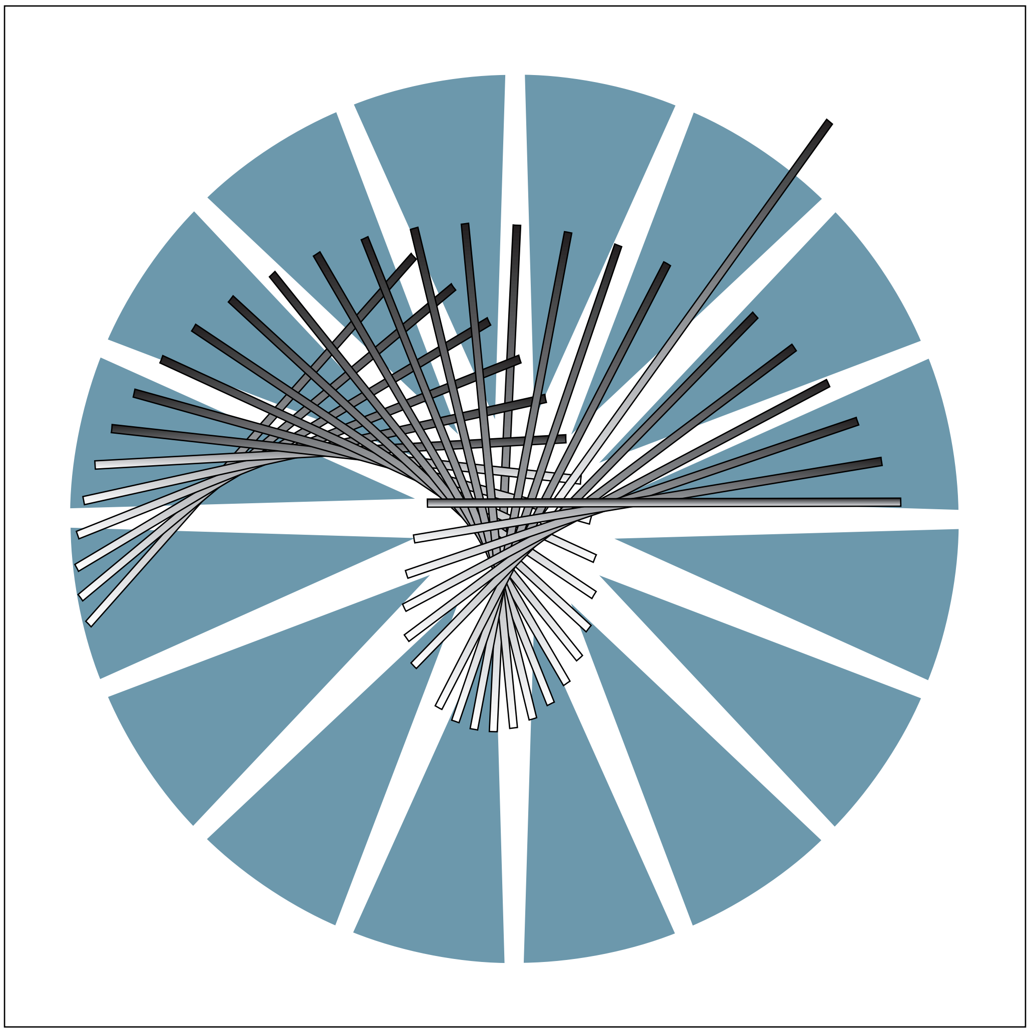
3745 Communication Controller Models A
3746 Nways Multiprotocol Controller
Models 900 and 950

Planning Guide

(Part 2/3)



GA33-0457-0A

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IBM

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GA33-0457-0A

Note!

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Preliminary Second Edition (December 1997)

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The Active Remote Couplers (ARCs) and the X.21 Interface, housed within the 3746 Model 900 and 3746 Model 950, are approved separately, each having their own independent approval number. These interface adapters, supplied by IBM, do not contain excessive voltages. An excessive voltage is one which exceeds 42.4 V peak ac or 60 V dc. They interface with the 3746 Model 900 or 3746 Model 950, using Safe Extra Low Voltages only.

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This product meets IBM™ Safety standards.

For more information, see the following manual: *IBM 3745 Communication Controller All Models*, *IBM 3746 Expansion Unit Model 900*, *IBM 3746 Nways Multinetwork Controller Model 950 Safety Information*, GA33-0400.

About this Guide

This guide applies to the IBM 3746 Nways™ Multiprotocol Controllers: the 3746 Model 950, 3746 Model 900 and 3745 Communication Controller Models A. Use it for configuration and installation planning, and to gather the information needed during the installation and network integration of 3746 Nways Multiprotocol Controllers operated in the APPN/High Performance Routing (APPN® /HPR) and Internet Protocol (IP) environments. There is also a general description of installation and upgrade scenarios.

Note: This guide contains information about major new features and their effect on existing features, and has been restructured since the last edition. If you are already familiar with the last issue, you are recommended to read this entire guide, not just the new features.

Information is provided about various parameters that have to be available to the IBM service representative and your network specialists for installation or upgrade of your machine. They relate to:

- 3745 Communication Controller Models A
- 3746 Models 900 and 950
- Controller Configuration and Management (CCM)
- Network Node Processor (NNP)
- Multiaccess Enclosure
- Service processor
- | Distributed Console Access Facility (DCAF) and TME10 remote consoles
- Network management

There is also an introduction to the Controller Configuration and Management application (CCM), which is required for the definition of 3746 Nways Multiprotocol Controller resources.

Note: Your IBM marketing representative can obtain this 3746 publication, the related 3746 Controller Configuration and Management application (CCM), and the *IBM 3746 Nways Multiprotocol Controller Model 950, IBM 3746 Model 900 Network Node Controller Configuration and Management: User's Guide* from the "900NN950" package, which is available through the IBM worldwide source of marketing materials.

| The 3746 *Planning Guide* available in this package may be a preliminary version of the next printed edition and, therefore, may be required for information about the latest 3746 enhancements.

Who Should Use this Guide

This guide is intended for network planners, network specialist, and system programmers responsible for preparing the information that is needed for the installation and network integration of 3745 Communication Controller Models A and 3746 Expansion Unit Model 900 in an SNA environment, as well as the 3746-950 and 3746-900 as APPN/HPR network nodes and IP routers.

Your Task Responsibilities as a Customer

These are not IBM tasks!

The tasks in Table 0-1 are not performed by IBM personnel as part of the machine installation and basic operations. They can be performed by IBM on a fee basis.

Table 0-1 (Page 1 of 3). Customer Tasks

Task	Where to Find Information
Network design	Network design is not covered in this guide. Refer to the following IBM books for SNA, APPN/HPR, and IP network planning guidance: • *Planning for Integrated Networks*, SC31-8062 • The following IBM "redbooks": – *Subarea Network to APPN Network Migration Guide*, SG24-4656 – *IBM 3746 Nways Multiprotocol Controller Model 950 and IBM Model 900: APPN Implementation Guide*, GG24-2536 – *IBM 3746 Nways Multiprotocol Controller Model 950 and IBM Model 900: IP Implementation Guide*, SG24-4845 – *IBM Nways 2216 Multiaccess Connector Description*, SG24-4957 – *IBM 2216 Multiaccess Connector ESCON Solutions*, SG24-2137.
Physical planning: Before the IBM service representative arrive to install your controller, make sure that you have met the necessary requirements for the following: • Electric power • Floor space with service clearances • Space for the cables • The RSF switched line • The Controller Expansion (Feature 5023) • Other components (such as the service processor).	Chapter 44, "Physical Planning Details"

Table 0-1 (Page 2 of 3). Customer Tasks	
Task	**Where to Find Information**
Controller hardware configuration definitions: Decide on what type of attachments (lines) and how many of each type you need.	This is input for the IBM ordering system (CF3745). Helpful information is found in "Line Weights and CLP Load" on page 18-9.
Software definitions and tuning: • ESCON port, host link, and station definitions; ESCON resource, TCP/IP, and VTAM tuning • Token-ring port and station definitions; PU and LU maximum limits; port sharing with NCP-controlled traffic; duplicate addresses; token-ring APPN, IP, and/or NCP resource tuning and VTAM tuning • Serial line (SDLC, PPP, frame-relay, and X.25) port and station definitions; location of CLPs, LICs, LCBs, and ARCs; maximum CLA line connectivity; CLP backups • Multiaccess Enclosure: hardware planning and configuration; software configuration and tuning • Use of the Controller Configuration and Management (CCM) application.	Refer to: • Chapter 15, "ESCON Adapters" • Chapter 22, "ESCON Channel Adapter" • Chapter 27, "3746 Base Frame ESCON Configuration Examples" • Chapter 16, "Token-Ring Adapters" • Chapter 18, "Serial Line Adapters" • Chapter 19, "3746 SDLC Support" • Chapter 20, "Multiaccess Enclosure" • Chapter 21, "Multiaccess Enclosure Adapters Overview" • Chapter 23, "Multiaccess Enclosure ISDN Support" • Chapter 26, "Multiaccess Enclosure Configuration" • Chapter 28, "Configuring the MAE ESCON Channel Adapter" • Chapter 25, "Welcome to the CCM" on page 25-1 • *IBM Controller Configuration and Management User's Guide*, SH11-3081. Also see: • *IBM 3746 Nways Multiprotocol Controller Model 950 and IBM Model 900: APPN Implementation Guide*, GG24-2536 (an IBM "redbook") • *IBM 3746 Nways Multiprotocol Controller Model 950 and IBM Model 900: IP Implementation Guide*, SG24-4845 (an IBM "redbook").
Filling out: • 3746 plugging sheets To keep a record of the processors and couplers (and their addresses) installed in the 3746 frame. • CCM worksheets To plan the non-MAE logical resource definitions. They can then be used when configuring the 3746 via the CCM. • Multiaccess Enclosure worksheets To plan the MAE logical resource definitions. They can then be used when configuring the MAE.	Refer to: • Chapter 43, "Plugging Sheets for the 3746 Nways Multiprotocol Controller" • Chapter 40, "CCM Worksheets for Controller Configuration Definitions." • Chapter 41, " Multiaccess Enclosure Worksheets."

Table 0-1 (Page 3 of 3). Customer Tasks

Task	Where to Find Information
NetView definitions in VTAM, the MOSS-E, NPM, CCM, MAE, NetView/360, NetView/AIX for: • APPN traffic • IP traffic • NetView alert path.	Refer to: • Chapter 29, “3746 Management Overview” on page 29-1 • Chapter 30, “3746 APPN/HPR Network Node Management” on page 30-1 • Chapter 31, “3746 IP Router Management” on page 31-1 • Chapter 32, “MAE APPN/HPR Network Node Management” on page 32-1 • Chapter 33, “MAE IP Router Management” on page 33-1.
Controller, service processor, and network node processor definitions. Some examples: • Link IPL port information • Service processor token-ring and IP LAN addresses • Password management • NetView alert reporting path definitions • DCAF LU definitions • Ethernet port definitions for SNMP.	Refer to Chapter 34, “Controller and Service Processor.” Fill out the Chapter 38, “MOSS-E Worksheets for Controller Installation (3745),” which are used by the IBM service representative during the installation.
Remote console definitions (using DCAF): • Insure that the necessary hardware and software is available for the type of console attachment chosen • Service processor definitions for DCAF • DCAF installation and configuration on the remote console.	Refer to: • Chapter 35, “Customer Consoles and DCAF.” • For the 3746-900, refer to the *3745 Console Setup Guide*, SA33-0158 • For the 3746-950, refer to the *IBM 3746 Nways Multiprotocol Controller Model 950 User's Guide*, SA33-0356.
Connection to the IBM remote support facility (RSF): • Service processor connection (modem) definitions • Customer definitions for RSF records.	Refer to Chapter 36, “Connecting to the IBM Remote Support Facility.”
Problem determination through the MOSS-E and NetView	For the 3746-900, refer to: • *Problem Analysis Guide* accessed online from the MOSS-E • *3745 Models A: Alert Reference Guide*, SA33-0175 • *3745 All Models: Advanced Operators Guide*, SA33-0097.

Where to Find More Information

During your migration planning, it may be necessary to use, in addition to this guide, the following documents:

- *IBM 3745 Communication Controller Models A, IBM 3746 Nways Multiprotocol Controller, Models 900 and 950: Overview*, GA33-0180.
- IBM *3746 Nways Multiprotocol Controller Models 900 and 950: Controller Configuration and Management User's Guide*, SH11-3081.
  Preparing controller definitions prior to installation of your 3746 Nways Multiprotocol Controller is recommended. To obtain a stand-alone version of the Controller Configuration and Management that runs on an OS/2 workstation, contact your IBM marketing representative.
- *IBM 3746 Nways Multiprotocol Controller Model 950: User's Guide*, SA33-0356.
  For information about routine operations, installing and testing the communication line adapters, service processor, and remote consoles.
- *IBM 3745 Communication Controller: Console Setup Guide*, GA33-0158
  For information about remote console access to 3745/3746-900(s) via an SNA/subarea path.

Be sure to use the latest editions of these documents. This will ensure that you have the necessary information about the 3746 Nways Multiprotocol Controllers.

Also helpful is:

- *Planning for Integrated Networks*, SC31-8062.

The following *IBM International Technical Support Organization* “redbooks”, are generally helpful for 3746 Nways Multiprotocol Controller implementation:

- *APPN Architecture and Product Implementations Tutorial*, GG24-3669
- *IBM 3746 Nways Multiprotocol Controller Model 950 and IBM Model 900: APPN Implementation Guide*, GG24-2536
- *Subarea Network to APPN Network Migration Guide*, SG24-4656 (an IBM “redbook”)
- *IBM 3746 Nways Multiprotocol Controller Model 950 and IBM Model 900: IP Implementation Guide*, SG24-4845 (an IBM “redbook”)

The following Enterprise Systems Connection Architecture documentation may also be helpful:

- *Enterprise Systems Connection Migration*, GA23-0383
- *Planning for Enterprise Systems Connection Links*, GA23-0367

For the Distributed Console Access Facility (DCAF) for Version 1.3:

- *DCAF: Installation and Configuration Guide*, SH19-4068
- *DCAF: User's Guide*, SH19-4069
- *DCAF: Target User's Guide*, SH19-6839.

See also the “Bibliography” on page X-9.

World Wide Web

You can access the latest news and information about IBM network products, customer service and support, and information about microcode upgrades via the Internet at `http://www.ibm.com/`.

CD-ROM Online Documentation

Starting with engineering change F12380, the Licensed Internal Code (LIC) is shipped on a CD-ROM. Also included on this CD-ROM is:

- 3745/3746 documentation
  (For example, the 3745 Model A and 3746 *Planning Guide*, 3746 NNP and service processor installation and maintenance guides, CCN *User's Guide*, 3746-950 *User's Guide*, and others. Refer to the “Bibliography” on page X-9 for the complete name and form number of these books.)

  The documentation is in the .PDF format. The Acrobat Reader™ for OS/2 is included on the CD-ROM. It lets you easily read the .PDF files and print all or part any book.

- 3746 presentations
  (For example, the latest Announcement, the Multiaccess Enclosure, Processors Type 3, and others.)

  They are available in:

  - .PRE format for Freelance for Windows™
  - .PRS format for Freelance for OS/2™
  - .PDF format for the Acrobat Reader.

- 3746 information pages
  (For example, details about the available presentations.)

  They are available in the .HTM format for use by any WEB browser. (The Netscape Navigator™ for OS/2 browser is available on the service processor.)

- .PRS format for Freelance for OS/2™
- .PDF format for the Acrobat Reader.

To Access the CD-ROM Information

The CD-ROM can be used on a service processor[1] .

To access the CD-ROM from the **service processor**:

Step 1. Install the CD-ROM in the service processor CD-ROM drive.

[1] The following service processors can be used:

- Service Processor 9585 (feature code 5021) equipped with:
  - Feature code 5051, a CD-ROM drive
  - Feature code 5028, 96 MB of memory
  - Feature code 5026, 2 GB hard disk drive.
- Service Processor, type 2 (feature code 5052).

Step 2. In the MOSS-E main window, open the **View** menu and select **Information**.

Step 3. Double click on **CD-ROM documentation**. Netscape Navigator automatically opens and displays the documentation home page.

Step 4. Click on any highlighted text (blue and underlined) to go to the material that interests you:

- Click on **File repository** to access the Freelance and .PDF presentations
- Click on **Documentation** to access 3745/3746 books.

  Then click on the icon marked PDF that corresponds to the item that interests you.

  The Acrobat Reader automatically opens and displays the file in the full screen mode. Use the **Page Up** and **Page Down** keys to move through the document.

  Press the **ESC** key to display the Reader menus that allow you to print all or part of the file.
- When you **Close** the Acrobat Reader, you return to the Netscape Navigator browser.
- When you **Close** the browser, you return to the MOSS-E **Documentation** menu.

Each presentation and book file has one or more of the following identifiers:

- Date
- Form number
- Engineering change level
- Revision code.

Check these identifiers on future releases of the CD-ROM to see if the documents that you use have been updated.

Part 2. Planning Guide Configuration and Management

Chapter 14. 3746 Planning Overview

This chapter introduces a series of topics that provide basic planning and migration guidance for using the 3745/3746-900 and 3746-950.

The two models of the 3746 Nways Multiprotocol Controller are:

- IBM 3746 Nways Multiprotocol Controller Model 950, also called the 3746 Model 950 or 3746-950. It operates as an APPN/HPR network node providing the dependent LU requester (DLUR) function, and as an IP router.
- IBM 3746 Nways Multiprotocol Controller Model 900, also called the 3746 Model 900 or 3746-900. This is the expansion unit of the 3745 Models A and if equipped with a network node processor operates as an APPN/HPR network node providing the dependent LU requester (DLUR) and/or an IP router function. These functions are independent from the NCP function running in the 3745.

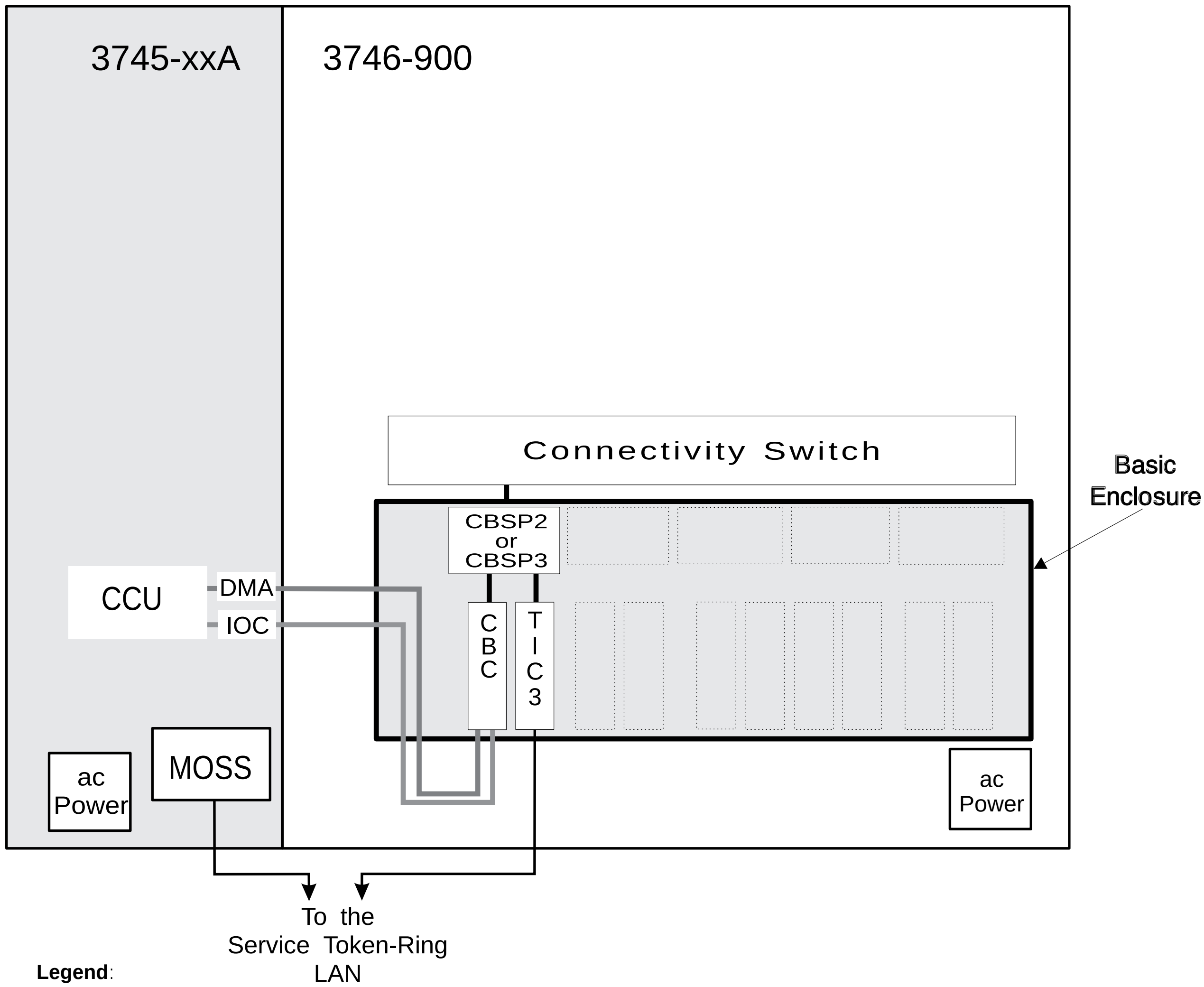
  The 3746 Model 900 is capable of operating with *both NCP controlled and network node processor controlled traffic at the same time*.

The remaining chapters provide more detailed planning information for the 3746 base and expansion enclosures, but not for the 3746 multiaccess enclosure. For 3746 multiaccess enclosure planning, see “Multiaccess Enclosure Planning Considerations” on page 22-15

| 3746 Model 900 and 950 Overview

3746-900 Minimum Machine Configuration

The 3746-900 minimum machine includes the minimum hardware needed to attach it to a single CCU 3745 and to connect the service processor, as shown in Figure 14-1 on page 14-2.



Legend:

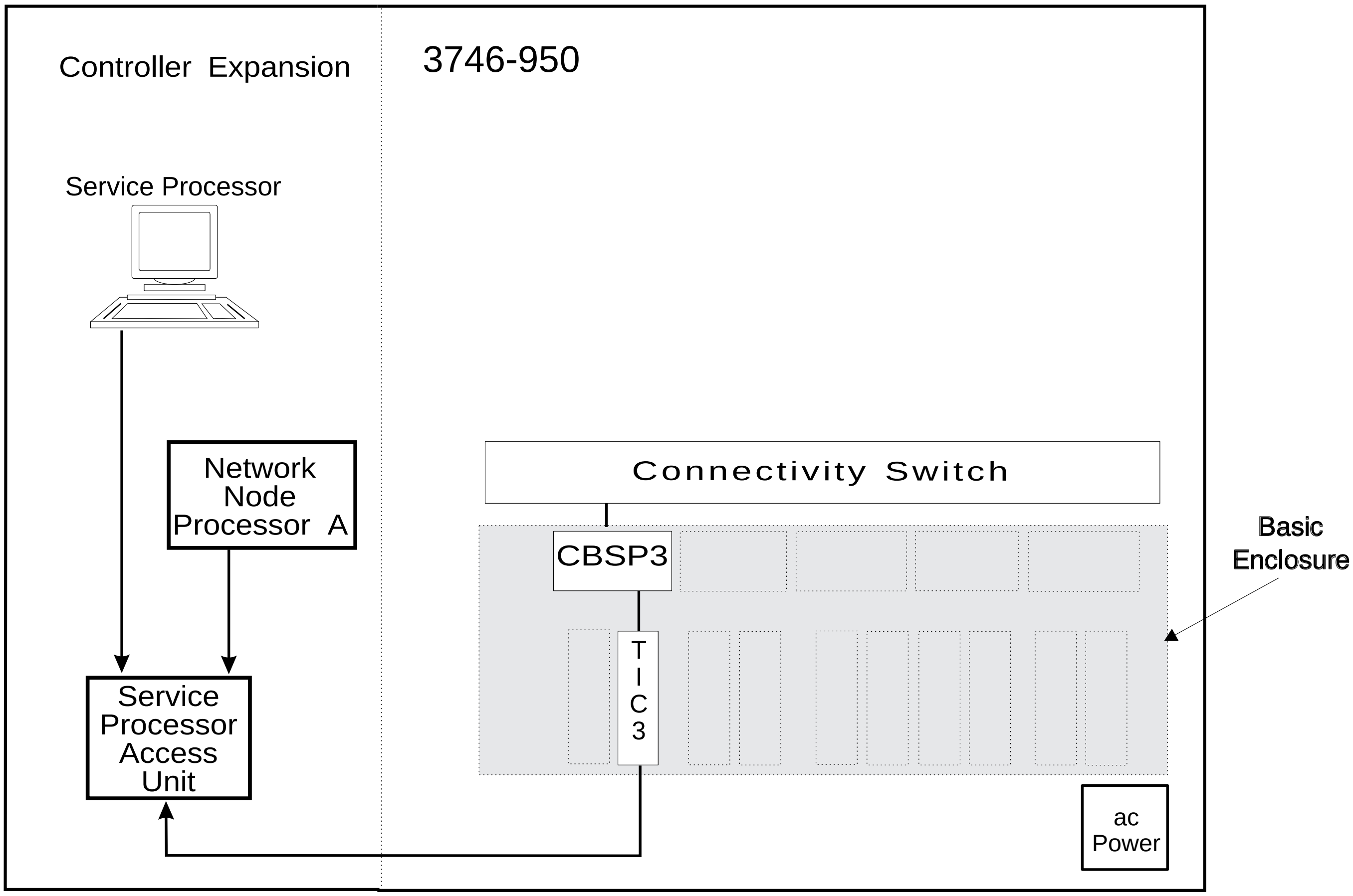
CBC	Controller bus coupler
CBSP	Controller bus and service processor
CCU	Central control unit
DMA	Direct Memory acess
IOC	Input/output control
TIC3	Token-ring coupler type 3

Figure 14-1. The 3746-900 Minimum Configuration. The 3746-900 is attached to a single CCU 3745.

Note: The 3746-900 is now delivered with a Control Bus and Service Processor (CBSP) type 2.

3746-950 Minimum Machine Configuration

The 3746-950 minimum machine includes the minimum hardware needed to operate the 3746 IP Router and APPN/HPR control point and attach the service processor, as shown in Figure 14-2.



Legend:

CBSP2 Controller bus and service processor type 2

TIC3 Token-ring coupler type 3

Figure 14-2. The 3746-950 Minimum Configuration

3746 Basic Features

The 3746-9x0 base machines include:

AC Power
The AC power supply requires a *single phase*, 200-240V, 50-60Hz source. The voltage and frequency varies according to local country and voltage requirements.

Basic Enclosure
The basic enclosure has four processor slots and eight coupler slots.

CBSP
Only available on the 3746-900.

The controller bus and service processor connects the CBC to the connectivity switch. The 3746-900 is now delivered with a controller bus and service processor type 2 (CBSP2).

CBSP2
Now delivered on the 3746-9x0, and as an upgrade of already installed 3746-900s. The controller bus and service processor type 2 connects the 3746-9x0 to the service token-ring LAN via a TIC3. The CBSP2 supports the 3746 network node and IP router functions.

TIC3
This token-ring interface coupler type 3 connects the CBSP or CBSP2 to the service processor access unit (token-ring LAN at 16 Mbps). User workstations operating at 16 Mbps can access host applications via this TIC3.

Note: No user workstation is allowed on the service LAN of a 3746-950 or a 3746-900 operating as an IP router or APPN/HPR network node.

Connectivity Switch
The high-speed connectivity switch connects all the adapters. It allows the IP and APPN/HPR traffic to be switched directly from adapter to adapter. The NCP traffic flows through the CBSP or CBSP2 and the 3745 CCU.

Controller Bus Coupler
Only available on the 3746-900.

The CBC attaches the Input/Output Control (IOC) bus and the Direct Memory Access (DMA) bus of the first 3745 CCU to the 3746-900 CBSP[1] or CBSP2[1].

Control Panel
The control panel on the front door is similar in design and function to the one on the 3745.

Cooling Unit
There are six fans.

---

1 The IOC bus is used for control and the DMA bus for data transfer between the 3745 CCU and the 3746-900. These buses are attached to the internal connectivity switch of the 3746 Model 900 via the CBC and the CBSP or CBSP2.

3746 Hardware Optional Features

The 3746-9x0 features provide connectivity for ESCON channels, token-ring and Ethernet LANs, and communication lines (using the SDLC, frame-relay, PPP, and X.25 link protocols).

The 3746-9x0 optional features include:

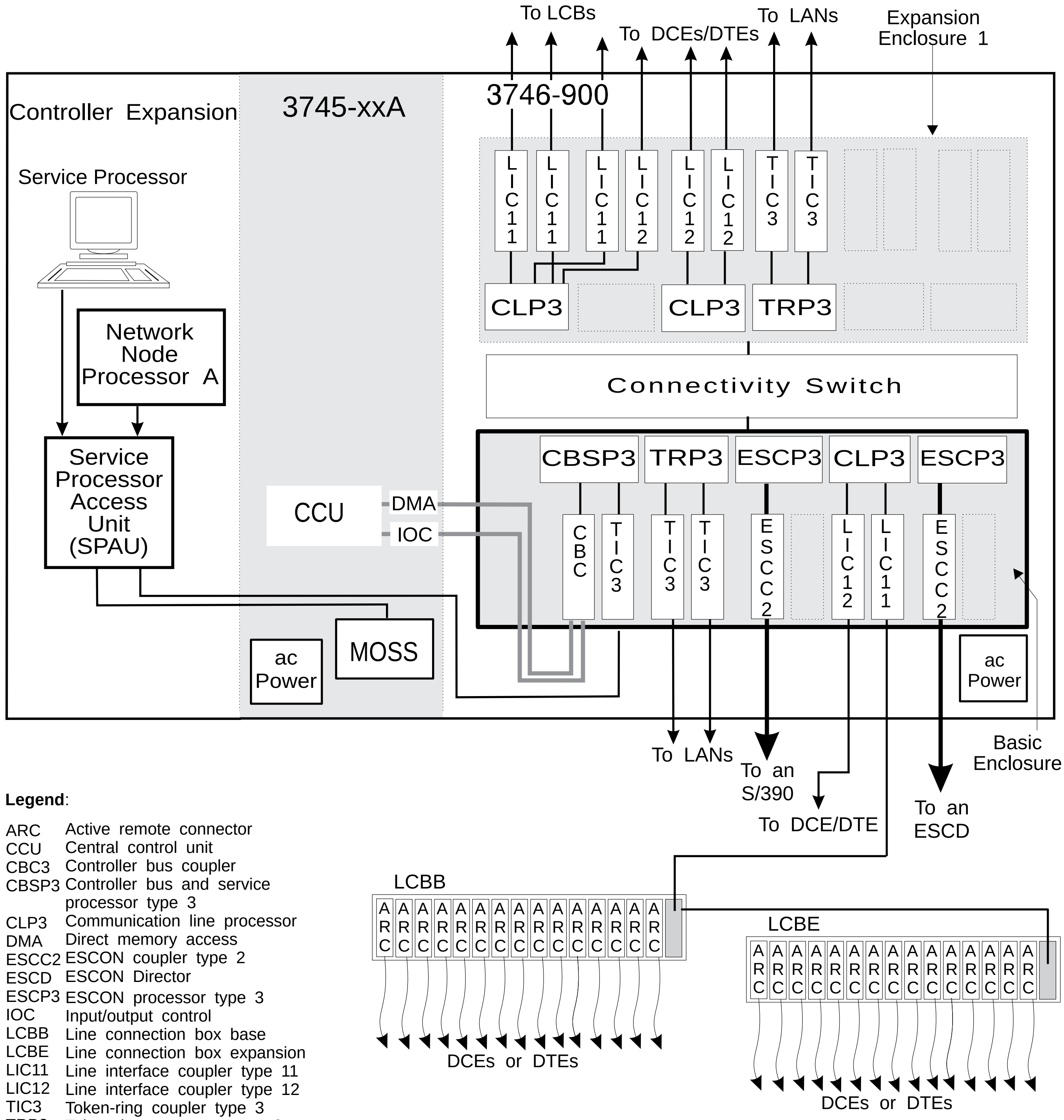
Controller Expansion
: Required for the 3746 IP router and network node and the 3746 Model 950. Houses the network node processor and service processor. The controller Expansion, the Network Node Processor, and the Service Processor are features of the 3745 Models A or 3746 Models 9x0.

  Figure 14-3 on page 14-6 and Figure 14-4 on page 14-7 show a 3746-900 and 3746-950 with a controller expansion.

Expansion Enclosures
: Besides the *basic* enclosure, which can house or to four adapters, two *expansion enclosures* can house up to six adapters each.

The 3746-9x0 can house up to 16 adapters. The adapter types can be mixed in each enclosure, and adapters can be placed in any position within the enclosures. There are no positions dedicated to just one type of adapter. This provides flexibility in the initial configuration (use of any combination of adapter types) and flexibility to upgrade the configuration according to the evolution of your communications needs.

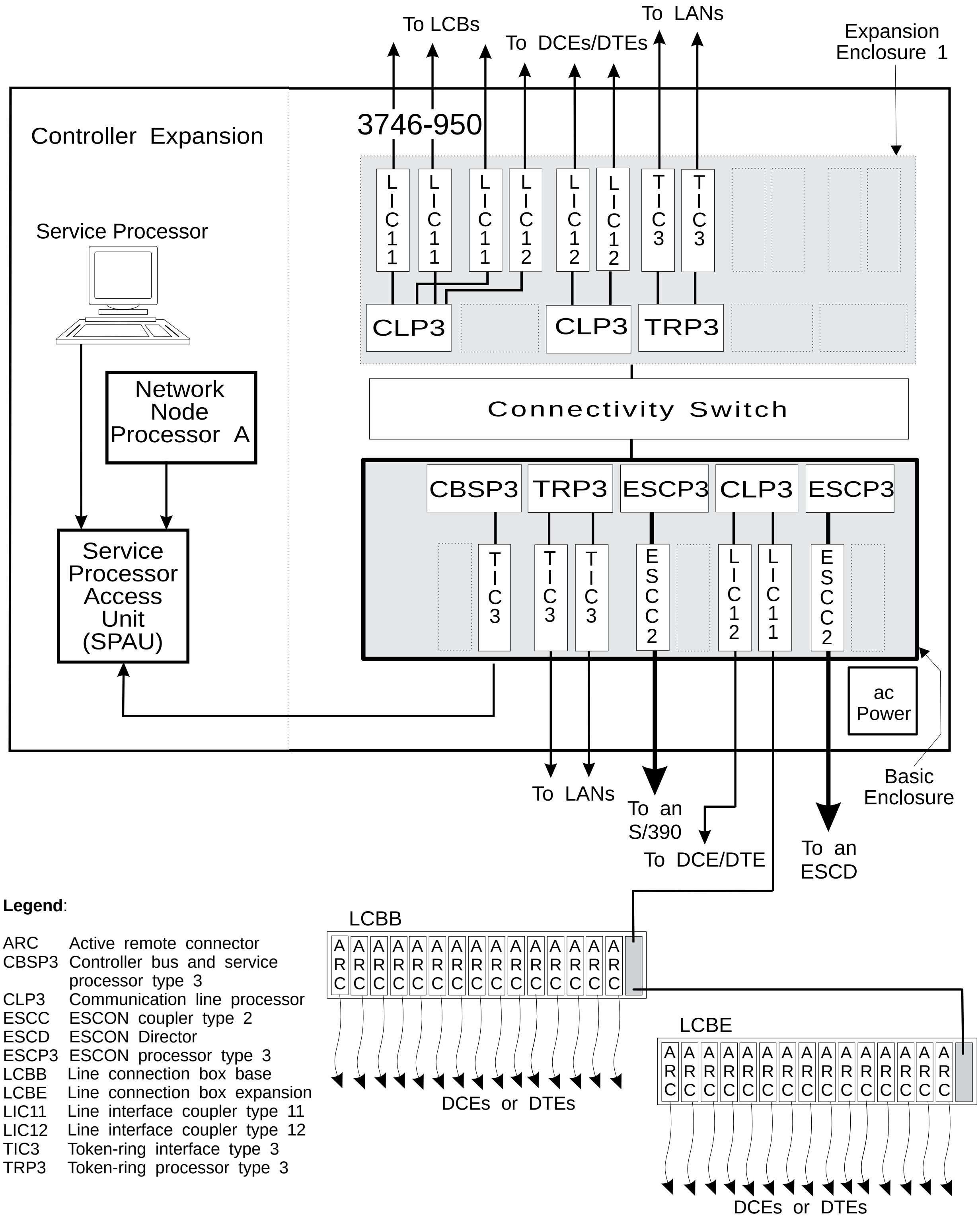
Figure 14-3 on page 14-6 and Figure 14-4 on page 14-7 respectively show a 3746-900 and a 3746-950 with one expansion enclosure. Figure 14-5 on page 14-8 shows a 3746-900 with two expansion enclosures.



Legend:

ARC	Active remote connector
CCU	Central control unit
CBC3	Controller bus coupler
CBSP3	Controller bus and service processor type 3
CLP3	Communication line processor
DMA	Direct memory access
ESCC2	ESCON coupler type 2
ESCD	ESCON Director
ESCP3	ESCON processor type 3
IOC	Input/output control
LCBB	Line connection box base
LCBE	Line connection box expansion
LIC11	Line interface coupler type 11
LIC12	Line interface coupler type 12
TIC3	Token-ring coupler type 3
TRP3	Token-ring processor type 3

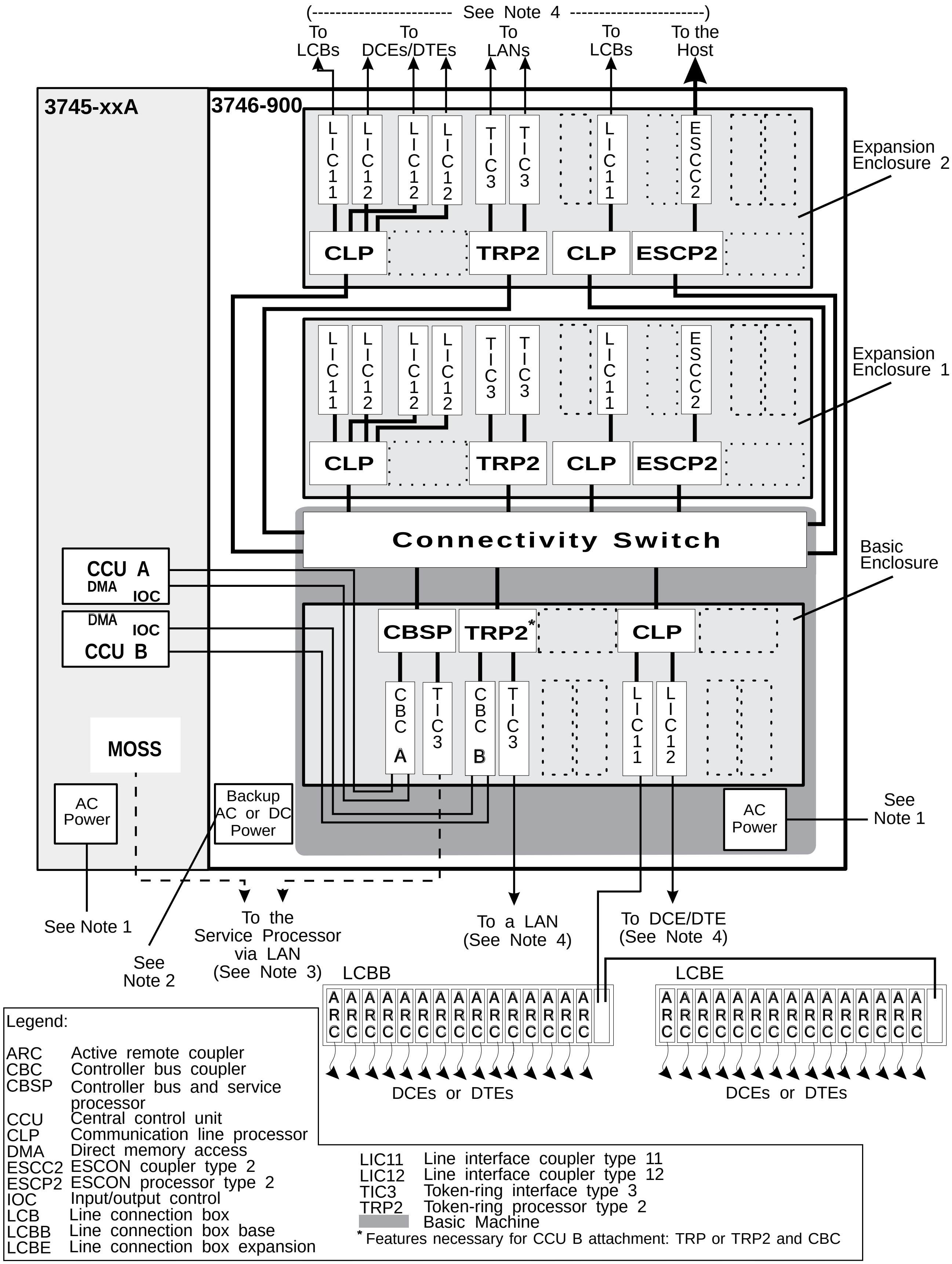
Figure 14-3. A 3746-900 Example Configuration. It includes two ESCON channel adapters, two token-ring adapters, and three communication line adapters in two enclosures.



Legend:

ARC	Active remote connector
CBSP3	Controller bus and service processor type 3
CLP3	Communication line processor
ESCC	ESCON coupler type 2
ESCD	ESCON Director
ESCP3	ESCON processor type 3
LCBB	Line connection box base
LCBE	Line connection box expansion
LIC11	Line interface coupler type 11
LIC12	Line interface coupler type 12
TIC3	Token-ring interface type 3
TRP3	Token-ring processor type 3

Figure 14-4. A 3746 Nways Multiprotocol Controller Example Configuration. It includes two ESCON channel adapters, two token-ring adapters, and three communication line adapters in two enclosures.



| *Figure 14-5. 3746-900 Physical Connectivity. The notes for this figure are on page 14-9.*

Notes for Figure 14-5:

1. The 3746-900 is powered separately from the 3745 base frame. It requires a separate power distribution providing single phase 200-240 V AC. The power plug and receptacle are different from the 3745. Refer to Chapter 44, “Physical Planning Details.”
2. A second power source for the 3746-900 frame is required if the optional backup power supply feature is installed.
3. All hardware and cables to interconnect the 3745, the 3746-900, the service processor, and the service processor modem are automatically provided with the machines.
4. All hardware and cables to connect the 3746-900 to user token-ring LANs, ESCON channels, and 3746-900 communication lines to DCEs and DTEs must be ordered according to your needs.

3746 Hardware Components

The 3746 Nways Multiprotocol Controller operates under the control of several processors[2]. These are:

- Network Node Processor (NNP)
- Adapter Processors
- Service Processor (SP)

These processors and their function are described in detail in the following sections:

Network Node Processor (NNP)

It runs:

- The APPN/HPR Control Point, which includes the dependent LU Requester (DLUR) function for the dependent PUs attached to the 3746 Nways Multiprotocol Controller.
- IP configuration and the SNMP agent, which requires installation of the optional Feature 5033.

The network node processor handles the 3746 APPN directory services, APPN network topology services, and APPN route selection. It also activates the ports and link stations, and sets up the Control Point-to-Control Point (CP-CP) and Logical Unit-to-Logical Unit (LU-LU) sessions allowing data traffic to flow between the 3764 network node and the other attached APPN/HPR nodes.

The routing of user data is done by the adapter processors without involving the network node processor as soon as the sessions have been established.

The NPALU and functions that collect performance and accounting data from the 3746 hardware also runs on the NNP.

[2] Running IBM Licensed Internal Code.

Adapter Processors

The 3746 architecture allows up to 16 adapter processors around an 18 port switch. Each processor utilizes one port of this switch and covers a 64 address range.

There are two types of processor apart from their function.

- TYPE 1 - will only run SNA traffic.
- TYPE 2 - required to run APPN/IP traffic with network node processor installed.

Each 3746 adapter is controlled by a processor running licensed internal code loaded from the service processor disk. The processor carries out data link control and path control for the adapter and routes the user data either:

- Adapter-to-adapter via a high-speed, non-blocking switch
- Port-to-port within the same adapter
- Station-to-station over the same port

The 3746 Nways Multiprotocol Controller supports the following four adapter types:

Token-Ring Adapter (TRA)

that consists of:

- Token-Ring Processor type 2 (TRP2) and
- One or two Token-Ring Interface Couplers type 3 (TIC3s).

The TRA can be optionally equipped with Token-Ring-to-Ethernet bridging to provide Ethernet LAN connectivity.

ESCON Channel Adapter (ESCA)

This consists of:

- ESCON Processor type 2 (ESCP2)
- ESCON Coupler type 1 (ESCC) or type 2 (ESCC2).

It provides native ESCON connectivity to processors adhering to the ESCON architecture (such as the IBM 3090® ES/9000® and 9672 processors) via either an ESCON Director (ESCD) or direct attachment.

Communication Line Adapter (CLA)

this consists of:

- A Communication Line Processor type 2 (CLP2)
- Line Interface Couplers (LICs)
- Line Connection Boxes (LCBs)
- Active Remote Connectors (ARCs)

Controller Bus and Service Processor Adapter

this consists of:

- Controller Bus and Service Processor type 2 (CBSP2)
- token-ring Interface Controller type 3 (TIC3)
- For the 3746-900, a Controller Bus Coupler (CBC)

This adapter connects the service processor and network node processor to the service ring. For the 3746-900, the

CBC connects the network node to the 3745 Central Control Unit (CCU).

These adapters allow you to design a high-connectivity and high-performance routing node for IP, APPN/HPR, and host VTAM-dependent traffic.

Service Processor (SP)
The service processor provides:

- The operator and service console for the maintenance and operator subsystem. The service processor runs the MOSS-E[3] code and communicates with the 3746-950, or the 3745 MOSS and 3746-900, via a 16 Mbps token-ring LAN (the service-ring LAN).

  A token-ring bridge is *not* allowed between the service processor and the 3746 or 3745 MOSS.

  To prevent 3746 Nways Multiprotocol Controller malfunctions resulting from improper use of the service LAN (leading to possible interruption of service), *never* connect any user stations to this LAN. Refer to Chapter 34 for important information about proper use of the service LAN.

- Access to the Controller Configuration and Management (CCM) program[4]. The CCM is used to configure and manage the 3746 network node and IP router resources.

- Maintenance capabilities to automatically notify an IBM support center when a 3746 Nways Multiprotocol Controller hardware error is detected. You may also manually report a problem to the same IBM support center.

Although the service LAN is used *exclusively* for communication between the network node processor, MOSS-E, and the 3746, it can also be used for:

- Sending service processor and 3746 Nways Multiprotocol Controller alerts to NetView (refer to "NetView Alerts" and Figure 29-16 on page 29-26).
- Connecting a remote console (refer to Chapter 35, "Customer Consoles and DCAF" and Figure 35-1 on page 35-2).

3 Maintenance and Operator Subsystem - Extended, IBM Licensed Internal Code

4 IBM Licensed Internal Code.

3746-900 Adapter Sharing

ESCON, Token-Ring, and Communication Line Adapters (ESCAs, TRAs, and CLAs) can support NCP and 3746 controlled traffic *simultaneously*. Higher-layer functions use the lower-layer functions provided by the 3746, that is, the physical and data link control layer functions (see Figure 14-6). The network node processor (NNP) is available to both 3746 IP and 3746 NN functions.

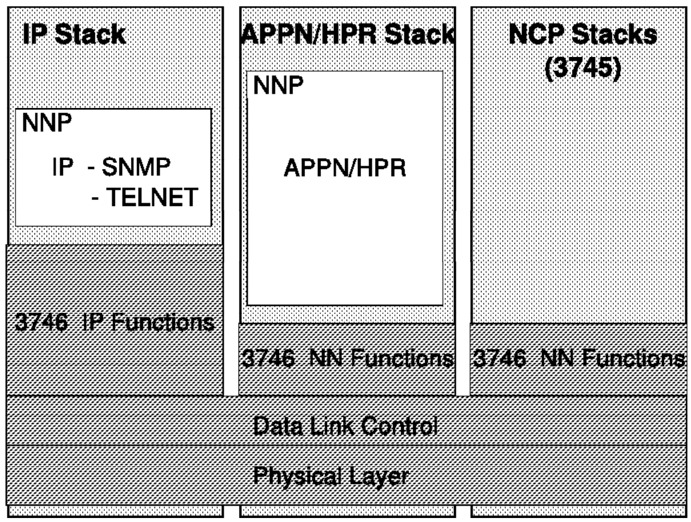


Figure 14-6. Resource Sharing

Adapter sharing allows physical resources on the 3746-9x0 to be used by the 3746 IP, 3746 NN, and 3745 NCP, enabling remote equipment to connect to the 3746 and NCP protocol stacks using a single physical attachment.

Each adapter port can be defined in NCP (one or both NCPs in a 3745-41A or 3745-61A) and the 3746 (APPN/HPR, or IP). Simultaneous activations by the 3746 and NCP(s) can be done for token-ring, frame relay, X.25, and ESCON ports.

ESCON coupler (ESCC or ESCC2)

The ESCON coupler has a single port which can carry *all* types of traffic, NCP-controlled and 3746-controlled. Two NCPs, the 3746 Nways Multiprotocol Controller and the 3746 IP router can be the owner of an ESCON port at the same time.

Token-ring coupler (TIC3)

The token-ring coupler has a single port which can be used for NCP-controlled or 3746-controlled traffic.

An adapter with two TIC3s can have each port activated by a different NCP, and both ports carrying IP and APPN/HPR traffic. Connecting the two ports to the same token-ring LAN allows you to share the adapter and the LAN between stations controlled by the active NCPs, stations controlled by the 3746 APPN/HPR network node and stations controlled by the 3746 IP router.

5 Frame-relay and X.25 lines can be shared between 3746 traffic (APPN/HPR, IP) and NCP traffic.

Line Interface Coupler type 11 (LIC11)

The LIC11 can carry **two** types of traffic with some ports controlled by NCP (SDLC, X.25[5], frame relay[5]), others controlled by the 3746 Control Point (SDLC, X.25[5], frame relay[5], PPP).

Line Interface Coupler type 12 (LIC12)

The LIC12 has a single port which is controlled by either NCP (SDLC, X.25[5], frame relay[5]) *or* 3746 (SDLC, X.25[5], frame relay[5], PPP).

3746 LIC Optional Features

The 3746 extended functions are provided as optional (chargeable) features of the 3746 licensed internal code. They can be activated from microcode EC levels D46130I (FC 5800) and F12380 (FC 5800, 5804, 5805, and 5806) as follows:

- A password is provided for each ordered chargeable feature. These passwords are different for each 3746.
- The password authorizes the use of the functions included in the corresponding feature.

The following sections list the functions in each optional feature (the feature code (FC) number is in parentheses).

X.25 Support (FC 5030)

The X.25 features performs the following:

- In the 3746-900 NN and the 3746-950, directs the CLP to perform X.25 DLC and Data Packet functions over PVC and SVC.
- In the 3746-900 NN, supports SNA Qualified Logical Link Control (QLLC) for NCP subarea and peripheral traffic. This means that the following are not needed:
  - NPSI in the 3745.
  - SNA QLLC traffic for the 3746.
  - Network Node and IP traffic for the 3746 IP Router.
  - In the 3746-950, supports SNA QLLC traffic (APPN, SNA/DLUR, HPR) and IP traffic for the 3746 IP Routing.

IP Routing (FC 5033)

The IP Routing feature is required for the 3746-900 NN and 3746-950, and provides the following:

- Licensed internal code for the IP functions of CBSP, CBSP2 or 3, TRP, TRP2 or 3, ESCP2 or 3, and CLP or CLP3 processors.
- IP management functions of the network node processor (SNMP agent, Telnet).

3746 Extended Functions

The 3746 extended functions are provided as optional (chargeable) features of the 3746 licensed internal code. They can be activated from microcode EC levels D46130I (FC 5800) and F12380 (FC 5800, 5804, 5805, 5806) as follows:

- A password is provided for each ordered chargeable feature. This password is specific to each 3746.
- The password authorizes the user to scan the functions included in the corresponding feature.

3746 Extended Functions (FC 5800)

Feature code 5800 must be ordered to get the corresponding password and operate any of the following functions:

Functions controlled by the NNP (3746 Models 900 and 950)

- HPR MLTG support over Token-Ring, Ethernet, SDLC, Frame Relay, and X25.
- Bandwidth Reservation System (BRS) for IP traffic over PPP lines.
- Frame relay enhancements:
  - Frame Relay switching (FRFH).
  - Committed information rate (CIR).
  - Bandwidth Reservation System (at DLCI level) between IP, APPN, and HPR.
- X.25 (requires FC 5030):
  - SNA/DLUR, APPN, HPR, and IP over X.25.
  - X.25 port sharing between NNP and NCP traffic (not NPSI).
  - PVCs and SVCs.
  - NPM support (requires NPM V2R3 + PTFs).

Functions controlled by NCP (3746 Model 900)

- Internal IP coupling to 3746 IP router (requires NCP V7R6).
- Dynamic windowing enhancements for Frame Relay/ISDN (requires NCP 7.6).
- PRI Euro-ISDN (LIC16) enhancements (requires NCP V7R5+).
  - Automatic back-up of frame relay link over ISDN (non-disruptive for NCP to NCP connections).
  - NPM support (requires NPM V2R3 + PTFs).

Multiaccess Enclosure Extended Functions Part 1 (FC 5804)

Feature code 5804 must be ordered in order to get the corresponding password and operate any of the following functions supported via the multiaccess enclosure of the 3746 Models 900 and 950:

- Interactive Network Dispatcher (NetDispatcher).
- RIP V2.
- Native HPR over ATM.
- Enhanced ATM adapters: LIC294, LIC295.
- Branch Extender.
- Enhancements in the areas of:
  - ATM.
  - Frame Relay, PPP, ISDN and WAN.
  - APPN/HPR, DLSw and IP.

Detailed Description of FC 5804

The MAE Extended Functions provide a set of routing protocols and transport software to enable scalability and load-balancing capabilities for S/390 IP/web servers connected to the Internet or an intranet.

- Interactive Network Dispatcher:

  The Network Dispatcher function provides load balancing among a set of IP servers adjacent to the router running this function. The load-balancing mechanism uses technology from IBM's Research Division to determine the most appropriate server to receive each new connection. Subsequent traffic for that connection is then forwarded to the same server. The routing is transparent to users and other applications. The load information is obtained from a set of weights based upon number of connections active per server, number of new connections since the last interval, feedback from response time of individual HTTP, FTP, SSL servers, and configurable policy information.

  The Network Dispatcher sees only the incoming packets from the client to the server. It does not need to see the outgoing packets which significantly reduces the overhead imposed by load balancing. The client's packet is forwarded to the chosen server exactly as it was created. Since Network Dispatcher is also available on AIX, Windows NT, and Sun Solaris, it is useful for many applications such as e-mail servers, Web Servers, distributed parallel database queries and other TCP/IP applications. The Interactive Network Dispatcher feature for Multiaccess Enclosure is priced based on the number of servers being balanced.

  Included with the Multiaccess Enclosure Extended functions is a license for Network Dispatcher for IBM Networking (5801-AAR FC 2151). One Network Dispatcher for IBM Networking Use Authorization license (program 5807-AAR FC 1453) must be purchased for each server. The user may not exceed the number of servers for which they are authorized.

- RIP Version 2:

  RIP Version 2 adds the following features: route tags to propagate EGP information, subnet masks to support variable subnet masks, next hop addresses to support optimization of routes, authentication for a password passing, and multicasting so that multicast can be used instead of broadcast. RIP V2 is available on Multiaccess Enclosure (FC 3000) only.

- ATM:

  – High Performance ATM Adapters:

    1-port 155 Mbps MMF (FC 3294 - LIC294) and 1-port 155 Mbps SMF (feature number 3295 - LIC295) provide improved performance compared to LIC284 and LIC293 respectively.

  – Native APPN/HPR over ATM:

    APPN/HPR supports native ATM so that the router can attach directly to ATM network without LAN emulation or encapsulation. This support includes: ATM signaling of bandwidth, QoS, ATM addressing, connection network support for SVC's, route selection extensions for ATM characteristics, mapping between ARB and ATM characteristics, and HPR over ATM MIB extensions.

- Native ATM bridging allows routers to connect frame relay/ATM interworking switches to devices on either PVCs or SVCs which do not support LAN emulation connections.
- Configurable Quality of Service (QoS) allows LAN emulation networks to take advantage of ATM's QoS capabilities.
- Next Hop Resolution Protocol (NHRP) enables short-cut routes for IP across ATM networks. NHRP supports zero-hop routing for end stations with NHRP and one-hop routing for stations without NHRP clients.
- For added failure recovery, a backup gateway for end stations on LAN emulation can now be configured with default gateway IP addresses. If the primary gateway goes down the backup gateway automatically starts passing packets from the end station to other subnets. Additionally, the user can configure which ARP server is the primary and backup.
- Server Cache Synchronization Protocol (SCSP) distributes the SRP servers to eliminate a single point of failure.
- All the supported routed protocols and native ATM bridging may be multiplexed onto a single ATM permanent virtual circuit.

- Branch Extender:

  Branch Extender is an APPN option that can be used to build a large APPN/HPR network that delivers access to customers' existing SNA applications with scalability and cost-effectiveness. It provides a gateway function to interconnect thousands of branch offices to an enterprise Wide Area Network (WAN) and improves efficiency of network flows.

  The Network Node with Branch Extender addresses the problem of too many Network Nodes, by limiting the "gateway" node to the topology of the branches it serves on its downstream links and uses a form of default routing for network services on its upstream link. In this way, Branch Extender reduces topology database size and traffic, adds the ability to register resources from a branch to a central directory server in the WAN, and allows for direct connections between subnetworks without using an Extended Border Node. This function is available for any data link type supported by APPN.

- Frame Relay, PPP, ISDN, and WAN enhancements:
  - Frame Relay

    Frame Relay dial circuit interface is configurable on a V.25bis interface type.

    Frame relay data compression (mode-1 FRF.9) is configurable per PVC to run over a frame relay interface.

    Congestion can be reduced with support for congestion management via CLLM messages;

    SNMP traps sent on receipt of CLLM, FECN, or BECN frames; throttling transmission upon receipt of FECN; and notifying FECN source.
  - PPP

    PPP Bandwidth Allocation Protocol/Bandwidth Allocation Control Protocol (BAP/BACP) adds the ability to dynamically add or drop links over ISDN B channels.

    Authentication servers can now be used so that names and passwords need not be configured at each router.

    Encryption Control Protocol (ECP) using Data Encryption Standard (DES) Cipher Block Chaining mode (CBC) is now available for PPP.

  – ISDN

    ISDN I.430 and I.431 is supported to enable interconnecting to lease-line service from NTT.

  – Ethernet

    Ethernet locally-administered MAC address can be configured to override the default burned-in address.

  – WAN

    Bandwidth Reservation (BRS) can assign TCP/IP packets to a BRS class and priority based on the packet's UDP or TCP port number.

    A backup frame relay, PPP, or X.25 link can be specified for IP over frame relay when the traffic rate reaches a specified threshold.

    Enabling or disabling of adapters can be done from a single operator console without knowing which interface(s) is configured for WAN reroute.

- APPN and DLSw enhancements:

  – APPN/HPR

    Native HPR over ATM (see ATM section)

    Implicit focal point and up to eight backups enables the router to initiate a management session with NetView.

  – DLSw

    A range of source/destination SAPs and MAC addresses can be configured to override circuit priority.

    DLSw Switch-to-Switch Protocol allows exchange of MAC address list between partners.

    NetBIOS session alive spoofing eliminates session alive frames on on a dial-on-demand link.

Multiaccess Enclosure Extended Functions Part 2 (FC 5805)

FC 5804 must be ordered to get the corresponding password. FC 5805 is required to operate any of the following functions supported via the multiaccess enclosure (MAE) of the 3746 Models 900 and 950:

- FDDI, HSSI, F-Enet, 128 MBytes (MAE memory)
- ESCON MultiPath Channel (MPC) support for IP applications
- Enterprise Extender for APPN/HPR over IP backbone
- Channelized T1/E1 and other enhancements

Detailed Description of FC 5805

FC 5805 requires FC 5804 and provides the following additional functions for the MAE (FC 3000 or 3001):

- FDDI support:

  One FDDI interface per adapter (FC 3286 - LIC286) operates as either a Dual Attach Station (DAS) or a Single Attach Station (SAS) using multimode fiber (MMF)

- HSSI support:

  One HSSI interface per adapter (FC 3289 - LIC289) supports T3 and E3 speeds

- 10/100 Mbps Ethernet support:

  One interface per adapter (FC 3288 - LIC288) speeds of either 10 Mbps or 100 Mbps

- 64 MB memory expansion (FC 3520)

  An optional second 64 MB DIMM is available on Multiaccess Enclosure for a total of 128 MB of memory for especially demanding environments (TN3270E, DLSw, APPN, DLUR etc.)

- High Performance Data Transport (HPDT) for UDP:

  High Performance Data Transfer (HPDT) MultiPath Channel (MPC), also known as MPC+, has been extended to include IP support over the ESCON channel. HPDT UDP extends the efficiencies of HPDT services to applications using OS/390 UNIX System Services UDP interface. HPDT reduces CPU cycle consumption and achieves a more efficient transfer of data. HPDT UDP is initially targeted for communications between DB2 on OS/390 V2R4 and SAP R/3 application servers. Other UNIX System Services socket applications using UDP, such as NFS and DCE, can also transparently take advantage of HPDT UDP services over the Multiaccess Enclosure ESCON channel.

- High Performance Data Transport (HPDT) for TCP:

  HPDT TCP/IP extends the efficiencies of HPDT services to IP applications using OS/390 V2R5. HPDT reduces CPU cycle consumption and achieves a more efficient transfer of data. It is supported over the ESCON channel of the MAE.

- Enterprise Extender:

  Enterprise Extender is a simple set of extensions to APPN High Performance Routing (HPR) technology to integrate SNA into IP backbones. To the HPR network, the IP backbone is a logical link; to the IP network, the SNA traffic is UDP datagrams.

  Enterprise Extender provides the flexibility for SNA parallel simplex features, that are currently available in HPR networks, now to be available to users in networks that have IP backbones, or even IP clients when coupled with TN3270e server support. Enterprise Extender also makes it possible for SNA networks to use IP attachments as alternate and backup routes for the SNA network.

  Enterprise Extender technology can also reduce the demands on the data center routing platforms, like the 2216 or the 3746 MAE, and, thus, provide a more cost-effective solution than other integration technologies. Enterprise

Extender seamlessly routes packets through the network protocol "edges" eliminating the need to perform costly protocol translation and the store-and-forward associated with transport-layer functions like DLSw.

The Enterprise Extender technology also provides many of the traffic control features that SNA users have come to expect. Using Class of Service (COS), SNA applications specify the nature of the services they require from the network (for example, interactive, batch, and so on). Enterprise Extender supports SNA priority in IP environments by mapping the SNA priority to four UDP port numbers that can be easily prioritized using Bandwidth Reservation System (BRS).

- Channelized/Fractional T1/E1 support:

  This support allows the current ISDN PRI adapter to be configured as a channelized T1 or E1 in lieu of using it for ISDN PRI. Support is provided for Frame Relay and PPP over individual or groups of DS0s. One or multiple connections is supported on the same physical interface. The bandwidth of each connection will be either 56 kbps, 64 kbps, or a multiple of 64 kbps up to the maximum speed of 24*64 for T1 or 31*64 for E1. With the 2216 supporting up to four adapters per box, this will allow up to 96 56 kbps or 64 kbps connections for T1 or up to 124 56 kbps or 64 kbps connections for E1. Depending upon tariffs, this can offer a significant savings versus multiple physical interfaces. The time-slots for the combined DS0s need not be contiguous.

- Dial-in support for SDLC PU Type 2 devices:

  Switched dial in is the capability for SDLC PU Type 2 devices to dial into the MAE through a switched network. The support is provided through DLSw. It provides HDX and FDX support as well as NRZ and NRZI. Call answering is supported but not a dial-out facility.

- X.25 scalability on the Multiaccess Enclosure:

  This extends the X.25 capacity of the MAE from a limit of 239 VCs to a limit of 400 PVCs and a limit that is memory dependent for SVCs and capable of supporting more than 1000 VCs.

TN3270E Server (FC 5806)

The TN3270E server provides a TN3270 gateway function for TN3270 clients downstream from an SNA/VTAM S/390. The clients connect to the server using a TCP connection that the server then maps to a corresponding SNA LU-LU session that the TN3270 server maintains with the S/390. The TN3270E server supports the capabilities defined in RFCs 1576, 1646, and 1647. The connection from the TN3270E server to the S/390 is between DLUR in the Multiaccess Enclosure and DLUS in VTAM. This connections uses either APPN ISR or HPR transport and is supported, locally and remotely, over all the interfaces that support these transport protocols.

When coupled with Enterprise Extender, the TN3270 servers can be distributed in the network with an IP infrastructure and, therefore, be placed in locations that provide the best scalability and availability without regard to backbone protocol. These TN3270 servers can run on IBM 2210, IBM 2216, and IBM 3746 platforms.

Activating Extended functions

Figure 14-7 shows how extended functions are activated from the MOSS-E screen, and where the passwords are entered.

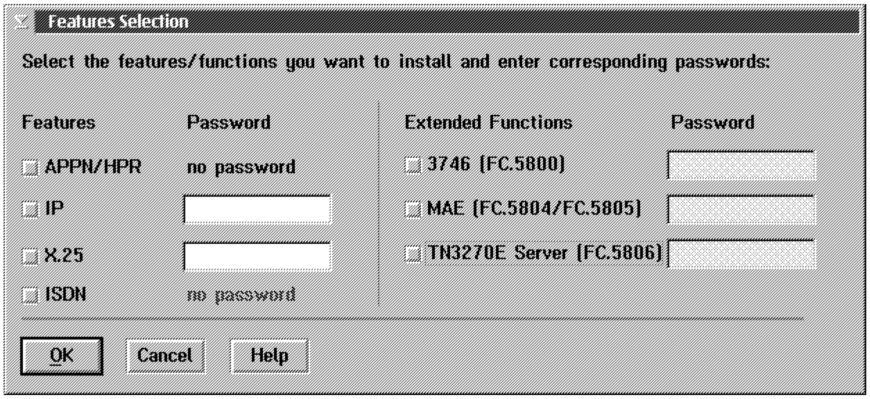


Figure 14-7. Activating Extended Functions

Hardware Configuration Planning

The 3745 and 3746 Configurator and Performance Model (CF3745) is used to create a valid hardware configuration based on your communication requirements. It models your expected traffic loads. This tool is available through IBM Information Network (IIN®) offerings or can be run by your IBM marketing representative. The output is commonly called the *HONE installation sheets* and is required information for the IBM service representative installing your 3746 Nways Multiprotocol Controller.

Configuration Planning

On the service processor, you configure and manage the 3746 Nways Multiprotocol Controller with the Controller Configuration and Management (CCM) application using its graphical user interface. Using the CCM windows, you make all the definitions required by the 3746 Nways Multiprotocol Controller (APPN/HPR, IP, ESCON, token-ring, frame relay, X.25, and PPP).

There is a graphical representation of the 3746 Nways Multiprotocol Controller couplers and, for installed couplers, their line address ranges and the Data Link Control (DLC) types.

The CCM configuration functions produce:

- The 3746 Nways Multiprotocol Controller configuration file, including:
  - ESCON resource definitions, refer to Chapter 15, “ESCON Adapters”
  - Token-ring resource definitions, refer to Chapter 16, “Token-Ring Adapters”
  - SDLC (communication line adapter) resource definitions, refer to Chapter 18, “Serial Line Adapters”
  - Frame relay resource definitions, refer to Chapter 7, “Frame Relay Overview”
  - PPP resource definitions, refer to Chapter 8, “Point-to-Point Protocol (PPP) Overview”
  - X.25 resource definitions, refer to Chapter 9, “X.25 Overview”
- Specific ESCON definitions used in:
  - IOCP and HCD generations
  - ACF/NCP channel definitions (for 3746-900s under NCP control)
  - MOSS-E definitions

CCM management functions include:

- Management of the 3746 Nways Multiprotocol Controller resources (APPN/HPR and IP), such as their activation and deactivation, and displaying the status of a resource
- Display of the network topology, the 3746 node directory, and the 3746 node resources

There are two versions of the CCM:

- The one that runs in the service processor and is accessed through the MOSS-E console
- The stand-alone version running on an OS/2 workstation

Note: The CCM does more than just produce the definitions needed to run the 3746 Nways Multiprotocol Controller. It also cross-checks all the parameters to make sure that their values are coherent throughout the 3746 configuration definitions.

Physical Planning

Significant planning is required to properly install, configure, and operate a 3746 Nways Multiprotocol Controller.

Detailed physical planning information is provided in Chapter 44, “Physical Planning Details.”

The following list summarizes the major physical planning aspects of the 3746 Nways Multiprotocol Controller:

- Ask the IBM service Installation Planning Representative (IPR) to assist you with physical planning and cable ordering information.
- The token-ring LAN attachment cables (for the TIC3) are different from a 3745 TIC2 cable.
- The communication line cables for the LIC11 are also different from 3745 LIC1, LIC3, and LIC 4A/4B cables.
- Service clearance requirements must be checked.
- ESCON distances up to 3 km are supported. Installations requiring longer distances will require the use of ESCON directors. See Chapter 11, “ESCON Overview,” consult with the IPR, and use the *Planning for Enterprise Systems Connection Links*, GA23-0367, for additional information.

3746 Nways Multiprotocol Controller Addressing

In the 3746 Nways Multiprotocol Controller, the ESCON, token-ring, and communication line adapters share a single address range.

Each enclosure in the 3746 houses (see Figure 14-5 on page 14-8):

- ESCON couplers and processors
- Token-ring interface couplers (type 3) (TIC3) and processors
- Communication line interface couplers (types 11 and 12) and processors. Any slot on the front side of the frame may contain any type of processor, and any slot on the rear side may contain any type of coupler. The only limitation is that the corresponding front and rear slots must be part of the same type of adapter.

Each LIC11 uses one or two Line Connector Boxes (LCBs). There is room for a pair of LCBs within the 3746 frame and more can be housed in the Controller Expansion (Feature 5023).

Each slot for a coupler has a unique, predetermined address. The installation sheets, produced by the CF3745 (refer to Chapter 42, “Familiarizing Yourself with the Installation Sheets”), assign slot locations (with their related line addresses) to the couplers.

Continuity of Operation

Some of the 3746 Nways Multiprotocol Controller options that minimize the effects of equipment malfunction are:

- Dual power input
- Dual network node processors (refer to “Dual Network Node Processors” on page 34-21 and “Network Node Processor Specifications” on page 44-41)

- Backup communication line adapters (refer to "Processor Backups" on page 18-24).
- Dual AC outlet distribution box in the controller expansion.

3746 Nways Multiprotocol Controller Operator Training

Since the 3746 Nways Multiprotocol Controller requires the use of the CCM functions in addition to MOSS-E functions, planning should include integration of these new functions into existing network operations. Operator training and familiarization with the service processor is required to maximize the efficiency of your network operations.

Installation Plan

The following items should be included in your installation plan:

- If your controller(s) will not be sending alerts to NetView, you must tell the MOSS-E. This is explained in "To Not Generate MOSS-E Alerts" on page 29-33; do not forget to read this section.
- Schedule operator education on the service processor and remote console operation.

  Check with your IBM marketing representative about classes that IBM offers to help with operator education on the 3746-950 (and 3745/3746-900).
- Remote DCAF software setup. For more information, refer to Chapter 35, "Customer Consoles and DCAF."
- Depending on how you place the service processor components, they may require table space and standard, single-phase power outlets to support the service processor configuration: system unit, display, optical disk unit, mouse, keyboard, RSF modem, and service processor access unit.

  These service processor components can be installed in the controller expansion which houses the network node processor (see "Controller Expansion (Feature 5023)" on page 44-46).
- An analog public switched telephone line must be available to allow complete testing of the 3746 and service processor. The IBM service representative will use this connection at installation time to retrieve the latest level of microcode from the RETAIN® databases.

Software Planning

The *3745 Models A: Overview*, GA33-0180, lists the minimum requirements for the operating programs. You must install and use ACF/NCP V6 R2 (or a higher release) before the actual upgrade to the 3745 Models A. This will provide time for you to become familiar with its new features, functions, and parameters. It also provides an opportunity to update and verify any changes to existing operating procedures.

If this installation or upgrade will include the 3746-900, a special feature of NCP (the 3746-900 Feature) is required to support the adapters installed in the 3746-900. The existing usage tier requirements and structure for adapters installed in the 3745 and 3746 Models A11 and A12 frames do not change, except for 3745

Models 41A and 61A configured in the twin-dual or twin-backup mode. These configurations require a tier 2 to attach a 3746-900.

Specific NCP usage tiers are applicable to the adapters of the 3746 Model 900, refer to Table 14-1, it shows the total number of adapters you can use for 3746 Model 900 usage tiers. Tiers do not include the token-ring processor to which the service processor is attached (CBSP or CBSP2).

Table 14-1. Usage Tiers for the 3746 Model 900

Usage Tier	Maximum Number of Adapters
A	Any combination of up to 5 token-ring, ESCON, or communication line adapters
B	Any combination of 6 or more token-ring, ESCON, or communication line adapters
C (see note)	Any combination of token-ring, ESCON, or communication line adapters

Note: Usage tier C (no charge) is available when the network node hardware feature 5022 is installed on your 3746 Model 900.

Certain features offered for the 3746-900 (such as support for SDLC communication lines, frame relay, and X.25) require higher levels of NCP. Refer to the appropriate *NCP Migration Guide* for help in modifying your current NCP definition and migrating to the new, higher program level.

ACF/SSP Version 3, Release 8 is required to support the generation, load, and dumping of ACF/NCP V6 R2 (program numbers 5665-338 for MVS and 5664-289 for VM).

Note: Higher levels of ACF/SSP are required for higher levels of NCP. IBM provides an ESCON generation tool, the 3745 *ESCON Generation Assistant*, which produces specific definitions used in:

- IOCP/HCD generation
- ACF/NCP channel definitions
- Service processor definitions

It is available both:

- From your IBM representative
- As part of the licensed internal code delivered with the 3746-900

Chapter 15 discusses the use of the *ESCON Generation Assistant* (EGA) when no NNP installed or *Controller Configuration and Management* (CCM) when one NNP is installed, which will be very useful when installing ESCON adapters in the 3746-900.

Creating several NCP load modules before the completion of the hardware upgrade should be considered. If problems occur in a new untested configuration, a reduced or simplified NCP configuration may help you isolate the cause. Fallback and recovery procedures should be developed.

16 MB Storage

If you plan to add the 16 MB storage feature, ensure that the host dump data sets have been increased to accommodate the larger NCP dump sets.

MVS Timer

The missing interrupt handler (MIH) timer must be set to 12 minutes for 3745 channel addresses which will receive NCP load modules greater than 4 MB.

Planning for a 3745 Model A Upgrade

Upgrading a 3745 Model xx0 to a Model xxA requires careful planning.

3745 Physical Planning

Your local IBM service office has an Installation Planning Representative (IPR) available to assist you with physical planning questions, parallel and fiber optic channel cable planning information, and power requirements.

Note: When adding a 3746-900, there are new and additional power requirements. These power requirements are discussed in more detail on page 14-9.

Upgrading requires access to standard wall power outlets to power the service processor. Unless you are putting the service processor in a controller rack, permanent table space is required to support the service processor configuration. All cables and hardware required to connect the service processor and the 3745 are provided by IBM.

For connection to the IBM Remote Support Facility (RSF), a dedicated public switched analog telephone line supporting (9600 bps at least or 19.2 Kbps) must be available for the service processor. It is used during the installation or upgrade and for maintenance. This line should remain available to allow the service processor to support:

- Automatic maintenance functions (see Chapter 36, Connecting to the IBM Remote Support Facility.
- Alternate alert path, see NetView Alerts.
- Backup path for remote console operations (see Chapter 35, Customer Consoles and DCAF).

Note: It is recommended that the service processor be located in same room as the 3745(s) and be within 10 meters of the 3745(s). Certain service and maintenance procedures at the communication controller frames, that require use of the service processor, may be hindered if the service processor is too far away from the communication controller.

The cable installation and configuration sheets for the line interface couplers, token-ring adapters, high-speed lines, and Ethernet adapters are explained in Chapter 42, “Familiarizing Yourself with the Installation Sheets.”

Consult Chapter 44, “Physical Planning Details” for detailed information.

3745 Operator Training

The 3745 service processor introduces new and advanced functions. Local and remote console operations are enhanced. A new single user interface connects the user with the existing 3745 MOSS functions and the new MOSS-E functions. Planning should include integration of new functions into existing network operating procedures. Operator training and familiarization with the service processor is required to ease the migration to new operating procedures and to maximize the increased efficiency that they can bring to your operations.

There are tutorials and demonstrations available on the MOSS-E to help with training. They are also found in the *3745 Models A: Education Package*, SA33-0185.

Also, check with your IBM marketing representative about classes that IBM offers to help with operator education on these machines.

Model Upgrade

There are three model upgrade scenarios that are provided later in this chapter. The upgrade replaces the existing MOSS hardware and provides a token-ring connection to the service processor. This MOSS token-ring connection is dedicated to the 3745 MOSS functions and cannot be used to carry user traffic or to send alerts from the MOSS-E to the NetView program. This token-ring operates at 16 Mbps. Any additional devices placed on this ring must operate at 16 Mbps.

Adding any additional 3745 adapters and 3746 Models A1x or L1x units should be completed before the installation of the 3745 upgrade. These new adapters and frames should be operational before beginning this upgrade.

Before installing the 3746-900, your 3745 must be operational as a 3745 Model A and running the ACF/NCP including the 3746-900 Feature. Refer to "Type 5 Scenarios: Migration to 3745 A Models" on page 12-9.

New ESCON, token-ring, and communication line adapters need to be added to the ACF/NCP software configuration. Refer to "Software Planning" on page 14-23.

Host and ESCON Director configuration changes should be done at the same time as the migration to the 3746-900. The *3745 ESCON Generation Assistant* will assist with NCP, IOCP, and MOSS-E definitions.

Note: If you are migrating to the Hardware Configuration Definition (HCD), you can use the IOCP generation provided by the *3745 ESCON Generation Assistant* as input for the HCD migration support.

Planning for Twin-CCU Operations with the 3746-900

This section gives general information about the 3745 CCU/3746-900 controller bus coupler (CBC) connections and explains the backup possibilities when using the 3746-900. Refer to Figure 14-5 on page 14-8 while reading this section.

Each 3745 CCU is connected through its input/output controller (IOC) bus and direct memory access (DMA) bus to its own 3746-900 CBC. The 3746-900 traffic flows through the 3745 DMA bus. Each CCU drives its own CBC and never addresses the CBC of the other CCU, even in the twin-standby or twin-backup mode. The 3746-900 ESCON processors (ESCPs), token-ring processors (TRPs), and communication line processors (CLPs) can communicate with any CCU through the corresponding CBC:

- An ESCC can carry traffic to and from both CCUs at the same time.

CCU Operating Mode

You must be absolutely sure that the MOSS-E station IPL definitions (in the "Manage ESCON Processors" function) correspond to the MOSS CCU operating mode choice (in the MOSS CDF function):

CCU Operating Mode (MOSS)	IPL Choices (MOSS-E)
Twin-backup	"CCU-A" or "CCU-B" or "NO IPL"
Twin-dual	"CCU-A" or "CCU-B" or "NO IPL"
Twin-standby	"CCU-A + CCU-B" or "NO IPL"

- Any LIC12 line or LIC11 ARC line can be activated by any CCU. This allows CLP and LIC11 sharing between two active CCUs.
- The two CCUs of the 3745 can share the two TIC3 ports on the same 3746-900 TRP, one port for each CCU. Any TIC3 can be activated by any CCU.

  However, once a LIC12, ARC, or TIC3 is activated, an attempt by the other CCU to activate it is not accepted.

If the 3746-900 cannot communicate with a CCU, the 3746-900 deactivates the resources and active sessions associated with this CCU. Depending on the mode of operation, these resources can be taken over by the other CCU and CBC.

3745 Twin-Dual Mode

Each CCU handles its own buses, 3745 adapters, and CBC.

If there is an interruption of 3746-900 operations with a CCU, the traffic in the 3746-900 corresponding to this CCU is interrupted. There is no switching of resources in this mode.

However, the 3746-900 resources can be reactivated if all of them are defined in each CCU (as described in "3745 Twin-Backup Mode" below). For example, if CCU-A fails, then a command list (CLIST) can reactivate 3746-900 resources via CCU-B. This allows restarting sessions that were previously using only 3746-900 adapters.

3745 Twin-Backup Mode

Each CCU handles its own buses, 3745 adapters, and CBC.

If the operations on a CCU are interrupted, an automatic fallback occurs. The remaining valid CCU handles all IOC buses, 3745 adapters, and 3746-900 adapters via its own CBC. If there is an interruption of the 3746-900 communications with a CCU (CBC failure), but the CCU remains operational, then there is no switching of buses. However, the 3746-900 resources which are normally owned by this CCU can be reactivated via the other CCU. This requires that NCP-A and NCP-B have all the 3746-900 resources defined as follows:

- In CCU-A the NCP has:
  - All resources of CCU-A defined and active
  - All CCU-B resources defined as backup and inactive
- In CCU-B the NCP has:
  - All resources of CCU-B defined and active
  - All CCU-A resources defined as backup and inactive

This allows restarting sessions that were previously using only 3746-900 adapters.

3745 Twin-Standby Mode

The active CCU handles all buses, 3745 adapters, and 3746-900 adapters via its own CBC.

If there is an interruption of the 3746-900 communications with a CCU and the CCU remains operational, then there is no automatic bus switching. However, a manual CCU fallback can be requested by the operator from the service processor. This allows reactivation of all 3746-900 resources via the other CCU and its CBC, but fallback is disruptive to all the remaining sessions, that is, those sessions that only 3745/3746 adapters (HSS, LSS, TRA, and ELA).

Chapter 15. ESCON Adapters

This chapter is designed to help you with the configuration and definition of ESCON adapters. Basic facts on installing ESCON processors and couplers in the base 9x0 frame are described in Chapter 11, "ESCON Overview" on page 11-1.

On the 3746, the ESCON adapter (ESCA) consists of a ESCON channel processor (ESCP), and ESCON channel couplers (ESCCs).

ESCP Types

ESCP Types include ESCP, ESCP2, and ESCP3. ESCP2 has a 16 MB storage and ESCP3 has a 32 MB storage and a more powerful processor. In this chapter ESCP stands for all ESCP processor types unless otherwise indicated. The improved performance and connectivity of the ESCP3 is described specifically in "ESCON Adapters" on page 15-2.

Planning for 3746 Base Frame ESCAs

Configuring your ESCON channels involves definitions in the service processor (MOSS-E[1]), host (IOCP/HCD), and possible 3745 NCPs and ESCON Directors.

To help you with this task, IBM has developed:

- ESCON Generation Assistant (EGA).
- Controller Configuration and Management (CCM)[2] , which is part of the Licensed Internal Code and is also available as a stand-alone program for OS/2 workstations from your IBM marketing representative. Use this program to configure your ESCAs in the 3746 Nways Multiprotocol Controller. Refer to "Using CCM" on page 15-6 and "Introducing EGA" on page 15-12 for more information.

  Plan your ESCA configuration by drawing a diagram, so that your ESCON connectivity requirements are clear. The diagram should include the following:
  - Amount of ESCAs required.
  - How they will be attached to the hosts, that is, with or without an ESCON Director(s).
  - If the ESCON Multiple Image Facility (EMIF) will be used to share one ESCA between several logical partitions (LPARs).
  - If the ESCON will be shared between several control points (NCPs, APPN/IP).

  A host link corresponds to a physical path between an ESCC or ESCC2 and a host or LPAR. Because only one host link can be established between an ESCC or ESCC2 and a host or LPAR, it is important to identify how many physical connections are required in your system to fulfill your throughput and backup requirements.

1 Licensed Internal Code.

2 CCM includes functions that are equivalent to the EGA for ESCONs under NCP control, previously available for the 3745/3746-900, and new functions to configure ESCON adapters for APPN, APPN/DLUR, APPN/HPR and/or IP.

It is also important to consider the use of LPARs and EMIF; each LPAR appears as a separate physical host. EMIF allows you to share ESCON channels across LPARs.

Installing the 3746 Nways Multiprotocol Controller Hardware

You should work with IBM to determine the positions of the ESCON adapter(s). The installation sheets produced by the hardware configurator (CF3745) provide guidelines for their physical installation. This, in turn, provides the 3746 ESCON coupler addresses needed for definitions in EGA for 3746-900 without NNP installed or CCM for 3746-9X0 with NNP installed (for ESCON under NCP control), Network Node Processor control (APPN/HPR, IP). You should review these sheets and verify that their ESCON channel needs have been met.

Chained ESCON Directors Are Supported

The use of chained ESCON Director is supported, but the use of ESCON Director ports already defined in dedicated connections is not checked by CCM (or EGA). Most of this information is defined by the ESCON Director administrator and can concern devices other than the 3746 ESCON adapters. Additional information about ESCON channels is available in the CCM/EGA online help.

ESCON Adapters

Native support of ESCON architecture provides flexibility in the design of host connections. ESCAs allow communication with the following:

- ES/3090 Models 180J, 200J, 280J, and above (ES/3090 J models must have EC 227574 or above installed).
- ES/3090-9000T (all models)
- ES/3090-9000 (TM) processors (all models)
- S/390 Parallel Transaction Servers (all models)
- S/390 Parallel Enterprise Servers (all models)
- S/390 Parallel Multiprise (TM) 2000 Servers (all models)

ESCAs also support the following attachments:

- 9032 and 9033 ESCON Directors

ESCON channels have the following advantages:

- Connectivity over greater distances between the 3745/3746 and the S/390. For example, the standard connection between a 3746 and a S/390 is up to 3 km. By using ESCON Directors, the S/390 can be up to 43 km away.
- More configuration flexibility.
- Increased performance.
- Decreased sensitivity to noise.

An ESCA consists of the following:

- One processor (ESCP2 or ESCP3)
- One coupler (ESCC2).

The ESCON channel processor type 3 (ESCP3) supports traffic routing for the 3746 network node, 3746 IP Router, and 3746 NCP traffic[3].

[3] ESCP3 enhanced performance for APPN/HPR, IP, and NCP traffic.

The ESCON coupler type 2 (ESCC2) provides:

- Higher data throughput for applications (for example, file transfer between S/390s and distributed servers).
- Enhanced performance in heavy interactive traffic environments using small messages.

When used in the 3746-900 NN, the ESCP2 or ESCP3 can concurrently support:

- NCP traffic for the Central Control Units (CCU) of the associated 3745.
- 3746 network node traffic.
- 3746 IP router traffic.

ESCON Multiple Image Facility (EMIF)

The 3746 9x0 supports ESCON Multiple Image Facility (EMIF) (see Figure 15-1). EMIF allows several logical partitions (LPARs) to share the same ESCON channel. A single ESCA can communicate with several LPARs in a S/390 server without the need of an ESCON director.

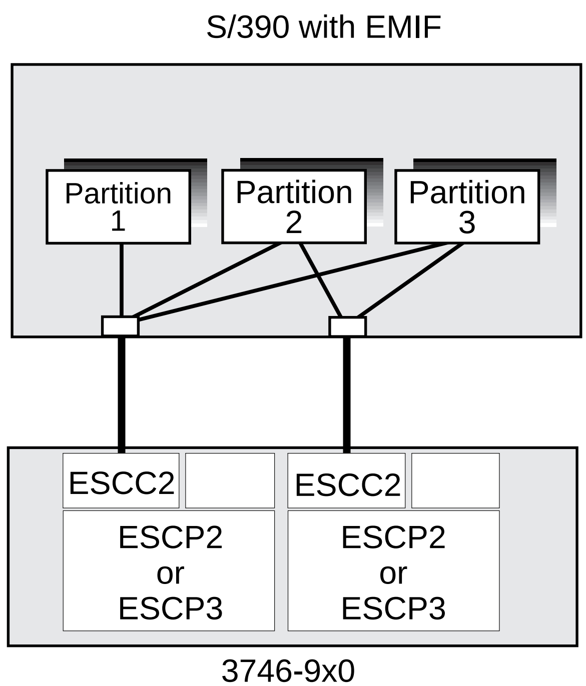


Figure 15-1. Example of EMIF Support with a 3746 9x0

ESCON Adapter Connectivity

ESCON adapters have the following connectivity options:

- An ESCA in the 3746-950 can communicate with 16 host logical stations (VTAMs, TCP/IPs, and TPFs) in up to 16 LPARs.
- An ESCON adapter in the 3746-900 NN can be shared by the 3746 NN, one or two active NCPs in the 3745, and the 3746 IP Router. Each ESCA supports up to 16 logical connections to host LPARs and stations. Any mix of 3746- or NCP-controlled logical connections to VTAMs, TPFs, and TCP/IPs can occur.

- An ESCON adapter type 3 supports up to 15000[4] APPN data sessions controlled by the 3746 network node.
- An ESCON adapter (ESCP2 or ESCP3) supports any number of HPR sessions (ANR) between HPR edge nodes and HPR VTAM nodes.

ESCON Link Components

An ESCA link consists of physical and logical parts shown in Figure 15-2 on page 15-5 and is described in this section:

- The physical line represents the ESCON adapter (ESCA) and the fiber optic cable between the ESCA and the host channel or ESCON Director.
- A host link (logical line) represents the logical connection between an ESCON coupler (ESCC or ESCC2) and a host (BASIC host mode) or a logical partition (LPAR or EMIF host mode).

  Several host links can be multiplexed over the same physical line using:

  – An ESCON Director, which can route the host links to different hosts or LPARs.
  – A host with the ESCON Multiple Image Facility (EMIF), which can route multiplexed host links to the correct LPARs.

  The ESCON adapter requires that *one* host link is defined for *each* host/partition that needs a logical connection.

- A logical link station (also called a host link station or link station) represents the logical connection between an active CCU or network node processor and a VTAM, TPF, or TCP/IP. Logical link stations can be multiplexed over a host link for 3745/3746-900 configurations, one logical link station must be defined for the 3746 Nways Multiprotocol Controller and one for each CCU to access the same VTAM, TPF, or TCP/IP.

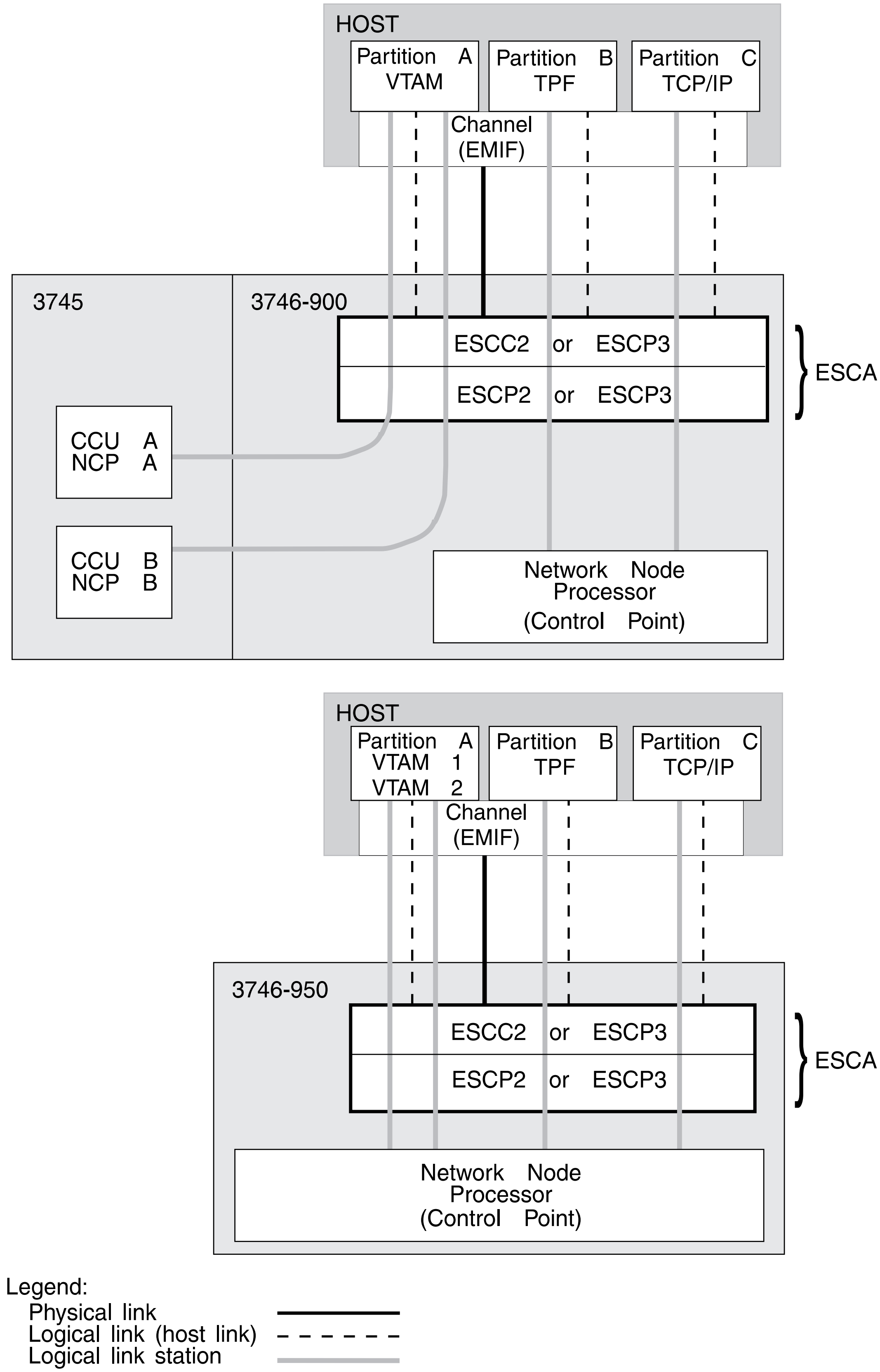
There should be *one* IODEVICE ADDRESS defined in VM/MVS/VSE IOGEN for *each* logical link station, that is to support a logical connection with a host/partition. If ADDRESS=(nnn,2) then this will make two IODEVICE addresses nnn and nnn+1.

Note: In Figure 15-2 on page 15-5, user traffic does not flow between the ESCP3 and the network node processor. This control part of the Logical Link Station path is only used for ESCON control messages (activation, deactivation, link status, and others).

User Traffic Bypasses Network Node Processor

The user traffic flows directly between the ESCP3 or ESCP2 and the host application without going through the network node processor.

4 See note 10 of Table 2-1 on page 2-32.



| *Figure 15-2. Physical Link and Host Link Sharing through the Same ESCON Adapter*

Using CCM

CCM parameter definitions necessary for ESCON channels can be grouped as follows:

- Couplers, including the ESCON directors.
- Hosts, including the host links.
- Stations (host link stations).
- IP address per station if IP is used.

Coupler Parameters

Coupler parameters include:

- Port name.
- Networking environment, that is, 3746 APPN/HPR, SNA/subarea (NCP), 3746 IP. Any combination can be used and may require ESCA sharing between NCP and the 3746 control point.
- Use of ESCON directors (ESCDs).

  If ESCDs are to be used, you must specify:

  – ESCD model and number

  – Control unit link address, which identifies the ESCD port connected to the optical fiber coming from the ESCON coupler.

Host Link Parameters

They include:

- Host link name.
- Host name.
- Host mode.
- Host CHPID, the channel path identifier that uniquely identifies a path. If the host mode is:

  – BASIC, only one CHPID must be specified because the ESCA communicates with the host through a single channel.

  – LPAR, a CHPID must be specified for each host link.

  – LPAR and an ESCD is used, the following parameters must be defined:

    - Partition name.

    - Host link address (HLA), which identifies the port on the ESCD connected to the optical fiber coming from a host. HLAs can be dynamically defined during path establishment. ESCC or ESCC2 and the host channel automatically assign a unique HLA to each path request in the order they are received.

      If you choose to manually define the HLAs, remember that each HLA must be unique among all the HLAs but also among all the CU link addresses.

  – EMIF, you must specify:

    - Partition name.

    - Partition number, which can be dynamically defined. (See “Dynamic Definition of Partitions” on page 15-7 for a definition of dynamic partitions.)

- Only one CHPID, since the ESCA communicates with the partitions through a single channel.

Station Parameters

They include:

- Station name
- Access method (VTAM, TPF, or TCP/IP)
- Unit address
- IP address in case of IP

Dynamic Definition of Host Link Addresses

For type 2.1 host nodes, this option allows the user to define a logical path from the host to the ESCC or ESCC2 without using predefined HLAs.

Each HLA must be unique among all the HLAs and *also among all the CU links*. Verification of the uniqueness of the HLAs and CU links is not done by CCM. This is the responsibility of the ESCD administrator.

When the dynamic link option is selected, during path establishment the ESCC or ESCC2 and host channel automatically assign a unique HLA to each path request in the order they are received.

Note: The path for a given connection may not always use the same links as the automatic assigning of HLAs to paths is done on a first-come-first-served basis.

For example, if the service processor is re-IMLed, the path could be different after the IML if the order of the path requests to reestablish the connections is different.

Dynamic Definition of Partitions

if you are using the ESCON Multiple Image Facility (EMIF), dynamic configuration of partitions is available. In the **ESCON Host links configuration** screen of CCM, use the *Partition Number Dynamic* option. This allows you to move an application from one partition to another without changing the MOSS-E definitions.

Dynamic Configuration Changes

If you modify an active configuration, changes can be either dynamically applied or saved into a new configuration file. When changes are dynamically activated, the network traffic is not affected except in some cases:

1. If SNA resources of an ESCON port that has been modified, are active, you must first manually deactivate these resources by using the VTAM program, and then activate the changes.
2. If you add or delete an ESCON port, the ESCON processor is automatically re-IMLed.
3. If you modify or delete an ESCON host link, the ESCON processor automatically is re-IMLed.

Preventing automatic IML

As a time saving option, CCM prompts you to choose if you want the ESCON processors to be automatically re-IMLed when you activate your configuration.

If you modify a non-active configuration, this does not affect the network traffic. In this situation, the changes you make to the configuration are only applied when that configuration is activated.

Configuration Example

Figure 15-3 shows the relationship between a configuration diagram and CCM configuration parameters.

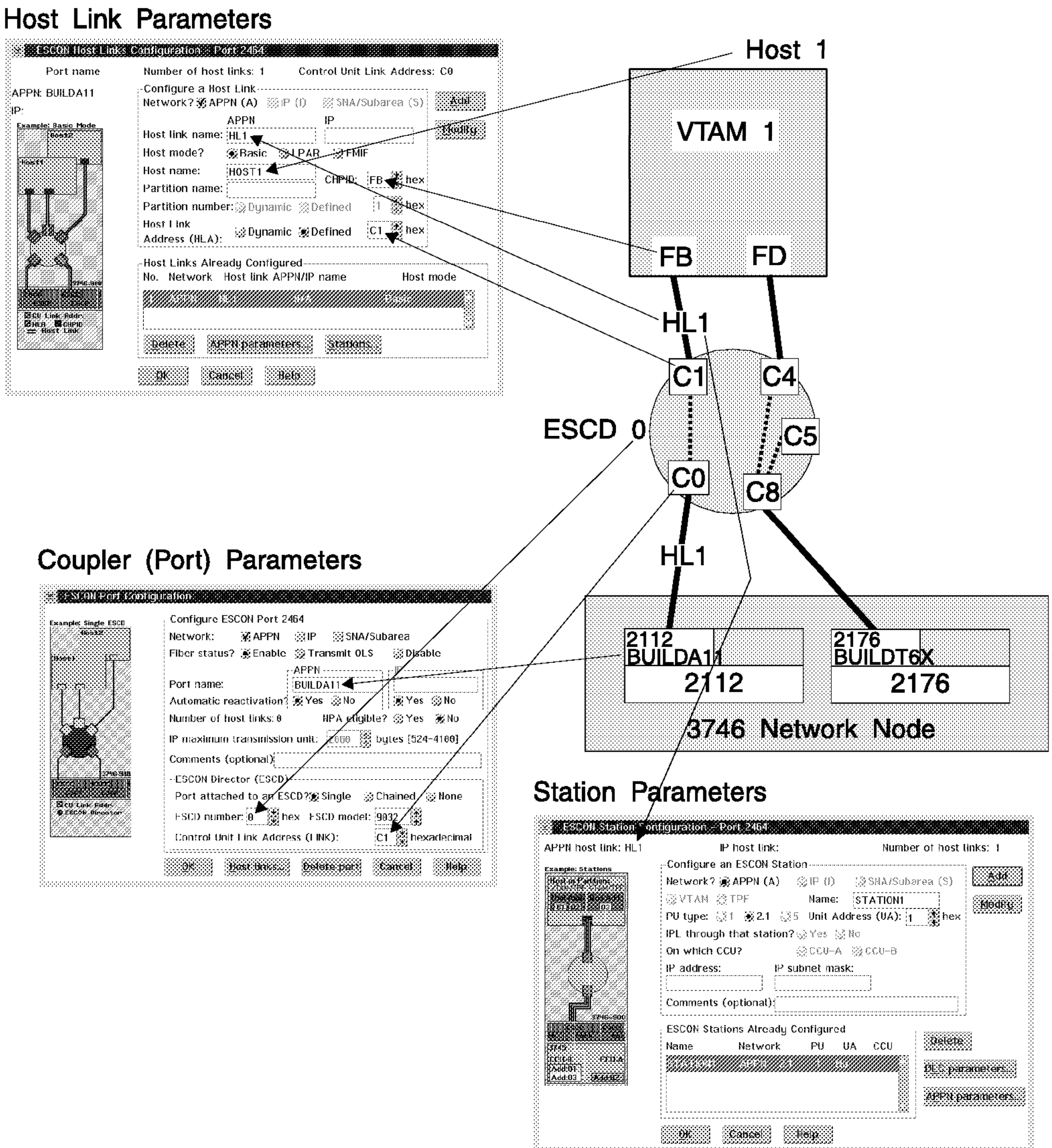


Figure 15-3. CCM Parameters

For further information about the parameters, refer to the worksheets in Chapter 40 and use CCM online help. For further information about CCM, refer to Chapter 25, “Welcome to the CCM” on page 25-1 and to the *IBM Controller Configuration and Management: User's Guide*, SH11-3081.

Configuration Reuse

Reusing Existing ESCON Configurations Created with the EGA

Configurations originally generated in EGA can be used in CCM by creating a new configuration and selecting **Import ESCON SBS file created with EGA**.

However, before the installation of the Licensed Internal Code supporting the 3746 Nways Multiprotocol Controller function, you should make sure that the existing EGA file (.SBS) reflects the ESCON configuration parameters currently used in your 3746. To check your definitions are correct or make necessary changes, use the following procedure:

Step 1. Record your current ESCON configuration parameters from the service processor display (Manage ESCON Processor).

Step 2. Install CCM stand-alone version on the OS/2 workstation where the .SBS files created by EGA stand-alone version are stored.

If CCM is installed on another workstation, copy the most recent .SBS files for your 3746 onto a diskette.

Step 3. Using CCM, create a new configuration and select **Import ESCON SBS file created with EGA**.

Step 4. Verify that the ESCON definitions match the current configuration parameters and, if needed, make updates.

Step 5. Add any new definitions and make any necessary changes needed for the new 3746 Nways Multiprotocol Controller.

Step 6. Export the resulting CCM configuration(s) onto a diskette (it contains all the ESCON files required).

Step 7. When the new microcode is installed in the 3746, use the CCM on the service processor to import CCM configuration (including the latest ESCON definitions you made) from the diskette.

Reuse of Existing ESCON Definitions

If you do not use EGA, or if you no longer have access to the .SBS files generated by the EGA for your machine, you must re-enter the ESCON definitions using CCM (either the stand-alone or the MOSS-E version). Until this is done, the current ESCON configuration parameters can be used with the Licensed Internal Code supporting the 3746 Nways Multiprotocol Controller, but they cannot be changed by using CCM on the service processor. To re-enter the ESCON definitions and be ready for the installation of the 3746 Nways Multiprotocol Controller support, use the following procedure:

Step 1. Record your ESCON configuration parameters from the service processor display.

Using the IOCP definition files, record also the CHPID and CU LINK values that are needed by CCM (they were not needed in version 3.6 or older of EGA).

Step 2. Use CCM (either the stand-alone or the MOSS-E version) to re-enter definitions for your ESCON resources. Make any changes and new definitions needed for the 3746 Nways Multiprotocol Controller.

Step 3. If you used an OS/2 workstation for step 2 on page 15-10:

a. Use CCM to export the resulting ESCON configuration onto a diskette.

b. Use CCM on the service processor of the 3746 Nways Multiprotocol Controller to import the ESCON configuration.

IOCP Generation for ESCON Channels

Following is the list of the IOCP macro-instructions supplied by the CCM in the generation output (.IOC) file.

```
RESOURCE                  CNTLUNIT
    PARTITION                 CUNUMBR
                              LINK
CHPID                         PATH
    PARTITION                 STADET
    PATH                      UNIT
    SWITCH                    UNITADD
    TYPE
                          IODEVICE
                              ADDRESS
                              CUNUMBR
                              UNIT
                              UNITADD
                              PARTITION
```

Note: If you are migrating to the Hardware Configuration Definition (HCD), use the IOCP generation provided by CCM as input for the HCD migration support.

NCP Generation for ESCON Channels (3746-900)

Following is the list of NCP definition statements and keywords supplied by CCM in the generation output (.NCF) file. They are only for NCP-controlled resources in a 3745/3746-900.

```
GROUP                    PU
    LNCTL                    ADDR
    PHYSRSC                  ANS
                             MONLINK
LINE                         PUTYPE
    ADDRESS                  XMONLNK
    HOSTLINK
    MAXPU
    MONLINK
```

Introducing EGA

Defining ESCAs for SNA/subarea traffic (for APPN/IP traffic, use CCM) for the 3746-900 can be done manually, but this may result in omissions or errors in specifying parameters, which can compromise, for example, an entire NCP generation. Therefore, the parameter definition tasks in the NCP, IOCP, and MOSS-E should be done using the latest version of EGA, which is part of the Licensed Internal Code (in the service processor) and is also available as a stand-alone program for OS/2 workstations from your IBM marketing representative. Use this program to configure your ESCAs. It has been developed to:

- Examine a range of input parameters
- Check and compare the input parameters
- Automatically create outputs to be used in NCP and IOCP generations and in the MOSS-E configuration

  Note: If you are migrating to the Hardware Configuration Definition (HCD), use the IOCP generation provided by the EGA as input for the HCD migration support.

The EGA will not remove all the complexity of defining a network that is heavily dependent on ESCAs, but it will help you to:

- Learn about the various parameters required to define an ESCA for NCP, IOCP, and MOSS-E.
- Understand the terms, ideas, and rules surrounding the configuration of 3746-900 ESCAs. For example, you will find out about:
  - Physical lines, host links, and stations
  - Basic mode
  - Logically partitioned mode (LPAR)
  - ESCON multiple image facility (EMIF)
  - Rules for specifying host links
  - Rules for specifying logical link stations
  - NCP definition statements and keywords
  - IOCP macro-instructions
  - MOSS-E parameters
- Create each source deck (parameter listing) to be used in NCP, IOCP, and MOSS-E.

  In creating the generations, the EGA requires you to answer a series of simple questions and make a small number of text entries. When you have finished entering the necessary information about all the ESCAs in one controller, you can save this input data in a subset (.SBS) file.

  When the subset is complete, the EGA creates formatted output for you to use in generating ESCA configurations for NCP, IOCP, and MOSS-E. This automatically verified parameter output (which is the ESCA portion of a complete NCP generation, IOCP generation, and MOSS-E configuration) is called a generation output.
- Prepare example subsets that may be studied and optimized. It is not necessary to re-enter all the data by hand when you want to change just a few parameters.

- EGA provides almost all definitions and helps you make consistent definitions for the IOCP, MOSS-E, and NCP. However, you must provide the labels for each NCP resource represented by an ESCON definition. You also must provide PCCU statements if they are used.

New Functions Supported in EGA 3.8 (for EC D22564.026 or Higher)

The EGA has several new abilities that are introduced with the Version 3.8:

1. The host link address (HLA) range has been extended from C0 - CF to 80 - FB, when using the IBM ESCON Director 9032 Model 3.
2. A new type of physical unit (PU) is supported for TCP/IP over ESCON: PU type 1 is selectable on the EGA station definition panel.
3. The initial ESCC fiber status can now be selected:
   - Enable (Enables the coupler and allows frame exchange to start.)
   - Transmit OLS (Off-line sequences are transmitted over the OUT fiber.)
   - Disable (Disables the coupler and turns off the light in the OUT fiber.)
4. The .SBS files can be exported using the Subset menu. This allows one or more configurations to be copied from the stand-alone EGA to a configuration diskette.
5. The IOCP output can now be used as input for HCD. The ADAPTER IOCP keyword value has been changed to TYPE7 to be compatible with HCD.
6. Using the service processor version of the EGA 3.8, the MOSS-E Configure ESCON Processors function now allows you to save several different ESCON configurations on the MOSS-E disk without interrupting the ESCA until you want to make a particular configuration active.

   To activate a configuration, select and open it. Choose **Save** in the Subset menu and then transmit it. Next do a permanent reset and IML of the modified ESCPs to actually activate the configuration.

Note: EGA version 3.8 is no longer available for IBM, it has been replaced by version 3.9 or higher versions. The EGA Version 3.9 supports OEM ESCON directors.

Installing Stand-Alone EGA

To run the stand-alone version of the *ESCON Generation Assistant*, you must have OS/2 Version 1.3 or higher, running on a PS/2 or equivalent workstation. It is recommended that you put this tool on your hard disk (it takes about three megabytes of storage, depending on the size of the output files) and that a printer be available. To transfer NCP and IOCP generation subsets to your host, you need Communications Manager.

To install EGA, follow the instructions in the READ.ME file that accompanies the program using a simple text editor.

All information and help for the EGA are online.

Note: The subsets created with versions previous to Version 2.0 cannot be used with Version 2.0 or later. Erase all the Version 1.x .SBS files from the directory where the tool is stored before using the Version 2.0 or later. All later versions of EGA are compatible with any .SBS files produced by earlier versions starting with Version 2.0.

Using EGA

EGA parameter definitions necessary for ESCON channels can be grouped as follows:

- Couplers, including the ESCON directors
- Hosts, including the host links
- Stations (host link stations)

Coupler Parameters

The coupler parameters include:

- Port name
- Use of ESCON directors

  If ESCDs are to be used, you must specify:

  – ESCD model and number

  – Control unit link address, which identifies the ESCD port connected to the optical fiber coming from the ESCON coupler

Host Link Parameters

The host link parameters include:

- Host link name
- Host name
- Host mode
- Host CHPID, the channel path identifier that uniquely identifies a path.

  If the host mode is:

  BASIC Only one CHPID must be specified because the ESCA communicates with the host through a single channel.

  LPAR CHPID must be specified for each host link.

  EMIF You must specify:

  – Partition name

  – Partition number, which can be dynamically defined

  – Only one CHPID, since the ESCA communicates with the partitions through a single channel

  LPAR and ESCD The following parameters must be defined:

  – Partition name.

  – Host link address (HLA), which identifies the port on the ESCD connected to the optical fiber coming from a host. HLAs can be dynamically defined during path establishment. ESCC or ESCC2 and the host channel automatically assign a unique HLA to each path request in the order they are received.

  If you choose to manually define the HLAs, remember that each HLA must be unique among all the HLAs but *also among all the CU link addresses*.

Station Parameters

The station parameters include:

- Station name
- Access method (VTAM or TPF)
- Unit address

Service Processor Version of EGA

Service Processor EGA

The microcode engineering change level D22560 provides the MOSS-E function equivalent to the stand-alone EGA Version 3.8.

| The microcode engineering change levels D46124 and D46134.008 provide
| MOSS-E functions equivalent to stand-alone EGA Version 3.9.

For a 3746-900 running this microcode level, you must use the new Configure ESCON Processors menu to configure the ESCON adapters via the MOSS-E. This menu is part of the Configuration Management function. It allows you to import and save an ESCON configuration from a diskette created by a
| stand-alone EGA 3.9.

It also allows you to prepare undated ESCON configurations and save them without disrupting the ESCON adapters. These adapters are now reset or re-IMLed only when the changes are activated.

The Manage ESCON Processors menu is used only to display the current status of the ESCON lines, stations, and couplers.

Notes:

1. If you have a second 3746-900 controlled by the same service processor, and it has not been upgraded to run the 3746-900 microcode provided in the engineering change level D22560, the MOSS-E Manage ESCON Processors menu continues to be used as before the upgrade to configure the second 3746-900.
2. If you are already using a stand-alone EGA, you should verify that the existing configuration on the OS/2 workstation accurately reflects the configuration that is actually running in the 3746-900 before the installation of an engineering change.
3. The latest EGA stand-alone version (3.9) for OS/2 workstations is available from your IBM representative through MKTTOOLS.

IOCP and NCP Generations for ESCON Channels

The IOCP macro-instructions and NCP definition statements and keywords supplied by the EGA are the same as CCM, refer to:

- “IOCP Generation for ESCON Channels” on page 15-11.
- “NCP Generation for ESCON Channels (3746-900)” on page 15-11.

MOSS-E Definitions for ESCON Channels

EGA produces a flat file containing all the ESCON channel parameters required by the MOSS-E.

They must be exported to a diskette for the IBM Service Representative installing your 3746-900. This configuration diskette is used to import the ESCON configuration into the MOSS-E[5] where it is saved on the hard disk.

EGA and a Microcode Upgrade

Using Your Current ESCON Configuration After the Upgrade

If you are not planning to change your current ESCON traffic in any way after the microcode change is installed, you have nothing to do; once this new level of MOSS-E and ESCA microcode is installed, your ESCON traffic will re-start using the same ESCON configuration as before the upgrade.

Changing an ESCON Configuration After the Upgrade

There are two methods to change your ESCON configuration for the *first* time after IBM upgrades your MOSS-E:

1. The easiest method, if you have been already using the stand-alone EGA, is to continue using the stand-alone EGA workstation. (This method assumes that you still have the configuration file(s) on your OS/2 workstation).
2. Manually using the MOSS-E on the service processor.

Using the Stand-Alone EGA

Step 1. Install the EGA in the sub-directory that contains the previous EGA version.

Step 2. Open the configuration

Step 3. Make the necessary changes for the new configuration

Step 4. Save the configuration

Step 5. Export it to a diskette.

After the microcode upgrade, use the MOSS-E Configuration Management function as follows:

Step 6. Open the **Configure ESCON Processors** menu.

[5] This is done with the service processor version of the EGA that has a minimum microcode level of D22560

Step 7. In the Subset menu, import, save, and, if you want to, activate the new configuration.

Repeat this procedure for every 3746-900 that will have the engineering change installed.

Note: If this procedure is used before the microcode change is installed, give the ESCON configuration diskette to the IBM service representative who installs the microcode change so that he can re-start the ESCON adapters using the new configuration.

Using the Service Processor EGA

Before the microcode upgrade, use the MOSS-E Configuration Management function as follows:

Step 1. Open the **Manage ESCON Processors** menu.

Step 2. Use the Display functions as necessary to record manually your complete current ESCON configuration on a worksheet.

After the microcode upgrade, use the MOSS-E Configuration Management function as follows:

Step 3. Open the **Configure ESCON Processors** menu.

Step 4. In the Subset menu, select **New** to enter the parameters you recorded on your worksheet in step 1 and make any necessary changes for the new configuration.

Step 5. While still in the Subset menu, save, and, if you want to, activate the new configuration.

Repeat this procedure for every 3746-900 that will have the engineering change installed.

Performance Tuning

A Note of Warning

Proper operation of the 3746-900 or 3746-950 requires adequate setting of VTAM, TCP/IP, and CCM parameters, and NCP for resources under NCP control.

There are parameter values that need to be changed when migrating from a parallel channel (CADS or BCCA) to an ESCON channel or from an NCP-controlled ESCON channel to a 3746-controlled ESCON channel. When planning your ESCON implementation, this section must be used.

TCP/IP Considerations

The 3746 Nways Controller (Model 900 and 950) implements both an APPN network node and an IP router function. The 3746-9x0 IP router function is completely independent of the 3745 NCP IP router function. The 3746-9x0 IP router function connects to TCP/IP for MVS over an ESCON channel using the CDLC channel protocol.

The 3746-9X0 supports native IP over:

- ESCON adapters (with ESCP2 and ESCP3)

- Token-ring adapters (with TRP2 and TRP3)
- Communication line adapters (with CLP2 and CLP3) for frame relay, PPP, and X.25).

The throughput is increased because the data goes directly from the adapter to MVS TCP/IP in the host. This enhancement allows IP datagrams to be sent and received across the channel without having been encapsulated into SNA, frames as otherwise done with SNALINK. The result is reduced mainframe CPU consumption and improved throughput, because interaction with SNALINK address space is no longer required.

Performance Tuning is simplified because:

- Controller Configuration Management (CCM) Tool is configured such that default parameters are optimized for performance, it is very important to keep ESCON Station DELAY at 0 in order to insure a good throughput during a one way file transfer.
- For ESCON, MTU or IP packet size needs to be set in the MVS TCP/IP profile (GATEWAY or BSDROUTING parameters). Recommended MTU size or packet size is 4096. Make sure you explicitly state the packet size instead of default size, and for that code 4096 in the DEVICE statement while 4092 is coded in GATEWAY or BSDROUTING. Please refer to the TCP/IP profile example in the following paragraph.
- for FTP make sure that the IP packet size MTU is large enough from end to end (workstation to host). For an ESCON adapter, use the value in the TCP/IP profile running on the host. For the other adapters,the default value needs to be increased to the recommended ESCON value of 4096 kbps.

