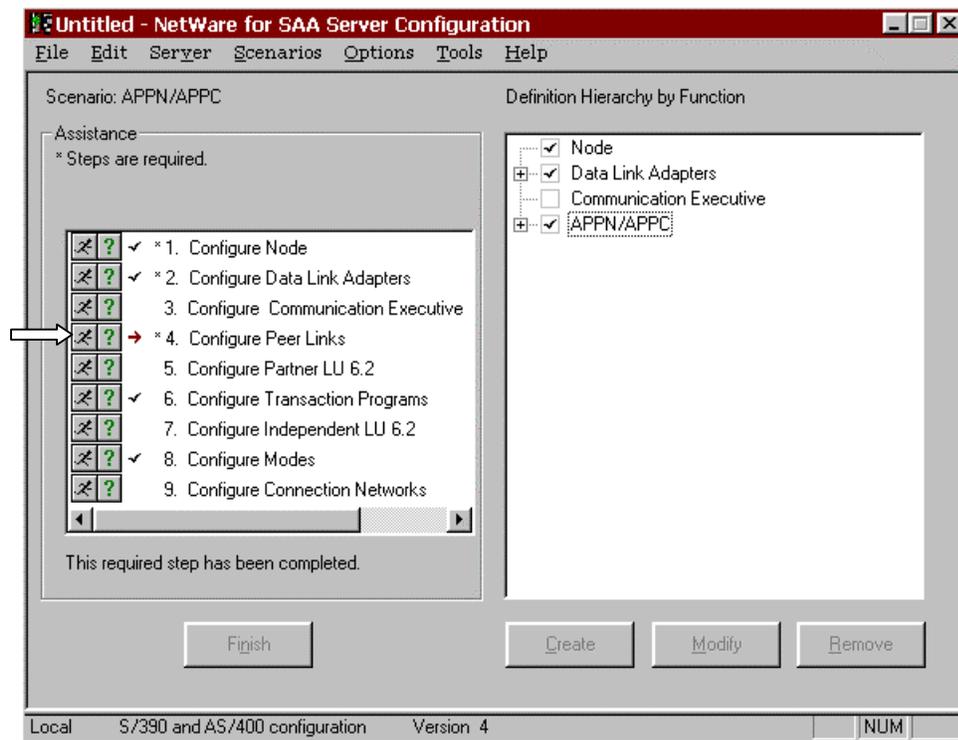


Figure 10-23. Configuring Peer Links

1. Click the "Running Man" next to **Configure Peer Links** (Figure 10-23). A Link Type dialog will display (Figure 10-24). Select **Custom** and click **OK**.

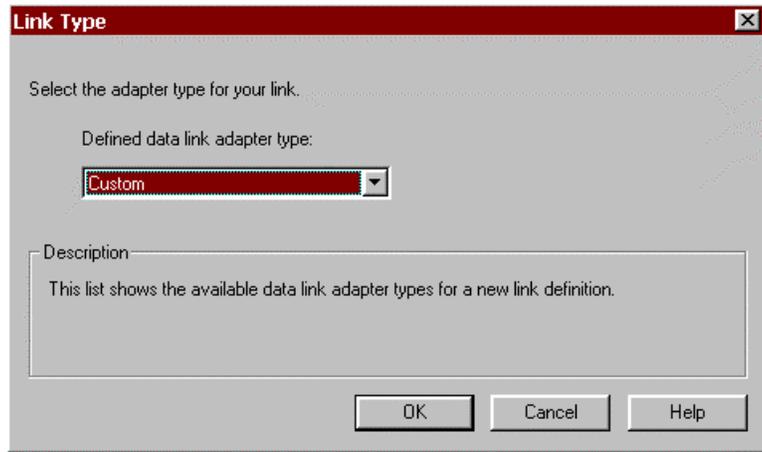


Figure 10-24. Specify Link Type for Peer Link

In IntraNetWare for SAA version 3, highlight **Configure Peer Links** in the **Configuration options:** box of the **APPN/APPCC...** scenario. Scroll to the bottom of the **Adapters:** box and highlight **Custom** (Figure 10-25).

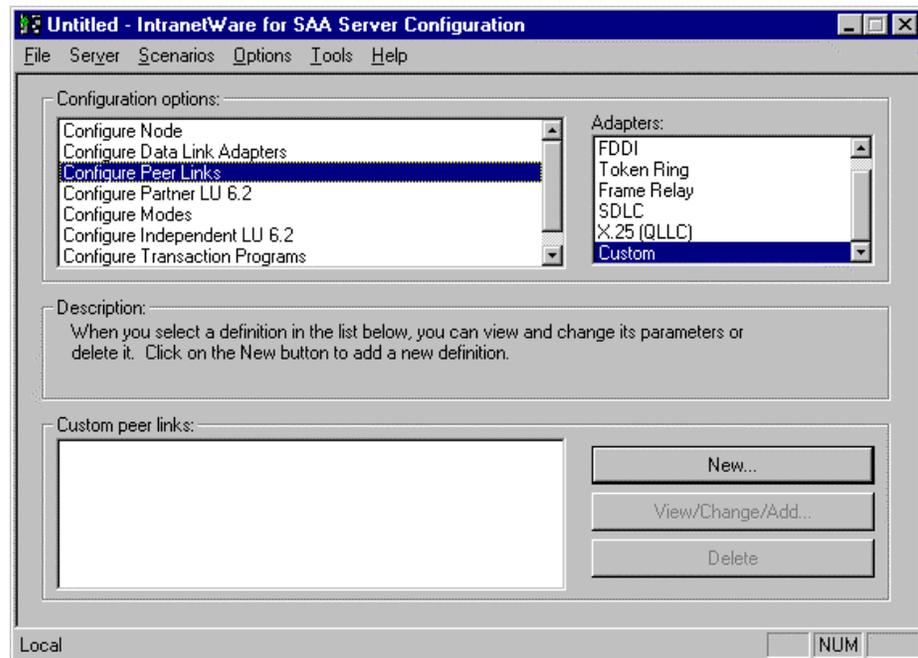


Figure 10-25. Start a Configure Peer Links Task

Click **New...**

2. The **Basic** tab of the *Configure a Custom Peer Link* screen (Figure 10-26) will display. Note that the **Reactivation** is new beginning in version 4 of the configuration utility.

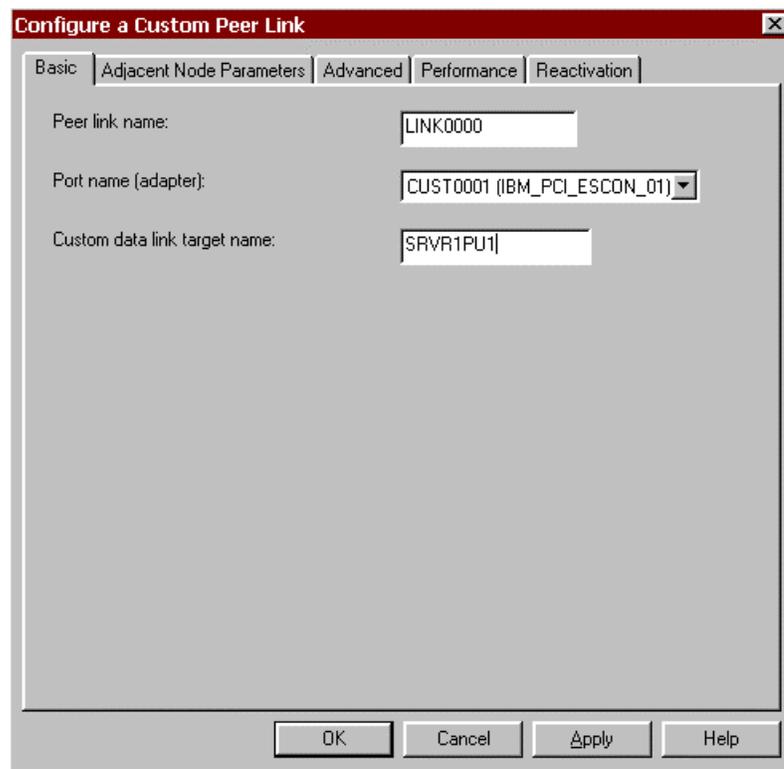


Figure 10-26. Configure a Custom Peer Link - Basic

The following fields appear on the **Basic** tab:

- **Host link name(PU profile name):** A default name will be automatically assigned by the system. You may accept the default, or enter your own name up to eight (8) characters in length.
- **Port name (adapter):** By default the first custom data link adapter defined will be displayed. Select the adapter you wish to associate with this Host Link (PU) from the pull-down list. Keep in mind that the ESCON adapter associates the PU to the sub-channel address used to communicate with the host.
- **Custom data link target name:** This optional field, which allows you to assign a symbolic address to the adapter, is used in NWSAA informational messages. It can be up to 16 characters long. It is recommended you enter the VTAM PU name in this field.

3. Click the **Adjacent Node Parameters** tab (Figure 10-27) to continue.

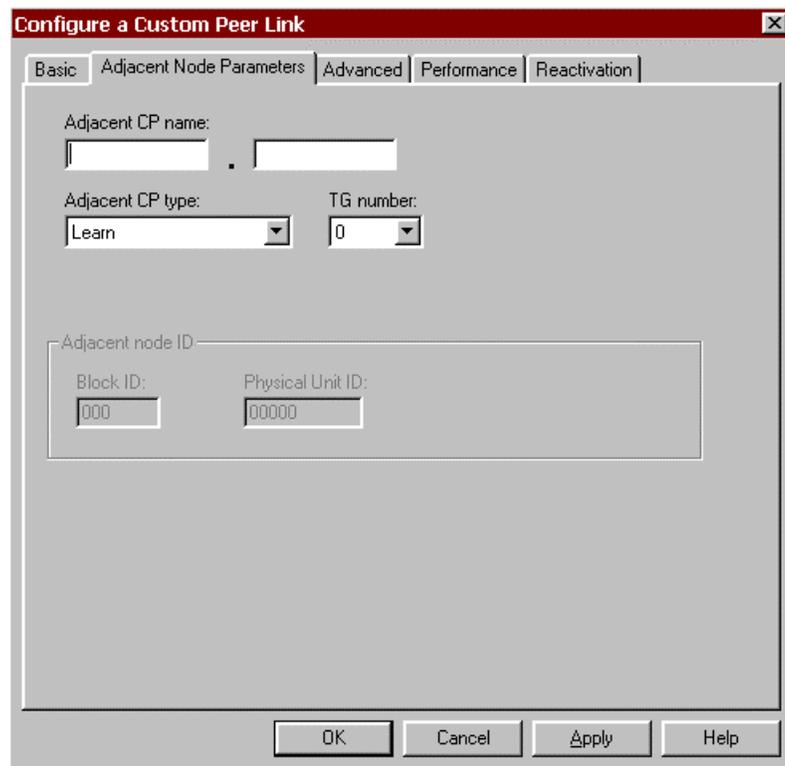


Figure 10-27. Configure a Custom Peer Link - Adjacent Node Parameters

The following fields appear on the **Adjacent Node Parameters** tab:

- **Adjacent CP name:** Identifies the Control Point (CP) name of the host. If this field is entered the name must match that defined on the host or a connection will not be established. Leave the field blank to avoid checking.
- **Adjacent CP type:** Identifies the CP type of the host. Select either End Node, Network Node, or Learn.
- **TG number:** A Transmission Group is a group of links between nodes that appears as a logical link. TG number identifies the transmission group this link belongs to. Any number from 0 to 20 may be entered. However, if a non-zero is entered it **must** match the number assigned on the adjacent node. Entering 0 will cause the TG number to be negotiated when the link is activated. Normally you should leave TG number at 0.
- **Adjacent Node ID:** If Adjacent CP type is set to Back-Level LEN, these fields become available. Some Back-Level LEN nodes do not send CP Node ID. These fields allow you to specify the ID of the remote node. Normally these fields are not required.

4. Click the **Advanced** tab (Figure 10-28):

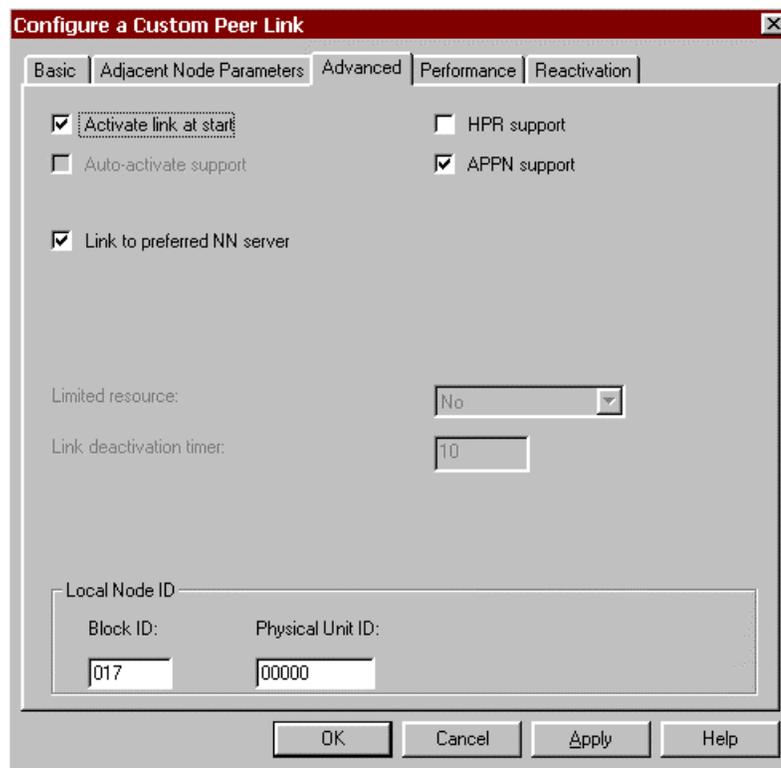


Figure 10-28. Configure a Custom Peer Link

The fields on the **Advanced** tab are:

- **Activate link at start:** This check box tells NetWare for SAA whether or not to automatically activate this communications link at startup. For a dedicated link, such as the ESCON adapter, this check box should **always** be checked.
- **HPR support:** This check box specifies if the link is to support High Performance Routing or not.
- **APPN support:** This check box specifies if the link supports APPN or not. It is automatically checked for peer links.
- **Auto-Activate Support:** This check box specifies if the link should be automatically activated when needed by a session. It cannot be selected with APPN support.
- **Auto-reactivate support:** (version 3 only) This check box specifies whether or not the link can be automatically re-activated if it becomes inactive. Re-activation will only be attempted once. If the re-activate fails, the link will remain inactive.
- **Link to preferred NN server:** This check box is only applicable if the CP type is set to End Node. It is used to identify this link as the link to the preferred Network Node server. It is normally set for peer link configurations.

- **Limited resource:** This check box is enabled if Auto-activate support is selected. There is no need to select Auto-activate support for an ESCON connection so this field is not enabled.
- **Link deactivation timer:** If Auto-activate support is checked and the Limited resource is defined to be **Inactivity**, then this field specifies a time (in minutes) after which the link will be de-activated if inactive. Since ESCON connections are a dedicated resource, you should not select Auto-activate support and this field will be disabled.
- **Local Node ID: Block ID and Physical Unit ID** provide the local node id that flows in the XID3. The Block ID identifies the product type in an SNA network and is a 3-digit hexadecimal number. Physical Unit ID is a 5 digit hexadecimal number that may be used to identify the PU. You should allow Block ID to default to 017. You may allow Physical Unit ID to default to 00000 or enter a unique 5-digit hexadecimal number.

5. Click the **Performance** tab (Figure 10-29).

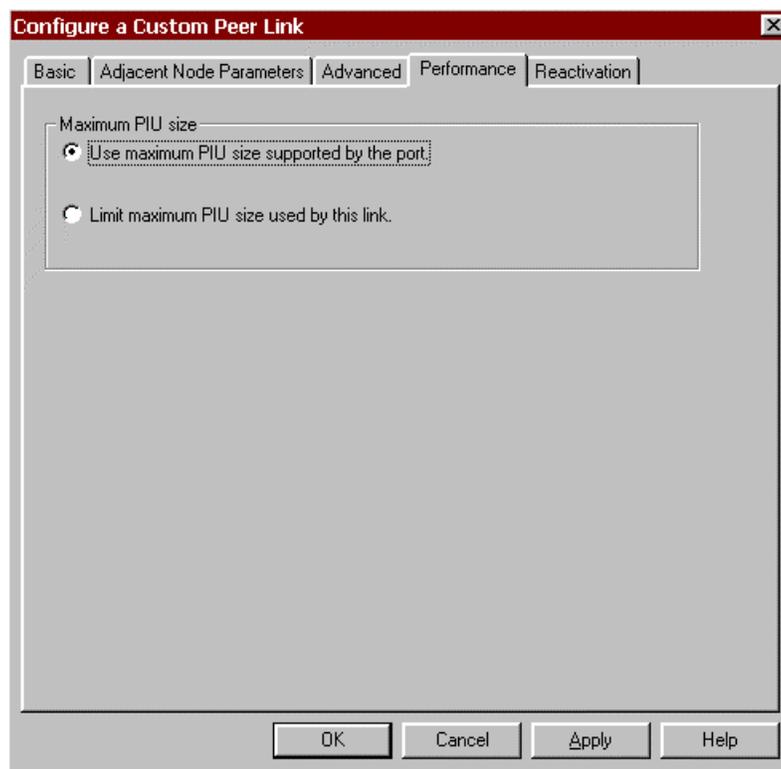


Figure 10-29. Configure a Custom Peer Link - Performance

The fields on the **Performance** tab are:

- **Use maximum PIU size supported by the port:** Check this box to all this link to use the maximum PIU size specified for the adapter (port).
- **Limit maximum PIU size used by this link:** Selecting this button will display a box in which you may enter a maximum PIU size to be used with this

PU. This value may not exceed the value specified for maximum PIU size for the adapter (port).

6. If you are using NetWare for SAA version 4, click the **Reactivation** tab (Figure 10-30).

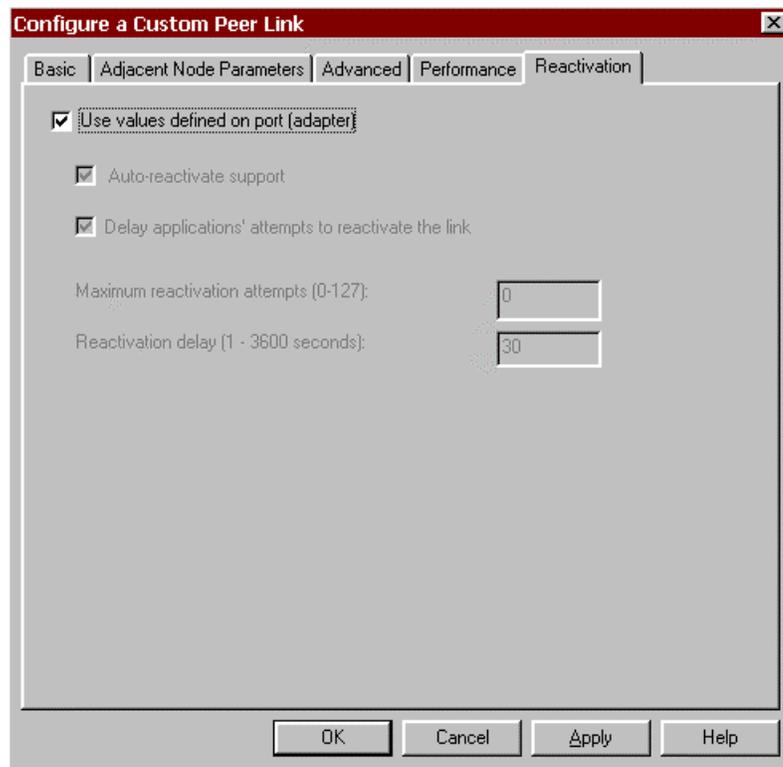


Figure 10-30. Peer Link Reactivation Parameters

A link may fail to start or fail after a successful start for a variety of reasons. You may set automatic reactivation parameters for the ESCON adapter so that it will automatically attempt to restart following a failure. The following fields are used to control reactivation:

- ***Use values defined on port (adapter)***: When selected this check box turns off all other reactivation settings on this dialog box and uses those set for the adapter. De-select this check box to set parameters specific to the link.
- ***Auto-reactivate support***: This check box controls whether or not automatic reactivation is attempted or not. When checked (the default), auto-reactivate will be attempted based on options specified in the remaining fields on this dialog.
- ***Delay applications' attempts to reactivate the link***: Specify whether reactivation attempts are to be delayed or not. When checked (the default), reactivation will be delayed based on the Reactivation delay entered.

- **Maximum reactivation attempts:** This field specifies the maximum number of reactivation attempts to processed. The range is 0-127. Entering 0 causes an unlimited number of attempts.
 - **Reactivation Delay:** Specifies the number of seconds to wait (delay) between attempts to reactivate the link. The range is 1 – 3600. The default is 30 seconds.
7. To complete the peer link configuration, click **OK**. The NWSAA Server Configuration main screen will re-appear (Figure 10-32). The newly defined link will appear in Custom Peer Links under the APPN/APPC Hierarchy.

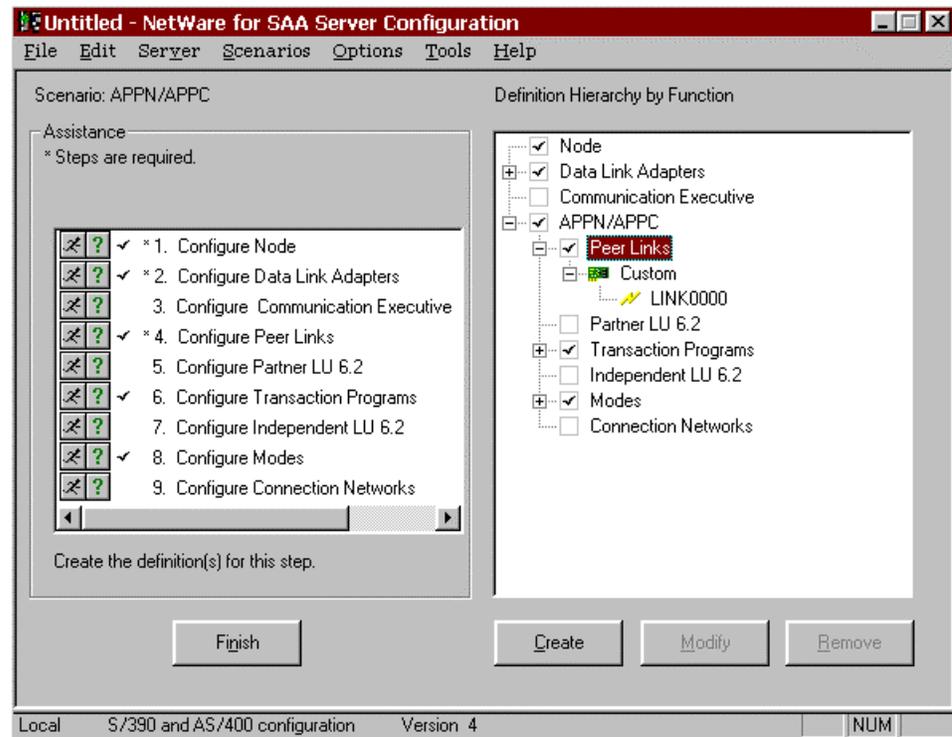


Figure 10-31. Custom Link

In intraNetWare for SAA version 3, the link will appear in the **Custom Peer Links:** box (Figure 10-32).

