IBM

International Technical Support Centers

IBM 3174
ESTABLISHMENT CONTROLLER
INSTALLATION GUIDE

IBM 3174
Establishment Controller
Installation Guide

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│  Before using this information and the product it supports, be sure to read the general information
│  under "Special Notices" on page iii.
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Fourth Edition (January 1991)

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Abstract

This document describes the installation, operation, features and models of the 3174. It is intended for systems engineers and customer personnel who are installing the 3174 Establishment Controller. A knowledge of the 3270 Information Display System is assumed.

The information contained in this document is based on installation experience at the IBM International Technical Support Center, Raleigh.

CSYS   (380 pages)

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The authors of this document are:

Paul Simmonds, IBM Australia
Kevin Webb, IBM United Kingdom

The advisor for this project was:

Penny Frisbie, International Technical Support Center, Raleigh

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Preface

This document provides an introduction to the IBM 3174 Establishment Controller. It describes the main components of the machine and microcode with emphasis on new features.

This edition is the result of several residencies at the ITSC Raleigh. Much of the content results directly from installing and testing different configurations of the 3174.

This document has been written for systems engineers and technical members of customer organizations involved in the installation, customization and maintenance of the IBM 3174 Establishment Controller.

A very basic knowledge of IBM 3270 Information Display System has been assumed.

The document is organized as follows:

1. Introduction to the IBM 3174 Establishment Controller

   This chapter offers a brief history of the evolution of the 3174 Controller from the first 3274 Control Unit up to the current range of machines. The various models available and the features, both hardware and microcode are introduced.

2. Pre-Installation Planning

   This chapter discusses the several tasks that when completed prior to installation of the 3174, contribute to the smooth installation of the controller.

3. Installation

   This chapter discusses the physical installation of the IBM 3174 Establishment Controller hardware.

4. Microcode and Customization

   This chapter describes the 3174 microcode and discusses its customization and installation.

5. The Token-Ring attaching models of the IBM 3174.

   This chapter covers the 3174 attached to a Token-Ring Network and presents such topics as performance, connectivity, customization, backup/recovery and considerations when installing them in different environments such as VM/SP, MVS and VSE.

6. 3174 X.25 Support

   Major aspects concerned with the 3174 working in a X.25 environment are documented here. Different scenarios of the 3174 with X.25 support are presented to the user.

7. Asynchronous Emulation Adapter (AEA)

   This chapter describes the installation and customization of the 3174 AEA.

8. ESCON

   This chapter describes the new Enterprise Systems Connection channel support for the 3174.

9. Multiple Logical Terminal (MLT)

   The customization of MLT including AEA, CCA, Token-Ring and ESCON attachments are discussed in this chapter.

10. Multi-Host Connectivity

    The functions of the Concurrent Communication Adapter and Single Link Multi-Host Support are documented in detail in this chapter. Also included are descriptions of the multi-host Token-Ring Gateway and the multi-host X.25 support.

11. Connectivity and Customization Examples

    Several scenarios for using the Concurrent Communication Adapter and Single Link Multi-Host Support are presented here.

12. Local Format Storage (LFS)

    This chapter explains LFS and how it can be used to improve line performance.

13. Network Management

    Facilities such as Network Asset Management and Central Site Control Facility (CSCF) are discussed in this chapter.

And the following appendixes:

- Appendix A - IBM 3174 Controller Adapters
- Appendix B - 3174 Feature Table
- Appendix C - 3174 Specifications
- Appendix D - 3174 Plug Chart
- Appendix E - VTAM APARs for the 3174 Gateway
- Appendix F - Storage Requirement Charts
- Appendix G - NCP and VTAM Examples

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1. Introduction to the IBM 3174 Establishment Controller

The IBM 3174 Establishment Controller is the most fundamental component of the 3270 family of products. It connects the user's terminal (either a display station, a printer, a PC or PS/2) to a host computer. The number and type of connections is growing with each new release of the 3174 Controller. Today, the 3174 Controller can participate in SNA, BSC, X.25, Token-Ring and ASCII networks.

It is the intention of this publication to describe the 3174's features and functions and to assist the reader in installing and implementing the product effectively.

This introduction provides a brief history of the 3270 family of products and the 3174 Controller. The overview includes descriptions of:

- The different models of the 3174

- Host and terminal attachment

- 3174 features

- Microcode

- Network management

- National Language Support including CECP.

1.1 History of the IBM 3270 Family of Products

The 3270 family has been with us now for nearly 20 years. In this time there were only two major changes to the basic design of the control unit: the change from the original 3271/2 control units to the NDS or New Display System 3274 and then, the change from 3274 to 3174. However, since the introduction of the 3174, there have been many changes to the communications environment and you will see that, in response, there are many more developments in the 3174 than in both its predecessors together.

1.1.1 3271/2

The 3271/2 controllers were introduced in 1971. The 3271 was a remote controller supporting BSC at speeds up to 9600 bps. (A later model had SNA support as a PU T1.) The 3272 was for S/370 channel attachment.

They each supported a maximum of 32 devices, typically a mixture of 3277 display stations and 3284 or 3286 printers.

These controllers were hard wired; that is, all the logic was coded in hardware on cards inside the machine. This made them very fast to start up; you could simply turn them on and they were ready. However it was a major problem to add new features. Invariably this required hardware changes such as card replacement and rewiring, which was both time consuming and inconvenient.

1.1.2 3274

To get around this problem, IBM introduced the customizable 3274 in 1977. It was a radical change from the 3271/2 in that it was designed around an internal processor programmed with microcode. The microcode was then tailored by the user to support the growing number of new features that this technology made available.

Terminals introduced with the 3274 included the first color display, the IBM 3279. This was originally a four-color screen, but with the introduction of the 3270 extended data stream, it became possible to deliver seven colors with highlighting and graphics.

The 3274 family of terminals included the 3278 monochrome display station, the 3279 color display station and a range of printers, including the 3287. These are sometimes referred to as Type A terminals to differentiate them from the 3271/2 terminals (Type B), which used a different coax protocol.

The 3274 developed over time to support features including:

- V.24 support up to 14.4 Kbps
- V.35 support up to 56 Kbps
- X.25 support
- DFT support
- 3299 multiplexer
- RPQs including:
  - Entry Assist
  - Dual logic (the ability to have two sessions from a CUT mode device)

3274 models included a small 8-port remote model as well as the 32-port local and remote models.

1.1.3 3174

The development of new technology such as faster internal processors and smaller packaging led to the introduction of the 3174 Subsystem Controller in 1986. The 3174 was designed to enhance the 3270 product line with many new connectivity options and features. Like the 3274, it was customizable, but it used smaller (5.25 inch) diskettes and the process was simplified and made considerably faster.

The packaging of the 3174 enabled the installation of many new features such as Token-Ring and Asynchronous Emulation Adapters.

New terminals were smaller, lighter and incorporated better ergonomic design. Image support was now available using the 3193 "portrait" monitor.

1.1.3.1 3174 Establishment Controller

In 1989, IBM introduced a new range of 3174 models, with a change in name from "Subsystem Controller" to "Establishment Controller." This name change reflects the expanded connectivity options now available on the 3174. The requirement being focused on is the ability to achieve "any-to-any" communications.

The new models provided increased internal processor speed, 2MB of base memory (twice that of the previous model) and a 2.4MB diskette drive. The new diskette drive was included because the microcode to support the new connectivity options was growing larger than the existing 1.2MB drives could sustain.

The present 3174 models include the Tokenway *, a small remote Token-Ring Gateway and now a rack-mountable 3174 for locations where larger numbers of terminals need to be attached.

New features include:

- Concurrent Communications Adapters (CCA), which allow additional SNA or BSC hosts to physically attach to a single 3174
- 64 coax port capability
- 32 port 3299 multiplexer
- S/390 host attachment over Enterprise Systems Connection Channels using optical fiber cable

and others, which will be described in more detail in the remainder of this publication.

1.2 3174 Models

Until the 1989 announcements, the range of 3174 Subsystem Controller models was:

- 01L, 01R, 02R, 03R, 51R, 52R, 53R, 81R, 82R.

In 1989 IBM announced the IBM 3174 "Establishment Controllers" comprising the following models:

- 11L, 11R, 12R, 13R, 61R, 62R, 63R, 91R, 92R.

These models supersede each of the original 3174 models and offer a higher throughput, more base storage and support for a total of 6MB of storage for the larger models.

They are designed and built with state-of-the-art CMOS technology and with Very Large Scale Integration (VLSI) circuitry. This new technology design produces advantages of smaller size, faster circuitry, less power, additional control storage capacity, and allows for growth.

In 1990, six more models were added:

- 90R (Tokenway), 21R, 21L, 12L, 22L, and 23R.

Let's look at the characteristics and capabilities of these models now.

Note that they all have a suffix, either "R" or "L." The "R" models are remote and the "L" models are local. This describes the base machine host attachment as being either network attached (SDLC, BSC, X.25 or Token-Ring) or directly attached to the host (S/370 channel or ESCON).

All 3174s are housed in one of four cabinet types. These are:

- Large floor standing models. These are models 0XX and 1XX. They have the capability of supporting up to 64 coax ports (with the port expansion feature), 24 asynchronous ports, two additional host communication adapters (CCAs) and a Token-Ring gateway.

- The rack-mounted models. These are the models beginning with "2." They are equivalent to the large 1XX models, but the packaging has been compressed to make them fit in a rack. They are only 10 inches (254 mm) high. These models have only five expansion slots available for adding extra features. (The 22L and 23R have only four expansion slots.) They support the same attachments as the large models but, due to the limited slots, not all at once.

  Having said that however, there are not many customers who do configure all features on a 3174, and so this model may be adequate for most situations.

- Medium sized desk top models. Models 5XX or 6XX can support 9 to 16 coax devices and, depending on the specific model type, one or a combination of the following:
  - Asynchronous adapter
  - Token-Ring gateway
  - Concurrent Communications Adapter (two on some models).

- Small table top models 8XX or 9XX. These models attach between 4 and 8 coax devices. The 90R is a Token-Ring Gateway. They do not support the Asynchronous Emulation Adapter or Concurrent Communications Adapters

1.3 Attachment Description

1.3.1 Host Attachments

There are three basic methods of physically attaching the 3174 to the host:

- Local - models 1L, 11L and 21L for the S/370 channel and models 12L and 22L for the S/390 ESCON channel.

- Communications Link - models X1R or 90R for V.24 or V.35 interfaces and models X2R for X.21 interfaces.

- Token-Ring - models X3R.

1.3.1.1 Local Channel Attach

The 3174 Models 01L, 11L, and 21L have Data-Chaining Interlocked, High Speed Transfer, and Data Streaming channel operational modes. This provides channel data rates up to 1.0, 1.25, and 2.5 megabytes per second, respectively.

The 3174 models 12L and 22L attach to the host via the ESCON optical fiber channel. This channel is capable of attaching the 3174 to up to eight different physical hosts via the ESCON director at distances of up to 5.4 miles (9 km) in three stages. Performance of the 3174 Controller over ESCON is comparable to that of a S/370 channel.

1.3.1.2 Remote Link Attach

The 3174 remote attach models provide improved communications capabilities. The base communications hardware will provide the following interfaces as applicable to the 3174 model selected. Communication protocol (SDLC, BSC, or X.25) is selectable in the customizing procedure.

- Model 1R, 11R, 21R, Model 51R, 61R and Model 81R, 90R, 91R - EIA RS-232C/CCITT V.24 and CCITT V.35 interfaces for SNA/SDLC, BSC, or X.25 remote link attachment. For operation up to a maximum speed of 19.2 Kbps for BSC, 64 Kbps for X.25 and 64 Kbps for SNA/SDLC.

- Model 2R, 12R, Model 52R, 62R and Model 82R, 92R - X.21 interface (CCITT V.11) for SNA/SDLC or X.25 remote link attachment. For operation up to a maximum speed of 64 Kbps for SNA/SDLC.

1.3.1.3 Token-Ring Attach

The IBM 3174 Models X3R provide host attachment via the IBM Token-Ring Network. They have a Token-Ring Adapter for the primary host connection. Given that the ring may operate at speeds up 16 Mbps, they provide a good solution for those users who need fast response time in both local and remote locations. The host gateway may include one the following:

- 3745, 3720 or 3725 Communications Controller fitted with a TIC or Token-Ring Interface Coupler and running the ACF/NCP facility called NTRI (NCP Token-Ring Interconnect).

  Notes:

  1. 3720 and 3725 TIC is limited to 4 Mbps

  2. NCP must be at least Version 4.2 or Version 5

- A 3174 gateway, a local or remote model fitted with either feature 3025 or 3026 and running Configuration Support-S or feature 3044 and running Configuration Support-B.

- An IBM 3172 fitted with a Token-Ring Gateway feature and supported in the host by ACF/VTAM V3.4. The 3172 can be channel attached or network attached via T1 or G.703 and the Model 2 also has announced support for FDDI.

- An IBM AS/400 with the Token-Ring Gateway feature.

- An IBM Series/1 with the Token-Ring Gateway feaure.

1.3.2 Terminal Attachment

The 3174 offers excellent flexibility for terminal attachment. 3270 terminals or workstations emulating a 3270 terminal may be connected via the 3174 Terminal Adapter; other devices can be attached over a Token-Ring LAN or via the Asynchronous Emulation Adapter.

3174 models 1XL, 2XL, 1XR, and 2XR can also have a second terminal adapter called the 3270 Port Expansion Feature.

Terminals are connected either directly to the 3174 or via a multiplexer. There are two basic kinds of multiplexer used, the Terminal Multiplexer Adapter or TMA and the 3299 Terminal Multiplexer.

1.3.2.1 Terminal Multiplexer Adapter

The TMA is ordered as feature code #3103 on the large and rack-mounted 3174s. It is a card which plugs into one of the 3174 feature slots.

A TMA has a short length of coax attached which is plugged into one port of the 3174 Terminal Adapter. The TMA then provides eight ports for device attachment. The 3174 Terminal Adapter can have a maximum of four TMAs connected.

1.3.2.2 3299

The 3299 is similar to the TMA, but it sits external to the 3174. It is attached to the 3174 Terminal Adapter at distances of up to 4920 ft (1500 m). See *IBM 3174 Site Planning* for more detail on cable distance limitations.

There are three available models of the 3299: Models 2, 3, and 32. The 3299 Model 2 and the 3299 Model 3 each attach up to eight devices while the 3299 Model 32 attaches up to 32 devices and may be attached to the 3174 via an optical fiber cable, a coaxial cable, or IBM Cabling System Media. The Model 1 has been withdrawn.

Notes:

1. To use fiber optic cable, a new terminal adapter is required in the 3174; the 3174 Fiber-Optic Terminal Adapter or FTA.

2. Fiber connection does not increase the maximum cable distance; what it does provide, however, is a very clean signal, which is important where 3270 devices are being used in environments with high levels of electromagnetic noise.

1.3.2.3 Multiplexer Configurations

Models 01R, 02R, 03R, 11R, 12L, 12R and 13R: On 3174s without the port expansion feature, 3299s and TMAs may be installed as follows:

- One-to-four IBM 3299 Model 2 or 3299 Model 3 Terminal Multiplexers.

- One-to-four Terminal Multiplexer Adapter optional features (#3103).

- Any combination (up to four) of the 3299 Model 2 or 3299 Model 3 or TMA

- One 3299 Model 32 attaching up to 32 ports

- One to three 3299 Model 32 attaching eight devices per multiplexer

- A combination of any 8-port multiplexers and the 3299-032 to a total of 32 ports.

Note: The 3299 Model 32 has to be installed in port 0 of the integrated terminal adapter in order to have the maximum 32-port capability. If it is installed in any other port it will only be capable of attaching eight terminals.

The 3270 Port Expansion Feature can only be installed on Models 11L, 11R, 12L, 12R, 13R, 21R, 22R, 22L, and 23R.

With the 3270 Port Expansion Feature, multiplexers may be installed as follows:

- Any combination (up to eight) of the 3299 Terminal Multiplexers and Terminal Multiplexer Adapters.

- One 3299 Model 32 and any combination (up to four) of the 3299 Model 2 or 3299 Model 3.

- Two 3299 Model 32s.

- Devices on ports 27-00 to 27-31 cannot access a host via a CCA.

Device attachment alternatives (21L, 22L, 21R, 23R):   Without the port expansion feature, these models can have:

- Any combination (up to four) of Terminal Multiplexer Adapters and/or 3299 Model 2 or 3299 Model 3 for a total of 32 ports

- One 3299 Model 32 for a total of 32 ports.

With the port expansion feature, they may be configured as follows:

- One 3299 Model 32 multiplexer with any combination (up to three) of Terminal Multiplexer Adapters and or 3299 Model 2 or 3299 Model 3 for a total of 56 ports or

- Two 3299 Model 32s for 64 ports.

Note: Two 3299 Model 32 multiplexers are required to access 64 ports. One 3299 Model 32 with combinations of Terminal Multiplexer Adapters and 8-port 3299s can only access 56 ports. The Terminal Multiplexer Adapters and 8-port 3299s must be removed and a 3299 Model 32 installed to access ports 57-63.

Models 51R, 52R,53R, 61R, 62R and 63R: The medium cluster control units (Models 51R/61R, 52R/62R, & 53R/63R) have similar attachment flexibility, but with a maximum attachment capability of sixteen terminals. A base control unit has an integrated nine-port terminal adapter which permits up to nine terminals to be directly attached, or by using one of the following, up to a maximum of 16 terminals can be attached:

- Two 8-port 3299 Terminal Multiplexers

- One 8-port 3299 Terminal Multiplexer and connecting up to eight ports directly.

Models 81R, 82R, 90R, 91R and 92R: The small control unit (Models 81R, 82R, 90R, 91R and 92R) have a maximum attachment capability of eight terminals. The base control unit provides an integrated four-port terminal adapter which permit up to four terminals to be directly attached, or using an 8-port 3299 Terminal Multiplexer attached to port 0, a maximum of eight terminals can be attached, in this case remaining ports of the control unit are disabled.

1.3.2.4 IBM Cabling System

When using the 3174 with IBM Cabling System data-grade media, cabling to terminals is via direct attachment to the IBM Cabling System media. A balun cable assembly is not required at the control unit end of the cable. Attached devices may still need baluns at their end.

1.4 Features

A base 3174 Controller comes with a minimum configuration of features as described in Table 1. In some cases, machines shown with 2.4 MB diskette drives, may have actually been delivered with 1.2 MB drives during the introduction of the new models. This would have occurred if the machine was ordered with Configuration Support-A. These drives will be upgraded to 2.4 MB when and if Configuration Support-B is ordered.

Table 1. 3174 Basic Machine Configuration			
Model	Storage	Diskette	Number of devices supported
01L	1 MB	1.2 MB	4-32
11L and 21L	2 MB	2.4 MB	4-64
12L and 22L	2 MB	2.4 MB	4-64
01R	1 MB	1.2 MB	4-32
11R and 21R	2 MB	2.4 MB	4-64
02R	1 MB	1.2 MB	4-32
12R	2 MB	2.4 MB	4-64
03R	1 MB	1.2 MB	4-32
13R and 23R	2 MB	2.4 MB	4-64
51R	1 MB	1.2 MB	9-16
61R	2 MB	2.4 MB	9-16
52R	1 MB	1.2 MB	9-16
62R	2 MB	2.4 MB	9-16
53R	1 MB	1.2 MB	9-16
63R	2 MB	2.4 MB	9-16
81R	1 MB	1.2 MB	4-8
91R	2 MB	2.4 MB	4-8
82R	1 MB	1.2 MB	4-8
92R	2 MB	2.4 MB	4-8
90R	2 MB	2.4 MB	1 or 8 and token ring gateway

1.4.1 Hardware Features

The following hardware features are optional features

1.4.1.1 3270 Port Expansion Feature (feature 3100)

This feature is applicable to 3174 Controller Models 11L, 12L, 12R, 13R, 21L, 21R, and 23R. It allows these controllers to support 32 additional 3270 devices over coax ports bringing the total number to 64.

For Models 11L, 11R, 12L, 12R, and 13R, this feature provides a terminal adapter and supporting hardware to attach the additional devices. Like the base 3174 Terminal Adapter this adapter has four Dual Purpose Connectors (DPC), which support attachment of Terminal Multiplexer Adapters or external 3299s. It can be installed in these models in one of the available feature slots (22 or 23).

For Models 2XX this feature provides a replacement planar board with four DPCs.

See "Multiplexer Configurations" on page 6 for the possible multiplexer configurations when using this feature.

Notes:

1. The 3270 Port Expansion feature requires Configuration Support-B release 4.

2. Devices on ports 27-00 to 27-31 cannot access a host via a CCA.

1.4.1.2 Terminal Multiplexer Adapter (feature 3103)

See "Terminal Multiplexer Adapter" on page 6.

1.4.1.3 3174 Fiber-Optic Terminal Adapter (feature 3110)

The 3174 Fiber-Optic Terminal Adapter provides the ability to attach a 3299 Model 32 to the 3174 Models 1XX, and 2XX via 62.5/125 micron fiber-optic media at a distance of up to 1,500 meters (4,920 ft). It can also be used with 100/140 micron and 50/125 micron fiber-optic cable.

The 3174 Fiber-Optic Terminal Adapter is a card that attaches to the 3174 Terminal Adapter or to the Port Expansion feature (feature 3100) card via a short coaxial cable in a similar way to the Terminal Multiplexer Adapter. If attached to port "0," it allows the 3299 Model 32 to support the full 32 terminals.

The maximum number of 3174 Fiber-Optic Terminal Adapters in any one controller is:

- Three for 3174 Model 11L, 11R, 12L, 12R, and 13R without 3270 Port Expansion Feature.

- Six for 3174 Model 11L, 11R, 12L, 12R, and 13R with 3270 Port Expansion Feature.

- Three for 3174 Model 21L, 21R, 23R and 22L with or without 3270 Port Expansion Feature.

This feature does not extend the 3174 Controller's ability to support more ports, (thirty-two without 3270 Port Expansion Feature, sixty-four with) but support for

multiple 3174 Fiber-Optic Terminal Adapters allows multiple 3299 Model 32s to be connected to a 3174 via fiber-optic cable. When the 3174 Fiber-Optic Terminal Adapter is connected to a port on the 3174 Terminal Adapter or Port Expansion other than port "0," only the first eight ports (0-7) on the attached 3299 Model 32 are active. You may choose to do this if you have eight or less terminals to install in electrically or magnetically "noisy" environments where coaxial cable may not shield the data signals sufficiently. The prerequisite microcode releases for 3174 Fiber-Optic Terminal Adapter support are:

- Configuration Support-B release 3.0 or later

- Configuration Support-A release 5.3 or later

Each 3174 Fiber-Optic Terminal Adapter requires one available 3174 feature slot. Planning information for determining fiber-optic drive distances is supplied in *IBM 3299 Model 032 Planning for Optical Fiber Cable*, GA27-3902.

1.4.1.4 IBM 3174 Token-Ring Gateway

There are two features currently available for providing a 3174 Token-Ring Gateway; feature 3026 and feature 3044. Both run at 4 or 16 Mbps. The 4 Mbps adapter, feature 3025, should no longer be ordered.

Feature 3026 is available for machines with the base microcode Configuration Support-A and it includes Configuration Support-S microcode.

Feature 3044 requires Configuration Support-B to operate as a gateway. We recommend that you use Configuration Support-B where possible as it is functionally richer than Configuration Support-S as explained below.

See "3174 Gateways" on page 60 for a full description of 3174 Token-Ring Gateway implementation.

IBM Token-Ring Network 3270 Gateway (feature 3026): This feature comprises the Licensed Internal Code, Configuration Support-S Release 5, the Type 3A Dual Speed 16/4 Mbps Token-Ring Adapter and a token-ring adapter cable. The "Early Token Release" function and larger I-Frame sizes on the token-ring are supported with this feature. The transmission speed is a customization option.

This optional feature, IBM Token-Ring Network 3270 Gateway is available for 3174 Controller local models X1L and X2L and for remote models X1R, X2R, but not the 8XX or 9XX range.

LAN workstations attached to the same Token-Ring as the 3174 gateway can coexist and operate concurrently with this feature. The IBM Token-Ring Network 3270 Gateway feature will not participate in, and will not be an inhibitor to, communications that occur on devices locally attached to the 3174, such as terminals connected to the Terminal Adapter.

If you are upgrading the 3174 to Configuration Support-B, feature 3026 will function the same as feature 3044.

1.4.1.5 Dual Speed (16/4) Communications - Alternate IML/Gateway (feature 3044)

If you are installing a 3174 Controller with Configuration Support-B, then this is the gateway you should be using. It costs less than feature 3026 (although more storage is required to run Configuration Support-B) and it provides more function.

Feature 3044 can be used with Configuration Support-A as an alternate configuration. This is described in "Backup Communication Adapter (Alternate IML)" on page 12.

With Configuration Support-B, feature 3044 provides all the function of feature 3026 plus:

- Group polling

- Single Link Multi-Host support

- Support for 250 DSPUs

- Peer RPQ support

- T2.1 RPQ support

- 8KB RUSIZE (Models 12L and 22L only).

1.4.1.6 Second Diskette Drive (2.4 MB) (feature 1048)

A second 5.25-inch diskette drive with 1.2/2.4MB capacity is available as an optional feature. The usable capacity depends on the Microcode Level installed. 2.4MB capacity is available with "Licensed Internal Code" (LIC) "B" only. It is required for down-loading operational microcode to DSL (Down Stream Load) devices including:

- The graphics models of the IBM 3179*, 3192*, and the 3472* display stations
- The 3193* Image Display Station
- The 3290* Display Panel.

It is also required for down-loading operational microcode to the Asynchronous Emulation Adapter optional feature (feature 3020), for a full diskette copy and for the Central Site Customization (CSC) and Central Site Change Management (CSCM) functions, provided there is no fixed disk installed.

While it is possible to use most offline diskette procedures without the optional second diskette drive, there are some that require it, see "Offline Microcode Utilities" on page 26. Although not required, having the optional second diskette drive reduces diskette swapping when customizing a 3174 and when running most offline diskette utility procedures.

The 3174 Models 81R, 82R, 90R, 91R and 92R do not support the second diskette drive.

1.4.1.7 Second Diskette Drive (1.2 MB) (feature 1046)

This optional feature has the same functions as feature 1048 but half the capacity and is supported by all microcode levels.

The 3174 Models 81R, 82R, 90R, 91R and 92R do not support the second diskette drive.

1.4.1.8 Fixed Disk Drive (20 MB) (feature 1056)

This optional feature has the same functions as the additional diskette drives but a significantly higher capacity and is supported by all current Microcode Levels.

The 3174 Models 81R, 82R, 90R, 91R and 92R do not support the fixed disk drive.

1.4.1.9 Storage Expansion

The capacity of the functional storage of the 3174 establishment controllers can be expanded by the following optional features:

- feature 1012 1 MB Storage expansion

- feature 1014 2 MB Storage expansion

- feature 1016 4 MB Storage expansion.

Storage expansion for the new models 2XX and 6XX plug directly into the planar board. That avoids occupation of an adapter slot.

The 3174 Models 81R, 82R, 90R, 91R and 92R do not support any storage expansion.

1.4.1.10 Backup Communication Adapter (Alternate IML)

If the primary host link - inherent to the model - fails, a backup link can be established. A pre-customized control disk must be loaded by IML and one of the following optional backup adapters must be activated:

- Feature 3040 Type 1 Teleprocessing Communication Adapter (V.24)

- Feature 3041 Type 1 Teleprocessing Communication Adapter (V.35)

- Feature 3042 Type 1 Teleprocessing Communication Adapter (V.35) (France only)

- Feature 3043 Type 2 Teleprocessing Communication Adapter (X.21)

- Feature 3044 Type 3A Dual Speed 16/4 Mbps Token-Ring Adapter.

Feature 3044 also supports the "Early Token Release" function and larger I-Frame sizes on the token-ring.

In conjunction with Configuration Support-B this feature can be used for the Token Ring Gateway Function. See "Dual Speed (16/4) Communications - Alternate IML/Gateway (feature 3044)" on page 11.

The 3174 Models 81R, 82R, 90R, 91R and 92R cannot have a backup adapter installed.

1.4.1.11 Concurrent Communication Adapter (CCA)

Depending on the 3174 model, one or two of these optional features can be installed. In addition to the primary host link adapter, which is inherent to the model, a second or third adapter with the same or different host link protocols as the primary adapter (SNA/non-SNA channel attach, BSC, SDLC, X.25 or Token-Ring) can be installed.

Each CCA provides an additional 3174 controller appearance in a single 3174. This is accomplished by having a separate microprocessor, control storage and communications interface.

If a CCA is installed and the 3174 is customized for it, direct attached 3270 displays can access multiple hosts. Up to five MLT sessions can be spread over the primary adapter and the CCAs. The adapters for the different TP interfaces have the following feature codes:

- #3050 Type 1 Concurrent Communication Adapter (V.24/V.28)
- #3051 Type 1 Concurrent Communication Adapter (V.35)
- #3052 Type 1 Concurrent Communication Adapter (V.35) (France only)
- #3053 Type 2 Concurrent Communication Adapter (X.21/V.11).

Maximum number of CCAs:

2	for models 0XX, 1XX, 2XX
1	for model 51R
none	for models 52R, 53R
2	for models 61R, 62R
1	for model 63R
none	for models 8XR, 9XR.

Up to 64 Kbps are supported by these adapters for SNA/SDLC and X.25 line protocols. Up to 19.2 Kbps are supported by these adapters for BSC line protocol.

Corequisite for these adapter types is Licensed Internal Code B.

The CCA cannot be used as a host connection for devices attached to the 3270 Port Expansion Feature #3100.

1.4.1.12 ASCII Support

For additional information, see "Asynchronous Emulation Adapter (AEA)" on page 157.

General Description: The Asynchronous Emulation Adapter (feature 3020) provides facilities to handle ASCII communications. 3270 emulation from ASCII displays and printers as well as ASCII emulation from 3270 devices is possible.

This feature consists of an adapter card and microcode. An auxiliary DSL diskette with microcode for the adapter is distributed with the hardware.

This feature can coexist only with the IBM Token-Ring Network 3270 Gateway feature 3026 installed on a 1XX, 2XX, or 6XX Model. This coexistence also requires that Configuration Support-S Release 5 or Configuration Support-B be installed. This feature cannot be installed in the 3174 Models 53R, 81R, 82R, 90R, 91R or 92R.

The second diskette drive feature or a fixed disk is a prerequisite for this feature in order that it may download operational microcode.

Asynchronous Emulation Adapter Description: Each adapter provides eight ASCII ports.

3174 Models 0XX, and 1XX can each have up to three adapters providing up to 24 ports.

3174 Models 2XX can each have up to three adapters providing up to 24 ports (expansion slots permitting). Models 51/61R and 52/62R can have one adapter, providing up to eight ports. These ports are in addition to the maximum available on SNA control units. The number of device addresses supported by non-SNA controllers is not expanded above 32.

The adapter supports full-duplex, character-mode, asynchronous transmission of seven-bit ASCII data with parity. Odd, even, mark, space, and no-parity encoding are supported.

In addition, with Configuration Support-B Release 2, 8-bit ASCII characters are supported.

Ports are configurable in any combination of ASCII Terminal Emulation, 3270 Terminal Emulation, or ASCII Pass-Through.

Each port provides an EIA RS-232D electrical interface, and supports transmission speeds of 300 to 19.2 Kbps via modems over switched or non-switched communications facilities or via direct connection, without modems.

1.4.1.13 Serial OEM Interface (SOEMI)

A Serial OEM Interface (SOEMI) is a base function for a non-SNA 3174 Model 01L, 11L, 21L, 12L or 22L that extends the attachment capabilities to a variety of industry devices of independent manufacturers for engineering, scientific and manufacturing environments. A protocol based on structured fields (extended Data Stream) provides the user programming flexibility.

Other OEM Adapters Attachment of instrumentation, measurement and control, and other equipment can be provided via OEM adapters that provide appropriate conversion and control functions to industry standard bus interfaces such as IEEE 488, IEEE 696, IEEE 796, etc. Applications such as controlling and measurement, robotics, process control, voice synthesis/recognition, medical applications and many others could then be implemented via the SOEMI support.

1.4.2 Microcode Features

Many of the features and functions of the 3174 are implemented in microcode; that is, no extra hardware is required to use them. Some of these features are described here.

1.4.2.1 Response Time Monitor

A response time monitor is built into the 3174. It provides for enhanced network management by permitting the accurate measurement and recording of transaction times between an inbound host attention (AID) and a user defined transaction end.

The data is collected in the 3174 and either viewed locally or retrieved by a host program such as NetView* Session Monitor for analysis.

1.4.2.2 Entry Assist

Entry Assist provides display units attached to the 3174 Controller in CUT mode
limited local format, entry and edit control. Some DFT mode workstations such
as the 3179-G, 3192-G and the 3472-G, provide entry assist as part of their base
function.

Entry Assist used with a full screen editor can be used to:

- Set margins

- Set tabs

- Sound the audible alarm when typing reaches the end of the line

- Wrap words to the next line automatically

- Delete words

- Indicate cursor position.

For more details on using Entry Assist, see GA23-0119 *IBM 3270 Entry Assist
User's Guide* .

1.4.2.3 Type Ahead

The Type Ahead function allows keystroke entry while the keyboard is locked
from a previous transaction such as a host I/O or a printer busy condition.
Type Ahead is enabled by default during 3174 customization and is available for
both 3270 CUT mode and ASCII terminals. When enabled, up to 50 keystrokes
can be stacked while the keyboard is locked.

If you fill the queue, the queue full indicator comes on. This is reset after a
host I/O occurs and the queue is processed.

Type Ahead is available on Configuration Support-B Release 2 or later.

1.4.2.4 Null/Space Processing

There are two things that often annoy people who are editing text on 3270
displays. One is the situation where you are keying in data in the middle of the
screen, you press enter and all the characters you carefully positioned are
returned compressed against the left margin of the screen. The second is
when you are trying to insert characters into a line with spaces at the end and
you have to move the cursor to the end of the line to do an EOF on the spaces
and then move the cursor back to where you want to insert. Both these
situations arise because 3270 treats space characters differently from nulls.

In the 3270 data stream, a null is X'00' and a space is X'40'. They both appear
on a screen as blank but the space occupies a position on the screen whereas
the null does not. Null/space processing can be used to turn nulls into spaces
for host transmission when the null precedes a character within an entry field
on the screen. A null to space conversion is performed in field positions
preceding the cursor as soon as the field is modified. That solves the first
problem. The second problem is also addressed. With null/space processing,
the blanks at the end of the line can be either nulls or spaces; insert will work
either way.

Null/space processing can be turned on or off by the user of any terminal (or logical terminal). It is toggled on or off by pressing the "ExSel" key followed by the Null/Space Processing key (the "N" key on most keyboards).

Null/space processing is available on Configuration Support-B release 2 or later for use on CUT mode or ASCII terminals.

1.4.2.5 Single Link Multi-Host Support

With this microcode-only function up to eight hosts can be accessed from the 3174 Controller's primary host connection in any of the following configurations:

- A 3174 with a Token-Ring Adapter configured as a downstream PU and communicating over a Token-Ring through multiple gateways.

- The ESCON adapter and then via the ESCON director to multiple local SNA hosts.

- An X.25 link with multiple hosts defined on different switched virtual circuits.

Using MLT support, it is possible to define up to five of these hosts to any one terminal on the 3174 Controller and the user may then hot-key between them.

Note: The hosts defined for each terminal are statically defined. A new customization is required to change them.

1.4.2.6 Remote Gateway Group Poll

The remote token-ring gateway and all attached DSPUs can be polled with a single poll using this function. Previously they had to be individually polled which limited the performance of the gateway. Under group poll, whenever input is pending from a token-ring attached device the gateway responds positively to that poll. In this way long polling lists are avoided within the NCP (improving NCP performance) and the number of unproductive polls is significantly reduced on the line. This in turn shortens the response times for the DSPUs or allows more DSPUs to be attached to the remote token-ring. See "Group Poll" on page 91 for more detail. To support group polling, NCP must be at V4.3.2 or V5.3 or later. (Alternately, a PTF can be applied to V4.3.1 or V5.2.1)

1.4.2.7 Network Asset Management

This function can be used in cooperation with NetView to provide an inventory management for both the 3174s and attached terminals in the network.

The 3174 records information about its attached devices every time one is powered on while plugged into a 3174 port. The information includes the device type and characteristics and on some of the newer terminals, the serial number is also available.

Data can also be entered manually into the 3174 by an operator for record keeping. The NAM data is retrieved to NetView in response to an SNA command on the SSCP-PU session.

To support **Network Asset Management** VTAM V3-R1.1 and NetView R3 for MVS/XA, MVS/ESA, VM/SP, VM/XA on the owning host are prerequisite. For processing the data gathered by NetView, products like Service Level Reporter (SLR), Information Management or other equivalent products are necessary.

1.4.2.8 Intelligent Printer Data Stream (IPDS) Support

Intelligent Printer Data Stream (IPDS) support for the IBM 4224 Printer, and future IBM APA (All Points Addressable) printers, is a structured field approach to management and control of printer processes and is designed to allow the presentation of text, raster images, vector graphics, bar codes and previously stored overlays at any point on a page. IPDS commands within the data stream also enable the host processor to control media handling, error recovery, and the down-loading and management of symbol sets (fonts) and printer stored objects, such as overlays and page segments. The printer can later use these stored objects to construct a printed page. IPDS can significantly reduce the load on the host processor.

Printers capable of IPDS are supported by SNA and non-SNA 3174s.

IPDS depends on programming support outside the the controller.

1.4.3 Licensed Internal Code

There are three different versions of 3174 microcode presently available. These versions of microcode are now licensed and will often be referred to as "Licensed Internal Code" in 3174 Controller documentation.

For convenience and understanding, the term *3174 microcode* is used more often in this document.

1.4.3.1 Microcode Levels and Releases

The three versions are:

1. Configuration Support-A

2. Configuration Support-S

3. Configuration Support-B.

The microcode level is shown on the diskette. For example a Configuration Support-B control diskette at release 3 will have the following information printed on the label:

```
DISKETTE TYPE: 2.4 MB  3174  CONTROL

LICENSED INTERNAL CODE - PROPERTY OF IBM

MACHINE 3174  P/N 25F8499  E/C A78832  ML90222  LVL B3.0
```

LVL B3.0 means the diskette is Configuration Support-B and *ML90222* means the microcode level is as available at Julian date, day 222 of 1990.

There are certain model dependencies on both the version used and the release level. These dependencies are driven by two factors. For backwards compatibility, they are driven by the ability of a controller to support enough storage to run the latest microcode. And for the newer models, it is the fact that the old versions or releases just do not support them.

The following table, Table 2 on page 19, illustrates these dependencies.

Table 2. 3174 Model Dependencies on Microcode Level	
3174 Model	LIC level
01R 01L 02R 51R	All levels
03R 53R	• All levels of Configuration Support-A • All levels of Configuration Support-B
52R	• All levels of Configuration Support-A • All levels of Configuration Support-S
81R 82R	All levels of Configuration Support-A
11R 11L 12R 61R 62R	• All levels of Configuration Support-B • Configuration Support-A Release 5.0 and above • Configuration Support-S Release 5.0 and above
13R 63R 91R 92R	• All levels of Configuration Support-B • Configuration Support-A Release 5.0 and above
21R 21L 23R 90R	Configuration Support-B Release 2.0 and above
12L 22L	Configuration Support-B Release 3.0 and above

Configuration Support-A: Configuration Support-A is the original microcode offered with the 3174 Controller. It provides all of the base functions of the 3174 and includes support for the following features:

- Asynchronous Emulation Adapter (AEA)

- 2.4 MB diskette drive

- 20 MB fixed disk

- Type 1 communications adapter (V.24/V.28 or V.35) used as an alternate configuration.

- Type 2 communications adapter (X.21) used as an alternate configuration.

- Type 3 communications adapter (4 Mb Token-Ring) used as an alternate configuration.

- Type 3A communications adapter (4/16 Mb Token-Ring) used as an alternate configuration.

- Storage expansion to 4 MB

- Central Site Customizing Utility

- Central site change management

- Intelligent Printer Data Stream (IPDS)

- Multiple Logical Terminals (MLT)

- Country Extended Code Page (CECP)

- Response Time Monitor (RTM)

- Terminal Multiplexer Adapter (TMA)

- Network Asset Management (NAM)

- Serial Original Equipment Manufacturer Interface (SOEMI)

- Encrypt/Decrypt.

The current release of Configuration Support-A is release 5. This is also the last release of A. However, microcode fixes and support enhancements will be made available as Engineering Changes.

Configuration Support-S: Configuration Support-S is delivered as part of the 3270 Token-Ring Gateway feature #3026. In the past it was also supplied with the 4 Mb gateway #3025.

Configuration Support-S includes all the function of Configuration Support-A plus the gateway support. Configuration Support-S Release 5 is the last planned release of this microcode.

Configuration Support-B: Concurrent with the announcement of the IBM 3174 Establishment Controller, IBM also announced Configuration Support-B.

Configuration Support-B Release 1 included all the features of Configuration Support-A and Configuration Support-S except for the Encrypt/Decrypt support, the 7232 Dual Control Unit Multiplexer, and Physical Services Header (PSH) protocol on X.25 host connections. In addition some new functions were included:

- Storage expansion to 6 MB

- Concurrent Communication Adapter

- Single Link Multi-Host option

- Token-ring gateway enhancements including:

	Group Poll
	250 DSPU support.

Since release 1, there have been three more releases.

Configuration Support-B Release 2: Release 2 was a significant release; it provided many new functions and feature support including:

- Local Format Storage

- Enhancements to AEA including:

	8-bit ASCII support enabling NLS and graphics
	UDT (user defined terminal tables)
	UDX (user defined translate tables)

- Type-ahead

- Null/space processing

- Extended Vital Product Data

- Remote Console Facility

- Support for models 21L, 21R and 90R.

Configuration Support-B Release 3: Release 3 offers the following:

- Enterprise Systems Connection (ESCON) Channel on Models 12L and 22L

- Support for 3299 Model 32

- Enhancements to Token-Ring Gateway support including:

  > Ability of Token-Ring attached devices to access a host via the CCA
  > Full duplex line support for gateway
  > 8KB RUSIZE for Model 12L and 22L gateways.

- Multiple host access over X.25 services

- Support for X.25 1984

- Remote IML via on-line tests (and remote console support).

Configuration Support-B Release 4: Release 4 offers the following:

- Support for the 3270 Port Expansion feature 3100 (64-port)

- Support for 4 MB storage expansion feature providing 6 MB total storage on Models 61R, 62R, and 63R.

Note:

> Configuration Support-B Licensed Internal Code is an optional feature. It is available under the following feature codes for the different models:
>
> - *Feature 5010* for models 0XX, 1XX, and 2XX
>
> - *Feature 5060* for models 51R, 53R, and 6XR
>
> - *Feature 5090* for models 90R, 91R and 92R.

Specify codes for microcode: The following "specify codes" are available with the microcode levels supporting the current models. They are for use when central site customization and distribution of microcode is desired.

- **Feature 9005 Inhibit LIC Shipment**

  This specify code blocks the shipment of Licensed Internal Code (LIC) or microcode and related documentation with the controller. A Limited Function Utility Diskette, which allows no customization is shipped instead.

  You would specify this feature for remote 3174 Controllers to which microcode is delivered from a central site, either physically or electronically.

- **Feature 9006 Central Site Diskette Distribution Aid**

  This specify code identifies the 3174 as the central site controller and enables the customer to order all combinations of:

  > Configuration support levels
  >
  > RPQs
  >
  > Downstream Load diskettes.

  This specify code provides automatic shipment of microcode updates.

- **Feature 9007 Configuration Support-S Central Site LIC Shipment**

This specify code is provided to enable the Central Site customer to order Configuration Support-S LIC for the Central Site 3174 for customizing purposes only. This Specify code is to be used in conjunction with specify code 9006, which identifies the Central Site 3174. This specify code cannot be ordered on 3174s that have the inhibit LIC code (9005) or on 3174s that are not designated Central Site 3174, with (9006).

- **Feature 9008 Central Site Distribution Aid for Models 21L and 21R**

  This specify code identifies the Model 21L or 21R as the Central Site 3174. When the Model 21L or 21R is the Central Site 3174, only Configuration Support-B Release 2 and future releases apply. Therefore, all the apply. Therefore, all the 3174s in the distribution network must operate at Configuration Support-B Release 2 or beyond. It enables a Central Site customer to order the LIC, RPQs, and Downstream Load Device Code for the central site 3174.

- **Feature 9009 Central Site Distribution Aid for Models 12L and 22L**

  This specify code identifies the Model 12L or 22L as the Central Site 3174. When the Model 12L or 22L is the Central Site 3174, only Configuration Support-B Release 3 and future releases apply. Therefore, all the 3174s in the distribution network must operate at Configuration Support-B Release 3 or beyond. It enables a Central Site customer to order the LIC, RPQs, and Downstream Load Device Code for the central site 3174.

1.4.3.2 Microcode RPQs

An RPQ (Request for Price Quotation) is an alteration or addition to the functional capabilities provided by the controller microcode. An RPQ diskette, purchased from IBM, can contain up to 30 RPQs. Up to ten RPQs can be installed on a 3174 Control diskette. This is done by a process called merge RPQ, which is chosen from the 3174 Controller customization panel.

Sometimes an RPQ is in the form of a new set of Control and Utility diskettes.

Some of the RPQs available are described in this section.

3174 Peer Communication RPQ (8Q0718): The 3174 Peer Communication RPQ provides the following function for DOS workstations attached to the 3174 via coax ports.

- Peer-to-Peer communications between DOS workstations allowing them to form a local area network segment

- Bridge function to access the IBM Token-Ring network for functions such as print/file servers

- Local management function for problem determination of the LAN segment.

Together with the co-requisite IBM 3174 Workstation Peer Communication Support Program, 5799-PHL (3174 WPCSP) in each DOS workstation, the 3174 Peer RPQ supports local area network applications such as workstation access to file/print servers attached to the 3174 Establishment Controller as well as to workstations and servers attached to IBM token-ring LANs.

Support for local area network applications is provided concurrently with support for S/370 host access applications via existing IBM 3270 emulator programs.

This facility provides peer-to-peer communications among DOS workstations connected to the 3174 via IBM 3270 Connection cards or IBM 3278/3279 Emulation Adapters using wiring media currently supported for 3270 terminal attachment.