TCP/IP PROFILE Example

```
;
; USRTCP.PROFILE.TCPIP
; ====================
; ----------------------------------------------------------------------
;
; The various pool sizes can be customized for your environment.
; Please see the Planning and Customization manual for details on
; improving your system's overall performance by changing these
; values.

ACBPOOLSIZE                 1000
ADDRESSTRANSLATIONPOOLSIZE  1500
CCBPOOLSIZE                 150
; DATABUFFERPOOLSIZE          160  8192
DATABUFFERPOOLSIZE          160  32768
ENVELOPEPOOLSIZE            750
IPROUTEPOOLSIZE             300
; LARGEENVELOPEPOOLSIZE       50   8192
LARGEENVELOPEPOOLSIZE      100   32768
RCBPOOLSIZE                 50
SCBPOOLSIZE                 256
SKCBPOOLSIZE                256
SMALLDATABUFFERPOOLSIZE     25
TCBPOOLSIZE                 256
UCBPOOLSIZE                 100

;
; ----------------------------------------------------------------------
;
; Turn off all tracing.  If tracing is to be used, comment out the
; NOTRACE command and insert the TRACE statements here.

NOTRACE SCREEN
; TRACE <trace_parameter>
; TRACE ALL
; MORETRACE ALL

;
; ----------------------------------------------------------------------
;
; Inform the following users of serious errors
;

INFORM
    CCPIBE TCPMAINT
    BEN    TCPMAINT
    CCPIB5 TCPMAINT
    COUSTO TCPMAINT
ENDINFORM

;
; Obey the following users for restricted commands
;

OBEY
    CCPIBE  TCP197E4 TCPMAINT
```

```
    TREMEUR TCP197E4 TCPMAINT
    CCPIB5  TCP197E4 TCPMAINT
ENDOBEY

;
; -----------------------------------------------------------------------
;
; Flush the arp tables every 5 minutes
;

ARPAGE 5

;
; -----------------------------------------------------------------------
;
; The SYSCONTACT and SYSLOCATION statements are used for SNMP.
;
; SYSCONTACT is the contact person for this managed node and how to
; contact this person.  Used for MVS agent MIB variable "sysContact".
;
;
;SYSCONTACT
;   MAIN SUPPORT
;ENDSYSCONTACT
;
;
DATASETPREFIX USRTCP
;
; SYSLOCATION is the physical location of this node.  Used for MVS
; agent MIB variable "sysLocation".
;
;
SYSLOCATION
   BOX TEST IP B2 LEVEL 1
ENDSYSLOCATION
;
; Set Telnet timeout to 10 minutes
; ================================
INTERNALCLIENTPARMS TIMEMARK 600 ENDINTERNALCLIENTPARMS

; DEFINITION OF IP NATIVE TCPIP MVS TO ESCON ADAPTER 3746-9XX
; ==========================================================
;DEVICE NCPCAR1 NCPC C25  "read-buff"
;                         "write buff" read_size" "write_size"
;
 DEVICE NCPCAR1 NCPC C25 100 100 4096 4096
 LINK  CAR1 NCPC 0 NCPCAR1
;
; -----------------------------------------------------------------------
;
; AUTOLOG the following servers.
;

AUTOLOG
;   T22SNL01    ; SNALINK
;   T22LU62     ; SNALINK LU 6.2
  T22FTPA     ; FTP Server
```

```
  T22FTPB     ; FTP Server
; CEFTP   CE  ; FTP Server
;   T22LPSV     ; LPD Server
;   T22NMS      ; Domain Name Server
;   T22PORTM    ; Portmap server
;   T22ROUTD    ; RouteD Server
;   T22SMTP     ; SMTP Server
;   T22SNMPD    ; SNMP Agent Server
;   T22SNMPQ    ; SNMP Client Address space
;   T22X25      ; X25
;   MVSNFS      ; Network File System Server
ENDAUTOLOG

;
; ----------------------------------------------------------------------
;
; Reserve PORTs for the following servers.
;
; NOTE:  A port that is not reserved in this list can be used by
;        any user.  If you are have TCP/IP hosts in your network that
;        reserve ports in the range 1-1023 for privileged
;        applications, you should reserve them here to prevent users
;        from using them.
;
;        The port values below are from RFC 1060, "Assigned Numbers"

PORT
    20 TCP T22FTPA   NOAUTOLOG ; FTP Server
    20 TCP T22FTPB   NOAUTOLOG ; FTP Server
    21 TCP T22FTPA             ; FTP Server
    21 TCP T22FTPB             ; FTP Server
    23 TCP INTCLIEN            ; TELNET Server
    25 TCP T22SMTP             ; SMTP Server
    53 TCP T22NMS              ; Domain Name Server
    53 UDP T22NMS              ; Domain Name Server
   111 TCP T22PORTM            ; Portmap Server
   111 UDP T22PORTM            ; Portmap Server
   135 UDP T22LLBD             ; NCS Location Broker
   161 UDP T22SNMPD            ; SNMP Agent
   162 UDP T22SNMPQ            ; SNMPQE Agent
   515 TCP T22LPSV             ; LPD Server
   520 UDP T22ROUTD            ; RouteD Server
   750 TCP T22KERB             ; Kerberos
   750 UDP T22KERB             ; Kerberos
   751 TCP T22@ADM             ; Kerberos Admin Server
   751 UDP T22@ADM             ; Kerberos Admin Server
  2049 UDP MVSNFS              ; NFS Server
  3000 TCP T22CICS             ; CICS Socket

; HOME Internet addresses of each link in the host.
; ================================================

HOME
 9.100.75.1    CAR1

;
; IP Routing information for the host.  All static IP routes should
```

```
; be added here.
;

GATEWAY
;
; Direct and Indirect routes
;
; Network  First hop  Driver   Packet size  Subnet mask  Subnet value
 9.100.75.2     =      CAR1      4092     HOST
 210       9.100.75.2 CAR1      4092      0
 204       9.100.75.2 CAR1      4092      0
 9         9.100.75.2 CAR1      4092      0
 10        9.100.75.2 CAR1      4092      0
 11        9.100.75.2 CAR1      4092      0
 12        9.100.75.2 CAR1      4092      0
 13        9.100.75.2 CAR1      4092      0
 14        9.100.75.2 CAR1      4092      0
;
; Default Route - All packets to an unknown destination are routed
;                through this route.
;
; Network  First hop   Driver   Packet size  Subnet mask  Subnet value
;
;DEFAULTNET 9.100.75.2  CAR1   DEFAULTSIZE         0
 DEFAULTNET 9.100.75.2  CAR1   4096                0
;
;
; -----------------------------------------------------------------------
;
; ; RouteD Routing information (if you are using the ROUTED server)
; ; If you are using RouteD, uncomment all the lines below for
; ; 'BSDROUTINGPARMS', and comment out all the lines for the 'GATEWAY'
; ; statement.
;
; ;  link     maxmtu   metric   subnet mask     dest addr
; BSDROUTINGPARMS false
;    TR1       2000      0     255.255.255.0   0
;    ETH1      1500      0     255.255.255.0   0
;    FDDI1  DEFAULTSIZE   0     255.255.255.0   0
;    L0102SNA  2000      0     255.255.255.0   1.2.1.1
; ENDBSDROUTINGPARMS
;
;
; Use TRANSLATE to specify the hardware address of a specific internet
; address.  See the Planning and Customization manual for more
; information
;
;TRANSLATE
```

VTAM Considerations

```
; -----------------------------------------------------------------------
; Define the VTAM parameters required for the TELNET server
;

BEGINVTAM
    ; Define logon mode tables to be the defaults shipped with the latest
    ; level of VTAM
  3278-3-E NSX32703 ; 32 line screen - default of NSX32702 is 24 line screen
  3279-3-E NSX32703 ; 32 line screen - default of NSX32702 is 24 line screen
  3278-4-E NSX32704 ; 48 line screen - default of NSX32702 is 24 line screen
  3279-4-E NSX32704 ; 48 line screen - default of NSX32702 is 24 line screen
  3278-5-E NSX32705 ; 132 column screen - default of NSX32702 is 80 columns
  3279-5-E NSX32705 ; 132 column screen - default of NSX32702 is 80 columns
    ; Define the LUs to be used for general users
  DEFAULTLUS
      TCP01001 TCP01002 TCP01003 TCP01004 TCP01005
      TCP01006 TCP01007 TCP01008 TCP01009 TCP01010
      TCP01011 TCP01012 TCP01013 TCP01014 TCP01015
  ENDDEFAULTLUS
  DEFAULTAPPL CNM01 ; Set the default application for all TELNET session
  LINEMODEAPPL ITPECHO ; send all line mode terminals directly to TSO
  ALLOWAPPL TSO* DISCONNECTABLE ; Allow all users access to TSO applications
              ; TSO is multiple applications all beginning with TSO so use
              ; the * to get them all. If a session is closed, disconnect
              ; the user rather than log off the user.
; RESTRICTAPPL IMS ; Only three users may use IMS
;   USER USER1 ; Allow user1 access
;     LU TCPIMS01 ; Assign USER1 LU TCPIMS01
;   USER USER2 ; Allow user2 access from the default LU pool
;   USER USER3 ; Allow user3 access from three TELNET sessions, each with
               ; different reserved LU.
;     LU TCPIMS31 LU TCPIMS32 LU TCPIMS33
  ALLOWAPPL * ; Allow all applications that have not been previously
              ; specified to be accessed
ENDVTAM

;
; -----------------------------------------------------------------------
;
; Start all the defined devices.
; Done with OBEYFILE COMMAND DSN='user.tcpip'
;
START NCPCAR1
```

VTAM PTFs

Refer to *IBM 3745 Communication Controller Models A, IBM 3746 Nways Multiprotocol Controller, Models 900 and 950: Overview* for information about the PTFs that need to be installed to insure proper support of the 3746 Nways Multiprotocol Controller DLUR function.

TCP/IP PTFs

Refer to *IBM 3745 Communication Controller Models A, IBM 3746 Nways Multiprotocol Controller, Models 900 and 950: Overview* for information about the PTFs that need to be installed to insure proper support of the 3746 Nways Multiprotocol Controller IP function (TCP/IP V3R1 + APAR II09903).

Attention Delay Timer

Attention delay is defined in CCM by the DELAY timer parameter in the ESCON Station - DLC Parameters panel. Defining ESCON stations with a Delay timer value greater than zero may increase the response time by up to two times the value compared to Delay timer=0. This represents an increase of up to 0.2 seconds when using the default value of 0.1 seconds.

Potential Effects of DELAY=0 on Adapter Throughput

A Delay timer=0 increases the occurrences of the attention status on the channel, which requires some host process before actual data transfer over the channel adapter. This may reduce the throughput, specifically when there is only one logical link station on the adapter. However, with multiple logical link stations per adapter (up to 16), the adapter is free for data transfer by the other logical link stations.

Therefore, the following is recommended:

- For response time-oriented applications (transaction processing, interactive traffic) and for data throughput-oriented applications (client-server, batch), the attention delay should be set to 0.

VTAM/TPF Buffer

For optimal throughput over an ESCON channel, the VTAM/TPF buffers (IOBUFs) should be as large as the largest message (including the SNA or APPN/HPR overhead) to be sent over the channel. The largest possible VTAM/TPF buffer size is about 4 KB (the size of one page of memory).

However, ESCON adapter performance is not significantly improved for buffer sizes greater than 2 KB and host memory management is optimized with this size buffer if the average message size is 2 KB or larger.

> **Important**
>
> Verify that the host has enough storage for these buffers so that the overall host performance is not impaired.

For more information on the definition of:

VTAM IOBUF buffer pool start option
Refer to the *VTAM Resource Definition Reference*.

UNITSZ definition in the VTAM HOST macro
Refer to the *VTAM Network Implementation Guide*.

Maximum BTU Size

The maximum basic transmission unit (BTU) size supported by the 3746 Nways Multiprotocol Controller is 8000 bytes. For ESCON host links, the CCM parameters “Maximum received PIU size” and “Maximum sent PIU size”in the “Port Configuration - APPN Configuration” panel of CCM should be set to 8000 bytes, if possible as it has the least amount of overhead due to frame headers. This means that it may be necessary to use a less than optimal value of 8000 bytes because some of the equipment used as network node may have a maximum possible BTU size less than 8000 bytes. Using CCM, specify a maximum BTU, or maximum IP transmission unit of at least 4096, or higher if TCP/IP MVS levels allow.

File Transfer Performance (APPN/HPR)

Using CCM, set the Maximum Received PIU size and Maximum Sent PIU size to higher values than the default set by CCM. Pay special attention to the Buffer Utilization of the adapter (see the MOSS-E Performance Management menus). If the processor utilization exceeds 70%, then either:

- Decrease the Transmission Window size, or
- Increase the Acknowledgment Frequency at the receiver side

You may need to do this more than once until you get the optimum values for this adapter.

File Transfer Performance (IP)

Using CCM, specify a maximum transmission unit (MTU) value of at least 4096 bytes, or higher if the TCP/IP MVS levels allow.

High Number of End Nodes on an ESCON Adapter

The information in “File Transfer Performance (APPN/HPR)” also applies here.

Forcing the Use of a Specific APPN/HPR Route

You can configure a session to use a specific path rather than the default used by the 3746 Nways Multiprotocol Controller. The method to force a route, explained in the VTAM V4 R2 (or higher) *Network Implementation Guide*, does not entirely apply to the 3746 Nways Multiprotocol Controller because the UPARM1 parameter has a fixed value (128) in the 3746. Instead, use the COSTBYTE or COSTTIME parameter:

1. In VTAM, set `UPARM1=(0,255)`. Set either COSTBYTE or COSTTIME to a range that will include the value used in CCM but exclude zero (0).
2. In CCM, change the default value (zero) of either COSTBYTE or COSTTIME. to the value corresponding to the route you want to use. Be sure to keep the value within the range set in VTAM.

Station Definitions in VTAM

In VTAM, you must attribute an address to each station defined in CCM.

For an APPN/HPR connection (controlled by the 3746 Nways Multiprotocol Controller), you must define and activate the local major node related to the MVS IOGEN address to activate the connection.

In the following example, the virtual address of the APPN/HPR station (controlled by the 3746 Nways Multiprotocol Controller) is 700.

```
S12L0700 VBUILD TYPE=LOCAL

P12L0700 PU    CUADDR=700,XID=YES,CPCP=YES,
               PUTYPE=2,MAXBFRU=15,
               CONNTYPE=APPN
```

For channel attachment to the data host (for channels controlled by NCP) you must define and activate the local major node related to the address to activate the attachment.

In the following example, the virtual address of the subarea station is 700.

```
C39MAJ   VBUILD TYPE=CA

GRC39    GROUP  LNCTL=NCP

LINEC39  LINE   ADDRESS=700,MAXBFRU=254

PHYC39   PU     TGN=1
```

Chapter 16. Token-Ring Adapters

This chapter is designed to help you with the configuration and definitions of your 3746 Nways Multiprotocol Controller token-ring adapters (TRAs) for APPN/HPR, IP traffic, and NCP.

While waiting for delivery of your 3746 Nways Multiprotocol Controller, start assembling the information necessary for its token-ring adapter definition(s).

On the 3746, token-ring adapters (TRAs) consist of a token-ring processor (TRP), and token-ring interface couplers (TICs).

TRP Types

TRP Types include TRP, TRP2, and TRP3. TRP2 has a 16 MB storage and TRP3 has a 32 MB storage and a more powerful processor. In this chapter, TRP stands for all TRP types, unless otherwise indicated. The improved performance and connectivity of TRP3 is described more specifically in "Token-Ring Adapter Connectivity" on page 16-4.

Planning for Token-Ring Adapters

The first step in planning your configuration is to decide how many TRAs you need. Besides physical connectivity, the following other items may affect the number of 3746 Nways Multiprotocol Controller token-ring ports (TIC3s) and processors (TRPs) needed:

- How many active physical units (PUs) need to be connected (APPN/DLUS/DLUR/HPR and NCP)?
- How many user sessions need to be supported (APPN/DLUR, NCP)?
- What is the minimum number of TIC3s needed to satisfy your token-ring availability requirements (including backup TIC3s)?
- Are different types of traffic (3746 IP, 3746 APPN/HPR, and 3746 NCP) to be carried over the same TIC3 or over different TIC3s (and TRPs)?
- What is the expected data throughput or transaction rate?

Note: A maximum of 16 TRAs can be installed in the 3746 if there are no ESCAs or communication line adapters (CLAs) installed and if the second and third adapter enclosures are installed.

Use of Service Processor LAN

You must not attach any user stations to the service LAN of a 3746 Nways Multiprotocol Controller. Refer to "Service Processor Sharing and Use of Service LAN" on page 34-6.

The service processor LAN must be used exclusively for communication between the service processor, CBSP[1], network node processor, multiaccess enclosure

[1] CBSP2 or CBSP3 is required if you are running APPN/HPR and/or IP traffic in the network node processor (NNP).

(MAE), and 3745 MOSS (for the 3746-900). The 3746 Nways Multiprotocol Controller does not activate user stations over the TIC3 port connecting the service LAN (logical address 2080).

A NCP-controlled 3746-900 without NNP can run 500 PUs on the service processor LAN.

NCP Remote Loading and Activation in Twin-CCU Models

If you plan to use NCP remote loading and activation (RLA) operations with 3746-900 TIC3s while in twin-backup or twin-dual mode, you must use a different TIC3 for each CCU. Refer to the information on token-ring links in the *NCP V7 R2: Generation and Loading Guide*, SC31-6221. To do RLA through TIC3 ports, the following resources have to be defined for each CCU:

- A physical line with an associated physical link station. There must be a different physical link for each CCU, that is, the NCP LOCADD keyword value (for the LINE definition) must be different for each CCU.
- A logical line with its associated logical link station in each CCU. There must be a different logical link for each CCU.

If the two CCUs access the same host via the same 3745 or 3746-900 TIC port, the corresponding PU definition has the same ADDR keyword value in both CCUs. This is shown in Figure 16-1 on page 16-3.

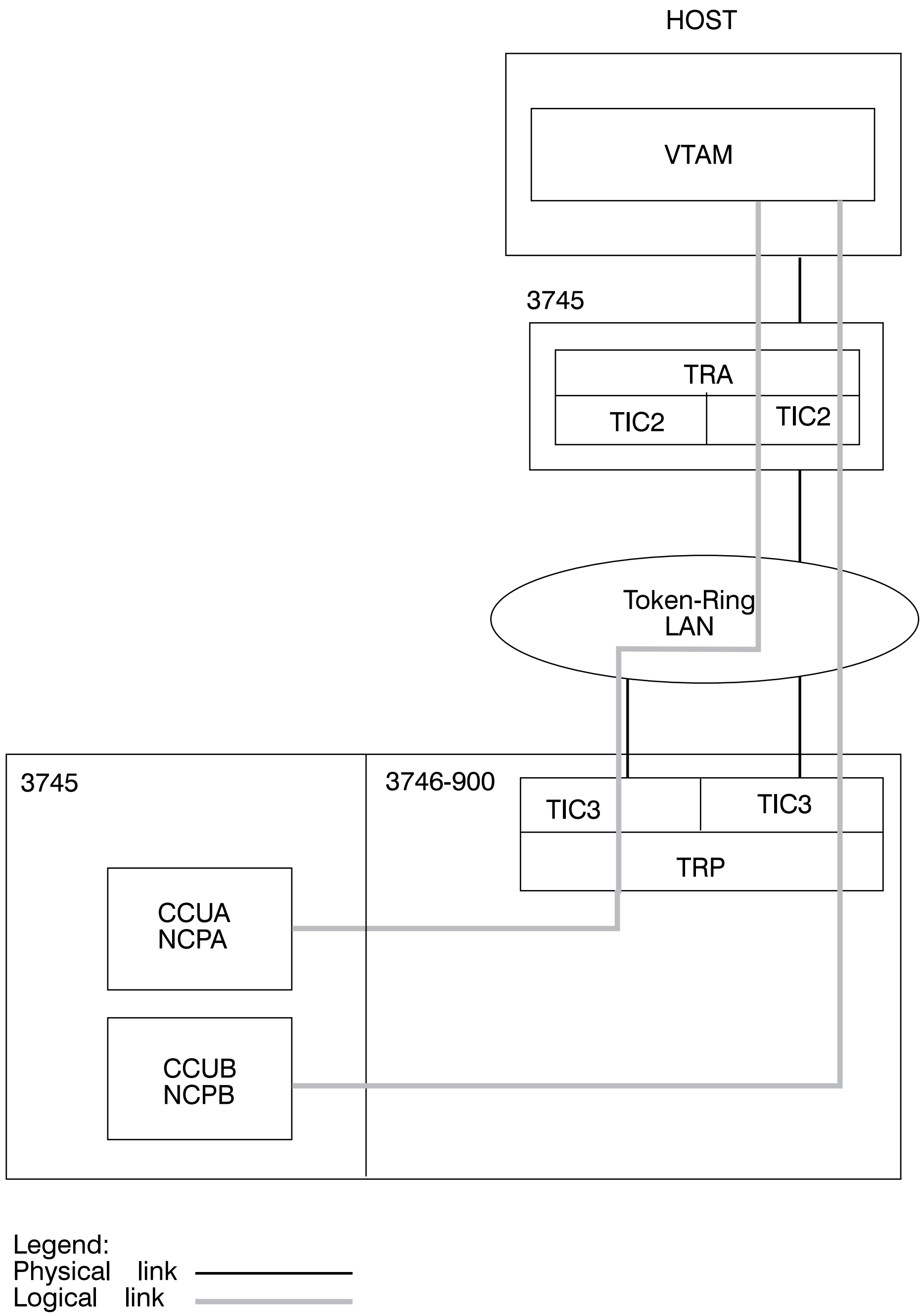


Figure 16-1. Physical and Logical Links

3746-9x0 Token-Ring Implementation

Token-Ring Adapter Connectivity

IP Connections

There are no limits to IP connections since IP is a “connectionless protocol”.

Maximum Number of Active Physical Units (APPN, Dependent, HPR)

In the 3746-950, up to 2000 physical units (PUs) (for example, PS/2s and 3174s) can be active at the same time on a token-ring processor type 3 (TRP3). The 2000 PUs can be NCP-controlled, APPN/HPR-controlled, or APPN/DLUR-controlled. Any mix of NCP, APPN/HPR, and APPN/DLUR PUs is supported. Any ratio of PU-sharing between the two TIC3s on the processor can be used. For example, 1600 PUs can be activated via one TIC3 and 400 via the other TIC3.

In the 3746-900, the TRP3 supports up to 2000 active PUs.

Maximum Number of LU Sessions (APPN/DLUR)

Depending on the amount of storage available in the TRP3, the maximum number of APPN and dependent LU sessions controlled by the network node processor is 8000 per TRP3.

In the 3746-900, the maximum number of sessions established by NCP depends on the amount of storage available in the 3745 CCU and is independent of the 3746 control point sessions. The maximum number of possible sessions over a TRP3 is equal to the maximum number of NCP-controlled sessions (3745 storage dependent) plus the maximum number of sessions that can be established by the 3746 control point on the TRP3 (up to 8000).

Checking of Activation Limits and Capacity Planning

Activation limits are controlled in the following ways:

3745/3746 configurator (CF3745)
For planning TRP storage and PU limits.

The performance and storage can be used to verify that the planned TRP configurations do not exceed the TRP storage and PU limits.

NetView Performance Monitor (NPM)
For TRP storage and processor utilization.

NPM Version 2, Release 3 (with APAR AW30643) monitors the storage and processor utilizations of TRPs.

Note: If you are using NPM Version 2 Release 1, APAR numbers OW08565 and OW10584 are required as a minimum.

This information can be used to balance PUs between existing TRPs or help in adding new TRPs.

MOSS-E function
For TRP storage and processor utilization.

The Performance Management function of the MOSS-E can produce a graph of TRP storage and processor utilization. This information can be used to balance PUs between existing TRPs or help in adding new TRPs.

PU limit per TRP
When a TRP has reached its limit of active PUs:

- If the 3746 control point or 3746-900 NCP tries to activate another PU, the TRP rejects the PU activation and a generic alert is sent to NetView indicating a congestion status.
- If there is an incoming call from a workstation, the TRP ignores the activation request (TEST frame).

Storage limit
For TRP storage thresholds.

There is no automatic control of the number of LU sessions being established by the 3746 control point for a given TRP.

If the storage limit of the TRP is reached:

- New PU activation requests from the 3746 control point (for example, from the Management Menu of CCM) or an NCP (3746-900) and new LU-LU requests from the 3746 control point are rejected and a generic alert is sent to NetView indicating a congestion status:

  TRP at High Storage Threshold (97%)
  When the TRP storage utilization is greater than or equal to 97% over a period of three minutes, an alarm and a NetView alert are generated (every three minutes, up to three times).

  TRP back to normal storage threshold (95%)
  An alarm and a NetView alert are generated when both the following are true about TRP storage utilization:

  – It is greater than or equal to 97% over a period of three minutes or more *and*

  – It decreases to 95% or less over a period of three minutes.

- New incoming calls (TEST frames) from workstations are ignored by the TRP.

Incoming Calls

Incoming calls over a TIC3 port are accepted by the 3746 Nways Multiprotocol Controller in two cases:

- The calling station is predefined in the 3746 Nways Multiprotocol Controller.
- The TIC3 port is defined in the Accept Incoming Calls option of CCM.

Unshielded Twisted-Pair Cabling

An IBM 8250 Multiprotocol Intelligent Hub, with a Token-Ring Multistation Access Unit (MAU) Module, can be connected to a TIC3 using an Unshielded Twisted-Pair (UTP) cable and a Token-Ring UTP Media Filter. The filter, which must be plugged into the TIC3, and the UTP cable replace the token-ring attachment cable.

The UTP media filter is a component of the IBM 8250. Depending on the country, it must be ordered as either an accessory (part number 43G3875) or a feature (number 3875). For more information on the UTP media filter and cables, refer to page 44-93.

Token-Ring Port Sharing with NCP (3746-900)

The 3746 NN and NCP can share the same TIC3 port, but this may lead to problems when one of the limits of active PUs is reached.

No Call-Ins Accepted

When there is a TIC3 shared between NCP and the 3746 NN and the NCP or TRP reaches the maximum number of possible active PUs, call-ins will not be accepted for NCP or for the NNP (3746 NN control point).

Note: The maximum number of active PUs may be reached in the following situations:

For NCP

- There are no more station available in the pool of token-ring switched stations.
- No CCU storage remains available for PU activation.

| **For a TRP**

| - 2000 active PU limit reached
| - No TRP storage remains available for PU activation.

When a port is shared between NCP-control and a 3746 NNP-control, the definitions for the port in NCP and CCM must use the following information:

- Same local MAC address
- Same speed
| - Different local SAPs ('04' is the SAP used by NCP)

Otherwise, the second activation of the port is refused.

Token-Ring Availability Functions

Duplicate TIC3 Addressing (3746 NN and NCP)

Duplicate TIC addresses can be used to provide automatic backup and load distribution for APPN, HPR, and VTAM-dependent (DLUR) traffic controlled by the 3746 Network Node (NN) or NCP.

As shown in Figure 16-2, a duplicate address configuration consists of multiple TIC3s, sharing the following characteristics:

- Installed in the same 3746
- Use the same MAC address (the locally administered address)
- Connect to the LAN backbone via bridges

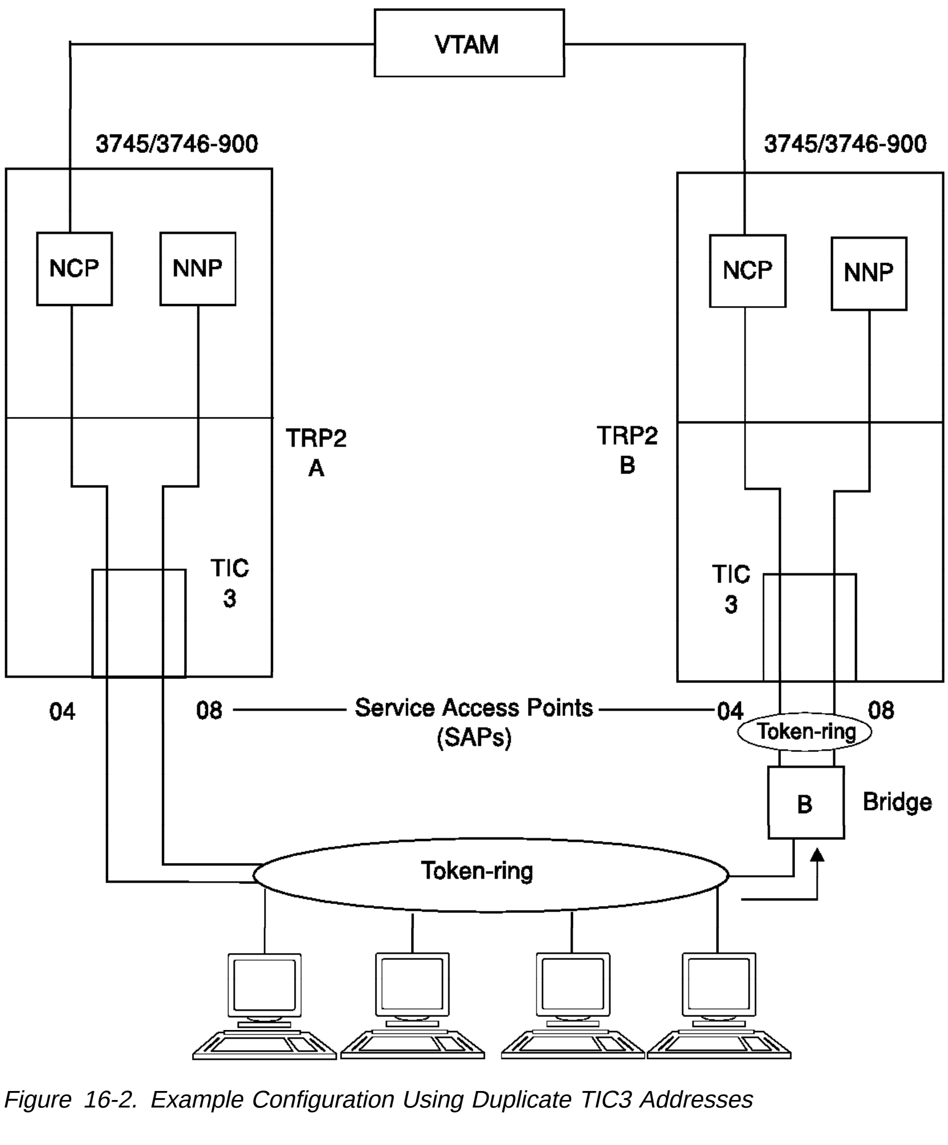


Figure 16-2. Example Configuration Using Duplicate TIC3 Addresses

To connect NCP-controlled PUs and NNP-controlled PUs, each TIC3 (using the same duplicate MAC address) must be enabled with the same set of service access point (SAP) values: one SAP for NCP (default = 4) and one SAP for the NNP. In this example, the token-ring stations that address NCP use a destination SAP (DSAP) of 04, and the stations that address the 3746 NNP use a DSAP of 08.

When TIC3s are used in this type of TIC address configuration, they operate as follows:

- For an incoming call, the PU is activated and the LU-LU session is established via the first TIC3 port that answers the workstation request (TEST frame).

  If the maximum number of allowed active PUs has been reached on a TRP, or if either NCP or the APPN control point are congested, the TRP ignores the workstation request (no NetView alert). If there is a TIC3 with the same MAC address, and it is connected to another TRP (as shown in Figure 16-2 on page 16-7) that has not reached its PU limit, then the PU is activated and the LU-LU session is established via this second TRP.

- For outgoing calls (PU activation requests from VTAM and CCM), the 3746 control point is able to distribute them over the TIC3 ports with the same MAC address, provided that these ports are on the same 3746 Nways Multiprotocol Controller.

If, for any reason, the traffic through a given path is interrupted, the PU connection procedure given above will restart via the remaining TIC3(s). An alert is sent to NetView, and the traffic will automatically begin to flow again via another path.

Note: If you want to use duplicate TIC addresses in a 3746-900 configuration, you must *not* use the same set of TIC3s to connect NCP-controlled PUs and 3746-controlled PUs.

If you use the same set of TIC3s, the TRP responds to all the test frames, even if one of the control points (NCP or NNP) is no longer able to accept new incoming calls. This would prevent the test frames from being answered by the alternate NCP or 3746 NNP, and the user from being (re)connected via this NCP or 3746 NNP.

TIC Port Swapping (NCP Control Only)

TIC port swapping can be used if there is a token-ring adapter (TRA) problem in either the TIC3 or the TRP. When using TIC port swapping, the following rules must be taken into consideration:

- TIC port swapping must use TICs of the same type (a TIC2-TIC3 swap is not possible).
- You cannot port swap between the TIC3 of the CBSP and any other TIC3.

Token-Ring Non-Disruptive Route Switching (NCP Control Only)

This function can bypass token-ring network problems affecting the communication between a TIC2 or TIC3 on one 3745/3746-900 and a TIC on another 3745 if the 3745/3746-900s are inter-connected via token-ring LANs and bridges with at least two different paths.

If the communication with another 3745 (or 3745/3746-900) node is lost, the 3745/3746-900 attempts to re-establish the logical connection before the link is made inoperative. If an alternate route is available using the same TICs and the other 3745/3746-900 is still active on the token-ring LAN, then normal NCP-to-NCP communication continues. The following TICs can be used:

- Two TIC2s
- Two TIC3s
- A TIC type 2 and 3

Mixed-Media Multilink Transmission Groups (NCP Control Only)

Mixed-media MLTGs consisting of multiple token-ring LAN connections between two 3745s or 3745/3746-900s can provide a non-disruptive backup path and load balancing for the subarea traffic between the two NCPs. TIC types 2 and 3 can be in the same mixed-media MLTG.

Migrating a Duplicate TIC3 Address Configuration from NCP to 3746 NN

The scenario described in this section allows you to migrate your token-ring lines from NCP control to 3746 NN control (APPN, DLUR, and/or HPR) with the following objectives:

- No changes in token-ring attached devices
- No changes in applications
- Limited changes in the 3746-900
- 100% backup capability during the whole migration.

Figure 16-3 shows the scenario before (1 - line under NCP control) and after (2 - line under 3746 NNP control) the migration.

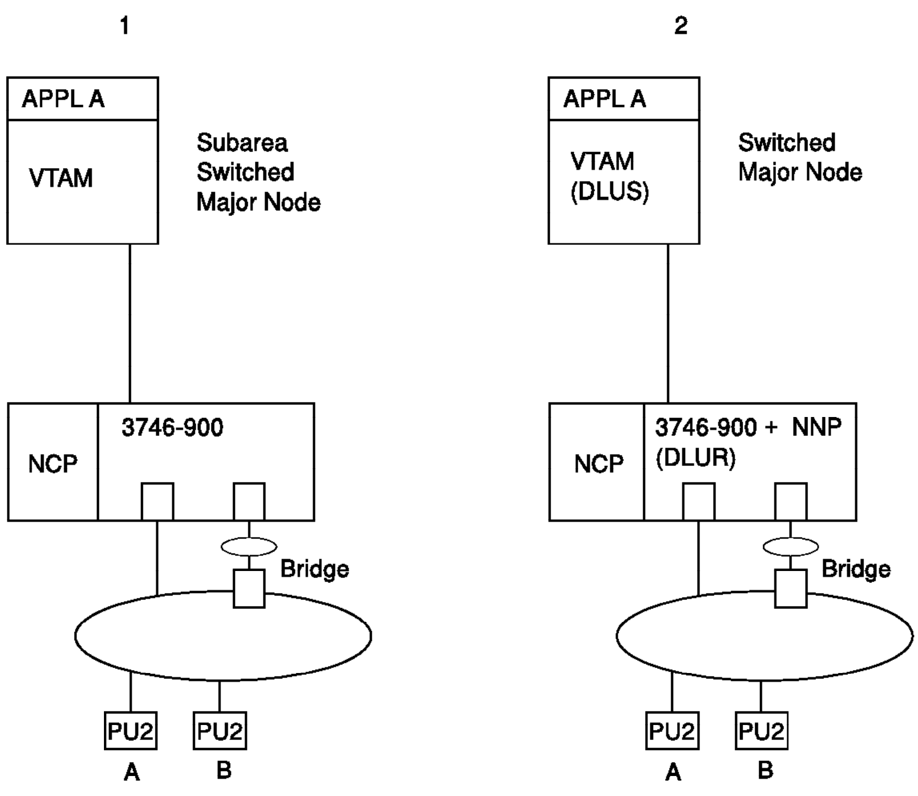


Figure 16-3. Migrating Duplicate TIC3 Address Configuration from NCP to 3746-NN

Notes:

1. For VTAM changes see "VTAM DLCADDR Keyword in PATH Statement" on page 2-38 and "VTAM DLCADDR Keyword for Token-Ring LANs" on page 16-12.
2. The network node processor must be installed and operational before starting the migration procedure.

Migration Procedure

Follow these steps to migrate your duplicate TIC3s:

Step 1. Set up the DLUS function (VTAM Version 4 Release 4 is recommended, though VTAM V4R2 is the minimum level required).

Step 2. Prepare a CCM configuration with the same MAC address for your two TIC3s (as defined in the NCP), and configure them with SAP=04. This is the SAP used by NCP token-ring implementation and you must define the CCM configuration with the same SAP=04 to avoid remote device changes.

Step 3. Deactivate one NCP token-ring line (TIC3), then load and activate the new CCM configuration for this TIC3.

Note: *Do not* activate the TIC3 corresponding to the line still active in NCP.

You can now start handling your PU2s through two TIC3s with the same MAC address:

- One TIC3 controlled by NCP
- One TIC3 controlled by the NNP

When your stations (remote PU2s) try to connect, they connect randomly to one TIC3 or the other (the first TIC3 that answers the TEST frame is used for the connection).

Step 4. Using the Management menu of CCM, verify that your 3746 NN (DLUR) configuration is working. After verifying that some PU2s are connected under NNP control, deactivate the second NCP TIC3 and re-activate it under NNP control.

Step 5. You now have two TIC3s under NNP control, with the same SAP and MAC addresses previously used with NCP), handling your PUs through DLUR.

Step 6. If there are problems, deactivate the two TIC3 ports in the Management menu of CCM and reactivate them in NCP.

Notes:

1. Using the local CCM, you must inactivate the NCP line (SAP=04) ***before*** you activate this TIC3 (that has the same SAP) under NNP control. If you try to activate the TIC3 line under NNP control when one or more NCP PUs are already active on this line, you will receive a sense code and your activation will be rejected.
2. For information related to token-ring DLUR/DLUS, see “Dependent LU Requester/Server” on page 2-25.
3. Only minor changes need to be made to your switched major node in VTAM. Refer to “Dependent LU Requester/Server” on page 2-25.

Performance Tuning

Maximum BTU Size (APPN/DLUR and HPR)

The maximum Basic Transmission Unit (BTU) size supported by the 3746 Nways Multiprotocol Controller is 8000 bytes. For token-ring links, the CCM parameters Maximum received PIU size and Maximum sent PIU size in the Port Configuration - APPN Configuration panel of the CCM should be set to 8000 bytes if possible.

The value of the send and receive PIUs (BTU size) that you choose must be a compromise:

- The maximum value of 8000 bytes has the least amount of overhead due to frame headers.
- However, the BTU size must be the same at both ends of a connection and, therefore, the same for all the nodes that make up a path through the network.

  This means that it may be necessary to use a less than optimal value of 8000 bytes because some of the equipment used as NN may have a maximum possible BTU size less than 8000 bytes.

Note: For IP over token-ring, the maximum IP transmission unit (MTU) can be 17749 bytes. This does not conflict with the 8000-byte maximum BTU size stated above.

Performance Tuning for Token-Ring Links

A Note of Warning

Proper operation of the 3746-900 requires correct setting of the NCP parameters. There are parameter values that need to be changed when moving lines from a 3745 adapter to a TRP, TRP2, or TRP3.

When making token-ring link definitions, this section must be used.

LINK TRANSMISSION GROUP (TGCONF IN THE PU STATEMENT)

TGCONF specifies whether a subarea link station is in multilink or single-link transmission group (TG). The default is:

```
TGCONF = MULTI
```

To improve the performance of transmission groups that contains a single token-ring line (a single-link TG), code as:

```
TGCONF = SINGLE
```

LOAD BALANCING IN A MLTG (MLTGORDR IN THE BUILD STATEMENT)
(MLTGPRI in the LINE Statement)

To balance the traffic load over two or more subarea lines in a MLTG, define the following:

- In the BUILD definition:

  ```
  MLTGORDR=MLTGPRI
  ```

- In the LINE definition for EACH line used set `MLTGPRI` to same value (from 0 to 255).

File Transfer Performance

Using CCM, set the “Maximum Received PIU size” and “Maximum Sent PIU size” to higher values than the default set by CCM. Pay special attention to the Buffer Utilization of the adapter (see the 3746-9X0 Performance Management menus). If the utilization exceeds 70%, then either:

- Decrease the Transmission Window size
- Increase the Acknowledgment Frequency at the receiver side

Always keep “MAXOUT” higher than “MAXIN”.

You may need to do try several pairs of values before you get the optimum values for the adapter.

For file transfer with IP over token-ring, see the note in “Maximum BTU Size (APPN/DLUR and HPR)” on page 16-11.

Configuration Information

NCP Definitions for TIC3s in Twin-CCU Models

In twin-CCU machines, any token-ring port (TIC3) can be activated by the NCP in either CCU. After deactivation by an NCP, the other NCP can activate it. The TIC3 cannot be activated by both CCUs at the same time.

When used to carry intermediate network node (INN) traffic with another 3745 or 3745/3746-900, a TIC3 port is configured in the NCP with the following resources:

- A physical link (and its associated physical link station) that represents the TIC3 port. In the LINE definition statement for the physical link, the LOCADD keyword value represents the MAC address of the TIC3 port.

  A physical link cannot be shared by both CCUs.

- A logical link (and its associated logical link station) that represents a connection between one of the two CCUs and a VTAM.

  In the NCP PU definition statement for the logical link station, the ADDR parameter value defines the MAC address of the TIC port on the other 3745 or 3745/3746-900.

See Figure 16-1 on page 16-3.

VTAM DLCADDR Keyword for Token-Ring LANs

See “VTAM DLCADDR Keyword in PATH Statement” on page 2-38 for a list of possible VTAM DLCADDR keyword coding formats. A token-ring data link control (DLC) address for an SNA peripheral resource has these elements:

- DLC type
- Port name
- Destination service access point (DSAP)
- Destination MAC address

The token-ring DLCADDR is coded as follows:

1. Specify a token-ring DLC type:

```
DLCADDR=(1,C,TR),
```

2. Identify the port name of the token-ring physical line:

   ```
   DLCADDR=(2,I,port_name),
   ```

   where port_name is the name of the port specified in CCM.

3. Specify the DSAP:

   ```
   DLCADDR=(3,X,hh),
   ```

   where hh is the SAP of the remote token-ring device, in hexadecimal.

4. Specify the token-ring destination MAC address:

   ```
   DLCADDR=(4,X,hhhhhhhhhhhh)
   ```

   where hhhhhhhhhhhh is the destination MAC address of the peripheral device on the token-ring LAN.

Example VTAM Switched Major Nodes

For Token-Ring Lines

It is not necessary to change the switched major node definitions that you are currently using for your token-ring lines when setting up your DLUS/DLUR pipes.

Token-ring switched major node for call-in example:

```
*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
*                                                               *
*  TOKEN RING       BNN STATION   CALL-IN                       *
*                                                               *
*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
ZITPNS07 VBUILD TYPE=SWNET
*---------------------------------------------------------------*
* TERMINAL Q7881001/Q7882001/Q7883001                           *
*---------------------------------------------------------------*
N7881001 PU    ADDR=04,PUTYPE=2,IDBLK=03A,IDNUM=A5000,          X
               MAXPATH=8,MAXDATA=4000,MAXOUT=7,DISCNT=NO,       X
               ISTATUS=INACTIVE,ANS=CONT
Q7881001 LU    LOCADDR=02,PACING=5,VPACING=6,MODETAB=LANMOTAB
Q7882001 LU    LOCADDR=03,PACING=5,VPACING=6,MODETAB=LANMOTAB
Q7883001 LU    LOCADDR=04,PACING=5,VPACING=6,MODETAB=LANMOTAB
*---------------------------------------------------------------*
```

Token-ring switched major node for call-out example:

```
******************************************************************
*                                                                *
*  TOKEN RING       BNN STATION   CALL-OUT                       *
*                                                                *
******************************************************************
ZOTPNS71 VBUILD TYPE=SWNET,MAXGRP=1,MAXNO=125,MAXDLUR=1
*----------------------------------------------------------------*
* TERMINAL Q7881001 ---> Q7883001                                *
*----------------------------------------------------------------*
N7881001 PU    ADDR=04,PUTYPE=2,IDBLK=03A,IDNUM=A5000,             X
               MAXPATH=8,MAXDATA=4000,MAXOUT=7,DISCNT=YES,         X
               ISTATUS=INACTIVE,ANS=CONT,DWACT=YES
P7881001 PATH  PID=1,DLURNAME=ERS1,                                X
               DLCADDR=(1,C,TR),                                   X
               DLCADDR=(2,X,54494332313736), * Portname on CCM * (#1)  X
               DLCADDR=(3,D,04),             * DSAP = 04 *         X
               DLCADDR=(4,X,400000071088)    * Remote MAC address *
Q7881001 LU    LOCADDR=02,PACING=5,VPACING=6
Q7882001 LU    LOCADDR=03,PACING=5,VPACING=6
Q7883001 LU    LOCADDR=04,PACING=5,VPACING=6
*----------------------------------------------------------------*
Note : (#1) Port Name specified in CCM = TIC2176  (ASCII characters)
            converted to hexadecimal in DLCADDR parameter.
```

Note: If you want to use ASCII format for DLCADDR, see "VTAM DLCADDR Keyword in PATH Statement" on page 2-38. Then this line:

```
DLCADDR=(2,X,54494332313736), * Portname on CCM * (#1)  X
```

would be coded as:

```
DLCADDR=(2,I,TIC2176), * Portname on CCM * (#1)  X
```

Chapter 17. Ethernet Adapters

This chapter tells you how the 3746-9X0 supports your Ethernet network(s). An Ethernet port of the 3746 acts as a MAC bridge between an Ethernet LAN and a TIC3. The port connects either an Ethernet Version 2 or IEEE 802.3 Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Ethernet LAN.

The port is functionally transparent to stations on the Ethernet LAN, appearing as a single native device on the LAN. The stations on the Ethernet LAN appear to the TRP2 as token-ring stations and the port (the bridge) is functionally transparent to any traffic routed by the 3746-9X0.

If you need detailed information on the functions provided by the Ethernet bridge box, refer to the IBM *8229 Bridge Manual*, GA27-4025.

Maximum Number of Addresses Allowed

The port supports up to 2048 active stations on Ethernet segments attached to that port, with a maximum of 255 stations per segment.

Information Field Length

The Ethernet port supports frames with a maximum information field of 1500 bytes, which is the maximum supported by Ethernet.

Protocols and Interfaces

The port supports SNA/NCP (3746-900), APPN/DLUR, HPR, and IP traffic on both Ethernet Version 2 and IEEE 802.3 Ethernet.

Source Address Database

The Ethernet port dynamically maintains a source address database for each of its LAN connections. This database is held in memory. The Ethernet port uses this database to decide whether or not to forward a frame onward through the 3746-9X0. This requires that:

- The port operates in a *promiscuous* mode so that every frame on the LAN is received.
- The source address from each frame is saved in the database.

The database is searched to determine whether the destination address of the frame is in the database. If the address is:

- Found, the frame is discarded since both the source and the destination stations are on the same LAN.
- Not found, the Ethernet port forwards the frame.

This decision process is a type of *filtering*. The Ethernet database contains the source addresses detected on the Ethernet Version 2 or IEEE 802.3 Ethernet LAN and the frame format that each station uses for data transmission. Entries are created as part of the *learning process* of the port when the port is activated.

Configuring the Ethernet Port

The Service Processor provides configuration capability for the port. Table 17-1 gives the configuration actions that need to be performed.

Table 17-1. Configuration Activities for an Ethernet Port (Bridge)

Action by	Configuration Activity
IBM	Install and configure the Ethernet bridge for SNMP. **Note:** You must provide the *IP address* of the bridge plus SNMP parameters so this can be configured by IBM at installation time. Refer to "Parameters for Ethernet Port (Bridge)" on page 38-8 and "SNMP Configuration Sheet" on page 40-80. For a description of SNMP parameters, refer to "Managing Your IP Resources with SNMP" on page 29-21. These parameters are: **Name of the Ethernet bridge** A 3746-9X0 can have more than one bridge, so each bridge must be uniquely identified. **SNMP Community Parameters** These parameters specify an administrative relationship between agents and managers. There are three parts to the community parameters: • Name of the community. • IP address of the manager within the community. • Privilege (access) mode of the manager: – Read. The manager can only read information. – Read/Write. The manager can both read and write. **Note:** Read/Write applies *only* to the Ethernet network connected to the Ethernet port. It is not implemented for the 3746 Nways Multiprotocol Controller. **Trap Parameters** • Name of the community • IP address of the community manager (0.0.0.0 is not a valid address for a trap community). **SNMP authentication of failure traps** Enabled or disabled
Customer	You must configure your Ethernet port as a TIC3 (token-ring port) in your CCM (APPN/HPR and/or IP) and/or NCP generation. You need to supply the Ethernet frame size used on the Ethernet network connected to this port. See the token-ring worksheets in Chapter 40, "CCM Worksheets for Controller Configuration Definitions" on page 40-1. All other parameter values for the Ethernet Bridge component of the port (see "Ethernet Port Specifications (Features 5631 and 5632)." on page 44-43,) are set to their default values and cannot be changed. If you need details of the default values, refer to the IBM *8229 Bridge Manual, GA27-4025*.

Chapter 18. Serial Line Adapters

On the 3746, serial line adapters are referred to as Communication Line Adapters (CLAs). A CLA consists of one Communication Line Processor (CLP) and up to four Line Interface Couplers (LICs). A CLA uses either LIC11s, LIC12s or LIC16s, or a combination of LIC types to connect to DCEs (modems) and DTEs (terminals) using SDLC, Frame relay, X.25, ISDN, or PPP Data Link Control (DLC).

The CLA components are housed in the same enclosures as the ESCAs and TRAs in the base 3746-9x0.

CLP Types

CLP Types include CLP and CLP3. CLP has a 16 MB storage and CLP3 has a 32 MB storage and a more powerful processor. In this chapter, CLP stands for both types of processors, unless otherwise indicated. The improved connectivity of CLP3 is described more specifically in "Communication Line Adapter Connectivity" on page 18-18.

Communication Line Processors (CLP and CLP3)

The CLP provides DLC for LIC types 11, 12, and 16. Up to four LICs can be attached to the same CLP. All four LICs may be active at the same time as long as the line weights for the CLP maximum processor load and maximum storage are not exceeded (see "Line Weights and CLP Load" on page 18-9 and "Communication Line Adapter Connectivity" on page 18-18).

Up to four CLPs can be installed in a basic enclosure and up to six in each expansion enclosure. There are two LIC slots for each CLP slot. To connect a third and fourth LIC to a CLP, the CLP slot next to it must be empty, and the CLP slot and empty slot must occupy one of the slot pairs in the enclosure. The processor slots in the basic enclosure are labeled H, K, M, and P, and in the expansion enclosures, labeled D, F, H, K, M, and P (see Table 18-1).

For enclosure examples, see "3746-900 Basic Enclosure Example" on page 42-2 and "3746-900 Expansion Enclosure Example" on page 42-2.

Table 18-1. 3746-900 Processor Slot Pairs

Enclosure	Slot Pairs		
Basic enclosure		H and K	M and P
First Expansion enclosure	D and F	H and K	M and P
Second Expansion enclosure	D and F	H and K	M and P

Note: For the addresses that correspond to the actual physical slot position, refer to "Enclosure Physical Positions and Logical Addresses" on page 42-15. The 3745/3746 hardware configurator (CF3745) automatically calculates the following:

- CLP and LIC locations.
- Maximum physical capacity (60 active lines per pair of LIC slots, 120 lines per CLP).

- Standard line weights, which represent an average between line speed, type of traffic, and traffic load. Large line weights might reduce the maximum capacity of the CLA. For details about CLP capacity, refer to “Line Weights and CLP Load” on page 18-9.

Communication Line Processor Connectivity

The maximum physical connectivity of a CLP is:

- 4 lines at speeds up to 2.048 Mbps[1].
- 32 lines at speeds up to 256 Kbps[2].
- 120 lines at speeds up to 64 Kbps. All 120 lines can be active at a time.

LICs

The 3746-9X0 can run three types of LICs: types 11, 12 and 16.

LIC Type 11

LIC11 is attached through active remote connectors (ARCs), which in turn are installed in line connection boxes (LCBs). Each ARC connects to a DCE or DTE. Up to 15 ARCs can be installed in a LCB. This allows a pair of LCBs to multiplex up to 30 lines into the LIC11.

The LIC11 attaches the following types of line to the controller:

- Low-speed (from 600 bps up to 64 Kbps) lines

  Each line can use one of the following ITU-T interfaces:

  – V.24 (switched or nonswitched) at speeds up to 28.8 Kbps.
  – V.35 (nonswitched) at speeds up to 64 Kbps.
  – X.21 (nonswitched) at speeds from 600 bps up to 64 Kbps.

  Thirty low-speed lines can be physically attached to a LIC11. All can be active at the same time.

- Medium-speed (above 64 Kbps up to 256 Kbps) lines.

  Each line is either ITU-T V.35 (nonswitched) or X.21 (nonswitched). Eight medium-speed lines can be attached to the LIC11.

Low- and medium-speed lines can be mixed on the same LIC11.

Direct attachment (without modem/DCE) to terminal/DTE is also possible. The following internal clocks are provided by the LIC11: 1200 bps, 2400 bps, 4800 bps, 9600bps, 19.2K bps, 38.4Kbps, 55.855 Kbps, 64 Kbps, and 256 Kbps.

---

[1] 1Mbps = 1 000 000 bits per second.

[2] 1Kbps = 1 000 bits per second.

LIC Type 12

LIC12 attaches one nonswitched line at speeds from 56 Kbps up to 2.048 Mbps. The ITU-T interface for this high-speed line is either:

- V.35
- X.21.

For direct attachment (without modems) to a DTE, for example, another 3745/3746, the LIC12 provides internal clocking for operations at 512 Kbps, 1.024 Mbps, 1.536 Mbps, or 2.048 Mbps. Directly attached DTEs operating at different or at lower speeds, for example, a 3720 or 3725, must provide clocking. In this case, the LIC12 operates with an external clock provided by the attached DTE which is set between 56 Kbps and 2.048 Mbps.

LIC Type 16

LIC16 is a single Primary Euro ISDN port (NCP controlled), operating at 2.048Mbps with an external clock provided by the network. LIC16 support is channelized E1 (30×64 Kbps) with HDB3 coding under NCP control.

The physical line interface of the LIC16 consists of a 120 ohms adapted link through an ODD26 connector fitted on the front of the case. The 30 m cable (part number 80G3984) of the LIC16 connects to the ISDN network connection. LIC16 supports CCITT G703, G704, G706, G732, and complies with European Community ISDN NET5/ETS 300011.

Characteristics of LIC Types 11, 12, and 16

Table 18-2. Characteristics of the LIC Types 11, 12, and 16

<table>
<tr><th rowspan="2"></th><th colspan="4">LIC Types</th></tr>
<tr><th colspan="2">LIC11</th><th>LIC12</th><th>LIC16</th></tr>
<tr><td>Protocol</td><td colspan="2">PPP, SDLC, Frame relay, X.25</td><td>PPP, SDLC, Frame relay, X.25</td><td>Euro-ISDN on D channel
Frame relay on B channel</td></tr>
<tr><td>Line Speeds</td><td colspan="2">600 bps to 256 Kbps</td><td>56kbps to 2.048 Mbps</td><td>1 D channel at 64 Kbps
30 B channel at 64 Kbps</td></tr>
<tr><td>ITU-T Interface</td><td colspan="2">V.24, (V.25 bis), V.35, X.21
(See Note 1)</td><td>V.35 or X.21
(See Note 2)</td><td>G703, G704, G706, G732</td></tr>
<tr><td>Number of Ports</td><td colspan="2">Up to 30
(See Note 3)</td><td>1</td><td>1</td></tr>
<tr><td>Cable Lengths (m)</td><td colspan="2">1.3, 7, 15, 35, 70, 105</td><td>(See Note 4)</td><td>30</td></tr>
<tr><td></td><td>Low-Speed Lines</td><td>Medium-Speed Lines</td><td colspan="2" rowspan="3"></td></tr>
<tr><td>ARC Interface</td><td>V.24
(See Note 1)</td><td>V.35 and X.21</td></tr>
<tr><td>Line Speed</td><td>Up to
28.8 Kbps</td><td>Up to
256 Kbps</td></tr>
</table>

Notes:

1. Other interfaces (X.21 bis, for example) are supported using appropriate 3745 cable. Refer to pages 44-77 through 44-86 for part numbers and cable lengths.
2. Depending on the cable used.
3. Multiplexed over the cable that connects the LIC11 to a pair of LCBs.
4. Refer to page 44-75.

LCBs

LCBs are used with the LIC11 to provide:

- Multiplexing of up to 30 lines to one LIC port.
- Reduced cable requirements between the controller and the modem room.

The LIC11 uses one cable to connect to one or two LCBs. Each LCB can connect up to 15 lines for a total of 30 lines per LIC11. The LCBs can be located in a standard 19-inch rack up to 103.5 m (341 ft) from the controller. This means, for example, that up to 30 DCEs (in a rack in the same room or in a separate modem room) need only one cable connection to the controller. See Figure 14-5 on page 14-8.

Note: The LIC11 cable is available as a plenum cable in the U.S.A. and Canada.

LCB Locations

LCBs can be installed in several locations:

3746-950 or 3746-900 frame
One or two LCBs (if no 2nd expansion enclosure installed).

Controller Expansion (Feature 5023)
Up to 18 LCBs.

User installed racks
Any number of LCBs up to twice the number of LIC11s installed in the machine; the maximum is 32 LIC11s, that is 64 LCBs (containing a maximum of 600 ARCs).

Two Types of LCBs

There are two types of LCBs (functionally equivalent):

Line Connection Box Base (LCBB)
Connected directly to the LIC11.

Line Connection Box Expansion (LCBE)
Connected to the LCBB.

See Figure 18-1 below.

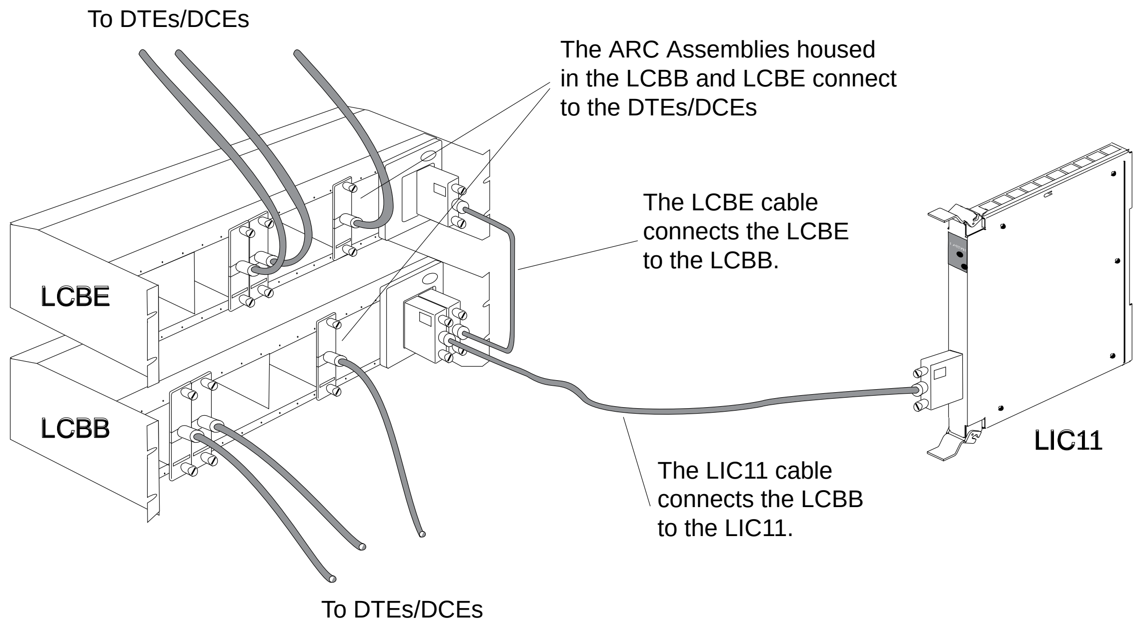


Figure 18-1. LCB Connections

For more information about the LCBs, refer to page 44-34. For ordering information about the LIC11 cable, refer to page 44-82.

ARCs

ARCs are housed in the LCBs and provide the electrical and physical interface between the DCE (modem) or DTE (terminal) and the adapter in the 3746-900 or 3746-950 (see Figure 18-1 on page 18-5). ARCs are available for different physical interfaces. For each type of ARC, there is a selection of cables with different lengths and types of end connectors.

An ARC is classified according to interface and attachment:

- Interface:

  ARC/V.24 Attached to a DTE or DCE through standard ITU-T V.24 interface connector.

  ARC/V.35 Attached to a DTE or DCE through standard ITU-T V.35 interface connector.

  ARC/X.21 Attached to a DTE or DCE through standard ITU-T X.21 interface connector.

  ARC/3745 Attached to a DTE or DCE through LIC1, LIC3, or LIC4A/LIC4B cable. This ARC cable has the same IBM connector as the connector on 3745/3746-L1x frames.

- Attachment:

  DCE
  DCE Transfix
  DTE (direct attachment)

- Cable length:
  Cable lengths range from 0.6 to 15 m. There are no plenum ARC cables.

For ordering information, refer to 44-84.

For more information on ARC assemblies, refer to Table 18-3 on page 18-7 and Table 18-4 on page 18-8.

ARC Assemblies A

The cable is permanently fixed to the ARC card.

Note: ARCs of this category are no longer available from IBM.

Table 18-3. ARC Assemblies A: ARC and Cable Permanently Attached

Interface	**V.24**				**V.35**				**X.21**			
Cable End Connector	**ARC V.24**		**ARC/3745**		**ARC V.35**		**ARC/3745**		**ARC X.21**		**ARC/3745**	
Attached to:	DCE	DTE	DCE	DTE	DCE	DTE	DCE	DTE	DCE	DTE	DCE	DTE
ARC Type (On label[1])	ARC V.24 DCE	ARC V.24 DTE	ARC V.24 DCE	ARC V.24 DTE	ARC V.35 DCE	ARC V.35 DTE	ARC V.35 DCE	ARC V.35 DTE	ARC X.21 DCE	ARC X.21 DTE	ARC X.21 DCE	ARC X.21 DTE
Cable Length m (ft.)	**ARC Name** (On MOSS-E display)											
5 (17)	ARC 1A1		ARC 1C	ARC 1D	ARC 3A1		ARC 3C	ARC 3D	ARC 4A1 ARC 4A3[2]		ARC 4C	ARC 4D
12 (40)	ARC 1A2											
15 (50)		ARC 1B			ARC 3A2	ARC 3B			ARC 4A2 ARC 4A4[2]	ARC 4B		

Notes:

1. An ARC is labeled according to the type of device that it attaches to.
2. ARC4A3 and ARC4A4 (X.21 DCE - Transfix) provide internal wrapping of control (C) and indicate (I) leads. This is designed for Transfix DCEs (France), which do not support I and C signaling of X.21 interfaces.

ARC Assemblies B

This ARC assembly includes the ARC card and a cable. The cable can be disconnected from the card. Cable lengths are indicated by feature codes (for available cable lengths, refer to “ARC Assemblies B” on page 44-85).

Note: Also part of the assembly are two wire wrap plugs, one for the ARC card and another for the ITU-T interface at the end of the cable.

Table 18-4. ARC Assemblies B: Separate ARC and Cable

Interface	**V.24**				**V.35**				**X.21**			
Cable End Connector	**ARC V.24**		**ARC/3745**		**ARC V.35**		**ARC/3745**		**ARC X.21**		**ARC/3745**	
Attached to:	DCE	DTE	DCE	DTE	DCE	DTE	DCE	DTE	DCE	DTE	DCE	DTE
ARC Card Type (On label[1]**)**	ARC V.24	ARC V.24	ARC V.24	ARC V.24	ARC V.35	ARC V.35	ARC V.35 3745 DCE	ARC V.35 3745 DTE	ARC X.21	ARC X.21	ARC X.21	ARC X.21
	ARC Name (On MOSS-E display)											
	ARC 1A0	ARC 1B0	ARC 1C0	ARC 1D0	ARC 3A0	ARC 3B0	ARC 3C0	ARC 3D0	ARC 4A0 ARC 4E0[2]	ARC 4B0	ARC 4C0	ARC 4D0

Notes:

1. An ARC is labeled according to the type of device that it attaches to.
2. ARC4E0 (X.21 DCE - Transfix) provides internal wrapping of control (C) and indicate (I) leads. This is designed for Transfix DCEs (France), which does not support I and C signaling of X.21 interfaces.

LCB Areas

LCBs are divided into four line areas. Each area of three or four lines can support one of the following:

- Up to four low-speed lines each with a speed of up to 64 Kbps.
- One medium-speed line with a speed of up to 256 Kbps.

A fully loaded LIC11 can serve 30 low-speed lines, 8 medium-speed lines, or any mixture of line types.

Areas for LCBs are shown in Table 18-5.

Table 18-5. LCB Slot Numbers in Each Area

LCB Type	**Area**	**Area**	**Area**	**Area**
LCBB	0 1 2 3	4 5 6 7	8 9 10 11	12 13 14
LCBE	16 17 18 19	20 21 22 23	24 25 26 27	28 29 30

Line Weights and CLP Load

Configuring Communication Lines on the 3746 (Line Weights)

CLPs perform DLC and data routing for traffic controlled by the 3746 (IP router, APPN/HPR network node). In addition, CLPs of the 3746-900 perform DLC for traffic routed by NCP running in the 3745. An individual line contribution to the CLP load (processor utilization) depends on the following:

- Traffic type: IP, HPR/ANR, HPR/RTP, APPN/DLUR, or NCP (3746-900).
- Line speed.
- Line protocol (Frame relay, SDLC, X.25, PPP).
- Transmission type (duplex or half-duplex).
- Percentage of line utilization [3], resulting from messages sent by users and applications, and control information (for example, acknowledgements, ANR status frames, and so on).
- Parameters used by the 3746: CCM definitions for the 3746-900 and 3746-950, and NCP definitions for the 3746-900.

CF3745 Hardware Configurator (Line Weights)

Standard Line Weight Assumptions: The 3746 hardware configurator (CF3745) assigns lines to CLPs by using standard line weights. The CF3745 assigns lines to CLPs without exceeding 90% of CLP load as calculated from standard line weights.

A standard line weight represents the CLP load resulting from a line operated under typical conditions, such as the percentage of line utilization (see Table 18-6 and Table 18-7 on page 18-10) and mix of traffic patterns (see Table 18-8 on page 18-10).

This line weight depends on the line speed, the line protocol (SDLC, Frame relay, and so on) and routing protocol (APPN, ANR, IP, and so on).

Table 18-6. Assumed Line Utilization (Duplex) (Except NCP Traffic)

Line Speed Range	**Line Utilization[1]**
Up to 4.8Kbps	40%
Up to 28.8Kbps	45%
Up to 64Kbps	50%
Up to 256Kbps	45%
Up to 2.048Mbps	40%

Note:

1. Line utilization includes user data, control traffic, header/trailer, and so on.

[3] Line utilization is determined by the size and rate of data messages exchange between users and applications.

Line Utilization Assumptions

Table 18-7. Assumed Line Utilization (NCP Traffic Only)

Line Speed Range[1]	Percentage of INN[3] Lines	INN Line Utilization[2]	Percentage of BNN[4] Lines	BNN Line Utilization[2]	Percentage of Duplex Lines	Percentage of Half-Duplex Lines
≥ 600 bps to 4800 bps	-	-	100%	40%	-	100%
> 4800 bps to 19.2 Kbps	-	-	100%	40%	20%	80%
> 19.2 Kbps to 64 Kbps	30%	60%	70%	40%	40%	60%
> 64 Kbps to 2 Mbps	100%	40%	-	-	100%	-

Notes:

1. Line polling delay is assumed to be 0.2 s at speeds above 19.2 Kbps and 0.5 s at speeds below or equal to 19.2 Kbps.
2. Line utilization includes user data/control traffic, header/trailer, interframe gaps, and so on.
3. Intermediate Network Node.
4. Boundary Network Node.

Traffic Pattern Assumptions

Table 18-8. Assumed Traffic Mix

Traffic Type	Transaction Size: Bytes[1]	Percentage of Transactions[2]
Transaction Processing	128/128	20%
Interactive (3270-like)	40/1000	50%
Batch/File Transfer/Image	0/2000	15%
Batch/File Transfer/Image	0/4000	15%

Note:

1. For each direction, in or out of the 3746, size of the data message created by the sending workstation or application (0 means that the data traffic is in a single direction, in or out).
2. Expressed in % of the total traffic (100%).

Traffic Type Assumptions

Most of the standard default parameters of the CF3745 performance model are assumed for standard line weights[4]. Traffic types indicated in Table 18-10 on page 18-14 to Table 18-12 on page 18-17 are described in this section:

[4] For X.25 lines, the standard parameters that mostly influence CLP utilization and resulting line weights are the following:

- Packet sizes (128 bytes) for X.25 packetization and re-assembly.
- Packet acknowledgement frequency.

APPNDLUR

APPNDLUR applies to SDLC, Frame relay, and X.25 3746 lines. The lines carry 3746-controlled APPN and/or dependent LU traffic.

Assumptions:

- Data messages (see Table 18-8 on page 18-10) are not segmented in the 3746 (particularly the CLP) or in any intermediate nodes between two end points (workstation and application).
- SDLC line polling delay is 0.2 seconds.

ANR

ANR applies to SDLC, Frame relay, and X.25 3746 lines. The lines carry 3746-controlled HPR/ANR traffic.

Assumptions:

- Data messages (see Table 18-8 on page 18-10) are not segmented at HPR end points (RTP). The smallest segment size used on the RTP route is assumed to be at least equal to the largest data message (this smallest segment size is automatically recognized when an RTP connection is established).
- Small number of stand-alone control frames.
- SDLC/Frame relay; assumed line mix of 50% SDLC and 50% Frame relay.
- SDLC line polling delay at 0.2 seconds.
- Frame relay lines, non-ERP mode.

Note: The first **ANR** column in Table 18-9 on page 18-13 to Table 18-12 on page 18-17 also applies to Frame Relay Frame Handler (FRFH) traffic (any protocol).

RTP

RTP applies to SDLC, Frame relay, and X.25 3746 lines. The lines carry 3746-controlled HPR/RTP traffic.

CLP performs the boundary function (RTP) between “downstream” APPN/dependent LU traffic over these lines and “upstream” HPR traffic (HPR pipes terminate in the CLP).

Assumptions:

- Data messages (see Table 18-8 on page 18-10,) are not segmented in the 3746 (particularly the CLP) or in any intermediate nodes between two end points (workstation and application).
- SDLC line polling delay is 0.2 seconds.

IP

IP applies to PPP, Frame relay, and X.25 3746 lines. The lines carry 3746-controlled IP traffic.

Assumptions:

- One stand-alone TCP acknowledgment of every two data packets.
- Data messages (see Table 18-8 on page 18-10) from IP hosts and applications are not fragmented at TCP/IP end points or in any intermediate router, including the 3746 (particularly the CLP).
- One data packet per data message.

NCP

The standard default parameters of the CF3745 performance model are assumed for line weights. Refer to Table 18-7 on page 18-10 for assumed line utilization.

For a given transmission speed, Table 18-9 on page 18-13 shows standard line weights for CLP and Table 18-10 on page 18-14 shows standard line weights for CLP3. Corresponding standard CLP connectivity is shown in Table 18-11 on page 18-16 and CLP3 standard connectivity in Table 18-12 on page 18-17.

Weights and number of lines per CLP and CLP3 are indicated for line protocols (SDLC, Frame Relay, PPP, and X.25), and traffic types (APPN/DLUR, HPR/ANR, HPR/RTP, IP, and NCP).

Standard Line Weights

Line weights corresponding to the "Standard Line Weight Assumptions" on page 18-9 are used by CF3745 to determine the required number of CLPs and lines. The CF3745 establishes the weight of a CLP at a maximum of 100, which is the theoretical CLP load of 90%. For the standard line weights of CLP3, see Table 18-10 on page 18-14.

The actual required number of CLPs and CLP3s, as determined by CF3745, will also depend on physical connectivity requirements.

Standard Line Weights for CLP

Table 18-9. Standard Line Weights[1] for CLP

Line Speeds (Kbps)	Assumed Line Utilization	SDLC and Frame relay[3]			PPP and Frame relay[3]	X.25				SDLC Frame relay X.25
		APPN DLUR	ANR	RTP	IP	APPN DLUR	ANR	RTP	IP	NCP[4]
2048.	40%	67	20	100[2]	16	100[2]	94	100[2]	100[2]	37.0
1544.		50	15	100	12	100[2]	70	100[2]	80	33.0
1024.		34	10	68	8	85	48	100[2]	54	29.0
512.		17	5	34	4	42	24	56	27	19.0
256.	45%	9.6	2.9	19.2	2.2	24	13.5	32	15.4	12.5
128.		4.9	1.5	9.6	1.1	12.2	6.9	16	7.8	7.5
96.		3.9	1.2	7.8	0.9	9.7	5.5	13	6.2	5.5
64.	50%	3.5	1.1	7.0	0.8	8.7	4.9	11.5	5.6	3.1
56.		3.3	1.0	6.6	0.6	8.2	4.6	10.9	5.3	2.9
48.		3.2	0.9	6.4	0.4	8.0	4.5	10.5	5.1	2.7
28.8	45%	2.5	0.75	5.0	0.35	6.2	3.5	8.2	4.0	1.6
19.2		2.0	0.6	4.0	0.3	5.0	2.8	6.6	3.2	1.0
14.4		1.75	0.5	3.5	0.25	4.4	2.5	5.8	2.8	0.85
9.6		1.5	0.45	3.0	0.2	3.7	2.1	5.0	2.4	0.7
4.8	40%	1.2	0.35	2.4	0.15	3.0	1.7	4.0	1.9	0.3
2.4		1.05	0.3	2.1	0.15	2.6	1.5	3.5	1.7	0.15
1.2		1.0	0.3	2.0	0.15	2.5	1.4	3.3	1.6	0.15

Notes:

1. The line weight for an intermediate speed is the weight corresponding to the nearest higher speed in the table.
2. Line utilization may not reach the percentages indicated in column **Assumed Line Utilization**.
3. For Frame Relay Frame Handler traffic (Frame Relay switching), use "ANR" line weights.
4. Any data link control (SDLC, Frame relay, X.25) and routing protocol (APPN, ANR, SNA/subarea).

Standard Line Weights for CLP3

Table 18-10. Standard Line Weights for CLP3[1]

Line Speeds (Kbps)	Assumed Line Utilization	SDLC and Frame relay[3]			PPP and Frame relay[3]	X.25				SDLC Frame relay X.25
		APPN DLUR	ANR	RTP	IP	APPN DLUR	ANR	RTP	IP	NCP[4]
2048.	40%	45	10.5	89[2]	8.4	100[2]	50	100[2]	56[2]	20
1544.		33	7.4	67	6.3	83	37	100[2]	42	17
1024.		34	5.2	45	4.2	57	25	75	28	15
512.		11	2.6	23	2.1	28	12.5	37	14	10
256.	45%	6.4	1.5	12.8	1.15	16	6.6	21	8.1	6.7
128.		3.3	0.8	6.4	0.6	8.1	3.6	10.6	4.1	4.0
96.		2.6	0.6	5.2	0.5	6.5	2.9	8.7	3.2	2.9
64.	50%	2.3	0.6	4.7	0.4	5.8	2.6	7.7	2.9	1.6
56.		2.2	0.5	4.4	0.3	5.5	2.4	7.3	2.8	1.5
48.		2.1	0.5	4.3	0.2	5.3	2.4	7.0	2.7	1.4
28.8	45%	1.7	0.4	3.3	0.15	4.1	1.8	5.5	2.1	0.8
19.2		1.3	0.3	2.7	0.15	3.3	1.5	4.4	1.7	0.5
14.4		1.2	0.25	2.4	0.15	2.9	1.3	3.9	1.5	0.4
9.6		1.0	0.25	2.0	0.1	2.5	1.1	3.3	1.3	0.35
4.8	40%	0.8	0.2	1.6	0.1	2.0	0.9	2.7	1.0	0.15
2.4		0.7	0.15	1.4	0.1	1.7	0.8	2.3	0.9	0.1
1.2		0.7	0.15	1.3	0.1	1.7	0.7	2.2	0.8	0.1

Notes:

1. The line weight for an intermediate speed is the weight corresponding to the nearest higher speed in the table.
2. Line utilization may not reach the percentages indicated in column **Assumed Line Utilization**.
3. For Frame Relay Frame Handler traffic (Frame Relay switching), use "ANR" line weights.
4. Any data link control (SDLC, Frame relay, X.25) and routing protocol (APPN, ANR, SNA/subarea).

Customized Line Weights

The CF3745 hardware configurator allows 3746-9x0 lines, or groups of lines, to be assigned customized line weights. If the traffic over your lines is substantially different from the assumptions of the standard line weights for CLP in Table 18-9 on page 18-13 and CLP3 in Table 18-10 on page 18-14, you can use CF3745 to calculate customized line weights as follows:

Customized line weight = Percentage of Standard line weight.

The following examples apply to CLP standard line weights; the same formula also applies to CLP3 standard line weights.

One type of traffic

Line weight = xxx%[5] of a standard line weight where xxx is the percentage of line utilization.

For example, if you have a 512 Kbps line speed and APPNDLUR type traffic, the standard line weight is 17 (see Table 18-9 on page 18-13). If your line has 60% utilization, the formula in CF3745 would read:

`150APPNDLUR`.

Your customized line weight is 25.5 (150% x 17).

Mixed traffic

Line weight = xxx% of the standard line weight for traffic type 1 + yyy% of the standard line weight for traffic type 2.

For example, if you have a 128 Kbps Frame relay line (or group of identical 128 Kbps Frame relay lines) with the following traffic mix:

- 50% IP traffic.
- 50% HPR/RTP traffic.

If both of the above meet standard line weight assumptions (total line use = 45%), then the formula in CF3745 would read:

`50IP50RTP`.

Your customized line weight in CF3745 is 5.35 (50% x 1.1 + 50% x 9.6).

[5] xxx can be greater than 100%.

Standard Line Connectivity for CLP

Table 18-11. Standard Line Connectivity[1] for CLP

Line Speeds (Kbps)	Assumed Line Utilization	SDLC and Frame relay			PPP and Frame relay	X.25				SDLC Frame relay X.25
		APPN DLUR	ANR	RTP	IP	APPN DLUR	ANR	RTP	IP	NCP[3]
2048.	40%	1	4	1[2]	4	1[2]	1	1[2]	1[2]	2
1544.	40%	2	4	1	4	1[2]	1	1[2]	1	3
1024.	40%	3	4	1	4	1	2	1[2]	1	3
512.	40%	4	4	2	4	2	4	1	3	4
256.	45%	10	32	4	32	4	7	3	6	8
128.	45%	20	32	10	32	8	14	6	12	13
96.	45%	25	32	12	32	10	18	7	16	18
64.	50%	28	90	14	120	11	20	8	17	32
56.	50%	30	100	15	120	12	21	9	18	24
48.	50%	31	111	15	120	12	22	9	19	37
28.8	45%	40	120	20	120	16	28	12	25	62
19.2	45%	50	120	25	120	20	35	15	31	100
14.4	45%	57	120	28	120	22	40	17	35	117
9.6	45%	66	120	33	120	27	47	20	41	120
4.8	40%	83	120	41	120	33	58	25	52	120
2.4	40%	95	120	47	120	38	66	28	58	120
1.2	40%	100	120	50	120	40	71	30	62	120

Notes:

1. This is the maximum number of lines allowed by CF3745, according to the following assumptions:
   - Lines have the same speed.
   - Carry a single traffic type (APPNDLUR, ANR, IP, and so on).
   - Carry standard traffic (see “Standard Line Weight Assumptions” on page 18-9).
2. Line utilization may not reach the percentages indicated in column **Assumed Line Utilization**.
3. Any data link control (SDLC, Frame relay, X.25) and routing protocol (APPN, ANR, SNA/subarea).

Standard Line Connectivity for CLP3

Table 18-12. Standard Line Connectivity[1] for CLP3

Line Speeds (Kbps)	Assumed Line Utilization	SDLC and Frame relay			PPP and Frame relay	X.25				SDLC Frame relay X.25
		APPN DLUR	ANR	RTP	IP	APPN DLUR	ANR	RTP	IP	NCP[3]
2048. 1544. 1024. 512.	40%	2 3 4 9	4 4 4 4	1 1 2 4	4 4 4 4	1[2] 1 1 4	2 2 4 4	1[2] 1[2] 1 2	1 2 3 4	4 4 4 4
256. 128. 96.	45%	15 30 38	32 32 32	7 15 19	32 32 32	6 12 15	15 27 34	4 9 11	12 24 31	14 25 32
64. 56. 48.	50%	43 45 47	120 120 120	21 22 23	120 120 120	17 18 18	38 41 34	12 13 14	34 35 37	62 66 71
28.8 19.2 14.4 9.6	45%	58 76 83 100	120 120 120 120	30 37 41 50	120 120 120 120	24 30 34 40	55 56 76 90	18 22 25 30	47 58 66 76	120 120 120 120
4.8 2.4 1.2	40%	120 120 120	120 120 120	62 71 76	120 120 120	50 58 58	111 120 120	37 43 45	100 120 120	120 120 120

Notes:

1. This is the maximum number of lines allowed by CF3745, according to the following assumptions:
   - Lines have the same speed.
   - Carry a single traffic type (APPNDLUR, ANR, IP, and so on).
   - Carry standard traffic (see "Standard Line Weight Assumptions" on page 18-9).
2. Line utilization may not reach the percentages indicated in column **Assumed Line Utilization**.
3. Any data link control (SDLC, Frame relay, X.25) and routing protocol (APPN, ANR, SNA/subarea).

CF3745 Performance Model (CLP Load Estimates)

Excessive CLP loads may alter response times by causing queuing delays and activating congestion mechanisms for preventing CLP overload. CF3745 projects the CLP load, and the performance model output provides a CLP load estimate for every line group connected to a CLP.

After CF3745 has placed the lines according to the preceding standard line weights, the performance model uses the user traffic parameters to estimate the actual CLP load. If the result exceeds a projected CLP load of 90%, you can use CF3745 options, for example, customized line weights, to adjust the configuration.

NetView Performance Monitor (NPM) CLP Load

NetView Performance Monitor (NPM) Version 2 Release 3 (with APAR AW30643) monitors the processor (and storage) utilization of the CLPs (and other adapters of the 3746).

Note: If you are using NPM Version 2 Release 1 or Release 2, APAR numbers OW08565 and OW10584 are required as a minimum.

Measuring CLP loads is useful in planning for additional lines or traffic.

Performance Measurement Function - MOSS-E (CLP Load)

You can use MOSS-E (running in local and remote consoles) to produce a graphical representation of CLP loads, and storage utilization versus time. If this function indicates a load imbalance between CLPs, communication line equipment can be re-allocated from heavily loaded CLPs to lightly loaded CLPs. Re-allocating equipment can be carried out either by the user (for ARCs, LCBs, and LIC11 cables) or by a service representative (for LIC11s, LIC12s, and CLPs), and does not affect the operation of other communication line equipment.

The CF3745 performance model may be used to predict the effect of such configuration changes on the CLP load.

Also, you can use the CLP load display in MOSS-E to plan configuration upgrades for adding new lines or traffic.

NetView Alerts (CLP Load Thresholds)

CLP at High Load Threshold (97%)

CLP loads greater than or equal to 97% for three minutes generate an alarm and a NetView alert.

If the CLP load reaches 100%, congestion mechanisms are automatically activated to prevent CLP overload. This may increase response times, but no data is lost.

CLP Back to Normal Load Threshold (95%)

An alarm and a NetView alert are generated if the following occurs:

- The CLP load is greater than or equal to 97% after three minutes or more.
- The CLP load decreases to 95% for three minutes.

Communication Line Adapter Connectivity

For an overview of the 3746 Nways Multiprotocol Controller and IP Router connectivity, refer to “Maximum Connectivity of the 3746-9x0 APPN/HPR Network Node” on page 2-31.

Maximum Number of Active Lines

The maximum number of active lines at the same time on a CLP can be up to 120.

A given line of the 3746-900 is assigned to either NCP-controlled traffic (defined and activated via NCP) or 3746-controlled traffic (defined and activated via the 3746 control point) or both (Frame relay and X.25 lines). In the 3746-900, 3746-controlled lines (SDLC, Frame relay, X.25, and PPP) and NCP-controlled lines (SDLC, Frame relay, X.25 and ISDN) can be run through the same CLP.

Maximum Number of Frame relay DLCIs

A 3746-900 configured with 3746 APPN/HPR or IP routing over WAN links, and the 3746-950 support 500 Frame relay DLCIs per CLP, and 2000 Frame relay DLCIs per CLP3.

A 3746-900 configured without APPN/HPR or IP routing over WAN links, (NCP controlled only), can support 3000 DLCIs per CLP and CLP3.

Maximum Number of Active Physical Units

CLP

In a 3746-900, with APPN/HPR or IP routing over WAN links, each CLP supports:

- Up to 1000 PUs over SDLC lines
- Up to 1000 PUs over Frame relay, X.25 lines (Virtual Circuits) and ISDN B-channels (NCP)

Up to 1000 PUs can be activated by the NNP over SDLC, X.25 and Frame relay lines, the rest being activated by NCP in the 3745.

In the 3746-950, up to 1000 physical units (PUs, for example, PS/2s and 3174s) can be active at the same time over the SDLC, Frame relay, and X.25 lines on each CLP.

Any ratio of PU-sharing between LICs on the CLP can be configured. For example in SDLC, 100 PUs can be activated via one LIC11, 200 via a second LIC11, 300 via a third LIC11, and 400 via a fourth LIC11.

CLP3

In a 3746-900, with APPN/HPR or IP routing over WAN links, each CLP3 supports:

- Up to 1000 PUs over SDLC lines
- Up to 2000 PUs over Frame relay, X.25 lines (Virtual Circuits) and ISDN B-channels (NCP)

Up to 3000 PUs can be activated by the NNP over SDLC, X.25 and Frame relay lines.

In the 3746-950, up to 3000 physical units (PUs, for example, PS/2s and 3174s) can be active at the same time over the SDLC, Frame relay, and X.25 lines on each CLP3. Any ratio of PU-sharing between LICs on the CLP3 can be configured. For example, 200 PUs can be activated via one LIC11, 400 via a second LIC11, 800 via a third LIC11, and 1600 via a LIC12.

Maximum Number of LU Sessions

CLP and CLP3 support respectively up to 3500 and 12500 sessions activated by the NNP. There is no limit to the number of APPN/ANR sessions.

In the 3746-900, the number of LU-LU sessions established by NCP depends on the amount of storage available in the 3745 CCU, rather than CLP storage, and is independent of the number of 3746-controlled sessions. The maximum number of possible sessions over a CLP or CLP3 is equal to the maximum number of NCP-controlled sessions (3745 storage dependent) plus the maximum number of sessions established by the 3746 Control Point.

Maximum Number of Active X.25, Frame relay, and ISDN Stations

In addition to the SDLC connectivity, each CLP and CLP3 support respectively any mix of up to 1000[6] or 2000[6] Frame relay stations (PUs), X.25 stations, and ISDN stations controlled by NCP. The maximum number of stations includes the following resources:

Frame relay
All PUs access CLP via FRTE connections, for example, all PUs downstream from IBM 2210s, IBM 2216s operating in Frame relay BAN mode, and IBM 3174 controllers. Each PU is controlled either by NCP or by the 3746 Controller.

Notes:

1. An IBM 2210 or IBM 2216 operating as an APPN/HPR network node for downstream PUs is seen by the 3746 NN as a single adjacent PU.
2. For Frame relay lines, if a DLCI carries IP traffic, the 3746 IP router uses one station on this DLCI.
3. IP over PPP or Frame relay switching does not use any stations.

X.25 logical stations
Virtual circuits (PVCs and SVCs) are run by NPSI V3R8, NCP (V7R4 or above), or the 3746 Controller. One VC is required per remote PU. Separate VCs are required for IP traffic.

X.25 physical stations (LAPB)
One per X.25 line, run by NPSI V3R8, or NCP (V7R4 or above), or 3746.

ISDN physical stations (LAP-D)
One per ISDN line on a LIC16, run by NCP.

ISDN Signalling Stations (Q.931)
One per ISDN line on a LIC16, run by NCP.

ISDN Logical Stations
Frame relay PUs activated over B channels (equivalent to 64 Kbps Frame relay lines).

Maximum Number of X.25 Modulo 128 Lines (NPSI)

An X.25 line is controlled either by NCP (X.25 ODLC line) or NPSI (X.25 line), and operates either at modulo 8 or at modulo 128. X.25 NPSI lines, which operate at modulo 128, affect the maximum line connectivity of the CLP as follows:

- CLP supports four X.25 modulo 128 lines controlled by NPSI per pair of LIC slots.
- Each X.25 NPSI modulo 128 line reduces the total connectivity of the CLP by 15 for the other types of supported lines. Table 18-13 on page 18-21 shows the allowed modulo 128 and other lines on one CLP with two LICs.

[6] 3000 for a 3746-900 with with all the CLPs and CLP3s operating under NCP control only.

Table 18-13. Lines Per CLP with Two LICs Attached					
Type of Line	**Number of Lines**				
X.25 NPSI Modulo 128	0	1	2	3	4
X.25 NPSI Modulo 8, X.25 ODLC, SDLC, Frame relay, or PPP	60	45	30	15	0
ISDN LIC16 lines	2	2	2	1	0

Careful

The numbers in Table 18-13 should not be exceeded by the following:

- CLP line definitions
- Backing up one active CLP with another active CLP

Total Number of Active Resources

The storage available in the CLP does not allow the maximum possible number of lines, NCP-controlled PUs, and 3746-controlled PUs to be simultaneously activated with any number of 3746-controlled sessions.

Table 18-14 on page 18-22 gives examples of maximum CLP configurations (IP routing not installed). It is assumed that within each configuration, PUs are configured with the same number of sessions, including control sessions (this does not include ANR sessions). For SDLC lines, all PUs are assumed to use modulo 8.

Examples of Maximum Configurations for CLP

Table 18-14. Examples of Maximum CLP Configurations

Lines	PUs (3746 NN)	LU Sessions (3746 NN)	ANR Sessions (3746 NN)	PUs (3746-900/ NCP)
Frame relay				
FR: 120	1 (APPN/HPR)	3500	Any	—
FR: 120	500 (APPN/HPR)	2180	Any	—
FR: 120	500 (APPN/HPR)	1580	Any	500
FR: 120	1000 (APPN/HPR)	860	Any	—
FR: 120	1000 (Dependent)	1260	Any	—
FR: 120	—	—	—	1000[1]
X.25				
X.25: 120	500 (APPN/HPR)	1960	Any	—
X.25: 120	500 (APPN/HPR)	1360	Any	500
X.25: 120	1000 (APPN/HPR)	640	Any	—
X.25: 120	1000 (Dependent)	1040	Any	—
X.25: 120	—	—	—	1000[1]
SDLC				
SDLC: 5	500 (APPN/HPR)	1500	Any	—
SDLC: 15	30 (APPN/HPR)	3000	Any	—
SDLC: 30	180 (APPN/HPR)	2270	Any	—
SDLC: 40	250 (APPN/HPR)	1300	Any	500
SDLC: 50	400 (Dependent)	1300	Any	—
SDLC: 60	300 (Dependent)	1500	Any	—
SDLC:120	—	—	—	1000

Note:

1. 3000 for a 3746-900 with all the CLPs operating under NCP control only.

The following simplified storage formula can help you estimate CLP (not CLP3) connectivity (microcode EC level D26120 and above):

```
  (20 x lines_SDLC) + (1.5 PU_NCP) + (1.2 PU_m128) + (1.25 x LU)
+ (4.8 x PU8s) + (5.2 x PU16s) + (6.0 x PU32s)
+ (7.6 x PU64s) + (10.8 x PU128s) + (17.2 x PU256s)
+ (4.3 x PUD8s) + (4.7 x PUD16s) + (5.5 x PUD32s)
+ (7.1 x PUD64s) + (10.3 x PUD128s) + (16.7 x PUD256s)
+ (3.3 x PU8) + (3.7 x PU16) + (4.5 x PU32)
+ (6.1 x PU64) + (9.3 x PU128) + (15.7 x PU256)
+ (2.8 x PUD8) + (3.2 x PUD16) + (4.0 x PUD32)
+ (5.7 x PUD64) + (8.9 x PUD128) + (15.2 x PUD256)
< or = 4375 - x
```

x is different from zero if any licensed internal code is loaded in the CLPs, in addition to the APPN/HPR option. x is identical for all CLPs in a given 3746 configuration, and is the sum of selected CLP options. These options include:

- IP = 1103
- X25 = 270
- ISDN = 306 (3746-900 only).

Various SDLC, X.25, and Frame relay resources that factor in CLP storage must be weighted, as indicated in the formula, and the total must not exceed the maximum specified value of 4735 – x. Use the formula and the number of related resources for each CLP:

Line_SDLC
Number of SDLC lines (3746 NN + NCP).

PU_NCP
Number of PUs controlled by NCP (3746-900 only) and connected via SDLC lines.

PU_m128
Total PUs (3746 NN + NCP) using modulo 128 over SDLC lines.

LU
Total number of user (half) sessions controlled by the 3746 NN (over SDLC, X.25, and Frame relay lines). This does not include ANR sessions, which can be in any quantity.

PUns
Total APPN/HPR PUs (modulo 8 + modulo 128), each with up to n sessions[7], connected to the 3746 NN via SDLC lines.

PUDns
Total dependent PUs (modulo 8 + modulo 128), each with up to n sessions[7], connected to the 3746 NN via SDLC lines.

PUn
Total APPN/HPR PUs, each with up to n sessions[7], connected to the 3746 NN via Frame relay or X.25 lines.

PUDn
Total dependent PUs, each with up to n sessions[7], connected to the 3746 NN via Frame relay or X.25 lines.

Note: Sessions entirely routed within the same processor must be counted twice in the LU number (full sessions). Sessions routed to another processor, for example ESCON, are counted once in the LU number (one half session in the CLP).

CF3745 provides an estimate of CLP storage utilization based on user connectivity requirements, including IP and HPR/RTP.

Actual storage use may vary, depending on the network environment. Storage congestion, if any, is reported to the network operator via NetView alerts.

7 Includes APPN/dependent (data) sessions and control sessions (CP-CP, SSCP-PU, SSCP-LU), and does not include ANR.

Checking Activation Limits and Capacity Planning

3745/3746 Configurator (CF3745)
Verifies that the planned CLP configuration does not exceed CLP storage and PU limits.

NetView Performance Monitor (CLP storage utilization)
Refer to “NetView Performance Monitor (NPM) CLP Load” on page 18-18.

MOSS-E (CLP storage utilization)
Refer to “Performance Measurement Function - MOSS-E (CLP Load)” on page 18-18.

PU limit
When a CLP reaches the limit of active SDLC PUs or active X.25, Frame relay, and ISDN stations, and the 3746 control point or NCP (3746-900) attempts to activate another PU or station beyond this limit, the following occurs:

- CLP rejects the PU activation request.
- A generic alert is sent to NetView indicating line congestion.

Storage limit (CLP storage thresholds)
There is no automatic control in the number of LU sessions established by the 3746 control point for a given CLP. If the storage limit of the CLP is reached, any new activation requests for SDLC lines, PUs, and 3746-controlled LU-LU sessions are rejected and a generic alert is sent to NetView indicating line congestion.

CLP at High Storage Threshold (97%)
CLP storage greater than or equal to 97% in a three minute time period generates an alarm and a NetView alert (every three minutes, three times).

CLP back to normal storage threshold (95%)
If CLP storage is greater than or equal to 97% for three minutes or more and decreases to 95% or less for a three minute time period, an alarm and a NetView alert is generated.

Note: The storage threshold alerts above are also applicable to other processor types (TRP2, TRP3, ESCP2, and ESCP3).

Processor Backups

In a CLP backup configuration, two LIC slots of a CLP are connected to an adjacent CLP. If a CLP fails, the LICs are automatically switched to the backup CLP. However, APPN, Dependent LU, and HPR sessions previously flowing over switched LICs must be re-established (IP and HPR/ANR traffic is connectionless and traffic is not disrupted). The backup CLP handles the additional traffic from the LICs of the failed CLP. When problems with the failed CLP are fixed, a switchback returns the system to the original configuration.

Use the MOSS-E **Define Backup CLP** option for backup links. Any combination of LIC types can be backed up.

Before you back up CLPs, refer to the following information:

Maximum Number of Active Lines, PUs, and 3746 LU-LU Sessions

Refer to "Total Number of Active Resources" on page 18-21.

Processor Slot Pairing

CLPs in a backup configuration must be located in one of the eight pairs of processor slots in the 3746 enclosure. Refer to Table 18-1 on page 18-1.

One-Way or Two-Way Backups

Figure 18-2 shows an example of a two-CLP backup configuration with the backup defined in both directions (two-way backup). Each CLP backs up the LIC(s) to the other CLP, and each has two LICs for normal operations. CLP X backs up the two LICs of CLP Y and CLP Y backs up the two LICs of CLP X.

You can also use one-way backups where CLP X backs up the LICs on CLP Y but CLP Y does not back up CLP X.

One- or two-way backups can be used with any number of LICs (up to four).

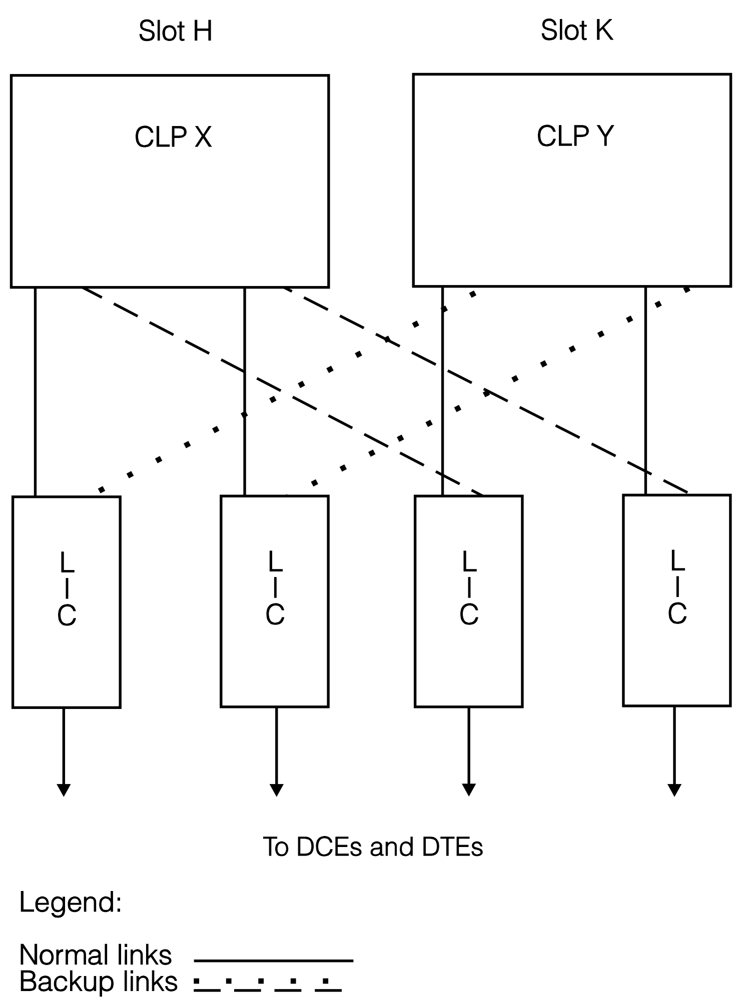


Figure 18-2. Example of a Configuration with CLP Backup Capability

Chapter 19. 3746 SDLC Support

This chapter covers VTAM DLCADDR keyword sets that should be used for SDLC-dependent LU/PU traffic, recommendations when migrating SDLC lines from a 3745 to the 3746, and performance tuning recommendations for SDLC lines.

VTAM DLCADDR Keyword for SDLC Leased Line (3746 APPN/DLUR)

See "VTAM DLCADDR Keyword in PATH Statement" on page 2-38 for a list of possible VTAM DLCADDR keyword coding formats.

You must have SDLC switched major node definitions in VTAM, even if you are using leased lines. The SDLC data link control information for a peripheral resource controlled by the 3746 NN (DLUR) on a leased line has the following elements:

- DLC type=SDLCNS
- Port name
- Secondary SDLC address

The DLCADDR keywords are coded as follows:

Step 1. Specify the SDLC type of non-switched:

```
DLCADDR=(1,C,SDLCNS)
```

Step 2. Identify the name of the SDLC port where the peripheral resource is attached:

```
DLCADDR=(2,I,port_name)
```

where port_name is the port name defined in the CCM in alphanumeric characters.

Step 3. Specify the secondary station SDLC address:

```
DLCADDR=(3,X,hh)
```

where hh represents the secondary station SDLC address. DLUR is always primary to its downstream link stations.

Refer to the VTAM switched major node examples on page 19-2.

SDLC switched major node for a VTAM DLUS triggered activation over a leased line example:

```
**************************************************************
*   SWITCH MAJOR NODE FOR DLUR/DLUS                          *
*   --> SDLC LEASED LINES MUST HAVE A VTAM DEFINITION        *
*       ( PUS AND LUS)                                       *
*       (IN THIS CASE NO MORE NCP DEFINITION)                *
*                                                            *
**************************************************************
B8DU2240 VBUILD TYPE=SWNET,MAXDLUR=3
*------------------------------------------------------------*
* SDLC LINE 2240                                             *
*------------------------------------------------------------*
PU224000 PU    ADDR=01,                                      X
               NETID=SYSTSTAP,                               X
               IDBLK=05D,                                    X
               IDNUM=22400,                                  X
               MAXDATA=265,                                  X
               DISCNT=NO,                                    X
               MAXPATH=2,                                    X
               ISTATUS=ACTIVE
*
PATH2240 PATH  PID=1,                                        X
               DLURNAME=NNBS8,                               X
               DLCADDR=(1,C,SDLCNS),                         X
               DLCADDR=(2,I,DL2260NS)
               DLCADDR=(3,X,01)
LU224000 LU    LOCADDR=02,PACING=1,VPACING=1
*------------------------------------------------------------*
```

SDLC switched major node for DLUR triggered activation over a leased line example:

```
**************************************************************
*   SWITCH MAJOR NODE FOR DLUR/DLUS                          *
*   --> SDLC LEASED LINES MUST HAVE A VTAM DEFINITION        *
*       ( PUS AND LUS)                                       *
*       (IN THIS CASE NO MORE NCP DEFINITION)                *
*                                                            *
**************************************************************
DL2624L3 VBUILD TYPE=SWNET
*------------------------------------------------------------*
* SDLC LINE 2624                                             *
*------------------------------------------------------------*
PU262400 PU    ADDR=01,                                      X
               IDBLK=05D,                                    X
               IDNUM=26240,                                  X
               MAXDATA=265,                                  X
               DISCNT=NO,                                    X
               ISTATUS=ACTIVE
*
LU262400 LU    LOCADDR=02,PACING=1,VPACING=1
*
*------------------------------------------------------------*
```

VTAM DLCADDR Keyword for SDLC V.25 Switched Line

The SDLC data link control information for a peripheral resource controlled by the 3746 NN (DLUR) on a V.25 bis switched line has the following elements. These elements *must* be specified in the following order:

- DLC Type=SDLCSW
- Port name
- Secondary SDLC Address
- DLC Type=V25BIS
- V.25 bis command and address string

Step 1. Specify the SDLC type of switched line:

```
DLCADDR=(2,I,SDLCSW)
```

Step 2. Identify the name of the port where the V.25 bis modem is attached:

```
DLCADDR=(2,I,port_name)
```

where port_name is the port name defined in the CCM in alphanumeric characters.

Step 3. Specify the secondary station SDLC address:

```
DLCADDR=(3,X,hh)
```

where hh represents the secondary station SDLC address. DLUR is always primary to its downstream link stations.

Step 4. Specify the DLC type of V25 bis:

```
DLCADDR=(1,C,V25BIS)
```

Step 5. Identify the same port name as above:

```
DLCADDR=(2,I,port_name)
```

Step 6. Specify the composite command and address string used to pass dialing information to the modem:

```
DLCADDR=(5,C,CRx:nnnnn)
```

The value is a three-character bis command followed by those addresses, separators and special characters that are appropriate for that command. Any character that is acceptable by the V.25 bis modem being used may be included in this value. No reordering of this signalling information is made before passing it to the modem.

Refer to the VTAM switched major node examples on page 19-4.

SDLC switched line major node for call-out over switched line example: (See "VTAM DLCADDR Keyword in PATH Statement" on page 2-38 for a list of possible coding formats.)

```
***************************************************************
*   SWITCH MAJOR NODE FOR DLUR/DLUS ON NNBS8 MACHINE          *
*   --> SWITCHED LINES MUST HAVE A VTAM DEFINITION            *
*       ( PUS AND LUS)                                        *
*                                                             *
*    NNBS8: SDLC LINES 2263 TO 22..                           *
*    ----                                                     *
***************************************************************
B8DLSW07 VBUILD TYPE=SWNET,MAXDLUR=8,MAXNO=50
*-------------------------------------------------------------*
* SDLC LINE 2266                                              *
*-------------------------------------------------------------*
PU224000 PU    ADDR=01,                                       X
               NETID=SYSTSTAP,                                X
               IDBLK=05D,                                     X
               IDNUM=22660,                                   X
               MAXDATA=265,                                   X
               DISCNT=NO,                                     X
               MAXPATH=2,                                     X
               ISTATUS=ACTIVE,                                X
               DYNADJCP=YES,                                  X
               PUTYPE=2

*
PATH2266 PATH  PID=1,                                         X
               DLURNAME=NNBS8,                                X
               DLCADDR=(1,C,SDLCSW),                          X
               DLCADDR=(2,I,DL2263SW),                        X
               DLCADDR=(3,X,01)                               X
               DLCADDR=(1,C,V25BIS),                          X
               DLCADDR=(2,I,DL2263SW),                        X
               DLCADDR=(5,C,CRN:T307100),REDIAL=2
LU226600 LU    LOCADDR=02,PACING=1,VPACING=1
LU226601 LU    LOCADDR=03,PACING=1,VPACING=1
LU226602 LU    LOCADDR=04,PACING=1,VPACING=1
LU226603 LU    LOCADDR=05,PACING=1,VPACING=1
LU226604 LU    LOCADDR=06,PACING=1,VPACING=1
*-------------------------------------------------------------*
```

Performance Tuning for NNP SDLC Controlled Lines

A Note of Warning

Proper operation of the 3746-9X0 requires correct setting of the CCM parameters.

There are parameter values that need to be changed when moving lines from a 3745 adapter to a CLP.

When making line definitions, this section must be used.

Proper tuning optimizes the performance of the CLP and related lines. This section gives recommendations to increase the throughput and reduce the response time over SDLC links.

CCM Definitions for SDLC Links

The CLP handles the data link control (DLC) for the lines connected to the 3746 Nways Multiprotocol Controller. Proper tuning has to be done to optimize the performance of the SDLC links after line migrations from the 3725/3745 to the 3746.

In the following sections the following format is used:

Parameter name (CCM panel name)

For All Link Configurations

- **Poll pause (SDLC Port - DLC Parameters 3/3 panel)**

  As polling takes up a large part of the CLP processing power, the Poll pause value has to be used judiciously. A compromise has to be reached between the response time and the non-productive polling. This must take into account all the resources of a CLP. If the interactive transaction rate is low on the link, reduce the Poll pause value in order to obtain an acceptable response time.

For Point-to-Point Links

- **Transmit-Receive Capability (SDLC Port - DLC Parameters 1/3 panel)**

  Like NCP, a CLP can provide outbound and inbound services concurrently for an active secondary station. For a duplex line, select Full duplex

- **Full duplex data (SDLC Station - DLC Parameters 1/2 panel)**

  To take advantage of the duplex line and the point-to-point environment, select Yes.

- **Modulo'?' (SDLC Station - DLC Parameters 1/2 panel)**

  It is recommended that the value of Modulo must be selected according to the values of Maximum transmitted frames before acknowledgment sent (MAXOUT) and Maximum number of frames (PASSLIM):

  – For MAXOUT and PASSLIM values up to 7, use MODULO = 8
  – For MAXOUT and PASSLIM values up to 127, use MODULO = 128

- **Maximum number of frames (PASSLIM) (SDLC Station - DLC Parameters 1/2 panel)**

PASSLIM is only relevant for multipoint lines. However, for point-to-point lines, it should be coded at its maximum value: PASSLIM=254. This will save CLP cycles by eliminating the checking at the end of each PASSLIM sequence of frames.

For Multi-Point Links

- **Transmit-Receive Capability (SDLC Port - DLC Parameters 1/3 panel)**

  Like NCP, a CLP can provide outbound services to one physical unit (PU) while performing inbound services for a second PU.

  In a multi-point environment, the Transmit-Receive Capability may be defined as Yes for duplex even if the peripheral PUs or nodes are not capable of duplex operation. This is the case for IBM 3174 controllers that are performing as token-ring gateways when the B or C code level is used, but not if the A or S level is used.

- **Full duplex data (SDLC Station - DLC Parameters 1/2 panel)**

  Since the CLP cannot perform the outbound and inbound services for two different PUs at the same time, the secondary stations have to be defined as half-duplex. The Transmit-Receive Capability is defined as No for half-duplex.

- **Maximum number of frames (PASSLIM) (SDLC Station - DLC Parameters 1/2 panel)**

  If the value of PASSLIM for one secondary station is much greater than those of the other secondary stations, the response times for the other users might be affected.

  However, if a user needs to transfer a large file (for example, a graphic image) all at once, the PASSLIM value should be large enough to allow sending all the necessary PIUs for the file at one time without service slicing.

Maximum BTU Size

The maximum basic transmission unit (BTU) size supported by the 3746 Nways Multiprotocol Controller is 8000 bytes. For SDLC links, the CCM parameters Maximum received PIU size and Maximum sent PIU size in the Port Configuration - APPN Configuration panel of the CCM should be set to 8000 bytes if possible.

The value of the send and receive PIUs (BTU size) should be the maximum value of 8000 bytes since it has the least amount of overhead due to frame headers.

Migrating Lines from the 3745 to the 3746

This section shows the main architecture differences between the 3745 and the 3746.

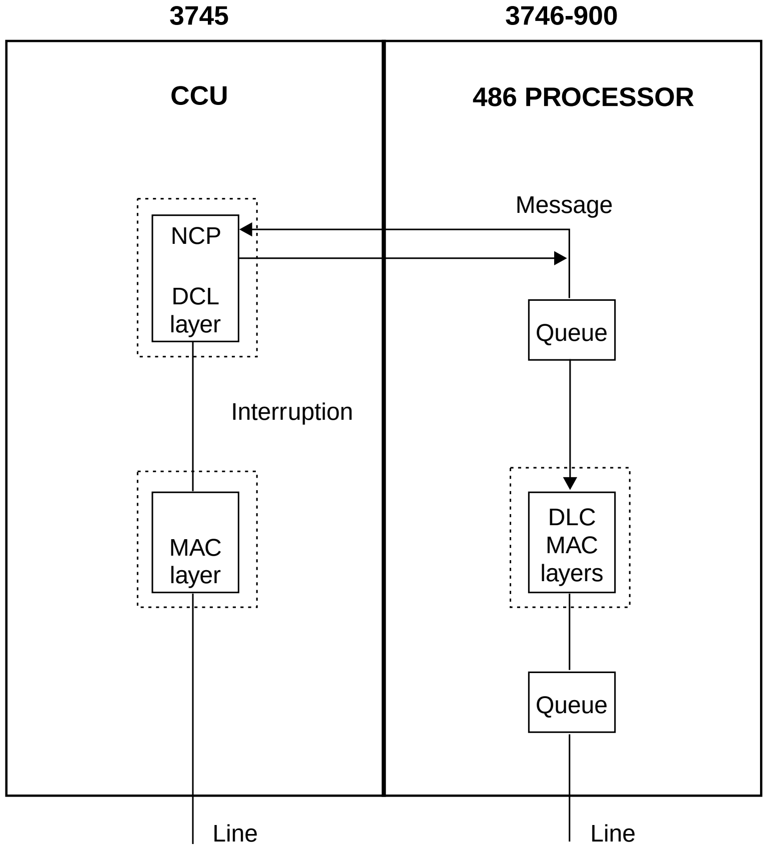


Figure 19-1. Architecture Differences between 3745 and 3746

DLC Layer

On the 3746, the DLC layer runs on a separate processor to the NCP. This difference allows the 3746 to be faster than the 3745 in handling the protocol, and to transmit and receive data. This reduces the NCP load.

Outbound Flow

On the 3745

The DLC layer takes CCU cycle time to answer the protocol. This means NCP is waiting for a MAC acknowledgment before sending data on the line. It must complete this action prior to processing the next burst of data.

On the 3746

A message up to MAXOUT or PASSLIM is put in a hardware queue. When the code transmits data, up to the full MAXOUT/PASSLIM can be put on the line.

Consequences

When the data is in this hardware queue, it is not possible to change the value of the Ns (transmit sequence value) or Nr (receive sequence value). This architecture gives a different flow between the 3745 and 3746. This can be handled by adjusting the poll pause timer.

Inbound Flow

On the 3745

The MAC layer is dispatched on a fixed number of bytes received. So for an input message (from the line), the DLC/NCP layer is interrupted more than one time.

On the 3746

The hardware handles the complete reception of a message. So for the same message the 3746-900 microcode is dispatched once and NCP is interrupted only once.

Consequences

The 3746 is much faster than the 3745 on protocol management. Therefore data is received at NCP at a faster rate from the 3746 than from the 3745.

DLC Protocol Management

The 3745 and the 3746 manage the SDLC protocol in the same way. The only difference is that the 3746-900 SDLC does not support the Service Order Table (SOT). This is now handled as the Service Order Chain (SOC) in the CLP.

For example, for NCP generation:

Service order = (S1, S2, S3, S1, S1, S1, S1, S2).

This results in the following polling sequence:

3745-Line : S1, S2, S3, S1, S1, S1, S1, S2
3746-Line : S1, S2, S3, S1, S2, S1, S1, S1.

In other words, the 3745 polls as the service order, while the 3746 assigns a polling weight according to the number of times a station is defined in the service order. If no service order is defined, the default value of one is used.

In the previous example:

S1 has a weight of 5.
S2 has a weight of 2.
S3 has a weight of 1.

General Consequences Related to NCP Tuning

When migrating lines from the 3745 to the 3746-9X0 it may be necessary to tune certain parameters in NCP. This is to ensure the same behavior for connected lines. The main parameters that need to be taken into account are:

ADDIFG, MAXOUT, PAUSE, REPLY, PASSLIM and the SOT.

Interframe Gap Tuning

- **Interframe gap (ADDIFG in the LINE statement)**

  When the line adapter of the partner DTE is experiencing a high rate of overrun errors, code:

  ```
  ADDIFG=YES
  ```

  This increases the gap between transmitted frames and decreases the frame rate.

NCP Definitions for Externally Clocked Lines

- **Line Speed (SPEED in the LINE Statement)**

  Refer to the NCP Version 7 *Resource Definition Reference* publication that corresponds to your release of NCP.

  For lines connected to the 3745 base unit or 3746 Models L13, L14, and L15, externally clocked lines (CLOCKING=EXT: in the NCP definition) do not require the SPEED keyword to be defined, unless NPM (NetView Performance Monitor) is used to monitor the line utilization, which is based on the SPEED value.

  For lines connected to the CLPs of the 3746-900, the SPEED keyword needs to be defined, whether the line uses external clocking (CLOCK=EXT) or provides clocking (CLOCKING=DIRECT). The line speed information is used as follows:

  – LIC11 line at speeds above 64K bps (up to 256 Kbps).

    The speed information is required by the CLP to scan only this line among the 3 or 4 addresses that are in the same LCB area. This allows the total scanning capacity of the LCB area (256 Kbps[1]) to be dedicated to this line address.

    Notes:

    1. If the speed of an externally clocked line is changed, the SPEED. keyword value does not need to be modified, as long as the new line speed value stays in the same range (see Table 19-1 on page 19-10), and you are not using NPM for line statistics (see below).
    2. If you are not using NPM for line statistics (see below), you may define the SPEED keyword with the highest line speed that you expect to use.

  – Monitoring the line utilization.

    NPM needs the SPEED information to accurately determine the line statistics.

  – Direct clocking

    The CLP uses the SPEED information to provide correct clocking to the directly attached DTE.

  – External clocking

    The CLP uses the SPEED information to verify that this speed is supported by the installed LIC (and ARC) type. Table 19-1 on page 19-10 shows the allowed LIC/ARC types depending on speed range.

1 Four lines at 64 Kbps scanning capacity per line equals 256 Kbps.

Table 19-1. LIC and ARC Assemblies Line Speeds		
LIC Type	**Line Speed Range**	**ARCs**
LIC11	From 600 bps up to 32Kbps	ARC V24 ARC V35 ARC X21
	Above 32Kbps up to 64Kbps	ARC V35 ARC X21
	Above 64Kbps up to 256Kbps (see note)	ARC V35 ARC X21
LIC12	From 256Kbps up to 2048 Kbps	N/A
Note: There can be only one such active ARC in an LCB area of 3 or 4 slots, refer to "LCB Areas" on page 18-8.		

NCP Definitions for SDLC Subarea Links (INN)

- **Polling Timer (PAUSE in the SDLCST or LINE Statement)**
- **Reply Timer (REPLYTO in the GROUP Statement)**

  CLP efficiency may be negatively affected by improper settings of the PAUSE timer. A small value results in non-productive polling which abnormally loads the CLP, reduces the amount of CLP cycles available for the traffic processing, and therefore may reduce CLP and line throughputs. This is especially true for high-speed lines carrying small messages. The CLP efficiency can be easily improved by increasing the value of PAUSE parameter.

  For a primary station, set the value between 0.5 and 1 second for both modulo 8 and modulo 128 operating lines:

  ```
  PAUSE=(0.5,1)
  ```

  For a secondary station, set a value between 1.0 and 2.0 seconds for both the modulo 8 and modulo 128 operating lines.

  For the primary and the secondary stations, the value must be selected in conjunction with the Reply Timer (REPLYTO) of the primary station. The following general rule applies:

  REPLYTO (primary NCP) must be greater than PAUSE (secondary NCP).

  PAUSE (secondary NCP) must be greater than PAUSE (primary NCP).

  An example based on the above recommendations:

  ```
  REPLYTO (primary) = 1.1 second
  PAUSE (secondary) = 1.0 second
  PAUSE (primary)   = 0.5 second
  ```

  Large values of PAUSE for the secondary station may improve the data throughput from the secondary to the primary, without affecting the throughput in the other direction (from the primary to the secondary station).

  Note: `PAUSE = 0` must not be used for the secondary station, as this would cause link performance degradation due to retransmissions and transmission delays.

  For more information on the PAUSE operand, refer to the *NCP Resource Definition Reference* manual (Line Definition Statement).

- **Transmission Group Flow Control Thresholds (ER in the PATH Statement)**

Code these threshold values as high as possible in the network. The maximum allowed values are the following:

`ERn=(adjsa,tgn,448000,448000,448000,512000)`

For more information on the Transmission Group Flow Control Threshold, refer to the *NCP Resource Definition Reference* manual (Path Definition Statement).

- **Virtual Route Pacing Window Size (VRPWSnm in the PATH Statement)**

  Code the Virtual Route Pacing Window size in the PATH statement definitions. These parameters have an important impact on response time through the network. Feeding a virtual route with a window size that is too small may result in detecting too quickly (and erroneously) node level congestion thus causing frequent interruptions during data transmission. For the links at speeds less than 64 Kbps, code at least:

  `VRPWSnm=(10,30)`

  Increase these values for higher speeds: at 2 Mbps the maximum values are:

  `VRPWSnm=(128,255)`

  In order to further improve the response time, code the highest priority for n:

  `VRPWSn0` or `VRPWSn1`.

- **Blocking Factor (BLOCK in the PU Statement)**

  BLOCK, in the PU statement, can be used to improve the throughput of the SDLC subarea links and reduce the processing load of the CLP. NCP can support multiple path information units (PIUs) in SDLC frames when they are routed over transmission group links. This results in fewer inter-frame gaps per transmission than if the sender transmitted the PIUs in individual frames. BLOCK specifies the maximum frame size and the maximum number of PIUs per frame.