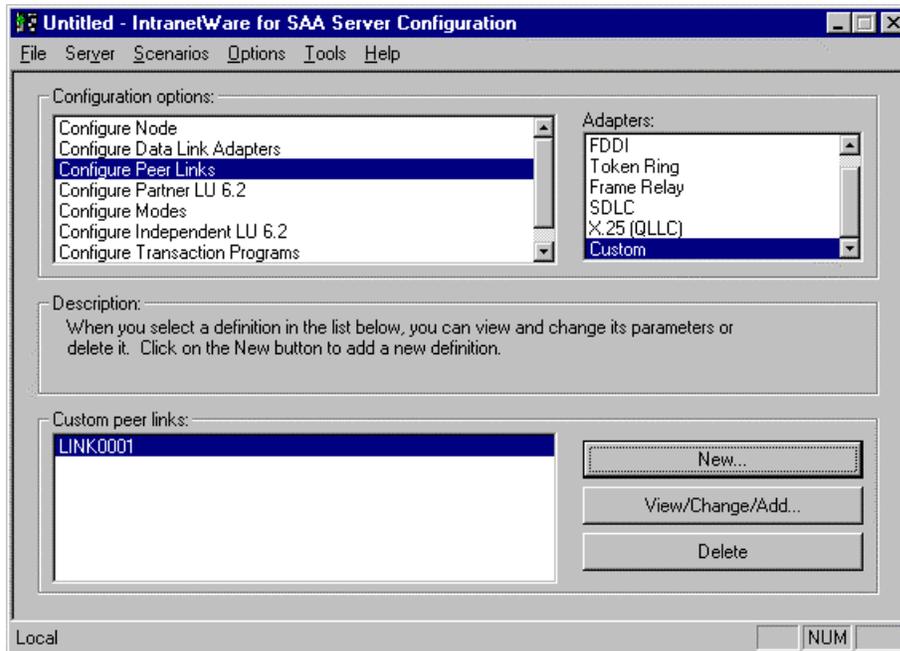


Figure 10-32. Main Display - Newly Created Custom peer link

This ends the Configure Peer Links task.

Chapter 11. TCP/IP PASSTHROUGH FOR NETWARE

Installation

Two software components must be installed in order to use TCP/IP Passthrough:

- Channel Drivers for NetWare
- TCP/IP Passthrough for NetWare

Installation of the Channel Drivers is covered in Chapter 3 beginning on page 11. The channel drivers must be installed before you install TCP/IP Passthrough.

The TCP/IP Passthrough program is installed using Novell's installation utility, **INSTALL**.

It is assumed your Netfinity server has the CDROM driver (CDROM.NLM) loaded. Using **RCONSOLE**, or the keyboard and monitor attached to the server, access the server console.

STEP

1. Mount the CD that came with your Netfinity ESCON Adapter in the CD-ROM drive and enter the following mount command at the NetWare system console prompt:

CD MOUNT IBMESCON

2. Then invoke the **INSTALL** utility by entering the following **LOAD** command:

LOAD INSTALL

INSTALL will display a menu of Installation Options (Figure 11-1).

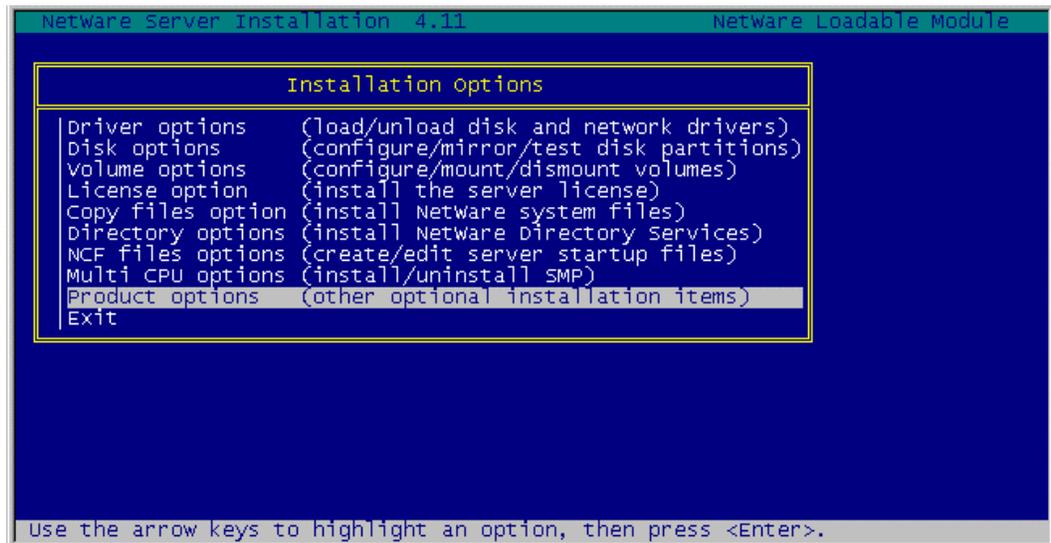


Figure 11-1. INSTALL Utility Main Menu

3. Choose the menu selection “**Product options**” and press **ENTER**. The Other Installation Actions menu will display (Figure 11-2).

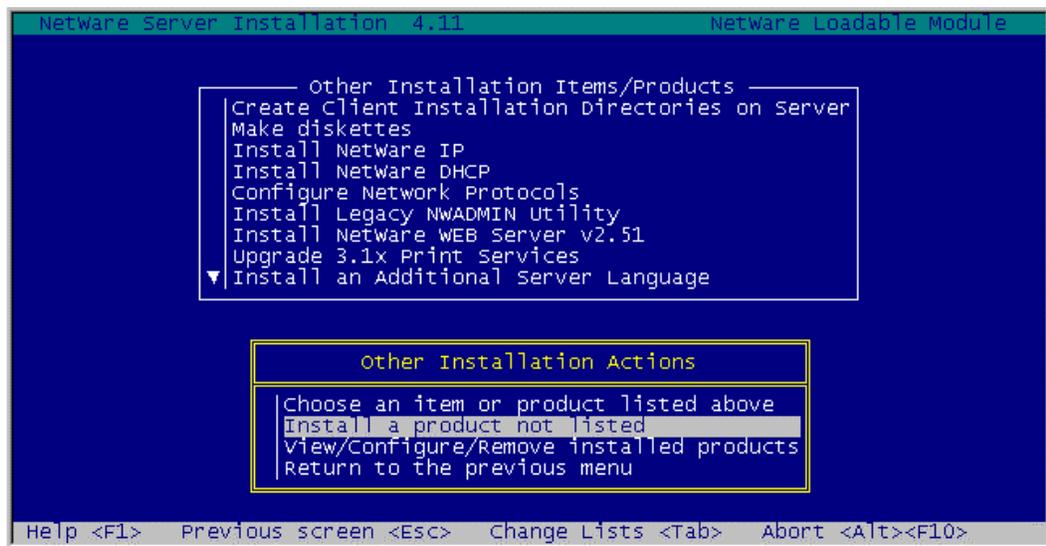


Figure 11-2. Other Installation Actions Menu

4. Select “**Install a product not listed**”. The Install Product screen (Figure 11-3) will be displayed.

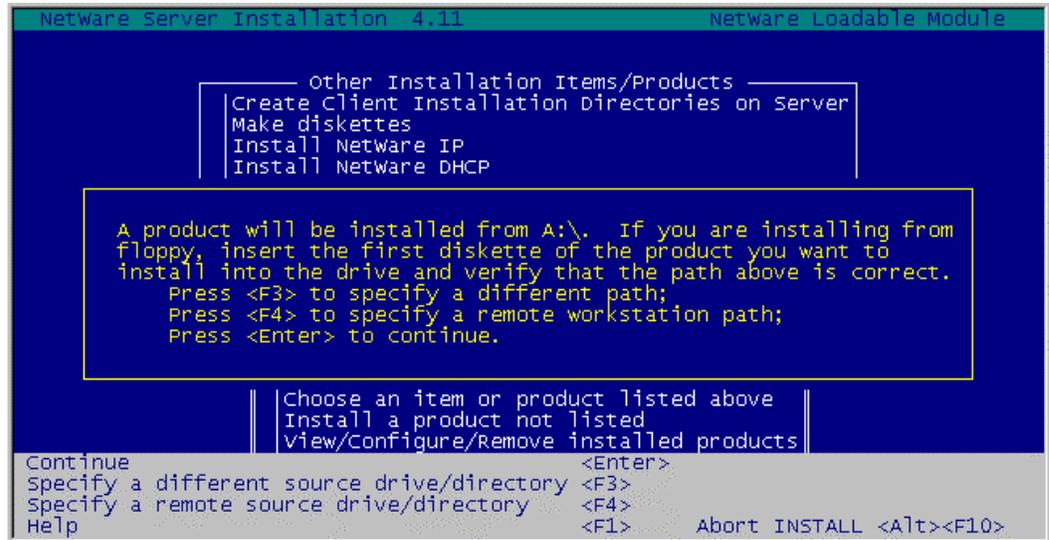


Figure 11-3. Install Product Screen

Press the <F3> key in order to install from the CD-ROM volume. A pop-up window prompting for a different path will display. Enter the path for the TCP/IP Passthrough install directory (“IBMESCON:\NETWARE\TCPIP”) as shown in Figure 11-4.

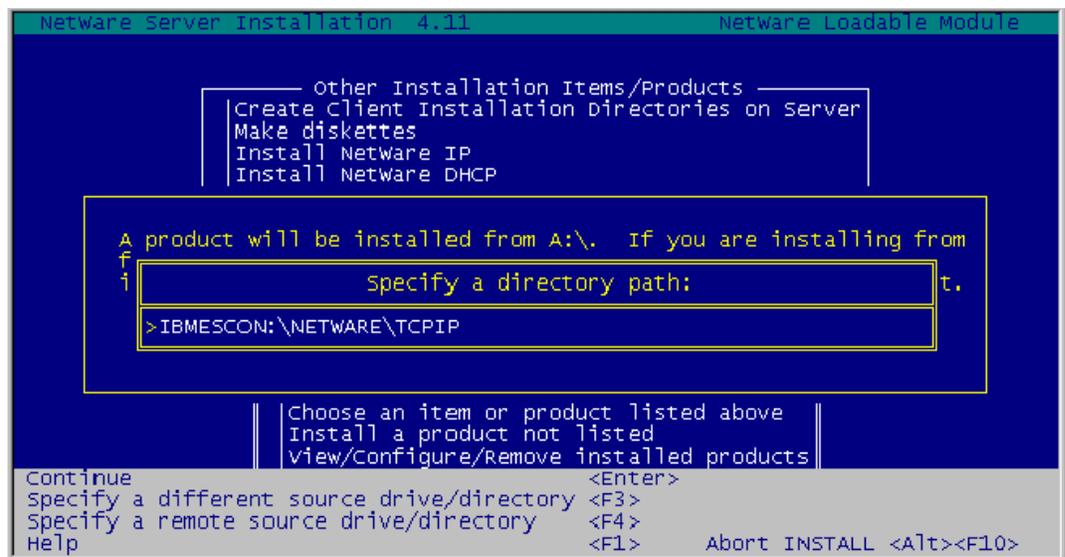


Figure 11-4. Pointing to the CD Install Directory

5. Press <Enter> to continue. An Installation Confirmation screen will display with the “**Install on this Server**” action highlighted (Figure 11-5). Press <Enter> to install the product.

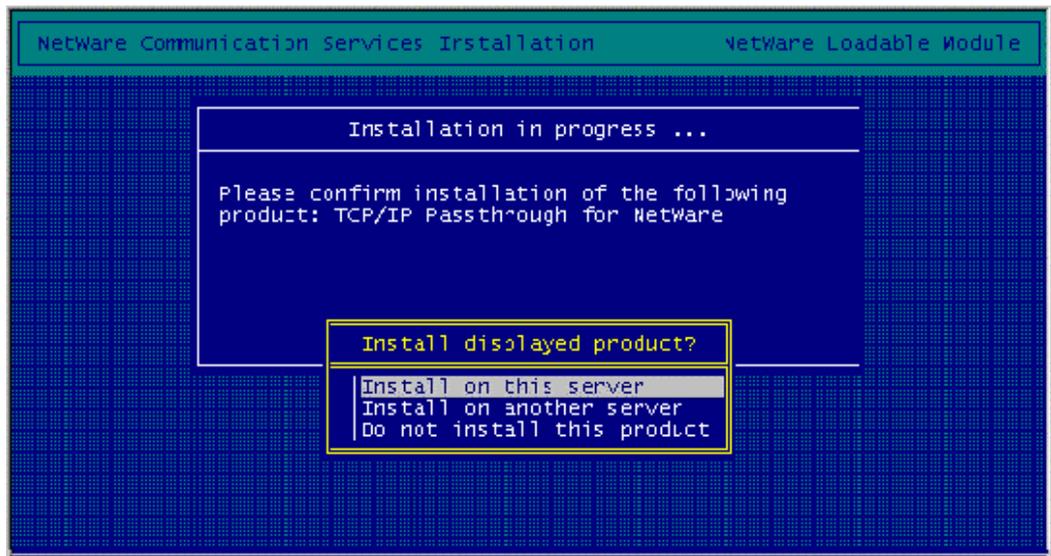


Figure 11-5. Installation Confirmation Screen

An installation complete message will display at the end of the install (Figure 11-6).

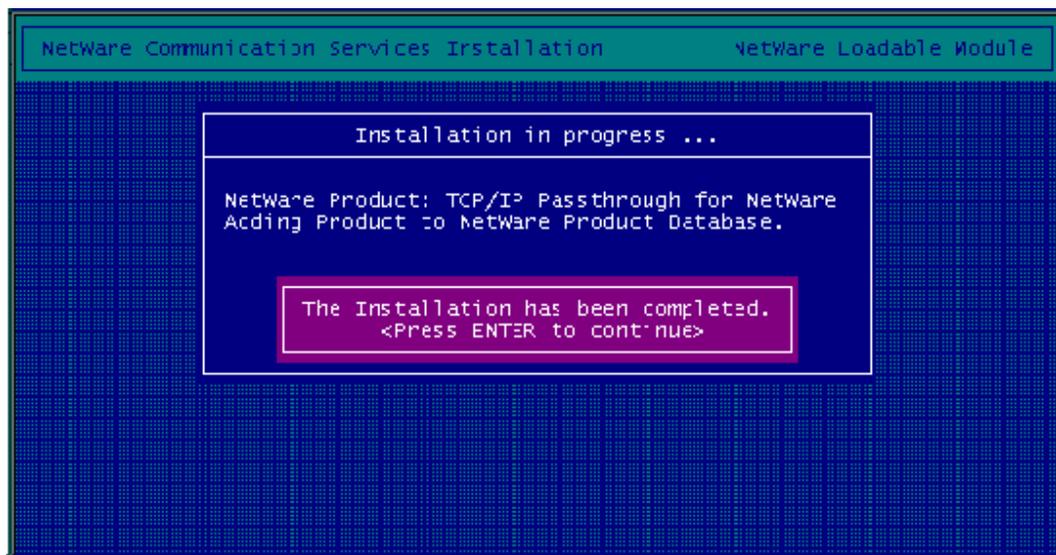


Figure 11-6. Installation Complete

6. Press <Enter> to display a list of the installed products on the server; now including TCP/IP Passthrough (Figure 11-7).

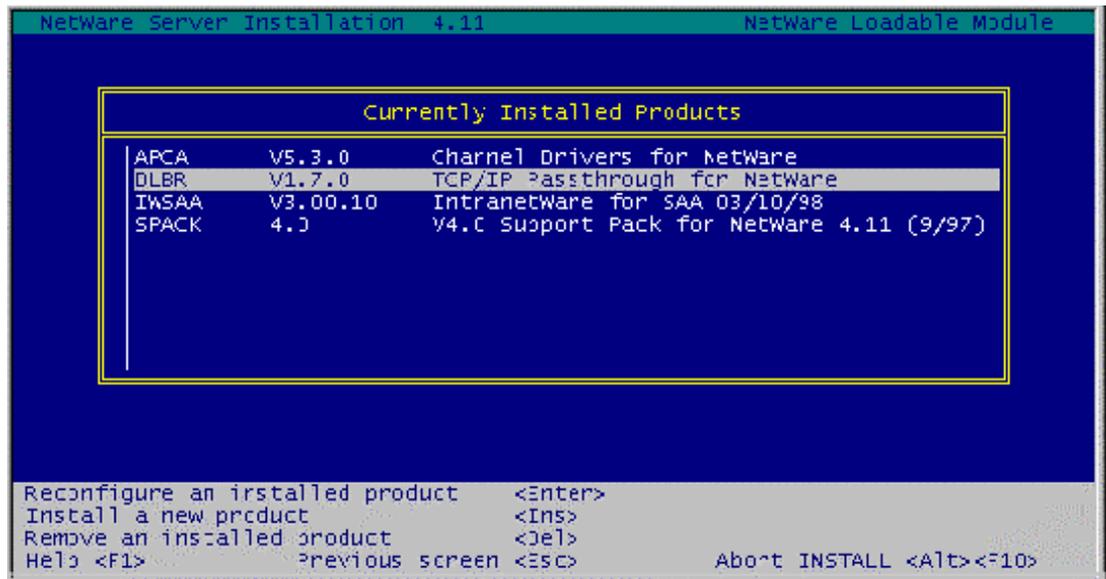


Figure 11-7. Installed Product List

7. The installation of TCP/IP Passthrough is complete. Press <ESC> three times to exit the INSTALL utility.
8. The following command will dismount the CD volume from the NetWare server:

CD DISMOUNT IBMESCON /PURGE

Configuration Overview

Configuring TCP/IP Passthrough involves the following steps:

1. Configuring the ESCON Adapter.
2. Configuring the LAN Adapter.
3. Loading the TCP/IP Passthrough NLM.
4. Binding TCP/IP Passthrough to the ESCON adapter and LAN adapter.

The following sections discuss each of these steps in detail and provide configuration examples for Ethernet, Token Ring, and FDDI LAN connections.

Configuring the ESCON Adapter

For each TCP/IP Passthrough connection, it is necessary to define the first subchannel address of each subchannel address pair to the ESCON adapter. For each connection the first subchannel address must always be even. Definition is accomplished as follows:

```
LOAD BTIPBXA SLOT=<n> FRAME=8232 UNIT=<xx> NAME=<name>
```

where '*<n>*' is the hardware slot number of the ESCON adapter, '*<xx>*' is the first mainframe control unit address of the pair and can be from hex 0 to F, and '*name*' is a unique name given to the adapter for the TCP/IP connection to be supported by this statement.

Ethernet LAN Adapter

The Ethernet LAN **frame type** normally used in a TCP/IP network is Ethernet_II. Consequently, if you do not already have this frame type included in the AUTOEXEC.NCF file for your Ethernet adapter, you must add it as follows:

```
LOAD <landriver> SLOT=<n> FRAME=ETHERNET_II  
NAME=<adapter>
```

where '*<landriver>*' is the name of the Ethernet LAN driver you are using, '*<n>*' is the hardware slot number of the Ethernet board in the NetWare Server, and '*<adapter>*' is a unique name given to the Ethernet board for this frame type.

Token Ring LAN Adapter

The LAN frame type normally used in a TCP/IP Token Ring network is Token Ring SNAP. Consequently, if you do not already have this frame type included in the AUTOEXEC.NCF file for your Token Ring adapter, you must add it as follows:

```
LOAD <landriver> SLOT=<n> FRAME=TOKEN-RING_SNAP  
NAME=<adapter>
```

where '*<landriver>*' is the name of the Token-Ring LAN driver you are using, '*<n>*' is the hardware slot number of the Token Ring board in the NetWare Server, and '*<adapter>*' is a unique name given to the Token Ring board for this frame type.

FDDI LAN Adapter

The FDDI LAN frame type normally used in a TCP/IP network is FDDI_SNAP. Consequently, if you do not already have this frame type included in the AUTOEXEC.NCF file for FDDI adapter, you must add it as follows:

```
LOAD <landriver> SLOT=<n> FRAME=FDDI_SNAP NAME=<adapter>
```

where '*<landriver>*' is the name of the FDDI LAN driver you are using, '*<n>*' is the hardware slot number of the FDDI board in the NetWare Server, and '*<adapter>*' is a unique name given to the FDDI adapter for this frame type.

Loading TCP/IP Passthrough NLM

The TCP/IP Passthrough for NetWare software should be loaded as follows:

```
LOAD BTIDLBR
```

BTIDLBR only needs to be loaded once regardless of the number of TCP/IP connections to be supported. You must load BTIDLBR after you have loaded the respective ESCON adapter driver (LOAD BTIPBXA).

Binding TCP/IP Passthrough

In order for TCP/IP Passthrough to work, it is necessary to associate it with the LAN adapter and mainframe subchannel address pair. This is accomplished with the following BIND statement:

CHL BIND DATALINK <adapter> TO <name>

where '*<adapter>*' refers to the name given the LAN adapter in the "LOAD <landriver> . . ." statement , and '*<name>*' refers to the **NAME=<name>**, given in the "LOAD BTI . . ." statement for this TCP/IP connection.

***Note:** Each TCP/IP host connection requires a unique MAC address as its HOME HARDWARE ADDRESS. Due to this requirement, there can be only one CHL BIND DATALINK statement per LAN adapter in the NetWare Server.*

Sample AUTOEXEC.NCF for Ethernet TCP/IP Passthrough

The following is an example of two TCP/IP Passthrough connections to two mainframe TCP/IPs. Note that this example indicates the use of two different Ethernet boards, named SLOT6II and SLOT7II, to support these two TCP/IP connections.

```
;      Define two NICs for the TCP/IP frame type.

LOAD IBMPCO SLOT=6 FRAME=ETHERNET_II NAME=SLOT6II
LOAD IBMPCO SLOT=7 FRAME=ETHERNET_II NAME=SLOT7II

;      Define two address pairs for the two TCP/IP connections.

LOAD BTIPBXA SLOT=4 UNIT=F0 FRAME=8232 NAME=ESCON_TCP9F0
LOAD BTIPBXA SLOT=4 UNIT=20 FRAME=8232 NAME=ESCON_TCP920

;      Load the DataLinkBridge (TCP/IP) Support modules

LOAD BTIDLBR

;      Bind TCP/IP Passthrough to the Ethernet and ESCON Adapters.

CHL BIND DATALINK SLOT6II TO ESCON_TCP9F0
CHL BIND DATALINK SLOT7II TO ESCON_TCP920
```

Sample AUTOEXEC.NCF for Token Ring TCP/IP Passthrough

The following is an example of two TCP/IP Passthrough connections to two mainframe TCP/IPs. Note that this example indicates the use of two different Token Ring boards, named SLOT6TR and SLOT7TR, to support these two TCP/IP connections.

```
;      Define two NICs for the TCP/IP frame type.

LOAD IBMMPCO SLOT=6 FRAME=TOKEN-RING_SNAP NAME=SLOT6TR
LOAD IBMMPCO SLOT=7 FRAME=TOKEN-RING_SNAP NAME=SLOT7TR

;      Define two address pairs for the two TCP/IP connections.

LOAD BTIPBXA SLOT=4 UNIT=F0 FRAME=8232 NAME=ESCON_TCP9F0
LOAD BTIPBXA SLOT=4 UNIT=20 FRAME=8232 NAME=ESCON_TCP920

;      Load the DataLinkBridge (TCP/IP) Support modules

LOAD BTIDLBR

;Bind TCP/IP Passthrough to the Token-Ring and ESCON Adapters.

CHL BIND DATALINK SLOT6TR TO ESCON_TCP9F0
CHL BIND DATALINK SLOT7TR to ESCON_TCP920
```

Sample AUTOEXEC.NCF for FDDI TCP/IP Passthrough

The following is an example of two TCP/IP Passthrough connections to two mainframe TCP/IPs. Note that this example indicates the use of two different FDDI adapters, named SLOT6FDDI and SLOT3FDDI, to support these two TCP/IP connections.

```
; Define two NICs for the TCP/IP frame type.  
LOAD IBMFDDIO SLOT=6 FRAME=FDDI_SNAP NAME=SLOT6FDDI  
LOAD IBMFDDIO SLOT=3 FRAME=FDDI_SNAP NAME=SLOT3FDDI  
  
; Define two address pairs for the two TCP/IP connections.  
LOAD BTIPBXA SLOT=4 UNIT=F0 FRAME=8232 NAME=ESCON_TCP9F0  
LOAD BTIPBXA SLOT=4 UNIT=20 FRAME=8232 NAME=ESCON_TCP920  
  
; Load the DataLinkBridge (TCP/IP) Support modules  
LOAD BTIDLBR  
  
; Bind TCP/IP Passthrough to the FDDI and ESCON Adapters.  
CHL BIND DATALINK SLOT6FDDI TO ESCON_TCP9F0  
CHL BIND DATALINK SLOT3FDDI TO ESCON_TCP920
```

Chapter 12. IMPLEMENTING SAP R/3

Overview

SAP's R/3 system is a set of core business applications including accounting and controlling, production and material management, quality management, plant maintenance, sales and distribution, human resources management, and project management. The R/3 applications are offered on a number of different operating platforms including Microsoft's Windows NT.