The following IBM LAN application programs have been tested for compatibility with 3174 Peer Communication:

- IBM Personal Communications/3270 Version 1.01 *(see note 1)*

- IBM PC LAN Program 1.32

- IBM DOS LAN Requester packaged with the IBM OS/2 LAN Server V1.2

- IBM Advanced Program to Program Communications/PC 1.11

- IBM 3270 Workstation Program V1.12

- IBM AS/400 PC Support Version 1 Release 3 *(see note 2)*

- IBM PC/Host File Transfer and Terminal Emulator Program (FTTERM) V2.1 *(see note 3)*.

Notes:

1. IBM Personal Communications/3270 supports 3174 Peer Communication only when used in a conventional memory environment. Running in Expanded Memory Specification (EMS) memory is not supported.

2. AS/400 PC Support is not supported with 3278/3279 Emulator Adapter P/N 1602507.

3. FTTERM is supported when communicating with the IBM LAN Asynchronous Communications Server (LANACS).

IBM PC 3270 Emulation Program Entry Level is not compatible with 3174 Peer Communication.

In order for a 3174 Peer Communication device to communicate with an SNA host application through the 3174 (all applicable models except the 3174 X3R), the 3174 is configured as a Token-Ring gateway. The Peer Communication devices are treated as DSPUs by the host and they are configured as such in the gateway.

Peer devices are not restricted to using the 3174 gateway but may use any appropriate gateway.

Capability is provided for the management of the LAN segment formed by a single 3174 controller and the workstations attached to it. These facilities are accessed via the online tests in the 3174 which are designed to diagnose and solve problems and to permit changes in the configuration of the network. These online tests may also be accessed by using Central Site Control Facility (CSCF). CSCF allows multiple LAN segments to be centrally managed. Refer to *IBM 3174 Establishment Controller Peer Communication User's Guide* GA27-3887, for more detail. The 3174 Peer RPQ provides approximately one fifth (1/5) the aggregate bandwidth of a 4Mb Token-Ring. Response times for server/requestor file copy functions will be equal to or better than response times for devices attached to a 3174 Model 11L, running Workstation Program Version 1.x. in file transfer mode with a SNA host. Response time will

vary with the amount of data being transferred, the location of the server/requestor in the configuration, and the 3174 system load.

This RPQ is intended for customers who require both host interactive access and IBM Token-Ring connectivity for programmable DOS workstations, and who have existing 3270 wiring to the workstation, and have not rewired (or cannot rewire) the workstation location to the IBM Cabling System and an IBM Token-Ring Network.

For customers with existing 3270 wiring, this RPQ provides a complementary LAN alternative to IBM Token-Ring. It also provides a migration path for 3270 customers evolving from a computing environment that is exclusively host interactive, to an environment that also includes LAN capability.

There are several significant differences between 3174 Peer Communication support and a Token-Ring LAN that should be understood. For example, the 3174 Peer Communication support provides a unique MAC layer function. The 3174 Peer RPQ and the 3174 WPCSP together allow the 802.2 and NETBIOS protocols to operate in the 3174 Peer Communication environment. Any application that is specific to the Token-Ring MAC layer (802.5) function, WILL NOT operate on the 3174 Peer Communication support.

The following 3174 Models and token ring features can use this RPQ:

- 3174 MODEL 01L with FC3026, 3030 or 3044
- 3174 MODEL 01R with FC3026, 3030 or 3044
- 3174 MODEL 02R with FC3026, 3030 or 3044
- 3174 MODEL 03R with FC3030
- 3174 MODEL 11L with FC3026 or 3044
- 3174 MODEL 11R with FC3026 or 3044
- 3174 MODEL 12L with FC3044
- 3174 MODEL 12R with FC3026 or 3044
- 3174 MODEL 13R and 23R
- 3174 MODEL 21L with FC3044
- 3174 MODEL 21R with FC3044
- 3174 MODEL 22L with FC3044
- 3174 MODEL 51R with FC3026, 3030 or 3044
- 3174 MODEL 53R with FC3030
- 3174 MODEL 61R with FC3026 or 3044
- 3174 MODEL 62R with FC3026 or 3044
- 3174 MODEL 63R.

Configuration Support-B release 1.1 is required and 150 KB of additional 3174 storage is needed for the the 3174 Peer Communication RPQ.

The Peer Communication workstations require:

- One of the following computers and respective adapter:
  - IBM PC, PC-XT, PC-AT, and PS/2 Models 25/30/30-286 with the IBM 3278/3279 Emulation adapter
  - IBM PS/2 Models 50Z/55/60/70/P70/80 with the IBM 3270 Connection card
- IBM DOS 3.3 or 4.0
- The IBM 3174 Workstation Peer Communication Support Program
- 70 KB of memory is required in the computer for the IBM 3174 Workstation Peer Communication Support Program.

T2.1 Gateway RPQ (8Q0800) This RPQ extends the 3174 Token-Ring Gateway support to allow LAN attached devices to establish T2.1 and PU 2.0 sessions with channel and TP attached hosts.: The T2.1 gateway function parallels the existing PU 2.0 support. That is, a logical connection is provided to a LAN attached T2.1 node which gives the appearance that the node is directly attached to the host. The gateway serves to map either the device subchannel addresses or SDLC poll addresses to LAN MAC addresses and vice versa. The gateway function has been expanded to handle XID3 transfer between the host and the LAN devices. Upon successful completion of the XID3 sequence the gateway "opens" the linkstation and enters a passthrough mode for the data transfers between the host and devices. Link termination for T2.1 devices is dependent on the protocol of the upstream link (SDLC or Channel). Termination can occur as a result of host request, device request, or link failure.

Customization for the T2.1 RPQ will be similar to that of the current gateway support.

Prerequisites

- Type 3A Dual Speed (16/4) Communication Adapter.
- Configuration Support-B Licensed Internal Code.
- Models 01L, 01R, 02R, 51R may require additional storage.
- For 3174 remote models, VTAM V3R2 or later is required.
- For 3174 local models with a VM system, VTAM V3R3 is required.
- For 3174 local models with an MVS system, VTAM V3R4 is required.
- NCP V4R3 is required for 3725.
- NCP V5R2 is required for 3720 or 3745.

This RPQ will only operate for link connections made via the Primary communication link (TP or Channel) to an SNA host.

Enhanced Language RPQs: The following enhanced language RPQs which are available for the 3174 provide keyboard and (when applicable) bi-directional cursor support for 3270 terminals.

- Arabic-XBASIC (8K1306)
- Arabic-XCOM2 (8D0312)
- Belgian (8K1346)

- Cyrillic (8K1304)

- Greek (8K1303)

- Hebrew-Bulletin (8K1307)

- Hebrew-A (8D0311)

- Icelandic (8K1301)

- ROECE Latin (8K1305)

- Swiss (8K1345)

- Turkish (8K1302)

- Yugoslav (8D0313).

1.4.3.3 Offline Microcode Utilities

Offline procedures are provided to aid in the configuring and managing of 3174 microcode and to provide offline diagnostic functions. They are invoked from a "Master Menu" panel that is displayed on a Control Unit Terminal (CUT) or a DFT/E capable device (such as a 3472-G) attached to port 26-00. 3174 offline procedures can be used to:

- Customize the control diskette - provides the ability to:

  - Configure control unit microcode.

  - Define printer authorization matrix.

  - Define devices (Configuration Support B only).

  - Perform Central Site Customization for Network Controllers.

  - Media Management.

  - Merge RPQs.

  - Modify keyboards.

- Merge Downstream Load: Provides the ability to merge the microcode required by two or more downstream-load terminals, such as the 3290, 3193, and graphics models of the 3179, 3192 and 3472 display stations on to one diskette or fixed disk. Use of this procedure requires an optional Diskette Drive or fixed disk drive.

- Copy Files: Through its seven variations, provides a means of duplicating diskettes, copying specific data areas, and copying with configuration modifications from one control diskette to another. The "Full Copy" and "Modify and Copy" options require the second diskette drive feature. This feature is not required for the other copy options, but their usage is enhanced with it, since the need for diskette swapping is reduced.

- Diagnostics: Provides a full range of offline diagnostics. Diagnostics are selected from a menu panel when this utility is invoked.

- Microcode Upgrade: Provides a process to update a newly released Control diskette with the configuration data from the down level Control diskette, thus greatly reducing the time required to execute this task.

- Encrypt/Decrypt: This facility is only available with Configuration Support A and S. It provides facilities to load a master key value into the Encrypt/Decrypt adapter, display the Verify Pattern that is resident on the Encrypt/Decrypt diskette, verify the current master key value, and test the

Encrypt/Decrypt feature. It is applicable only to Models 1R, 2R, and 3R that have the Encrypt/Decrypt feature #3680, or Models 1R, 2R, 11R, and 12R which have RPQ 8Q0742.

- Identify Customizing Keyboard: Expands the types and configurations of keyboards from which the 3174 customization process can be executed. It is applicable primarily in World Trade Corporation countries, due to the variability of the keyboard layouts found there.

1.5 Communications Network Management

Communication Network Management Products support IBM 3174 error detection and configuration reporting. However, the enhancements and changes made in the 3174 require the following programs at the specified levels for central site problem determination:

- For all models except those with optional IBM Token-Ring Network 3270 Gateway feature.

  - NPDA V3R2

    - APAR PP43332 (PTF UP90223) for MVS/370

    - APAR PP43337 (PTF UP90224) for MVS/XA

    - APAR VM22413 (PTF UV90110) for VM

  - NetView

- For models with the optional IBM Token-Ring Network 3270 Gateway feature.

  - ACF/VTAM V3R1.1

  - NetView

Response Time Monitor (RTM) is a base IBM 3174 function. It is supported at the host by:

- NLDM Rel 2 for VM/SP

- NLDM Rel 3 for MVS/370, MVS/XA, and VSE

- NetView

RTM may also be used without host support.

1.6 Personal Computer Support

1.6.1 IBM PC 3270 Emulation Support

The 3174 supports IBM Personal Computers configured to operate with:

- The IBM Personal Computer 3278/79 Emulation Control Program Version 1, P/N 6024134 and Version 2, P/N 8665780.

- The IBM PC 3270 Emulation Program, Entry Level, P/N 59X9904.

- The IBM PC 3270 Emulation Program Version 3.0, P/N 59X9969.

- The RT Personal Computer 3278/79 Emulation Program, PP 5669-052.

- IBM Virtual Machine/Personal Computer Release 2 P/N 6467040.

- PC/VM Bond Release 2 P/N 6467022.

- Personal Communications/3270 Version 1.01, P/N 15F7121

- OS/2 Extended Edition Version 1.2, P/N 15F7143 or 15F7144

- OS/2 Extended Edition Version 1.3, P/N 15F7195 or 15F7196

1.6.2 IBM PC File Transfer Support

The 3174 supports the following Host File Transfer Programs which allow the above PC configurations to perform file transfers.

- PC Bond, PP 5664-298

- VM/PC, PP 5664-319

- MVS/TSO, PP 5665-311

- VM/SP, PP 5664-281

- DISOSS, P/N 6476054 Version 1 Release 2

- PROFS, PP 5664-309 Version 2.

1.7 National Language Support and CECP

The 3174 offers two levels of language support; the basic support and an extended support called Country Extended Code Page (CECP).

1.7.1 National Language Support (NLS)

The 3174 supports the following languages for keyboards, code pages, and character generators:

- Austrian/German

- Belgian

- New Belgian

- Brazilian

- Canadian Bilingual

- Cyrillic

- Danish

- English (UK)

- English (USA)

- English (USA ASCII International)

- English (USA ASCII-7)

- English (USA ASCII-8)

- Finnish

- French

- Greek

- Icelandic

- Italian

- Japanese English

- Japanese Katakana

- Netherlands

- Norwegian

- Portuguese

- ROECE Latin

- Spanish

- Spanish-speaking

- Swedish

- New Swiss/French

- New Swiss/German

- Thai

- Turkey

- Yugoslav.

In addition, some specialized keyboards are supported including:

- APL

- APL2

- EBCDIC (WT)

- TEXT.

1.7.2 Country Extended Code Page (CECP)

The Country Extended Code Page (CECP) feature is covered in detail in the IBM ITSC publication *IBM 3174 CECP Migration Issues* GG24-3380.

CECP is an extension of each Latin-based national language code page, to a 191-code-point language code page for the following languages.

- Austrian/German (EBCDIC 76)

- New Belgian (International)

- Canadian Bilingual

- Danish

- English (UK)

- English (US)

- Finnish

- French (AZERTY) (105)

- Italian

- Netherlands

- Norwegian

- Portuguese

- Spanish

- Spanish-speaking

- Swedish

- New Swiss/French (International)

- New Swiss/German (International).

When used in conjunction with CECP-capable displays and printers, CECP allows you to use symbols from languages other than the one for which the 3174 Controller is customized.

The following devices support CECP when attached to a 3174.

- 3191 models D, E and L

- 3192 models C, D, F, L and W

- 3472 InfoWindow

- 3812 printer model 2

- 3816 printer models 01D and 01S

- 4224, 4234 and 6262 printers

- ASCII attached devices

CECP is invoked by responding to customization question 123 with a "1" and it requires the keyboard selected in question 121 to be one of the CECP-capable languages listed above. It will be active then for all CECP capable devices powered on and connected to that controller.

To understand CECP, it is first necessary to know what a code page is. A code page is the table which translates the hexadecimal characters sent to the 3174 into commands or graphical characters for displays or printers. These characters are referred to as *code points*. 3270 Commands are the same for all languages and they are confined to X'00-3F'. The remaining code points (X'40-FF') are for graphical characters; however they are not all used. Different languages can use different code points for their own unique characters.

Before CECP, there were inconsistencies between the different implementations, some languages used different code points for the same character.

For CECP, one universal character set has been defined. It contains 190 characters plus a "space" required to support all CECP languages. It is known as *character set 697*.

There are host programming considerations for CECP. First the host application must be capable of accepting without error all the 190 CECP code points. Secondly the application must be using the code points as CECP characters. You should be aware that if you are using some of the code points which were unassigned before CECP was available that you could encounter problems with existing application data bases. See "System Considerations" below.

1.7.2.1 System Considerations

You may need to consider whether host programs accept CECp data before customizing for CECP. When CECP is supported, conventions may need to be adopted. IBM host applications, vendor applications, and in-house applications may be affected.

CECP generally doubles the number of valid I/O code points generated from a keyboard and sent inbound. It is the customer's responsibility to ensure that host programs and data bases can accept CECP data. Be careful of the following:

Host filters

Host use of previously defined I/O code points

Data integrity.

You may be required to keep track of which data sets will or will not be CECP.

Host Filters: Filters in host programs could generate undesired results. The filters might reject or translate some CECP-unique graphic code points from their original values to incorrect values. This might cause a data loss, a program check, or undetected, erroneous alteration of data.

Host Use of Previously Undefined I/O Code Points: Since a user could not directly enter previously undefined character code points, a host program could be using those code points for other purposes without causing conflicts before CECP support. However, with CECP support, host usage of these previously undefined code points may now result in conflict with the CECP usage.

One example would be if a host application (such as a data base manager) used the previously undefined character code points as control codes (such as end of file markers).

Another example would be a host application that used the previously undefined character code points as values for a special font (such as APL).

2. Pre-Installation Planning

2.1 Introduction

The smooth installation of any system or subsystem is normally directly proportional to the amount of thought that has been focussed on the project prior to installation. The 3174 is no different in this respect to any other system or subsystem.

Customers that are familiar with the installation of 3274 Control Units will find that the 3174 is an easier proposition for the reasons outlined in the introductory chapter. However this does not mean that it should be approached in a less professional manner, because by using the new aids and techniques that are provided by the 3174, a customer can make real productivity savings on the installation, and maintenance of the device.

2.1.1 Planning

The starting point prior to installation is the *IBM 3174 Site Planning Manual* (GA23-0213).

A Site Planning Checklist is contained in the *IBM 3174 Site Planning Manual* (GA23-0213). It is not be reproduced here. Please use the one contained in that manual.

The installation may not always be of a new 3174. It could be one of the following:

- Installing a new 3174 or expanding an existing 3174.

- Relocation of a 3174.

- Replacing and removing existing control units.

2.1.2 Host Attachment

Host attachment of the S/370 channel and link attached controllers is exactly the same as an equivalent 3274. I/O and NCP generation should be done as though an equivalent 3274 was being attached.

2.1.2.1 Local

The 3174 Model 1L/11L/21L attaches to the host via Channel Interface Cables (Bus and Tag) in exactly the same way as the 3274 channel models. This is the only part of the installation procedure that needs to be done by the IBM service representative. The rest of the installation is CSU (Customer SetUp).

A difference between the 3274 and the 3174 however is that the Bus and Tag need to be between .455 meters (1.5 feet) and .915 meters (3 feet) longer to accommodate the 3174. The floor cutout for the cables is different as well. This is because the channel cables attach to the lower right of the 3274 whereas they attach to the top left of the 3174. The 3174 Models 12L and 22L attach to the S/390 ESCON channels via optical fiber cable.

2.1.2.2 Remote (TP Link)

When attaching the Communications cable (also known as; modem cable, data set cable or TP interface cable) to the 3174, it is important that you use the cable supplied with the 3174. Cables from a 3274 do not work. The reason for this is that the DCE interface is at the end of the IBM supplied cable, not at the 3174 Communications Adapter socket.

An example of this is the V.35 cable. It looks like a V.24 cable with an extra stub cable attached to the end of it. This is not the case and attempting to remove the V.35 stub cable and use the resultant cable as a V.24 cable will result in failure. Also, the 3174 has the capability to detect what kind of cable is attached. If an improper cable is attached, an error occurs.

2.1.2.3 Token-Ring (Upstream)

The 3174 Models X3R provide for token-ring communication to an SNA host. Communication to the host is through a host gateway. Typical gateways are: an IBM 37XX Communication Controller with the Network Control Program Token-ring Interface (NTRI) feature, or a 3174 Model with the Token-ring Network 3270 Gateway feature. The Token-ring Network 3270 Gateway feature is available on local and remote attached 3174 models.

The 3174 Models X3R have a token-ring adapter that provides attachment to the IBM Token-Ring Network.

Like the other large 3174 models, up to 32 terminals may be attached to the model 3R, 13R, 23R and up to 16 terminals may be attached to the model 53R and 63R. The model 13R may have the 3270 Port Expansion Feature installed for attachment of up to 64 terminals.

2.1.3 3270 Terminal Attachment

The most significant 3270 terminal attachment features on the IBM 3174 are

- Three ways of attaching terminals

  1. Direct

  2. Via Integrated TMAs (Terminal Multiplexer Adapters)

  3. Via IBM 3299 Terminal Multiplexers

  4. A mix and match of the previous

- Direct attachment to the IBM Cabling System Type 1/2 data grade media; no baluns needed when the Dual Purpose Connector (DPC) is used.

2.1.3.1 Cabling

The IBM 3174 is designed to work with either coax or the IBM Cabling System both with or without baluns. However you should be aware that if you use coax, attached devices may be up to 4920 feet (1.5km) away, whereas if the IBM Cabling System is used, attached devices may be up to 3280 feet (1.0km) away if the device requires a balun, or 4920 feet away if the device supports the DPC. These distances refer to the terminal if it is attached to a TMA (Terminal Multiplexer Adapter) or to the IBM 3299.

- Coax

  If you use coax then your cabling will be exactly the same as for a 3274.

- IBM Cabling System

  If you use the IBM Cabling System then the 3174 has a useful new facility that you should know about.

  Up until recently, in order to use a 3270 type device on the IBM Cabling System media, it was necessary to put a balun (BALancer/UNbalancer) at both ends of the cable. This meant that all of the ports on a controller had to have baluns attached and the device at the other end of the cable also had to have a balun.

  Baluns are no longer required at the controller end of the cable when a DPC is used. This is because the Terminal Adapter and the TMAs have been designed with the IBM Cabling System in mind. Devices at the other end of the cable may or may not need a balun depending on the device. For instance the IBM 3299 Model 2 does not need a balun at its end of the cable (3299 Model 2 requires the DPC).

- TMAs or 3299 Terminal Multiplexers

  - Large Controllers (not 2XX)

    The large 3174 models have an adapter called the Terminal Adapter (TA). This has four BNC connectors and can be used to attach up to four terminals. However it would normally be used with either a TMA or a IBM 3299 Terminal Multiplexer attached to each of the four ports, giving a total of up to 32 ports on each 3174. The large 3174 models may also have the 3270 Port Expansion Feature installed. This feature provides four more BNC connectors which would be used with either a TMA or a 3299 Terminal Multiplexer. The feature provides an additional 32 ports for the large model 3174s so that a total of 64 devices may be attached.

  - Terminal Multiplexer Adapter (3174 0XX, 1XX and 2XX only)

    This is a 3174 Adapter that is customer installable and is normally plugged into the logic board. These TMAs use different positions in the logic board depending on the 3174 model and other installed options, for reference a 3174 Plug Chart is shown in the appendix of this manual. Each TMA is then attached to one of the four ports of the Terminal Adapter with a short coax cable. You may now attach up to eight devices to the ports on the TMA. If you are using the IBM Cabling System, you do not need baluns when the DPC is used.

  - IBM 3299 Terminal Multiplexer

    The IBM 3299 Terminal Multiplexer is a device that multiplexes the data streams from category A 3270 devices onto a single cable. It has connectors for attaching the terminals and a connector for attaching a cable to the controller. The device is powered from a normal wall power outlet. There are three models of the 3299. The Model 2/3 may attach to the controller via coax cable or the IBM Cabling System with a DPC. The model 32 can attach via coax, fiber optic or IBM Cabling System media, see "Terminal Multiplexer Adapter" on page 6.

    If you use the IBM Cabling System with the Model 2, a DPC at the 3299 end of the cable is required, when used with the IBM Cabling System (ICS), some IBM terminals require baluns at their end of the ICS cable.

    You may attach IBM 3299 Terminal Multiplexers to any of the four ports on the Terminal Adapter instead of a TMA. This means that you may

have a single cable (coax or IBM Cabling System) running out to a cluster of users, where you install an IBM 3299. It is at this point that you attach the terminals to the IBM 3299. This can give you considerable savings in the cost of cables and can make problem determination easier in the future by cutting the number of cables all running to the same area of the building. Or you may 'mix and match TMAs and 3299s on a single 3174, thereby giving you the best of both worlds.

- Intermediate Controllers (5XR/6XR)

  TMAs are not available with these 3174 models. These controllers can attach up to 16 terminals. At the back of a medium 3174 are nine BNC connectors labeled 0 to 8. All of these ports may be used to attach terminals, giving up to nine devices on each 3174. However ports 0 and 8 are special ports and may have IBM 3299 Terminal Multiplexers attached to them. This means that by using one IBM 3299 attached to port 8 and attaching terminals to ports 0 to 7 you can have up to 16 terminals attached. Alternatively you may attach an IBM 3299 to port 0 and then attach the terminals to it. With this option then ports 1 to 7 can not be used.

- Small Controllers (8XR/9XR)

  These Controllers can attach up to eight terminals. At the back of the unit there are four BNC connectors labeled 0 to 3, you can have up to four terminals attached directly to these ports or attach an IBM 3299 to port 0 for a maximum of eight terminals, in this case ports 1-3 can not be used.

  Note: 3174 Model 90R only has one BNC port for connection of a terminal or a 3299 Model 2 or 3.

2.1.4 Physical Installation

The physical installation of any of the IBM 3174 models is very easy. The new machines are all Customer Setup (CSU) so Customer Engineering (CE) is only needed to attach the Channel Interface Cables (Bus and Tag) to the Models 1L/11L or 21L. The CE can also change the priority of the 3174 on the channel.

To install a 3174 is simply a matter of unpacking the machine, installing any features and cables. Microcode may be customized at this time from the planning worksheets and the machine is IMLed.

All of the optional adapters are in the form of customer installable modules. For example, in order to install 16 extra ports, it is simply a matter of plugging in two TMA adapters and plugging a short, internal coax cable between them and the Terminal Adapter.

2.1.5 Customization

This can be thought of in two phases:

- Planning - mostly to be done prior to installation.

- Procedures - mostly to be done at installation.

For a full description of this, please refer to "Microcode Customization" on page 41.

2.1.6 9309 Rack Enclosure

The 9309 Rack Enclosure provides mounting space and power distribution for the IBM 3174 Establishment Controller models 2XX. The 9309 enclosure is available in two models, the Model 1 and the Model 2:

- The Model 1 is 1.0m (39.3 in.) high

- The Model 2 is 1.6m (62.1 in.) high.

Both models conform to the 19-inch mounting dimension and universal spacing hole pattern in the Electronic Industries Association (EIA) RS-310-C standard for racks, panels, and associated equipment. Both models of the 9309 rack feature:

- Minimal floor space requirement

- AC power distribution and sequencing of six outlets

- Emergency power-off control.

The outlets provide 220-volt single phase power. Single phase and 3-phase versions of the rack enclosure are available. Each 9309 rack enclosure is provided with an emergency power off control.

The 3174 2XX models are specified as being 10 inches in height, but in reality will take approximately 10.5 inches due to the hole placement (in a 9309 rack).

The 3174-2XX are six EIA units high, so five model 2XX can fit in an IBM 9309 Model 2 rack.

In terms of EIA units:

- the 9309 Model 1 can contain 19 EIA units.

- the 9309 Model 2 can contain 32 EIA units.

Thus, five 3174 model 2XX take 30 EIA units of the 32 available in a 9309-2.

Note: An EIA unit is 1.75 inches.

In the *3174 Site Planning Manual* (GA23-0213), the cable specifications for System/370 channels used for interconnecting rack mounted 3174 21Ls **within** the rack are shown as:

- Cable Group 0790 (2.5 ft)

- Cable Group 0799 (4.5 ft)

- Cable Group 0185 should be used for cables to and from a 9309.

Full recommendations on rack mounting are contained in the 3174 Site Planning manual.

Feature #9030 provides rails for mounting the 3174 21L in a 9309 rack and provides a shortened power cord for 9309 use.

Note: This specify code is not orderable for the 3174 21R.

3. Hardware Installation

3.1 Introduction

The 3174 is designated a Customer Setup (CSU) machine. This means that the customer is responsible for unpacking, installing, testing and customizing the controller. If you are installing a local controller Model 01L, 11L or 21L, there are a few things you will need to have performed by the IBM service representative.

3.1.1 S/370 Channel Attachment

For local Models 01L, 11L and 21L you will need an IBM service representative to perform the following tasks:

- Connecting the 3174 Controller to the channel using bus and tag cables.

- Connecting the power control and sequence cable if required.

- Altering the channel priority switches if required. (The default setting is for *high priority*.)

- Checking the UCW setting.

The 3174 customization should be completed before the service representative is called in. There are some customization questions related to the channel operation including:

- **104** Channel address

- **105** Channel address - upper limit

- **222** Command retry

- **224** Mode of data transfer

- **225** Channel burst size.

You may need to consult your service representative or Systems Engineer to help you decide on the best values to use for your installation.

3.1.2 CSU Installation

To install a 3174:

1. Review any 3174 installation tips available on INFOSYS* or IBMLink*

2. Remove packaging and place the machine in the position that it will occupy when operational.

3. Power switch

   - Model 1L/11L/21L - Turn the Channel Interface switch to offline, the power control to local and the power switch to 0 (off).

   - All others - Move the power switch to 0 (off).

4. At this time install any optional features that you have and attach any remote communications cables or token-ring cables to the cards.

5. Route the power cord out of the front bottom of the control unit and plug it into a grounded electrical outlet. -

6. Install the *utility diskette* and run diagnostics as described in the *Setup Instructions* in the User's Guide for the machine.

7. Attach a CUT or DFT/E terminal to port 0 and perform the customization.

8. Communications Cables

   • Model 1L/11L/21L - Get the IBM service representative to attach the channel interface and power sequencing (if used) cables to the machine.

   • Model 12L/22L - Connect fiber-optic cable as per the *Setup Instructions* in the User's Guide for the machine.

   • Attach the communications cable to the data communications equipment or equivalent.

9. Attach the terminal cables to the machine.

10. Make sure the customized control disk is ready and the DSL diskette (if needed) is in drive two and IML the machine.

11. Turn the channel interface switch to online for Models 1L/11L/21L and vary the channel addresses online.

12. Activate the controller and devices.

4. Microcode Customization

4.1 Introduction

Customizing is the term used to describe the process of tailoring the 3174 microcode supplied by IBM with the 3174 on 1.2/2.4MB, 5.25 inch diskettes, to support various displays, and printers, and method of host attachment that a particular 3174 will handle.

One of the problems of customization and the 3274 was its "user friendliness", or comparative lack of it, plus there is often the need to treat each customization slightly differently than the last. However the process is now much faster and easier.

The introduction of the IBM 3174 Establishment Controller simplifies the customization process for all users while still retaining the basic advantages of a customizable device:

- Flexibility

- Ease of adding new features and functions

- Ease of upgrading the microcode level

- Central site customization.

The simplification is of course particularly relevant for the user with only a small number of controllers, where the need to customize infrequently precludes the development of a high level of skill in this area. However, because of the considerably reduced amount of time required to customize, the large user can also make considerable productivity savings in line with this time saving. Those larger organizations will also probably want to make use of *Central Site Customizing*, which is a 3174 function.

4.1.1 Microcode Differences in Support A, S, and B

Several new questions have been added to all Configuration Support levels to support new function.

The functional differences between the versions A, S, and B, and the release differences in Configuration Support-B are discussed in "Licensed Internal Code" on page 18.

4.2 3174 Diskettes

All 3174 microcode is delivered on 1.2/2.4MB 5.25 inch diskettes. They contain all of the microcode that is needed for the day-to-day running of the 3174 plus various utilities used during:

- Customization

- Problem Determination.

These diskettes consist of:

- **Control Diskette**

  Two of these are delivered with every 3174. A backup may be made from an ordinary IBM High Capacity 1.2MB 5.25 inch diskette by using utilities contained on the Utility diskette. This may be done for all type 3174 diskettes and is a recommended procedure.

  Contains:

  - System Bring-Up

  - Operational Code

  - Languages

  - Some Diagnostics.

  After Customization is performed, the **Control Diskette** also contains:

  - Customization Parameters

  - Any Patches and/or RPQs applied.

  When a customized **Control Diskette** is IMLed, the 3174 is made "operational" (ready to put online and into production).

- **Utility Diskette**

  Contains the following Utilities:

  - Configure

  - Merge DSL

  - Copy Files

  - Diagnostics

  - Media Management

  - Microcode Upgrade

  - Define Devices/Define PAM

  - Central Site Customizing.

- **Limited Function Utility**

  As the name implies, this diskette contains the utility microcode that would be used in 3174 Controllers that are being serviced from the central site. This diskette has fewer options, and has no functions for customization. This is an optional diskette that has to be specifically ordered.

- **DSL (Down Stream Load) Diskette**

  These optional diskettes are required to support devices/features that need a Downstream Microcode Load (DSL) such as the IBM 3290 Display Panel, the IBM 3179G/3192G/3472G Graphics Displays, the IBM 3193 Image Display or the 3174 AEA feature.

  - Contains Diagnostics, System Bring-Up, and microcode for DSL display stations.

  - The 3174 downstream loads this microcode to the display station.

  - DSL microcode can be merged onto one DSL diskette, or onto the fixed disk if present.

- **RPQ (Request for Price Quotation) Diskette(s)**

  This is an optional diskette that contains microcode required to support special features as required by individual customers. The code is merged onto the *control diskette.*

  — There may be up to 30 RPQs per diskette

  — 25K bytes of control diskette space is reserved for RPQs

  — Up to 10 RPQs may be merged onto a single control diskette.

  More detail on the types of RPQ can be found in "Licensed Internal Code" on-page 18.

4.3 The Customization Process

Customization of the 3174 is in two stages. These are:

- Planning

- Procedures.

Each of these stages may consist of a number of self-contained steps. Each stage may be carried out by a different person. Only the configuring steps have to be carried out; all of the others are optional.

4.3.1 Planning

Planning should revolve around the worksheets found in the back of the *IBM 3174 Planning Guide* (GA27-3844) for Configuration Support-A and S, and *3174 Planning Guide* (GA27-3862) for Configuration Support-B. These worksheets may be freely copied and a set should be made for each 3174 to be customized. When doing this only include those sheets that you are actually going to use; for example, you only need the BSC sheet from the various communications options sheets, if that is the protocol that you will be using. Additionally, if you do not intend to configure local copy facilities, do not bother to include the PAM (Printer Authorization Matrix) Worksheet.

There are various steps during the planning phase, all of which are optional except Configuring. All except the Copy Files, Merge, and Upgrade have worksheets at the back of the manual. These worksheets should always be used. It is much easier to re-configure 3174 microcode than the 3274 was. It is even easier if the original configuration is documented!

The planning steps (remember only step 1 always has to be done; the others are optional) are:

1. Planning to Configure/Reconfigure

2. Planning for Port Assignment

3. Planning for Response Time Monitor (RTM)

4. Planning for X.25

5. Planning for AEA

6. Planning to Define a PAM or Define Devices

7. Planning to Modify Keyboards

8. Planning to Copy Files

9. Planning for Merge Procedure

10. Planning for a Microcode Upgrade

11. Planning for a CSCM

12. Planning for Encryption (not supported in Configuration Support-B).

We will now look at each of these steps:

4.3.1.1 Planning to Configure/Reconfigure

Configuring needs to be done for each 3174 and is similar to the operation needed on a 3274. It is the only step that has to be carried out in order to put the 3174 into service; all of the other steps are optional.

At some time in the future a customer may wish to *Re-configure*. That is to say make changes to the hardware, the host, or terminal attachment. For example, perhaps some new printer has been added and one wishes to add a PAM or one has changed from BSC to SDLC host attachment. In this case a new worksheet should be made out reflecting the changes.

If the 3174 is being upgraded with a Concurrent Communication Adapter and being customized to support multi-host, please read "Multi-Host Connectivity" on page 239.

4.3.1.2 Planning for Port Assignment

This area is based on the response to question 116. The planning process is different based on the Configuration Support you are using.

Configuration Support A/S: If you will be providing the MLT function for CUT devices or if you will be attaching DFT devices such as the IBM 3290 Display Panel or the IBM 3270 Personal Computer, and using their multiple session facilities, then you have to use either option *1* or *2*. There are three possible responses to this question:

The first option *0* is the default and the easiest. If you take this option the customization process will automatically assign port addresses and you will not see panels :117 and :118. However, if you have a Model 0XX, 1XX, or 2XX, then 32 port addresses will be assigned, whether you need them (i.e., you have 32 devices attached) or not. This can be wasteful on addresses. A similar process is true of the Models 5XR/6XR and 8XR/9XR although in these cases only 16 addresses will be assigned to Models 5XR/6XR and 8 addresses to Models 8XR/9XR.

The *1* option allows you to specify just the number of sessions per port, and the customization program deals with the assigning of addresses. In order to do this simply fill in the number of sessions per port in column *#/S* on the *117:* Port Assignment Worksheet. You could put a *0* against any port not required at this time so that addresses will not be allocated to it. When you press *PF8* during the actual configuring process, you will see that the customization program has filled in panel *:118* for you. You cannot change panel *:118*, it is for your information only. If you wish to update this worksheet in the future by adding or removing devices and you use this option, all of the addresses will be re-assigned by the customization program. In order to avoid this and keep the

address assignment of the unchanged devices the same as before, you need to use option *2* below.

Option *2* is useful for the reasons above and is additionally useful if you have DFT devices or if you are using the MLT function for CUT terminals with multiple sessions and you wish to control the port assignments of individual sessions. If you leave this up to the program, then the ports will be assigned as follows. First addresses will be assigned sequentially to all of the primary ports starting at port zero. Then starting at the next available address, addresses will assigned to the secondary ports. Obviously if you wish to use addressing other than this, you need to use this option.

When using this option you need to do just a little more than with option *1*. In this case you have to enter the port addresses on :117 Worksheet in decimal. Once again the customization program will fill out sheet :118 for you.

Configuration Support B: In Configuration Support B, the response to question 116 can be one to four alphanumeriç digits. The four digits of this response are grouped into two pairs. The first (leftmost) pair represents the assignment of 3270 address. The second pair represents the assignment of AEA addresses. Depending on your configuration, you may not be specifying all four digits; you may have a one, two, or four-digit response. However, placement of the digits is crucial, so please make sure that you have done the necessary planning before starting this step.

The default response to question 116 is *0* The process for the default response in Configuration Support B is the same as that for Configuration Support A/S. You should use the default if you want only one 3270 address per port, do not want to plan for port assignment, and do not want any AEA addresses assigned.

You should use responses *1* or *2* if you plan to assign port addresses on a port-by-port basis, plan to use MLT on your CUT devices, plan to have ASCII devices access 3270 hosts, or plan to use DFTs with multiple interactive screens.

The *1* option allows you to specify just the number of sessions per port, and the customization program deals with the assigning of addresses. In order to do this simply fill in the number of sessions per port in column *#IS* on the *117:* Port Assignment Worksheet. You could put a *0* against any port not required at this time so that addresses will not be allocated to it. When you press *PF8* during the actual configuring process, you will see that the customization program has filled in panel *:118* for you. You cannot change panel *:118*, it is for your information only. If you wish to update this worksheet in the future by adding or removing devices and you use this option, all of the addresses will be re-assigned by the customization program. In order to avoid this and keep the address assignment of the unchanged devices the same as before, you need to use option *2* below.

Option *2* is useful for the reasons above and is additionally useful if you have DFT devices or if you are using the MLT function for CUT terminals with multiple sessions and you wish to control the port assignments of individual sessions. If you leave this up to the program, then the ports will be assigned as follows. First addresses will be assigned sequentially to all of the primary ports starting at port zero. Then starting at the next available address,

addresses will assigned to the secondary ports. Obviously if you wish to use addressing other than this, you need to use this option.

When using this option you need to do just a little more than with option **1**. In this case you have to enter the port addresses on :117 Worksheet in decimal. Once again the customization program will fill out sheet :118 for you.

Option **SX** (where X equals a number from 1 to 5) should be used if: 1) you want to specify the number of addresses (1 to 5) to be assigned to each 3270 port, 2) you have answered question 110 with a non-zero response, 3) do not plan to have ASCII devices access 3270 hosts, and 4) plan to use DFTs with multiple interactive sessions. Note that the same number of addresses will be assigned to all 3270 ports and the addresses will be automatically assigned. Responses S1-S5 are only allowed on SNA host attachments.

The above responses do not result in AEA port address assignment. You should enter **SX AY** (where X and Y equal numbers from 1 to 5) if you want to specify the number of addresses to be assigned to each 3270 port, the number of addresses to be assigned to each AEA port, and plan to have ASCII devices access 3270 hosts. The individual addresses are automatically assigned to each port. If you use this response, you should answer questions 110 and 703 with non-zero responses.

4.3.1.3 Planning for Response Time Monitor (RTM)

RTM is a standard function on all 3174s; ideally it should be used as part of the Communication Network Management (CNM) operation. However, even in a stand-alone form, it is a valuable tool in the management and control of information systems.

The first decision that you need to make when planning for RTM is, "Am I going to configure RTM?". If your answer is no then simply answer question 127 with two zeros and that is the end of it. As previously discussed, when RTM cost you extra money and storage, you may have thought that this was a good answer in your case. With those factors being removed you may like to revisit RTM and look again at its benefits, but this time at no extra cost.

If you decide to use RTM, then the first digit of question 127 asks you whether you have host support for RTM and its nature. Even without host support you can use RTM as a valuable management tool.

The second digit asks you for the point at which you wish to measure response times. It is up to you to decide which point of measurement is more meaningful to you. However, if this is the first time that you are using RTM, then this is a good opportunity to set some standards for your organization.

Having set question #127 to something other than two zeros, you will now get another panel during the configuration process, #128. This contains the measurement parameters and, like a number of questions during the customization process, IBM has supplied some default values. If you are using RTM for the first time, then why not just circle the responses on the worksheet for the defaults and let the configuration program supply the defaults this time. When you get more experience at using the data supplied to you by RTM, you may want to use parameters of your own or you may have a particularly sensitive application/set of users that you wish to monitor more closely than normal.

4.3.1.4 Planning for X.25

The major difference between configuring all the other protocols and X.25 is that if you answer question #101 with a 3 (X.25), then you get an extra panel *332* to fill in. This panel asks you for information about the X.25 network. The customizing questions refer to:

- Closed User Group
- Connection Size
- Window Size
- Packet Size
- Recognized Private Operating Agency
- Reverse Charge
- Throughput Class.

This information can be gotten from the person in the organization responsible for X.25.

4.3.1.5 Planning for AEA

The *Asynchronous Emulation Adapter* provides the ability for:

- 3270 displays to communicate with ASCII hosts
- ASCII displays to communicate with IBM hosts
- ASCII displays to communicate with ASCII hosts.

When planning for AEA you should use the planning worksheets 15 to 27 in the *IBM 3174 Planning Guide.* These should be copied and used for documentation support on each 3174.

When customizing an *Asynchronous Emulation Adapter* you are required to define at the *port* level "AEA station sets" and "AEA port sets," plus if you are planning for multi-host support, there are additional fields to define on the MLT panels.

4.3.1.6 Planning to Define a Printer Authorization Matrix (PAM)

This only needs to be done if you wish to have local printer defined (for doing screen copies).

It is one of those areas on the 3274 where some people will tell you how easy it is to do and others will disagree.

The new PAM definition is much easier both to understand and do. This is partly due to a re-design of the worksheet(s) and panel(s) used in the definition.

The PAM worksheet(s) (each worksheet having a corresponding panel) can be thought of as being in two parts, the top half and the bottom half. The top half defines the printer and the bottom half defines the terminals that may use it. By using multiple worksheets you may define up to 47 printers at five per worksheet (panel). You can define printers which are attached to 3270 ports as well as printers which are attached to AEA ports.

The first entry required is the *port* number of the first printer that you wish to define (this may not be port 26-00). The next field to enter is the *mode*. This can be:

- *0 = System*

  In this mode the printer can only do host initiated print, it cannot do local (screen) copy. As this is the default mode, this is the reason for not needing a PAM if you only wish to use the printers for host printing and do not need/want local copy facilities.

- *1 = Local*

  In this mode the printer can only do local copy. Although in an SNA environment the host can initiate a local screen copy.

- *2 = Shared*

  In this mode the printer can do both of the above. For the implications of this and further information, please refer to the *3174 Planning Guide*.

The b = next field, *Class*, allows one to group printers in classes. That is to say one may wish to group all of the same type of printers into a class, group all those printers on the same floor into a class, or group printers for some other reason.

Finally, in the bottom half of the page, simply put an "X" on the line corresponding with the printers number (line 1 for printer 1 defined above) under the port number(s) of any terminal(s) that you wish to authorize for local copy to that printer.

Installing the PAM is now simply a menu option described in the *"Procedures"* section of the Utilities Guide.

4.3.1.7 Planning to Modify Keyboard (CUT Mode Devices)

The purpose of the Modify Keyboard Utility is to create unique keyboard layouts to be used on IBM display stations supporting modifiable keyboards. With this utility, keyboard layouts can be tailored to meet specific user applications.

This utility is not for use with the DFT type of devices like the IBM 3290 Information Panel, IBM 3179-G Graphics Display, or the 3192-G Graphics Display. Information to perform keyboard modification for these units is found in the display description manual.

Most characters, symbols, and functions can be relocated, deleted, or duplicated from almost any key position.

Restrictions:

* The display station used with this utility must be connected to port 26-00 of the 3174. Terminals with modifiable keyboards must be working in 3278/79 emulation mode.

* Local keys that do not send scan codes to the controller should not be used for copy or exchange operations (SETUP, COPY or PLAY).

* Typamatic assignment can not be modified.

* Certain keys cannot be copied or moved.

Question 136 refers to four unmodified keyboards:

1. Converged Typewriter

2. Converged APL

3. Converged Data Entry

4. Enhanced Typewriter.

Question 137 refers to which modified keyboards, IDs A, B, C, or D, are to be configured.

The total number of unmodified and modified keyboards can not exceed four.

Use the "Planning to Modify Keyboards" chapter of the *3174 Planning* Guide along with the keyboard layout from the worksheet section. Decide which of the keyboards you wish to modify.

* Converged Typewriter

* Converged Data entry

* Converged APL

* Enhanced Typewriter

Fill out the keyboard layout worksheet using the "Planning to Modify Keyboards" section of the *3174 Planning Guide*. Then take this and use it with the Modify Keyboard Utility.

4.3.1.8 Planning to Copy Files

These processes are so straight forward that planning worksheets are not required or provided. Copies can be done easily by one person. It is simply a matter of following the menus.

Note: For all Copy Utilities you can copy from diskette to diskette, diskette to fixed disk, fixed disk to fixed disk, or from fixed disk to diskette.

The options here are:

1. Full Copy

   This process duplicates a diskette (including any configuration present) onto an ordinary 1.2MB or 2.4MB IBM High Capacity 5.25 inch diskette. The utility takes just over two minutes for the actual copying process whereas the *Copy Configuration* process takes less than half as long at about one minute. Copying to an unformatted diskette adds about 30 seconds to the process.

2. Modify and Copy

   This is similar to the Full Copy but allows you to change some responses to questions on the diskette that you are copying to. This is done by means of a menu and is fully explained in the 3174 Utilities Guide. This is a useful utility for organizations that wish to produce "Pattern Diskettes" which are then modified for individual controllers.

3. Copy Configuration

   This copies a configuration from one Control diskette to another. You can use this utility to make a backup Control diskette. You should carry out this process immediately after customizing the control diskette; it saves time and trouble should the original be lost or damaged. It only takes about one minute for the actual copying process, a considerable saving over the 3274. This process requires the Target diskette to already be formatted and contain Control Diskette data.

4. Copy Patches

   This utility copies the patch files from one disk to another that are the same microcode levels. This operation applies to Control or Utility disks.

5. Copy PAM

   This Utility is for copying the PAM from one Control diskette of the same configuration and release level to another.

6. Copy Modified Keyboards

   This utility copies modified keyboard tables from one Control diskette of the same configuration and release level to another.

7. Copy RPQs

   This copies merged RPQ data from one Control diskette to another. Be aware that doing so erases any RPQs already on the diskette that you are copying to. To move an RPQ from one diskette to another while retaining the original RPQs, use the Merge Procedure.

The following copy utilities are available with Configuration Support B depending on the release level you have.

1. Copy Device Definition

   This utility copies the Device Definition files from one Control disk to
   another. The Device Definition files can consist of one or more of the
   following:

   - Logical Terminal Assignment (LTA)

   - Printer Authorization Matrix

   - Prompts for Extended Vital Product Data

2. Copy Vital Product Data

   This utility copies the Vital Product Data files from one Control disk to
   another.