  If `BLOCK` is coded, NCP verifies that the sender of the format 2 XID supports PIU blocking. If not, NCP uses one frame per PIU. If the sender format 2 XID supports a smaller block size, NCP adjusts its block size to the XID value. A performance increase may be obtained when this parameter is coded.

  Code the blocking factors at each side of the transmission group links connecting two subarea nodes. The values recommended for BLOCK are:

  `BLOCK=(4096,16)`

  This means that each SDLC frame is up to 4096 bytes long and will contain up to 16 PIUs.

- **Transfer (TRANSFR in the LINE Statement)**

  TRANSFR defines the maximum number of buffers necessary to contain the maximum amount of data that NCP can receive in a single data transfer operation. If a channel adapter is being defined, it determines the maximum length PIU that the channel adapter will accept in a single data transfer operation.

  Note: It is highly recommended to make the TRANSFR value the same for all lines in the same multi-link transmission group. Otherwise, there are problems with link activation.

For optimal CLP performance (line and machine throughputs), coding as high a value as possible is recommended. However, this TRANSFR must comply with the following two rules:

1. The TRANSFR value multiplied by the BFRS value minus 18 must match the value of MAXDATA in the PCCU definition statement.
2. The TRANSFR value must be less than or equal to the ratio:

   `((MAXBFRU x UNITSZ) - BFRPAD) / BFRS.`

For more information on the TRANSFR operand, refer to the *NCP Resource Definition Reference* manual (Line Definition Statement).

- **Maxout (MAXOUT in the PU and SDLCST Statement)**

  MAXOUT specifies the maximum number of information frames (I-f rames) that an NCP sends over a line before requesting a response from the NCP of the adjacent subarea. At activation, an NCP informs the adjacent NCP of its MAXOUT. This value is used by the adjacent NCP as its transmit limit; it is the maximum number of frames the adjacent NCP will send before waiting for a response.

  If this NCP is the secondary NCP, the value used comes from the SDLCST statement with MODE set as:

  `MODE=SECONDARY`

  If this NCP is the primary NCP, the value used comes from the PU statement.

  A higher MAXOUT value improves link throughput. However, a higher value also causes more PIU re-transmissions if an error occurs. You might want to select a lower value for links with high error rates (or operating at a low speed) and a higher value for links with low error rates (or operating at a high speed).

  The maximum value for MAXOUT is 127.

  The optimal value depends on the number of active PUs connected to the CLP. This value corresponds to the maximum utilization of the CLP buffer storage, which is reached just before RNR (receive not ready) control frames are observed on the line. RNRs are sent by the flow control mechanism of the CLP to prevent the CLP from congestion.

- **Modulo (MODULO in the PU Statement)**

  MODULO must be selected according to the value of MAXOUT exph.:

  – For MAXOUT values up to 7, use `MODULO=8`
  – For MAXOUT values from 8 to 127, use `MODULO=128`.

- **Link Transmission Group (TGCONF in the PU Statement)**

  TGCONF specifies whether a subarea link station is in a multilink or single-link transmission group (TG). The default is:

  `TGCONF=MULTI`

  To improve the performance of transmission groups that contains a single SDLC line (a single-link TG), code:

  `TGCONF=SINGLE`

NCP Definitions for SDLC Peripheral Links

The CLP (instead of NCP) handles the Data Link Control (DLC) for the lines connected to the 3746-900. Proper tuning has to be done to optimize the performance of the SDLC peripheral links after line migrations from the 3725/3745 to the 3746-900.

For All Peripheral Link Configurations

- **Polling Timer (PAUSE in the LINE Statement)**

  As polling takes up a large part of the CLP load, the PAUSE value has to be used judiciously. A compromise has to be reached between the response time and the non-productive polling. This must take into account all the resources of a CLP. If the interactive transaction rate is low on the link, reduce the PAUSE value in order to obtain an acceptable response time. For example, if PAUSE was 0.4 on the 3745 line, 0.1 is recommended for the 3746-900.

For Peripheral Point-to-Point Links

- **To have a Duplex Line (ADDRESS in the LINE Statement)**

  Like NCP, a CLP can provide outbound and inbound services concurrently for an active secondary station. To do this, code:

  `ADDRESS=(lnbr,FULL)`

- **To have a Duplex Station (DATMODE in the PU Statement)**

  In order to take advantage of the duplex line and the point-to-point environment, the physical unit has to be defined as:

  `DATMODE=FULL`

- **Modulo (MODULO in the PU Statement)**

  It is recommended that the value of `MODULO` be selected according to the values of `MAXOUT` and `PASSLIM`. Use for:

  – `MAXOUT` and `PASSLIM` values up to 7, use `MODULO = 8`
  – `MAXOUT` and `PASSLIM` values up to 127, use `MODULO = 128`.

- **Passlim (PASSLIM in the PU Statement)**

  `PASSLIM` is only relevant for multipoint lines. However, for point-to-point lines, it should be coded at its maximum value:

  `PASSLIM=254`

  This will save CLP cycles by eliminating the checking at the end of each `PASSLIM` sequence.

For Peripheral Multi-Point Links

- **Duplex Line (ADDRESS in the LINE Statement)**

  Like NCP, a CLP can provide outbound services to one physical unit (PU) while performing inbound services for a second PU.

  In a multi-point environment, the line may be defined as duplex:

  `ADDRESS=(lnbr,FULL)`

  even if the peripheral controllers are not capable of duplex operation. This is the case for IBM 3174 controllers which are performing as token-ring gateways when the B or C code level is used, but not if the A or S level is used.

- **Half-Duplex Station (DATMODE in the PU Statement)**

  Since the CLP cannot perform the outbound and inbound services for two different PUs at the same time, the secondary stations have to be defined as half-duplex:

  `DATMODE=HALF`

- **Passlim (PASSLIM in the PU Statement)**

  If the value of PASSLIM for one secondary station is much greater than those of the other secondary stations, the response times for the other users might be affected.

  However, if a user needs to transfer a large file (for example, a graphic image) all at once, the PASSLIM. value should be large enough to allow sending all the necessary PIUs for the file at one time without service slicing.

Chapter 20. Multiaccess Enclosure

Figure 20-1. The 3746-950 with the 3746 Multiaccess Enclosure Installed in the First Controller Expansion.

This chapter introduces the 3746 multiaccess enclosure what it consists of, what the options are, and what the prerequisites are for installation.

The 3746 multiaccess enclosure is a new extension to the existing hardware. This multiaccess expands the connectivity of the 3746 by offering eight new adapter slots. These new adapters are based on the latest PCI technology and offer a broad range of high-speed LAN (ATM LAN emulation client and classical IP), increase traditional LANs interfaces (token-ring and Ethernet), and offer additional cost effective E1/T1 and some low-speed lines. It will also bring new ESCON adapters (PCI). Its new enclosure will be primarily an APPN, APPN/DLUR, HPR and IP router. It will also provide new specific functionalities such as IPX, DLSW support, MPC+ as the latest IBM channel protocol (it requires VTAM V4R4) for very efficient HPR traffic only, and bring additional high performance ESCON for IP and SNA/APPN.

The first delivery of the 3746 multiaccess enclosure will connect to the 3746 Nways Multiprotocol Controller via two dedicated token-ring attachments. Figure 20-2 on page 20-3 shows this.

It will appear as a separate APPN, HPR, IP control point and a future delivery will bring a deep hardware attachment and single APPN, HPR, IP node functionalities. This hardware attachment will use one empty processor slot in the base of the 3746 enclosure or in the first expansion enclosure (FC 5016), or in the second expansion enclosure (FC5216).

Refer to Figure 20-3 on page 20-5. The later connection will increase the throughput for traffic between the 3746-9x0 adapters and the 3746 multiaccess enclosure adapters.

Description

The base 3746 multiaccess enclosure (FC#3000) (refer to Figure 21-1 on page 21-1) consists of:

- A base enclosure
- One power supply (a second redundant power supply is optional (FC#3500))
- A cooling fan tray assembly
- A system backplane
- A system card containing:
  - A 604 133-Mhz PowerPC microprocessor
  - 64-MB DRAM
  - A PCMCIA token-ring card and cable
- Eight adapter slots
- Two 8228 MAUs
- A cable to connect the multiaccess enclosure maintenance serial port to the service processor

The following is also automatically prompted on CF3745 screen with all 3746 multiaccess enclosure orders: (refer to Figure 20-2 on page 20-3.

- A 2-port token-ring card (FC#3280) for slot 1 (dedicated to the 3746 connectivity)
- Two 8228 to 3746 multiaccess enclosure slot 1 token-ring connection cables (P/N 43G3953)

The required operational software is shipped preloaded on each 3746 multiaccess enclosure.

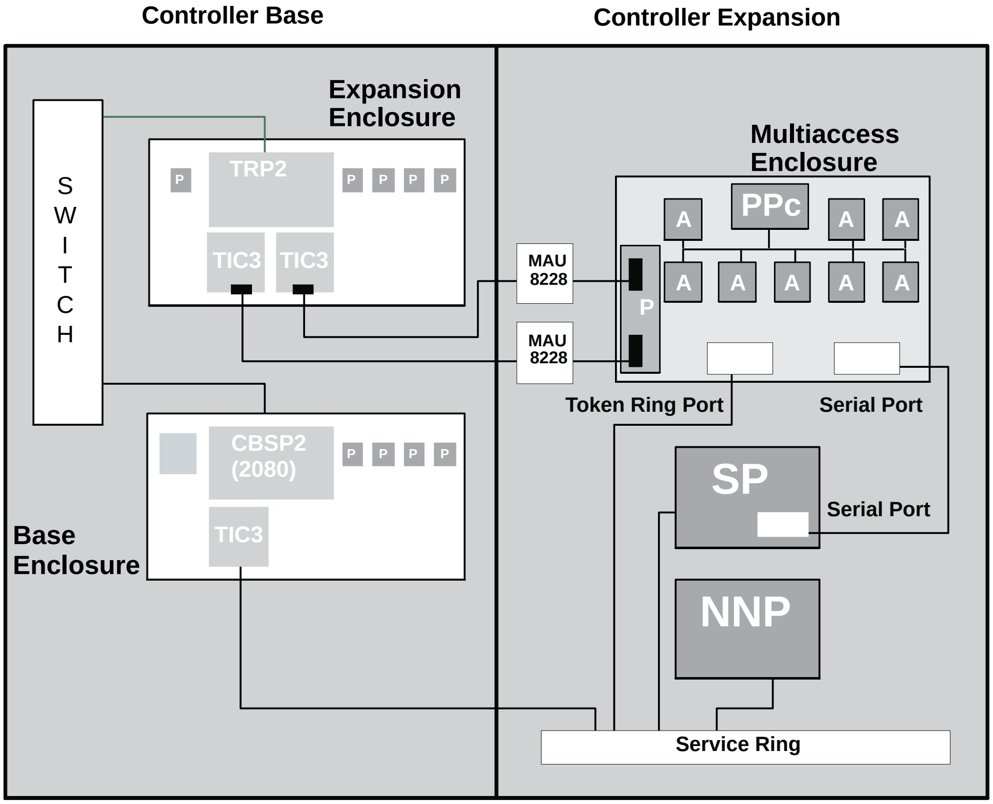


Figure 20-2. Block diagram Showing the Components used to Attach the 3746 Multiaccess Enclosure

Prerequisites

Hardware Requirements

You must provide the following hardware to integrate and operate the 3746 multiaccess enclosure with the 3746:

- Two TIC3 interfaces in the 3746-9x0 (dedicated for 3746 multiaccess enclosure connection). These TIC3s will connect to the 3746 multiaccess enclosure slot 1 token-ring card via the two 8228s. Refer to Figure 20-2 on page 20-3
- Two cables to connect the 8228 MAUs to the 3746-9x0 TIC3s. (Cable Group#7003).
- Service Processor Feature Code 5021 3172 Pentium 90 minimum (P/N 55H7630) with Feature Code #5051 or Feature Code 5052. See Table 34-8 on page 34-27.
- Network Node Processor (FC5022)
- 3746 IP Feature (FC5033) enabled on the Network Node Processor if you want IP traffic on the multiaccess enclosure to communicate with 3746-9x0 base frame adapters.
- Any cables required for the 3746 multiaccess enclosure Adapters. See “Multiaccess Enclosure Cables” on page 44-90 for a list of IBM cable feature numbers.
- The controller expansion (FC5023) used to house the service processor and network node processor, or the second controller expansion (FC5023).

Note: Processors controlling the TIC3s connecting the 3746-9x0 and 3746 multiaccess enclosure must be TYPE2 (for example TRP2). The TIC3s may be connected to a single TRP2, or on two separate TRP2s.

Configuration Requirements

The following resources must be configured with IP addresses to allow the 3746 multiaccess enclosure to communicate with the 3746-9x0 hardware. This can be done using the 3746 multiaccess enclosure configuration tool, or during initial hardware install by the IBM service representative:

- 3746 multiaccess enclosure service token-ring IP address (same subnet as the service processor, NNP(s), 3746-9x0 port 2080). See Table 34-6 on page 34-19.
- 3746 multiaccess enclosure IP address for both PORT 0 and 1 on the token-ring card in adapter slot 1.

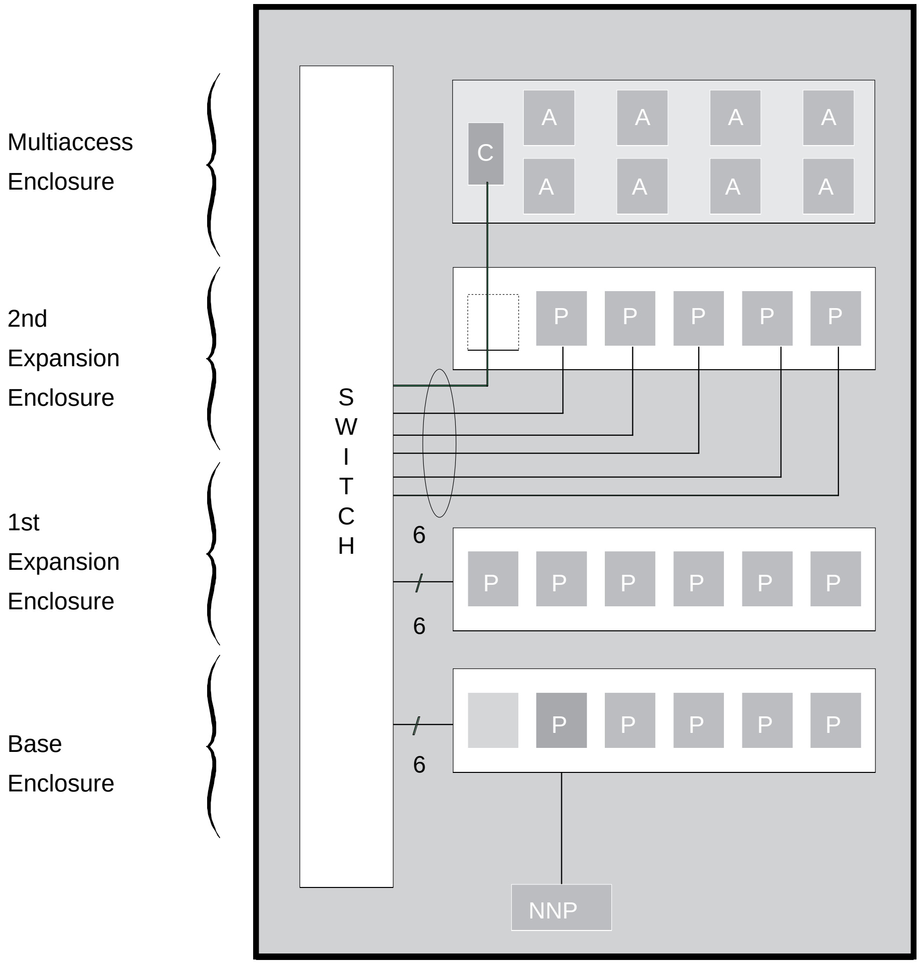


Figure 20-3. Previewed Connectivity Switch Connection of the multiaccess enclosure

3746 Multiaccess Enclosure Support

LANs

The following LANs are supported by the multiaccess enclosure:

- Token-ring (IEEE 802.5) with STP or UTP connection
- Ethernet or IEEE 802.3 with 10BASE2 or 10BASE-T connection
- ATM LAN emulation (client)

Interfaces

The interfaces supported by the multiaccess enclosure are:

- EIA-232E/V.24
- V.35
- V.36
- X.21
- ISDN—Primary (T1/J1)
- ISDN—Primary (E1)
- ATM 155-Mbps multimode fiber
- ATM 155-Mbps single-mode fiber
- ESCON

Protocols

The protocols supported by the multiaccess enclosure are shown in the following table:

Table 20-1. 3746 Multiaccess Enclosure Connectivity and Major Routing Protocols

Protocols		**IP**	**SNA**	**APPN (ISR)**	**HPR**
CHANNEL	ESCON	LCS	LSA	LSA	MPC+
LAN	Ethernet	yes	yes	yes	yes
	Token-Ring	yes	yes	no	no
WAN	ISDN (PRI)	yes	DLUR/DLSW[1]	yes	yes
	Frame Relay (RFC1490)	yes	DLUR/DLSW	yes	yes
	X.25	yes	DLUR/DLSW	no	no
	SDLC	_	DLUR/DLSW	yes	yes
	PPP (Leased Switched)	yes	DLSW	yes	yes
	ATM 155Mbps	Clasical IP	LANe	LANe	LANe

Note: X.25 routing is accomplished using IP Bridging Tunnel over X.25.

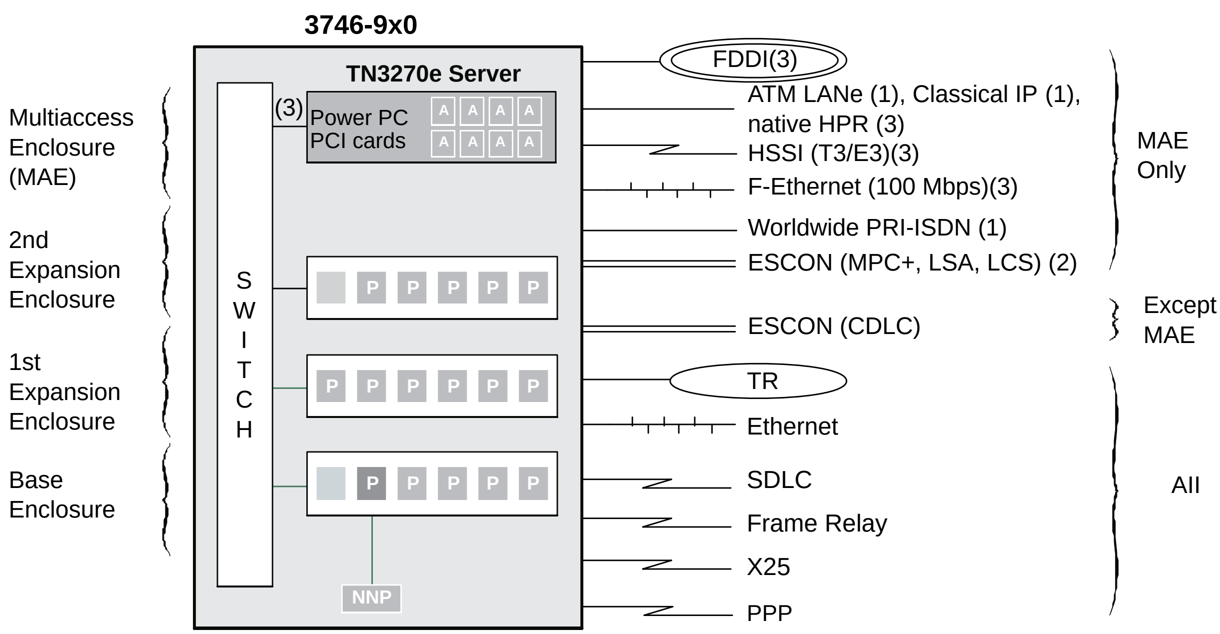
The 3746 multiaccess enclosure supports some protocols that are not supported by adapters in the 3746-9x0, and the 3746-9x0 supports some protocols that are not supported by the 3746 multiaccess enclosure. This is illustrated in Figure 20-4 on page 20-7.

[1] DLUR only for Frame Relay over ISDN

These new network interfaces located within the MAE are not under NCP control. They are configured through the service processor using the multiaccess enclosure configurator.

IPX is supported on the multiaccess enclosure interfaces only covering:

- PPP links
- FR links
- X.25 links
- ISDN
- Token Ring
- Ethernet [2]



(1) Available 6/30/97 (2) Available 9/30/97 (3) Product Preview

Figure 20-4. Protocol Support for 3746-9x0.

2 IPX is supported using LAN emulation

Chapter 21. Multiaccess Enclosure Adapters Overview

Slots and Adapter Plugging

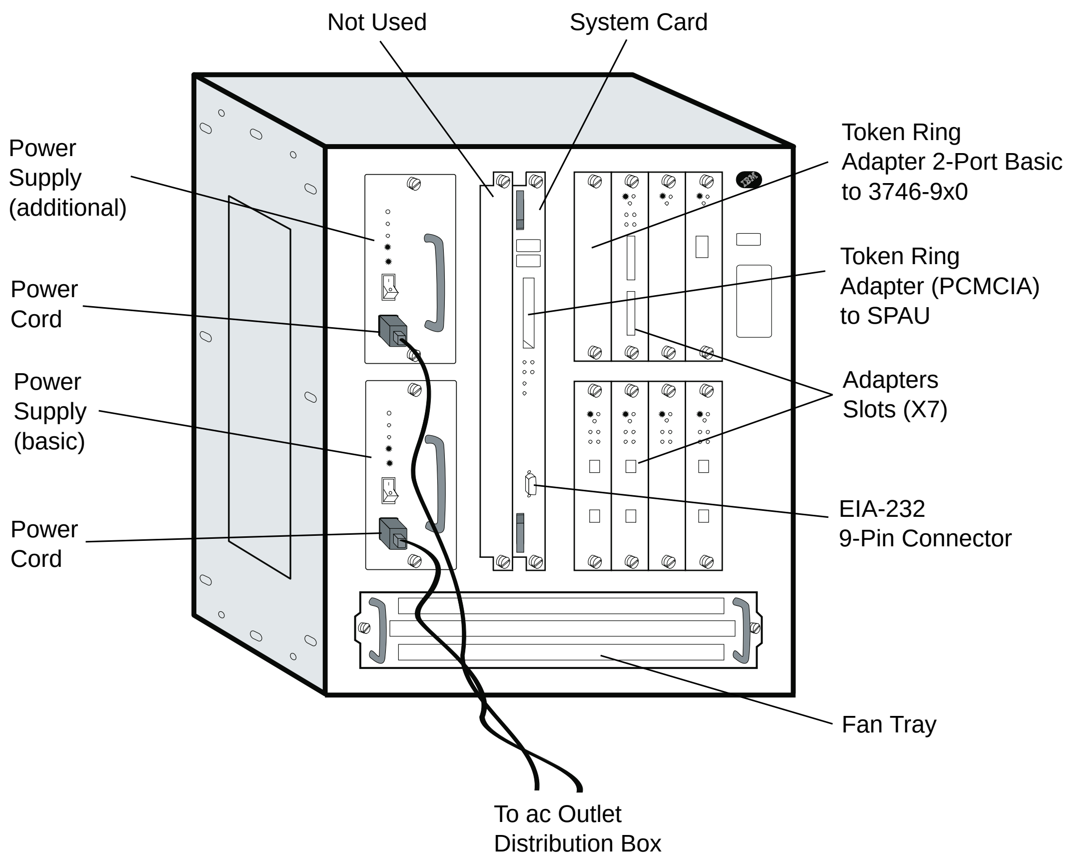


Figure 21-1. The 3746 Multiaccess Enclosure Showing Components

Figure 21-1 shows the 3746 multiaccess enclosure. There are two large slots, designated *A* and *B*, on the 3746 Multiaccess Enclosure. Currently, slot *A* is unused. Slot *B* is occupied by the system card. In addition, there are eight adapter slots, designated *1* through *8*. These eight slots are used to plug new adapters based on the advanced PCI technology. These MAE adapters cannot be plugged in the 3746 base enclosure nor in the first or second expansion enclosure (FC 5016 or FC 5216).

Note: Slot 1 is reserved for the 2-port token-ring card (FC 3280) which interfaces the 3746 multiaccess enclosure to the base 3746-9x0 frame. This slot will be free for customer use when the 3746 multiaccess enclosure is connected directly to the 3746 connectivity switch in a subsequent release using an empty processor slot in the base 3746 enclosure or in the first or second expansion enclosure (FC 5016 or FC 5216).

Adapters can be installed in any of the slots numbered *2* through *8* with the following restrictions:

1. The 3746 multiaccess enclosure supports a maximum of two ATM adapters (FC#3284 or FC#3293)
2. The 3746 multiaccess enclosure supports a maximum of four ISDN adapters (FC#3283 or FC#3292)
3. If the 2-port token-ring (FC#3280) or 2-port Ethernet (FC#3281) adapter is plugged into slot 3 and active, then slot 4 cannot be used.
4. If the 2-port token-ring (FC#3280) or 2-port Ethernet (FC#3281) is plugged into slot 4 and active, then slot 3 cannot be used.
5. If the 2-port token-ring (FC#3280) or 2-port Ethernet (FC#3281) adapter is plugged into slot 7 and active, then slot 8 cannot be used.
6. If the 2-port token-ring (FC#3280) or 2-port Ethernet (FC#3281) adapter is plugged into slot 8 and active, then slot 7 cannot be used.

Plugging Sequences

The following table illustrates how the slots are numbered: two rows of four slots, numbered 1 through 8 (slot 1 is reserved for the TR connection to the 3746-9x0 base frame):

Table 21-1. Slot Numbering

Slot 1	Slot 2	Slot 3	Slot 4
Slot 5	Slot 6	Slot 7	Slot 8

These tables show the default sequence of installation for the various adapters.

LIC 280s (FC 3280 2-port token ring) and LIC 281s (FC 3281 2-port Ethernet) are installed left to right, beginning with slot 5. A maximum of five may be installed in any single MAE.

Table 21-2. FC#3280s (LIC280s) and FC#3281s (LIC281s)

Reserved (TR)	2 nd	4 th	
1 st	3 rd	5 th	

Other adapters are installed right-to-left in the first-available slot beginning with slot 8 on the far right.

Table 21-3. All Other Adapters

Reserved (TR)	6 th	4 th	3 rd
7 th	5 th	2 nd	1 st

Note: The 3746 Multiaccess Enclosure will ship complying to the rules according to these features ordered.

Adapter Details

The following adapters are available for the 3746 Multiaccess Enclosure.

Cable information for these adapters can be found in “Multiaccess Enclosure Cables” on page 44-90.

Table 21-4. 3746 Multiaccess Enclosure Adapters and Feature Codes

Adapter	Feature Code (FC)
2-port Token-Ring	3280
2-port Ethernet	3281
8-port EIA-232E/V24	3282
1-port ISDN-PRI (T1/J1 interface)	3283
1-port ATM 155-Mbps MMF	3284
1-port ESCON	3287
6-port V.35/V.36	3290
8-port X.21	3291
1-port ISDN-PRI (E1 interface)	3292
1-port ATM 155-Mbps SMF	3293

Note: Adapters can be inserted and removed while the multiaccess enclosure is operational. Failed adapters can be replaced without rebooting or taking down the enclosure. The replaced adapter assumes the configuration of the failed adapter. New adapters can be added without powering the enclosure down and activated at a convenient time by rebooting the multiaccess enclosure.

The adapters are described below in detail. For detailed cable information refer to “Multiaccess Enclosure Cables” on page 44-90.

2-port Token-Ring - LIC280 (FC#3280)

Maximum of six adapters (including the required Slot 1 adapter); each provides for two attachments to token-ring LANs. This adapter can continually process frames of data to and from system card memory and the token ring at a speed of either 4 Mbps or 16 Mbps. It supports the use of either shielded twisted-pair or unshielded twisted-pair cable through a single connector.

Note: Cable FC#3713 is not provided but is available for this adapter.

2-port Ethernet - LIC281 (FC#3281)

Maximum of five adapters; each provides for two attachments to Ethernet LANs. It supports the use of either 10BASE-T cable or 10BASE2 cable.

Note: Cable FC#3713 is not provided but is available for this adapter.

8-port EIA-232E/V.24 Adapter - LIC282 (FC#3282)

Maximum of seven adapters; each adapter provides eight discreet attachments to EIA-232E/V.24 WANs, via a fanout cable (FC#3701). Each attachment provides:

- Support for receiving clocking (modem-attached) at a line speed from 2.4 Kbps to 64 Kbps
- Support for providing clocking (directly attached) from 9.6 Kbps to 64 Kbps
- Software selectable to receive clock (modem-attached) or provide clock (directly attached) with the appropriate cable
- A 100-pin D-shell female connector

- Support for cables FC#3701, FC#3705, and FC#3706.

Note: Cables FC#3701,FC#3705, and FC#3706 are not provided but are available for this adapter.

1-port ISDN PRI (T1/J1) Adapter - LIC283 (FC#3283)

Maximum of four adapters; each provides one attachment to an ISDN Primary Rate service at T1/J1 speed. This attachment provides:

- Support for T1/J1 line speed of 1.544 Mbps
- Twenty-three 64 Kbps B-channels for data and one 64 Kbps D-channel for signalling
- Selectable framing to D4 (SF), D5 (ESF), or SLC-96R formats
- Detection and generation of yellow and blue alarms
- Facility Data Link (FDL) support
- Generation of DSX-1 and CSU line build outs
- Generation and detection of CSU loop codes
- Line error counters for BPV, CV, CRC6, and framing-bit errors
- Monitoring and enforcing of ANSI ones density requirement
- Extraction and insertion of robbed bit signaling
- B8ZI and AMI line coding
- DB-26 (26-pin D-shell) female connector
- Support for cables FC#3714 and FC#3716

Note: Cables FC#3714, and FC#3716 are not provided but are available for this adapter.

1-port ATM 155-Mbps Multimode Fiber Adapter - LIC284 (FC#3284)

Maximum of two adapters; each provides one attachment to an ATM switch over a multimode fiber optic cable. Each attachment provides:

- 8 MB of packet memory and 2 MB of control memory for high-performance support
- A specialized ATM support chip to perform the segmentation and reassembly (SAR) function for ATM Adaptation Layer 5 (AAL-5)
- SONET OC3c framing
- Nominal operating wavelength of 1300 nm using LED-based technology
- Support for a 62.5/125μm multimode fiber
- A multimode duplex SC connector

Note: Cables FC#5710 and FC#5715 are not provided but are available for this adapter.

1-port ESCON Channel Adapter - LIC287 (FC#3287)

Maximum of four adapters; each provides one attachment to an ESCON switch or direct to a host CPU. Each attachment provides:

- Support for three channel attached methods:
  - MPC+ (Multi-Path Channel), over which you can run APPN/HPR.
  - LSA (Link Services Architecture), over which you can run hierarchical SNA, including DLSw, or APPN ISR.
  - LCS (LAN Channel Station), over which you can run TCP/IP.

- Enables access to Host VTAM/SNA and TCP/IP
- Support for 16 HPR or IP Hosts/LPARs
- Support for 32 APPN Hosts/LPARs
- Supports Standard ESCON cable group#3797

Note: ESCON cables must be ordered separately through your IPR, according to requirements.

6-Port V.35/V.36 Adapter - LIC290 (FC#3290)

Maximum of eight adapters; each provides six attachments to ITU-T V.35 or V.36 WANs, via a fanout cable (FC#3702 or 3703). Each attachment provides:

- Support for receiving clocking (modem-attached) at a line speed from 2.4 Kbps to 2.048 Mbps
- Support for providing clocking (directly attached) from 9.6 Kbps to 460.8 Kbps as well as 1.544 Mbps and 2.048 Mbps
- Software selectable to receive clock (modem-attached) or provide clock (directly attached) with the appropriate cable
- A 100-pin D-shell female connector
- Support for cables FC#3702, FC#3703, FC#3707, FC#3708, FC#3709 FC#3710, and FC#3799

  With the V.35/V.36 adapter you can use the following combination of cables:

  - FC#3702 with FC#3707, FC#3708, and FC#3799 (for V.35)
  - FC#3703 with FC#3709 and FC#3710 (for V.36)

Note: Cabling to mix V.35 and V.36 interfaces on adapter FC#3290 is not provided.

8-Port X.21 Adapter - LIC291 (FC#3291)

Maximum of seven adapters; each provides eight attachments to ITU-T X.21 WANs, via a fanout cable (FC#3704). Each attachment provides:

- Support for receiving clocking (modem-attached) at a line speed from 2.4 Kbps to 2.048 Mbps
- Support for providing clocking (directly attached) from 9.6 Kbps to 460.8 Kbps as well as 1.544 Mbps and 2.048 Mbps
- Software selectable to receive clock (modem-attached) or provide clock (directly attached) with the appropriate cable
- A 100-pin D-shell female connector
- Support for cables FC#3704, FC#3711, and FC#3712

Note: Cables FC#3704, FC#3711,and FC#3712 are not provided but are available for this adapter.

1-port ISDN PRI (E1) Adapter - LIC292 (FC#3292)

Maximum of four adapters; each provides one attachment to an ISDN Primary Rate service at E1 speed. This attachment provides:

- Support for E1 line speed of 2.048 Mbps
- Thirty 64 Kbps B-channels for data and one 64 Kbps D-channel for signaling
- Selectable framing to FAS, CAS, and CRC4 formats
- Detection and generation of remote and AIS alarms
- Full access to both Si and Sa bits
- Generation of line build outs for a 120 ohm line
- Three separate loopbacks for testing
- Line error counters for bipolar and code violations, CRC4 code word errors, FAS errors, and E-bits
- Extraction and insertion of CAS signaling
- B8ZI and AMI line coding
- DB-26 (26-pin D-shell) female connector
- Support for cable FC#3715

Note: Cable FC#3715 is not provided but is available for this adapter.

1-port ATM 155-Mbps Single-Mode Fiber Adapter - LIC293 (FC#3293)

Maximum of two adapters; each provides one attachment to an ATM switch over a single-mode fiber optic cable. Each attachment provides:

- 8 MB of packet memory and 2 MB of control memory for high-performance support
- A specialized ATM support chip to perform the segmentation and reassembly (SAR) function for ATM Adaptation Layer 5 (AAL-5)
- SONET OC3c framing
- Nominal operating wavelength of 1310 nm using laser-based technology
- Support for a 9/125μm single-mode fiber
- Transceiver support for a maximum cable length of 20 km (12.4 miles)
- A single-mode polarized duplex SC connector

Note: Cables FC#5720 and FC#5725 are not provided but are available for this adapter.

Power Supply

The 3746 multiaccess enclosure can have one or two power supplies. A single power supply can provide power for a fully configured unit. The first power supply will remain fully operational while a second power supply (FC#3500) is either being installed or removed. The second power supply must have its power switch in the off position while it is being installed or removed. If a second power supply is not installed, a filler plate is used to cover the cavity where it would have been installed.

The AC input(s) is connected to the Controller Expansion internal AC outlet distribution box(es).

Note: Power plugging rules apply. See "Single AC Outlet Distribution Box Option" on page 44-47 The power supply(s) uses a voltage sensing system that converts line current of 200—240 volts AC, 50/60 Hz single-phase from the AC outlet distribution box to DC input as required by the system card, the adapters, and the fan tray.

Chapter 22. ESCON Channel Adapter

A general description of the 3746 Multiaccess Enclosure ESCON adapter can be found in Chapter 11, "ESCON Overview" on page 11-1. Additional functional detail follows. The discussion will be mainly confined to traffic that flows solely between adapters installed in the multiaccess enclosure.

For details, refer also to *2216 Nways Multiaccess Connector ESCON Channel Adapter Planning and Setup Guide*, GA27-4193.

Planning for the 3746 Multiaccess Enclosure ESCON Adapter

This chapter describes how to plan for the installation of the multiaccess enclosure ESCON Adapter. It includes the following topics:

- "ESCON Channel Adapter Functions"
- "Introduction to Host Planning for the Multiaccess Enclosure" on page 22-6
- "Multiaccess Enclosure Planning Considerations" on page 22-15
- "Host Definition Planning" on page 22-19

ESCON Channel Adapter Functions

The Multiaccess Enclosure ESCON Channel Adapter (FC 3287) provides access to SNA and TCP/IP host applications over a duplex-to-duplex multimode fiber-optic cable. At most four ESCON adapters can be installed in the multiaccess enclosure. The adapter features:

- High-performance IP and SNA host-application access, featuring Multi-Path Channel+ (MPC+) support for high-throughput APPN high-performance routing (HPR) to VTAM 4.4 SNA applications
- APPN intermediate session routing (ISR) to VTAM 3.4 (or higher) SNA applications
- APPN and IP routing over any other Multiaccess Enclosure interface
- Dependent LU Requester (DLUR) in APPN to provide connectivity between dependent downstream SNA devices and VTAM SNA applications
- Boundary access node (BAN) support in APPN to provide connectivity between downstream BAN frame relay access devices and VTAM SNA applications
- IP route selection based on static, RIP, OSPF and BGP-4 routes and filtering of IP frames coming from or destined for the channel
- Data link switching (DLSw) support for VTAM 3.4 (or higher) SNA applications DLSw allows for local (single multiaccess enclosure) conversion from SDLC and LANs to the channel and remote (via DLSw partners) connectivity to SNA devices on SDLC, LANs, and ATM forum-compliant LAN emulation (LANe)
- ESCON channel-to-channel connectivity for token-ring, Ethernet, and ATM LAN emulation
- Support for up to 32 ESCON logical addresses (subchannels) per adapter for access to up to 32 hosts for LSA or 16 hosts for LCS or 16 hosts for MPC+

(assuming these types are not mixed on the adapter) when used with an IBM 9032 or 9033 ESCON Director or access to up to 15 logical host images in EMIF-capable processors operating in a logically partitioned (LPAR) mode

The Multiaccess Enclosure LAN/WAN Gateway

A multiaccess enclosure with an ESCON Channel Adapter that provides access for LAN-to-host applications is called a *multiaccess enclosure LAN/WAN gateway*.

The multiaccess enclosure LAN gateway gives LAN devices concurrent access to VTAM and TCP/IP programs running on host computers.

Figure 22-1 represents a possible environment consisting of 3746 multiaccess enclosures, hosts, and LAN devices (it is only a sample configuration).

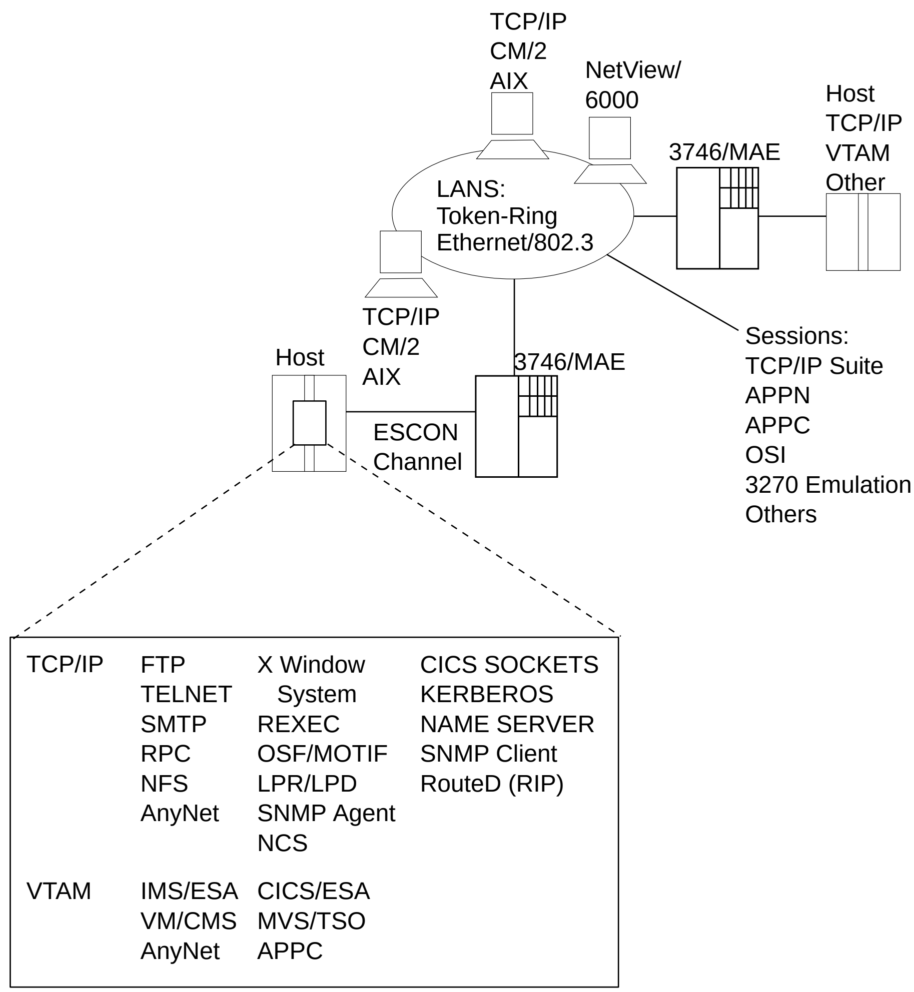


Figure 22-1. Representative Network Containing the 3746 Multiaccess Enclosure

The multiaccess enclosure LAN/WAN gateway with ESCON channel adapter supports the following communications:

- Between a LAN/WAN device and a host, through a Multiaccess Enclosure (LAN/WAN-to-host)
- From a device on one LAN/WAN to a device on a different LAN/WAN, with host routing support

See Table 22-1 on page 22-5 for more information on LAN/WAN devices.

In both cases, LAN/WAN-to-channel connections in the multiaccess enclosure are dedicated (defined as part of the host and multiaccess enclosure configuration). Each host program (using either one subchannel or a pair of subchannels, depending on the host program type) communicates through a LAN/WAN adapter in the multiaccess enclosure.

LAN/WAN-to-channel connections (LAN/WAN gateway definitions) are defined during configuration for the multiaccess enclosure by associating the subchannels used by the host programs to the LAN/WAN adapters.

The dedicated definition allows faster processing of frames, because the multiaccess enclosure need not determine the route a frame must take. For each LAN/WAN-to-host definition, data typically follows the same path through the multiaccess enclosure when going both to the host or to the LAN/WAN.

The host and LAN/WAN device can each be one of the following:

- A TCP/IP client, server, or IP router.

  Note: This support is provided by Logical Channel Station (LCS) virtual network handlers in the multiaccess enclosure.

- A PU 5 (VTAM), PU 2.0, PU 2.1, APPN end node (EN), or network node (NN)

  Note: This support is provided by Link Services Architecture (LSA) virtual net handlers in the multiaccess enclosure.

The LAN/WAN device can also be a PU 4 with the IBM Network Control Program (NCP) on the IBM 3745 or 3746.

Multi-Path Channel+ Support (MPC+)

The multiaccess enclosure provides the latest level of MPC support, *High Performance Data Transfer (HPDT)*, also referred to as *MPC+*. HPDT MPC connections provide more efficient transfer of data than non-HPDT MPC connections.

The multiaccess enclosure Multi-Path Channel+ support, which is called Multi-Path Channel+,MPC+, provides more efficient transfer of data by using high-performance data transfer (HPDT) services (in VTAM) to provide data packing without data movement and chain scheduling of programs. While MPC+ in the 3746/MAE does not fully make use of HPDT services (that is, it does data movement), it does support receiving data that fully uses the HPDT services in VTAM.

The level of MPC support used for an MPC connection is automatically determined by negotiation between the partner nodes.

When HPDT MPC Is Used: If both partner nodes support MPC+, MPC+ is automatically used.

- The multiaccess enclosure only supports MPC+
- You can control the level used in VTAM by coding the MPCLEVEL operand on the TRLE definition statement that defines the MPC connection. VTAM supports MPC+ if it is defined as an HPR APPN node that provides RTP-level HPR support.

Note: Keep in mind that pre-V4R4 VTAMs do not support HPDT MPC.

When Non-HPDT MPC Is Used: If either partner node does not support MPC+, non-HPDT MPC is automatically used.

The multiaccess enclosure does not support non-HPDT MPC.

Multi-Path Channel+ (MPC+) connections allow you to code a single transmission group (TG) that uses multiple write-direction and read-direction subchannels. Because each subchannel operates in only one direction, the half-duplex turnaround time that occurs with other channel-to-channel connections is reduced. The multiaccess enclosure MPC+ does not allow the subchannels of an MPC+ group to be on more than one physical channel.

If at least one read and one write path is allocated successfully, the MPC+ channel connection is activated. Additional paths (defined but not online) in an MPC+ group can late r be dynamically added to the active group using the MVS VARY ONLINE command. For example, if there is a need for an increase in capacity to allow for extra traffic over a channel, additional paths can be added to the active group without disruption. Similarly, paths can be deleted from the active group when no longer needed using the MVS command VARY device OFFLINE.

Currently the multiaccess enclosure MPC+ supports only APPN HPR.

Note: For the multiaccess enclosure ESCON Channel Adapter, the terms *MPC+ Group* and *MPC+ Virtual Interface* mean the same thing.

Multiaccess Enclosure ESCON Functional Support

Depending on the environment, a multiaccess enclosure with an ESCON Channel Adapter gives host applications access to different types of LANs/WANs. The particular networks supported depend on the communications protocols being used, which host applications they are used with, and which operating systems are supported.

Multiaccess Enclosure ESCON software provides support for TCP/IP and SNA Gateway host programs, and support for VTAM applications to token-ring, IEEE 802.3, Ethernet/V2, and LAN/WAN-attached devices.

Table 22-1 on page 22-5 illustrates the multiaccess enclosure connections provided for each host program. The supported environments are grouped by protocol. The table shows the host programs, operating systems, and adapters that provide each protocol support. For example, the TCP/IP protocol is supported by the TCP/IP host program (for VM or MVS). For each of these host environments, the adapters that can be used are indicated with a Y in the table.

Table 22-1. Functional Support for Multiaccess Enclosure ESCON Adapter

		VTAM [2]			
	TCP/IP [1] (LCS) Gateway	**SNA (LSA) Gateway**	**APPN ISR**	**MPC+ [3]**	**DLSw**
Token-Ring	Y	Y	Y	Y	Y
Ethernet V2	Y	N	Y	Y	Y
Ethernet 802.3	Y	Y	Y	Y	Y
Serial PPP	Y	N	Y	Y	Y
Serial FR:					
bridged	N	N	Y	Y	Y
routed	Y	N	Y	Y	N
SDLC	N	N	Y	N	Y
X.25	Y	N	Y	N	Y
ATM LANE	Y	Y	Y	Y	Y
ATM Classical IP	Y	N	N	N	N

Notes:

1. TCP/IP 2.2 or higher.
2. ESCON support requires an ESA operating system (V3R4 or higher).
3. MPC+ requires VTAM V4R4 and APPN HPR. VTAM V4R4 requires the following PTFs:

```
UW36478   UW36159   UW36490   UW36495   UW36245   UW36265   UW36540
UW36537   UW36564   UW36612   UW36614   UW36861   UW37958   UW38105
```

Channel and Network Connections

The following ESCON channel connections are supported:

- ES/3090J Processor (selected models)
- 9021 ES/9000 Processor
- 9121 ES/9000 Processor
- 9221 ES/9000 Processor
- 9032 and 9033 ESCON Directors
- 9036 ESCON Remote Channel Extender

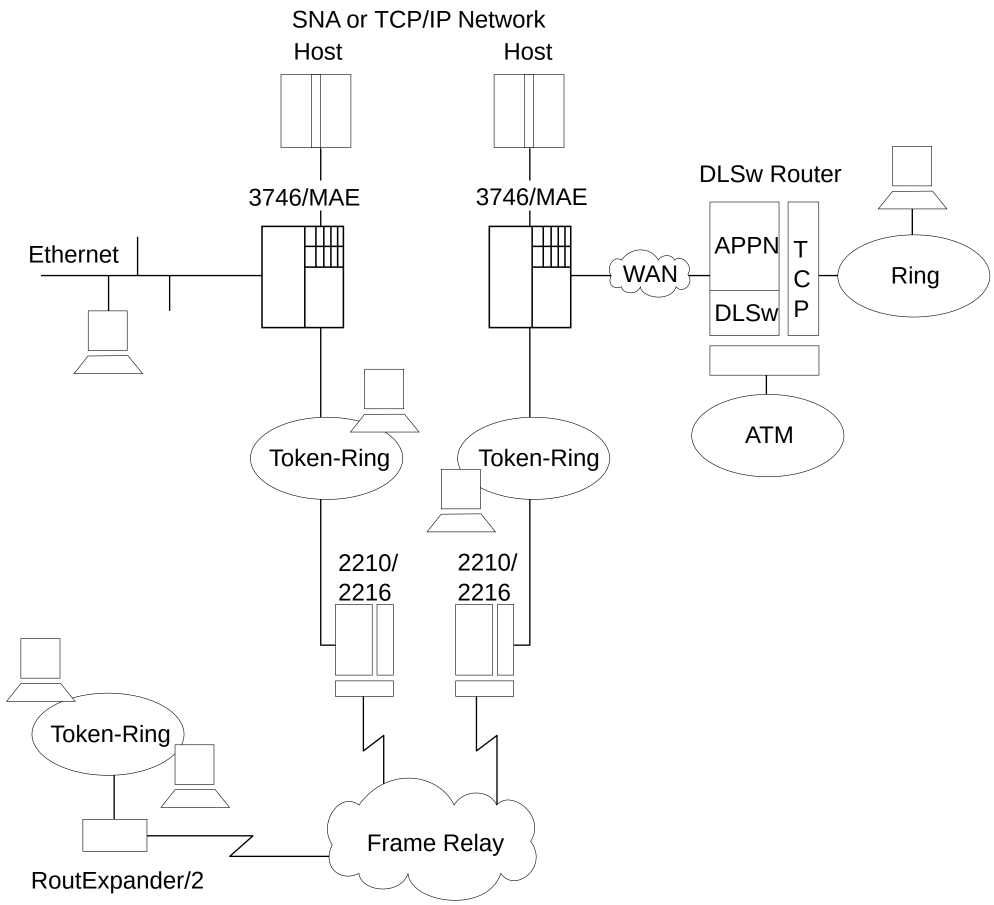
Introduction to Host Planning for the Multiaccess Enclosure

Table 22-2 summarizes the protocols, channels, networks, and management functions supported by the multiaccess enclosure with an ESCON channel adapter.

Table 22-2. Multiaccess Enclosure ESCON Functional Summary

Communications Protocols	Channels and Networks	Management
• TCP/IP • Subarea SNA • APPN ISR • APPN HPR • DLSw	• ESCON Channel • Token-Ring Network • Ethernet V2 Network • IEEE 802.3 Network • ATM LANE • Frame Relay	• SNMP Client

The multiaccess enclosure offers a solution for customers with traditional hierarchical (host-centric) networks as well as those customers who are migrating to flat (network-centric) networks. Figure 22-2 illustrates the latter, showing a local LAN and remote LAN gaining access to an existing hierarchical network (depicted by the cloud) through a multiaccess enclosure with an ESCON channel adapter.



- All workstations can talk to all hosts.
- All workstations can talk to each other.

Figure 22-2. IBM 3746 with Multiaccess Enclosure ESCON Channel Adapter in a Network

Channel Support

This section describes the characteristics of host channel support. Host connection selections impact design decisions for the 3746-9x0 and multiaccess enclosure.

Remember that at most four ESCON adapters (PCI adapter based) can be installed in a multiaccess enclosure.

ESCON Channel Characteristics and Configuration Examples

The multiaccess enclosure with an ESCON adapter provides the following support:

- A maximum of 32 logical paths (ESCON subchannels) per multiaccess enclosure ESCON channel adapter to the connected hosts. These logical paths can be defined to the same ESCON channel or divided among multiple ESCON channels.
- EMIF support for sharing ESCON channels for connection to multiple host images in LPAR-capable hosts. This support can be used with the IBM ESCON Directors connecting to multiple hosts, or for direct connection to a single host processor.
- A maximum of two IBM 9032 or 9033 ESCON Directors (ESCDs) in the path between the multiaccess enclosure ESCON channel adapter and the host.
- Distances of up to 43 km (26.7 mi) using the ESCON Extended Distance Feature (XDF) available on host processors, ESCDs, and ESCON Remote Channel Extenders.

The following examples illustrate various Multiaccess Enclosure/ESCON configurations:

- Single and direct attachment between a S/370 or S/390 processor and multiaccess enclosures

  See Figure 22-3 on page 22-8.

- Multiple systems attachment with ESCDs

  See Figure 22-4 on page 22-9.

- EMIF attachment between a S/370 or S/390 processor and multiaccess enclosures

  See Figure 22-5 on page 22-10.

Direct Attachment Between a S/390 Host and a Multiaccess Enclosure: In Figure 22-3, connection A shows a multiaccess enclosure directly attached to a S/390 host channel. The separation of the host and the multiaccess enclosure can be up to 3 km (1.86 mi).

Single Attachment Between a S/390 Processor and Multiaccess Enclosures: Connections A, B, C, and D show multiaccess enclosures attached to a single host.

The maximum distance between the S/390 host and the multiaccess enclosure can vary from 3 km (1.86 mi) to 43 km (26.7 mi). For connection A, a maximum distance of 3 km (1.86 mi) can be achieved without ESCDs between the host and multiaccess enclosure. For connection B, a maximum distance of 9 km can be achieved with two ESCDs connected with multimode fiber. As shown in connections C and D, distances of up to 43 km can be achieved by using 9032 or

9033 ESCDs with the XDF or a combination of ESCDs and 9036 remote channel extenders. The host must also have the XDF.

When two ESCON directors are serially attached, the connection through one of the directors must be dedicated.

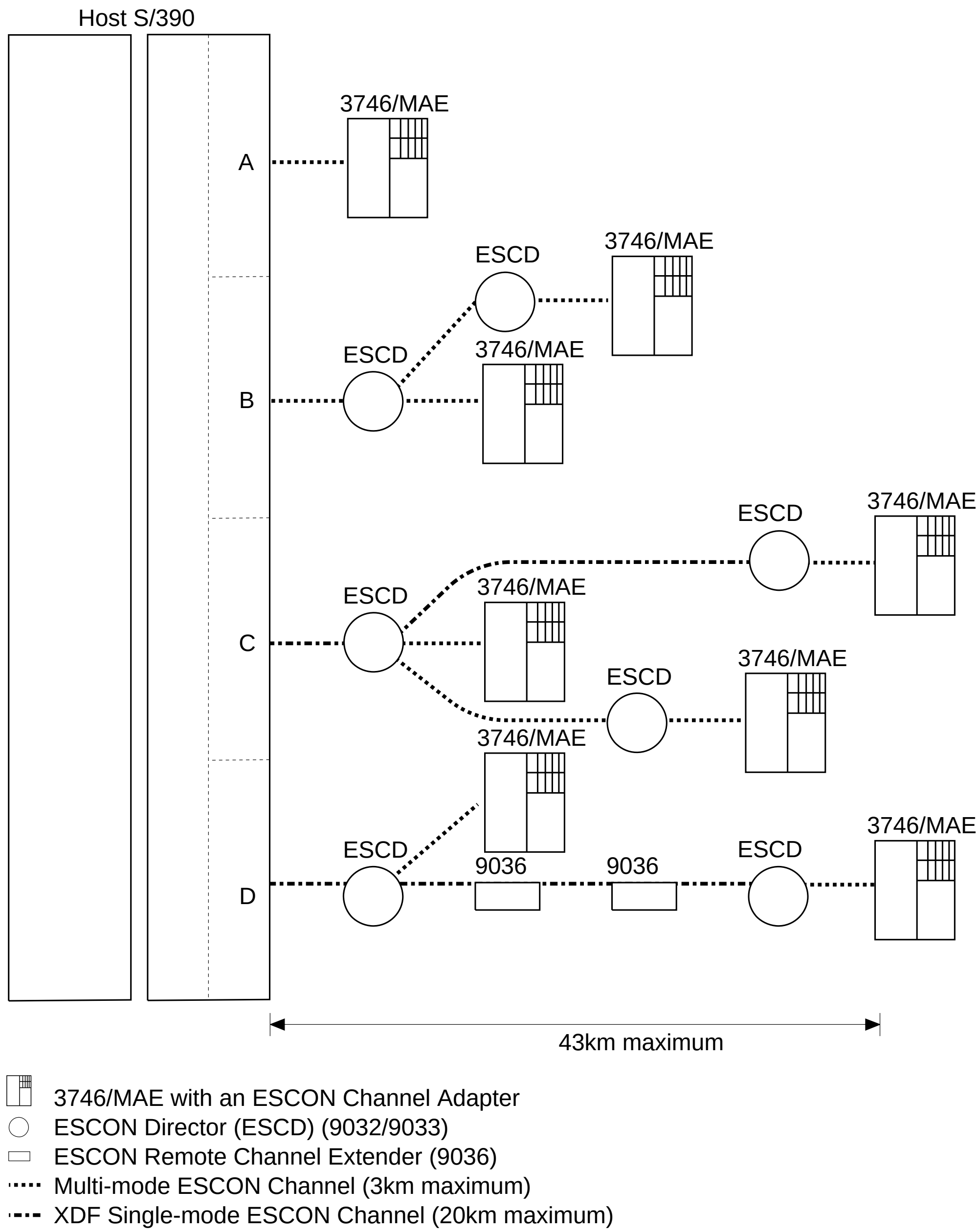


Figure 22-3. Single System ESCON Connection Example

Multiple Systems Attachment with ESCDs: Figure 22-4 shows the connection of multiple S/390 hosts to single and multiple multiaccess enclosures, with possible backup paths. A fault-tolerant solution can be designed using backup channels, multiple ESCDs, and/or multiple multiaccess enclosures.

For additional information, see "3746 Multiaccess Enclosure: Availability and Backup" on page 13-1.

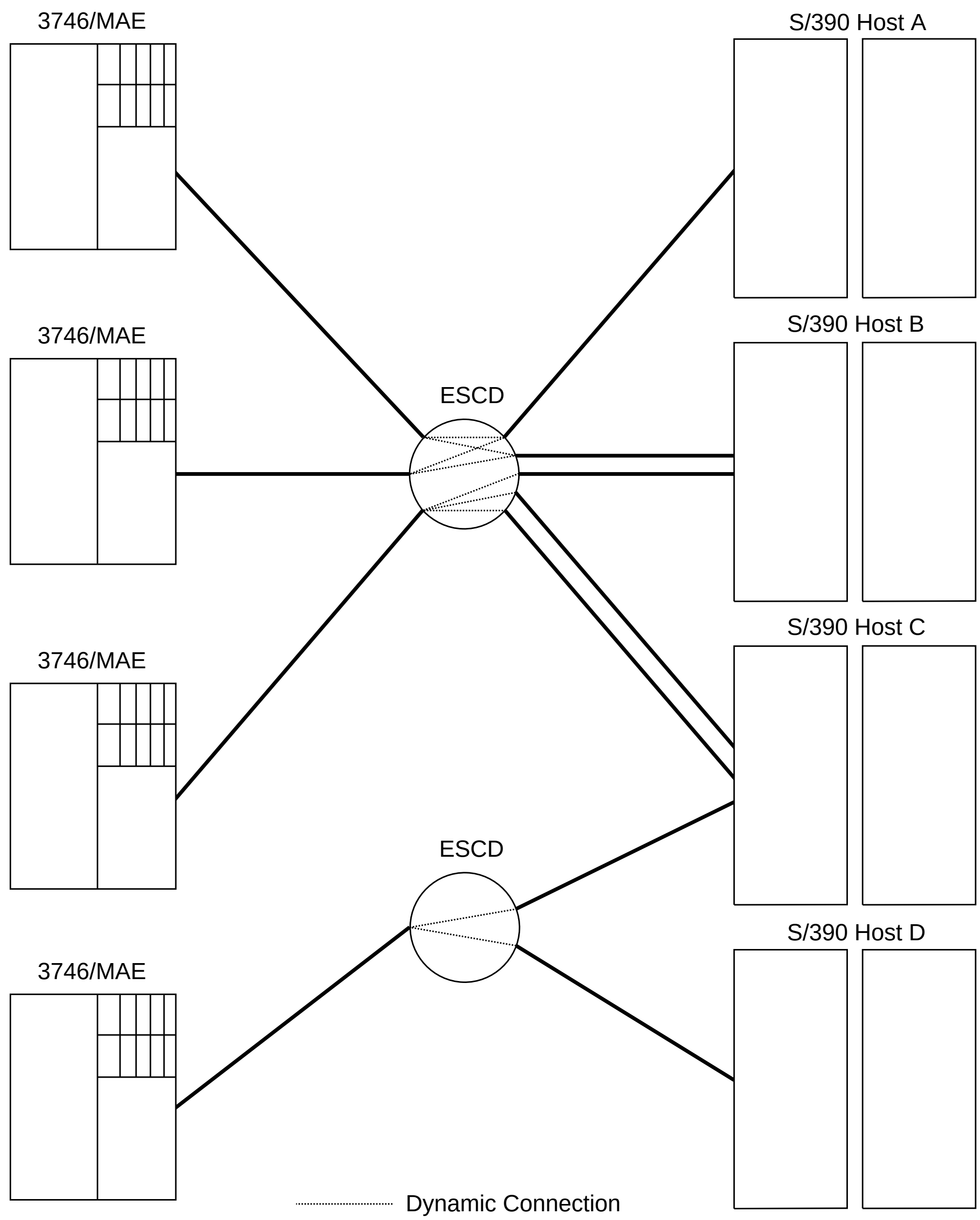


Figure 22-4. Multiple System ESCON Connections Example

EMIF Attachment Between an ES/9000 Processor and a Multiaccess Enclosure: The ESCON Multiple Image Facility (EMIF) allows the sharing of ESCON channels across Processor Resource/Systems Manager (PR/SM) logical partitions (LPARs). Prior to EMIF, dedicated channels to each logical partition were required.

EMIF is supported on all ES/9000 Model 511/711-based processors, and on the Model 520-based processors.

The Multiaccess Enclosure ESCON Channel Adapter supports EMIF connectivity. This connection can be either direct host attachment or through an ESCD, and the logical hosts can be on the same or different physical hosts.

Figure 22-5 on page 22-10 shows multiaccess enclosure connectivity to an LPAR host. Logical hosts A and B are connected directly to the multiaccess enclosure. Logical hosts B, C and D are connected to multiple multiaccess enclosures with a single ESCON connection from the ESCON Director. Each of these multiaccess enclosures may be connected to both logical hosts B, C and D.

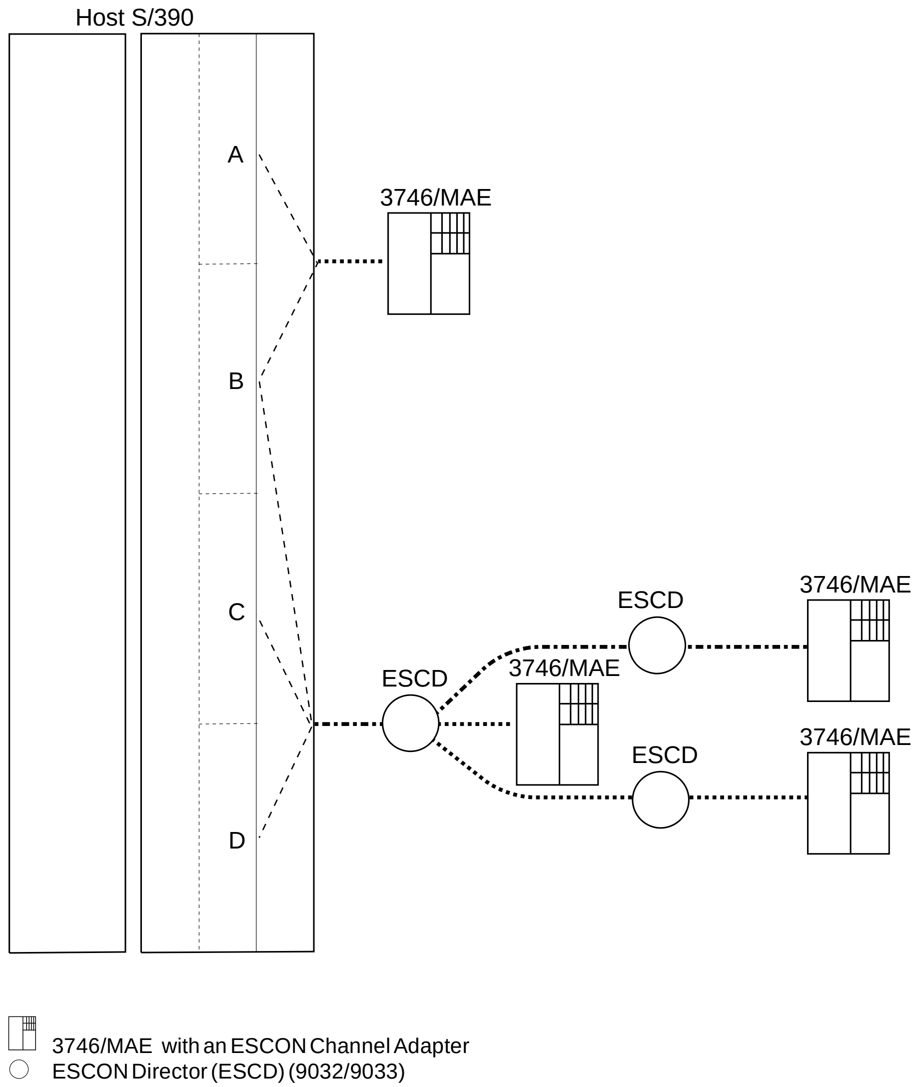


Figure 22-5. Multiaccess Enclosure EMIF Attachment Example

Number of Hosts, Host Programs, and Users

Your channel and LAN/WAN choices affect the number of hosts and host programs each multiaccess enclosure can support. Also, your host program choice affects the number of users that can be supported by each multiaccess enclosure.

Number of Hosts

The number of hosts (or the number of logical partitions in a single host) you can configure to use with one multiaccess enclosure is influenced by several factors.

For ESCON hosts that are attaching to a multiaccess enclosure, the multiaccess enclosure must have at least:

- One LSA subchannel for each host (or logical partition) running VTAM programs that are not using MPC+
- One LCS interface (two subchannels) for each host (or logical partition) connecting to TCP/IP
- Two subchannels for each host (or logical partition) that will be communicating with the Multiaccess Enclosure using MPC+

Refer to "Limits for Multiaccess Enclosure ESCON Network Interfaces and Subchannels" on page 22-12 for more information about the limits mentioned here.

Number of Host Programs

The number of host programs that can run using a multiaccess enclosure is less restrictive than the number of hosts that can use a multiaccess enclosure. This allows you to run more than one VTAM or TCP/IP host program on the same host (or in the same logical partition) using the same multiaccess enclosure.

For host programs that need to access a multiaccess enclosure, the multiaccess enclosure must have at least:

- One subchannel (or subchannel pair) for each host program instance
- One LCS interface for each TCP/IP program

Be aware that multiple VTAMs can share an LSA interface If more than one VTAM needs to use the same LSA interface, each VTAM needs to open a different SAP.

Refer to "Limits for Multiaccess Enclosure ESCON Network Interfaces and Subchannels" on page 22-12 for more information about the limits mentioned here.

Number of Users

Table 22-3 describes the maximum number of users attached through a multiaccess enclosure that can have concurrent sessions with host programs.

Table 22-3. Number of Concurrent Sessions

Host Program	Maximum Number of Users	See Note
VTAM	1500	1
TCP/IP for MVS TCP/IP for VM	5000 sessions (Number of sockets) 2000 sessions (Number of sockets)	2 2

1. Each LSA is limited to 255 LLC link stations per SAP. This is 255 sessions per LAN adapter. For SNA, this is the number of PUs supported. For MPC+, the number of users is based on APPN and not on the interface type.
2. For example, you can have up to 5000 Telnet sessions (number of sockets) with TCP/IP for MVS using one multiaccess enclosure.

Limits for Multiaccess Enclosure ESCON Network Interfaces and Subchannels

Subchannels will be associated with network interfaces when you configure the Multiaccess Enclosure with an ESCON Channel Adapter as described in Chapter 26, “Multiaccess Enclosure Configuration” on page 26-1.

A few simple rules govern the network interfaces:

1. Up to 16 interfaces can be configured.
2. Up to 32 subchannels can be used per ESCON Channel adapter.
3. One LCS interface is required for each host (or logical partition) connecting to TCP/IP.
4. One or more subchannels are used for each VTAM host LAN/WAN gateway (LSA).
5. Two or more subchannels are required for each MPC+ interface.
6. EMIF provides attachment to multiple host images in LPAR-capable processors using a single host ESCON port. Attachment to multiple hosts including LPAR hosts is provided using an IBM 9032 or 9033 ESCON director.
7. VTAM (LSA) interfaces must be defined as either SNA gateway (TR, EN, ATM LANE) or loopback (APPN or DLSw). Gateway LSA interfaces are associated with a specific LAN or LANE interface. LSA loopback interfaces can be used for both APPN ISR and DLSw. An LSA interface cannot be both loopback and SNA gateway.
8. Each LCS interface must have a unique subnet address.
9. Each MPC+ interface (also known as an MPC+ group) must have at least two subchannels, one for reading and one for writing. If VTAM has the subchannel configured as “read” then the MPC+ group in the multiaccess enclosure must have the subchannel configured as “write.”
10. MPC+ groups cannot share subchannels with other MPC+ groups.

Sample Illustration of the Rules for LCS and LSA Subchannels

Figure 22-6 illustrates valid uses of subchannels by LAN adapters, according to these rules, for LCS and LSA.

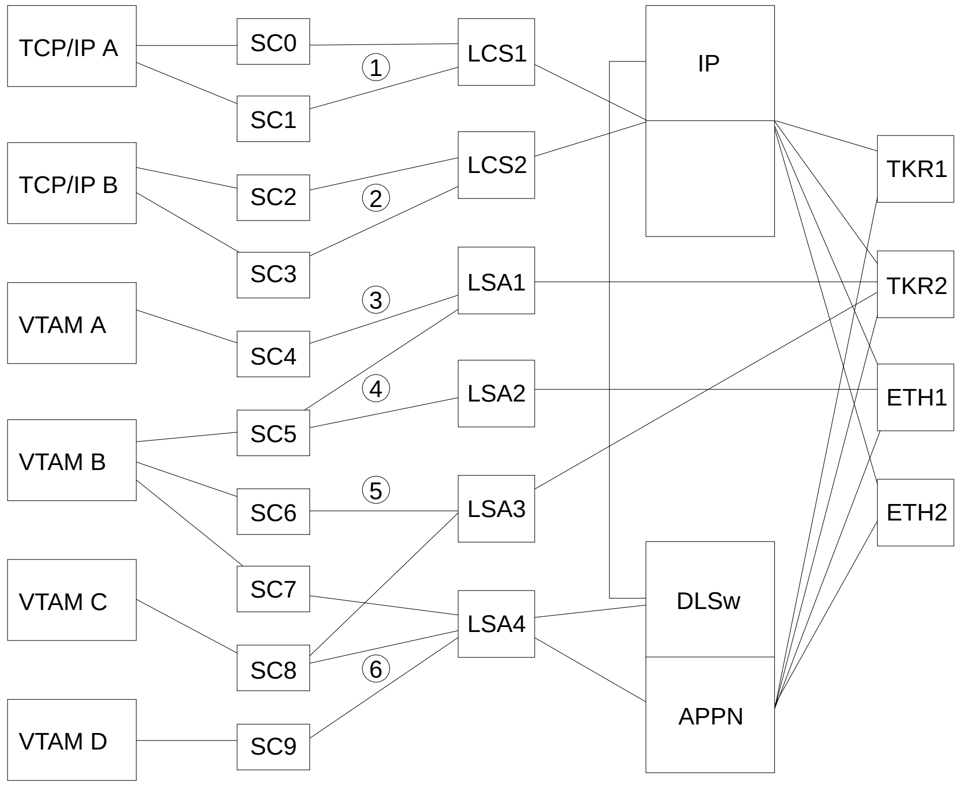


Figure 22-6. Rules for LAN/WAN Gateway Definitions for LCS and LSA Subchannels

1 LCS interface 1 uses subchannels 0 and 1 and provides access to all LAN interfaces for TCP/IP host A.

2 LCS interface 2 uses subchannels 2 and 3 and provides access to all LAN interfaces for TCP/IP host B.

3 LSA interface 1 uses subchannels 4 and 5 and provides access to TKR2 for VTAM hosts A and B, respectively.

4 LSA interface 2 uses subchannel 5 and provides access to ETH1 for VTAM host B.

5 LSA interface 3 uses subchannels 6 and 8 and provides access to TKR2 for VTAM hosts B and C.

6 LSA interface 4 uses subchannels 7, 8 and 9 and provides APPN ISR and DLSw access to all LAN interfaces for VTAM hosts B, C and D, respectively.

Sample Illustration of the Rules for MPC+ Subchannels

Figure 22-7 illustrates valid uses of subchannels for MPC+.

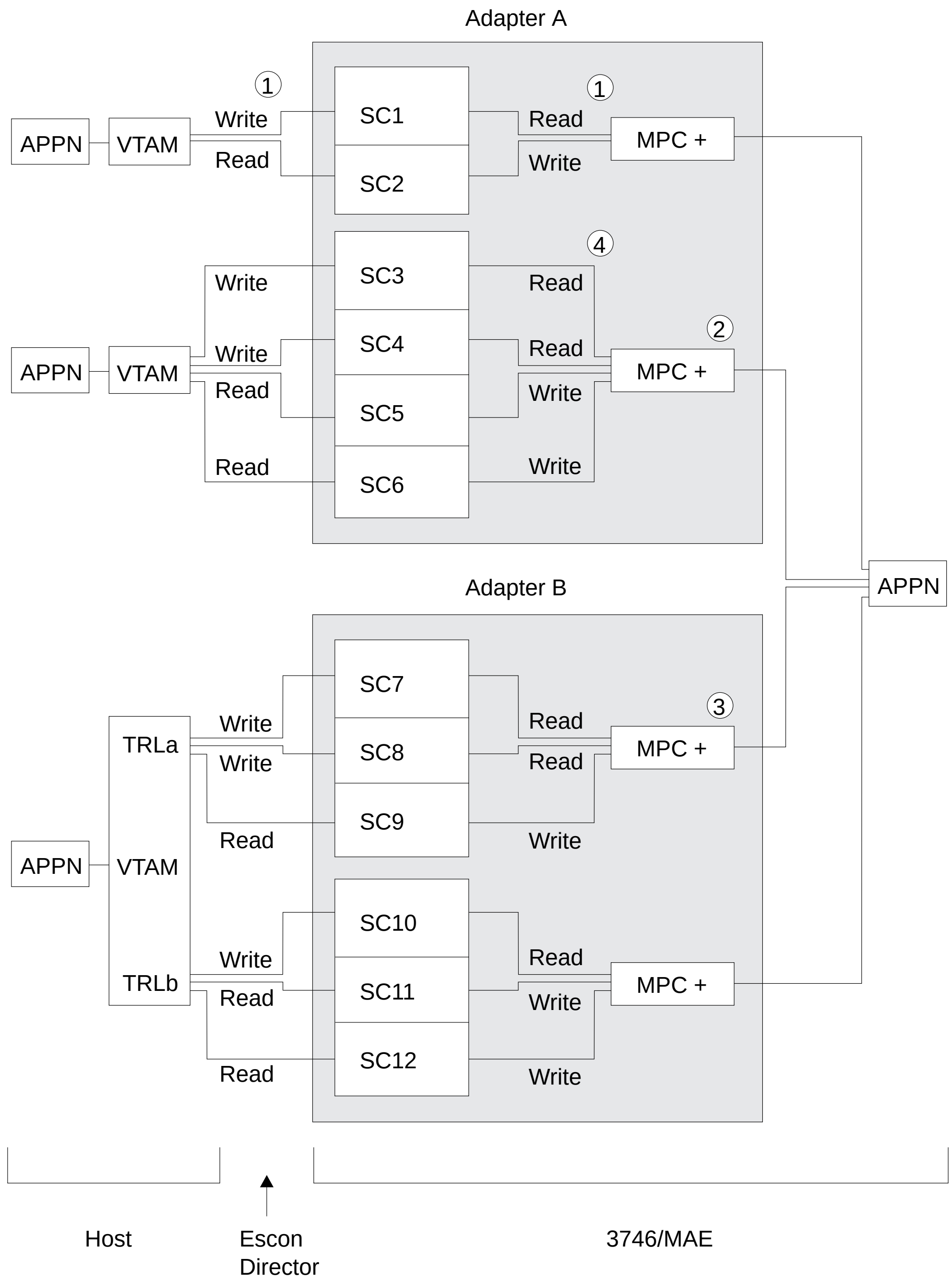


Figure 22-7. Rules for Definitions for MPC+

1 A subchannel that is configured as a “write” subchannel in VTAM is a “read” subchannel in the multiaccess enclosure ESCON configuration.

2 There can be multiple MPC+ Groups on the same ESCON channel adapter.

3 Parallel MPC+ groups are supported but each must be placed in a separate TRL entry in the VTAM definition.

4 Although you must have at least two subchannels (one read and one write) you can have more if there is at least one read subchannel and one write subchannel.

Multiaccess Enclosure Planning Considerations

This section discusses planning considerations for installing and configuring a multiaccess enclosure. It includes:

- What activities you need to plan for before installing and configuring the 3746/MAE in your network
- What to consider about how the 3746/MAE fits into your network
- What you will need to have available before you begin installation and configuration
- What to consider for supporting the 3746/MAE in the network

Activities to Plan for Before Installation and Configuration

You will need to plan for the following activities prior to installing and configuring the 3746/MAE in a network:

- Defining the 3746/MAE for channel attachment
- Defining the 3746/MAE for LAN attachment
- Supporting the 3746/MAE. in the network

Defining the 3746/MAE for Channel Attachment

Your system programmer will need to determine configuration and system generation (SYSGEN) parameter values for the following program types at the host:

- Control programs and operating systems (including IOCP, HCD for MVS, MVS, and VM)
- Host programs (including VTAM and TCP/IP)
- Applications
- Network management (including SNA management services and NetView)

The system generations and configurations should be done before the 3746/MAE hardware is installed and released for customer use. "Host Definition Planning" on page 22-19, contains detailed information about host parameter definition for the 3746/MAE.

Defining the 3746/MAE for LAN Attachment

Defining the 3746/MAE for LAN attachment requires several tasks:

- LAN adapter address administration
- Changes to LAN device configurations to optimize performance
- Matching 3746/MAE configuration parameters to those of your LAN or host devices.

Considerations for Including a Multiaccess Enclosure in a Network

Host and LAN planners and administrators will need to be involved in integrating the 3746/MAE into your network. System and application programmers will also participate in defining configuration parameters and installing code.

Configuration Considerations

Before configuring the 3746/MAE in your network, consider:

Addresses Group, functional, multicast, and node (universally or locally administered individual) addresses need to be assigned by the network administrator for each 3746/MAE LAN adapter. These addresses may need to be specified in the configurations for LAN devices that will access a 3746/MAE.

SAPs For VTAM communication, the network administrator needs to decide the SAPs to be used for each 3746/MAE LAN adapter.

Each VTAM host program that uses a 3746/MAE LAN adapter is assigned a different SAP value. The SAP for each adapter can be used once on the adapter; VTAM can use the same SAP on different LAN adapters.

Note: If APPN and LSA are configured to use the same LAN adapter, they must use different SAPs.

The network administrator and system programmer must determine how to change the SAP value used by each LAN adapter, if necessary.

MPC+ timers

Reply TO timer This is the amount of time that the MPC+ Group will wait to hear from across the channel during XID2 and DISC exchanges before it decides that the other end of the channel is not answering and this side should continue with the bring up or bring down of the MPC+ group.

Sequencing Interval timer Used to determine whether connection-oriented data is flowing smoothly across the connection on an MPC+ Group. The MPC+ control flows and the APPN activation/deactivation flows flow connection-oriented. Since these commands must have guaranteed delivery at the link level they flow connection-oriented and the sequencing interval timer is used to determine whether enough time has passed that checking of the delivery of connection-oriented traffic should be done.

Note: This value can be overwritten for each APPN PORT on an MPC+ Group. This is done during the APPN PORT configuration.

LLC timers If a 3746/MAE supports remote SNA connections (using a remote bridge, for example), consider what values are needed for LLC timers T1, Ti, and T2 on the LAN adapters.

LAN number This number distinguishes between multiple network interfaces of the same type within one 3746/MAE. Link number for TCP/IP and ADAPNO for VTAM specify the LAN number to the host program.

These definitions must be the same if both programs use the same network interface.

Subchannels The subchannels (logical paths for ESCON) must be defined for all 3746/MAE LAN/WAN gateway definitions to associate 3746/MAE channel adapters with 3746/MAE LAN adapters.

PMF password
The Parameter Management Frames (PMF) password protects the station from an unauthorized setting of MIB attributes by a remote station using Simple Mail Transfer Protocol (SMTP) PMF frames.

LAN data transfer rate
The 3746/MAE Token-Ring Adapter can be configured to transfer data at 4 Mbps or 16 Mbps. Select the data transfer rate to match your LAN.

Receive mode Determines which frames will be received by the Ethernet adapter.

Transceiver type
Identifies the type of transceiver that the Ethernet adapter uses.

Optimizing Performance

There are many parameters that affect the overall performance of a host-to-LAN network. The parameters that affect 3746/MAE throughput are discussed in this section.

In planning the volume and flow of traffic over the network, consider the following configuration parameters. It is recommended that the default 3746/MAE host parameters be used initially. You can then tune the network to optimize overall performance.

TCP/IP Window Size
A larger TCP/IP window size allows more frames to be sent before requiring acknowledgment. This helps move frames through devices faster and requires less frequent processing of acknowledgments.

VTAM I/O Buffer Size
Frames are segmented into more than one buffer when the frame size exceeds the VTAM I/O buffer size, causing additional processing overhead. Make the VTAM buffers large enough to contain the largest average frame size.

Also consider the following concepts:

Sharing Subchannels
When defining a LAN/WAN gateway, dedicate a subchannel or subchannel pair for each network interface to ensure maximum performance.

Trace Using the 3746/MAE trace function may affect performance noticeably.

Frame Size Most protocols segment data into packets based on restrictions of the network to which they are attached. Bridges, for example, may restrict the size of forwarded frames to the smaller of the two maximum sizes that can be handled by the LANs they connect. Frames that traverse different LAN types can be limited in size by the maximum frame size of the most restrictive LAN. Frames that are larger than the specified maximum size can get segmented into two or more packets for network transmission; the packets must be reassembled by the receiver into their original size. Some programs and devices discard frames that are too large or too small.

Protocols and applications take these frame size limits into consideration when they determine their maximum frame size; some can negotiate to the largest common frame size that both sender and receiver can handle. (The 3646/MAE does not negotiate frame size.) To reduce the effects of segmenting data into smaller frame sizes, you need to be aware of how devices on the network affect protocol packet size.

Table 22-4 shows the size of the largest frame that can be transferred by each type of 3746/MAE LAN adapter.

Table 22-4. LAN Adapter Maximum Frame Sizes and Channel Adapter Maximum Block Sizes

Adapter Type	**Largest Frame Size**	**Maximum Block Size**
Token-Ring (4 Mbps)	4.5 KB	
Token-Ring (16 Mbps)	17.5 KB	
Ethernet V2/IEEE 802.3	1.5 KB	
ESCON		32 KB

Host Definition Planning

This section provides information to help you plan for host definition. It includes information for system definition from the host perspective and information for definition from the 3746/MAE perspective.

Before you can attach the 3746/MAE to an ESCON channel, the host system must be configured correctly. The following series of steps is required to define the 3746/MAE connection to the host. These definition steps should be done by your system programmer.

1. Define the 3746/MAE to the host channel subsystem using either the host Input/Output Configuration Program (IOCP) or Hardware Configuration Definition (HCD) program.
2. Define the 3746/MAE to the host operating system.
3. Define the 3746/MAE and configuration to the host program (TCP/IP or VTAM).

After the host definitions are complete, you must configure the MAE ESCON interfaces using the command line interface, as described in Chapter 26, “Multiaccess Enclosure Configuration” on page 26-1, or using the configuration program described in *Configuration Program User's Guide*, GC30-3830. Many of the parameters that you provide when you configure the MAE must match corresponding parameters in the host definition.

Finally, the stations will need to be configured to communicate through the 3746/MAE to the host applications.

The following sections describe host definition and provide sample host configuration statements.

IOCP Definition for the MAE

The following sections describe examples of IOCP definitions for the MAE with ESCON channel attachment. The output of the IOCP device definitions (I/O Configuration Data Set or IOCDS) can be generated using MVS, VM, VSE, or in a stand-alone environment. Refer to the *ES/9000 and ES/3090 Input/Output Configuration Program User’s Guide Volume A04*, GC38-0097, for details.

Example IOCP Definition for the ESCON Channel

Figure 22-8 on page 22-20 shows an example of an ESCON configuration. The S/390 host is divided into two logical partitions (LP): LPA and LPB. A connection on path 30 is configured between LPA and MAE1 through ESCD switch 00. LPA is attached to ESCD port C0 and MAE1 is attached to port C1. The connection between port C0 and C1 is dynamic.

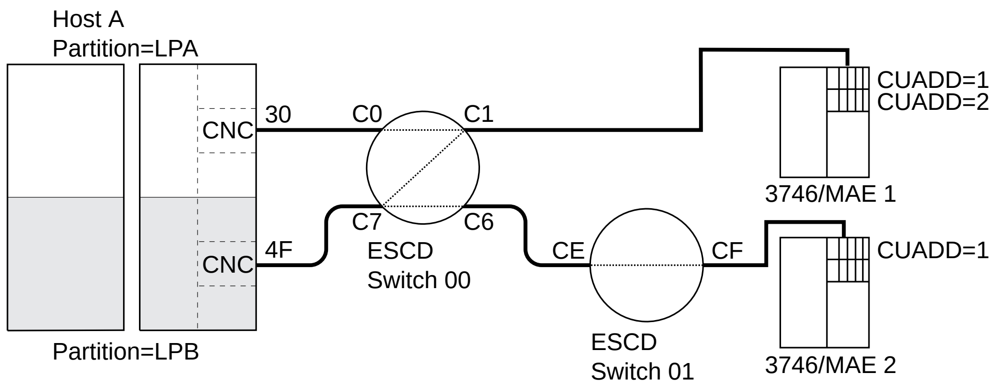


Figure 22-8. ESCON Channel Configuration Example

LPB on path 4F has a connection with MAE1 through ESCD switch 00, and a connection with MAE2 through ESCD switches 00 and 01. The connection between ports C7 and C6 is dynamic; the connection between ESCD ports CE and CF is dedicated.

The following example definitions match Figure 22-8:

Channel path definitions:

```
CHPID      PATH=((30)),TYPE=CNC,PART=(LPA),SWITCH=00
CHPID      PATH=((4F)),TYPE=CNC,PART=(LPB),SWITCH=00
```

Control unit and device definition for the 3746/mae, with logical addressing = 1 for 3746-MAE1:

```
CNTLUNIT   CUNUMBR=500,PATH=30,UNIT=3172,LINK=C1,         X
           UNITADD=(00,32),CUADD=1
IODEVICE   ADDRESS=(500,32),CUNUMBR=500,UNIT=SCTC,        X
           UNITADD=((00,32))
```

Control unit and device definition for the multiaccess enclosure with logical addressing = 2 for MAE1:

```
CNTLUNIT   CUNUMBR=600,PATH=4F,UNIT=3172,LINK=C1,        X
           UNITADD=(00,32),CUADD=2
IODEVICE   ADDRESS=(600,32),CUNUMBR=600,UNIT=SCTC,       X
           UNITADD=((00,32))
```

Control unit and device definition for the multiaccess enclosure, with logical addressing = 1 for MAE2:

```
CNTLUNIT   CUNUMBR=620,PATH=4F,UNIT=3172,LINK=C6,         X
           UNITADD=(20,32),CUADD=1
IODEVICE   ADDRESS=(620,32),CUNUMBR=620,UNIT=SCTC,        X
           UNITADD=((20,32))
```

The IOCP macroinstructions in the example:

- Assign a CHPID to logical partitions LPA and LPB.
- Define channel path 30 to MAE1. for partition LPA and channel path 4F for partition LPB.
- Identify channel type as an ESCON channel (CNC).
- Assign the two CHPIDs to ESCD switch number 00.
- Associate control unit numbers 500 and 600 to logical addresses 1 and 2 on MAE1 and control unit number 620 to logical address 1 on MAE2.

- Assign link address C1 to control units 500 and 600 and link address C6 to control unit 620.
- Define unit addresses (subchannels) 00 through 1F to control units 500 and 600 and unit addresses 20 through 3F to control unit 620.
- Identify each control unit as an SCTC device.

Considerations:

1. The address range for each MAE must be contiguous pairs of addresses for TCP/IP programs and a single address for VTAM. TCP/IP programs require even-odd pairs and VTAM accepts an even or odd address.

   The allowable device address range is 00 through FF. The MAE address range is limited to 32 addresses, and only requires that the addresses defined at the host computer map to the address or addresses configured in the MAE. The address range can extend beyond the addresses actually used, but cannot overlap addresses of other control units cabled to the same CHPID or channel.
2. The ESCON channel mode of operation can be type CNC for basic ESCON channel mode or CVC if there is an ESCON converter attached.
3. The IODEVICE UNIT parameter should be set to SCTC.
4. The LINK number specifies the link address (ESCD port number) to which the MAE is connected. When two ESCDs are connected in series, the link address must be the port number of the ESCD that has the dynamic connection and to which the MAE is attached.
5. The logical address (CUADD) must be unique for a given path between a host channel and a MAE.

Example IOCP Definition for the EMIF Host

Figure 22-9 shows an example of an ESCON configuration using the ESCON Multiple Image Facility (EMIF). The S/390 host is divided into two logical partitions (LP): LPA and LPB. Both LPA and LPB are connected on path 30 to 3746-MAE1 through switch 00.

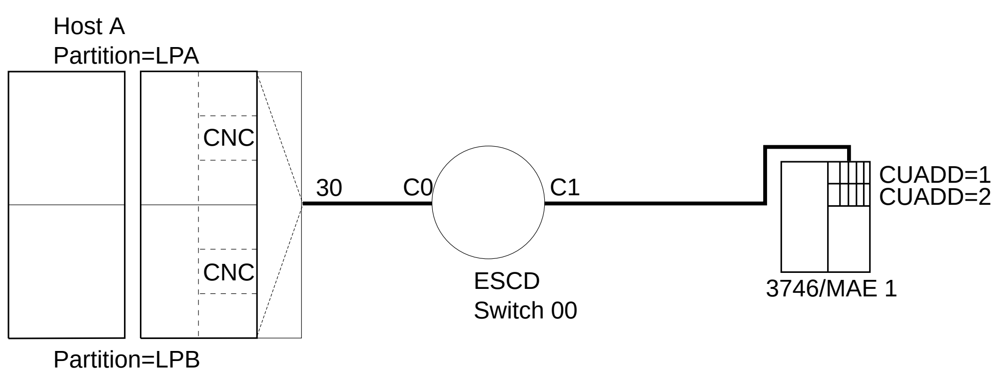


Figure 22-9. EMIF Host Configuration Example

The following example definitions match Figure 22-9:

Channel path definitions:

```
CHPID      PATH=((30)),TYPE=CNC,PART=(LPA,LPB),SWITCH=00
```

Control unit and device definition for the MAE, with logical addressing = 1 for MAE1:

```
CNTLUNIT   CUNUMBR=500,PATH=30,UNIT=3172,LINK=C1,         X
           UNITADD=(00,32),CUADD=1
IODEVICE   ADDRESS=(500,32),CUNUMBR=500,UNIT=SCTC,        X
           UNITADD=((00,32))
```

Control unit and device definition for the MAE, with logical addressing = 2 for MAE1:

```
CNTLUNIT   CUNUMBR=620,PATH=30,UNIT=3172,LINK=C1,         X
           UNITADD=(20,32),CUADD=2
IODEVICE   ADDRESS=(620,32),CUNUMBR=620,UNIT=SCTC,        X
           UNITADD=((20,32))
```

The IOCP macroinstructions in the example:

- Assign a CHPID to logical partitions LPA and LPB
- Define channel path 30 to the MAE to be shared by partition LPA and partition LPB.
- Identify channel type as an ESCON channel (CNC)
- Assign the CHPID to ESCD switch number 00
- Associate control unit numbers 500 to logical address 1 and 620 to logical address 2 on MAE1
- Assign link address C1 to control units 500 and 620
- Define unit addresses (subchannels) 00 through 1F to control unit 500 and 20 through 3F to control unit 620
- Identify each control unit as an SCTC device

Considerations:

1. The address range for each 3746/MAE must be contiguous pairs of addresses for TCP/IP programs and a single address for VTAM. TCP/IP programs require even-odd pairs and VTAM accepts an even or odd address.

   The allowable device address range is 00 through FF. The MAE address range is limited to 32 addresses, and only requires that the addresses defined at the host computer map to the address or addresses configured in the MAE. The address range can extend beyond the addresses actually used for the MAE, but cannot overlap addresses of other control units cabled to the same CHPID or channel.
2. The ESCON channel mode of operation can be type CNC for basic ESCON channel mode or CVC if there is an ESCON Converter attached.
3. The IODEVICE UNIT parameter should be set to SCTC.
4. The LINK number specifies the link address (ESCD port number) to which the MAE is connected. When two ESCDs are connected in series, the link address must be the port number of the ESCD that has the dynamic connection and to which the MAE is attached.
5. The logical address (CUADD) must be unique for a given path between a host channel and a MAE.
6. Each partition must have a unique logical address defined on the MAE.

Defining the MAE to the Operating System

The following definitions apply to a MAE with an ESCON channel adapter.

MAE Definition for VM/SP

The MAE must be defined to a VM/Extended Architecture™, (VM/XA™), or VM/ESA® operating system. This definition is accomplished by updating the real I/O configuration file (DMKRIO) with entries for the MAE in the RDEVICE and the RCTLUNIT macros. In the following example, 640 is the base unit address and the size of the address range is 32.

```
RDEVICE ADDRESS=(640,32),DEVTYPE=3088
RCTLUNIT ADDRESS=640,CUTYPE=3088,FEATURE=32-DEVICE
```

MAE Definition for VM/XA and VM/ESA

The MAE must be defined to a VM/Extended Architecture (VM/XA or VM/ESA operating system. This definition is accomplished by updating the real I/O configuration file (HCPRIO) with an entry for the MAE in the RDEVICE macro. In the following examples, 640 and 2A0 are base control unit addresses. The address range size, as defined in the UCW or IOCP, is 8 in both examples.

The following example is a VM/XA HCPRIO definition:

```
RDEVICE ADDRESS=(640,8),DEVTYPE=CTCA
```

The following example is a VM/ESA HCPRIO definition:

```
RDEVICE ADDRESS=(2A0,8),DEVTYPE=CTCA
```

MAE Definition for MVS/XA and MVS/ESA

The MAE must be defined to an IBM Multiple Virtual Storage/Extended Architecture (MVS/XA) or MVS/ESA operating system. This definition is accomplished by updating the MVS Control Program with an entry for the MAE in the IODEVICE macro.

For ESCON channels, an example IODEVICE macro is:

```
IODEVICE UNIT=SCTC,ADDRESS(540,8)
```

The base control unit address is 540 and the address range size, as defined in the UCW or IOCP, is 8.

MAE Definition for MVS/ESA with HCD

The hardware configuration definition (HCD) component of MVS/ESA SP Version 4.2 and 4.3 with APAR #OY67361 offers an improved method of defining system hardware configuration for MAE. Several complex steps required for entering hardware configuration data can be accomplished using an interactive dialog with HCD.

The required configuration data for the MAE is:

1. When using HCD, with APAR #OY67361, the MAE is defined as (UNIT = 3172).
2. Without HCD, the MAE is defined for ESCON channels as a serial CTC device (UNIT = SCTC).

Notes:

1. If you are using HCD for MVS Version 4 to define your ESCON host connection, you may need APAR # OY67361 to obtain the UIM support for the device definition (UNIT=3172).
2. When migrating your IOCP definition and operating system definitions to the HCD environment, it is important that all MAE device statements be changed to device type (UNIT=3172).

MAE Definition for VSE/ESA

The MAE must be defined to a VSE/ESA operating system. This definition is accomplished by supplying an ADD statement for each channel unit address at initial program load (IPL) time. Code the device type on the ADD statement as CTCA,EML as shown in the following example:

```
ADD 640,CTCA,EML
```

The base control unit address is 640 in the example. For the number of channel unit addresses added, increment the IOTAB storage macro by this count.

Defining the MAE to Host Programs

The section has configuration definitions with samples of host definitions required to connect to the MAE ESCON channel adapter.

Configuring the Host for TCP/IP

TCP is configured on a host by modifying the TCP/IP profile. The default name for the TCP/IP profile data set is TCPIP.PROFILE.TCPIP for MVS and PROFILE TCPIP for VM. Each channel connection requires:

- One LINK and one DEVICE statement in the TCP/IP profile
- An entry in the HOME statement
- Entries in the GATEWAY statement for the link to be used (if ROUTED is not being used)
- A START command for the device

DEVICE and LINK statements: The format of the DEVICE and LINK statements are:

```
DEVICE devicename LCS subchannel
LINK   iplinkname LANtype LANnumber devicename
```

where:

devicename	is a local name to distinguish devices. You need a START statement for this device name at the end of the TCP/IP profile as shown in “TCP/IP Commands - Example” on page 22-25.
LCS subchannel	is the even subchannel of the two LCS subchannels that this connection to the MAE will use.
iplinkname	is a local name to distinguish LINKs. This name can help you identify which link is being configured.
LANtype	is the type of link.
LANnumber	is obtained from the MAE by using the LIST NETS command of the appropriate NETWORK submenu.

HOME Command: Specify IP addresses for each channel connection using the following format:

```
HOME hostipadd iplinkname
```

where:

hostipadd	is the host's IP address for this connection to the TCP/IP network.
iplinkname	is the parameter defined by the LINK statement as described in "DEVICE and LINK statements" on page 22-24.

GATEWAY Command: Specify routing information if you are not using the ROUTED server.

```
GATEWAY network  first hop  driver  packet size  subn mask  subn value
```

where:

network	is the IP address for the network. The default value is *defaultnet*, which specifies a default routing entry for any network not explicitly routed.
first hop	is the internet address that you can reach directly and that forwards messages to the destination. A value of = implies that messages are routed directly to the destination.
driver	is the *iplinkname* defined by the LINK statement as described in "DEVICE and LINK statements" on page 22-24.
packet size	is the maximum transmission unit in bytes for the network or host.
subn mask	is a bit mask that defines the bits of the host field that make up the subnet field.
subn value	is the value of the subnet field.

START Command: Start all the interfaces:

```
START devicename
```

where:

devicename	is the parameter defined by the DEVICE statement as described in "DEVICE and LINK statements" on page 22-24.

TCP/IP Commands - Example:

```
DEVICE LCS1 LCS   108
LINK   TR1  IBMTR 0 LCS1
HOME
    16.51.136.199 TR1
GATEWAY
    DEFAULTNET 16.51.136.201 TR1 4000 0
START LCS1
```

Sample MAE Definition to TCP/IP for MVS or VM

The following is an example of TCP/IP definitions provided to the host computer in the TCP/IP profile data set. The default name for the TCP/IP profile data set is TCPIP.PROFILE.TCPIP for MVS and PROFILE TCPIP for VM.

First, MAE devices and links are defined to TCP/IP.

There is a DEVICE statement for each subchannel pair that is used to access MAEs. The first address specified must be an *even* address. In this example, two devices (subchannel pairs) are defined: one at address 640 and one at address

642. These devices could be in the same or different MAEs. A device type of LCS (LAN Channel Station) is used to define these devices to TCP/IP.

There is a LINK statement for each LAN adapter that is accessible from these devices. In this example, one Ethernet/802.3 Adapter is assigned to the device using subchannels 640 and 641, and two token-ring adapters are assigned to the device using 642 and 643. These two token-ring adapters are in the same MAE because they are associated with the same device. The LINK number for each adapter (0 and 1 in this example) is assigned by the MAE when you add an adapter to a profile. When sharing a LAN adapter with VTAM, the ADAPNO value in the VTAM definition and the LINK number in the TCP/IP definition will be the same number, which is assigned by the MAE.

Note: Two subchannel addresses are required for sending and receiving (for example, 640 and 641), but only the first address is defined.

```
DEVICE LCS1 LCS 640
LINK ETH1 ETHERor802.3  0 LCS1
DEVICE LCS2 LCS 642
LINK TR1  IBMTR     0 LCS2
LINK TR2  IBMTR     1 LCS2
```

Note: In this example, `0` and `1` are the LAN numbers for these connections.

This section of the example TCP/IP profile defines the local host internet addresses:

```
HOME

193.5.2.1      ETH1
130.50.75.1    TR1
130.50.76.1    TR2
```

This section of the example TCP/IP profile represents the LAN/WAN gateway definition:

```
GATEWAY

Network  First hop Driver  Packet Size Subnet mask Subnet value
193.5.2     =      ETH1    1500           0
130.50      =      TR1     2000        0.0.255.0   0.0.75.0
130.50      =      TR2     2000        0.0.255.0   0.0.76.0
```

This section of the example TCP/IP profile activates the LCS devices:

```
START LCS1
START LCS2
```

The following examples illustrate various ways that LAN adapters can be specified and linked to subchannel pairs in the TCP/IP profile.

Two LCS devices for the two subchannel pairs 40,41 and 42,43 and four LAN adapters are defined in the MAE as follows:

```
DEVICE LCS1 LCS 640
LINK ETH1 ETHERNET 0 LCS1
LINK ETH2 ETHERNET 1 LCS1
DEVICE LCS3 LCS 642
LINK TRN1 IBMTR    0 LCS2
LINK TRN2 IBMTR    1 LCS2
```

Four LCS devices for the four subchannel pairs 40,41; 42,43; 44,45; and 46,47 and four LAN adapters are defined in the MAE as follows:

```
DEVICE LCS1 LCS 640
LINK ETH1 ETHERNET 0 LCS1
DEVICE LCS2 LCS 642
LINK ETH2 ETHERNET 1 LCS2
DEVICE LCS3 LCS 644
LINK TRN1 IBMTR    0 LCS3
DEVICE LCS4 LCS 646
LINK TRN2 IBMTR    1 LCS4
```

One LCS device for the subchannel pair 40,41 and four LAN adapters are defined in the MAE as follows:

```
DEVICE LCS1 LCS 640
LINK ETH1 ETHERNET 0 LCS1
LINK ETH2 ETHERNET 1 LCS1
LINK ETH3 ETHERNET 2 LCS1
LINK ETH4 ETHERNET 3 LCS1
```

For more information about TCP/IP definitions, refer to the TCP/IP publications listed in “Related Manuals for 3745” on page X-16.

VTAM Control Blocks Used to Configure LSA at the Host

Configuring the VM or MVS host requires entries in two VTAM control blocks:

- External communication adapter (XCA) major node definition file
- Switched major node configuration file

For more information on configuring VTAM, refer to *VTAM Resource Definition Reference*.

XCA Major Node Definition File - Sample: Defining an XCA major node requires coding VTAM definition statements to define the following characteristics:

- Node type (VBUILD definition statement)
- Port used by the LAN (PORT definition statement)
- Switched lines attached through the MAE ESCON Channel Adapter (GROUP, LINE, and PU definition statements)

You must code a VBUILD definition statement and a PORT definition statement for the major node, and code GROUP, LINE, and PU definition statements for minor nodes.

You must also assign service access points (SAPs) to be used for each virtual channel to a LAN or emulated LAN.

Switched Major Node Definition File - Sample: The switched major node definition file defines the workstations that VTAM will be able to access through the MAE ESCON Channel Adapter, and identifies:

- Node type (VBUILD definition statement)
- Network Resources (PU and LU definition statements)

To define the MAE LAN/WAN gateway to VTAM, the appropriate LAN adapter in the IBM MAE must be associated with a subchannel address. This association is defined to VTAM in a major node definition that is supported by VTAM Version 3 Release 4 and VTAM Version 4 Release 1.

Configuring an LSA Direct Connection at the VTAM Host

Configuring the VM or MVS host requires entries in two VTAM control blocks, the XCA Major Node Definition File and the Switched Major Node Definition File. See “VTAM Control Blocks Used to Configure LSA at the Host” on page 22-27 for a description of the purpose of these control blocks and references to VTAM publications.

XCA Major Node Definition File - Sample

```
ROUTE6B1 VBUILD TYPE=XCA
PORT6B1  PORT   CUADDR=0CB,ADAPNO=0,TIMER=60,SAPADDR=08,
               MEDIUM=RING
GRP6B1   GROUP  DIAL=YES
************************
LN06B001 LINE  ANSWER=ON,CALL=INOUT,ISTATUS=ACTIVE
PU06B001 PU    ISTATUS=ACTIVE
```

Notes:

1. ADAPNO is the LAN number for the MAE interface.
2. CUADDR is the channel address. This corresponds to the device address (two hexadecimal characters defining the lower byte of the channel address) for the MAE interface.
3. MEDIUM=RING for token ring and MEDIUM=CSMACD for Ethernet. This corresponds to the value specified for LANtype for the MAE interface.

Switched Major Node Definition File - Sample

```
PS06SW  VBUILD TYPE=SWNET
PS06PU  PU ADDR=01,IDBLK=05D,IDNUM=54445,MAXOUT=7,PACING=0,VPACING=0,  C
               SSCPFM=USSSCS,MAXDATA=4105,MODETAB=LMT3270,MAXPATH=1,   C
               ANS=CONT,ISTATUS=ACTIVE,DLOGMOD=B22NNE
PS06LU2 LU LOCADDR=02
PS06LU3 LU LOCADDR=03
PS06LU4 LU LOCADDR=04
PS06LU5 LU LOCADDR=05
```

Configuring an LSA APPN Connection at the VTAM Host

With the following exceptions, APPN is configured over the MPC+ interface as it is over other interface types:

- On the APPN "add port" command, specify link type MPC.
- On the APPN "add port" command, you may specify the MPC+ sequencing interval timer.

Configuring the VM or MVS host requires entries in two VTAM control blocks, the XCA Major Node Definition File and the Switched Major Node Definition File. See “VTAM Control Blocks Used to Configure LSA at the Host” on page 22-27 for a description of the purpose of these control blocks and references to VTAM publications.

XCA Major Node Definition File - Sample

```
P15AP63X VBUILD TYPE=XCA
PORT63X  PORT   CUADDR=0CD,ADAPNO=0,TIMER=60,SAPADDR=04,               C
               MEDIUM=CSMACD
GRP63X   GROUP  DIAL=YES
************************
LN630403 LINE  ANSWER=ON,CALL=INOUT,ISTATUS=ACTIVE
PU630403 PU    ISTATUS=ACTIVE
```

Notes:

1. ADAPNO is the LAN number for the MAE interface.
2. CUADDR is the channel address. This corresponds to the device address (two hexadecimal characters defining the lower byte of the channel address) for the MAE interface.
3. MEDIUM=RING for token ring and MEDIUM=CSMACD for Ethernet. This corresponds to the value specified for LANtype for the MAE interface.

Switched Major Node Definition File - Sample

```
LS601    VBUILD TYPE=SWNET
CS601   PU ADDR=02,CPNAME=C210,MAXOUT=7,PACING=0,VPACING=0,           C
               CPCP=YES,MAXDATA=4105,MODETAB=LMT3270,MAXPATH=10,      C
               CONNTYPE=APPN,DYNLU=YES
```

Configuring an LSA DLSw Connection at the VTAM Host

Configuring the VM or MVS host requires entries in two VTAM control blocks, the XCA Major Node Definition File and the Switched Major Node Definition File. See "VTAM Control Blocks Used to Configure LSA at the Host" on page 22-27 for a description of the purpose of these control blocks and references to VTAM publications.

XCA Major Node Definition File - Sample

```
P15AP60X VBUILD TYPE=XCA
PORT60X  PORT   CUADDR=0CC,ADAPNO=1,TIMER=60,SAPADDR=04,              C
               MEDIUM=CSMACD
GRP60X   GROUP  DIAL=YES
************************
LN600403 LINE  ANSWER=ON,CALL=INOUT,ISTATUS=ACTIVE
PU600403 PU    ISTATUS=ACTIVE
LN600404 LINE  ANSWER=ON,CALL=INOUT,ISTATUS=ACTIVE
PU600404 PU    ISTATUS=ACTIVE
```

Notes:

1. ADAPNO is the LAN number for the MAE interface.
2. CUADDR is the channel address. This corresponds to the device address (two hexadecimal characters defining the lower byte of the channel address) for the MAEinterface.
3. MEDIUM=RING for token ring and MEDIUM=CSMACD for Ethernet. This corresponds to the value specified for LANtype for the MAE interface.

Switched Major Node Definition File - Sample

```
PSK5SW  VBUILD TYPE=SWNET
PSK5PU  PU ADDR=03,IDBLK=05D,IDNUM=07251,MAXOUT=7,PACING=0,VPACING=0,  C
               DLOGMOD=B22NNE,                                        C
               SSCPFM=USSSCS,MAXDATA=2000,MODETAB=LMT3270
PSK5LU2 LU LOCADDR=02
PSK5LU3 LU LOCADDR=03
PSK5LU4 LU LOCADDR=04
PSK5LU5 LU LOCADDR=05
PSK5LU6 LU LOCADDR=06
```

Configuring an LSA DLSw Local Conversion at the VTAM Host

Configuring the VM or MVS host requires entries in two VTAM control blocks, the XCA Major Node Definition File and the Switched Major Node Definition File. See “VTAM Control Blocks Used to Configure LSA at the Host” on page 22-27 for a description of the purpose of these control blocks and references to VTAM publications.

XCA Major Node Definition File - Sample

```
P15AP60X VBUILD TYPE=XCA
PORT60X  PORT   CUADDR=0CC,ADAPNO=1,TIMER=60,SAPADDR=04,               C
               MEDIUM=CSMACD
GRP60X   GROUP  DIAL=YES
************************
LN600403 LINE  ANSWER=ON,CALL=INOUT,ISTATUS=ACTIVE
PU600403 PU    ISTATUS=ACTIVE
LN600404 LINE  ANSWER=ON,CALL=INOUT,ISTATUS=ACTIVE
PU600404 PU    ISTATUS=ACTIVE
```

Notes:

1. ADAPNO is the LAN number for the MAE interface.
2. CUADDR is the channel address. This corresponds to the Device Address (two hexadecimal characters defining the lower byte of the channel address) for the MAE interface.
3. MEDIUM=RING for Token Ring and MEDIUM=CSMACD for Ethernet. This corresponds to the value specified for LANtype for the MAE interface.

Switched Major Node Definition File - Sample

```
PS06SW  VBUILD TYPE=SWNET,MAXDLUR=20
PS06PU  PU ADDR=01,IDBLK=05D,IDNUM=54445,MAXOUT=7,PACING=0,VPACING=0,  C
               SSCPFM=USSSCS,MAXDATA=4105,MODETAB=LMT3270,MAXPATH=1,   C
               ANS=CONT,ISTATUS=ACTIVE,DLOGMOD=B22NNE
PS06LU2 LU LOCADDR=02
PS06LU3 LU LOCADDR=03
PS06LU4 LU LOCADDR=04
PS06LU5 LU LOCADDR=05

PSK5SW  VBUILD TYPE=SWNET
PSK5PU  PU ADDR=03,IDBLK=05D,IDNUM=07251,MAXOUT=7,PACING=0,VPACING=0,  C
               DLOGMOD=B22NNE,                                         C
               SSCPFM=USSSCS,MAXDATA=2000,MODETAB=LMT3270
PSK5LU2 LU LOCADDR=02
PSK5LU3 LU LOCADDR=03
PSK5LU4 LU LOCADDR=04
PSK5LU5 LU LOCADDR=05
PSK5LU6 LU LOCADDR=06
```

The following examples show XCA and SWNET macros that define the LAN major node for a token-ring adapter and an Ethernet adapter, respectively. In the examples:

- GROUP1T, GROUP1E, and GROUP1F represent resources connected to the LAN that require a VBUILD TYPE=SWNET.
- GROUP2T, GROUP2E, and GROUP2F represent a connection for the PU 5 node.

The mode table and default mode entries are examples only. Be sure to use the mode tables and mode entries defined in your installation.

```
TRLAN1   VBUILD TYPE=XCA
PORT1    PORT   MEDIUM=RING,ADAPNO=0,CUADDR=644,TIMER=60,SAPADDR=4
GROUP1T  GROUP  DIAL=YES    * Switched Attachment
LINE1TA  LINE   ANSWER=ON,CALL=INOUT,ISTATUS=ACTIVE
PU1TA    PU     ISTATUS=ACTIVE
LINE1TB  LINE   ANSWER=ON,CALL=INOUT,ISTATUS=ACTIVE
PU1TB    PU     ISTATUS=ACTIVE
GROUP2T  GROUP  DIAL=NO     * Leased Definition
LINE2T   LINE   USER=SNA    * Multi-domain Connection
PU2T     PU     MACADDR=400000000001,TGN=1,SUBAREA=2,SAPADDR=4,PUTYPE=5
```

```
ENLAN2   VBUILD TYPE=XCA
PORT2    PORT   MEDIUM=CSMACD,ADAPNO=0,CUADDR=645,TIMER=60,SAPADDR=4
GROUP1E  GROUP  DIAL=YES    * Switched Attachment
LINE1EA  LINE   ANSWER=ON,CALL=INOUT,ISTATUS=ACTIVE
PU1EA    PU     ISTATUS=ACTIVE
LINE1EB  LINE   ANSWER=ON,CALL=INOUT,ISTATUS=ACTIVE
PU1EB    PU     ISTATUS=ACTIVE
GROUP2E  GROUP  DIAL=NO     * Leased Definition
LINE2E   LINE   USER=SNA    * Multi-domain Connection
PU2E     PU     MACADDR=400000000002,TGN=2,SUBAREA=2,SAPADDR=4,PUTYPE=5
```

The following examples are the switched major node definitions:

```
LS100SW VBUILD TYPE=SWNET,MAXGRP=400,MAXNO=400
CS100001 PU  ADDR=01,PUTYPE=2,MAXPATH=4,ANS=CONT,DLOGMOD=B22NNE,
         ISTATUS=ACTIVE,MAXDATA=521,IRETRY=YES,MAXOUT=7,
         PASSLIM=5,IDBLK=111,IDNUM=00001,MODETAB=LMT3270
         PATH  DIALNO=0104400000000004,GRPNM=GROUP1T
S00102   LU   LOCADDR=2
CS100002 PU  ADDR=02,PUTYPE=2,MAXPATH=4,ANS=CONT,DLOGMOD=B22NNE,
         ISTATUS=ACTIVE,MAXDATA=521,IRETRY=YES,MAXOUT=7,
         PASSLIM=5,CPNAME=MYNS2,MODETAB=LMT3270
         PATH  DIALNO=0104400000000005,GRPNM=GROUP1T
S00200  LU   LOCADDR=0,DLOGMOD=LU62MODE
S00202  LU   LOCADDR=2
```

```
CS100003 PU  ADDR=03,PUTYPE=2,MAXPATH=4,ANS=CONT,DLOGMOD=B22NNE,
         ISTATUS=ACTIVE,MAXDATA=521,IRETRY=YES,MAXOUT=7,
         PASSLIM=5,IDBLK=111,IDNUM=00003,MODETAB=LMT3270
         PATH  DIALNO=0104400000000006,GRPNM=GROUP1E
S00302   LU   LOCADDR=2
CS100004 PU  ADDR=04,PUTYPE=2,MAXPATH=4,ANS=CONT,DLOGMOD=B22NNE,
         ISTATUS=ACTIVE,MAXDATA=521,IRETRY=YES,MAXOUT=7,
         PASSLIM=5,IDBLK=111,IDNUM=00004,MODETAB=LMT3270
         PATH  DIALNO=0104400000000007,GRPNM=GROUP1E
S00402  LU   LOCADDR=2
```

```
CS100005 PU  ADDR=05,PUTYPE=2,MAXPATH=4,ANS=CONT,DLOGMOD=B22NNE,
         ISTATUS=ACTIVE,MAXDATA=521,IRETRY=YES,MAXOUT=7,
         PASSLIM=5,IDBLK=111,IDNUM=00005,MODETAB=LMT3270
         PATH  DIALNO=0104400000000008,GRPNM=GROUP1F
S00502   LU   LOCADDR=2
CS100006 PU  ADDR=06,PUTYPE=2,MAXPATH=4,ANS=CONT,DLOGMOD=B22NNE,
         ISTATUS=ACTIVE,MAXDATA=521,IRETRY=YES,MAXOUT=7,
         PASSLIM=5,IDBLK=111,IDNUM=00006,MODETAB=LMT3270
         PATH  DIALNO=0104400000000005,GRPNM=GROUP1F
S00602  LU   LOCADDR=2
```

For more information about VTAM definitions, refer to the VTAM publications listed in “Related Manuals for 3745” on page X-16.

Configuring the VTAM Host for MPC+

Configuring the VTAM host requires entries in two VTAM control blocks, the Local SNA Major Node and the Transport Resource (TRL) Major Node, and a change to the VTAM startup parameters. For more information on configuring VTAM, refer to *VTAM Resource Definition Reference*.

Local SNA Major Node: Use the following definition statements to configure a local SNA major node in VTAM:

```
UTYLSNA VBUILD TYPE=LOCAL
UTYHCC1 PU     TRLE=UHCC1,XID=YES,CONNTYPE=APPN,CPCP=YES,HPR=YES
```

Transport Resource List (TRL) Major Node:

```
BC4UTRL VBUILD TYPE=TRL
UHCC1   TRLE LNCTL=MPC,                                       C
             MAXBFRU=8,                                       C
             READ=(xxx1,xxx2,...),                            C
             WRITE=(yyy1,yyy2,...),                           C
             REPLYTO=3.0
```

where:

xxx1,xxx2,... are the read subchannel numbers.
yyy1,yyy2,... are the write subchannel numbers.

The read and write subchannel numbers must match those configured on the MAE.

Note: A read subchannel to VTAM is a write subchannel to the MAE and a write subchannel to VTAM is a read subchannel to the MAE.

VTAM Start-up Parameters: In the VTAM initialization file ATCSTRxx, where xx is defined by the user, define a network node:

```
NODETYPE=NN
```

Since high-performance routing (HPR) is being used, you also should add to this file:

```
HPR=YES
```

Note: Only APPN HPR is supported across the MPC+ interface. APPN ISR is not supported.

Chapter 23. Multiaccess Enclosure ISDN Support

The 3746 Multiaccess Enclosure offers a variety of ways to connect to ISDN networks. Native connections are made via LIC 283 or LIC 292 for respectively T1/J1 or E1 speeds. Each of these LICs supports an ISDN primary rate interface. Alternatively, X.21 adapters together with appropriate terminal adapter hardware can also provide for ISDN access.

Figure 23-1 illustrates multiaccess enclosure access to ISDN networks.