IBM and SAP have worked together to provide a three-tiered computing model in which the System/390 mainframes running OS/390 and DB/2 become the data base server for R/3 applications running on AIX or Windows NT servers (See Figure 12-1).

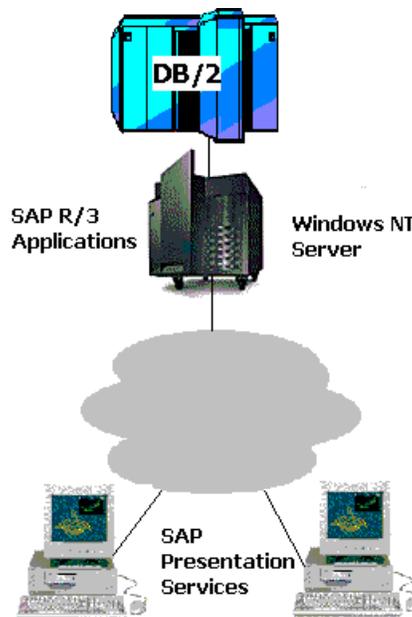


Figure 12-1. System/390 SAP R/3

The Netfinity ESCON Adapter may be configured to provide a very high-speed communications link between a Netfinity Windows NT R/3 application server and the mainframe DB/2 database. This chapter specifically discusses how to configure your Netfinity ESCON Adapter to support SAP R/3 in Windows NT.

Installing and running the R/3 applications with a Netfinity ESCON Adapter requires two separate connections to be defined and configured in your Netfinity server and IBM mainframe. The first connection is a TCP/IP Direct Connect link which uses a standard 3088 (non-MPC) transport to provide FTP services between the mainframe and the Netfinity server. The second connection is a High-Speed Access Services connection, requiring you to install both the MPC+ driver and a second TCP/IP Direct Connect Adapter on your Netfinity server.

Note: TCP/IP Direct Connect was formerly known as Virtual Point-to-Point Adapter (VPPA).

Installation

The following procedure will install the necessary adapter software to allow you to use your Netfinity ESCON Adapter with SAP R/3:

Step

1. Once you have installed the Netfinity ESCON Adapter into an option slot in your Netfinity server (see Chapter 2), begin by installing the PCI ESCON Adapter driver into Windows NT. Instructions for installing this driver may be found in Chapter 3 under the heading “Windows NT Server” beginning on page 7.
2. Install the MPC+ software. Instructions for installing MPC+ may be found in Chapter 5 under the heading “MPC+ Installation” beginning on page 30.
3. Install TCP/IP Direct Connect for use with HSAS. Instructions for installing TCP/IP Direct Connect are found in Chapter 6 under the heading “Installation” beginning on page 38. Be sure to set the link type to “HSAS”. As part of this installation you will need to create a MPC+ transmission group. Keep specific note of the sub-channel addresses you assign to the MPC Group (transmission group) and to the IP addresses assigned to the mainframe’s and NT server’s TCP/IP stacks.
4. Install TCP/IP Direct Connect a second time. This time set link type to “CTC”. Again keep track of sub-channels and IP addresses assigned.
5. Add the sub-channel’s device definitions to the mainframe’s IOCP using the HCD utility (see Chapter 14). You should be adding 4 subchannels; two for the MPC+ (HSAS) connection and two for the CTC connection.
6. Define the TCP/IP stack to the OpenEdition parmlib as described in Chapter 14 in the section titled “Define the Stack in the OpenEdition Parmlib Member” beginning on page 141.
7. Define a VTAM Transport resource list entry (TRLE) for the MPC group as described in Chapter 14 in the section titled “Define the MPC Transmission Group to VTAM” beginning on page 138.
8. Activate the MPC Group by issuing a VARY command on the OS/390 console.
9. Issue an oeifconfig command to assign the IP addresses to the MPC group (See page 142). Be sure the IP addresses match those assigned in the TCP/IP Direct Connect Adapter Properties screen and the Microsoft TCP/IP Properties screen.
10. Modify the TCP/IP Profile for the TCP/IP Direct Connect link type CTC connection (see page 139).

Chapter 13. ADDING AN ADDITIONAL ADAPTER

During installation of the first Netfinity ESCON Adapter into a Windows NT or NetWare server it was necessary to install an adapter driver and/or application specific software such as Data Link Control or TCP/IP Passthrough.

When adding a second Netfinity ESCON Adapter to an existing server it is not always necessary for you to re-install software already present in your system. The following sections discuss what needs to be done for each environment.

Windows NT

When adding an additional Netfinity ESCON Adapter to an existing server you will need to install the IBM PCI ESCON adapter driver for the new adapter. The procedure for installing the driver is discussed in detail in Chapter 3 beginning on page 7.

MPC+

The MPC+ software only needs to be installed once in your server. Once the IBM PCI ESCON adapter driver is installed for the second adapter, both adapters will be available in the **Add Connection** panel (Figure 5-9) when defining a MPC transmission group.

TCP/IP Direct Connect

TCP/IP Direct Connect Adapter must be installed into the Network Adapters list for each Point-to-Point TCP/IP connection you wish to define. Multiple copies of the TCP/IP Direct Connect Adapter may be installed for use with a single Netfinity ESCON Adapter. Refer to page 38 for instructions on installing a TCP/IP Direct Connect Adapter.

Communications Server for Windows NT

If your existing Netfinity ESCON Adapter was previously configured to work with Communications Server for Windows NT (CS/NT), it is not necessary to re-install Data Link Control. Proceed with CS/NT configuration as described beginning on page 51 of this manual.

If your existing Netfinity ESCON Adapter was not previously configured for CS/NT, you will need to install Data Link Control from CD as described at the beginning of Chapter 5.

SNA Server for Windows NT

If your existing Netfinity ESCON Adapter was previously configured for SNA Server, you will not need to re-install the Data Link Service. Follow the procedure “**Configuring a Link Service**” on page 68 to configure the new adapter.

If your existing Netfinity ESCON Adapter was not configured for SNA Server, you will need to install the Link Service from CD as described at the beginning of Chapter 6.

TCP/IP Passthrough

If your existing Netfinity ESCON Adapter was configured for TCP/IP Passthrough, there is no need to re-install TCP/IP Passthrough. Simply configure the new adapter as described in the section “**Configuring TCP/IP Passthrough**” on page 80.

If your existing Netfinity ESCON Adapter was not configured for TCP/IP Passthrough you will need to install the TCP/IP Passthrough software. Installation is described beginning on page 75.

NetWare

If you are installing an additional Netfinity ESCON Adapter into an existing NetWare server you will only need to install software that has not previously been installed. Configuration of the new adapter is accomplished by adding additional control statements to AUTOEXEC.NCF.

Defining the ESCON configuration to the adapter is accomplished exactly the same the second adapter as it was for the first. Refer to the section “**NetWare ESCON Configuration**” beginning on page 25.

NetWare for SAA

If an existing Netfinity ESCON Adapter is configured for use with NetWare for SAA it is not necessary to re-install the NetWare drivers to support NetWare for SAA.

Configuration of the new adapter is accomplished with the following steps:

1. Addition of one or more LOAD BTIPBXA commands in AUTOEXEC.NCF.
2. Configuration of the Data Link Adapter.
3. Configuration of Host Links or Custom Peer Links.

Coding of the LOAD commands is described in the section “**Loading the Drivers**” on page 16. Configuration of the Data Link Adapter, Host Links, and Customer Peer Links is described in Chapter 10.

If no existing Netfinity ESCON Adapter has been configured for NetWare for SAA it is necessary to install NetWare drivers that will support NetWare for SAA. Follow the driver installation procedure beginning on page 11. Once the drivers are installed, proceed with ESCON configuration as described in Chapter 4 and NetWare for SAA configuration as described in Chapter 10.

TCP/IP Passthrough

If an existing Netfinity ESCON Adapter has been configured for TCP/IP Passthrough it is not necessary to re-install TCP/IP Passthrough into your NetWare server. The new adapter can be configured for use with TCP/IP Passthrough by adding additional commands to AUTOEXEC.NCF. Please refer to the section titled “**Configuration Overview**” beginning on page 124 for instructions on configuring TCP/IP Passthrough.

If no existing Netfinity ESCON Adapter has been configured for TCP/IP Passthrough for NetWare it will be necessary to install the software from CD. Please refer to Chapter 11 for a complete discussion of both installation and configuration of TCP/IP Passthrough for NetWare.

Chapter 14. MAINFRAME CONFIGURATION

This chapter is organized in sections based on the type of channel connection being defined:

- MPC+
- TCP/IP Direct Connect
- SNA Gateway
- TCP/IP Passthrough

Please refer to the section or sections appropriate to your server's configuration.

MPC+

As explained in Chapter 5, MPC+ uses transmission groups for communications over the ESCON channel. A MPC transmission group is made up of a minimum of 2 sub-channels (devices); one for mainframe read activity and one for mainframe write activity.

Configuring the mainframe with a new MPC transmission group involves two simple tasks on the mainframe:

1. Define the devices to the I/O configuration.
2. Define the MPC transmission group to VTAM.

Make sure you know which devices are defined in the adapter's configuration as type "MPC" (refer to the Chapter 4).

Define the Devices to the Mainframe I/O Configuration

At least two sub-channels (devices) must be defined for each MPC transmission group; one for read activity and one for write activity. Devices defined for a MPC transmission group must be defined as Serial Channel-to-Channel ("SCTC") devices in the mainframe IOCP. It is recommended that for serviceability these devices be adjacent and the first one be even numbered.

OS/390 Version 2 Release 4 and above uses the HCD Configuration Utility, a menu-based interactive program to complete this task. Refer to the *OS/390 HCD User's Guide* for instructions on using HCD.

In HCD define devices with Device Type "SCTC".

OS/390 Parmlib Update

Turn off the missing interrupt handling processes for the device addresses being used by MPC+ by adding the devices to the SYS1.PARMLIB(IECIOSxx) member as follows:

```
MIH TIME=00:00,DEV=(xxx-yyy)
```

where xxx-yyy identifies the range of addresses you want to disable for MIH processes.

Define the MPC Transmission Group to VTAM

A MPC transmission group is defined to VTAM with a VTAM Transport Resource List Major Node (TRL). Following is an example for a VTAM TRL major node defining a MPC Group:

```
MPCTRL VBUILD TYPE=TRL  
MPC410 TRLE LNCTL=MPC,READ=(410),WRITE=(411),MAXBFRU=9
```

The MAXBFRU **must be** set to 9 to support HSAS (see Chapter 6). Each buffer is 4096 bytes. VTAM reserves the MAXBFRU buffers for each read sub-channel in the group.

The TRLE name (MPC410) will be used to identify the MPC transmission group by APPN and TCP/IP.

Note that if the TRLE MPCLEVEL=NOHPDT operand is coded the connection cannot support HSAS.

Information about defining the TRLE can be found in *OS/390 eNetwork Communications Server: SNA Resource Definition Reference*. For more information on VTAM commands, refer to *OS/390 eNetwork Communications Server: SNA Operation*.

Once defined, the following VTAM operator command will vary the TRL active:

```
V NET,ACT,ID=MPC410
```

TCP/IP Direct Connect

Note: TCP/IP Direct Connect was previously known as Virtual Point-to-Point Adapter (VPPA).

Mainframe configuration TCP/IP Direct Connect is dependent on link type (CTC, HSAS, or MPCPTP). Please refer to the appropriate sub-section below.

CTC

TCP/IP Direct Connect over Channel-to-Channel (CTC) uses two adjacent sub-channel addresses. The first of these addresses must be even numbered (for example: A0, C0, 40, etc.).

The two sub-channel addresses must both be defined to the mainframe as Channel-to-Channel (SCTC) devices.

OS/390 Version 2 Release 4 and above uses the HCD Configuration Utility, a menu-based interactive program to complete this task. Refer to the *OS/390 HCD User's Guide* for instructions on using HCD.

Turn off the missing interrupt handling processes for the device addresses being used by adding the devices to the SYS1.PARMLIB(IECIOSxx) member as follows:

```
MIH TIME=00:00,DEV=(xxx-yyy)
```

where xxx-yyy identifies the range of addresses you want to disable for MIH processes.

Make sure the Subchannel Address field on the TCP/IP Direct Connect Adapter Properties screen (see Figure 6-8) matches the first of the two device addresses defined in HCD.

TCP/IP Direct Connect requires the IBM TCP/IP protocol stack running on your System/390. Your TCP/IP Profile will need to be modified to support the new link. The following is an example of the entries required to define a TCP/IP Direct Connect link:

```
; CTC connection
DEVICE DEVCTC1 CTC a00 IOBUFFERSIZE 32768
LINK LINKCTC1 CTC 0 DEVCTC1
;
HOME
    192.168.1.33 LINKCTC1

GATEWAY
;
; Direct Routes - Routes that are directly connected to my interfaces.
;
; Network First Hop Link Name Packet Size Subnet Mask Subnet Value
192.168.1 = LINKCTC1 32000 0.0.0.224 0.0.0.32

START DEVCTC1
```

Depending on the HOST TCP/IP version, either IOBUFFERSIZE or LARGEENVELOPEPOOLSIZE must match the Large Envelope Pool Size specified in the TCP/IP Direct Connect link configuration screen (see page 41). Also note that the packet size on the Gateway statement must be less than this IOBUFFERSIZE value in order to allow for header information.

The following is an example TCP/IP Profile when Host routing is turned on.

```
;TCPIP Profile with a CTC connection using OROUTED and 64K buffers
;
DEVICE DEVCTC1 CTC A00 IOBUFFERSIZE 65535
LINK LINKCTC1 CTC 0 DEVCTC1
;
HOME
192.168.1.33 LINKCTC1
;
BSDROUTINGPARMS TRUE
LINKCTC1 65000 0 255.255.255.224 192.168.1.34
ENDBSDROUTINGPARMS
;
START DEVCTC1
```

Notice that the packet size (65000 above) is less than the maximum buffer size (IOBUFFERSIZE). IOBUFFERSIZE (LARGEENVELOPEPOOLSIZE) must match the Large Envelope Pool Size configured in TCP/IP Direct Connect (see page 41).

If Windows NT is not running RIP you will need to disable RIP across the CTC link. Otherwise the mainframe will time out the interface after 300 seconds. The following statement in the TCP/IP Gateways Data Set will disable RIP on the channel link.

```
;TCPIP Gateways data set
;
OPTIONS INTERFACE LINKCTC1 192.168.1.33 PASSIVE
```

High Speed Access Services

For High-Speed Access Services you must have at least one MPC transmission group defined in the IOCP and VTAM (see the section titled “MPC+” earlier in this chapter). Once the MPC transmission group is defined, complete the following mainframe configuration tasks to use HSAS:

1. Define the Stack in the OpenEdition Parmlib Member
2. Configure and activate the HSAS network interface.

For further information on High Speed Access Services please refer to *OS/390 eNetwork Communications Server: High Speed Access Services User's Guide*.

Define the Stack in the OpenEdition Parmlib Member

You must define the OpenEdition Common INET physical file system to include the HSAS communications stack (OESTACK). Unlike other TCP/IP stacks which require a separate MVS address space, the HSAS stack resides within the OpenEdition kernel. HSAS is defined through the BPXPRMxx member in SYS1.PARMLIB.

The following is a sample of BPXPRMxx:

```
FILESYSTYPE      ENTRYPOINT(BPXTCINT)
                  TYPE(CINET)
SUBFILESYSTYPE   NAME(TCPIP)
                  ENTRYPOINT(BPXPFINI)
                  DEFAULT
SUBFILESYSTYPE   NAME(OESTACK)
                  ENTRYPOINT(BPXUIINT)
                  TYPE(CINET)
NETWORK          DOMAINNAME(AF_INET)
                  DOMAINNUMBER(2)
                  MAXSOCKETS(25000)
                  TYPE(CINET)
                  INADDRANYPORT(20000)
                  INADDRANYCOUNG(4000)
```

Where:

FILESYSTYPE

defines the common INET physical file system (PFS), which is required to allow multiple AF_INET transport drivers to provide IP network access transparently from a socket application perspective.

SUBFILESYSTYPE NAME(TCPIP) statement

defines the full-function TCP/IP stack. Its parameter, **DEFAULT**, makes TCP/IP the default stack, since it is the only full-function stack. The **NAME** parameter can be variable for TCP/IP. Refer to *OS/390 OpenEdition Planning* for more information.

SUBFILESYSTYPE NAME (OESTACK) statement

defines the HSAS stack. You must code this statement exactly as shown (including the identifier OESTACK) and you may code only one such statement.

NETWORK statement

correlates the common INET PFS with all its sub-transport drivers through the TYPE parameter. The INADDRANYPORT and INADDRANYCOUNT parameters reserve ports explicitly for common INET use. Refer to *OS/390 OpenEdition Planning* for more information about INADDRANYPORT and INADDRANYCOUNT.

Configure and Activate the HSAS Network Interface

The *oeifconfig* command assigns IP Addresses to the VTAM TRLE. The format of the command is:

```
oeifconfig trl_name source_IP_address destination_IP_address mtu maxmtu netmask  
subnet_mask nochecksum
```

Where:

trl_name

defines the name of the TRLE entry for the MPC Group.

source_IP_address

defines the OS/390 home IP address of this interface. This address must be unique for the entire OS/390 image, which includes the full-function TCP/IP stack. This address must match the IP address specified for mainframe IP address in the TCP/IP Direct Connect Adapter Properties screen (see Figure 6-9).

destination_IP_address

defines the IP address of the Netfinity Windows NT server. This address must match the address configured in the Microsoft TCP/IP Properties screen for this TCP/IP Direct Connect Adapter (see Figure 6-11).

maxmtu

defines the maximum transmission unit size for this interface. All hosts connected to the ESCON link must agree on a common maximum transmission unit size. The range of this values is from 512 to 32768. The default is 32768 bytes.

subnet_mask

defines the subnet mask associated with the interface. The value can be expressed in either dotted decimal format (for example, 255.255.255.0), or in hexadecimal format (for example, 0xfffff00). If netmask is not specified, the subnet mask is based on the local address portion of the destination address.

The following command activates a HSAS link using MPC Group MP1 between a mainframe with address 237.221.147.35 and a NT server with address 237.221.147.36 with a subnet mask of 255.255.255.192:

```
oeifconfig MP1 237.221.147.35 237.221.147.36 mtu 32768 netmask 255.255.255.192  
nochecksum
```

For more information on using oifconfig to configure and control a HSAS connection, please refer to *OS/390 eNetwork Communications Server: High Speed Access Services User's Guide*.

MPCPTP

For MPCPTP you must have at least one MPC transmission group defined in the IOCP and VTAM (see the section titled “MPC+” earlier in this chapter). Once the MPC transmission group is defined, you must configure OpenEdition to support the Telnet server and/or FTP server. Please refer to *OS/390 eNetwork Communications Server: IP Configuration* manual for information specific to configuring OpenEdition services.

The following bolded lines provide a sample of the control statements that must be added to the OpenEdition TCP/IP Profile in order to define a new MPC link.

```
; ===== MPC Profile Entries =====  
  
DEVICE MPC410      MPCPTP  
LINK   LINKPTP    MPCPTP      MPC410  
  
HOME  
198.178.232.3    LINKPTP  
  
GATEWAY  
198.178.232      =          LINKPTP    32000    0  
START MPC410
```

In this example, **MPC410** is the name of the VTAM TRLE statement defining the MPC transmission group (see page 138). The same name must be entered on both the DEVICE and LINK statements.

198.178.232.3 is the IP address assigned to this link. In other words it is the IP address client workstations would use to access the mainframe over this link. It must match the Mainframe IP Address coded in the TCP/IP Direct Connect Adapter Properties (see Figure 6-9 on page 42).

The GATEWAY statement beginning “**198.178.232**” defines a static IP route over the MPC link for the entire Class C network and assigns a maximum packet size of 32000. The maximum packet size (32000) must be less than the MTU size defined in the TCP/IP Direct Connect Adapter Properties (see Figure 6-8) in order to allow room for header information.

The following is an example TCP/IP Profile when Host routing is turned on.

```
;TCPIP Profile with a CTC connection using OROUTED and 64K buffers  
;  
DEVICE MPC410 MPCPTP  
LINK LINKPTP MPCPTP MPC410  
;  
HOME  
192.168.1.33 LINKPTP  
;  
BSDROUTINGPARMS TRUE  
LINKPTP 61000 0 255.255.255.224 192.168.1.34  
ENDBSDROUTINGPARMS  
;  
START MPC410
```

The packet size specified on the BSDROUTINGPARMS (61000) must be less than MTU size entered in TCP/IP Direct Connect (see page 42).

If Windows NT is not running RIP you will need to disable RIP across the MPCPTP link. Otherwise the mainframe will time out the link after 300 seconds. The following statement, added to the TCP/IP Gateways Dataset will disable RIP on the link.

```
;TCPIP Gateways data set  
;  
OPTIONS INTERFACE LINKPTP 192.168.1.33 PASSIVE
```

SNA Gateway Definition

This section describes how to configure your mainframe for Communications Server for Windows NT, Novell's NetWare for SAA, and Microsoft's SNA Server.

Note: *If you are planning to use an MPC+ link for Communications Server for Windows NT you do not need to define 3174 devices in the IOCP. Refer to the section "MPC+" earlier in this chapter for information on defining an MPC transmission group to the mainframe. Then follow instructions beginning on page 152 for VTAM System Definition of the APPN Physical Units (PUs).*

Each ESCON adapter attached to a mainframe channel must be described to the mainframe hardware. Depending on the host CPU type, this is performed with either an IOCP generation or the method of defining the CPU's UCWs (Unit Control Words) supported by your CPU type.

For proper operation observe the following IOCP or UCW parameter requirements:

- Each adapter can support a maximum of thirty two (32) channel addresses (PUs). Each PU requires a separate I/O Device Address.
- For IOCP CNTLUNIT and IODEVICE definitions, specify UNIT=3174.

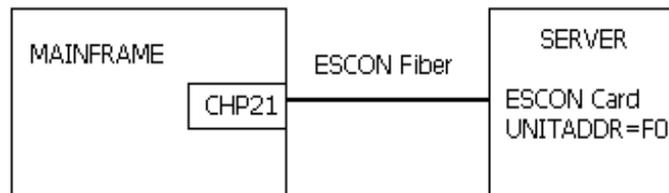
For further information on IOCP or UCW generation methods and parameters, refer to your mainframe CPU documentation.

IOCP Definition Examples

The following are non-MPC examples for creating the Mainframe IOCP Generation for ESCON Adapter cards connecting to IBM ESCON Channels.