   Note: These Vital Product Data files are not created during 3174
   customizing. They are created when a user on an attached terminal uses
   Online Test 5 to enter Extended Vital Product Data for their terminal. Of
   course, to do this, the Control Disk must be IMLed in the 3174.

4.3.1.9 Planning for Merge Procedures

RPQs: This procedure allows you to:

- Include or omit RPQs resident on a Control diskette at IML time

- Delete RPQs from a Control diskette

- Merge RPQs from an RPQ diskette to the Utility Diskette.

You use RPQ Merge to move RPQs from the IBM supplied RPQ diskette to the
Utility diskette, from where you can include them or omit them from IML. This is
done by choosing the Merge RPQ option from the configuration menu.

Remember an RPQ diskette can have up to 30 RPQs on it. A Control disk has
space for ten RPQs whether they are *included* or *omitted* at IML. If you need to
make space then you can delete unwanted RPQs from the Control disk.

DSL Diskettes: This is the procedure for merging DSL diskettes. The planning
for and performing of the procedure can be integrated into one task carried out
by one person. No worksheets are required or provided.

If a 3174 has any DSL (Down Stream Load) device/feature attached to it then it
must have a second diskette drive or a fixed disk drive for the use of the DSL
disk. Examples of DSL devices are the IBM 3290 Display Panel and the IBM
3179-G Graphics Display. The DSL diskette contains microcode needed by the
DSL device which is entirely dependant on the 3174 for its microcode. When you
switch on a DSL device, the only operation that it is capable of is attempting to
receive its microcode from the 3174.

If you do not have any DSL devices in the cluster, then you do not need a DSL
diskette. However, you may need the second disk drive for other purposes
described in this document. If you only have one type of DSL device, then
simply put its DSL diskette into drive two. You do not need to use the merge
procedure. However if you do have more than one type of DSL device in the
cluster, then you need to merge the DSL diskettes onto one disk.

The procedure is to call a menu and follow it to merge diskettes *from* one
diskette (or more) *to* another.

4.3.1.10 Planning for a Microcode Upgrade

Periodically IBM may issue an upgrade *Control Diskette* for maintenance reasons and/or add new function for the controller. 3274 users are familiar with this happening in the past. However, in the past this has generally meant re-customizing. Not too bad if the Configuration Data is handy. Microcode upgrade on the 3174 is dealt with by a utility on the *Utility Disk* called "Microcode Upgrade". Using this utility the responses from the previously customized *Control Disk* are copied onto the new later level microcode diskette. No re-customizing is required. This procedure is so straight forward no worksheet is provided or needed.

4.3.1.11 Central Site Change Management

Using NetView Distribution Manager Release 2, 3174 Central Site Change Management (CSCM) is a method of managing and distributing microcode and customization data to 3174s in a SNA network. To use CSCM, you can build a library of 3174 customization data using the Central Site Customizing Utility (CSCU).

The facilities provided in the CSCU utilities include:

- Create the configuration for the 3174

- Configure the AEA

- Customize the PAM

- Device Definition (Configuration Support-B only)

The facilities provided in the CSCM utilities include:

- Transmit the configuration to a remote 3174

- Install the customization on the networked 3174

- Activate the 3174 which has had a microcode update.

To invoke the CSCU utility, you select an option from the *Master menu* when the utility microcode is loaded. The 3174 customization then requires additional questions, 500, 501, and 502, to be completed in order to use CSCM. Any 3174 that will be in the *central site change management* network has to be defined to VTAM as a CSCM device; this is achieved by coding an additional LU with a LOCADDR of *1*. For full detail of CSCM see *NetView Distribution Manager Release 2, 3174 CSCM Implementation Guide.* Also see the *3174 Central Site Customizing User's Guide*

CSCM is provided at Configuration Support-A, and Configuration Support-S Release 4, although it is recommended that Release 5 or Configuration Support-B is used.

4.3.1.12 Planning for Encrypt/Decrypt

> **Note**
>
> This feature is not available for the new Models 1XX, and 2XX. It is only supported by Models 01R, 02R, 03R. Also note that Encrypt/Decrypt is not supported in Configuration Support-B. It is only supported in Configuration Support-A and Configuration Support-S. Optionally, RPQ 8Q0742 supports Encrypt/Decrypt on Models 01R, 02R, 11R, and 12R, using Configuration Support-A/S.

This is the procedure for changing the master key value.

It is only used when you have the Encrypt/Decrypt adapter installed in the 3174. It should only be performed by a specially authorized person within the organization.

You need:

- The adapter security key (this is a real key)

- A master key value (this is a code).

- A control Unit ID

This is a very simple operation fully described in the Configuration Support-A/S *Utilities Guide*. If you do not have any one of the above list or are unable to obtain the information requested in the guide, then you are probably not authorized by your organization and should get someone who is authorized to carry out this procedure.

4.4 Customizing Procedures

This section describes the physical customization of the microcode using the worksheets constructed in the previous *"Planning"* section.

The *3174 Utilities Guide* contains instructions on how to perform the procedural parts of customizing. There really is not much to be said about these. If you have carried out the planning described in Section Two of the *Planning Guide*, it is just a matter of entering the worksheet information onto a display attached to port zero of the control unit. Like the 3274 this must be a CUT (Control Unit Terminal) such as a 3178 or similar. If you use a 3270-PC then it must be configured in CUT mode not DFT (Distributed Function Terminal). The *3174 Utilities Guide* contains information on how to do the following:

- How to display the Master Menu

- Identifying Customizing Keyboard

- How to Customize

- Configure the Control diskette

- Reconfigure the Control diskette

- Merge RPQs

- Modify Keyboards

- How to Merge DSL code

- How to Upgrade Microcode.

It is not necessary to explain these here as they are really so easy to use, being menu driven. Once you get past the first two, you just follow the menus. The first two are the ones needed to start the process. To display the master panel:

- Put the Utility Diskette in drive one.

- Next hold *Alt 1* and press *IML*.

  - The status display on the 3174 contains *40*

- Press *ENTER*.

If you have two diskette drives:

- Put the Utility Diskette in drive two.

- Next hold *Alt 1* and press *IML*.

- The Control Unit Display will read *40*

- Type *0240* on the keypad.

- Press *ENTER*.

Note: If your Utility code is on a fixed disk, you can load it by typing **0340** or **0440** and pressing **Enter**.

The 3174 loads the utility microcode and the display will eventually read *7000*. If the display stops and the number does not change after approximately 45 to 60 seconds, then check the number in *3174 Status Codes,* GA27-3832,

e.g; **7080:** There is some problem with the display attached to port zero. (It may not be powered up or the coax may not be connected). If the check light comes on, then look up the number shown on the 3174 Status display in the *3174 Status Codes* manual. This will tell you what the problem is.

Identifying Customizing Keyboard: If you wish, for example, to use one of the following keyboards to customize the 3174, then you need to identify it to the 3174 using the procedure Identify Customizing Keyboard in the 3174 Utilities Guide *before* you start the customization processes.

- Austrian/German

- Belgian

- French AZERTY

- Japanese English

- Japanese Katakana

If your keyboard is not one of the above, then you should ignore this procedure.

4.5 How to Select a Patch.

To allow the 3174 additional function, you may be required to apply a patch or patches. The patch procedure provides the ability either to add two types of patches or to process an existing patch. The two types of patches that can be added are PC and Zap patches. The *3174 Maintenance Information* manual for your 3174 Model includes detailed instructions on how to apply each type of patch.

4.5.1 How to display the 3174 Test Menu

If you just want to look at a customization panel, or error logs there is no need to run the utility disk. From a native attached CUT display you can do the following sequence:

- Holding down the Alt key, press the Test-Key.

- When "TEST" appears in the OIA (Operator Information Area) press PF12.

- Use the menu panels for simple selection

- Use the Alt/Test keys again to exit test mode.

These menus can also be displayed remotely using CSCF.

4.5.2 CSCF

Central Site Control Facility gives you the ability in NetView Release 3, to both view the configuration file of a remote 3174 and run online diagnostics.

From any NetView-supported console you can invoke the CSCF command and selective at the PU level ask for the details of any 3714 running Configuration Support-B. You are supplied at your remote terminal with the initial menu panel and a "new set of PF keys." From the *menu* you can then select what function you require, and CSCf issues commands down to the 3174 to retrieve the information.

For details see "Remote Console Facility" on page 309.

5. Token-Ring 3174

5.1 Introduction

This chapter discusses the 3174 controllers which attach to the IBM Token-Ring Network. Readers will find useful tips regarding physical installation, customization, operating system considerations, backup/recovery, and performance. This chapter summarizes findings and experiences related to the installation of 3174 ring-attached models and gateways in a test environment with different operating systems and other Token-Ring attached devices.

5.2 IBM Token-Ring Concepts

The IBM Token-Ring Network is a general purpose Local Area Network (LAN) with the topology of a star-wired ring, using baseband signalling and token-passing protocols in conformance with the IEEE 802.5 standards for transmission control. Device attachments conforming to the IEEE 802.2 and 802.5 standards may communicate over an IBM Token-Ring Network.

The token passing technique for ring access control is based on a predefined bit pattern (24 bits), called a *token*, which continuously circles the ring. When a station has data to transmit, it waits until its station adapter detects a *token* bit pattern (token bit = 0). When the station waiting to send receives a token, it starts transmission of the data.

The transmitting station creates a *frame* by setting the token bit to *1*; then it inserts destination and source addresses, control information and the data to be sent to the destination address. During the time the frame is being transmitted, no token is available on the ring (token bit = 1) and no other station can initiate a transmission (collisions on the ring are avoided). The frame is passed (received and retransmitted) by all stations on the ring until the station with a matching destination address receives it.

The destination station copies the data to its internal memory and retransmits the frame after setting control bits to indicate that it recognized the address and successfully copied the data.

When the frame returns to the originating station with control bits indicating successful transmission and receipt, it is removed from the ring. A new token is then created and transmitted, thereby permitting other stations to send data.

An optional function available for the 3174 16/4MB Token-Ring Adapter is *early token release* This is an adapter configuration used only in the 16Mbps IBM Token-ring Network segments. Early token release gives network adapters more frequent access to a free token by allowing one token and one or more frames to circulate on the network at once. The use of early token release allows the sender to release a new token without waiting for the acknowledged frame to return.

5.2.1 Terminology

In referring to Token-Ring devices in the context of host communications, two terms are often used. They are:

- Gateway

- DSPU or down stream physical unit.

A *gateway* is the host communication server. It links the Token-Ring to the host network, translating the Token-Ring protocol into that used for the host link. The gateway may also reassemble frames for transmission.

The *DSPU* is the device on the Token-Ring requiring host connection via the gateway.

5.2.2 Types of Token-Ring Addresses

The Token-Ring Adapter address field is six bytes (48 bits) in length and is, with minor variations in format, used as source address and destination address in frames sent from Network Station to Network Station.

There are two different formats of token-ring addresses. The first one is called *Universal address*, which is the address given to the adapter card by the manufacturer at the factory; it is also known as the *burned-in address* or *hard address*. The second format is called the *Locally Administered address*, which is given by the user at customization time; it is also known as the *soft address*.

Each Token-Ring Adapter card has a unique burned-in six byte address. The uniqueness of this address is administered by the IEEE among vendors, and internally by the vendor.

For a Token-Ring environment without a host connection, the IEEE Universal address may be useful. The advantage of using the universal address is its guaranteed uniqueness and the avoidance of local address administration. Be sure to keep a list of stations, some topologic information, and the corresponding universal addresses for TRN Management.

When a Token-Ring is being set up for host connection through a gateway, the locally administered address is a more suitable implementation. The reasons are:

- Generation of *future* DSPU devices is impossible for burned in addresses as you will not know what the address will be.

- If a defective adapter is replaced, you won't have to update the customization to include the new address.

- From an operational point of view (CNM and TRN Management) it may be useful to make the address informative, instead of a random number.

5.2.3 Naming Convention Example for Adapter Addresses

The Locally Administered addresses have 12 digits. The first four of them are fixed; the last eight digits may have any value less than or equal to *7FFF FFFF*. The general format of such an address is:

```
4000 cddddddd
```

The first digit "4" indicates a soft address; the next three digits are reserved.

The following is the naming convention used in the test configuration installed in our center; we considered mainly operational aspects for this naming convention. The topological information we used is the subarea number of VTAM or NCP, the ring number where the device is attached and a serial number within this ring. One digit is used to define the station type.

```
┌─────────────────────────────────────────────────────────────┐
│ LOCALLY ADMINISTERED  ADAPTER  ADDRESS    ( 12 DIGITS )      │
├─────────────────────────┬───────────────────────────────────┤
│ FIXED (4 DIGITS)        │ VARIABLE    ( LAST 8 DIGITS )      │
├─────────────────────────┼───────────────────────────────────┤
│        4000             │ a bb cc ddd                        │
└─────────────────────────┴───────────────────────────────────┘
```

```
┌─────────────────────────────────────────────────┐
│ a  = Station Type                                │
│                                                  │
│       0 - Not used (optional)                    │
│       1 - 37XX Gateway                           │
│       2 - 3174 Gateway                           │
│       3 - PS/2 DSPU                              │
│       4 - 3174  DSPU                             │
│       5 - AS/400 DSPU                            │
│       6 - other downstream PUs                   │
│       7 - reserved                               │
│                                                  │
│     8-F - not allowed                            │
│                                                  │
├─────────────────────────────────────────────────┤
│ bb = Subarea number of NCP or VTAM               │
├─────────────────────────────────────────────────┤
│ cc = Ring number                                 │
├─────────────────────────────────────────────────┤
│ ddd= Unique identifier                           │
└─────────────────────────────────────────────────┘
```

Figure 1. Locally Administered Adapter Addresses

5.2.4 Getting the Universal TRN Address of the 3174

After proper installation of the Token-Ring Adapter card, you may obtain the "burned-in" or universal adapter address by following the steps presented here.

The alphabetic characters of the universal address appear as other symbols; for this reason, the following table is included to help the reader to correctly interpret them.

```
BITS 4-7  |  Character displayed
_____
   A      |       - (dash)
   B      |       E
   C      |       H
   D      |       L
   E      |       P
   F      |          (blank)
```

- Insert the utility diskette (level S or B for the gateway, level A or B for the 3174 DSPU) into diskette drive 1.

- At the operator panel, press and hold the ALT1 key.

- Holding the ALT1 key, press and release the IML key.

- When "40" is displayed, press the ENTER-Key.

- The display connected to port 26-00 will show the MASTER MENU.

- Enter a "4", the DIAGNOSTIC TEST MENU appears.

- Enter "3110"
   "31" is the hardware group (HG) of the adapter.
   "10" is the function code (FC): "Display universal address".

- 16 digits, (e.g. "4535 1000 5A06 00F2") will be displayed; in this example,
   "4535" is the status code
   "10005A" is IBM's manufacturer ID
        (the first two bits in byte 0 of a universally
         administered address are "00")
        (the first two bits in byte 0 of a locally
         administered address are "01")
   "0600F2" is the unique portion of this adapter address.

- To make another selection, press ENTER.

5.3 3174 Gateways

This section addresses the 3174 gateway feature; however you should be aware that there are other IBM gateways available. The most suitable gateway will be determined by factors such as the function required, your budget and in many cases, on what hardware is already installed.

Other IBM gateways include:

- 3720, 3725 or 3745 Communication Controllers with ACF/NCP and NTRI implemented. This can be used as a very high performance gateway for large Token-Ring Networks as it supports very fast host links and also has the benefit of being able to route traffic at the session level.

- The IBM 3172* can be used as a local (channel attached) gateway in situations where only a dedicated controller is required (no other device support).

- A PS/2 with OS/2 Extended Edition can be used as a remote gateway for smaller Token-Rings. This gateway is limited in function compared to the

3174 gateway as it does not have features such as multi-host, it cannot support as many DSPUs and it has a limited number of host communications options.

- A PS/2 with DOS** and an emulator such as Personal Communications 3270 can also be used as a gateway but this is less functional again.

5.3.1 3174 Gateway Features

Some of the advantages and benefits of the 3174 Gateway are:

- It can be installed in a wide variety of configurations such as local and remote, both 4 Mbps and 16 Mbps and with multiple host support.

- Easy Customization and Maintenance

  Personnel experienced in customizing the 3174 will have to learn only a few new parameters. These new parameters have default values which (in most cases) will produce ready-to-run configurations.

  Customization for backup units can be avoided if the 3174 copy procedure is used. The microcode update procedure allows the customer to upgrade the microcode level of the 3174 Gateway. Each procedure will take about two minutes.

- Ring Error Monitor (REM) Facility

  This is an exclusive facility of the the 3174 Gateway. It allows the Token-Ring errors to flow through the gateway and be reported to NetView in the host as alerts. As several 3174 Gateways can be active at the same time in the Token-Ring Network, additional information can be added to identify which gateway is reporting the alerts.

- Dual Function: Gateway/Controller

  The 3174 gateway can also be used as the controller for its attached terminals.

- Efficient Backup/Recovery

  It is possible to define and IML two 3174 Gateways with the same Token-Ring addresses. The gateway which finishes the IML first will become the main gateway and the other will become the backup gateway. See "Backup and Recovery" on page 120

- Performance vs. Cost

  The 3174 local gateway can handle from 35 to 40 transactions per second with a utilization of 65 to 70% at a relatively low cost.

- Reliability

  Because the 3174 is dedicated to providing host access to its supported devices, it is not affected by other things happening in the network. A PS/2 gateway, if not dedicated, may require re-booting if a hang occurs in a user program and this would disrupt all users of the gateway.

  Conversely, if a problem does occur on a 3174, it can be restarted without affecting a large part of the network such as would occur if a 3745 required an IML.

5.3.1.1 Multi-Host Gateway Considerations

One of the major differences between the gateways is the host routing capabilities. In an SNA network, the sub-area network has routing designed into it. This is implemented in the SNA layers of VTAM and NCP and it means that with just a single link, a user can access any application in the network so long as it resides on one of the host processors which form part of that network. If you need to access a host processor in another network, then you can use the SNI (SNA Network Interconnect) implementation to do this at the NCP level.

For many reasons such as complexity, security and software compatibility, many customers choose not to implement SNI. Also, if one of the host processors is an AS/400 or any other processor type which will communicate downstream to a PU T2.0, but not participate in the SNA sub-area routing, then an alternate means of connectivity is required.

The routing provided by the 3174 is at a physical level rather than the dynamic routing of the sub-area network. You define each terminal's connection at customization time and if the user wishes to change hosts, it is done by hot-keying.

So, the 3174 multi-host support can be used to provide simultaneous access to multiple hosts, either in the same network or in other networks and to a wide variety of hosts in a simpler manner than the NCP gateways; however you will need to install a separate line to each 3174 which requires these additional connections. The SLMH (Single Link Multi-Host) support now available in the 3174 (See "Single Link Multi-Host Support" on page 243) improves on this situation but it is still different to NCP routing.

Consider the differences between using SNI and 3174 SLMH. With SNI, only one link is required for anyone in the network to have access to another host. The session is set up by VTAM and the user may be entirely unaware that he or she is connected to a different network.

To achieve this using the SLMH feature of the 3174. A gateway and hence a separate line would have to be set up on each LAN in the organization where a user requires access to the other network. The user would hot-key to the other session when changing from one host to the other. The decision then comes down to:

- How many users need access to other hosts
- Where they are located
- What kind of hosts
- How much you want to spend on communications lines.

5.3.1.2 Ring Error Monitor (REM)

The 3174 Gateway microcode includes a function to report Token-Ring errors to the host. This function is called the Ring Error Monitor; it performs analysis of non-random error conditions on a real-time basis. In case of a failure of one of the stations in the ring, the REM derives information indicating the two consecutive adapters and the media in between them most likely to be causing a failure. Other type of ring errors are also accumulated and reported to NetView when thresholds have been exceeded.

This information is presented to the host on the SSCP-PU session in the form of Alerts, Link Events and PD Statistics.

This is one of the advantages of the 3174 gateway compared to the NCP Gateway. It presents information about the entire Token-Ring Network to the host, while the TIC (the Token-ring Interface Coupler used on the 37X5 controllers) is only able to report its own status. Token-Ring errors are shown at the operator panel of the 3174 as "5xx" and "8xx" status codes, and hardware errors of the Token-Ring adapter are shown as "3xx" status codes.

Note: When you elect to customize for the Ring Error Monitor, you must also customize for the Alert function. Otherwise the REM data cannot be sent up to the host.

5.3.2 Hardware Requirements for Gateway

There are three 3174 features which provide gateway support. They are:

1. Feature 3025
2. Feature 3026
3. Feature 3044

Feature 3025 is now obsolete. It was limited to 4 Mbps and did not support the early token release or the larger ring frame size. It will not be covered in any detail here, however you may consider it compatible with the new adapters providing they are installed at 4 Mbps and do not use early token release or greater than 2K frames. Feature 3025, if installed, can be recognized by the card type "9350."

Feature 3026 and feature 3044 both use the same hardware adapter. This is card type "9351." The difference between them is that feature 3026 comes with microcode Configuration Support-S and feature 3044 does not have any microcode included. To use feature 3044 as a gateway, you need to have Configuration Support-B installed on your controller.

Notes:

1. Feature 3026 can be used with Configuration Support-B and you will get the same function as feature 3044, however you will pay more for this configuration as the price of feature 3026 includes the price of the licensed internal code Configuration Support-S.

2. Feature 3044 will work with Configuration Support-S but unless you have already installed feature 3025 or 3026 on your machine, you will not be licensed to use Configuration Support-S. Keep in mind that Configuration Support-B provides additional functions, such as Multi-host Gateway support and Group Poll.

When you order the gateway feature, you will also receive a 2.4 m (8 ft) communications cable with connectors to the adapter and the IBM Cabling System or a Multi-Station Access Unit (MSAU), respectively.

> **Warning**
>
> Be careful to install the adapter card in the correct location according to the Customer Setup Instructions. Installing the Adapter in the wrong slot can cause severe problems to the host system on locally attached 3174s.

5.3.2.1 Model Dependencies

The Token-Ring Gateway feature can be installed on any 3174 models except:

The DSPU models, X3R,
The small models 8XR, and 9XR.

Notes:

1. The Model 90R comes with the gateway already installed.

2. A 3174 with a Token-Ring Gateway installed can be customized as a DSPU. (You may find this useful for contingency planning.)

5.3.3 Gateway Microcode

The gateway is supported by 3174 Controller microcode Configuration Support-S or Configuration Support-B.

If you are installing feature 3026 you will get replacement *Control* and *Utility* diskettes to be customized in place of the existing *Control* and *Utility* diskettes for Configuration Support-A. They will be equivalent to Configuration Support-A in other functions except that Configuration Support-S does not support BSC communications, X.25, nor will it operate as a DSPU. This microcode will not affect the installation or proper functioning of any RPQs available for installation in the 3174.

Configuration Support-B is the preferred microcode to use for the 3174 Token-Ring Gateway. It contains more function than Configuration Support-S for gateway support and it is still being enhanced, whereas Configuration Support-S will not have any new functions added.

Some of the features in Configuration Support-B that are not possible with Configuration Support-S are:

* Group Poll. See "Group Poll" on page 91
* Support for 250 DSPUs
* Single link multi-host support
* Multi-host gateway (CCA access from gateway)
* Duplex support.

5.3.4 Storage Requirements

The amount of 3174 storage required to support the gateway feature will depend on:

* Which level of microcode you use. Configuration Support-B is functionally richer than Configuration Support-S but it requires more storage.
* How many DSPUs will be attached to this gateway.

To calculate the amount you need you should look in the planning guide for the release level you are using under the heading "An Overview of Controller Storage Planning" The manual numbers to reference are:

GA27-3844 *IBM 3174 Planning Guide for Configuration Support A and S*

GA27-3862 *IBM 3174 Planning Guide for Configuration Support B*

The charts are reproduced in "Storage Charts" on page 339

As a starter, if you are installing a gateway with Configuration Support-B, you will need at least 2176 KB of storage, which is enough to support up to 28 DSPUs. With 3 MB of storage you can service up to 72 DSPUs.

Be aware that the old model controllers (0XX and 5XX) have only 1 MB base storage and the new controllers (1XX, 2XX, and 6XX) have 2 MB of base storage.

5.3.4.1 Model 90R Gateway Storage

The Model 90R warrants special mention when it comes to calculating storage for your gateway. As the 90R is only supported by Configuration Support-B and only comes with 2 MB of storage, it would appear unable to support a gateway. However, the 90R actually creates a subset of Configuration Support-B at customization time and it can, in fact, support up to 40 DSPUs as a Token-Ring Gateway.

Storage is available for the 3174 in either 1, 2 or 4 MB increments to a maximum of 6 MB on the 1XX, 2XX, and 6XX machines. It is recommended to use the larger increments if feature slots are scarce on your machine as the storage cards in the large machines occupy the same slots as some of the feature cards.

5.3.5 Devices Supported by the Gateway

The 3174 gateway feature can support up to 250 DSPUs at Configuration Support-B and 140 DSPUs at Configuration Support-S

The actual number you install will depend on several factors including:

- The speed of the upstream port/s.
- The response time required
- The use of *Group Poll* on remote gateways
- The volume of traffic expected to flow through the gateway
- Storage available in the 3174.

The gateway will not participate in communications on the ring itself and it will not be an inhibitor to such communications (e.g. between two PS/2 workstations attached to the ring).

Any combination of the following devices can be attached to the 3174 Token-Ring Gateway as DSPUs.

- 3174 DSPU
- PC or PS/2 using APPC/PC

- System/36 PU using APPC

- System/36 using 3270 emulation

- AS/400 PU using APPC

- AS/400 using 3270 emulation

- IBM RT System using OEM 3270 emulation

- IBM RS/6000 using OEM 3270 emulation

- IBM 9370

- PC or PS/2 with 3270 Workstation Program 1.1

- PC or PS/2 with OS/2 EE 1.1

- PC or PS/2 with PC 3270 Emulation Program operating as a PU

- Personal Communications/3270 PC or PS users in Network Station mode

- Personal Communications/3270 as a gateway for other downstream users

- OS/2 EE 1.2 used as a gateway for other PC/PS products downstream.

Note: PCs using PC 3270 Emulation Program Version 3 are a PU through the 3174 token-ring gateway when configured in:

  - Standalone mode

  - Gateway mode supporting other PCs in Network station mode.

  - Gateway with a network station mode. PC 3270 EP V3 in network station mode act as LUs off the PC gateway PUs. PC as LUs do not have host addresses defined.

The number of SNA logical units (LUs) supported by each PU and the protocols used by these LUs are transparent to the Gateway. Each DSPU attached to the Token-Ring appears to the host as an addressable PU T2.0.

The local gateway can only be an SNA device and the DSPUs are addressed as contiguous sub-channel addresses starting from the gateway address.

DSPUs attached to a remote SDLC gateway are addressed as multi-point controllers with contiguous addresses starting from the gateway address.

At 3174 customization time a list of Token-Ring addresses of the devices to which the 3174 Gateway is going to give service is defined. The 3174 Gateway will give service only to devices within this list. If DSPUs have to be added or deleted from this list a gateway customization is necessary to update the new configuration.

5.3.5.1 Coaxial Attached Devices

Apart from performance considerations, the 3174 Gateway does not affect the operation of the displays, printers or workstations directly attached.

The following devices were tested coax-attached to a 3174 gateway:

- 3178
- 3179
- 3179G
- 3180
- 3192C
- 3193
- 3471
- 3472
- 3472G
- 3270PC.

5.3.6 Host Software Support

The 3270 Token-Ring Gateway is supported by the following programs and versions:

- ACF/VTAM under MVS, VM and VSE

  VTAM Version 2 Release 1 and later support the 3174 gateway.

- ACF/NCP V4.3.1 or V5.2.1 if group poll is required; (see "Group Poll" on page 91.) otherwise, no specific version or release is required as the remote controllers, both gateway and DSPU will appear as controllers on a multi-point line.

- NetView Version 1.

- Application programs supporting 3274-41A with Configuration Support-D Rel. 65 need not be altered, unless they interpret certain SNA sense information, see *3174 Planning Guide*.

For a list of the software maintenance required for Token-Ring Gateway support refer to "VTAM APARs for the 3174 Gateway" on page 335.

This list is current at the time of publication of this document.

5.4 3174 Local Gateway

The 3174 local gateway is an easy and efficient way to connect DSPU devices to the host. Because it is channel attached, it can handle a very high throughput. The gateway feature can be installed on any "L" model 3174 attached as an SNA controller.

The following sections describe the environment and definitions required to install a local gateway. See "The Remote Gateway" on page 80 for similar detail on remote gateway installation.

Most of this information is documented from installation experiences at our test facility. Figure 2 illustrates the configuration we used.
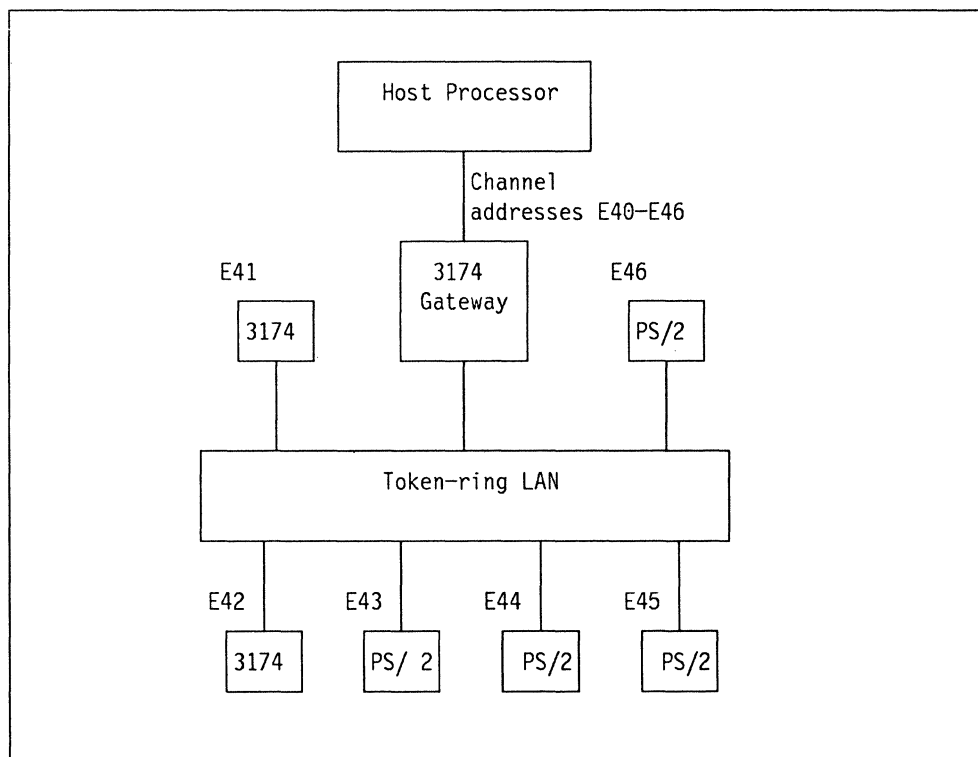
Figure 2. 3174 local gateway configuration

5.4.1 Systems Definitions

The local gateway is supported in the following operating system environments:

- MVS
- VM/SP
- VSE

5.4.1.1 Host Addressing

In all of these environments, when using a local 3174 gateway, a token-ring device becomes an SNA PU with attached LUs. Each PU appears to VTAM and to the host operating system as if it was a local SNA 3270 control unit. Within VTAM each control unit (PU) is identified by its own separate channel address. The 3174 gateway resolves this channel address to the device's token-ring address by use of an internal 3174 table that is defined during the 3174 customization procedure.

Thus to begin your host I/O (and VTAM planning), you need to identify the PU requirements for your token-ring. Then you need to define for your SCP (operating system) the channel addresses for the PUs. See "Devices Supported by the Gateway" on page 65 for a list of downstream devices requiring a defined channel address.

In our example, we have the gateway 3174 at address E40 and six PUs using the 3174's gateway feature. The addresses defined are: E40 (3174 with gateway), E41, E42, E43, E44, E45 and E46, for a total of 7 addresses.

Due to past procedures for addressing devices, to have proper operation of local 3174 gateway you should:

- Ensure that the host IOCP and host operating system address range start on a hex 16 boundary. That is, the last digit of the address is '0'. For example, 200, 240, 2C0, 480, 860 are valid.

- Try to have the address range defined to the host consist of a multiple of eight devices. That is, the last address will end in hex '7' or hex 'F'. The following represent valid ranges:

  - 200-207 (8 addresses)

  - 200-20F (16 addresses)

  - 200-21F(32 addresses).

For our examples with six DSPU devices you should, at a minimum, define to the host (IOCP and IO gen) the address range of E40-E4F.

These restrictions are not 3174 restrictions; the 3174 base address does not need to start on a '0' boundary nor have only a multiple of eight addresses defined. These limitations exist within IOCP and the operating system IOS subsystems. Since I/O and host IOCP generations are not quickly implemented, you should consider defining extra device addresses. A recommendation is to use larger address ranges of 16 or 32 devices for the I/O generation. Thus instead of generating 16 devices for our simple example above, we would define a block of 32. In VM systems it is mandatory to do this; in MVS and VSE, this addressing is desirable.

Be aware, however, that in defining extra devices, the unused addresses may cause operator messages at host IPL time indicating these addresses are not available.

Also, it is wise to ensure that the channel having the local 3174 gateway has an appropriate address range to allow for future growth.

5.4.1.2 Host Input/Output Configuration Definitions

There are some special considerations for the IOCP when defining the local 3174 Token-Ring Gateway because of the number of devices addressed. A non-gateway SNA 3174 supports only one I/O address at a time, whereas the gateway has several.

It is important that you review the following differences and restrictions.

For 370 mode channel operations the unit control word (UCW) sharing differs between the gateway 3174 and the non-gateway 3174. These differences are illustrated in the following table.

Table 3. 3174 Local Gateway IOCP Requirements		
Channel Type	Non-gateway 3174	Gateway 3174 (and DSPU devices)
370 Byte	Non-shared	Shared for 308X or 3090 otherwise non-shared
370 Block	Non-shared	Shared
370/XA Byte	Non-shared	Non-shared
370/XA Block	Non-shared	Shared or non-shared

To specify shared status you specify the SHARED = parameter with either Y or YB. Y should be used for S/370 block mode. In 370 and XA byte mode SHARED = N is required. 370 XA block may be specified with YB or N.

For IOCP definitions treat the 3174 gateway and the Token-Ring addresses as 3791, 3705, or 3725 controllers. Typically a 3791 definition is used with MVS and either 3705 or 3725 with a VM system to agree with the SCP's Input/Output. Since the UNIT = parameter on the CNTLUNIT statement content is not validated, many users are now coding UNIT = 3174S (S for SNA) for documentation purposes rather than using 3705, 3725, or 3791L.

The 3174 requires that PROTOCL = D be specified.

```
┌── Warning ──────────────────────────────────────────────┐
│                                                          │
│  The 3174 gateway and its associated channel address range must be  │
│  defined in a SINGLE CNTLUNIT IOCP statement. Use of multiple CNTLUNIT  │
│  statements can cause IOS071I Start Pending errors or performance  │
│  problems.                                                │
│                                                          │
└──────────────────────────────────────────────────────────┘
```

It is also recommended that, in the UNITADD parameter, the beginning address end with hex "0" and that the number of addresses should be a multiple of eight. Remember that the 3174 is fooling the system into thinking that there are multiple real SNA 3174 control units attached when there is really only one. To make this work correctly the single statement is required to inform IOCP scheduling of only one 3174. A hex "0" boundary for the first address with a multiple of eight makes the definition more consistent with older control units

having multiple addresses. The use of xx0 address and multiple of eight addresses will prevent any IOCP (or operating system) scheduling mistakes that could be caused by scheduling techniques that would assume these boundaries.

5.4.1.3 MVS

An IODEVICE macro must be coded for the 3174 local gateway and the attached DSPUs. The UNIT parameter of the IODEVICE macro must be coded "3791L." The ADDRESS parameter of the IODEVICE macro allows specification of multiple Token-Ring attached devices. In our example we have coded a range of 16 addresses.

The code for our installation is:

```
DEVE40  IODEVICE  UNIT=3791L,
                  ADDRESS=(E40,16)
```

Figure 3. MVS Local Gateway Definitions

Note: For Models 12L and 22L, the IODEVICE macro is coded "3174".

5.4.1.4 VM/SP

The following examples are valid VM definitions for the 3174 local gateway and for the attached DSPUs

These definitions can be used if the Gateway is attached to a virtual guest machine (e.g. VSE/VCNA) or if the Gateway is attached to the so called "native" VTAM directly under VM.

For the Gateway:

```
RDEVICE ADDRESS=E40,DEVTYPE=3705,ADAPTER=TYPE4,MODEL=H8,          *
        CPTYPE=NCP


RCTLUNIT ADDRESS=E40,CUTYPE=3705,FEATURE=16-DEVICE
RCHANNEL ADDRESS=E,CHTYPE=BLKMPXR
```

Figure 4. VM Local Gateway Definition

The FEATURE parameter of the RCTLUNIT macro in Figure 4 specifies the maximum number of Token-Ring attached cluster 3174s or workstations supported by a single local 3174 with the gateway feature installed. The value given in the FEATURE parameter must be a multiple of eight.

For the DSPUs:

```
        RDEVICE  ADDRESS=E41,DEVTYPE=3705,ADAPTER=TYPE4,MODEL=H8,          *
                 CPTYPE=NCP
        RDEVICE  ADDRESS=E42,DEVTYPE=3705,ADAPTER=TYPE4,MODEL=H8,          *
                 CPTYPE=NCP
        RDEVICE  ADDRESS=E43,DEVTYPE=3705,ADAPTER=TYPE4,MODEL=H8,          *
                 CPTYPE=NCP
        RDEVICE  ADDRESS=E44,DEVTYPE=3705,ADAPTER=TYPE4,MODEL=H8,          *
                 CPTYPE=NCP
        RDEVICE  ADDRESS=E45,DEVTYPE=3705,ADAPTER=TYPE4,MODEL=H8,          *
                 CPTYPE=NCP
        RDEVICE  ADDRESS=E46,DEVTYPE=3705,ADAPTER=TYPE4,MODEL=H8,          *
                 CPTYPE=NCP
```

Figure 5. VM Local DSPU Definition

For Configuration Support-S where the maximum number of workstations or controllers supported by the gateway feature is 140, the parameter should be coded:

FEATURE=144-DEVICE

to support the full configuration.

For Configuration Support-B where 250 DSPUs can be defined,

FEATURE=256-DEVICE

should be coded.

The value given in the ADDRESS parameter of the RCTLUNIT macro must end with a "0".

An RDEVICE macro must be coded for the Gateway itself and for each Token-Ring attached cluster controller or workstation (PU).

Warning

If there are more DSPU definitions in the 3174 Gateway than VM RDEVICE macro definitions, any attempt to bring up the gateway will lead to a VTAM hang.

5.4.1.5 VSE

VSE/SP2.1 will not automatically recognize and generate ADD statements for locally attached 3174 Models 01L, 11L, 12L, 21L, and 22L. The user must manually include ADD statements, as in Figure 6 on page 73.

```
For the Gateway:

        ADD E40,3791L,EML

For the DSPUs:

        ADD E41,3791L,EML
        ADD E42,3791L,EML
        ADD E43,3791L,EML
        ADD E44,3791L,EML
        ADD E45,3791L,EML
```

Figure 6. VSE Local Gateway Definition

The emulation parameter (EML) is necessary to inform VSE/SP2.1 that the
3174-01L/11L/12L/21L/22L is to be handled as a 3274-A41.

5.4.1.6 VTAM

If (n) Token-Ring nodes are supported through a single 3174 Gateway, (n + 1)
VTAM PU macros must be coded for local, channel-attached SNA controllers. A
sub-channel address must be defined for the gateway and each Token-Ring
attached cluster controller or workstation. The sub-channel address assigned to
the gateway must be the lowest address in the ring, and all sub-channel
addresses must be contiguous.

In VTAM Version 3.1.1, the SECNET parameter of the PU macro must be set to
"YES" for all DSPUs but not for the gateway itself.

The size of the host buffers multiplied by the number of host buffers must be
large enough to accommodate:

- The Link Header (min. 4 Bytes, max. 32 Bytes) (LH)

- The Transmission Header (TH)

- The Request Header (RH)

- A minimum of 256 bytes of user data (RU).

The size of the host buffers is defined in the ACF/VTAM start options:

- MVS: The buffsize value of the IOBUF buffer pool

- VSE: The buffsize value of the LFBUF buffer pool.

The number of host buffers is defined in the MAXBFRU parameter of the PU
macro for the local SNA minor node.

5.4.2 Customization

If the Token-Ring Gateway feature is installed on a controller already used as a
non-SNA or as an SNA channel-attached controller, a new customization must
be performed with Configuration Support "S" or "B". In case the controller was
used as a non-SNA controller, the host system definitions must be done again.
Remember that the gateway customization can be done in any model of the

3174 controller. (At IML time, the 3174 will determine whether there is any incompatibility between the hardware and the microcode.)

Only those customization questions dealing with the Token-Ring Gateway Feature are discussed in this chapter. See "Connectivity and Customization Examples" on page 253 for 3174 gateway customization examples.

5.4.2.1 Question 100: Model Designation

Enter *xxL* in response to this question, since the gateway is a channel attached model where xx is the appropriate local model number as written on the box.

5.4.2.2 Question 101: Host Attachment

Enter a *5* in response to this question if single host support is required.

Enter an *M* in response to this question if multi-host support is required. If multi-host is chosen, you will be presented with a customization screen for each host you define. Multi-host is covered in more detail in "Multi-Host Connectivity" on page 239.

5.4.2.3 Question 104: Control Unit Address

Response: The two-digit address of the gateway.

The host system recognizes this as the controller address assigned to represent the I/O address of the 3174 Gateway as an SNA Physical Unit. For example, enter *40* if the CUADDR parameter of the VTAM PU macro for the gateway has been coded *E40* (*E* being the channel address).

5.4.2.4 Question 105: Upper Limit Address

This question works, in conjunction with question 104, to set the range of channel addresses that the 3174 will recognize. Question 104, the lowest actual sub-channel address, and question 105, the upper sub-channel address, provide the range of sub-channels used by the gateway feature. This range defines the number of DSPUs being configured. The sub-channel range is checked to ensure that it does not exceed the maximum number of DSPUs supported by the feature (plus one for the gateway itself); the response to question 105 minus the response to question 104 therefore cannot be greater than 140 (X'8C') for LIC Level S and 250 (X'FA') for LIC Level B.

Addresses reserved here (even if they are not used) cannot be used by other devices on the channel.

If you do not want to define any DSPUs attached to the Token-Ring, your response to question 105 must be 00 or must be equal to the response to question 104. This prevents the Token-Ring customization panels from being presented.

5.4.2.5 Question 150: Token-Ring Network Gateway

This question is not applicable to Configuration Support-S.

Specify *1* to include gateway support.

5.4.2.6 Question 223: Attention Delay Value (SNA)

Attention delay is not implemented for the 3270 Token-Ring Network Gateway feature. Therefore, any response entered here will be ignored by the gateway microcode.

5.4.2.7 Question 900: Token-Ring Network Address for the Gateway

The response must contain 12 hexadecimal digits for Configuration Support-S or Configuration Support-B Release 1. From Configuration Support-B Release 2, the SAP address will also be included on this screen. The response cannot be all zeroes. The format is:

```
        4000 annn nnnn  ss
    Where:

        4000    is the fixed part of the address

        a       must not be greater than X'7'

        n       can be any value from X'0' to X'F'

        ss      is the SAP address (if displayed)
```

Note: The SAP address will default to X'04'

See "Naming Convention Example for Adapter Addresses" on page 59.

5.4.2.8 Question 905: Ring Error Monitor (REM)

The response must be "1" (REM active) or "0" (REM inactive). Default is "1". If you answer "1" to this question, be sure that you turn on the Alert function in Question 220 so that the REM data will be sent to the host.

5.4.2.9 Question 908: Link Subsystem Name

The response must be six alphanumeric non-blank characters for Configuration Support-S or eight for Configuration Support-B. The default value is *IBMLAN*.

This name should be unique for each gateway controller and it should be included in your installation naming conventions because it is inserted into each Alert-RU travelling upstream to the host.

5.4.2.10 Question 911: Ring Speed of the Gateway

The default response is 0. Possible responses are:

- 0 = 4Mbps with normal token release

- 1 = 16Mbps with normal token release

- 2 = 16Mbps with early token release.

NOTES:

1. For controllers with a 4Mbps Token-Ring adapter installed, 0 is the only valid response.

2. For controllers with a 16/4Mbps Token-Ring adapter installed, 0, 1, or 2 is a valid response. A response of 2 is recommended for large networks.

5.4.2.11 Question 940: Ring Address Assignment

This question comes up in the form of a panel with four columns in the left half of the figure and the same four columns repeated in the right half. Each half-line relates the host sub-channel addresses to the gateway or to downstream PU addresses, providing in this way the logical mapping between both. The panel displays as many entries as devices were specified in questions 104 and 105.

Note: The entry for the gateway (the first entry) is already filled in based on your answer to question 900 and you cannot alter it here.

- Column 1 (S@)

  The sub-channel addresses are provided automatically in this column. They are derived from the range of sub-channels entered in questions 104 and 105. If the number of DSPUs is greater than the number of half-lines fitting on one panel, additional panels will be presented.

- Column 2 (Ring@)

  In this column, the 12-digit token-ring addresses of the DSPUs must be entered.

- Column 3 (SAP@) This column defines the service access point (SAP) ID. The combination of the ring address and the SAP must be unique. Some attaching products may appear as multiple SNA physical units and therefore have multiple SAP addresses and a single Ring address. Refer to the installation manuals for the products you wish to attach for more information.

  A 3174 DSPU using SLMH over this gateway is an example of a device with multiple SAPs for the same token-ring address.

  If the ring addresses are different, the SAP-IDs may be equal for the Gateway and all DSPUs.

  If the downstream PU to be defined here is a 3174 DSPU running Configuration Support-A the SAP ID has to be "04". (It is hard-coded within the Configuration Support-A microcode). One link connection is maintained over this SAP. The SAP ID of the 3174 local gateway itself is also hard-coded as "04" if Configuration Support-S is used and is forced during the customization.

  SAP addresses specified here must be a multiple of four in the range of X'04' - X'EC'.