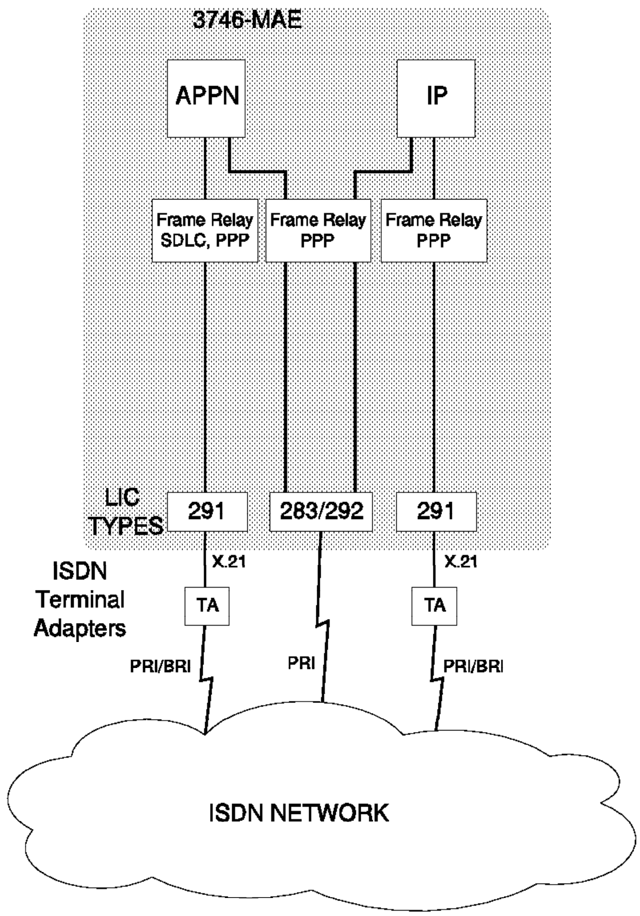


Figure 23-1. ISDN Access from the 3746 Multiaccess Enclosure

Native ISDN Access

Native ISDN access is supported over the LIC type 283 and 292 adapters. These support one primary rate worldwide ISDN interface each. More details on these adapters can be found under "1-port ISDN PRI (T1/J1) Adapter - LIC283 (FC#3283)" on page 21-4 and "1-port ISDN PRI (E1) Adapter - LIC292 (FC#3292)" on page 21-6. The multiaccess enclosure adapters support both SNA and IP traffic using frame relay and PPP framing.

ISDN Terminal Adapter Access

As with the 3746 native adapters, ISDN terminal adapters (TA) can be used to adapt X.21 links to ISDN networks. In this case, the X.21 call setup procedure is used to call out, or answer via the ISDN network.

For more details see “ISDN Terminal Adapter” on page 10-14.

Chapter 24. 3746 Configuration Overview

The hardware of the 3746 can be configured in various ways.

Note: This description refers to the 1997 3746 multiaccess enclosure release.

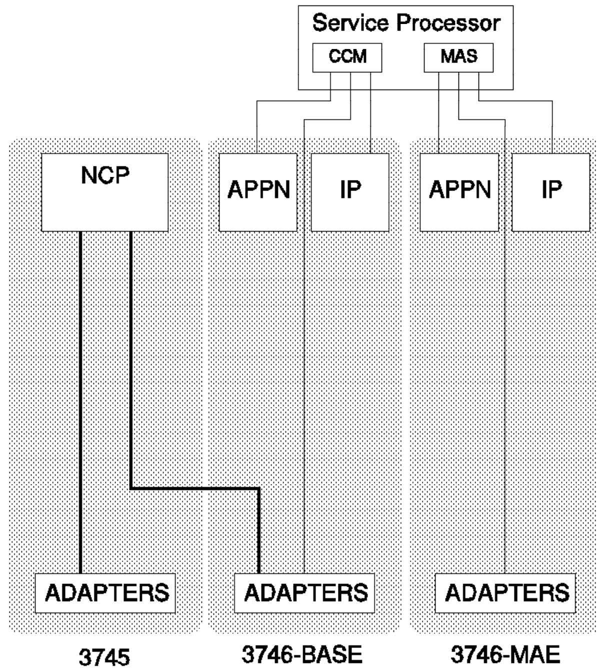


Figure 24-1. 3746 Configuration Options Overview

Figure 24-1 gives an overview of which configuration method can be used for which hardware adapters in the 3746. The following configuration methods are available:

NCP

For the 3745 and 3746 adapters that are under NCP control, NCP and the NCP generation process are responsible for configuration of these adapters.

Refer to the NCP manuals listed in “Related Manuals for 3745” on page X-16 (bibliography) for details of the NCP configuration process.

CCM

For the 3746 base and expansion frame adapters, and APPN and IP routers, the CCM is responsible for configuration and local management.

See Chapter 25, “Welcome to the CCM” on page 25-1 for details of the CCM configuration process.

MAS

For the 3746 multiaccess enclosure adapters, and APPN and IP routers, the MAS is responsible for configuration and local management.

See Chapter 26, “Multiaccess Enclosure Configuration” on page 26-1 for details of the MAS configuration process.

Chapter 25. Welcome to the CCM

The IBM Communication Configuration and Management application (CCM) is designed to help you configure and manage an IBM 3746 communication controller and its associated network resources.

When you configure your controller and its resources, the CCM creates a configuration file, referred to as the ***3746 controller configuration file***. Using the CCM, you can create several configurations.

The CCM runs under the control of the OS/2* and features a Presentation Manager* graphical user interface, where you can perform a wide range of tasks.

The CCM tasks are divided into two main categories:

Configuration for defining configuration parameters such as coupler type, mode, class of service, transmission group, and others. When a group of configuration parameters has been defined, it can be saved to file on disk. This file can then be immediately activated for use by the network, or it can be saved for later use. Configuration parameters are defined by specifying values in CCM windows.

Management that involves viewing operational information about the currently defined network resources, and activating or deactivating network resources to maintain optimal network performance. Tasks requesting network resource information use commands that only specify the resource address.

Note: For more information about how to use the CCM, refer to *3746 Nways Multiprotocol Controller, Models 900 and 950: Controller Configuration and Management User's Guide*, SH11-3081.

Operating Environments

The CCM can be used on either:

- The service processor, where it is accessed via the MOSS-E. (The service processor may be accessed via a Distributed Console Access Facility (DCAF) remote console). This environment is referred to as the ***service processor environment***.
- A stand-alone workstation. This environment is referred to as the ***stand-alone environment***

Service Processor Environment

With the CCM installed and running on the service processor, you access it through the MOSS-E user interface. In this type of installation, both the configuration and the management functions can be used.

Stand-Alone Environment

When the CCM is running in the stand-alone environment, the management part of the application and the coupler with the 2080 address are not available for use (they are ‘greyed-out’).

However the configuration part of the application is fully available for configuring the controller and its resources before your machines arrive.

If several controllers are operating on the network, a good strategy is to configure all controllers from a centralized location, using the stand-alone CCM. The configurations can then be sent (exported) to each service processor when complete.

Minimum Hardware and Software Requirements

The minimum requirements for workstations running the stand-alone version of the CCM are:

- 80486 microprocessor or higher.
- 40 MB of hard disk space free.
- VGA display (for example, an IBM 8515 Color Display or equivalent).
- 24 MB of virtual memory. The actual amount of virtual memory needed depends on the size of the configuration (does it have tens of lines or hundreds of lines).
- Mouse.
- 3.5-inch diskette drive.
- IBM Operating System/2 (OS/2), version 2.1 or higher.

Installing CCM

This section discusses the CCM level compatibility and describes the MOSS-E and stand-alone installation procedures.

CCM Levels

Level compatibility

Different levels of CCM are upwardly compatible only. For this reason, a configuration that has been generated at CCM one level can only be exported to a CCM at the same or higher level.

IBM recommends that the same level of the CCM should be maintained in the service processor and the stand-alone environment. This is important if configurations generated on the stand-alone CCM are to be exported to a CCM running in a service processor.

Details about the CCM level are displayed in the **Product Information** window.

Viewing the CCM Product Information

You can view information about this release of the CCM: its version, EC (APPN BLPU engineering change), and the date of general availability of this EC version. To view the product information:

Main window **Help** menu → **Product information**

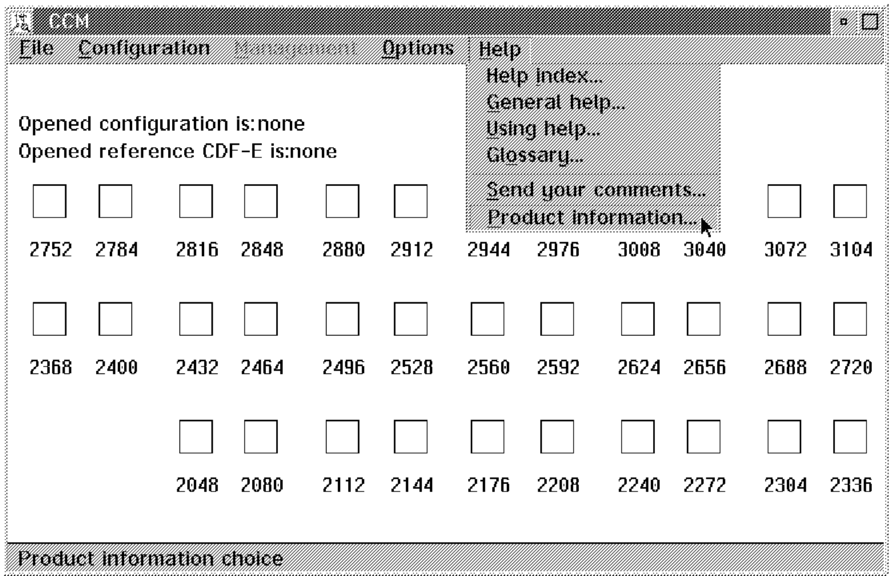


Figure 25-1. Main Window Help Menu

Installing CCM in Service Processor Environment

Installation of the CCM in the MOSS-E is a task which is performed by an IBM customer engineer. The CCM is installed when the MOSS-E is installed.

Installing CCM in Stand-Alone Environment

The IBM customer engineer creates the CCM installation diskettes that you use for installing the CCM.

Before installing CCM

Ensure that your workstation has the correct hardware and software requirements (see page 25-2).

The installation procedure is in the README files that comes with the CCM and may be different according to the level of the CCM that is being installed.

CCM Password Protection from MOSS-E

The CCM on a service processor can be protected by a password using the MOSS-E **CCM/Tenet User Profile Management** function in the **Manage Passwords** menu.

Starting the Service Processor CCM

To start the CCM in the service processor environment:

Step 1. Open the MOSS-E **3746-9xx** group of menus.

Step 2. In the **3746-9xx Network Node Processor Management** menu select (→) the **CCM-Controller Configuration and Management** function.

Starting the Stand-Alone CCM

Note: When the CCM is running in the stand-alone environment, the management part of the application and the 2048 coupler are not available for use (they are 'greyed-out').

To start the stand-alone CCM, you can use either the mouse or the keyboard.

Using the Mouse

Step 1. Double-click on the CCM folder icon 

Step 2. Double-click on the CCM icon 

to start the application.

Using the Keyboard

Step 1. Open an OS/2 window.

Step 2. Type `CCM` and press **Enter**.

Stopping and Exiting from CCM

To stop the CCM:

Main window **File** → **Exit**

CCM, An Easier Way to Configure

The CCM is designed to provide a much simpler method of configuring the controller and its resources, when compared with the NCP generation process.

About 80% of the parameters have predefined default values. These values can be used, or modified and saved as new default values if required. This saves time and effort when several identical lines, ports, or stations are being configured.

Configuration files can also be copied or exported (or printed as listings). The CCM ensures that the configuration is internally consistent by dynamically cross-checking the validity of parameter values while you are entering them.

This dynamic checking allows CCM to help you, when you choose a value for a parameter, by immediately disabling (greying-out) all the other CCM parameters that are:

- No longer relevant to the configuration you are working on.

  For example, if you start to configure an ESCON port for a SNA/subarea network, the APPN and IP name parameters are greyed-out as they do not apply to a SNA/subarea ESCON Channel.

- Automatically selected by the CCM and cannot be changed.

  For example, for a serial line port, if you choose the DLC as SDLC, the network parameter is automatically set to APPN and the set of choices is greyed-out. But, if you choose the PPP DLC, the network is automatically set to IP and, again, the set of choices is greyed-out.

During the configuration process, the CCM creates a set of output files which are then compressed into a single file known as the 3746 configuration file (the .CCM binary file, see Figure 25-2).

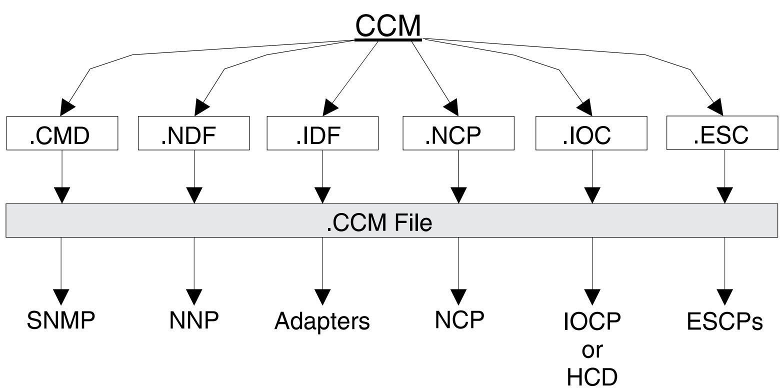


Figure 25-2. Files Created by the CCM during the Configuration Process

Legend:

.CMD
: *Name:* SNMP Definition File
: *Contents:* SNMP definitions
: *Destination:* Network Node Processor (NNP)

.NDF
: *Name:* Network Definition File
: *Contents:* APPN and IP resource configurations
: *Destination:* Network Node Processor (NNP)

.IDF
: *Name:* Internet Definition File
: *Contents:* IP resource data
: *Destination:* Processors that handle IP traffic

.IOC
: *Name:* I/O Configuration Program file
: *Contents:* Defines the ESCON channel paths
: *Destination:* Destination: Host (IOCP or the MVS Hardware Configuration Definition (HCD) tool)

  Note: The CCM produces this file as output from a 3746 configuration file to be used as input for the host.

.NCP
: *Name:* Network Control Program (NCP) file
: *Contents:* ESCON definitions for NCP

Destination: Host (NCPGEN)

Note: The CCM produces this file as output from a 3746 configuration file to be used as input for the host.

.ESC

Name: ESCON Definition File
Contents: SNA/subarea, APPN, and IP ESCON definitions
Destination: Used to configure ESCON processors

.CCM

Name: CCM Configuration File
Contents: Complete CCM configuration (compressed) with all the above files and others
Destination: Hard disk that contains the CCM program

What You Can Do with a CCM Configuration

With the CCM, configuration files can be created, modified, copied, imported, exported, and activated as required.

Creating Configuration Files

Different configuration files can be created for different controller configurations and environments (but only a single configuration file can be active at a given time).

You can create a configuration file in the service processor environment or in stand-alone environment.

Before starting the initial configuration ensure you have available:

- The hardware configuration worksheets, which are in Chapter 43, “Plugging Sheets for the 3746 Nways Multiprotocol Controller” and are used for keeping a record the controller hardware topology, including details of coupler position and type.
- The CCM parameter worksheets, which are in Chapter 40, “CCM Worksheets for Controller Configuration Definitions” and are used for recording the configuration information for each controller and its associated resources.

Modifying Configuration Files

If resources are changed (for example, if a coupler is added or a coupler is replaced with one of a different type) the configuration file must also be updated.

This can be done in the service processor environment or in stand-alone environment. For more information about modifying CCM configuration files, refer to the 3746 CCM *User's Guide*.

After modifying a configuration, you can activate the changes in the configuration either:

- Immediately, using the CCM Dynamic Configuration Update function on individual ports and stations without disrupting the rest of the network.
- Later, by activating the whole configuration.

Before modifying a configuration ensure that you:

- Know the file name of the configuration to be modified.
- Have the hardware configuration worksheet, if the hardware topology of the machine has changed.
- Have the parameter worksheets with the details of the changes to be made in the configuration.

Copy a Configuration

You can make one or more copies of a given configuration by saving its file under different names.

This is used, for example, if several controllers on the network have similar configurations and a "master" configuration contains most of definitions needed by all these controllers. This master configuration can be changed as needed for an individual controller and saved under a unique name that corresponds to this controller. This can be repeated for each of the other controllers, giving you a group of configurations each customized for a specific controller.

This method can also be used to produce several configurations for the same controller. For example, to handle traffic over a coupler differently at night, the active configuration could change at 20:00 to the night version and change again at 07:00 to the day version.

Export/Import a Configuration

If you configure in the stand-alone environment, or in the service processor for a controller not attached to the service processor, the configuration file must be exported from the CCM to a diskette and then imported onto the service processor hard disk of the destination controller using its CCM and MOSS-E.

You can also import a CCM configuration file for other than the default directory.

Activate a Configuration

This must be done in the service processor environment CCM, refer to the 3745 CCM *User's Guide*.

A single configuration only can be active at a given time.

Configuring the Controller

To configure a controller, you define the parameters for the:

Controller itself:

- Controller frame information
- Its network focal point
- As a dependent LU requester (DLUR)
- Its mode of CCU operation (for a 3746-900)
- Class of service (COS) for its traffic
- Communications protocol.

Controller resources:

The couplers.

To configure a coupler, you define parameters for its ports and stations.

The controller and its resources must be configured when they are first installed and when modifications are made to the network.

Configuration Creation in Different Environments

The procedure for creating a configuration depends on the environment in which you are working (service processor or stand-alone).

Note: In the following figures, the activation step has been included to show the difference between the two environments.

In the Service Processor Environment

If you are using the service processor environment, follow the steps shown in Figure 25-3.

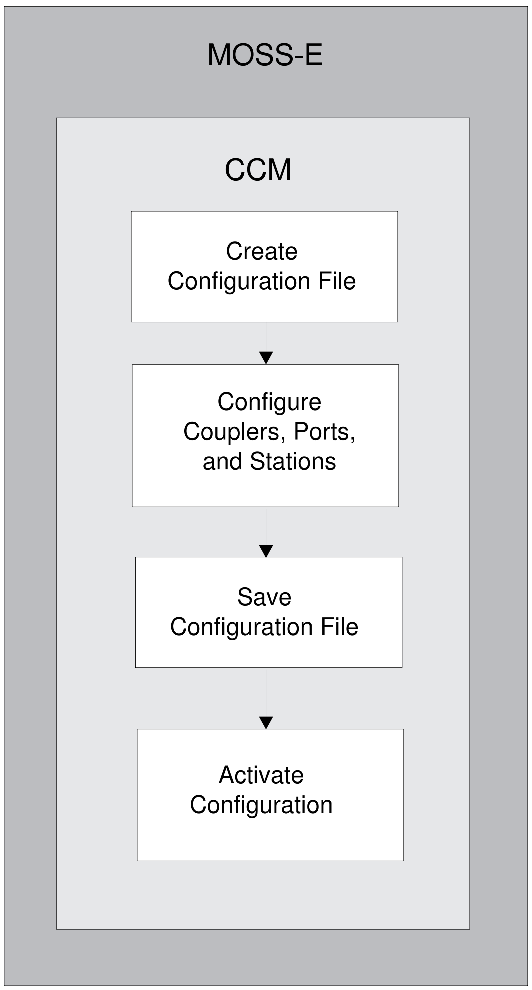


Figure 25-3. Creating a Configuration in the Service Processor Environment

In the Stand-Alone Environment

If you are using the stand-alone environment, follow the steps shown in Figure 25-4.

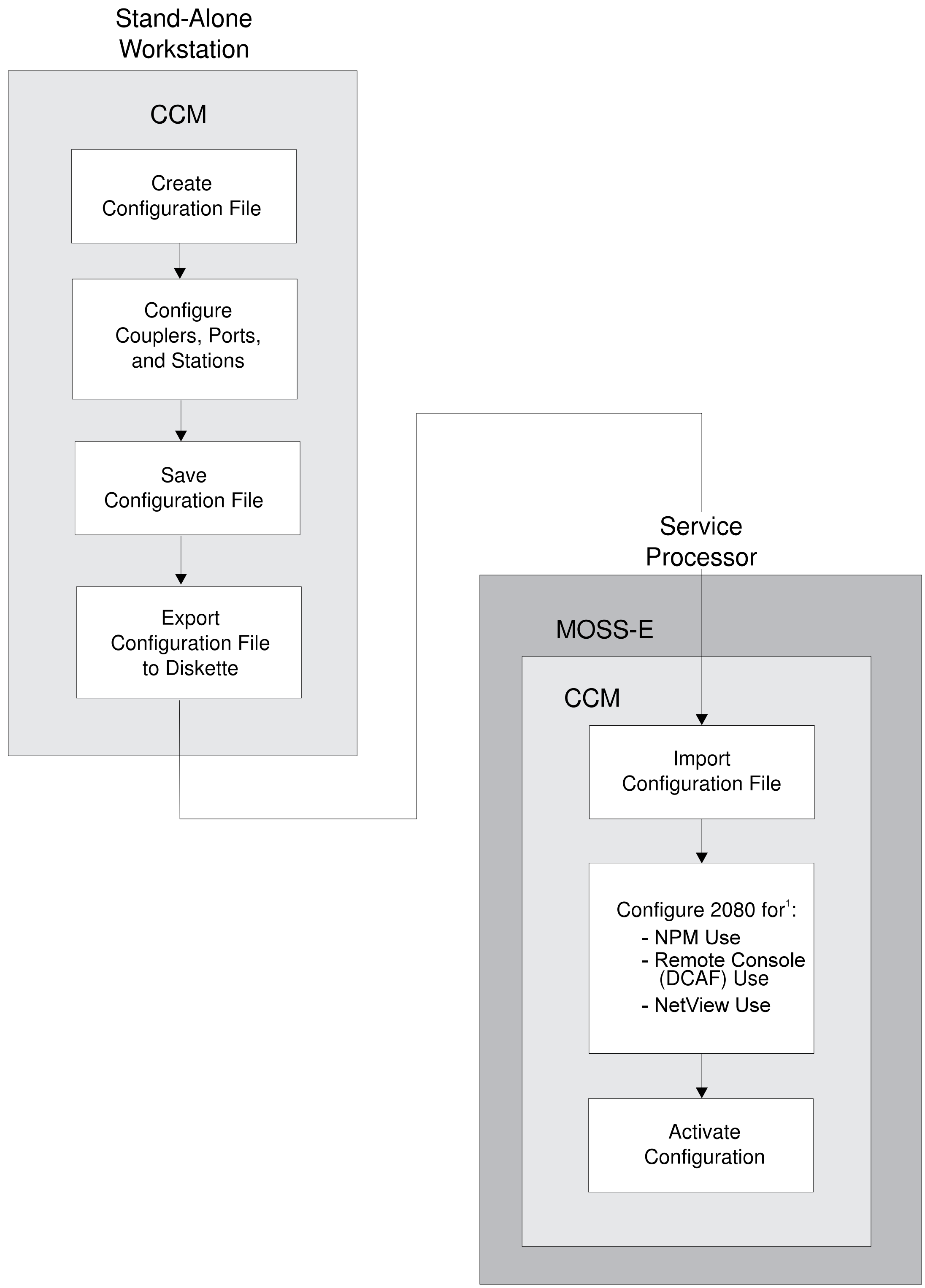


Figure 25-4. Creating a Configuration in a Stand-Alone Environment.
[1]*Refer to the 3746 CCM* User's Guide.

Chapter 26. Multiaccess Enclosure Configuration

The 3746 multiaccess enclosure uses the 2216-400 Configuration Program integrated into the service processor to configure its slots, adapters, interfaces, and protocols to be used in your network. The 3746 Multiaccess Enclosure functions are accessed from the 3746-9x0 menu. See Figure 26-1. Selecting **Manage Multiaccess Enclosure** from this menu will open the 3746 multiaccess enclosure management window. Refer to Figure 26-3 on page 26-3.

The multiaccess enclosure can only be used from the service processor, as there is no way of importing a configuration file from a diskette.

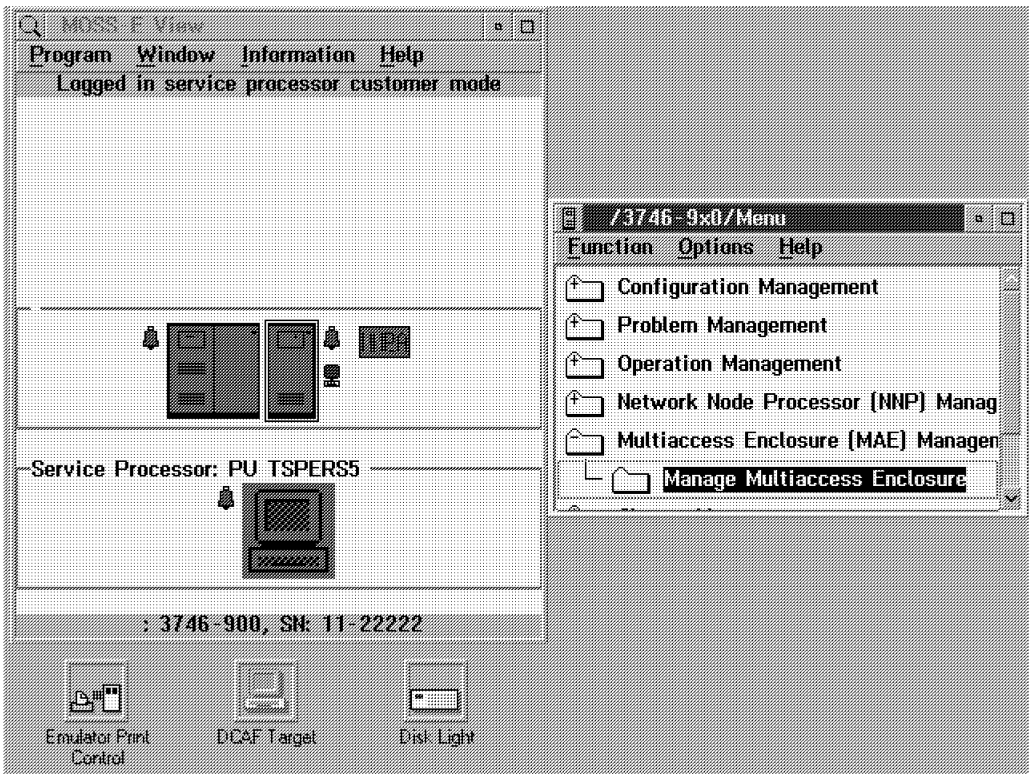


Figure 26-1. Multiaccess Enclosure Management Menu within Service Processor

Some consideration must be given to configuring the token-ring adapter ports in slot 1 of the multiaccess enclosure, and matching definitions for the associated TIC3s in the 3746-9x0 using CCM, to allow the 3746 multiaccess enclosure traffic to flow to the existing 3746-9x0 hardware, (see “Setting up the Multiaccess Enclosure Connection” on page 26-18).

Overview of the Multiaccess Enclosure Environment

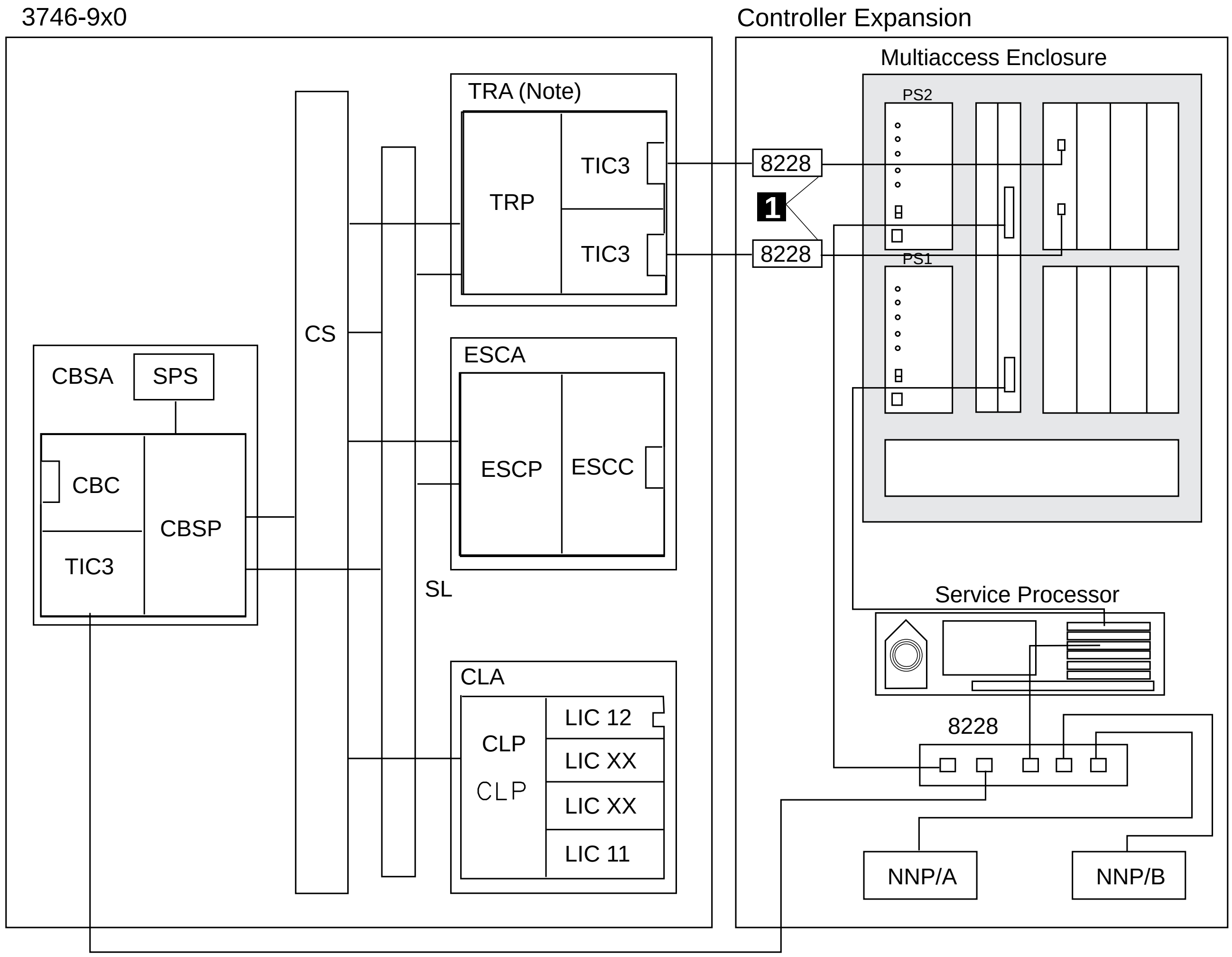


Figure 26-2. Multiaccess Enclosure Environment

Notes:

1. If internal attachment via LAN to the 3746 Models 900 or 950 switch is required for traffic routing between MAE ports and other ports (such as IP traffic, APPN/HPR traffic, or NCP traffic) a 2-port Token-Ring adapter (feature code 3280), one or two dedicated Token-Ring couplers type 3 (feature code 5601), and one or two multiaccess enclosure Token-Ring kit (feature code 9713) (depending on performance requirement) are required. See **1** in Figure 26-2 for Token-Ring cable connection between the Multiaccess Enclosure and the 3746 Model 900 or 950.
2. If there is only traffic routing between MAE ports (inside the multiaccess enclosure) this internal attachment is not required.
3. When installed, the two TIC3s can be plugged on two different TRPs.

Communicating with the 3746 Multiaccess Enclosure

There are three methods of communicating with the multiaccess enclosure from the service processor

1. ASCII connection, maintenance operation only, through an RS-232 null modem cable.
2. TELNET session, network operations and dynamic online configuration update, thru the Service ring.
3. Via the Multiaccess Enclosure Configuration Program to write configuration files to the 3746 multiaccess enclosure.

For items 2 and 3 to work, it is required that the multiaccess enclosure have been already installed (see “Setting Up the 3746 Multiaccess Enclosure” on page 26-5). Also, the PCMCIA token-ring port on the service LAN must have an IP address set (refer to “IP Addressing” on page 26-5).

Figure 26-3 shows the Multiaccess Enclosure Management Menu before any setup has been performed on a new 3746 multiaccess enclosure. The field MAE IP address is blank and should have the IP address of the multiaccess enclosure service LAN port entered directly into this field. This will tell the service processor who to talk to when addressing the multiaccess enclosure.

Note: The same address must also be set in the multiaccess enclosure firmware by using the procedure described in “Setting Up the 3746 Multiaccess Enclosure” on page 26-5.

All of the above should be operational when IBM complete the hardware install.

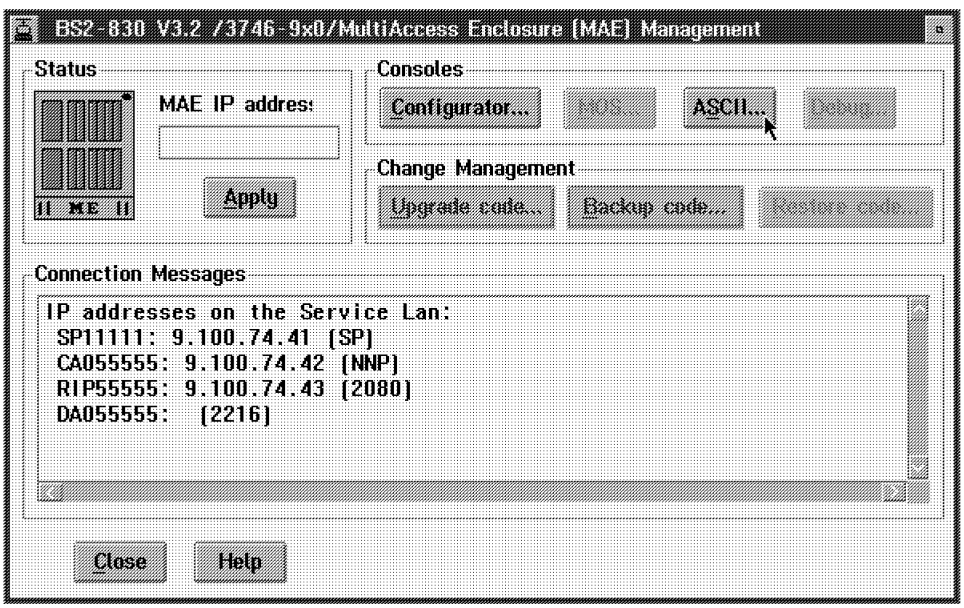


Figure 26-3. Multiaccess Enclosure Management Menu Window

Multiaccess Enclosure Consoles

There are two type of console access to the multiaccess enclosure operational code. *ASCII* and *MOS* allow you to access the user interface to monitor and change the function of the multiaccess enclosure.

ASCII Console

The ASCII console is a direct connection from the service processor SERIAL port to the multiaccess enclosure IEA 232 interface on the system card. The ASCII... button on the Multiaccess Enclosure Management Menu (see Figure 26-3 on page 26-3) opens a QVT window for communication. You may need to use this console during the initial installation. After the initial setup connection (refer to "Setting Up the 3746 Multiaccess Enclosure" on page 26-5), generally performed by the IBM service representative, you will not be required to use this console interface for multiaccess enclosure operation, as long as IP forwarding is enabled. If IP forwarding is enabled, an IP stack is built on the multiaccess enclosure and the service LAN token-ring port IP address has been set, then you may connect via MOS (TELNET) (see "MOS (Telnet) Console").

When the configured multiaccess enclosure is started for the first time, a boot message appears in the QVT window, followed by the operator's console or OPCON prompt (*). The * prompt indicates that the multiaccess enclosure is ready to accept OPCON commands.

For further information on OPCON commands refer to *IBM Nways Broadband Switch Control Program Routing Subsystem Command Interface Software Users Guide* book.

Note: The ASCII console should not be used by customer.

MOS (Telnet) Console

The MOS console is accessed from the Multiaccess Enclosure Management Menu consoles area by pressing the MOS... button and establishes a TELNET session to the multiaccess enclosure via the service ring.

Note: In Figure 26-3 on page 26-3 the MOS... button is disabled. This is because the multiaccess enclosure requires initial setup. Refer to "Setting Up the 3746 Multiaccess Enclosure" on page 26-5.

The MOS console provides the same function as the ASCII console, except that TELNET will not work until initial setup is performed. Once set up the MOS console provides a faster user interface, via the 16 Mbps service ring. You may also remotely TELNET to the multiaccess enclosure by connecting to any IP address defined on the multiaccess enclosure.

Login and Passwords: When connecting to the multiaccess enclosure via a remote Telnet session, you are prompted for a login name and password. You can display the login name when logged in to the multiaccess enclosure from a remote console by using the status command. Use the set password command to supply a password for the multiaccess enclosure. You may also configure a password for users of the MOS console.

Note: If you do not enter a login name and a valid password within one minute of the initial prompt, or if you enter an incorrect password three times in succession, the multiaccess enclosure drops the Telnet connection.

Multiple users with login permissions may also be added using the add user command.

IP Addressing

In the MultiAccess Enclosure Management Window the 3746 multiaccess enclosure Status should be green. This only indicates that the multiaccess enclosure PCMCIA service ring port has been contacted, that is, it has an IP address set. If the icon is not green, you need to set the MAE IP address. (refer to the status area on Figure 26-3 on page 26-3) and also follow the procedure found in “Setting Up the 3746 Multiaccess Enclosure.”

Note: A green icon does not indicate that successful communication will occur via the service ring. The multiaccess enclosure still requires an IP stack. See “Setting Up the 3746 Multiaccess Enclosure.” During installation of your 3746 multiaccess enclosure, the IBM Service Representative will be required to set an IP address for the PCMCIA token-ring port. This address may be set to the default, if you have not changed the service LAN IP addresses. Refer to “Service LAN IP Addresses (MOSS-E)” on page 34-18.

Setting Up the 3746 Multiaccess Enclosure

If your 3746 multiaccess enclosure has no configuration loaded, you must perform the steps in this section before you can send a configuration built by the configuration program to the multiaccess enclosure.

The objective is to be able to communicate from the service processor to the multiaccess enclosure for configuration/operations of network resources.

This situation could occur if:

- You have a new multiaccess enclosure with no configuration (first installation)

  Note: This setup is normally done by your service representative when he will installed the multiaccess enclosure.

- You cleared the multiaccess enclosure's configuration
- The multiaccess enclosure encountered a problem that cleared the configuration

To set up the 3746 multiaccess enclosure:

1. Establish access to the multiaccess enclosure.

   You can establish access through the ASCII terminal window, by clicking the **ASCII...** button in the Multiaccess Enclosure Management Menu.

   a. Power ON or Reset the MAE.

      Note: If prompted, the default password is 2216.

   b. Select **Reload** after obtaining the console.

   c. Select **Yes** to reload the gateway question.

   d. Select **No** to the save configuration question.

      Note: This line will not appear when installing this machine for the first time.

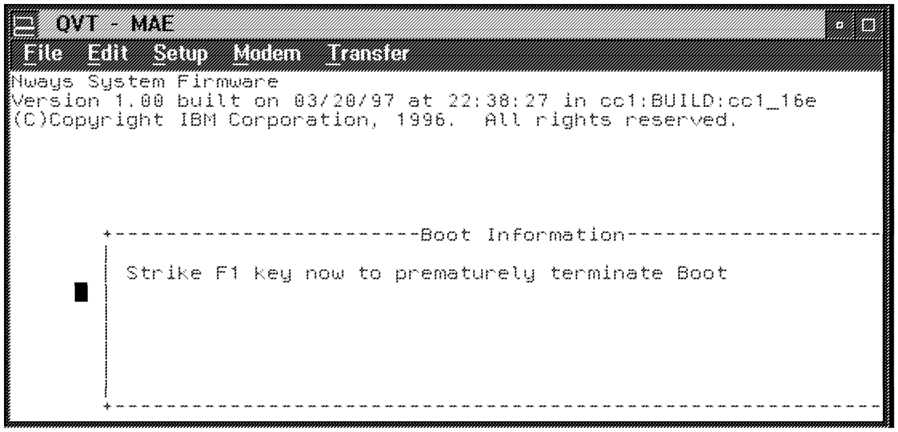


Figure 26-4. Watch for This Screen and Press F1. (You Have 3 Seconds).

e. Watch the screen carefully and when prompted, press F1 (to prematurely terminate boot)

   Note: If you get the message: `System programs cannot be entered from warm boot`, `please turn the multiaccess enclosure off and try again`, do the following.

f. Enter the default Supervisory password 2216 if prompted.

g. Using the arrows keys, select **Utilities**, then press Enter.

h. Using the arrows keys, select **(11) Remote Initial Program Load Setup** and press Enter. **(1) IP Parameters** is selected, then press Enter again.

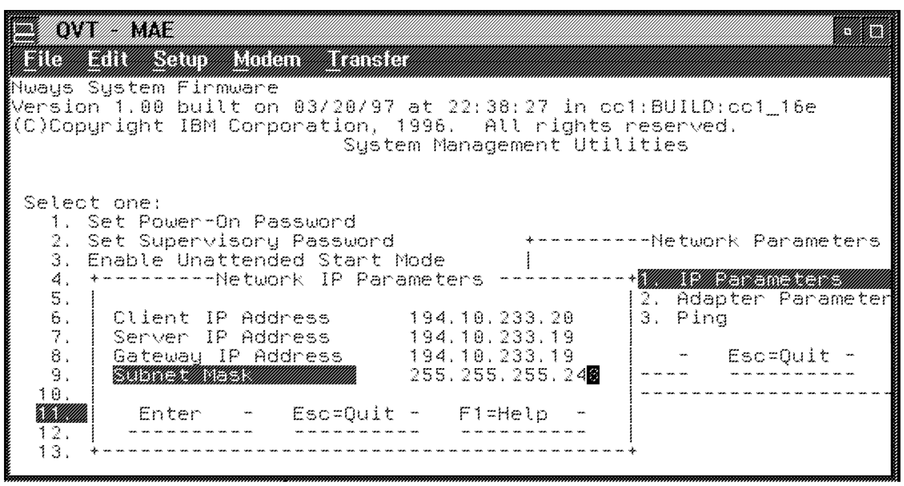


Figure 26-5. Setting the Multiaccess Enclosure IP Address for the Service Port

i. As shown inFigure 26-5, enter the Client IP address (MAE address of the PCMCIA card), Server IP address (service processor address), Gateway IP address (if no router on the ring, enter the service processor IP address), then press Enter

   Note: These IP addresses must be set according to "Service LAN IP Addresses (MOSS-E)" on page 34-18.

j. Press the Esc key twice, then press F3.

k. Enter Y to restart the system (the process can take up to 3 minutes).

l. When prompted, press the space bar. The multiaccess enclosure is now started.

m. At the Config Only prompt, type `Add Device Token-ring`, then press Enter.

```
  "Device slot # (1-8) (1) ? ", type "1"  <Enter>
  "Device Port # (1-2) (1) ? ", type "1"  <Enter>
Response =>
 Adding Token-Ring device at slot 1 port 1 as interface # 0
 Use "net 0" to Configure Token-Ring Parameters.
```

n. At the Config Only prompt, type `QC`, then press Enter.

```
Configure Bridging ? " (Yes, No, Quit): (Yes)  "NO"
Configure Protocols? " (Yes, No, Quit): (Yes)  "YES"
Configure IP?        " (Yes, No, Quit): (Yes)  "YES"
Configure IP on this interface?" (Yes, No, Quit): (Yes)  "YES"
IP Address:[ ] 1.1.1.1
Address Mask: [255.0.0.0] [255.255.255.0]
Enable Dynamic Routing? (Yes, No): (Yes)    "NO"
Define Community with read/write/trap access? (Yes, No): (Yes) "YES"
       Community Name: []   "PUBLIC"
  Save this configuration? (Yes, No): (Yes)     "YES"
  Configure IPX?           (Yes, No): (Yes)     "NO"
  Configure DNA?           (Yes, No): (Yes)     "NO"

Do you want to write this  configuration? (Yes, No): (Yes)     "YES"
```

o. At Config Only prompt, type `Reload`, then press Enter.

```
 Are you sure (Yes, No): "YES"
```

p. Then close the ASCII window.

Note: The IP stack on the multiaccess enclosure will now be built when this configuration is activated, and communication will then be possible between the service processor and the multiaccess enclosure via TCPIP over the service LAN.

q. Now the Multiaccess Enclosure Management window is displayed. Wait for the `Reading VPD for MAE` message to disappear and then enter the MAE IP address (same value recorded in step 1i on page 26-6), then click on **Apply**.

The system is reading the VPDs, when the multiaccess enclosure icon is **green**, click on **Close** to exit.

If the icon does not become green, verify that:

a. The IP address given to the MAE PCMCIA card is correct.
b. The yellow LED on PCMCIA card is off (card or cable unplugged).

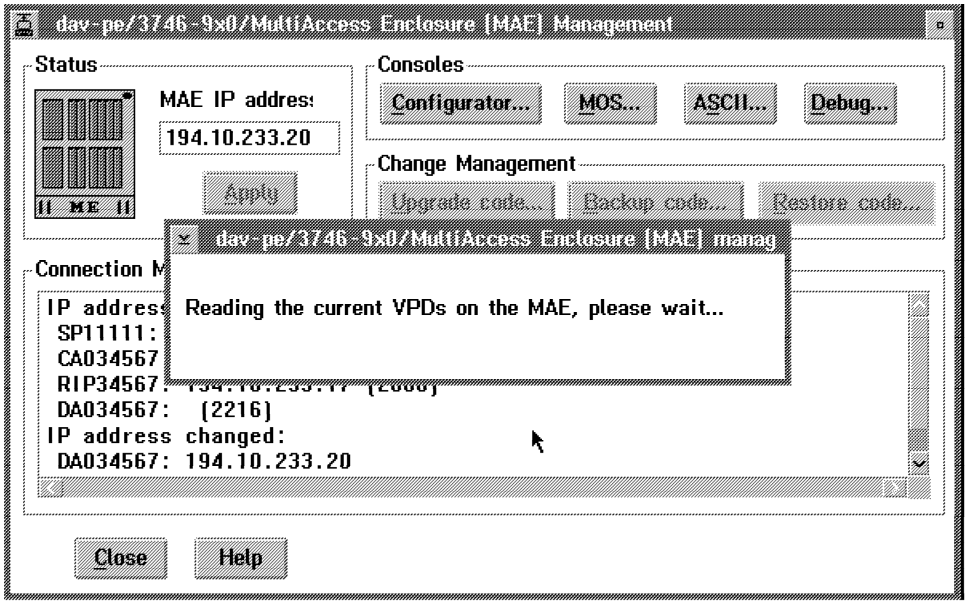


Figure 26-6. Multiaccess Enclosure Reading VPD information

When the multiaccess enclosure completes the restart sequence, it can communicate with the configuration program.

Starting the Configuration Program

Depending on the microcode level installed on your service processor, the procedure is different.

Up to D46130 Microcode Level...

The configuration program resides on the 3746 Multiaccess Enclosure Optical Disk (labeled 'MAE_XXXX' where XXXX is the version level). It is therefore a requirement to have this disk inserted in the optical drive. The configuration database and configurations that you create will also be saved onto this optical disk.

To start the configuration program:

1. Locate and open the Multiaccess Enclosure menu (Figure 26-1 on page 26-1).
2. Double-click on the Multiaccess Enclosure menu. line to open the window (Figure 26-3 on page 26-3).
3. Click on the Configurator... button.

   Note: You may be requested to insert the MAE NORMAL diskette or media. This means you need to insert the 3746 multiaccess enclosure normal optical disk (label 'MAE_XXXX') into the OD drive before the program will start.

   The main window for the configuration program will be displayed.

From F12380 Microcode Level...
The MAE configuration program is delivered on a CD-ROM that also contains the MOSS-E microcode and the product documentation. It is therefore a requirement to have the CD-ROM inserted in the CD-ROM drive. However, the configuration database and configurations that you create are to be saved on a diskette (refer to “Save Configuration” on page 34-11 for more information).

To start the configuration program:

1. Locate and open the Multiaccess Enclosure menu (Figure 26-1 on page 26-1).
2. Double-click on the Multiaccess Enclosure menu line to open the window (Figure 26-3 on page 26-3).
3. Click on the Configurator... button.

   Note: You may be requested to insert the MAE NORMAL diskette or media. This means that before the program starts, you must insert into the CD-ROM drive the CD-ROM on which the MAE code is delivered.

   The main window for the configuration program is then displayed.

Using the Configuration Program

This section describes how to use the configuration program by including some of the navigation features of the program.

Understanding the Navigation and Configuration Windows

After you start the configuration program and clear the copyright notice, you will see two windows similar to those in Figure 26-7 on page 26-10 and Figure 26-8 on page 26-12.

The thinner, left-hand window is the Navigation Window and the broader, right-hand window is the Configuration Window

Note: The Navigation Window overlaps the *Configuration Window*, and if you click on the *Configuration Window* the *Navigation Window* is now hidden. To switch back to the *Navigation Window*, press Ctrl+Esc keys to see a list of open windows and select the Navigation Window.

You configure the multiaccess enclosure by selecting items in the Navigation Window and then providing the details for each selected item in the Configuration Window. When you have completed entering the configuration details, select a new item to configure by selecting the item in the Navigation Window.

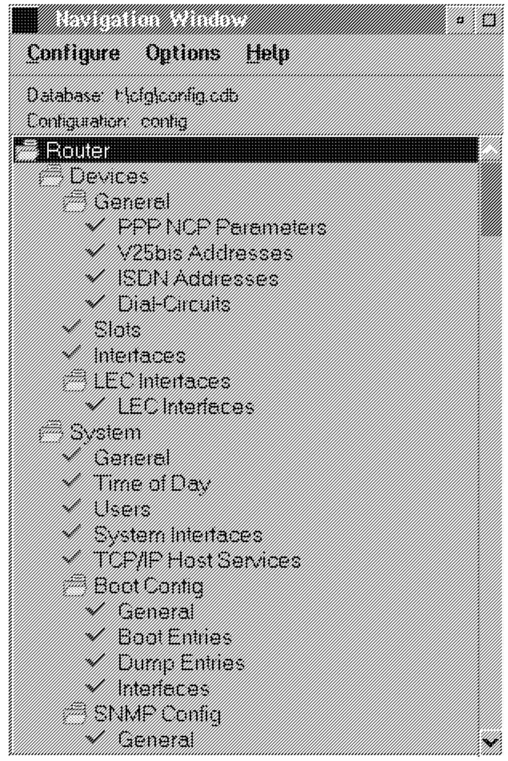


Figure 26-7. Multiaccess Enclosure Configurator Navigation Window (List)

The Navigation Window

The Navigation Window contains:

- A title bar
- A menu bar
- A configuration description area
- A scrollable list of features and protocols that you can configure

This book refers to the scrollable list as a navigation list. As you select items in the navigation list, the program displays a configuration panel in the Configuration Window. If you select a folder item, the configuration program displays help for configuring the feature that is represented by the folder in the Configuration Window. A folder is an item in the Navigation Window that has a folder icon next to the item. You can copy the help text from the Configuration Window to a Help window by pressing F1 at this time.

If there is an error or if you have not supplied required information in the current configuration, a yellow question mark (?) appears next to that item in the navigation list.

If there are no errors, a green check mark (√) appears next to that item in the navigation list.

The title bar of the Configuration Window displays an identification for an item that is selected in the navigation list.

The Navigation Window's menu bar contains the following options:

Configure
Options
Help

The area below the menu bar is the configuration description area. It displays the following information:

- Database path and name that contains the configuration.
- Filename of the current configuration (the default is config)

Another feature of the Navigation Window is a pop-up menu that you invoke by pressing the mouse button 2 (right mouse button) on any selected folder in the navigation list.

The pop-up menu allows you to:

- Fully expand the navigation list.
- Expand a portion of the navigation list out of a folder.
- Contract a portion of the navigation list into a folder.
- Display a history pop-up menu of configuration items you have selected. From the history pop-up you can access any of the previously selected configuration items. Press and hold mouse button 2 until you select the item from the submenu displayed by the history menu item. You can invoke the history pop-up from any item in the navigation list as you would the pop-up menu.
- Validate a selection item in error. The Navigation Window displays erroneous items with a yellow question mark (?) next to the item. The validate function displays messages for any configuration errors or required fields that do not have correct values based on the list item selected. Using the validate function on a folder in the navigation list will display validation messages for all of the navigation list items within that folder.

  After you correct an error and leave the panel that contained the error, the program replaces the question mark (?) with a check mark (√).

Changing the Configuration Program Options

Use the Option menu to change:

- Font
- Colors
- Message Prompting
- ATM Address Format

The Configuration Window

As you select items in the Navigation Window, the program presents panels in the Configuration Window. The format of the configuration panels depends on the item that you select.

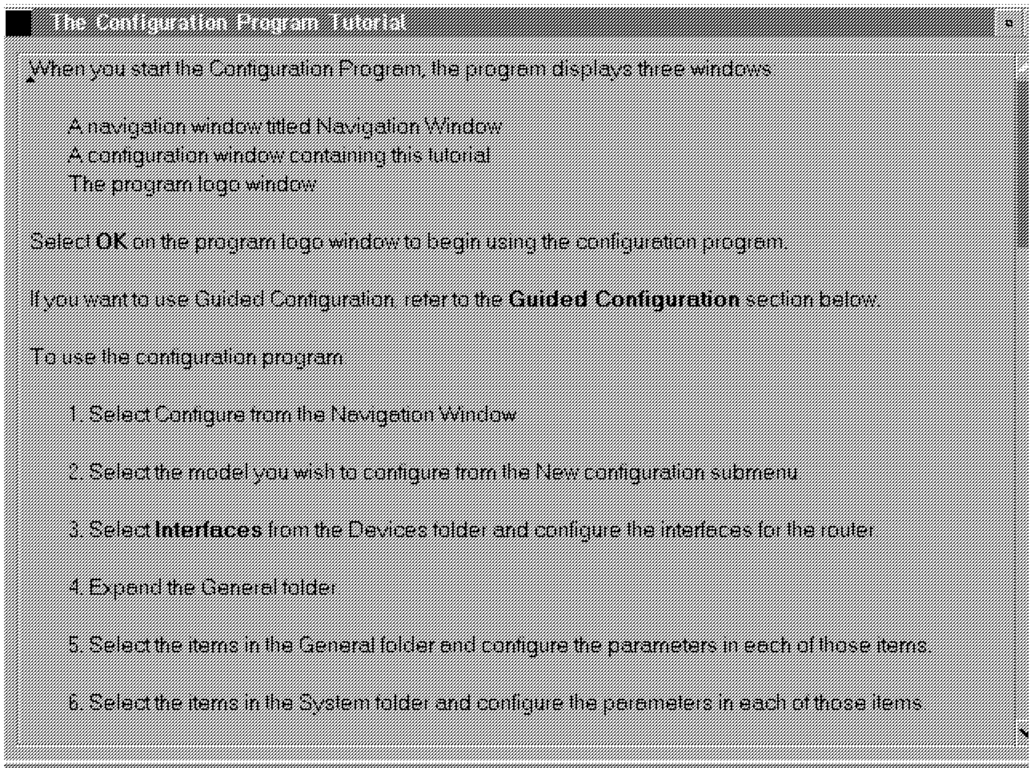


Figure 26-8. Multiaccess Enclosure Configuration Window

Navigating Through the Configuration Program

The configuration program is designed as a point-and-click interface. You select items from the Navigation list using a pointer and then fill in items in the various panels in the Configuration Window. Various keys also have specific meanings to the configuration program (see Table 26-1 on page 26-14).

Using the Mouse

The mouse is the main tool you use to move through the various lists and panels in the configuration program.

The configuration program uses the following buttons:

- Left (button 1) - to select an item in a panel
- Right (button 2) - to perform the following actions:
  - In the Navigation Window
    - Display a pop-up menu for a selected item in the scrollable list.
    - Move through and select items in a menu.
    - Validate a selection item in error. The Navigation Window displays erroneous items with a yellow question mark next to the item. The validate function displays a message for each required field that does not have a valid values and for any configuration errors.
  - In the Configuration Window
    - Drag-and-drop items in lists. The program indicates that drag-and-drop is active by changing the cursor into a hand icon. Use this function to reorder filters, dump entries, and other configuration lists.

Using the Keyboard in the Configuration Program

Various keys have specific functions in the configuration program. Table 26-1 explains these.

Table 26-1 (Page 1 of 2). The Configuration Program Keyboard Functions

<table>
<tr><th>Keys</th><th>Function</th><th>How to Use</th></tr>
<tr><td>F1 (Help)</td><td>Request help (see note).</td><td>To obtain help for configuring a feature or protocol:
The configuration program displays a configuration process for a feature or protocol in the Configuration Window. See “The Navigation Window” on page 26-10.

To obtain help on a panel:
1. Select an item in the Navigation Window.
2. Press F1.

To obtain help on a parameter, a button, or a drop-down list:
1. Select the parameter field or button by tabbing to the field, button, or list.
2. Press F1.

Note: When you tab to the field or button, a yellow box will highlight the item and you can then request help. Clicking on a button causes the configuration program to perform the configuration task indicated by that button or drop-down list.

In the help text, additional information is hypertext linked to the information on a particular panel. By default, this link is highlighted in blue.

If you press F1 on different panels or parameters without closing a previously opened help window, the new help text overlays the currently displayed text.
• To view the previous topics, select the UP button.
• To view the next topic, select the DOWN button.
• To close the help window, select the CLOSE button.</td></tr>
<tr><td colspan="3">Note: After you press F1, the configuration program displays a frame that you use to position the window. Position the frame wherever you wish on your desktop and press the left mouse button to display the help text.</td></tr>
<tr><td>Up/Down Arrow Keys</td><td>Move vertically.</td><td>Use these keys to move through lists on any panel, including the Navigation Window or items in any of the drop-down menus. To select an item,press the Enter key.</td></tr>
<tr><td>Left/Right Arrow Keys</td><td>Move horizontally.</td><td>Use these keys to move through the menu items on the Navigation Window, after you have selected one of the menu items. Also use them to move through a parameter field without affecting the existing values.</td></tr>
<tr><td>Tab and Back-tab</td><td>Next or previous entry field.</td><td>These keys work only in the Configuration Window. The keys move you to the various entry items in the Configuration Windows. If there are items in a scrollable list, such as in the Device Interfaces panel you will move to items that are below the scrolling window.</td></tr>
</table>

Table 26-1 (Page 2 of 2). The Configuration Program Keyboard Functions

Keys	Function	How to Use
Character Keys	Speed-scroll	Use character keys in the Navigation Window to speed your scrolling through the list. As you type in characters, the selection marker will move to an item in the list. This feature can help you change specific protocols in the configuration without using the scroll bar to locate the protocol. The following limitations exist: • Speed-scroll works only in the Navigation Window. • The selection marker will stop at the first item in the list that matches your keystrokes. You will be unable to speed-scroll to a second item with the same name unless you compact the list at a point above the currently selected item. • Once you speed-scroll to an item, you must select that item before you can use the speed-scroll feature again.
Alt + C	Configure pull-down menu	Drops down the Configure menu to allow you to select items from that menu.
Alt + P	Options pull-down menu	Drops down the Options menu to allow you to select items from that menu.
Alt + H	Help pull-down menu	Drops down the Help menu to allow you to select items from that menu.
Esc	Escape	Clears pull-down menus.

Using the Configure Menu

The Configure pull-down menu enables you to access the configuration program's features. Table 26-2 describes the menu choices and their use. The underscored character and the text in parentheses indicates the keyboard shortcut for the choice.

Table 26-2 (Page 1 of 2). Configure Menu Choices

Choice	Use
New configuration	Reset the working configuration to the default configuration for a specific model. The program resets the Navigation Window with a list appropriate for the selected model.
Open configuration (Alt+O)	Update an existing configuration or use an existing configuration as basis for a new configuration.
Save configuration (Alt+S)	Save the current configuration into a configuration database. If the current configuration is named config and a config.cdb with a configuration named config does not exist, the program invokes the Save configuration as dialog box to allow you to specify a different name.
S**a**ve configuration as	Save the current configuration with a different configuration name.
Delete configuration	Remove configurations from a configuration database.
Create 3746 multiaccess enclosure configuration	Create a binary configuration file that you load into your 3746 multiaccess enclosure.

Table 26-2 (Page 2 of 2). Configure Menu Choices	
Choice	**Use**
Read 3746 multiaccess enclosure configuration	Read a binary configuration file created by the Create 3746 multiaccess enclosure configuration option or obtained from the 3746 multiaccess enclosure using TFTP.
Co**m**munications	Use this choice to: • Send or retrieve a configuration to or from a single 3746 multiaccess enclosure, restart a single 3746 multiaccess enclosure, or query a single 3746 multiaccess enclosure's information. • Send or retrieve configurations to or from multiple 3746 multiaccess enclosures or restart multiple 3746 multiaccess enclosures. **Note:** Before using the communication features, you must establish communications between the configuration program and the 3746 multiaccess enclosure. See "Setting Up the 3746 Multiaccess Enclosure" on page 26-5 for details.
ASCII **f**ile	Use this option to create an ASCII version of a configuration. You can use this file as documentation of a 3746 multiaccess enclosure's configuration.
E**x**it (Alt+X)	Leave the configuration program.

Firmware

The 3746 Multiaccess Enclosure has its own firmware and operational microcode. These can both be accessed from either the ASCII... or MOS... consoles, and reside on the multiaccess enclosure System Card. The firmware is kept in Flash Memory and the Operational microcode is on a hard disk drive (HDD). Refer to Figure 26-9.

The HDD has two image *banks* of microcode and configurations that can be used to IML or boot the enclosure. These *banks* are known as Bank A and Bank B.

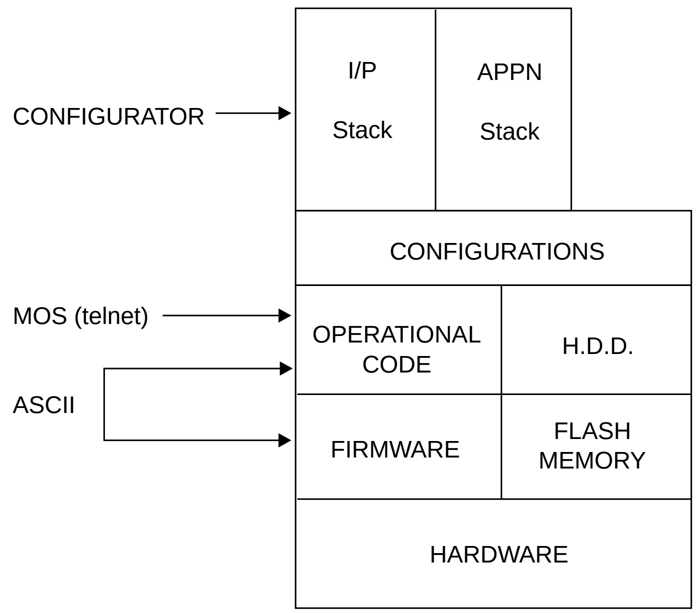


Figure 26-9. Logical View of Multiaccess Enclosure Operational Structure

The multiaccess enclosure is designed to boot from one of the integrated image banks, allowing for microcode upgrades to be loaded concurrently and activated at a later time by switching to the other bank. Figure 26-10 on page 26-18 shows these banks displayed through the ASCII, *QVT* console.

The structure of the image banks is as follows:

- IMAGE - Status of image
- CONFIG 1 - Status of Config
- CONFIG 2 - Status of Config
- CONFIG 3 - Status of Config
- CONFIG 4 - Status of Config

The possible file status descriptors are:

ACTIVE The file is currently loaded and is running on the multiaccess enclosure.

AVAIL The file is a valid file that can be made ACTIVE.

CORRUPT The file was damaged or not loaded into the multiaccess enclosure completely. The file must be replaced.

LOCAL The file will be used only on the next reload or reset. After the file is used, it will be placed in AVAIL state.

PENDING The file will be loaded on the next reload, reset, or power-up of the 3746 multiaccess enclosure

When a file is saved to the multiaccess enclosure HDD from the configurator, it will become *PENDING* unless the restart router option is selected, as shown in Figure 26-29 on page 26-33.

```
MAE MOS Console
Select the source bank:  (A, B): [A]
Select the source configuration:  (1, 2, 3, 4): [1] 1
Enter the description of the file: () MAE MPG slot1 ip
Attempting to set description for bank A and configuration 1.

Operation completed successfully.
Boot config>list
+------ BankA -----------+--------- Description ----------+------ Date -------+
| IMAGE - ACTIVE         |                                | 11 Apr 1997 12:52 |
| CONFIG 1 - PENDING     | MAE MPG slot1 ip               | 09 May 1997 13:25 |
| CONFIG 2 - AVAIL       |                                | 07 May 1997 08:18 |
| CONFIG 3 - AVAIL       |                                | 07 May 1997 11:12 |
| CONFIG 4 - ACTIVE  +   |                                | 09 May 1997 07:06 |
+------ BankB -----------+--------- Description ----------+------ Date -------+
| IMAGE - AVAIL          |                                | 11 Apr 1997 12:52 |
| CONFIG 1 - NONE        |                                |                   |
| CONFIG 2 - NONE        |                                |                   |
| CONFIG 3 - NONE        |                                |                   |
| CONFIG 4 - NONE        |                                |                   |
+------------------------+--------------------------------+-------------------+
  + - Last Used Config      L - Config File is Locked


Boot config>
```

Figure 26-10. MOS Console

The four configurations are saved consecutively. As shown in Figure 26-10 CONFIG 4 is ACTIVE. A new configuration has been created and saved to the next AVAIL position, CONFIG 1.

The restart router option, (see Figure 26-29 on page 26-33) was not selected so CONFIG 1 has become pending and will become ACTIVE on the next multiaccess enclosure reboot or power on.

Setting up the Multiaccess Enclosure Connection

For traffic from the multiaccess enclosure, in its current implementation, to pass from the multiaccess enclosure hardware to the 3746-9x0 base frame hardware, it is required to define the two token-ring paths from slot 1 in the multiaccess enclosure to the two TIC3s in the 3746-9x0 base frame and vice versa. Both these rings need configuring to support the protocols that will pass over those links.

Figure 26-11 on page 26-19 shows the data connections between the multiaccess enclosure and the 3746 base frame. It includes the configuration data used for the MAC layer, APPN, and IP traffic over the two token-ring connections, as configured in the following examples.

Notes:

1. In the APPN definitions shown, HPR has not been activated. If you wish to route HPR traffic over these connections, then you must update these definitions accordingly.
2. If you will not be using IP in your network, it is still required to define at least one of the SLOT 1 ports on the multiaccess enclosure for IP, to enable the service ring port to operate.

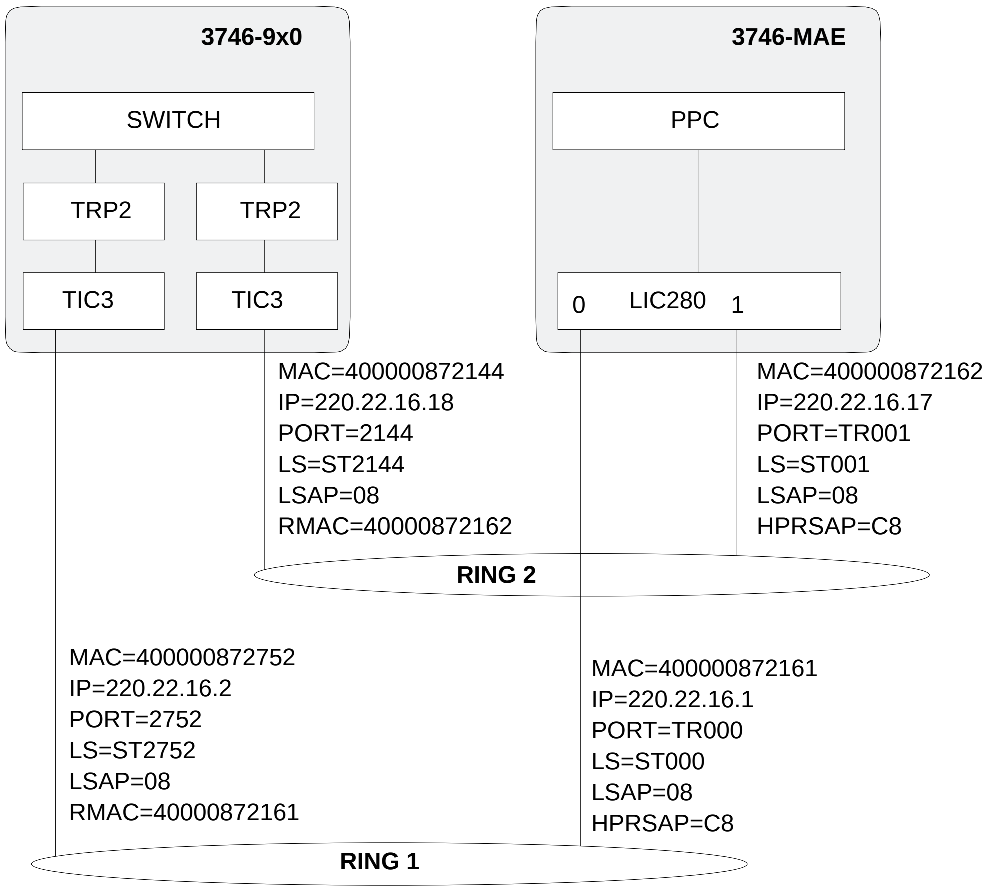


Figure 26-11. 3746 to Multiaccess Enclosure Data Connections

The procedure starting on page 26-20 takes you through the configuration of the resources shown in Figure 26-11.

Step 1. Slot Configuration

Refer to Figure 26-12.

- Select **Slots** on the Navigation list. Refer to Figure 26-7 on page 26-10.
- In the Slot Browser window click the down arrow for Slot 1.
- Select **2 Port TR**.

  Note: At this time you may set each *Slot* for the appropriate adapters for your configuration.

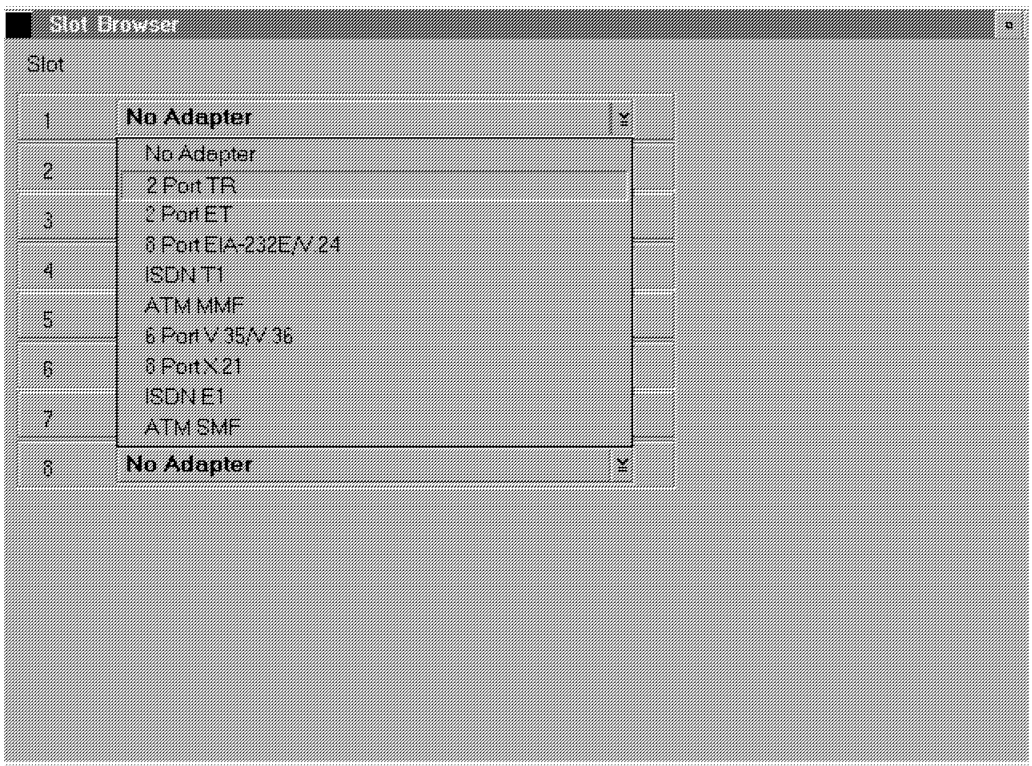


Figure 26-12. Defining the Slot 1 Token-Ring Ports in the Slot Browser window

Step 2. Token Ring Configuration

Refer to Figure 26-13.

- Select **Interfaces** from the Navigation list. Refer to Figure 26-7 on page 26-10.
- Select **Configure** from the device interfaces window for Interface 0 (Slot 1 / Port 1).
- Set the token-ring MAC address, keeping to your network standard, in this example it is set to 400000872161 Set the Cable type to STP and verify that Speed is set for 16 Mbps.

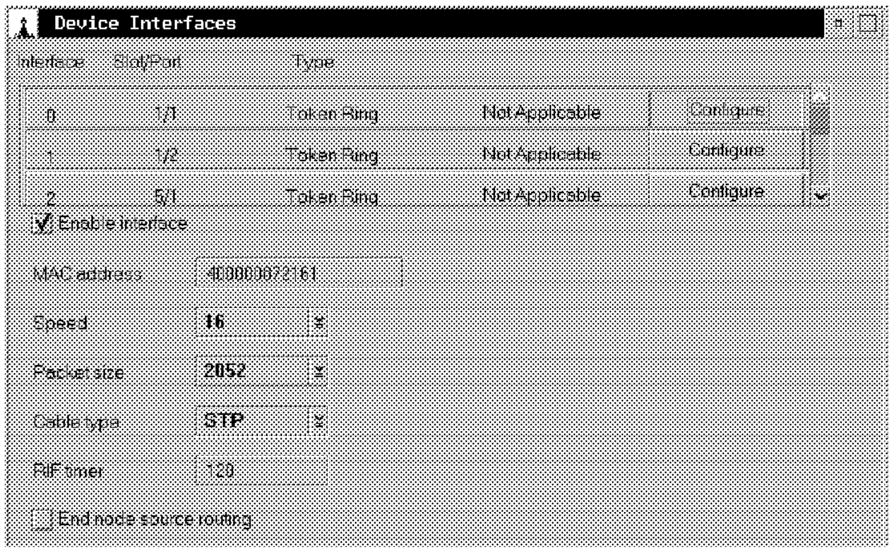


Figure 26-13. Setting MAC Address, Speed and Cable Type for Port 0

- Select **Configure** from the Device Interfaces window (see Figure 26-14 on page 26-22) for Interface 1 (Slot 1 / Port 2).

- Set the MAC to **400000872162**.

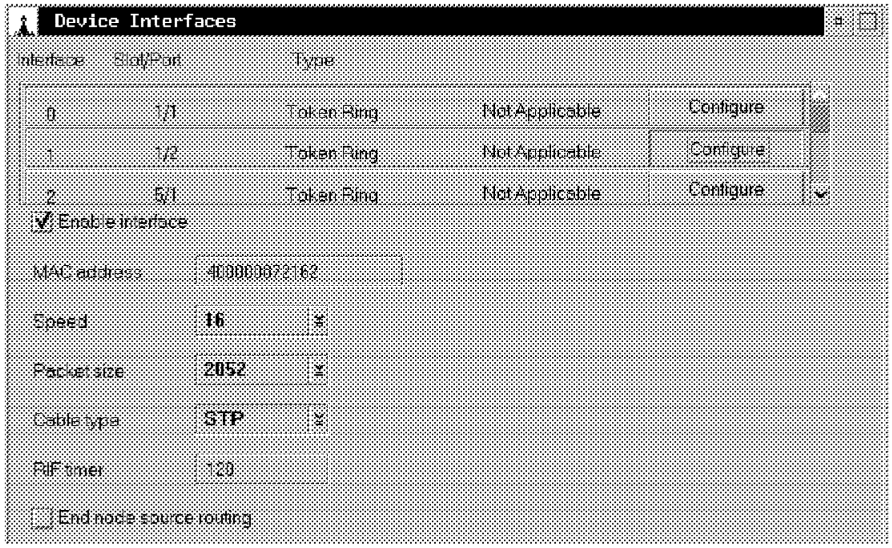


Figure 26-14. Setting MAC Address, Speed and Cable Type for Interface 1

Step 3. IP Configuration

- Locate (by scrolling down) and click on **Interfaces** under the Protocols/IP folders in the Navigation Window, shown below in Figure 26-15.

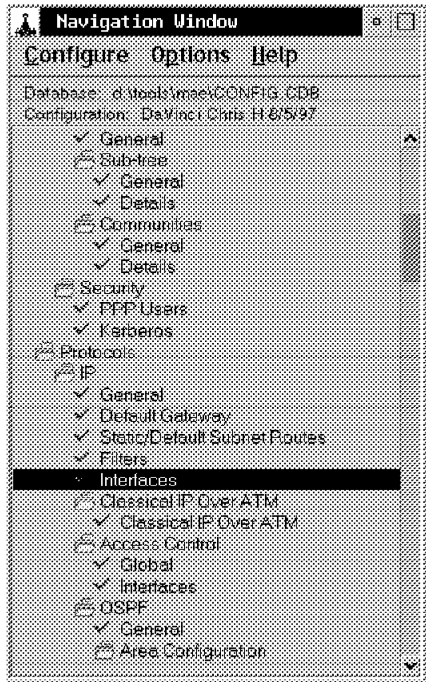


Figure 26-15. Selecting IP Interfaces in the Navigation Window

- In the IP Interface window, select **IP Addresses** as shown below:

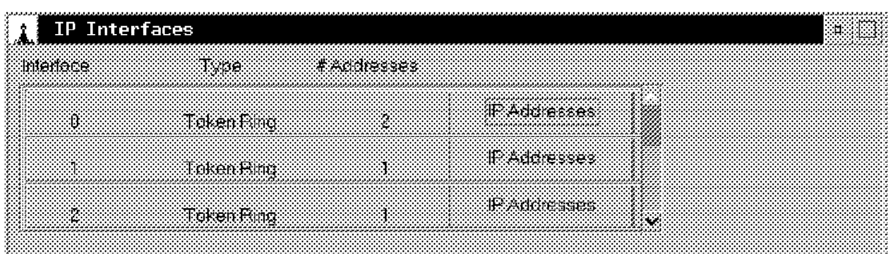


Figure 26-16. IP Interfaces Window

- The IP address: 220.22.16.1 and subnet mask: 255.255.255.240 for this example, has been set on interface 0, as shown in Figure 26-17.

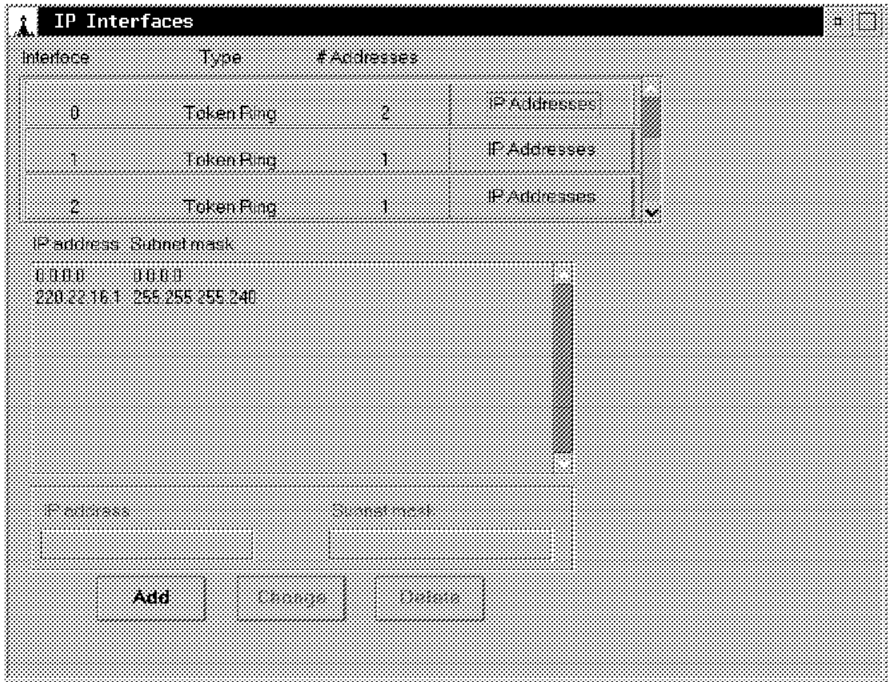


Figure 26-17. Configure IP Address for Interface 0

- Figure 26-18 shows the IP address: 220.22.16.17 and subnet mask: 255.255.255.240, on interface 1, for this example, being entered.

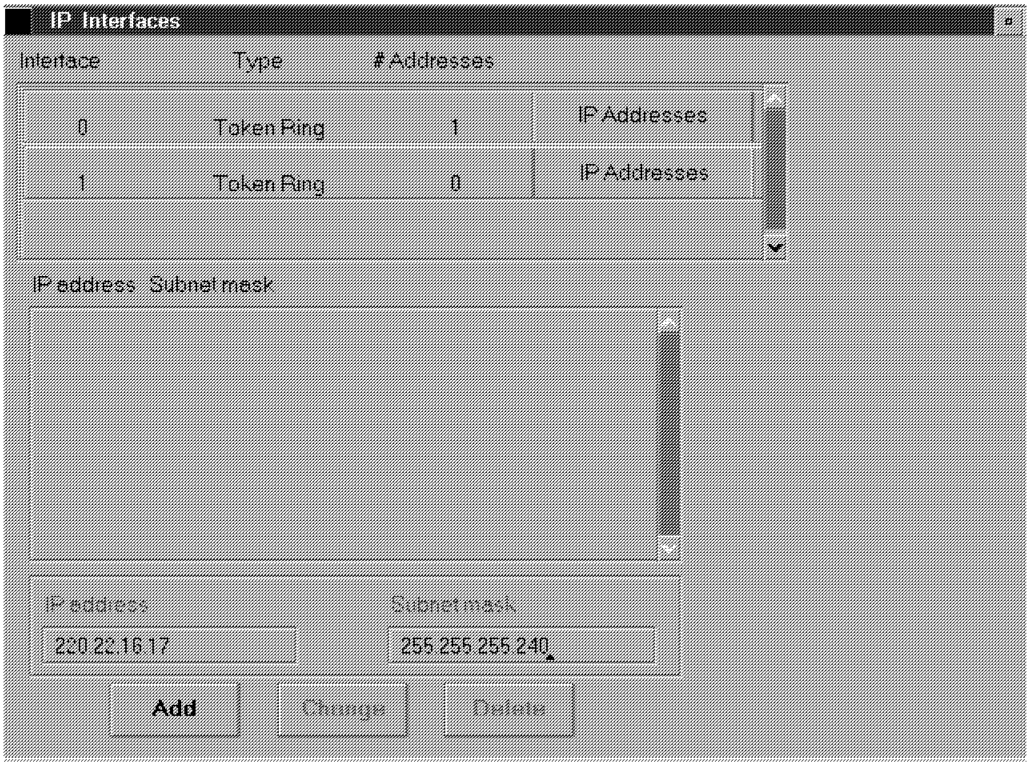


Figure 26-18. Configure IP Address for Interface 1

Note: Both interfaces *must* be defined to be on a different subnet, to ensure that both paths will be utilized. It also makes validation of each path, and performance monitoring possible.

Step 4. APPN Configuration

- In the navigation Window, scroll down until the APPN folder is displayed and select **Interfaces** under this folder as shown below in Figure 26-19.

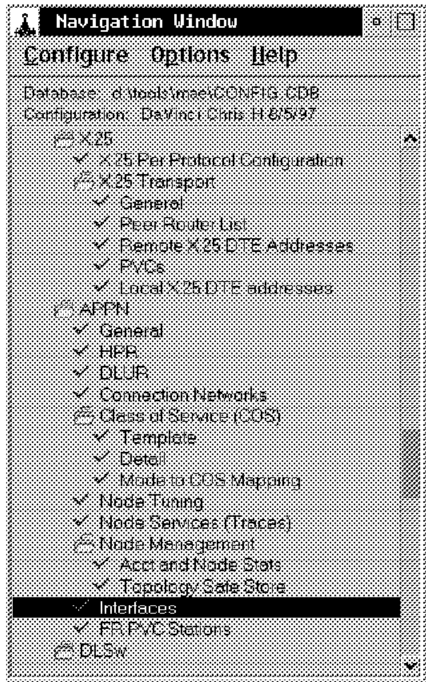


Figure 26-19. Selecting APPN Interfaces

Now in the Configuration Window a list of interfaces that were the previously defined is displayed and can be configured for APPN.

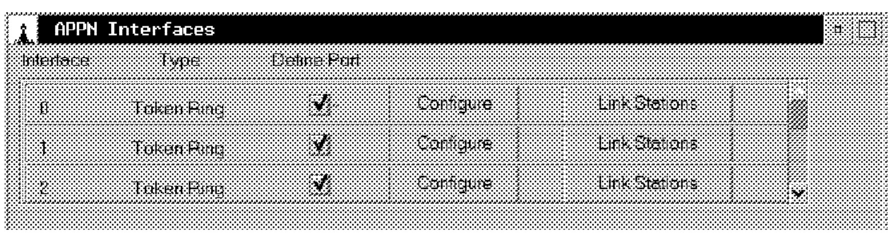


Figure 26-20. APPN Interfaces

- Select **Configure** for Interface 0 The port name TR000 has been entered for this interface, shown in Figure 26-21.

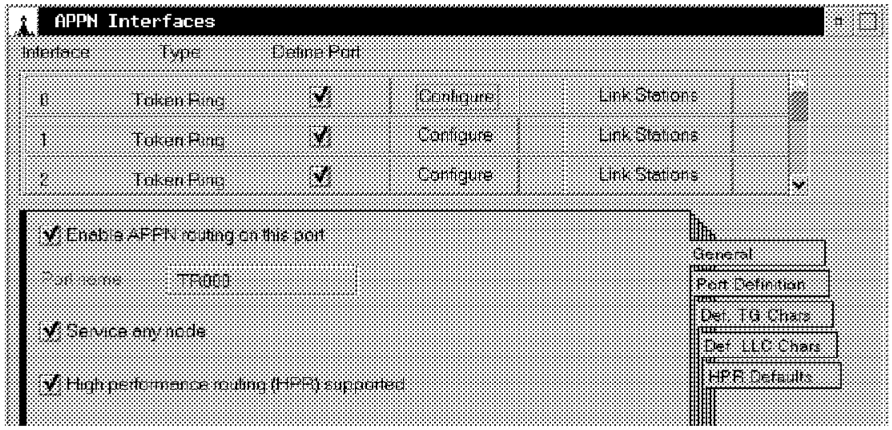


Figure 26-21. Configure APPN for Interface 0

- Select the **Port Definition** tab on the notebook, where the local APPN SAP 8 and local HPR SAP C8 can be specified, as in Figure 26-22 below.
- Select the **Def. LLC Chars** tab on the notebook, and set the Remote SAP 8.

  Note: In the Multiaccess Enclosure the Local SAP has a default value of 04, while the CCM uses a default value of 08 (NCP uses 04). While you may use any valid local SAP value, care should be taken to define the correct remote SAP for a link.

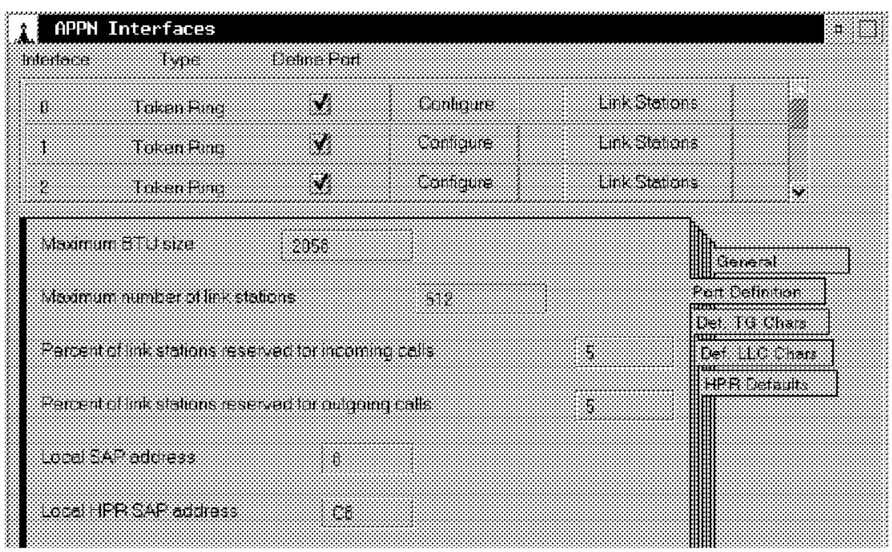


Figure 26-22. APPN Port Definitions for Interface 0

- Select the **Link Stations** button, for Interface 0 here the link station name **ST000** has been specified, shown in Figure 26-23 below.

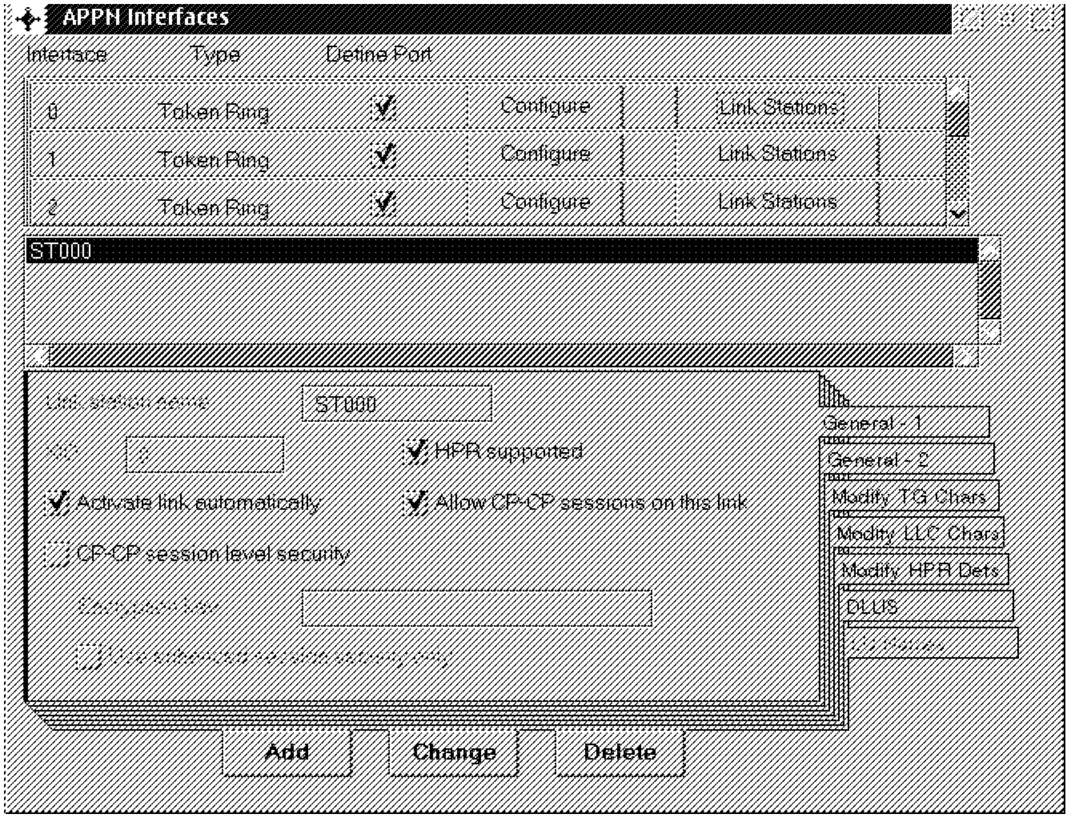


Figure 26-23. APPN Link Station Name for Interface 0

Note: The APPN Interfaces window, shown above in Figure 26-23, is divided into three areas.

a. Interface selection area

b. Defined stations list area

c. Station definition notebook area

Selecting a station in the Defined stations area will display that stations definitions in the notebook area. If no station is selected (highlighted), the notebook values will be default.

- Select the **General - 2** tab brings up the notebook page where the destination MAC of this link *must* be specified: 400000872144 in this case.

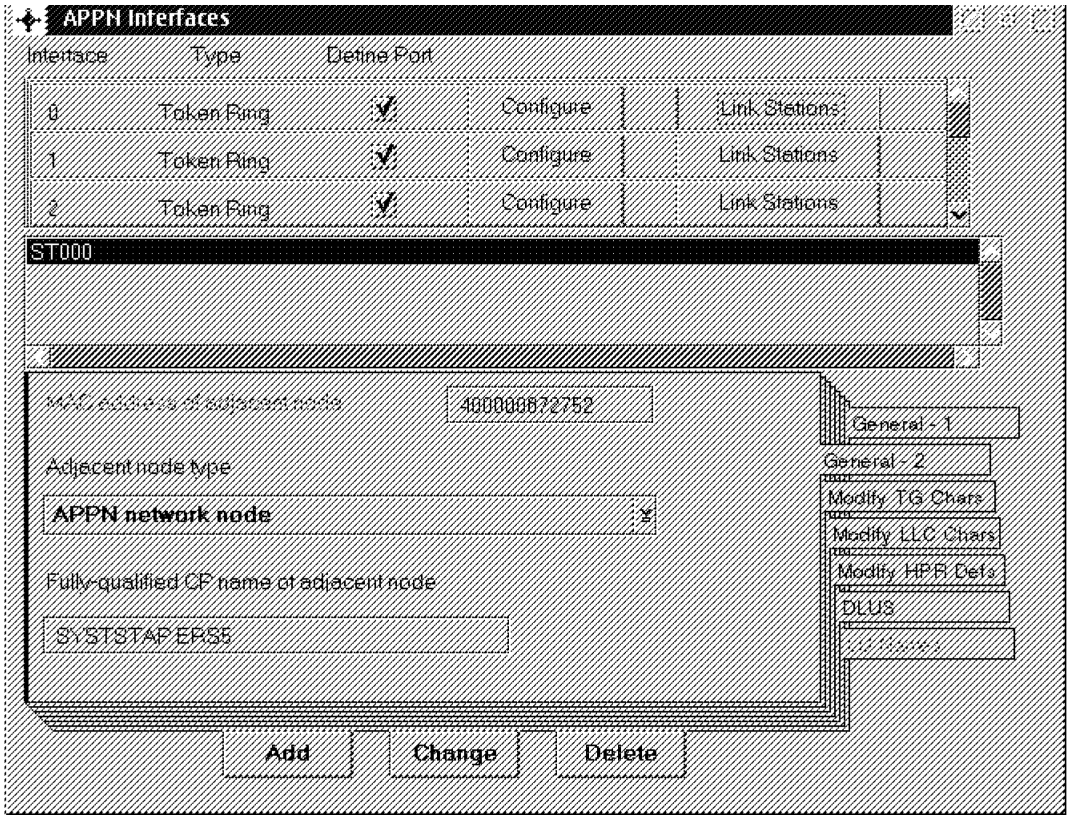


Figure 26-24. APPN Destination MAC for Interface 0

- Select **Configure** for interface 1.
- The Port name TR001 has been entered for this interface in Figure 26-25.

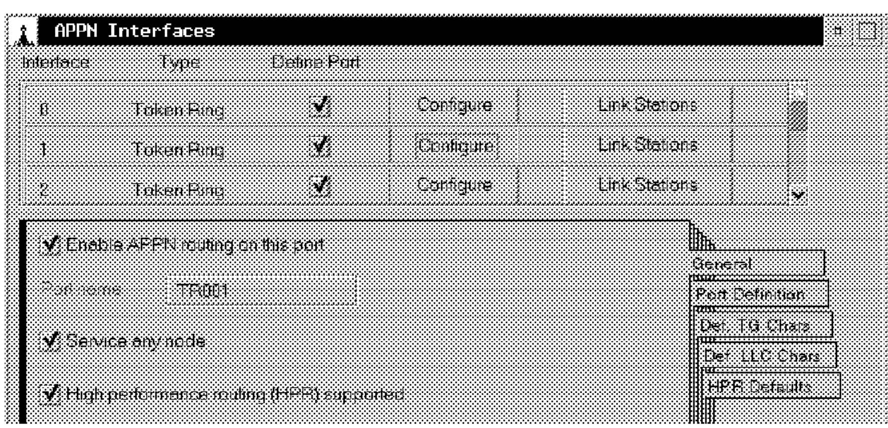


Figure 26-25. Configure APPN Name on Interface 1

- Select the Port Definition tab on the notebook, where the local APPN SAP 8 and local HPR SAP C8 can be specified.
- Select the **Def. LLC Chars** tab on the notebook, and set the Remote SAP 8.
- In Figure 26-26, select the **Link Stations** button. Here the link station name ST001 has been specified.

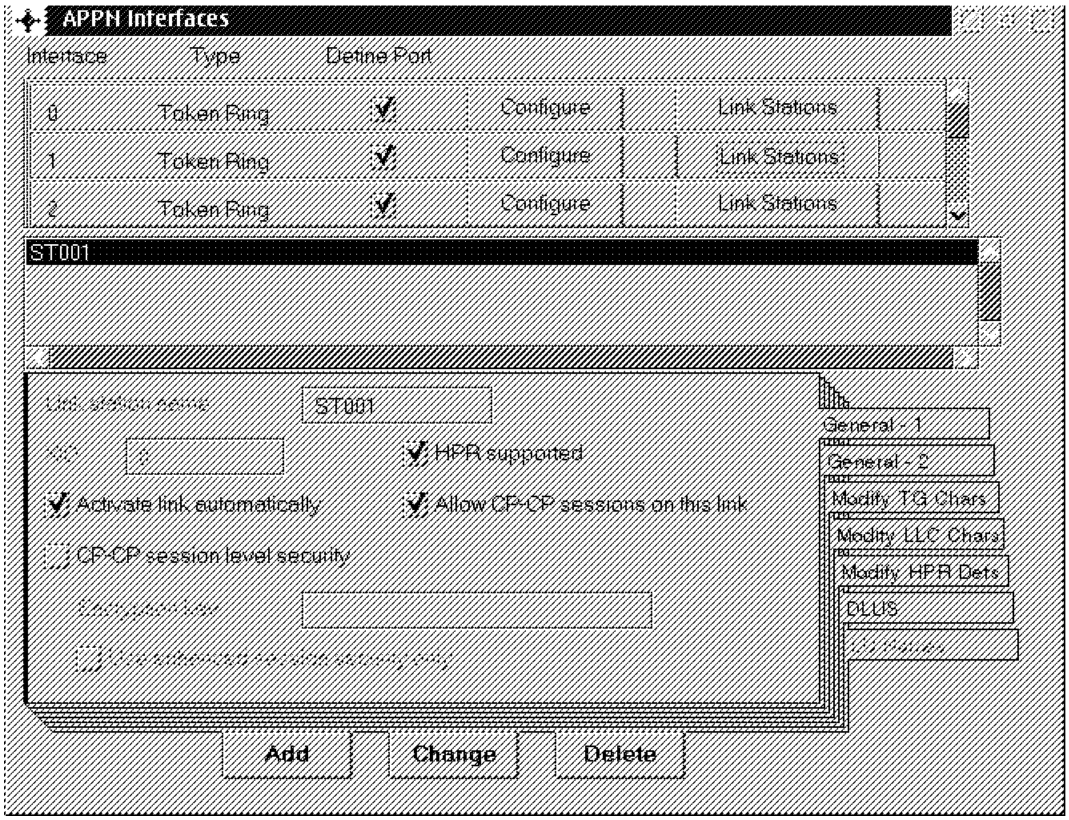


Figure 26-26. APPN Link Station Name for Interface 1

- Select the **General - 2** tab brings up the notebook page where the destination MAC of this link *must* be specified: 400000872752 in this case.

Step 5. SNMP Access

- In the Navigation Window, scroll up until the SNMP folder is displayed. Select **General** under the Communities subfolder.
- Ensure that there is an entry for the public Name with Access type set to Read-write trap.

This allows the configurator program to write the configuration file to the multiaccess enclosure hard disk.

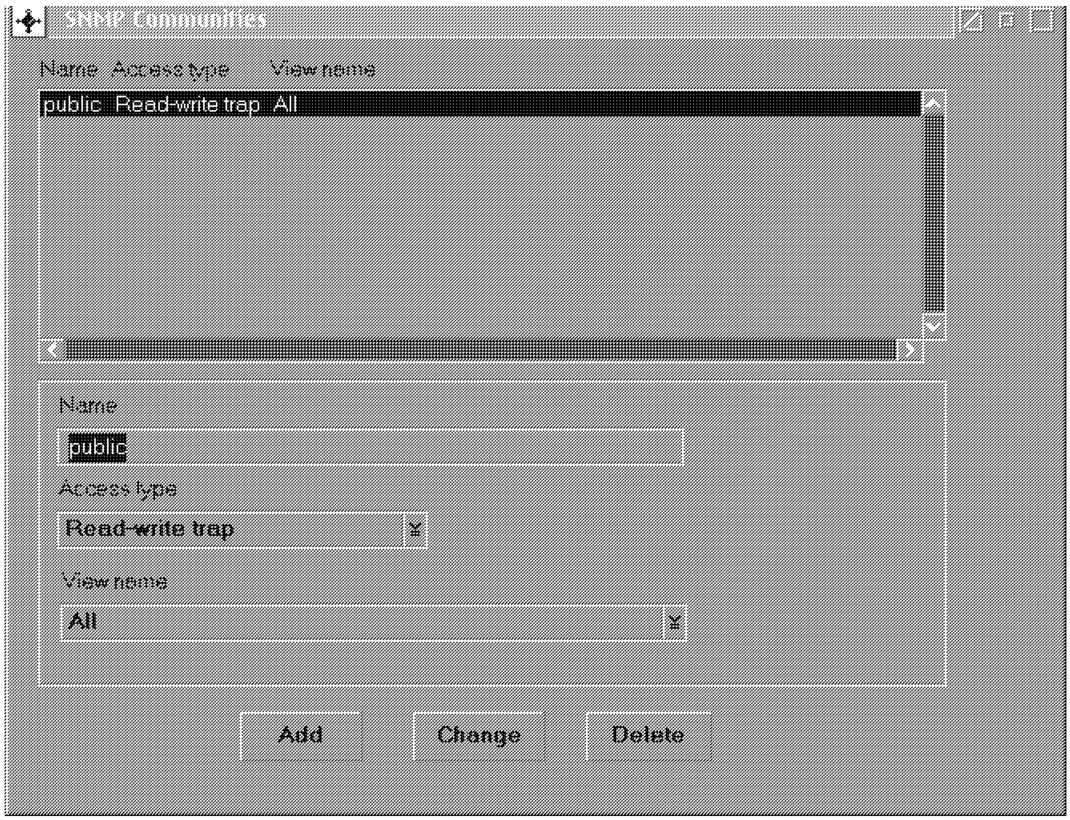


Figure 26-27. SNMP Communities Set for Read-write Trap

Step 6. Saving your new configuration

- In the Navigation Window, click on **Configure** and select **Save As** from the pull-down menu.

  The window shown in Figure 26-28 will open.

- Type a description for your configuation in the Configuration name field. You can save to a different database if appropriate also, for example Production environment and Test environment databases.

- Click on **OK**.

This has now saved the new configuation to the optical disk and is not yet written to the multiaccess enclosure.

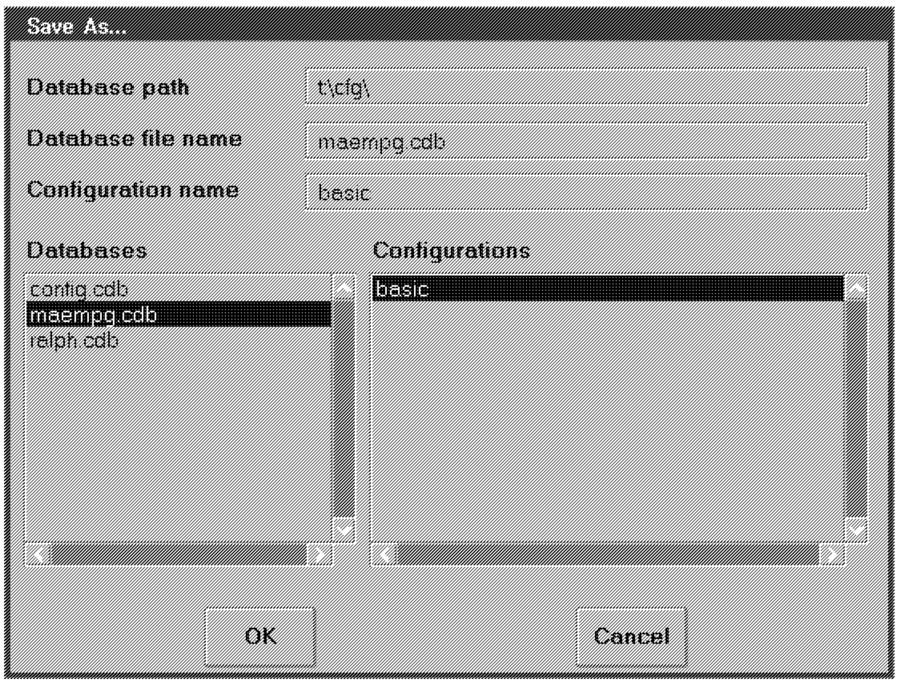


Figure 26-28. Saving Your Configuration

Step 7. Sending the configuration to the Multiaccess Enclosure

- In the Navigation Window, click on **Configure** and select **Communications** from the pull-down menu.
- Select **Single router...**

  The window shown in Figure 26-29 will appear.
- Enter the multiaccess enclosure IP address in the IP Address or name field, and ensure that Community is set to public.
- Check (√) the **Send configuration to router** box.
- Check (√) the **Restart router** box, if you want to make this configuration ACTIVE.

Figure 26-29. Sending a Built Configuration to the Multiaccess Enclosure

Note: If you receive a timeout error, ensure that the procedure "Setting Up the 3746 Multiaccess Enclosure" on page 26-5 has been followed.

Step 8. Configuring the 3746 base frame TIC3s using CCM

While reading the following configuration steps, refer to Figure 26-11 on page 26-19.

TIC3 Port 2752 Configuration

- Select the **2752 TIC3** from the CCM Main window shown in Figure 26-30 below.

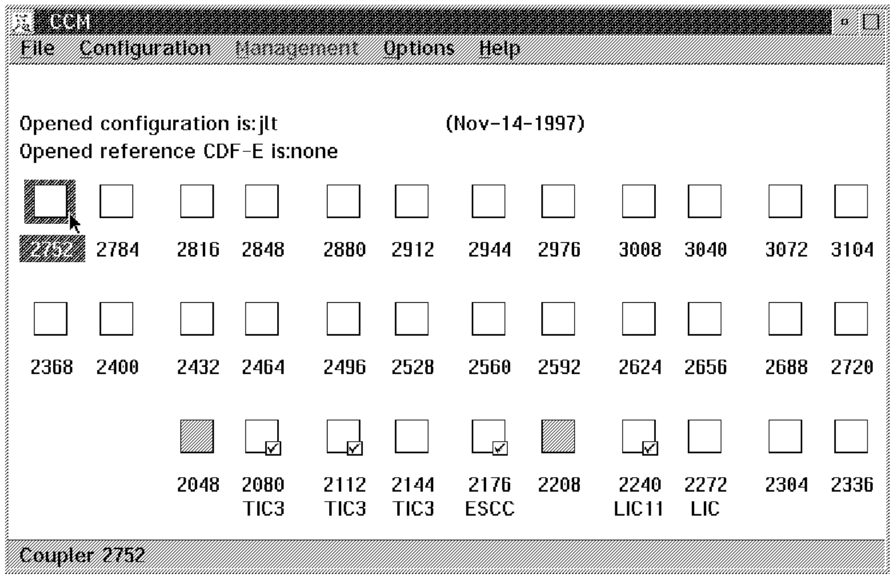


Figure 26-30. Selecting Port 2752 from the CCM Main Window

- Check (√) **APPN** and **IP** network boxes, and specify the APPN and IP port names
- Select **Speed 16 Mbps**, and enter the local MAC address 400000872752, as shown in Figure 26-31.

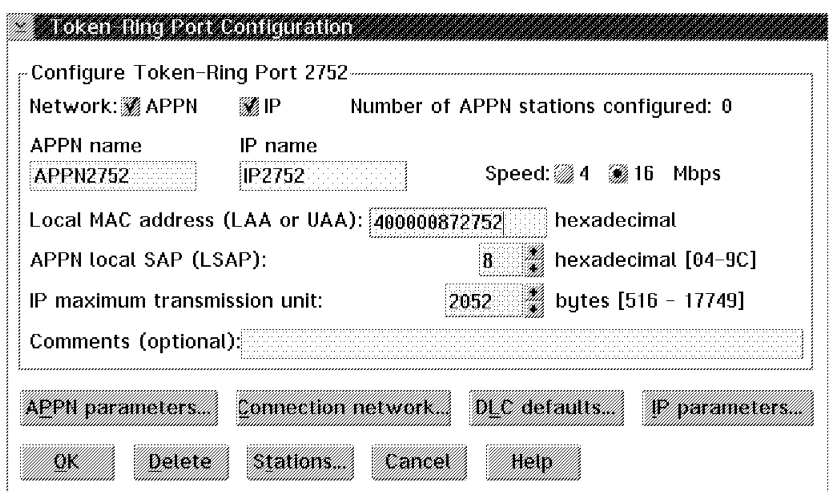


Figure 26-31. Token-Ring Port Configuration for Multiaccess Enclosure Port 0 Connection

- Click the **APPN parameters** button.

- Select **Yes** for any incoming call and Automatic reactivation (see Figure 26-32). Selecting **Accept any incoming call** will allow the 3746 to define a dynamic link station for an incoming call from the multiaccess enclosure if any of the definitions do not match exactly at both sides. As no other stations should be connected to these token-rings, setting this parameter as shown will not cause problems.

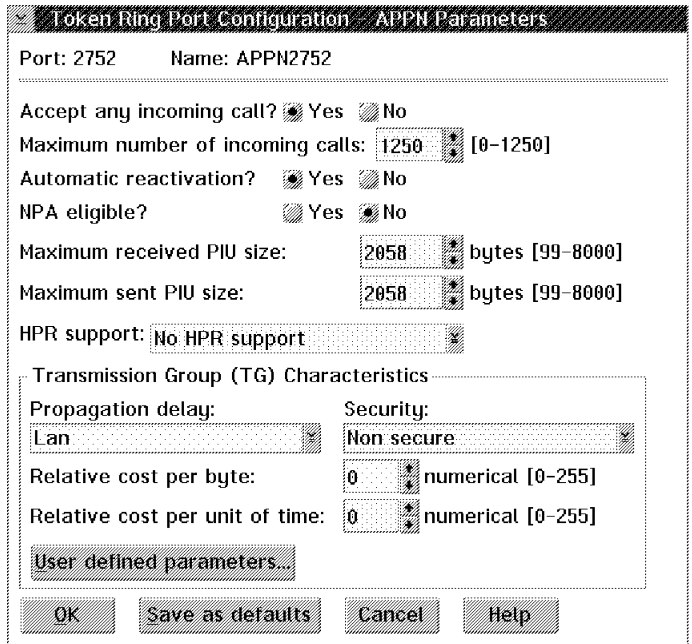


Figure 26-32. APPN Parameters

- Select **OK** to return one level, then click the **IP parameters** button.
- Enter the address 220.22.16.2, and the Subnet mask 255.255.255.240 for this token ring connection to Port 0 on the multiaccess enclosure, as shown in Figure 26-33.

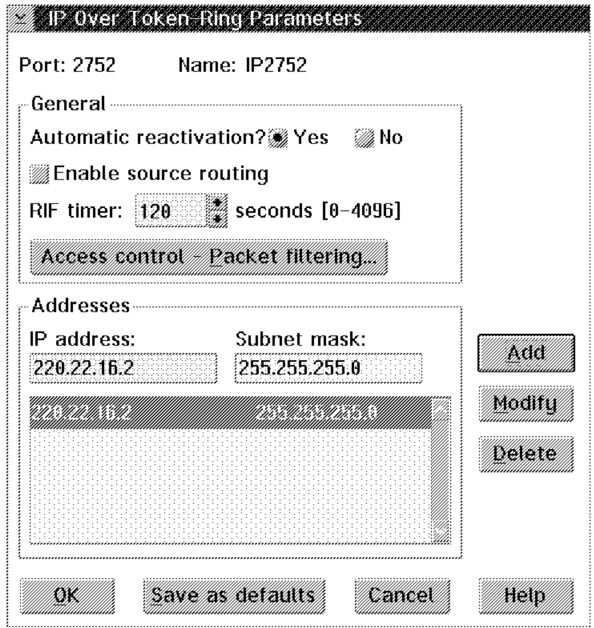


Figure 26-33. IP over Token-Ring Parameters

- Select **OK** to return one level, then click the **Stations** button.

- Figure 26-34 shows where to enter the Remote Station Name ST2752, Remote MAC address 40000872161. and Remote SAP 08.

  Note: The default APPN HPR SAP value of C8 is used for the HPR SAP. This value cannot be specified from the CCM screens. If an adjacent station wants to use a different SAP for HPR, this can be negotiated during XID exchange. In the multiaccess enclosure the remote SAP value of C8 was defined for HPR. See Figure 26-22 on page 26-27.

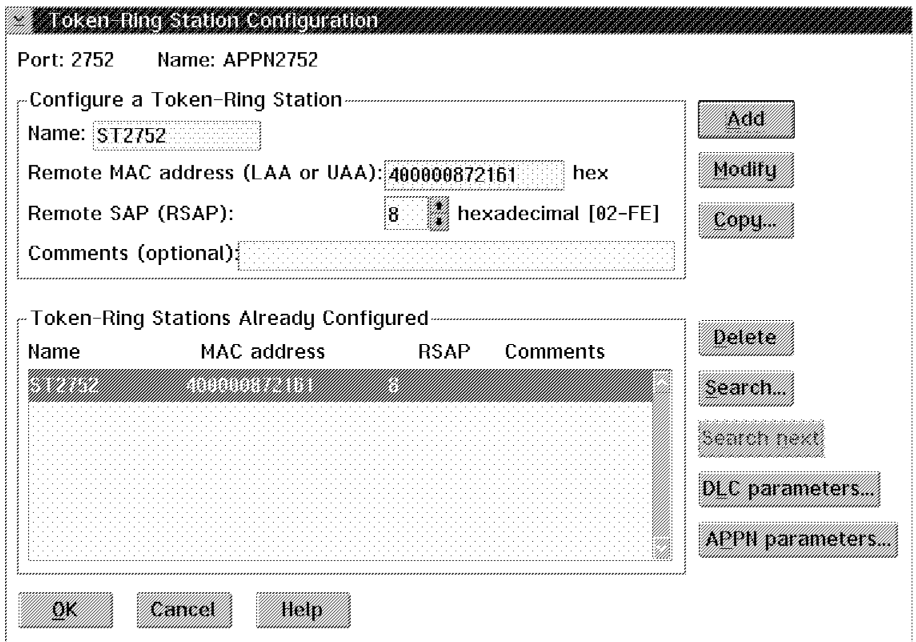


Figure 26-34. Token-Ring Station Configuration

- Click the **APPN parameters** button, here select **Yes** to set CP-CP session support.

  HPR, MLTG, and DLUR parameters can also be specified here. See Figure 26-35.

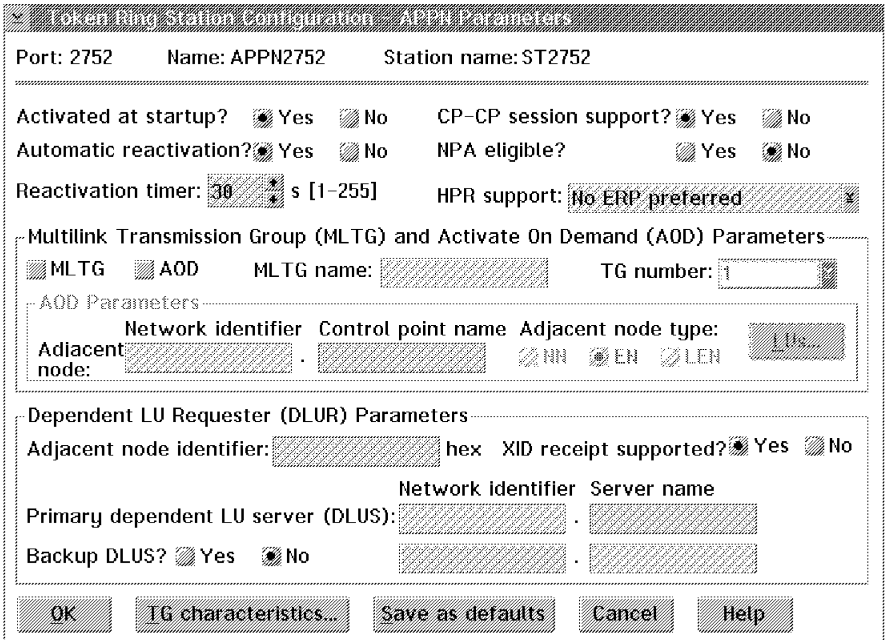


Figure 26-35. APPN Station Parameters

Step 9. TIC3 Port 2144 Configuration

- Select **2144 TIC3** from the CCM Main window shown below.

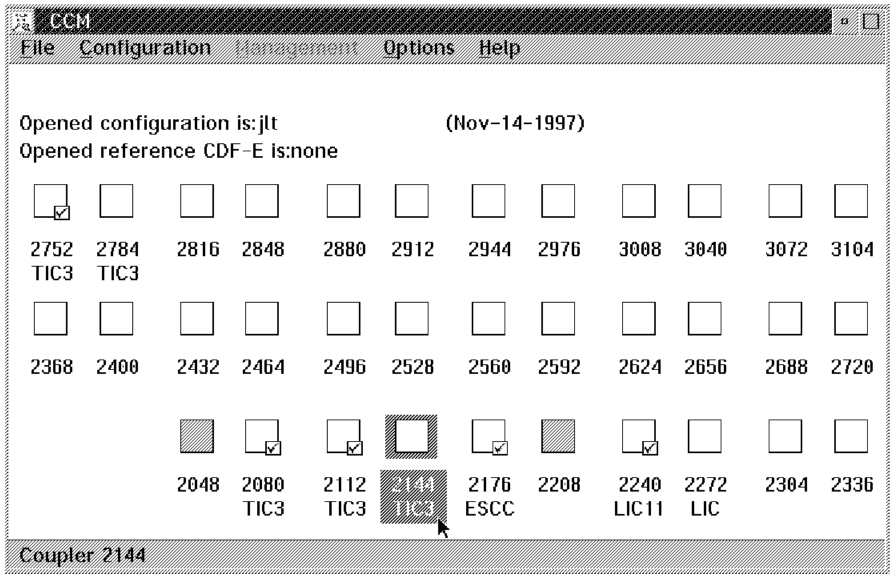


Figure 26-36. Selecting Port 2144 on the CCM Main Window

- Check (√) **APPN** and **IP** Network boxes, and specify the APPN and IP port names,
- Select **Speed 16 Mbps**, and enter the local MAC address 400000872144. as shown in Figure 26-37 and the local MAC address.

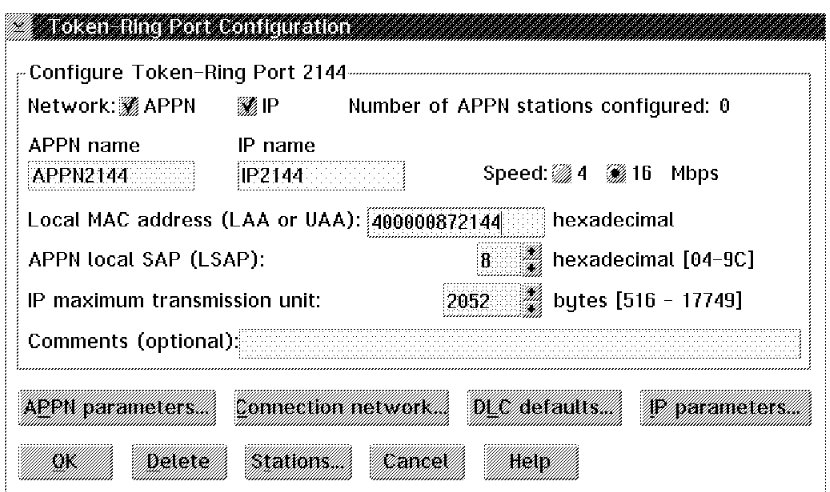


Figure 26-37. Token-Ring Port Configuration for Multiaccess Enclosure port 1 Connection

- Click the **APPN parameters** button, and select **Yes** for any incoming call, and Automatic reactivation.