Example A: CONNECTION DIRECT TO ESCON CHANNEL (ONE VTAM PU)

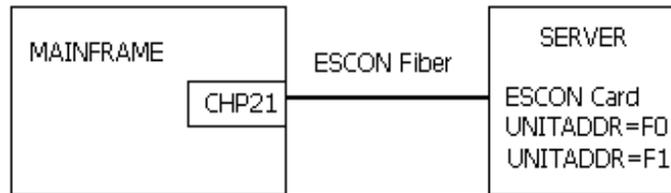
The following example shows a configuration of one subchannel address (i.e., one VTAM PU) generated on the adapter connected to a mainframe using CHPID 21:



```
*** CHPID STATEMENTS ***
    CHPID PATH=( ( 21 ) ),TYPE=CNC
*** CNTLUNIT STATEMENTS ***
    CNTLUNIT CUNUMBR=002,PATH(21),LINK=(**),UNIT=3174,UNITADD=( ( F0,1 ) )
*** IODEVICE STATEMENTS ***
    IODEVICE ADDRESS=( 2F0,1 ),CUNUMBR=( 002 ),UNIT=3174
```

Example B: Connection direct to ESCON Channel (Multiple VTAM PUs)

The following example shows a configuration of two subchannel addresses (i.e. two VTAM PUs) generated on the adapter connected to a mainframe using CHPID 21:



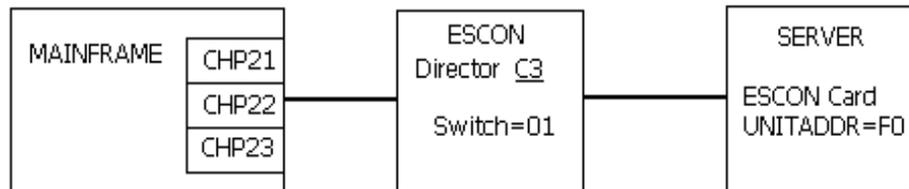
```
*** CHPID STATEMENTS ***
    CHPID PATH=(( 21 ) , TYPE=CNC

*** CNTLUNIT STATEMENTS ***
    CNTLUNIT CUNUMBR=002 , PATH( 21 ) , LINK=( ** ) , UNIT=3174 , UNITADD=( ( F0 , 2 ) )

*** IODEVICE STATEMENTS ***
    IODEVICE ADDRESS=( 2F0 , 2 ) , CUNUMBR=( 002 ) , UNIT=3174
```

Example C: CONNECTION TO ESCON DIRECTOR IN BASIC MODE (ONE VTAM PU)

The following example shows a configuration of one subchannel address (i.e. one VTAM PU) generated on the adapter connected to a mainframe using CHPID 22:



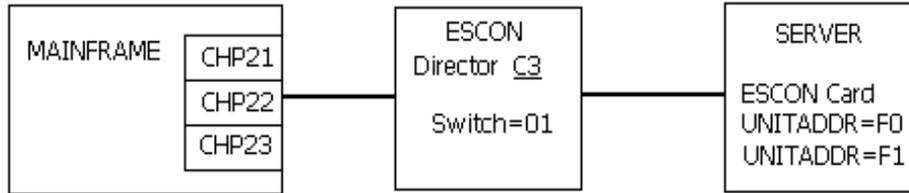
```
*** CHPID STATEMENTS ***
    CHPID PATH=(( 22 ) , TYPE=CNC , SWITCH=01

*** CNTLUNIT STATEMENTS ***
    CNTLUNIT CUNUMBR=002 , PATH( 22 ) , UNITADD=( ( F0 , 1 ) ) , UNIT=3174 LINK=( C3 )

*** IODEVICE STATEMENTS ***
    IODEVICE ADDRESS=( F0 , 1 ) , CUNUMBR=( 002 ) , UNIT=3174
```

Example D: CONNECTION TO ESCON DIRECTOR IN BASIC MODE (MULTIPLE VTAM PUs)

The following example shows a configuration of two subchannel addresses (i.e. two VTAM PUs) generated on the adapter connected to a mainframe using CHPID 22:



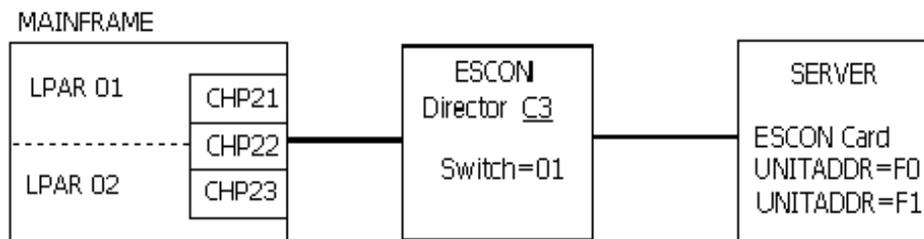
```
*** CHPID STATEMENTS ***
    CHPID PATH=(( 22)),TYPE=CNC,SWITCH=01

*** CNTLUNIT STATEMENTS ***
CNTLUNIT CUNUMBR=002,PATH(22),UNITADD=(( F0,2)),UNIT=3174 LINK=(C3)

*** IODEVICE STATEMENTS ***
    IODEVICE ADDRESS=(F0,2),CUNUMBR=(002),UNIT=3174
```

Example E: CONNECTION TO ESCON DIRECTOR IN SHARED (EMIF) MODE (MULTIPLE VTAM PUs)

The following example shows a configuration of two subchannel addresses (i.e. two VTAM PUs) generated on the adapter connected to a mainframe using CHPID 22. CHPID 22 is shared among multiple LPARS on the mainframe:



```
*** CHPID STATEMENTS ***
    CHPID PATH=(( 22)),TYPE=CNC,SWITCH=01,SHARED

*** CNTLUNIT STATEMENTS ***
CNTLUNIT CUNUMBR=002,PATH(22),UNITADD=(( F0,2)),UNIT=3174 LINK=(C3)

*** IODEVICE STATEMENTS ***
    IODEVICE ADDRESS=(F0,2),CUNUMBR=(002),UNIT=3174
```

VM System Generation

VM/SP

For proper operation of the Netfinity ESCON Adapter on a VM/SP system, observe the following DMKRIO system generation requirements:

- There must be one RCTLUNIT macro, each with one RDEVICE defined, for each device address to be supported.
- Specify CUTYPE=3725 in each RCTLUNIT macro.
- Specify DEVTYPE=3725, MODEL=2, ADAPTER=TYPE5, and CPTYPE=NCP in each RDEVICE macro.

VM/SP Definition Example

```
DMKRIO

* ONE RDEVICE/CUADDR PER PU:

ESC1      RDEVICE ADDR=5F0,DEVTYPE=3725,MODEL=2,          +
           ADAPTER=TYPE5,CPTYPE=NCP
ESC2      RDEVICE ADDR=5F1,DEVTYPE=3725,MODEL=2,          +
           ADAPTER=TYPE5,CPTYPE=NCP

* ONE RCTLUNIT PER PU:

RCTLUNIT ADDRESS=5F0,CUTYPE=3725
RCTLUNIT ADDRESS=5F1,CUTYPE=3725
```

VM/ESA, VM/XA

For proper operation on a VM/ESA or VM/XA system, observe the following HCPRIO system generation requirements:

- There must be one RDEVICE defined for each device address to be supported. VM/XA and VM/ESA do not use the RCTLUNIT macro.
- Specify DEVTYPE=3705, MODEL=L1, and ADAPTER=TYPE4 in each RDEVICE macro.

VM/ESA, VM/XA Definition Example

```
HCPRIO

* ONE RDEVICE/CUADDR PER PU:

ESC1      RDEVICE ADDR=5F0,DEVTYPE=3705,MODEL=L1,          +
          ADAPTER=TYPE4
ESC2      RDEVICE ADDR=5F1,DEVTYPE=3705,MODEL=L1,          +
          ADAPTER=TYPE4
```

MVS System Generation

For proper operation of the Netfinity ESCON Adapter on an MVS system, observe the following MVS system generation requirements:

- There must be one CNTLUNIT and one IODEVICE definition for each device address to be supported.
- In each CNTLUNIT definition, specify SHARED=N.
- In each CNTLUNIT and IODEVICE definition, specify UNIT=3791L.

MVS Definition Example

```
IODEVICE CUNUMBR=5F0,UNIT=3791L,ADDRESS=(5F0,1)
IODEVICE CUNUMBR=5F1,UNIT=3791L,ADDRESS=(5F1,1)
```

DOS/VSE, VSE/ESA System Generation

For proper operation of the Netfinity ESCON Adapter on a DOS/VSE or VSE/ESA system, define the adapters in the IPL file:

- There must be one ADD statement for each device address to be supported.
- Specify device type 3791L on the ADD statement(s).

DOS/VSE, VSE/ESA Definition Example

```
* ONE ADD STATEMENT FOR EACH PU / DEVICE ADDRESS  
ADD 5F0,3791L  
ADD 5F1,3791L
```

VTAM System Generation

Installation of an ESCON adapter for SNA communications requires changes or additions to your current VTAM definitions.

For proper operation with VTAM, observe the following definition requirements:

- There must be one PU defined for each host connection (PU) defined in the gateway (CS/NT, SNA Server, or NetWare for SAA).
- The channel DLC uses a maximum frame size of 4105. For better performance it is recommended the MAXBFRU value in the PU definition be set so that when multiplied by VTAM's I/O Buffer size (IOBUF) the result is greater than 4109 (4105 plus 4 bytes of channel link header). Further explanation may be found in the IBM VTAM Network Implementation Guide, SC31-6434.

Either the IBM supplied standard VTAM LOGMODE tables, or those currently in use in your installation may be used for VTAM terminals. The LOGMODE specified in the VTAM generation should match the Model Type specified in the gateway.

For further information on VTAM generation, refer to the appropriate VTAM documentation for your installation.

Following are VTAM sample definitions for a typical installation. Modify these samples as necessary for your own installation.

VTAM PU 2.0 Definition Example

This example defines a LOCAL SNA Major Node (non-MPC) for PU type 2.0. This example is applicable to SNA Server, CS/NT, or NetWare for SAA.

```

                                LCL5F0  VBUILD TYPE=LOCAL

PL5F0  PU  CUADDR=5F0,          * ONE CUADDR PER GATEWAY PU      +
          DISCNT=NO,           +
          DLOGMOD=D4A32782,    * DEFAULT MOD 2 LOGON TABLE ENTRY  +
          ISTATUS=ACTIVE,      +
          MAXBFRU=5,          * MUST SUPPORT FRAME SIZE OF 4105  +
          MODETAB=ISTINCLM,    * DEFAULT LOGMODE TABLE          +
          PUTYPE=2,           +
          USSTAB=AUSSTAB,      +
          VPACING=5           +
          * LU DEFS TO MATCH GATEWAY CONFIG:
            LL5F0002 LU      LOCADDR=002
            LL5F0003 LU      LOCADDR=003
            LL5F0004 LU      LOCADDR=004
            LL5F0005 LU      LOCADDR=005
            LL5F0006 LU      LOCADDR=006
            LL5F0007 LU      LOCADDR=007
            LL5F0008 LU      LOCADDR=008
                                ...etc...

PL5F1  PU  CUADDR=5F1,          * ONE CUADDR PER GATEWAY PU      +
...etc...

```

VTAM PU 2.1 Definition Example

This example defines a LOCAL SNA Major Node (non-MPC) for PU type 2.1 (notice XID=YES on the PU definition). This example is applicable to SNA Server, CS/NT, or NetWare for SAA.

```

                                LCL5F0  VBUILD TYPE=LOCAL

PL5F0  PU      CUADDR=5F0,      * ONE CUADDR PER GATEWAY PU      +
                                DISCNT=NO,                               +
                                DLOGMOD=D4A32782, * DEFAULT TABLE ENTRY          +
                                ISTATUS=ACTIVE,                            +
                                MAXBFRU=5, * MUST SUPPORT FRAME SIZE OF 4105 +
                                MODETAB=ISTINCLM, * DEFAULT MODE TABLE      +
                                PUTYPE=2,                                  +
                                SSCPFM=USSSCS,                             +
                                USSTAB=AUSSTAB,                            +
                                VPACING=5,                                 +
                                XID=YES * NOTE: XID=YES FOR PU TYPE 2.1

* LU DEFS TO MATCH COMM. SERVER CONFIG:
                                LL5F0002 LU   LOCADDR=002
                                LL5F0003 LU   LOCADDR=003
                                LL5F0004 LU   LOCADDR=004
                                LL5F0005 LU   LOCADDR=005
                                LL5F0006 LU   LOCADDR=006
                                LL5F0007 LU   LOCADDR=007
                                LL5F0008 LU   LOCADDR=008
                                ...etc...

PL5F1  PU      CUADDR=5F1,      * ONE CUADDR PER GATEWAY PU      +
                                ...etc...

```

VTAM LOCAL SNA Major Node implementing APPN

This example defines a Local APPN Major Node (non-MPC). The node could be either a Network Node (NN) or an End Node (EN). This example is applicable to either CS/NT or NetWare for SAA which are both APPN nodes.

```

AP900  VBUILD TYPE=LOCAL
*
APU900  PU      CUADDR=0900,      +
                                ISTATUS=ACTIVE,                            +
                                XID=YES,                                    +
                                CONNTYPE=APPN,                             +
                                CPCP=YES,                                  +
                                MAXBFRU=32,                               +
                                DELAY=0
*
ALU900  LU      LOCADDR=0

```

VTAM LOCAL SNA Major Node implementing MPC and APPN including RTP

This example defines a Local SNA Major Node which references a VTAM Transport Resource List (TRL) and implements APPN including support for Rapid Transport Protocol (RTP). This example is only applicable to Communications Server for Windows NT which supports a MPC transport.

```
AT950  VBUILD TYPE=LOCAL
*
* OPTIONS - Local SNA APPN LINK via ESCON MPC (High Performance)
*           (requires HPR be enabled in the VTAM startup parms )
*           (i.e. - HPR=(RTP,NONE)
*
TPU950  PU          TRLE=TRL950,                                +
          ISTATUS=ACTIVE,                                     +
          XID=YES,                                           +
          CONNTYPE=APPN,                                       +
          CPCP=YES,                                           +
          CAPACITY=128M,                                       +
          HPR=YES,                                           +
          DELAY=0
*
TLU950  LU          LOCADDR=0
```

You will notice that CAPACITY=128M has been specified. Testing has shown significant performance improvements sending data out from the mainframe when the link capacity is specified as 128M (Mbits) in the PU definition for 17.5 Mbyte ESCON connections. Setting CAPACITY too high can have significant impact on mainframe CPU utilization. Also note that setting CAPACITY to a value higher than the capacity of the link will significantly impact the performance of the connection. You may need to adjust this value based on the characteristics of your mainframe.

MPC requires High-Performance Routing (HPR). VTAM uses a startup option to specify support for HPR. HPR=(RTP,NONE) in the VTAM startup parameters allows RTP when HPR=YES is coded on the PU definition. If HPR is not coded on the PU definition then no routing (NONE) will be allowed.

A sample TRL definition completing this example is:

```
MPC950  VBUILD TYPE=TRL
*
* OPTIONS - Transport Resource List Major Node for ESCON
*           (Reference SNA Local Major Node AT950)
*
TRL950  TRLE       LNCTL=MPC,MAXBFRU=9,READ=950,WRITE=951
```

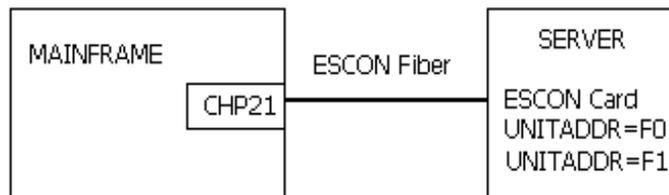
TCP/IP Passthrough

IOCP Definition Examples

The following are examples of the Mainframe IOCP Generation for a Netfinity ESCON Adapter supporting TCP/IP Passthrough.

Example A: CONNECTION DIRECT TO ESCON CHANNEL

The following example shows a configuration of two subchannel addresses (i.e. one TCP/IP Passthrough connection) generated on the ESCON adapter in the server connected to a mainframe using CHPID 21:



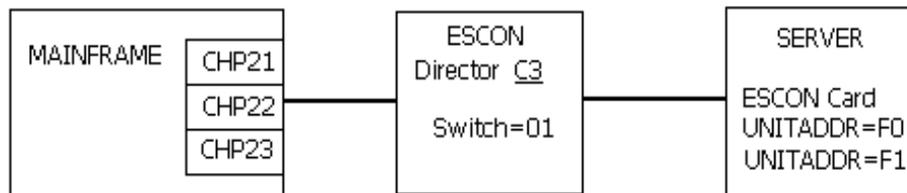
```
*** CHPID STATEMENTS ***
    CHPID PATH=((21)),TYPE=CNC

*** CNTLUNIT STATEMENTS ***
    CNTLUNIT CUNUMBR=002,PATH=(21),LINK=(**),UNIT=SCTC,UNITADD=((F0,2))

*** IODEVICE STATEMENTS ***
    IODEVICE ADDRESS=(2F0,2),CUNUMBR=(002),UNIT=SCTC
```

Example B: CONNECTION TO ESCON DIRECTOR IN BASIC MODE

The following example shows a configuration of two subchannel addresses (i.e. one TCP/IP Passthrough connection) generated on the ESCON adapter in the server connected to a mainframe using CHPID 22:



```

*** CHPID STATEMENTS ***
CHPID PATH=((22)),TYPE=CNC,SWITCH=01

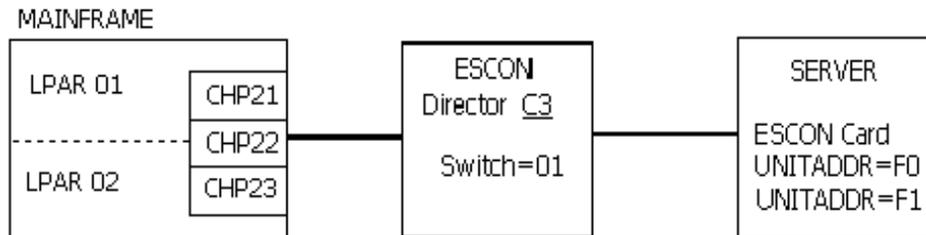
*** CNTLUNIT STATEMENTS ***
CNTLUNIT CUNUMBR=002,PATH=(22),UNITADD=((F0,2)),UNIT=SCTC,LINK=(C3)

*** IODEVICE STATEMENTS ***
IODEVICE ADDRESS=(F0,2),CUNUMBR=(002),UNIT=SCTC

```

Example C: CONNECTION TO ESCON DIRECTOR IN SHARED (EMIF) MODE

The following example shows a configuration of two subchannel addresses (i.e, one TCP/IP Passthrough connection) generated on the ESCON adapter in the server connected to a mainframe using CHPID 22. CHPID 22 is shared among multiple LPARS on the mainframe:



```

*** CHPID STATEMENTS ***
CHPID PATH=((22)),TYPE=CNC,SWITCH=01,SHARED

*** CNTLUNIT STATEMENTS ***
CNTLUNIT CUNUMBR=002,PATH=(22),UNITADD=((F0,2)),UNIT=SCTC,LINK=(C3)

*** IODEVICE STATEMENTS ***
IODEVICE ADDRESS=(F0,2),CUNUMBR=(002),UNIT=SCTC

```

Mainframe Operating System Generation Examples

VM/SP

DMKRIO	TITLE	'DMKRIO EXAMPLE FOR VM/SP'
	RDEVICE	ADDRESS=(9F0,02),DEVTYPE=3088
	RCTLUNIT	ADDRESS=9F0,CUTYPE=3088
	RCHANNEL	ADDRESS=9,CHTYPE=BLKMPXR

VM/XA

HCPRIO	TITLE	'HCPRIO EXAMPLE FOR VM/XA'
	RDEVICE	ADDRESS=9F0,DEVTYPE=3088,CLASS=TERM
	RCTLUNIT	ADDRESS=9F0,CUTYPE=3088
	RCHANNEL	ADDRESS=9,CHTYPE=BLKMPXR

VM/ESA

VM/ESA does not require an I/O gen. The addresses are dynamically defined to the system.

MVS

MVS Version 5 and OS/390 uses the HCD Configuration Utility, a menu-based interactive program. HCD builds both the IOCP statements and the internal MVS device control blocks. For older MVS systems, the following IODEVICE statement is recommended:

IODEVICE	CUNUMBER=016,UNIT=3088,ADDRESS=(9F0,2)
----------	--

Mainframe TCP/IP Profile Examples

IBM's TCP/IP For MVS or VM – Single Link

The following example shows the statements that would be added to the standard IBM TCP/IP configuration dataset PROFILE.TCPIP, when the TCP Passthrough link is the only connection. In this example, two devices have been defined in the IOCP configuration as channel-to-channel adapters, with addresses 9F0 and 9F1. The network is a “Class C” IP network, on Ethernet wiring, having a network IP address of 192.168.4.xxx, with 254 possible nodes. There is a router on the network with the IP address of 192.168.4.254, which knows how to reach other networks outside of 192.168.4.xxx.

```
.  
.
DEVICE      CHAN9F0          LCS          9F0
LINK        CHANLINK        ETHERNET     0          CHAN9F0
.
HOME
192.168.4.1 CHANLINK
.
GATEWAY
192.168.4 =      CHANLINK 1500      0
DEFAULTNET      192.168.4.254    =      CHANLINK      DEFAULTSIZE
.
START CHAN9F0
```

IBM's TCP/IP for MVS or VM – Multiple Links

The following example shows the statements (**in boldface**) that would be **added** to the standard IBM TCP/IP configuration dataset PROFILE.TCPIP, when the TCP Passthrough link is being installed as an additional connection. In this example, it is assumed that there are 2 existing Token-Ring links, and TCP Passthrough is being added as a new Ethernet link. The new Ethernet link defines a “Class C” network having the address 198.162.4.xxx. Note that Token-Ring link TRLINK1 will still be the master link to the outside world, via its gateway router at 10.200.5.1.

```
DEVICE    TRDEV8A0      LCS             8A0
LINK      TRLINK1     IBMTR           0              TRDEV8A0
DEVICE    TRDEV8C0      LCS             8C0
LINK      TRLINK2     IBMTR           0              TRDEV8C0
DEVICE    CHAN9F0      LCS             9F0
LINK      CHANLINK     ETHERNET        0              CHAN9F0

HOME
    10.200.5.2      TRLINK1
    131.144.29.1   TRLINK2
    192.168.4.1    CHANLINK

GATEWAY
; Network First-hop Driver Packetsize Subnetmask Subnetvalue
    10 = TRLINK1 4000 0.255.255.0 0.200.5.0
    131.144 = TRLINK2 4000 0.0.255.0 0.0.29.0
    192.168.4 = CHANLINK 1500 0
DEFAULTNET 10.200.5.1 TRLINK1 DEFAULTSIZE 0

START TRDEV8A0
START TRDEV8C0
START CHAN9F0
```

Interlink's TCP-Access for MVS – Single Link

The following example shows the statements that would be added to the standard TCP Access configuration member ACPCFG0x, when the TCP Passthrough link is the only connection. In this example, It is assumed that two devices have been defined in the IOCP configuration as channel-to-channel adapters, with addresses 9F0 and 9F1. The network is a “Class C” IP network, on Ethernet wiring, having a network IP address of 192.168.4.xxx, with 254 possible nodes. There is a router on the network with the IP address of 192.168.4.254, which knows how to reach other networks outside of 192.168.4.xxx.

```
***      ICS.PARM(ACPCFG00)
.
***      LAN CONTROLLER DEFINITIONS SECTION
NETWORK HOST(192.168.4.2)
        SUBNET(255.255.255.0)
        NAME('TCP PASSTHROUGH')
        MSSDEF(1500)
        MTU(1500)
        LNID(TCPPLINK)
LNILCS  CUTYPE(8232)
        NAME(TCPPDEV)
        DEVADDR(9F0)
LNILINK NAME(TCPPLINK)
        DEVNAME(TCPPDEV)
        ETHERNET
        ADAPTER(0)

***      ROUTING STATEMENTS
ROUTE(0.0.0.0)  DEST(192.168.4.254)  NET('TCP PASSTHROUGH')
ROUTE(0.0.0.0)  DEST(192.168.4.254)
```

Interlink's TCP-Access for MVS – Multiple Links

The following example shows the statements (**in boldface**) that would be **added** to the standard TCP Access configuration member ACPCFG0x, when the TCP Passthrough link is being installed as an additional connection. In this example, it is assumed that there is 1 existing FDDI link, and TCP Passthrough is being added as a new Ethernet link. The new Ethernet link defines a “Class C” network having the address 198.162.4.xxx. Note that FDDILINK will still be the master link to the outside world, via its gateway router at 10.200.5.1.

```
*** ICS.PARM(ACPCFG00)
NETWORK HOST(10.200.5.2)
    SUBNET(255.255.255.0)
    NAME('FDDI BACKBONE')
    MSSDEF(32768)
    MTU(32768)
    LNID(FDDILINK)
LNILCS CUTYPE(8232)
    NAME(FDDIDEV)
    DEVADDR(8A0)
LNILINK NAME(FDDILINK)
    DEVNAME(FDDIDEV)
    FDDI
NETWORK HOST(192.168.4.2)
    SUBNET(255.255.255.0)
    NAME('TCP PASSTHROUGH')
    MSSDEF(1500)
    MTU(1500)
    LNID(TCPPLINK)
LNILCS CUTYPE(8232)
    NAME(TCPPDEV)
    DEVADDR(9F0)
LNILINK NAME(TCPPLINK)
    DEVNAME(TCPPDEV)
    ETHERNET
    ADAPTER(0)
*** ROUTING STATEMENTS
ROUTE(0.0.0.0) DEST(10.200.5.1) NET('FDDI BACKBONE')
ROUTE(0.0.0.0) DEST(192.168.4.254) NET('TCP PASSTHROUGH')
ROUTE(0.0.0.0) DEST(10.200.5.1)
```

Chapter 15. TROUBLESHOOTING

If your Netfinity ESCON Adapter fails to initiate successfully this chapter will provide you with some general troubleshooting guidelines to help you identify and fix your problem.