- Column 4 (T) The response in this column is used to calculate the default I-frame size and maxout value presented on the next panel (941). A *0* response sets the I-frame size to 256 bytes and the maxout to 2.

  A *1* sets the values to 2042 and 2 respectively. The *0* response is suitable for workstations, however if you have a 3174 DSPU or any device which can handle large RU sizes then you should use the large values instead as this will improve the efficiency of the ring.

5.4.2.12 Question 941: Ring Transmission Definition

The Ring Transmission Definition panel presents the default values for the Token-Ring maximum I-frame size (F-field) and the window size (W-field) based on the type entered by the user on the Ring Address Assignment panel. The user has the option at this point to change these values or to accept the defaults. If he wants to accept the defaults for all of the DSPUs, he should press the PF key for FWD and continue the configuration process. The current implementation for the default values is as follows:

Downstream PU	Maximum I-frame size	Maximum window size
Workstation (T=0) Controller (T=1)	entry 0 (265 value) entry 3 (2042 value)	2 2

Figure 7. Ring Transmission Definition Values

Valid entries for maximum I-frame size are:

- 0 for 265 bytes
- 1 for 521 bytes
- 2 for 1033 bytes
- 3 for 2042 bytes
- 4 for 4105 bytes
- 5 for 8201 bytes.

It should be noted that the values for maximum I-frame include the additional bytes for the SNA header.

The maximum out window size is the number of I-frames the 3174 gateway transmits before waiting to receive an acknowledgment. The valid maximum window size is based on the user's entry for the F-field. Current implementation of this algorithm yields the following:

I-FRAME SIZE ENTERED	MAX WINDOW SIZE
265 bytes	7
521 bytes	7
1033 bytes	4
2042 bytes	2
4105 bytes	1
8201 bytes	1

Figure 8. Frame Size Compared with Window Size

Note: 3174 Token Ring Gateways equipped with the Type 3A Dual Speed 16/4 Mbps Communication Adapter can send and receive I-Frames with a size of up to 8201 (8192 + TH + RH) bytes.

The sub-channel addresses (along with their corresponding ring addresses and their SAP-IDs) also appear on this screen based on your answer to question 940 but they are protected and you cannot change them here.

I-Frame Size and Window Size Considerations: This section defines the interrelationship between the I-frame size (F-field) and the Window size (W-field) of the 3174 Gateway with question 380 (Max. receive I-frame size) and question 381 (Receive window size) of the 3174 DSPU.

> **Note**
>
> In Configuration Support-B Release 2 and higher, questions 380 and 381 will no longer be asked when customizing a DSPU 3174. These values will default instead to the following:
>
> **4 Mbps token-ring** Size = 2042 Window = 1
>
> **16 Mbps token-ring** Size = 4105 Window = 1
>
> The following section will only apply to DSPUs at Configuration Support-A or Configuration Support-B release 1.

Accepting the default values given by the 3174 customizing procedure for the gateway and the DSPU will give an operative environment. However, the following points should be taken into consideration to improve the performance of the Token-Ring Network and the total response time of the system.

The I-frame size of the 3174 Gateway and the Token-Ring attached workstation must be the same. If it is a 3174 DSPU, the response to the F-field should match the response to question 380 during customization.

The W-field defines the number of frames that the 3174 Gateway will send to the downstream node before suspending transmission to await acknowledgement. Question 381 defines the number of frames that the 3174 DSPU will receive before it sends a supervisory frame to acknowledge receipt of the frames (if inbound data is being sent to the host, this Token-Ring acknowledgement would be piggybacked on the data).

It appears that the supervisory frame sent by the 3174 DSPU adds very little to Token-Ring congestion. Therefore, it may often be advisable to set question 381 to 1 because this ensures that the frame is acknowledged and there is very little chance that the sender (the 3174 Token-Ring Gateway, for instance) will need to suspend to await this acknowledgement. If Token-Ring congestion is a concern of the user, a value greater than 1 could be specified in question 381.

In most cases, performance can be improved by making the W-field value greater than the value in question 381. This will allow the 3174 Gateway to continue transmission while the 3174 DSPU is processing the data it received already and is sending the response back to the 3174 Gateway. If they are equal, then the 3174 Gateway will probably suspend when it has transmitted the number of frames designated by W-field. Since the acknowledgement is not ready to be sent until the 3174 DSPU has received the data, there is a delay in sending the acknowledgement, and thus the 3174 Gateway will suspend.

The W-field value should never be set less than value in question 381 because this will definitely cause suspension of transmission while waiting for acknowledgement, and thus degrade performance.

If the path from the 3174 Gateway to the 3174 DSPU contains Token-Ring bridges, there may be justification for making the difference between the W-field and 381 value greater than 1. This is because of the delay introduced by copying data from one ring to another by the Token-Ring Bridge.

In addition, one must remember when specifying W-field values, that the buffers are retained by the Gateway until the data in the buffers are acknowledged. If the W-field is significantly large, then the Gateway could deplete its buffer resources frequently and thus decrease performance.

If the value in question 381 is set to 1, then the best value for the W-field is 2 or 3 if no bridges are used and slightly larger if bridges are used. This should prevent suspension of transmission, but shouldn't cause continual depletion of buffer resources.

5.5 The Remote Gateway

There is frequently a requirement to access a remote host site across a "wide-area network" based on IBM's System Network Architecture (SNA). The Token-Ring Network and SNA network use different protocols at the "link" level; it is the essential function of a Token-Ring Gateway to convert between SNA Synchronous Data Link Control (SDLC) formats, Token-Ring Medium Access Control (MAC) and Logical Link Control (LLC) formats. The conversion is transparent to higher-level protocols such as Logical Unit Type 6.2 and the 3270 data stream.

5.5.1.1 3174 Gateway Physical View

The remote 3174 is attached to the host via a leased full-duplex or half-duplex SDLC line running DATA half-duplex. SDLC and X.21 switched connections are *not* supported. X.25 virtual circuits can be supported when using RPQ 8Q0743. The 3174 attaches to a 308X, 3090, 4341, 4361, 4381 or 9370 via a 3720, 3725 or 3745 Communications Controller. It can also attach to a 4361 Communication Adapter or a 9370 Telecommunications Subsystem Controller.
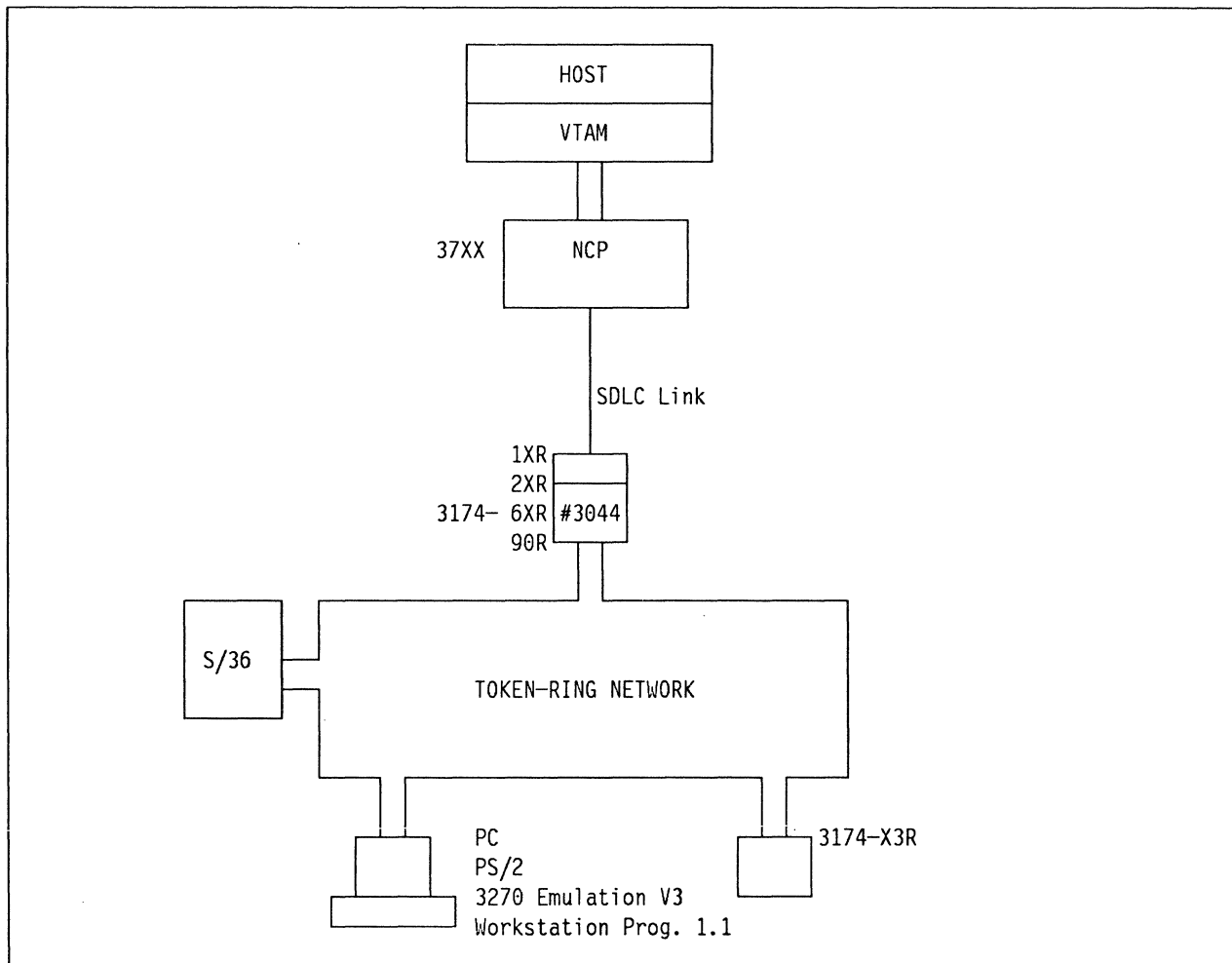
Figure 9. Remote 3174 Token-Ring Gateway: Physical View

5.5.1.2 3174 Gateway Logical View

VTAM and NCP view the Gateway 3174 and DSPUs as stations on a multipoint SDLC link. Outbound data is addressed to DSPUs using SDLC station addresses. The gateway references an address translation table to route the data on to the destination device. It also converts between SDLC and Token-Ring frame formats by stripping the SDLC link header and trailer and enclosing the remaining TH, RH and RU in MAC/LLC headers and trailers. The process is reversed for inbound data.
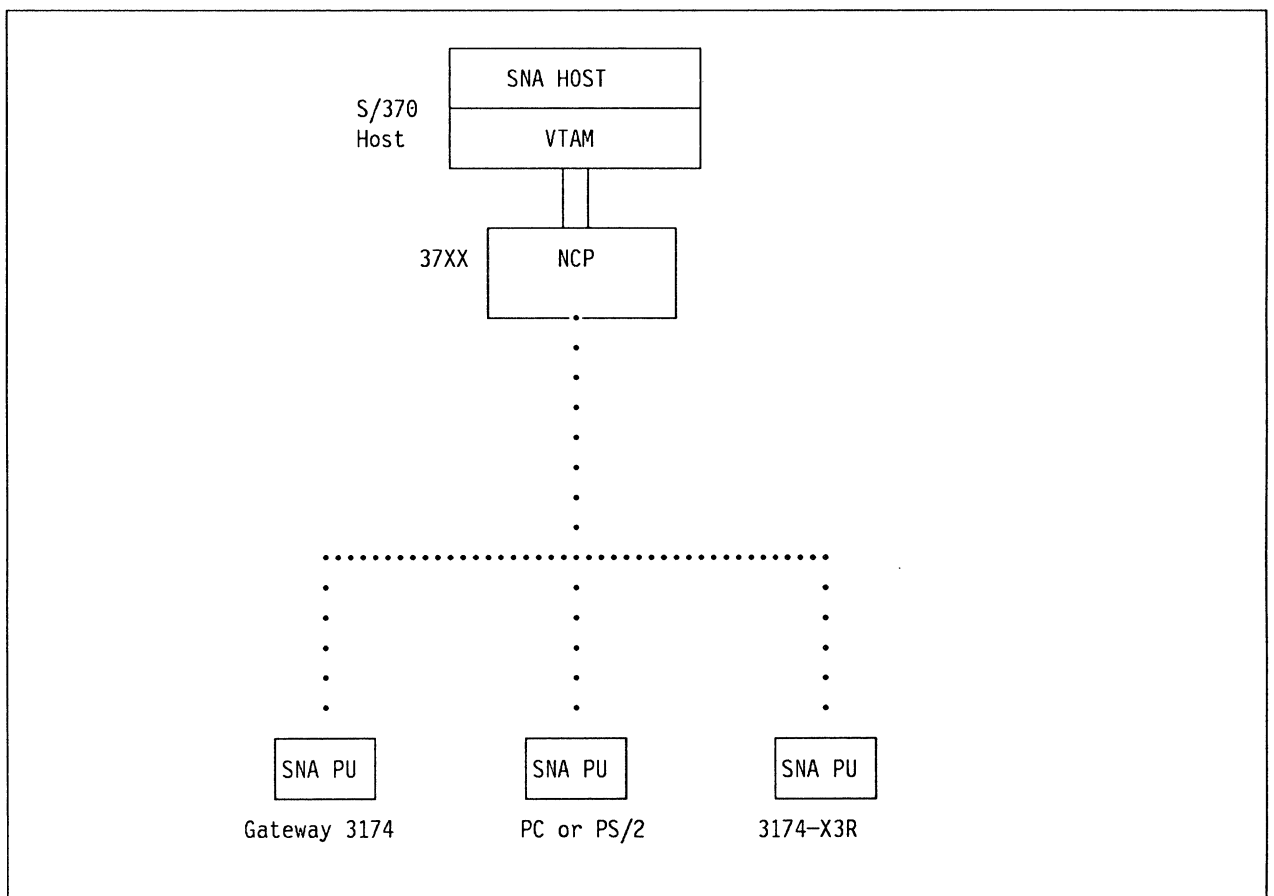
Figure 10. Remote 3174 Token-Ring Gateway: Logical View

5.5.2 Remote 3174 Gateway Highlights

The following is a summary of the advantages and benefits of the 3174 remote Token-Ring Gateway:

- Dual Function: Gateway/Controller

  The gateway can be installed in a 3174 that is also used as a controller for attached terminals. Under heavy loads, 3174 capacity may become a critical factor.

  The 3174 can be attached to a communications link at up to 64000 bps. This compares favorably with PC-based gateways that have a maximum speed of either 9600 or 19200 bps depending on the model. The faster line speed and lower transmission delays may lead to improved response times for end users.

- Capacity

  The 3174 gateway is designed to support up to 250 DSPUs, although in practice the actual number supported may be fewer. By comparison, PC-based gateways are limited in any event to five downstream devices (in the case of a DFT-attached PC) or 32 downstream devices (in the case of a PC attached via an SDLC adapter).

  The 3174 remote Token-Ring Gateway requires no special software at the host apart from an NCP able to support a multipoint link. The gateway itself is an adapter installed by the customer in the 3174. Assuming the installer is familiar with 3174 customization, the microcode is easily prepared.

- Ring Error Monitor

  This allows Token-Ring errors to flow through the 3174 gateway to the NetView hardware monitor in the form of alerts.

- Remote IML

  Allows an operator, using a NetView console, to IML a remote 3174 Controller via the online test panels.

- Remote Management

  Using NetView/DM you can customize and upgrade the microcode from the central site.

- Group Poll

  Using the group poll function you can improve on the response times of the remote users, and reduce overheads in the NCP, see "Group Poll" on page 91 for a complete description.

5.5.3 Implementing the 3174 Gateway

Implementation of the remote 3174 Token-Ring Gateway comprises the following tasks:

1. Installation of the 3270 gateway feature in the 3174

2. Creation of an NCP to support the line and downstream devices

3. Production of a customized control diskette to support the gateway

4. Customization of DSPUs.

The material presented here is based on the configuration at the International Technical Support Center in Raleigh as depicted in Figure 11.
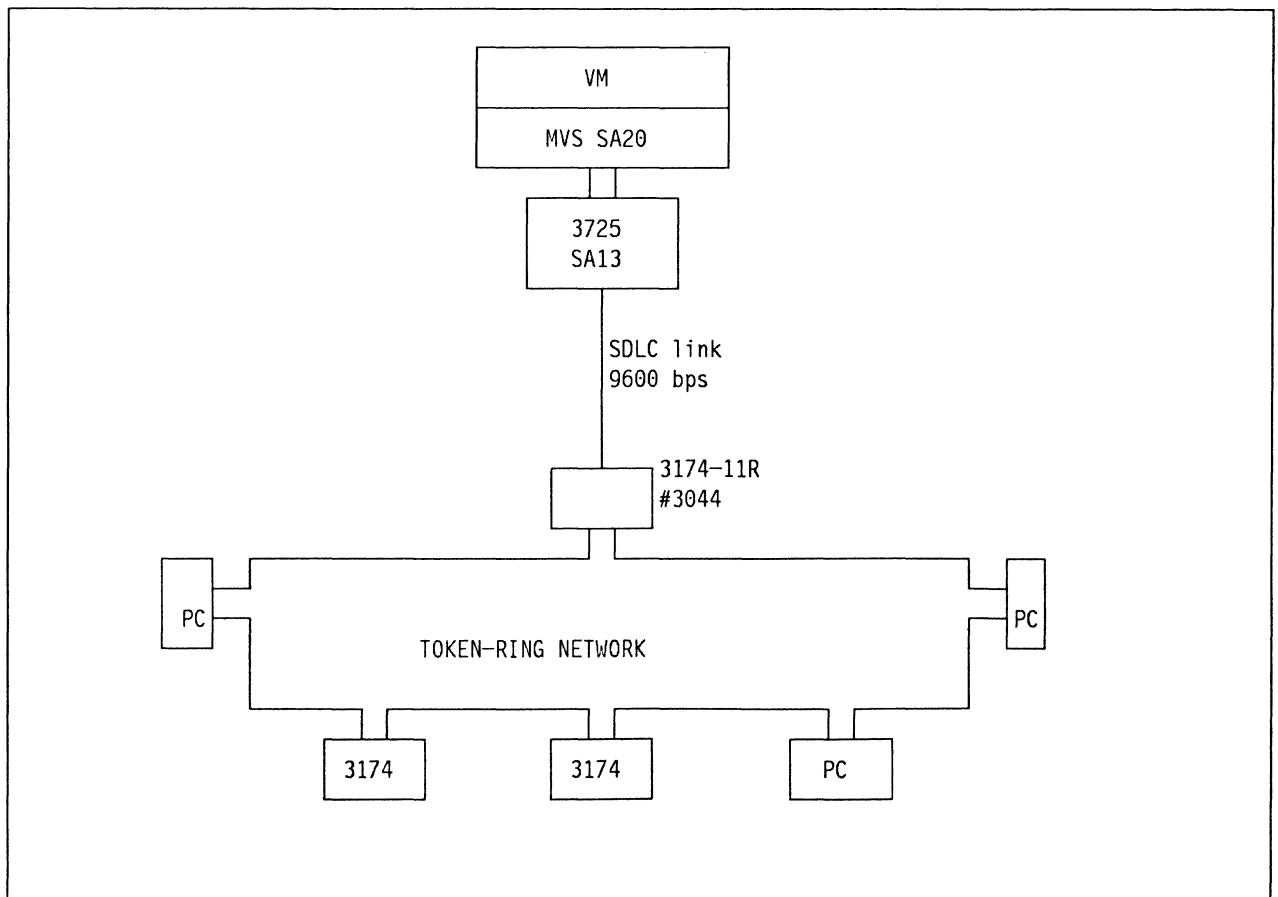
Figure 11. Raleigh ITSC Configuration

5.5.4 Microcode Customization

Several new customization questions have been added for the remote Token-Ring Gateway. In addition, several of the local gateway questions have been updated for the remote telecommunications environment.

With the addition of Configuration Support-B Release 3 there are additional customization questions given for the configuration options as discussed in "Backup and Recovery" on page 120. These are described here, along with existing questions, with the responses that are specific to the 3174 Remote Gateway. The *IBM 3174 Planning Guide*, is the appropriate source of planning information for the other questions. You should regard the material presented here as supplementary to the information contained in this publication.

5.5.4.1 Question 100: 3174 Model Designation

No change, just the addition of the new models.

5.5.4.2 Question 101: Host Attachment

This is dependent on whether you are planning for multiple host support, X.25, or SDLC connection, the valid response is:

```
2 = SDLC                    5 = Local Channel(SNA)
3 = X.25                    6 = SDLC(X.21 Switched)
M = Multi-Host Support
```

5.5.4.3 Questions 104-105: SDLC Address Range

Each DSPU functions logically as a PU on a multipoint line. NCP refers to them by a one-byte SDLC station address. These values tell the 3174 how many DSPUs it will be supporting in terms of a lower and upper SDLC address. The lowest address (104) will be the address of the PU in the gateway 3174. The highest address (105) will be the highest SDLC station address for a DSPU. For instance, if the SDLC address of the gateway is 'C1' and there are five DSPUs, the responses to 104 and 105 will be 'C1' and 'C6' respectively. It is possible to cater for future growth by declaring a number of "redundant" station addresses. Since the theoretical maximum capacity of the gateway is 250 DSPUs, values with a difference of greater than 250 (X'FA') will be rejected.

5.5.4.4 Question 150: Token-Ring Network Gateway

This determines whether the controller will be configured as a gateway device. Enter:

- 0 = This controller is NOT a gateway
- 1 = This controller is a gateway.

5.5.4.5 Question 900: Token-Ring Adapter Address

The response must contain 12 hexadecimal digits; it cannot be all zeroes. The format is:

```
    4000 annn nnnn  ss
Where:

    4000     is the fixed part of the address

    a        must not be greater than X'7'

    n        can be any value from X'0' to X'F'

    ss       is the SAP address (default is X'04')
```

Note: The SAP address can only be specified in Configuration Support-B Release 2 and later where SLMH is supported. Previous levels of microcode will force this value to X'04'.

The user-specified portion will be determined by the addressing conventions in force in the installation, see "Naming Convention Example for Adapter Addresses" on page 59.

5.5.4.6 Question 905: Ring Error Monitor

This indicates whether the Token-Ring adapter in the 3174 will function as a ring error monitor for the ring to which it is attached. Alerts relating to the Token-Ring are sent up to NetView. The default response is '1' (the REM function will be included). Note that if you respond to this question with a '1', you must also specify a value for Question 220 that turns on the Alert function to allow transport of your REM data to NetView.

5.5.4.7 Question 908: Link Subsystem Name

This is a six-character customer-defined name that identifies which subsystem an alert is from when it is sent to the host. The default is "IBMLAN" but it will be more meaningful to network operators in installations with multiple gateways if a unique identifier is assigned to each one.

5.5.4.8 Question 912: Group Poll Address

This panel allows you on the gateway 3174 to code an additional polling address, which **must be outside the polling address range** as specified in Questions 104 and 105.

This address must also match the value specified in **GP3174=** for all the PU definitions requiring group poll on the same line group in the NCP definitions. See "Remote 3174 Gateway: Performance" on page 88 and "Host Software Planning" on page 95 for further information.

5.5.4.9 Question 940: Ring Address Assignment

This panel establishes the address translation table used by the 3174 to map SDLC address to Token-Ring addresses.

SDLC addresses are provided automatically in column 1 based on the range of values indicated in Questions 104 and 105.

Token-ring addresses of DSPUs are entered in column 2. The adapter address of the gateway is provided automatically from the response to Question 900 and is assigned to the lowest SDLC address.

Column 3 contains the Service Access Point (SAP) address for the DSPU. This is the "port" through which an application in the DSPU requests the services of the underlying communication protocols. A SAP ID must be a multiple of four in the range X'04' to X'EC'. The default value is X'04', the "standard" SAP ID defined by IBM to interface between SNA and Token-Ring protocols. The required SAP address for devices running 3270 Emulation V3, APPC/PC and for 3174 models 13R or 63R is also X'04'. For Workstation Program 1.1 it is X'08'.

In situations where there is a requirement for a DSPU to support multiple SAP IDs (such as when migrating from 3270 emulation to the Workstation Program) it is possible to code the Token-Ring address more than once with different SAP IDs.

Indicate in Column 4 whether the device is a workstation (response = "0") or a 3174-X3R (response = "1"). The response will also be "1" for a System/36.

5.5.4.10 Question 941: Ring Transmission Definition Questions

The Ring Transmission Definition panel presents the default values for the Token-Ring maximum I-frame size (F-field) and the window size (W-field) based on the type entered by the user on the Ring Address Assignment panel. The user has the option at this point to change these values or to accept the defaults. If he wants to accept the defaults for all of the DSPUs, he should press the PF key for FWD and continue the configuration process. The current implementation for the default values is as follows:

Downstream PU	Maximum I-frame size	Maximum window size
Workstation (T=0) Controller (T=1)	entry 0 (265 value) entry 3 (2042 value)	2 2

Figure 12. Ring Transmission Definition Values

Valid entries for maximum I-frame size are:

- 0 for 265 bytes

- 1 for 521 bytes

- 2 for 1033 bytes

- 3 for 2042 bytes

- 4 for 4105 bytes

- 5 for 8201 bytes.

It should be noted that the values for maximum I-frame include the additional bytes for the SNA header.

The maximum out window size is the number of I-frames the 3174 gateway transmits before waiting to receive an acknowledgment. The valid maximum window size is based on the user's entry for the F-field. Current implementation of this algorithm yields the following:

I-FRAME SIZE ENTERED	MAX WINDOW SIZE
265 bytes	7
521 bytes	7
1033 bytes	4
2042 bytes	2

Figure 13. Frame Size Compared with Window Size

Note: 3174 Token Ring Gateways equipped with the Type 3A Dual Speed 16/4 Mbps Communication Adapter can send and receive I-Frames with a size of up to 8201 (8192 + TH + RH) bytes.

The SDLC addresses (along with their corresponding ring addresses and their SAP-IDs) also appear on this screen as a result of your answer to question 940, but are protected here and cannot be changed.

You can let these values default or you may modify them if you wish. See the discussion in "I-Frame Size and Window Size Considerations" on page 78 if you want to modify these values to support a 3174 DSPU more efficiently.

5.5.5 Remote 3174 Gateway: Performance

This section discusses some of the performance characteristics of the remote Token-Ring Gateway. Tuning becomes more critical as more devices use the gateway and traffic volumes increase.

5.5.5.1 SDLC Multipoint Lines

The performance characteristics of the gateway are influenced by the SDLC multipoint polling mechanism. A useful reference on this subject is *Tuning and Problem Analysis for NCP SDLC Devices.* A brief summary of the mechanism is provided here.

5.5.5.2 Service Order Table Polling

When PUs on the link are active, they receive data or are polled for input in the sequence in which they are listed in the Service Order Table. The time it takes to pass through the Service Order Table determines the rate at which DSPUs receive polls and therefore the performance they experience. Inactive PUs are not polled. Factors that affect the time it takes to pass through the table include the number of entries being polled (that is, the number of active devices), the line speed and the line propagation delay (the delay induced on transmission due to factors such as modem transit time and line length).

5.5.5.3 Group Poll

Prior to group poll, data flowing from the stations on the Token-Ring arrived asynchronously at the gateway, but was queued at the 3174 Controller until a poll containing the station's specific address arrived. This "wait time" at the 3174 could increase response time.

With NCP's group poll support and Configuration Support-B, "wait time" can be decreased by allowing data from any station whose address matches the group poll address to flow inbound when the gateway receives a group poll.

5.5.5.4 Duplex Gateway

Until the introduction of a duplex gateway you had to code any line that had a 3174 Token-Ring Gateway on it as "half duplex." This was due to the 3174 gateway design, in that after receiving a response for a station on its ring it would disable the receiver and then transmit that response onto the LAN. If in the meantime another response came in (FDX type mode) for another station on the LAN the controller would miss that frame, as its receiver would still be disabled.

In Configuration Support-B Release 3 support has been added to allow the 3174 Controller to "leave" its receiver enabled while transmitting and vice-versa.

5.5.6 NCP Tuning Parameters

5.5.6.1 SERVLIM

"Contact" polling (the transmission of a SNRM, SNRME or DISC) is not subject to the data polling cycle. After the number of passes through the Service Order Table specified by SERVLIM, the NCP performs one contact poll for a PU. On the next contact poll it looks for an outstanding SNRM, SNRME or DISC for the next entry in the Service Order Table. SERVLIM thus determines the ratio of activation/deactivation processing to normal data transfer. Setting the value high (its maximum is 254) means that relatively few attempts are made to contact a PU in order to activate it. While this may help performance for active users by reducing the time spent transmitting and waiting for responses to special polls, it has a negative impact on resource activation times. This effect may be more marked in the remote Token-Ring Gateway environment since two polls are required to establish connectivity between the NCP and each DSPU (see the session activation flow diagram later in the chapter).

In environments where 3270 emulation is being started and terminated frequently and devices powered on and off, which is often the case with PC users, a high value should not be specified. The long wait for the VTAM "USS10" message after requesting a host session may be considered unacceptable. During the tests we found that a SERVLIM value of 254 led to resource activation times of some minutes. We recommend setting SERVLIM to 4 as a good starting point for your installation.

5.5.6.2 SERVICE

By giving a DSPU multiple entries in the Service Order Table it is polled more frequently. This is a good way to give preferential treatment to particular devices. The order of the DSPUs in the table does not have any effect on performance.

It is also possible to reduce the number of entries in the Service Order Table where 3270 Emulation V3 is used by customizing gateway stations supporting several network stations rather than making each PC a stand-alone station. This could reduce the contribution of the polling delay to total response time. However, device path-lengths will increase due to the NETBIOS session between gateway and network stations. Furthermore, host access from network stations is dependent on the availability of the gateway PC.

5.5.6.3 PAUSE

The objective of the PAUSE operand on the LINE macro is to introduce a delay between passes through the Service Order Table so that the impact of excessive negative polling on communication controller CCU utilization is reduced. If the NCP goes through the table before the PAUSE time elapses, it waits for the timer to elapse before proceeding with the next pass. It may be possible to reduce response times by setting PAUSE to 0 if there are few lines competing for CCU cycles. If there are many lines the increased polling that ensues reduces the cycles available for data processing rather than polling and may therefore be harmful to performance. See "Group Poll" on page 91 for further considerations.

5.5.6.4 PASSLIM

The objective of the PASSLIM operand is to limit the amount of data transmitted to a PU in one pass through the Service Order Table so that it does not monopolize the link. In order to avoid a "staggered" screen-paint, it should not be set so low that only a small portion of the screen is sent on each pass through the Service Order Table. For example, it takes about eight PIUs to paint a full 1920 character screen for a single workstation running 3270 Emulation Version 3 since data will be sent to the DSPU in 256 byte segments. If this is a stand-alone station with only one LU to support, 8 is a suitable value. If it is a PU with multiple LUs to support, setting PASSLIM high enough to allow each LU to receive a full screen on a pass through the table may adversely affect performance of other PUs. As a general rule in such circumstances, you should set PASSLIM less than or equal to MAXOUT.

5.5.6.5 HDXSP

If HDXSP (Half-Duplex Send Priority) is coded as "YES", outbound data is sent as soon as possible without waiting for the turn of the PU in the Service Order Table. This improves performance for large numbers of PUs on a line with low traffic frequency.

5.5.6.6 PACING

This is used to control the flow of traffic on an LU-LU session. It is useful where the secondary LU is a printer or a display that will be doing large amounts of file transfer to and from the host. You may wish to examine the possibility of using inbound and outbound pacing to reduce excessive line utilizations when DSPUs are sending files to and from the host. Inbound pacing is agreed at BIND time and should therefore be specified in the logmode entry for the device (see Appendix F of *VTAM Programming*, SC23-0115). Outbound pacing can be defined in either the logmode entry or the NCP LU macro. If a non-zero value is coded in the logmode entry, the NCP value is overridden. If a zero entry is coded in the logmode entry, the NCP value is used.

Outbound pacing is particularly useful in preventing the transmission of more data to a device (such as a PC printer) than it can handle and may therefore reduce line utilization.

5.5.7 Group Poll

Using the group poll facility, you change the way the line handles the devices defined. Instead of sequentially polling each device in the SOT "looking" for data to receive, it sends a group poll on it s first available "free" frame (no data to send), and will accept data from any device defined in the group poll range.

The group poll is set up on the 3174 via 3174 customization question *912* (Configuration Support-B only) which identifies the SDLC address for the gateway's group poll address. On the NCP side, you indicate the group address that corresponds to the gateway's group poll address in the physical unit (PU) statement for the DSPUs (downstream PUs). When NCP finds a station (PU) in the service order table (SOT) for which a transmission is pending, it sends the data and then sends a specific poll to the station address. None of the other 3174's stations in the network answer this poll because NCP does the address resolution.

If there are no pending transmissions to any stations in the SOT, the NCP polls the gateway using the unnumbered poll command and the gateway's group address. The gateway recognizes this as a group poll and sends traffic from one station, followed by the unnumbered response. This way it increases the possibility that a poll results in a useful transaction which could increase the response time for end-users.

Remote Gateway Physical View
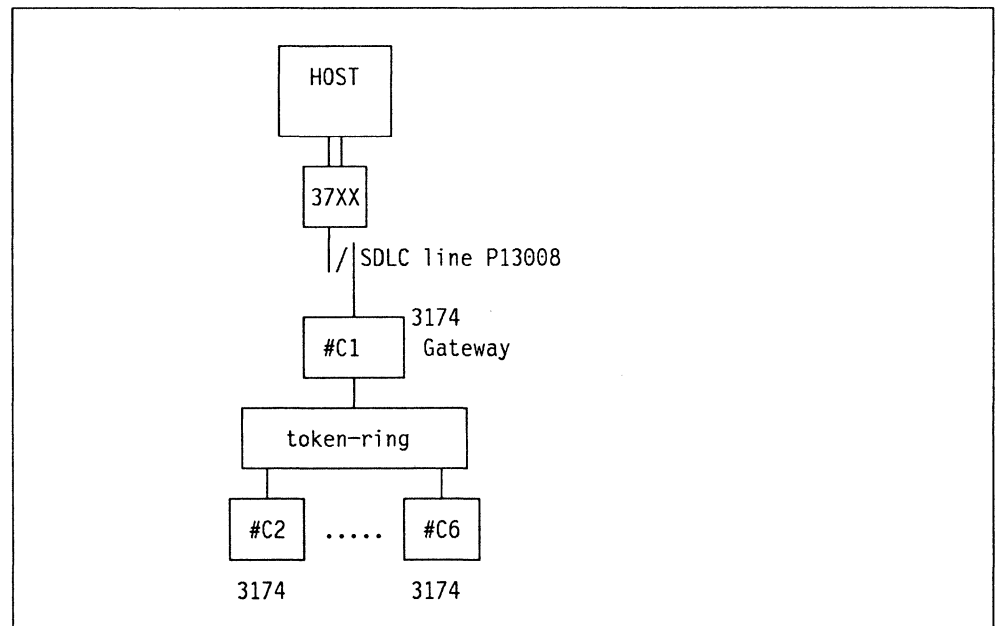
Figure 14. Remote Gateway

Remote Gateway Logical View
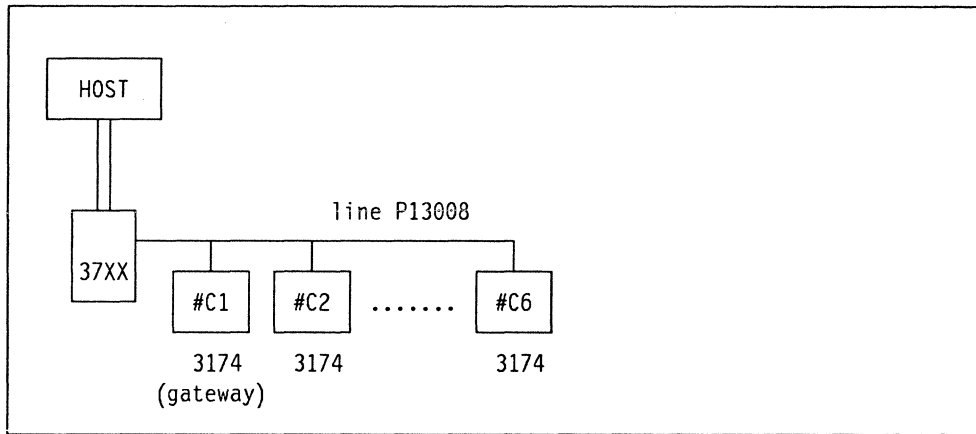
Figure 15. Logical remote gateway view

NCP source for Group Poll

This code is an extract from the NCP loaded onto a 3725 at the ITSC. We were using line 08 as full duplex to a 3174 gateway, and then 3174 DSPUs on the Token-Ring Network.

```
L13008    LINE ADDRESS=(08,FULL),ANS=CONTINUE,CLOCKNG=EXT,DUPLEX=(FULL),*
              ETRATIO=30,ISTATUS=ACTIVE,LPDATS=LPDA2,MAXPU=10         *
              NPACOLL=YES,PAUSE=.5, 1 .SERVLIM=10,SPEED=9600,
              SRT=(,64)
*                                                                    *
P13008A   PU ADDR=C1,DISCNT=(NO),MAXDATA=521,ISTATUS=ACTIVE,MAXOUT=7,PAC*
              ING=0,PASSLIM=8,PUDR=NO,PUTYPE=2,GP3174=AE 2
T13008A1  LU LOCADDR=2
T13008A2  LU LOCADDR=3
*
RADP08B   PU ADDR=C2,DISCNT=(NO),MAXDATA=265,ISTATUS=ACTIVE,MAXOUT=7,PAC*
              ING=0,PASSLIM=8,PUDR=NO,PUTYPE=2,GP3174=AE 2
RADT08B1  LU LOCADDR=2
RADT08B2  LU LOCADDR=3
*
P13008C   PU ADDR=C3,DISCNT=(NO),MAXDATA=265,ISTATUS=ACTIVE,MAXOUT=7,PAC*
              ING=0,PASSLIM=8,PUDR=NO,PUTYPE=2,GP3174=AE 2
T13008C1  LU LOCADDR=2
T13008C2  LU LOCADDR=3
*********************************************************************
```

Notes:

1 Pause value, see note on group poll performance

2 A group poll address, unique to any "real" controller address defined on this line.

SNA Data Flow for Group Poll

The data flow shown here in Figure 16 was taken from a line trace on *P13008*
as shown in Figure 14 on page 91.

```
        ───────────►  ◄───────────
        "normal data flows C1, C2, C3"
        ◄───────────────────────────►


        ┌─────────────────────────────────────────────┐
        │ When the Host has no data for any specific device │
        │ on the token ring, we then issue a Group Poll.    │
        └─────────────────────────────────────────────┘


              AE33                    (Group Poll addr='AE')
        ───────────────►

                    C133              (gateway C1 responds)
                ◄───────────          (no requests to send)

              AE33                    (Group Poll again)
        ───────────────►

                    C2 "I"            (C2 now has data to transmit )
                ◄───────────          (and the gateway sends it on )
                    "I" data          (the next "free" poll issued.)
                ◄───────────

              C2RR                    (the host does a specific)
        ───────────────►              (poll back to C2.        )

                    C2RR              (C2 has no more data.)
                ◄───────────

              AE33                    (HOST still has no data for)
        ───────────────►              (any device, so issues GP. )

                    C133              (gateway responds with no)
                ◄───────────          (data to transmit.       )
```

Figure 16. Group Poll, Polling Sequence

5.5.7.1 Group Poll Performance

There are several considerations concerning line performance that must be reviewed if using group poll.

As discussed in "NCP Tuning Parameters" on page 89, the SOT, Pause, and HDXSP are "tuned" to give the best line performance; **with group poll added the line handling characteristics are changed.**

The first point is that **HDXSP = YES is only valid with Pause = 0**; bearing that in mind you should then look at how PAUSE can affect group poll:

Group Poll Performance

- With PAUSE = 0, the NCP will, at the first "free" poll (no data to transmit), start to send the group poll and sends the group poll XX times (where XX is the number of active devices multiplied by the SERVLIM parameter).

  For example, with three active devices, five devices defined in the SOT, and a SERVLIM = 10 value you would see 30 group polls before a SERVICE POLL is done.

- With a non-zero pause value, at the first free poll you again send the group poll but you only poll "one device," not all the active devices in the SOT. So as in the above example you would see only 10 group polls before a SERVICE POLL is performed.

On a large Token-Ring Network this can have a significant effect on activation times if you have large numbers of PUs defined.

The 3174 must be upgraded to Configuration Support-B Release 1 or higher and customized for the Group Poll function before this support can be generated in NCP.

This NCP enhancement is described in the cover letter for PTF UR90157 and the following related APARs:

IR83735	SSP V3R4.1 MVS
IR83776	SSP V3R4.1 VSE
IR83775	SSP V3R4.1 VM
IR83751	NCP V5R2.1 MVS/VSE/VM
IR83826	NCP V4R3.1 MVS/VSE/VM

5.5.8 Host Software Planning

This section discusses some of the host software planning considerations for the Token-Ring Gateway, concentrating on the NCP considerations.

5.5.8.1 VTAM

There are no specific VTAM considerations although you may need to generate a suitable logmode entry for file transfer. If a 3270 emulation DSPU is to transfer files to and from TSO or CMS at the host it should access these applications using a logmode with the Query bit set ON in the PSERVIC macro.

These are the logmodes used by 3270 emulation LUs in the tests:

```
M2SDLCQ  MODEENT LOGMODE=M2SDLCQ,FMPROF=X'03',TSPROF=X'03',
                 PRIPROT=X'B1',SECPROT=X'90',COMPROT=X'3080',
                 RUSIZES=X'8587',PSERVIC=X'0280000000000185000007E00'

M3287SCS MODEENT LOGMODE=M3287SCS,FMPROF=X'03',TSPROF=X'03',
                 PRIPROT=X'B1',SECPROT=X'90',COMPROT=X'3080',
                 RUSIZES=X'87C7',PSNDPAC=X'01',SRCVPAC=X'01,
                 SSNDPAC=X'00',PSERVIC=X'01000000E100000000000000'
```

The first sample is for a display LU. The second is for a printer LU in SNA Character String (SCS) mode. Notice that pacing has been requested from the host to the printer (PSNDPAC and SRCVPAC). This is to prevent data being transmitted to the printer faster than it can be processed.

A more complete description of host requirements for 3270 Emulation V3 is found in *PC 3270 Emulation Program V3 Application Programming Interface and Host Reference.*

It is also possible to use the Dynamic Reconfiguration facility to add DSPUs without the need to regenerate an NCP. This requires the creation of appropriate Dynamic Reconfiguration Data Sets in VTAM as described in *VTAM Installation and Resource Definition.*

5.5.8.2 NetView

No specific changes are required of NetView for the gateway although you will probably want to update CLISTs and online documentation to reflect the new resources. For instance, the Token-Ring introduces a new level of resource names and problem determination procedures may differ from those followed for coaxially-attached terminals.

5.5.8.3 ACF/NCP

An SDLC multipoint definition should be created in the NCP. Some of the important parameters are indicated in Figure 17. A more complete extract from the NCP used in the tests is included in Appendix F. Parameters which influence performance are discussed in "NCP Tuning Parameters" on page 89.

```
L13008 LINE ADDRESS=(08,FULL ▉1 ),PAUSE=.5 ▉2 ,HDXSP=NO, ▉2
            MAXPU=10,SERVLIM=10 ▉2

    SERVICE MAXLIST=10,ORDER=(P13008A,P13008B,P13008C,
            P13008D,P13008E,P13008F)

P13008A  PU ADDR=C1,GP3174=AE, ▉3
            MAXDATA=521

T13008A1 LU LOCADDR=2,


P13008B  PU ADDR=C2,
            GP3174=AE

T13008B1 LU LOCADDR=2,


P13008C  PU ADDR=C3,        (pc in our case   )
            PUDR=YES ▉4

T13008C1 LU LOCADDR=2,
            MODETAB=AMODETAB,
            DLOGMOD=M2SDLCQ,
            .
            .
            .
P13008F  PU ADDR=C6,
            GP3174=AE

T13008F1 LU LOCADDR=2,
```

Figure 17. Extract of NCP source.

Notes:

▉1 See "LINE Macro" on page 97 for ADDR value.

▉2 See "Group Poll" on page 91 for explanation of dependencies.

▉3 See "PU Macro" on page 97 for GP3174 value.

▉4 See "PU Macro" on page 97 for PUDR value.

5.5.8.4 LINE Macro

- **ADDRESS**: can now be (XXX,FULL) with Configuration Support-B Release 3. Prior to Release 3, and with Configuration Support-A this can only be coded as Half Duplex.

- **MAXPU**: specifies the maximum number of PUs this line will support, including the PU in the gateway. You should specify a value high enough to cater for current and anticipated requirements.

5.5.8.5 SERVICE Macro

- **MAXLIST**: this indicates the maximum number of entries that will be listed in the Service Order Table. You should define a high enough value to cater for anticipated growth.

- **SERVICE**: a list of the PUs supported by the 3174 gateway (including the PU in the gateway itself). The list builds the Service Order Table that determines the sequence in which PUs receive outbound data or are polled for inbound data.

5.5.8.6 PU Macro

Three types of PU are shown in Figure 17 on page 96. The first is the PU for the gateway itself. The second is a 3174 with group poll, and the third is a PC attached to the ring running 3270 Emulation V3.

- **ADDR**: this is the SDLC station address of the PU. The lowest address for this 3174 equates to the response to Question 104 in the 3174 customization and is the PU inside the gateway 3174. The highest ADDR value should be less than or equal to the response to Question 105 in the 3174 customization. The responses to Question 940 determine to which Token-Ring address the ADDR value should be mapped.

- **MAXDATA**: note that the gateway 3174 itself has a larger buffer than the PC. It is therefore possible to code MAXDATA as 521 bytes. The same value would be coded for a 3174-X3R attached to the Token-Ring. Specify 265 for 3270 Emulation V3.

- **PUDR**: specifying "YES" permits the deletion of this PU from one line and its addition to another one using the VTAM dynamic reconfiguration facility. This may be the case if the backup strategy involves dynamic reconfiguration.

  Planning for dynamic reconfiguration should also include the allocation of sufficient empty PU control blocks in the NCP and an indication of the maximum number of LUs that can be added to any of the PUs in the pool. This is done via the NUMBER and PU operands of the PUDRPOOL definition statement.