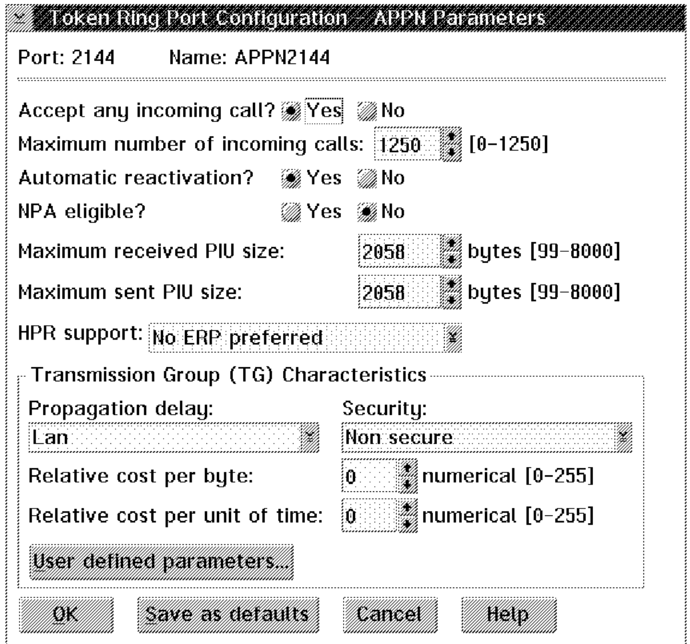


Figure 26-38. APPN Parameters

- Select **OK** to return one level, then click the **IP parameters** button.
- Enter the IP address 220.22.16.18, and the Subnet mask 255.255.255.240 for this token-ring connection to Port 0 on the multiaccess enclosure, as shown in Figure 26-39.

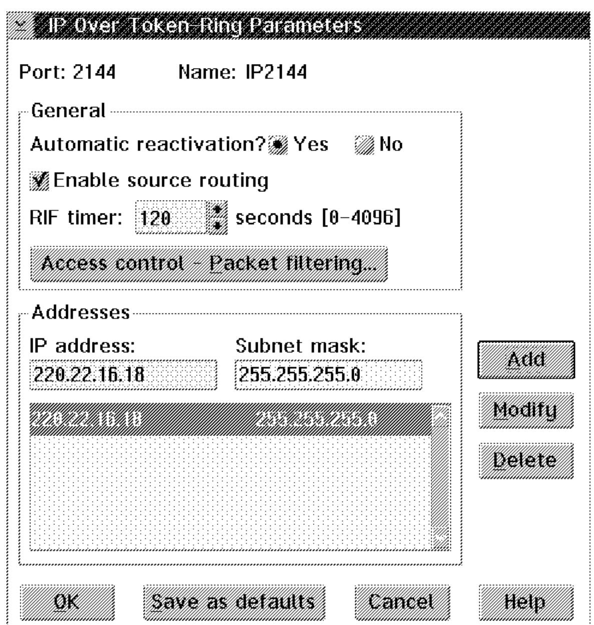


Figure 26-39. IP over Token-Ring Parameters

- Select **OK**, to return one level, then click the **Stations** button.

- Figure 26-40 shows where to enter the Remote Station Name ST2144, Remote MAC address 400008721622 and Remote SAP 08.

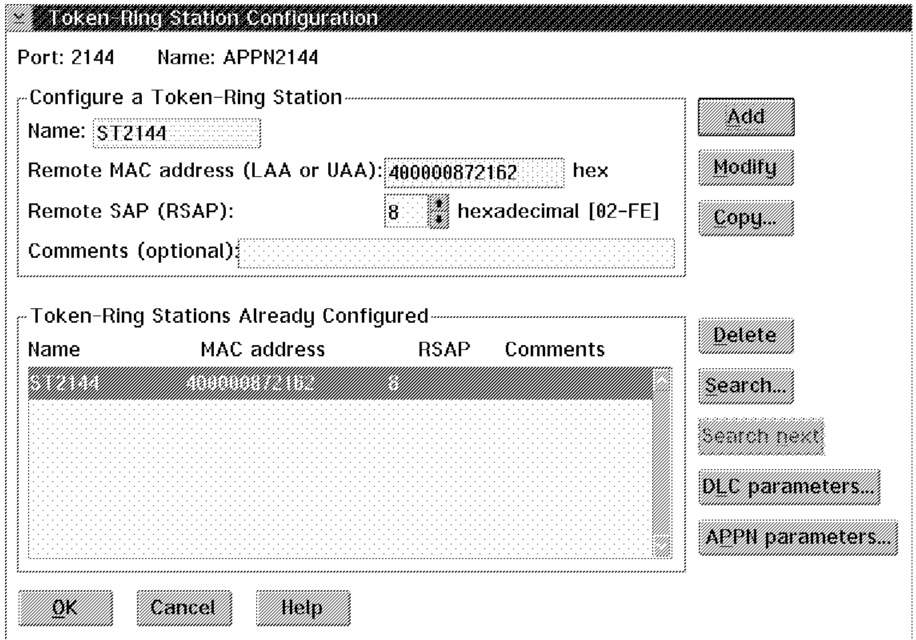


Figure 26-40. Token-Ring Station Configuration

- Click the **APPN parameters** button, and select **Yes** for CP-CP session support.

  HPR, MLTG, and DLUR parameters can also be specified here.

Recommendations

- Even though the configuration on the multiaccess enclosure may be changed via the ASCII or MOS user interfaces, it is recommended that you use the configurator to construct and load your network configurations for the multiaccess enclosure. Using the configurator means that your configurations are saved on the 3746 multiaccess enclosure optical disk. Therefore, in the case of an multiaccess enclosure failure, you still have a copy of your configs.

  Note: Performing a Backup code... function from the Multiaccess Enclosure Management Menu (refer to Figure 26-3 on page 26-3), does *not* save the configurations that are on the multiaccess enclosure hard disk. This function only saves the microcode.

- Each 3746-9x0 to multiaccess enclosure ring should be defined on separate subnets to allow each paths operation to be validated easily, and to monitor their performance.
- ESCON processor utilization should be monitored as the traffic to/from the host can easily increase above 80%, so further ESCON paths may be required to handle the load.

Chapter 27. 3746 Base Frame ESCON Configuration Examples

This section provides diagrams of eight typical 3746 ESCON configurations controlled by the 3745 NCPs and/or 3746 NNP (APPN/HPR and IP) that can be created with the CCM. Also included are example IOCP and, for the 3746-900, NCP macroinstructions that correspond to the configuration in each example.

Some examples have been coded for NCP (SNA); some have been coded for 3746 IP or 3746 APPN/HPR. See Table 27-1.

Table 27-1. Variations of ESCON Example Configurations Coded for SNA, IP, and APPN/HPR.

Example and Page Number	3746 Model	3745 Mode	SNA (NCP)	IP (3746)	APPN/HPR (3746)	Host Mode
1 on Page 27-3	950	-	-	Yes	-	Basic
2 on Page 27-7	950	-	-	-	Yes	Basic
3 on Page 27-11	900	Single	Yes	Yes	Yes	Basic ESCD
4 on Page 27-23	900	Single	Yes	-	-	Basic
5 on Page 27-28	900	Single	Yes	-	-	Basic ESCD
6 on Page 27-41	900	Backup	Yes	-	-	LPAR ESCD
7 on Page 27-59	900	Dual	Yes	-	-	LPAR ESCD
8 on Page 27-82	900	Dual	Yes	-	-	EMIF ESCD

Figure 15-3 on page 15-9 shows the CCM port and host link panels used during ESCON configuration. The example shown is for a 3746 Nways Multiprotocol Controller configuration in an APPN/HPR network.

IOCP and NCP Output Files

The CCM output files have to be completed before they can be used for IOCP and NCP generation.

IOCP Output Files

Make the following changes, as necessary, in the IOCP output files:

- Replace “____” with your own labels.
- The CUNUMBR of the CNTLUNIT macroinstruction must be unique in your IOCP.
- For ESCON Directors, define them with CNTLUNIT and IODEVICE macros if they are not yet defined in your IOCP GEN.
- For VM:

– If you want to run this file with a VM IOCP, you must remove the ADAPTER=TYPE7 line from each of the IODEVICE macro examples in this chapter.

– Create the DMKRIO or HCPRIO file.

- For HCD/MVS (to use this file with the HCD migration task), you must define at least one NIO console by adding an MVSCP NIPCON macro.
- For EMIF, if you use duplicate device numbers in two or more partitions, you must add the PART= parameter to each of the IODEVICE macros.

NCP Output Files

Make the following changes, as necessary, in the NCP output files:

- Replace "_______" with your own labels.
- Match PU labels with physical resource (PHYSRSC) values.
- For VTAM activation, add a PCCU macroinstruction for VTAM activation, if you want to use this NCP with a VTAM.

Figure 27-1 shows the main parameters given in the example diagrams that follow in this section.

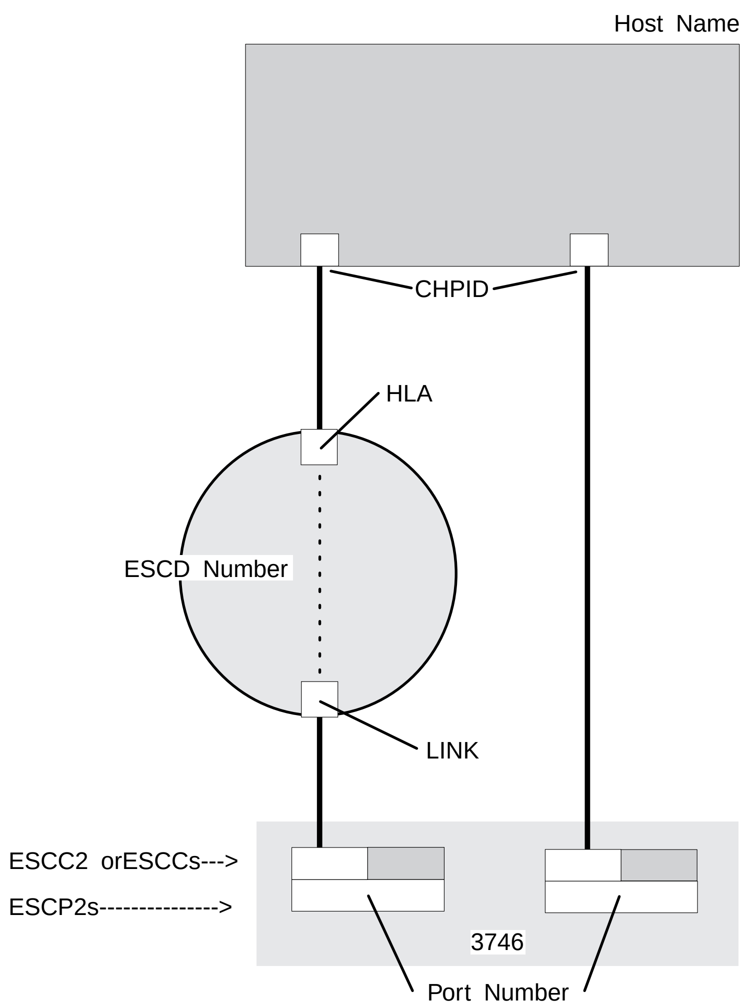


Figure 27-1. Main Parameters in Example Diagrams

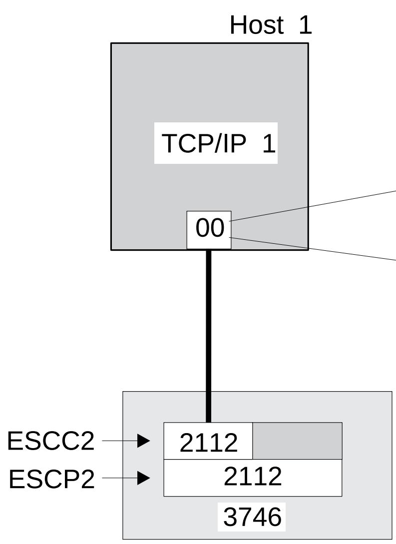
Example 1 (IP)

The characteristics of this example are:

3746 model	950
Network type	IP
CCU mode	
ESCD	None
Host mode	Basic

The following configuration figure includes its associated IOCP file:

Example 1: IOCP Macros for Host 1




```
*******************************************************
*IOCP ESCON  GENERATION SUBSET
*FOR HOST 1
****************************************
        CHPID PATH=((00)), TYPE=CNC
****************************************
* CHPID 00
****************************************
*
  CNTLUNIT CUNMBR=_____,
            UNITADD=((01,1)),
             PATH=(00),
             UNIT=3745
*
  IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
           UNIT=3745
           ADAPTER=TYPE7
           ADDRESS=(xxx,1)       * xxx must match the CUADDR of
                                    a PCCU in NCP, when requested
*
```

CCM Worksheets for Example 1

Example 1: ESCON Port Configuration

Port number: *2112*	
Network:	☐ *APPN* √ IP ☐ SNA Subarea
Fiber Status	√ *Enable* ☐ Transmit OLS ☐ Disable
Port name APPN	__________ alphanumeric characters
Port name IP	PLI2112 alphanumeric characters
Automatic Reactivation	√ *Yes* ☐ No
NPA eligible	☐ Yes ☐ No
Port attached to an ESCD?	☐ *Single* ☐ Chained √ None
ESCD number	__________hexadecimal (default: *0*)
ESCD Model	☐ *9032* ☐ 9033 ☐ OEM
Control Unit Link Address (LINK)	__________hexadecimal (default: *80*)

Example 1: ESCON Port – Host Link Configuration

Port number: *2112*	
Network	□ *APPN (A)* √ IP (I) □ SNA/Subarea (S)
Host Link Name (APPN)	__________ (alphanumeric characters)
Host Link Name (IP)	*HLI12112* (alphanumeric characters)
Host mode?	√ *Basic* □ LPAR □ EMIF
Host name	*HOST1* (alphanumeric characters)
Partition name	__________ (alphanumeric characters)
CHPID	*0* hexadecimal (default: *0*)
Partition number	□ *Dynamic* □ Defined If defined: _________hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* □ Defined If defined: _________hexadecimal (default: *80*)

Example 1: ESCON Port – Station Configuration

Port number: *2112* Port name : *PLI2112* Host link name: *HLI12112*	
Network	□ *APPN (A)* √ IP (I) □ SNA/Subarea (S)
Access Method	□ VTAM □ TPF
Name:	*. STI12112* (alphanumeric characters)
PU type	√ 1 □ *2.1* □ 5
Unit address (UA)	*1* hexadecimal (default: *1*)
IPL through that station	□ *Yes* □ No
On which CCU	□ *CCU-A* □ CCU-B
IP address:	*2.1.1.1* (IP dotted notation)
IP subnet mask:	*255.0.0.0* (IP dotted notation)
Comments	*TCP/IP1*

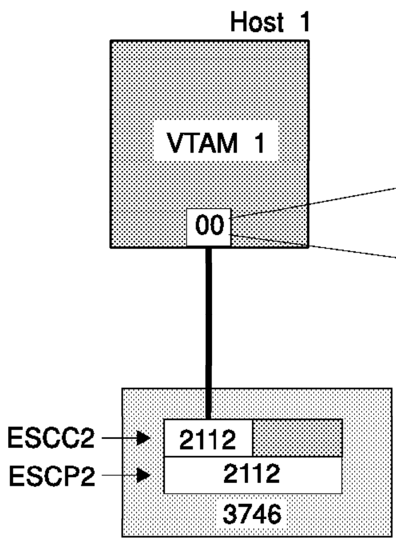
Example 2 (APPN)

The characteristics of this example are:

3746 model 950
Network type APPN/HPR
CCU mode
ESCD None
Host mode Basic

The following configuration figure includes its associated IOCP file:

Example 2: IOCP Macros for Host 1




```
**********************************************************
*IOCP ESCON  GENERATION SUBSET
*FOR HOST 1
*******************************************
       CHPID PATH=((00)), TYPE=CNC
*******************************************
* CHPID 00
*******************************************
*
  CNTLUNIT CUNMBR=______,
           UNITADD=((01,1)),
           PATH=(00),
           UNIT=3745
*
  IODEVICE CUNUMBER=_____, * Same as CNTLUNIT CUNUMBR
           UNIT=3745
           ADAPTER=TYPE7
           ADDRESS=(xxx,1)      * xxx must match the CUADDR of
                                  a PCCU in NCP, when requested
*
```

CCM Worksheets for Example 2

Example 2, ESCON Port Configuration

Port number: _2112_	
Network:	√ *APPN* ☐ IP ☐ SNA Subarea
Fiber Status	√ *Enable* ☐ Transmit OLS ☐ Disable
Port name APPN	_PLA2112_ alphanumeric characters
Port name IP	__________ alphanumeric characters
Automatic Reactivation (APPN)	√ *Yes* ☐ No
NPA eligible	☐ Yes √ No
Port attached to an ESCD?	☐ *Single* ☐ Chained √ None
ESCD number	__________hexadecimal (default: *0*)
ESCD Model	☐ *9032* ☐ 9033 ☐ OEM
Control Unit Link Address (LINK)	__________hexadecimal (default: *80*)

Example 2, ESCON Port – Host Link Configuration

Port number: _2112_	
Network	√ *APPN (A)* □ IP (I) □ SNA/Subarea (S)
Host Link Name (APPN)	_HLA12112_ (alphanumeric characters)
Host Link Name (IP)	____________________ (alphanumeric characters)
Host mode?	√ *Basic* □ LPAR □ EMIF
Host name	_HOST1_ (alphanumeric characters)
Partition name	____________________ (alphanumeric characters)
CHPID	_0_ hexadecimal (default: *0*)
Partition number	□ *Dynamic* □ Defined If defined: _________hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* □ Defined If defined: _________hexadecimal (default: *80*)

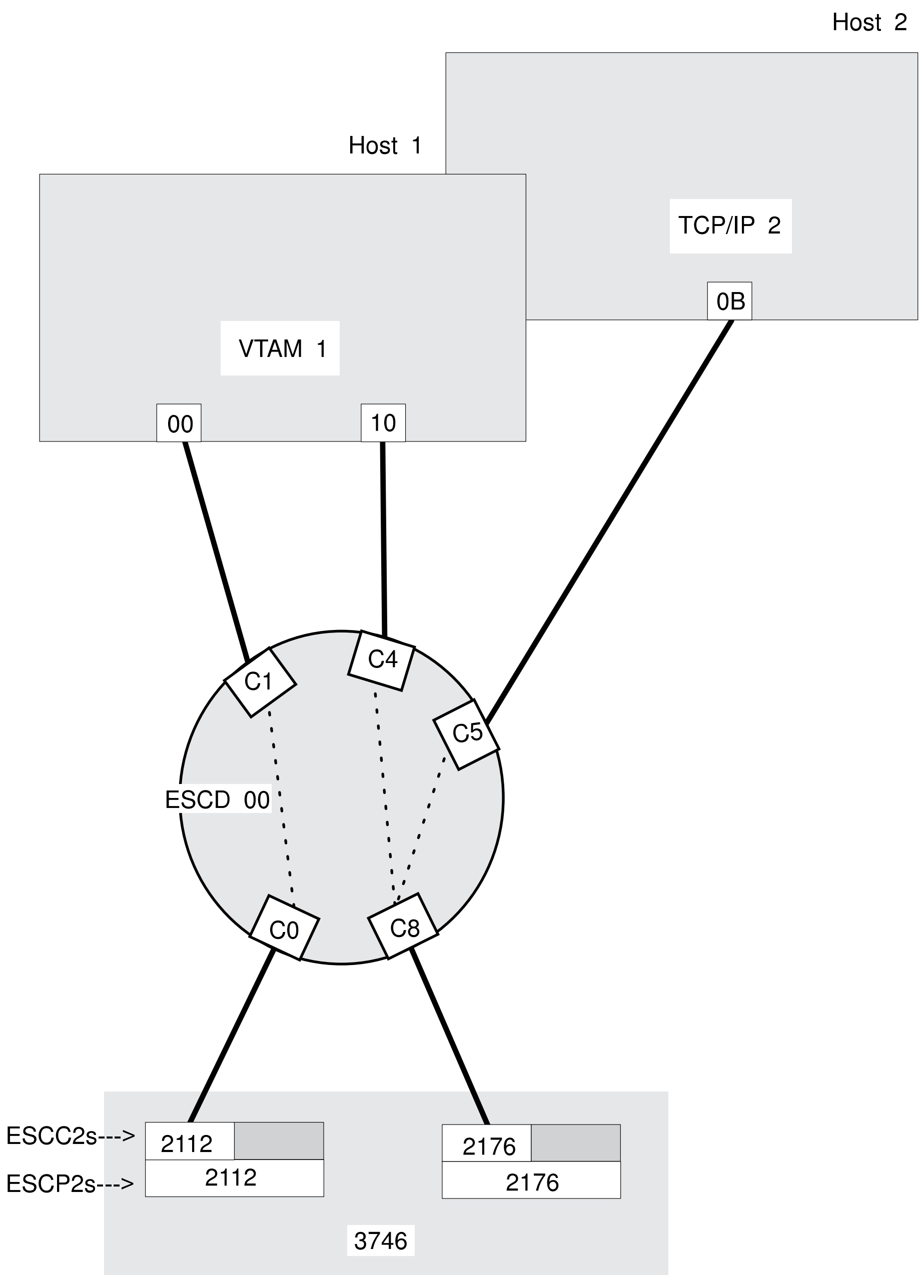
Example 2, ESCON Port – Station Configuration

Port number: _*2112*_ Port name : _*PLA2112*_ Host link name: _*HL012112*_	
Network	√ *APPN (A)* □ IP (I) □ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	__________________ (alphanumeric characters)
PU type	□ 1 √ *2.1* □ 5
Unit address (UA)	_*1*_ hexadecimal (default: *1*)
IPL through that station	□ *Yes* □ No
On which CCU	□ *CCU-A* □ CCU-B
IP address:	__________________ (IP dotted notation)
IP subnet mask:	__________________ (IP dotted notation)
Comments	_*VTAM1*_ __________________

Example 3 (SNA, IP, APPN/HPR)

The characteristics of this example are:

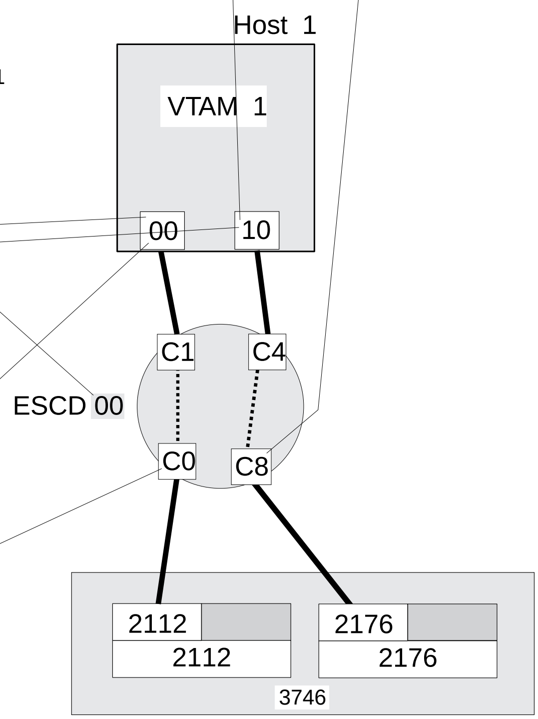
3746 model	900
Network type	SNA, IP, APPN/HPR
CCU mode	Single
ESCD	One
Host mode	Basic



Example 3: IOCP Macros for Host 1

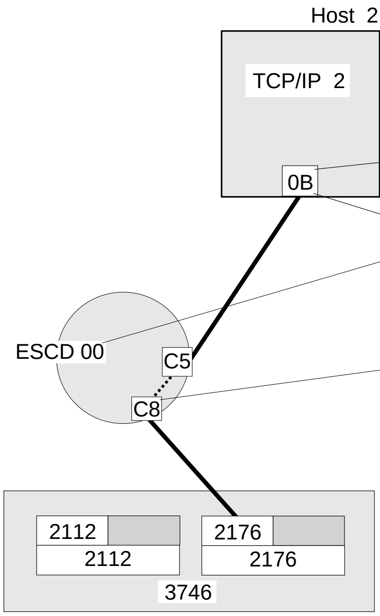
```
************************************************************
* CHPID 10
************************************************************
*
  CNTLUNIT CUNMBR=_____,
           UNITADD=((0E,1)),
            PATH=(10),
            LINK=C8,
            UNIT=3745
*
  IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
           UNIT=3745
           ADAPTER=TYPE7,
           UNITADD=0E,
           ADDRESS=(xxx,1)       * xxx must match the CUADDR of
*                                  a PCCU in NCP, when requested
************************************************************
```

```
*******************************************************
* IOCP ESCON  GENERATION SUBSET FOR HOST 1
*
*******************************************************
        CHPID PATH=((00)), SWITCH=00, TYPE=CNC
        CHPID PATH=((10)), SWITCH=00, TYPE=CNC
```




```
*****************************************************
* CHPID 00
*****************************************************
*
  CNTLUNIT CUNMBR=_____,
           UNITADD=((01,1)),
            PATH=(00),
            LINK=C0,
            UNIT=3745
*
  IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
           UNIT=3745
           ADAPTER=TYPE7,
           UNITADD=01,
           ADDRESS=(xxx,1)       * xxx must match the CUADDR of
*                                  a PCCU in NCP, when requested
```

Example 3: IOCP Macros for Host 2




```
******************************************************
*IOCP ESCON  GENERATION SUBSET
*FOR HOST 2
******************************************************
        CHPID PATH=((0B)), SWITCH=00, TYPE=CNC
******************************************************
* CHPID 0B
******************************************************
*
  CNTLUNIT CUNMBR=_____,
           UNITADD=((0F,1)),
           PATH=(0B),
           LINK=C8,
           UNIT=3745
*
  IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
           UNIT=3745
           ADAPTER=TYPE7,
           UNITADD=0F,
           ADDRESS=(xxx,1)       * xxx must match the CUADDR of
*                                  a PCCU in NCP, when requested
```

CCM Worksheets for Example 3

Example 3: ESCON Port Configuration

Port number: *2112*	
Network:	√ *APPN* ☐ IP ☐ SNA Subarea
Name	*PLA2112*
Fiber Status	√ *Enable* ☐ Transmit OLS ☐ Disable
Port name APPN	*PLA2112* alphanumeric characters
Port name IP	____________ alphanumeric characters
Automatic Reactivation	√ *Yes* ☐ No
NPA eligible	√ Yes ☐ No
IP maximum transmission unit	____________bytes (524-4100, default: *2060*)
Port attached to an ESCD?	√ *Single* ☐ Chained ☐ None
ESCD number	*0* hexadecimal (default: *0*)
ESCD Model	√ *9032* ☐ 9033 ☐ OEM
Control Unit Link Address (LINK)	*C0* hexadecimal (default: *80*)

Example 3: ESCON Port – Host Link Configuration

Port number: _2112_	
Network	√ *APPN (A)* □ IP (I) □ SNA/Subarea (S)
Host Link Name (APPN)	*HL012112* (alphanumeric characters)
Host Link Name (IP)	____________ (alphanumeric characters)
Host mode?	√ *Basic* □ LPAR □ EMIF
Host name	*HOST1* (alphanumeric characters)
Partition name	____________ (alphanumeric characters)
CHPID	*0* hexadecimal (default: *0*)
Partition number	□ *Dynamic* □ Defined If defined: ________hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: *C1* hexadecimal (default: *80*)

Example 3: ESCON Port – Station Configuration

Port number: *2112* **Port name :** *PL2112* **Host link name:** *HL012112*	
Network	√ *APPN (A)* □ IP (I) □ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	*STA2112* (alphanumeric characters)
PU type	□ 1 √ *2.1* □ 5
Unit address (UA)	*1* hexadecimal (default: *1*)
IPL through that station	□ *Yes* □ No
On which CCU	□ *CCU-A* □ CCU-B
IP address:	________________ (IP dotted notation)
IP subnet mask:	________________ (IP dotted notation)
Comments	*VTAM1* ________________

Example 3: ESCON Port Configuration

Port number: *2176*	
Network:	□ *APPN* √ IP √ SNA Subarea
Name	*PL2176*
Fiber Status	√ *Enable* □ Transmit OLS □ Disable
Port name APPN	*PLI2176* alphanumeric characters
Port name IP	____________ alphanumeric characters
Automatic Reactivation	√ *Yes* □ No
NPA eligible	□ Yes □ No
IP maximum transmission unit	____________bytes (524-4100, default: *2060*)
Port attached to an ESCD?	√ *Single* □ Chained □ None
ESCD number	*0* hexadecimal (default: *0*)
ESCD Model	√ *9032* □ 9033 □ OEM
Control Unit Link Address (LINK)	*C8* hexadecimal (default: *80*)

Example 3: ESCON Port – Host Link Configuration

Port number: _2176_	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	____________________ (alphanumeric characters)
Host Link Name (IP)	____________________ (alphanumeric characters)
Host mode?	√ *Basic* □ LPAR □ EMIF
Host name	_HOST1_ (alphanumeric characters)
Partition name	____________________ (alphanumeric characters)
CHPID	_10_ hexadecimal (default: *0*)
Partition number	□ *Dynamic* □ Defined If defined: _________hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: _C4_ hexadecimal (default: *80*)

Example 3: ESCON Port – Station Configuration

Port number: *2176* **Port name :** *PL2176* **Host link name:** ________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	____________________ (alphanumeric characters)
PU type	□ 1 □ *2.1* √ 5
Unit address (UA)	*E* __________ hexadecimal (default: *1*)
IPL through that station	□ *Yes* √ No
On which CCU	□ *CCU-A* □ CCU-B
IP address:	____________________ (IP dotted notation)
IP subnet mask:	____________________ (IP dotted notation)
Comments	*VTAM1* ____________________

Example 3: ESCON Port – Host Link Configuration

Port number: *2176*	
Network	□ *APPN (A)* √ IP (I) □ SNA/Subarea (S)
Host Link Name (APPN)	__________ (alphanumeric characters)
Host Link Name (IP)	*HLI22176* *(alphanumeric characters)*
Host mode?	√ *Basic* □ LPAR □ EMIF
Host name	*HOST2* (alphanumeric characters)
Partition name	____________________ (alphanumeric characters)
CHPID	*B* hexadecimal (default: *0*)
Partition number	□ *Dynamic* □ Defined If defined: _________hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: *C5* hexadecimal (default: *80*)

Example 3: ESCON Port – Station Configuration

Port number: _2176_ **Port name :** _PLI2176_ **Host link name:** _HLI2176_	
Network	□ *APPN (A)* √ IP (I) □ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	_STIE2176_ (alphanumeric characters)
PU type	√ 1 □ *2.1* □ 5
Unit address (UA)	_F_ hexadecimal (default: *1*)
IPL through that station	□ *Yes* □ No
On which CCU	□ *CCU-A* □ CCU-B
IP address:	_2.4.3.5_ (IP dotted notation)
IP subnet mask:	_255.0.0.0_ (IP dotted notation)
Comments	_TCP/IP2_ ____________________

NCP Output File for Example 3

```
*********************************************************************
*  ESCON PHYSICAL DEFINITION FOR ALL ESCP RESOURCES                 *
*********************************************************************
*
________ GROUP LNCTL=CA
*
*
*********************************************************************
*  ESCON PHYSICAL DEFINITION: ESCP 2176                             *
*********************************************************************
*
________ LINE ADDRESS=2176
*
PU2176   PU ANS=CONT,                * PU label must match PHYSRSC X
               XMONLNK=YES,                                        X
               PUTYPE=1
*
*
*********************************************************************
*********************************************************************
*  ESCON LOGICAL DEFINITION: ESCP 2176                              *
*********************************************************************
*
________ GROUP LNCTL=CA,                                           X
               PHYSRSC=PU2176    * Must match PU label
*                                  of 2176 physical definition
*********************************************************************
*  ESCP 2176  ESCC 2176  HOST/PART: HOST 1  HOST LINK 1
*********************************************************************
*
________ LINE HOSTLINK=1,                                          X
               MAXPU=16,                                           X
               MONLINK=CONT
________ PU   PUTYPE=5,                                            X
               ADDR=0F,                                            X
               MONLINK=YES,                                        X
               ANS=CONT
*
*********************************************************************
```

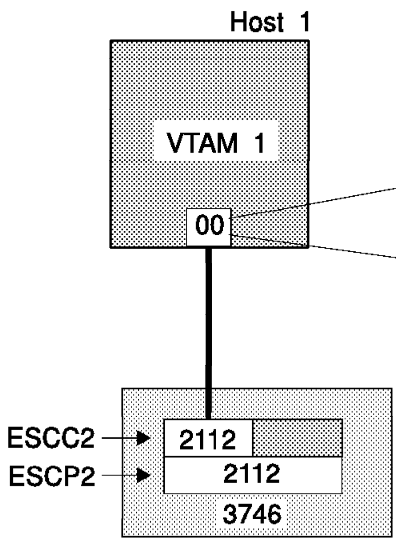
Example 4 (SNA)

The characteristics of this example are:

3746 model	900
Network type	SNA/subarea
CCU mode	Single
ESCD	None
Host mode	Basic

The following configuration figure includes its associated IOCP file:

Example 4: IOCP Macros for Host 1




```
*******************************************************
*IOCP ESCON  GENERATION SUBSET
*FOR HOST 1
*****************************************
       CHPID PATH=((00)), TYPE=CNC
****************************************
* CHPID 00
****************************************
*
  CNTLUNIT CUNMBR=______,
         UNITADD=((01,1)),
         PATH=(00),
         UNIT=3745
*
  IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
         UNIT=3745
         ADAPTER=TYPE7
         ADDRESS=(xxx,1)       * xxx must match the CUADDR of
                                 a PCCU in NCP, when requested
*
```

CCM Worksheets for Example 4

Example 4: ESCON Port Configuration

Port number: *2112*	
Network:	□ *APPN* □ IP √ SNA Subarea
Name	*PL2112*
Fiber Status	√ *Enable* □ Transmit OLS □ Disable
Port name APPN	__________ alphanumeric characters
Port name IP	__________ alphanumeric characters
Automatic Reactivation	□ *Yes* □ No
NPA eligible	□ Yes □ No
Port attached to an ESCD?	□ *Single* □ Chained √ None
ESCD number	__________hexadecimal (default: *0*)
ESCD Model	□ *9032* □ 9033 □ OEM
Control Unit Link Address (LINK)	__________hexadecimal (default: *80*)

Example 4: ESCON Port – Host Link Configuration

Port number: _2112_	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	__________________ (alphanumeric characters)
Host Link Name (IP)	____________________ (alphanumeric characters)
Host mode?	√ *Basic* □ LPAR □ EMIF
Host name	_*HOST1*_____________ (alphanumeric characters)
Partition name	____________________ (alphanumeric characters)
CHPID	_*0*_______hexadecimal (default: *0*)
Partition number	□ *Dynamic* □ Defined If defined: _________hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* □ Defined If defined: _________hexadecimal (default: *80*)

Example 4: ESCON Port – Station Configuration

Port number: *2112* Port name : *PL2112* Host link name: ________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	________________ (alphanumeric characters)
PU type	□ 1 □ *2.1* √ 5
Unit address (UA)	*1* hexadecimal (default: *1*)
IPL through that station	√ *Yes* □ No
On which CCU	□ *CCU-A* □ CCU-B
IP address:	________________ (IP dotted notation)
IP subnet mask:	________________ (IP dotted notation)
Comments	*VTAM1* ________________

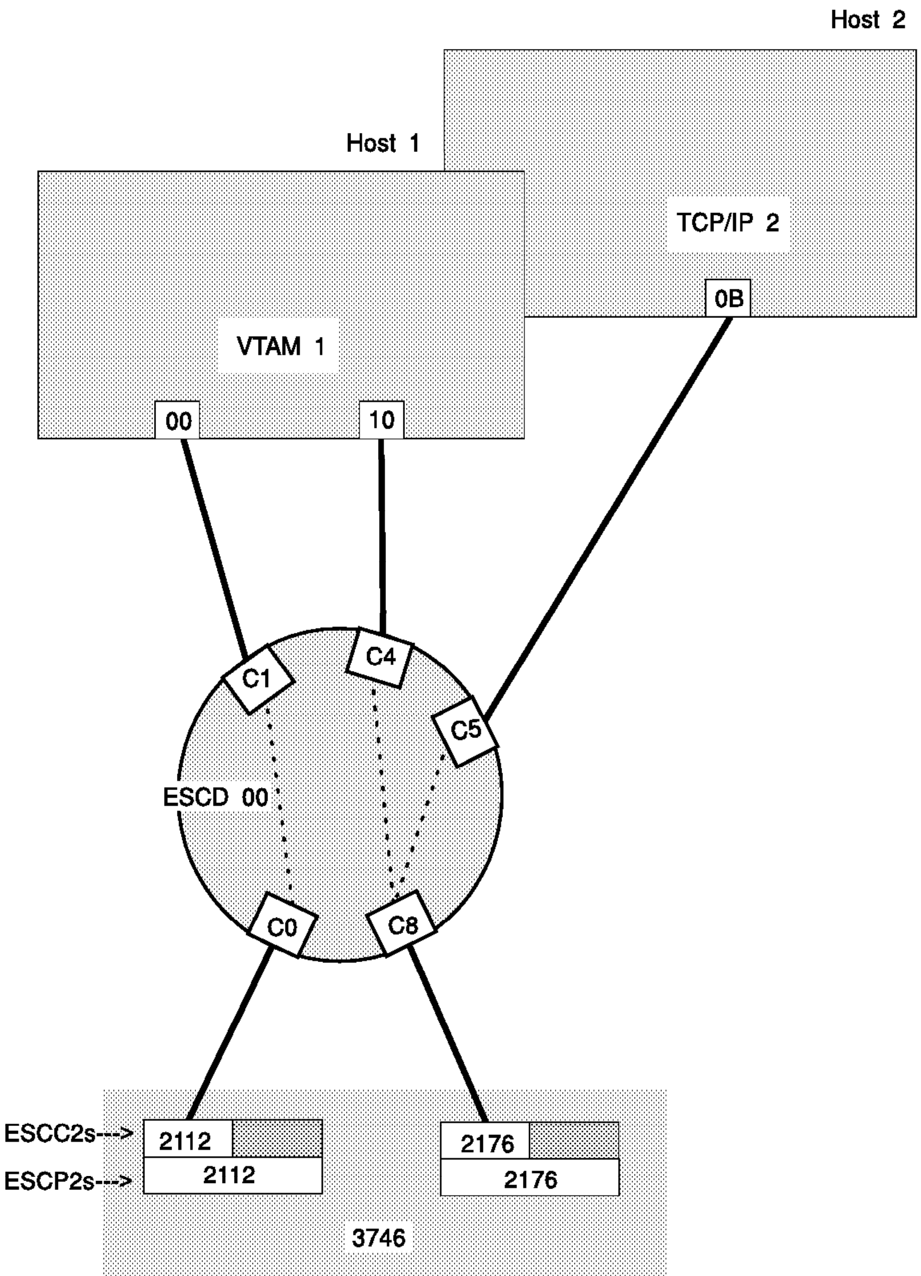
NCP Output File for Example 4 This example is for single CCU without an ESCD and without a host partition (no LPAR).

```
*********************************************************************
*  ESCON PHYSICAL DEFINITION FOR ALL ESCP RESOURCES
*********************************************************************
*
_______ GROUP LNCTL=CA
*
*********************************************************************
*  ESCON PHYSICAL DEFINITION: ESCP 2112
*********************************************************************
*
_______ LINE ADDRESS=2112
*
PU2112   PU ANS=CONT,             * PU label must match PHYSRSC    X
               XMONLNK=YES,                                        X
               PUTYPE=1
*********************************************************************
*  ESCON LOGICAL DEFINITION: ESCP 2112
*********************************************************************
*
_______ GROUP LNCTL=CA,                                            X
               PHYSRSC=PU2112       * Must match PU label of
*                                     2112 physical definition
*********************************************************************
*  ESCP 2112  ESCC 2112  HOST/PART: HOST 1  HOST LINK 1
*********************************************************************
*
_______ LINE HOSTLINK=1,                                           X
               MAXPU=16,                                           X
               MONLINK=CONT
_______ PU   PUTYPE=5,                                             X
               ADDR=01,                                            X
               MONLINK=YES,                                        X
               ANS=CONT
*********************************************************************
```

Example 5 (SNA)

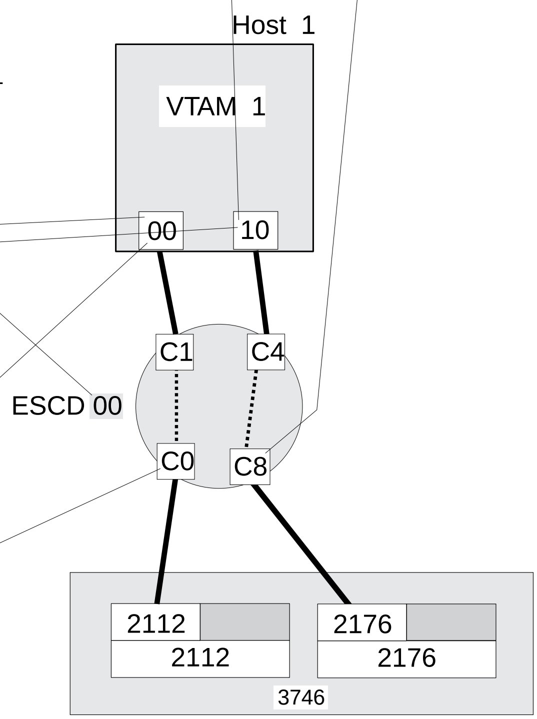
The characteristics of this example are:

3746 model	900
Network type	SNA/subarea
CCU mode	Single
ESCD	One
Host mode	Basic



Example 5: IOCP Macros for Host 1

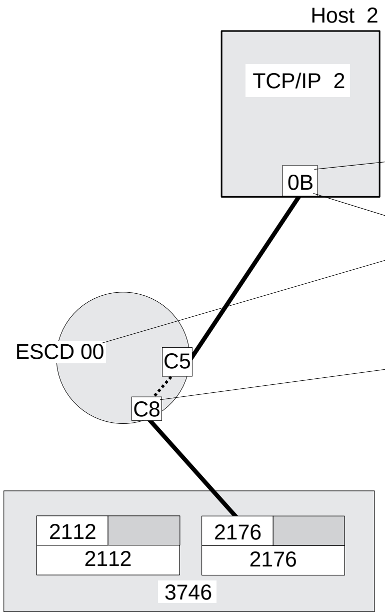
```
************************************************************
* CHPID 10
************************************************************
*
  CNTLUNIT CUNMBR=_____,
           UNITADD=((0E,1)),
            PATH=(10),
            LINK=C8,
            UNIT=3745
*
  IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
           UNITADD=3745
           ADAPTER=TYPE7,
           UNITADD=0E,
           ADDRESS=(xxx,1)       * xxx must match the CUADDR of
*                                  a PCCU in NCP, when requested
*************************************************************
```




```
*********************************************************
* IOCP ESCON  GENERATION SUBSET FOR HOST 1
*
*********************************************************
        CHPID PATH=((00)), SWITCH=00, TYPE=CNC
        CHPID PATH=((10)), SWITCH=00, TYPE=CNC
```

```
*******************************************************
* CHPID 00
*******************************************************
*
  CNTLUNIT CUNMBR=_____,
           UNITADD=((01,1)),
            PATH=(00),
            LINK=C0,
            UNIT=3745
*
  IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
           UNIT=3745
           ADAPTER=TYPE7,
           UNITADD=01,
           ADDRESS=(xxx,1)       * xxx must match the CUADDR of
*                                  a PCCU in NCP, when requested
```

Example 5: IOCP Macros for Host 2




```
*******************************************************
*IOCP ESCON  GENERATION SUBSET
*FOR HOST 2
*******************************************************
       CHPID PATH=((0B)), SWITCH=00, TYPE=CNC
*******************************************************
* CHPID 0B
*******************************************************
*
  CNTLUNIT CUNMBR=_____,
           UNITADD=((0F,1)),
            PATH=(0B),
            LINK=C8,
            UNIT=3745
*
  IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
           UNIT=3745
           ADAPTER=TYPE7,
           UNITADD=0F,
           ADDRESS=(xxx,1)      * xxx must match the CUADDR of
*                                 a PCCU in NCP, when requested
```

CCM Worksheets for Example 5

Example 5: ESCON Port Configuration

Port number: *2112*	
Network:	□ *APPN* □ IP √ SNA Subarea
Name	*PL2112*
Fiber Status	√ *Enable* □ Transmit OLS □ Disable
Port name APPN	________ alphanumeric characters
Port name IP	________ alphanumeric characters
Automatic Reactivation	□ *Yes* □ No
NPA eligible	□ Yes □ No
Port attached to an ESCD?	√ *Single* □ Chained □ None
ESCD number	*0* hexadecimal (default: *0*)
ESCD Model	√ *9032* □ 9033 □ OEM
Control Unit Link Address (LINK)	*C0* hexadecimal (default: *80*)

Example 5: ESCON Port – Host Link Configuration

Port number: _*2112*_	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	____________________ (alphanumeric characters)
Host Link Name (IP)	____________________ (alphanumeric characters)
Host mode?	√ *Basic* □ LPAR □ EMIF
Host name	_*HOST1*______________ (alphanumeric characters)
Partition name	____________________ (alphanumeric characters)
CHPID	_*0*_________hexadecimal (default: *0*)
Partition number	□ *Dynamic* □ Defined If defined: __________hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: _*C1*________hexadecimal (default: *80*)

Example 5: ESCON Port – Station Configuration

Port number: _*2112*_____ **Port name :** _*PL2112*____ **Host link name:** ________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	___________________ (alphanumeric characters)
PU type	□ 1 □ *2.1* √ 5
Unit address (UA)	_*1*________hexadecimal (default: *1*)
IPL through that station	□ *Yes* √ No
On which CCU	□ *CCU-A* □ CCU-B
IP address:	___________________ (IP dotted notation)
IP subnet mask:	___________________ (IP dotted notation)
Comments	_*VTAM1*______________ ___________________

Example 5: ESCON Port Configuration

Port number: _2176_	
Network:	□ *APPN* □ IP √ SNA Subarea
Name	_PL2176_
Fiber Status	√ *Enable* □ Transmit OLS □ Disable
Port name APPN	________ alphanumeric characters
Port name IP	________ alphanumeric characters
Automatic Reactivation	□ *Yes* □ No
NPA eligible	□ Yes □ No
Port attached to an ESCD?	√ *Single* □ Chained □ None
ESCD number	_0_ hexadecimal (default: *0*)
ESCD Model	√ *9032* □ 9033 □ OEM
Control Unit Link Address (LINK)	_C8_ hexadecimal (default: *80*)

Example 5: ESCON Port – Host Link Configuration

Port number: *2176*	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	____________________ (alphanumeric characters)
Host Link Name (IP)	____________________ (alphanumeric characters)
Host mode?	√ *Basic* □ LPAR □ EMIF
Host name	*HOST1* (alphanumeric characters)
Partition name	____________________ (alphanumeric characters)
CHPID	*10* hexadecimal (default: *0*)
Partition number	□ *Dynamic* □ Defined If defined: __________hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: *C4* hexadecimal (default: *80*)

Example 5: ESCON Port – Station Configuration

Port number: _*2176*_ **Port name :** _*PL2176*_ **Host link name:** ______	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	____________ (alphanumeric characters)
PU type	□ 1 □ *2.1* √ 5
Unit address (UA)	_*E*_____ hexadecimal (default: *1*)
IPL through that station	√ *Yes* □ No
On which CCU	□ *CCU-A* □ CCU-B
IP address:	____________ (IP dotted notation)
IP subnet mask:	____________ (IP dotted notation)
Comments	_*VTAM1*_______ ____________

Example 5: ESCON Port – Host Link Configuration

Port number: _2176______	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	________ (alphanumeric characters)
Host Link Name (IP)	____________________ (alphanumeric characters)
Host mode?	√ *Basic* □ LPAR □ EMIF
Host name	_*HOST2*______________ (alphanumeric characters)
Partition name	____________________ (alphanumeric characters)
CHPID	_*B*________hexadecimal (default: *0*)
Partition number	□ *Dynamic* □ Defined If defined: _________hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: _*C5*_______hexadecimal (default: *80*)

Example 5: ESCON Port – Station Configuration

Port number: *2176* **Port name :** *PL2176* **Host link name:** ________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	________________ (alphanumeric characters)
PU type	□ 1 □ *2.1* √ 5
Unit address (UA)	*F* ________ hexadecimal (default: *1*)
IPL through that station	□ *Yes* √ No
On which CCU	□ *CCU-A* □ CCU-B
IP address:	________________ (IP dotted notation)
IP subnet mask:	________________ (IP dotted notation)
Comments	*VTAM4* ________________

NCP Output File for Example 5 This example is for single CCU with an ESCD and without a host partition (no LPAR).

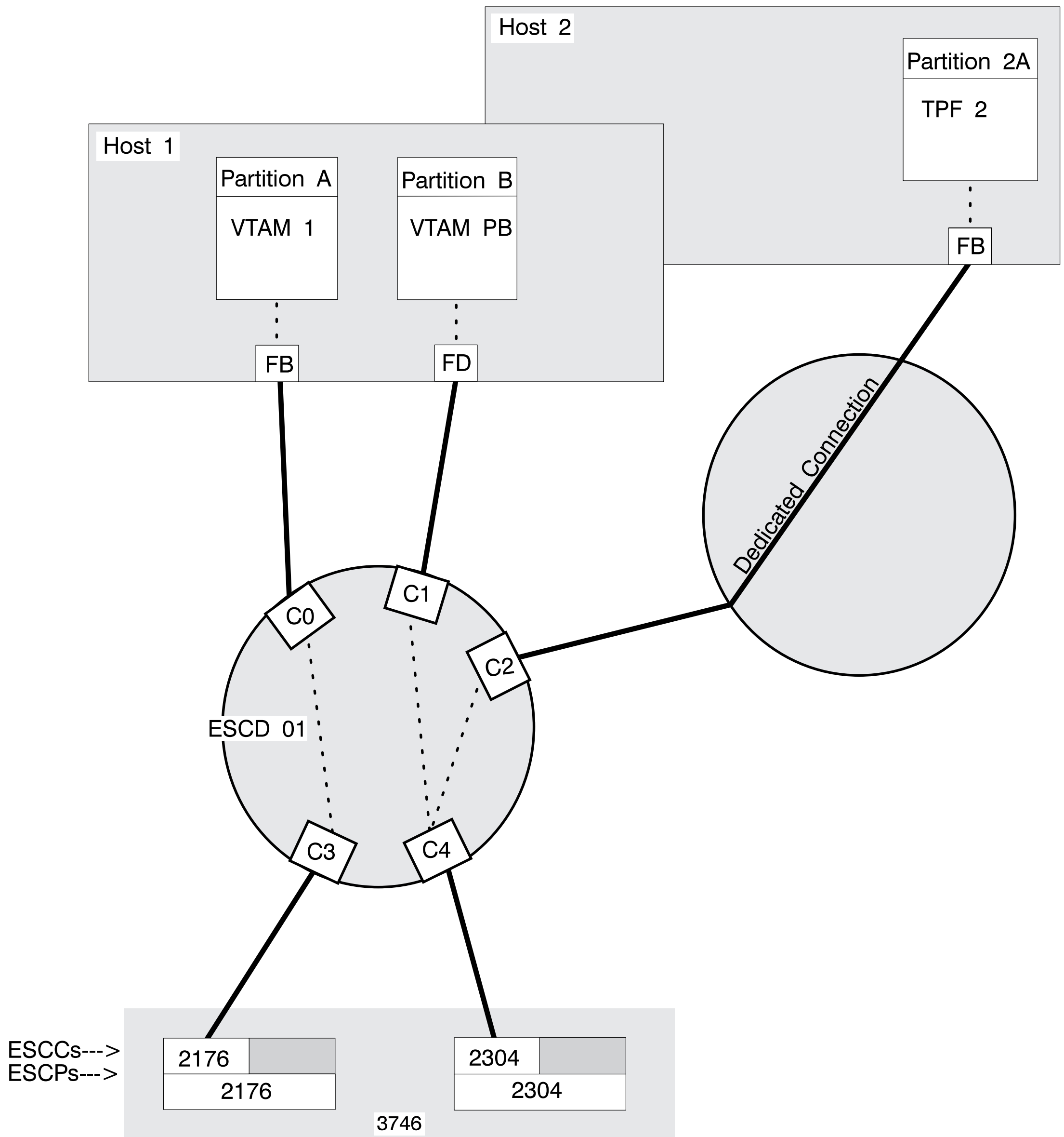
```
************************************************************************
*  ESCON PHYSICAL DEFINITION FOR ALL ESCP RESOURCES                    *
************************************************************************
*
________ GROUP LNCTL=CA
*
*
************************************************************************
*  ESCON PHYSICAL DEFINITION: ESCP 2112                                *
************************************************************************
*
________ LINE ADDRESS=2112
*
PU2112   PU ANS=CONT,               * PU label must match PHYSRSC X
               XMONLNK=YES,                                     X
               PUTYPE=1
*
*
************************************************************************
*  ESCON PHYSICAL DEFINITION: ESCP 2176                                *
************************************************************************
*
________ LINE ADDRESS=2176
*
PU2176   PU ANS=CONT,               * PU label must match PHYSRSC X
               XMONLNK=YES,                                     X
               PUTYPE=1
*
*
************************************************************************
*  ESCON LOGICAL DEFINITION: ESCP 2112                                 *
************************************************************************
*
________ GROUP LNCTL=CA,                                        X
               PHYSRSC=PU2112    * Must match PU label
*                                  of 2112 physical definition
*
************************************************************************
```

```
**********************************************************************
*  ESCP 2112  ESCC 2112  HOST/PART: HOST 1  HOST LINK 1
**********************************************************************
*
________ LINE HOSTLINK=1,                                            X
               MAXPU=16,                                             X
               MONLINK=CONT
________ PU   PUTYPE=5,                                              X
               ADDR=01,                                              X
               MONLINK=YES,                                          X
               ANS=CONT    * You can change CONT to STOP
*                            if needed
**********************************************************************
*  ESCON LOGICAL DEFINITION: ESCP 2176                               *
**********************************************************************
*
________ GROUP LNCTL=CA,                                             X
               PHYSRSC=PU2176    * Must match PU label
*                                  of 2176 physical definition
**********************************************************************
*  ESCP 2176  ESCC 2176  HOST/PART: HOST 1  HOST LINK 1
**********************************************************************
*
________ LINE HOSTLINK=1,                                            X
               MAXPU=16,                                             X
               MONLINK=CONT
________ PU   PUTYPE=5,                                              X
               ADDR=0E,                                              X
               MONLINK=YES,                                          X
               ANS=CONT
*
**********************************************************************
*  ESCP 2176  ESCC 2176  HOST/PART: HOST 2  HOST LINK 2
**********************************************************************
*
________ LINE HOSTLINK=2,                                            X
               MAXPU=16,                                             X
               MONLINK=CONT
________ PU   PUTYPE=5,                                              X
               ADDR=0F,                                              X
               MONLINK=YES,                                          X
               ANS=CONT    * You can change CONT to STOP
*                            if needed
**********************************************************************
```

Example 6 (SNA)

The characteristics of this example are:

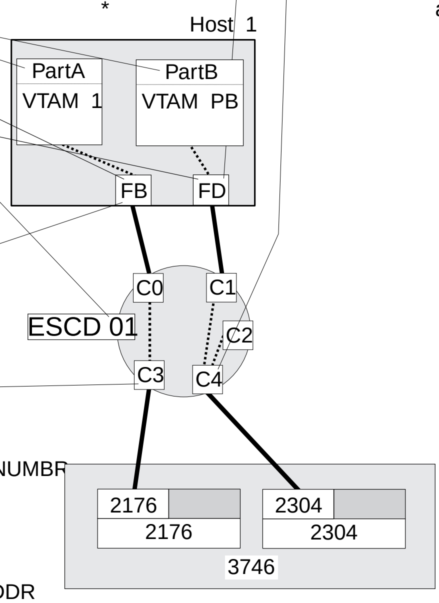
3746 model	900
Network type	SNA/subarea
CCU mode	Twin-backup
ESCD	Cascaded
Host mode	LPAR



Example 6: IOCP Macros for Host 1

```
****************************************************
* IOCP ESCON  GENERATION SUBSET
* FOR HOST 1
****************************************************
       CHPID PATH=((FB)), SWITCH=01, TYPE=CNC
              PARTITION=(PARTA, REC)
       CHPID PATH=((FD)), SWITCH=01, TYPE=CNC
              PARTITION=(PARTB, REC)
```

```
************************************************************
* CHPID FD
************************************************************
*
  CNTLUNIT CUNMBR=_____,
           UNITADD=((01,8)),
            PATH=(FD),
            LINK=C4,
            UNIT=3745
*
  IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
           UNIT=3745
           ADAPTER=TYPE7,
           UNITADD=01,
           PARTITION=PARTB,
           ADDRESS=(xxx,1)      * xxx must match the CUADDR of
                                * a PCCU in NCP, when requested
*
  IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
           UNIT=3745
           ADAPTER=TYPE7,
           UNITADD=08,
           PARTITION=PARTB,
           ADDRESS=(xxx,1)      * xxx must match the CUADDR of
*                                 a PCCU in NCP, when requested
```

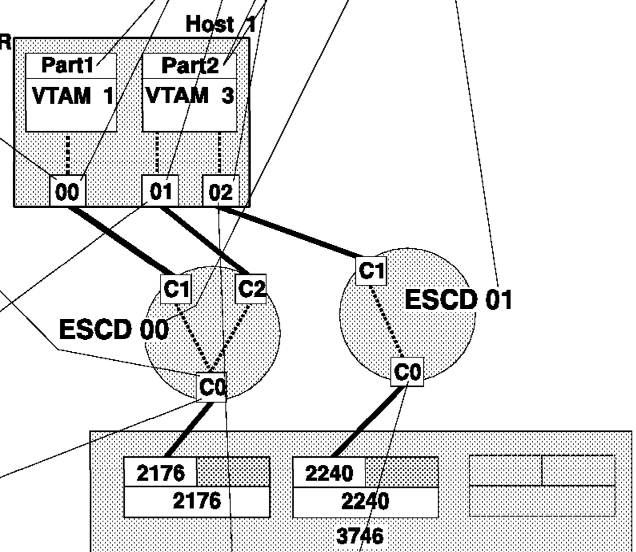



```
****************************************************
* CHPID FB
****************************************************
*
  CNTLUNIT CUNMBR=_____,
           UNITADD=((01,2)),
            PATH=(FB),
            LINK=C3,
            UNIT=3745
*
  IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
           UNIT=3745
           ADAPTER=TYPE7,
           UNITADD=01,
           PARTITION=PARTA,
           ADDRESS=(xxx,2)     * xxx must match the CUADDR
                                 of a PCCU in NCP, when
                                 requested
***********************************************************
```

Example 7: IOCP Macros for Host 1

```
**********************************************************
* CHPID 00
**********************************************************
*
  CNTLUNIT CUNUMBR=______,
           UNITADD=((02,1)),
           PATH=(00),
           LINK=C0,
           UNIT=3745
*
  IODEVICE CUNUMBR=_____,  * Same as CNTLUNIT CUNUMBR
           UNIT=3745,
           ADAPTER=TYPE7,
           UNITADD=02,
           ADDRESS=(xxx,1)      * xxx must match the CUADDR
*                                 of a PCCU in NCP, when
*                                 requested
**********************************************************
```

```
**********************************************************
* IOCP ESCON  GENERATION SUBSET
* FOR HOST 1
**********************************************************
        CHPID PATH=((00)), SWITCH=00, TYPE=CNC,
              PARTITION=(PART1, REC)
        CHPID PATH=((01)), SWITCH=00, TYPE=CNC,
              PARTITION=(PART2, REC)
        CHPID PATH=((02)), SWITCH=01, TYPE=CNC,
              PARTITION=(PART2, REC)
```




```
**********************************************************
* CHPID 01
**********************************************************
*
  CNTLUNIT CUNUMBR=______,
           UNITADD=((02,1)),
           PATH=(01),
           LINK=C0,
           UNIT=3745
*
  IODEVICE CUNUMBR=_____,  * Same as CNTLUNIT CUNUMBR
           UNIT=3745,
           ADAPTER=TYPE7,
           UNITADD=02,
           ADDRESS=(xxx,1)      * xxx must match the CUADDR of
*                                 a PCCU in NCP, when requested
**********************************************************
```

```
**********************************************************
* CHPID 02
**********************************************************
  CNTLUNIT CUNUMBR=______,
           UNITADD=((01,1)),
           PATH=(02),
           LINK=C0,
           UNIT=3745
*
  IODEVICE CUNUMBR=_____,  * Same as CNTLUNIT
                           * CUNUMBR
           UNIT=3745,
           ADAPTER=TYPE7,
           UNITADD=01,
           ADDRESS=(xxx,1)      * xxx must match the
                                * CUADDR of
                                * a PCCU in NCP,
*                                 when requested
```

CCM Worksheets for Example 6

Example 6: ESCON Port Configuration

Port number: _2176_	
Network:	□ *APPN* □ IP √ SNA Subarea
Name	_PL2176_
Fiber Status	√ *Enable* □ Transmit OLS □ Disable
Port name APPN	________ alphanumeric characters
Port name IP	________ alphanumeric characters
Automatic Reactivation	□ *Yes* □ No
NPA eligible	□ Yes □ No
Port attached to an ESCD?	√ *Single* □ Chained □ None
ESCD number	_1_ hexadecimal (default: *0*)
ESCD Model	√ *9032* □ 9033 □ OEM
Control Unit Link Address (LINK)	_C3_ hexadecimal (default: *80*)

Example 6: ESCON Port – Host Link Configuration

Port number: _2176_	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	____________________ (alphanumeric characters)
Host Link Name (IP)	______________________ (alphanumeric characters)
Host mode?	□ *Basic* √ LPAR □ EMIF
Host name	_HOST1_ (alphanumeric characters)
Partition name	_PARTA_ (alphanumeric characters)
CHPID	_FB_ hexadecimal (default: *0*)
Partition number	□ *Dynamic* □ Defined If defined: __________hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: _C0_ hexadecimal (default: *80*)

Example 6: ESCON Port – Station Configuration

Port number: _*2176*_____ **Port name :** _*PL2176*____ **Host link name:** __________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	____________________ (alphanumeric characters)
PU type	□ 1 □ *2.1* √ 5
Unit address (UA)	_*1*_________hexadecimal (default: *1*)
IPL through that station	√ *Yes* □ No
On which CCU	√ *CCU-A* □ CCU-B
IP address:	____________________ (IP dotted notation)
IP subnet mask:	____________________ (IP dotted notation)
Comments	_*VTAM1*______________ ____________________

Example 6: ESCON Port – Station Configuration

Port number: _2176_ **Port name :** _PL2176_ **Host link name:** _HL012176_	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	____________________ (alphanumeric characters)
PU type	□ 1 □ *2.1* √ 5
Unit address (UA)	_2_ hexadecimal (default: *1*)
IPL through that station	□ *Yes* √ No
On which CCU	□ *CCU-A* √ CCU-B
IP address:	____________________ (IP dotted notation)
IP subnet mask:	____________________ (IP dotted notation)
Comments	_VTAM1_ ____________________

Example 6: ESCON Port Configuration

Port number: _*2304*_	
Network:	□ *APPN* □ IP √ SNA Subarea
Name	_*PL2304*_
Fiber Status	√ *Enable* □ Transmit OLS □ Disable
Port name APPN	________ alphanumeric characters
Port name IP	________ alphanumeric characters
Automatic Reactivation	□ *Yes* □ No
NPA eligible	□ Yes □ No
Port attached to an ESCD?	□ *Single* √ Chained □ None
ESCD number	_*1*_ hexadecimal (default: *0*)
ESCD Model	√ *9032* □ 9033 □ OEM
Control Unit Link Address (LINK)	_*C4*_ hexadecimal (default: *80*)

Example 6: ESCON Port – Host Link Configuration

Port number: _2304_	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	________________ (alphanumeric characters)
Host Link Name (IP)	________________ (alphanumeric characters)
Host mode?	□ *Basic* √ LPAR □ EMIF
Host name	_HOST1_ (alphanumeric characters)
Partition name	_PARTB_ (alphanumeric characters)
CHPID	_FD_ hexadecimal (default: *0*)
Partition number	□ *Dynamic* □ Defined If defined: ________hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: _C1_ hexadecimal (default: *80*)

Example 6: ESCON Port – Station Configuration

Port number: *2304* **Port name :** *PL2304* **Host link name:** ______	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	____________ (alphanumeric characters)
PU type	□ 1 □ *2.1* √ 5
Unit address (UA)	*1* ______ hexadecimal (default: *1*)
IPL through that station	□ *Yes* √ No
On which CCU	□ *CCU-A* √ CCU-B
IP address:	____________ (IP dotted notation)
IP subnet mask:	____________ (IP dotted notation)
Comments	*VTAMPB* ____________

Example 6: ESCON Port – Station Configuration

Port number: _*2304*_ **Port name :** _*PL2304*_ **Host link name:** ________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	________________ (alphanumeric characters)
PU type	□ 1 □ *2.1* √ 5
Unit address (UA)	_*8*_ hexadecimal (default: *1*)
IPL through that station	√ *Yes* □ No
On which CCU	□ *CCU-A* √ CCU-B
IP address:	________________ (IP dotted notation)
IP subnet mask:	________________ (IP dotted notation)
Comments	_*VTAMPB*_ ________________

Example 6: ESCON Port – Host Link Configuration

Port number: _2304_	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	____________ (alphanumeric characters)
Host Link Name (IP)	____________ (alphanumeric characters)
Host mode?	□ *Basic* √ LPAR □ EMIF
Host name	_HOST2_ (alphanumeric characters)
Partition name	_PART2A._ (alphanumeric characters)
CHPID	_FB_ hexadecimal (default: *0*)
Partition number	□ *Dynamic* □ Defined If defined: ______ hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: _C2_ hexadecimal (default: *80*)

Example 6: ESCON Port – Station Configuration

Port number: _*2304*_ **Port name :** _*PL2304*_ **Host link name:** ________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	□ VTAM √ TPF
Name:	________________ (alphanumeric characters)
PU type	□ 1 √ *2.1* □ 5
Unit address (UA)	_*1*_ ________hexadecimal (default: *1*)
IPL through that station	□ *Yes* □ No
On which CCU	√ *CCU-A* □ CCU-B
IP address:	________________ (IP dotted notation)
IP subnet mask:	________________ (IP dotted notation)
Comments	_*TPF2*_ ______________ ________________

Example 6: ESCON Port – Station Configuration

Port number: _*2304*_____ **Port name :** _*PL2304*____ **Host link name:** __________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	□ VTAM √ TPF
Name:	____________________ (alphanumeric characters)
PU type	□ 1 √ *2.1* □ 5
Unit address (UA)	_*2*_________hexadecimal (default: *1*)
IPL through that station	□ *Yes* □ No
On which CCU	□ *CCU-A* √ CCU-B
IP address:	____________________ (IP dotted notation)
IP subnet mask:	____________________ (IP dotted notation)
Comments	_*TPF2*_______________ ____________________

NCP Output File for Example 6 This example is for twin CCUs with two ESCDs (one cascaded) and two hosts with partitions (with LPARs).

For CCU A

```
*********************************************************************
*  ESCON PHYSICAL DEFINITION FOR ALL ESCP RESOURCES                 *
*********************************************************************
*
________ GROUP LNCTL=CA
*
*********************************************************************
*  ESCON PHYSICAL DEFINITION: ESCP 2176                             *
*********************************************************************
*
________ LINE ADDRESS=2176
*
PU2176   PU ANS=CONT,                * PU label much match PHYSRSC X
               XMONLNK=YES,                                        X
               PUTYPE=1
*
*********************************************************************
*  ESCON PHYSICAL DEFINITION: ESCP 2304                             *
*********************************************************************
*
________ LINE ADDRESS=2304
*
PU2304   PU ANS=CONT,                * PU label much match PHYSRSC X
               XMONLNK=YES,                                        X
               PUTYPE=1
*
*********************************************************************
*  ESCON LOGICAL DEFINITION: ESCP 2176                              *
*********************************************************************
*
________ GROUP LNCTL=CA,                                           X
               PHYSRSC=PU2176         * Must match PU label
*                                       of 2176 physical definition
*
*********************************************************************
*  ESCP 2176  ESCC 2176  HOST/PART: HOST 1/PARTITION A  HOST LINK 1
*********************************************************************
*
________ LINE HOSTLINK=1,                                          X
               MAXPU=16,                                           X
               MONLINK=CONT
________ PU   PUTYPE=5,                                            X
               ADDR=01,                                            X
               MONLINK=YES,                                        X
               ANS=CONT
*
*********************************************************************
```

```
*********************************************************************
*  ESCON LOGICAL DEFINITION: ESCP 2304                              *
*********************************************************************
*
________ GROUP LNCTL=CA,                                            X
               PHYSRSC=PU2304          * Must match PU label
*                                        of 2304 physical definition
*
*********************************************************************
*  ESCP 2304  ESCC 2304  HOST/PART: HOST 1/PARTITION B  HOST LINK 1
*********************************************************************
*
________ LINE HOSTLINK=1,                                           X
               MAXPU=16,                                            X
               MONLINK=CONT
________ PU   PUTYPE=5,                                             X
               ADDR=01,                                             X
               MONLINK=YES,                                         X
               ANS=CONT
*
*********************************************************************
*  ESCP 2304  ESCC 2304  HOST/PART: HOST 2/PARTITION 2A HOST LINK 2
*********************************************************************
*
________ LINE HOSTLINK=2,                                           X
               MAXPU=16
________ PU   PUTYPE=2,                                             X
               ADDR=01,                                             X
               ANS=CONT    * You can change CONT to STOP
*                            if needed
*********************************************************************
```

For CCU B

Note: The macros for CCU B are the same as for CCU A, except that the ADDR values are different.

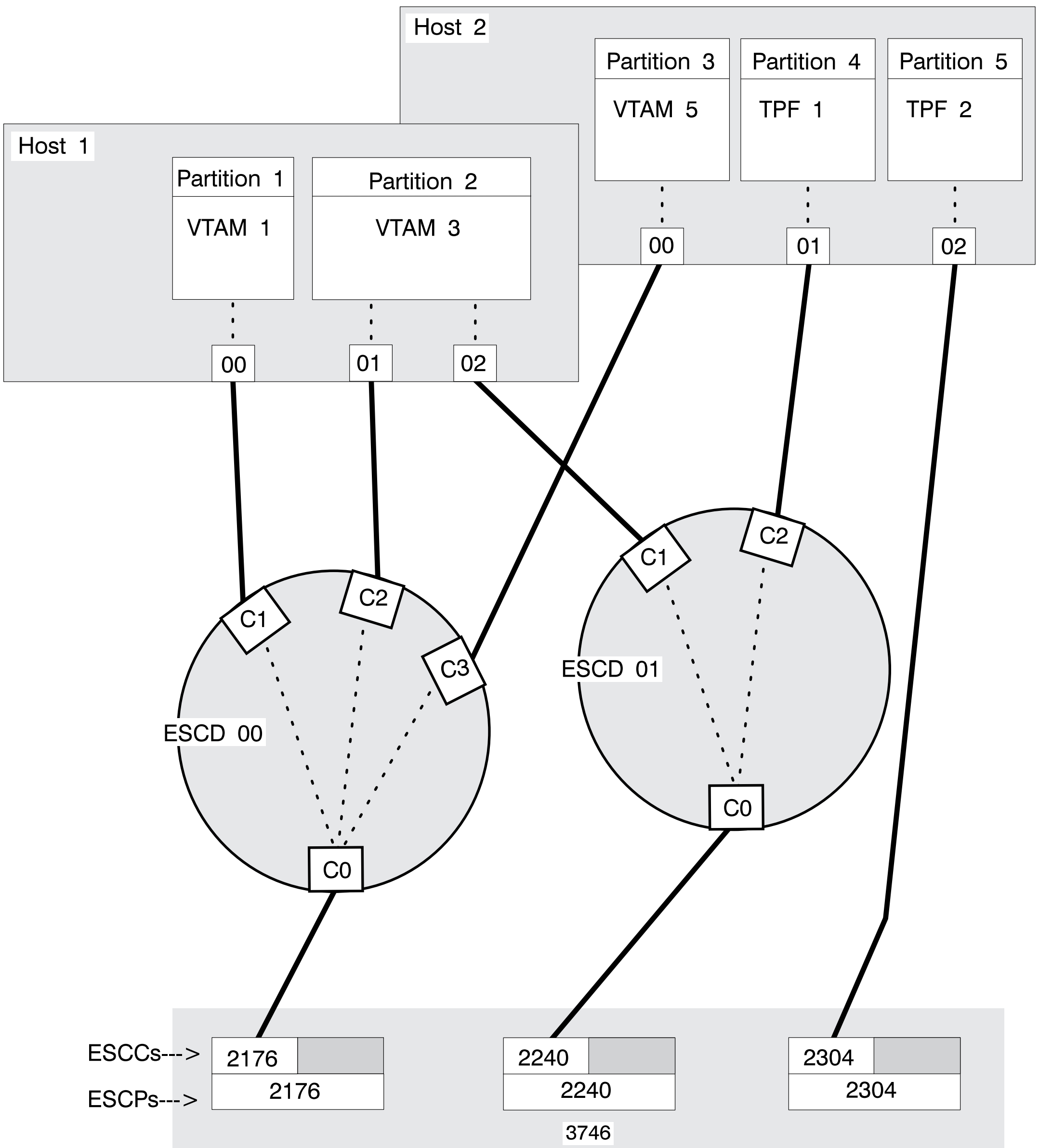
```
**********************************************************************
*  ESCON PHYSICAL DEFINITION FOR ALL ESCP RESOURCES                  *
**********************************************************************
*
________ GROUP LNCTL=CA
*
**********************************************************************
*  ESCON PHYSICAL DEFINITION: ESCP 2176                              *
**********************************************************************
*
________ LINE ADDRESS=2176
*
PU2176   PU ANS=CONT,                * PU label much match PHYSRSC X
               XMONLNK=YES,                                        X
               PUTYPE=1
*
**********************************************************************
*  ESCON PHYSICAL DEFINITION: ESCP 2304                              *
**********************************************************************
*
________ LINE ADDRESS=2304
*
PU2304   PU ANS=CONT,                * PU label much match PHYSRSC X
               XMONLNK=YES,                                        X
               PUTYPE=1
*
**********************************************************************
*  ESCON LOGICAL DEFINITION: ESCP 2176                               *
**********************************************************************
*
________ GROUP LNCTL=CA,                                           X
               PHYSRSC=PU2176         * Must match PU label
*                                       of 2176 physical definition
*
**********************************************************************
*  ESCP 2176  ESCC 2176  HOST/PART: HOST 1/PARTITION A  HOST LINK 1
**********************************************************************
*
________ LINE HOSTLINK=1,                                          X
               MAXPU=16,                                           X
               MONLINK=CONT
________ PU   PUTYPE=5,                                            X
               ADDR=02,                                            X
               MONLINK=YES,                                        X
               ANS=CONT
*
**********************************************************************
```

```
********************************************************************
*  ESCON LOGICAL DEFINITION: ESCP 2304                             *
********************************************************************
*
________ GROUP LNCTL=CA,                                           X
               PHYSRSC=PU2304          * Must match PU label
*                                        of 2304 physical definition
*
********************************************************************
*  ESCP 2304  ESCC 2304  HOST/PART: HOST 1/PARTITION B  HOST LINK 1
********************************************************************
*
________ LINE HOSTLINK=1,                                          X
               MAXPU=16,                                           X
               MONLINK=CONT
________ PU   PUTYPE=5,                                            X
               ADDR=08,                                            X
               MONLINK=YES,                                        X
               ANS=CONT
*
********************************************************************
*  ESCP 2304  ESCC 2304  HOST/PART: HOST 2/PARTITION 2A HOST LINK 2
********************************************************************
*
________ LINE HOSTLINK=2,                                          X
               MAXPU=16
________ PU   PUTYPE=2,                                            X
               ADDR=02,                                            X
               ANS=CONT    * You can change CONT to STOP
*                            if needed
*
********************************************************************
```

Example 7 (SNA)

The characteristics of this example are:

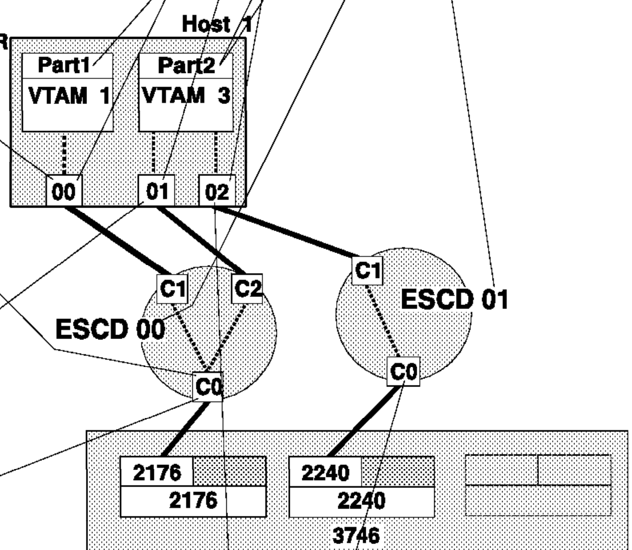
3746 model	900
Network type	SNA/subarea
CCU mode	Twin-dual
ESCD	Two
Host mode	LPAR



Example 7: IOCP Macros for Host 1

```
*********************************************************
* CHPID 00
*********************************************************
*
  CNTLUNIT CUNUMBR=_____,
           UNITADD=((02,1)),
            PATH=(00),
            LINK=C0,
            UNIT=3745
*
  IODEVICE CUNUMBR=____,  * Same as CNTLUNIT CUNUMBR
           UNIT=3745,
           ADAPTER=TYPE7,
           UNITADD=02,
           ADDRESS=(xxx,1)     * xxx must match the CUADDR
*                               of a PCCU in NCP, when
*                               requested
*************************************************************
```

```
*********************************************************
* IOCP ESCON  GENERATION SUBSET
* FOR HOST 1
*********************************************************
       CHPID PATH=((00)), SWITCH=00, TYPE=CNC,
                PARTITION=(PART1, REC)
       CHPID PATH=((01)), SWITCH=00, TYPE=CNC,
                PARTITION=(PART2, REC)
       CHPID PATH=((02)), SWITCH=01, TYPE=CNC,
                PARTITION=(PART2, REC)
```




```
*************************************************************
* CHPID 01
*************************************************************
*
  CNTLUNIT CUNUMBR=_____,
           UNITADD=((02,1)),
           PATH=(01),
           LINK=C0,
           UNIT=3745
*
  IODEVICE CUNUMBR=____,   * Same as CNTLUNIT CUNUMBR
           UNIT=3745,
           ADAPTER=TYPE7,
           UNITADD=02,
           ADDRESS=(xxx,1)      * xxx must match the CUADDR of
*                                 a PCCU in NCP, when requested
*************************************************************
```

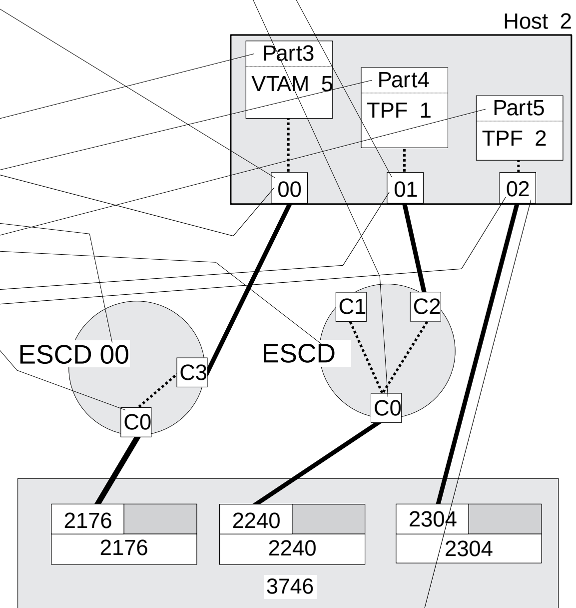
```
*********************************************************
* CHPID 02
*********************************************************
  CNTLUNIT CUNUMBR=_____,
           UNITADD=((01,1)),
            PATH=(02),
            LINK=C0,
            UNIT=3745
*
  IODEVICE CUNUMBR=____,     * Same as CNTLUNIT
                             * CUNUMBR
           UNIT=3745,
           ADAPTER=TYPE7,
           UNITADD=01,
           ADDRESS=(xxx,1)   * xxx must match the
                             * CUADDR of
                             * a PCCU in NCP,
*                              when requested
```

Example 7: IOCP Macros for Host 2

```
*************************************************************
* CHPID 00
*************************************************************
*
  CNTLUNIT CUNMBR=_____,
           UNITADD=((01,1)),
            PATH=(00),
            LINK=C0,
            UNIT=3745
*
  IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
           UNIT=3745
           ADAPTER=TYPE7,
           UNITADD=01,
           PARTITION=PART3,
           ADDRESS=(xxx,1)       * xxx must match the CUADDR of
*                                  a PCCU in NCP, when requested
```

```
*************************************************************
* CHPID 01
*************************************************************
*
  CNTLUNIT CUNMBR=_____,
           UNITADD=((01,1)),
            PATH=(01),
            LINK=C0,
            UNIT=3745
*
  IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
           UNIT=3745
           ADAPTER=TYPE7,
           UNITADD=01,
           PARTITION=PART4,
           ADDRESS=(xxx,1)       * xxx must match the CUADDR of
*                                  a PCCU in NCP, when requested
```

```
*************************************************************
* IOCP ESCON  GENERATION SUBSET
* FOR HOST 2
*************************************************************
      CHPID PATH=((00)), SWITCH=00, TYPE=CNC,
               PARTITION=(PART3,REC)
      CHPID PATH=((01)), SWITCH=01, TYPE=CNC,
               PARTITION=(PART4,REC)
      CHPID PATH=((02)), TYPE=CNC, PARTITION=(PART5,REC)
```




```
*************************************************************
* CHPID 02
*************************************************************
*
  CNTLUNIT CUNMBR=_____,
           UNITADD=((01,1)),
            PATH=(02),
            UNIT=3745
*
  IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
           UNIT=3745
           ADAPTER=TYPE7,
           UNITADD=01,
           PARTITION=PART5,
           ADDRESS=(xxx,1)       * xxx must match the CUADDR of
*                                  a PCCU in NCP, when requested
```

CCM Worksheets for Example 7

Example 7: ESCON Port Configuration

Port number: _2176_	
Network:	□ *APPN* □ IP √ SNA Subarea
Name	_PL2176_
Fiber Status	√ *Enable* □ Transmit OLS □ Disable
Port name APPN	__________ alphanumeric characters
Port name IP	__________ alphanumeric characters
Automatic Reactivation	√ *Yes* □ No
NPA eligible	□ Yes □ No
IP maximum transmission unit	__________bytes (524-4100, default: *2060*)
Port attached to an ESCD?	√ *Single* □ Chained □ None
ESCD number	_0_ hexadecimal (default: *0*)
ESCD Model	√ *9032* □ 9033 □ OEM
Control Unit Link Address (LINK)	_C0_ hexadecimal (default: *80*)

Example 7: ESCON Port – Host Link Configuration

Port number: *2176*	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	*HL012176* (alphanumeric characters)
Host Link Name (IP)	____________ (alphanumeric characters)
Host mode?	□ *Basic* √ LPAR □ EMIF
Host name	*HOST1* (alphanumeric characters)
Partition name	*PART1* (alphanumeric characters)
CHPID	*0* hexadecimal (default: *0*)
Partition number	□ *Dynamic* □ Defined If defined: ________hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: *C1* hexadecimal (default: *80*)

Example 7: ESCON Port – Station Configuration

Port number: *2176* **Port name :** *PL2176* **Host link name:** __________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	__________________ (alphanumeric characters)
PU type	□ 1 □ *2.1* √ 5
Unit address (UA)	*2* hexadecimal (default: *1*)
IPL through that station	√ *Yes* □ No
On which CCU	√ *CCU-A* □ CCU-B
IP address:	__________________ (IP dotted notation)
IP subnet mask:	__________________ (IP dotted notation)
Comments	*VTAM1* __________________

Example 7: ESCON Port – Station Configuration

Port number: _2176_______ **Port name :** _PL2176_____ **Host link name:** ___________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	____________________ (alphanumeric characters)
PU type	□ 1 □ *2.1* √ 5
Unit address (UA)	_*4*__________hexadecimal (default: *1*)
IPL through that station	√ *Yes* □ No
On which CCU	□ *CCU-A* √ CCU-B
IP address:	____________________ (IP dotted notation)
IP subnet mask:	____________________ (IP dotted notation)
Comments	_*VTAM1*______________ ____________________

Example 7: ESCON Port – Host Link Configuration

Port number: _*2176*____	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	________________ (alphanumeric characters)
Host Link Name (IP)	__________________ (alphanumeric characters)
Host mode?	□ *Basic* √ LPAR □ EMIF
Host name	_*HOST1*____________ (alphanumeric characters)
Partition name	_*PART2*____________ (alphanumeric characters)
CHPID	_*1*________hexadecimal (default: *0*)
Partition number	□ *Dynamic* □ Defined If defined: _________hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: _*C2*______hexadecimal (default: *80*)

Example 7: ESCON Port – Station Configuration

Port number: _*2176*_____ **Port name :** _*PL2176*____ **Host link name:** __________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	____________________ (alphanumeric characters)
PU type	□ 1 √ *2.1* □ 5
Unit address (UA)	_*2*_________hexadecimal (default: *1*)
IPL through that station	□ *Yes* □ No
On which CCU	√ *CCU-A* □ CCU-B
IP address:	____________________ (IP dotted notation)
IP subnet mask:	____________________ (IP dotted notation)
Comments	_*VTAM3*____________ ____________________

Example 7: ESCON Port – Host Link Configuration

Port number: _*2176*_	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	____________________ (alphanumeric characters)
Host Link Name (IP)	______________________ (alphanumeric characters)
Host mode?	□ *Basic* √ LPAR □ EMIF
Host name	_*HOST2*_____________ (alphanumeric characters)
Partition name	_*PART3*_____________ (alphanumeric characters)
CHPID	_*0*________hexadecimal (default: *0*)
Partition number	□ *Dynamic* □ Defined If defined: __________hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: _*C3*_______hexadecimal (default: *80*)

Example 7: ESCON Port – Station Configuration

Port number: _2176_ **Port name :** _PL2176_ **Host link name:** ________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	________________ (alphanumeric characters)
PU type	□ 1 □ *2.1* √ 5
Unit address (UA)	_1_ hexadecimal (default: *1*)
IPL through that station	√ *Yes* □ No
On which CCU	□ *CCU-A* √ CCU-B
IP address:	________________ (IP dotted notation)
IP subnet mask:	________________ (IP dotted notation)
Comments	_VTAM5_ ________________

Example 7: ESCON Port Configuration

Port number: *2240*	
Network:	□ *APPN* □ IP √ SNA Subarea
Name	*PL2240*
Fiber Status	√ *Enable* □ Transmit OLS □ Disable
Port name APPN	________ alphanumeric characters
Port name IP	________ alphanumeric characters
Automatic Reactivation	□ *Yes* □ No
NPA eligible	□ Yes □ No
Port attached to an ESCD?	√ *Single* □ Chained □ None
ESCD number	*1* hexadecimal (default: *0*)
ESCD Model	□ *9032* √ 9033 □ OEM
Control Unit Link Address (LINK)	*C0* hexadecimal (default: *80*)

Example 7: ESCON Port – Host Link Configuration

Port number: *2240*	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	____________________ (alphanumeric characters)
Host Link Name (IP)	____________________ (alphanumeric characters)
Host mode?	□ *Basic* √ LPAR □ EMIF
Host name	*HOST1* (alphanumeric characters)
Partition name	*PART2* (alphanumeric characters)
CHPID	*2* hexadecimal (default: *0*)
Partition number	□ *Dynamic* □ Defined If defined: __________hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: *C1* hexadecimal (default: *80*)

Example 7: ESCON Port – Station Configuration

Port number: _2240_____ **Port name :** _PL2240____ **Host link name:** __________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	____________________ (alphanumeric characters)
PU type	□ 1 √ *2.1* □ 5
Unit address (UA)	_*1*_________hexadecimal (default: *1*)
IPL through that station	□ *Yes* □ No
On which CCU	√ *CCU-A* □ CCU-B
IP address:	____________________ (IP dotted notation)
IP subnet mask:	____________________ (IP dotted notation)
Comments	_*VTAM3*____________ ____________________

Example 7: ESCON Port – Host Link Configuration

Port number: _2240_	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	____________________ (alphanumeric characters)
Host Link Name (IP)	______________________ (alphanumeric characters)
Host mode?	□ *Basic* √ LPAR □ EMIF
Host name	_HOST2_ (alphanumeric characters)
Partition name	_PART4_ (alphanumeric characters)
CHPID	_1_ hexadecimal (default: *0*)
Partition number	□ *Dynamic* □ Defined If defined: __________hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: _C2_ hexadecimal (default: *80*)

Example 7: ESCON Port – Station Configuration

Port number: _2240_____ **Port name :** _PL2240____ **Host link name:** __________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	□ VTAM √ TPF
Name:	____________________ (alphanumeric characters)
PU type	□ 1 √ *2.1* □ 5
Unit address (UA)	_*1*_________hexadecimal (default: *1*)
IPL through that station	□ *Yes* √ No
On which CCU	√ *CCU-A* □ CCU-B
IP address:	____________________ (IP dotted notation)
IP subnet mask:	____________________ (IP dotted notation)
Comments	_*TPF1*_______________ ____________________

Example 7: ESCON Port Configuration

Port number: _2304_	
Network:	□ *APPN* □ IP √ SNA Subarea
Name	_PL2304_
Fiber Status	√ *Enable* □ Transmit OLS □ Disable
Port name APPN	________ alphanumeric characters
Port name IP	________ alphanumeric characters
Automatic Reactivation	□ *Yes* □ No
NPA eligible	□ Yes □ No
Port attached to an ESCD?	□ *Single* □ Chained √ None
ESCD number	________hexadecimal (default: *0*)
ESCD Model	□ *9032* □ 9033 □ OEM
Control Unit Link Address (LINK)	________hexadecimal (default: *80*)

Example 7: ESCON Port – Host Link Configuration

Port number: _2304_	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	____________________ (alphanumeric characters)
Host Link Name (IP)	____________________ (alphanumeric characters)
Host mode?	□ *Basic* √ LPAR □ EMIF
Host name	_HOST2_ (alphanumeric characters)
Partition name	_PART5_ (alphanumeric characters)
CHPID	_2_ hexadecimal (default: *0*)
Partition number	□ *Dynamic* □ Defined If defined: __________hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* □ Defined If defined: __________hexadecimal (default: *80*)

Example 7: ESCON Port – Station Configuration

Port number: _*2304*_ **Port name :** _*PL2304*_ **Host link name:** ________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	□ VTAM √ TPF
Name:	________ (alphanumeric characters)
PU type	□ 1 √ *2.1* □ 5
Unit address (UA)	_*1*_ hexadecimal (default: *1*)
IPL through that station	□ *Yes* √ No
On which CCU	□ *CCU-A* √ CCU-B
IP address:	________ (IP dotted notation)
IP subnet mask:	________ (IP dotted notation)
Comments	_*TPF2*_ ________

NCP Output File for Example 7 This example is for a twin CCU configuration with two ESCDs and two hosts, each with partitions (with LPARs).

For CCU A

```
********************************************************************
*  ESCON PHYSICAL DEFINITION FOR ALL ESCP RESOURCES                *
********************************************************************
*
________ GROUP LNCTL=CA
*
********************************************************************
*  ESCON PHYSICAL DEFINITION: ESCP 2176                            *
********************************************************************
*
________ LINE ADDRESS=2176
*
PU2176   PU ANS=CONT,                * PU label must match PHYSRSC X
               XMONLNK=YES,                                        X
               PUTYPE=1
*
********************************************************************
*  ESCON PHYSICAL DEFINITION: ESCP 2240                            *
********************************************************************
*
________ LINE ADDRESS=2240
*
PU2240   PU ANS=CONT,                * PU label must match PHYSRSC X
               XMONLNK=YES,                                        X
               PUTYPE=1
*
********************************************************************
*  ESCON LOGICAL DEFINITION: ESCP 2176                             *
********************************************************************
*
________ GROUP LNCTL=CA,                                           X
               PHYSRSC=PU2176         * Must match PU label
*                                       of 2176 physical definition
*
********************************************************************
*  ESCP 2176  ESCC 2176  HOST/PART: HOST 1/PARTITION 1  HOST LINK 1
********************************************************************
*
________ LINE HOSTLINK=1,                                          X
               MAXPU=16,                                           X
               MONLINK=CONT
________ PU   PUTYPE=5,                                            X
               ADDR=02,                                            X
               MONLINK=YES,                                        X
               ANS=CONT
*
********************************************************************
```

```
*********************************************************************
*  ESCP 2176  ESCC 2176  HOST/PART: HOST 1/PARTITION 2  HOST LINK 2
*********************************************************************
*
________ LINE HOSTLINK=2,                                           X
               MAXPU=16,                                            X
               MONLINK=CONT
________ PU   PUTYPE=2,                                             X
               ADDR=02,                                             X
               ANS=CONT    * You can change CONT to STOP
*                            if needed
*
*********************************************************************
*  ESCP 2176  ESCC 2176  HOST/PART: HOST 2/PARTITION 3  HOST LINK 3
*********************************************************************
*
________ LINE HOSTLINK=3,                                           X
               MAXPU=16
*
*********************************************************************
*  ESCON LOGICAL DEFINITION: ESCP 2240                              *
*********************************************************************
*
________ GROUP LNCTL=CA,                                            X
               PHYSRSC=PU2240         * Must match PU label
*                                       of 2240 physical definition
*
*********************************************************************
*  ESCP 2240  ESCC 2240  HOST/PART: HOST 1/PARTITION 2  HOST LINK 1
*********************************************************************
*
________ LINE HOSTLINK=1,                                           X
               MAXPU=16
________ PU   PUTYPE=2,                                             X
               ADDR=01,                                             X
               ANS=CONT    * You can change CONT to STOP
*                            if needed
*
*********************************************************************
*  ESCP 2240  ESCC 2240  HOST/PART: HOST 2/PARTITION 4  HOST LINK 2
*********************************************************************
*
________ LINE HOSTLINK=2,                                           X
               MAXPU=16,                                            X
               MONLINK=CONT
________ PU   PUTYPE=5,                                             X
               ADDR=01,                                             X
               MONLINK=YES,                                         X
               ANS=CONT
*
*
*********************************************************************
```

For CCU B

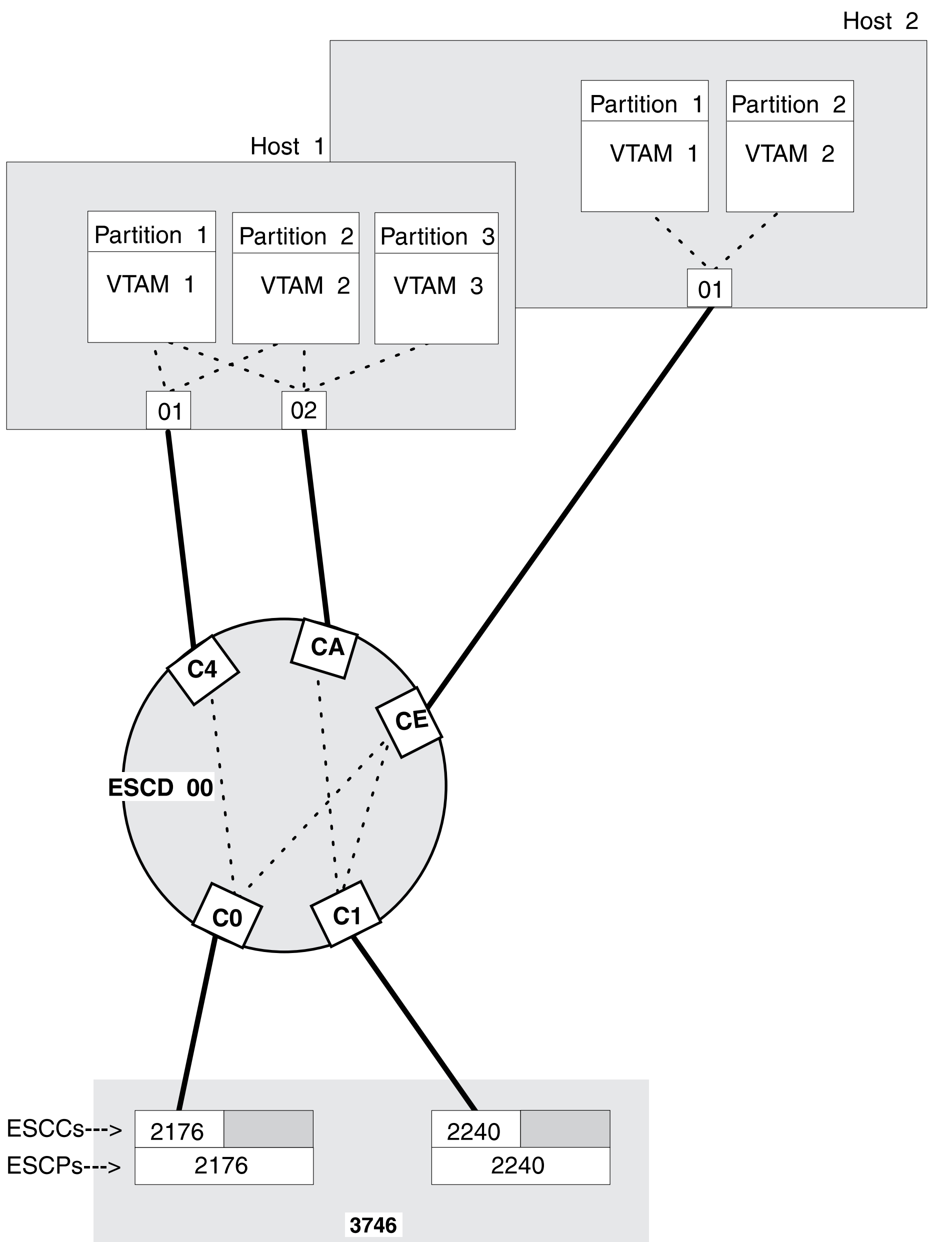
```
**********************************************************************
*  ESCON PHYSICAL DEFINITION FOR ALL ESCP RESOURCES                  *
**********************************************************************
*
________ GROUP LNCTL=CA
*
**********************************************************************
*  ESCON PHYSICAL DEFINITION: ESCP 2176                              *
**********************************************************************
*
________ LINE ADDRESS=2176
*
PU2176   PU ANS=CONT,                * PU label must match PHYSRSC X
               XMONLNK=YES,                                        X
               PUTYPE=1
*
**********************************************************************
*  ESCON PHYSICAL DEFINITION: ESCP 2304                              *
**********************************************************************
*
________ LINE ADDRESS=2304
*
PU2304   PU ANS=CONT,                * PU label must match PHYSRSC X
               PUTYPE=1
*
**********************************************************************
*  ESCON LOGICAL DEFINITION: ESCP 2176                               *
**********************************************************************
*
________ GROUP LNCTL=CA,                                           X
               PHYSRSC=PU2176         * Must match PU label
*                                       of 2176 physical definition
*
**********************************************************************
*  ESCP 2176  ESCC 2176  HOST/PART: HOST 1/PARTITION 1  HOST LINK 1
**********************************************************************
*
________ LINE HOSTLINK=1,                                          X
               MAXPU=16
*
**********************************************************************
```

```
**********************************************************************
*  ESCP 2176  ESCC 2176  HOST/PART: HOST 1/PARTITION 2  HOST LINK 2
**********************************************************************
*
________ LINE HOSTLINK=2,                                             X
               MAXPU=16
*
**********************************************************************
*  ESCP 2176  ESCC 2176  HOST/PART: HOST 1/PARTITION 3  HOST LINK 3
**********************************************************************
*
________ LINE HOSTLINK=3,                                             X
               MAXPU=16,                                              X
               MONLINK=CONT
________ PU   PUTYPE=5,                                               X
               ADDR=01,                                               X
               MONLINK=YES,                                           X
               ANS=CONT
*
**********************************************************************
*  ESCON LOGICAL DEFINITION: ESCP 2304                               *
**********************************************************************
*
________ GROUP LNCTL=CA,                                              X
               PHYSRSC=PU2304         * Must match PU label
*                                       of 2304 physical definition
**********************************************************************
*  ESCP 2304  ESCC 2304  HOST/PART: HOST 2/PARTITION 5  HOST LINK 1
**********************************************************************
*
________ LINE HOSTLINK=1,                                             X
               MAXPU=16
________ PU   PUTYPE=2,                                               X
               ADDR=01,                                               X
               ANS=CONT    * You can change CONT to STOP
*                            if needed
**********************************************************************
```

Example 8 (SNA)

The characteristics of this example are:

3746 model	900
Network type	SNA/subarea
CCU mode	Twin-dual
ESCD	One
Host mode	EMIF



Note: In this example, only one host link can be defined between an ESCC and a given partition. There is no possibility for an ESCC to access a partition by two different paths.

If a backup is required, a second logical link must be defined over another ESCC to access a partition by two different paths. In this example, VTAM 1 can be reached from either:

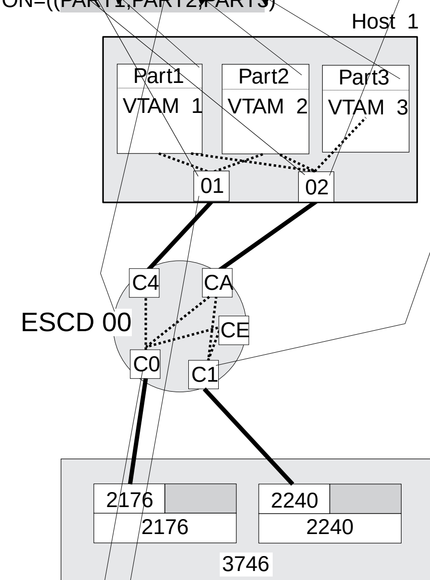
- ESCC 2176 via C0 → C4 → 01

or

- ESCC 2240 via C1 → CA → 02.

Example 8: IOCP Macros for Host 1

```
**************************************************************
* IOCP ESCON  GENERATION SUBSET
* FOR HOST 1
**************************************************************
        RESOURCE
PARTITION=((PART1,1),(PART2,2),(PART3,3))
        CHPID PATH=((01)), SWITCH=00, TYPE=CNC,SHARED
              PARTITION=(PART1,PART2)
        CHPID PATH=((02)), SWITCH=00, TYPE=CNC,SHARED
              PARTITION=((PART1,PART2,PART3)
```



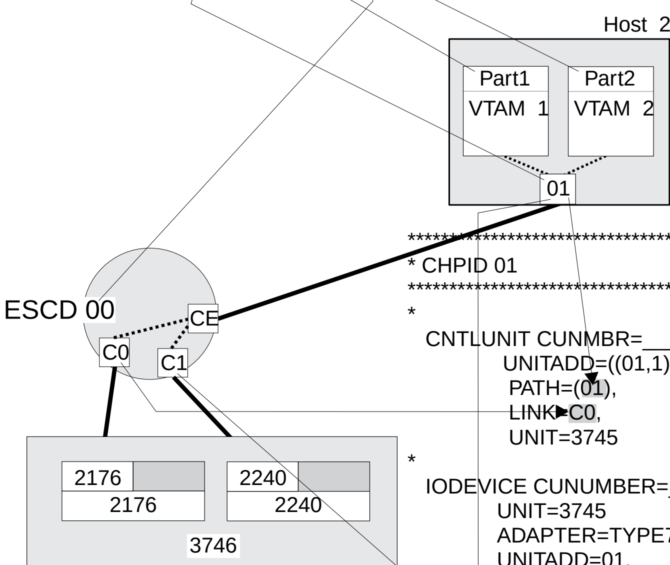

```
**************************************************************
* CHPID 01
**************************************************************
*
  CNTLUNIT CUNMBR=_____,
           UNITADD=((01,1)),
            PATH=(01),
            LINK=C0,
            UNIT=3745
*
  IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
          UNIT=3745
          ADAPTER=TYPE7,
          UNITADD=01,
          PARTITION=PART1,
          ADDRESS=(xxx,1)       * xxx must match the CUADDR of
*                                 a PCCU in NCP, when requested
 IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
          UNIT=3745
          ADAPTER=TYPE7,
          UNITADD=01,
          PARTITION=PART2,
          ADDRESS=(xxx,1)       * xxx must match the CUADDR of
*                                 a PCCU in NCP, when requested
**************************************************************
```

```
**************************************************************
* CHPID 02
**************************************************************
*
  CNTLUNIT CUNMBR=_____,
           UNITADD=((02,10)),
            PATH=(02),
            LINK=C1,
            UNIT=3745
*
  IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
          UNIT=3745
          ADAPTER=TYPE7,
          UNITADD=02,
          PARTITION=PART1,
          ADDRESS=(xxx,1)       * xxx must match the CUADDR of
*                                 a PCCU in NCP, when requested
*
 IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
          UNIT=3745
          ADAPTER=TYPE7,
          UNITADD=09,
          PARTITION=PART2,
          ADDRESS=(xxx,1)       * xxx must match the CUADDR of
*                                 a PCCU in NCP, when requested
*
 IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
          UNIT=3745
          ADAPTER=TYPE7,
          UNITADD=0B,
          PARTITION=PART3,
          ADDRESS=(xxx,1)       * xxx must match the CUADDR of
*                                 a PCCU in NCP, when requested
**************************************************************
```

Example 8: IOCP Macros for Host 2

```
************************************************************
* IOCP ESCON  GENERATION SUBSET
* FOR HOST 2
************************************************************
        RESOURCE PARTITION =((PART1,1),(PART2,2))

        CHPID PATH=((01)), SWITCH=00, TYPE=CNC, SHARED,
              PARTITION=(PART1,PART2)
```




```
************************************************************
* CHPID 01
************************************************************
*
  CNTLUNIT CUNMBR=_____,
           UNITADD=((01,1)),
            PATH=(01),
            LINK=C0,
            UNIT=3745
*
  IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
           UNIT=3745
           ADAPTER=TYPE7,
           UNITADD=01,
           PARTITION=PART1,
           ADDRESS=(xxx,1)      * xxx must match the CUADDR of
*                                 a PCCU in NCP, when requested
  CNTLUNIT CUNMBR=_____,
           UNITADD=((01,2)),
            PATH=(01),
            LINK=C1,
            UNIT=3745
*
  IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
           UNIT=3745
           ADAPTER=TYPE7,
           UNITADD=01,
           PARTITION=PART2,
           ADDRESS=(xxx,1)      * xxx must match the CUADDR of
                                * a PCCU in NCP, when requested
*
  IODEVICE CUNUMBER=____, * Same as CNTLUNIT CUNUMBR
           UNIT=3745
           ADAPTER=TYPE7,
           UNITADD=02,
           PARTITION=PART1,
           ADDRESS=(xxx,1)      * xxx must match the CUADDR of
*                                 a PCCU in NCP, when requested
************************************************************
```

CCM Worksheets for Example 8

Example 8: ESCON Port Configuration

Port number: _2176_	
Network:	☐ *APPN* ☐ IP √ SNA Subarea
Name	_PL2176_
Fiber Status	√ *Enable* ☐ Transmit OLS ☐ Disable
Port name APPN	________ alphanumeric characters
Port name IP	________ alphanumeric characters
Automatic Reactivation	☐ *Yes* ☐ No
NPA eligible	☐ Yes ☐ No
Port attached to an ESCD?	√ *Single* ☐ Chained ☐ None
ESCD number	_0_ hexadecimal (default: *0*)
ESCD Model	√ *9032* ☐ 9033 ☐ OEM
Control Unit Link Address (LINK)	_C0_ hexadecimal (default: *80*)

Example 8: ESCON Port – Host Link Configuration

Port number: *2176*	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	________________ (alphanumeric characters)
Host Link Name (IP)	________________ (alphanumeric characters)
Host mode?	□ *Basic* □ LPAR √ EMIF
Host name	*HOST1* (alphanumeric characters)
Partition name	*PART1* (alphanumeric characters)
CHPID	*1* hexadecimal (default: *0*)
Partition number	□ *Dynamic* √ Defined If defined: *1* hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: *C4* hexadecimal (default: *80*)

Example 8: ESCON Port – Station Configuration

Port number: _*2176*_ **Port name :** _*PL2176*_ **Host link name:** __________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	____________________ (alphanumeric characters)
PU type	□ 1 □ *2.1* √ 5
Unit address (UA)	_*1*_________hexadecimal (default: *1*)
IPL through that station	√ *Yes* □ No
On which CCU	√ *CCU-A* □ CCU-B
IP address:	____________________ (IP dotted notation)
IP subnet mask:	____________________ (IP dotted notation)
Comments	_*VTAM1*_ ____________________

Example 8: ESCON Port – Host Link Configuration

Port number: _*2176*_	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	____________________ (alphanumeric characters)
Host Link Name (IP)	______________________ (alphanumeric characters)
Host mode?	□ *Basic* □ LPAR √ EMIF
Host name	_*HOST1*_______________ (alphanumeric characters)
Partition name	_*PART2*_______________ (alphanumeric characters)
CHPID	_*1*_________hexadecimal (default: *0*)
Partition number	□ *Dynamic* √ Defined If defined: _*2*________hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: _*C4*________hexadecimal (default: *80*)

Example 8: ESCON Port – Station Configuration

Port number: _*2176*______ **Port name :** _*PL2176*_____ **Host link name:** __________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	___________________ (alphanumeric characters)
PU type	□ 1 □ *2.1* √ 5
Unit address (UA)	_*1*_________hexadecimal (default: *1*)
IPL through that station	√ *Yes* □ No
On which CCU	√ *CCU-A* □ CCU-B
IP address:	___________________ (IP dotted notation)
IP subnet mask:	___________________ (IP dotted notation)
Comments	_*VTAM2*_____________ ___________________

Example 8: ESCON Port – Host Link Configuration

Port number: _*2176*_	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	____________ (alphanumeric characters)
Host Link Name (IP)	____________ (alphanumeric characters)
Host mode?	□ *Basic* □ LPAR √ EMIF
Host name	_*HOST2*_ (alphanumeric characters)
Partition name	_*PART1*_ (alphanumeric characters)
CHPID	_*1*_ hexadecimal (default: *0*)
Partition number	□ *Dynamic* √ Defined If defined: _*1*_ hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: _*CE*_ hexadecimal (default: *80*)

Example 8: ESCON Port – Station Configuration

Port number: _*2176*_ **Port name :** _*PL2176*_ **Host link name:** ________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	________________ (alphanumeric characters)
PU type	□ 1 √ *2.1* □ 5
Unit address (UA)	_*1*_ hexadecimal (default: *1*)
IPL through that station	□ *Yes* □ No
On which CCU	□ *CCU-A* √ CCU-B
IP address:	________________ (IP dotted notation)
IP subnet mask:	________________ (IP dotted notation)
Comments	_*VTAM1*_ ________________

Example 8: ESCON Port Configuration

Port number: *2240*	
Network:	□ *APPN* □ IP √ SNA Subarea
Name	*PL2240*
Fiber Status	√ *Enable* □ Transmit OLS □ Disable
Port name APPN	______ alphanumeric characters
Port name IP	______ alphanumeric characters
Automatic Reactivation	□ *Yes* □ No
NPA eligible	□ Yes □ No
Port attached to an ESCD?	√ *Single* □ Chained □ None
ESCD number	*0* hexadecimal (default: *0*)
ESCD Model	√ *9032* □ 9033 □ OEM
Control Unit Link Address (LINK)	*C1* hexadecimal (default: *80*)

Example 8: ESCON Port – Host Link Configuration

Port number: _*2240*_	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	________________ (alphanumeric characters)
Host Link Name (IP)	________________ (alphanumeric characters)
Host mode?	□ *Basic* □ LPAR √ EMIF
Host name	_*HOST1*_ (alphanumeric characters)
Partition name	_*PART2*_ (alphanumeric characters)
CHPID	_*2*_ hexadecimal (default: *0*)
Partition number	□ *Dynamic* √ Defined If defined: _*2*_ hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: _*CA*_ hexadecimal (default: *80*)

Example 8: ESCON Port – Station Configuration

Port number: _2240_ **Port name :** _PL2240_ **Host link name:** _HL012240_	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	____________________ (alphanumeric characters)
PU type	□ 1 □ *2.1* √ 5
Unit address (UA)	_9_ hexadecimal (default: *1*)
IPL through that station	□ *Yes* √ No
On which CCU	□ *CCU-A* √ CCU-B
IP address:	____________________ (IP dotted notation)
IP subnet mask:	____________________ (IP dotted notation)
Comments	_VTAM2_ ____________________

Example 8: ESCON Port – Host Link Configuration

Port number: *2240*	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	________________ (alphanumeric characters)
Host Link Name (IP)	________________ (alphanumeric characters)
Host mode?	□ *Basic* □ LPAR √ EMIF
Host name	*HOST1* (alphanumeric characters)
Partition name	*PART1* (alphanumeric characters)
CHPID	*2* hexadecimal (default: *0*)
Partition number	□ *Dynamic* √ Defined If defined: *1* hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: *CA* hexadecimal (default: *80*)

Example 8: ESCON Port – Station Configuration

Port number: _2240_ **Port name :** _PL2240_ **Host link name:** ________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	________________ (alphanumeric characters)
PU type	□ 1 √ *2.1* □ 5
Unit address (UA)	_2_ hexadecimal (default: *1*)
IPL through that station	□ *Yes* □ No
On which CCU	√ *CCU-A* □ CCU-B
IP address:	________________ (IP dotted notation)
IP subnet mask:	________________ (IP dotted notation)
Comments	_VTAM1_ ________________

Example 8: ESCON Port – Host Link Configuration

Port number: *2240*	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	____________ (alphanumeric characters)
Host Link Name (IP)	____________ (alphanumeric characters)
Host mode?	□ *Basic* □ LPAR √ EMIF
Host name	*HOST1* (alphanumeric characters)
Partition name	*PART3* (alphanumeric characters)
CHPID	*2* hexadecimal (default: *0*)
Partition number	□ *Dynamic* √ Defined If defined: *3* hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: *CA* hexadecimal (default: *80*)

Example 8: ESCON Port – Station Configuration

Port number: *2240* **Port name :** *PL2240* **Host link name:** ________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	________ (alphanumeric characters)
PU type	□ 1 □ *2.1* √ 5
Unit address (UA)	*B* hexadecimal (default: *1*)
IPL through that station	√ *Yes* □ No
On which CCU	√ *CCU-A* □ CCU-B
IP address:	________ (IP dotted notation)
IP subnet mask:	________ (IP dotted notation)
Comments	*VTAM3* ________

Example 8: ESCON Port – Host Link Configuration

Port number: *2240*	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	__________________ (alphanumeric characters)
Host Link Name (IP)	____________________ (alphanumeric characters)
Host mode?	□ *Basic* □ LPAR √ EMIF
Host name	*HOST2* (alphanumeric characters)
Partition name	*PART1* (alphanumeric characters)
CHPID	*1* hexadecimal (default: *0*)
Partition number	□ *Dynamic* √ Defined If defined: *1* hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: *CE* hexadecimal (default: *80*)

Example 8: ESCON Port – Station Configuration

Port number: _2240_______ **Port name :** _PL2240_____ **Host link name:** __________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	____________________ (alphanumeric characters)
PU type	□ 1 □ *2.1* √ 5
Unit address (UA)	_*2*_________hexadecimal (default: *1*)
IPL through that station	□ *Yes* √ No
On which CCU	√ *CCU-A* □ CCU-B
IP address:	____________________ (IP dotted notation)
IP subnet mask:	____________________ (IP dotted notation)
Comments	_*VTAM1*______________ ____________________

Example 8: ESCON Port – Host Link Configuration

Port number: *2240*	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Host Link Name (APPN)	________________ (alphanumeric characters)
Host Link Name (IP)	________________ (alphanumeric characters)
Host mode?	□ *Basic* □ LPAR √ EMIF
Host name	*HOST2* (alphanumeric characters)
Partition name	*PART2* (alphanumeric characters)
CHPID	*1* hexadecimal (default: *0*)
Partition number	□ *Dynamic* √ Defined If defined: *2* hexadecimal (default: *1*)
Host Link Address (HLA)	□ *Dynamic* √ Defined If defined: *CE* hexadecimal (default: *80*)

Example 8: ESCON Port – Station Configuration

Port number: _2240_ **Port name :** _PL2240_ **Host link name:** ___________	
Network	□ *APPN (A)* □ IP (I) √ SNA/Subarea (S)
Access Method	√ VTAM □ TPF
Name:	____________________ (alphanumeric characters)
PU type	□ 1 √ *2.1* □ 5
Unit address (UA)	_1_ hexadecimal (default: *1*)
IPL through that station	□ *Yes* √ No
On which CCU	√ *CCU-A* □ CCU-B
IP address:	____________________ (IP dotted notation)
IP subnet mask:	____________________ (IP dotted notation)
Comments	_VTAM2_ ____________________

NCP Output File for Example 8 This example is for a twin CCU configuration with one ESCD and two hosts, each with partitions using EMIF.