If after you have been through this troubleshooting chapter you are still unable to make your adapter work properly you should contact your primary service provider for assistance. Please refer to the section titled “Help and Service Information” on page 201 for information on obtaining help.

Hardware

The Netfinity ESCON adapter includes two Light Emitting Diodes (LEDs) on the back edge of the adapter. These LEDs are located just below the ESCON connector and can be used to help isolate whether a problem is hardware or software related.

Each LED will illuminate in one of three colors. The Top LED illuminates Red, Yellow, or Green. The bottom LED illuminates Red, Orange, or Green. When the server’s power is turned on both LEDs should always be illuminated. Table 15-1 summarizes the use of each LED.

Color \ LED	Top LED	Bottom LED
OFF	Power Off	Power Off
Yellow	POST in Progress	Not Applicable
Orange	Not Applicable	Emulation Loaded, Channel Offline
Red	POST Failed	Emulation Not Loaded
Green	POST Ran Successfully	Channel Online

Table 15-1. Status LED Summary

As soon as the system is powered on, under normal operation the ESCON adapter executes it’s own Power On Self Test (POST) and then loads the emulation firmware. Follow the steps below to determine if the adapter has powered on successfully and is operational.

STEP

1. With your server powered on, check to make sure both LEDs are lit. If the top LED is Green and the bottom LED is Orange then the adapter has successfully completed POST and loaded firmware. This is the normal condition prior to starting the software. The adapter is operational. The bottom LED will remain Orange until the server is varied online at the mainframe console.

Proceed to the troubleshooting section on ESCON configuration and then the section(s) appropriate to the software you are using.

2. If either LED is off, power down your server, remove the adapter, and re-install it. Make sure the adapter is properly seated in the slot. Power the server back on. If the LED(s) remain unlit, contact your service provider.
3. When your server is first powered on both LEDs will briefly turn Red. When the adapter starts running Power On Self Test (POST) the top LED will illuminate Yellow. Once POST completes, the top LED will illuminate Green if POST was successful or Red if POST failed.

Watch the top LED as your system powers up. Verify the top LED goes from Red to Yellow to Green. If the top LED remains Red or turns Yellow and then Red again the adapter is not working properly. Power down your server and re-install the adapter. Power the server back on. If the condition repeats itself contact your service provider.

If the top LED is Yellow and the bottom LED is Red wait for 5 minutes to see if the status changes.

4. When the top LED turns Green, POST has completed. The adapter's Intel 960 processor will then load the device emulation (either 3172 or 3274). The bottom LED indicates the status of the emulation.

When the adapter is first powered on the bottom LED should be Red. This is a normal indication that the emulation has not loaded. The LED will remain Red while POST runs. Once the top LED turns green, indicating POST has been successful, the bottom LED should quickly turn Orange.

If the top LED is Green and the bottom LED is Red wait for one minute. If the bottom LED remains Red, the emulation has not successfully loaded. Perform a hardware reset (or Power Off / Power On) of your server. If the problem persists contact your service provider.

5. If you have checked your software configuration and are still not able to vary the system online, check your ESCON cable. Make sure both ends are properly seated. Unplug both ends. Plug them back in. Be sure you hear them click when you insert them into the connector.

ESCON Configuration

When the adapter loads the emulation it also loads the ESCON configuration (Chapter 4. Defining the ESCON Configuration). This configuration must match the configuration defined on your mainframe(s).

Windows NT

In Windows NT use the Network ICON on the Control Panel to display the server's network adapters (Figure 15-1).

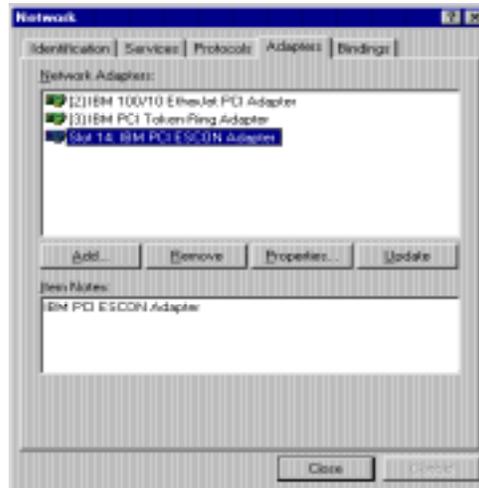


Figure 15-1. Network Adapters

Highlight the ESCON adapter and click Properties to display the ESCON configuration for this adapter (Figure 15-2).

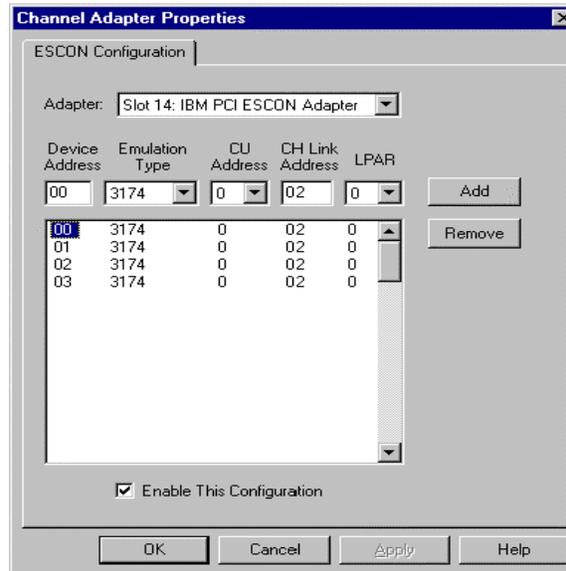


Figure 15-2. ESCON Configuration

Verify that the configuration defined here matches that of the mainframe and that the configuration is enabled. Correct any discrepancies you find and reset the server.

NetWare

In NetWare verify that the following LOAD statements are properly located in your AUTOEXEC.NCF file:

```
Load PBXAAPI
Load ESCONCFG Slot=x filename.CFG
Load BTIPBXA Slot=x Unit= ....
```

The low level API driver (PBXAAPI) must be loaded before the configuration program (ESCONCFG). The configuration program must be loaded before the ODI drivers (BTIPBXA).

Edit the file name by “filename.CFG”. Verify the ESCON configuration matches that defined on the mainframe (see section “Creating a Configuration File” on page 25 for explanation of the fields). Correct any discrepancies and reset the server.

MPC+

Setting up MPC+ involves several key items:

Windows NT

- Defining an appropriate ESCON Configuration
- Defining a MPC transmission group
- Configuring the application using MPC+

Mainframe

- Defining devices in the IOCP
- Defining the MPC transmission group (TRL Major Node) to VTAM
- Configuring an application to use the MPC transmission group

Once these activities have been properly completed you should be able to bring the Netfinity server on line using a V Net command for the MPC transmission group.

Figure 15-3 shows a properly configured MPC transmission group.

Verify the devices defined in the MPC Group definition point to devices defined as “Generic” in the ESCON Adapter Configuration.

Verify the devices defined in the ESCON Configuration are properly defined in the IOCDS as “SCTC” devices.

Verify the devices are defined in the VTAM TRLE defining the MPC transmission group. Make sure the same device addresses are defined as read/write in both the TRLE and the MPC Group definition on the server.

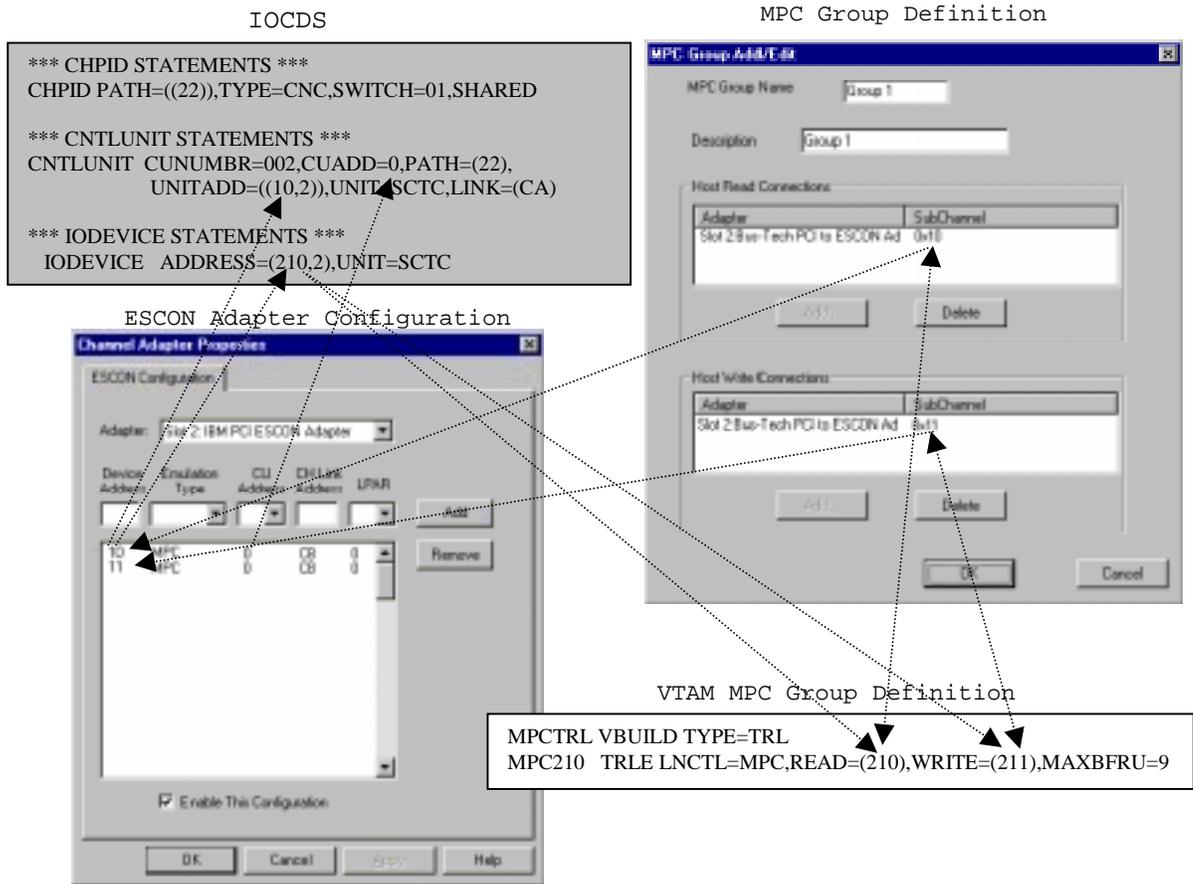


Figure 15-3. MPC Transmission Group Definitions

TCP/IP Direct Connect

Note: TCP/IP Direct Connect was previously known as Virtual Point-to-Point Adapter (VPPA).

CTC

Figure 15-4 shows proper configuration parameters for a Point-to-Point TCP/IP connection using Link Control Station (LCS). Check the following:

1. Verify the devices defined in the IOCDS are defined as "SCTC" devices. CTC requires two adjacent addresses with the first one the even numbered address.
2. Make sure the devices match those defined in the ESCON Configuration. The device type should be "Generic".
3. Verify the even numbered device address has been properly defined in the TCP/IP Profile.
4. Make sure the HOME IP address defined in the TCP/IP Profile matches the IP address defined for "Mainframe IP Address" in the TCP/IP Direct Connect Adapter Properties.
5. Make sure the IP address and subnet mask assigned to the TCP/IP Direct Connect Adapter in Microsoft TCP/IP Properties matches the IP address and subnet mask

defined in the TCP/IP Profile for first hop. Make sure the HOME IP address and the TCP/IP Direct Connect IP address are in the same subnet. Otherwise TCP/IP will look for a gateway address.

- Verify the even numbered channel address defined in the TCP/IP Direct Connect Adapter Properties panel.

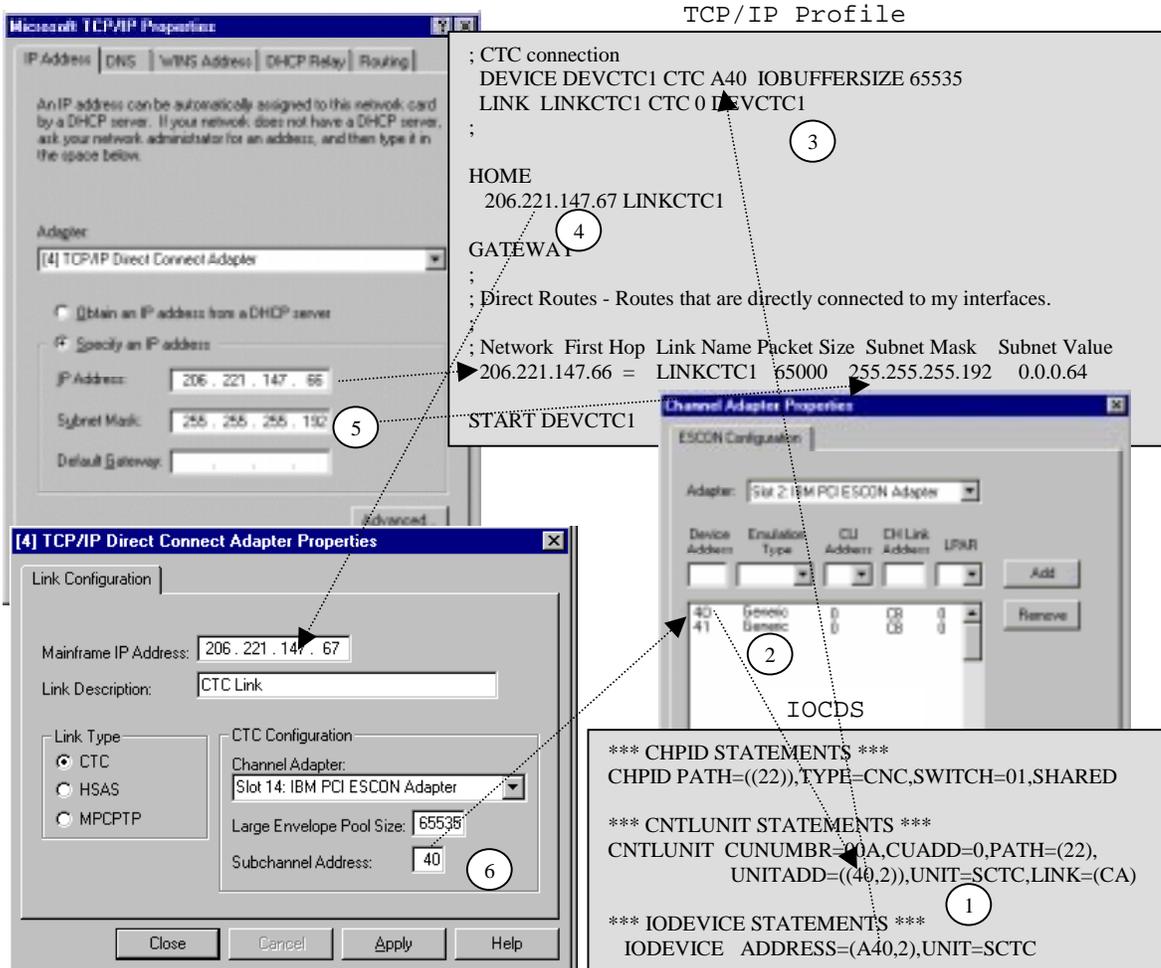


Figure 15-4. TCP/IP Direct Connect CTC Configuration

HSAS

High-Speed Access Services is a MPC+ link. As such you must have defined a MPC transmission group. Please refer to Chapter 5 for instruction if you have not defined a MPC transmission group. Then, if you are unable to verify the group active, refer to the section titled “MPC+” earlier in this chapter for information on trouble shooting a MPC+ connection. If you are able to vary the MPC transmission group active but you are still having trouble with a HSAS link check the following (refer to Figure 15-5).

- Check the OpenEdition Parmlib member to make sure the HSAS stack has been included in the TCP/IP definition.

- Verify the IP address and subnet mask defined to TCP/IP Direct Connect are the same as those specified for the destination IP address and subnet mask in the oEIFCONFIG. Keep in mind that the IP addresses of the mainframe and TCP/IP Direct Connect must be in the same subnet.

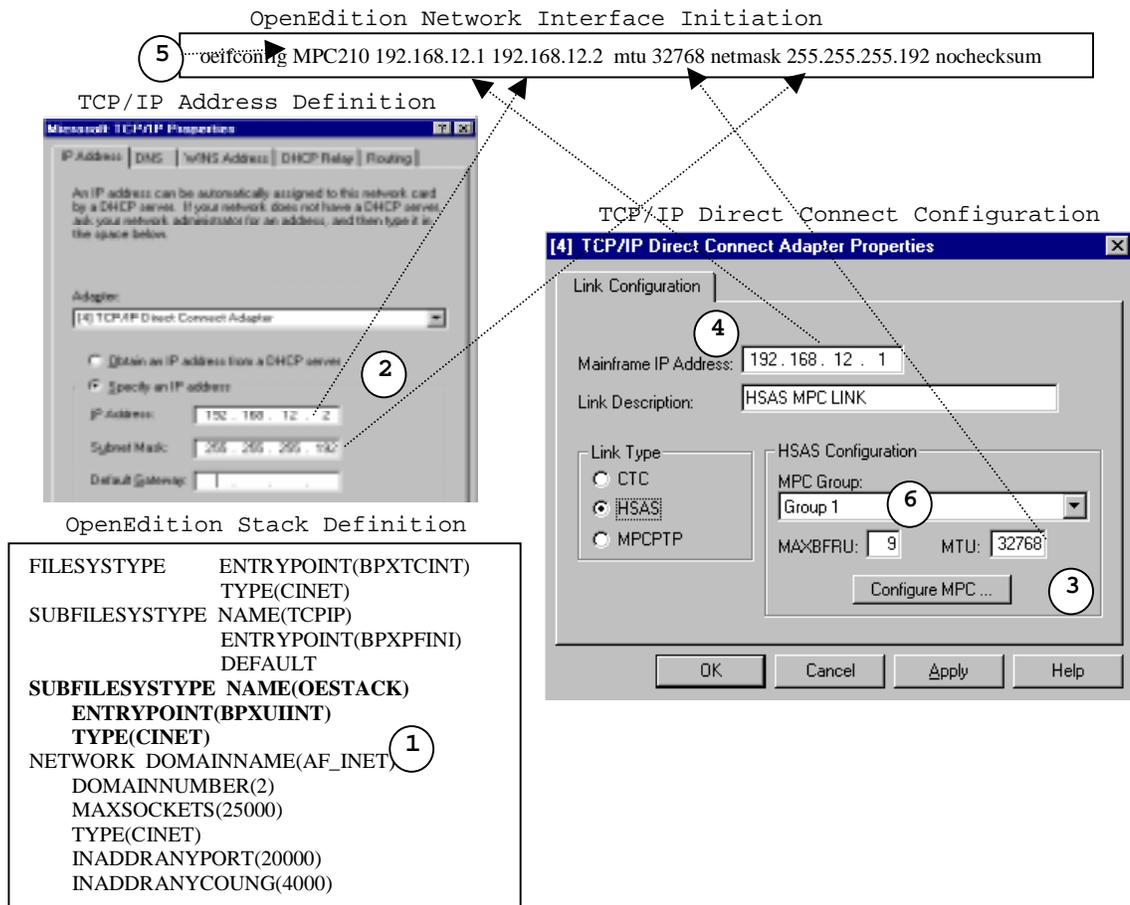


Figure 15-5. HSAS Configuration

- Verify the MAXBFRU number and MTU size defined in the TCP/IP Direct Connect Adapter Properties match the oEIFCONFIG statement. MAXBFRU must be 9 for HSAS.
- Verify the Mainframe IP Address in TCP/IP Direct Connect Adapter Properties is the same as the one specified in the source IP field on the oEIFCONFIG.
- Verify the oEIFCONFIG statement for the MPC group name. The name must match the one included on the VTAM VTRLE.
- Verify the MPC Group defined in TCP/IP Direct Connect Adapter Properties is the correct group for this connection.

MPCPTP

MPCPTP links are MPC+ connections. You must have installed the MPC+ software before you will be allowed to configure a MPCPTP link to TCP/IP Direct Connect. Additionally, you must define at least one MPC transmission group that can be used by TCP/IP Direct Connect for this link (note: the MPC transmission group may be shared with HSAS and/or CS/NT). Please refer to Chapter 5 for assistance installing MPC+ software or configuring a MPC transmission group.

If you have defined a MPC transmission group but cannot vary it active, then please refer to the section titled “MPC+” earlier in this chapter for information on troubleshooting MPC transmission groups.