- **GP3174**: specify GP3174=XX, where XX is a unique polling address not in the ADDR= range used on this line group. This address should match that coded in Question 912 on the gateway controller.

  If you use group poll you should note that you cannot use PUDR as discussed above.

5.5.9 Token-Ring Gateway Data Flows

The following diagrams depict the flow of network data through a remote gateway as DSPUs are activated and deactivated. They are included to aid problem determination.

5.5.9.1 Problem Determination Tools

Data flows between the host and DSPUs can be analyzed using two trace tools which complement each other:

1. SNA Line Traces formatted using the *Advanced Communication Function/ Trace Analysis Program* (ACF/TAP).

   These trace data between the host and the Gateway 3174.

2. The IBM Token-Ring Trace and Performance Program.

   This traces data between the Gateway 3174 and the DSPU.

5.5.9.2 Activation of DSPUs

Figure 18 on page 99 outlines the flow of data in a realistic situation where the DSPU and associated LUs are being activated (perhaps as part of a cascaded network initialization procedure) but the end-user has not yet requested a 3270 Emulation session.

```
┌──────────────┐   ┌──────┐            ┌──────┐┌──────────────────────────┐┌──────┐
│    VTAM      │───│ NCP  │            │      ││       TOKEN-RING         ││      │
│              │   │      │  SDLC Link │      ││                          ││      │
│ 1.V NET,ACT  │   │      │            └──────┘└──────────────────────────┘└──────┘
└──────────────┘   └──────┘            Gateway                              PU B
                                       3174

        ──────────────────────► 2.CONTACT
        ◄──────────────────────  Resp.
                      ──────────────────────► 3.SNRM
                      ◄──────────────────────  4.DM
                                      ──────────────────────────────────► 5.TEST
                                      ◄──────────────────────────────────  Resp.
                                      ──────────────────────────────────► 6.XID

                                                     ┌────────────────────┐
                                                     │ 7.Session not      │
                                                     │   yet requested    │
                                                     └────────────────────┘

                      ──────────────────────► 8.SNRM
                      ◄──────────────────────  9.DM
                                       o
                                       o
                                       o
                                                     ┌────────────────────┐
                                                     │ 10.User requests   │
                                                     │    3270 session    │
                                                     └────────────────────┘

                             ◄────────────────────────────────── 11.XID
                             ──────────────────────────────────►  Resp.
                      ──────────────────────► 12.SNRM
                      ◄──────────────────────  13.DM
                                      ──────────────────────────────────► 14.TEST
                                      ◄──────────────────────────────────  Resp.
                                      ──────────────────────────────────► 15.XID
                                      ◄──────────────────────────────────  XID Resp
                                      ──────────────────────────────────► 16.SABME
                                      ◄──────────────────────────────────  17.UA
                      ──────────────────────► 18.SNRM
                      ◄──────────────────────  19.UA
        ◄──────────────────────  20.CONTACTED
        ──────────────────────────────────────────────────────────────► 21.ACTPU
        ◄──────────────────────────────────────────────────────────────  Resp.
        ──────────────────────────────────────────────────────────────► 22.ACTLU
        ◄──────────────────────────────────────────────────────────────  Resp.
```
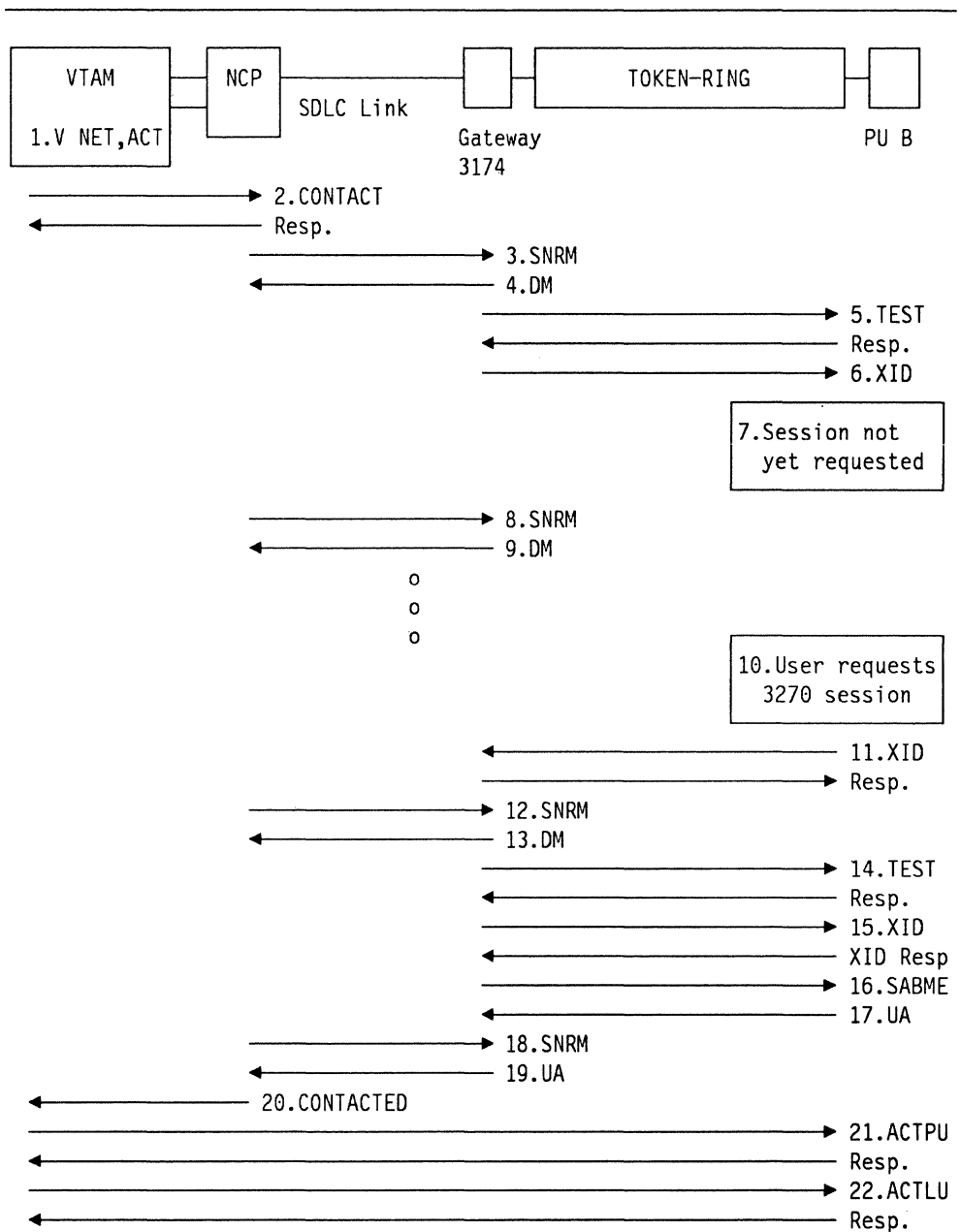
Figure 18. DSPU Activation Flows

1. The network operator issues a "VARY NET" command to activate the DSPU or VTAM initializes resource activation when the NCP major node is activated.

2. VTAM sends a CONTACT request to the NCP.

3. The NCP queues a SNRM request, which is sent when it is the turn of this DSPU to receive a contact poll.

4. The gateway recognizes that it has no link to the DSPU so returns a DM to the NCP in order that it does not timeout waiting for a response and can continue with other processing pending establishment of the link to the DSPU.

5. The gateway 3174 sends a TEST request to the DSPU. This and the subsequent response constitute a basic test of the transmission path between the gateway and the DSPU.

6. The gateway sends an XID to the DSPU. No response is received because 3270 Emulation has not been started.

7. The DSPU does not continue link activation activity until a session is requested by the 3270 Emulation control program.

8. On subsequent passes through the polling cycle, the NCP resends the pending SNRM to the gateway for the DSPU.

9. The gateway recognizes that there still is no link to the DSPU and returns a DM to the SNRM requests.

10. Sometime later the end user requests a 3270 session by selecting option "a" from the 3270 Task Selection menu.

11. An XID flows from the DSPU to the gateway. The gateway returns a response acknowledging the request.

12. Following the session request from the DSPU, the next SNRM received by the gateway re-starts the link activation procedure.

13. The gateway recognizes that there still is no link to the DSPU and returns a DM to the NCP.

14. The gateway 3174 sends a TEST request to the DSPU and receives a response.

15. The gateway sends an XID to the DSPU. This time an XID response is received from the DSPU.

16. The gateway sends a SABME, the Token-Ring link connection request command.

17. The DSPU acknowledges the SABME request with a UA (positive response). The link is now established, and both devices reset their send and receive counters.

18. On a subsequent pass through the polling cycle, the NCP resends the pending SNRM to the gateway for the DSPU.

19. The gateway returns a UA to the NCP recognizing that there now exists a Token-Ring link from the gateway to the DSPU.

20. NCP informs VTAM that it has CONTACTED the DSPU.

21. An ACTPU request is eventually sent by VTAM to the DSPU.

22. Positive response to the ACTPU is followed by ACTLUs to the devices attached to the PU.

5.5.9.3 Session Termination Data Flows

Figure 19 outlines what happens when a user terminates the 3270 session either by ending the 3270 task or by powering off the workstation.
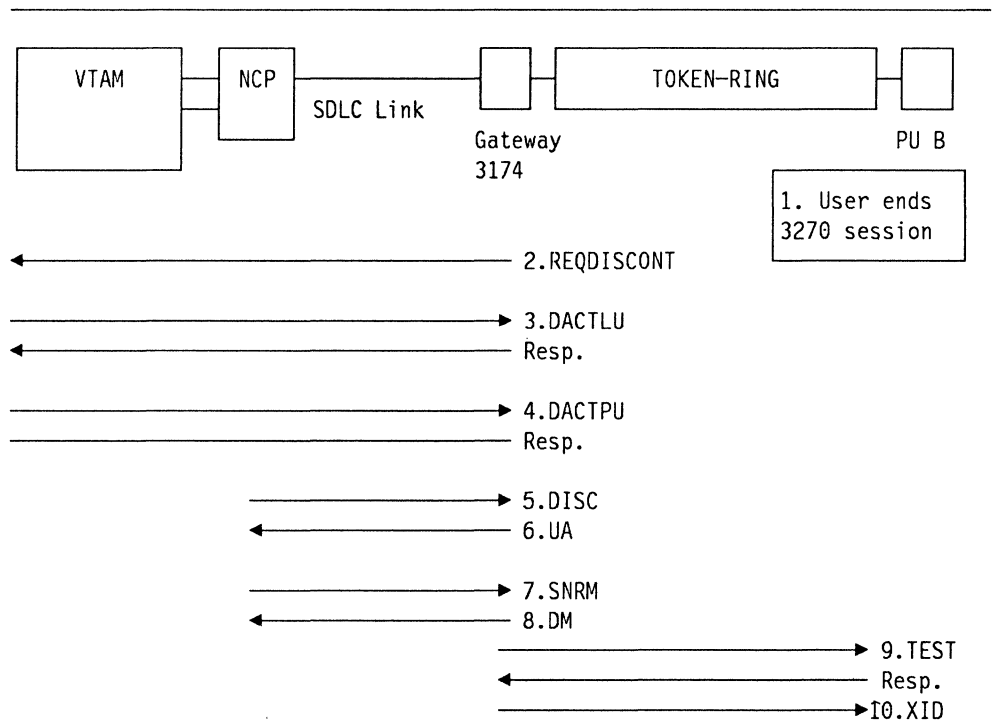
Figure 19. DSPU Deactivation Flows

1. The end user terminates the session by ending the 3270 task.

2. The gateway detects the loss of the downstream connection and builds a REQDISCONT RU for transmission to the host. This has byte three set to X'81' indicating the Contact Immediate option.

3. On receipt of the REQDISCONT, VTAM sends DACTLUs for devices attached to the PU. The gateway responds to these on behalf of the DSPU.

4. VTAM sends a DACTPU to deactivate the DSPU. Again, the gateway generates a response.

5. NCP sends a DISC request breaking the SDLC connection between the host and the DSPU.

6. The gateway returns a positive (UA) response to the DISC.

7. The NCP recommences polling of the DSPU as a result of the Contact Immediate option on the REQDISCONT.

8. The DSPU is now registered as PCTD2 by VTAM. The periodic arrival of the SNRM at the gateway causes it to reattempt connection with the DSPU in the manner described in the previous diagram.

5.5.10 Remote Token-Ring Gateway: Management Considerations

This section looks at some of the management aspects of the 3174 Token-Ring Gateway. We first consider some of the facilities available in this area and then describe some of the data flows involved in session activation and deactivation through the Gateway.

5.5.11 3174 Problem Determination Facilities

The 3174 Test facilities, invoked by pressing ALT-TEST from a CUT device, or, with Configuration Support-B Release 2, remotely via CSCF and a NetView defined console have been extended to provide information specific to the Token-Ring Gateway.

The functions accessible from the Test Menu are described in detail in *3174 Customer Extended Problem Determination*, GA23-0217. Shown below are some sample panels from Configuration Support-A/S Release 3 demonstrating the type of information available relating to the Gateway. Releases after Release 3 and Configuration Support-B provide more information. The following panels are described to give you an idea of the types of information available to help you solve problems.

```
┌─────────────────────────────────────────────────────────────────────────┐
│                                                                           │
│                     ────────Log Records  - All────────                    │
│                                                                           │
│      (Day/Time since last POR:009/02:22)                                  │
│       Day      Time      SC    QA    HG    PN    LT        Extended Data   │
│       009     00:57     0883   07    31                    0000 4000 0031 4002 04 │
│       009     00:49     0883   03    31                    0000 4000 0031 4005 04 │
│       008     18:12     0412   03    00    00   000                       │
│                                                                           │
│                                                                           │
│                                                                           │
│                               .                                           │
│                                                                           │
│                                                                           │
│                                                                           │
│                                                                           │
│      SC=Status Code  QA=Qualifier  HG=Hardware Group                      │
│      PN=Part Number     LT=Logical Terminal                               │
│                                                                           │
│      To go directly to other tests, enter: /Test,Option                   │
│      Select ===▶_                                                         │
│      PF: 3=Quit                      8=Fwd            12=Test Menu         │
│                                                                           │
└─────────────────────────────────────────────────────────────────────────┘
```

Figure 20. 3174 Event Log

This panel shows some entries in the Event Log (Option 1 from the Test Menu). The status codes and qualifiers are interpreted using *3174 Customer Extended Problem Determination*

The second event in this example resulted from a user-initiated termination of 3270 Emulation in a workstation causing the logical link to be broken between the DSPU and the gateway. The last event listed resulted from a device power-off at the workstation causing a link timeout to occur. Status codes are sent to NetView in the form of NMVTs.

```
                      ─────────Token-Ring Test Menu ─────────

      Select Option; press ENTER

         Option              Description

            1                Monitor Token-Ring status
            2                Display Token-Ring adapter status summary
            3                Reset Token-Ring Adapter status summary
            4                Display link status summary for all links
            5,n              Display link status summary for all link address n
            6                Reset link status counters for all links
            7,n              Reset link status counters for all link address n
            8                Display Gateway host status summary for all links




      To go directly to other tests, enter: /Test,Option
      Select ===▶_
      PF: 3=Quit                    8=Fwd           12=Test Menu
```

Figure 21. Token-Ring Test Menu

This menu is invoked by selecting option 9 from the Test Menu.

```
                      ─────────Token-Ring Status─────────

        4698 - Local Token-Ring Adapter open









        4694 - The test has been active for 0000 minutes

      To go directly to other tests, enter: /Test,Option
      Select ===▶_
      PF: 3=Quit                                    12=Test Menu
```

Figure 22. Token-Ring Status

The Token-Ring Status panel indicates the status of the Token-Ring Adapter.
The 4698 message indicates that the adapter is open. It will change to 4697 if
the adapter closes for some reason (for example, if the cable is removed from
the 8228).

```
┌─────────────────────────────────────────────────────────────────────┐
│              ───Token-Ring Adapter Status Summary───                  │
│                                                                       │
│  Adapter Address -          40003174000104      Adapter Status - Open │
│                                                                       │
│  Customized links  - 005                        Active Links - 003    │
│                                                                       │
│                            Counters              Overflow             │
│          Line Errors       00000000                 0                 │
│          Internal Errors   00000000                 0                 │
│          Burst Errors      00000000                 0                 │
│          ARI/FCI Errors    00000000                 0                 │
│          Abort Delimiters  00000000                 0                 │
│          Lost Frames       00000000                 0                 │
│          Receive Congestion 00000000                0                 │
│          Frame Copied Errors 00000000               0                 │
│          Frequency Errors  00000000                 0                 │
│          Token Errors      00000000                 0                 │
│                                                                       │
│                                                                       │
│                                                                       │
│  To go directly to other tests, enter: /Test,Option                   │
│  Select ===►_                                                         │
│  PF: 3=Quit                              12=Test Menu                  │
└─────────────────────────────────────────────────────────────────────┘
```

Figure 23. Token-Ring Adapter Status Summary

The Token-Ring Adapter Status Summary panel indicates the number of errors detected for the Token-Ring by category.

```
┌─────────────────────────────────────────────────────────────────────┐
│               ───────Link Status Summary───────                       │
│  Link Address      40000031400204   40000031400404   40000031400504   │
│  Primary/Secondary     01/00            01/00            01/00         │
│  Trans I-frames    00000007 - 0     00000030 - 0     00000007 - 0      │
│  Rec I-frames      00000005 - 0     00000022 - 0     00000005 - 0      │
│  Transmit Errors   00000000 - 0     00000000 - 0     00000000 - 0      │
│  Received Errors   00000000 - 0     00000000 - 0     00000000 - 0      │
│  T1 Expired        00000000 - 0     00000000 - 0     00000000 - 0      │
│  Com/Res Ind       01    01          01    01         01    01         │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│  To go directly to other tests, enter: /Test,Option                   │
│  Select ===►_                                                         │
│  PF: 3=Quit                              12=Test Menu                  │
└─────────────────────────────────────────────────────────────────────┘
```

Figure 24. Link Status Summary

The Link Status Summary panel shows traffic characteristics of each DSPU during this counting period, including the number of frames transmitted and received, the number of times the T1 or reply timer expired and the last command/response sent. The "Primary/Secondary" values indicate the Token-Ring primary and secondary states for the link station, where "01'"for primary state identifies the link as being open.

```
                        ──────Gateway Host Status Summary──────
        Customized Links - 006                            Address Range - C1 - C6

        Host      Link      Token-Ring          Host      Link      Token-Ring
        Address   Status    Address             Address   Status    Address
          C1        02      400031740001 04       C2        00      400000314001 04
          C3        02      400000314002 04       C4        02      400000314003 04
          C5        02      400000314004 04




        To go directly to other tests, enter: /Test,Option
        Select ===▶_
        PF: 3=Quit                                    12=Test Menu
```

Figure 25. Gateway Host Status Summary

This panel was introduced in Configuration S Release 2.0 to show the number
of links declared to the microcode at customization time and the status of each
link.

Field	Description
Customized Links	The number of links declared in customization
Address Range	The host address range declared in customization
Host Address	The address assigned each link during customization
Link Status	The two-digit status code representing the status of the link

- For Local models:

  - 00 = The Token-Ring attached physical unit is in disconnect mode

  - 02 = The Token-Ring attached physical unit is connected

- For Remote models:

  - 00 = SRNM required

  - 01 = SRNM received

  - 02 = Connected/active

  - 03 = Poll timeout.

Token-Ring Address The station address assigned to each link during customization. This address is the six byte Token-Ring adapter address followed by the one byte service access point (SAP) address.

5.6 3174 Gateway: Performance Considerations

The performance information presented in this section is intended to provide guidance in planning for your system. For the most current information, the IBM Systems Engineer should consult INFOSYS.

5.6.1.1 3174 Gateway Utilization

The 3174 Gateway functions as a "pass-through" multiplexer for Token-Ring Network traffic to and from a host. Its pass-through capacity determines the upper limit of the traffic flow, and therefore the total number of workstations and devices that can be usefully accommodated on ring-attached 3174s. The 3174 gateway does not care about source or destination device type, only about the characteristics and rate of the traffic.

The utilization of the 3174 with the Token-Ring Gateway feature can be summarized in the following table:

CU/Term	TPM	Utilization (%)		
		3174 3R/53R	3174 Gateway	Ring
1/1	6.7	.95	.20	
1/32	214	30	6.5	
10/320	2140		65	15-17

Figure 26. 3174 Utilization with Gateway Feature

The first line in the table shows that the utilization of the 3174 Gateway is .2 percent when a single terminal attached to a controller is transacting 6.7 type A-1200 transactions per minute (TPM). The next line shows the increase of the 3174 Gateway when the number of terminals on a single 3174 Model 03R is increased to 32, each processing 6.7 transactions per minute. In the bottom line the number of terminals and controllers have been increased to 320 and 10 respectively (to 20 in the case of the model 53R), again, with a transaction load of 6.7 TPM per terminal.

According to this information, the 3174 Gateway can handle a maximum of 35 to 40 transactions per second (TPS) resulting in a controller utilization of 65 to 70 percent. With this traffic, the Token-Ring Network utilization is in the range of 15 to 17 percent. When the aggregate transaction demand from devices attached to 3174 subsystems with a token-ring starts to exceed the thresholds presented in this document, operations continue without loss of data but response times increase, and data transfer rates drop.

The cited performance characteristics were obtained by customizing for an I-frame size of 2042 bytes on the Token-Ring Network, and a window size of 2. See configuration question 941. Using a smaller frame-size for large messages substantially increases utilization of the 3174 Gateway for a given amount of data to be transported, because overhead processing increases. As a result, traffic-handling capacity of the 3174 gateway may be reduced by as much as fifty percent, depending on the application.

For Models 3R and 53R, the answers to configuration questions 380, 381, 382, and 383 were assumed to be "2042", "1", "2042", and "2", respectively.

On the SNA level, one acknowledgement message has been assumed to follow the "write" operations in both type A-1200 benchmarks and file transfers. While a SNA acknowledgement message does not add much to response time, it does significantly increase gateway utilization, thereby decreasing the maximum amount of traffic that the gateway can handle.

5.6.1.2 File Transfer Considerations

An aggregate rate of concurrent file transfers of 60 Kbytes/second would produce 65 percent utilization in the 3174 Gateway, which is the recommended maximum. Please consider that file transfer and interactive transactions have to share the resources of the 3174 gateway. For example, when you want to allow for a combined average file transfer rate of 20 kbytes per second, do not plan for more than 24 type A-1200 transactions through the Gateway. (The actual rate associated with a given file transfer depends on many factors such as workstation type and host support).

5.6.1.3 3174 DSPU vs. Channel-Attached 3274

Preliminary analysis indicates that it may be possible to migrate from channel-attached 3274 control units to the new Token-Ring attached 3174s and realize an improvement in performance. For short data stream applications, such as alphanumerics, user response times across the Token-Ring Network can be less than those for direct channel attachment via the current 3274 control units. Major reasons for the performance improvement include a faster processor and channel adapter in the 3174-01L (and even more in the 3174-11L), improvements in microcode, and the ability of the Token-Ring Network to support data transfer rates in the megabit-per-second range. In sample analysis, user response times were compared for a simple interactive workload (40-bytes in and 1400-bytes out) on two system configurations. The first configuration consisted of 3278 displays directly attached to 3274 controllers on a S/370 channel.

The second configuration had the 3278 displays on 3174 controllers located within a building complex on the Token-Ring Network. The Token-Ring Network, in turn, is connected to a 3174 controller on a S/370 channel. The subsystem response times (excluding the S/370 response time) for the Token-Ring configuration were 40-80 percent of response times for the channel-attached 3274s. The smaller percentage occurred at higher terminal transaction rates where the greater throughput capacity of the 3174 was an advantage. For terminals emulating the 3278, the internal delays of the terminals may be large compared to the subsystem response times, so the improvement may not be noticeable to the user. These preliminary performance analyses were obtained from simulation models using simple, homogeneous workloads. Performance for a particular customer's workload and environment may be different.

5.7 IBM 3174 Token-Ring Gateway with PC 3270 Emulation Workstations

The PC 3270 Emulation Program is intended to allow a PC user to communicate with host applications written for 3270 devices. Three types of links are supported: SDLC links, Token-Ring Network, and attachment to a 3270 controller as a DFT device with up to five logical terminals (displays and printers). This section deals only with the PCs in a Token-Ring environment.

In terms of SNA, the displays are acting as LU-T2; PC-attached printers appear as LU-T1 or LU-T3.

File transfer to and from the host is supported with PC 3270 Emulation. In this case, the *query bit* must be set in the PSERVIC parameter of the LOGMODE entry used to bind a session with the workstation-LU. This is necessary because PC 3270 Emulation uses *Structured Fields* in the file transfer protocol. In all other aspects, PC 3270 Emulation behaves like and has the capabilities of a CUT terminal. File transfer is optional and (if customized) can be started from the *Request Task* panel. One of the following host programs is needed as the file transfer upstream partner.

- IBM 3270 PC File Transfer Program, R.1 (5665-311) for MVS/TSO

- IBM 3270 PC File Transfer Program, R.1 (5664-281) for VM/CMS

- IBM CICS/VS PC File Transfer Program, R.1 (5798-DQH) for MVS/VSE-CICS

The format of the SEND and RECEIVE commands depends on the host partner used.

5.7.1 Prerequisites and Coexistence

- PC 3270 Emulation Version 3.0 is required for a host connection over the Token-Ring Network.

- DOS 3.2 or later is required for Token-Ring Network products on a PC. Release 1.2, even if PC LAN is configured as Redirector, Server, Receiver or Messenger.

- If the PC LAN Program is run concurrently with the stand-alone mode of the PC 3270 Emulation Program V 3.0, then an additional SAP and Link Station must be allocated with the NETBEUI (or equivalent) command.

- The PC 3270 Emulation program can be accessed from a shared disk, as long as a separate directory is available for each station running emulation.

- The PC LAN program will not start if another application has already initialized the Token-Ring Adapter. Therefore, it must be started before PC 3270 Emulation.

- PC 3270 Emulation checks the status of the Token-Ring Adapter. If the adapter has been already opened by another application, the emulator does not try to reopen it, but shares the adapter (if possible).

- Before PC 3270 Emulation can be started, the Adapter Support Program must be loaded. If a locally administered address is used for the adapter, this must be entered as a parameter of the TOKREUI load command; see *Guide to Operations for the Token-Ring Network PC Adapter* (P/N 6165874) for the format.

- If PC 3270 Emulation is configured as a gateway or as a network station, the NETBIOS program must first be loaded with the NETBEUI command before PC 3270 Emulation can be started. The stand-alone station configuration interfaces directly to the TOKREUI Program without the need of NETBIOS.

5.7.2 Installation and Customization

PC 3270 Emulation is delivered on two 360K PC diskettes. Create a sub-directory (if a hard disk is available) and copy both diskettes into this sub-directory. For detailed information of how to install and handle PC 3270 Emulation see *IBM PC 3270 Emulation Program, Version 3.0, User's Guide*, (P/N 75X0805).

It would be a nice idea to have a batch file in the root directory for automatic path definitions, loading the Token-Ring Adapter and starting (eventually) NETBIOS and the Emulation.

Such a batch file (let us name it EMU70.BAT) could look like this:

```
echo off
path \DOS32;\EDIT;\TOKENL;\EMU3270
cd \TOKENL
TOKREUI 400033301004
rem Load primary adapter with local administered address
if errorlevel 3 goto ER3
if errorlevel 2 goto ER2
if errorlevel 1 goto ER1
if errorlevel 0 goto ER0
rem The adapter load program has set the DOS indicator (ERRORLEVEL)
:ER3
echo ===► One or both shared RAM locations are invalid
goto EXI
:ER2
echo ===► One or both adapter addresses are invalid
goto EXI
:ER1
echo ===► Adapter already loaded with same code, proceed
goto EOK
:ER0
echo ===► Adapter loaded successfully
:EOK
rem If necessary start here NETBIOS program with the NETBEUI command
cd \EMU3270
PSCPG,f
rem Load the PC 3270 Emulation program
:EXI
cd \
rem Return to route directory
echo on
```

Figure 27. 3270 Emulation Startup Batch File Example

NOTE: The LAN Support program will replace TOKREUI; NETBEUI and these modules will be located in the CONFIG.SYS file instead of a BAT file.

5.7.2.1 Customization Menus

```
Chg Profile      |    |    |      |    | Ext 101 |      |100
                    COMMUNICATION PROFILE TASKS

       ID  ITEM                 YOUR          POSSIBLE
                                CHOICE        CHOICES

       +------------------+
       |a   Configuration |       1           1 = Stand-alone Station
       +------------------+                   2 = Network Station
                                              3 = Gateway
                                              4 = Gateway With
                                                    Network Station

       +-------------------------+
       |b   Communication Attachment| 3        1 = SDLC    2 = DFT
       +-------------------------+             3 = Token-Ring Network

       c   Alternate Tasks        2           1 = Yes    2 = No
       d   3270 Keyboard        101           1 - 199
       e   3270 Keyboard Remap    2           1 = Yes    2 = No


       f   Create Or Revise Communication Setup
       g   Create Or Revise Modem And Line Description
       h   Create Or Revise Gateway Setup

       z   Return To Task Selection

    Type ID Letter To Choose Item, Press Enter:
```

Figure 28. 3270 Emulation Communication Profile Tasks Menu

The above menu is selected from the *PC 3270 Emulation Task Selection* Menu (item b)

- (a): There are two choices for display stations providing PU communications with the host: Stand-alone or Gateway.

  — Use the gateway configuration if this PC is to act as a gateway for other network stations on the same or another ring.

  — The Stand-alone configuration does not require NETBIOS.

  In a Token-Ring environment, a PC configured as a stand-alone station has several advantages over a PC configured as a network station. *Stand-alone* is normally the configuration of choice.

  The main advantages of a stand-alone station are:

  — No additional station is involved in the gateway function, which improves performance and availability while eliminating the cost associated with a dedicated workstation.

  — Less workstation memory is required because NETBIOS is not required for support of dependent network stations.

  A disadvantage of using stand-alone stations could be that each PC is represented with a PU and LU in VTAM and in NCP. There may be some situations where a configuration with gateway and network stations would be preferable. These include situations where the number of stations is very large, and thus the number of switched or local PU definitions is

excessive. There may also be situations in which the sharing of such resources as high quality printers requires that the shared resource be defined on the same PU as the display LUs which share it.

- (b): For the communications attachment, selection '3' is required for IBM Token-Ring Network.

- (g): This choice displays the menu dealing with the Token-Ring attachment.

```
┌─────────────────────────────────────────────────────────────────────┐
│                                                                       │
│  Chg Profile       |     |      |      |  | Ext 101 |      |100        │
│                                                                       │
│                      MODEM AND LINE DESCRIPTION                       │
│                                                                       │
│     ID  ITEM                     YOUR        POSSIBLE                  │
│                                  CHOICE      CHOICES                   │
│                                                                       │
│    ┌──────────────────────┐                                           │
│    │a   Physical Unit ID   │      A0001                               │
│    └──────────────────────┘                                           │
│     b   Network Facility         1           1 = Switched             │
│                                              2 = Dedicated            │
│                                              3 = Switched Backup       │
│                                                                       │
│    ┌──────────────────────┐                                           │
│    │c   SDLC Link Address   │     04                                  │
│    └──────────────────────┘                                           │
│     d   Continuous Carrier       1           1 = Yes     2 = No       │
│     e   Half Speed               2           1 = Yes     2 = No       │
│     f   NRZI Encoding            1           1 = Yes     2 = No       │
│     g   Answertone Generation    2           1 = Yes (Switched Only)  │
│                                              2 = No                    │
│     h   End With REQDISCONT       2           1 = Yes     2 = No       │
│                                                                       │
│    ┌──────────────────────┐                                           │
│    │i   Destination Address │     23301001                            │
│    └──────────────────────┘                                           │
│    When Finished With This Menu, Press Enter                          │
│                                                                       │
│    Type ID Letter To Choose ITEM, Press Enter:                        │
│                                                                       │
└─────────────────────────────────────────────────────────────────────┘
```

Figure 29. 3270 Emulation Modem and Line Description Menu

The above menu is chosen by selecting "g" on the *Communication Profile Tasks* menu in Figure 28 on page 110.

- (a): The Physical Unit ID must match the IDNUM value in the VTAM switched major node if the gateway is an IBM 37XX. If the gateway is an IBM 3174-X1L, this value has no significance, yet we recommend supplying a unique value, since the gateway might change (e.g. for backup reasons). The IDBLK value inserted into the XID command by the PC 3270 Emulation is equal to that of a real 3274/3174 controller (X'017').

- (c): The SDLC Station address must be the SAP value of the gateway (which is X'04' for the NCP and the IBM 3174-X1L in our case).

- The following parameters are not applicable in the Token-Ring environment:

  - (b) Network Facility

  - (d) Continuous Carrier

  - (e) Half Speed

  - (f) NRZI Coding

- (g) Answertone Generation

- (h) End With REQDISCONT

- (i): The value coded for the *Destination Address* must match the last four bytes of the gateway token-ring address (the address of the TIC of the 37XX or of the Token-Ring Adapter of the 3174-X1L).

  The PC 3270 Emulation adds the leading four digits (X'4000'). PC 3270 Emulation V3 requires a locally administered gateway address in the range '00000000' through '79999999'.

  With a 37XX gateway, this value must be equal to the last eight digits of the LOCADD parameter of the LINE macro in the *Physical Group* definition of the TIC.

  With a 3174-X1L gateway, this value must be equal to the last eight digits entered in response to question 900 during customization.

5.7.3 Test Cases

PC 3270 Emulation has been tested under two different configuration options:

1. Stand-alone Station.

2. Gateway with Network Station.

No functional deviations could be observed during 3270 emulation.

Session establishment, dialog communication, file transfer and session termination have been tested with two different host environments: 1) TSO under MVS, and 2) CMS under VM/VTAM. No problems and no functional deviations could be observed in these two environments.

Unlike a 3174, NMVT-Alerts are not supported by PC 3270 Emulation V 3.0. This means no alert messages are generated by PC 3270 Emulation to inform NetView of certain problems.

5.7.3.1 File Transfer Performance

A file transfer performance test in our specific environment has shown the following result:

- PC 3270 Emulation configured as stand-alone workstation

- A PC AT with Token-Ring Adapter

- Token-Ring Gateway was a 3174-01L

- Host application was CMS under VM/VTAM

- No additional traffic was on the Token-Ring (or through the 3174-01L).

62,672 Bytes were transferred in about 23 seconds.

5.7.4 PC Scenario
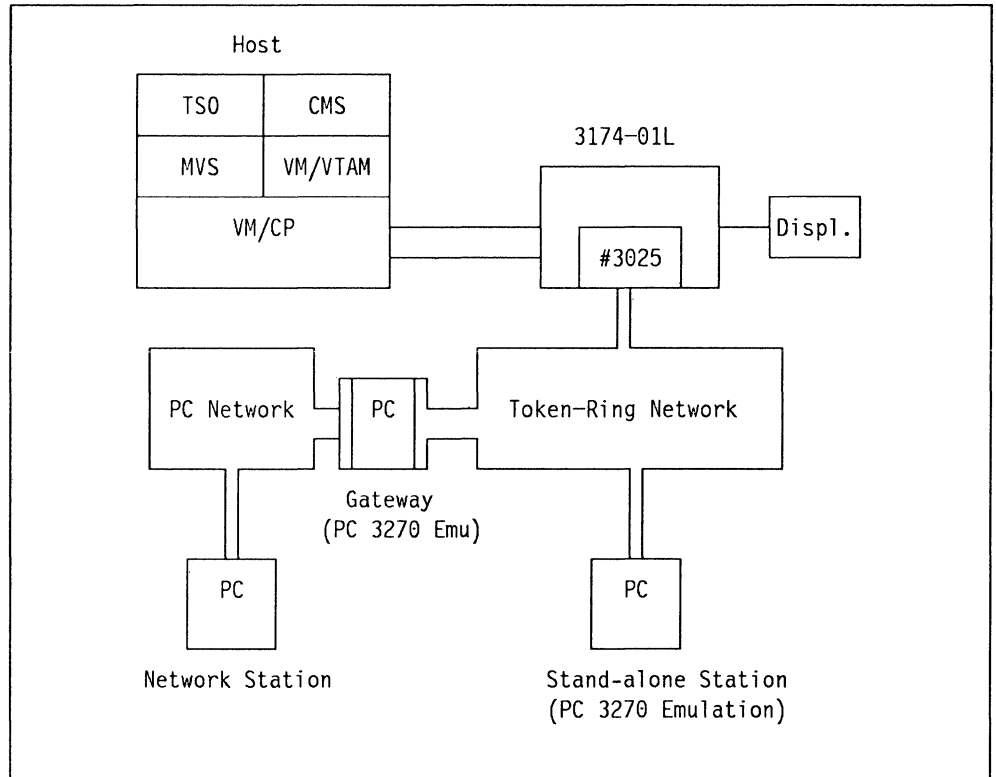
Figure 30. PC to 3174 Gateway Scenario

5.8 3174 Gateway and S/36 Considerations

A System /36 can be attached as a downstream PU to a Token-Ring Network and can communicate with a main-frame host via a 3174-X1L serving as a gateway. In this environment, the /36 must behave as a PU-T2.0.

5.8.1 Test Cases

Unlike other DSPUs discussed until now, the S/36 was attached to a separate Token-Ring Network (Ring 2) and both Networks were connected via a PC serving as a bridge. The bridge for these Token-Ring Networks is fully transparent to the both the gateway and to the DSPUs, easing connection across the two networks.

In the first test case, the S/36 was driven with 3270 Emulation, its logical units behaved as LU-T2. Since the host application was CMS, the VM/CMS logo appeared on the screen of a S/36 display, and CMS could be accessed from them. No problems were experienced during this test.

In the second test case, the S/36 was driven with APPC, so that its logical units behaved as LU-T6.2 units. The host application in this case was MVS/CICS in another domain (subarea 11, see Figure 31 on page 114). For this reason, the APPC-LUs were also defined as cross-domain resources in the CICS host and in the CICS TCT. The owner of the PU/LUs was the CMS host with VM/VTAM (subarea 33). to this host, the S/36 appeared as a local channel-attached SNA

PU. On the other hand, the applications in subarea 11 must have been defined as cross-domain resources in subarea 33. The connection between both domains (SSCPs) was provided by VM/CP in the form of a virtual channel-to-channel connection.

5.8.2 S/36 Scenario
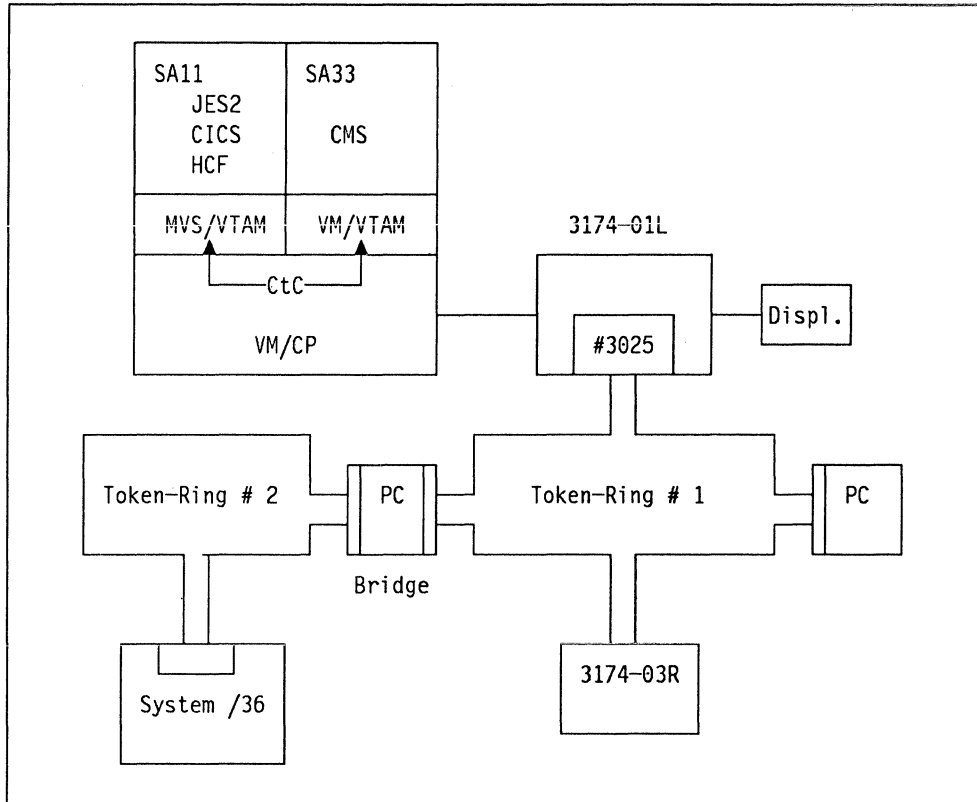
Figure 31. S/36 Scenario

5.9 3174 DSPU: Models X3R

These models of the 3174 Controller attach to the Token-Ring Network and communicate with a host through a gateway. 3174 DSPUs can connect up to 32 or 64 workstations, see "3270 Port Expansion Feature (feature 3100)" on page 9.

For workstations in DFT mode with multiple logical units or CUT terminals using the MLT function these controllers support up to 320 LUs, see "Multiple Logical Terminal (MLT)" on page 217 for detail.

The gateway address is defined at "Microcode Customization" on page 41, if you are customizing for multiple gateways then you have to code the additional gateways as you do for all multiple host configurations by specifying an "M" to Question 101, and then defining the additional hosts as normal.

Unlike the PCs attached to the ring, devices attached to these 3174 models are not able to communicate directly with other devices in the ring unless the 3174 has "RPQ 8Q0718" for peer communications; see "3174 Peer Communication RPQ (8Q0718)" on page 22 for further detail.

5.9.1 Hardware Installation

3174 models with the upstream Token-Ring Adapter card are:

- 3174-13R has up to 64 ports and manages up to 320 LUs.

- 3174-23R has up to 64 ports and manages up to 320 LUs.

- 3174-63R has up to 16 ports and manages up to 80 LUs.

Functionally, the models are identical. You can also change existing 3174-X1R (V.24 Interface) or 3174-X2R (X.21 Interface) models to 3174-13R models simply by installing the Token-Ring Adapter card and, customizing a new control diskette. The available 3174-13R conversion package includes the following:

- Token-Ring Adapter

- Control and Utility diskettes

- Adapter cable.

No additional storage expansion is needed for this conversion. The microcode determines which adapter of the 3174 is working. For information on the position of the different cards in the 3174 please refer to "IBM 3174 Large Controller Plug Chart" on page 333.

5.9.2 Microcode

The microcode includes a Utility diskette and a control diskette with the microcode needed to handle the Token-Ring Network connection. This microcode is implemented in Configuration Support-A Release 2 and higher of the standard 3174 microcode and therefore supports all standard functions of the 3174 at this level.

5.9.3 Prerequisites

There are no memory prerequisites for these models.

Since these downstream PUs communicate with the host through gateways, they appear to the host access methods and applications like a PU type 2.0. Certain sense information generated by these PUs is different from that generated by the former 3274 controllers, see *3174 Functional Description* "Host Programming Considerations," Appendix B.

5.9.4 Customization

Before your 3174 can be used as a downstream cluster controller, it has to be properly customized. Only those customization questions dealing with the Token-Ring Network attachment are discussed in this chapter.

Take this into consideration if (for example) you have to decide whether data should be compressed. The recommendation is that locally attached devices should transmit non-compressed data because of the high channel speed and remotely attached devices should compress data to be transmitted because of the lower line speed.

5.9.4.1 Question 100: Model Designation

The response to this question is:

```
X3R        where X is the model type.
```

5.9.4.2 Question 101: Host Attachment

Depending on the response to this question, the next customization panel displayed relates to the environment chosen. If your response is '7', the next panel presented is the Token-Ring network panel.

Multi-host configurations and responses are covered in "Multi-Host Connectivity" on page 239.

5.9.4.3 Question 106: Token-Ring Network Address of the 3174 (DSPU)

The response must contain 14 hexadecimal digits for the Token-Ring address and SAP of the 3174 you are currently customizing.

```
    4000 annn nnnn  ss
Where:

    4000    is the fixed part of the address

    a       must not be greater than X'7'

    n       can be any value from X'0' to X'F'

    ss      is the SAP address (default is X'04')
```

Note: The SAP address can only be specified in Configuration Support-B Release 2 and later where SLMH is supported. Previous levels of microcode will force this value to X'04'.

5.9.4.4 Question 107: Token-Ring Network Address of the Gateway

The response must contain 14 hexadecimal digits for the token-ring address and SAP of the gateway.

```
      4000 annn nnnn  ss
Where:

      4000      is the fixed part of the address

      a         must not be greater than X'7'

      n         can be any value from X'0' to X'F'

      ss        is the SAP address (default is X'04')
```

Note: The SAP address can only be specified in Configuration Support-B Release 2 and later where SLMH is supported. Previous levels of microcode will force this value to X'04'.

The user-specified portion will be determined by the addressing conventions in force in the installation, see "Naming Convention Example for Adapter Addresses" on page 59.

5.9.4.5 Question 215: Physical Unit Identification

The Physical Unit Identification (PUID) consists of five hexadecimal digits in the range "0" through "F" hexadecimal. The default value is '00000'. Each PUID in the network should be unique because it identifies the 3174 to the host in response to an XID command. The PUID is mandatory if the 3174 DSPU uses a 37XX gateway.

The PUID has no significance if the gateway is a 3174. There is no IDNUM parameter in the PU statement of a local SNA node. However, we recommend supplying a unique value, since sometimes the type of gateway may change (e.g., for backup reasons).

5.9.4.6 Questions 380 and 381

- **Question 380: Max. Receive I-Frame Size**
- **Question 381: Token-Ring Network Maximum In**

At Configuration Support-B Release 2 and higher, questions 380 and 381 are no longer asked when customizing. See "I-Frame Size and Window Size Considerations" on page 78 for a detailed explanation of the values in these questions.

5.9.4.7 Question 382: Max. Transmission I-Frame Size

The response consists of four numerical characters (padded if necessary with leading zeros). The default value is "0521".

Notes:

1. The response to this question is dependent upon your gateway and ring configuration.

2. The I-Frame size should include the length for the SNA transmission header and the request header (TH = 6 bytes, RH = 3 bytes).

3. Valid responses range from 265 to 2042 bytes.

4. DSPUs equipped with the Type 3A Dual Speed 16/4 Mbps Communication Adapter (for example 3174-13R/63R) can send I-Frames of up to 2057 (2048+TH+RH) bytes length.