For CCU A

```
********************************************************************
*  ESCON PHYSICAL DEFINITION FOR ALL ESCP RESOURCES                *
********************************************************************
*
________ GROUP LNCTL=CA
*
********************************************************************
*  ESCON PHYSICAL DEFINITION: ESCP 2176                            *
********************************************************************
*
________ LINE ADDRESS=2176
*
PU2176   PU ANS=CONT,                * PU label must match PHYSRSC X
               XMONLNK=YES,                                        X
               PUTYPE=1
*
********************************************************************
*  ESCON PHYSICAL DEFINITION: ESCP 2240                            *
********************************************************************
*
________ LINE ADDRESS=2240
*
PU2240   PU ANS=CONT,                * PU label must match PHYSRSC X
               XMONLNK=YES,                                        X
               PUTYPE=1
*
********************************************************************
*  ESCON LOGICAL DEFINITION: ESCP 2176                             *
********************************************************************
*
________ GROUP LNCTL=CA,                                           X
               PHYSRSC=PU2176         * Must match PU label
*                                       of 2176 physical definition
*
********************************************************************
*  ESCP 2176  ESCC 2176  HOST/PART: HOST 1/PARTITION 1  HOST LINK 1
********************************************************************
*
________ LINE HOSTLINK=1,                                          X
               MAXPU=16,                                           X
               MONLINK=CONT
________ PU   PUTYPE=5,                                            X
               ADDR=01,                                            X
               MONLINK=YES,                                        X
               ANS=CONT
*
********************************************************************
```

```
**********************************************************************
*  ESCP 2176  ESCC 2176  HOST/PART: HOST 1/PARTITION 2  HOST LINK 2
**********************************************************************
*
________ LINE HOSTLINK=2,                                             X
              MAXPU=16,                                               X
              MONLINK=CONT
*
________ PU   PUTYPE=5,                                               X
              ADDR=01,                                                X
              MONLINK=YES,                                            X
              ANS=CONT
*
**********************************************************************
*  ESCP 2176  ESCC 2176  HOST/PART: HOST 2/PARTITION 1  HOST LINK 3
**********************************************************************
*
________ LINE HOSTLINK=3,                                             X
              MAXPU=16,                                               X
*
**********************************************************************
*  ESCON LOGICAL DEFINITION: ESCP 2240                                *
**********************************************************************
*
________ GROUP LNCTL=CA,                                              X
              PHYSRSC=PU2240        * Must match PU label
*                                     of 2240 physical definition
*
**********************************************************************
*  ESCP 2240  ESCC 2240  HOST/PART: HOST 1/PARTITION 2  HOST LINK 1
**********************************************************************
*
________ LINE HOSTLINK=1,                                             X
              MAXPU=16,                                               X
              MONLINK=CONT
*
**********************************************************************
*  ESCP 2240  ESCC 2240  HOST/PART: HOST 1/PARTITION 1  HOST LINK 2
**********************************************************************
*
________ LINE HOSTLINK=2,                                             X
              MAXPU=16
*
________ PU   PUTYPE=2,                                               X
              ADDR=02,                                                X
              ANS=CONT
*
**********************************************************************
```

```
*********************************************************************
*  ESCP 2240  ESCC 2240  HOST/PART: HOST 1/PARTITION 3  HOST LINK 3
*********************************************************************
*
________ LINE HOSTLINK=3,                                              X
               MAXPU=16,                                               X
               MONLINK=CONT
*
________ PU   PUTYPE=5,                                                X
               ADDR=0B,                                                X
               MONLINK=YES,                                            X
               ANS=CONT
*
*********************************************************************
*  ESCP 2240  ESCC 2240  HOST/PART: HOST 2/PARTITION 1  HOST LINK 4
*********************************************************************
*
________ LINE HOSTLINK=4,                                              X
               MAXPU=16,                                               X
               MONLINK=CONT
*
________ PU   PUTYPE=5,                                                X
               ADDR=02,                                                X
               MONLINK=YES,                                            X
               ANS=CONT
*
*********************************************************************
*  ESCP 2240  ESCC 2240  HOST/PART: HOST 2/PARTITION 2  HOST LINK 5
*********************************************************************
*
________ LINE HOSTLINK=5,                                              X
               MAXPU=16
*
________ PU   PUTYPE=5,                                                X
               ADDR=01,                                                X
               MONLINK=YES,                                            X
               ANS=CONT    * You can change CONT to STOP if needed
*
*********************************************************************
```

For CCU B

```
*********************************************************************
*  ESCON PHYSICAL DEFINITION FOR ALL ESCP RESOURCES                 *
*********************************************************************
*
________ GROUP LNCTL=CA
*
*********************************************************************
*  ESCON PHYSICAL DEFINITION: ESCP 2176                             *
*********************************************************************
*
________ LINE ADDRESS=2176
*
PU2176   PU ANS=CONT,               * PU label must match PHYSRSC X
               XMONLNK=YES,                                      X
               PUTYPE=1
*
*********************************************************************
*  ESCON PHYSICAL DEFINITION: ESCP 2240                             *
*********************************************************************
*
________ LINE ADDRESS=2240
*
PU2240   PU ANS=CONT,               * PU label must match PHYSRSC X
               XMONLNK=YES,                                      X
               PUTYPE=1
*
*********************************************************************
*  ESCON LOGICAL DEFINITION: ESCP 2176                              *
*********************************************************************
*
________ GROUP LNCTL=CA,                                         X
               PHYSRSC=PU2176        * Must match PU label
*                                      of 2176 physical definition
*
*********************************************************************
*  ESCP 2176  ESCC 2176  HOST/PART: HOST 1/PARTITION 1  HOST LINK 1
*********************************************************************
*
________ LINE HOSTLINK=1,                                        X
               MAXPU=16,                                         X
               MONLINK=CONT
*
*********************************************************************
*  ESCP 2176  ESCC 2176  HOST/PART: HOST 1/PARTITION 2  HOST LINK 2
*********************************************************************
*
________ LINE HOSTLINK=2,                                        X
               MAXPU=16,                                         X
               MONLINK=CONT
*
*********************************************************************
*  ESCP 2176  ESCC 2176  HOST/PART: HOST 2/PARTITION 1  HOST LINK 3
*********************************************************************
*
________ LINE HOSTLINK=3,                                        X
               MAXPU=16
*
________ PU   PUTYPE=2,                                           X
               ADDR=01,                                           X
               ANS=CONT    * You can change CONT to STOP if needed
*
*********************************************************************
```

```
**********************************************************************
*  ESCON LOGICAL DEFINITION: ESCP 2240                               *
**********************************************************************
*
________ GROUP LNCTL=CA,                                             X
               PHYSRSC=PU2240         * Must match PU label
*                                       of 2240 physical definition
*
**********************************************************************
*  ESCP 2240  ESCC 2240  HOST/PART: HOST 1/PARTITION 2  HOST LINK 1
**********************************************************************
*
________ LINE HOSTLINK=1,                                            X
               MAXPU=16,                                             X
               MONLINK=CONT
*
________ PU   PUTYPE=5,                                              X
               ADDR=09,                                              X
               MONLINK=YES,                                          X
               ANS=CONT
*
**********************************************************************
*  ESCP 2240  ESCC 2240  HOST/PART: HOST 1/PARTITION 1  HOST LINK 2
**********************************************************************
*
________ LINE HOSTLINK=2,                                            X
               MAXPU=16,                                             X
               MONLINK=CONT
*
**********************************************************************
*  ESCP 2240  ESCC 2240  HOST/PART: HOST 1/PARTITION 3  HOST LINK 3
**********************************************************************
*
________ LINE HOSTLINK=3,                                            X
               MAXPU=16,                                             X
               MONLINK=CONT
*
**********************************************************************
*  ESCP 2240  ESCC 2240  HOST/PART: HOST 2/PARTITION 1  HOST LINK 4
**********************************************************************
*
________ LINE HOSTLINK=4,                                            X
               MAXPU=16,                                             X
               MONLINK=CONT
*
**********************************************************************
*  ESCP 2240  ESCC 2240  HOST/PART: HOST 2/PARTITION 2  HOST LINK 5
**********************************************************************
*
________ LINE HOSTLINK=5,                                            X
               MAXPU=16,                                             X
               MONLINK=CONT
*
**********************************************************************
```

An Invalid IOCP Configuration

The ESCON configuration defined in IOCP/HCD (each ESCA has a host links and logical link stations defined) in Figure 27-2 is:

Invalid If there is only *one* control unit and two separate paths to two ESCAs.

Valid If there is *two* control units and two separate paths to two ESCAs.

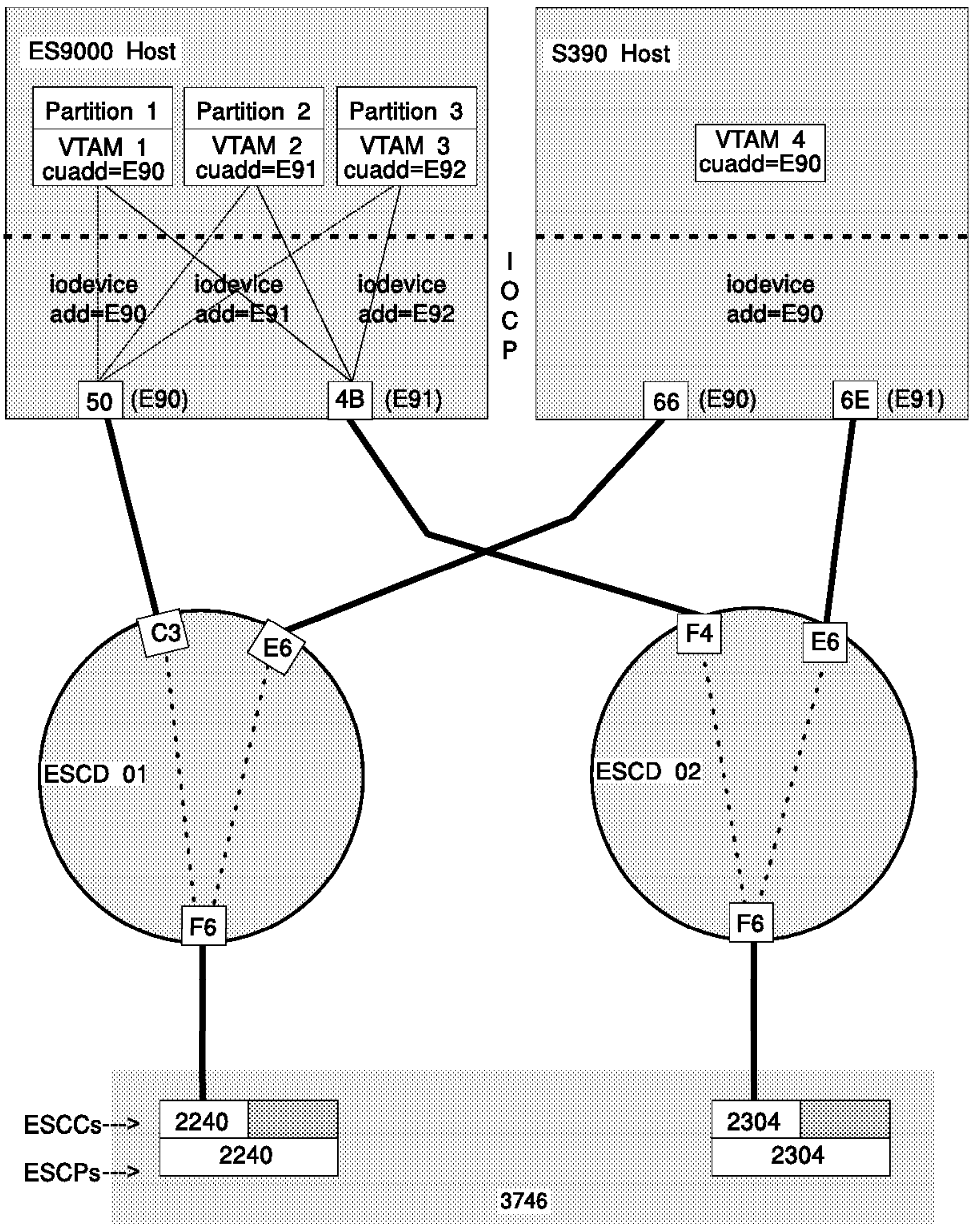


Figure 27-2. A Possibly Invalid ESCON Configuration

Invalid IOCP Definitions When the following IOCP definitions are used with the ESCON configuration in Figure 27-2 on page 27-109, the results are *invalid*.

```
****************************************************
*
*  INVALID IOCP WITH ONE LOGICAL CONTROL UNIT
*
***************************************************
*    ES9000 (EMIF)  3 LPARS
***************************************************
RESOURCE PARTITION=((PART1,1),(PART2,2),(PART3,3))
*
*
CHPID PATH=(4B),SHARED,
      PARTITION=((PART1,PART2,PART3),(PART1,PART2,PART3)),SWITCH=02,
      TYPE=CNC
CHPID PATH=(50),SHARED,
      PARTITION=((PART1,PART2,PART3),(PART1,PART2,PART3)),SWITCH=01,
      TYPE=CNC
*
*
CNTLUNIT CUNUMBR=0003,PATH=(4B,50),UNITADD=((01,004)),
      LINK=(F6,F6),UNIT=3745
IODEVICE ADDRESS=(E90,004),UNITADD=01,CUNUMBR=0003,STADET=Y,
      UNIT=3745
*
*
************************************************************************
*   S390 (BASIC)
************************************************************************
CHPID PATH=(66),SWITCH=01,TYPE=CNC
CHPID PATH=(6E),SWITCH=02,TYPE=CNC
*
CNTLUNIT CUNUMBR=0003,PATH=(66,6E),UNITADD=((01,004)),
      LINK=(F6,F6),UNIT=3745
IODEVICE ADDRESS=E93,UNITADD=01,CUNUMBR=0003,STADET=Y,
      UNIT=3745
************************************************************************
```

The problems with this type of IOCP definition are:

ES9000 (EMIF)

These definitions are invalid because two paths between the 3746 and the host (CNTLUNIT CUNUMBR=0003,PATH=(4B,50) and so on) are defined. This would be seen from VTAM as a multilink transmission group (TG), which is not supported over channel connections (only parallel TGs can be defined between VTAM and the 3746).

The PATH=(4B,50) statement tries to configure this unsupported multilink TG. This statement tries to assign device address E90 to LPAR 1 using CHPID 4B and 50. This would define two physical paths between the 3746 with only one control unit at the host LPAR.

S390 (BASIC)

These IOCP statements are invalid for the same reasons as in the ES9000 IOCP statements. There are two paths (66 and 6E) defined from the host to one control unit (CUNUMBR=0003) in the 3746 making an unsupported multilink TG.

Valid IOCP Definitions When the following IOCP definitions are used with the ESCON configuration in Figure 27-2 on page 27-109, the results are *valid*. It has as many CNTLUNIT statements (specifying a unique path to a CHPID) as ESCON station statements.

```
*-------------------------------------------------------------------*
*    ES9000 (EMIF) 3 LPARS                                          *
*-------------------------------------------------------------------*
         RESOURCE PARTITION=((PART1,1),(PART2,2),(PART3,3))
         CHPID PATH=((4B)),SWITCH=02,TYPE=CNC,SHARED,                  X
               PARTITION=(PART2,PART1,PART3)
         CHPID PATH=((50)),SWITCH=01,TYPE=CNC,SHARED,                  X
               PARTITION=(PART1,PART2,PART3)
*
*********************************************************************
*    CHPID 50                                                       *
*********************************************************************
*                                                                   *
         CNTLUNIT CUNUMBR=0003,                                        X
               UNITADD=((01,1)),                                       X
               PATH=(50),                                   X
               LINK=F6,                                                X
               UNIT=3745
*
         IODEVICE CUNUMBR=0003,         * Same as CNTLUNIT CUNUMBR *   X
               UNIT=3745,                                              X
               ADAPTER=TYPE7,                                          X
               UNITADD=01,                                             X
               ADDRESS=(E90,1)
*
         IODEVICE CUNUMBR=0003,         * Same as CNTLUNIT CUNUMBR *   X
               UNIT=3745,                                              X
               ADAPTER=TYPE7,                                          X
               UNITADD=01,                                             X
               ADDRESS=(E91,1)
*
         IODEVICE CUNUMBR=0003,         * Same as CNTLUNIT CUNUMBR *   X
               UNIT=3745,                                              X
               ADAPTER=TYPE7,                                          X
               UNITADD=01,                                             X
               ADDRESS=(E92,1)
*
*
*********************************************************************
*    CHPID 4B                                                       *
*********************************************************************
*                                                                   *
         CNTLUNIT CUNUMBR=0004,                                        X
               UNITADD=((01,1)),                                       X
               PATH=(4B),                                    X
               LINK=F6,                                                X
               UNIT=3745
*
         IODEVICE CUNUMBR=0004,         * Same as CNTLUNIT CUNUMBR *   X
               UNIT=3745,                                              X
               ADAPTER=TYPE7,                                          X
               UNITADD=01,                                             X
               ADDRESS=(E90,1)
```

```
*
        IODEVICE CUNUMBR=0004,        * Same as CNTLUNIT CUNUMBR *   X
              UNIT=3745,                                             X
              ADAPTER=TYPE7,                                         X
              UNITADD=01,                                            X
              ADDRESS=(E91,1)
*
        IODEVICE CUNUMBR=0004,        * Same as CNTLUNIT CUNUMBR *   X
              UNIT=3745,                                             X
              ADAPTER=TYPE7,                                         X
              UNITADD=01,                                            X
              ADDRESS=(E92,1)

*------------------------------------------------------------------*
*    S/390 (BASIC)                                                 *
*------------------------------------------------------------------*

        CHPID PATH=((66)),SWITCH=01,TYPE=CNC
        CHPID PATH=((6E)),SWITCH=02,TYPE=CNC
*
********************************************************************
*    CHPID 66                                                      *
********************************************************************
*                                                                  *
        CNTLUNIT CUNUMBR=0003,                                       X
              UNITADD=((01,1)),                                      X
              PATH=(66),                                   X
              LINK=F6,                                               X
              UNIT=3745
*
        IODEVICE CUNUMBR=0003,        * Same as CNTLUNIT CUNUMBR *   X
              UNIT=3745,                                             X
              ADAPTER=TYPE7,                                         X
              UNITADD=01,                                            X
              ADDRESS=(E90,1)
*
********************************************************************
*    CHPID 6E                                                      *
********************************************************************
*                                                                  *
        CNTLUNIT CUNUMBR=0004,                                       X
              UNITADD=((01,1)),                                      X
              PATH=(6E),                                   X
              LINK=F6,                                               X
              UNIT=3745
*
        IODEVICE CUNUMBR=0004,        * Same as CNTLUNIT CUNUMBR *   X
              UNIT=3745,                                             X
              ADAPTER=TYPE7,                                         X
              UNITADD=01,                                            X
              ADDRESS=(E90,1)
```

Using One Channel UCB Number from Multiple Hosts

You can define the same IODEVICE address in your IOGENs on more than one MVS.

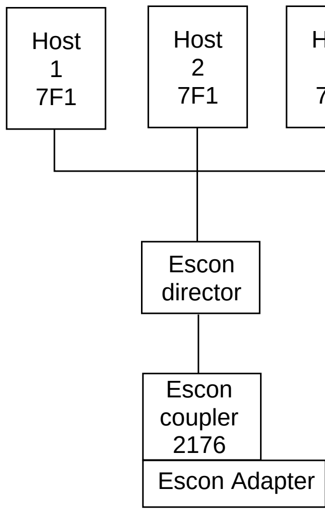


Figure 27-3. Multiple Hosts

There *must* be *one* host link defined for each host, as there will be one connection between each host and the ESCC. So using either CCM or EGA, once defining one ESCON you should define as many *host links* as there are hosts to be reached. In this example there are three *host links* off the ESCC 2176 (HL1, HL2, HL3). Once three *host links* have been defined, **one** logical station should be defined off *each host link:*

- HL1 -> PU1, ADDR=01
- HL2 -> PU1, ADDR=01
- HL3 -> PU1, ADDR=01

Here each PU has ADDR=01, which means that EGA/CCM will produce three sets of:

- Line/PU with ADDR=01 for NCP
- IOCP subset for each host with ONE IODEVICE specifying UNITADDR=01

As a result each host will get the same IODEVICE unit address in the form of xxx1.

ESCON Adapter Sharing between SUBAREA, CNN, APPN/HPR toward One Host

There is no real difference between VTAM-NCP subarea and VTAM-NCP in a CNN configuration. The exact naming for a combined CNN and Subarea VTAM-NCP connection is ICN (Interchange Node). Refer to *VTAM Network Implementation Guide*.

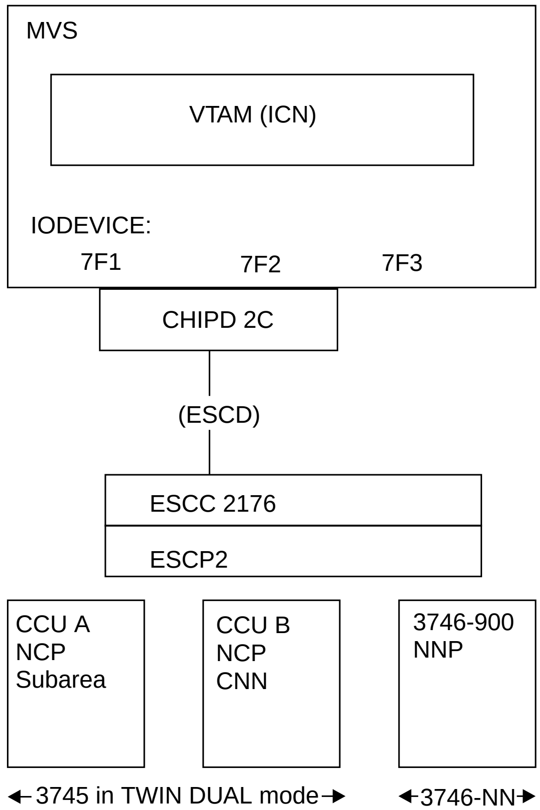


Figure 27-4. ESCON Adapter Sharing

To achieve this configuration, *one* host link is to be defined as there is *one* connection between the ESCC2 and *one* VTAM/HOST. There must be three logical stations defined, one for *each* distinct IODEVICE address that VTAM requires to connect to each of the control points: NCP in CCU A, NCP in CCU B, and NNP in the 346-900. The following is done using CCM:

ESCC2: 2176 APPN/SUBAREA-> BOTH
-> add Host Link HL1 APPN/SUBAREA -> Both
-> Add Station 1: Subarea, PU type=5, ADDR=01 (UA)
-> Add Station 2: Subarea, PU Type=5, ADDR=02 (UA)
-> Add station 3: APPN, PU type=2.1, ADDR=03 (UA)

This will result in an IOCP specifying:

```
CNTLUNIT....
      UNITADD=((01,3))

IODEVICE .....
      ADDRESS=(xxx,3)
```

which is the expected result allowing IOCP to define three IODEVICE distinct addresses that could be specified as 7F1, 7F2, 7F3 in the MVS IOGEN.

Chapter 28. Configuring the MAE ESCON Channel Adapter

This chapter describes how to configure the ESCON Channel Adapter and attached networks. It includes the following sections:

- "MAE ESCON Channel Adapter Overview," which describes ESCON support:
  - LCS (LAN Channel Station) over which you can run TCP/IP
  - LSA (Link Services Architecture) over which you can run hierarchical SNA, including DLSw, or APPN ISR
  - MPC+ (Multi-Path Channel) over which you can run APPN HPR
- "Configuring the ESCON Interface" on page 28-12
- "ESCON Configuration Commands" on page 28-13

A general description of the multiaccess enclosure configuration process can be found in Chapter 26, "Multiaccess Enclosure Configuration" on page 26-1. We will supply more details in this chapter.

Note: As mentioned earlier, ESCON support in the multiaccess enclosure has a later availability date than the multiaccess enclosure itself. The following discussion applies to the ESCON features when the adapter becomes available.

MAE ESCON Channel Adapter Overview

It is a PCI ESCON adapter (FC 3287) base technology. You can have a maximum of four ESCON adapters installed in the MAE.

The ESCON channel adapter provides the 3746 multiaccess enclosure with access to SNA and TCP/IP host applications from LANs, WANs, and ATM over a duplex-to-duplex multimode fiber optic cable.

A detailed discussion of the configuration process for the ESCON adapter begins on "Configuring the ESCON Interface" on page 28-12. What now follows is a logical overview of the various connectivity options.

Figure 28-1 on page 28-2 shows a multiaccess enclosure connected to a VTAM host through an ESCON channel adapter. Each ESCON channel adapter provides up to 32 subchannels and up to 16 associated virtual network handlers that can support LAN channel station (LCS), Link Services Architecture (LSA), and Multi-Path Channel (MPC+) protocols. Each multiaccess enclosure can contain up to four ESCON channel adapters and each ESCON channel adapter can provide connections to up to 16 hosts when used with an ESCON Director or access to up to 15 logical host images in EMIF-capable processors operating in logically partitioned mode.

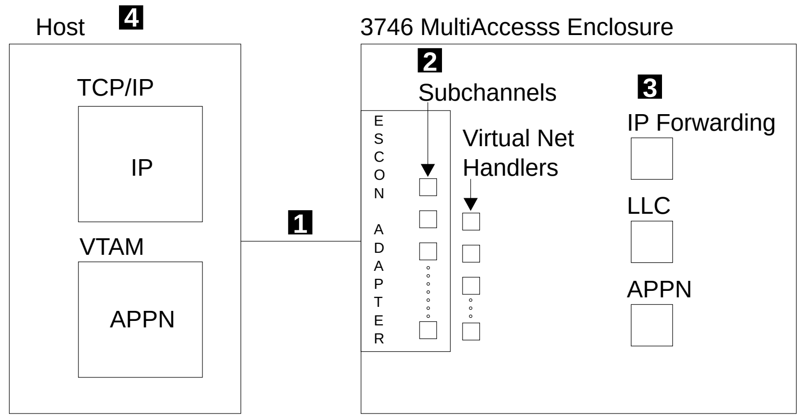


Figure 28-1. Multiaccess Enclosure Connected to a Host through an ESCON Channel Adapter - Logical View

1 At the physical level, the ESCON channel adapter provides a flexible fiber optic connection to communication channels at the host processor.

2 At the logical level, the ESCON Channel Adapter provides up to 32 subchannels and up to 16 associated virtual network handlers.

Each virtual network handler supports one of the following protocols:

LCS	LAN Channel Station
LSA	Link Services Architecture
MPC+	Multi-Path Channel+

For each LCS virtual network handler, you must define two subchannels, one for read and one for write; you can define up to 16 LCS virtual network handlers for each ESCON channel adapter.

For each LSA virtual network handler, you must define at least one subchannel up to a maximum of 32 subchannels. You can define up to 16 LSA virtual network handlers for each ESCON channel adapter.

For MPC+, you can define up to 32 subchannels. You must have at least one read subchannel and at least one write subchannel. You can define up to 16 MPC+ virtual network handlers for each ESCON Channel Adapter.

Each multiaccess enclosure can contain up to four ESCON channel adapters and each ESCON Channel Adapter can provide connections to up to 16 hosts when used with an ESCON director or access up to 15 logical host images in EMIF-capable processors operating in logically partitioned mode.

Notes:

1. You can configure LCS and LSA on the same ESCON channel adapter.
2. For migration purposes, MPC+ may be configured on the same ESCON channel adapter as LCS/LSA. This is not recommended as a long term solution. MPC+ combined with another type of virtual interface (LCS/LSA) on the same adapter could impact the performance benefits provided by the MPC+ interface.

3 The multiaccess enclosure ESCON channel adapter provides services for IP forwarding, Logical Link Control (LLC), and Advanced Peer-to-Peer Networking (APPN).

4 The virtual net handlers provide connections for transmitting and receiving packets of information for host applications as, shown in Figure 28-2 on page 28-3 and Figure 28-3 on page 28-3.

Once the ESCON channel adapter is installed and configured for LCS, LSA, and MPC+, (with VTAM V4R4 as minimum level), it can provide the functions listed in "ESCON Channel Adapter Functions" on page 22-1.

- Hierarchical SNA, including DLSw traffic, and APPN ISR traffic runs over LSA connections. (DLSw and APPN require LLC loopback.)
- TCP/IP traffic runs over LCS.
- APPN HPR traffic runs over MPC+.

Figure 28-2 shows the basic flow for an ESCON channel adapter with LCS and LSA configured.

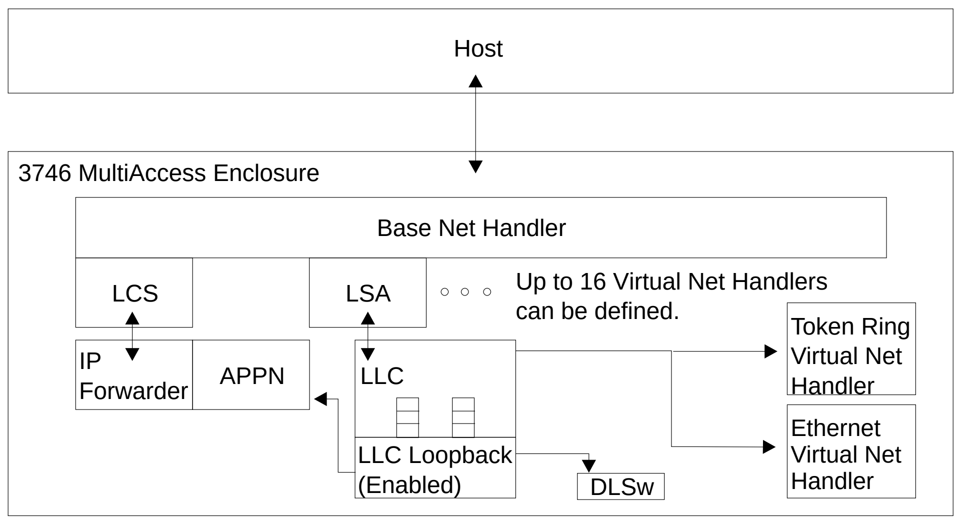


Figure 28-2. Multiaccess Enclosure ESCON Virtual Net Handlers for LCS and LSA - Logical View

Figure 28-3 shows the basic flow for an ESCON Channel Adapter for which MPC+ is configured.

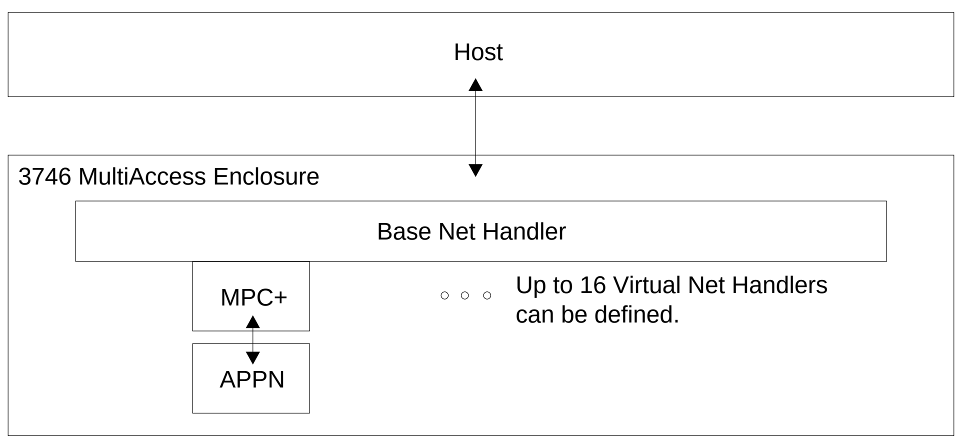


Figure 28-3. Multiaccess Enclosure ESCON Virtual Net Handlers for MPC+ - Logical View.

LAN Channel Station (LCS) Support

Figure 28-4 shows how TCP/IP data flows from the host, through LCS and other Multiaccess Enclosure software components, and out to the LANs/WANs.

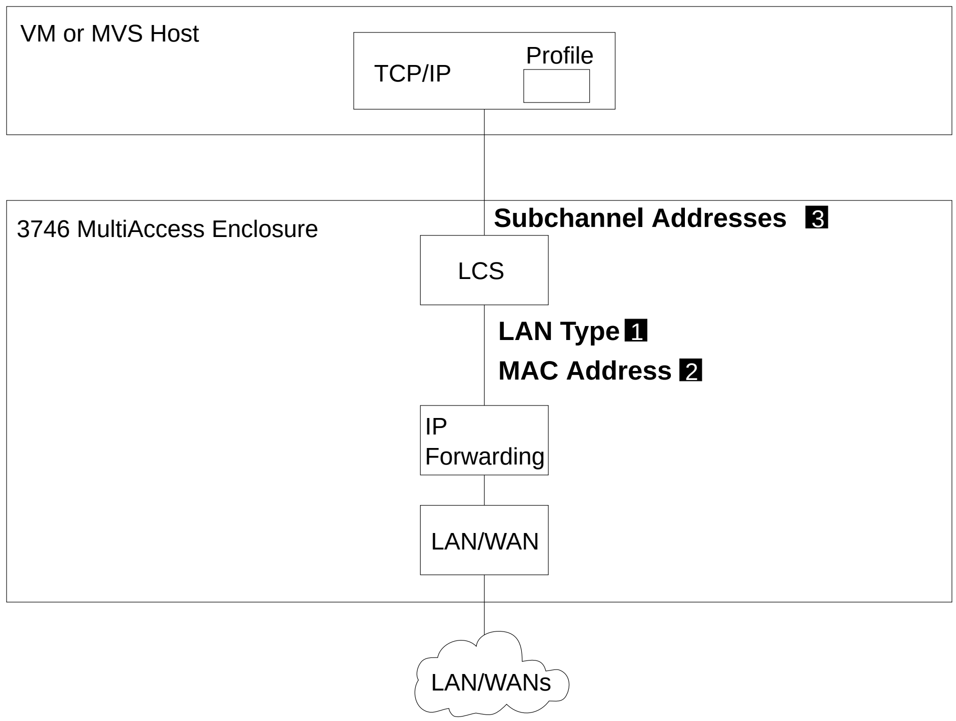


Figure 28-4. Configuring LAN Channel Station (LCS) Virtual Net Handlers. This figure shows LCS flow and highlights key parameters at the host and in the Multiaccess Enclosure

Configuring the 3746 Multiaccess Enclosure for LCS

Three parameters are required to configure the Multiaccess Enclosure for LCS as shown in Figure 28-4:

1 LAN type Type of LAN connection, either Ethernet or token-ring. This is the frame type that the host expects to send and receive.

2 MAC address A unique MAC address to identify this virtual interface.

Note: If the LAN type is Ethernet, then the MAC address must be in canonical format.

3 Configure the subchannel pair used by this connection as described in “Configuring an LCS Subchannel” on page 28-15.

You must configure an IP address and mask. Refer to “IP Addressing” on page 3-2.

There is one optional parameter:

maxdata Maximum size of data handled by this virtual network

For information on the corresponding host definitions, see “Configuring the Host for TCP/IP” on page 22-24.

Link Services Architecture (LSA) Support

Link Services Architecture (LSA) permits the VTAM host to communicate with the ESCON channel Adapter in the multiaccess enclosure.

Figure 28-5 shows the four types of LSA connections:

- "Configuring an LSA Direct Connection at the Multiaccess Enclosure" on page 28-6
- "Configuring an LSA APPN Connection at the Multiaccess Enclosure" on page 28-7
- "Configuring an LSA DLSw Connection at the 3746 Multiaccess Enclosure" on page 28-9
- "Configuring an LSA DLSw Local Conversion at the 3746 Multiaccess Enclosure" on page 28-10

For information on the corresponding host definitions, see "VTAM Control Blocks Used to Configure LSA at the Host" on page 22-27.

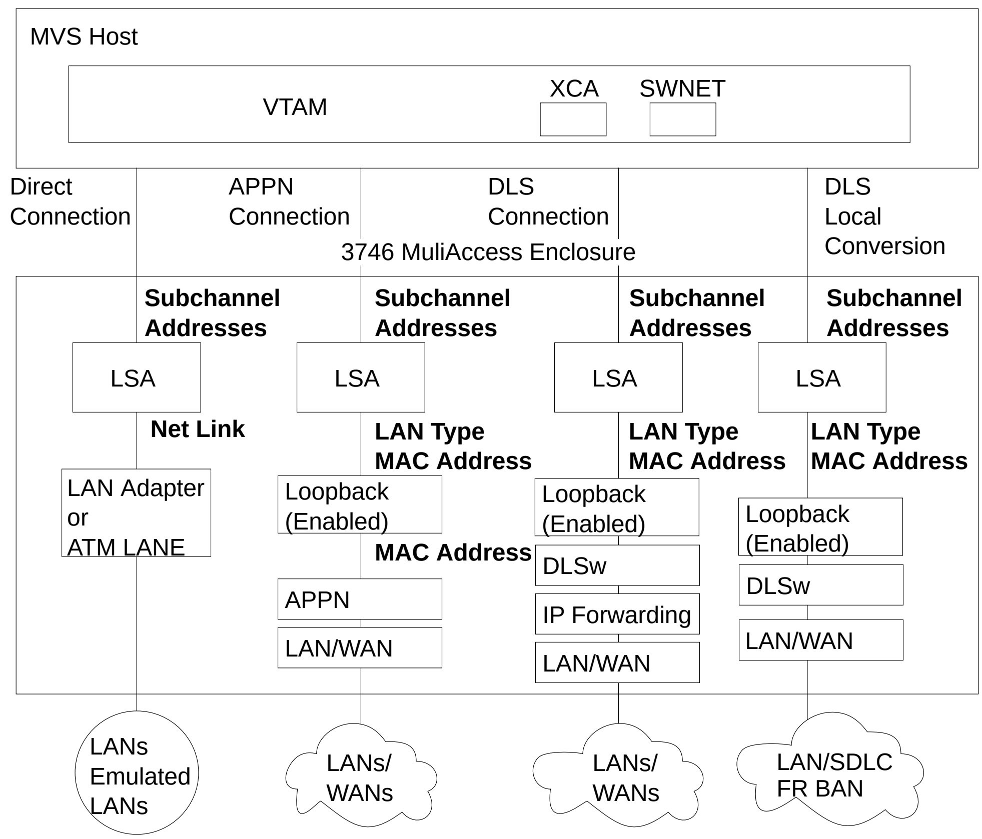


Figure 28-5. Configuring Link Services Architecture (LSA) Virtual Net Handlers

Configuring an LSA Direct Connection at the Multiaccess Enclosure

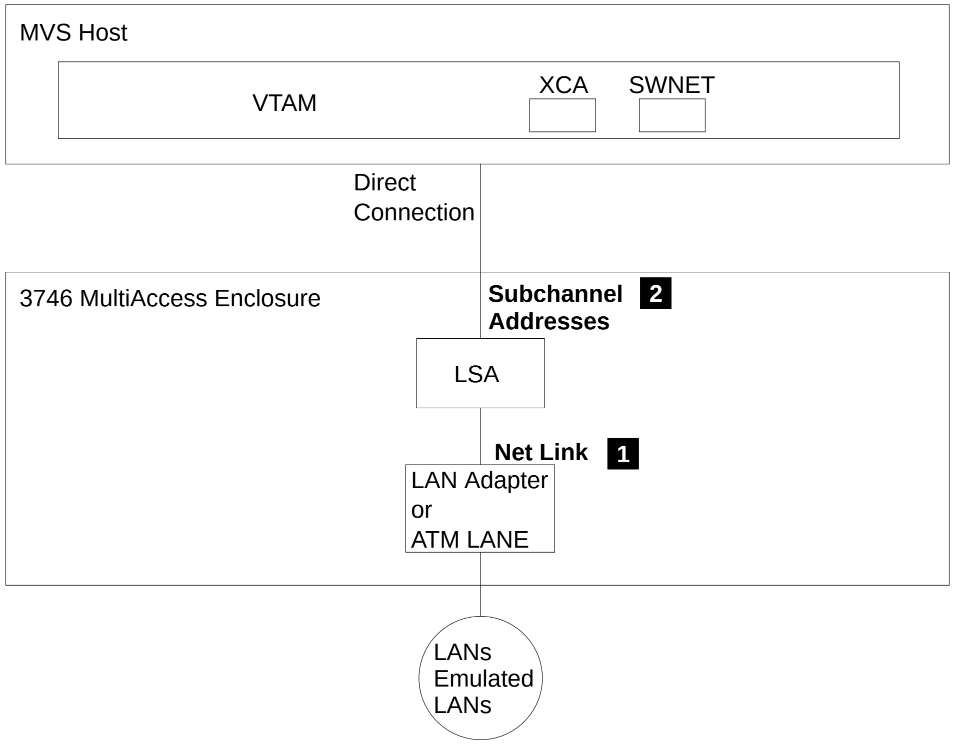


Figure 28-6. Configuring Virtual Net Handlers for LSA Direct Connection

Two parameters are required to configure the multiaccess enclosure for a direct LSA connection as shown in Figure 28-6:

1 Net Link The network interface number of the LAN adapter to which the LSA network is linked. This is the interface used by the multiaccess enclosure to transmit data to the host.

2 Configure the subchannel or subchannels used by this connection as described in "Configuring an LSA Subchannel" on page 28-19.

There is one optional parameter:

maxdata Maximum size of data handled by this virtual network

Note: The LSA net will read its MAC address from the multiaccess enclosure interface configured with the Net Link command.

For information on the corresponding host definitions, see "Configuring an LSA Direct Connection at the VTAM Host" on page 22-28.

Configuring an LSA APPN Connection at the Multiaccess Enclosure

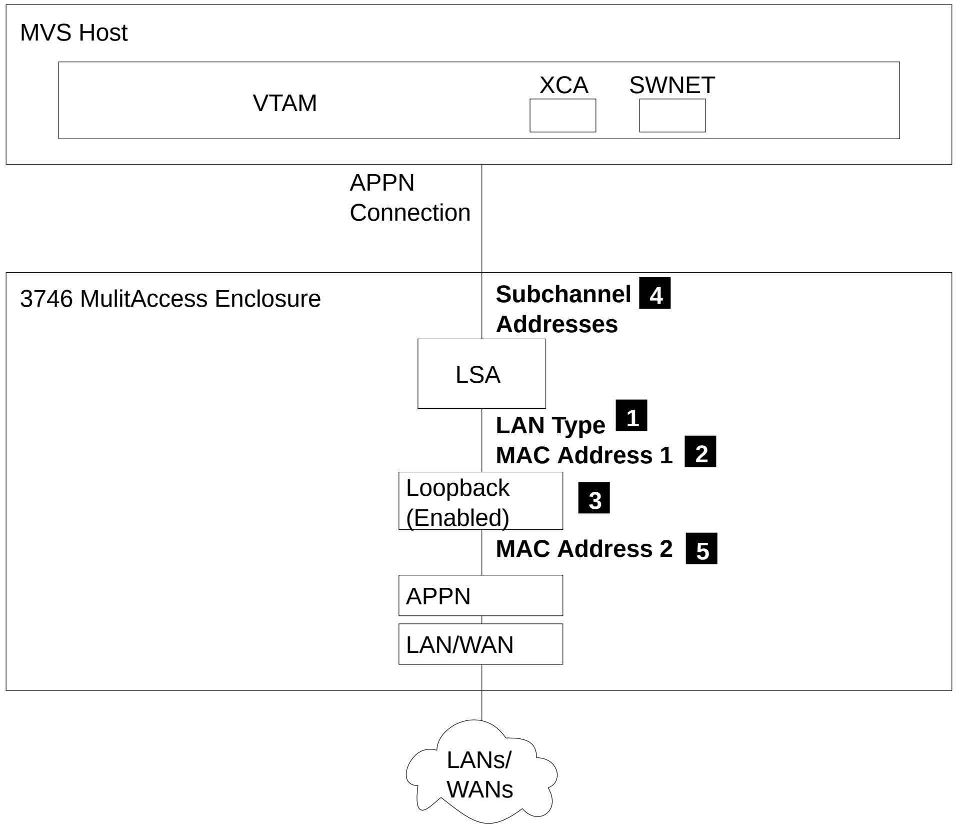


Figure 28-7. Configuring Virtual Net Handlers for LSA APPN Connection

Four parameters are required to configure the 3746 multiaccess enclosure for an LSA APPN connection as shown in Figure 28-7:

1 LAN type LAN type, either Ethernet or token-ring.

Note: You must configure the LAN type for both the LSA net and the Loopback net.

2 MAC Address 1 A unique MAC address to identify the host (VTAM) end of the loopback connection.

Note: If the LAN type is Ethernet, then the MAC address must be in canonical format.

3 Enable LSA loopback using the enable parameter.

4 Configure the subchannel or subchannels used by this connection as described in "Configuring an LSA Subchannel" on page 28-19.

There is one optional parameter:

maxdata Maximum size of data handled by this virtual network

Also, configure APPN to use the APPN loopback net. The APPN port must be configured on the APPN loopback net. To then configure an APPN link station over this APPN port, the destination MAC address of the link station definition should be that of the LSA net.

Specify a LAN type (token-ring or Ethernet) using the LANtype command.

5 MAC Address 2 A unique MAC address to identify the multiaccess enclosure (APPN) end of the loopback connection.

Note: If the LAN type is Ethernet, then the MAC address must be in canonical format.

For information on the corresponding host definitions, see "Configuring an LSA APPN Connection at the VTAM Host" on page 22-28.

Configuring an LSA DLSw Connection at the 3746 Multiaccess Enclosure

.

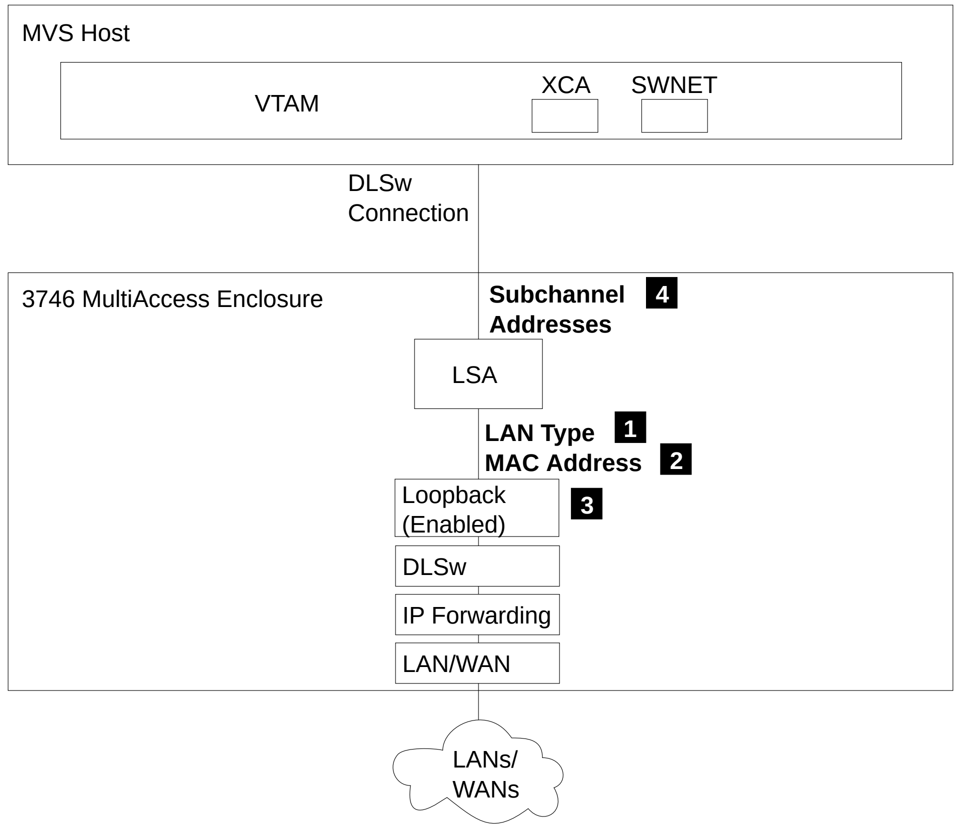


Figure 28-8. Configuring Virtual Net Handlers for LSA DLSw Connection

Four parameters are required to configure the multiaccess enclosure for an LSA DLSw connection as shown in Figure 28-8:

1 LAN type Type of LAN connection, either Ethernet or token-ring. This is the frame type that the host expects to send and receive.

2 MAC Address A unique MAC address to identify the host (VTAM) end of the loopback connection.

Note: If the LAN type is Ethernet, then the MAC address must be in canonical format.

3 Enable LSA loopback using the enable parameter.

4 Configure the subchannel or subchannels used by this connection as described in "Configuring an LSA Subchannel" on page 28-19.

There is one optional parameter:

maxdata Maximum size of data handled by this virtual network

For information on the corresponding host definitions, see "Configuring an LSA DLSw Connection at the VTAM Host" on page 22-29.

Configuring an LSA DLSw Local Conversion at the 3746 Multiaccess Enclosure

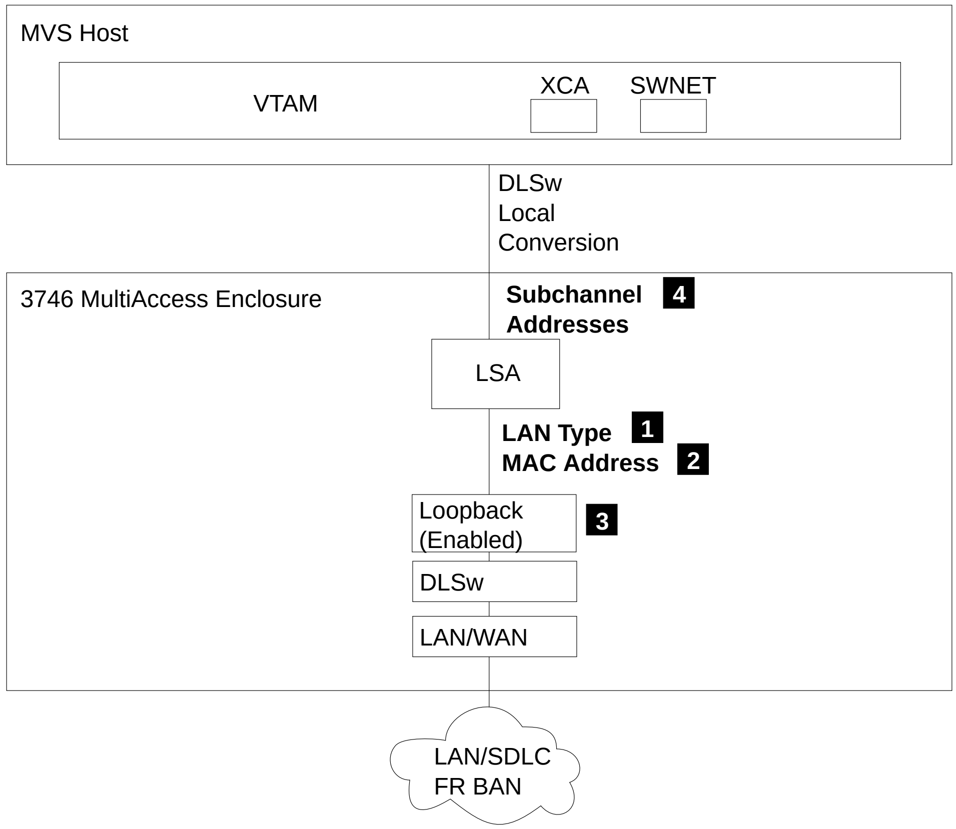


Figure 28-9. Configuring Virtual Net Handlers for LSA DLSw Local Conversion

Three parameters are required to configure the Multiaccess Enclosure for LSA DLSw Local Conversion as shown in Figure 28-9:

1 **LAN type**	Type of LAN connection, either Ethernet or token-ring. This is the frame type that the host expects to send and receive.
2 **MAC Address**	A unique MAC address to identify the host (VTAM) end of the loopback connection. **Note:** If the LAN type is Ethernet, then the MAC address must be in canonical format.

3 Enable LSA loopback using the enable parameter.

4 Configure the subchannel or subchannels used by this connection as described in "Configuring an LSA Subchannel" on page 28-19.

There is one optional parameter:

maxdata Maximum size of data handled by this virtual network

Multi-Path Channel+ (MPC+) Support

Figure 28-10 shows MPC+ flow and highlights key parameters at the host and in the 3746 multiaccess enclosure.

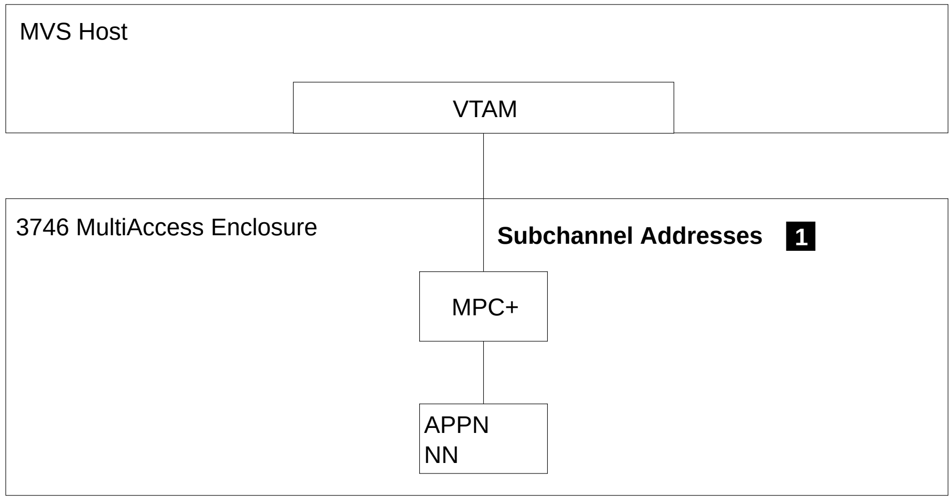


Figure 28-10. Configuring Virtual Net Handlers for Multi-Path Channel+ (MPC+)

Configuring the Multiaccess Enclosure for MPC+

Figure 28-10 shows the parameters required to configure MPC+.

1 Configure subchannels for read and write connections to the host as described in "Configuring an MPC+ Subchannel" on page 28-21.

There are three optional parameters:

reply timeout
: Timer for XID2/disconnect timeout in milliseconds.

  This is the amount of time that the MPC+ Group waits to hear from across the channel during XID2 and DISC exchanges before deciding that the other end of the channel is not answering and that this side should continue as you bring up or bring down the MPC+ Group.

sequencing interval timer
: Sequencing interval timer in milliseconds.

  This timer is used to determine whether connection-oriented data is flowing smoothly across the connection on an MPC+ Group. The MPC+ control flows and the APPN activation/deactivation flows flow connection-oriented. Since these commands must have guaranteed delivery at the link level they flow connection-oriented and the sequencing interval timer is used to determine whether enough time has passed that checking of the delivery of connection-oriented traffic should be done.

  Note: This value can be overwritten for each APPN PORT on an MPC+ Group. This is done during the APPN PORT configuration.

maxdata	Maximum size of data handled by this virtual network handler.

With the following exceptions, APPN is configured over the MPC+ interface as it is over other interface types:

- On the APPN add port command, specify link type MPC+.
- On the APPN add port command, you may specify the MPC+ sequencing interval timer.

For information on the corresponding host definitions, see "Configuring the VTAM Host for MPC+" on page 22-32.

Configuring the ESCON Interface

The following steps are required to configure the ESCON interface:

1. Access the ESCON interface as described in "Accessing the ESCON Interface." This will cause the base ESCON interface to be defined.
2. Configure the virtual net handlers as described in:
   "Configuring an LCS Virtual Interface" on page 28-14
   "Configuring an LSA Virtual Interface" on page 28-17
   "Configuring an MPC+ Virtual Interface" on page 28-20
3. Configure the subchannels:
   "Configuring an LCS Subchannel" on page 28-15
   "Configuring an LSA Subchannel" on page 28-19
   "Configuring an MPC+ Subchannel" on page 28-21

Once the 3746 multiaccess enclosure ESCON configuration is complete,

- Configure the protocols.
- Save the configuration.
- Reboot the 3746 Multiaccess Enclosure to activate changes.

Accessing the ESCON Interface

As already mentioned, this process will be incorporated as part of CCM in a future release. This first release will require a Telnet session to be established with the multiaccess enclosure from your service processor. The IP service ring port should already have been defined and enabled. You should know its name and address. The operator's console was discussed earlier. It is the familiar router console with the OPCON prompt (*).

To access the ESCON interface:

1. At the OPCON prompt, enter `talk6` For example:

   ```
   * talk 6
     Config>
   ```

   After you enter the talk 6 command, the CONFIG prompt (`Config>`) displays on the console. If the prompt does not appear, press Return again.

2. Enter the list devices command to display the network interface numbers that are currently configured.

3. Record the interface numbers.

4. Create an ESCON interface by entering the add device esc command at the `Config>` prompt.

```
Config> add dev esc
Device Slot x(1-8) 7?
Adding ESCON Adapter device in slot 7 port 1 as interface x
```

Note: **x** is the assigned interface number.

Note: The 3746 multiaccess enclosure has eight slots, numbered 1 to 8.

Caution

The 3746 multiaccess enclosure in the first release requires a token-ring connection from the multiaccess enclosure to the 3746 base frame. The required token-ring is in slot 1.

5. Enter the network command and the number of the ESCON interface you want to configure. For example:

```
Config> network 0
ESCON Config>
```

The ESCON configuration prompt (`ESCON Config>`), is displayed.

6. Configure the ESCON virtual net handlers and associated subchannels using the commands in Table 28-1.

ESCON Configuration Commands

The following commands can be entered at the ESCON configuration prompt (`ESCON Config>`):

Table 28-1. ESCON Interface Configuration Commands

Command	Description
? (Help)	Lists all of the ESCON interface configuration commands or lists the options associated with specific commands.
add	Adds a virtual net handler for one of the base protocols or adds APPN loopback: • LCS - LAN Channel Station Support • LSA - Link Services Architecture • MPC+ - Multi-Path Channel+ • APPN loopback Each protocol provides a unique set of parameters which can be used to configure the virtual net handlers.
list	Lists the ESCON configuration and optionally lists subchannels.
exit	Exits the ESCON configuration process or returns to the previous prompt level.

? (Help)

Use the ? command to list the configuration commands that are available from the command prompt level. You can also enter ? after a subcommand to list its options.

Syntax ?

Example:

```
ESCON Config> ?
ADD
MODify
DElete
LIst
Exit
```

Note: Valid command abbreviations are shown in uppercase letters. For example, `LIst` means that you can enter `LI` for the list command.

Add

Use the add command to add virtual network handlers for LCS, LSA, and MPC+, and to enable loopback for APPN.

Syntax: add lcs
lsa
mpc
appn loopback

Configuring an LCS Virtual Interface

add lcs

Under add lcs, the following second-level parameters can be entered:

lan type
mac address
subchannels
maxdata

Use the add lcs command to add an LCS virtual interface and get to the `ESCON Add Virtual>` prompt from which you can enter other interface and subchannel parameters.

Note: Although LCS requires two subchannels, it is only necessary to specify one subchannel. An adjacent subchannel will be chosen such that the two subchannels will form a sequential pair with the write subchannel (device address is even) before the read subchannel (device address is odd).

See “LAN Channel Station (LCS) Support” on page 28-4 for a description of flow and key parameters.

Example: Adding an LCS interface

```
ESCON Config>add lcs
ESCON Add Virtual>
```

LAN Type LAN type, either Ethernet or token-ring

Example: Specifying LAN Type for an LCS interface

```
ESCON Add Virtual>lan
Please select one of the following LAN types:
    E  Ethernet
    T  Token Ring
LCS LAN Type: [E]?
```

MAC Address MAC Address of the virtual net handler

Example: Specifying MAC Address for an LCS interface

```
ESCON Add Virtual>mac
MAC address in 00:00:00:00:00:00
form [000000000000]? 40:00:22:16:00:01
```

maxdata
Maximum size of data handled by this virtual network handler.

Valid Values: 516 to 17749 for token-ring, 1500 for Ethernet

Default: 2052 for token-ring, 1500 for Ethernet

Example: Specifying maxdata for an LCS interface

```
ESCON Add Virtual>max 2052
```

Configuring an LCS Subchannel

subchannels

A subcommand from which you can add, modify, delete, or list subchannels.

Under add lcs subchannels, the following third-level parameters can be entered:

add
modify
delete
list

add
Adds a subchannel pair and displays the `ESCON Config LCS Subchannel>` prompt from which you can add device address, LPAR number, link address, and CU logical address.

Note: You must add or configure one subchannel for an LCS virtual interface. Although LCS requires two subchannels, it is only necessary to specify one subchannel. An adjacent subchannel will be chosen such that the two subchannels will form a sequential pair with the write subchannel (device address is even) before the read subchannel (device address is odd).

Device Address
The unit address transmitted on the channel path to select a multiaccess enclosure device. It is also referred to as subchannel number in S/370 I/O architecture. It is a two-digit hexadecimal value that may range from 00-FF. This value is defined in the host IOCP by the UNITADD statement on the CNTLUNIT macro instruction for the real device.

Valid Values: X'00' to X'FF'

Default: None

LPAR number
Logical partition number. This allows multiple logical host partitions, LPARs, to share one ESCON fiber.
This value is defined in the host Input/Output Configuration Program (IOCP) by the RESOURCE macro instruction.
If the host is not using EMIF, use the default of 0 for the LPAR number.

Valid Values: X'0' - X'F'

Default: X'0'

Link Address

If one ESCD is in the communication path, the link address is the ESCON Director (ESCD) port number that is attached to the host. If two ESCDs are in the path, it is the host-side port number of the ESCD defined with the dynamic connection.
When no ESCD is in the communication path, this value must be set to X'01'.

Valid Values: X'01' - X'FE'

Default: X'01'

CU Logical Address

The control unit address defined in the host for the 3746 multiaccess enclosure. This value is defined in the host Input/Output Configuration Program (IOCP) by the CUADD statement on the CNTLUNIT macro instruction.
The control unit address must be unique for each logical partition defined on the same host.

Valid Values: X'0' - X'F'

Default: X'0'

Enter `exit` to return to the `ESCON Add Virtual>` prompt.

Example: Adding a subchannel for an LCS interface

```
ESCON Add Virtual>sub add
Please add or configure one subchannel for an LCS virtual interface.
Although LCS requires two subchannels, it is only necessary to specify
one subchannel.  An adjacent subchannel will be chosen such that the two
subchannels will form a sequential pair with the write subchannel (device
address is even) before the read subchannel (device address is odd).
ESCON Config LCS Subchannel>d 4
ESCON Config LCS Subchannel>e
```

mod Modifies a configured LCS subchannel pair. It lists the configuration for the configured LCS subchannels and allows you to modify one of them by specifying the "sub" number from the list. Once you have selected the subchannel, you can change the device address, LPAR number, link address, and CU logical address as described in "Configuring an LCS Subchannel" on page 28-15.

delete Deletes a configured LCS subchannel. It lists the configuration for the configured LCS subchannels and allows you to delete one of them by specifying the "sub" number from the list.

list Lists information for the LCS subchannels.

Example: Listing subchannels for an LCS interface

```
ESCON Add Virtual>sub lis
          Read Subchannels:
          Sub  0   Device address   :  5   LPAR number        : 0
                   Link address     :  1   CU Logical Address : 0
          Write Subchannels:
          Sub  1   Device address   :  4   LPAR number        : 0
                   Link address     :  1   CU Logical Address : 0
```

exit Returns to the previous prompt.

Configuring an LSA Virtual Interface

add lsa

Under add lsa, the following second-level parameters can be entered:

enable
disable
maxdata
net link
lantype
subchannels

Use the add lsa command to add an LSA virtual interface and get to the `ESCON Add Virtual>` prompt from which you can enter other interface and subchannel parameters.

There are four types of LSA connections, as shown in Figure 28-5 on page 28-5. They are:

- “Configuring an LSA Direct Connection at the Multiaccess Enclosure” on page 28-6
- “Configuring an LSA APPN Connection at the Multiaccess Enclosure” on page 28-7
- “Configuring an LSA DLSw Connection at the 3746 Multiaccess Enclosure” on page 28-9
- “Configuring an LSA DLSw Local Conversion at the 3746 Multiaccess Enclosure” on page 28-10

The example shows adding two LSA interfaces. The first one uses loopback and the second one is a direct connection.

Example 1: Adding an LSA interface with loopback

```
ESCON Config>add lsa
ESCON Add Virtual>enable
Enabling loopback through network 2.
Please set the MAC address using the "MAC" command
ESCON Add Virtual>mac 40:00:00:00:22:16
ESCON Add Virtual>lan
Please select one of the following LAN types:
    E  Ethernet
    T  Token Ring
LSA LAN Type: [E]? e
ESCON Add Virtual>sub add
ESCON Add LSA Subchannel>link c5
ESCON Add LSA Subchannel>d 8
ESCON Add LSA Subchannel>e
ESCON Add Virtual>e
ESCON Config>list all
Net:  2   Protocol: LSA    LAN type: LSA Ethernet    LAN number:  0
          Maxdata: 1500
          Loopback is enabled.
          MAC address: 400000002216
          Sub  0   Dev addr:  8  LPAR: 0  Link addr: C5  CU addr: 0
```

Example 2: Adding an LSA interface with direct connection

```
ESCON Config>add lsa
ESCON Add Virtual>net 0
ESCON Add Virtual>sub add
ESCON Add LSA Subchannel>link c5
ESCON Add LSA Subchannel>d 9
ESCON Add LSA Subchannel>e
ESCON Add Virtual>e
ESCON Config>list all
Net:  2   Protocol: LSA    LAN type: LSA Ethernet    LAN number:  0
          Maxdata: 1500
          Loopback is enabled.
          MAC address: 400000002216
          Sub  0   Dev addr:  8  LPAR: 0  Link addr: C5  CU addr: 0

Net:  3   Protocol: LSA    LAN type: Token Ring      LAN number:  0
          Maxdata: 2052
          Loopback is not enabled.
          MAC address: Obtained from net 0
          Sub  0   Dev addr:  9  LPAR: 0  Link addr: C5  CU addr: 0

ESCON Config>
```

enable OR disable

Enables or disables loopback on an LSA interface.

Note: Only *one* of these parameters can be entered, depending on the state of the loopback function. If the loopback is disabled, you can enable it; if it is enabled, you can disable it.

Valid Values: enable or disable

Default: disable

Example: Enabling loopback on LSA interface

```
ESCON Config>add lsa
ESCON Add Virtual>en
Enabling loopback through network 5.
Please set the MAC address using the "MAC" command
```

LAN Type

LAN type, either Ethernet or token-ring

Example:

```
ESCON Config>add lsa
ESCON Add Virtual>lant
Please select one of the following LAN types:
    E  Ethernet
    T  Token-Ring
LSA LAN Type: [E]? e
```

maxdata

Maximum size of data handled by this virtual network handler.

Valid Values: 516 to 17749 for token-ring, 1500 for Ethernet

Default: 2052 for token-ring, 1500 for Ethernet

Example:

```
ESCON Config>add lsa
ESCON Add Virtual>max 2052
```

Net Link

This parameter is available only when loopback is disabled. It is used to indicate the LAN adapter over which this LSA net will communicate. The LAN adapter must have been previously configured and can only be token-ring or Ethernet (including emulated LANs).

Example:

```
ESCON Config>add lsa
ESCON Add Virtual>net 0
```

MAC Address A unique MAC address to identify this virtual interface. This parameter is available only when loopback is enabled. It is the MAC address of the LSA/VTAM side of the loopback connection. The MAC address of the APPN side of the loopback connection is specified using ADD APPN.

Configuring an LSA Subchannel

subchannels
A subcommand from which you can add, modify, delete, or list subchannels.

Under add lsa subchannels, the following third-level parameters can be entered:

add
modify
delete
list

add Adds a subchannel and displays the `ESCON Add LSA Subchannel>` prompt from which you can add:

Device Address
The unit address transmitted on the channel path to select a 3746 multiaccess enclosure device. It is also referred to as subchannel number in S/370 I/O architecture. It is a two-digit hexadecimal value that may range from 00-FF. This value is defined in the host IOCP by the UNITADD statement on the CNTLUNIT macro instruction for the real device.

Valid Values: X'00' to X'FF'

Default: None

LPAR number
Logical partition number. This allows the host multiple logical partitions (LPARs) to share one ESCON channel.
This value is defined in the host Input/Output Configuration Program (IOCP) by the RESOURCE macro instruction.
If the host is not using EMIF, use the default of 0 for the LPAR number.

Valid Values: X'0' - X'F'

Default: X'0'

Link Address
If one ESCD is in the communication path, the link address is the ESCON Director (ESCD) port number that is attached to the host. If two ESCDs are in the path, it is the host-side port number of the ESCD defined with the dynamic connection.
When no ESCD is in the communication path, this value must be set to X'01'.

Valid Values: X'01' - X'FE'

Default: X'01'

CU Logical Address
The control unit address defined in the host for the 3746 multiaccess enclosure. This value is defined in the host Input/Output Configuration Program (IOCP) by the CUADD statement on the CNTLUNIT macro instruction. The Control Unit Address must be unique for each LPAR defined on the same host.

Valid Values: X'0' - X'F'

Default: X'0'

Enter `exit` to return to the `ESCON Add Virtual>` prompt.

Example: Adding a subchannel for an LSA interface

```
ESCON Add Virtual>sub add
ESCON Add LSA Subchannel>link f7
ESCON Add LSA Subchannel>device 0
ESCON Add LSA Subchannel>cu 0
ESCON Add LSA Subchannel>lpar 0
ESCON Add LSA Subchannel>exit
```

mod Modifies a configured LSA subchannel. It lists the configuration for the configured LSA subchannels and allows you to modify one of them by specifying the “sub” number from the list. Once you have selected the subchannel, you can change the device address, LPAR number, Link Address, and CU Logical Address as described in “Configuring an LSA Subchannel” on page 28-19.

delete Deletes a configured LSA subchannel. It lists the configuration for the configured LSA subchannels and allows you to delete one of them by specifying the “sub” number from the list.

list Lists information for the LSA subchannels.

Example: Listing subchannels for an LSA interface

```
ESCON Config Virtual>sub list
          Sub  0   Device address   : 42   LPAR number        : 0
                   Link address     : C5   CU Logical Address : 0
          Sub  1   Device address   : 43   LPAR number        : 0
                   Link address     : C5   CU Logical Address : 0
          Sub  2   Device address   : 44   LPAR number        : 0
                   Link address     : C5   CU Logical Address : 0
```

exit Returns to the previous prompt.

Configuring an MPC+ Virtual Interface

add mpc

Under add mpc, the following second-level parameters can be entered:

reply timeout
sequencing interval timer
maxdata
subchannels

Use the add mpc command to add a MPC+ virtual interface and get to the `ESCON Add Virtual>` prompt from which you can enter other interface and subchannel parameters.

See "Configuring the Multiaccess Enclosure for MPC+" on page 28-11 for a description of flow and key parameters.

Example: Adding an MPC+ interface

```
ESCON Config>add mpc
ESCON Add Virtual>
```

reply timeout
Timer for XID2/disconnect timeout in milliseconds.

Valid Values: 1 to 50 000

Default: 45 000

sequencing interval timer
Sequencing interval timer in milliseconds.

Valid Values: 1 to 50 000

Default: 3000

maxdata Maximum size of data handled by this virtual network handler.

Valid Values: 512 to 32 768

Default: 2 048

Configuring an MPC+ Subchannel

subchannels
A subcommand from which you can add, modify, delete, or list subchannels.

Under add mpc subchannels, the following third-level parameters can be entered:

addr (add a read subchannel)
addw (add a write subchannel)
modify
delete
list

Note: A subchannel defined as a read subchannel to VTAM is a write subchannel to the 3746 Multiaccess Enclosure and a subchannel defined as a write subchannel to VTAM is a read subchannel to the 3746 Multiaccess Enclosure.

addr Adds a read subchannel and displays the `ESCON Add MPC+ Read Subchannel>` prompt from which you can add:
Device Address
The unit address transmitted on the channel path to select a 3746 Multiaccess Enclosure device.
It is also referred to as subchannel number in S/370 I/O architecture. It is a two-digit hexadecimal value that may range from 00-FF. This value is defined in the host IOCP by the UNITADD statement on the CNTLUNIT macro instruction for the real device.

Valid Values: X'00' to X'FF'

Default: None

LPAR number

Logical partition number. This allows the host multiple logical partitions (LPARs) to share one ESCON channel.
This value is defined in the host Input/Output Configuration Program (IOCP) by the RESOURCE macro instruction.
If the host is not using EMIF, use the default of 0 for the logical partition number.

Valid Values: `X'0'` - `X'F'`

Default: `X'0'`

Link Address

If one ESCD is in the communication path, the link address is the ESCON Director (ESCD) port number that is attached to the host. If two ESCDs are in the path, it is the host-side port number of the ESCD defined with the dynamic connection.
When no ESCD is in the communication path, this value must be set to `X'01'`.

Valid Values: `X'01'` - `X'FE'`

Default: `X'01'`

CU Logical Address

The control unit address defined in the host for the 3746 Multiaccess Enclosure. This value is defined in the host Input/Output Configuration Program (IOCP) by the CUADD statement on the CNTLUNIT macro instruction.
The control unit address must be unique for each LPAR defined on the same host.

Valid Values: `X'0'` - `X'F'`

Default: `X'0'`

Enter `exit` to return to the `ESCON Add Virtual>` prompt.

Example: Adding read subchannels for an MPC+ interface

```
ESCON Add Virtual>sub addr
ESCON Add MPC+ Read Subchannel>d 8
ESCON Add MPC+ Read Subchannel>e
ESCON Add Virtual>sub addr
ESCON Add MPC+ Read Subchannel>d 9
ESCON Add MPC+ Read Subchannel>e
```

addw Adds a write subchannel and displays the `ESCON Add MPC+ Write Subchannel>` prompt from which you can add:

Device Address

The unit address transmitted on the channel path to select a multiaccess enclosure device. It is also referred to as subchannel number in S/370 I/O architecture. It is a two-digit hexadecimal value that may range from 00-FF. This value is defined in the host IOCP by the UNITADD statement on the CNTLUNIT macro instruction for the real device.

Valid Values: `X'00'` to `X'FF'`

Default: None

LPAR number
: Logical partition number. This allows multiple logical host partitions, LPARs, to share one ESCON fiber.
This value is defined in the host Input/Output Configuration Program (IOCP) by the RESOURCE macro instruction.
If the host is not using EMIF, use the default of 0 for the LPAR number.

Valid Values: X'0' - X'F'

Default: X'0'

Link Address
: If one ESCD is in the communication path, the link address is the ESCON Director (ESCD) port number that is attached to the host. If two ESCDs are in the path, it is the host-side port number of the ESCD defined with the dynamic connection.
When no ESCD is in the communication path, this value must be set to X'01'.

Valid Values: X'01' - X'FE'

Default: X'01'

CU Logical Address
: The control unit address defined in the host for the 3746 multiaccess enclosure. This value is defined in the host Input/Output Configuration Program (IOCP) by the CUADD statement on the CNTLUNIT macro instruction.
The control unit address must be unique for each logical partition defined on the same host.

Valid Values: X'0' - X'F'

Default: X'0'

Example: Adding write subchannels for an MPC+ interface

```
ESCON Add Virtual>sub addw
ESCON Add MPC+ Write Subchannel>d 10
ESCON Add MPC+ Write Subchannel>e
ESCON Add Virtual>sub addw
ESCON Add MPC+ Write Subchannel>d 11
ESCON Add MPC+ Write Subchannel>e
```

mod
: Modifies a configured MPC+ subchannel. It lists the configuration for the configured MPC+ subchannels and allows you to modify one of them by specifying the “sub” number from the list. Once you have selected the subchannel, you can change the device address, LPAR number, link address, and CU logical address as described in “Configuring an MPC+ Subchannel” on page 28-21.

delete
: Deletes a configured MPC+ subchannel. It lists the configuration for the configured MPC+ subchannels and allows you to delete one of them by specifying the “sub” number from the list.

list
: Lists information for the MPC+ subchannels.

Example: Listing subchannels for an MPC+ interface

```
ESCON Add Virtual>sub lis
          Read Subchannels:
          Sub  0   Device address   :  8   LPAR number       : 0
                   Link address     :  1   CU Logical Address : 0
          Sub  1   Device address   :  9   LPAR number       : 0
                   Link address     :  1   CU Logical Address : 0
          Write Subchannels:
          Sub  2   Device address   : 10   LPAR number       : 0
                   Link address     :  1   CU Logical Address : 0
          Sub  3   Device address   : 11   LPAR number       : 0
                   Link address     :  1   CU Logical Address : 0
```

exit Returns to the `ESCON Add Virtual` prompt.

```
ESCON Add Virtual>e
```

Once you have returned to the `ESCON Config>` prompt, you can list the entire MPC+ configuration as shown in the following example:

Example: Listing the MPC+ configuration

```
ESCON Config>list all
Net:  1   Protocol: MPC+   LAN type: MPC+           LAN number:  0
          Maxdata: 2048
          Reply TO: 45000   Sequencing Interval Timer: 3000
          Read Subchannels:
          Sub  0   Dev addr: 40  LPAR: 0  Link addr: F5  CU addr: 0
          Write Subchannels:
          Sub  1   Dev addr: 41  LPAR: 0  Link addr: F5  CU addr: 0

Net:  2   Protocol: MPC+   LAN type: MPC+           LAN number:  1
          Maxdata: 2048
          Reply TO: 45000   Sequencing Interval Timer: 3000
          Read Subchannels:
          Sub  0   Dev addr: 42  LPAR: 0  Link addr: F5  CU addr: 0
          Write Subchannels:
          Sub  1   Dev addr: 43  LPAR: 0  Link addr: F5  CU addr: 0

Net:  3   Protocol: MPC+   LAN type: MPC+           LAN number:  2
          Maxdata: 2048
          Reply TO: 45000   Sequencing Interval Timer: 3000
          Read Subchannels:
          Sub  0   Dev addr: 44  LPAR: 0  Link addr: F5  CU addr: 0
          Write Subchannels:
          Sub  1   Dev addr: 45  LPAR: 0  Link addr: F5  CU addr: 0

ESCON Config>mod 3
ESCON Config Virtual>?
REply timeout
SEQuencing int timer
MAXdata
SUBchannels
Exit
ESCON Config Virtual>rep 3100
ESCON Config Virtual>exit
ESCON Config>list all
Net:  1   Protocol: MPC+   LAN type: MPC+           LAN number:  0
          Maxdata: 2048
          Reply TO: 45000   Sequencing Interval Timer: 3000
          Read Subchannels:
          Sub  0   Dev addr: 40  LPAR: 0  Link addr: F5  CU addr: 0
          Write Subchannels:
          Sub  1   Dev addr: 41  LPAR: 0  Link addr: F5  CU addr: 0

Net:  2   Protocol: MPC+   LAN type: MPC+           LAN number:  1
          Maxdata: 2048
          Reply TO: 45000   Sequencing Interval Timer: 3000
          Read Subchannels:
          Sub  0   Dev addr: 42  LPAR: 0  Link addr: F5  CU addr: 0
          Write Subchannels:
          Sub  1   Dev addr: 43  LPAR: 0  Link addr: F5  CU addr: 0
```

```
Net:  3   Protocol: MPC+   LAN type: MPC+           LAN number:  2
          Maxdata: 2048
          Reply TO: 3100   Sequencing Interval Timer: 3000
          Read Subchannels:
          Sub  0   Dev addr: 44  LPAR: 0  Link addr: F5  CU addr: 0
          Write Subchannels:
          Sub  1   Dev addr: 45  LPAR: 0  Link addr: F5  CU addr: 0

ESCON Config>
```

Configuring APPN Loopback

add appn loopback

Under add appn, the following second-level parameters can be entered:

lantype.
mac address.

Use the add appn command to add APPN loopback.

Note: APPN loopback cannot be added unless loopback has been enabled on an LSA virtual net as described in "Configuring an LSA Virtual Interface" on page 28-17.

LAN Type Ethernet or token-ring

MAC Address A unique MAC address to identify the APPN side of the loopback connection in the 3746 Multiaccess Enclosure. This address must be different from the MAC address given to the host (VTAM) side of the loopback connection when configuring the LSA interface.

Example: Adding APPN loopback

```
ESCON Config>add appn
ESCON Add Virtual>
ESCON Add Virtual>lan
Please select one of the following LAN types:
    E  Ethernet
    T  Token Ring
APPN LAN Type: [T]?
ESCON Add Virtual>mac
MAC address in 00:00:00:00:00:00 form [000000000000]? 40:00:22:16:00:09
ESCON Add Virtual>e
ESCON Config>li all
Net:  9   Protocol: APPN Loopback   LAN type: Token-Ring/802.5
          APPN loopback MAC address: 400022160009

Net:  5   Protocol: LSA    LAN type: Token Ring           LAN number:  0
          Maxdata: 2052
          Loopback is enabled.
          MAC address: 400022160005
          Sub  0   Dev addr:  0  LPAR: 0  Link addr:  1  CU num: 0

Net:  6   Protocol: LSA    LAN type: token-ring           LAN number:  1
          Maxdata: 2052
          Loopback is not enabled.
          MAC address: Obtained from net 3
          Sub  0   Dev addr:  1  LPAR: 0  Link addr:  1  CU num: 0

Net:  7   Protocol: LCS    LAN type: LCS Ethernet 802.3   LAN number:  0
          Maxdata: 1500
          MAC address: 400022160007
          Read Subchannels:
          Sub  0   Dev addr:  5  LPAR: 0  Link addr:  1  CU num: 0
          Write Subchannels:
```

```
         Sub  1   Dev addr:  4  LPAR: 0  Link addr:  1  CU num: 0
ESCON Config>e
```

Notes:

1. The APPN port would be configured on net 9 of the example.
2. Any APPN link station to VTAM over this APPN port would be configured to use the mac address of one of the LSA nets that have the same LAN type of the APPN loopback net.

Delete

Use the delete command to delete an interface on the ESCON adapter. If you know the interface number you wish to delete, you can specify it; otherwise, if you do not enter an interface number, the configuration is listed and you will be prompted to enter an interface number.

Syntax: delete interface_number
(no parameter)

interface_number
Deletes the configuration for the specified interface number.

Example: Deleting a specified interface

```
ESCON Config>del 1
Are you sure?(Yes or [No]): y
```

(no parameters)
Lists the configured interfaces for the ESCON adapter and prompts you for the interface number you wish to delete.

Example: Deleting an interface (no parameters given)

```
ESCON Config>del
Net:  1   Protocol: MPC+   LAN type: MPC+           LAN number:  0
          Maxdata: 2048
          Reply TO: 45000   Sequencing Interval Timer: 3000
Net:  2   Protocol: MPC+   LAN type: MPC+           LAN number:  1
          Maxdata: 2048
          Reply TO: 45000   Sequencing Interval Timer: 3000
Net:  3   Protocol: MPC+   LAN type: MPC+           LAN number:  2
          Maxdata: 2048
          Reply TO: 45000   Sequencing Interval Timer: 3000
Virtual net number to delete: [1]? 3
Are you sure?(Yes or [No]): y
```

Mod

Use the mod command to modify a configured interface on the ESCON adapter. If you know the interface number you wish to modify, you can specify it; otherwise, if you do not enter an interface number, the configuration is listed and you will be prompted to enter an interface number.

Syntax: modify interface_number
(no parameters)

interface_number
Modifies the configuration for the specified interface number.

(no parameters)
Lists the configured interfaces for the ESCON adapter and prompts you for the interface number you wish to modify.

```
ESCON Config> mod
Net:  1   Protocol: MPC+   LAN type: MPC+           LAN number:  0
          Maxdata: 2048
          Reply TO: 45000   Sequencing Interval Timer: 3000
Net:  2   Protocol: MPC+   LAN type: MPC+           LAN number:  1
          Maxdata: 2048
          Reply TO: 45000   Sequencing Interval Timer: 3000
Virtual net number to configure: [1]? 2
ESCON Config Virtual> ?
REply timeout
SEQuencing int timer
MAXdata
SUBchannels
Exit
ESCON Config Virtual>re
Reply Time Out (range 1-50000 milliseconds): [45000]? 30003
ESCON Config Virtual>sub list
          Read Subchannels:
          Sub  0   Device address   :  7   LPAR number       : 0
                   Link address     : F4   CU Logical Address : 0
          Write Subchannels:
          Sub  1   Device address   :  6   LPAR number       : 0
                   Link address     : F4   CU Logical Address : 0
ESCON Config Virtual>sub addr
ESCON Add MPC+ Read Subchannel> ?
LINk address (ESCD Port)
LPAR number
CU logical address
Device address
Exit
ESCON Add MPC+ Read Subchannel>d 5
ESCON Add MPC+ Read Subchannel>? e
ESCON Config Virtual>sub list
          Read Subchannels:
          Sub  0   Device address   :  7   LPAR number       : 0
                   Link address     : F4   CU Logical Address : 0
          Sub  1   Device address   :  5   LPAR number       : 0
                   Link address     : F4   CU Logical Address : 0
          Write Subchannels:
          Sub  2   Device address   :  6   LPAR number       : 0
                   Link address     : F4   CU Logical Address : 0
ESCON Config Virtual>sub ?
ADDRead subchannel
ADDWrite subchannel
MODify subchannel
DELete subchannel
LIst subchannels
ESCON Config Virtual>sub del
          Read Subchannels:
          Sub  0   Device address   :  7   LPAR number       : 0
                   Link address     : F4   CU Logical Address : 0
          Sub  1   Device address   :  5   LPAR number       : 0
                   Link address     : F4   CU Logical Address : 0
          Write Subchannels:
          Sub  2   Device address   :  6   LPAR number       : 0
                   Link address     : F4   CU Logical Address : 0
Subchannel number to delete: [0]? 0
Are you sure?(Yes or [No]): y
ESCON Config Virtual>sub list
          Read Subchannels:
          Sub  0   Device address   :  5   LPAR number       : 0
                   Link address     : F4   CU Logical Address : 0
          Write Subchannels:
          Sub  1   Device address   :  6   LPAR number       : 0
                   Link address     : F4   CU Logical Address : 0
ESCON Config Virtual>sub mod
          Read Subchannels:
          Sub  0   Device address   :  5   LPAR number       : 0
                   Link address     : F4   CU Logical Address : 0
          Write Subchannels:
          Sub  1   Device address   :  6   LPAR number       : 0
```

```
                   Link address     : F4   CU Logical Address : 0
Subchannel number to modify: [0]? 1
ESCON Modify MPC+ Subchannel>d 2
ESCON Modify MPC+ Subchannel>e
ESCON Config Virtual>sub list
          Read Subchannels:
          Sub  0   Device address   :  5   LPAR number        : 0
                   Link address     : F4   CU Logical Address : 0
          Write Subchannels:
          Sub  1   Device address   :  2   LPAR number        : 0
                   Link address     : F4   CU Logical Address : 0
ESCON Config Virtual> exit
ESCON Config>
```

List

Use the list command to list the ESCON configuration and also (with list all) list a subchannel summary.

Syntax: list (no parameters)
all

(no parameters)
Lists the ESCON configuration.

Example: Listing the ESCON configuration

```
ESCON Config>li
Net:  5   Protocol: LSA    LAN type: token-ring          LAN number:  0
          Maxdata: 2052
          Loopback is enabled.
          MAC address: 400022160005
```

all
Lists the ESCON configuration with a subchannel summary. Two examples are provided. The first is for an ESCON channel adapter with LSA subchannels. The second is for an ESCON channel addapter with MPC+ subchannels.

Example for LSA and LCS: Listing the ESCON configuration with subchannel summary

```
ESCON Config>li all
Net:  2   Protocol: LCS    LAN type: LCS Ethernet    LAN number:  0
          Maxdata: 1500
          MAC address: 400000002216
          Sub  0   Dev addr:  8  LPAR: 0  Link addr: C5  CU addr: 0

Net:  5   Protocol: LSA    LAN type: token-ring          LAN number:  0
          Maxdata: 2052
          Loopback is enabled.
          MAC address: 400022160005
          Sub  0   Dev addr:  0  LPAR: 0  Link addr:  1  CU num: 0
```

Example for MPC+: Listing the ESCON configuration with subchannel summary

```
Net:  1   Protocol: MPC+   LAN type: MPC+            LAN number:  0
          Maxdata: 2048
          Reply TO: 45000   Sequencing Interval Timer: 3000
          Read Subchannels:
          Sub  0   Dev addr: 40  LPAR: 0  Link addr: F5  CU addr: 0
          Write Subchannels:
          Sub  1   Dev addr: 41  LPAR: 0  Link addr: F5  CU addr: 0

Net:  2   Protocol: MPC+   LAN type: MPC+            LAN number:  1
          Maxdata: 2048
          Reply TO: 45000   Sequencing Interval Timer: 3000
          Read Subchannels:
          Sub  0   Dev addr: 42  LPAR: 0  Link addr: F5  CU addr: 0
          Write Subchannels:
```

```
Sub  1   Dev addr: 43  LPAR: 0  Link addr: F5  CU addr: 0
```

Exit

Use the exit command to return to the previous prompt level.

Syntax exit

Example:

```
ESCON Config>exit
```

Chapter 29. 3746 Management Overview

This chapter gives an overview of network management relevant to the operation of the 3746 Nways Multiprotocol Controller. The addition of the NNP to allow the 3746 to function as a stand-alone APPN network node and/or IP router, and the recent addition of the MAE. with its APPN and IP functions gives a number of options for managing the hardware and software running in these platforms.

The management tasks associated with the 3746 are:

- Reporting hardware and software alerts
- APPN and IP Topology management
- Configuration management with the CCM (including MAE)
- Performance management with Network Performance Monitor (NPM)

Management can be divided up into local and remote management. Local management is carried out via the service processor (SP), but this can also be done from remote workstations by using DCAF. Remote management is carried out from different platforms, these may be distributed or centralized. Management information is forwarded from the SP, and the APPN and IP control points to management software running on a variety of hardware platforms, different protocols may be used to transport this data.

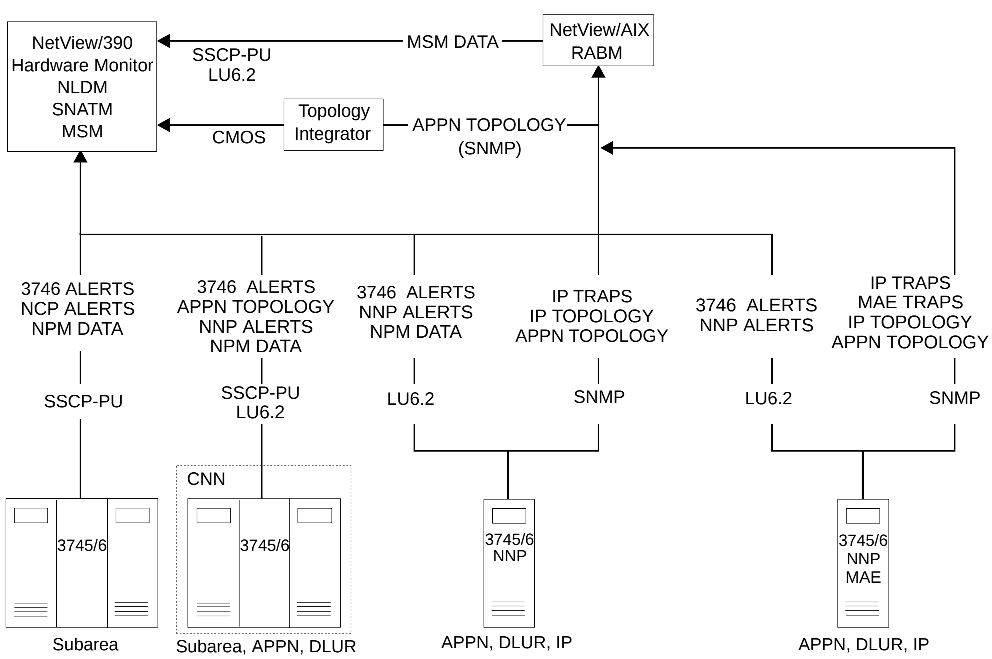


Figure 29-1. 3746 Management Options

Figure 29-1 shows the available hardware and software configurations reporting management data to different management platforms. Table 29-1 on page 29-2 gives an overview of the management options for each configuration. The options are discussed in greater detail in the following sections.

Networking Architecture	Management Data Available	Management Software	Transport	See Page:
Subarea SNA	3746 Alerts NCP Alerts NPM Data	NetView/390 NetView/390 NPM	SSCP-PU	37-1
Subarea SNA APPN (CNN)	3746 Alerts NNP Alerts NPM Data	NetView/390 NetView/390 NPM	LU6.2	29-2 37-1
APPN (NNP) DLUR	3746 Alerts NNP Alerts NPM Data	NetView/390 NetView/390 NPM	LU6.2	29-2 37-1
IP (NNP)	IP Traps IP Topology APPN Topology	NetView/AIX NetView/AIX, MSM RABM, SNATM	SNMP	29-21 29-10 29-23
APPN (MAE) DLUR (MAE)	3746 Alerts NNP Alerts	NetView/390 NetView/390	LU6.2	32-1
IP (MAE)	IP Traps MAE Traps IP Topology APPN Topology	NetView/AIX NetView/AIX, MSM NetView/AIX, MSM RABM, SNATM	SNMP	29-21 29-10 29-23 29-2
APPN (MAE)	SNMP Traps APPN Traps	NetView/AIX	SNMP	

Table 29-1. Summary of Management Options

NetView/390 Management of APPN Networks Overview

IBM NetView V2R4 includes a feature for managing APPN networks called the NetView APPN Topology and Accounting Management (APPNTAM). This feature works with corresponding agent functions to gather and record data about APPN networks.

NetView V3R1 was enhanced to include functions for managing the topology and status of both subarea and APPN networks. For more information on SNA and APPN management, please see *Dynamic Subarea and APPN Management Using NetView V3R1,* SG24-4520. For APPN, these enhancements include:

- Integration of the APPN Topology and Accounting Management (APPNTAM) feature into the Enterprise Option of NetView V3R1. It is now called the SNA Topology and Accounting Manager (SNATAM), and it provides support for both APPN and subarea topology.
- The CMIP services function is no longer part of NetView in V3R1. Instead, NetView utilizes the CMIP services function present in VTAM V4R3 in order to communicate with agents.
- Support for the VTAM SNATAM agent shipped as a part of VTAM V4R3.
- The CM/2 agent is now shipped as part of NetView and has been renamed the APPN Topology and Accounting Agent (APPNTAA). This agent is also available for the IBM 2217 and 3746 NNP.
- Support for the dynamic topology and status of LUs. With the SNA topology manager in NetView Version 3, LU information is not automatically collected from the VTAM agent for all LUs. This choice was made in order to reduce the network traffic and the number of objects created and maintained in NetView's Resource Object Data Manager (RODM). Application LUs and APPN control points will automatically be reported by the VTAM agent to the SNA topology manager when local and network topology is being collected from the VTAM agent.

Note: The NetView RODM is an object-oriented data cache. Objects in RODM represent resources in the network. The data cache is located entirely in the memory of the host processor resulting in fast access to data and high transaction rates.

- Session monitor support for DLUR/S sessions, border nodes, and VR-TGs. The session monitor will be able to indicate whether the SSCP-PU and SSCP-LU sessions are using the Dependent LU Requester/Server (DLUR/S) pipe. The session monitor has also been enhanced to be able to indicate in the APPN route displays whether the APPN route for a session traverses VR-TGs or crosses APPN networks.

The *Topology Management* function provides the ability to obtain, monitor, control and graphically display the topology of your APPN networks:

- Collection and storage of APPN topology data, including real-time updates, in the RODM data cache
- Dynamic, graphical display of APPN topology, using the NGMF
- Control of SNA ports and links using commands on the NGMF pull-down menus, the operator console, and Command Tree/2

The Accounting Management function provides the ability to centralize collection of LU 6.2 session and conversation accounting information. This information is logged to the system management facilities (SMF) or a user-defined external log.

You can automate these functions using the NetView automation facilities, such as command lists and the automation table. In addition, you can automate using methods and objects stored in RODM.

SNATAM Structural Overview

SNATAM provides APPN management functions according to a manager-agent relationship. This feature uses the Open System Interconnect (OSI) system management model. Management service is provided by one or more managing systems, which gather and correlate data from multiple managed systems. The managing systems provide this service through one or more management applications, called managers, which communicate using OSI Common Management Information Protocol (CMIP) with management applications at the managed systems, called agents.

The topology manager and accounting manager applications are separate entities that can be installed and initialized independently. You can install the topology manager application on a NetView central system. You can install the accounting manager application on a NetView central system and on a NetView distributed system.

The corresponding SNATAM agent applications reside on VTAM and on APPN network nodes and end nodes that use the OS/2 Communications Manager/2 platform. The SNATAM agent includes both the topology agent and the accounting agent applications that can be initialized independently.

In all cases, the CMIP services must be active to support the manager-agent communications. Communication between the manager and agent applications is over LU 6.2 sessions using OSI CMIP and the SNA multiple domain support (MDS).

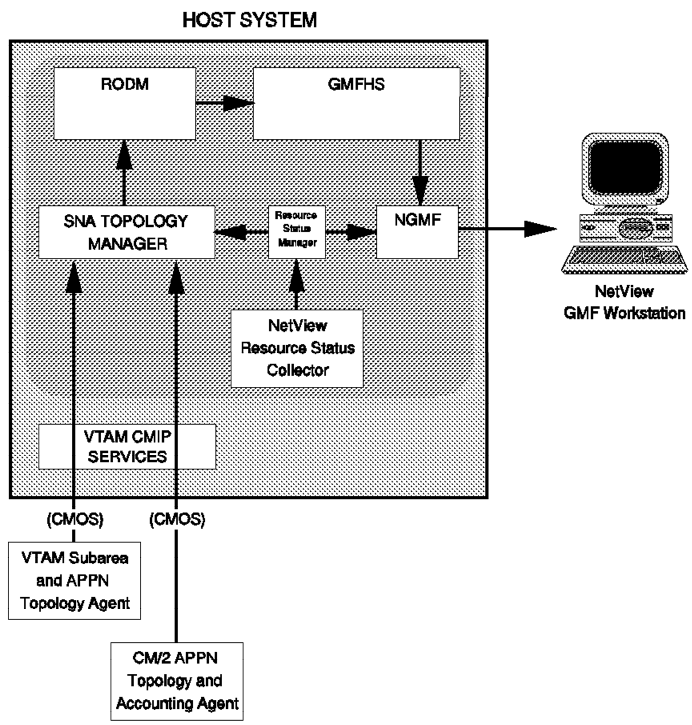


Figure 29-2. Structural Overview of SNATAM

Figure 29-2 on page 29-4 illustrates the structure of the SNATAM feature. The topology agent on the OS/2 system is gathering and forwarding topology information to the topology manager. The accounting agent is gathering and forwarding accounting data to the accounting manager. Note that each manager application can gather information from multiple agent applications; each agent application can forward data to multiple manager applications.

VTAM CMIP Services

The VTAM CMIP services component allows communication between the SNATAM manager and agent applications using VTAM MS transport. MS transport uses LU 6.2 sessions for the actual communications between systems in the network. The CMIP data exchanged between the manager and agent applications is encapsulated in MDS-MUs and transported over these LU 6.2 sessions using the management services MDS-SEND and MDS-RECEIVE transaction programs. The CMIP services task or program comprises the OSI layers 5 to 7 and other services, such as internal MIB API.

SNATAM Topology Manager Overview

The topology manager works with one or more topology agents to gather the APPN topology information of your APPN networks, as well as to monitor the networks for any topology or resource status changes. Agent applications can be on APPN network nodes (NNs) and end nodes (ENs). NNs provide network and local topology support; ENs provide local topology support.

The topology agent forwards APPN topology and status information upon request to the topology manager. The topology manager correlates and stores this data in RODM according to the SNATAM topology data model. It dynamically creates objects in RODM and updates the status of these objects as information is received from the topology agents in the network.

The topology manager allows you to manage APPN resources, namely logical links and ports, at the agent nodes. When you issue a command to start monitoring network or local topology, the topology manager sends a request to the agent. The agent sends the requested topology data to the manager, then continues to send status and configuration updates to the manager. The agent also activates and deactivates ports and links when it receives those commands from the manager. An agent can interact with one or more managers, each requesting the same or different data.

SNATAM Topology Data

The SNATAM topology manager gathers topology data from the topology agent nodes in the network. The two types of topology being collected and monitored are:

Network topology
: That is, your APPN backbone topology. It contains information about network nodes (NNs), virtual routing nodes (VRNs), and transmission groups (TGs) between nodes that are part of an APPN intermediate routing network. Topology manager should request network topology from at least one agent network node in each subnetwork.

Local topology
: That is, local information about network nodes (NNs), end nodes (ENs), and low entry networking (LEN) nodes, the connections between nodes, and the ports and links that make up the connections. A node must have a topology agent installed to support local topology monitoring.

NGMF Graphic Views of APPN

The APPNTAM topology manager uses the NGMF to provide the graphical interface for displaying and monitoring APPN resources stored in RODM. APPN views are updated dynamically as changes occur in the network. This ensures that the most current status and configuration are available to the operator. Operators can use the views to monitor the status of the APPN network, navigate through the network, locate failed resources, activate and deactivate links and ports, and control topology monitoring.

Topology Manager Functions

The functions available with the topology manager enable you to do the following:

- Monitor APPN network topology to view the connectivity between APPN network nodes. The views are updated dynamically with configuration and status changes of the network nodes and the TGs between them.
- Monitor APPN local topology to view APPNTAM agent nodes and their TGs, ports, and logical links. Local topology also displays adjacent network nodes, end nodes, and low entry networking (LEN) nodes. These views are updated dynamically with configuration and status changes to nodes, TGs, links, and ports.
- Control the status of ports and links (activate, deactivate, and recycle).
- Navigate from high-level aggregate views to real resources, using functions such as the More detail, Fast path to failing resource, and Locate resource pull-down menu selections.

- Display views of an APPN network, including views of:
  - All APPN subnetworks being monitored (with each subnetwork as an aggregate object)
  - An individual APPN subnetwork (an aggregate view representing NN domains and the TG circuits between NNs)
  - A particular domain of an NN
  - Local connections of a node (TG, links, ports, and adjacent nodes)
  - A particular connection (a TG or link and the adjacent node)
- Display information about resources such as CP and link names, TG numbers, and the NETID of a subnetwork.
- Identify which NNs, ENs, and TGs have additional capabilities and display what they are. For example, NN capabilities can include border node and directory server. TG capabilities can include support for CP-CP sessions.
- Use existing NGMF functions to navigate and edit views.
- Automate operations using RODM objects.
- Create user-defined objects and views in RODM for customized operation.

Figure 29-3 on page 29-7 gives an example of a subarea network topology displayed by SNATAM.

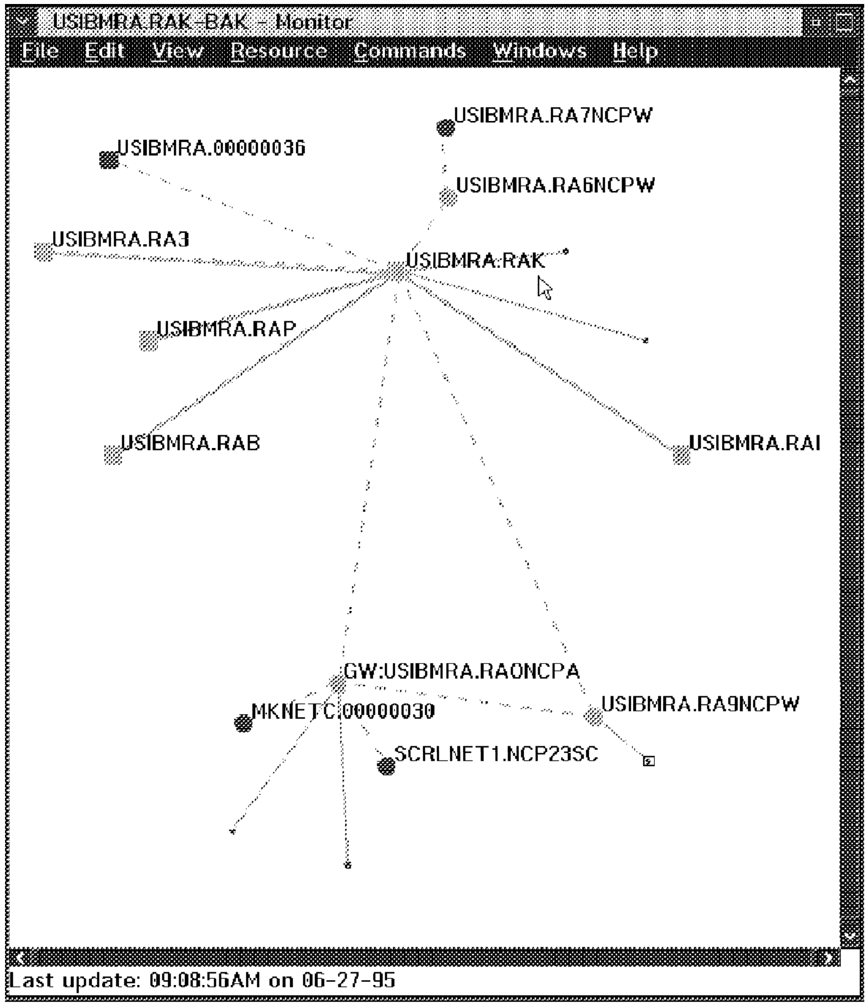


Figure 29-3. APPN Topology Example

APPN Topology Integrator

The APPN Topology Integrator (referred to as the *integrator*) is an application that runs on any Operating System/2 (OS/2) Warp or Warp Connect workstation with Communications Manager/2 (CM/2) V1R1 or later and TCP/IP V3R0. The integrator enables the management of SNMP devices via CMIP. Together with the NetView SNA Topology and Accounting Manager (SNATAM) and the APPN Topology and Accounting Agent (APPNTAA), the integrator is part of a complete solution providing for the management of APPN topology.

SNATAM provides APPN management functions according to a manager-agent relationship. This relationship is defined by the International Organization for Standardization (ISO) in terms of a managing system and a managed system, respectively. The manager applications for APPN topology are NetView applications. Agent applications, including APPNTAA and the integrator, which collect information for transmission to NetView, reside on APPN network nodes and end nodes that use the CM/2 platform. Communication between the manager and agent applications is over APPC sessions using Open Systems Interconnection (OSI) Common Management Information Protocol (CMIP) and the Systems Network Architecture (SNA) Multiple-Domain Support (MDS). To support the CMIP Services, the integrator uses the Management Services (MS) transport.

The integrator is installed, started, and maintained entirely separately from the manager function (see “NetView/390 Management of APPN Networks Overview” on page 29-2).

How the Topology Manager and Integrator Work Together

The Topology Manager application works with one or more integrators to gather topology from the SNA network. The integrator is needed to provide APPN topology information from SNMP devices. An integrator can be located on an APPN network node (NN) or end node (EN).

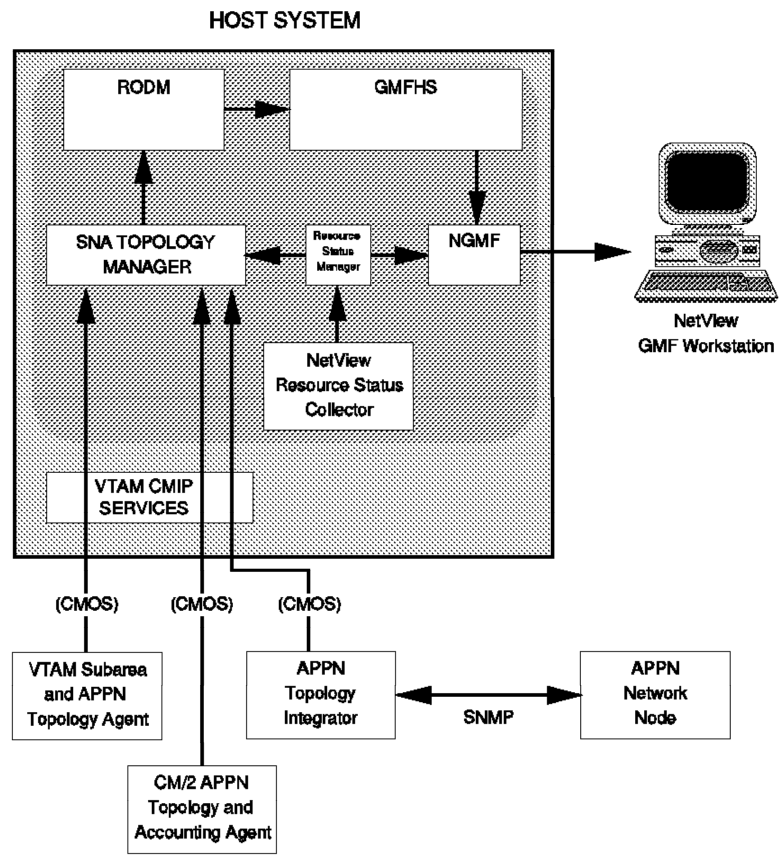


Figure 29-4. APPN Topology Integrator

When an operator issues a command to start monitoring topology at a node with an SNMP agent, the topology manager sends a request to the integrator. The integrator obtains the requested network or local topology data from the respective SNMP agent and sends the data to the manager. It continues to send status and configuration updates to the manager by polling the SNMP agent for topology changes. An integrator can support approximately 200 concurrent monitor requests.

Note: Each monitor request is handled in a separate OS/2 thread. Although OS/2 can handle a theoretical maximum of 4095 processes or threads, the system default value is 256.

The integrator can also activate and deactivate ports and links at an SNMP device upon receiving requests from the manager if these actions are supported by the SNMP agent at the device.

NetView/390 Management of IP Networks

NetView provides a solution for the monitoring and control of IP resources under GMF. The IP resources can be displayed on the same screen as subarea and APPN SNA resources, and controlled in the same way. This product is called *MultiSystem Manager* (MSM).

MultiSystem Manager uses a manager-agent relationship to manage LAN and IP workgroups. This relationship consists of a managing system, from now on referred to as the topology manager, and managed systems, from now on referred to as topology agents.

MultiSystem Manager Release 2 enables management of the following IP resources:

- Networks
- Locations
- Subnets
- Segments
- Routers
- Hosts
- Bridges
- Hubs
- Interfaces

The MSM topology agents are supported for the following software platforms:

- NetView/6000
- NetView for AIX
- LAN Network Manager Entry
- LAN Network Manager
- Novell NetWare

The role of the topology agents is to monitor all of the resources controlled by the workstation in which the agent resides and to dynamically communicate any changes in resource status to the topology manager. The NetView/6000 agent only retrieves topology information from the NetView/6000 database when requested by MSM. Resource status changes are sent to MSM by NetView/6000.

Managing System

MSM consists of a base component and features for the different environments. Figure 29-5 on page 29-11 provides more detail showing the components of the MSM base code.

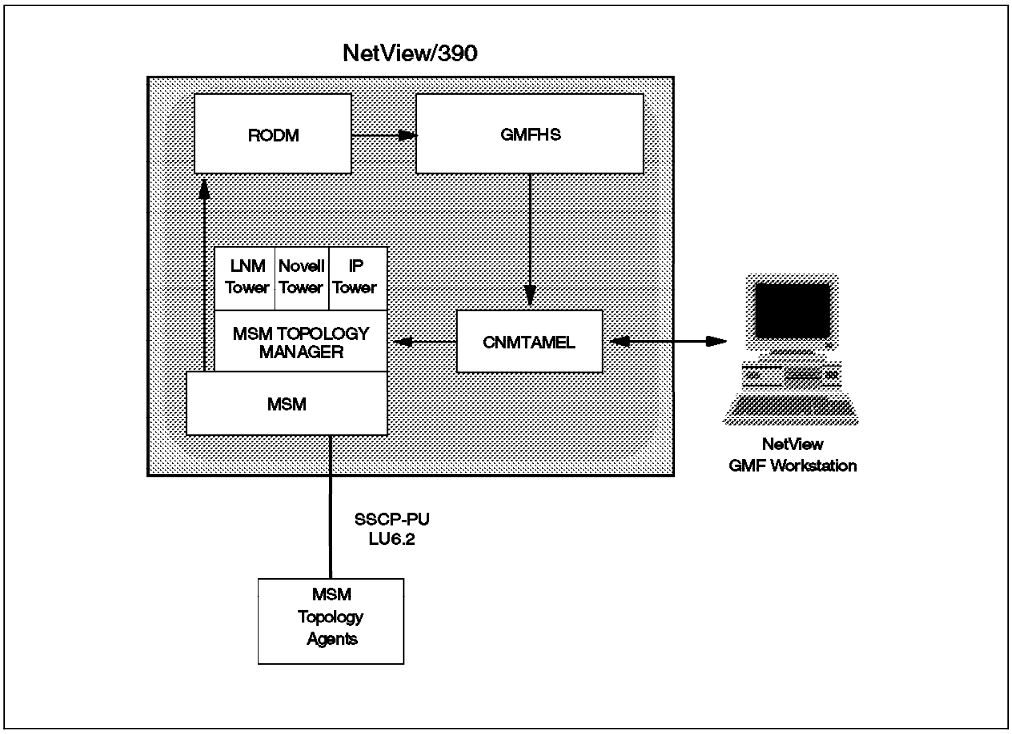


Figure 29-5. Detail of MultiSystem Manager and NetView Component Parts

MSM consists of the following components:

- NetView REXX command lists with a REXX alternate library

  Note: With SAA® REXX/370 installed, the command lists run compiled. Without the SAA REXX/370 installed, the command lists will run with the alternate library.

- NetView command processors
- NetView panels
- Load files for the MSM data model

The command lists and command processors can run in one or several NetView autotasks (for load balancing).

The MSM topology manager performs the following tasks:

- Dynamically discovers the topology and status of the network.
- Stores this information in the NetView Resource Object Data Manager (RODM).
- Automatically processes topology and status updates from the topology agents.

Centralized and integrated LAN and IP management can be achieved, because status information about your networks and all LAN and IP resources is stored in RODM. The information in RODM relates to the information received from your topology agents. In addition MSM allows graphical management of LAN and IP resources by displaying the information on the NetView Graphic Monitor Facility (NGMF) workstation. Figure 29-5 shows you how MSM works in the NetView environment.

MultiSystem Manager Presentation Services

Using NGMF you can navigate through the views of your networks. Figure 29-6 on page 29-15 gives you an example of the IP views created by MultiSystem Manager.

As a result of the object-oriented approach used in the data repository (RODM), the IP objects/views created by MSM can easily be integrated with other types of objects/views in RODM (for example LAN adapter, NetWare requester or SNA objects).

Manager-to-Agent Communication

The MSM topology manager communicates with the topology agents by means of NetView RUNCMD commands across SNA sessions. Topology agents communicate with MSM through RUNCMD responses, alerts and resolutions.

RUNCMD

RUNCMD commands are SNA Network Management Vector Transports (NMVTs) that you send from NetView to a service point application. The workstation topology agent translates each NetView RUNCMD command into the specific workstation command. Command response NMVTs contain information about the workstation or about the result of a workstation command. After the workstation processes a command from NetView, the topology agent builds a command response, imbeds it in an SNA/MS NMVT and sends it to NetView.

Alerts and Resolutions

Alerts in this context are SNA/MS NMVTs sent from service point applications to NetView. The alerts from the service points will appear in the hardware monitor component of NetView.

The topology agent sends an alert when it wants to notify the topology manager of a topology or status change. When all of the problems associated with a resource are corrected, the topology agent sends a resolution notification to the topology manager indicating that the resource has now returned to a satisfactory status.

Monitoring Resources

Once the initial status for the managed resources is stored in RODM, the MSM agents can notify NetView of topology or status changes by sending alerts to NetView.

The NetView Automation Table routes the alerts to the topology manager and the GMFHS event manager. The topology manager queries RODM for the topology resources. If the resources that caused the topology change alert are not found in RODM, the topology manager will create them.

The MSM IP Tower

MSM utilizes functions of the following products to enable centralized management of IP network environments:

- AIX NetView Service Point V1.2 or V1.2.1 (referred to hereafter as the service point)
- AIX SystemView NetView/6000 V2.1 (referred to hereafter as NetView/6000) or NetView for AIX V3 (referred to hereafter as NetView for AIX)

MSM uses a manager-agent relationship to manage IP networks. This relationship consists of a managing system referred to as the topology manager and a managed system, referred to as the topology agent MSM provides the topology manager that runs on the NetView for MVS management platform. Each NetView for AIX includes a topology agent that reports on all of the resources controlled by that IP manager.

The data collected by MultiSystem Manager from the managed NetView for AIX systems is stored in a single high-speed data cache called the Resource Object Data Manager (RODM) and is presented on the NGMF workstation in graphical form. You still need to run NetView for AIX on one or multiple workstations, all of them managing their own resources.

NetView/6000 is a comprehensive management tool for distributed heterogeneous, multivendor devices on TCP/IP networks. It provides an open network management platform that enables the integration of Simple Network Management Protocol (SNMP) and Common Management Information Protocol (CMIP) applications.

Most common is SNMP, which is a TCP/IP recommended standard that enables managers to ask agents to retrieve and change information about network objects. Those objects make up a collection called the Management Information Base (MIB). The MIB is not an actual database residing somewhere on the network: the individual pieces of information, called MIB objects, reside on the agent system, where they can be accessed (GET-command) and changed (SET-command) at the manager's request. This is how NetView/6000 manages network objects.

NetView/6000 is an AIX application; some of the functions it provides are listed below:

- Dynamic discovery and management of IP resources
  - Networks
  - Segments
  - Routers
  - Hubs
  - Bridges
  - Hosts
  - Adapters
- Configuration, fault and performance management
- Threshold monitoring and automation facility
- Host communications with NetView for MVS using Service Point
- Alert filtering
- Interface with Ingres database
- Graphical user interface using OSF/Motif and X-Windows System standards
- SNMP and NetView/6000 linemode commands

NetView for AIX adds the following functions:

- Enhanced database support to manage trap, topology and collected SNMP data using, additionally:
  - DB2/6000
  - Informix
  - Oracle
  - Sybase
- Enhanced event handling including trap-forwarding, multiple dynamic workspaces and operator-less event automation
- Integrated System Resource Monitoring Tool
- Distributed discovery and management using Systems Monitor V2
- Enhanced APIs
- Backup Manager function

Note

For further information on NetView for AIX, please refer to the NetView for AIX manuals you will find listed in the related publications section of this document.

Example IP Views

This section gives some examples of how IP resources are displayed by NGMF.

The View Hierarchy

Included below is a simple scenario in which the NGMF operator navigates "down" by double clicking on resources to display IP Internet views. Details on the views are explained in the next chapter.

An overview of the view hierarchy is provided in Figure 29-6 on page 29-15 to illustrate how to click your way down to the IP Internet view.