If the MPC transmission group varies active, but you are still unable to use the MPCPTP connection here are some things to consider (refer to Figure 15-6):

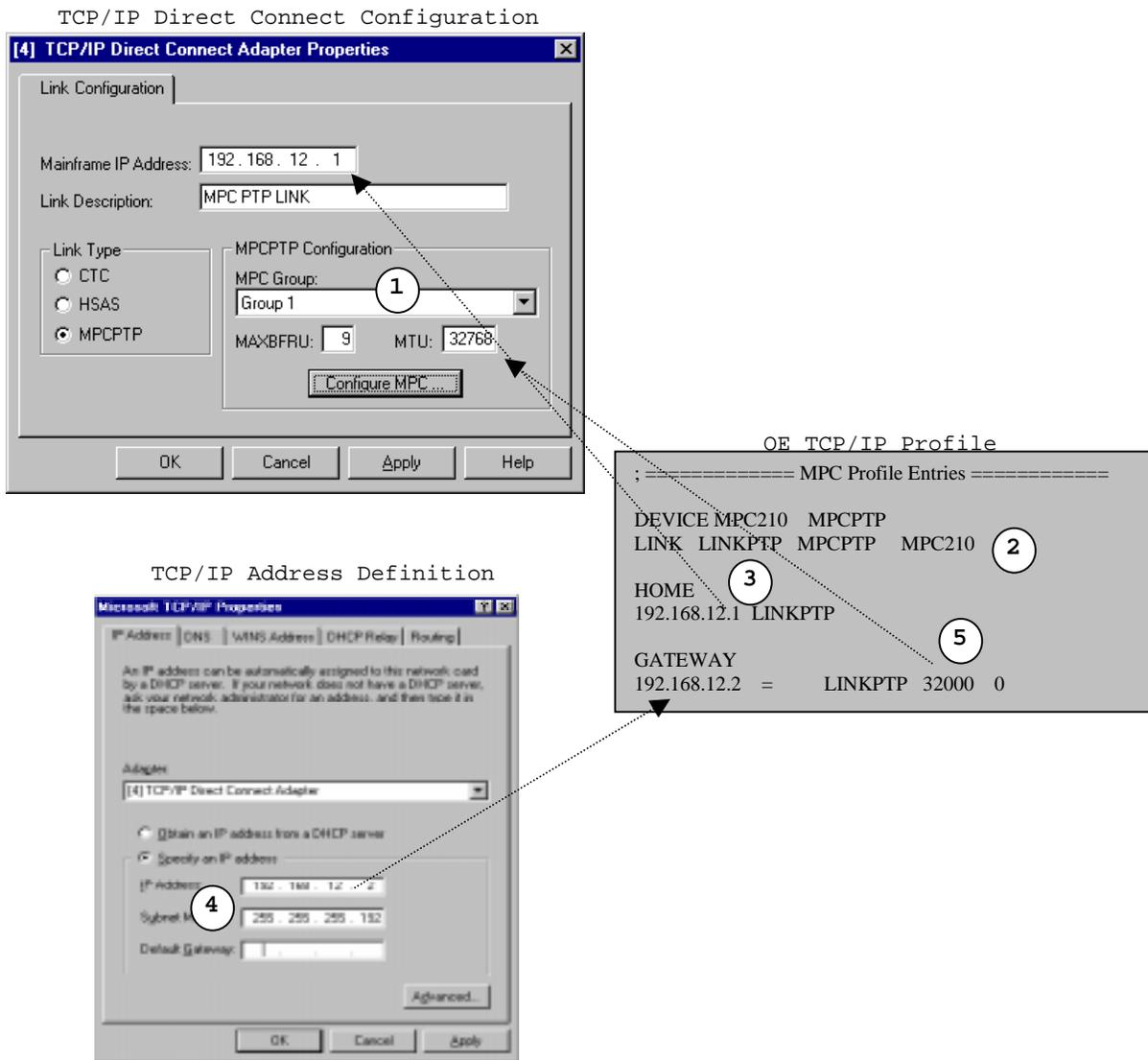


Figure 15-6. MPCPTP Configuration

1. Verify the correct MPC Group has been named in TCP/IP Direct Connect Adapter Properties.
2. Make sure the correct MPC group has been named in the LINK statement in the TCP/IP Profile. It should match the VTAM TRLE.
3. Make sure the HOME IP address in the TCP/IP Profile is identical to the address entered in TCP/IP Direct Connect Adapter Properties.
4. Make sure the IP Address entered for TCP/IP Direct Connect in Microsoft TCP/IP Properties matches the IP address specified in the GATEWAY statement in the TCP/IP profile.

Remember that the Mainframe's IP address and the TCP Direct Connect IP address **MUST BE** in the same subnet. If these two addresses are in different subnets, Microsoft's TCP/IP stack on the Netfinity server will attempt to forward mainframe traffic to a gateway.

5. The MTU size defined in the TCP/IP Direct Connect Adapter Properties is determined by the MAXBFRU size specified in the MPC Transmission Group (see page 138). $MTU = (MAXBFRU - 1) * 4096$. The packet size specified in the TCP/IP profile must be less than MTU to allow for header information. Normally it is set to the next lower thousand (in this example 32000).

Communications Server for Windows NT

If the channel fails to vary online there are several things you need to check.

1. Communications Server opens a configuration file during startup. Make sure that the configuration file being used is the correct one.
2. Verify that the ESCON adapter is in the list of devices in the configuration (Figure 15-7).

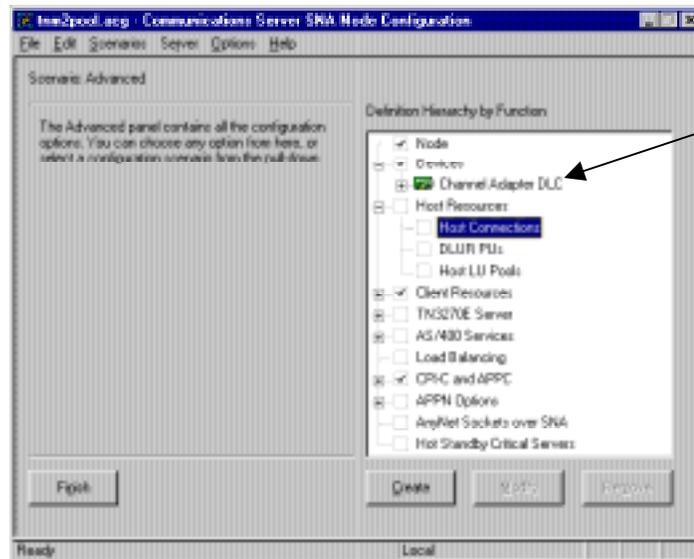


Figure 15-7. ESCON Adapter DLC

If the Channel Adapter DLC is not present, refer to page (52) of this manual for detailed instructions for defining the adapter to Communications Server.

3. Verify that a host connection has been defined for the adapter (Figure 15-8).

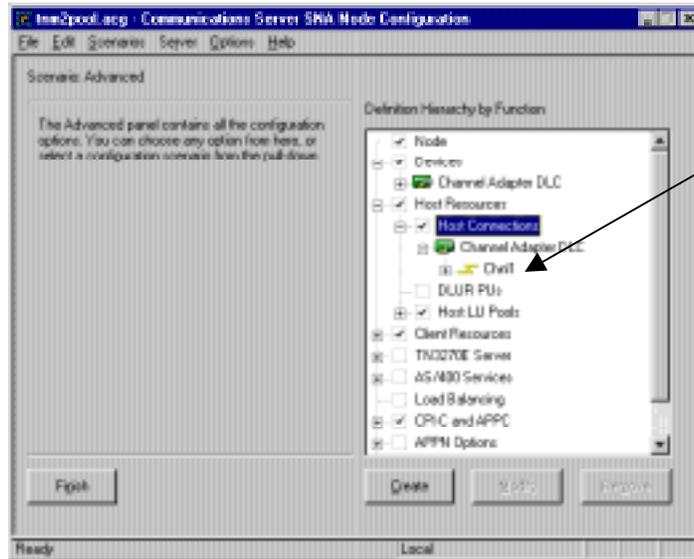


Figure 15-8. Host Connection

4. Verify that the PU Address matches the address defined in the ESCON configuration and the mainframe IOCP (Figure 15-9).

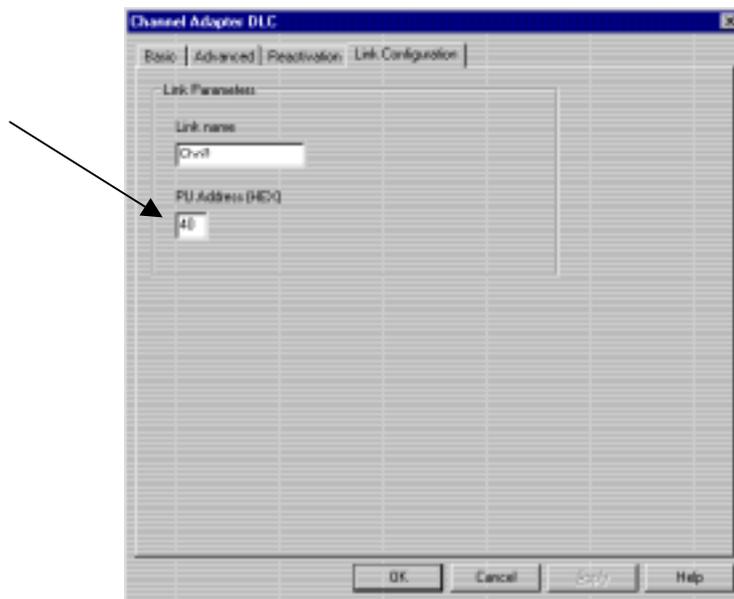


Figure 15-9. Check PU Address

5. Verify when the link is set to activate (Figure 15-10). If Activate link at start is not checked, you will have to manually start this link.

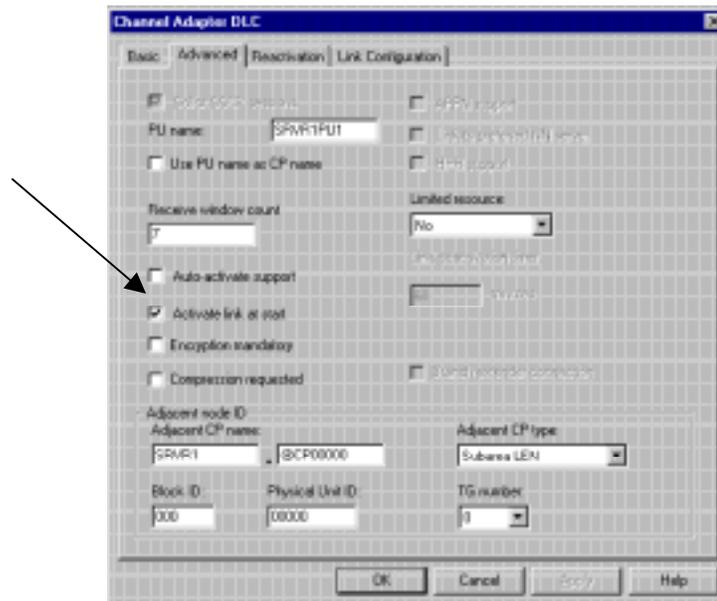


Figure 15-10. Activate Link at Start

SNA Server for Windows NT

If the channel fails to vary online there are several things you need to check in SNA Server.

1. In SNA Server Manager verify that a link service has been defined for the channel (Figure 15-11).

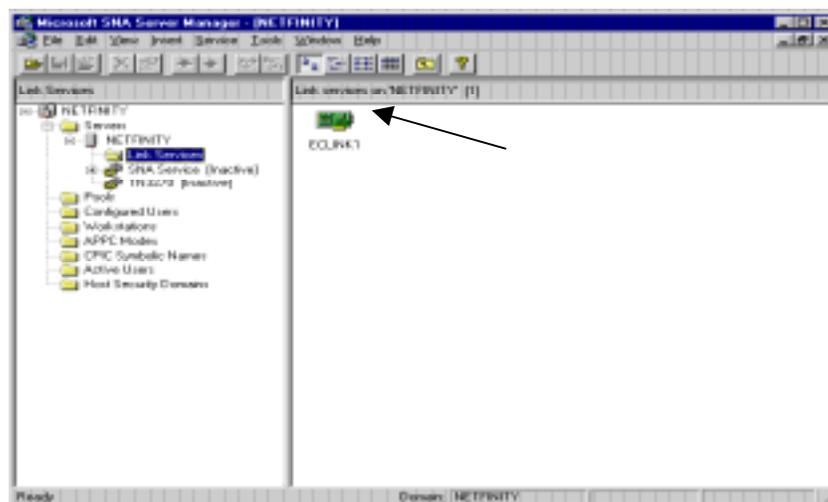


Figure 15-11. ESCON Link Service

2. Verify that a connection is defined to the link service (Figure 15-12).

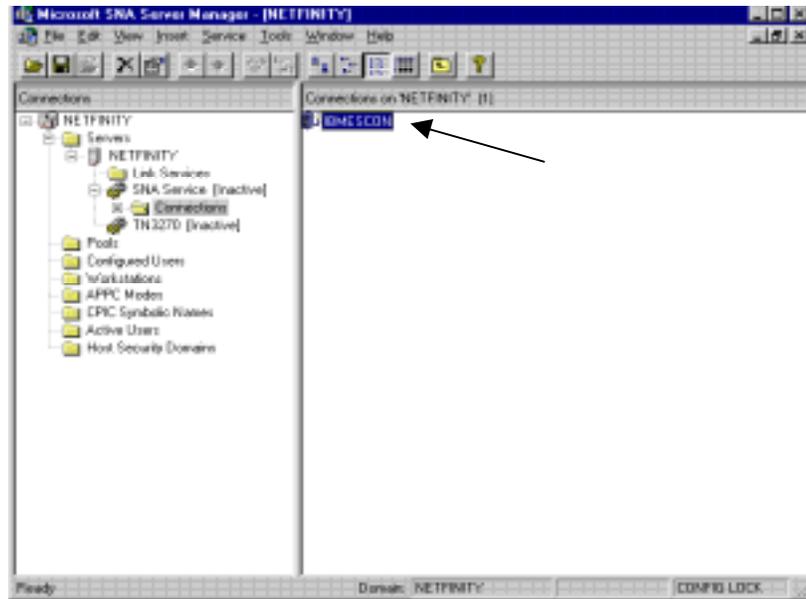


Figure 15-12. ESCON Connection (PU)

3. On the connection properties verify the Channel Address (PU Address) matches that defined in the ESCON configuration and mainframe IOCP (Figure 15-13).

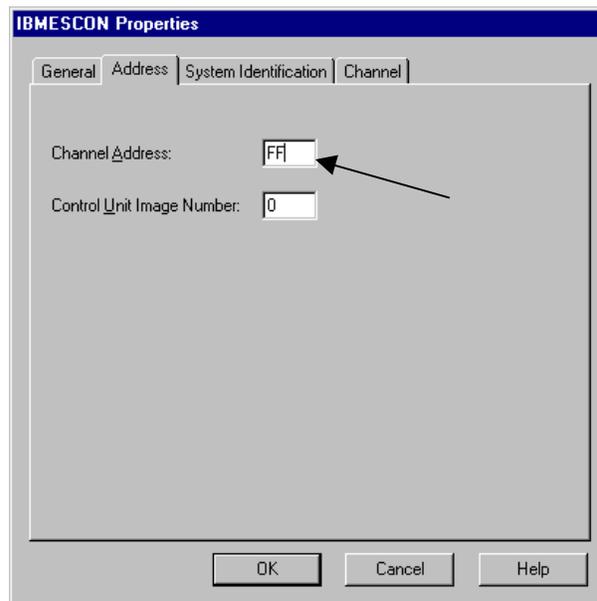


Figure 15-13. Channel (PU) Address]

4. Verify the activation setting for the connection (Figure 15-14). ESCON connections should be set to activate on server startup. They should never be set to activate on demand.

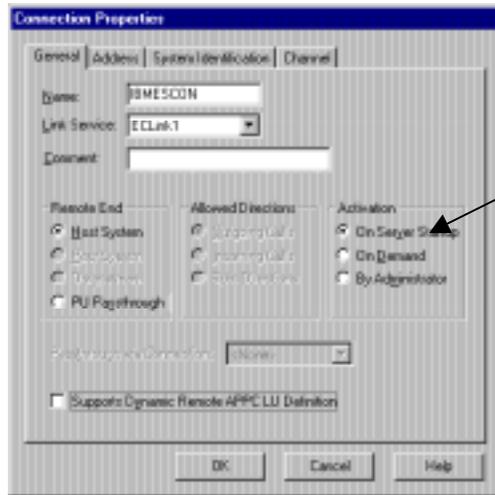


Figure 15-14. Activate at Startup

TCP/IP Passthrough for Windows NT

If the channel fails to vary online there are several things you need to check in TCP/IP Passthrough.

1. From the Network ICON in the Windows NT Control Panel, verify that TCP/IP Passthrough is installed as a protocol (Figure 15-15).

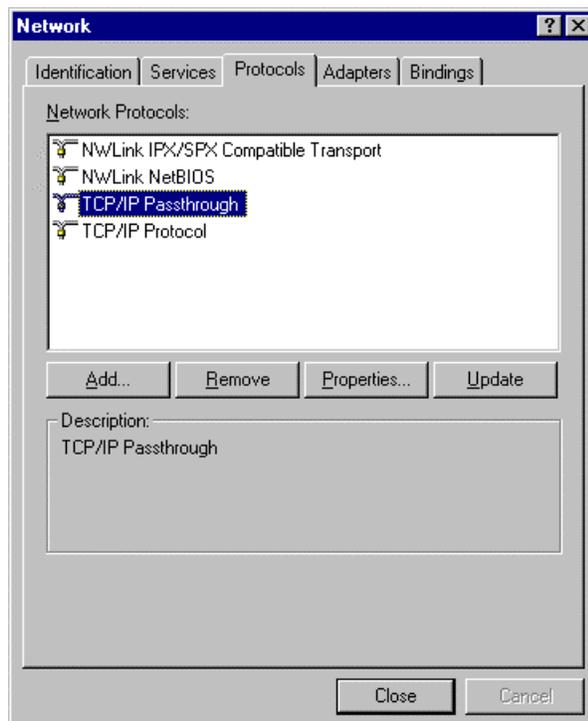


Figure 15-15. TCP/IP Passthrough Protocol

2. Click on **Properties**. Verify the subchannel addresses match the ESCON and mainframe configurations (Figure 15-16). Remember that each TCP/IP connection requires two subchannel addresses. If your TCP/IP Passthrough configuration has subchannel 50 defined, your ESCON and mainframe configurations must have both subchannel 50 and 51 defined.

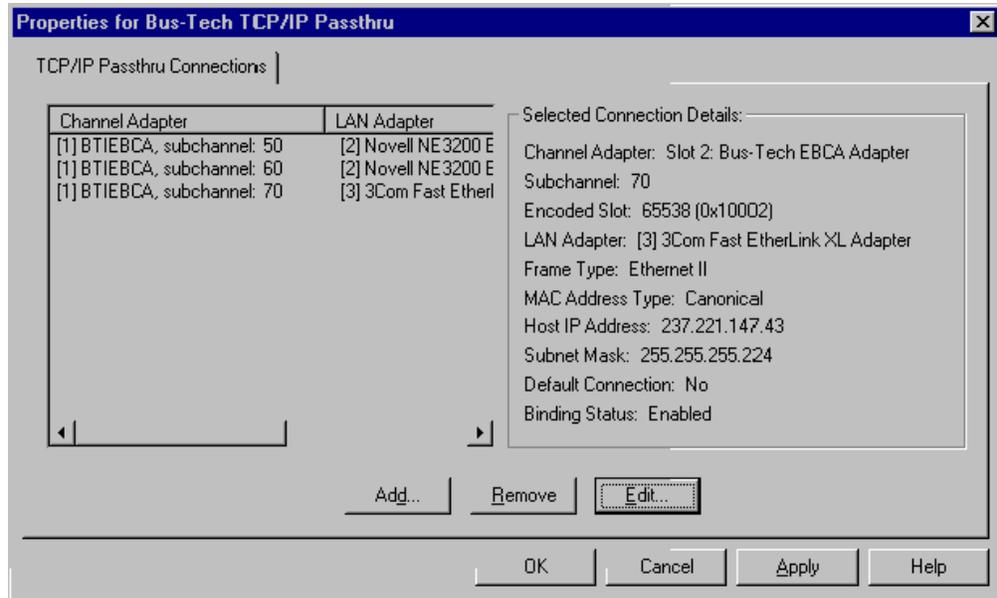


Figure 15-16. TCP/IP Subchannel Configuration

If you find any discrepancies correct them and reset the server.

NetWare for SAA

If the channel fails to vary online there are several things you need to check in NetWare for SAA.

1. Begin by verifying that the adapter is defined in the configuration. In the NetWare for SAA Configuration program, click “**Configure Data Link Adapters**” and then “**Custom**”. A custom adapter should be defined (Figure 15-17) for each host link (PU) that you have defined.

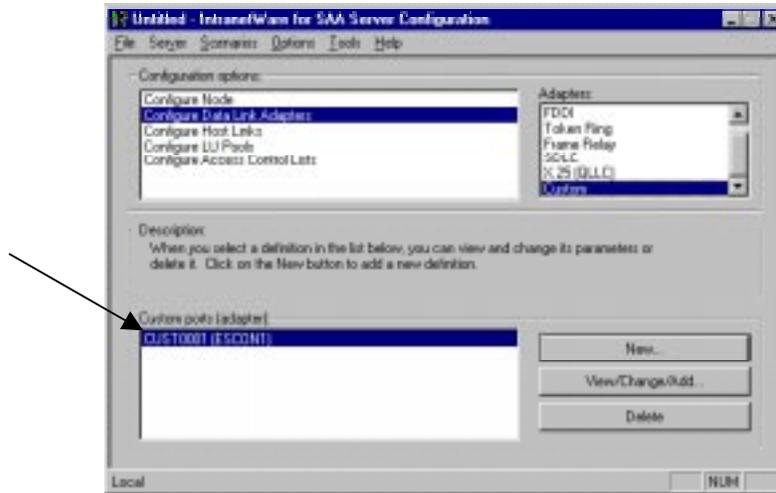


Figure 15-17. ESCON Adapter in SAA

If no Custom adapters are listed, follow the procedure on page 92 to install the adapter.

2. Double click the custom adapter (or click View/Change/Add). The adapter’s properties screen will display (Figure 15-18). Make note of the Adapter name.

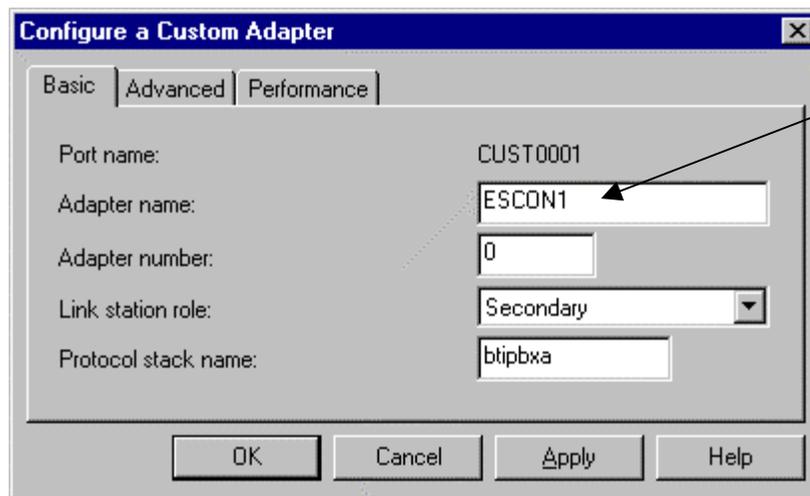


Figure 15-18. Adapter Properties

3. Click **Cancel** to return to the main configuration menu. Double click “**Configure Host Links**” (Figure 15-19).

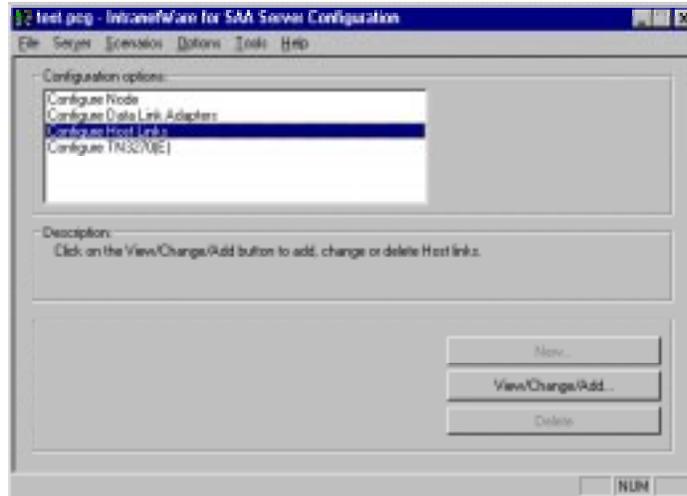


Figure 15-19. To Verify Host Links

The Configure Host Links panel will display (Figure 15-20) and should contain one or more link definitions (PUs).