5.9.4.8 Question 383: Token-Ring Network Maximum Out

The response must be a number from 1 to 7. The default value is 2. This value defines the Transmit Window Size for the DSPU.

Notes:

1. The response to this question is dependent upon your gateway and the ring configuration. The value given here specifies the maximum number of link level I-Frames that the 3174 DSPU transmits before it waits for an acknowledgement.

2. The following figure specifies valid responses based on the associated I-Frame size given in the response to question 382.

I-Frame size entered as response to # 382	Token-Ring Network Maximum Out
265 ← X ← 521 bytes	7
522 ← X ← 1033 bytes	7
1034 ← X ← 2042 bytes	4

Figure 32. DSPU Frame Size and Maximum Out

5.9.4.9 Question 384: Ring Speed of the Token-Ring Network

Possible responses are:

- 0 = 4Mbps with normal token release

- 1 = 16Mbps with normal token release

- 2 = 16Mbps with early token release.

Notes:

1. For controllers with a 4Mbps Token-Ring adapter installed, 0 is the only valid response.

2. For controllers with a 16/4Mbps Token-Ring adapter installed, 0, 1, or 2 is a valid response. A response of 2 is recommended for large networks.

5.10 Planning for 3174 DSPUs - 37XX Gateway

The 3174 DSPU communicating with the host via a 372x or 3745 communication controller must be defined to VTAM in a Switched SNA Major Node and to NCP as a PU-T2.0 attached to a switched SDLC link (the TIC must be defined to NCP as a PU-T1 attached to a leased line). The IDBLK-Number carried in the inbound XID command is '017' (as it is for a 3174/3274 attached to a real switched line).

A 3745 can support 9,999 DSPUs, a 3725 can support 2,440 DSPUs, and a 3720 522 DSPUs. If a DSPU must communicate through a second gateway (a second TIC, or another 3720/25) with a different Token-Ring address, you must re-IML the control diskette for the second gateway address unless you are running multi-host support.

The gateways used for the tests were a 3725 channel-attached to the host with two different TICs attached to two different rings and, in another case, a remote 3720 connected via an INN link to a local channel-attached 3720.

5.10.1.1 Differences Between the 3174 DSPU and a PC

The two major differences between a PC with IBM PC 3270 Emulation Program Version 3 and a 3174 DSPU using a 372X/45 host gateway are:

1. The 3174 normally has more than two LUs defined. Adjust your LUDRPOOL parameters accordingly. Likewise having several LUs per PU impacts the MAXLU value on the logical lines PU statement.

2. The 3174 allows receiving and transmission of larger Token-Ring frames. The PC is limited to 265 characters; the 3174 supports up to 4105 characters. This impacts your coding of MAXOUT parameters in the switch major nodes PU, your specification of frame sizes received, RCVBUFC=, and frames transmitted by the Token-Ring Interface Coupler (TIC), MAXTSL=.

5.10.1.2 DSPU Examples.

See "Connectivity and Customization Examples" on page 253 for examples of VTAM, NCP, and 3174 customization questions for 3174's defined as DSPUs.

5.11 Backup and Recovery

5.11.1.1 Installed Equipment for Tests

This section presents the configuration installed in the Raleigh International Technical Support Center to test different backup/recovery scenarios and file transfer from a 3270 PC to different operating systems through different gateways.
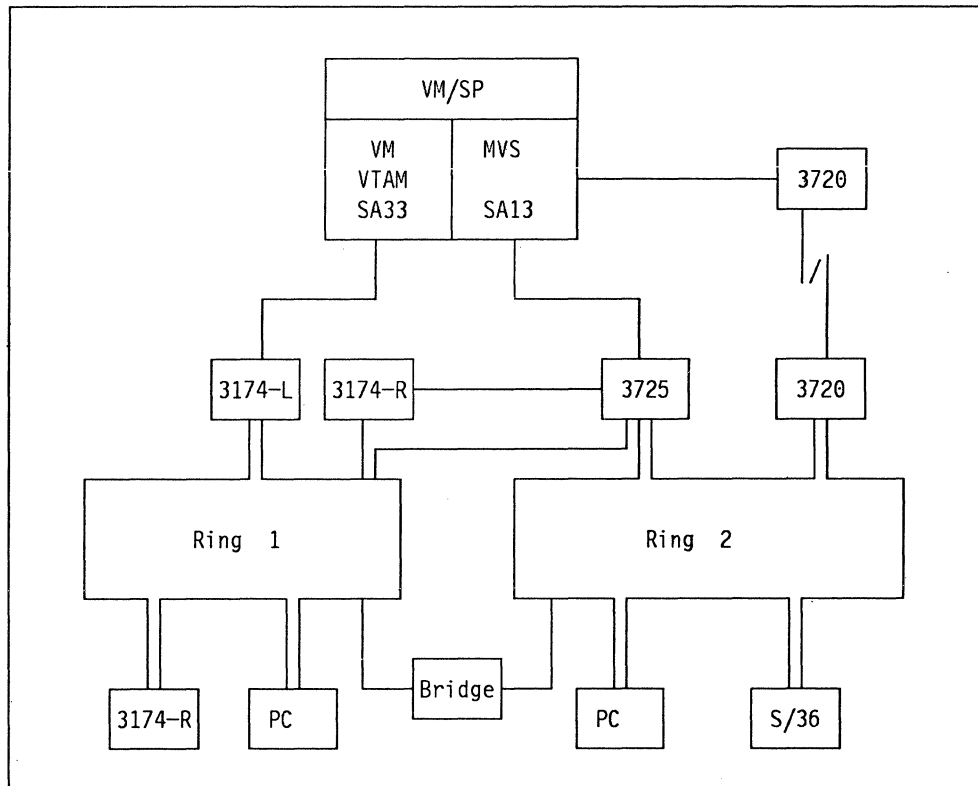
Figure 33. Installed Equipment for Tests

3174 and 3725 gateways were channel-attached to different subareas, one under VM/VTAM and the other under MVS. Both virtual machines were linked via a virtual channel-to-channel connection. The 3720 gateway was line-attached to another 3720 which was in turn channel-attached to the same MVS system.

Different downstream PUs (like the 3174-03R, System/36 and PCs using 3270 emulation or APPC/PC) were set up to test them with all the gateways, to different operating systems, and applications.

Two different Token-Rings linked via a bridge were installed to test backup/recovery scenarios when the gateways were located in the same or different ring of the DSPUs. The 3725 was attached to both rings with two different TICs.

5.11.2 Planning for Backup/Recovery with the 3174 Gateway

The 3174 gateway offers powerful backup/recovery possibilities. Personnel responsible for network planning and installation should consider the information presented here and tailor it to their own environments.

Different scenarios are offered as suggestions for gateway backup and Token-Ring Network recovery. The number of 3174 gateways, ring addresses of the gateways and number of host are some of the different factors taken in consideration. A scenario with mixed type of gateways is also presented.

Network topology can be accommodated to fit any of these environments. As this book deals with the 3174, the reader will not find information regarding Token-Ring topologies or Token-Ring Network design; other manuals should be consulted for this purpose.

5.11.2.1 Backup Planning

The following points should be taken in consideration for backup planning:

- Number of gateways

  The number of transactions per second that flow through the gateway determines the number of gateways needed. The user should use different tools (SNAP/SHOT, FIVE3270, 3X74 performance guidelines manual, etc.) to determine the load the gateway is going to handle.

  Each gateway should have its own backup controller ready to restart the traffic in case the main gateway fails.

- Number of hosts

  The number of hosts (and how they are interconnected) determines the way the 3174 gateways (main and backup) should be attached.

- Token-ring topology

  Any Token-Ring topology is accepted by the 3174 gateways and by the DSPUs. Bridges are transparent from the gateway and DSPU point of view.

5.11.2.2 Recovery Planning

When the gateway fails, the 3174 DSPUs and all the ring-attached stations that were using their service start sending a test command to the gateway address (and only to this address). If there is no answer in the ring where the DSPUs are attached they send every other test command with the broadcast bit on; these commands are propagated through the bridges if they are present. 3174 DSPUs keep sending the test command until a backup gateway is activated or the broken one is recovered.

In case of failure of one or more DSPUs, the 3174 gateway only attempts to connect them for each *contact* received from the host (just one for initial processing). In an error situation where the link was operational and fails, the Token-Ring Adapter attempts recovery; then VTAM is notified with an INOP, and VTAM may attempt recovery one time depending on what was specified to VTAM. The 3174 gateway does not make a continual attempt to connect by itself.

If you are running Configuration Support-S your 3174 does not have the ability to attach to two different hosts. A second controller should be attached to a different host or to a different channel in the same host; this creates full gateway backup and complete recovery scenario from the gateway's and the host's point of view.

If two gateways are attached to two different hosts and customized with the same Token-Ring address in two different rings, they can be active at the same time. In this scenario, if the main gateway fails, recovery to the backup gateway by the DSPUs is automatic and almost instantaneous.

- 3174 Gateways with same address

  If you have customized two gateway controllers with the same token-ring address, the IML and the opening of the Token-Ring Adapter for the first controller should be successful. When you IML the second controller, it tries to open its Token-Ring Adapter (which cannot be successful due to the duplicate address). It displays a status code of "881-01" (if the two controllers are in the same ring) but stays operational for its coax attached devices.

  If the production gateway fails you activate, via NetView, the "backup" gateway. Any DSPUs defined in the local major node of the backup gateway is able to re-establish a host session, as the backup gateway has the same token-ring address as the now inactive production gateway. In case the number of DSPUs to recover is very large, the user may want to include all the necessary commands under a NetView CLIST.

  If only one host is present, deactivation/activation of the involved Local Major Nodes is necessary. If Local Major Nodes definitions are located in different hosts, both can be active at the same time.

  If both gateways are attached to different rings connected via a bridge, duplicate address checking is not done; in this case, both 3174-01L gateways come up initially without returning the status code 881.

  This is the best recovery approach that can be offered with the 3174 type of gateway, since it requires only a NetView command from the CNM console with no re-IML of DSPUs and/or movement of people.

- 3174 gateways with different addresses

  Another alternative could be be that you have a production gateway and a backup gateway with different token-ring addresses. The advantage is that both can be active at the same time in the same ring, and they can share the load of the ring traffic. If one gateway fails, the second can take over if all the DSPUs of the failing gateway are re-IMLed with the other gateway address. Probably this alternative will not be acceptable in most installations.

5.11.3 Recovery Scenarios

5.11.3.1 Scenario: One
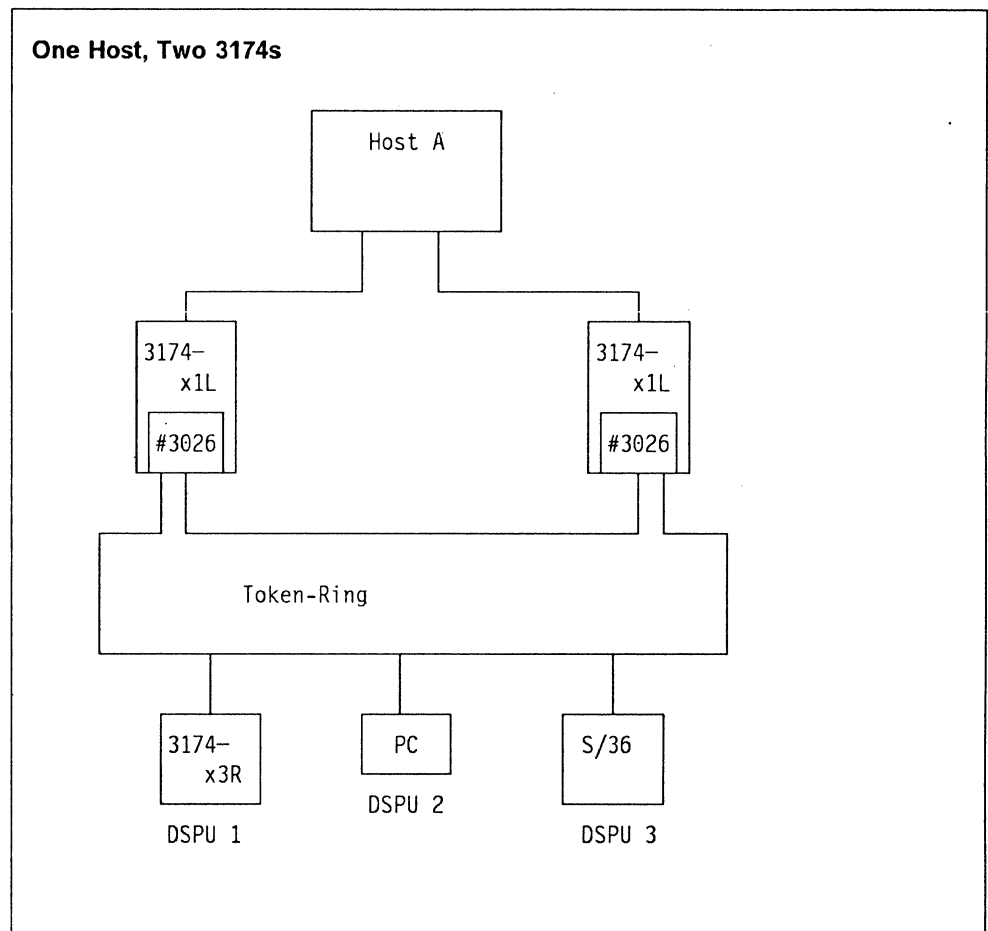
Figure 34. Recovery Scenario: One Host, Two 3174s

This is the simplest scenario. The second 3174 is responsible for handling the traffic in case the main 3174 fails.

- Both gateways have the same token-ring address.

- All DSPUs point to the gateway address. The 3174-x3R defines this address during the customizing procedure with the answer to question 107.

- Recovery should be done as described in "Recovery Planning" on page 121.

- For better reliability, each gateway should be attached to a different host channel.

5.11.3.2 Scenario: Two

```
┌────────────────────────────────────────────────────────────────┐
│                                                                  │
│  Two Hosts, Two 3174s                                            │
│                                                                  │
│       ┌──────────────┐    CtC       ┌──────────────┐            │
│       │   Host A     │══════════════│   Host B     │            │
│       │              │              │              │            │
│       └──────┬───────┘              └──────┬───────┘            │
│              │                             │                     │
│       ┌──────┴───────┐              ┌──────┴───────┐            │
│       │  3174-       │              │  3174-       │            │
│       │    x1L       │              │    x1L       │            │
│       │  ┌────────┐  │              │  ┌────────┐  │            │
│       │  │ #3026  │  │              │  │ #3026  │  │            │
│       │  └───┬────┘  │              │  └───┬────┘  │            │
│       └──────┼───────┘              └──────┼───────┘            │
│              │                             │                     │
│       ┌──────┴─────────────────────────────┴──────┐            │
│       │              Token-Ring                    │            │
│       └─────┬─────────────┬──────────────┬─────────┘            │
│             │             │              │                      │
│       ┌─────┴────┐   ┌────┴───┐     ┌────┴────┐                │
│       │ 3174-    │   │   PC   │     │  S/36   │                │
│       │   x3R    │   │        │     │         │                │
│       └──────────┘   └────────┘     └─────────┘                │
│                       DSPU 2                                    │
│         DSPU 1                        DSPU 3                    │
│                                                                  │
└────────────────────────────────────────────────────────────────┘
```
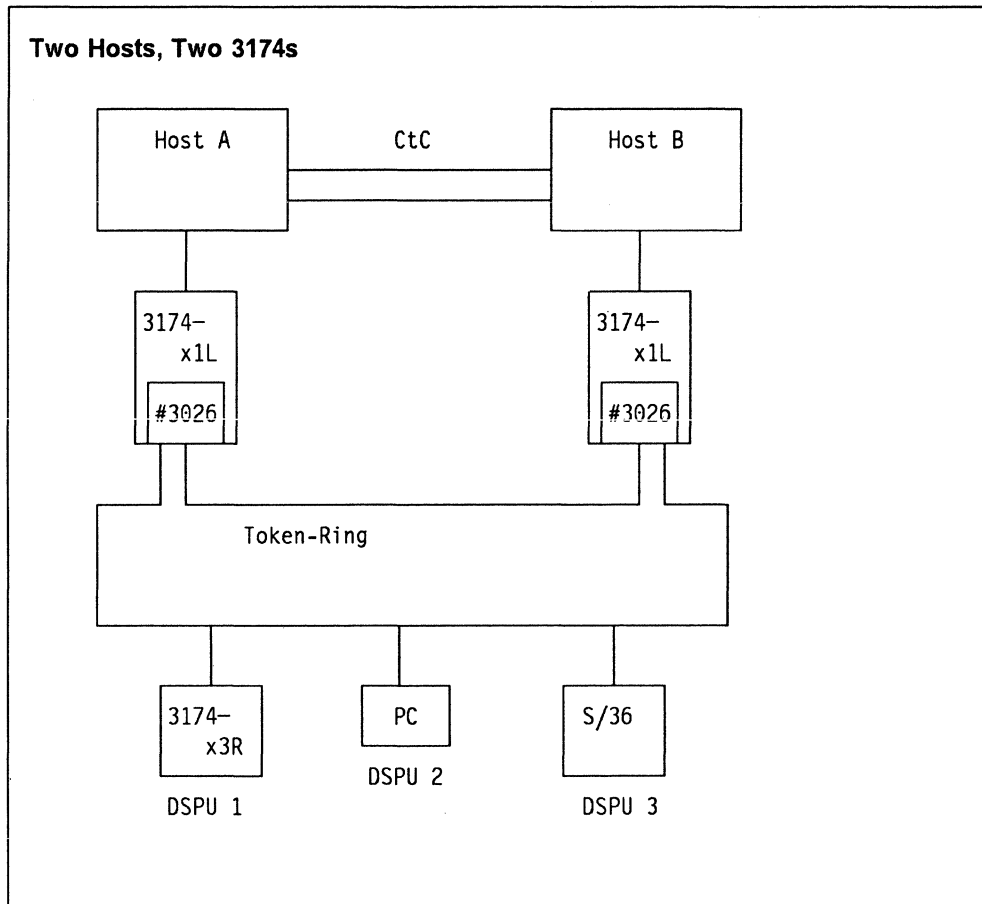
Figure 35. Recovery Scenario: Two Hosts, Two 3174s

This scenario is more complex than the previous one. The following points should be taken in consideration:

1. There isn't enough traffic flowing through the gateway to justify more than one active gateway at a time.

2. End users need to access applications in both hosts through cross-domain facilities they already have in place. The figure above shows a channel-to-channel facility.

3. In order to provide the best recovery capabilities, the second 3174 gateway should be attached to Host B.

Recovery:

- *Host resources*

  As two hosts are available in this scenario, VTAM definitions for network resources can be active at the same time, this allows you to recover all the DSPUs with only one ACTIVATE command from the CNM console if the gateway or the host fails.

- *Failure of main 3174 Gateway controller*

  Activation of ring-attached controllers should be done with the procedure already explained. Interactive users of applications in host A should regain access to them through a cross-domain route from host B; users of host B applications get access to them directly.

- *Failure of host A*

  In this scenario, the main 3174 senses that host A is broken and terminates the sessions for its local terminals but keeps the Token-Ring Adapter open, since there was no error in the ring. This adapter should be forced closed before attempting to recover the traffic through the second 3174 otherwise, the backup controller finds a duplicated address and does not open its own adapter.

  The only way to force the adapter closed is either to physically disconnect the unit from the Token-Ring Network or to interrupt the controller with an IML (or by powering it off).

  Interactive users of applications in host B get direct connection to this host. Users of applications in host A have to stand by until the host is recovered (or they may access any available application in host B).

- *Failure of host B*

  Users of applications in host A should not be aware that host B is not available. Users of host B will have to stand by until the host is recovered or they may access any available application in host A.

5.11.3.3 Scenario: Three

```
┌───────────────────────────────────────────────────────────────────┐
│                                                                     │
│  Two Hosts, Multiple Gateways                                       │
│                                                                     │
│     ┌──────────────┐      CtC      ┌──────────────┐                 │
│     │    Host A     │───────────────│    Host B     │                │
│     │               │───────────────│               │                │
│     └──────────────┘               └──────────────┘                 │
│                                                                     │
│      ┌──────┐  ┌──────┐      ┌──────┐  ┌──────┐                      │
│      │3174- │  │3174- │      │3174- │  │3174- │                      │
│      │ x1L  │  │ x1L  │      │ x1L  │  │ x1L  │                      │
│      │┌────┐│  │┌────┐│      │┌────┐│  │┌────┐│                      │
│      ││#3026││  ││#3026││      ││#3026││  ││#3026││                    │
│      │└────┘│  │└────┘│      │└────┘│  │└────┘│                      │
│      └──────┘  └──────┘      └──────┘  └──────┘                      │
│                                                                     │
│        D1        D1             D2        D2                         │
│                                                                     │
│                      Token-Ring                                     │
│                                                                     │
│      ┌──────┐      ┌──────┐      ┌──────┐                            │
│      │3174- │      │  PC  │      │ S/36 │                            │
│      │ x3R  │      └──────┘      │      │                            │
│      └──────┘     DSPU 2         └──────┘                            │
│     DSPU 1                       DSPU 3                              │
│                                                                     │
└───────────────────────────────────────────────────────────────────┘
```
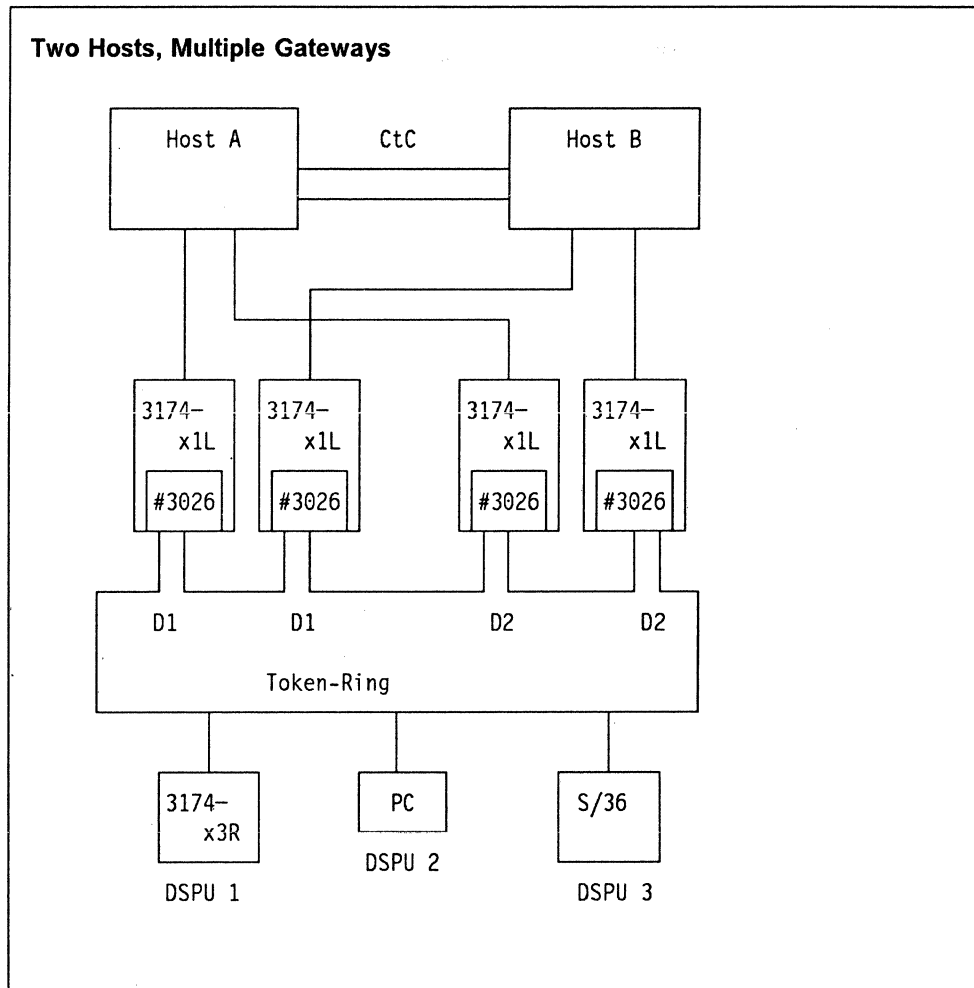
Figure 36. Recovery Scenario: Two Hosts, Multiple Gateways

This scenario assumes higher traffic volumes through the gateway, forcing it to have more than one active gateway at the same time. There are three kinds of users: a group which accesses applications only in host A, another group which accesses applications only in host B and a third group which accesses applications in both hosts.

Every 3174 gateway should have a backup gateway customized with the same address but channel-attached to the other host. That is, a main 3174 in address D1 attached to host A and its backup 3174 (with same address, D1) attached to host B.

Recovery procedures are similar to the previous scenarios; the important point to remember here is that the backup controller should be attached to a different host. The group of users accessing applications in host A should be routed through the gateway with the D1 address, the group of users accessing applications in host B should be routed through the gateway located in address D2. Multi-host access should be done through the conventional cross-domain links.

5.11.3.4 Scenario: Four

```
+--------------------------------------------------------------+
| Mixed Gateway Types                                          |
|                                                              |
|   +-----------+       CtC        +-----------+               |
|   |  Host A   |==================|  Host B   |               |
|   +-----------+                  +-----------+               |
|      |    |                          |                       |
|      |    +------------------+       |                       |
|      |                Twintail|      |                       |
|   +--------+               +--------+                        |
|   | 3174-  |               | 372x   |                        |
|   |   x1L  |               | 3745   |                        |
|   | +----+ |               | +---+  |                        |
|   | |#3026||               | |TIC|  |                        |
|   | +----+ |               | +---+  |                        |
|   +--------+               +--------+                        |
|      |                          |                            |
|   +--------------------------------------------+             |
|   |            Token-Ring                      |             |
|   +--------------------------------------------+             |
|      |                 |                 |                   |
|   +--------+        +-------+        +-------+               |
|   | 3174-  |        |  PC   |        | S/36  |               |
|   |   x3R  |        +-------+        +-------+               |
|   +--------+        DSPU 2           DSPU 3                  |
|   DSPU 1                                                     |
|                                                              |
+--------------------------------------------------------------+
```
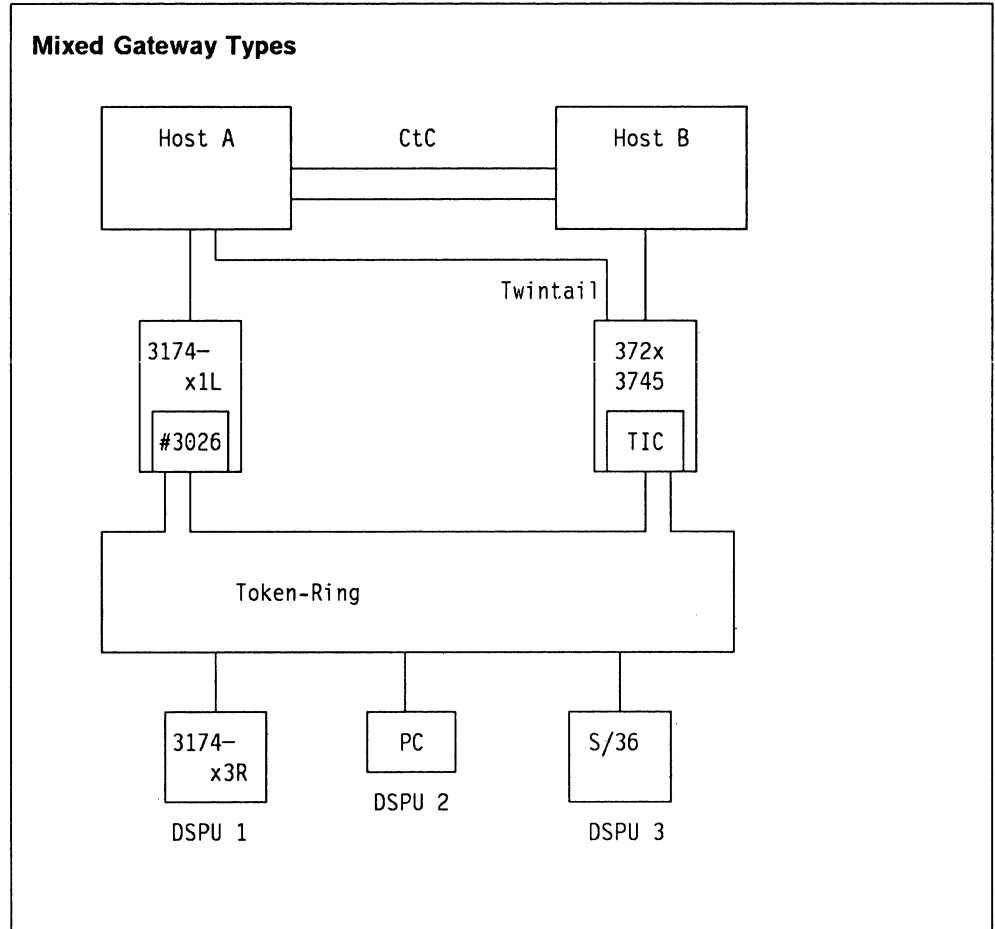
Figure 37. Recovery Scenario: Mixed Gateway Types

This scenario considers that a 3174 is working as the backup controller for a 37XX, or vice-versa. The same considerations given in previous scenarios apply for this one.

```
+-- Note ------------------------------------------------------+
|                                                              |
| One of the most important points to remember is that host    |
| definitions for the DSPUs are different depending on the     |
| gateway they are using.                                      |
|                                                              |
| In the case of the 3174, they are defined as channel-        |
| attached controllers in a Local Major Node, while in the     |
| case of the 372X, they are defined as remote controllers     |
| in a Switched Major Node.                                    |
+--------------------------------------------------------------+
```

This scenario combines the best of both worlds. It is be applicable for customers who are installing a Token-Ring interface in an already existing 37XX and want to have a full backup/recovery scenario without having to install a second 3725.

If gateways are attached to different hosts and different rings, both gateways and their VTAM resources for the DSPUs can be active at the same time; in this case recovery is automatic and almost instantaneous.

5.11.3.5 Scenario: Five

```
┌─────────────────────────────────────────────────────────────┐
│ Alternate IML Communication Adapter                            │
│                                                                │
│     ┌──────────────┐          ┌──────────────┐                 │
│     │  Host   A    │          │  Host   B    │                 │
│     └──────┬───────┘          └──────┬───────┘                 │
│            │                         │                         │
│     ┌──────┴───────┐          ┌──────┴───────┐                 │
│     │  3174-11L    │          │  372x/45     │                 │
│     ├──────┬───────┤          │              │                 │
│     │#3026 │#304x  ├──────────┤              ├──────┐          │
│     └──┬───┴───────┘          └──────┬───────┘      │          │
│        │   │                         │              │          │
│     ┌──┴───┴─────────────────────────┴──────────────┴──┐      │
│     │               Token-Ring                          │      │
│     └──┬────────────────┬────────────────┬─────────────┘      │
│        │                │                │                     │
│  ┌─────┴──────┐  ┌───────┴─────┐  ┌───────┴─────────┐          │
│  │ 3174-13R   │  │ 3174-13R    │  │ 3174-13R        │          │
│  │            │  │             │  │         ┌───────┤          │
│  │ A          │  │ B           │  │ C       │#304x  ├──────────┘
│  └────────────┘  └─────────────┘  └─────────┴───────┘          │
└─────────────────────────────────────────────────────────────┘
```
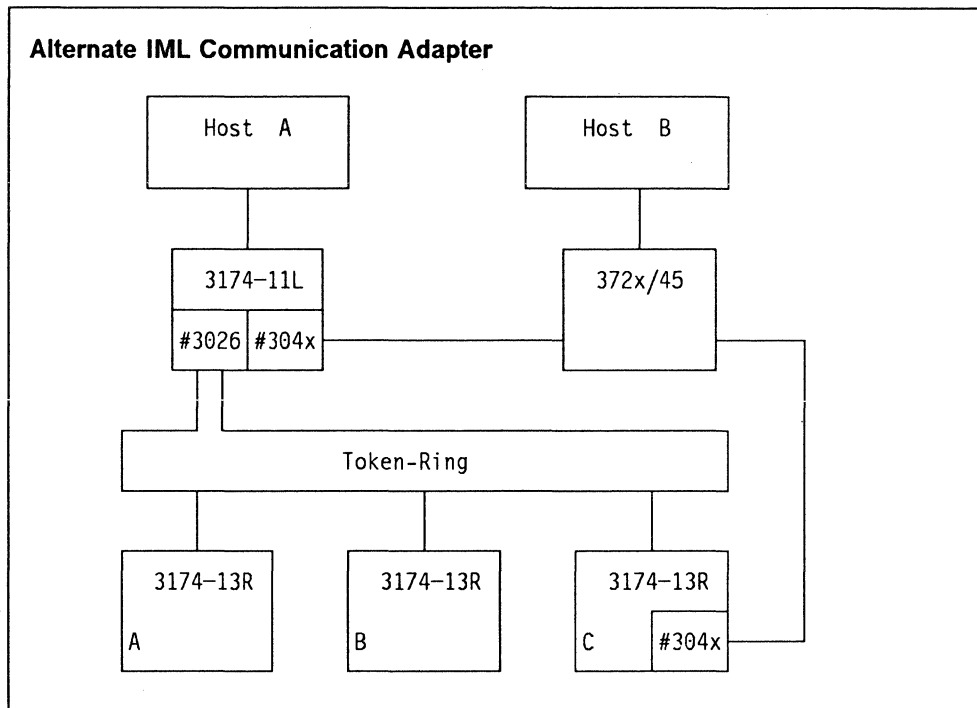
Figure 38. Recovery Scenario: Alternate IML Communication Adapter

For 3174 Models 01L/11L and 03R/13R features #3040 through #3043 provide an additional communication adapter with a V.24 or V.35 or X.21 interface. These adapters cannot be used concurrently with the primary host link, and require an IML after loading another precustomized Control diskette.

If Host A fails, the local channel attached gateway can be re-IMLed with a control diskette also carrying Configuration Support-S but customized for a TP interface, thus giving to the 11L the appearance of an 11R or 12R model. The local gateway becomes a remote gateway, attached via a TP link and 37XX to Host B.

On the downstream PUs (A, B, C), normally Configuration Support-A is installed because this base microcode supports the upstream Token-Ring Adapter inherent to the model. One of the Token-Ring devices (let us say DSPU C) can have an alternate TP link (#3040 through #3043) installed and can have Configuration Support-S for backup reasons (that means, feature #3026 must have been ordered for DSPU C, which is not cost effective). The better alternative would be to install the optional Configuration Support-B on DSPU C also for the normal usage as DSPU, and to prepare a backup customization, supporting TP link #304x.

If then the local gateway fails in addition to host A, it disconnects from the Token Ring giving DSPU C the opportunity to connect to the ring with the same gateway address as the former local gateway. The new remote gateway has the same DSPU addresses customized with the exception of its own address.

After the alternate IML of "C," all Token-Ring attached devices can communicate with Host B via the remote gateway "C" and the 37XX.

5.11.3.6 Scenario: Six
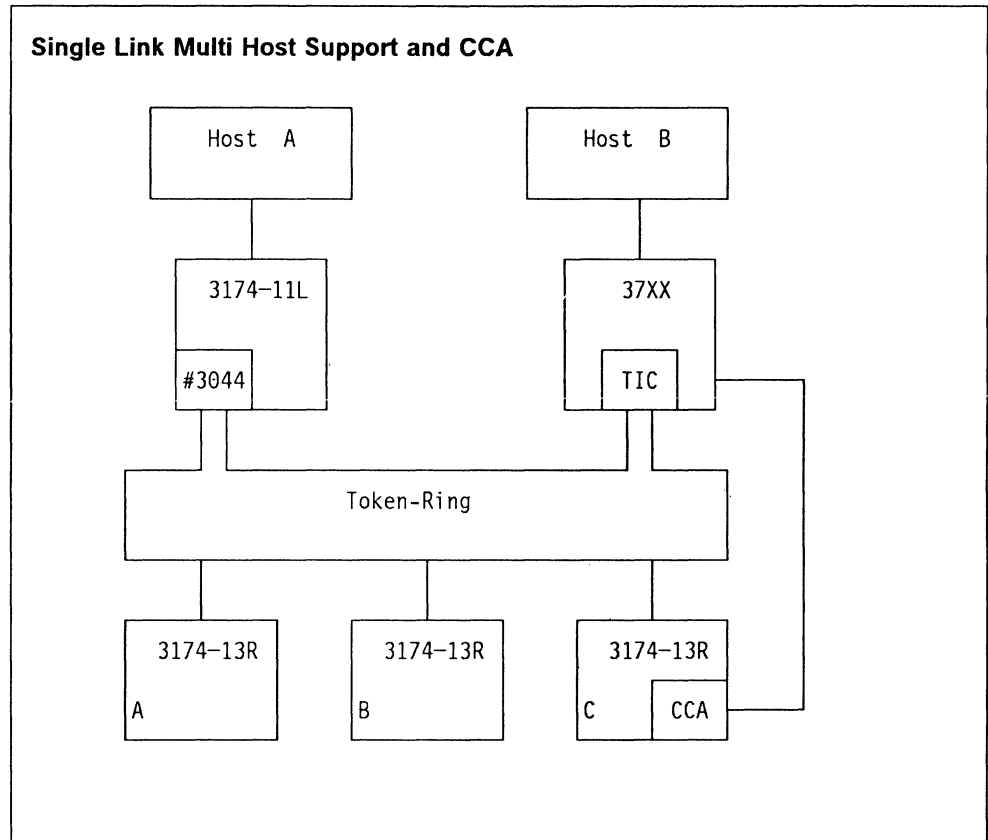
Figure 39. Recovery Scenario: Single Link Multi Host Support and CCA

With the optional Configuration Support-B and the Concurrent Communication Adapters (feature #3050/1/3 for a V.24, V.35 or X.21 interface), new backup possibilities are provided.

From a 3174 controller with Configuration Support-B and up to two CCAs installed, up to three hosts can be accessed concurrently from direct attached devices. DFT devices with multiple host sessions and CUT devices using the MLT function can spread up to five sessions over the primary host link and up to two secondary links in any combination. If Host A fails it has no impact on the sessions to Host B. The operator can *hot key* between those sessions.

In addition to the Concurrent Communication Adapter, Configuration Support-B supports over the primary token-ring host link the concurrent access to as many as eight hosts via their respective gateways attached to the token-ring network. This SLMH function is microcode-only and has no additional hardware requirements.

What is said for MLT sessions over different CCAs is also true for the multi-host access over a single link and even for the combination of both functions: Up to five MLT sessions can be spread over up to ten hosts (eight via the token ring and two via CCAs) from a device directly attached to a 3174 controller. The operator can then *hot key* between those five sessions.

5.11.3.7 Scenario: Seven

```
┌──────────────────────────────────────────────────────────┐
│  Multi Host Token Ring Gateway                           │
│                                                          │
│      ┌─────────────┐           ┌─────────────┐          │
│      │  Host   A   │           │  Host   B   │          │
│      └──────┬──────┘           └──────┬──────┘          │
│             │                         │                 │
│      ┌──────┴──────┐           ┌──────┴──────┐          │
│      │  3174–11L   │           │    37XX     │          │
│      ├──────┬──────┤           │             │          │
│      │#3044 │ CCA  ├───────────┤             │──────┐   │
│      └──┬───┴──────┘           └─────────────┘      │   │
│         │                                           │   │
│      ┌──┴──────────────────────────────────────┐    │   │
│      │            Token-Ring                    │    │   │
│      └──┬─────────────┬─────────────┬───────────┘    │   │
│         │             │             │                │   │
│   ┌─────┴─────┐ ┌─────┴─────┐ ┌─────┴──────────┐     │   │
│   │ 3174–13R  │ │ 3174–13R  │ │  3174–13R      │     │   │
│   │           │ │           │ │      ┌─────────┤     │   │
│   │A          │ │B          │ │C     │  CCA    ├─────┘   │
│   └───────────┘ └───────────┘ └──────┴─────────┘         │
└──────────────────────────────────────────────────────────┘
```
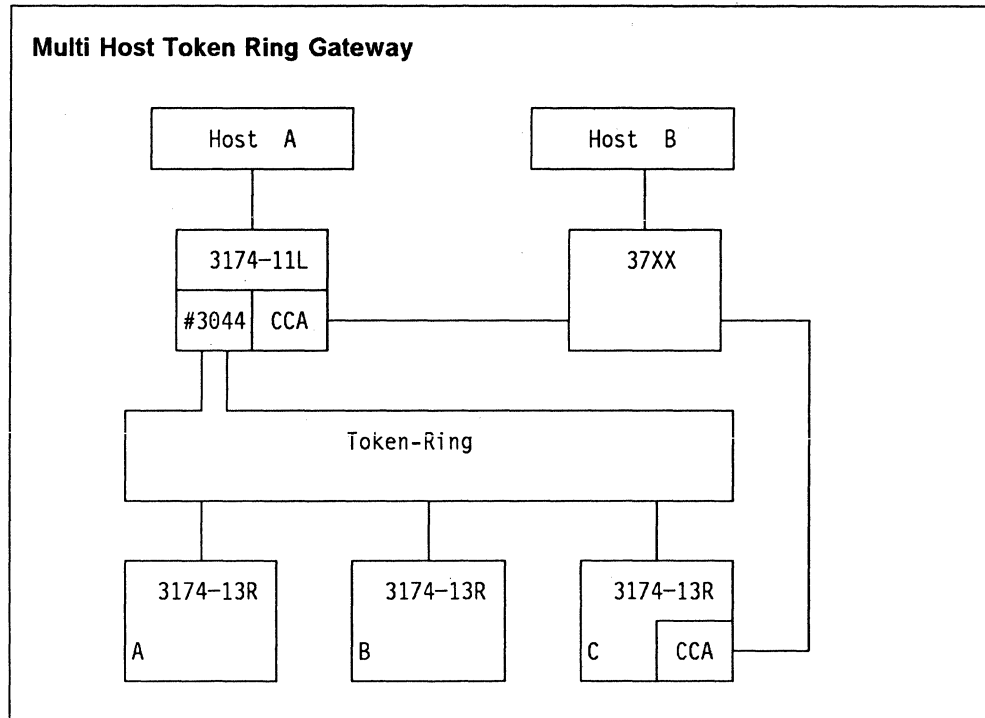
Figure 40. Recovery Scenario: Multi-Host Token-Ring Gateway

With Configuration Support-B Release 3 the recovery and connectivity options have been further enhanced by allowing a DSPU to access the CCAs installed in the gateway controller.

A terminal on DSPU "B" using its five available MLT sessions can access *Host A* through the gateway's "primary" route. You can also access *Host B* by going through the **same** gateway and then accessing the CCA and using its host connection. DSPU "C" has the added connectivity option of using its own CCA as a third path back to *Host B*

Note

There is a maximum of 50 DSPUs that can access an SNA host through each Concurrent Communication Adapter.

In a remote Token-Ring Network this method of multiple connection or backup option becomes very attractive as there can be considerable cost savings on lines and hardware as you don't require a Concurrent Communication Adapter in each 3174 Controller.

In the case of DSPU "C" a 3174-13R you also have the *Alternate IML function* and backup TP line. This is also true in the case of the 12L, 22L, and 23R Models.

5.11.4 Disconnecting/Reconnecting from the Token-Ring Network

The following figure shows the recovery steps necessary if the connector to the Token-Ring is pulled off at the gateway or at the DSPU.

Operation	Gateway			DSPU		
	Operat. Panel	Adapter Status	VTAM Status	Operat. Panel	Adapter Status	VTAM Status
Gateway T-Ring Connector pulled	880-05	CLOSED 4693 wire f.	ACTIV	583-09	OPEN	PSUB 1
T-Ring reconnect	3174	OPEN	ACTIV	"	"	"
V INACT,F / V ACT DSPU	"	"	"	3174	"	IINOP/ ACTIV
DSPU T-Ring Connector pulled	3174	OPEN	ACTIV	580-05	CLOSED 4693 wire f.	PSUB1
T-Ring reconnect	"	"	"	"	"	"
IML DSPU	"	"	"	505-01	OPEN	"
V INACT,F / V ACT DSPU	"	"	"	3174	"	IINOP/ ACTIV

Figure 41. Disconnecting/Reconnecting the Token-Ring Network

5.11.5 Hints for 3174 at IML Time

If for any reason a 3174 DSPU must be re-IMLed, the result depends on the status of LU-LU sessions at IML time. If no LU-LU session exists, the controller becomes ready immediately at the end of IML. If LU-LU sessions are broken by the IML, the PU must be deactivated with the *force* option after IML (and afterwards it must be activated again). Then, the controller becomes available. The status of the LU-SSCP sessions does not matter.

If for any reason a 3174L gateway must be re-IMLed all LU-LU sessions (to the native attached devices and to devices attached to the DSPUs) are ended logically in VTAM. This means that at the end of the IML process all devices become available (under VM/VTAM, all VM sessions to CUT devices are reestablished).

If for any reason a 3174 gateway must be switched offline from the channel, "503" status code displays at the gateway controller and a "583" status code displays at all DSPU controllers. After the gateway is switched back online, all controllers recover the session with the host and display the "3174" status code.

6. 3174 and X.25 Support

The remote models of the IBM 3174 can communicate with host systems through an X.25 Packet Switched Data Network (PSDN). Using 3174 Controller microcode Configuration Support-B release 3.0 or later, the implementation of X.25 support on the 3174 follows the International Telephone and Telegraph Consultative Committee (CCITT) recommendations given in 1988. Previous microcode releases support the 1980 recommendation.

It is important to understand that some X.25 knowledge is required when connecting to a X.25 PSDN, and several points must be considered before attempting to customize the 3174. This chapter details:

- A summary of the X.25 features supported by the 3174

- Planning guidelines for installing a 3174 in an X.25 network

- 3174 configuration and operation hints

- Scenarios used to test the 3174 X.25 feature.

Further information can be found in the following manuals:

- 3174 Planning Guide (GA27-3844).

- X.25 SNA Guide (GG24-1568).

- IBM 3270 Information Display System X.25 operation (GA23-0204).

6.1.1 3174 Implementation of X.25

All 3174 models can operate up to a maximum speed of 19.2 Kbps with X.25. The physical interface can be X.21 or X.21 bis.