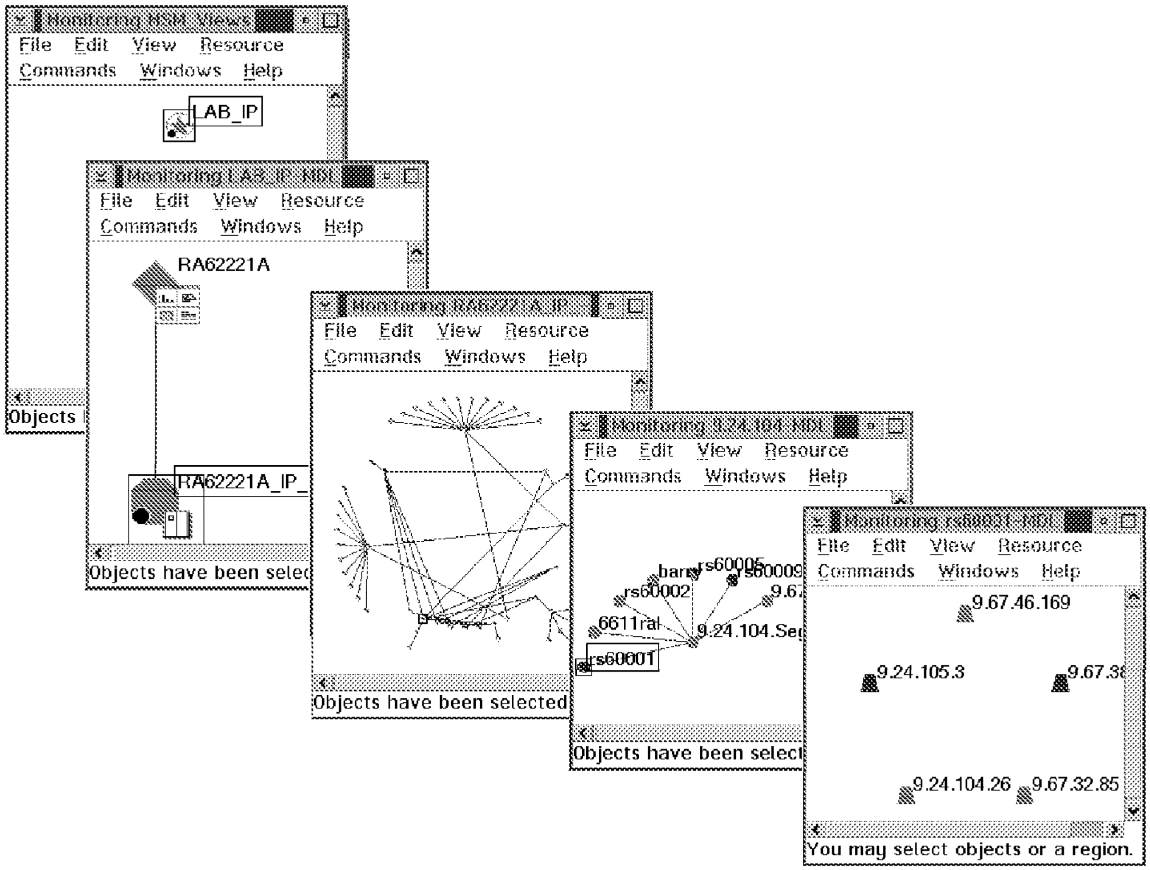


Figure 29-6. The MSM/IP Views at a Glance

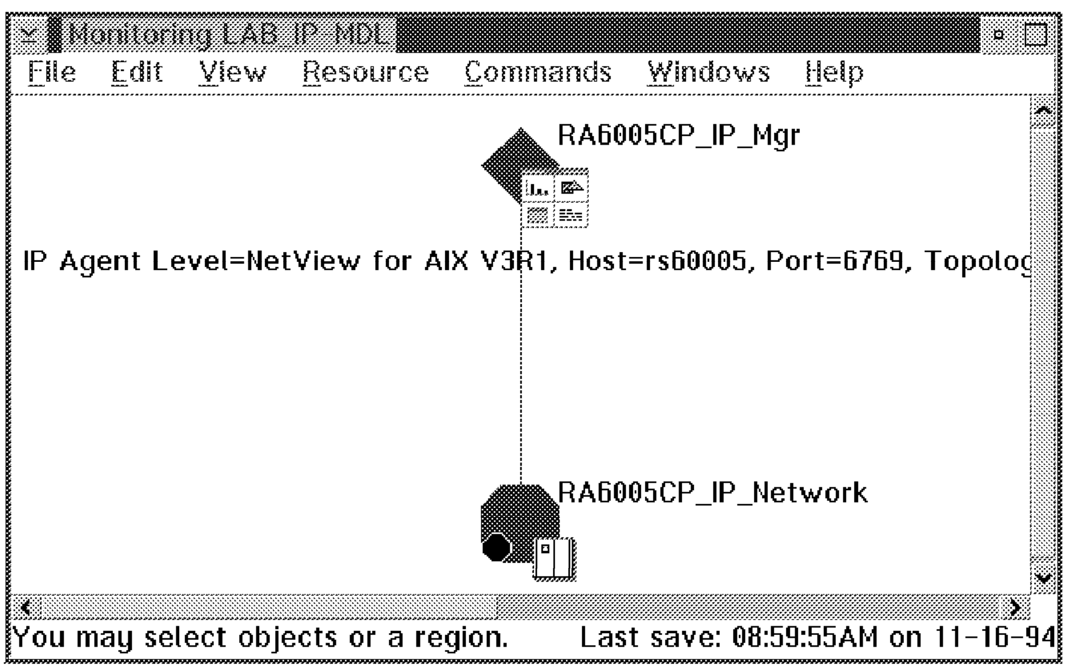


Figure 29-7. Domain Manager and IP Network Aggregation Object

In this example the managed IP network has a service point called RA6005CP. This is the CP name of our service point machine and has to be used in the RUNCMD, as shown later, if LU 6.2 is used for transport. This view includes also the IP network aggregate object (RA6005CP_IP_Network) and some helpful information about the domain manager including its IP agent level, host name and topology level (so-called "other data"), which is optional.

By double clicking on the network aggregate 9.24.104, which is our local IP network, we get a view containing the network with all attached routers. This view hierarchy corresponds to the view hierarchy NetView for AIX uses.

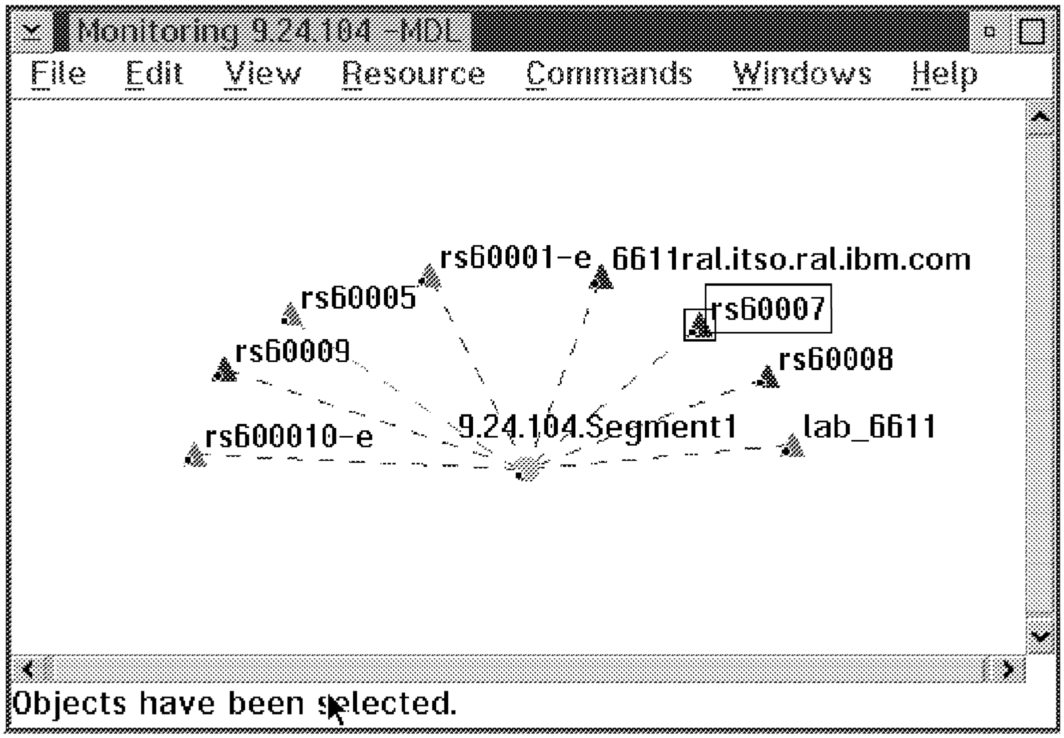


Figure 29-8. Display of Segment

NetView for AIX to MultiSystem Manager Communication

MultiSystem Manager communicates with NetView for AIX using the following products on an AIX workstation:

- AIX SNA Server V2
- AIX NetView Service Point V1.2.1

or

- AIX SNA Services V1.2
- AIX NetView Service Point V1.2

SNA Server/Services only provides a connection; the service point is a transport vehicle, moving data. The following applications thath use the service point are provided in NetView for AIX.

- Trap-to-Alert Daemon (TRALERTD)
- Service-Point-Application Daemon (SPAPPLD)

The flow of information between NetView for AIX and NetView for MVS is illustrated in Figure 29-9.

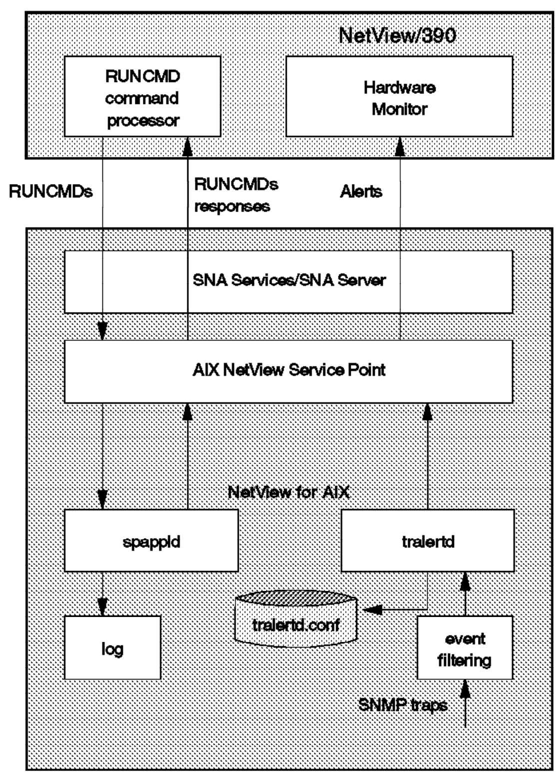


Figure 29-9. The Flow of Information between NetView for AIX and NetView for MVS

Note

NetView for AIX and Service Point have to run on the same physical machine in order to work with MSM.

The Trap-to-Alert Daemon TRALERTD receives SNMP traps and converts them into NetView for MVS Alerts (NMVTs). There is a special filter function, that allows you to customize which traps are forwarded to NetView for MVS. The TRALERTD provides default trap to alert conversion rules and default filter. The conversion rules are stored in the tralertd.conf file.

The service point application daemon SPAPPLD receives commands that are sent from NetView for MVS and sends RUNCMD responses. It also logs all activities in the NV390.log logfile.

NetView for MVS to AIX Service Point Communication

NetView for MVS communicates with service point using one of the following SNA connections:

- An SSCP-PU session
- MDS Transport using LU 6.2 session

Communication over an SSCP-PU Session: This is not supported for NetView/6000-MSM communication. We tried it and found that it worked, but you should consider using LU 6.2 for support and performance reasons. If your AIX service point and your NetView focal point VTAM are in different SNA networks, you will have to use an LU 6.2 session since this provides the required cross domain support.

Communication over an MDS Transport LU 6.2 Session: An LU 6.2 connection is required when the service point. node is not in the same SNA network or VTAM domain as NetView MSM. It is also required for APPN networks, where the role of the PU is taken over by the APPN control point.

When using the SNA server, the control point takes the place of the LU and is used to address the service point with the RUNCMD command. This facility has two advantages:

- Definition is much easier, because you don't have to define any LUs.
- It is possible to change the focal point NetView used by service point, which means you can share one service point machine between two NetView for MVS (not at the same time). All you have to do is to send a NetView FOCALPT CHANGE command to the service point and the host partner LU is changed.

Note

If an LU 6.2 session is used with SNA services, the connection is dependent on the status of the partner LU, which in this case is NetView for MVS. The connection is reestablished by the first RUNCMD sent by NetView for MVS after the LU-LU session has become inactive. It is necessary to define an LU 6.2 logmode for this.

If you are using SNA server, there should be no problem if the host partner LU becomes inactive. SNA server tries to reestablish the session continuously and so the session becomes active shortly after the VTAM major node is activated. SNA server only has to be restarted when the connection has been down too long SNA server stops trying to reconnect after a maximum of 500 attempts.

The retry frequency and number of retries is controlled by fields in the SNA DLC profile. The default is 20 retries at one-minute intervals.

Note

When the VTAM switched major node is inactivated and activated, sometimes it may also be necessary to restart the SNA subsystem in addition to service point.

Performance Management

This section assumes you are familiar with NetView Performance Monitor (NPM). It describes NPM on an SAA subarea environment.

The Need for Performance Monitoring

Performance monitoring consists of three basic tasks:

- Collecting data as the events being monitored are happening.
- Sending the data collected to a central point.
- Analyzing the data to give the required picture of present performance against either:
  - A past situation
  - An ideal attainable situation

The purpose of analysis depends on the requirement for monitoring. It could be:

- To offer the best throughput for the cost of the network
- Real-time traffic management
- Accounting and charging purposes

Whatever the purpose, performance monitoring is a combination of host and 3746 Nways Multiprotocol Controller activities.

Present Performance Monitoring on SNA Networks

Referring to Figure 29-10 on page 29-20, the present mix of activities is:

1. Individual DLCs (SDLC, CDLC, token-ring 802.2, frame relay, X.25, and ISDN) collect data according to keywords chosen at NCP generation time. The DLCs have algorithms onboard to watch data flowing through them and to collect the required information. Only that information chosen at generation time can be collected.
2. A task running in the same NCP to which the DLCs are connected, NPA (Network Performance Application) gathers data from the DLCs. This is running in an LU0-PU2.0 session.
3. The NPA in NCP is connected to the NPM running in the host via an LU-LU session. NPM receives the data from all the NPAs and displays or prints the required analysis.

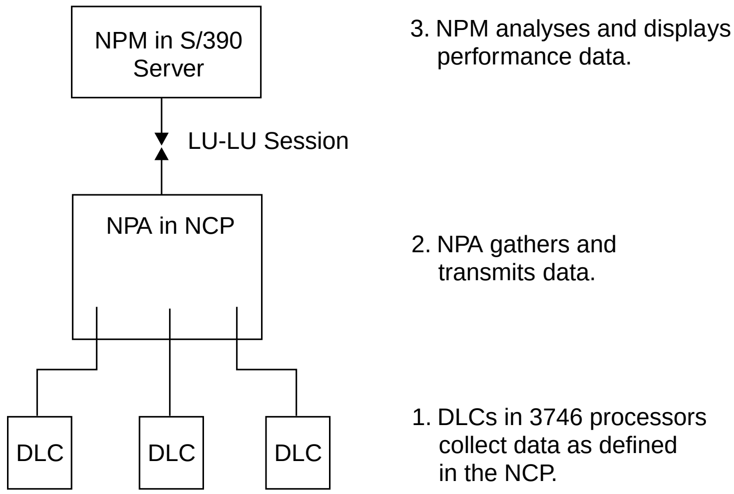


Figure 29-10. SNA (NCP) Performance Monitoring Activities (3745/3746-900)

NetView Performance Monitor Support Details

The NetView Performance Monitor (NPM) Version 2 Release 1 or Release 2, used in conjunction with NCP Version 7 Release 3 or Release 4, is required for performance monitoring of:

- X.25 lines connected to the 3746-900, supported by X.25 NPSI Version 3 Release 8 or by the X.25 ODLC function of NCP V7R4 requiring FC 5030 into the 3746-900. NPM must be installed with APAR number OW10583.
- TIC3 and 3746-900 processor (CLP, TRP, TRP2, ESCP, ESCP2, and CBSP or CBSP) utilization. NPM must be installed with APAR numbers OW08565 and OW10584.

Support for LAN counter data reporting for non-ERP traffic[1] over a TIC3 requires NCP V7 R4 and one of the following:

- NPM V1 R6 with APAR OW17878
- NPM V2 R1 with APAR OW17876.

Support for the HPR LAN counter date reporting over a TIC3 requires NCP V7 R4 and NPM V2 R2 with APAR OW17876.

[1] The 3746-900, operating as an APPN composite network node (CNN) with NCP V7 R4, supports HPR/ANR traffic, which does not require error recovery procedures (ERPs) with the adjacent HPR node.

NetView for AIX Management of IP Networks

Managing Your IP Resources with SNMP

Your IP resources are managed with the Simple Network Management Protocol (SNMP), which is used to:

- Monitor and control network elements
- Communicate fault management information between the network management stations and agents in the network elements (hosts, gateways, and terminal servers).

Unsolicited messages (traps) inform network management stations of asynchronous events such as:

- Cold start
- Warm start
- Link down
- Link up
- Authentication failure
- Neighbor loss
- Enterprise specific

Managers and Agents

SNMP operates with *agents* that monitor network resources and report events to their *manager* on a network management station. The relationship between a manager and its collection of agents is called a *community*, and is defined by three properties:

- Name of the community
- IP address of the manager within the community
- Access mode of the manager (also called *privilege*). The 3746 Nways Multiprotocol Controller implements Read access which allows the manager to read information from a resource, but not to make changes to that information.

Traps

These are event notifications sent by agents to their managers. They consist of two parts:

- Name of the trap community
- IP address of the SNMP manager that is to receive the traps (alerts).

NetView for AIX Examples

The following figures show example NetView/6000 displays of IP networks. Figure 29-11 shows an example IP network; Figure 29-12 show an example of an Ethernet segment.

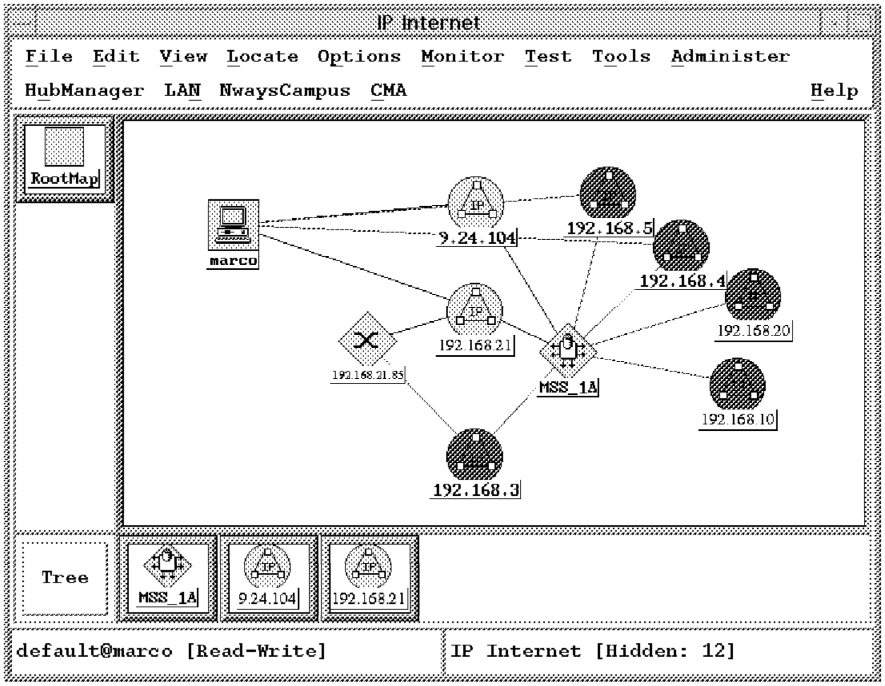


Figure 29-11. Example IP Network

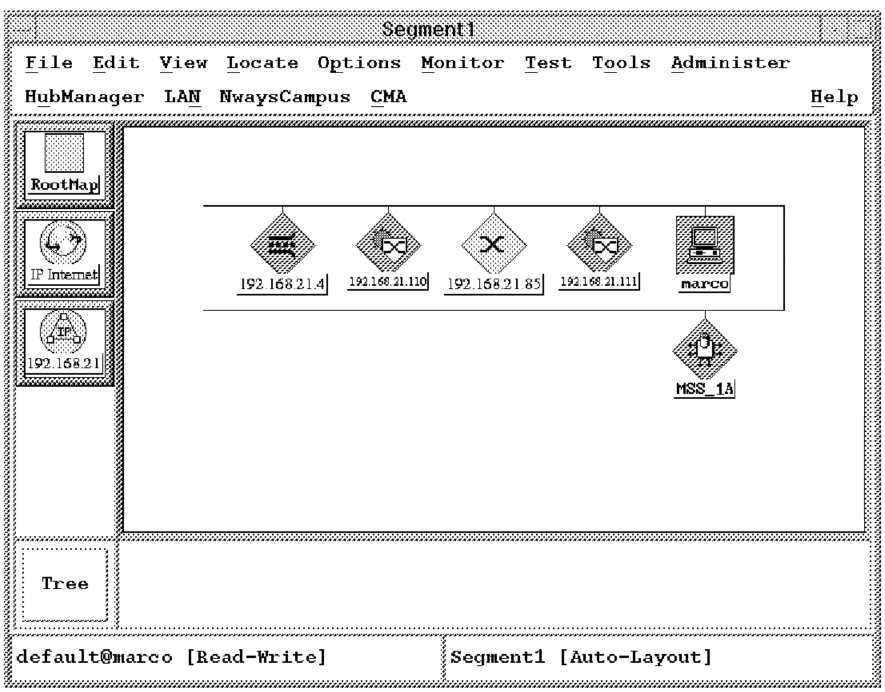


Figure 29-12. Example IP Segment

SNMP Management of APPN Networks

IBM Nways Campus Manager - LAN for AIX now includes the functionality of IBM Router and Bridge Manager/6000 V1.2 (RABM). RABM is used to monitor the health and performance of bridges and routers in the campus network. Among support for other IBM and OEM devices through standard and enterprise-specific MIBs, it also supports APPN and DLSw MIBs. In addition, it includes Alert Manager, which enables SNA alerts that are enveloped in SNMP traps to be displayed correctly on the NetView for AIX Event Desk. Although this function was provided specifically for IBM 3746 and AS/400 devices, it can be used by any SNMP agent.

With the APPN Topology feature, it is possible to view APPN networks end-to-end. APPN resources are discovered automatically and can be viewed with their status as color-coded icons. APPN protocol performance and error events (data and graphs) are also provided.

A single NN RABM client provides details of the complete APPN backbone. For local topology of network and end nodes, the RABM client must be installed in each network node.

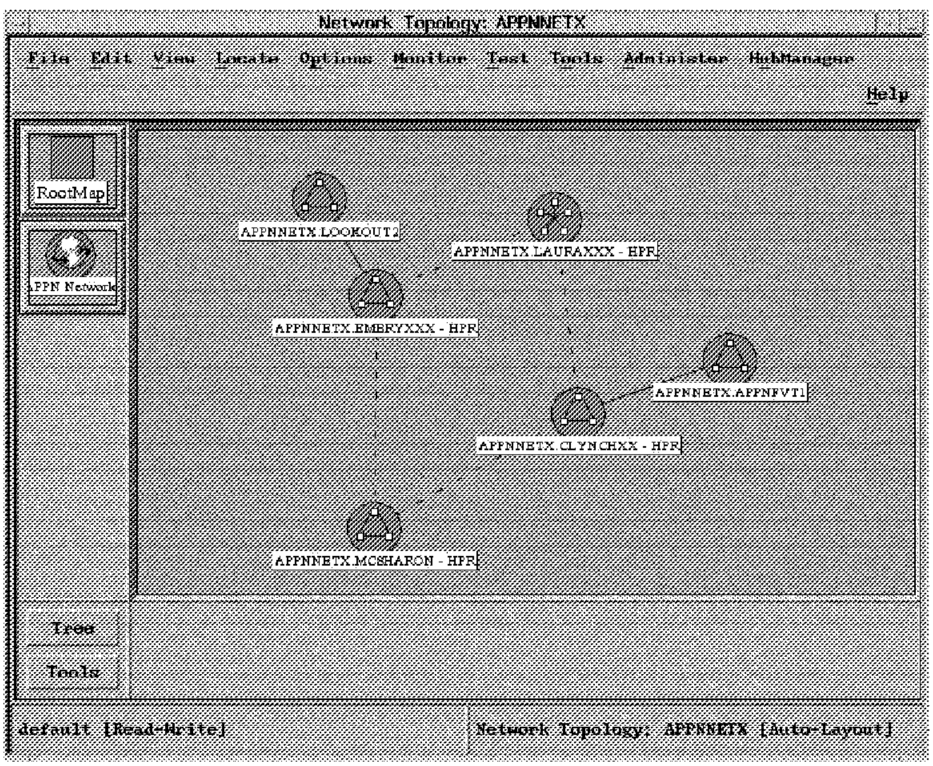


Figure 29-13. Example RABM Display

Figure 29-13 shows an example RABM screen. It shows a network of six APPN nodes; the nodes with the suffix *-HPR* are HPR-capable. HPR links are shown as dotted lines, and APPN links are shown with solid lines.

NetView Alerts

If you are not going to use the NetView program, please go to “To Not Generate MOSS-E Alerts” on page 29-33.

External Box Errors

A network error detected by the network node processor is an external box error. It causes the network node processor to generate a network alert, which is sent to the NetView program via the session between the network node processor and the NetView program.

For external box errors, there is no MOSS-E intervention.

Internal Box Errors

An internal hardware or microcode problem in the 3746 Nways Multiprotocol Controller (3746-900, 3746-950, network node processor, or service processor) is an internal box error. The 3746-900 or 3746-950 sends its hardware or microcode error data to the service processor (MOSS-E) and network node processor (control point) via the TIC3 on the CBSP. For MOSS-E microcode errors, the network node processor is not notified. The following happens after an internal box error has been detected:

- The network node processor generates a network alert for the 3746 Nways Multiprotocol Controller resources that are affected by the internal box error. This alert is sent to the NetView program via the session between the network node processor and the NetView program.
- The MOSS-E:
  - Records a system reference code (SRC) on the service processor hard disk
  - Displays an alarm on the service processor
  - Generates a hardware alert that is sent to the NetView program via a session between the service processor and NetView
  - Automatically calls the IBM Remote Support Facility, if this function is enabled (refer to Chapter 36)

Note: To match the network alerts reported by the network node processor with the hardware alerts reported by the MOSS-E for the same problem, make sure that both the network node processor and the MOSS-E alerts are reported to the *same* NetView program (refer to “Path for Reporting Network Node Processor Alerts” on page 29-27 and “Paths for Reporting MOSS-E Alerts” on page 29-27).

Focal Points

Alerts are sent to a node's *focal point* (FP) NetView. When this FP is unavailable, alerts may then be sent to a *backup focal point* NetView. Figure 29-14 on page 29-25 shows how the primary alert focal point is defined, and Figure 29-15 on page 29-25 shows how the backup alert focal point is defined for the 3746 NNP.

If the connection to the primary focal point cannot be established, or an existing connection becomes inactive, the 3746 will attempt the following:

Backup focal point is defined The 3746 attempts to connect to the backup focal point.

No backup focal point defined The 3746 attempts to reconnect to the primary focal point.

If the connection attempt to a focal point is not successful, then a timer is set and a retry is made when the timer expires. For each subsequent failure, the retry time is doubled up to an interval of one day. After that a retry is attempted once a day.

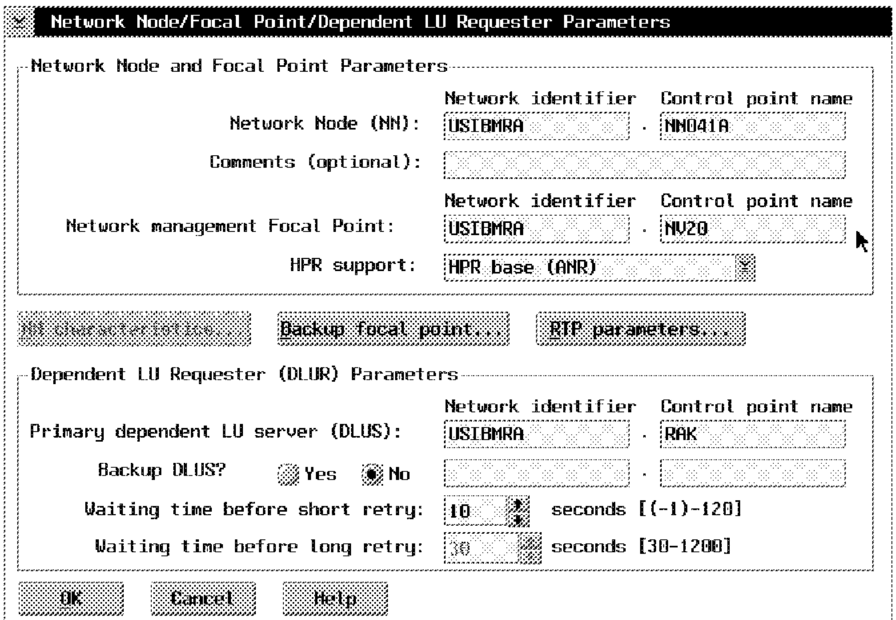


Figure 29-14. Defining the Primary Focal Point

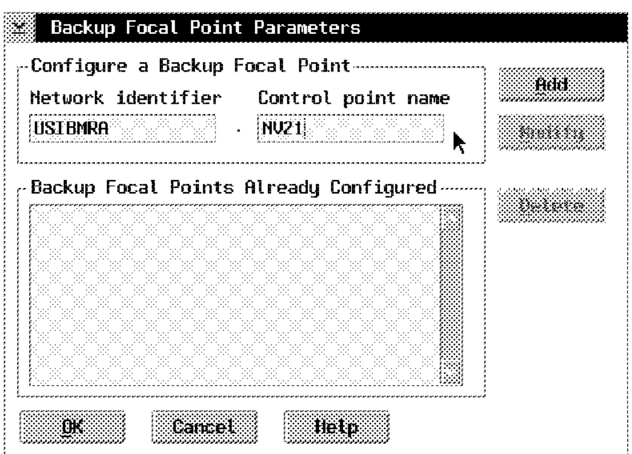


Figure 29-15. Defining the Backup Focal Point

Paths for Reporting Alerts to NetView

Figure 29-16 on page 29-26 shows the paths for reporting network node processor and MOSS-E alerts to NetView over an APPN network.

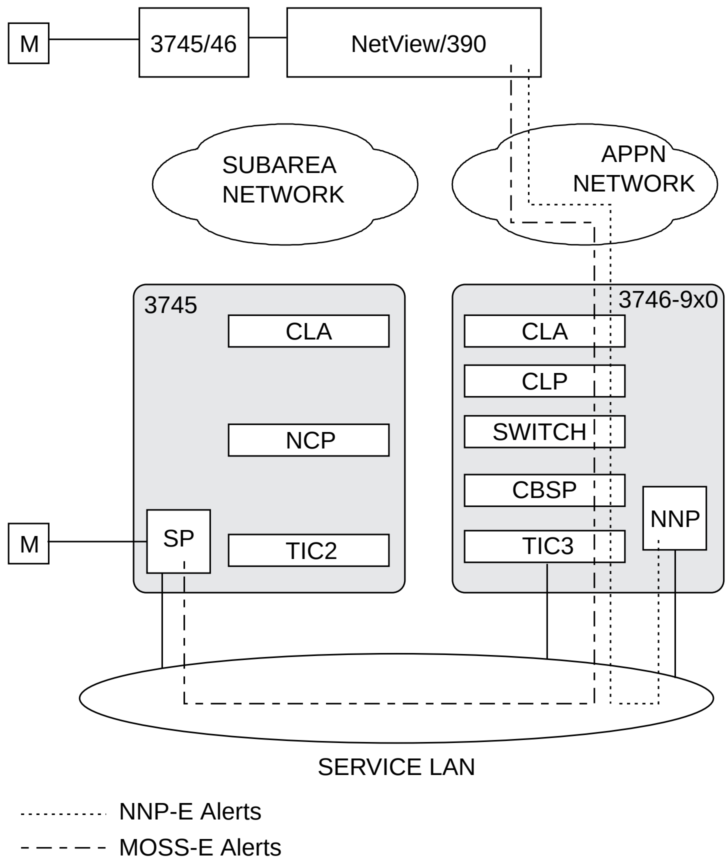


Figure 29-16. NetView Alert Paths over APPN

Figure 29-17 on page 29-27 shows the paths for reporting network node processor and MOSS-E alerts to NetView over a subarea network.

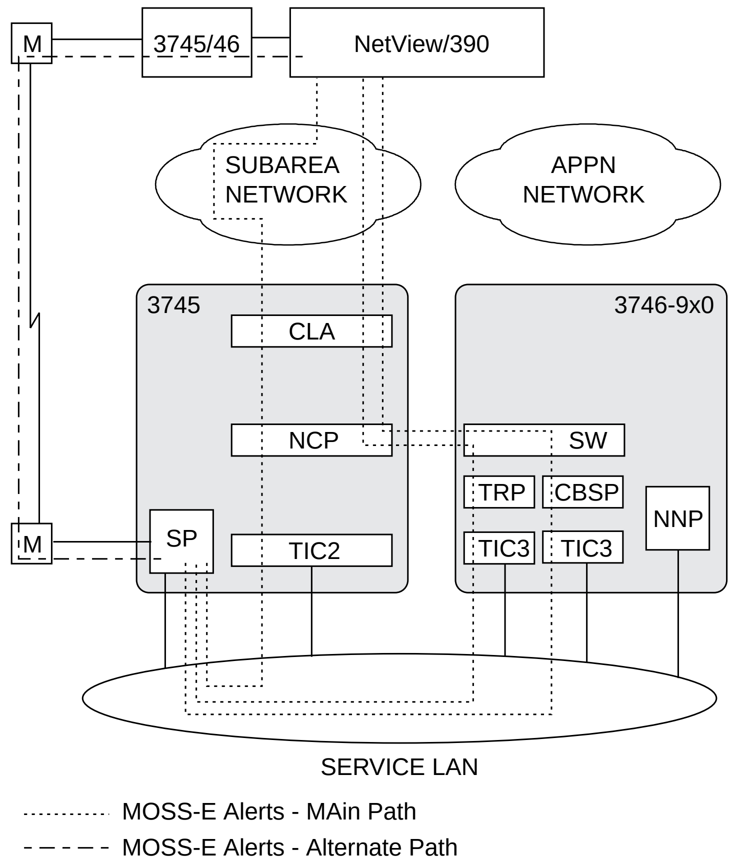


Figure 29-17. NetView Alert Paths over Subarea

Path for Reporting Network Node Processor Alerts

The network node processor reports the network alerts to NetView via the APPN/HPR network. The network alerts flow over from the NNP into the 3746 via the service LAN TIC3, and then over an APPN connection out of the 3746 to NetView (see Figure 29-16 on page 29-26).

Paths for Reporting MOSS-E Alerts

Two paths can be used by the service processor (MOSS-E) for sending the hardware alerts to NetView. These are:

- Mainstream path, or
- Alternate path

Mainstream Path: This is the normal path to the NetView program, generally flowing through the APPN/HPR network or, depending on the service LAN configuration, the SNA/subarea network. Either the APPN/HPR path or one of the SNA/subarea paths to NetView must be defined at installation time.

APPN/HPR Path: The MOSS-E alerts flow from the service processor to NetView over the same physical path (although using a different session) as the alerts reported by the network node processor. See Figure 29-16 on page 29-26.

The alerts flow from the service processor into the 3746 through the TIC3 connected to the service LAN, and from there via an APPN network to NetView.

Note: This path uses the DLUR support of the network node processor and requires a VTAM with the dependent LU server (DLUS) function at the other end of the DLUR pipe.

SNA/Subarea Path: The service processor can use an SNA/subarea path to NetView. This is via an NCP-controlled token-ring port operating as the gateway to the NetView program. One of the following 16 Mbps token-ring ports[2] connected to the service processor LAN is used to send the MOSS-E-generated hardware alerts to the NetView program (see Figure 29-17 on page 29-27):

- The TIC3 of the 3746-900 which provides the communication between the CBSP and the service processor:
- A TIC3 port of another token-ring adapter in the 3746-900:
- A TIC2 port of a token-ring adapter in a 3745:

Note: If you select an SNA/subarea path, you can use any 3745 or 3746-900 that is connected to the service LAN.

Alternate Path

If the mainstream path is not available, the MOSS-E can be pre-configured to contact the NetView program host via the SDLC port on the service processor (see Figure 29-17 on page 29-27):

Alerts are sent via the service processor SDLC port to the SP modem, through a public switched network to another modem that is connected to a 374X that provides a subarea path to NetView.

| This alternate path must be defined in the service processor, refer to Figure C-5 on
| page C-3.

You must provide a 3745 or 3746 switched port at the host site. This port must be equipped with a switched line modem to receive the dial connection. This modem must be compatible with the service processor modem. For more information about the type of modem needed, refer to “Service Processor Modem” on page 34-4.

Host procedures must include the activation of the switched port to answer the call.

Parameter Definitions for Reporting Alerts to NetView

The following groups of parameters must be defined in the service processor according to the path used. These parameters allow reporting of alerts resulting from problems detected in either the 3746 Nways Multiprotocol Controller or the network. Use page 38-5 to record the parameter values discussed in this section.

Network Node Processor Alerts

The network node processor reports the network alerts to NetView according to the network management focal point definition via the CCM (see the worksheet on page 40-63:

2 The token-ring port on the MOSS does not provide this path to the NetView program.

Network identifier

Identifies the APPN/HPR network to which the focal point node (running NetView) is connected.

IBM-registered networks identifiers should have an 8-byte name with the structure `cceeeenn`, where:

- `cc` is the country code (according to ISO 3166)
- `eeee` is the enterprise code (unique within a country)
- `nn` is the network suffix code (unique within one enterprise).

Control point name

Identifies the focal point node (running the NetView program) that is to receive the alerts.

Note: Up to eight backup focal points (running other NetView programs) can be defined via the CCM. Use the worksheet on page 38-5 to record the parameter values discussed in this section.

MOSS-E Alerts: Mainstream Path Definitions for APPN/HPR Path

Use the worksheet on page 38-5 to record the parameter values discussed in this section. This APPN/HPR path (refer to "APPN/HPR Path" on page 29-27) uses the TIC3 of the CBSP. If you want to use it as the mainstream path for the MOSS-E alerts, the following MOSS-E, CCM, and VTAM definitions are needed:

MOSS-E Parameters

LAN destination address

This is the MAC address (locally administered address) of the TIC3 on the CBSP (token-ring adapter used as the gateway to the NetView program). See Figure 29-16 on page 29-26.

This address must be defined the same as the Token-ring local address (MAC address) on page 34-17.

This address has 12 digits and must be unique among all other network addresses (LAAs) on the service LAN. Specify this address in the IBM Token-Ring Network format (your network administrator should be able to help you with this format). This address will be used by your service representative when customizing your service processor (refer to Figure C-5 on page C-3).

CCM Parameters: The APPN/HPR path uses the DLUR support of the 3746 Nways Multiprotocol Controller, which requires a VTAM with the DLUS function to be defined via the CCM. CCM allows you to define a primary DLUS and backup DLUSs.

Primary dependent LU server (DLUS)

Identifies the VTAM running the DLUS that you want to use.

Backup DLUS

Specifies whether there is a backup dependent LU server. If you select Yes, give the network identifier and the server name of the backup DLUS(s).

Waiting Time Before Retry

Specifies the length of time, in tenths of a second, that the DLUR must wait before attempting to re-establish a broken path to the DLUS. The maximum value is 120 seconds.

The default value is -1, for no retry. Some other values are:

- Zero (0): for an immediate retry
- One second: for a short retry
- Three seconds: for a long retry.

VTAM Keywords: To report alerts to NetView, you must define the service processor as a switched major node (PU type 2.1) in VTAM with the following parameters:

CPNAME which must be defined the same as the MOSS-E parameter Local node name on page 34-9.

NETID which must be defined the same as the MOSS-E parameter Network ID on page 34-9.

```
*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
*     MAJNODE FOR CONNECTION :  MOSS-E  <==> NETVIEW                *
*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
NTVMOSSE VBUILD TYPE=SWNET,MAXGRP=1,MAXNO=1
*-------------------------------------------------------------------*
MOSSE    PU    ADDR=04,PUTYPE=2,                                    X
               NETID=Network ID,                                    X
               CPNAME=Local node name,                              X
               DISCNT=NO
```

Figure 29-18. Example of Switched Major Node Definition

Note: This PU definition can also be coded in the switched major node using the IDBLK and IDNUM parameters instead of NETID and CPNAME. Here, the service processor local node characteristics must be defined using the Communications Manager. Specifically, the two fields of the local node ID parameter are used:

- **IDBLK** has the value of first field (three digits)
- **IDNUM** has the value of second field (five digits)

MOSS-E Alerts: Mainstream Path Definitions for SNA/Subarea Path

If you use an NCP path for the MOSS-E alerts (refer to "SNA/Subarea Path" on page 29-28), the following MOSS-E, NCP, and VTAM definitions are needed:

MOSS-E Parameters

LAN destination address

This is the MAC address (locally administered address) of the token-ring port used as the gateway to the NetView program (See Figure 29-16 on page 29-26).

This address must be defined the same as the Token-ring local address (MAC address) on page 34-17.

This address has 12 digits and must be unique among all other network addresses (LAAs) on the service LAN. Specify this address in the IBM Token-Ring Network format (your network administrator should be able to help you with this format).

NCP Keywords: The following NCP definitions must be planned if you use an SNA/subarea for the mainstream path:

1. A **Physical line** and a **physical unit (PU)**. **A** must be defined the same as the MOSS-E parameter Token-ring local address (MAC address) on page 34-17.

```
*-------------------------------------------------------------------* FFA30320
* TIC         PORT 2080 ATT TO SERVICE PROCESSOR - PHYSICAL         * FFA30330
*-------------------------------------------------------------------* FFA30340
GP50C2080 GROUP ECLTYPE=(PHYSICAL, ANY),                            *
                ADAPTER=TIC3
K50C2080 LINE ADDRESS=(2080,FULL),PORTADD=0,LOCADD= A                *
               MAXTSL=16732,LSPRI=PU,PUTYPE=1,ANS=CONTINUE,          *
               ADAPTER=TIC3,TRSPEED=16,TRANSFR=254
S50C2080 PU ADDR=01,                                                 *
               INNPORT=NO
   .
   .
```

Figure 29-19. Example of NCP Generation for a Link to the Service LAN, Part 1. The link passes through a 3746-900 (TIC3 of the CBSP).

2. A Logical group with at least one Line/PU.

   These definitions apply to a TIC type 3 or 2.

```
********************************************************************* FFA33180
*   TIC        GROUP L78G2080: LAN  LOGICAL  DEFINITIONS            * FFA33200
********************************************************************* FFA33230
L50G2080 GROUP DIAL=YES,LNCTL=SDLC,TYPE=NCP,ECLTYPE=(LOGICAL,PER),   *
               CALL=INOUT,PHYSRSC=S50C2080,                          *
               LINEAUT=YES,                                          *
               MAXPU=1,                                              *
               NPACOLL=NO,                                           *
               PUTYPE=2,                                             *
               RETRIES=(6,0,0,6)
R50A0001 LINE
Z50A0001 PU
   .
   .
```

Figure 29-20. Example of NCP Generation for a Link to the Service LAN, Part 2. The link passes through a 3746-900 (TIC3 of the CBSP).

VTAM Keywords: To report alerts to NetView, you must define the service processor as a switched major node (PU type 2.1) in VTAM with the following parameters:

CPNAME which must be defined the same as the MOSS-E parameter Local node name on page 34-9.

NETID which must be defined the same as the MOSS-E parameter Network ID on page 34-9.

```
*****************************************************************
*     MAJNODE FOR CONNECTION :  MOSS-E  <==> NETVIEW            *
*****************************************************************
NTVMOSSE VBUILD TYPE=SWNET,MAXGRP=1,MAXNO=1
*---------------------------------------------------------------*
MOSSE    PU    ADDR=04,PUTYPE=2,                                X
               NETID=Network ID,                                X
               CPNAME=Local node name,                          X
               DISCNT=NO
```

Figure 29-21. Example of Switched Major Node Definition

Note: This PU definition can also be coded in the switched major node using the IDBLK and IDNUM parameters instead of NETID and CPNAME. In this case, the service processor local node characteristics must be defined using the MOSS-E Communications Manager. Specifically, the two fields of the local node ID parameter are used:

- **IDBLK** has the value of first field (three digits)
- **IDNUM** has the value of second field (five digits).

MOSS-E Alerts: Alternate Path Definition

MOSS-E Parameters

If you plan to use an alternate path along with the mainstream path, you must supply the following:

Modem type
: Select the type of the modem used and on which where it is connected to (MPA card or COM1 port), refer to Figure C-1 on page C-1.

Telephone number for alert reporting on the switched SDLC link
: This is the telephone number used by the service processor and its modem for automatic dialing to the SNA port providing access to the NetView program via the public switched network. Refer to "Alternate Path" on page 29-28, to Figure 29-16 on page 29-26, and to Figure C-5 on page C-3.

Note: The Link type is SDLC, the default value, as the alternate path to the NetView program uses an SDLC link via the public switched network.

NCP Keywords: In the 37xx controller providing channel access to the host running NetView, the following NCP definition must be taken into consideration for your alternate path:

Note: Make sure that NRZI is the same, either YES or NO, in the MOSS-E Communications Manager and in the NCP.

```
*********************************************************************
G23SIDES GROUP DIAL=YES,LNCTL=SDLC,TYPE=NCP,REPLYTO=3,XID=YES
K23C0004 LINE ADDRESS=(0004,FULL),DUPLEX=FULL,RING=YES,NEWSYNC=NO,    *
              V25BIS=(YES,DLSDLC),AUTO=YES,PAUSE=0.1,TRANSFR=71,      *
              NRZI=YES,CLOCKNG=EXT,RETRIES=(3,3,3),CALL=IN,ENABLTO=15
P23C0004 PU PUTYPE=2,ISTATUS=ACTIVE
*********************************************************************
```

Figure 29-22. Example of a NCP Generation for an SDLC Link to the NetView program

Note: Remember to change your network operator procedures or CLIST to enable the activation of the SNA port called by the service processor. Use the worksheet on page 38-6 to record the parameter values discussed in this section.

Generate MOSS-E Alerts

To Generate MOSS-E Alerts

If you use the NetView program, verify that the Configuration management parameter in the MOSS-E NetView/Link Operation function Generate alerts is checked (√) and customized (refer to Figure C-5 on page C-3).

To Not Generate MOSS-E Alerts

If you do not want to report alerts from the service processor to the NetView program, verify that the Configuration management parameter in the MOSS-E NetView/Link Operation function Generate alerts is *not* checked. If you are using the NetView program, but do not want MOSS-E alerts sent for a time, use this parameter to prevent alert generation and later to re-enable the alerts.

Use the worksheet on page 38-6 to record the parameter values discussed in this section.

To Locate the Generate Alerts Parameter

To locate this parameter:

Step 1. Open the **Service Processor** menu.
Step 2. Open the **Configuration Management** menu.
Step 3. Run the **SP Customization** function.
Step 4. Check (√) **NetView Link / Operations** and click on **Next.**
Step 5. Check (√) **Generate Alerts** or remove the check mark next to **Generate Alerts** as needed.
Step 6. If you enabled **Generate Alerts**, customize the NetView Links / Identification / LAN address / and Dial Phone number as required.
Step 7. Click on **Next** and customize the 3270 Session Information if required.
Step 8. Click on **Next** to exit the screen.
Step 9. Click on **Close**.
Step 10. Select **Yes** to validate the changes, or **No** to cancel the changes.

Wait for the `Service Processor Customization in Progress` message to clear, this may take several minutes.

Step 11. Click on **OK** when `Service Processor Customization Successful` message is displayed.

NetView V2R4 Alert Code Point Customizing

The NetView Program, Version 3 Release 1, supports all the code points used by the service processor and network node processor in the alerts sent to the network operator.

NetView V2R4 does not support all the code points of the 3746 Nways Multiprotocol Controller; new code points are used in the alerts related to APPN/HPR.

If you are using NetView V2R4, the code points listed in this section must be added to your NetView program with their messages. The procedure to customize the code points is found in the *NetView V2 R4: Customization Guide*, SC31-7091.

Generic Alert Data (X'92') Alert MS Subvector

X'3122' APPN/HPR-DLUR PROTOCOL ERROR
Meaning: A product implementing the APPN/HPR dependent LU requester (DLUR) function has detected a protocol problem that may impact users.

X'800A' APPN/HPR-DLUR CONFIGURATION ERROR
Meaning: A product implementing the APPN/HPR dependent LU requester (DLUR) function has detected a configuration problem that may impact users.

Most Probable Cause (X'93') Alert MS Subvector

X'2019' APPN/HPR COMMUNICATIONS
Meaning: Self explanatory

Install Causes (X'95') Alert MS Subvector

X'80B9' NODE WAS INCORRECTLY SPECIFIED AS DEPENDENT LU SERVER
Meaning: A network administrator has specified the name of a dependent LU requester instead of the name of a dependent LU server. The configuration must be corrected before the DLUR function can operate.

Failure Causes (X'96') Alert MS Subvector

X'202C' APPN/HPR COMMUNICATIONS FAILURE
Meaning: Self explanatory

Chapter 30. 3746 APPN/HPR Network Node Management

This chapter describes aspects of network management relevant to the operation of the 3746 Nways Multiprotocol Controller. It only deals with the management of APPN Resources connected to the 3746 native enclosures, and visible through the NNP control point. For APPN resources controlled by the MAE control point, see Chapter 32, "MAE APPN/HPR Network Node Management" on page 32-1. This chapter covers the following subjects:

- Graphical APPN Topology management with NetView
- APPN Configuration management with the CCM
- Performance management with Network Performance Monitor, see Chapter 37, "Performance Management with NetView Performance Monitor" on page 37-1.

NetView APPN/HPR Topology Management

As explained in "NetView/390 Management of APPN Networks Overview" on page 29-2, the Topology Manager of APPN/HPR is part of the NetView for MVS product, and allows the user to graphically display and control APPN resources. The 3746 supports the SNATAM topology agent but does not support the Accounting Manager.

The Topology Manager of NetView and the Topology Agent of the 3746 Nways Multiprotocol Controller exchange data over LU 6.2 sessions.

Topology Manager enables you to:

- Monitor APPN/HPR network topology to view the connectivity between APPN/HPR network nodes.
- Monitor APPN/HPR local topology to view a 3746 Nways Multiprotocol Controller and its:
  - Transmission groups (TGs)
  - Ports
  - Logical links
  - Adjacent network nodes
  - End nodes
  - Low end networks
- Control the status of ports and links, that is, to activate or deactivate them.
- Display views of:
  - An APPN/HPR network
  - APPN/HPR subnetworks
  - Particular domains of a network node
- Display information about resources such as control points, link names, TG numbers and so on.
- Automate operations using NetView Resource Object Data Manager (RODM) objects.

Note: The APPNTAM TOPOSNA RECYCLE is not supported by the 3746.

Configuring APPN/HPR Topology Management

Host Definitions

To monitor the APPN topology of a network, the name of a network node must be declared to the NetView topology manager with the following command:

```
TOPOSNA MONITOR, NETWORK, NODE
```

=*Nodename*

Where *Nodename* is the name of the network node.

To change the node monitoring the network use the following commands:

```
TOPOSNA STOP, NETWORK, NODE
```

=*Nodename*

```
TOPOSNA MONITOR, NETWORK, NODE
```

=*NewNodename*

All APPN network nodes with a topology agent are capable of monitoring their local topology and sending the information to the NetView topology manager, including the 3746-9x0. To monitor local topology use the following commands:

```
TOPOSNA STOP, LOCAL, NODE
```

=*Nodename*

```
TOPOSNA MONITOR, NETWORK, NODE
```

=*NewNodename*

It is not recommended that the 3746 NN be used as the agent for monitoring the network topology of a large APPN network due to the extra load this creates on the NNP.

CCM Definitions

The topology agent runs continually on the 3746 NNP, and does not need to be explicitly started. .

NetView Graphic Monitor Facility Topology Examples

NGMF topology presents a list of the topology displays available when the operator logs on to NGMF. The list of displays available depends upon the network being monitored and the number of agents that topology data is being collected from. Selecting one of these displays and navigating down through the data presented allows the operator to display a wealth of APPN information.

Figure 30-1 shows an example APPN network. As APPN network nodes all have the same representation of a network's topology, network topology need not be collected from every network node in an APPN network. The view shown displays APPN network nodes and the transmission groups connecting them.

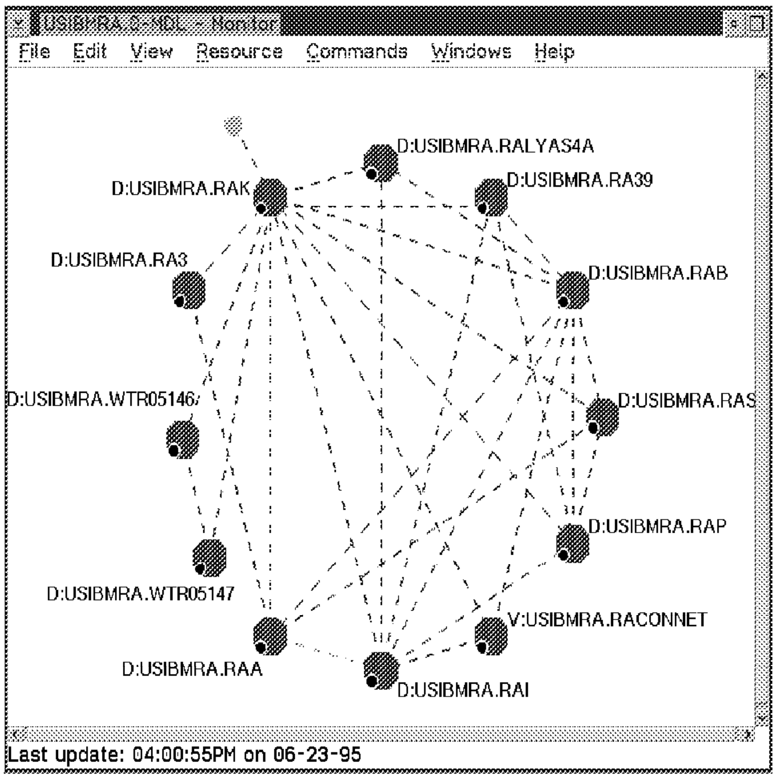


Figure 30-1. Single Network View

Selecting a more detailed view for node USIBMRA.WTR05147 brings up a More detail logical view with information similar to that shown in Figure 30-2 on page 30-4.

In this figurs, all nodes and TGs are shown that connect to USIBMRA.WTR05147. All resources shown can have commands issued against them.

When local topology is also connected for a 3746, then physical adapters and pre-defined or dynamic links can also be displayed.

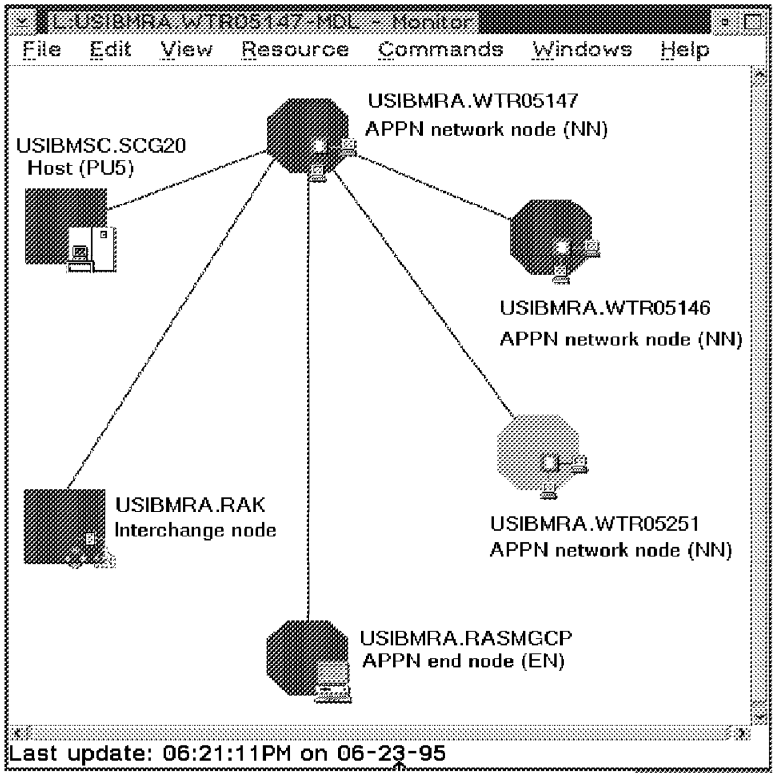


Figure 30-2. More Detail View of a Network Node

Local 3746 APPN/HPR Topology Management from the Service Processor

To display the local topology of the 3746 APPN network nodes, (adjacent nodes, including dependent PUs), the CCM tool must be used.

With DCAF running in the NGMF workstation (or an OS/2 workstation), the operator can remotely access 3746 Nways Multiprotocol Controllers and run the 3746 node configuration, local topology display, and network management functions of the CCM.

Local APPN Topology Examples

This section explains how to go to the windows where you can see details of the APPN resources running on the network, and activate or deactivate these resources.

Figure 30-3 shows the APPN-specific cascade menu.

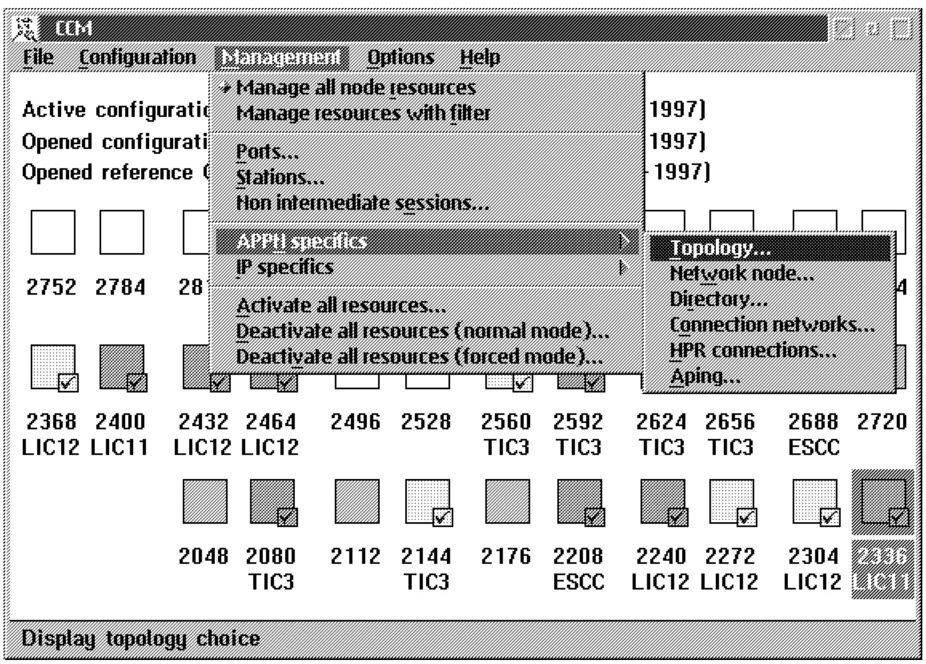


Figure 30-3. Example Management Window for APPN

Definitions for Performance Monitoring on APPN/HPR

For 3746-900 adapters running APPN that are not under NCP control, and 3746-950 adapters running APPN, the NPALU which runs in the NNP collects performance data.

If the 3746 is connected to the host NetView over an APPN network, then the NPALU session (LU type 0) must be transported over a DLUR/DLUS connection to the host. To support DLUS, the minimum level required for VTAM is Version 4, Release 2.

The following section explains how to activate NPM performance monitoring on the NNP, and then how to define a path to the host NetView for delivering the information collected to NPM over an APPN network.

In addition to these definitions, either at the port or station level, you must specify whether to collect NPM information or not for your resources.

Note: By default, *all* resources are defined with NPA eligible set to No. This means that if you want to collect data from a particular resource you should set NPA eligibility to Yes. In addition, setting NPA eligible set to Yes for a port, will enable data collection for all dynamically defined stations on that port.

Figure 30-4 shows the machine configuration that the following definition steps refer to.

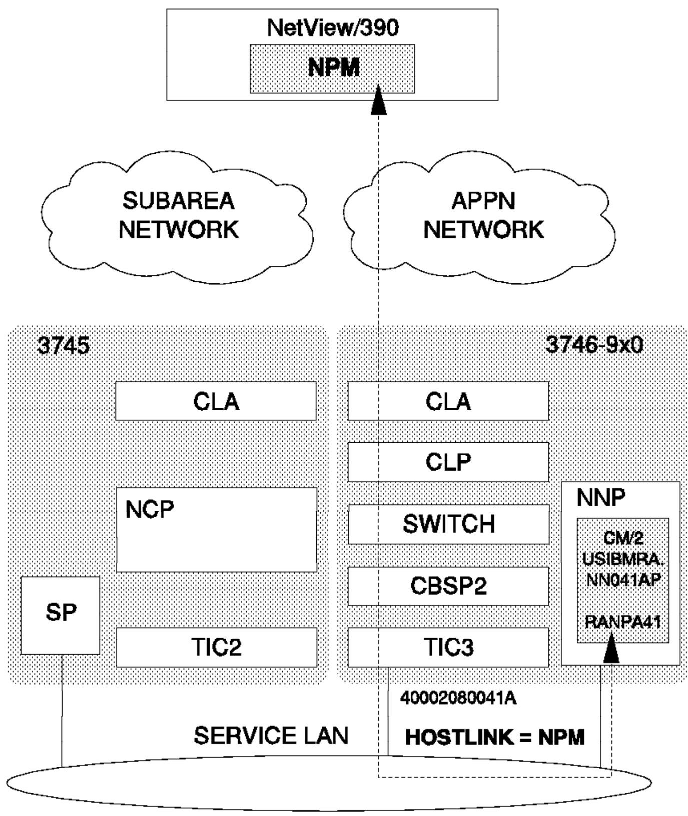


Figure 30-4. NPM Configuration

3746 Definitions for NPM

To create definitions for NPM on the 3746, you need:

1. Use CCM to allow port 2080 to automatically generate a station for the NPALU on the NNP.
2. Use CCM to define a DLUS/DLUR pipe to the VTAM that is the DLUS.
3. Create the host VTAM and NPM definitions.

Descriptions of these steps are described in the following sections.

Note: You will need about the NPALU that was configured in CM/2 by the IBM customer engineer during the installation of the service processor. See the procedure for the NPALU CM/2 Definitions in the section about configuring the NetView Performance Monitor (NPM) in either of the following:

- *3746 Nways Multiprotocol Controller, Model 900: Installation Guide*, SY33-2114
- *3746 Nways Multiprotocol Controller, Model 950: Installation Guide*, SY33-2107.

After the definitions have been made, be sure to fill out the worksheet on page 38-6 with the following names:

- The NETID of NPM
- The PU supplied by CM/2 running on the NNP
- The NPA LU supplied by CM/2 running on the NNP.

CCM station definitions on Port 2080

These CCM definitions allow the NPALU on the NNP to communicate with VTAM via PORT2080. Port 2080 does not allow link stations to be dynamically defined for incoming calls, therefore the link station for the NPALU must be manually defined.

Step 1. Select and open the active configuration on CCM.

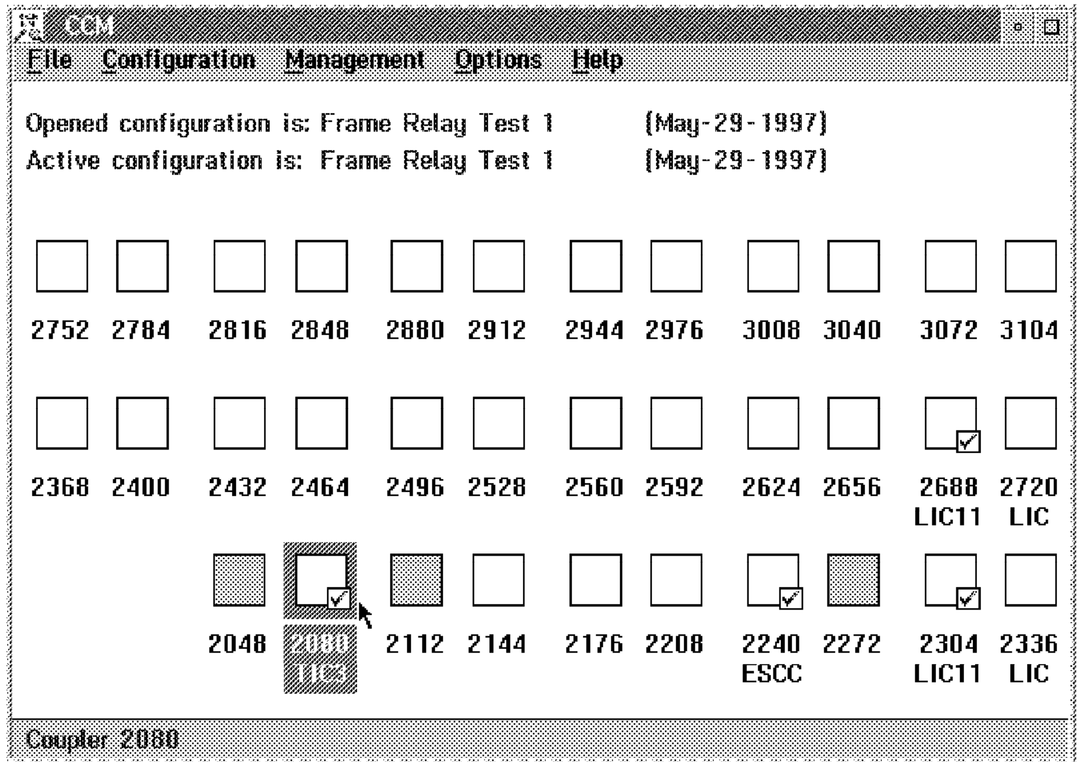


Figure 30-5. Active Configuration

Step 2. Select **port 2080**, this brings up a list box that asks you if you want to have automatic NPM definitions made on this port. Click on **YES**.

Note: This is not possible on the stand-alone CCM.

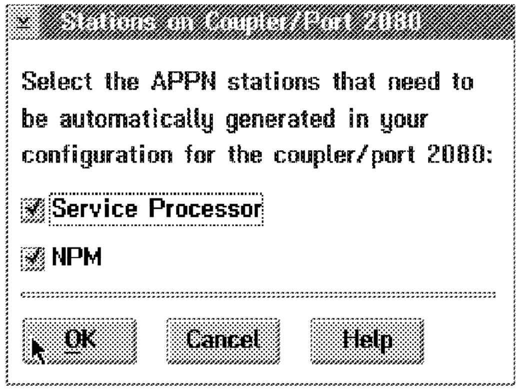


Figure 30-6. Stations on Coupler/Port 2080

Step 3. Make sure NPM and (if applicable) service processor are checked, then click on **OK**.

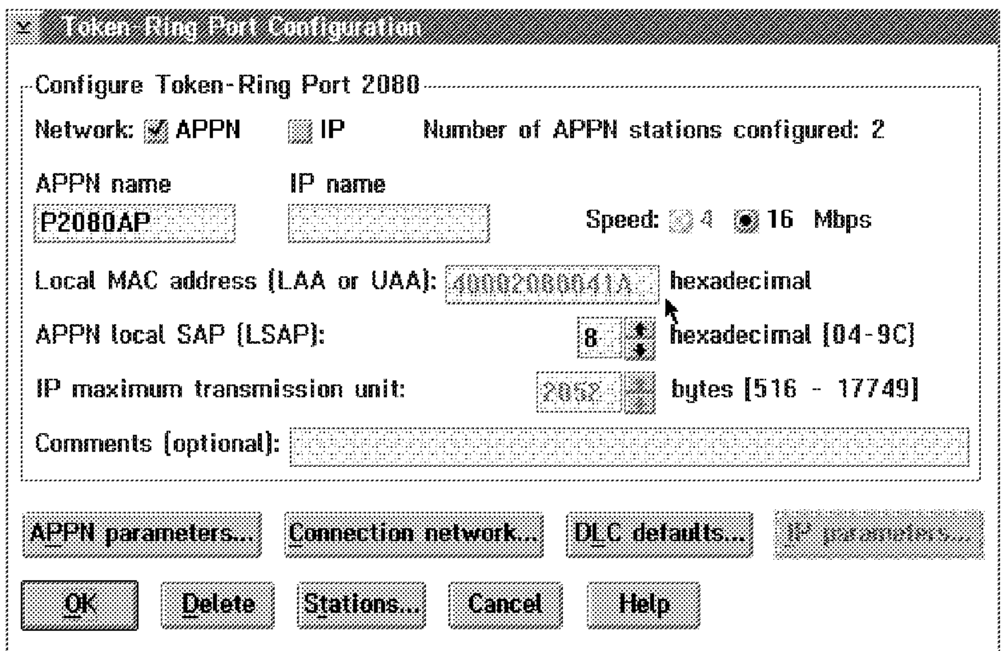


Figure 30-7. Token Ring Port Configuration

Note: On this window, you can see the MAC address of this port, this must match the destination MAC address defined in CM/2 for the link called **NPM**.

Step 4. Click on **Stations**.

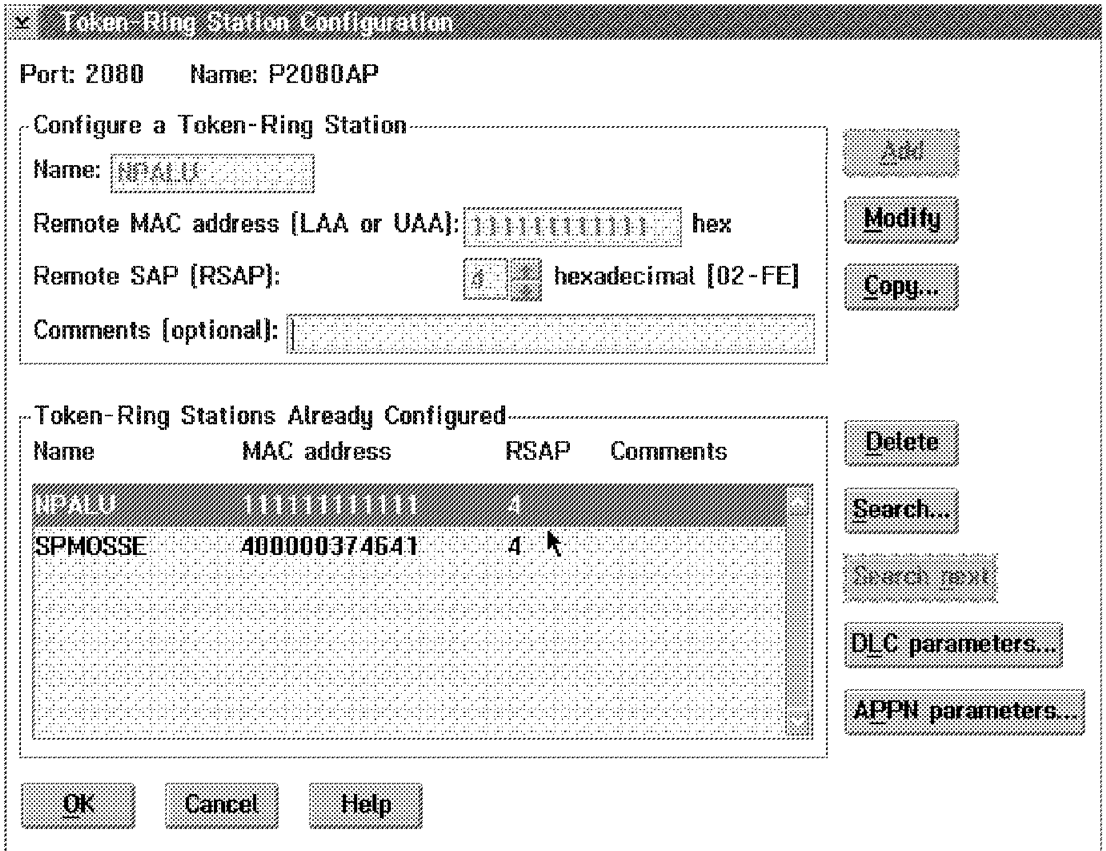


Figure 30-8. Token Ring Station Configuration

Step 5. On this window, you can see the station which was automatically defined for the NPALU running on the NNP. The destination MAC address of **111111111111** does not match any real address. When this CCM configuration is activated, the NDF part is sent to the NNP. There, this MAC address is automatically updated to contain the correct MAC address for the NNP.

Step 6. Select **NPALU**, click on **APPN Parameters**, and go to "DLUR/DLUS Definitions" on page 30-11.

DLUR/DLUS Definitions

Enter (or verify that) the information in Figure 30-9, for the primary DLU server **USIBMRA.RAK** has been defined.

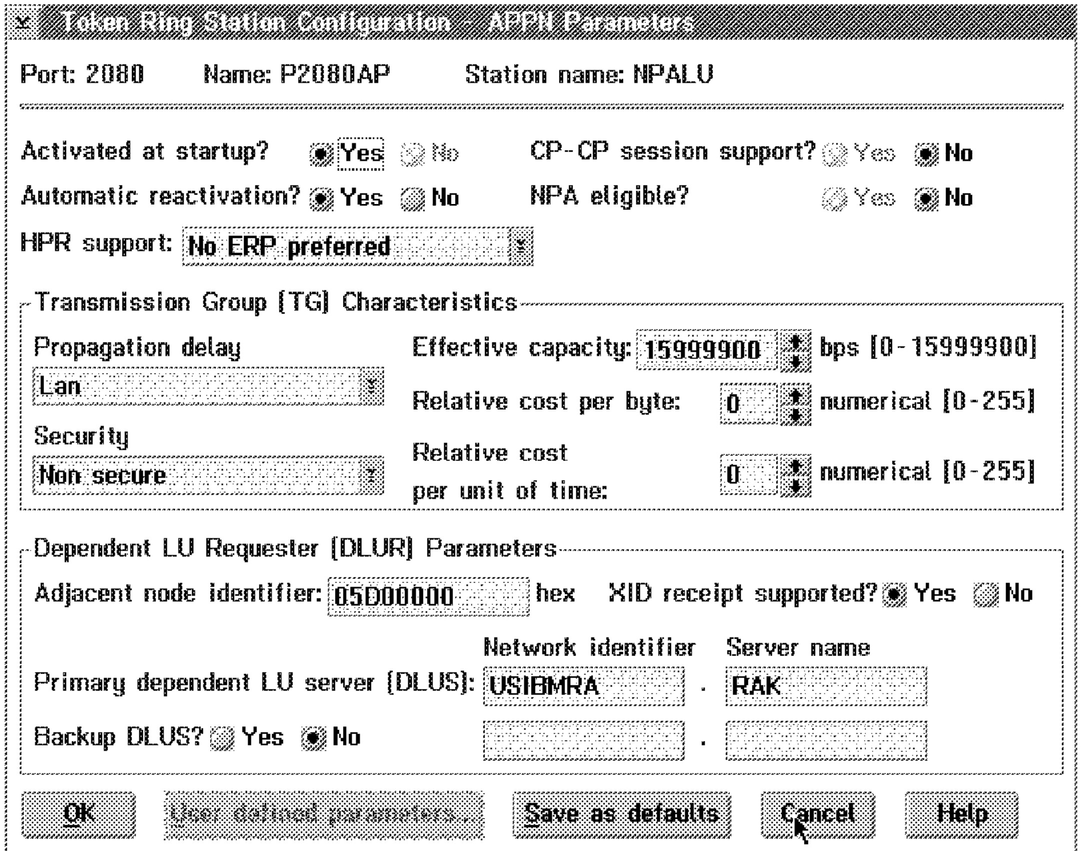


Figure 30-9. APPN Parameters

In our case the DLUS/R is needed as we only have an APPN path to RAK, where NetView and NPM are running. As the NPALU (RANPA41) is a type 0 LU, DLUR provides the path through the APPN network to allow the PU NN041AP and its LU RANPA41 to be activated and have SSCP sessions to RAK.

Close the CCM windows by clicking on **OK**, and the configuration can be activated when desired.

Host VTAM and NPM Definitions

To support NPM, the following host definitions must be made:

1. **Switched major node**, refer to the example given in Figure 30-10 on page 30-12.
2. **Resource resolution table**, refer to the example given in Figure 30-11 on page 30-12.

In these tables the CP and LU names must be equal to the names previously defined in communications manager:

- CPNAME (NN041AP) = Local node name
- LUNAME (RANPA41) = LU name

```
DLUR41   VBUILD TYPE=SWNET,MAXGRP=1,MAXNO=1
*----------------------------------------------------------------------*
* ERS4 : PU NNP                                                        *
*----------------------------------------------------------------------*
NN041AP PU    ADDR=04,PUTYPE=2,CPNAME= NN041AP
 RANPA41   LU    LOCADDR=2
```

Figure 30-10. Example of Switched Major Node

```
************************************************************************
*  DESCRIPTIVE NAME : 3746 MODEL 900 VTAMLST DEFINITION                *
************************************************************************
*     BUILD STATEMENT - CONTROLLER INFO                                *
************************************************************************
*
TESTNOD BUILD MODEL=3746-900,                                           X
               NETID=SYSTSTAP,                                          X
               NEWNAME=TESTNOD,                                         X
               NPA=(YES,DR),                                            X
               VERSION=N/A
*
************************************************************************
*     NPM VIRTUAL RESOURCES                                            *
************************************************************************
M900NPA  GROUP LNCTL=SDLC,                                              X
               NPARSC=YES,                                              X
               VIRTUAL=YES,                                             X
               NPACOLL=YES,                                             X
               ISTATUS=ACTIVE
TESTNODL LINE
NN041AP    PU
RANPA41    LU
*
************************************************************************
*     END OF GEN SOURCE                                                *
************************************************************************
*
GENEND   GENEND
         END
```

Figure 30-11. Example of Resource Resolution Table

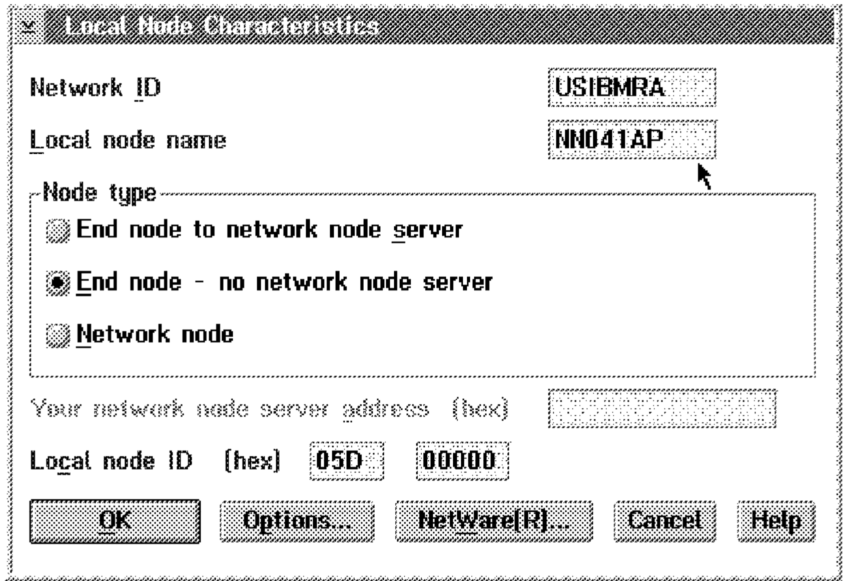


Figure 30-12. Communications Manager Profile List

Chapter 31. 3746 IP Router Management

Managing Your 3746 IP Resources

This section provides details on managing the IP resources that are controlled by the 3746 IP Router. These are the IP functions running on the 3746 native adapters (we will refer to this as the &iproute.). For management of the MAE controlled IP resources, see Chapter 33, “MAE IP Router Management” on page 33-1.

The 3746 provides the function of an SNMP agent and can communicate, using IP datagrams, with an SNMP manager such as NetView for AIX. The Router and Bridge Management (RABM) application (which is available with the IBM Nways Enterprise Manager, program number 5777-AAK) is needed to display the following information:

- Alert and fault management information
- ESCON MIB information.

The relationship between these elements is shown in Figure 31-1. The SNMP agent code runs on the NNP in the 3746. The SNMP agent is supplied as part of the IP routing feature (#5033), which runs on the NNP feature (#5022).

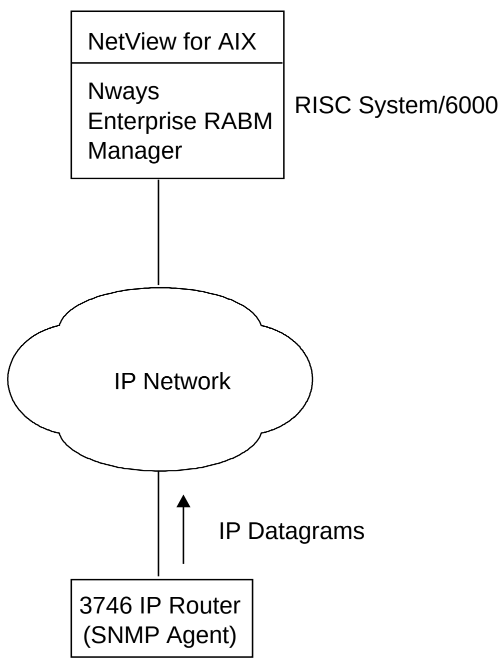


Figure 31-1. Managing IP Resources with SNMP (3746)

If you want to manage your IP resources centrally from a DCAF station, refer to “Managing IP Resources via DCAF” on page 31-8 for further information.

3746-9x0 SNMP Functions

Management Information Base (MIB) Support for 3746 IP Router

A *management information base (MIB)* defines which aspects of network communications will be managed by SNMP. These are standard objects, and the following MIBs are supported by the 3746 Nways Multiprotocol Controller:

- MIB 2 (standard MIB, RFC 1213)
- OSPF MIB (standard MIB, RFC 1253)
- Token-ring MIB (standard MIB, RFC 1231)
- Frame relay MIB (standard MIB, RFC 1315)
- PPP MIB (standard MIB, RFC 1471)
- ESCON MIB
- X.25 MIB (Standard MIBs, RFC 1381, RFC 1382).

Note: The SNMP SET request is not supported.

Problems detected in the 3746 Nways Multiprotocol Controller are reported to NetView for AIX as SNA alerts or CMIP alarms enveloped in traps. Those traps are received by RABM, which translates them in a local trap to send them to the event desk of NetView for AIX.

3746-9x0 SNMP Agent Functions

The 3746 IP router provides SNMP V1 agent support. The SNMP GET, GET_NEXT, and TRAP commands are supported. The SNMP SET command is not supported. Every SNMP network management station equipped with the appropriate MIB support can retrieve this information.

To configure the 3746 IP SNMP configuration (community names, TRAP receivers, etc.) requires CCM configuration. SNMP configuration via the TELNET Config interface is not available. For a discussion of the CCM configuration, see the CCM user's guide.

3746-9x0 SNMP Relay

Figure 31-2 depicts the 3746 IP SNMP implementation. As can be seen two main components can be identified:

- SNMP relay code residing on the 3746-9x0
- SNMP agent code residing on the NNP.

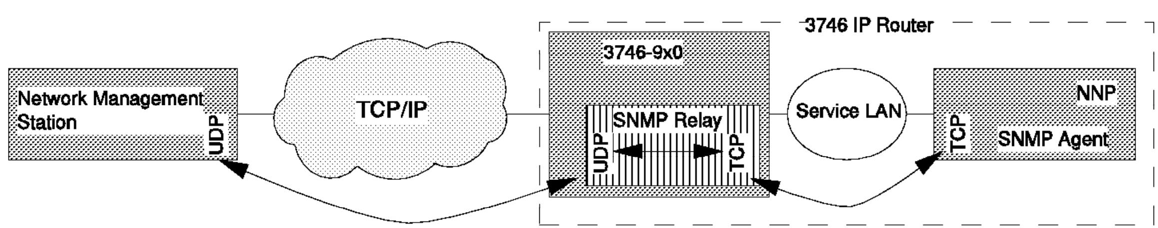


Figure 31-2. 3746-9x0 IP SNMP Implementation

The *SNMP relay* function on the 3746-9x0 enables an SNMP network management station to send its SNMP requests to any of the IP ports of the 3746-9x0 IP router.

By relaying SNMP traffic, rather than forcing network stations to contact the NNP, the location of the SNMP agent is transparent to the network management station.

IP connectivity is required between the network management station and the 3746 IP router. The service LAN is used for the traffic between the 3746-9x0 and the NNP. Both 3746 IP and NNP must be operational to enable SNMP access. Note that the SNMP traffic between 3746-9x0 and network management station is using UDP (port 161), while the SNMP relay function uses TCP transport.

Distributed Agents

The NNP SNMP agent uses the distributed programming interface (DPI V2) described in RFC 1592. To retrieve the information that SNMP network management stations are soliciting, the SNMP agent interfaces with a number of subagents. As most of the SNMP MIB information required is maintained on the 3746-9x0, the subagents themselves interact with processes running on the 3746-9x0 processors.

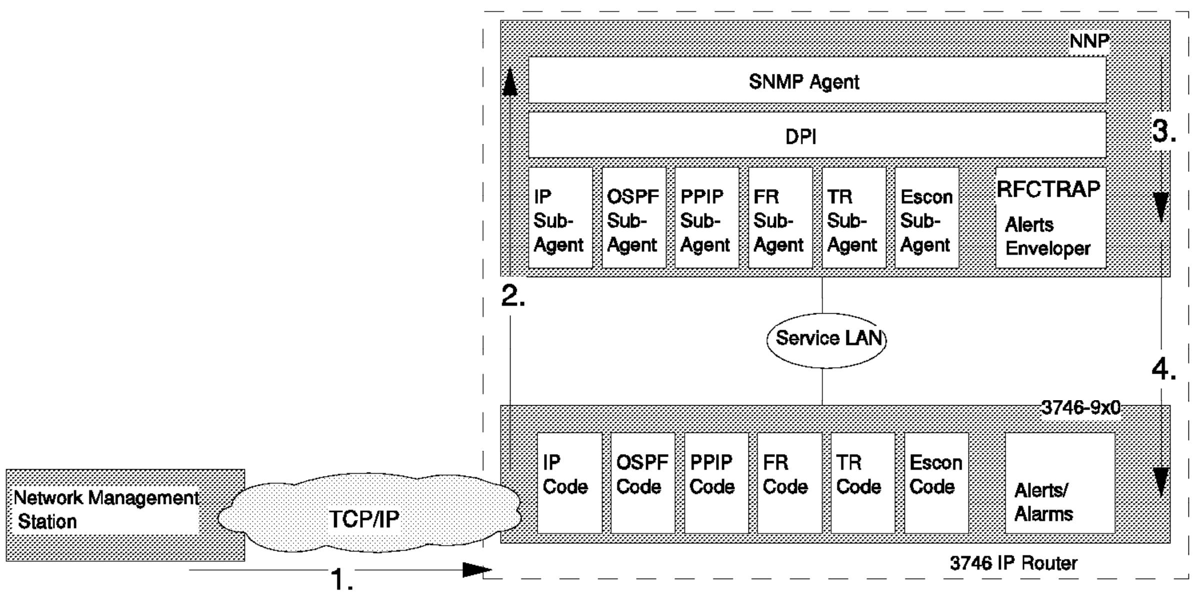


Figure 31-3. Distributed SNMP Agents

Figure 31-3 details the subagents concept. Network management stations soliciting SNMP information access (1) the 3746-9x0 which relays (2) the requests to the NNP. The NNP accepts the SNMP request and forwards it (3) to its appropriate subagent. The subagent decodes the ASN.1 format and interfaces (4) with its counterpart in the 3746-9x0.

Note: For performance reasons, the subagents retrieve whole tables that are cached to respond to successive SNMP requests.

The 3746 IP agent supports solicited and unsolicited SNMP traffic. Solicited data is sent in response to an SNMP query received from a network management station. Soliciting data requires read SNMP access on the 3746-9x0 IP routers. Figure 31-6 on page 31-6 depicts how the IP addresses and community names are set to enable read access. Unsolicited data is sent after errors have been detected. Unsolicited data is sent as TRAPs. Figure 31-7 on page 31-7 depicts how the IP addresses and community names are set for network management stations that must receive TRAPs.

SNMP Traps

Errors detected by the 3746-9x0 are categorized as external or internal errors. 3746-9x0 external errors are due to protocol violations, cabling problems, etc. 3746-9x0 internal errors are due to microcode and hardware problems.

Figure 31-4 on page 31-5 depicts how the 3746-9x0 IP router generates TRAPs.

- External error

  When an external error is detected the 3746-9x0 generates an alert to the NNP control point (CP). The NNP CP decides if the error is IP related and invokes its RFCTRAP code. RFCTRAP generates the SNMP trap and hands it over to the SNMP agent. The latter forwards it to all SNMP network management stations that are configured to receive TRAPs.

- Internal error

  When an internal error is detected the 3746-9x0 generates an alert to both NNP and SP. The processing of the alert sent to the NNP is equivalent to an external error and results in SNMPs being sent. For the alert received by the SP, configuration information is added before invoking RFCTRAP on the NNP and generating (a second) TRAP.

To handle the TRAPs on your network management station requires IBM's Router and Bridge Manager (RABM) that is presently available with Nways Enterprise Manager. The Alert Manager within RABM is able to understand and convert the CMIP data that is contained within some of the TRAPs. For details on the information contained in the TRAPs, see Alert Reference Guide, SA33-0175.

Definitions for SNMP Management

The SNMP manager must be reachable on the IP network by the 3746 it manages. A 3746 IP Router may be managed by more than one SNMP manager, and may also report problems to more than one SNMP manager. The SNMP agent in the 3746 IP Router uses a simple authentication to determine which SNMP manager can access its MIB variables. This authentication scheme includes the specification of a *community name* that must be defined on both sides:

- The 3746 SNMP agent
- The SNMP manager.

This relationship is shown in Figure 31-5 on page 31-5.

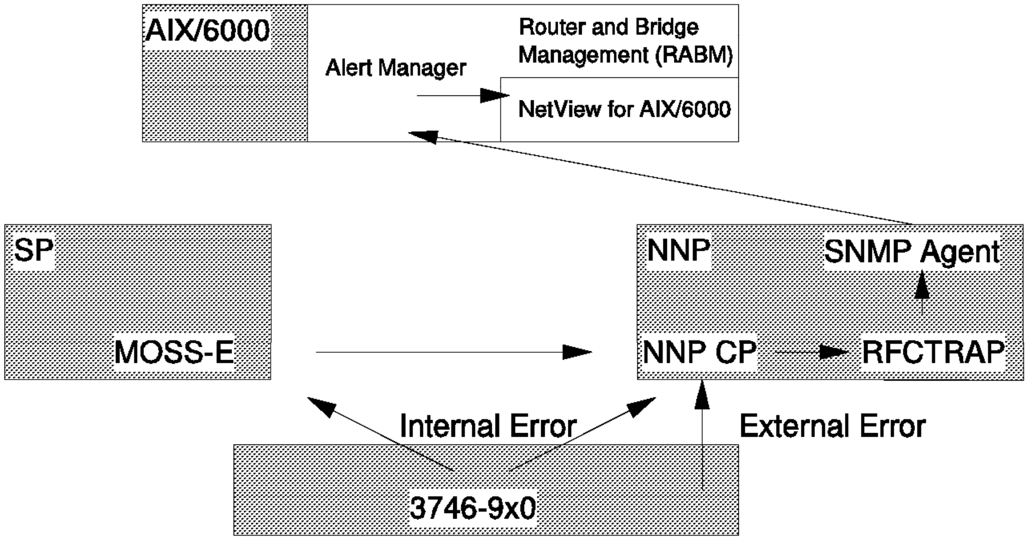


Figure 31-4. 3746-9x0 IP SNMP TRAPs

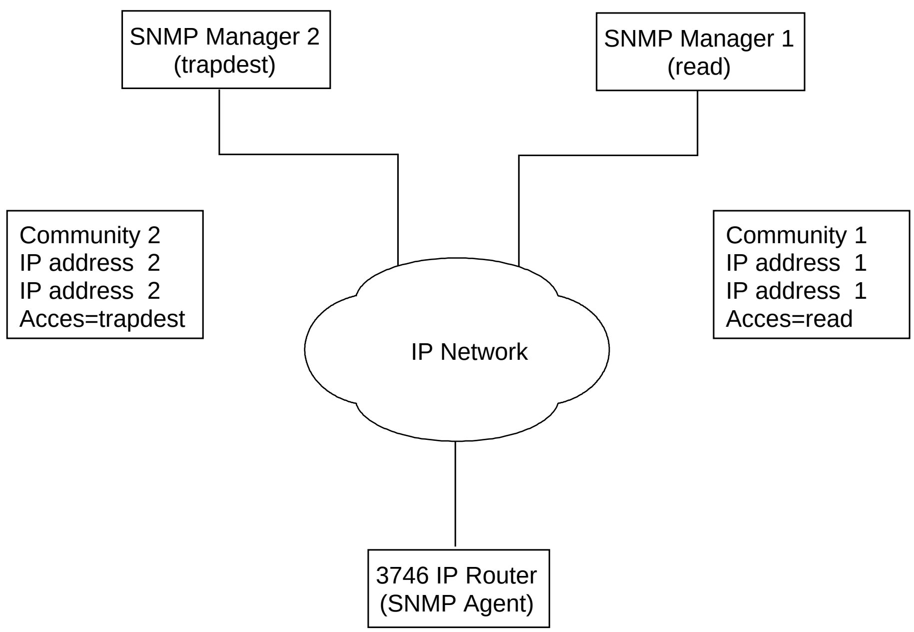


Figure 31-5. Two SNMP Managers for One 3746 IP Router

Definitions for SNMP management are made with the CCM. Use one worksheet (from page 40-80) for *each* SNMP manager to define:

- The IP address of the SNMP manager.
- The IP subnet mask of the SNMP manager.
- The community name that will be used. This must be the same community name defined for the SNMP manager.
- The access mode:
  - **Read -** this SNMP manager is allowed to read 3746 MIB variables but not to change them.

– **Trapdest -** this SNMP manager will receive problem reports (traps) from the 3746 IP Router.

Note: Refer to “Access Control Mandatory Entry” on page 3-51 for access control information that must be made to allow the SNMP manager to access the SNMP agent.

Setting the SNMP Information from CCM

Figure 31-6 shows how to allow all network management stations on network 9.24.104, using community name *PUBLIC*, to have read access to the 3746 SNMP IP variables.

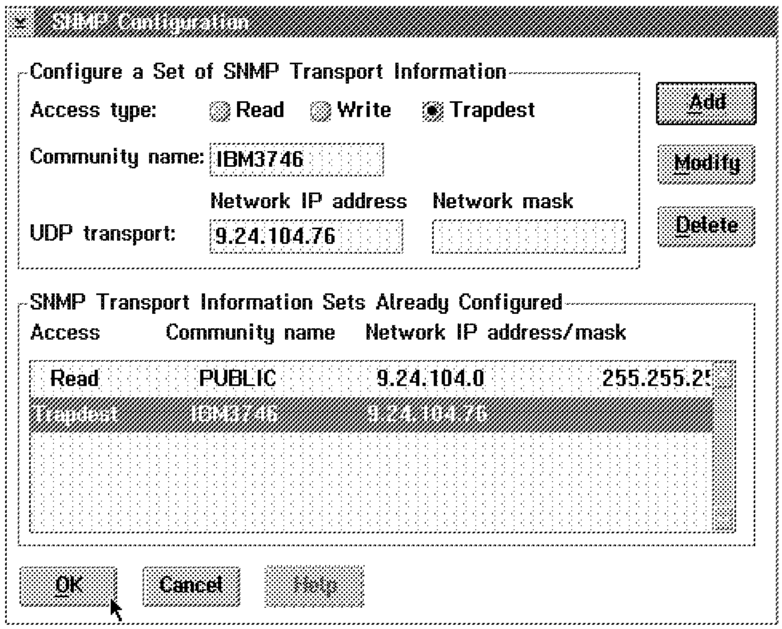


Figure 31-6. SNMP Read Access

Figure 31-7 shows how to configure the 3746 IP router to send its SNMP traps, using community name *IBM3746*, to the network management station 9.24.104.76.

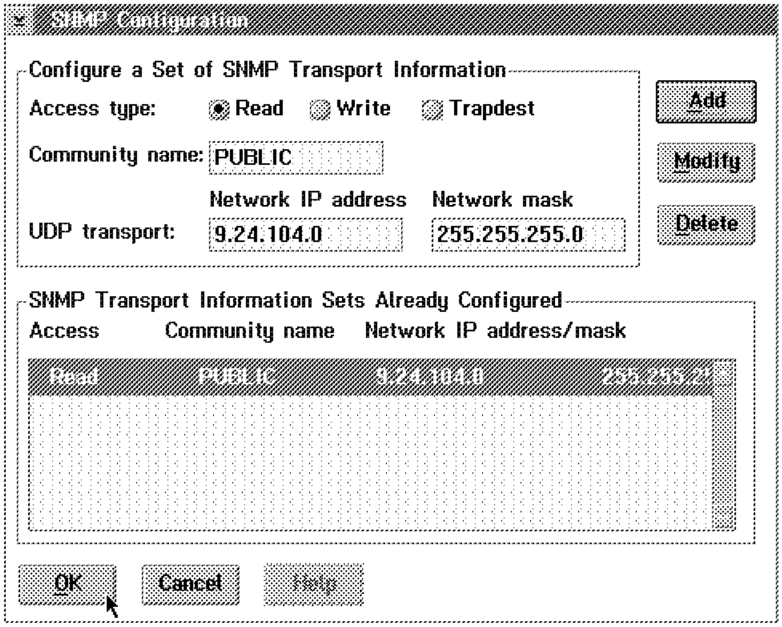


Figure 31-7. SNMP Traps

Managing IP Resources via DCAF

If you want to manage your 3746 Nways Multiprotocol Controller IP resources centrally via the DCAF (refer to Chapter 35, “Customer Consoles and DCAF” on page 35-1), you will need the following:

- An OS/2 station, running DCAF, with an SNA, APPN/HPR, or IP path to the service processor
- A RISC/6000, running NetView for AIX, for IP topology display and IP performance reporting, with an IP path to the service LAN of the 3746.

Local IP Resource Management from the Service Processor

You can manage IP network resources by issuing commands from either:

- The CCM IP Specifics menu.

  If information is generated as the result of a CCM command being issued, it is displayed by CCM in the CCM IP Results Display window.

- The Telnet console

  If you are using Telnet, refer to the publication *3746 Nways Multiprotocol Controller Model 950: User's Guide*, SA33-0356.

Figure 31-8 shows some of the IP management cascade menus.

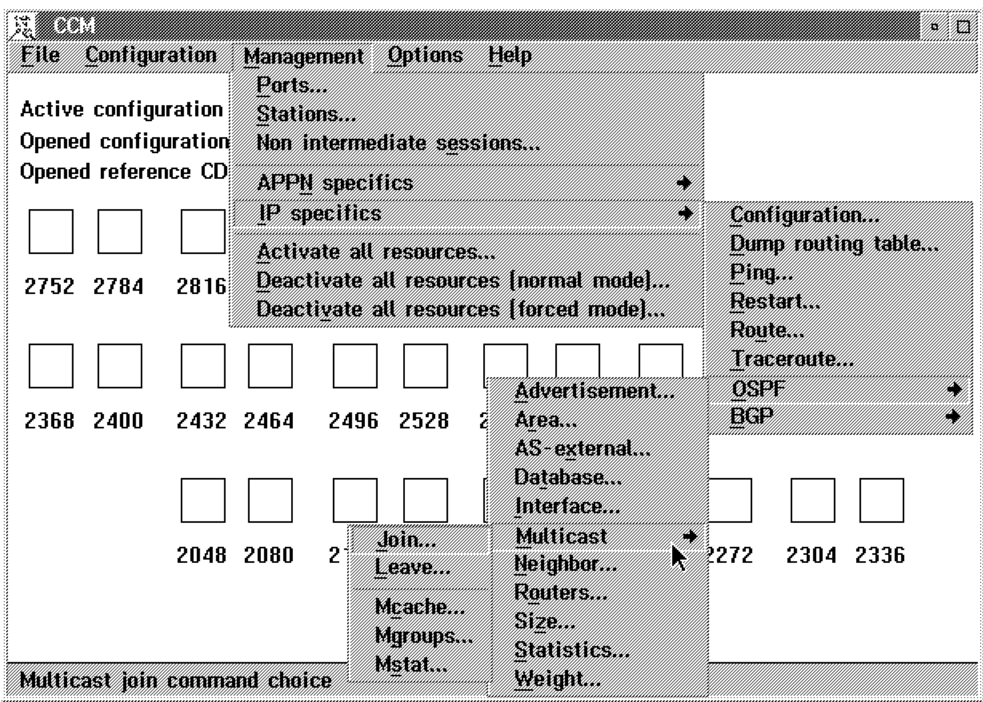


Figure 31-8. Some of the IP Commands

Supported RFCs

The 3746 IP router supports the following RFCs:

RFC 768 UDP

RFC 791 IP

RFC 792 ICMP

RFC 793 TCP

RFC 826/1042 ARP

RFC 919/922 Broadcast including

RFC 925 ARP Subnet Routing

RFC 950 Subnetting

RFC 951/1542 BOOTP Relay Agents

RFC 1009 Internet Gateways

RFC 1027 Proxy ARP(Subnet Routing)

RFC 1058 RIP V1

RFC 1112 IP Multicast

RFC 1122 Requirements for Internet Hosts -- Communication Layers

RFC 1144 TCP/IP header compression

RFC 1155 Structure of Management Information

RFC 1157, 1441->1450, 1452 SNMP v2

RFC 1191 Path MTU Discovery

RFC 1213 MIB-II for TCP/IP-based Internet

RFC 1231 Token-Ring MIB

RFC 1253 OSPF V2 MIB

RFC 1315 Frame Relay MIB

RFC 1331/1332 PPP

RFC 1471 PPP IP MIB Support

RFC 1490 Frame Relay

RFC 1583/1584 OSPF V2 and Multicast Extensions to OSPF

RFC 1592 DPI

RFC 1654 BGP V4

RFC 1716 Towards Requirements for IP Routers

CDLC Protocol

For CDLC protocol used by the 3746, the buffer size used in the DEVICE statement must be at least 4 bytes larger than that used on the GATEWAY or, BSDROUTINGPARMS statements. See below:

```
;    device_name CDLC base_dev_addr r_bufs w_bufs read_size write_size
DEVICE DEVXA8C   CDLC  967          200    200       4096     4096


GATEWAY
;net_number  first_hop     link  packet_size subnet_mask subnet_value
  193.9.200       =        LINK1   4092   0
  128.84     193.9.200.2   LINK1   4092   0.0.255.0   0.0.1.0


BSDROUTINGPARMS false
;   link    mtu     metric  subnet_mask     dest_addr
    LINK1   4092      0     255.255.255.0      0
    LINK2   .......
    LINK3   .......
ENDBSDROUTINGPARMS
```

Chapter 32. MAE APPN/HPR Network Node Management

You can manage the MAE network node as an APPN entry point, which forwards APPN-related alerts to an APPN focal point, or as an SNMP-managed node.

APPN/HPR Alerts

The MAE network node can serve as an APPN entry point for alerts related to APPN. As an entry point, the router is responsible for forwarding APPN and LU 6.2 generic alerts about itself and the resources in its domain to a *focal point* for centralized processing. A focal point is an entry point that provides centralized management and control for other entry points for one or more network management categories.

Note: If the focal point node is not available to receive an alert from the router network node, the alert is “held” (stored) by CPMS. APPN on the router can hold up to ten alerts.

Entry points, such as the MAE, that communicate with a focal point make up that focal point’s *sphere of control*. If a focal point explicitly defines the entry points in its sphere of control and initiates communication with those entry points, it is an *explicit focal point*. If a focal point is designated by its entry points, which initiate communication with the focal point, the focal point is an *implicit focal point*. The focal point for the router is an explicit focal point.

An explicit focal point must define the router entry point node as being within its sphere of control and initiate a session, or *focal-point-to-entry-point relationship*, with the router. When this relationship is established, the focal point becomes the *primary focal point* for the router. The focal point also informs the router entry point about the existence of a *backup focal point*, if one has been designated.

If the session between the router entry point and its primary focal point fails, the router can initiate a session with a designated backup focal point, provided it has been informed by the primary focal point of the backup focal points it is to use. Before initiating a session with a backup focal point, the router entry point makes an attempt to re-establish communication with its primary focal point. If that attempt fails, the router switches to the backup focal point. The primary focal point is then responsible for re-establishing the focal point to entry-point relationship with the router.

The router entry point communicates with the focal point through an LU 6.2 session. Multiple-domain support (MDS) is the mechanism that controls the transport of management services requests and data between these nodes. The router network node does *not* support SSCP-PU sessions with focal points.

Management processes within the router’s control point are handled by its control point management services (CPMS) component. The CPMS component within the router network node collects unsolicited problem management data from resources within the router’s domain and forwards this data to the appropriate focal point.

Supported Message Units

The MAE network node uses the following message units for sending and receiving management services data, including alert messages from domain ENs:

Message unit **Description**

CP-MSU Control point management services unit. This message unit is generated by CPMS and contains alert information forwarded by the router entry point. CPMS passes CP-MSU message units to MDS.

MDS-MU Multiple-domain support message unit. This message unit is generated by MDS. It encapsulates the CP-MSU for transport between nodes.

Logging of APPN Alerts on the Router

The MAE network node logs all APPN and LU 6.2 generic alerts using the Event Logging System (ELS). You can access these alerts by using the MAE error logging facility.

Managing the Network Node Functions from an SNMP Manager

The router network node can function as an SNMP-managed node. An operator or application at an SNMP network management station can query objects in the APPN MIBs (using the SNMP GET AND GET NEXT commands) to retrieve APPN status information and node statistics. A subset of APPN MIB objects can be modified using the SNMP SET command.

As an SNMP-managed node, the router can send unsolicited status and error information, in the form of `traps` to an SNMP manager.

MIBs Provided by APPN

The MIB support provided by APPN in MAS V1R1.0 on the MAE is:

- Support of GET, GET_NEXT, SET, AND TRAP
- APPN MIB
- APPN HPR MIB
- APPN DLUR MIB
- RPC 1666 - SNA NAU MIB

The MIB support provided by APPN in the multiaccess enclosure is:

- Support of GET, GET_NEXT, SET, AND TRAP
- IETF Standard APPC MIB - RFC 2051
- IETF Standard APPN MIB
- IETF Standard APPN HPR MIB
- IETF Standard APPN DLUR MIB
- RPC 1666 - SNA NAU MIB
- Portions of the previously available private APPN MIB
  - DLC Trace, Memory, and Accounting
- Portions of the previously available private APPN HPR MIB
  - HPR NCL and Toute Test

Note that MIB information is also available for the underlying interfaces and protocols that APPN uses. APPN is just a logical protocol that sits above and uses the interfaces.

Providing Topology Information to the SNA Topology Manager

The SNA Topology Manager (SNATM) components of TME 10 NetView for OS/390 and NetView for MVS/ESA V3R1 provide object-oriented management and control of SNA subarea and APPN networks. SNATM uses CMIP protocols over SNA transport to communicate with agents, which provide it with topology information. CMIP-based agents are provided for such products as VTAM V4R3, Communications Manager/2 and Communications Server/2, the 2217, and the 3746-9X0 Network Node Processor.

The MAE APPN implementation does not provide a CMIP over SNA agent, so its APPN topology cannot be managed directly, in a transparent way, from the mainframe NetView. The TME 10 NetView for OS/390 APPN Topology Integrator allows the MAE APPN topology to be managed by NetView.

Chapter 33. MAE IP Router Management

IP management of the 3746 Multiaccess Enclosure IP router is done using the same tools as the 3746 base IP router function. For details of this see Chapter 31, "3746 IP Router Management" on page 31-1.

MAE IP Management Configuration

The same definitions are needed for management of the multiaccess enclosure IP router as the 3746 base IP router. This section shows how to make the necessary definitions.

1. From the Navigation Window, select **General**, under the SNMP Config folder.

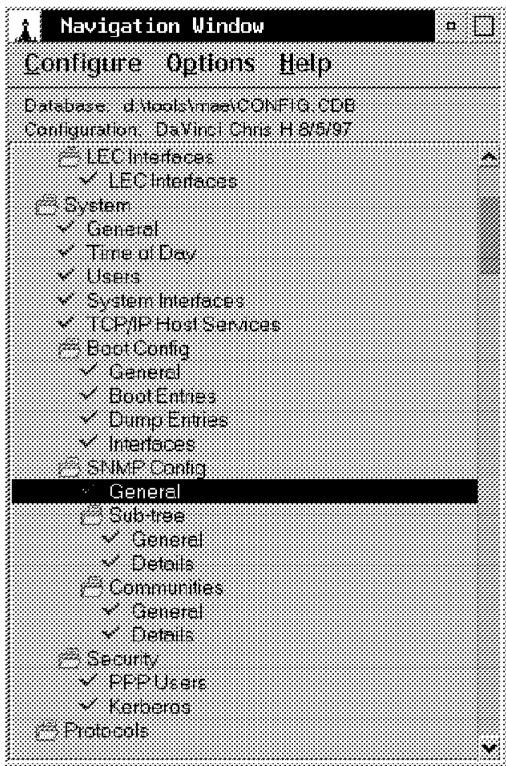


Figure 33-1. Navigation Window

2. On the SNMP general window, SNMP can be enabled, and the UPD port for traps can be specified.

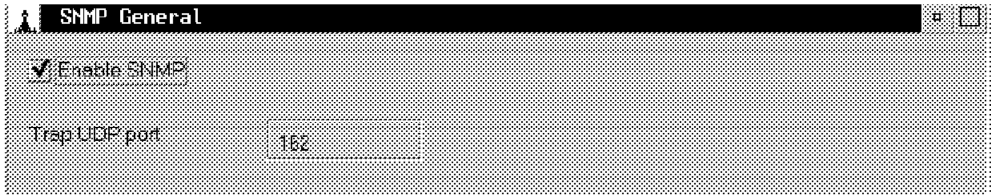


Figure 33-2. SNMP General Window

3. From the Navigation Window, select **General**, under the Communities folder. On the SNMP Communities screen, the names of SNMP communities can be defined, the type of access the community has to the MIB variables, and the view of the MIB that the community is presented.

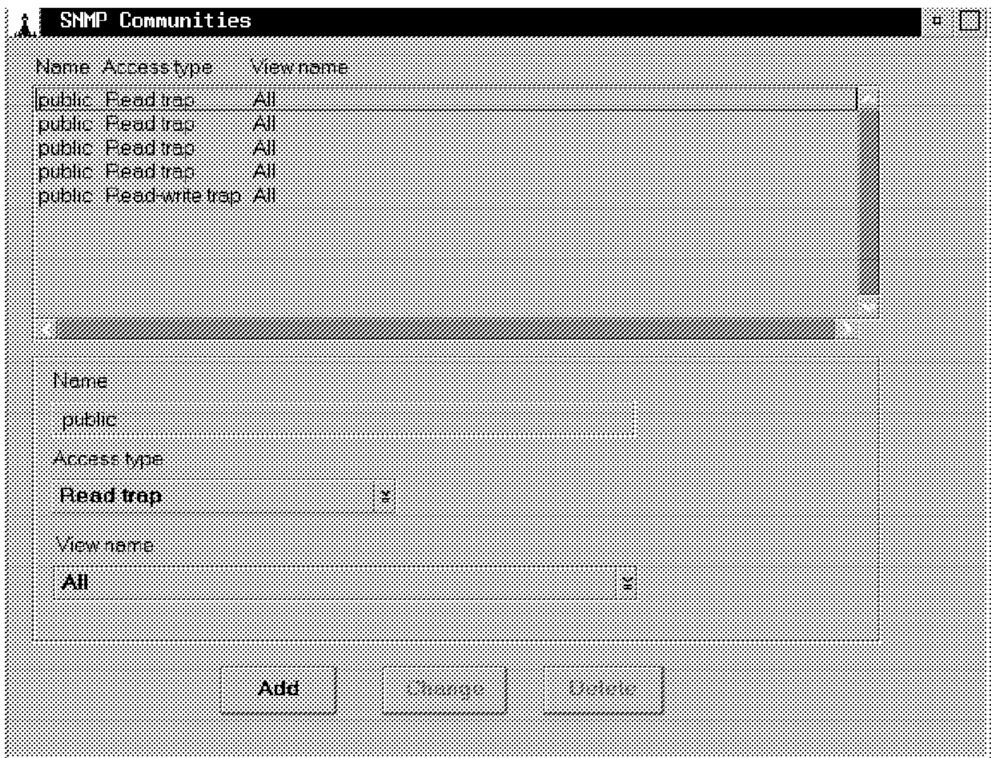


Figure 33-3. SNMP Communities Window

4. From the Navigation Window, select **Details**, under the Communities folder. On the SNMP Communities (Details) screen, the names of SNMP communities defined on the Communities screen are listed, select **Addresses**. This gives you the possibility to define the IP addresses and subnet masks of members of the community.

   The members will receive traps from the 3746 multiaccess enclosure, and can access the MIB variables allowed for their community.

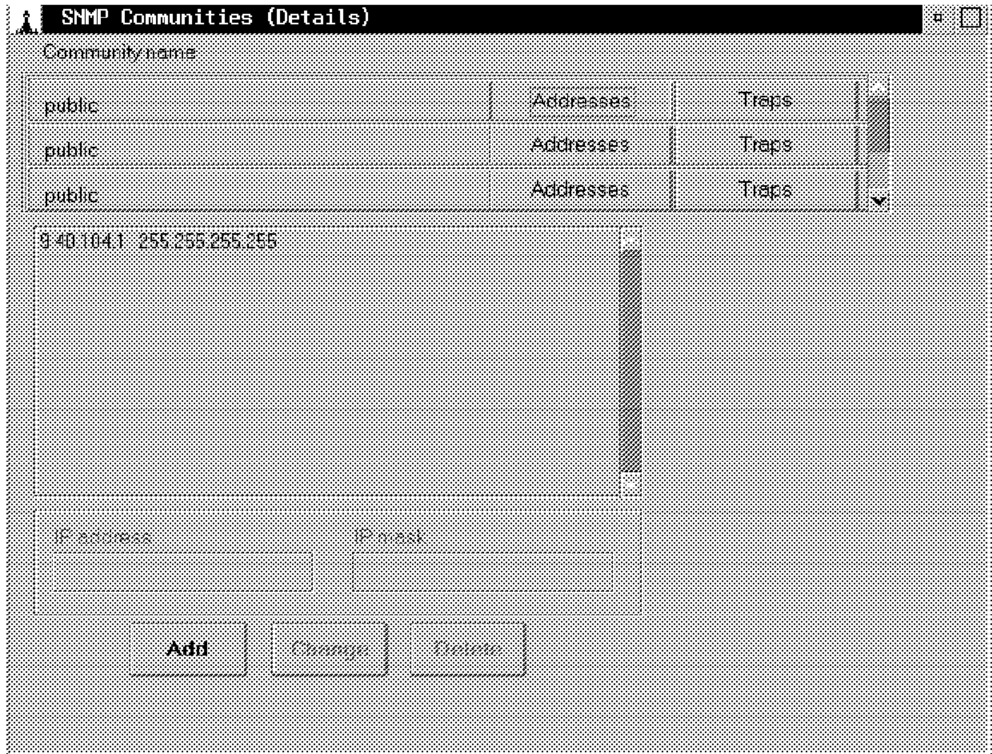


Figure 33-4. SNMP Communities (Details)

5. Select **Traps**. This allows you to define the types of traps that are sent to the members of the community. In this case **ALL** was selected.

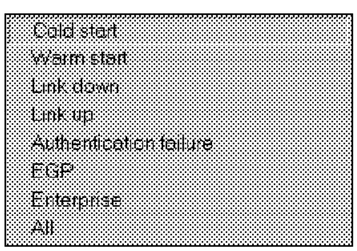


Figure 33-5. Types of Traps

Chapter 34. Controller and Service Processor

This chapter points out several options and parameters that you need to consider before using the procedures in the *3745 All Models and 3746-900 Connection and Integration Guide*, SA33-0129, or the *3746-950 User's Guide*, SA33-0356, at the initial installation or upgrade of your controller.

Controller Time

The MOSS-E time is used in the 3745, 3746-900, 3746-950, and service processor. It is set using a MOSS-E function.

The NetView host time may be different from the controller time if the host and controller are in different time zones. This could be important when checking box error reports (BERs), alerts, and system reference codes (SRCs).

Controller Integration

Use the worksheet starting on page 38-1 to record the parameter values discussed in this section.

Controller Name

This is the name you set during installation time to help identify your controllers (3745, 3746/3746-900, or 3746-950) for your own purposes. This name is displayed in the first MOSS-E window, MOSS-E View. The names can be up to 25 alphanumeric characters long. You should develop a naming convention that will allow an operator to easily distinguish each 3746 Nways Multiprotocol Controller from all the others.

This name is not used for any network or system purpose, nor to contact or identify the controller from elsewhere in the network.

Set Power ON Schedule

This function is only available on the 3746-900.

The MOSS Time Services (TIM) function can be used if you want to set the dates and times that your controller is to automatically power on. Be sure to consider a possible time difference between the NetView host and the 3745/3746-900 described in “Controller Time.”

MOSS-E Database Optimization

At regular intervals the MOSS-E databases are automatically reorganized to optimize hard disk and program performance. You can specify when and how often this will take place. This optimization should not take place:

- During a scheduled power on of the machine
- During heavy operator use of the service processor

The parameters are:

Optimize database
This operation can be done daily or weekly. Daily is the default value.

Day
Give the day of the week if you save weekly.

Time
Use the HH:MM 24 hour time format. 00:00 is the default value.

Service Processor Integration

The service processor is preconfigured and preloaded during manufacturing with the MOSS-E and Controller Configuration and Management programs[1]. They provide the operator and service support through user interfaces for the:

- 3745, 3746-900, and 3746-950 connected to the service processor
- APPN/HPR, DLUR, and IP functions of the 3746 Nways Multiprotocol Controller
- Remote Support Facility (RSF)
- Remote console access

CD-ROM Support

Up to the D46130x microcode level, the MOSS-E microcode and MAE code and configurator are delivered on two dedicated optical disks.

From the F12380 microcode level, the 3746-9x0 microcode, the MAE code and configurator, and the product documentation are to be delivered on a single CD-ROM. This results in:

- Dual microcode-level management support
- On-line access to 3746 product information
- New service processor requirements.

Dual Microcode-Level Support

From the F12380 microcode level, two 3746 microcode levels can be installed and managed on the service processor hard disk – One is active whereas the other one is inactive. Benefits of dual microcode-level support are:

- On-line microcode updates
- Backup and testing facilities.

On-line Microcode Updates: In case of new microcode installation or updates, changes are applied on the inactive version, so that the 3746 operation is not interrupted, until the operator switches from the active version to the inactive one. The switching operation, which lasts about five to 15 minutes, depending on the number of processors in the 3746 configuration, can be performed at a time convenient for and compatible with network operations and requirements.

Compared to a microcode upgrade using the optical disk media, on-line microcode updates minimizes the disturbances resulting from the installation of a new microcode version – The time during which the 3746 is not operating has been reduced from 150 minutes(average duration) to less than 15 minutes.

[1] They are IBM Licensed Internal Code.

Backup Facilities: When the new microcode level is activated, the previous production level becomes 'inactive', but remains available for possible re-activation, if you need to quickly go back to a previous version of microcode in case of problems with the new version. Should this happen, the time during which the 3746 operation is interrupted, is limited to the time required for a 3746 IML.

Testing Facilities: By taking advantage of unused machine time, you can test a new level of microcode, maintenance or functional level. You can activate a trial level of microcode and then go back to the production level when required.

On-line 3746 Product Information

Using Netscape and Acrobat Reader (available from the CD-ROM), you can consult directly from the service processor screen the following 3746 product information, including:

- All the customer publications relating to the 3745 Communication Controller and 3746 Nways Multiprotocol Controllers.
- Additional 3746 presentations and documents.

Service Processor Requirements

From the F12380X microcode level, the 7585 service processor type 2 (FC5052) is required. However, the service processor type 1 (FC5021) can be upgraded to support the functions available from the F12380X microcode level. They must be equipped with:

- A CD-ROM drive only (the optical drive no longer available)
- A 96-Mbyte memory
- A two-Gbyte hard disk drive (HDD) (only for FC5021, SP type 9585)

Service Processor Physical Connections

The service processor may have up to three physical connections (see Figure 29-16 on page 29-26):

1. **Service LAN**

   A token-ring port allows for communication with:

   - Multiple 3745s and 3746s (refer to “Service Processor Sharing and Use of Service LAN” on page 34-6)
   - Network node processor A
   - Network node processor B
   - 3746 multiaccess enclosure
   - NetView (via the mainstream path, refer to “NetView Alerts” and Figure 29-16 on page 29-26)
   - LAN-, SNA-, APPC-, APPN-attached remote consoles (refer to Chapter 35, “Customer Consoles and DCAF” and Figure 35-1 on page 35-2)

2. **Public switched telephone network**

   An SDLC port and modem allows:

   - Connection to the IBM support center and the IBM RETAIN databases
   - An alternate path to NetView for the alerts reported by the MOSS-E
   - A backup path from a remote user console

3. If a 3746 multiaccess enclosure is installed, an RS232 null modem cable from the service processor COM2 port to the 3746 multiaccess enclosure IEA-232

port allowing direct communication to the multiaccess enclosure maintenance mode.

Service Processor Modem

The modem provided by IBM with the service processor attaches the SDLC or asynchronous port of the service processor to the public switched telephone network.