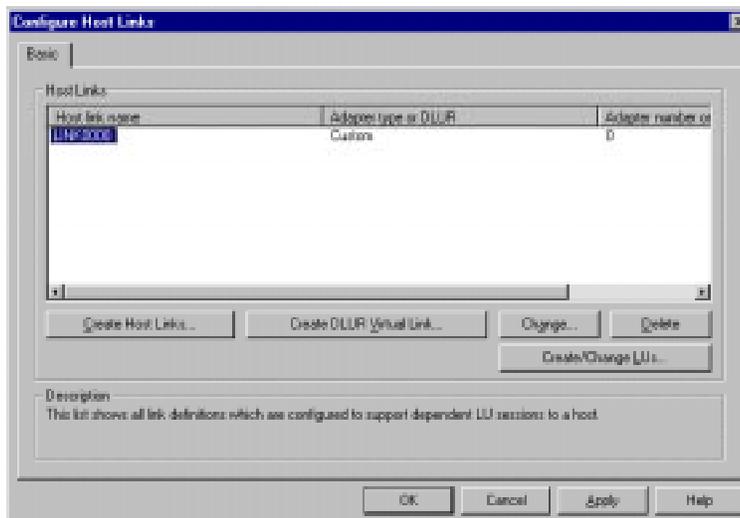


Figure 15-20. Configure Host Links with 1 link (PU)

If no links are configured follow the procedure on page 99 to define at least one link (PU).

4. Double click the link (LINK0000 above) to display the link’s properties (Figure 15-21).

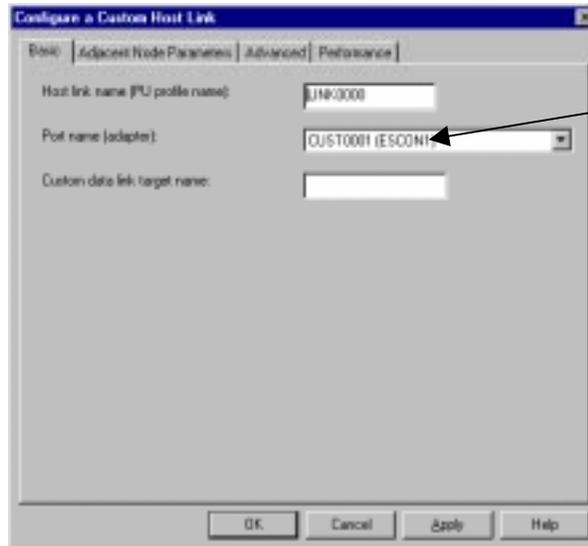


Figure 15-21. Link Configuration

The Port name (adapter) field shows both the port name (CUST0001) and the adapter name (ESCON1).

5. On the Advanced page (Figure 15-22) verify that the adapter is configure to activate at system startup.

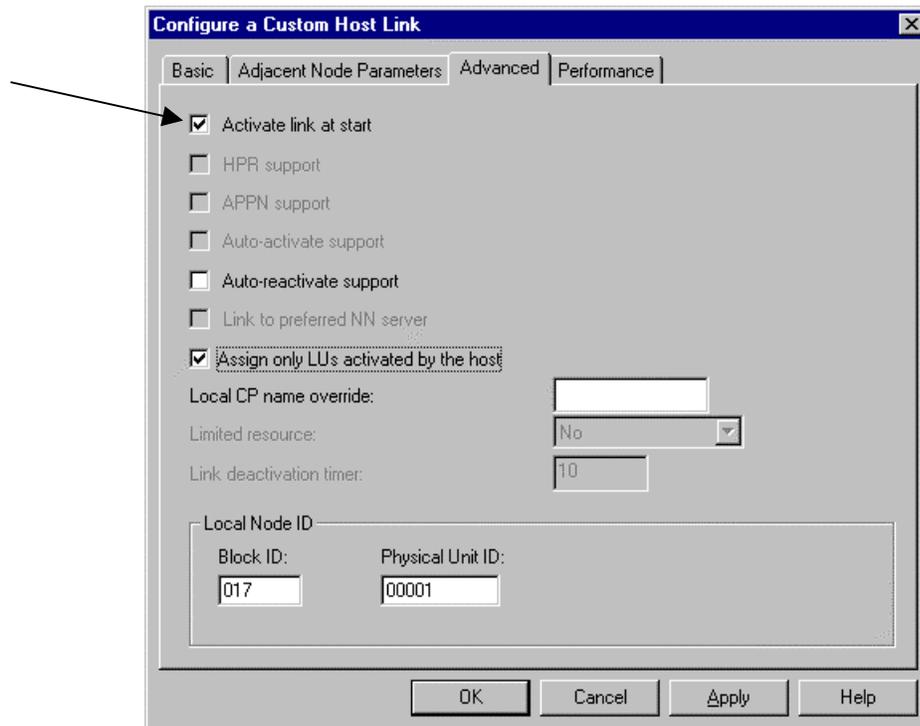


Figure 15-22. Activate Link at Startup

6. Verify the adapter name (ESCON1) is used on a LOAD command in AUTOEXEC.NCF. The adapter name is the connection between the LOAD statement, the Custom Adapter definition, and the Host Link definition.

```

.
.
.
Load PBXAAPI
Load ESCONCFG Slot=2 ESCN1.CFG
Load BTIPBXA Slot=2 Unit=01 Frame=3174 Name=ESCON1
.
.
Load COMMEEXEC

```

7. Verify that the Unit= parameter is a valid device address and matches an address defined in the ESCON configuration and mainframe IOCP.

TCP/IP Passthrough for NetWare

If TCP/IP Passthrough fails to activate, there are several activities you may try in order to correct the problem.

1. Verify the Passthrough application is installed on your server. Load Novell's INSTALL program and display the Currently Installed Products. TCP/IP Passthrough should be listed (Figure 15-23).

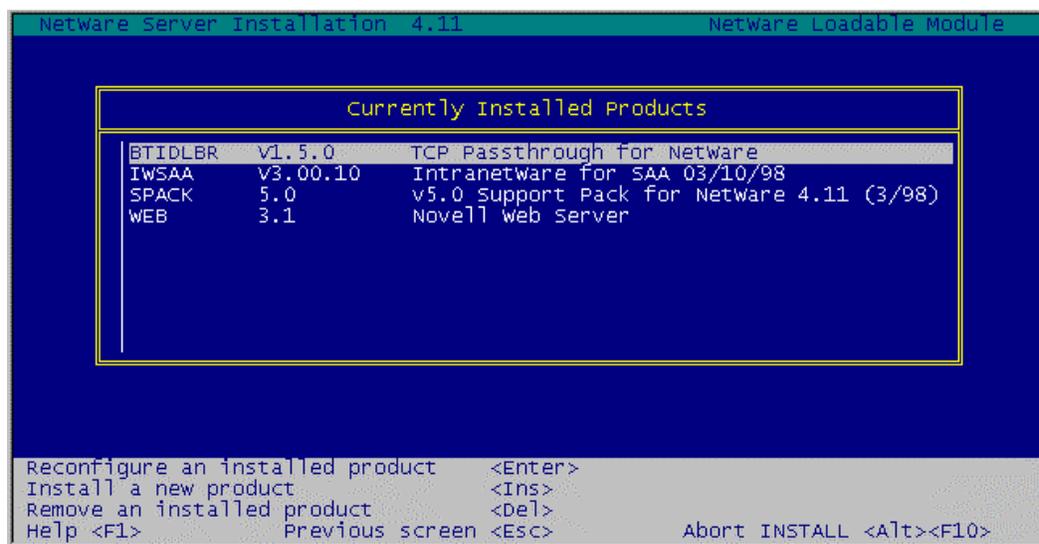


Figure 15-23. Passthrough on Installed Products List

If it is not listed, follow the procedure on page 119 to install TCP/IP Passthrough.

2. Edit AUTOEXEC.NCF. Verify that BTIAAPI is the first module loaded for TCP/IP Passthrough. (Figure 15-24).

```

; Define two NICs for the TCP/IP frame type.

LOAD IBMMPKO SLOT=6 FRAME=TOKEN-RING_SNAP NAME=SLOT6TR
LOAD IBMFDDIO SLOT=3 FRAME=FDDI_SNAP NAME=SLOT3FDDI

; Load the ESCON Configuration File

LOAD BTIAAPI
LOAD ESCONCFG SLOT=4 ESCN1.CFG

; Define two address pairs for the two TCP/IP connections.

LOAD BTIPBXA SLOT=4 UNIT=F0 FRAME=8232 NAME=ESCON_TCP9F0
LOAD BTIPBXA SLOT=4 UNIT=20 FRAME=8232 NAME=ESCON_TCP920

; Load the DataLinkBridge (TCP/IP) Support modules

LOAD BTIDLBR

; Bind TCP/IP Passthrough to the FDDI and ESCON Adapters.

CHL BIND DATALINK SLOT6TR TO ESCON_TCP9F0
CHL BIND DATALINK SLOT3FDDI TO ESCON_TCP920

```

Figure 15-24. AUTOEXEC.NCF for TCP/IP Passthrough

3. Verify that ESCONCFG is loaded after BTIAAPI but before any LOADs for BTIPBXA.
4. Verify that there is one LOAD statement for each LAN adapter supporting TCP/IP Passthrough.
5. Verify that there is one LOAD BTIPBXA statement for each passthrough connection being defined.
6. For each LOAD BTIPBXA statement verify that the address specified in the Unit= parameter matches a subchannel pair configured in the ESCON configuration and mainframe IOCP. Remember that TCP/IP Passthrough uses two addresses, one for input and one for output.

If the LOAD statement specifies Unit=20 then the ESCON and mainframe configurations must configure 20 and 21.

7. Verify that BTIDLBR is loaded following all BTIPBXA load commands.
8. Verify that the CHL BIND commands properly define a connection between the LAN adapter and the ESCON adapter.

Collecting Mainframe TCP/IP Traces

Tracing Devices in TCP/IP for VM and MVS

Sometimes it is necessary to trace the activity of the links in TCP/IP For VM and MVS. TCP/IP provides a comprehensive trace facility based on “process” names, which are typically function-oriented instead of being specific. Each trace process has a unique name, such as TCPUP, TCPDOWN, ARP, CETI, PING, UDP, TELNET, etc. The process name to trace a TCP Passthrough link is **PCCA**. The **PCCA** trace is an “all-link” trace of I/O activity on all links of a particular type. Unfortunately, it cannot trace a specific link so if you have multiple links, all the links are traced.

Activating the PCCA Trace

Edit the TCP/IP profile dataset (in MVS TCP/IP, this is the PROFILE.TCPIP dataset; in VM TCP/IP, this is the PROFILE TCPIP A1 CMS file). Insert a TRACE PCCA statement and a MORETRACE statement at the end of the dataset. For example:

```
; THE LINK DEVICES ARE USUALLY STARTED AT THE END OF THE DATASET
;
; add the TRACE statements just before the START commands
;
TRACE PCCA
MORETRACE
; if this is VM TCP/IP, the trace output appears on the CMS
;   console, and can be captured in a CP spool file.
;
; if this is MVS TCP/IP, add the FILE statement too:
FILE IBMTCP.TRACE.OUTPUT
;
START CHAN9A0
START ETH1
START TRING2C0
```

Stopping the PCCA Trace

The trace can be stopped without shutting down TCP/IP by using the OBEYFILE command and sending a NOTRACE command to the server. The trace is also stopped if the TCP/IP server is shutdown in an orderly way. The TRACE and MORETRACE statements can be then removed from the dataset, or, they can be turned into comments by placing a semicolon and space in front of the commands, such as:

```
; TRACE PCCA
; MORETRACE
```

Tracing Devices in a VM/ESA System

To trace all the I/O activity for a TCP/IP controller in a VM environment, use the TRSOURCE command. The TRSOURCE command must be executed in a privileged virtual machine such as OPERATOR or MAINT. In the following example, devices 5A0 and 5A1 are traced, dumping 256 bytes of data for each I/O event. For this example, the trace event is named "esctrace".

```
LINK MAINT 193 333 RR
ACCESS 333 B/A
TRSOURCE ID esctrace TYPE IO DEVICE 5A0-5A1 IODATA 256
TRSOURCE ENABLE ID esctrace
```

Once these commands are entered, VM is tracing devices 5A0 and 5A1, so you should recreate the situation or problem with those devices. Once that is done, type:

```
TRSAVE ID CHLTRACE
CP QUERY TRFILES (you should see a trace file, e.g. number
2349)
TRSOURCE DROP ID esctrace
TRACERED 2349 CMS esctrace output a ( ALL
```

The trace is stopped. Use TRACERED, a CMS program, to read the trace data file named ESCTRACE OUTPUT A1.

Tracing Devices in MVS Using GTF

Sometimes it is necessary to trace all I/O activity of a TCP/IP link to determine what data, if any, is moving to and from the TCP/IP controller. To trace all the I/O activity for a TCP/IP controller in an MVS environment, use the GTF PROC, which is a standard PROC in SYS1.PROCLIB used for starting the Generalized Trace Facility.

Creating the GTF Trace JCL Procedure

Following is an example of a GTF PROC:

```
//GTF      PROC MEMBER=GTFPARM
//*        LIB: SYS1.PROC(GTF)
//*        GDE: CBIPO MVS INSTALLTION
//*        DOC: THIS PROCEDURE EXECUTES THE PTF PROGRAM
//*
//IEFPROC  EXEC PGM=AHLGTF, PARM='MODE=EXT,DEBUG=NO,TIME=YES', X
//        REGION=2280K,DPRTY=(15,15)
//IEFRDER  DD  DSNAME=SYS1.TRACE,DISP=SHR
//SYSLIB   DD  DSNAME=SYS1.PARMLIB(&MEMBER),DISP=SHR
```

Creating the GTF Trace Parameters Member

Notice the member GTFPARM in SYS1.PARMLIB. You should code default GTF parameters in that member, so that the right trace information is captured. Suggested default parameters are:

```
TRACE=IOP,SSCHP,HSCH,CSCH,CCW
```

Initializing and Starting the GTF Trace Procedure

To trace a problem prepare a job to run the GTF PROC. When the job executes, it will require responses at the operator's console. For example:

```
MSG:
*nn AHL125A Respecify options or reply U
RESPONSE:
nn TRACE=IOP,SSCHP,CCWP,HSCH,CSCH
MSG:
*nn AHL125A SPECIFY TRACE EVENT KEYWORDS
- IO=, SSCH=, IO=SSCH=
RESPONSE:
nn IO=SSCH=A20,CCW=DATA=256
```

In this example, mainframe device address A20 is being traced.

To trace multiple addresses, reply instead:

```
nn IO=SSCH=(A20,A21),CCW=DATA=256
MSG:
*nn AHL102 CONTINUE TRACE DEFINITION
OR REPLY END
RESPONSE:
nn END
```

You will receive another message from GTF:

```
MSG:
*nn AHL125A Respecify options or reply U
```

and you should reply

```
RESPONSE:
nn U
```

At this point, the GTF will be running.

You should now reproduce your problem and then stop GTF with the P command at the operators console.

Formatting the GTF Trace Output

Once the problem is “captured” in the trace, you will need to format the GTF trace data so that it can read. The following PROC is used to print the GTF trace:

```
//GTFPRT JOB (A), 'USER NAME', MSGLEVEL=(1,1), CLASS=X, MSGCLASS=X
//IPCS EXEC PGM=IKJEFT01, DYNAMNBR=20, REGION=1500K
//SYSTSPRT DD SYSOUT=*
//TRACE DD DSN=SYS1.TRACE, DISP=SHR
//IPCSDDIR DD DSN=IPOIPCS.DATA.SET.DIRECTRY, DISP=SHR
//SYSTSIN DD *
IPCS NOPARM
SETDEF DSN('SYS1.TRACE') LIST NOCONFIRM DDNAME(TRACE)
GTFTRACE CCW, IO, SSCH
/*
```

Replacing a Failed Adapter

Replacing a failed Netfinity ESCON Adapter is easy and straightforward. The following steps must be completed.

1. Power down the server.
2. Remove the cover.
3. Disconnect the ESCON cable from the Netfinity ESCON Adapter.
4. Remove the Netfinity ESCON Adapter from system by removing the screw holding down the connector plate and pulling evenly up on the adapter.
5. Follow the instructions in Chapter 2 for installing a new adapter. Be sure to install the replacement adapter into the same slot as the adapter being replaced.
6. Replace the system cover.
7. Re-attach the ESCON cable to the new adapter.
8. Power on the system.
9. Verify the adapter is working by varying the server online.

Note: *As long the new adapter is installed in the same slot as the adapter being removed, there will be no need to re-install or re-configure either the adapter driver or applications using the adapter. However, if the adapter is installed in a new slot then the software will need to be re-configured. Please refer to “[Chapter 13. Adding an Additional Adapter](#)” for a discussion on configuring existing software for a new adapter.*

Chapter 16. CHLTOOL UTILITY

Overview

CHLTOOL is a custom diagnostic program provided with each Netfinity ESCON Adapter. It can be used to debug adapter hardware and software, while the server is still operating normally.

CHLTOOL gives the user the ability to:

- Trace activity between the Host Channel and the adapter hardware and firmware.
- View the current revision level of firmware and optionally load new firmware into the adapter.
- Retrieve assorted diagnostic information.
- Test the functionality of the adapter through various command structures.

Starting CHLTOOL

Windows NT

The CHLTOOL program is started from a DOS window as follows:

```
CD \Channel <Enter>  
CHLTOOL <Enter>
```

When the CHLTOOL program is started successfully, the DOS prompt will change to a greater than sign, (>).

To use the “direct entry” mode, just type the desired CHLTOOL command at the DOS Command Line Prompt. For example:

```
C:>CHLTOOL ENABLE FIRMWARE TRACE SLOT=1 <ENTER>
```

NetWare

The CHLTOOL NLM is loaded through the NetWare Console by typing the following at the NetWare console prompt:

```
LOAD CHLTOOL <Enter>
```

When the NLM is loaded successfully, the following message will appear:

```
Loading Module CHLTOOL.NLM  
Channel Adapter Tool  
Version x.x.x Feb 29, 2000
```

Commands for using CHLTOOL can be invoked by using either the CHLTOOL Main Menu or by using the “direct entry” method at the NetWare Console Command Prompt [:].

To invoke the CHLTOOL MAIN MENU at the NetWare Console Prompt type:

CHLTOOL <Enter>

The NetWare console screen will clear and you will get the CHLTOOL Prompt:

CHLTOOL>

To use the “direct entry” mode, just type the desired CHLTOOL command at the NetWare Console Prompt. For example:

CHLTOOL ENABLE FIRMWARE TRACE SLOT=1 <ENTER>

Exiting CHLTOOL

Windows NT

To terminate execution of CHLTOOL, type the following:

EXIT <Enter>

The DOS prompt will revert back to normal, i.e. C:

NetWare

The CHLTOOL.NLM is unloaded through the NetWare Console prompt by typing the following:

UNLOAD CHLTOOL <Enter>

When the NLM is successfully unloaded the following message will appear:

:Module CHLTOOL.NLM unloaded

Note: It is not necessary to unload CHLTOOL.NLM after each use. You may leave it running without any impact on the NetWare server.

CHLTOOL Command Summary

The following is a list of available CHLTOOL commands. This section provides a quick summary of the commands. The next section will provide detailed information about each CHLTOOL command.

Tracing Commands

ENABLE FIRMWARE TRACE [HaltOnError] [SLOT=n] [UNIT=n] [RANGE=n]
DISABLE FIRMWARE TRACE [SLOT=n]
SAVE DRIVER TRACE filename (Windows NT Only)
SAVE FIRMWARE TRACE filename [SLOT=n]
SAVE FIRMWARE TRACE FORMAT filename [SLOT=n]

Diagnostic Commands

SHOW VERSION INFO [SLOT=n] [UNIT=n]
SHOW ESCON PATHS [SLOT=n] [UNIT=n]
SHOW REJECTED PATHS [SLOT=n] [UNIT=n]
SHOW PROCESS INFO [SLOT=n] [UNIT=n]
SHOW DEBUG INFO [SLOT=n] {UNIT=n}
DUMP ADAPTER MEMORY filename [SLOT=n] [UNIT=n] [ADDR=n]
[LENGTH=n]

Firmware Manipulation Commands

SHOW FIRMWARE VERSION [SLOT=n]
LOAD FIRMWARE filename [SLOT=n] [UNIT=n]
LOAD POST filename [SLOT=n] [UNIT=n]
REBOOT FIRMWARE [FORCE] [SLOT=n]

Test Commands

GO ONLINE [SLOT=n] [UNIT=n]
TEST CHANNEL WRAP [EXTERNAL] [SLOT=n]
RECEIVE MAIL [SLOT=n] [UNIT=n] [COUNT=n] [DELAY=n]
SEND MAIL [SLOT=n] [UNIT=n] [COUNT=n] [DELAY=n]
RECEIVE PACKETS [SLOT=n] [UNIT=n] [COUNT=n] [LENGTH=n]
[DELAY=n]
SEND PACKETS [SLOT=n] [UNIT=n] [COUNT=n] [LENGTH=n] [DELAY=n]

General Commands

HELP [TEST]
SHOW ALL [SLOT=n]
SHOW INTERRUPT LEVEL [SLOT=n]
EXIT

CHLTOOL Command Examples

This section describes each CHLTOOL command in detail, grouped according to its functionality.

Please note that all **optional** entries are shown in brackets. [] The following optional entries are used in CHLTOOL:

- [SLOT=nnnnnn]** Specifies the encoded slot number that the adapter is plugged into in the server. (i.e. SLOT=65538) This is a decimal number. This must be specified if there are multiple channel adapters installed in the system. Use the 'SHOW ALL' command to find valid values for this field.
- [UNIT=nn]** Allows you to specify the desired Host Device Address of the adapter (i.e. UNIT=F0). This is a two digit hexadecimal number. Default value is device address "00".
- [RANGE=nnn]** Specifies the size of a range of Device Addresses starting with the 'unit' parameter. This is a two digit decimal number. This parameter is used with the 'ENABLE FIRMWARE TRACE' command.
- [COUNT=nnnnn]** Specifies an integer used to count the number of iterations of the selected test. The number must be between 1 and 65535 (i.e. COUNT=50). This is a decimal number. The default value is 1000. If you specify a value of 0, the test will endlessly loop. In this case, press any key to abort the test.
- [LENGTH=nnnnn]** For the SEND/RECEIVE PACKETS commands, this specifies the length of the packet data to be sent or received by the selected test program. (i.e. LENGTH=4096) Minimum value is 1. Maximum value is 65535. Default value is 4096. For the 'DUMP ADAPTER MEMORY' command, this specifies the length of the memory area to be retrieved. This LENGTH may be greater than 65535. In both cases, this is a decimal number.

[DELAY=nnnnn] Specifies a delay in milliseconds between the sending of each mail message, the sending of each packet, the receiving of each mail message, and the receiving of each packet. This is a decimal number. The default value is zero.

[ADDR=nnnnnnnn] Specifies an adapter local memory address. This is used by the 'DUMP ADAPTER MEMORY' command. This is an eight digit hexadecimal number. The default value is zero.

Tracing Commands

This group of commands enables tracing of the events between the Mainframe Host Channel and the adapter to which it is attached. Recording of trace data can be accomplished by any user, however, the output of the trace events is intended to be interpreted only by technical support personnel. Be aware that the trace data may wrap depending on how much activity is recorded and how long that you run it.

**ENABLE FIRMWARE TRACE [HaltOnError] [SLOT=n] [UNIT=n]
[RANGE=n]**

Example: **ENABLE FIRMWARE TRACE SLOT=1 <Enter>**

Expected response: Operation was successful!

This command will begin a firmware trace of channel activity between the Host Channel and the adapter. The trace events will be stored in buffer memory of the channel adapter for retrieval by another utility.