In an X.25 network, the 3174 Controller uses SNA/SDLC protocols at the higher layers of communication, making the transport system transparent. This allows the user to work as in an SNA environment, establishing sessions with VTAM applications (like TSO, CICS), in one or more domains. The SNA logical link controls supported by the 3174 are:

- Qualified Logical Link Control (QLLC), logical link control type 3.

- Physical Services Header (PSH), logical link control type 2.

You need to use PSH if the control unit will be connected to a host via a network interface adapter or NIA. However with current products, there should be no reason to do this. We recommend that you use QLLC for SNA X.25 connection because it takes advantage of the X.25 integrated support of the IBM SNA host and SNA subsystems. In Configuration Support-B PSH is no longer supported for the 3174.

The 3174 access to the network is a 4-wire link using the LAPB protocol (Link Access Protocol Balanced).

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6.1.1.1 Virtual Circuits

The 3174 supports both switched virtual circuits and permanent virtual circuits or SVCs and PVCs. A PVC can be thought of as a point-to-point, four-wire leased line. An SVC can be thought of as a point-to-point, four-wire switched line. Sessions between the host and 3174 attached devices are multiplexed on a virtual circuit.

Configuration Support-B Release 3 included many enhancements to X.25 support in the 3174 Controller; one of the main features is the multi-host support. Before Configuration Support-B Release 3 only a single X.25 link was supported and within that link only one virtual circuit could be established.

Now with Configuration Support-B Release 3 up to eight hosts can be defined on the 3174 Controller primary adapter and up to four on each of the secondary adapters (CCA). These connections can be a mixture of PVCs and SVCs. If a PVC is used, the 3174 attempts to open the link at IML time. When customizing, you define a single PVC for each host you wish to access.

If you use SVCs, you can establish a connection in a number of ways including:

- Manually from a "Dial" screen on the 3174.

- The new autocall feature, which initiates the call request automatically whenever the first device with a logical terminal defined to the required host is powered on.

- By responding to an incoming call from the host.

6.1.1.2 X.25 Options

The following X.25 options are supported by the 3174:

- Data Packet sizes of 64, 128, 256, or 512 bytes

- Packet-size negotiation

- Modulo 8 or 128 for packet level sequence numbering

- Packet window sizes of 1 to 7 for modulo 8

- Packet window sizes of 1 to 11 for modulo 128

- Packet window size negotiation

- Connection Identifier

- Recognized Private Operating Agency

- Closed User Group

- Reverse charging

- Throughput class negotiation.

These options are specified when the customizing process take place. A summary of the customization is provided in "Customizing X.25" on page 137. However we suggest you use the *3174 Planning Guide* at the correct release for your machine's microcode level for the detailed responses.

6.1.1.3 Configuration Support-B Release 3 Enhancements

We have already mentioned some of the new functions available with Configuration Support-B Release 3. In summary, these functions are:

- Support for CCITT X.25 recommendation 1988

- Multiple host access using the 3174 Concurrent Communication Adapter

- Multiple host access over a single link (either primary or Concurrent Communication Adapter)

- Autocall/Autodisconnect for SVC operation

- Enhancements to X.21 and X.25 Dial screens

- Support for maxdata 521.

6.2 Planning for X.25.

This section provides some guidance and suggestions for the attachment of a 3174 to a X.25 network.

You may wish to consider some of the following points when planning your network.

6.2.1.1 Financial

When planning the network, the main consideration is usually to find the correct balance between the financial cost and the function required. 3174 planners must remember that packet-switched network costs are usually volume dependent, regardless of whether switched or permanent virtual circuits are used or the distance between the communicating ends. Packet switched networks may be a more economical alternative for terminal locations that are widely dispersed and have low traffic volumes. You need to determine when it is more economical to use conventional leased lines or circuit-switched networks.

The use of X.25 may save on hardware costs. Instead of running multiple lines on a 37X5 and using modem racks, multiplexers, banks of switches etc., with X.25, you need only one line into the network for all of your devices (provided, of course, that it can handle the traffic).

6.2.1.2 Performance

If you are planning to use X.25 as the protocol in a private SNA network, it adds an overhead to the performance of the network and the capacity of the components such as the 37X5. All other things being equal, SDLC is more efficiently processed in an IBM network.

It is necessary to be aware that in an PSDN, there are no guarantees for continuous throughput. Frequently, PSDNs use flow control mechanisms like window sizes or maximum packet length in order to regulate the input/output rate for all users. The user should have a realistic idea of the response time that can be expected. Good performance can be obtained with careful planning and tuning of the definitions used in the network.

6.2.1.3 Function

With the advent of 3174 Single Link Multi-host support for X.25, the cost of using X.25 may be more attractive for situations where multiple host access is required from remote sites. For example, you can access both a S/370 host and an AS/400 host over a single connection, whereas to do this with SDLC requires either two lines or a host router program such as HCF.

6.2.2 Preparing to Customize

When you are customizing a 3174 for X.25, you are asked many questions that require careful preparation. This is especially true if you are using SVCs. X.25 networks offer a wide variety of options and unfortunately, this makes the job of the network planner more difficult.

You are advised to meet with the company providing the X.25 facilities to discuss your specific requirements, and review the PSDN facilities in light of the function available on the 3174 and the host software you are using.

Consider some of the following:

- Level of CCITT recommendation supported

- Line speed

- Type of virtual circuit (SVC or PVC)

- Number of logical channel/s to be used

- Call initiation for SVCs

- Frame window size

- Packet window size

- Parameter negotiation.

    This optional facility allows the negotiation of data flow control parameters on a calling basis, and it is applicable to SVCs only. When an SVC is established, the DTE and DCE agree about the packet and packet window size. There are two packet and window sizes; one for each direction.

- Closed user group

    This facility provides better security, because only SVCs between DTEs of the same group can be established.

- Reverse charge

    This option permits the data communication expenses to be centralized.

- Default throughput class assignment

    Optional facility that provides network subscription class of a default throughput class from a list of classes supported by the network.

When you have decided on the features and you have the subscription information from the network supplier, you have enough information to begin customizing the 3174.

6.3 Customizing X.25

This section summarizes the specific X.25 questions asked during customization. The *3174 Planning Guide* is where you find the details and the sample worksheets of the X.25 customization panels

6.3.1.1 Question 101: Host Attachment

When customizing for X.25, the response to this question must be **3** for single host configurations and **M** for the multi-host support. (**M** is supported only in Configuration Support-B release 3 and later.)

6.3.1.2 Question 215: Physical Unit Identification. (PUID)

If you are working with a Switched Virtual Circuit (SVC) you must give a unique identification number to the physical unit. The value is used in the QXID, when the connection is established (see the SVC examples later in this chapter). If you are using a VTAM host, the PUID must match the IDNUM parameter on the PU macro for the switched major node definition of this 3174. For other host types, there is an equivalent definition for this value for example:

- EXCHID of the AS/400 or System/38

- REMOTE XID of the System/36.

6.3.1.3 Question 372: Autocall/Autodisconnect

This is a new feature for Configuration Support-B Release 3 It is a two digit field with the following meaning:

First digit

- 0 = Autocall should not be used

- 1 = Autocall should be used (dial)

- 2 = Autocall should be used (direct, X.21 switched only)

Second digit

- 0 = Autodisconnect should not be used

- 1 = Autodisconnect should be used.

This feature, if used, may reduce network charges for X.21 switched or X.25 SVC connections. With autocall active, the 3174 dials the host when the first terminal is powered on and autodisconnect disconnects from the host when the last terminal is powered off.

6.3.1.4 Question 400: Network Type

Note: The response to this question depends on the microcode level. Configuration Support-B release 3 includes support for CCITT recommendation X.25, 1988 level.

Prior to Configuration Support-B release 3.0, the response to question 400 is two characters as follows:

00 = CCITT recommended network with announced IBM support.

01 = Connection is to the Netherlands DATANET1.

02 = UKPSS** or Telenet** (UKPSS is the United Kingdom Packet Switched Service)

In Configuration Support-B Release 3 and higher, the response to question 400 is four characters. They appear on the screen in the default format:

00 0 0

the first two are as follows:

00 = CCITT recommended network with announced IBM support.

01 = Connection is to the Netherlands DATANET1.

Note: Option **02** has been dropped from this question. Use **00** if your network is UKPSS or Telenet.

The third character is the level of CCITT recommendation X.25 supported.

0 = 1980 level

1 = 1984 and beyond level.

The fourth character is coded:

0 = The 3174 should use SNA diagnostic codes for network errors.

1 = The 3174 should use ISO diagnostic codes for network errors.

6.3.1.5 Question 401: Circuit Type

The 3174 can support four circuit types. The type of virtual circuit is defined according to the capability of the 3174 to initiate a call and the subscription option with the network.

- 1 = Permanent virtual circuit. (PVC)

- 2 = Incoming virtual circuit; used only when the DTE host can initiate the call. (SVC)

- 3 = Outgoing virtual circuit; used only when the 3174 can initiate the call. (SVC)

- 4 = Two-way virtual circuit; in this case, either the 3174 or the host can initiate the call. (SVC)

6.3.1.6 Question 402: Logical Channel Identifier

For Configuration Support-B release 3 and later, this question defines the value of the logical channel used for a PVC. PVC usage is specified in question 401.

Prior to B3, this field is also used for the LCN of the SVC. See questions 461-466 for defining the LCNs for SVCs if you are using Configuration Support-B release 3.

The value should be in the range 0000-4095 and is available from your network subscription information.

6.3.1.7 Question 403: Logical Link Control

This question is not presented for Configuration Support-B. The 3174 no longer supports PSH and all connections use QLLC. If you are customizing Configuration Support-A, then code as follows:

- 0 = PSH control

- 1 = QLLC control

Normally code for QLLC. PSH is only required if a network interface adapter (NIA) is used. This definition can be changed on the dial screen, field QLLC for Configuration Support-A.

6.3.1.8 Question 409: X.25 Keyboard Support Options

This question allows you to choose how to use X.25 Extension Mode Keys.

- Digits 1 and 2: Disc key

  This option determines whether the disconnect key can be used and from where it can be used.

- Digits 3 and 4: LOCAL & COMM Keys

  This option defines if the Local and COMM keys are supported and what terminal can use them.

- Digit 5: X.25 extension keys

  Defines whether the extension keys are supported on all attached CUT terminals, or only from the terminal attached to port 0.

- Digit 6: Dial Keys

  Display all fields on the dial screen or only the HNAD (Host Network Address).

- Digit 7: DISC/LOCAL

  Specifies whether the disconnect is delayed or immediate.

- Digit 8: Reserved

6.3.1.9 Question 420: Incoming Call Options

Specifies the facilities supported by the 3174 and the network that is in effect when the host is trying to make a call to the 3174.

Refer to the network subscription to determine which facilities are used.

These settings can be changed on the dial screen, field IOPT.

- Digit 1: Host DTE Address

  Indicates whether the Host DTE address will be validated or not.

- Digit 2 and 3: Reverse-charge facility

  These digits are used to specify whether incoming calls with reverse charge are accepted or not.

  - 00 = do not accept reverse-charge call requests

  - 01 = accept calls with the reverse-charge facility equal to reverse-charge requested.

- 10 = accept calls with the reverse-charge facility equal to reverse-charge **not** requested.

- 11 = accept calls with the reverse-charge facility whether reverse-charges are requested or not.

- Digit 4: Negotiated Packet Size

  Specifies whether the 3174 Controller allows incoming calls which negotiate the packet size. not.

- Digit 5: Negotiated Window size

  Determines whether Incoming calls that want to change the maximum number of packets that can cross the DTE/DCE interface before receiving an acknowledgment are accepted.

- Digit 6: Connection Identifier

  Verifies the Connection Identifier (CID) on incoming calls (SVC). This may be required in some networks. If specified, the 3174 compares the CID on incoming calls against the value you specify in question 452.

- Digit 7: Throughput Class Negotiation

  Accepts or rejects incoming calls that want to change the communication speed.

- Digit 8: Reserved.

6.3.1.10 Question 421: Outgoing Call Options

Specifies the facilities supported when the 3174 is trying to make a call to the host. Please refer to the network subscription in order to determine what facilities are be used.

These settings can be changed on the dial screen, field OOPT.

- Digit 1: Indicates whether the 3174 DTE address is supplied in the call request packet.

- Digits 2 and 3: Reverse Charge facility. Specifies whether the 3174 Controller will try to make calls with reverse charge.

  - 00 = do not include reverse-charge request in the call request

  - 01 = request reverse-charge via reverse-charge facility

  - 10 = request **no** reverse-charge via reverse-charge facility

- Digit 4: Negotiated Packet size. Defines that the 3174 tries to negotiate the packet size during the session establishment.

- Digit 5: Negotiated Window size. Indicates that the 3174 wants to change the packet window size for this call.

- Digit 6: Determines whether the connection identifier password is supplied in the call request packet.

- Digit 7: Throughput Class Negotiation. Determines whether to change the communication speed in outgoing calls. This option is not supported by NPSI, but the user could get support by the use of DATE facility.

- Digit 8: Reserved.

6.3.1.11 Question 423: Host DTE Address

Enter a maximum of 15 digits for host DTE address. (SVC) This definition can be changed on the Dial screen, field HNAD.

6.3.1.12 Question 424: 3174 DTE Address

Enter a maximum of 15 digits for the 3174 DTE address. (SVC)

6.3.1.13 Question 430: Negotiated Packet Size

- 1 = 64-byte packet
- 2 = 128-byte packet
- 3 = 256-byte packet
- 4 = 512-byte packet

For an **SVC**, this value defines the maximum packet size that is supported for the 3174 when a negotiation takes place (if negotiation is specified in questions 420 or 421). This definition can be changed on the Dial screen, field NPKT.

For Configuration Support-B Release 3 and later this value is also used for a **PVC** where the packet size is not negotiated and this field is used to set the packet size.

The value used should be compatible with your network and your host.

6.3.1.14 Question 431: Packet Sequence Numbering

- 0 = modulo 8
- 1 = modulo 128

Specify **1** if your network supports this and you wish to use the extended packet sequence numbering.

6.3.1.15 Question 432: Negotiated Window Size (NWND) or PVC Window Size

- 01-07 for modulo 8
- 01-11 for modulo 128

For an SVC, this field defines the packet window size range that can be supported by the 3174 when a negotiation takes place if specified in question 420. This answer can be changed on the Dial screen, field NWND.

For a PVC, no negotiation occurs and this value sets the window size.

6.3.1.16 Question 433: K-Maximum Out

A number from 1 to 7. It indicates the maximum number of frames that the 3174 can send or receive before sending or receiving an acknowledgment. Essentially this is a checking mechanism used to ensure that the exchange of information is free of errors. For an error-free access line, better throughput is obtained if the largest value is used. Refer to the network subscription for more information.

6.3.1.17 Question 434: Nonstandard Default Packet Size

- 1 = 64-byte packet

- 2 = 128-byte packet

- 3 = 256-byte packet

- 4 = 512-byte packet

Before Configuration Support-B Release 3, this value is used if negotiation is not done or when the 3174 is working with a PVC.

After Configuration Support-B Release 3, this question is not used for PVCs. The PVC gets this value from your response to question 430.

This answer can be changed on the Dial screen, field DPKT prior to Configuration Support-B Release 3.

6.3.1.18 Question 435: Nonstandard Default Window Size

- 01-07 for modulo 8

- 01-11 for modulo 128

This answer specifies the default packet window size for SVCs. This value is used if there is no window size negotiation.

This answer can be changed on the Dial screen, field NWND prior to Configuration Support-B Release 3. Refer to the Network subscription for more information.

6.3.1.19 Question 440: Throughput Class Negotiation

This response is used if throughput class negotiation is specified in questions 420 or 421. It can be used to set the priority for packets

The value entered here is included in the outgoing call request, and is used to determine whether to accept the incoming calls.

Configuration Support-B release 3 allows for a new value of **D** to be entered which represents the value **64 000 bps**. This answer can be changed on the Dial screen, field TCLS. Refer to the Network subscription to determine whether the facility is supported

6.3.1.20 Question 441: Closed User Group

This field is optional. If used, the value should be in the range 00-99. A value entered here is included in the outgoing call request. This answer can be changed on the dial screen, field CUG. Refer to the Network subscription to check whether the facility is supported.

6.3.1.21 Question 442: Recognized Private Operating Agency

Optional. When a value is specified, it is used to route the packet in a multi-PSDN. This answer can be changed on the Dial screen, field RPOA. Refer to the network subscription to check whether the facility is supported. Valid values are 0000-9999.

6.3.1.22 Question 450: Link Level Transmit Timeout

Specified in 0.1 second intervals. Refer to the Network subscription for the value.

6.3.1.23 Question 451: Number Retries

Number of retries required. Refer to the Network subscription for the value.

6.3.1.24 Question 452: Connection Identifier (CID)

An alphanumeric value entered here defines the Connection Identifier that may be sent on a call request for an SVC.

This value can be changed on the Dial screen, field CID.

When digit 6 of of question 420 is set to **1**, the CID is used to determine whether to accept the incoming calls. It is included in the outgoing call request if digit 6 of question 421 is set to **1**

If you are connecting to NPSI*, this value must be hexadecimal instead of numeric.

> **Note**
>
> The following questions only apply to Configuration Support-B release 3 and later

6.3.1.25 Question 453: Connection Options

This is a 8-digit field; the default response is **00000000**. Only the first two digits are used.

Digit 1 is used to define the level of CCITT X.25 architecture supported by the 3174 Controller.

- 0 = 1980

- 1 = 1984 and beyond

Digit 2 is used to define the diagnostic codes issued by the 3174 Controller for **Clear Request** or **Reset Request** packets when breaking the connection with a remote DTE.

- 0 = SNA

- 1 = ISO

This answer can be changed on the Dial screen, field COPT in Configuration Support-B Release 3 and higher.

6.3.1.26 Questions 461-466: Logical Channel Numbering

These questions are used to define the range of logical channel numbers (LCNs) used for X.25 SVC call establishment. Configuration Support-B release 3 allows multiple virtual circuits to be defined so that multiple hosts can be defined. The values are in the range 0000-4095 and are sequential in the order they are listed below and following the PVC LCN if specified in question 402. The total number defined (including PVC) must not exceed 255.

- Question 461: Lowest Incoming Channel

- Question 462: Highest Incoming Channel
- Question 463: Lowest Two-way Channel
- Question 464: Highest Two-way Channel
- Question 465: Lowest Outgoing Channel
- Question 466: Highest Outgoing Channel

6.4 3174 Operating Procedures for X.25

When the control unit is ready to work, some operational considerations must be taken into account depending on what type of virtual circuit is used. If a 3174 is working with PVCs, the operation of the controller is similar to a leased SDLC line and operator intervention is minimal.

An SVC connection, however, may require an operator to initiate a call into the network. This can be done automatically with Configuration Support-B Release 3 using the Autocall/Autodisconnect feature simply by powering on a terminal which is configured for the switched host. Otherwise it is performed manually as explained below.

An SVC connection may be initiated by the host and in this case, the operational procedures (if used at all) involve altering the incoming call options.

This section explains the procedure needed to manually control the call from the 3174 end.

The 3174 permits the operator of an attached CUT device (like a 3278 or 3178) to initiate an outgoing call or modify the incoming call parameters. To support X.25 SVC, specific key functions are provided at the display. These are DIAL, LOCAL, COMM and DISC. These keys are active on (CUT mode terminals only) when the keyboard is in "Extended Select" mode which can be entered on most current IBM displays by pressing the "ExSel" key. On some older displays, Extended Select can be entered by pressing Alt-EOF. You know if you are in Extended Select by a solid right arrowhead displaying in the operator information area of your screen.

Once you are in this mode, you can invoke the X.25 special keys. Keyboards vary greatly in layout, but on a US English typewriter keyboard, these keys are:

- Key character "1" = DIAL
- Key character "2" = LOCAL
- Key character "3" = COMM
- Key character "5" = DISC.

If you are using a different keyboard, then the key is the one occupying the same position on the layout of the central keys. Once the extended key is pressed, the keyboard will go back out of Extended Select mode.

The keys make the following functions available:

- DIAL key

  This key permits you to connect the 3174 to the host through an outgoing call, or change the incoming call parameters using the dial screen. See "Dial Screen," below, for the format of this screen.

- DISC key

  Allows you to disconnect the 3174 from the X.25 network. The 3174 may have been configured to send an Operator Check indicator if an active SNA session is present. If the DISC key is pressed again, the disconnect process takes place by sending a clear request packet from the 3174. However, if the RESET key is pressed after the first DISC the process is reset. If no SNA sessions are active, the disconnect process is made automatic after the DISC Key is pressed.

- LOCAL key

  This key permits the user to disconnect the 3174 from the X.25 link. The process to disconnect the 3174 from the network is the same as with the DISC key.

- COMM key

  Permits the user to reconnect the 3174 to the X.25 link. For PVC operations, the LOCAL and COMM keys can be used for disconnect and reconnect operations. The customizer has the option of deleting these keys in order to eliminate operator intervention.

6.4.1 Dial Screen

If you are using switched virtual circuits, you can initiate the connection from a screen called the **Dial screen**. This screen appears when you press the **DIAL** key (mentioned in the previous chapter).

Depending on your response to question 409, you get either one of the full screens shown below or a screen which only gives you the HNAD to change. The first screen shown is for Configuration Support-A but the Configuration Support-B screen before release 3 is almost the same except that you do not have the QLLC field. The second screen shows the format after Configuration Support-B Release 3. The changes are:

- DPKT and DWND are removed as these parameters with their modified meanings in Configuration Support-B Release 3 should no longer be changed on a per call basis.

- COPT (connection options) is added.

- The CID is now displayable, not hidden.

```
          HNAD         =      123456789012345


          CID          =      A0000076
          NPKT         =      1
          NWND         =      07
          RPOA         =      1898
          CUG          =      32
          QLLC         =      1
          TCLS         =      9
          DPKT         =      1
          DWND         =      02
          OOPT         =      00000000
          IOPT         =      00000000
          I/O          =      0
```

Figure 42. X.25 Dial Screen for Configuration Support-A

```
          HNAD         =      123456789012345


          CID          =      A0000076
          NPKT         =      1
          NWND         =      07
          RPOA         =      1898
          CUG          =      32
          TCLS         =      9
          OOPT         =      00000000
          IOPT         =      00000000
          COPT         =      00000000
          I/O          =      0
```

Figure 43. X.25 Dial Screen after Configuration Support-B Release 3

The I/O field is displayed only in two-way calls. It defines whether the new values entered are only stored (and are valid until next IML or next change) or if the 3174 initiates an outgoing call (value 0) with the values displayed on the dial screen.

Explanations for the rest of the fields are available in "Customizing X.25" on page 137. The following table can be used to cross reference the fields to the questions.

Table 4. Dial Screen Parameters	
Field	Corresponding customization question
HNAD	Question 423: Host DTE address
CID	Question 452: Connection identifier
NPKT	Question 430: Negotiated packet size
NWND	Question 432: Negotiated window size
RPOA	Question 442: Recognized private operating agency
CUG	Question 441: Closed user group
TCLS	Question 440: Throughput class negotiation
DPKT	Question 434: Nonstandard default packet size
DWND	Question 435: Nonstandard default window size
OOPT	Question 421: Outgoing call options
IOPT	Question 420: Incoming call options
COPT	Question 453: Connection options

The dial screen can be reset after an unsuccessful call by pressing the RESET key after pressing the CLEAR key.

6.5 Packet Types

Common packet types are used by the 3174 in a X.25 environment. A brief description of the different packet types follows. Use of these packet types are described in the test scenarios, later in this chapter.

The *3174 Maintenance Information* also has a description of the packet types.

- Call request

  Sent by a 3174 operating in an SVC circuit, when an outgoing call is made using the dial operation. The packet contains the host's telephone number, and the specified options that must match with the user's subscription.

- Incoming call

  Received by the 3174 in a SVC when the host is initiating a call.

- Call accepted

  Sent after one incoming call arrives to a 3174 working in an SVC circuit.

- Call connected

  Received as a confirmation of the "call request" sent to the remote DTE. The SVC circuit is now in "data ready" state and SNA data flow begins.

- Clear Request

  Sent by the 3174 when certain errors are detected (logged) or when a DISC operation is issued. (SVC only)

- Clear indication

  Received as a result of a normal clearing sequence, or as a result of problems detected by the network or the remote DTE. In the last case, the 3174 logged the cause and diagnostic codes. The 3174 answers this packet with a clear confirmation packet. (SVC only)

- Clear confirmation

  Sent by the 3174 as an acknowledgement of the receipt of a clear indication packet. (SVC only)

- Reset request Sent by the 3174 connected to a PVC when it detects certain X.25 errors or when the Local operation is specified. In the first case, the 3174 logs the cause and diagnostic codes.

- Reset indication

  Received by the 3174 when a problem is detected by the network or by the remote DTE.

- Reset confirmation

  Sent by the 3174 as acknowledgement of a reset indication packet.

- Restart request

  The 3174 sent the restart request packet because it has detected certain X.25 errors, the local key has been pressed, or an open link operation has been performed. Open link is performed when:

    1. The 3174 is IMLed.

    2. Local mode has been entered and the COMM key has been pressed.

    3. The link has been closed because of an error condition.

- Restart Indication

  Received from the remote DTE when it wants to initialize the packet level. The 3174 response with a Restart Confirmation packet.

- Restart Confirmation

  Indicates the end of the link initialization.

- Data

  Used to receive or transmit data once the circuit has been established.

- Receive Not Ready

  Can be sent or received by the 3174. When it is received, transmission is stopped until a Receiver Ready packet is received.

- Receive Ready

  Sent in response to any packet that is received unless an outgoing data packet is ready for transmission. Receipt of a Receive Ready packet indicates that the transmission by the 3174 may continue.

- Diagnostic

  From a Reset, Clear or Restart packet, the 3174 logs this information.

6.6 Test Scenarios

The 3174 was tested with different hosts (System/36, System/38, System 308X and a system 3090) installed at the Raleigh International Technical Support Center. Data flow is presented in the following sections as a result of different tests made with the 3174 in an X.25 environment. They can be taken as a guideline of the normal control flow. Scenarios for System/38 are not presented here because data obtained was exactly the same as for System/36. The following IBM products were used:

- 3174 using Microcode level A1.4.

- 3174 using Microcode level B3.0 for the multi-host test.

- NPSI Network Packet Switched Interface. V1.R4.3.

- NPSI Network Packet Switched Interface. V2.R1 for the multi-host test.

- VTAM Virtual Telecommunication Access Method. V3.R1.1.

- VTAM Virtual Telecommunication Access Method. V3.3 ESA for the multi-host test.

- NCP Network Control Program. V4.R2.0.

- X25 Interconnection PRPQ V1.R1.0. (XI).

- System/36, System Support Program Release 5.

- System/38, CPF Release 8.

6.6.1 3174 as a PVC

Different scenarios were studied with the 3174 in a PVC environment. The connection to a VTAM system and System 36/38 were tested; the results can be observed in the following figures.

6.6.1.1 Access to a VTAM System

This test includes host access using a PSDN (Case A) and using XI instead of X.25 Network (Case B). Flows and configurations are shown next.

Case A. Connecting through TYMNET.
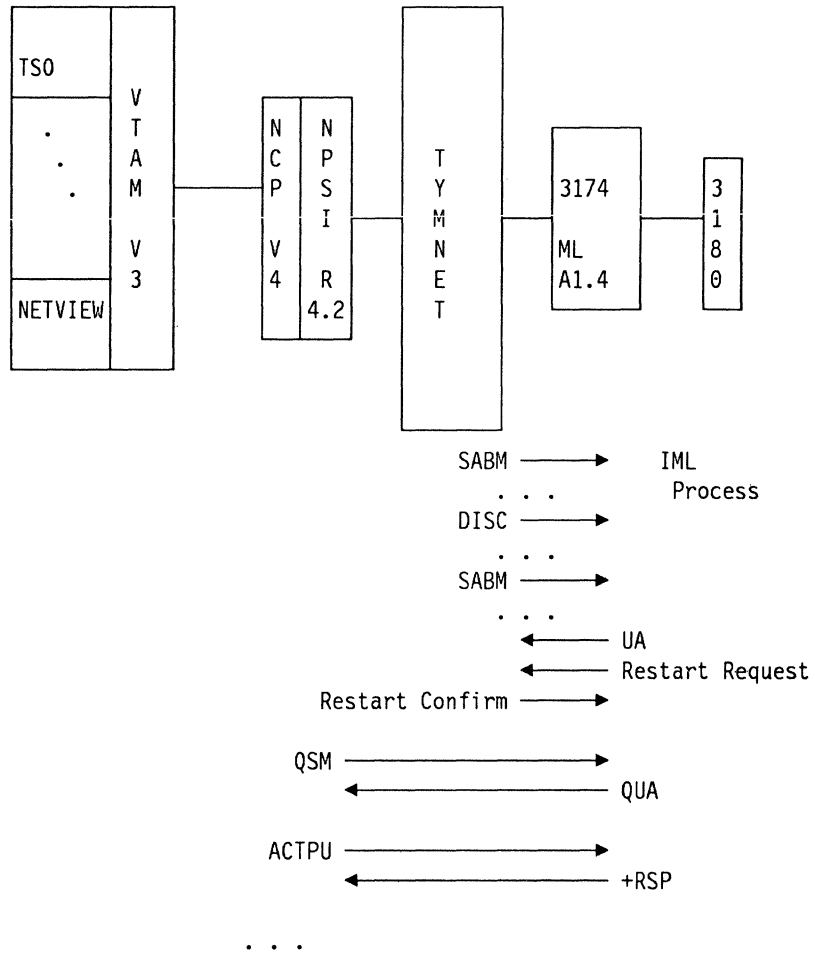
Figure 44. Case A, X.25 Connecting through TYMNET

Case B. Using XI. The following scenario shows the configuration used for Case B. As it can be seen, XI was used instead of the X.25 Network.
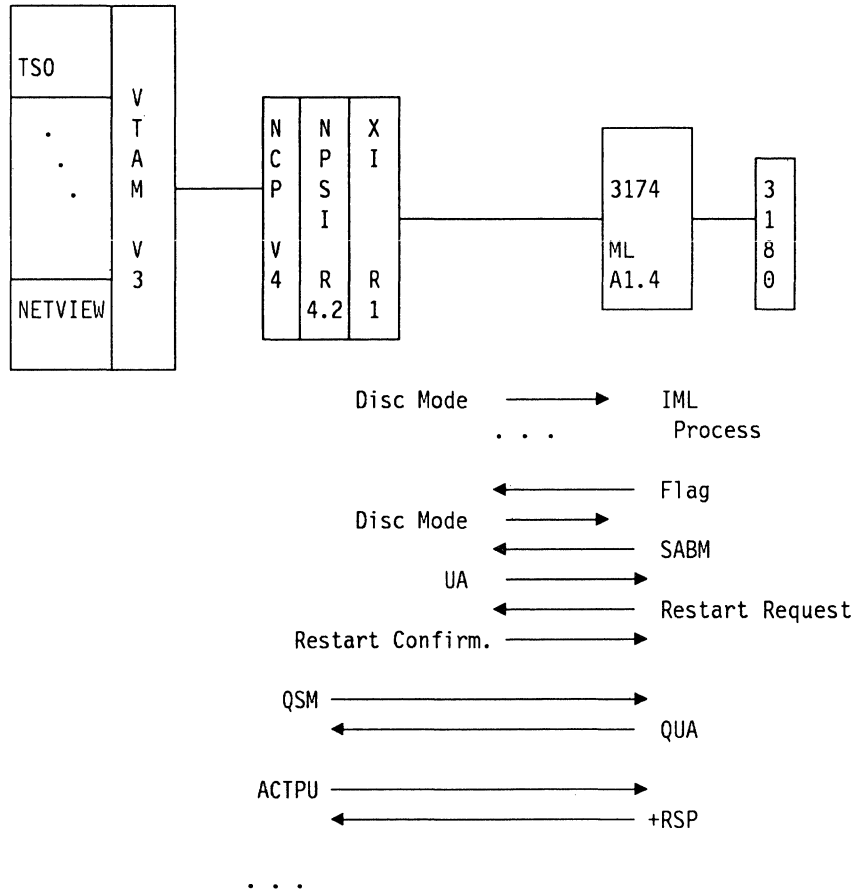
Figure 45. Case B, 3174 Using XI

6.6.1.2 Access to System/36

Again, two different scenarios were tested:

1. Case A: Access the host using a PSDN.

2. Case B: Access the host through XI.

Configurations for these tests and the resulting data flows are presented below:

Case A. Connecting through TYMNET.

```
┌──────────────┐        ┌───┐
│              │        │ T │
│ System 36    │        │ Y │        ┌──────┐   ┌───┐
│              │        │ M │        │ 3174 │   │ 3 │
│ Microcode    │────────│ N │────────│      │───│ 1 │
│ Level        │        │ E │        │ ML   │   │ 8 │
│              │        │ T │        │ A1.4 │   │ 0 │
│              │        │   │        └──────┘   └───┘
└──────────────┘        │   │
                        │   │
                        └───┘
                            DISC ─────────►    IML
                                  • • •           Process
                            DISC ─────────►
                                 ◄───────── FLAG
                            SABM ─────────►
                                 ◄───────── UA
                                 ◄───────── Restart Request
                  Restart Confirm ─────────►

        QXID ───────────────────────────────►
             ◄─────────────────────────────── QXID

         QSM ───────────────────────────────►
             ◄─────────────────────────────── QUA

       ACTPU ───────────────────────────────►
             ◄─────────────────────────────── +RSP

              • • •
```
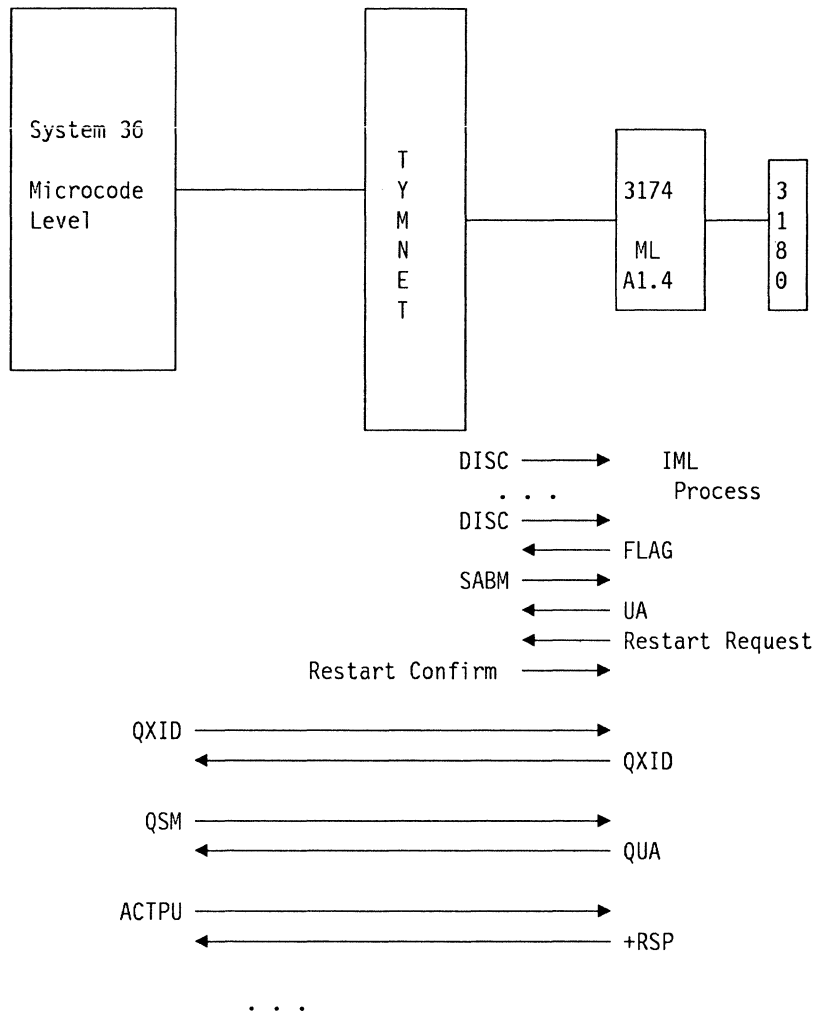
Figure 46. S/36 Case A, Connecting through TYMNET

Case B. Connecting through XI, using XI as a DCE.

```
┌──────────────┐          ┌──────────┐
│              │          │  NCP V4  │
│              │          │          │
│  System 36   │          │    +     │
│              │          │          │      ┌────────┐   ┌───┐
│  Microcode   │          │  XI R1.0 │      │  3174  │   │ 3 │
│  Level       │──────────│          │──────│        │───│ 1 │
│              │          │    +     │      │   ML   │   │ 8 │
│              │          │          │      │  A1.4  │   │ 0 │
│              │          │  NPSI    │      └────────┘   └───┘
│              │          │    R4.3  │
└──────────────┘          └──────────┘
```

```
                                 DISC ─────────▶        IML
                                  . . .                 Process
                                      ◀─────────  FLAG
                                 DISC ─────────▶
                                      ◀─────────  SABM
                                   UA ─────────▶
                                      ◀─────────  Restart Request
                     Restart Confirm ─────────▶

          QXID ──────────────────────────────────▶
               ◀──────────────────────────────────  QXID

           QSM ──────────────────────────────────▶
               ◀──────────────────────────────────  QUA

         ACTPU ──────────────────────────────────▶
               ◀──────────────────────────────────  +RSP


                     . . .
```
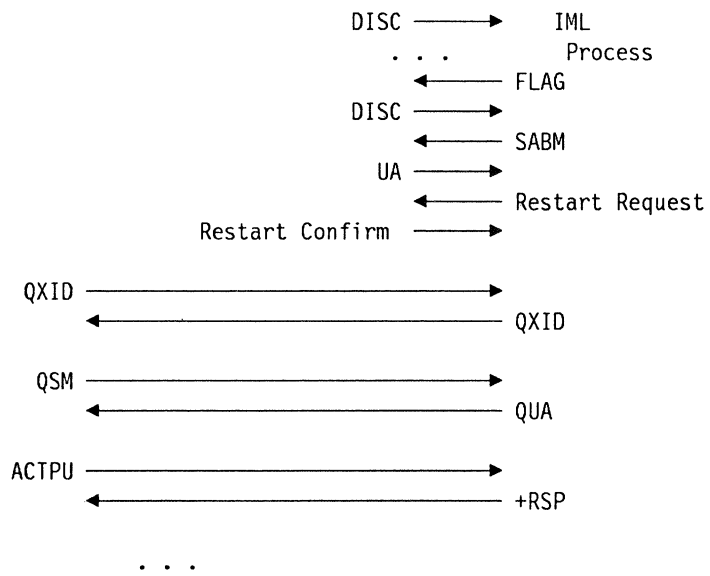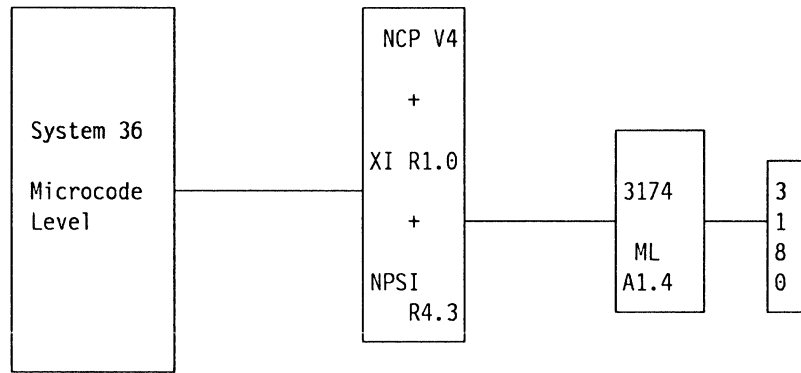
Figure 47. S/36 Case B, Connecting through XI, using XI as a DCE

Case C. Multi-host simulation using NPSI as a DCE.

In this case, even though there was really only one host, the 3174 view was that of four different hosts over different PVCs. SVCs could have been used instead for one or any of the connections.

The 3725 used is simulating a PSDN by having specified "STATION=DCE" in the X25.MCH macro of the NCP gen. VTAM and NCP see four different PUs downstream.


```
                                DISC ──────▶      IML
                                   . . .             Process
                                     ◀─────── FLAG
                                DISC ──────▶
                                     ◀─────── SABM
                             UA ──────▶
                                     ◀─────── Restart Request
                   Restart Confirm ──────▶

        QXID ──────────────────────────────▶
             ◀────────────────────────────── QXID

         QSM ──────────────────────────────▶
             ◀────────────────────────────── QUA

       ACTPU ──────────────────────────────▶
             ◀────────────────────────────── +RSP

            . . .
```
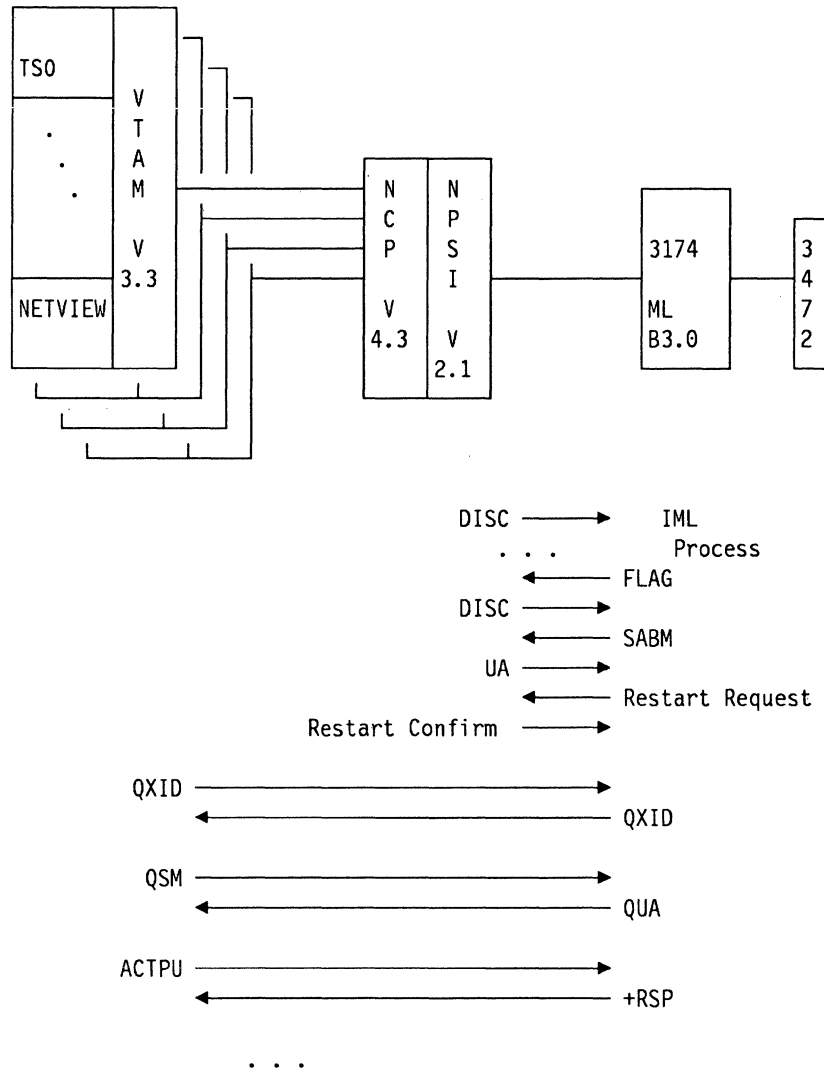
Figure 48. Multi-Host X.25 Configuration

6.6.2 3174 as an SVC

The ability of the 3174 to work in a Switched Virtual Circuit was tested too; in one test the 3174 started the connection by making an outgoing call and in the other, the 3174 waited for the call which is initiated from the host. Connections to a VTAM system and System 36/38 were tested again.

6.6.2.1 Access to VTAM System

This test included host access using a PSDN, (Case A) and the XI test, (Case B). The incoming call and the outgoing call capability of the 3174 were tested.