The service processor modem has the following characteristics:

- Support for ITU-T V.25 bis (auto-call) and auto-answering
- Synchronous, asynchronous or autosync mode of operation (modem-dependent)
- Automatically sets the modulation scheme compatible with the remote modem (V.22, V.22 bis, V.32, or V32 bis)
- Operates at speeds up to 33.6Kbps or 28.8Kbps in countries where the 33.6Kbps-speed is not homologated
- Automatically adapts the line speed to the remote console and, if possible, line conditions

You must provide access to a dedicated analog line of the public switched telephone network.

Table 34-1 on page 34-5 through Table 34-3 on page 34-6 show the **compatibility** between the the modems and ports used between the **remote workstation** and the **service processor**. For details about the remote workstation settings, refer to *3745 and 3746 Model 900 Console Setup Guide*, SA33-0158 if you are working on a **3746-900** or *3746 Nways Multiprotocol Controller Model 950 User's Guide*, SA33-0356 if you are working on a **3746-950**.

If you are installing or upgrading a service processor type:

- **7585**, refer to Table 34-1.
- **3172**, refer to Table 34-2.
- **9585 or 9577**, refer to Table 34-3 on page 34-6.

Table 34-1. Modem connections between a remote workstation and a target service processor 7585

7585 (Connection Type and Mode)	**Modem Type**	**Remote Workstation (DCAF Modem Type)**									
		MPA Card Connection			**COM1 Port Connection**						
		7855	**7857**	**7858**	**7855**	**7857**		**7858**		**Hayes**	
		SYNC			**ASY**	**ASY**	**AUTO**	**ASY**	**AUTO**	**ASY**	**AUTO**
COM1 ASY	7857	-	-	-	OK	OK	-	OK	-	OK	-
	7858	-	-	-	OK	OK	-	OK	-	OK	-
	Hayes	-	-	-	OK	OK	-	OK	-	OK	-

Table 34-2. Modem connections between a remote workstation and a target service processor 3172

3172 (Connection Type and Mode)	**Modem Type**	**Remote Workstation (DCAF Modem Type)**									
		MPA Card Connection			**COM1 Port Connection**						
		7855	**7857**	**7858**	**7855**	**7857**		**7858**		**Hayes**	
		SYNC			**ASY**	**ASY**	**AUTO**	**ASY**	**AUTO**	**ASY**	**AUTO**
MPA Card SYNC	7855	OK	OK	OK	-	-	OK	-	OK	-	OK
	7857	OK	OK	OK	-	-	OK	-	OK	-	OK
	7858	OK	OK	OK	-	-	OK	-	OK	-	OK
COM1 ASY	7857	-	-	-	OK	OK	-	OK	-	OK	-
	7858	-	-	-	OK	OK	-	OK	-	OK	-
	Hayes	-	-	-	OK	OK	-	OK	-	OK	-
MPA Card COM2	7857	-	-	-	OK	OK	-	OK	-	OK	-
	7858	-	-	-	OK	OK	-	OK	-	OK	-

Table 34-3. Modem connections between a remote workstation and a target service processor 9585 or 9577

9585 (Connection Type and Mode)	Modem Type	Remote Workstation (DCAF Modem Type)									
		MPA Card Connection			COM1 Port Connection						
		7855	7857	7858	7855	7857		7858		Hayes	
		SYNC			ASY	ASY	AUTO	ASY	AUTO	ASY	AUTO
MPA Card SYNC	7855	OK	OK	OK	-	-	OK	-	OK	-	OK
	7857	OK	OK	OK	-	-	OK	-	OK	-	OK
	7858	OK	OK	OK	-	-	OK	-	OK	-	OK
	INT	OK	OK	OK	-	-	OK	-	OK	-	OK
COM1 ASY	7857	-	-	-	OK	OK	-	OK	-	OK	-
	7858	-	-	-	OK	OK	-	OK	-	OK	-
	Hayes	-	-	-	OK	OK	-	OK	-	OK	-

Service Processor Sharing and Use of Service LAN

The service processor LAN must be used exclusively for communication between the 3746 network node processor(s), 3746-9x0(s), 3746 multiaccess enclosure,the 3745 MOSS, and the service processor.

You must not attach any user stations to the service LAN of a 3746 Nways Multiprotocol Controller. However, one or more remote consoles (OS/2 workstations running the Distributed Console Access Facility [DCAF]) can be used to reach the service processor via the service LAN (refer to “Customer Consoles” on page 35-2).

When sharing the service processor between several 3745s and 3746s, the following connections are allowed to the service processor LAN:

- Service processor
- Up to four 3745 Models A (their MOSS connections)
- One 3746 Nways Multiprotocol Controller and its Network Node Processor(s) and its multiaccess enclosure
- One 3746-900 without a network node (without a network node processor)

Note: As a minimum requirement, a Service Processor Feature 5021 with a 64MB Memory Expansion Feature 5027 should be used for the proper operation of a multi-374X configuration. See Table 34-8 on page 34-27.

The Service Process Access Unit (SPAU) included with the service processor provides eight ports for the above connections. If more than eight ports are required, an IBM 8228 Multistation Access Unit can be connected to the SPAU. For example, this might be necessary to connect remote consoles to the service LAN, or implement the above maximum configuration including a back-up network node processor (nine ports are required).

Do Not Use Service Processor LAN for User Stations

Important!

Service LAN problems may disrupt 3746 Nways Multiprotocol Controller operations.

Token-Ring LAN Bridges

If remote consoles are connected to your LAN, the communication with the service LAN must be done through a bridge:

1. The bridge *must* be configured with the proper *filters* to prevent unnecessary traffic, such as "broadcast storms", from entering the service LAN. Such broadcast storms are usually produced by IP traffic.

   The bridge must forward only those frames that are explicitly addressed (no broadcast frames) to the service processor(s).

2. An improperly configured bridge on the service LAN can interfere with the operation of the network node processor and service processor. Among possible effects, such interference could:

   - Prevent the 3746 from completing its IML.
   - Prevent the 3746 from performing the selective IML of a processor, for example, the IML of ESCON processors for which a host link (not a host link station) definitions has been modified or deleted.
   - Degrade the operation of the 3746 Nways Multiprotocol Controller (as explained below in item "Unplugged Cables and Stations").

3. If a hub is used for communication between remote consoles and the service processor(s), the service processor access unit (the SPAU, that forms the service LAN inside the controller expansion) must be connected to the hub with the proper filter protection.

   Vital components of the 3746 Nways Multiprotocol Controller [the CBSP2/TIC3, service processor, and network node processor(s)] *must never be directly* connected to a hub because of the risk of accidental or unplanned disruption of the related cables. Refer to "Unplugged Cables and Stations."

Unplugged Cables and Stations

Beaconing (resulting from removing a station or bridge) or unplugging the network node processor cable from the service LAN for a short time does not interfere with 3746 operations. The network node automatically re-establishes communications between the 3746 adapters and the network node processor. However, if these conditions last for more than about two minutes, the network node processor cannot re-establish contact with the 3746 adapters. While established user sessions are not disturbed, network node operations degrade (refer to "Controller Operations when the Network Node Processor is Not Available" on page 34-20). To re-establish normal operation of the network node processor, it is necessary to re-IPL the network node processor. During the IPL, all traffic and sessions on the network node are halted.

Service Processor LAN Management Definition

If you want the service processor to report information to a LAN Manager or LAN Network Manager, then you must define the following parameter and record it on the worksheet found on page 38-3.

C&SM LAN ID

Communications and System Management (C&SM) LAN ID is the value of the LAN NAME parameter in your LAN manager that identifies the locally administered service LAN containing the service processor node.

Definition of Service Processor LAN Address

Use the worksheet on page 38-3 to record the value of the following address:

Network adapter address

This is the locally administered address (LAA) of the service processor token-ring adapter. This address is also required for parameter definitions in the following programs:

- DCAF controlling workstations (remote consoles) which are attached to the service LAN and operate under CM/2. Refer to **Network adapter address** on page 35-7.
- The ACF/VTAM switched major node, if a DCAF workstation uses the SNA/subarea network to access the service processor.
- CCM, if the service processor is defined as an end node of the 3746 NN. Refer to **Remote MAC address** on page 34-9.

This address has 12 digits and must be unique among all other network addresses (LAAs) on the service LAN. Specify this address in the IBM Token-Ring Network format.

Definition of Service Processor in APPN/HPR or SNA/Subarea Network

Definitions are required for:

- MOSS-E to report hardware alerts to NetView (refer to “NetView Alerts” for more information).
- Customer consoles to remotely access the service processor using the Distributed Console Access Facility (DCAF). See Chapter 35, “Customer Consoles and DCAF” for more information.

The service processor must be defined either as an end node of the 3746 network node or, if an SNA/subarea physical path exists, as an SNA/subarea physical unit (PU).

Use the worksheets on page 38-3 to record the parameter values in the following two sections for the definitions in the MOSS-E and CCM.

APPN/HPR

The following definitions are required for the service processor to be an end node of the 3746 network node:

MOSS-E Parameters

Network ID

Identifies the network to which the service processor node is connected. It has to be defined the same as the:

- CCM parameter **Network identifier** on page 34-17
- VTAM parameter **NETID** on page 29-30 or 29-31

Local node name

This identifies the service processor in the network and must be defined the same as the:

- CCM parameter **Name** on page 34-9
- VTAM parameter **CPNAME** on page 29-30 or 29-31

The **Network ID** and **Local node name** values are 1 to 8 characters long and can include:

- Upper case letters (A - Z)
- Digits (0 - 9), but it cannot start with a digit
- Dollar sign ($)
- At sign (@)
- Number sign (#)

CCM Parameters

Token-Ring Station Configuration:

These are your service processor definitions via the CCM:

Name

This must be defined the same as the MOSS-E parameter:

- **Local node name** on pages 34-9 and 35-7.

Remote MAC address

This must be defined the same as the MOSS-E parameter:

- **Network adapter address** on page 34-8 and 35-7.

PU type

The service processor is a PU type 2.1.

SNA/Subarea

Instead of defining the service processor as an APPN/HPR resource, you may use SNA/subarea definitions, if the service LAN has a connection to a 3745 or 3746-900. See the example in Figure 29-16 on page 29-26.

MOSS-E parameters

Network ID

Identifies the network to which the service processor node is connected. It has to be the same as the CCM parameter:

- **Network identifier** on page 34-17.

Local node name

This identifies the service processor in the network and must be defined the same as the:

- CCM parameter **Name** on page 34-9
- VTAM parameter **CPNAME** on page 29-30 or 29-31.

The **Network ID** and **Local node name** values are 1 to 8 characters long and can include:

- Upper case letters (A - Z)
- Digits (0 - 9), but it cannot start with a digit
- Dollar sign ($)
- At sign (@)
- Number sign (#)

NCP and VTAM parameters

Refer to the NCP and VTAM definitions in:

- “NetView Alerts” on page 29-24
- Chapter 35, “Customer Consoles and DCAF” on page 35-1.

For more information, including any needed NCP and VTAM definitions, refer to “NetView Alerts” on page 29-24, Chapter 35, and the *3746-950 User's Guide*, SA33-0356 or the *3745 Console Setup Guide*, SA33-0158.

Controller Operations when the Service Processor is Not Available

If you have a problem with your service processor, switch to your backup service processor, if you have one (refer to “Backing Up Your Service Processor” on page 34-12), and call the IBM service representative.

Normal operation of the 3746 Nways Multiprotocol Controller requires the service processor but once the controller is correctly configured and operating, it may not be necessary to use the service processor for extended periods of time.

This means that if the service processor fails, you may not notice any immediate degradation in controller operation. If the service processor is not operational, then:

- All operations explained in the following chapters are no longer available:
  - Chapter 34, “Controller and Service Processor.” The Controller Configuration and Management functions are not available to the local and remote operators.

– “NetView Alerts.” There are no alerts reported to NetView for the 3746 Nways Multiprotocol Controller or the service processor.

– Chapter 36, “Connecting to the IBM Remote Support Facility.” There are no calls to the RSF (RETAIN).

– Chapter 35, “Customer Consoles and DCAF.” There is no remote access to the MOSS-E.

- The service processor operator cannot:

  – IPL or IML the 3746 Nways Multiprotocol Controller from the service processor.

  – IML a specific adapter.

  – Power on or off the 3746 Nways Multiprotocol Controller through the MOSS-E.

- NNP access is unavailable.
- Also unavailable are the automatic IMLs of the 3746 adapters.
- MAE access is unavailable.

However, the 3746 adapter dumps and error records are saved in the adapter. When the service processor is operational again, the MOSS-E automatically detects if there are any dumps or error messages available in the adapters.

Recommendations for Customer Operations

IBM recommends regular scheduled use of the service processor to ensure that it is operating correctly and to keep network operators proficient with its advanced functions.

Save Configuration

Depending on the microcode level installed on your service processor, the procedure is different.

- Up to D46130 microcode level, an optical disk is used to back up the configuration data.
- From the F12380 microcode level, a diskette is used to back up the configuration data.

It is recommended to save the configuration data each time the configuration changes. For further information about backing up the configuration data, refer to the *3746 Nways Multinetwork Controller Model 950: User's Guide*, SA33-0356, or the *3745 All Models and 3746-900 Basic Operations Guide*, SA33-0177.

Save Microcode

Only for EC up to D46130...

The following applies to the LIC delivered on a optical disk.

The current level of the MOSS-E microcode in the MOSS-E *must* be saved after each of the following functions is used:

- Change Active Code
- Manage Microcode Changes

- Manage Microcode Fixes.

To back up all the microcode, you must re-IPL the service processor. Refer to the *3746-950 User's Guide* or the *3745/3746-900 Basic Operations Guide*.

Backing Up Your Service Processor

> **Only for EC up to D46130...**
>
> The following applies to the LIC delivered on a optical disk.

To provide a higher level of reliability, you can order a second service processor which will replace your active service processor if it fails.

During normal operations, the backup service processor *is not connected* to the service processor LAN and should remain powered off. Its hard disk will be a duplicate of the active service processor hard disk. If recovery is needed, the failing active service processor is disconnected from the LAN and replaced by the backup.

Backing up your service processor requires:

- Ordering and setting up a backup service processor and
- Saving either:
  - Configuration data of the active MOSS-E and copying it to the backup hard disk or
  - All the microcode in the active service processor, including the configuration data, and copying it to the backup hard disk.

Ordering and Setting Up a Backup Service Processor

> **Only for EC up to D46130...**
>
> The following applies to the LIC delivered on a optical disk.

You can order a second service processor feature as a backup. It is delivered with the licensed internal code already loaded on the hard disk.

If the backup service processor is delivered after the first one, the microcode level of the backup might differ from the level of the first service processor[2].

If the code levels are different, you can use either the microcode level of your:

- Active service processor by copying it onto the hard disk of the backup service processor[2].

  or

- Backup service processor by copying just the active configuration onto the hard disk of the backup service processor[2].

[2] For information on how to check the microcode levels, to back up the MOSS-E microcode and the configuration data, refer to the *3745/3746-900 Basic Operations Guide*, SA33-0177 or the *3746-950 User's Guide*, SA33-0356.

Loading the Control Program

Link IPL Ports

There are three types of links that can be used to initially load the control program (an NCP load module) directly in a 3745 CCU without using the MOSS disk:

3745 parallel channels
The parallel channels are link IPL ports by default.

SDLC 3745 communication lines
To enable 3745 LSS and HSS lines as link IPL ports, use the MOSS Link IPL Ports (LKP) function at the service processor console.

3746-900 ESCON channels
To use ESCON channel adapters as link IPL ports, logical link stations must be defined as link IPL ports in the MOSS-E generation subset produced by the 3745 ESCON Generation Assistant The 3746-900 must be IPLed and running.

Note: The last adapter slot in the second expansion enclosure (address 3272) *cannot* be used as a link IPL ports. For more information, see "Using CCM" on page 15-6.

The load module can be saved on the MOSS disk after being loaded in the CCU using the SAVEMOD=YES option in the VTAM command. For this, there is no need to have an NCP load module running in the 3745 CCU.

Table 34-4 shows the maximum number of link IPL ports available in the single-CCU (Models 21A and 31A) and the twin-CCU (Models 41A and 61A) 3745s.

Table 34-4. Maximum Number of Link IPL Ports

IPL Port Type	Single-CCU Models	Twin-CCU Models CCU A	Twin-CCU Models CCU B
Parallel channel (3745)	16	8 (See Note 1)	8 (See Note 1)
SDLC communication line (3745)	8	8	8
ESCON Station per adapter	16	16 (See Note 2)	
Total ESCON	256	240 (See Note 2)	

Notes:

1. The figures for the twin-CCU models assume that both CCUs are active. Otherwise, use the single-CCU figures.
2. In the twin-CCU models with 3746-900 ESCON channels the link IPL ports (logical link stations) can be distributed unequally between the two CCUs. Refer to "ESCON Link Components" on page 15-4.

Link Types for Downloading NCP onto MOSS Disk

There are four types of links that can be used to nondisruptively download a new control program (a NCP load module) onto to the MOSS disk when an NCP load module is already running the 3745:

1. 3745 communication line: SDLC, X.25 (NPSI), or frame relay
2. 3745 token ring (TIC2)
3. 3746-900 communication line: SDLC, X.25 (NCP and NPSI) or frame relay
4. 3746-900 token ring (TIC3).

The following procedure is recommended:

1. Download the NCP load module onto the MOSS disk using the VTAM command:

   ```
   MODIFY NET,LOAD,ID=NCPname,LOADMOD=modulename,ACTION=ADD/REPLACE
   ```

2. Load the NCP load module from the MOSS disk and activate it using the VTAM command:

   ```
   VARY NET,ACT,LOADFROM=EXT,LOAD=YES,ID=NCPname,RNAME=PUname.
   ```

If you transfer and activate a load module in a single command on any other line than a 3745 LSS or HSS line running SDLC, you have to wait for the load module to be downloaded onto the MOSS disk of the remote 3745 and then loaded from the disk to the 3745 CCU. Thus, the load takes about twice as long as on a 3745 LSS or HSS line running SDLC. Also, the actual activation of the remote load module occurs some time after the `VTAM IPL COMPLETE` message is displayed. For more information, refer to the *NCP, SSP, and EP Generation and Loading Guide*, SC31-6221.

Loading 3746-900 Microcode or Multiaccess Enclosure

The 3746-900 and the MAE do not have a 3745-type load module. However, similar to loading the 3745 microcode from the MOSS disk, the 3746-900 and MAE microcode is loaded from the service processor MOSS-E disk, and MAE hard disk.

Depending on the 3746-900 configuration, it can take somewhat longer to load.

Automatic Dump/Load Options

These are the same as the MOSS Disk IPL Information (DII) function.

NCP Dump Transfer

For the 3745 Models A, the NCP dumps are automatically stored on the service processor hard disk.

The VTAM command F NET,DUMP,ID=...,ACTION=TRANSFER,... can be used to send an NCP dump from the service processor to the host. There is also a MOSS-E function to transfer NCP dumps from the service processor hard disk to:

1. The host, via the SNA backbone. This function can be used instead of the VTAM command to significantly reduce the dump transfer time, especially when you have a large CCU storage.

   This method uses a 3270 terminal emulation on the service processor to transfer the dump file. You must provide a USERID on the host for the service processor and be logged on to the host before using this function.

To use this method from a remote console you must open a DCAF session with the service processor.

2. A re-writable optical disk (optical cartridge) for transfer by hand or mailing to your software support center. When a dump is written to the optical disk it is not formatted. This is done at the host level.

NCP dumps should be processed quickly because:

1. The service processor hard disk can only hold one dump per CCU.
2. When there is already a dump on the hard disk, a new dump cannot be accepted. The information in the second dump will be lost.
3. If a dump remains on the disk for seven days, it will be *automatically* purged.

Note: The VTAM command D NET DISK ... should not be used on a 3745 disk immediately after a CCU dump. Until the dump is completely stored on the service processor hard disk, this command may give incorrect results.

Dump Transfer Parameters

Use the worksheet on page 38-3 to record the value of the following parameters in the service processor Communications Manager for the 3270 emulation session:

Destination address
This is the MAC address of the token-ring port (a TIC3 or TIC2) into the SNA network. It is available from your network administrator.

This may be the CBSP TIC3. In this case, it is identical to the Token-ring local address (MAC address) in "Definition of the 3746 Controller Address on the Service LAN (MOSS-E)" on page 34-17.

Long session/LU name
This is the session ID/LU name of the 3270 emulation.

The default is MOSSEEMU.

LU local address
03 or greater.

Note: The value of this parameter must be the same as the VTAM LU LOCADDR definition.

Required Host Program

The NCP Dump Transfer function uses one of the following programs, depending on the host operating system:

Operating System	Required Program
MVS with TSO/E	3270 PC File Transfer Program (FTP) Version 1 Release 1.1 (program number 5665-311)
VM/SP with CMS	3270 PC FTP Version 1 Release 1.1 (program number 5664-281)
MVS with CICS	3270 PC FTP (program number 5798-DQH)
VSE	Either VSE/SP Independent Work Station (IWS) Support Version 3 Release 2.0 (program number 5666-345) or VSE/SP IWS Support Version 4 Release 1 (program number 5750-ABF).

VTAM Switched Major Node for Dump Transfers

The following switched major node definitions are for the PU and LU used to transfer the dumps:

```
MOSSE    PU   ADDR=04,PUTYPE=2,NETID=SYSTST,CPNAME=MOSSNMVT,          X
              MAXPATH=8,MAXDATA=265,MAXOUT=1,                         X
              DISCNT=NO
MOSSEEMU LU   LOCADDR=03,DLOGMOD=SNX32702
```

3746 Nways Multiprotocol Controller Integration

Definition of the 3746 Controller Name (CCM)

The 3746 Nways Multiprotocol Controller with its network node processor is known to the APPN/HPR network by the following CCM parameters (defined in the worksheet on page "Network Node and DLUR Configuration Parameters" on page 40-63):

Network identifier
Identifies the APPN/HPR network to which the 3746 Nways Multiprotocol Controller is connected. This network identifier has to be defined the same as the:

- MOSS-E parameter **Network ID** on page 34-9 or 34-10
- VTAM parameter **NETID** on page 29-30 or 29-31.

IBM-registered network identifiers should have an 8-byte name with the structure `cceeeenn`, where:

- `cc` is the country code (according to ISO 3166)
- `eeee` is the enterprise code (unique within a country)
- `nn` is the network suffix code (unique within one enterpris e).

Control point name
Identifies the network node processor of the network node.

Use the worksheet on page 38-3 to record these parameters.

Definition of the 3746 Controller Address on the Service LAN (MOSS-E)

The 3746-900 or 3746-950 connection to the service LAN (CBSP2/TIC3) must be defined in the following MOSS-E parameter:

Token-ring local address (MAC address)
During an IML of the 3746 Nways Multiprotocol Controller, the service processor uses this MAC address to establish the communication with the CBSP2 and to load the adapter microcode.

During activation of the 3746 Nways Multiprotocol Controller, the network node processor uses this MAC address to activate the TIC3 on the CBSP2.

Be careful when choosing the LAA...

If you find it necessary to change the token-ring local address after your controller is in operation, this will require a re-IML of the CBSP2 and:

- Interruption of the NCP-controlled traffic between the 3745 CCU A and 3746-900.
- Interruption of all traffic controlled by the 3746 Nways Multiprotocol Controller.

This could take some time, depending on the number of sessions that have to be restarted.

Use the worksheet on page 38-3 to record these parameters including those of the second, non-network node 3746, if installed.

Service LAN IP Addresses (MOSS-E)

If you plan to use a workstation running TCP/IP for OS/2 to remotely access any of the following:

- Service processor
- Control point-A
- Control point-B
- 3746 Nways Multiprotocol Controller
- Multiaccess enclosure

which you need to define in the MOSS-E their *IP addresses*. (For a detailed description of the IP addressing system refer to Chapter 3, "Internet Protocol (IP) Overview" on page 3-1.)

If the service LAN has no other TCP/IP connection, use the default values as they do not need to be unique worldwide.

Class C is the default IP address class. See "IP Address Classes" on page 3-3.

Use the worksheets on page 38-4 to record the parameters shown in Table 34-5.

Table 34-5. Service LAN IP Address Parameters

Parameter	**Description**	**Where defined**
IP Address	The 32-bit IP address consists of two parts see: **Network address** — The address of the IP network that contains the service LAN. **Note:** The default network address assumes that the IP network consists of only the service LAN. **Host address** — The local address of the service processor, NNP, MAE, or 3746.	"IP Addressing" on page 3-2.
Subnet mask	The subnetwork mask, used with the host address, divides the physical IP network into smaller logical units called subnetworks.	"Subnets" on page 3-4.

The default IP addresses are shown in Table 34-6 on page 34-19, and are shown in dotted notation.

Table 34-6. Default Service LAN IP Addresses	
Unit	**Default IP Address**
Service Processor	192.9.200.1
Network Node Processor-A	192.9.200.2
Network Node Processor-B	192.9.200.3
3746 Nways Multiprotocol Controller	192.9.200.4
3746 Multiaccess Enclosure	192.9.200.5

Controller Operations when the Network Node Processor is Not Available

APPN/HPR Network Node

The interruption of network node processor operations does not disturb the established user traffic (LU-LU sessions) until the network node processor comes up again and the control point is activated. However, the interruption of the 3746 control point results in a degradation of the following network node operations:

- Resources cannot be activated and deactivated.
- Sessions cannot be started or stopped.
- Network problems cannot be reported.
- Other network nodes get no response from the network node processor. They then assume that the node has failed and remove it from their network topology map.

In order to recover from a failing situation and return to normal operations, you can either:

- Restart the APPN/HPR control point that runs in the network node processor.
- Shutdown and restart, that is re-IML the whole network processor.

In either case, CCM provides the possibility to automatically activate the configuration by enabling the **Automatic configuration activation** option.

When this option is enabled, restarting the control point or re-IMLing the network node interupts the 3746 operation, which results in the loss of data traffic flowing through the 3746 resources.

When this option is disabled, restarting the control point or re-IMLing the network node does not interupt the 3746 operation and therefore preserves the traffic flowing through the 3746 resources, until you manually activate the configuration by pressing the **Activate Configuration** pushbutton.

IP Routing

The interruption of the network node processor does not disturb IP routing functions:

- IP datagrams are still forwarded based on the existing routing table and caches.
- OSPF/RIP/BGP are still able to exchange routing information thus allowing datagrams for new destinations to be routed.

However, the interruption of the network node processor results in a degradation of network node operations:

- IP resources cannot be activated, deactivated, nor displayed.
- No Telnet operations to the NNP are possible.
- SNMP flows are no longer handled. This could lead to a *router down* image in the NetView for AIX displays.

Restarting the network node processor resets and activates all the 3746 interfaces and flushes all caches and dynamic routing table entries (that is, those *known* by OSPF/RIP/BGP). For IP users, this could lead to longer response times; some IP packets are lost and retransmitted by the TCP end points during the restart of the interfaces. However, from the user's (end-to-end) point of view, the TCP connection is not disrupted.

Dual Network Node Processors

Each 3746 Nways Multiprotocol Controller can have two network node processors:

- One is *active* and running the control point.
- The other is in *hot standby* and ready to take over in case the active network node processor should fail.

The first network node processor installed is identified as NNP-A, the second is NNP-B. (See “Network Node Processor Specifications” on page 44-41 for the physical location of the two network node processors.) Dual network node processor operation can be enabled or disabled depending on whether or not the operator has selected the **Enable CP/NNP Backup** option. Both network node processors are monitored by the service processor.

When the active network node processor is failing , the service processor requests the standby network node processor to become active using the same configuration as the formerly active network node processor used. This can be either automatically or manually done:

- If the **Enable CP/NNP Backup** option is enabled, the standby NNP automatically takes over the failing active NNP.
- Otherwise, the operator manually starts or IMLs the standby NNP.

In either case, CCM provides the possibility to automatically activate the configuration by enabling the **Automatic configuration activation** option.

- When this option is enabled, data traffic flowing through the 3746 resources is lost, reset, and started.
- When this option is disabled, established traffic stays running but no new connections are possible until the operator manually activates the configuration by pressing the **Activate Configuration** pushbutton, which is disruptive for the 3746 operation.

Telnet to NNP

Specific functions implemented on the 3746 Nways Multiprotocol Controller are:

Direct Telnet access to NNP from any IP station
DCAF is not required on the remote station and there is no need to go through the service processor.

Service processor access to NNP
The MOSS-E function IP Commands (in the Network Node Processor (NNP) Management menu). provides Telnet access to the active NNP.

Remote console access to NNP
Using DCAF, you can use the MOSS-E to access the active NNP via Telnet.

Telnet Configuration

Password

Telnet applications can be secured by a password. The **CCM/Telnet user profiles management** password management function available from the service processor Operations Management menu allows you to define, modify, and delete the Telnet password. For further information, refer to “Passwords” on page 34-23.

Note: Deleting the password disables the Telnet function. These changes are dynamic for the 3746 operations, so there is no need to restart the 3746.

The default userID is NNPIP and the default password 3746XOA.

NNP access control

If you want to restrict the access to the NNP to one station (or a limited number of stations), use the following (which are connected to the service ring):

3746 with IP
: The MOSS-E IP Access Control can be used to define the stations allowed to access the Telnet application of the 3746 network node.

Bridge
: When using a bridge to access the service ring from a user LAN), change the filtering to allow messages to the 3746 IP station to pass the bridge (in addition to the service processor messages).

Network Routing Protocol for Each Processor Type

The choice of the specific licensed internal code option (APPN/HPR, APPN/HPR and IP, or only the basic NCP support) is made at installation time. This selection can be changed later, but it requires a re-IML of the processors involved to load the updated licensed internal code configuration.

The options selected require certain features to be ordered:

- APPN/HPR requires the Network Node Processor (Features 5022 or 5122)
- IP requires the IP Routing (Feature 5033).

  Since IP Routing requires APPN/HPR in the same processor, select both features for each category of processors that will be used for IP[3] .

Load only the code that is necessary for your network routing. This saves processor storage and maximizes processor connectivity (number of PUs, LU-LU sessions, and SDLC links) for APPN/HPR/DLUR.

Note: The 3746-900 minimum option is APPN/HPR for all processors. Use the worksheet on page 38-4 to record the options selected (none, APPN/HPR, or APPN/HPR with IP) for each type of processor. The following explains some of the restrictions on the options can be selected for each processors types:

CLP and CLP3 In the 3746-900, select none as the option if you:

- Do not need APPN/HPR or IP support on any CLP and
- Want to be able to connect up to 3000 active PUs and/or X.25

3 All processors of the same category are loaded with the same options.

virtual circuits over a mix of frame-relay, X.25, and ISDN lines. (With APPN/HPR, the PU maximum is 1000.)

CBTRP2 and CBTRT3 For a 3746-900 connected to a 3745 Model 41A or 61A, APPN/HPR (and IP) can only be selected if the TRP (CBTRP) connected to the CCU-B is a type 2.

A CBTRP type 1 can only be loaded with the basic NCP support.

TRP2 and TRP3 For a 3746-900 with TRPs type 1, only the basic NCP support can be loaded.

ESCP2 and ESCP3 For a 3746-900 with ESCPs type 1, only the basic NCP support can be loaded.

Passwords

The MOSS-E functions are organized in menus for:

- 3746 Nways Multiprotocol Controller functions for operations (customer functions) and service (maintenance functions)
- Service processor operator and maintenance functions.

All menus are accessed from the first window displayed by the MOSS-E, the MOSS-E View window. Examples of customer functions are Display Active Configuration and Manage Disks and Databases Examples of maintenance functions are Trace Adapters and Display Files.

A group of five passwords can be used to secure access to customer and maintenance functions on the MOSS-E menus.

Use the worksheet on page 38-5 to record the new passwords.

Controller customer password: Provides access to the operator functions in the 3746 Nways Multiprotocol Controller menus. It should be assigned to the first level operator.

Controller maintenance password: Provides access to the operator and maintenance functions in the 3746 Nways Multiprotocol Controller menus. It should be assigned to IBM Service.

Service processor customer password: Provides access to all operator functions in both the service processor and in all controllers attached to the service processor. It should be assigned to the operations supervisor and system programmer.

Service processor maintenance password: Provides access to all functions in both the service processor and in all controllers attached to the service processor. Care should be used in the distribution of this password. IBM requires this password for service.

Management password: Provides access to the password management function in the service processor menu. Care should be used in the distribution of this password.

The passwords are from 5 to 8 alphanumeric characters long.

Telnet password: Provides access to the telnet console.

MOSS-E Password Organization

Table 34-7 summarizes the password organization and the access they provide to the different types of MOSS-E functions.

Table 34-7. MOSS-E Password Modes

Password Modes	3746 Nways Multiprotocol Controller Menus		Service Processor Menu		
	Operator Functions	**Maint Functions**	**Operator Functions**	**Maint Functions**	**Password Mgt**
Controller customer	X				
Controller maintenance	X	X			
Service processor customer	X		X		
Service processor maintenance	X	X	X	X	
Management password					X
Telnet password					X

Legend:

Mgt Management
Maint Maintenance

The controller customer and maintenance passwords provide access to all controllers attached to a service processor, see Figure 34-1.

The service processor customer and maintenance passwords provide access to all controllers and the service processor.

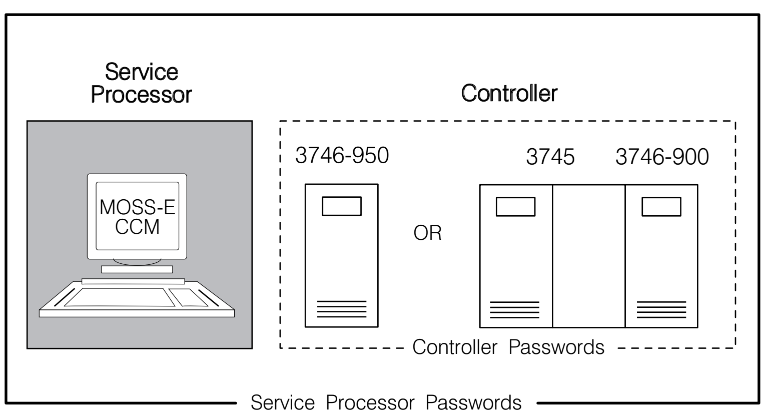


Figure 34-1. Controller and Service Processor Passwords

Default Passwords

The factory default value (IBM3745 in either upper or lower case letters) is the same for all five passwords. Changing the default passwords is optional. If you decide not to change the default password, you will be able to log on only in the service processor maintenance mode. This means that:

- You will have access to *all* functions on *all* the MOSS-E menus.
- The logon attempt threshold counter cannot be reset.

IBM recommends that the default passwords always be changed (using the Manage Passwords MOSS-E function.)

When you change the passwords, you can change some and leave others with the default value.

Maintenance Password Status

For the maintenance passwords you can set the number of times the MOSS-E can be accessed using the password:

Permanent Allows an unlimited number of accesses. This is the default value.
Temporary Allows only one access.
Deactivated Prevents any access.

Logon Attempt Threshold

You can set a threshold defining the number of times that an incorrect password can be tried before access to a menu is blocked.

When access is blocked, use the service processor maintenance password and the management password function to reset the logon attempt counter.

Note: If you are using the default passwords, you cannot reset it.

Restoring Passwords

If the service processor maintenance or management password has been forgotten, then all passwords must be restored to their default values using the Restore Passwords MOSS-E function. During the password restoration procedure, the service processor installation diskette is required.

Remote Operator Password

This is the first of two passwords used by your remote operators to access the service processor from a PS/2 workstation running the IBM Distributed Console Access Facility (DCAF) program. For more information see Chapter 35, “Customer Consoles and DCAF.”

To define or change this password, use the Customize DCAF Target Settings function which is in the MOSS-E Service Processor menu. The two parameters that you have to plan for are:

Enable DCAF password
Yes or no. The default is yes.

Password
1 to 8 alphanumeric characters.

Use the worksheet on page 38-5 to record these parameters.

Note: There is no factory default password. If no password has been defined, the remote operator just presses the Enter key when asked for the password.

Remote Access Security

To log on to a service processor using a remote DCAF workstation you must first establish a DCAF link between the remote workstation and the service processor. This link requires certain parameters that are unique to each service processor. Refer to Chapter 35, “Customer Consoles and DCAF” for planning information about these parameters.

A series of passwords provide access security:

- As part of the process of establishing the link between the remote workstation and the service processor, you are asked for the service processor DCAF password before you can have access to the service processor. This password can be unique for each service processor.

  Once this password is entered and the link is established, you can monitor the display of the service processor.

- To remotely control the service processor, you must enter the MOSS-E password to log onto the MOSS-E. These passwords are explained on page 34-23.

Disabling of Incoming Calls

The service processor modem can be set not to accept any incoming calls. This is mainly used to isolate the service processor from remote modem-attached consoles (DCAF controlling and RSF console). The procedure is different depending on the type of modem used:

Integrated modem
: Use the MOSS-E Disable incoming calls function and record this parameter on the worksheet on page 38-5. This type of modem is no longer available from IBM.

External modem
: Manually, using the modem buttons. Refer to the *Guide to Operation* for your modem for this procedure.

Service Processor (SP) and Network Node Processor (NNP) Support Matrix

The following table gives an overview of the service processor (SP) and network node processor (NNP) features and machine types needed to support each of the available 3746 hardware configurations.

Table 34-8 (Page 1 of 2). Service Processor (SP) / Network Node Processor (NNP) Feature Code and Machine Type

Function	Service Processor					NNP	
	FC #5020	**FC #5021**			**FC #5052 (SPtype 2)**	**FC #5022**	**FC #5122 (NNPtype 2)**
	9577 486-33Mhz	**9585 486-66Mhz**	**3172 P/N 41H7520 486-66Mhz**	**3172 PN 55H7630 P-90Mhz**	**7585 P-200Mhz**	**3172 p-90Mhz**	**7585 P-200Mhz**
NNP traffic only	Yes	Yes	Yes	Yes	Yes	(Note 2)	(Note 2)
2nd. exp. enclosure (FC #5016)	(Note 1)	FC #5028	FC #5028	FC #5028	Yes	(Note 2)	(Note 2)
SP Sharing	(Note 1)	FC #5028	FC #5028	FC #5028	Yes	(Note 2)	(Note 2)
APPN/HPR (NNP) IP (FC #5033)	FC #5026	Yes	Yes	Yes	Yes	Yes	Yes
APPN ISR/DLUR,RTP More than: -3000 PUs -9000 LU-LU sessions	FC #5026	Yes	Yes	Yes	Yes	FC #5027	FC #5027
APPN ISR/DLUR/RTP More than 15000 LUs-LUs sessions (up to 30000) (Note 3)	FC #5052	FC #5026 FC #5028 FC #5051 (Note 1)	FC #5028 FC #5051 (Note 1)	FC #5028 FC #5051	Yes	FC #5211	Yes
3746 -FC #5802 (SSE) -More than 120 lines controlled by the NNP (up to 240) -CD-ROM support -APING from SP	FC #5052	FC #5026 FC #5028 FC #5051 (Note 1)	FC #5028 FC #5051 (Note 1)	FC #5028 FC #5051	Yes	Yes	Yes

Table 34-8 (Page 2 of 2). Service Processor (SP) / Network Node Processor (NNP) Feature Code and Machine Type

Function	Service Processor					NNP	
	FC #5020	**FC #5021**			**FC #5052 (SPtype 2)**	**FC #5022**	**FC #5122 (NNPtype 2)**
	9577 486-33Mhz	**9585 486-66Mhz**	**3172 P/N 41H7520 486-66Mhz**	**3172 PN 55H7630 P-90Mhz**	**7585 P-200Mhz**	**3172 p-90Mhz**	**7585 P-200Mhz**
MAE -FC #3000 -FC #3001 -Extended function (FC #5804) -Extended functions 2 (FC #5805) -TN3270e server (FC #5806) -HSSI (T3/E3 speeds) (FC #3289) -Fast Ethernet (FC #3288) -FDDI (FC #3286) -64MB memory expansion (FC #3520)	FC #5052	FC #5026 FC #5028 FC #5051 (Note 1)	FC #5028 FC #5051 (Note 1)	FC #5028 FC #5051	Yes	Yes	Yes
Previews • EBN	FC #5052	FC #5026 FC #5028 FC #5051 (Note 1)	FC #5028 FC #5051 (Note 1)	FC #5028 FC #5051	Yes	Yes	Yes

Notes:

1. Recommended alternative: Replace the service processor by a service processor type 2 (FC #5052) for better response times at the operator console.
2. No requirement on the NNP.
3. Requires also a CBSP3 or CBSP3 upgrade.

SP and NNP Feature Codes:

#5020 Service Processor (Type: 9577)

#5021 Service Processor (Type: 9585, 3172 P/N 41H7520 or 3172 P/N 55H7630)

#5022 Network Node Processor (Type: 3172 P/N 41H7522, no longer orderable)

#5026 Service Processor HDD upgrade (HDD 2GB/1GB formatted)

#5027 Network Node Processor Memory Expansion (64MB available on FC #5022 and FC #5122)

#5028 Service Processor Memory Expansion (64 MB available on FC #5021)

#5029 Service Processor Rack Mount Kit (for SP re-installation in the Controller Expansion FC #5023). FC #5029 may be required if rack mount equipment is not available. It contains:

- 2 brackets support and 1 plate for the Display Screen
- 2 brackets support for any kind of Service Processor (but 7585)
- 1 drawer kit for Keyboard/Mouse
- 1 plate for the Modem and Optical Disk Drive

#5051 Service Processor CD-ROM drive (Provides a CD-ROM frive for SP FC #5021)

#5052 Service Processor Type 2 (Type: 7585 with 96MB memory, 2GB HDD, Cd-ROM drive)

#5122 Network Node Processor Type 2 (Type: 7585)

Chapter 35. Customer Consoles and DCAF

PS/2 workstations can be used to remotely access the service processor. These workstations access the service processor MOSS-E and CCM using the Distributed Console Access Facility (DCAF), an IBM licensed program. DCAF allows the operator at a remote workstation to control the keyboard input and monitor the display output of the service processor.

The remote PS/2 workstation operates as a DCAF controlling workstation and the service processor as a DCAF target workstation. Once a connection is established between a controlling workstation and the service processor, the remote operator can perform MOSS-E and CCM functions as if seated in front of the service processor.

Notes:

1. Remotely controlling a service processor blocks the operation of its keyboard and mouse except for the DCAF hotkeys.

   Before concluding that the service processor is not working, make sure that it is not under the control of a DCAF remote console. Try the DCAF hotkeys (the default keys are ALT+T). Refer to the *IBM 3746 Nways MultiprotocolController Model 950 Models 900 and 950 User's Guide* or the *3745 All Models, 3746-900, Console Setup Guide, SA33-0158,* or the DCAF documentation for hotkey information.

2. Only one remote workstation can control the service processor at a time.
3. A remote workstation can be configured to have access to more than one service processor.
4. The service processor is shipped pre-configured as a DCAF target workstation.
5. DCAF is a separate product from the 3746 Nways Multiprotocol Controller. Installation of DCAF on a PS/2 (or equivalent) workstation is a customer responsibility.

Customer Consoles

There are five categories of customer remote consoles (PS/2 workstations). Figure 35-1 shows how these categories of consoles connect to the service processor.

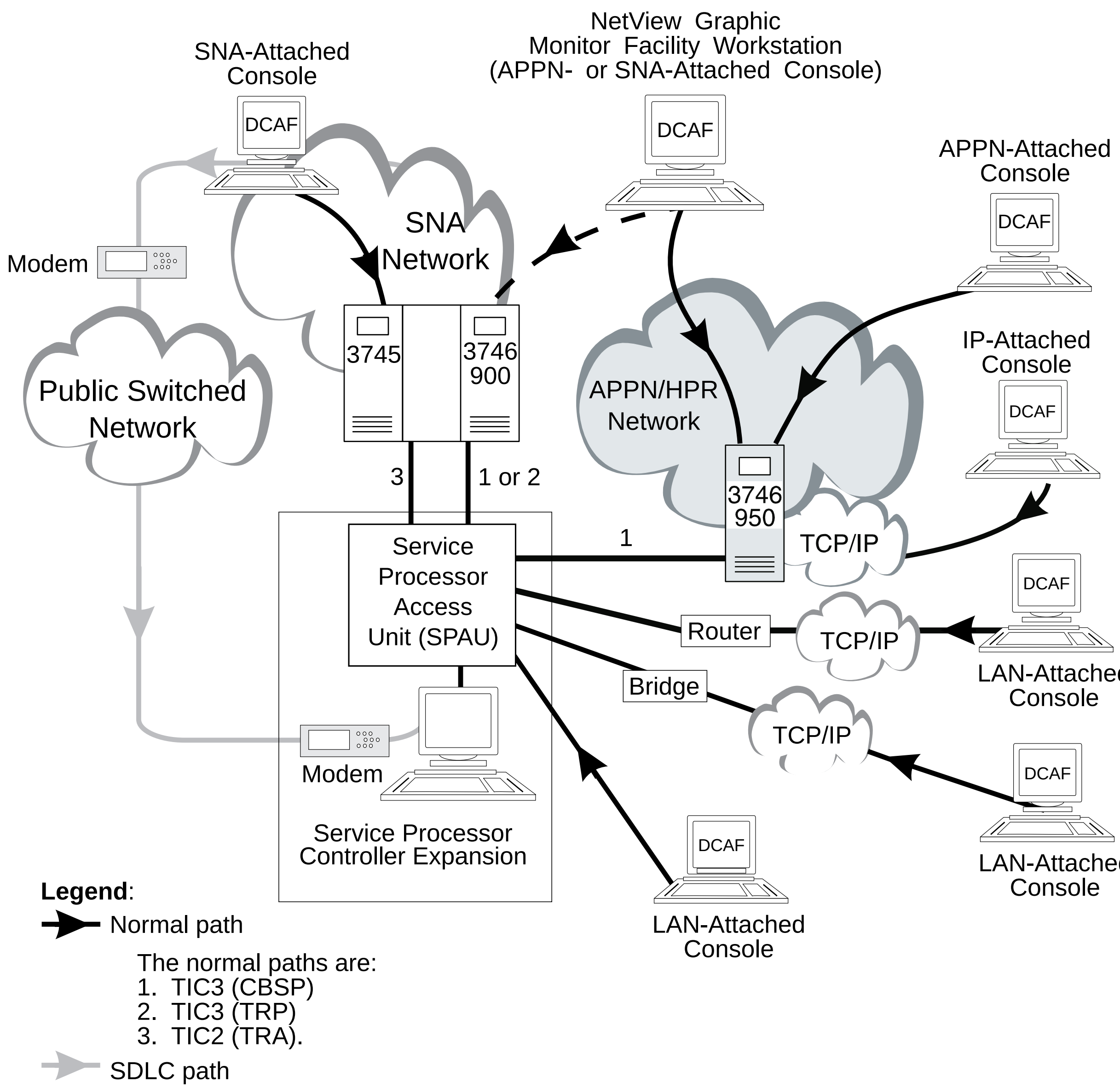


Figure 35-1. Console Attachments

The types of consoles are:

1. **LAN-attached**, which attach:
   - Directly to the same token-ring LAN as the service processor
   - Indirectly through LAN bridges to the service processor LAN.

   Communications Manager/2 or TCP/IP communications can be used.

   Service LAN Problems

   Service LAN Problems may disrupt 3746 Nways Multiprotocol Controller Operations. Refer to 34-7 for important information about token-ring LAN bridges and unplugged cables and stations on the service LAN.

2. **APPN/HPR-** or **SNA-attached**, which communicate with the service processor via an SNA LU 6.2 session over your APPN/HPR or SNA backbone.
3. **IP-attached**, the remote console communicates with the service processor via the DCAF for TCP/IP application.
4. **Modem-attached**, which use the analog switched telephone network to access the service processor via its SDLC port and modem. The service processor modem is normally used for the RSF connection. If the APPN/HPR or SNA path for the remote console is not available, a modem attached to the switched network would allow the remote console to access the service processor.

Sending an alert to NetView via service processor SDLC port[1] or calling RSF[2] has a higher priority for the MOSS-E than remote console sessions using the SDLC port of the service processor. This means that should either of these needs arise during a DCAF session, the remote workstation operator using a modem-attached console may be asked to end the remote session to free the service processor SDLC port. Refer to Chapter 36, “Connecting to the IBM Remote Support Facility.”

A remote console can be configured for all types of access. This way, a single console at a central control site could be LAN-attached to a local service processor while providing SNA, APPN/HPR, and modem access to other (remote) service processors.

The NetView Graphic Monitor Facility (NGMF) workstation (or any workstation running DCAF) can also use the public switched network to access the service processor if the path through the user network is not available.

---

1 Refer to “Alternate Path” on page 29-28.

2 Refer to Chapter 36, “Connecting to the IBM Remote Support Facility” on page 36-1.

Minimum Workstation Configuration

An overview of the system requirements for remote workstations is given in this section. For more complete information, see Chapter 2 of *DCAF: Installing and Using*, SH19-6838, which is shipped with the DCAF product.

Programming

You need the following minimum program levels in your workstations to remotely access the service processor in the:

Communications Manager environment:

- Distributed Console Access Facility, Version 1.3 with the corrective service diskette (CSD) UB20924
- IBM OS/2, Version 2.1 operating system
- Communications Manager/2, Version 1.11.

TCP/IP environment (for LAN-attached consoles):

- Distributed Console Access Facility, Version 1.3 with the corrective service diskette (CSD) UB20924
- IBM OS/2, Version 2.1 operating system
- TCI/IP for OS/2, Version 2.0 and the corrective service diskette (CSD).

Note: Subsequent releases of the above programs can be used unless otherwise stated.

Hardware

The remote workstations must be IBM PS/2s (with an 80386 microprocessor or better) or the equivalent. A hard disk of at least 80MB and at least 10MB of storage (RAM) is recommended. If you have other applications besides OS/2 and DCAF, you may need more hard disk space and storage. For input/output, the console must have:

- A VGA display such as an IBM 8515 color display or equivalent.
- A mouse.
- A QWERTY keyboard. If this keyboard is not available, then the QWERTY equivalent keys must be used. For example, on an AZERTY keyboard you must use the "q" key when you want to type an "a".

  To find the equivalent keys on an IBM non-QWERTY keyboard, refer to your OS/2 documentation for keyboard layouts or codes.
- For a LAN-attached console, an IBM Token-Ring Network Adapter/A operating at 16Mbps.
- For a modem-attached console, a synchronous modem (compatible with the service processor modem, such as the IBM 7855 or 7857 modem) and a serial port (compatible with the synchronous modem).

  To dial the service processor, the modem must either provide dialing capability (like the IBM 7855 and 7857) or be complemented with a telephone set.

  The characteristics of the service processor modem are provided on "Service Processor Modem" on page 34-4.

- For an APPN/HPR- or SNA-attached console, an IBM Token-Ring Network Adapter or a serial port with a synchronous modem.

Service Processor Parameters for DCAF

The following MOSS-E parameters should be supplied to the IBM service representative for installation of the service processor and will be used when customizing the service processor (refer to Appendix C, "Service Processor Customization" on page C-1). This information about the service processor is necessary for the DCAF controlling workstations to know how to find the service processor in your network. This information should be available at installation time even if you do not plan to use DCAF to remotely access the service processor. Having these parameters already defined in the service processor will save a service representative visit and possible interruption of MOSS-E if you should decide in the future to use DCAF.

For Consoles Using Communications Manager/2

For CM/2 consoles, supply the following parameters:

Local LU name

The DCAF target running in the service processor must be defined in the service processor as a local LU. One LU name is required for each type of remote console that you plan to use:

- LAN-attached
- APPN/HPR- or SNA/subarea-attached
- Modem-attached

Refer to "Customer Consoles" on page 35-2.

The LU names must be defined in the MOSS-E and be unique in the APPN/HPR or SNA/subarea network that contains the service processor.

This parameter value should be entered on the worksheet on page 38-6 for each type of remote console used. Your service representative will used this parameter when configuring your service processor (refer to Figure C-8 on page C-4).

In the DCAF controlling workstations, this LU name is used in the definitions of the partner LU. The LU name value is 1 to 8 characters long and can include:

- Upper case letters (A - Z)
- Digits (0 - 9), but it cannot start with a digit
- Dollar sign ($)
- At sign (@)
- Number sign (#)

Destination address

This address is used only for SNA and APPN consoles attached. Refer to Figure 35-1 on page 35-2, if the alert path to NetView is:

- **Not defined** or thru **SNA**:
  - The DCAF SNA can be set for path: 1, 2, 3, or 4
  - The DCAF APNN can be set for path: 4
- Defined thru **APPN**:

- The DCAF SNA can be set for path: 1, 2, 3, or 4 with RSAP different than the TIC3 RSAP defined for the NetView link (see Figure C-5 on page C-3)
- The DCAF APNN can be set for path: 4 with the same RSAP defined for the NetView link (see Figure C-5 on page C-3).

This parameter value should be entered on the worksheet on page 38-6 for SNA and APPN type of remote console. Your service representative will used this parameter when configuring your service processor (refer to Figure C-8 on page C-4). The remaining values in this section have been already defined elsewhere.

Network ID

Identifies the APPN/HPR or SNA network to which the service processor node is connected. Refer to the **Network ID** on page 34-9 or 34-10 and Figure C-5 on page C-3.

Local node name

This identifies the service processor in the network. Refer to the **Local node name** on page 34-9 or 34-10 and Figure C-5 on page C-3.

Network adapter address

This is the locally administered address (LAA) of the service processor token-ring adapter. Refer to the **Network adapter address** on page 34-8 and Figure C-5 on page C-3.

There are definitions required in VTAM and NCP for SNA/subarea-attached consoles. There are no VTAM or NCP definitions for LAN-attached and modem-attached consoles.

APPN/HPR-attached consoles must not be defined in VTAM or NCP.

For detailed information about DCAF definitions in the CM/2 of the controlling workstation, refer to the *IBM 3746 Nways Multiprotocol Controller Model 950 Models 900 and 950 User's Guide* or the *3745 All Models, 3746-900, Console Setup Guide, SA33-0158.*

For Consoles Using TCP/IP

If your workstation running DCAF uses the TCP/IP protocols to communicate with the target service processor over the service LAN, or your IP network, you need to define the IP address and subnet mask of the service processor (defined via the MOSS-E) in your remote consoles.

Refer to “Service LAN IP Addresses (MOSS-E)” on page 34-18 for details about IP address of the service processor and refer to Figure C-4 on page C-3.

For detailed information about DCAF definitions in TCP/IP of the controlling workstation, refer to the Refer to the *IBM 3746 Nways MultiprotocolController Model 950 Models 900 and 950 User's Guide* or the *3745 All Models, 3746-900, Console Setup Guide, SA33-0158*

DCAF Installation and Configuration

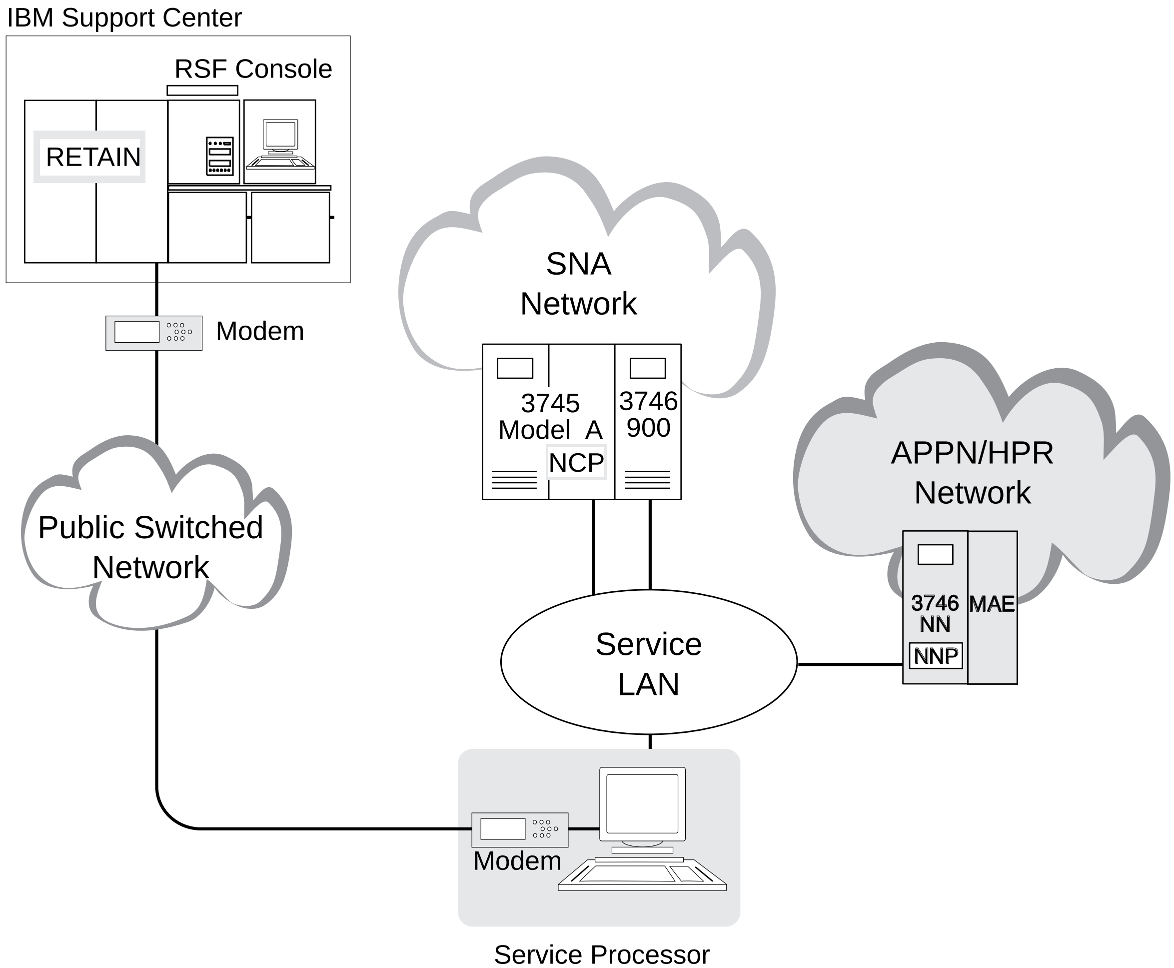
In the *IBM 3746 Nways MultiprotocolController Model 950 Models 900 and 950 User's Guide* or the *3745 All Models, 3746-900, Console Setup Guide, SA33-0158* there are procedures for:

- Installing DCAF and starting a DCAF controlling session with a service processor.
- Installing Communications Manager/2 and/or TCP/IP.
- Configuring customer consoles as one or more of the five types of DCAF controlling workstations:
  1. LAN-attached (APPC type)
  2. LAN-attached (TCP/IP type)
  3. APPN/HPR-attached
  4. SNA-attached
  5. Modem-attached

The diskette supplied with the *IBM 3746 Nways MultiprotocolController Model 950 Models 900 and 950 User's Guide* or the *3745 All Models, 3746-900, Console Setup Guide, SA33-0158* contains an example for each type of remote console attachment.

Chapter 36. Connecting to the IBM Remote Support Facility

The 3746 Nways Multiprotocol Controller service support is based on automatic problem reporting to and problem resolution from IBM RETAIN databases via the remote support facility (RSF).



Legend:

3746 NN A 3745/3746-900 with an NNP or a 3746-950
NNP Network Node Processor
MAE Multiaccess Enclosure

Figure 36-1. RSF Connections

When a critical problem is detected in the 3746 Nways Multiprotocol Controller (3746-900, 3746-950, network node processor, or service processor):

1. The system reference code (SRC) of the problem is recorded in a MOSS-E event log.
2. An alarm is displayed at the service processor.

3. If you are using the IBM RSF and its authorization has been enabled:

   a. An alert is sent to the NetView program informing the operator that the IBM RSF is being called.

   b. Problem and error data are automatically reported to RETAIN.

   c. A second alert is sent to the NetView program informing the NetView operator of the results of the call to RSF.

   d. If there are any microcode changes, they will be downloaded from RETAIN to the service processor hard disk. It may be possible that the new level of microcode could solve the problem.

   e. If further investigation is needed, the IBM support center can access the service processor from a remote console. If a hardware failure is suspected, an IBM service representative goes to your site with replacement parts.

The same sequence applies to problems detected in any 3745 or 3746-900 sharing the service processor with the 3746 Nways Multiprotocol Controller. The MOSS event log is used to store information about 3745 problems.

Note: If you have a 3746-900 attached to a 3745 Model A, confirm with your Customer Engineer that the 3746-900 has been registered separately on the RETAIN database. If it isn't, then a call from such a 3746-900 will fail.

If you have a problem not detected by the MOSS-E, you can manually report the problem to RETAIN using the MOSS-E **Report Problem Using Remote Support Facility** function in the Problem Management menu

Automatic Microcode Download

The microcode in the controller and the service processor may be updated by downloading microcode via the RSF link from the IBM RETAIN database. The microcode change levels (MCLs) are saved on the service processor hard disk in a temporary file and must be installed and activated before being operational.

If you are an RSF user, it is recommended that you select the automatic MCL download option to periodically receive the latest MCLs. The MOSS-E will automatically define the date and time of the download and will initiate the RSF connection when the day and time occur. The procedure for this option is explained in the *IBM 3745/3746-900 Connection and Integration Guide*, SA33-0129, or *IBM 3746-950 User's Guide*, SA33-0356.

If you do not use RSF, you will (at your request) receive MCLs on an optical disk. This may mean delays in the correct operation of your network, if MCLs are needed to solve microcode problems. Therefore, IBM strongly recommends the use of RSF to minimize any such delays.

Note: Automatic microcode download is only available if the RSF authorization has been enabled.

Parameter Definitions for RSF

These parameters should be recorded on the parameter worksheet on page 38-7. They are stored in the service processor for use by your IBM service representative, refer to Figure C-2 on page C-2 and Figure C-7 on page C-4.

Customer Information

This information is used by IBM RSF and RETAIN to call you if there is a controller problem.

Company name
The name of your organization, up to 35 characters in length.

Address
The address of your organization. You can use up to three lines of up to 35 characters each.

System location
The physical location of the 3746 Nways Multiprotocol Controller. You can use up to 35 characters in each line and up to two lines.

Contact person
The name of the person to contact at your central site responsible for activating and deactivating systems, and monitoring system problems. Enter up to 30 characters.

The following two telephone numbers can be up to 34 characters long. Include your area code in the telephone number that you specify.

Company telephone number for voice communications
The telephone number that you want IBM to use in normal situations. Use a telephone number other than the service processor modem telephone number.

Company service telephone number for RSF modem communications
The telephone number of the modem attached to the service processor SDLC port.

RSF Authorization

Remote support facility authorization

Enable This is necessary to allow automatic RSF calls by the MOSS-E.

Disable Default value. This prevents the 3746 Nways Multiprotocol Controller from calling RSF; the operator must call IBM to report any problems detected by the 3746 Nways Multiprotocol Controller.

Automatic/Microcode Download Option

This option is only available if the preceding RSF authorization value is set to ENABLE.

Set Automatic Microcode Download Option

Yes This allows periodic downloading from RETAIN via the RSF of any new MCLs that might be available from RETAIN.

No Default value. This prevents automatic MCL downloads.

RSF Modem

The modem attached to the service processor is used:

- Primarily to provide the RSF connection to the IBM support center.

  and also for:

- Remote console access
- Sending alerts to the NetView program (alternate path).

For the characteristics of the modem used for RSF (and RETAIN), refer to “Service Processor Modem” on page 34-4.

Chapter 37. Performance Management with NetView Performance Monitor

This chapter describes the 3746 support of the NetView Performance Monitor (NPM) and the migration of performance monitoring using NPM from an SNA environment to an APPN/HPR environment. It assumes you are familiar with the NPM.

The Need for Performance Monitoring

Performance monitoring consists of three basic tasks:

- Collecting data as the events being monitored are happening.
- Sending the data collected to a central point.
- Analyzing the data to give the required picture of present performance against either:
  - A past situation
  - An ideal attainable situation

The purpose of analysis depends on the requirement for monitoring. It could be:

- To offer the best throughput for the cost of the network
- Real-time traffic management
- Accounting and charging purposes

Whatever the purpose, performance monitoring is a combination of host and 3746 Nways Multiprotocol Controller activities.

Present Performance Monitoring on SNA Networks

The Network Performance Application (NPA) in the NCP collects performance and accounting data from the 3745, and 3746 adapters that are under NCP control. Referring to Figure 37-1 on page 37-2, the present mix of activities is:

1. Individual DLCs (SDLC, channel CDLC, token-ring 802.2, frame relay, X.25, and ISDN) collect data according to keywords chosen at NCP generation time. The DLCs have algorithms onboard to watch data flowing through them and to collect the required information. Only that information chosen at generation time can be collected.
2. The task running in the NCP that controls the DLCs, NPA (Network Performance Application) gathers data from the DLCs. This is running in an LU0-PU2.0 session.
3. The NPA in NCP has a LU0 logical unit called the NPALU. This is connected to the NPM running in the host via an LU-LU session.
4. The NPALU is connected either over a subarea path, or over an APPN path to the host NPM. Figure 37-2 on page 37-3 shows these paths.
5. NPM receives the data from all the NPAs and displays or prints the required analysis.

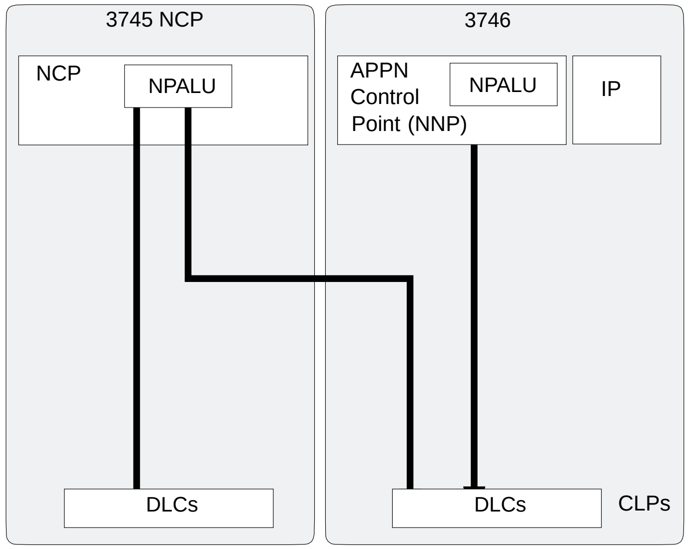


Figure 37-1. NPM Data Collection

Migrating to APPN/HPR Performance Monitoring

Under APPN/HPR there is a more dynamic situation, which allows you to do the following:

- Define the data you want to collect using the CCM. The definitions are held in the Network Definition File (NDF).
- A DLUR/DLUS connection must be established to a VTAM that has subarea connectivity to the NPM that will collect the data (this VTAM must be V4R2 or above). The DLUR/DLUS session is needed to transport the LU0 session between the NPALU and NPM over the APPN network.
- Refer to “Definitions for Performance Monitoring on APPN/HPR” on page 30-5 for details of the definitions needed in the CCM and VTAM.

Once you have set up the collection environment, you can collect and analyze performance data:

1. Individual DLCs (SDLC, ESCON, CDLC, 802.2, frame relay, and X.25) collect data according to keywords defined in the CCM. Only that information defined in the NDF by the CCM can be collected.
2. NPA, running under the 3746 APPN/HPR control point gathers data from the DLCs.
3. NPA transfers the data to NPM via the NPALU (LU0), this LU is supported by CM/2 running on the NNP.
4. NPM receives the data from all the NPAs and displays or prints the required analysis.

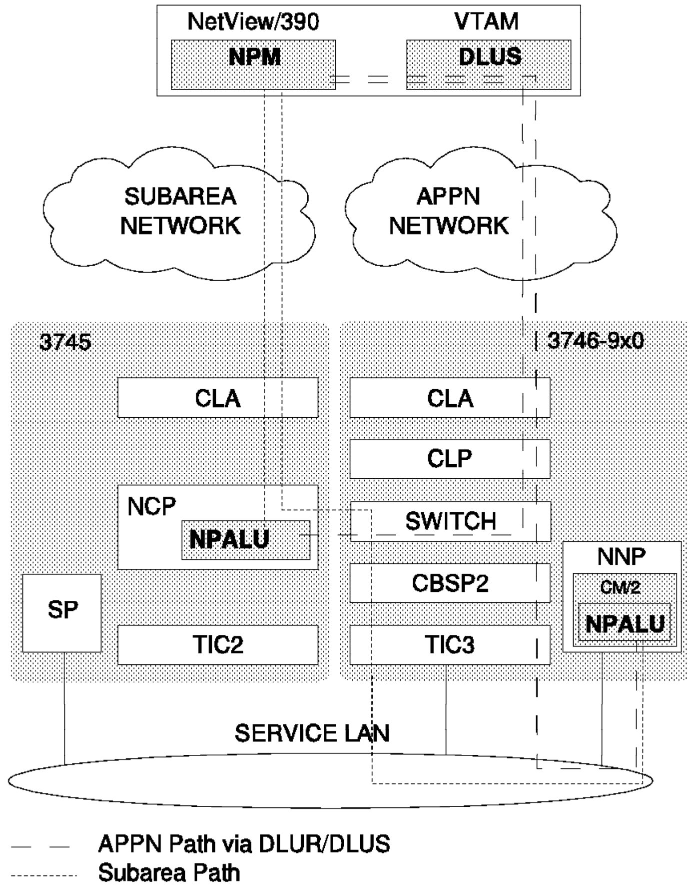


Figure 37-2. APPN/HPR Performance Monitoring Activities (3746 NN)

Note: Figure 37-2 shows NPM data being transmitted from the NNP over the service LAN to the 3746 or 3745. Although it is recommended that no stations use the service LAN for user data, using a path over the service LAN and PORT2080 for NPM data is acceptable.

Data Collected for the NetView Performance Monitor

No data is collected and sent to the NetView Performance Monitor (NPM) for an MAE resource.

Performance monitoring data

The 3746-900 and 3746-950 provide the NetView Performance Monitor (NPM) with many performance monitoring records, no matter how they are reported (through a 3746-900 via the NCP or NNP or through a 3746-950 via the NNP). The contents of these records depend on which resource is monitored.

Note that for a given resource, a 3746-900 equipped with an NNP can forward the reports using both the NCP and the NNP if the resource is shared by both control points, and defined as NPA-eligible in both configurations.

- **Processor utilization**

  The following data is provided for each processor of the 3746-9x0:

– Processor type :

x'51' CBTRP : Controller Bus and Token-Ring Processor. The CBTRP is a TRP equipped with a CBC in place of a TIC3 for attachment to the 3745 CCU B.

x'52' CLP : Communication Line Processor

x'53' ESCP : ESCON Processor

x'54' TRP : Token-Ring Processor

x'55' CBSP : Controller Bus and Service Processor

– Processor utilization (in percentage from 0 to 100)

– Buffer storage utilization (SDS), i.e. percentage of buffer storage in use

– Program storage utilization (PDS), i.e. percentage of program storage in use

For a 3746-900, NCP adds information about the 3745 CCU and buffer utilization to the above-mentioned data. Of course the corresponding fields are meaningless for a 3746-950.

Since a resource name is required to reference the processor utilization record, the NCP name is used for a 3746-900 and the network node name for a 3746-950.

Note: Monitoring of processor utilization requires the engineering change D46130I for a 3746-950.

- **ESCON physical link**

  The following counters are provided to the NPM:

  – I-frames sent
  – I-frames received
  – Bytes sent
  – Bytes received
  – Retransmitted I-frames
  – Retransmitted bytes
  – Total error count
  – Outbound queue length
  – Total poll count
  – Positive poll count
  – When one or more ESCON stations work in HPR mode, the following counters are also provided for the global HPR traffic flowing over the optical link:

    - HPR frames sent
    - HPR frames received
    - HPR bytes sent
    - HPR bytes received
    - HPR bytes queued for transmission
    - Transmit HPR frames discarded for exceeding the transmit queue threshold
    - Received HPR frames discarded due to congestion in this node

- **ESCON station**

  The following counters are provided to the NPM for each ESCON station, i.e. for each VTAM linked to the 3746-9x0:

  – I-frames sent
  – I-frames received
  – Bytes sent

  - Bytes received
  - Retransmitted I-frames
  - Retransmitted bytes
  - Total error count
  - Outbound queue length
  - Total poll count
  - Positive poll count
  - The following counters are also provided for the HPR traffic flowing to/from the station, when it works in HPR mode:
    - HPR frames sent
    - HPR frames received
    - HPR bytes sent
    - HPR bytes received
    - HPR bytes queued for transmission
    - Transmit HPR frames discarded for exceeding the transmit queue threshold
    - Received HPR frames discarded due to congestion in this node

- **SDLC physical link**

  The following counters are provided to the NPM:

  - I-frames sent
  - I-frames received
  - Bytes sent
  - Bytes received
  - Retransmitted I-frames
  - Retransmitted bytes
  - Total error count
  - Outbound queue length
  - Total poll count
  - Positive poll count
  - When one or more SDLC stations work in HPR mode, the following counters are also provided for the global HPR traffic:
    - HPR frames sent
    - HPR frames received
    - HPR bytes sent
    - HPR bytes received
    - HPR bytes queued for transmission
    - Transmit HPR frames discarded for exceeding the transmit queue threshold
    - Received HPR frames discarded due to congestion in this node

- **SDLC station**

  The following counters are provided to the NPM for each SDLC station:

  - I-frames sent
  - I-frames received
  - Bytes sent
  - Bytes received
  - Retransmitted I-frames
  - Retransmitted bytes
  - Total error count
  - Outbound queue length
  - Total poll count

- Positive poll count
- The following counters are also provided for the HPR traffic flowing to/from the station, when it works in HPR mode:
  - HPR frames sent
  - HPR frames received
  - HPR bytes sent
  - HPR bytes received
  - HPR bytes queued for transmission
  - Transmit HPR frames discarded for exceeding the transmit queue threshold
  - Received HPR frames discarded due to congestion in this node

- **Token-ring physical link**

  The following counters are provided to the NPM:

  - Wrongly addressed frames received
  - Total frames sent
  - Total frames received
  - Total frames re-transmitted
  - Total bytes sent
  - Total bytes received
  - Total bytes re-transmitted
  - I-frames sent
  - I-frames received
  - I-frames discarded
  - Unrecognized frames
  - Reply timeouts
  - TIC processing time for each frame received
  - TIC processing time for each frame sent
  - TIC processing time for each byte received
  - TIC processing time for each byte sent
  - When one or more TR stations work in HPR mode, the following counters are also provided for the global HPR traffic flowing over the token ring:
    - HPR frames sent
    - HPR frames received
    - HPR bytes sent
    - HPR bytes received
    - HPR bytes queued for transmission
    - Transmit HPR frames discarded for exceeding the transmit queue threshold
    - Received HPR frames discarded due to congestion in this node

  Note: All the token ring counters apply also to the service processor LAN attached to the CBSP.

- **Token-ring external user**

  The following counters are provided to the NPM for each token ring external user, i.e. for each SAP (service access point) used by the token ring:

  - Discarded frames
  - Total connections
  - UI frames sent
  - UI frames received
  - Reply timeouts

Note: All the token-ring counters also apply to the service processor LAN attached to the CBSP.

- **Token-ring station**

  The following counters are provided to the NPM for each token ring station:

  – Total frames sent
  – Total frames received
  – Total frames re-transmitted
  – Total bytes sent
  – Total bytes received
  – Total bytes re-transmitted
  – I-frames sent
  – I-frames received
  – Local busy occurrences
  – Total frames transmitted and discarded
  – Total frames received and discarded
  – Reply timeouts
  – Timer
  – The following counters are also provided for the HPR traffic flowing to/from the station, when it works in HPR mode:

    - HPR frames sent
    - HPR frames received
    - HPR bytes sent
    - HPR bytes received
    - HPR bytes queued for transmission
    - Transmit HPR frames discarded for exceeding the transmit queue threshold
    - Received HPR frames discarded due to congestion in this node

  Note: All the token ring counters apply also to the service processor LAN attached to the CBSP.

- **Frame-relay physical line**

  The following counters are provided to the NPM:

  – I-frames sent
  – I-frames received
  – Total bytes sent
  – Total bytes received
  – Retransmitted I-frames
  – Retransmitted bytes
  – Total frames sent
  – Total frames received
  – Number of active logical connections
  – Number of frames with forward congestion indication
  – Number of frames with backward congestion indication
  – Number of frames discarded

- **Frame-relay FRTE**

  The following counters are provided to the NPM for each frame relay logical link (DLCI) defined as a FRTE (Frame Relay Terminal Equipment) :

  – I-frames sent
  – I-frames received
  – Total bytes sent

- Total bytes received
- Retransmitted I-frames
- Retransmitted bytes
- Outbound queue length
- Total frames sent
- Total frames received
- Number of reply (TI) timeouts
- Number of frames with forward congestion indication
- Number of frames with backward congestion indication
- The following counters are also provided for the HPR traffic flowing to and from the FRTH logical link, when it works in HPR mode:
  - HPR frames sent
  - HPR frames received
  - HPR bytes sent
  - HPR bytes received
  - HPR bytes queued for transmission
  - Transmit HPR frames discarded for exceeding the transmit queue threshold
  - Received HPR frames discarded due to congestion in this node

- **Frame-relay FRFH**

  The following counters are provided to the NPM for each frame relay DLCI (PU) defined as a FRFH (Frame Relay Frame Handler, which provides switching of a frame relay DLCI) :

  - Total bytes sent
  - Total bytes received
  - Outbound queue length
  - Total frames sent
  - Total frames received
  - Number of frames with forward congestion indication
  - Number of frames with backward congestion indication
  - Number of frames discarded

- **Frame-relay LMI PU**

  The following counters are provided to the NPM for the LMI PU (one LMI PU per physical FR line):

  - Total bytes sent
  - Total bytes received
  - Total frames sent
  - Total frames received
  - Number of frames discarded

- **X.25 physical line**

  The following counters are provided to the NPM:

  - I-frames sent
  - I-frames received
  - Total bytes sent
  - Total bytes received
  - Retransmitted I-frames
  - Retransmitted bytes
  - Outbound queue length
  - Total RNR (Receive Not Ready) frames sent

- Total RNR frames received
- Total RR (Receive Ready) frames sent
- Total RR frames received

- **X.25 physical PU**

  The following counters are provided to the NPM for the X.25 physical PU (one physical PU per physical X.25 line):

  - Total data packets sent
  - Total data packets received
  - Total RNR packets sent
  - Total RNR packets received
  - Current number of VCs (virtual circuits)
  - New VCs established during this interval
  - Total number of call request packets (outbound connections)
  - Total number of incoming call packets (inbound connections)
  - Total number of clear request packets (outbound disconnections)
  - Total number of clear indication packets (inbound disconnections)

- **X.25 Virtual Channel**

  The following counters are provided to the NPM for each X.25 virtual circuit (VC), i.e. each logical station:

  - Total bytes sent
  - Total bytes received
  - Total data packets sent
  - Total data packets received
  - Data packets sent with delivery confirmation bit (D-bit) ON
  - Data packets received with delivery confirmation bit (D-bit) ON
  - Data packets sent with more data bit (M-bit) ON
  - Data packets received with more data bit (M-bit) ON
  - The following counters are also provided for the HPR traffic flowing over the VC, when it works in HPR mode:
    - HPR frames sent
    - HPR frames received
    - HPR bytes sent
    - HPR bytes received

- **Point-to-Point Protocol**

  There is no NPM performance monitoring for a line or station running the Point-to-Point Protocol (PPP).

- **ISDN**

  There is no performance monitoring for an ISDN D-channel of LIC16, because traffic on this channel is not high enough to require performance monitoring.

  For an ISDN B-channel line, the same performance monitoring counters as for a physical frame relay line are reported to the NPM, since this channel runs the frame relay protocol.

  For a logical ISDN line, the same performance monitoring counters as for a logical frame-relay line (FRTE) are reported to the NPM, since this channel runs the frame relay protocol.

  Note: ISDN performance monitoring requires the feature code 5800.

Accounting data

Accounting reports can be used:

- To check the network charges.

  In this case, remember that the way the network performs billing may be slightly different from the way the 3746-9x0 builds the accounting reports. So the checking can only be rough. The 3746-9x0 accounting reports can never be considered as a reference.

- To get detailed statistics data for each call.

  As an example, accounting allows to compute the percentage of calls abnormally cleared by the network or remote equipment.

Accounting data is reported to the NPM only for X.25 and ISDN protocols. The latter does not apply to a 3746-950, since ISDN (LIC16) can flow only NCP traffic. X.25 accounting applies to a 3746-900 and 3746-950.

Accounting data is reported on behalf of an X.25 physical line or ISDN D-channel (PU) resource.

Note: X.25 accounting requires the engineering change D46130I for a 3746-950. ISDN accounting requires the feature code 5800.

- **X.25 accounting**

  There are four types of accounting report:

  – **START accounting report**

    This report is generated at SVC setup time (when the call connected packet is received or call accepted packet is sent) or PVC activation.

    This report contains:

    - Product identifier (x'03' for X.25 in 3746-9x0)
    - Sequence number
    - Logical channel number
    - Called DTE address
    - Calling DTE address
    - Time stamp
    - Local address, configured through CCM or NCP (NPADTEAD operand) and preceded by x'99' (format not interpreted).
    - LLC description (x'02' for an APPN or SNA peripheral connection, x'03' for a subarea connection)
    - Report type :

      b'1001 000x' Incoming call
      b'1010 000x' Outgoing call
      b'10xx 0000' PVC
      b'10xx 0001' SVC

    - Local access attribute :

      b'0001 0001' Direct access (DTE to DTE)
      b'0001 0011' Access to an X.25 network

    - Facilities :

      b'0000 000x' ICRD (Internetwork Call Redirection or Deflection) status not selected

b'0001 000x'	ICRD status allowed
b'0010 000x'	ICRD status not allowed
b'00xx 0000'	Call not reverse charged
b'00xx 0001'	Call reverse charged

- Window sizes (in and out)
- Call user data (for SVC only). Only the first byte of the CUD field is given.

– **END accounting report**

This report is generated at SVC clearing time (when the clear request packet is sent or clear indication packet is received) or PVC deactivation.

This report contains:

- Product identifier (x'03' for X.25 in 3746-9x0)
- Sequence number
- Logical channel number
- Time stamp
- Local address, configured through CCM or NCP (NPADTEAD operand) and preceded by x'99' (format not interpreted).
- LLC description
  Refer to the START accounting report
- Clearing cause code
- Report type
  Refer to the START accounting report
- Local access attribute
  Refer to the START accounting report
- Number of data segments received
- Number of data segments sent
- Number of data bytes sent
- Number of data bytes received
- Number of DTE-originated reset packets (sent and received)
- Number of interrupt packets (sent and received)
- Clear diagnostic code

– **STARTEND accounting report**

This report is generated when a call is rejected, i.e. a call request or an incoming call is responded with a clear.

- Product identifier (x'03' for X.25 in 3746-9x0)
- Sequence number
- Logical channel number
- Called DTE address
- Calling DTE address
- Time stamp
- Local address, configured through CCM or NCP (NPADTEAD operand) and preceded by x'99' (format not interpreted).
- LLC description
  Refer to the START accounting report
- Clearing cause code
- Report type
  Refer to the START accounting report
- Local access attribute
  Refer to the START accounting report
- Facilities

Refer to the START accounting report
- Window sizes (in and out)
- Call user data (for SVC only). Only the first byte of the CUD field is given.
- Clear diagnostic code

– **INTERMEDIATE accounting report**

This report is generated either when an accounting counter threshold is reached (unsolicited report) or when the NPM operator requests it (solicited report).

- Product identifier (x'03' for X.25 in 3746-9x0)
- Sequence number
- Logical channel number
- Time stamp
- Local address, configured through CCM or NCP (NPADTEAD operand) and preceded by x'99' (format not interpreted).
- LLC description
  Refer to the START accounting report
- Report type
  Refer to the START accounting report
- Local access attribute
  Refer to the START accounting report
- Number of data segments received
- Number of data segments sent
- Number of data bytes sent
- Number of data bytes received
- Number of DTE-originated reset packets (sent and received)
- Number of interrupt packets (sent and received)

Accounting data for X.25 is put within the control vector 81 (CV81).

Note: There is no accounting report when the X.25 virtual circuit flows IP traffic.

• **ISDN accounting**

There are only three types of accounting report for ISDN. The intermediate accounting report does not exist because this type of report would normally be sent:

– When an accounting counter overflows (unsolicited report). But there is no accounting counter for ISDN, because ISDN charges are not based on data volume.

– When solicited by the NPM operator. But in this case the report would be empty (only the time stamp), since there is no counter in the report.

The types of accounting report are:

– **START accounting report**

This report is generated at set up time, i.e. when the connect message is sent or received.

This report contains:

- Sequence number
- Report type :

b'1x00 0000' Outgoing call

b'0x00 0000'	Incoming call
b'x100 0000'	Backup call
b'x000 0000'	Call on demand

- Call reference
  Refer to the note.
- Time stamp
- Called party number length
- TON/NPI sub-field of the called party number (TON: Type Of Numbering, NPI: Numbering Plan Identification)

b'0000 xxxx'	Unknown
b'0001 xxxx'	International number
b'0010 xxxx'	National number
b'0011 xxxx'	Network specific number
b'0100 xxxx'	Subscriber number
b'0xxx 0000'	Unknown numbering plan
b'0xxx 0001'	ISDN/Telephony numbering plan (E.164)
b'0xxx 1000'	National standard numbering plan
b'0xxx 1001'	Private numbering plan

- Digits of the called party number (in IA5 format, similar to ASCII)
- Calling party number length
- TON/NPI sub-field of the calling party number (TON: Type Of Numbering, NPI: Numbering Plan Identification)
  Refer to the called party number
- Digits of the calling party number (in IA5 format, similar to ASCII)
- Called party sub-address length
- Type of the called party sub-address

b'0000 0000'	NSAP (Network Service Access Point) Specified in ITU-T recommendation X.213 or ISO standard 8348 Addendum 2.
b'0010 x000'	User specified
b'0010 0000'	The user specified sub-address contains an even number of digits
b'0010 1000'	The user specified sub-address contains an odd number of digits

- Called party sub-address information
- Calling party sub-address length
- Type of the calling party sub-address
  Refer to the called party sub-address
- Calling party sub-address information

– **END accounting report**

  This report is generated at call clearing time, i.e. when the first clearing message (disconnect, release or release complete message) is sent or received.

  This report contains:

  - Sequence number
  - Report type :
    Refer to the START accounting report
  - Call reference
    Refer to the note.
  - Clearing location :

b'0000 0000'	Remote terminal equipment (TE)
b'0000 0001'	Private network serving the local user
b'0000 0010'	Public network serving the local user
b'0000 0011'	Transit network
b'0000 0100'	Public network serving the remote user
b'0000 0101'	Private network serving the remote user
b'0000 0111'	International network
b'0000 1010'	Network beyond internetworking point
b'0000 1111'	Local terminal equipment (TE) (this 3746-900)

- Clearing cause value
  Specified in ITU-T recommendation Q.850
- Time stamp

– **STARTEND accounting report**

This report is generated when a call is rejected, i.e. a clearing message (disconnect, release or release complete message) responds to a call setup (no connect message was sent or received).

This report contains:

- Sequence number
- Report type :
  Refer to the START accounting report
- Call reference
  Refer to the note.
- Clearing location
  Refer to the END accounting report
- Clearing cause value
  Specified in ITU-T recommendation Q.850
- Time stamp
- Called party number length
- TON/NPI sub-field of the called party number (TON: Type Of Numbering, NPI: Numbering Plan Identification)
  Refer to the START accounting report
- Digits of the called party number (in IA5 format, similar to ASCII)
- Calling party number length
- TON/NPI sub-field of the calling party number (TON: Type Of Numbering, NPI: Numbering Plan Identification)
  Refer to the START accounting report
- Digits of the calling party number (in IA5 format, similar to ASCII)
- Called party sub-address length
- Type of the called party sub-address
  Refer to the START accounting report
- Called party sub-address information
- Calling party sub-address length
- Type of the calling party sub-address
  Refer to the START accounting report
- Calling party sub-address information

Accounting data for ISDN are put within the control vector 83 (CV83).

Note: To correlate the START and END accounting reports for the same call for:

- X.25

  It is performed through the logical channel number.

- ISDN

  It is performed through both the call reference (2 bytes) and call direction, because the call reference is significant only for one call direction (incoming or outgoing).

  The call reference is the one sent or received in each ISDN message. However the call reference flag (position X'8000'), which indicates the initiator of the call, has been removed for easier correlation between start and end reports.

List of Abbreviations

AB	area border
ACF	Advanced Communications Function
ACF/VTAM	Advanced Communications Function for the Virtual Telecommunications Access Method
ANR	automatic network routing
APPN	advanced peer-to-peer networking
ARB	adaptive rate-based flow/congestion control
ARC	active remote connector
ARP	address resolution protocol
AS	autonomous system
ASB	autonomous system border
ASE	autonomous system external
ASCII	American National Standard Code for Information Interchange
AUTO	automatic
BECN	backward explicit congestion notification
BER	box event record
BGP	border gateway protocol
BOOTP	bootstrap protocol
bps	bits per second
BRS	bandwidth reservation system
BSC	binary synchronous communication
C&SM	communications and system management
CBSP	control bus and service processor
CCITT	Comité Consultative International Télégraphique et Téléphonique The International Telegraph and Telephone Consultative Committee
CCU	central control unit
CD	carrier detector
CDF-E	configuration data file - extended
CE	customer engineer
CF3745	3745 and 3746 Configurator and Performance Model
CHPID	channel path id
CIDR	classless inter-domain routing
CIR	committed information rate
CLIST	command list
CLA	communication line adapter
CLP	communication line processor
CM	Communications Manager
CNN	composite network node
CNM	communication network management
COS	cost of service
CP	control point
CR	communications rate
CSU	customer service unit
DCAF	Distributed Console Access Facility
DCE	data circuit-terminating equipment
DDS	digital data service
DE	discard eligibility
DLC	data link control
DLCI	data link connection identifier
DLUR	dependent LU requester
DLUS	dependent LU server
DMUX	double multiplex circuit
DSU	data service unit
DTE	data terminal equipment
DX	duplex
EBCDIC	extended binary-coded decimal interchange code
EBN	extended border node
EC	engineering change
EMIF	ESCON Multiple image Facility
EN	end node
EP	emulation program
EPO	emergency power OFF
ESCA	ESCON channel adapter
ESCC	ESCON channel coupler
ESCD	ESCON Director
ESCON	Enterprise Systems Connection
ESCP	ESCON processor
FDX	full duplex
FECN	forward explicit congestion notification
FRFH	frame relay frame handler
FRSE	frame relay switching equipment
FRTE	frame relay terminating equipment

HCD	Hardware Configuration Definition
HDX	half duplex
HI	high
HLA	host link address
HONE	Hands-On Network Environment
HPR	high performance routing
ICMP	internet control message protocol
IML	initial microcode load
INN	intermediate network node or
	IBM Information Network
IOCP	Input/Output Configuration Program
IP	internet, or internetwork, protocol
IPL	initial program load
IPR	Installation Planning Representative
ITU-T	International Telecommunications Union - Telecommunications (ex-CCITT)
KB	kilobyte (processor storage) 1KB = 2^{10} bytes (1 024 bytes)
Kbps	kilobits bits per second (speed or communication volume per second) 1Kbps = 1 000 (one thousand) bits per second
LAA	locally administered address
LAN	local area network
LCB	line connection box
LCBB	line connection box base
LCBE	line connection box expansion
LCP	link control protocol
LDM	limited distance modem
LED	light emitting diode
LIB n	line interface board type n
LIC n	line interface coupler type n
LSA	link state advertisement
LIU n	line interface coupler unit type n
LIV	link integrity verification
LMI	local management interface
LPAR	logical partition
LPDA	Link Problem Determination Aid
LQ	line quality
LU	logical unit
MAC	medium access control
MAU	medium attachment unit
MB	megabyte (processor storage) 1MB = 2^{20} bytes (1 048 576 bytes)
Mbps	megabits per second (speed or communication volume per second) 1Mbps = 1 000 000 (one million) bits per second
MCL	microcode change level
MES	miscellaneous equipment specification
MIB	management information base
MIH	missing interrupt handler
MLC	machine level control
MLTG	multi-link transmission group
MOSS-E	maintenance and operator subsystem - extended
MTP	multipoint
MUX	multiplex circuit
MVS	multiple virtual storage
NAU	network addressable unit
NMBA	nonbroadcast multiaccess
NCP	Network Control Program
NDRS	non-disruptive route switching
NGMF	NetView Graphic Monitor Facility
NN	network node
NNP	network node processor
NPM	NetView Performance Monitor
NRZI	non-return-to-zero inverted
NVT	network virtual terminal
ODLC	outboard data link control
OSPF	open shortest path first
PBN	peripheral border node
PCI	Peripheral component interconnect
PEP	partitioned emulation program
PING	packet internet groper
PN	peripheral node
PPP	point-to-point protocol
PPPNCP	point-to-point network control protocol
PTP	point-to-point
PTT	post, telegraph, and telephone
PU	physical unit
PVC	permanent virtual circuit
QUAL	quality
RCV	receive clock

RETAIN	Remote Technical Assistance Information Network
RFS	ready for sending
RIP	routing information protocol
ROS	read-only storage
RSF	remote support facility
RTP	rapid transport protocol
RTS	request to send
SDLC	Synchronous Data Link Control
SMUX	single multiplex circuit
SNBU	switched network backup
SNI	SNA network interconnection
SNMP	simple network management protocol
SPAU	service processor access unit
SRC	service reference code
S/S	start-stop
SVC	switched virtual circuit
TC	test control
TCM	Trellis code modulation
TCP	transmission control protocol
TG	transmission group
THRES	threshold
TICn	token-ring interface coupler type n
TIM	Time Services
TOS	type of service
TPF	Transaction Processing Facility
TRA	token-ring adapter
TRP	token-ring processor
UDP	user datagram protocol
UTP	unshielded twisted pair
VTAM	Virtual Telecommunications Access Method
XID	exchange station identification
XMIT	transmit

Glossary

This glossary defines new terms used in this manual. It also includes terms and definitions from the *IBM Dictionary of Computing,* SC20-1699.

adaptive rate-based flow and congestion control (ARB). A function of High Performance Routing (HPR) that regulates the flow of data over an RTP connection by adaptively changing the sender's rate based on feedback on the receiver's rate. It allows high link utilization and prevents congestion before it occurs, rather than recovering after congestion has occurred.

Advanced Communication Function (ACF). A group of IBM licensed programs. principally VTAM programs. TCAM*, NCP, and SSP, that use the concepts of Systems Network Architecture (SNA), including distribution of function and resource sharing.

Advanced Communications Function for the Virtual Telecommunications Access Method (ACF/VTAM). An IBM licensed program that controls communication and the flow of data in an SNA network. It provides single-domain, multiple-domain, and interconnected network capability.

advanced peer-to-peer networking (APPN). Data communications support that routes data in a network between two or more advanced program-to-program communications (APPC) systems that do not need to be adjacent.

automatic network routing. A function of High Performance Routing (HPR) that is provides a low-level routing mechanism that requires no intermediate storage.

channel adapter (CA). A communication controller hardware unit used to attach the controller to a host processor.

communication controller. A device that directs the transmission of data over the data links of a network; its operation may be controlled by a program executed in a processor to which the controller is connected or it may be controlled by a program executed within the device. For example, the IBM 3745 and 3746 Nways Multiprotocol Controllers.

communications manager. A function of the OS/2 Extended Edition program that lets a workstation connect to a host computer and use the host resources as well as the resources of the other personal computers to which the workstation is attached, either directly or through a host system. The communications manager provides application programming interfaces (APIs) so that users and develop their own applications.

configuration data file - extended (CDF-E). A 3746 Nways Multiprotocol Controller MOSS-E file that contains a description of all the hardware features (presence, type, address, and characteristics).

communications management configuration host node. The type 5 host processor in a communications management configuration that does all network-control functions in the network except for the control of devices channel-attached to a data host nodes. Synonymous with communications management host. See also data host node.

control panel. A panel that contains switches and indicators for the customer's operator and service personnel.

control program. A computer program designed to schedule and to supervise the execution of programs of the controller.

control subsystem. The part of the controller that stores and executes the control program, and monitors the data transfers over the channel and transmission interfaces.

Customer Engineer. See IBM service representative

data circuit-terminating equipment (DCE). The equipment installed at the user's premises that provides all the functions required to establish, maintain, and terminate a connection, and the signal conversion between the data terminal equipment (DTE) and the line. For example, a modem is a DCE.

Note: The DCE may be a stand-alone equipment or integrated in the 3745.

data terminal equipment (DTE). That part of a data station that serves as a data source, data link , or both, and provides for the data communication control function according to protocols. For example, the 3174 and PS/2s are DTEs.

data host node. In a communication management configuration, a type 5 host node that is dedicated to processing applications and does not control network resources, except for its channel adapter-attached or communication adapter-attached devices. Synonymous with data host. See also communications management configuration host node.

direct attachment. The attachment of a DTE to another DTE without a DCE.

ESCON channel. A channel having an Enterprise System Connection* channel-to-control-unit I/O interface that uses optical cables as a transmission medium.

ESCON channel adapter (ESCA). A communication controller hardware unit used to attach the controller to a host via ESCON fiber optics. An ESCA consists of an ESCON channel processor (ESCP) and an ESCON channel coupler (ESCC).

ESCON channel coupler (ESCC). A communication controller hardware unit which is the interface between the ESCON channel processor and the ESCON fiber optic cable.

ESCON channel processor (ESCP). A communication controller hardware unit which provides the channel data link control for the ESCON channel adapter.

Distributed Console Access Facility. (1) This program product provides a remote console function that allows a user at one programmable workstation (PS/2) to remotely control the keyboard input and monitor the display of output of another programmable workstation. The DCAF program does not affect the application programs that are running on the workstation that is being controlled. (2) An icon that represents the Distributed Console Access Facility.

Enterprise Systems Connection (ESCON). A set of IBM products and services that provides a dynamically connected environment within an enterprise.

Host. See host processor

host processor. (1) A processor that controls all or part of a user application network. (2) In a network, the processing unit where the access method for the network resides. (3) In an SNA network, the processing unit that contains a system services control point (SSCP). (4) A processing unit that executes the access method for attached communication controllers.

High Performance Routing (HPR). An extension of APPN that provides faster traffic throughput, lower delays, and lower storage overheads.

IBM service representative. An individual in IBM who does maintenance services for IBM products or systems. Also called the IBM *Customer Engineer*.

initial microcode load (IML). The process of loading the microcode into an adapter, the MOSS, or the service processor.

Internet. (1) A wide area network connecting disparate networks using the internetwork protocol (IP) (2) A public domain wide area network connecting thousands of disparate networks in industry, education, government and research. The Internet uses TCP/IP as the standard for transmitting information.

Internet address. The numbering system used in IP internetwork communications to specify a particular network, or a particular host on that network with which to communicate.

Internet Control Message Protocol (ICMP). A protocol used by a gateway to communicate with a source host, for example, to report an error in a datagram. It is an integral part of the Internetwork Protocol (IP).

Internetwork Protocol. A protocol that routes data from its source to its destination in an internet environment. It is also called the *Internet Protocol*.

Internetwork. Any wide area network connecting more than one network.

initial program load (IPL). The initialization procedure that causes the 3745 control program (NCP) to begin operation.

LAN-attached console. A PS/2 attached to the token-ring LAN that has the service processor attached. It is used to operate remotely the MOSS and MOSS-E functions.

IP router. A device that enables an Internetwork Protocol (IP) host to act as a gateway for routing data between separate networks.

line interface coupler (LIC). A circuit that attaches up to four transmission cables to the controller (from DTEs, DCEs or telecommunication lines).

locally administered address. In a local area network, an adapter address that the user can assign to override the universally administered address.

maintenance and operator subsystem - extended (MOSS-E). The licensed internal code loaded on the service processor hard disk to provide maintenance and operator facilities to the user and IBM service representative.

microcode. A program that is loaded in a processor (for example, the MOSS processor) to replace a hardware function. The microcode is not accessible to the customer.

modem (modulator-demodulator). See DCE.

Multiple Virtual Storage (MVS). Multiple Virtual Storage, consisting of MVS/System Product Version 1 and the MVS/370 Data Facility Product operating on a System/370* processor.

NetView. An IBM licensed program used to monitor a network, manage it, and diagnose its problems.

nonswitched line. A connection between systems or devices that does not have to be made by dialing. The connection can be point-to-point or multipoint. The line can be leased or private. Contrast with *switched line.*.

ping. A simple IP application that sends one or more messages to a specified destination host requesting a reply. Usually used to verify that the target host exists, or that its IP address is a valid address.

remote console. A PS/2 attached to the 3746 Nways Multiprotocol Controller either by a switched line (with modems) or by one of the communication lines of the user network.

Remote Technical Assistance Information Network (RETAIN).

service processor. The processor attached to a 3745, 3746-900, and 3746-950 via a token-ring LAN.

remote support facility (RSF). RSF provides IBM maintenance assistance when requested via the public switched network. It is connected to the IBM RETAIN database system.

service representative. See IBM service representative

services. A set of functions designed to simplify the maintenance of a device or system.

switched line. A transmission line with which the connections are established by dialing, only when data transmission is needed. The connection is point-to-point and uses a different transmission line each time it is established. Contrast with *nonswitched line*.

Synchronous Data Link Control (SDLC). A discipline for managing synchronous, code-transparent, serial-by-bit information transfer over a link connection. Transmission exchanges may be duplex or half-duplex over switched or nonswitched links. The configuration of the link connection may be point-to-point, multipoint, or loop. SDLC conforms to subsets of the Advanced Data Communication Control Procedures of the American National Standards Institute and High-Level Data Link Control (HDLC) of the International Standards Organization.

synchronous transmission. Data transmission in which the sending and receiving instruments are operating continuously at substantially the same frequency and are maintained, through correction, in a desired phase relationship.

token-ring adapter (TRA) type 3. 3746-900 and 3746-950 line adapter for IBM Token-Ring Network, composed of one token-ring processor card (TRP2), and two token-ring interface couplers type 3 (TIC 3s).

token-ring interface coupler type 2 (TIC2). A circuit that attaches an IBM Token-Ring network to the 3745.

token-ring interface coupler type 3 (TIC3). A circuit that attaches an IBM Token-Ring network to the 3746-900 or 3746-950.

user access area. A specific area in the controller where the customer can install, remove, change, or swap couplers and cables without IBM assistance.

universally administered address. In a local area network, the address permanently encoded in an adapter at the time of manufacture. All universally administered addresses are unique.

user application network. A configuration of data processing products, such as processors, controllers, and terminals, for data processing and information exchange. This configuration may use circuit-switched, packet-switched, and leased-circuit services provided by carriers or PTT. Also called a *user network.*

V.24, V.35, and X.21. ITU-T (ex-CCITT) recommendations on transmission interfaces.

Bibliography

Customer Documentation for the 3745 (Models 210, 310, 410, 610, 21A, 31A, 41A, and 61A), and 3746 (Model 900)

Table X-1 (Page 1 of 4). Customer Documentation for the 3745 Models X10 and X1A, and 3746 Model 900

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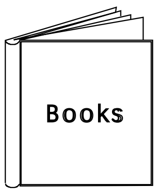
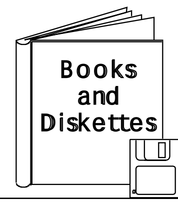




Finding Information		
		3745 Models A and 3746 Books Starting with engineering change (EC) F12380, all of the books in the 3745 Models A and 3746 library are available on the CD-ROM that contains the Licensed Internal Code (LIC) for this EC.
	SA33-0172	***IBM 3745 Communication Controller Models 210 to 61A IBM 3746 Expansion Unit Model 900*** ***Customer Master Index***[1] Provides references for finding information in the customer documentation library.
Evaluating and Configuring		
	GA33-0092	***IBM 3745 Communication Controller Models 210, 310, 410, and 610*** ***Introduction*** Gives an introduction of the IBM Models 210 to 610 capabilities. For Models A refer to the *Overview*, GA33-0180.
	GA33-0180	***IBM 3745 Communication Controller Models A***[2] ***IBM 3746 Nways Multiprotocol Controller Models 900 and 950*** ***Overview*** Gives an overview of connectivity capabilities within SNA, APPN, and IP networking.
	GA33-0457	***IBM 3745 Communication Controller Models A***[2] ***IBM 3746 Expansion Unit Model 900 Models 900 and 950*** ***Planning Guide*** Planning for: • Field upgrades • Service processor and alert management configuration • Network integration (NCP, APPN, and IP control) • Physical installation.

Table X-1 (Page 2 of 4). Customer Documentation for the 3745 Models X10 and X1A, and 3746 Model 900

Preparing Your Site

GC22-7064

IBM System/360, System/370, 4300 Processor

Input/Output Equipment Installation Manual-Physical Planning
(Including Technical News Letter GN22-5490)

Provides information for physical installation for the 3745 Models 130 to 610.

For 3745 Models A and 3746 Model 900, refer to the *Planning Guide*, GA33-0457.

GA33-0127

IBM 3745 Communication Controller
Models 210, 310, 410, and 610

Preparing for Connection

Helps for preparing the 3745 Models 210 to 610 cable installation.

For 3745 Models A refer to the *Connection and Integration Guide*, SA33-0129.

Preparing for Operation

GA33-0400

IBM 3745 Communication Controller All Models[3]
IBM 3746 Nways Multiprotocol Controller
Models 900 and 950

Safety Information[1]

Provides general safety guidelines.

SA33-0129

IBM 3745 Communication Controller All Models[3]
IBM 3746 Nways Multiprotocol Controller Model 900

Connection and Integration Guide[1]

Contains information for connecting hardware and integrating network of the 3745 and 3746-900 after installation.

SA33-0416

Line Interface Coupler Type 5 and Type 6
Portable Keypad Display

Migration and Integration Guide

Contains information for moving and testing LIC types 5 and 6.

SA33-0158

IBM 3745 Communication Controller All Models[3]
IBM 3746 Nways Multiprotocol Controller Model 900

Console Setup Guide[1]

Provides information for:

- Installing local, alternate, or remote consoles for 3745 Models 130 to 610
- Configuring user workstations to remotely control the service processor for 3745 Models A and 3746 Model 900 using:
  - DCAF program
  - Telnet Client program.

Customizing Your Control Program

SA33-0178

Guide to Timed IPL and Rename Load Module

Provides VTAM procedures for:

- Scheduling an automatic reload of the 3745
- Getting 3745 load module changes transparent to the operations staff.

Operating and Testing

Table X-1 (Page 3 of 4). Customer Documentation for the 3745 Models X10 and X1A, and 3746 Model 900

SA33-0098	***IBM 3745 Communication Controller All Models***[4] ***Basic Operations Guide***[1] Provides instructions for daily routine operations on the 3745 Models 130 to 610.
SA33-0177	***IBM 3745 Communication Controller Models A***[2] ***IBM 3746 Nways Multiprotocol Controller Model 900*** ***Basic Operations Guide***[1] Provides instructions for daily routine operations on the 3745 Models 17A to 61A, and 3746 Model 900 operating as an SNA node (using NCP), APPN/HPR Network Node, and IP Router.
SA33-0097	***IBM 3745 Communication Controller All Models***[3] ***Advanced Operations Guide***[1] Provides instructions for advanced operations and testing, using the 3745 MOSS console.
On-line Information	***Controller Configuration and Management Application*** Provides a graphical user interface for configuring and managing a 3746 APPN/HPR Network Node and IP Router, and its resources. Is also available as a stand-alone application, using an OS/2 workstation. Defines and explains all the 3746 Network Node and IP Router configuration parameters through its online help.
SH11-3081	***IBM 3746 Nways Multiprotocol Controller Models 900 and 950*** ***Controller Configuration and Management: User's Guide***[5] Explains how to use CCM and gives examples of the configuration process.
Managing Problems	
SA33-0096	***IBM 3745 Communication Controller All Models***[3] ***Problem Determination Guide***[1] A guide to perform problem determination on the 3745 Models 130 to 61A.
On-line Information	***Problem Analysis Guide*** An online guide to analyze alarms, events, and control panel codes on: • IBM 3745 Communication Controller Models A[2] • IBM 3746 Nways Multiprotocol Controller Models 900 and 950.

Table X-1 (Page 4 of 4). Customer Documentation for the 3745 Models X10 and X1A, and 3746 Model 900

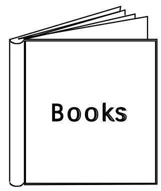
	SA33-0175	***IBM 3745 Communication Controller Models A*[2]** ***IBM 3746 Expansion Unit Model 900*** ***IBM 3746 Nways Multiprotocol Controller Model 950*** ***Alert Reference Guide*** Provides information about events or errors reported by alerts for: • IBM 3745 Communication Controller Models A[2] • IBM 3746 Nways Multiprotocol Controller Models 900 and 950.

[1] Documentation shipped with the 3745.
[2] 3745 Models 17A to 61A.
[3] 3745 Models 130 to 61A.
[4] Except 3745 Models A.
[5] Documentation shipped with the 3746-900.

Additional Customer Documentation for the 3745 Models 130, 150, 160, 170, and 17A

Table X-2. Additional Customer Documentation for the 3745 Models 130 to 17A

This customer documentation has the following format:



Finding Information		
	SA33-0142	***IBM 3745 Communication Controller Models 130, 150, 160, 170, and 17A IBM 3746 Nways Multiprotocol Controller Model 900*** ***Customer Master Index***[1] Provides references for finding information in the customer documentation library.
Evaluating and Configuring		
	GA33-0138	***IBM 3745 Communication Controller Models 130, 150, and 170*** ***Introduction*** Gives an introduction about the IBM Models 130 to 170 capabilities, including Model 160. For Model 17A refer to the *Overview*, GA33-0180.
Preparing Your Site		
	GA33-0140	***IBM 3745 Communication Controller Models 130, 150, 160, and 170*** ***Preparing for Connection*** Helps for preparing the 3745 Models 130 to 170 cable installation. For 3745 Model 17A refer to the *Connection and Integration Guide*, SA33-0129.

[1] Documentation shipped with the 3745.

Customer Documentation for the 3746 Model 950

Table X-3 (Page 1 of 2). Customer Documentation for the 3746 Model 950

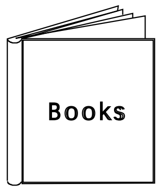
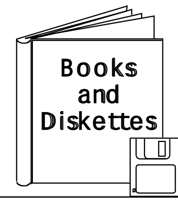
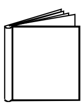
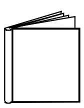
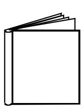
This customer documentation has the following formats:		
		
Finding Information		
		3745 Models A and 3746 Books Starting with engineering change (EC) F12380, all of the books in the 3745 Models A and 3746 library are available on the CD-ROM that contains the Licensed Internal Code (LIC) for this EC.
Preparing for Operation		
	GA33-0400	***IBM 3745 Communication Controller All Models***[1] ***IBM 3746 Expansion Unit Model 900*** ***IBM 3746 Nways Multiprotocol Controller Model 950*** ***Safety Information***[2] Provides general safety guidelines
Evaluating and Configuring		
	GA33-0180	***IBM 3745 Communication Controller Models A***[3] ***IBM 3746 Nways Multiprotocol Controller*** ***Models 900 and 950*** ***Overview*** Gives an overview of connectivity capabilities within SNA, APPN, and IP networking.
	GA33-0457	***IBM 3745 Communication Controller Models A***[2] ***IBM 3746 Expansion Unit Model 900*** ***Models 900 and 950*** ***Planning Guide*** Planning for: • Field upgrades • Service processor and alert management configuration • Network integration (NCP, APPN, and IP control) • Physical installation.

Table X-3 (Page 2 of 2). Customer Documentation for the 3746 Model 950

Operating and Testing		
	SA33-0356	***IBM 3746 Nways Multiprotocol Controller Model 950*** ***User's Guide***[2] Explains how to: • Carry out daily routine operations on Nways controller • Install, test, and customize the Nways controller after installation • Configure user's workstations to remotely control the service processor using: – DCAF program – Telnet client program.
	On-line information	***Controller Configuration and Management Application*** Provides a graphical user interface for configuring and managing a 3746 APPN/HPR network node and IP Router, and its resources. Is also available as a stand-alone application, using an OS/2 workstation. Defines and explains all the 3746 Network Node and IP Router configuration parameters through its on-line help.
	SH11-3081	***IBM 3746 Nways Multiprotocol Controller Models 900 and 950*** ***Controller Configuration and Management: User's Guide***[2] Explains how to use CCM and gives examples of the configuration process.
Managing Problems		
	On-line information	***Problem Analysis Guide*** An on-line guide to analyze alarms, events, and control panel codes on: • IBM 3745 Communication Controller Models A[3] • IBM 3746 Nways Multiprotocol Controller Models 900 and 950.
	SA33-0175	***IBM 3745 Communication Controller Models A***[3] ***IBM 3746 Expansion Unit Model 900*** ***IBM 3746 Nways Multiprotocol Controller Model 950*** ***Alert Reference Guide*** Provides information about events or errors reported by alerts for: • IBM 3745 Communication Controller Models A[3] • IBM 3746 Nways Multiprotocol Controller Models 900 and 950.

[1] Models 130 to 61A.
[2] Documentation shipped with the 3746-950
[3] 3745 Models 17A to 61A.

Related Manuals

Related Manuals for 3745

The following documents are indispensable for planning for your 3745 Communication Controllers Models A:

- *IBM 3745 Communication Controller: Console Setup Guide*, GA33-0158
- *IBM 3745 Communication Controller Models A: Overview*, GA33-0180.

Be sure to use the latest editions of the above documents.

Also helpful are:

- *Planning for Integrated Networks*, SC31-8062
- *Planning and Reference for NetView, NCP, and VTAM*, SC31-7122.
- *Virtual Telecommunications Access Method V3 R4: Resource Definition Reference*, SC31-6438

The following Enterprise Systems Connection (ESCON) documents may be helpful:

- *Introducing the Enterprise Systems Connection*, GA23-0383
- *Enterprise Systems Connection Migration*, GA23-0383
- *Planning for Enterprise Systems Connection Links*, GA23-0367
- *Introducing Enterprise Systems Connection Directors*, GA23-0363.

The following *IBM International Technical Support Centers* “redbooks” are generally very helpful:

- *Frame Relay Guide*, GG24-4463
- *3746-900 and NCP Version 7 Release 2*, GG24-4464.

The following Network Control Program (NCP) documents may be helpful:

- For NCP V6 R2:
  - *Network Control Program V6 R2: Migration Guide*, SC31-6216
  - *Network Control Program V6 R2, ACF/SSP V3 R8, EP R11: Resource Definition Guide*, SC31-6209-01
  - *Network Control Program V6 R2, ACF/SSP V3 R8, EP R11: Resource Definition Reference*, SC31-6210-01
  - *Network Control Program V6 R2: Planning and Implementation Guide*, GG24-4012
  - *Network Control Program V6 R2, ACF/SSP V3 R8, EP R11: Library Directory*, SC31-6215.
- For NCP V6 R3:
  - *Network Control Program V6 R3: Migration Guide*, SC31-6217
  - *Network Control Program V6 R3, ACF/SSP V3 R9, EP R11: Resource Definition Guide*, SC31-6209-02
  - *Network Control Program V6 R3, ACF/SSP V3 R9, EP R11: Resource Definition Reference*, SC31-6210-02 Guide,
  - *Network Control Program V6 R3, ACF/SSP V3 R9, EP R11: Library Directory*, SC31-6218.
- For NCP V7 R1:
  - *Network Control Program V7 R1: Migration Guide*, SC31-6219
  - *Network Control Program V7 R1, ACF/SSP V4 R1, EP R12: Resource Definition Guide*, SC31-6223-00
  - *Network Control Program V7 R1, ACF/SSP V4 R1, EP R12: Resource Definition Reference*, SC31-6224-00
  - *Network Control Program V7 R1, ACF/SSP V4 R1, EP R12: Library Directory*, SC31-6220.
- For NCP V7 R2:
  - *Network Control Program V7 R2, ACF/SSP V4 R2, EP R12: Generation and Loading Guide*, SC31-6221.
  - *Network Control Program V7 R2: Migration Guide*, SC31-6258-00
  - *Network Control Program V7 R2, ACF/SSP V4 R2, EP R12: Resource Definition Guide*, SC31-6223-01

  - *Network Control Program V7 R2, ACF/SSP V4 R2, EP R12: Resource Definition Reference*, SC31-6224-01
  - *Network Control Program V7 R2, ACF/SSP V4 R2, EP R12: Library Directory*, SC31-6259.
- For NCP V7 R3:
  - *Network Control Program V7 R3: Migration Guide*, SC31-6258-01
  - *Network Control Program V7 R3, ACF/SSP V4 R3, EP R12: Resource Definition Guide*, SC31-6223-02
  - *Network Control Program V7 R3, ACF/SSP V4 R3, EP R12: Resource Definition Reference*, SC31-6224-02
  - *Network Control Program V7 R3, ACF/SSP V4 R3, EP R12: Library Directory*, SC31-6262.
- For NCP V7 R4:
  - *Network Control Program V7 R4: Migration Guide*, SC30-3786
  - *Network Control Program V7 R4, ACF/SSP V4 R4, EP R12: Resource Definition Guide*, SC31-6223-03
  - *Network Control Program V7 R4, ACF/SSP V4 R4, EP R12: Resource Definition Reference*, SC31-6224-03
  - *Network Control Program V7 R4, ACF/SSP V4 R4, EP R12: Library Directory*, SC30-3785.

The following OS/2 document may be of some help:

IBM Extended Services for OS/2 Programming Services and Advanced Problem Determination for Communications, SO4G-1007.

For the Distributed Console Access Facility (DCAF) Version 1.3 the following documents are needed:

- *DCAF: Installation and Configuration Guide*, SH19-4068
- *DCAF: User's Guide*, SH19-4069
- *DCAF: Target User's Guide*, SH19-6839.

Related Manuals for 3746-9X0 (APPN)

To learn more about the APPN architecture, including high-performance routing (HPR), adaptive rate based flow and congestion control (ARB), dependent LU requesters/servers (DLURs/DLUSs), and other subjects, refer to:

- *Inside APPN - The Essential Guide to the Next-Generation SNA*, SG24-3669.
- *APPN Architecture and Protocol Implementations Tutorial:ecit, SG24-3669.*

The following Enterprise Systems Connection (ESCON), Virtual Telecommunications Access Method (VTAM), and OS/2 documentation may be also helpful:

- Introducing the Enterprise Systems Connection*, GA23-0383*
- Enterprise Systems Connection Migration*, GA23-0383*
- Planning for Enterprise Systems Connection Links*, GA23-0367*
- Introducing Enterprise Systems Connection Directors*, GA23-0363*
- Virtual Telecommunications Access Method V4R3: Resource Definition Reference*, SC31-6438.*
- IBM Extended Services for OS/2 Programming Services and Advanced Problem Determination for Communications*, SO4G-1007.*

For help with TCP/IP, refer to:

- TCP/IP for MVS: Performance Tuning Guide*, SC31-7188.*

To learn more token-ring configurations and the IEEE 802.2 standard, refer to:

- Token-Ring Network Architecture Reference*, SC30-3374.*

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3746 Nways Multiprotocol Controller
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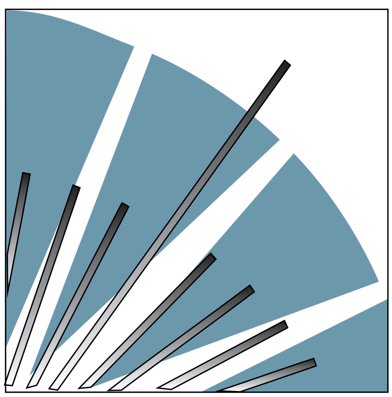

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