The 'HaltOnError' option causes the firmware to stop recording trace data after a Channel "error" has occurred. Channel "errors" include System Reset, Bus Out Parity Error, Selective Reset, Disconnect (Halt I/O), and Streaming Timeout. This feature allows the retrieval of trace events surrounding a Channel error which otherwise may have been overwritten by an automatic recovery procedure. Note that the 'HaltOnError' option must be specified before any other options in the command line.

The 'UNIT' and 'RANGE' parameters allow the filtering of trace events according to a range of Device Addresses. The default is to record trace events for all Device Addresses. For example, specifying UNIT=A0 and RANGE=0 causes trace events to be recorded for Device Address A0 only. Specifying UNIT=C0 and RANGE=1 causes trace events to be recorded for Device Addresses C0 and C1 only.

DISABLE FIRMWARE TRACE [SLOT=n]

Example: **DISABLE FIRMWARE TRACE SLOT=1 <Enter>**

Expected response: Operation was successful!

This command will stop the firmware trace of channel activity between the Host Channel and the adapter.

SAVE DRIVER TRACE filename

Example: **SAVE DRIVER TRACE A:\TEST1.LOG <Enter>**

Expected response: Operation was successful!

This command will save the device driver trace data stored in server memory to a disk file. SAVE DRIVER TRACE is only available in Windows NT. The trace data will be saved in ASCII format. If no filename is given the trace data will be saved in the CHANNEL directory of the server with a filename of “BTI.LOG”. If the “BTI.LOG” file already exists, this command will generate a new and unique filename, i.e. “BTI01.LOG”.

SAVE FIRMWARE TRACE filename [SLOT=n]

Example: **SAVE FIRMWARE TRACE A:\TEST1.TRB SLOT=1 <Enter>**

Expected response: Operation was successful!

This command will save the trace data stored in buffer memory to a disk file. The trace data will be saved in binary format. If no filename is given the trace data will be saved in the CHANNEL directory of the server with a filename of “BTI.TRB”. If the “BTI.TRB” file already exists, this command will generate a new unique filename, i.e. “BTI01.TRB”.

SAVE FIRMWARE TRACE FORMAT filename [SLOT=n]

Example: **SAVE FIRMWARE TRACE FORMAT A:\EBCA6.BTI SLOT=1 <Enter>**

Expected response: Operation was successful!

This command will save a special file which is necessary to format the binary trace file that was saved by the “save trace” command. If no filename is given the trace

data will be saved in the CHANNEL directory of the server with a filename of “PBSA.BTI”. It is only necessary to use this command when formatting of the trace has changed due to engineering change activity. Normally, this command is not used.

Diagnostic Commands

This group of commands is used to retrieve diagnostic information. These commands are only used when directed by Technical Support personnel.

SHOW VERSION INFO [SLOT=n] [UNIT=n]

Example: **SHOW VERSION INFO SLOT=1 <Enter>**

Expected response:

```
Name:..... BTIxxxx POST Vxx.xx
Length:.... xxxxxx,  Checksum:.. xxxx
Flash addr: xxxxxxxx, Start Addr: xxxxxxxx
Reserved1:. xx, Reserved :. xx Reserved3:. xx
Press ESC to quit or any key to continue.
```

This command will display the current revision information of “other” firmware installed on the adapter such as the Power On Self Test firmware.

SHOW ESCON PATHS [SLOT=n] [UNIT=n]

Example: **SHOW ESCON PATHS SLOT=1 <Enter>**

Expected response:

```
Local chLinkAdr chLogAdr cuLogAdr       lowest       Number
Path# {ChanLink LPAR  cuAddr} CUPort DeviceAddr Devices active configured
  xx       xx       x       x       xx       xx       xxx   xx       xx
```

This command retrieves the ESCON Path information from the channel adapter. The format of this display has multiple ESCON Paths under header lines.

SHOW REJECTED PATHS [SLOT=n] [UNIT=n]

Example: **SHOW REJECTED PATHS SLOT=1 <Enter>**

Expected response:

```

chLinkAdr chLogAdr cuLogAdr cuLinkAdr
{ChanLink LPAR cuAddr} CUPort
      xx      xx      xx      xx

```

This command retrieves the ESCON Rejected Path information from the channel adapter. The format of this display has multiple ESCON Rejected Paths under header lines.

The ESCON Rejected Path information is sent from the host to the channel adapter after ESCON configuration. This information is used to help isolate and diagnose ESCON configuration problems.

SHOW PROCESS INFO [SLOT=n] [UNIT=n]

Example: **SHOW PROCESS INFO SLOT=1 <Enter>**

Expected response:

```

EMIFIndex LocalPath chLinkAdr chLogAdr cuLogAdr DeviceAddr PType active
      xx      xx      xx      x      x      xx      xxxxx  xxx

```

This command retrieves the Channel Process information from the adapter. The information for each Process is formatted and displayed under a header line.

SHOW DEBUG INFO [SLOT=n] [UNIT=n]

Example: **SHOW DEBUG INFO SLOT=1 <Enter>**

Expected response:

Name: xxxxxxxx, Start Addr: xxxxxxxx, Length: xxxx

This command retrieves Debug information from the channel adapter. This information is formatted and displayed as shown above. This information is typically used in conjunction with the DUMP ADAPTER MEMORY command.

DUMP ADAPTER MEMORY filename [SLOT=n] [UNIT=n] [ADDR=n] [LENGTH=n]

Example: **DUMP ADAPTER MEMORY A:\TEST1.MEM SLOT=1
 ADDR=10000 LENGTH=1000<Enter>**

Expected response: Successful write of xxx bytes to xxxxxxxx

This command retrieves the requested contents of the local memory of the adapter and writes this information to a disk file. This data is saved in binary format. The ADDR parameter is a hexadecimal number of up to eight digits. The LENGTH parameter is a decimal value which may be larger than 65536. If no filename is given the adapter data will be saved in the CHANNEL directory of the server with a filename of "BTI.MEM". If the "BTI.MEM" file already exists, this command will generate a new and unique filename, i.e. "BTI01.MEM".

Firmware Manipulation Commands

This group of commands is used to display and load new firmware into the adapters. They are normally only used when directed by Technical Support personnel. They are also used to perform upgrades for certain newly released adapter software modules.

SHOW FIRMWARE VERSION [SLOT=n]

Example: **SHOW FIRMWARE VERSION SLOT=1 <Enter>**

Expected response: Firmware version is xxx (8/24/1995)

This command will display the current revision level of firmware installed on the adapter.

LOAD FIRMWARE filename [SLOT=n] [UNIT=n]

Example: **LOAD FIRMWARE A:\PBSA.HEX SLOT=1 <Enter>**

Expected response: Loading channel board firmware...
 Operation was successful!

This command will load new firmware from the source filename into the Flash PROM of the adapter.

LOAD POST filename [SLOT=n] [UNIT=n]

Example: **LOAD POST A:\PBSAPOST.HEX SLOT=1<Enter>**

Expected response: Loading channel board firmware...
 Operation was successful!

This command will load new firmware from the source filename into the Flash PROM of the adapter. This file may contain the POST firmware, the SLC firmware, etc. Normally, this command is not used. **THIS COMMAND SHOULD ONLY**

BE USED UNDER THE DIRECTION OF TECHNICAL SUPPORT PERSONNEL.

REBOOT FIRMWARE [FORCE] [SLOT=n]

Example: **REBOOT FIRMWARE SLOT=1 <Enter>**

Expected response: Rebooting the channel interface...
Operation was successful!

This command will cause the adapter to reboot and run the firmware that is currently installed in the EEPROM. It is normally used after new firmware has been loaded into the adapter. The FORCE parameter will cause the firmware to reboot even if other adapter applications are currently active. Use this option with caution. The FORCE parameter must be specified before the SLOT parameter.

Test Commands

This group of commands is normally used to test the functionality of the adapters. You may be directed by Technical Support personnel to use these commands to ensure that the adapter is functioning properly.

GO ONLINE [SLOT=n] [UNIT=n]

Example: **GO ONLINE SLOT=1 UNIT=F0 <Enter>**

Expected response: Now online. Press <CR> to go offline.

This command will force the adapter to go “on-line” to the Host channel. You should use extreme caution when using this command as it may interfere with current channel operations.

RECEIVE MAIL [SLOT=n] [UNIT=n] [COUNT=n] [DELAY=n]

Example: **RECEIVE MAIL SLOT=1 UNIT=F0 COUNT=1000 <Enter>**

Expected response: Receiving mail...
1000 letters expected.
1000 letters received.
Elapsed time: xx.xx

This command will test the Receive Mail function of the adapter. Mail will be sent to the CHLTOOL program from the respective channel adapter in order to test functionality.

SEND MAIL [SLOT=n] [UNIT=n] [COUNT=n] [DELAY=n]

Example: **SEND MAIL SLOT=1 UNIT=F0 COUNT=1000 <Enter>**

Expected response: Sending mail...
1000 letters requested.
1000 letters were sent.
Elapsed time: xx.xx

This command will test the Send Mail function of the adapter. Mail will be sent to the respective channel adapter from the CHLTOOL program in order to test functionality.

**RECEIVE PACKETS [SLOT=n] [UNIT=n] [COUNT=n] [LENGTH=n]
[DELAY=n]**

Example: **RECEIVE PACKETS SLOT=1 UNIT=F0 COUNT=1000
LENGTH=4096 <Enter>**

Expected response: Receiving packets...
1000 packets expected.
1000 packets were sent.
Elapsed time: xx.xx

This command will test the Receive Packet function of the adapter. Data packets will be sent to the CHLTOOL program from the respective channel adapter in order to test functionality.

**SEND PACKETS [SLOT=n] [UNIT=n] [COUNT=n] [LENGTH=n]
[DELAY=n]**

Example: **SEND PACKETS SLOT=1 UNIT=F0 COUNT=1000 LENGTH=4096
<Enter>**

Expected response: Sending packets...
1000 packets requested.
1000 packets were sent.
Elapsed time: xx.xx

This command will test the Send Packet function of the adapter. Data packets will be sent to the respective channel adapter from the CHLTOOL program in order to test functionality.

General Commands

This group of commands is designed to assist with CHLTOOL command syntax. It also provides a means of exiting CHLTOOL.

HELP [TEST]

Example: **HELP <Enter>**

Expected response: CHLTOOL commands are:
 DISABLE FIRMWARE TRACE [SLOT=n]
 ENABLE FIRMWARE TRACE [HaltOnError] [SLOT=n] [UNIT=n]
 [RANGE=n]

 EXIT
 HELP
 LOAD FIRMWARE filename [SLOT=n]
 SAVE DRIVER TRACE filename
 SAVE FIRMWARE TRACE filename [SLOT=n]
 SAVE FIRMWARE TRACE FORMAT filename [SLOT=n]
 SET CHANNEL MODE [DCI | 3.0 | 4.5] [SLOT=n]
 SHOW ALL [SLOT=n]
 SHOW CHANNEL MODE [SLOT=n]
 SHOW FIRMWARE VERSION [SLOT=n]
 SHOW INTERRUPT LEVEL [SLOT=n]
 <Press any key to continue>

Example: **HELP TEST<Enter>**

Expected response: TEST commands are:
 DUMP ADAPTER MEMORY filename [SLOT=n] [UNIT=n] [ADDR=n]
 [LENGTH=n]

 GO ONLINE [SLOT=n] [UNIT=n]
 LOAD POST filename [SLOT=n] [UNIT=n]
 REBOOT FIRMWARE [FORCE] [SLOT=n]
 RECEIVE MAIL [SLOT=n] [UNIT=n] [COUNT=n] [DELAY=n]
 RECEIVE PACKETS [SLOT=n] [UNIT=n] [COUNT=n] [LENGTH=n]
 [DELAY=n]

 SEND MAIL [SLOT=n] [UNIT=n] [COUNT=n] [DELAY=n]
 SEND PACKETS [SLOT=n] [UNIT=n] [COUNT=n] [LENGTH=n]
 [DELAY=n]

 SHOW DEBUG INFO [SLOT=n] [UNIT=n]
 SHOW ESCON PATHS [SLOT=n] [UNIT=n]
 SHOW PROCESS INFO {SLOT=n} [UNIT=n]
 SHOW REJECTED PATHS [SLOT=n] [UNIT=n]
 SHOW VERSION INFO [SLOT=n] [UNIT=n]
 TEST CHANNEL WRAP [EXTERNAL] [SLOT=n]

This command will display Help screens showing all available CHLTOOL commands and their syntax.

SHOW INTERRUPT LEVEL [SLOT=n]

Example: **SHOW INTERRUPT LEVEL SLOT=1 <Enter>**

Expected response: Interrupt level is xx

This command will display the interrupt request level generated by the adapter.

EXIT

Example: **EXIT <Enter>**

Expected response: Return to the DOS prompt.

This command will exit the CHLTOOL program and return to the DOS prompt.

HELP AND SERVICE INFORMATION

If you have questions about your new Options by IBM product, or require technical assistance, visit the IBM Personal Computing Web site at <http://www.pc.ibm.com> for information about IBM, Options by IBM, or IBM Service and Support. Additionally, you can receive information from the IBM Automated Fax system at 1-800-426-3395 (in Canada, 1-800-465-3299), or from the Personal Systems Group Bulletin Board System (PSG BBS) at 1-919-517-0001. You can also get help and information through the IBM PC HelpCenter, 24 hours a day, seven days a week. Response time may vary depending on the number and nature of the calls received.

Marketing, installation, and configuration support through the HelpCenter will be withdrawn or made available for a fee, at IBM's discretion, 90 days after the option has been withdrawn from marketing. Additional support offerings, including step-by-step installation assistance, are available for a nominal fee.

During the warranty period, assistance for replacement or exchange of defective components is available. In addition, if your IBM option is installed in an IBM computer, you might be entitled to service at your location. Your technical support representative can help you determine the best alternative.

Step 1: Problem Solving

You may be able to solve the problem yourself. Before calling the HelpCenter, please prepare for the call by following these steps:

1. If you are having installation or configuration problems, refer to the detailed installation and configuration sections found in this manual for the software you are configuring, and review any README.TXT files found on the installation CD.
2. Visit the Service and support section of the Personal Computing Web site specific to the model of option you have purchased. Updated installation instructions, hints, and tips, or updated system-specific notes are often published in this section. You might find that later device drivers are available that will improve the performance and compatibility for your new option.

If you are installing this option in an IBM computer, also visit the applicable Web page for that computer model. These pages might also contain useful hints and tips related to installation of this option and might refer to BIOS or device-driver updates required for your computer model. If you are installing the option in a non-IBM computer, refer to the manufacturer's Web site.

3. Uninstall, and then reinstall the option. During the uninstall process, be sure to remove any files that were installed during the previous installation. Many IBM options include uninstall programs.

4. Check your ESCON cabling. Make sure both the server and mainframe are properly connected.
5. Review Chapter 15. Troubleshooting. Go through the steps in the Hardware section as well as Software sections appropriate to your server.

Step 2: Preparing for the Call

To assist the technical support representative, have available as much of the following information as possible:

1. Option name
2. Option number
3. Proof of purchase
4. Computer manufacturer, model, serial number (if IBM), and manual
5. Exact wording of the error message (if any)
6. Description of the problem
7. Hardware and software configuration information for your system

If possible, be at your computer. Your technical support representative might want to walk you through the problem during the call.

Step 3: Placing the Call to IBM

If you call 90 days or more after the date of withdrawal or after your warranty has expired, you might be charged a fee.

For the support telephone number and support hours by country, refer to the following table or the enclosed technical support insert. If the number is not provided, contact your IBM reseller or IBM marketing representative.

<i>Support 24 hours a day, 7 days a week</i>	
Canada	1-800-565-3344
U.S.A. / Puerto Rico	1-800-772-2227

Additional Technical Support Resources

Online technical support is available during the life of your product. Online assistance can be obtained through the IBM Automated Fax System, the Personal Computing Web page, and the PSG Electronic Bulletin Board System.

<i>Online Technical Support</i>	
IBM Personal Computing Web Page	www.pc.ibm.com
IBM PSG BBS	1-919-517-0001
IBM Automated Fax System	1-800-426-3395 1-800-465-3299 (in Canada)

NOTICES

References in this publication to IBM products, programs or services do not imply that IBM intends to make these available in all countries in which IBM operates. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Subject to IBM's valid intellectual property or other legally protectable rights, any functionally equivalent product, program, or service may be used instead of the IBM product, program, or service. The evaluation and verification of operation with other products, except those expressly designated by IBM, are the responsibility of the user.

Warranties

The following Warranty information applies to products purchased in the United States, Canada, and Puerto Rico. For warranty terms and conditions for products purchased in other countries, see the enclosed Warranty insert, or contact your IBM reseller or IBM marketing representative.

International Business Machines Corporation

Armonk, New York, 10504

Statement of Limited Warranty

The warranties provided by IBM in this Statement of Limited Warranty apply only to Machines you originally purchase for your use, and not for resale, from IBM or your reseller. The term "Machine" means an IBM machine, its features, conversions, upgrades, elements, or accessories, or any combination of them. Unless IBM specifies otherwise, the following warranties apply only in the country where you acquire the Machine. If you have any questions, contact IBM or your reseller.

Machine: Netfinity ESCON Adapter

Warranty Period*: 3 Years

**Contact your place of purchase for warranty service information.*

Production Status

Each Machine is manufactured from new parts, or new and used parts. In some cases, the Machine may not be new and may have been previously installed. Regardless of the Machine's production status, IBM's warranty terms apply.

The IBM Warranty for Machines

IBM warrants that each Machine 1) is free from defects in materials and workmanship and 2) conforms to IBM's Official Published Specifications. The warranty period for a Machine is a specified, fixed period commencing on its Date of Installation. The date on your receipt is the Date of Installation, unless IBM or your reseller informs you otherwise.

During the warranty period IBM or your reseller, if authorized by IBM, will provide warranty service under the type of service designated for the Machine and will manage and install engineering changes that apply to the Machine.

For IBM or your reseller to provide warranty service for a feature, conversion, or upgrade, IBM or your reseller may require that the Machine on which it is installed be 1) for certain Machines, the designated, serial-numbered Machine and 2) at an engineering-change level compatible with the feature, conversion, or upgrade. Many of these transactions involve the removal of parts and their return to IBM. You represent that all removed parts are genuine and unaltered. A part that replaces a removed part will assume the warranty service status of the replaced part.

If a Machine does not function as warranted during the warranty period, IBM or your reseller will repair it or replace it with one that is at least functionally equivalent, without charge. The replacement may not be new, but will be in good working order. If IBM or your reseller is unable to repair or replace the Machine, you may return it to your place of purchase and your money will be refunded.

If you transfer a Machine to another user, warranty service is available to that user for the remainder of the warranty period. You should give your proof of purchase and this Statement to that user. However, for Machines which have a life-time warranty, this warranty is not transferable.

Warranty Service

To obtain warranty service for the Machine, you should contact your reseller or call IBM. In the United States, call IBM at **1-800-772-2227**. In Canada, call IBM at **1-800-565-3344**. You may be required to present proof of purchase.

IBM or your reseller will provide certain types of repair and exchange service, either at your location or at IBM's or your reseller's service center, to restore a Machine to good working order.

When a type of service involves the exchange of a Machine or part, the item IBM or your reseller replaces becomes its property and the replacement becomes yours. You represent that all removed items are genuine and unaltered. The replacement may not be new, but will be in good working order and at least functionally equivalent to the item replaced. The replacement assumes the warranty service status of the replaced item. Before IBM or your reseller exchanges a Machine or part, you agree to remove all features, parts, options, alterations, and attachments not under warranty service.

You also agree to ensure that the Machine is free of any legal obligations or restrictions that prevent its exchange.

You agree to:

1. obtain authorization from the owner to have IBM or your reseller service a Machine that you do not own; and
2. where applicable, before service is provided –
 - a. follow the problem determination, problem analysis, and service request procedures that IBM or your reseller provide.
 - b. secure all programs, data and funds contained in a Machine, and
 - c. inform IBM of your reseller of changes in a Machine's location.

IBM is responsible for loss of, or damage to, your Machine while it is 1) in IBM's possession or 2) in transit in those cases where IBM is responsible for transportation charges.

Extent of Warranty

IBM does not warrant uninterrupted or error-free operation of a Machine.

The warranties may be voided by misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, removal or alteration of Machine or parts identification labels, or failure caused by a product for which IBM is not responsible.

THESE WARRANTIES REPLACE ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THESE WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF EXPRESS OR IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU. IN THAT EVENT SUCH WARRANTIES ARE LIMITED IN DURATION TO THE WARRANTY PERIOD. NO WARRANTIES APPLY AFTER THAT PERIOD.

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1. damages for bodily injury (including death) and damage to real property and tangible personal property; and
2. the amount of any other actual direct damages or loss, up to the greater of U.S. \$100,000 or the charges (if recurring, 12 months' charges apply) for the Machine that is the subject of the claim.

UNDER NO CIRCUMSTANCES IS IBM LIABLE FOR ANY OF THE FOLLOWING: 1) THIRD-PARTY CLAIMS AGAINST YOU FOR LOSSES OR DAMAGES (OTHER THAN THOSE UNDER THE FIRST ITEM LISTED ABOVE); 2) LOSS OF, OR DAMAGE TO, YOUR RECORDS OR DATA; OR 3) SPECIAL, INCIDENTAL, OR INDIRECT DAMAGES OR FOR ANY ECONOMIC CONSEQUENTIAL DAMAGES (INCLUDING LOST PROFITS OR SAVINGS), EVEN IF IBM OR YOUR RESELLER IS INFORMED OF THEIR POSSIBILITY. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE EXCLUSION OR LIMITATION MAY NOT APPLY TO YOU.

Electronic Emission Notices

Federal Communications Commission (FCC)

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

IBM is not responsible for any radio or television interference caused by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Class A Emission Compliance Statement

This Class A digital apparatus complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Deutsche EMV-Direktive (electromagnetische Verträglichkeit)

Dieses Gerät ist berechtigt in Übereinstimmung mit dem deutschen EMVG vom 9.Nov.92 das EG-Konformitätszeichen zu führen.

Der Aussteller der Konformitätserklärung ist die IBM UK, Greenock.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse A. Für diese Klasse von Geräten gilt folgende Bestimmung nach dem EMVG:

Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministers für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind.

(Auszug aus dem EMVG vom 9.Nov.92, Para.3. Abs.4)

Hinweis: Dieses Genehmigungsverfahren ist von der Deutschen Bundespost noch nicht veröffentlicht worden.

European Union – EMC Directive

This product is in conformity with the protection requirements of EU Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility.

IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM options cards.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to CISPR 22 / European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

Warning: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Union Européenne – Directive Conformité

Ce produit est conforme aux exigences de protection de la Directive 89/336/EEC du Conseil de l'UE sur le rapprochement des lois des États membres en matière de compatibilité électromagnétique.

IBM ne peut accepter aucune responsabilité pour le manquement aux exigences de protection résultant d'une modification non recommandée du produit, y compris l'installation de cartes autres que les cartes IBM.

Ce produit a été testé et il satisfait les conditions de l'équipement informatique de Class A en vertu de CISPR22 / Standard européen EN 55022. Les conditions pour l'équipement de Class A ont été définies en fonction d'un contexte d'utilisation commercial et industriel afin de fournir une protection raisonnable contre l'interférence d'appareils de communication autorisés.

Avvertissement: Ceci est un produit de Class A. Dans un contexte résidentiel, ce produit peut causer une interférence radio exigeant que l'utilisateur prenne des mesures adéquates.

Union Europea – Normativa EMC

Questo prodotto è conforme alle normative di protezione ai sensi della Direttiva del Consiglio dell'Unione Europea 89/336/CEE sull'armonizzazione legislativa degli stati membri in materia di compatibilità elettromagnetica.

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Unione Europea – Directiva EMC (Conformidad electromagnética)

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