Case A. Connecting through TYMNET. Outgoing call.
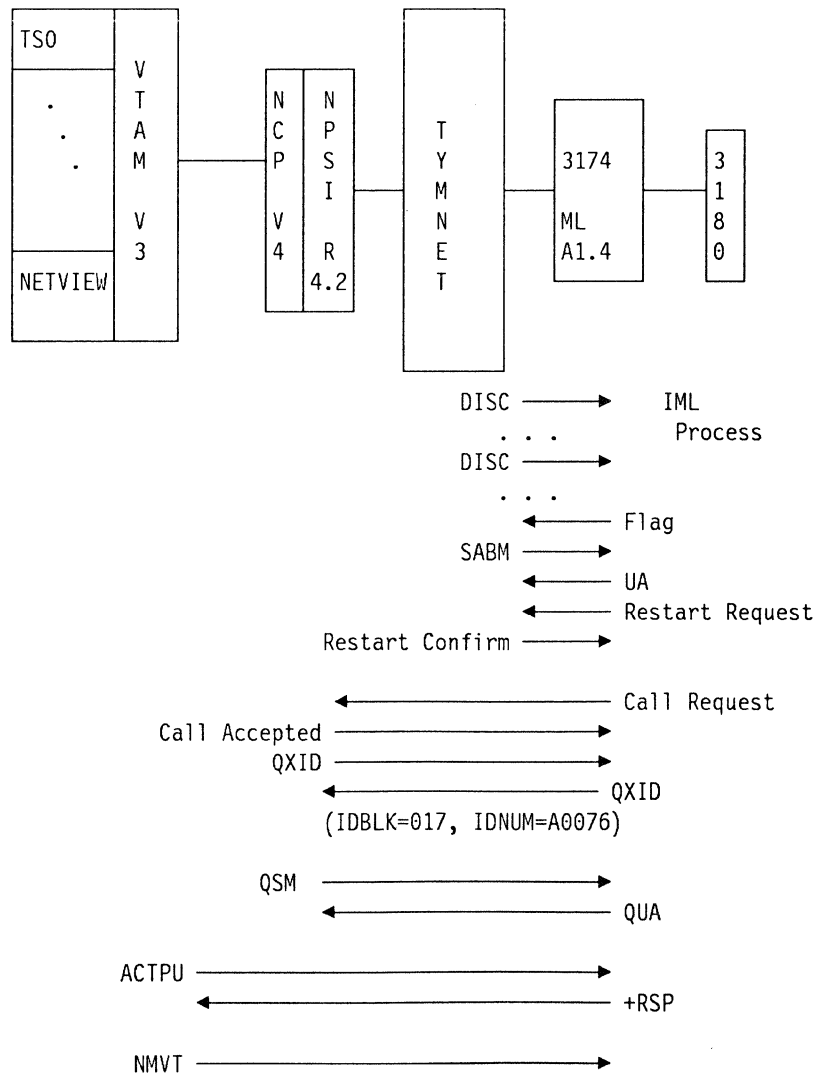
Figure 49. 3174 as an SVC - Case A, Connecting through TYMNET

Case B. Using XI. Incoming call.

```
┌──────────┬───┐        ┌───┬───┬───┐      ┌────────┐    ┌───┐
│ TSO      │ V │        │ N │ N │ X │      │ 3174   │    │ 3 │
│          │ T │        │ C │ P │ I │      │        │    │ 1 │
│    .     │ A │        │ P │ S │   │      │        │    │ 8 │
│    .     │ M │        │   │ I │   │      │ ML     │    │ 0 │
│    .     │   │        │ V │ R │ R │      │ A1.4   │    │   │
│          │ V │        │ 4 │   │   │      │        │    │   │
│          │ 3 │        │   │ 4.│ 1.│      │        │    │   │
│ NETVIEW  │   │        │   │ 2 │ 0 │      │        │    │   │
└──────────┴───┘        └───┴───┴───┘      └────────┘    └───┘
```

```
                                         ...
                            DISC ───────────►
                                         ...
                            DISC ───────────►
                                  ◄─────────── SABM
                              UA ───────────►
                                  ◄─────────── Restart Request
                 Restart Confirm ───────────►

            Call Request ─────────────────────►
                          ◄───────────────────── Call Accepted

                    QXID ───────────────────►

                          ◄─────────────────── QXID
                          (IDBLK=017, IDNUM=A0076)

                     QSM ─────────────────►
                          ◄───────────────── QUA

            ACTPU ─────────────────────────►
                  ◄───────────────────────── +RSP

            NMVT ──────────────────────────►

                  .  .  .
```
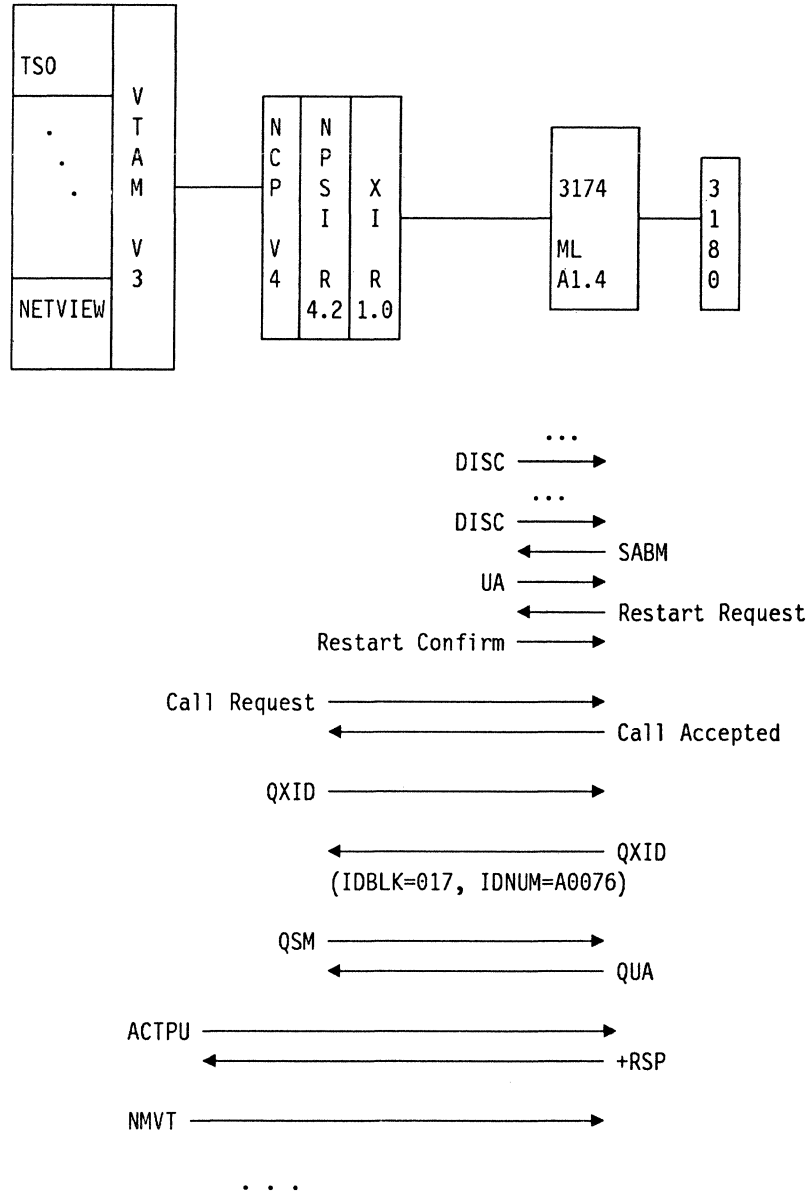
Figure 50. 3174 as an SVC - Case B, Using XI

7. Asynchronous Emulation Adapter (AEA)

In this chapter, the 3174 Asynchronous Emulation Adapter (AEA) is described. The introduction provides an overview of the function of the adapter and a description of the enhancements made in Configuration Support-B Release 2. Following the introduction are some examples of using the AEA and an explanation of the customization process. An AEA configuration example is worked through with the customization panels included. This configuration was tested at the ITSC, Raleigh.

7.1 Introduction

Many customers have the requirement to connect asynchronous ASCII devices to their network or to connect to ASCII hosts. The protocols and datastreams used to do this are quite different from those used in the traditional 3270 networks, however asynchronous communications can sometimes be more cost efficient than synchronous due to the low costs in producing the communication adapters and terminals. IBM announced asynchronous support for the 3174 Controller in 1987 to address the growing demand for asynchronous support. In 1990, we announced Configuration Support-B Release 2 which includes some significant enhancements to the original AEA support. The AEA feature provides ASCII attachment to the 3174 and serves to integrate ASCII workstations and hosts into the 3270 environment.

Three major functions are provided by the AEA. They are:

- **ASCII terminal emulation**, which allows 3270 displays and printers to emulate certain ASCII devices and communicate with ASCII hosts.

- **3270 terminal emulation**, which allows ASCII displays and printers (including PCs or PS/2s emulating these devices) to emulate 3270 devices and communicate with 3270 data stream applications.

- **Asynchronous pass through**, which allows ASCII devices to connect to ASCII hosts *through* the 3174

In addition, there are a number of functions provided to manage this environment such as:

- Destination switching

- Switched line management

- Support for "smart" modems

- Network management support

- Local copy facilities

- Customization support.

7.1.1 Description

The 3174 AEA feature can be ordered as feature number 3020. The feature consists of an adapter card, eight asynchronous ports, a downstream load diskette for the AEA and a wrap plug for testing. The number of adapters installed on a 3174 depends on the model number and the available slots. The large machines, models 1XX and the rack-mounted machines, models 2XX, can each have up to three adapters installed. The 2XX machines only have a maximum of five expansion slots, so if you are using other adapters in a model 2XX, you will need to plan the use of the slots. For example, if you wish to have 32 coax ports and 24 asynchronous ports, you would have to use at least two 3299s instead of using Terminal Multiplexer Adapters in order to accommodate the feature cards. The intermediate machines, the 5XR and 6XR, can have only one adapter installed, except the 53R which cannot support an AEA at all.

The 52R cannot support Configuration Support-B because of storage constraints and therefore, although it will support one AEA adapter, it will not support the Configuration Support-B Release 2 enhancements.

The small models, 8XR and 9XR, cannot support an AEA.

7.1.1.1 Storage Requirements

If AEA is configured on a 3174, there are storage requirements. See "Storage Charts" on page 339 for details on calculating the amount of storage you need. Remember that you may want to use MLT in conjunction with the AEA, especially if you are using multiple hosts; this also requires extra storage.

7.1.1.2 Disk Requirements

The AEA requires either the second diskette drive feature or the fixed disk in order to load the AEA microcode. If you are already using the second diskette drive for loading DSL devices, then you can merge the microcode onto one diskette using the *Merge DSL* procedure from the 3174 Customizing menu. (See "Planning for Merge Procedures" on page 51.)

7.1.1.3 Hardware Installation

For 3174 AEA installation purposes, you should use the *Asynchronous Emulation Adapter Customer Set Up Instructions* GA23-0341, which comes with the feature.

After installing the AEA card(s) and I/O Panel(s), a Card Verification Test is required. The Wrap Plug supplied with the AEA package is required for this test. The test is described in detail in the AEA set up instruction manual. After a successful completion of the Card Verification Test, the 3174 is ready for customization.

When customization is completed, the AEA code should be installed. It can be either:

- A single DSL diskette in drive 2

- A merged DSL diskette in drive 2 if you are using other DSL devices, or

- Merged onto the fixed disk if installed.

The AEA code is loaded into the AEA adapter at each 3174 Controller IML.

7.1.1.4 Network Management

ASCII terminals attached to the AEA are supported by most 3174 network management functions. Specific AEA tests are available from option 12 of the test menu. Some of the functions include:

- Test ports
- Connect to smart modem
- Transmit and receive test data
- Display device status and errors.

Error Log and Alerts: The 3174 logs errors and generate alerts to the primary host for conditions including:

- Permanent link outages
- Permanent calling outages
- Station outages
- Temporary error counts exceeded.

Response Time Monitor The AEA supports the full set of RTM functions. An ASCII device can be used in test mode to display the results and the LTTI (Last Transaction Time Indicator) can be displayed in the operator information area.

Vital Product Data There is currently no support available in ASCII terminals for Vital Product Data or VPD; however, you can enter and store the data manually in the 3174 Controller just as you would for the "pre-VPD" terminals. See "Vital Product Data" on page 313 for details on VPD.

7.1.2 Configuration Support-B Release 2 Enhancements

Configuration Support-B Release 2 for the 3174 was a major upgrade to the AEA microcode. The enhancements require an upgrade for the base configuration to Configuration Support-B Release 2 or later and a new level of DSL diskette. Make sure the AEA DSL diskette is at the same level as the microcode diskettes. If you are upgrading from Configuration Support-A, you may also require a diskette drive upgrade for handling the 2.4MB format that Configuration Support-B uses. You also require more storage to run Configuration Support-B, so you need to check this as well. (See "Storage Charts" on page 339.)

The major additions to the Configuration Support-A AEA support in Configuration Support-B Release 2 are:

- Performance improvements
- MLT support (multiple host sessions)
- UDT (user defined terminal tables)
- UDX (user defined translate tables)
- NLS (national language support)
- ASCII graphics support
- 8-bit ASCII character support
- ASCII plotter support

- Support for large format ASCII screens (30x80 and 32x80)

- Multiple passwords (defined for each port set)

- Additional device support.

7.2 Connectivity Summary

7.2.1 ASCII Host Support

The AEA is designed to be compatible with a wide range of ASCII hosts; at the ITSC, we tested an asynchronous connection to the IBM Information network and a dial up connection to a DEC host.

7.2.2 3270 Host Support

The AEA allows ASCII devices to have 3270 host sessions using the following upstream protocols:

- Local channel (SNA and non-SNA)

- ESCON

- SDLC

- BSC

- Token-ring

- X.25.

7.2.2.1 AEA, MLT and Multi-Host Considerations

Using AEA, you have a form of multi-host support in that you can have multiple ASCII hosts as well as a 3270 host. This differs from multiple 3270 host operation, as you cannot have the sessions concurrently and hot-key from one to the other using just the AEA function. It can, however, work in harmony with MLT and multi-host. Consider that the AEA will sit "in front of" the existing support to provide a connection menu for each terminal (both real and logical) defined to it.

The AEA does not support 3270 multi-host for ASCII terminals; ASCII devices can only be defined to one 3270 host. This is the primary host on the primary adapter, or host 1A. However, MLT is available for ASCII devices in Configuration Support-B Release 2 and later so that you can have multiple sessions with that host and concurrently with ASCII hosts, if desired.

A connection menu is still available for each logical terminal or LT defined in MLT to select whether the session is with the 3270 host or with an ASCII host.

If multi-host is used for the 3270 terminals, they can also have a connection menu on each LT which provides them with the choice of the 3270 host to which that particular LT is defined or to an ASCII host.

Connection menus can be defined as the default display for the terminal at power up time, or else the terminal can be connected to a default destination. The connection menu can then be invoked at a later time by a special key sequence. See "AEA Default Destination Panel" on page 195.

7.2.3 AEA Downstream Support

The AEA downstream connectivity is summarized in the following diagram.

```
┌──────────────────────────────────────────────────────────────────────┐
│ ┌──────────┐      ┌────────────┬─────────┐                            │
│ │3270 HOST │      │   3174     │ AEA 1   │                            │
│ │          │      │            │         │                            │
│ │          ........│[1].................│...........ASCII display     │
│ │          │       │            │        │                            │
│ │          │       │     .......│........│...........ASCII display    │
│ │          │       │[2] :      │         │                            │
│ │          │       │    :......│.........│...........ASCII host       │
│ │          │       │            │        │                            │
│ │          ........│[3]........│.........│...........ASCII display    │
│ │          │  :    │            │        │              with printer  │
│ │          ....:   │      ......│........│...........ASCII host       │
│ │          │       │     :     │┌────────┤                            │
│ │          │       │[4]  :     ││        │                            │
│ │          │       │     :     ││ TA     │                            │
│ │          │       │     :......│.........│...........3270 display     │
│ │          │       │            │        │                            │
│ │          ........│[5].........│.........│...........3270 display     │
│ │          │       │            │        │                            │
│ │          ........│[6].........│.........│...........3270 printer     │
│ │          │       │            │        │                            │
│ │          │       │     .......│.........│...........3270 printer     │
│ │          │       │     :     │┌────────┤                            │
│ │          │       │[7]  :     ││        │                            │
│ │          │       │     :     ││ AEA 2  │                            │
│ │          │       │     :......│.........│...........ASCII host       │
│ │          │       │            │        │                            │
│ │          ........│[8].........│.........│...........ASCII printer    │
│ │          │       │            │        │                            │
│ │          │       │     .......│.........│...........ASCII printer    │
│ │          │       │[9]  :     │         │                            │
│ │          │       │     :......│.........│...........ASCII host       │
│ │          │       │            │        │                            │
│ │          │       │     .......│.........│...........ASCII host       │
│ │          │       │[10] :     │         │                            │
│ │          │       │     :......│.........│...........ASCII display    │
│ │          │       │            │        │              with printer  │
│ └──────────┘      └────────────┴─────────┘                            │
└──────────────────────────────────────────────────────────────────────┘
```
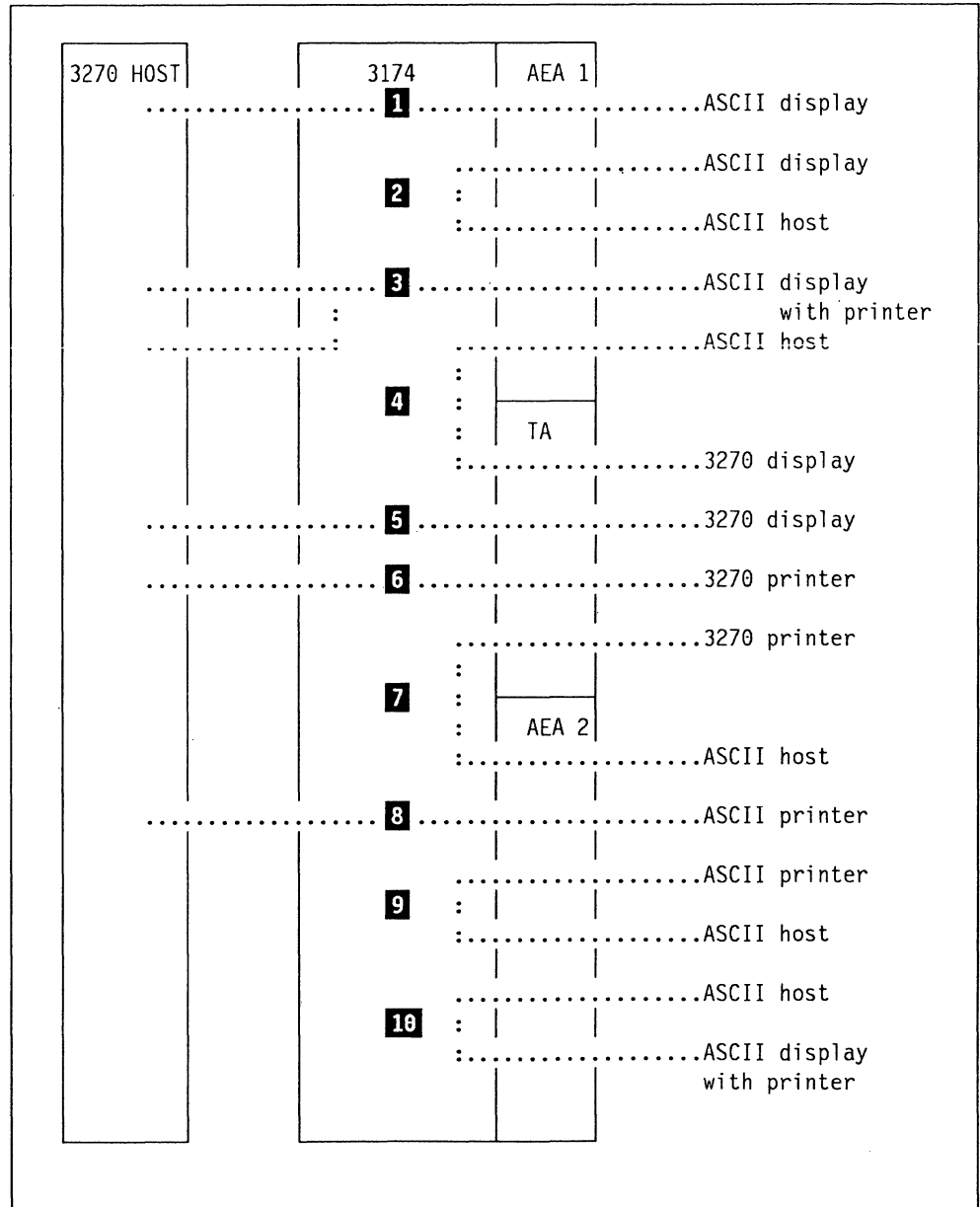
Figure 51. Connectivity Summary for Asynchronous Emulation Adapter

Note:

[1] The ASCII display terminal is mapped to appear to the 3270 host as a 3270 terminal in CUT mode. This can be monochrome or color.

[2] An ASCII display is connected to an ASCII host in passthrough mode. This connection is not confined to ports on the same adapter, it could be made to an ASCII host on AEA 2 also.

[3] An ASCII display with attached printer is mapped to the 3270 host as a 3270 display and a 3270 printer.

4 A 3270 display in CUT mode can connect to an ASCII host emulating an ASCII terminal.

5 A traditional 3270 terminal session is not affected by the AEA. In addition, a menu can be added for the terminal operator to allow an alternate connection to an ASCII host.

6 Traditional 3270 printing is unaffected by the AEA. However, printer definitions are static and, unlike display sessions, they cannot be switched by the operator to an ASCII host. You would have to plug it to another port with the ASCII host defined if you wished to print from an ASCII host as well as a 3270 host.

7 3270 printers (excluding 4250 image printers and SOEMI devices) can be mapped to an ASCII host as a "generic" ASCII printer.

8 ASCII printers can be mapped to appear as a 3287 printer to the 3270 host.

9 Passthrough from an ASCII host to an ASCII printer is supported.

10 Passthrough to an ASCII host from an ASCII display with a printer attached is supported but if you also desire a 3270 host connection for the printer, then the display must also be switched to the 3270 host. Otherwise the printer is disabled to the 3270 host.

7.2.3.1 Supported 3270 Displays

Using the AEA, all CUT mode displays with US English Typewriter keyboards and at least 1920 characters per screen are capable of emulating ASCII terminal types:

- IBM 3101
- DEC VT100**
- DEC VT220** (Configuration Support-B Release 2 or later)
- Dasher D210** (Configuration Support-B Release 2 or later).

The ASCII terminal emulation capability is in addition to the base 3270 display ability to perform in a 3270 environment.

CUT mode terminals include 3278, 3279, 3178, 3179 (not G models) 3180, 3191, 3192 (not G models), 3471 and 3472 (see note below). Also a PC or PS/2 running a 3270 CUT mode emulator is supported.

Note: DFT terminals are not supported on the 3174 AEA feature but DFT/E terminals such as the 3472G can have a CUT mode session and therefore can have an ASCII session.

7.2.3.2 Supported 3270 Printers

The following 3270 US English printers are supported by the AEA either for local copy from ASCII terminals emulating 3270 displays or as mapped ASCII printers.

- 3287 Models 1 and 2
- 3289 Models 1 and 2

- 3230 Model 2

- 3262 Models 3 and 13

- 3268 Model 2

- 4224

- 4214

- 4234

- 4245.

7.2.3.3 Supported ASCII Displays

The following ASCII displays emulate monochrome 3270 devices to a 3270 host when attached to a 3174 AEA:

- ADDS Viewpoint A-2**

- ADDS Viewpoint 78**

- ANSI 3.64 terminals**

- DEC VT100**

- DEC VT220** (Configuration Support-B Release 2 and later)

- DEC VT52**

- Hazeltine 1500**

- Esprit Executive 10/78**

- Hewlett-Packard 2621B**

- IBM 3101

- IBM 3161

- IBM 3163

- IBM 3164

- IBM FTTERM (monochrome)

- ROLM Cedar, Cypress and Juniper

- Lear Siegler ADM 3A**

- Lear Siegler ADM 5**

- Lear Siegler ADM 11**

- Lear Siegler ADM 12**

- Lear Siegler ADM 1178**

- Televideo 912**

- Televideo 970**

- Minitel 1B**

- Wyse 50/60**.

The following ASCII displays emulate four color 3270 devices to a 3270 host when attached to a 3174 AEA:

- DEC VT241**

- Tektronix 4205** two color only (Configuration Support-B Release 2 and later)

- IBM 3164

- IBM FTTERM (color).

There are many other displays which work. Most PCs and PS/2s work if they are emulating an ASCII terminal. It is, however, the customers responsibility to test terminals other than those listed above.

It is also possible with Configuration Support-B Release 2 or later to modify the supplied UDTs to support a similar or related terminal. In appendix C of the *3174 AEA Description and Reference* are examples of this for terminals:

- DEC VT240**

- Tektronix 4207/8/9**

- Tektronix 4105**.

ASCII devices used to emulate a 3270 device on the AEA must be capable of:

- Supporting one of the speeds provided by the 3174 AEA (300, 600, 1200, 2400, 4800, 9600 and 19200) on a RS-232D interface. Transmit and receive speeds must be equal.

- Operating in Full Duplex Character Mode.

- Supporting the 7-bit code defined by ANSI 3.4 previous to Configuration Support-B Release 2.

- Supporting the 7-bit or 8-bit code defined by ANSI 3.4 if Configuration Support-B Release 2 or later is used.

- Supporting one of the flow control procedures that the 3174 AEA supports.

- Displaying at least a 24 row x 80 column screen.

If using a device not listed above, then consider that it should match one of the displays from the list in the following respects:

- The Control Sequences used for 3270 Emulation:

  - Cursor Position
  - Line Erase
  - Screen Erase
  - Highlighting (if available)
  - Status Line Control (if available)
  - Printer Port Sharing (if available)
  - Terminal Set Up and Reset

- Control codes and graphic characters must preserve the same codes and characters on both 3270 displays and ASCII displays.

- The Keyboard layout must send the same codes and controls sequences to the 3174 AEA.

- The terminal must handle the End-Of-Line and End-Of-Screen condition in the same manner as 3270 displays.

7.2.3.4 Supported ASCII Printers

ASCII printers, when attached to a 3174 AEA, emulate a 3287 with a 2K print buffer. If they are attached to an SNA 3174, SNA Character Set (SCS) is supported as well. With the graphics support in Configuration Support-B Release 2 and later, structured field processing is also supported. The basic 3174 AEA requires printers being capable of:

- Supporting one of the speeds provided by the 3174 AEA (300, 600, 1200, 2400, 4800, 9600 and 19200) on a RS232D interface. Transmit and receive speeds must be equal.

- Operating in Full Duplex Character Mode.

- Supporting the 7-bit code defined by ANSI 3.4 previous to Configuration Support-B Release 2.

- Supporting the 7-bit or 8-bit code defined by ANSI 3.4 if Configuration Support-B Release 2 or later is used.

- Supporting one of the flow control procedures that 3174 AEA supports or be capable of printing at the full line speed.

- Supporting either ASCII upper and lower case or folding lower case to upper case.

- Supporting Carriage Return (CR) and Line Feed (LF) and CR should not perform LF automatically.

- Not requiring delay characters to allow for mechanical motion.

With UDT and UDX support the connectivity options available are better, but you need to define the characteristics yourself.

The printer should support one of the following character sets:

- US ASCII
- ISO 8859-1.2
- DEC MCS
- PC code page 850.

Otherwise with Configuration Support-B Release 2 or later you may specify a User Defined Translate (UDX) table.

IBM ASCII printers supported include:

- 4201 Proprinter and Proprinter II

- 4202 Proprinter XL

- 4207 Proprinter X24

- 4208 Proprinter XL24

- 4224 Printer Models 301, 302, and 3E3.

ASCII plotters are also supported. See "ASCII Plotter Support" on page 207.

7.2.3.5 Supported Modems

Modems used to connect ASCII hosts and devices to the 3174 AEA can use leased line, limited distance or switched lines. They should be asynchronous, provide equal transmit and receive speeds and conform to EIA 232D or CCITT V.24/V.28 specifications.

Table 5 lists the signals and pins used by the AEA.

Table 5. AEA Modem Pin Assignment	
Pin Number	Signal Name
1	GND (Frame Ground)
2	TD (Transmit Data)
3	RD (Receive Data)
4	RTS (Request To Send)
5	CTS (Clear To Send - optional)
6	DSR (Data Set Ready)
7	SG (Signal Ground)
8	CD (Carrier Detect) or RLSD (Receive Line Signal Detect)
20	DTR (Data Terminal Ready)
22	RI (Ring Indicator)
25	BSY (Busy Out - optional, not RS232C)

The following "smart modems" are also supported for PBXs and Public Switched networks:

- Hayes 300, 1200 and 1200B **

- IBM 5841

- Micom 3012+ and 3024+ **.

7.2.3.6 ASCII Attachment cabling

Be very careful about the wiring in RS-232 cables. Incorrectly wired cables may cause such signals as Data Terminal Ready (DTR) or Data Set Ready (DSR) to be in the wrong state at the wrong time, and the result usually is that absolutely nothing happens. RS-232 cables come in many varieties with anywhere from 3 to 25 wires in the cable. The wires may pass straight through, or almost any number may be crossed in the cable. Pin 6 at one end of the cable may be Pin 20 at the other end, or Pin 5 may be connected to Pin 8 at one end and a single wire then goes to Pin 4 at the other end. The RS-232 cable currently in use for attaching an asynchronous ASCII terminal to an OEM host communications port is, in many cases, not the proper cable for attaching the same device to the 3174 RS-232 port. The key is to understand which connection is being made, modem, null modem, or direct, and then follow the cable diagrams in *IBM 3174 Site Planning*, GA23-0213, or the *3174 AEA Description and Reference*.

7.3 AEA Configuration

The following section describes a sample configuration of the 3174 with the AEA feature. Figure 52 illustrates the configuration set up at our test site. This was customized using Configuration Support-B Release 3 and the responses are shown in "AEA Customizing" on page 168. In this example, all displays are configured with three LTERMS and are able to connect to any of the hosts.
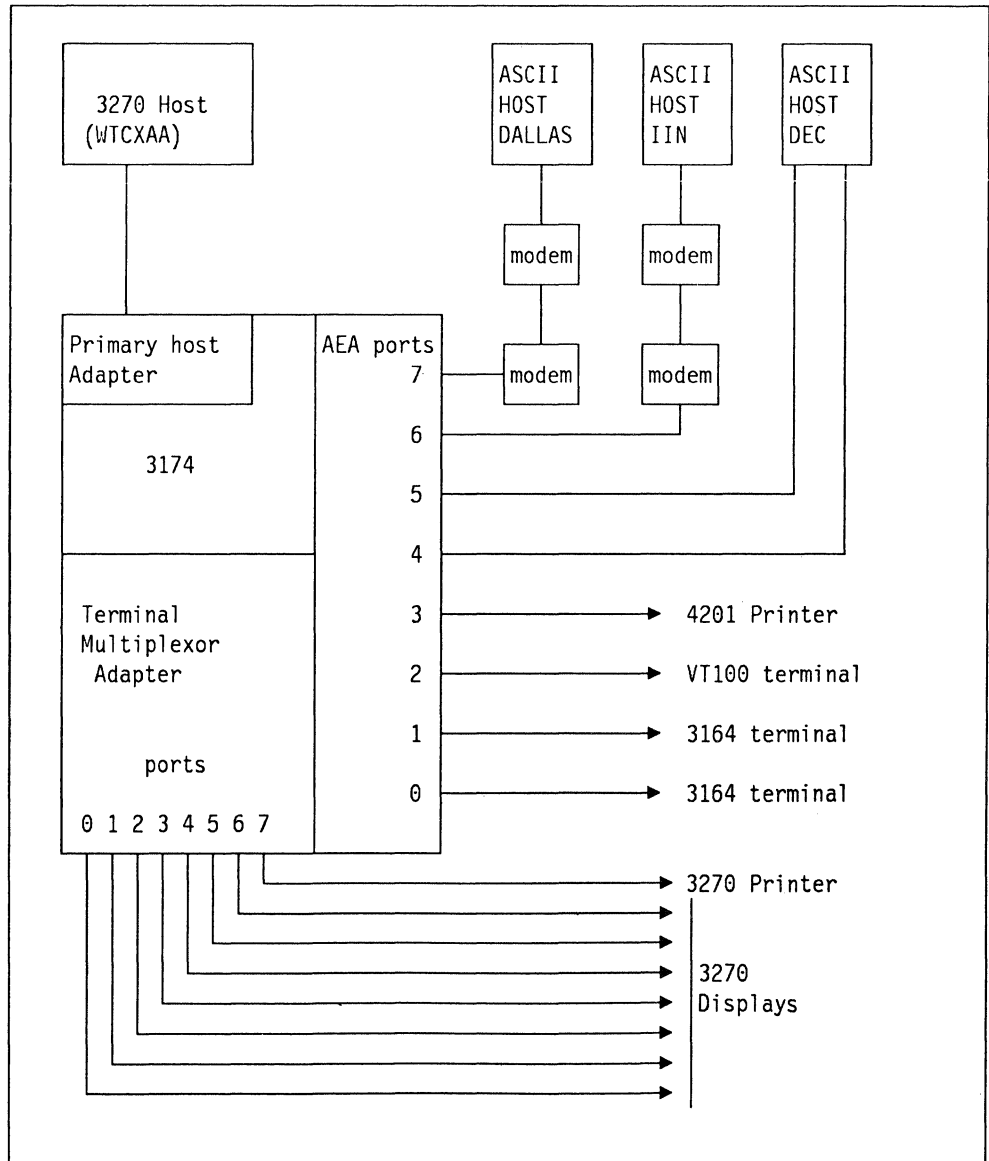
Figure 52. AEA Physical View

7.4 AEA Customizing

The ASCII world deals with many different types of terminals with a wide variety of features and operating parameters. Customizing the AEA to support an ASCII environment can be a complex procedure. A successfully configured 3174 is dependent largely on the care taken to prepare and plan for the customization. Therefore, it is vital to follow the steps outlined in the *3174 Planning Guide* and to fill in the worksheets provided in appendix A.

These worksheets help you perform an efficient and timely customization as many of the parameters need to be determined before going into the actual customizing process. This process is designed around having the worksheets completed in sequence. Perhaps if you have performed AEA customization several times before, you may feel comfortable in taking some short cuts, but if it is the first time **use the worksheets**.

To begin customizing, you need the following:

- 3174 Control and Utility diskettes

- 3174 Planning Guide

- Copies of the planning worksheets

- Characteristics of the ASCII devices and hosts you are using

Although AEA operation requires the AEA code to be loaded into the 3174, customizing does not require the AEA diskette. The actual AEA code is loaded during IML.

In the following section we describe AEA customization and work through an example where the configuration shown in Figure 52 on page 167 is customized. But first let's look at some of the AEA terminology.

7.4.1 AEA Customizing Terminology

During 3174 AEA customizing, you will encounter some unique terms including the following:

- Connection Menu

  A menu list of all the available host connections for a given terminal. The menu appears on the terminal's screen according to customizing definitions.

- Default Destination

  A host to which the terminal is connected when it is initially turned on. If a host is not defined as the default destination, the connection menu is displayed.

- ASCII Terminal Emulation

  A 3270 terminal emulating an ASCII terminal.

- 3270 Terminal Emulation

  An ASCII terminal emulating a 3270 terminal.

- AEA Station

Any facility supported by the AEA, either ASCII or 3270, host or terminal, printer or display.

- AEA Station Set

One or more AEA stations with the same attributes.

- AEA Port

Any 3174 port either coax or ASCII which uses the AEA functions

- AEA Port Set

One or more AEA ports having the same physical characteristics. If more than one station set is defined for a port set, then a display using that port set is presented with a menu prompting for the desired station set.

- AEA Port Set Panel

The AEA port set panel is used by both AEA and MLT functions. The AEA function uses it to define the port type (i.e. switched, direct etc.) and the modem type for each station set. The MLT function is defined in the AEA port set by defining a session limit for every device.

Note: Prior to Configuration Support-B Release 2, ASCII devices could only have a single session and the session limit for ASCII devices was forced to a blank.

- AEA Port to Port Set Map Panel

This is a customizing panel used to associate the AEA port sets with the physical 3174 ports. There is an entry for each 3174 port to which a Port Set is assigned.

- AEA Station Set Panel

This is the customizing panel which describes the characteristics of the stations which participate in the 3174 AEA operation and maps them to a Port Set. The AEA Station Set definitions comprise many options of which you need to define a subset depending on the station type you are defining.

- Port Assignment

If the AEA feature is used on a 3174 with the MLT feature, the port assignment panel must be completed. The port assignment panel defines which hardware 3174 port supports which logical terminal.

7.4.2 Worksheet Description

The worksheets used for an AEA are:

- Worksheet 15 - 3270 Attachment Diagram

On this sheet, you group each 3270 port into a port set. You use this sheet to plan for the the attachment of 3270 terminals to an ASCII host.

- Worksheet 16 - ASCII attachment diagram

This sheet is used to group the ASCII ports into port sets.

- Worksheet 17 - AEA Configure

- Worksheet 18 - AEA Port Set

- Worksheet 19 - AEA Port-to-Port Set Map

- Worksheet 20 - AEA Station Set
- Worksheet 21 - AEA Default Destination.

In addition there are worksheets to fill out if you are modifying or creating UDTs or UDXs.

Worksheets 17 to 21 are in the same format as the actual screens you customize. The first two planning worksheets, 15 an 16, are not like any screen but they are probably the key to getting it right because this is where you decide all the names and groups you will use.

7.4.3 3174 AEA Customizing Data Flow Chart

The following chart is a rough guide to the AEA customization process.


```
┌─────────────────┐        ┌─────────────────┐
│ START           │        │ Fill out the    │
│ Configure AEA   │───────▶│   worksheets    │
└─────────────────┘        └─────────────────┘
                                    │
                                    ▼
Note: This step ensures that  ┌─────────────────┐   ┌──────────────────┐
      you will be able to     │ Will ASCII      │ y │ Customize the    │
      address ASCII terminals │ devices emulate │──▶│ Port Assignment  │
      from the 3270 host.     │ 3270 devices    │   │ for AEA host     │
                              └─────────────────┘   │ addresses        │
                                    │ n             └──────────────────┘
                                    ▼
                              ┌─────────────────┐
                              │ Select          │
                              │  Configure AEA  │
                              │ from menu       │
                              └─────────────────┘
                                    │
                                    ▼
                              ┌─────────────────┐
                              │ Complete        │
                              │ AEA Configure   │
                              │ using           │
                              │ worksheet 17    │
                              └─────────────────┘
                                    │
                                    ▼
Note: Get the Port Set names  ┌─────────────────┐
      from your completed      │ Complete        │
      sheets 15 and 16         │ AEA Port Set    │
                               │ using           │
                               │ Worksheet 18    │
                               └─────────────────┘
                                    │
                                    ▼
                              ┌─────────────────┐
                              │ Complete        │
                              │ AEA Port to Port│
                              │ Set Map using   │
                              │ Worksheet 19    │
                              └─────────────────┘
                                    │
                                    ▼
Note: Allocate a Port Set to  ┌─────────────────┐
      each Station Set you      │ Complete one    │
      define. Different         │ AEA Station Set │
      Station Sets may use the  │ entry for each  │
      same Port Set.            │ Station Set type│
                               │ using Worksheet 20│
                               └─────────────────┘
                                    │
                                    ▼
                              ┌─────────────────┐   ┌──────────────────┐
                              │ Complete        │   │ AEA Customization│
                              │ AEA Default     │   │ is now complete  │
                              │ Destination     │──▶│                  │
                              │ using           │   │ Update PAM if    │
                              │ Worksheet 21    │   │  required.       │
                              └─────────────────┘   └──────────────────┘
```

Figure 53. AEA Customizing Overview

7.4.4 3174 AEA Customizing Questions

The questions asked during AEA customization are listed in this section. The differences after installing Configuration Support-B Release 2 are noted.
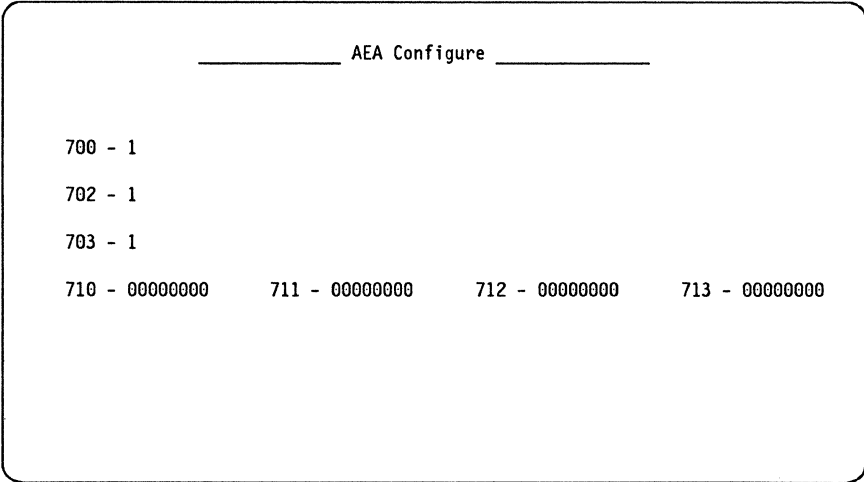
7.4.4.1 Q 110 - MLT Support Level

Before configuring the AEA, make sure that you have this question answered in your host(s) definition. If the answer for this question is other than 0 (0 = No MLT), you need a response to question 116 as well. This sets up the host addresses used by both 3270 and ASCII terminals when they are connected to a 3270 host. The AEA connection menu, if used, lists this session under the host name you specify in the Station Set definition.

If you specify ASCII MLT in question 703 (Configuration Support-B Release 2 and later) then you must also specify MLT support for question 110. See "Multiple Logical Terminal (MLT)" on page 217 for more information on MLT.

7.4.4.2 AEA Configure Panel

This panel is different after Configuration Support-B Release 2. Figure 54 shows the Configuration Support-B Release 2 panel. The main change is the addition of two new questions, 702 and 703 and the prompt for the AEA password (Q 701) is gone. Password is now specified at the Port Set level.

```
┌─────────────────────────────────────────────────────────────────────┐
│                                                                       │
│                  _____ AEA Configure _____                │
│                                                                       │
│                                                                       │
│      700 - 1                                                          │
│                                                                       │
│      702 - 1                                                          │
│                                                                       │
│      703 - 1                                                          │
│                                                                       │
│      710 - 00000000    711 - 00000000    712 - 00000000    713 - 00000000 │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
│                                                                       │
└─────────────────────────────────────────────────────────────────────┘
```

Figure 54. AEA Configure Panel for Configuration Support-B Release 2 and later

Q. 700 - Configure The AEA Feature

Response: 0 = Turns the AEA Configuration OFF, any previously configured AEA related entries are stored.

1 = Turns the AEA Configuration ON, initiates configuration or uses the previously entered parameters.

Default = 0

Q 701 - Password for ASCII Displays on Switched Lines.: *This question is removed in Configuration Support-B Release 2 and later. See Port Set definition for entering passwords.*

You may enter up to eight Alphanumeric characters (no blank/space allowed). This entry specifies a Password for all ASCII Display stations which operates on switched lines. If there is no entry in this question field, the user is not prompted for a password.

Q. 702 - Control Key Assignment: Configuration Support-B Release 2 and later only.

Response: Allows you to change the control key when using ASCII emulation.

0 = ALT key (same as before Configuration Support-B Release 2)

1 = CTRL key

Q. 703 - MLT for AEA: Configuration Support-B Release 2 and later only.

Response: Specify if you are using MLT on ASCII terminals.

0 = No MLT

1 = MLT

Q. 710 Miscellaneous ASCII Feature Options (A)

Response: Eight digits (0 or 1). The default response is 00000000.

- Digit 1 - Reverse Video Blanks-to-Hyphen Option:

  For 3270 displays *without* EABs, specifying this bit as 1 results in reverse video blanks displaying as hyphens.

- Digit 2 - Automatic New Line After End of Print:

  Specifying this bit as 1 results in an automatic new line only if the column pointer is in a position other than column 1. Specifying this bit as a 0 results in an automatic new line regardless of where the column pointer is located.

- Digit 3 - DSR Timing for Activating Connections:

  Specifying this bit as a 1 results in the AEA recognizing that a connection has been established on switched or direct ports if DSR remains high for 500 milliseconds in response to the AEA raising DTR and RTS. This allows for faster connections on lines where the leads are stable.

  When this bit is specified as a 0, DSR must remain high for two seconds in response to the AEA raising DTR and RTS.

- Digit 4 - DSR Timing for Deactivating Connections:

  When this bit is specified as a 1, the AEA will not immediately deactivate a connection for a direct or switched port when DSR drops. Instead, it will time how long DSR remains low. If it is low for less than two seconds, the connection will remain active. If it is low for more than two seconds, the connection will be deactivated.

  When this bit is specified as a 0, the AEA will deactivate a connection for direct and switched ports as soon as DSR drops.

- Digit 5 - Printer Keyboard Option:

When this bit is set, it causes the AEA to update the status line after it finishes updating the data portion of the screen.

- Digits 7 through 8 - Reserved.

Q.711 Miscellaneous ASCII Feature Options (B)

Response: Eight digits (0 or 1). The default response is 00000000.

- Digit 1 - Send TERMSELF when Device Disconnects:

  Specifying this bit as a 1 results in TERMSELF being sent when a device in session with a 3270 SNA host application disconnects.

  Specifying this bit as a 0 results in an UNBIND being sent when a device in session with a 3270 SNA host application disconnects.

- Digit 2 - SLU Capability of Power Off Request:

  Specifying this bit as a 1 results in a value of X'00' for the Secondary LU capability byte of control vector X'0C' for Power Off Notify requests. This prevents a SNA host application from retaining data between sessions.

  Specifying this bit as a 0 results in a value of X'10' for the Secondary LU capability byte of control vector X'0C' for a Power Off Notify Request.

- Digits 3 through 8 - Reserved.

Q.712 and 713 Miscellaneous ASCII Feature Options (C and D)

Response: Eight digits (0 or 1). The default response is 00000000.

These questions are reserved for use in defining non-standard feature options. All digits are reserved on both questions.

7.4.4.3 Port Set Definitions

Following are examples of the AEA Port Set panel before and after Configuration Support-B Release 2. Note the additional field for the Port Set password.

Another difference in Configuration Support-B Release 2 and later is that you can enter session limit values for ASCII devices.

Normally, this screen is empty and ready to accept the user entries. The entries shown in Figure 56 on page 175 are for our example, illustrated in Figure 52 on page 167 and associated with the examples which appear later in "Port to Port Set Map" on page 176, and "Station Set Definition (Q 721 - Q 787)" on page 177.

```
                    _____AEA Port Set_____


              Name      Session      Port        Modem
                        Limit        Type        Type
     1  =  3270DSP_       3            1           -
     2  =  3270PRT_       1            1           _
     3  =  3164DSP_       _            3           _
     4  =  VT100D__       _            2           1
     5  =  4201____       _            3           -
     6  =  DECHOST_       _            3           _
     7  =  IBMIN___       _            2           1
     8  =  DALLAS__       _            2           1
     9  =  _____        _            _           _
    10  =  _____        _            _           _
    11  =  _____        _            _           _
    12  =  _____        _            _           _
    13  =  _____        _            _           _
    14  =  _____        _            _           _
    15  =  _____        _            _           _
    16  =  _____        _            _           _
```

Figure 55. AEA Port Set panel before Configuration Support-B Release 2

```
                    _____AEA Port Set_____


              Name      Session      Port        Modem       Password
                        Limit        Type        Type
     1  =  3270DSP_       3            1           -
     2  =  3270PRT_       1            1           _          _____
     3  =  3164DSP_       3            3           _          _____
     4  =  VT100D__       3            2           1          IBMITSC_
     5  =  4201____       1            3           _          _____
     6  =  DECHOST_       1            3           _          _____
     7  =  IBMIN___       1            2           1          _____
     8  =  DALLAS__       1            2           1          _____
     9  =  _____        _            _           _          _____
    10  =  _____        _            _           _          _____
    11  =  _____        _            _           _          _____
    12  =  _____        _            _           _          _____
    13  =  _____        _            _           _          _____
    14  =  _____        _            _           _          _____
    15  =  _____        _            _           _          _____
    16  =  _____        _            _           _          _____
```

Figure 56. AEA Port Set Panel for Configuration Support-B Release 2 and Later

Response Field	Description
Name	This is the Port Set Name that is assigned in the AEA worksheets. A Maximum of 16 Port Names are allowed. Port Names must be consistent for the Port Names on all AEA panels. In the example above, entry number 1 is a 3270 display with 3 MLT sessions, entry number 2 is a 3270 printer, etc. It is suggested that the customizer assign meaningful Port Names in order to have an easy method of port name recognition.

Session Limit	Total number of sessions permitted for a device type (recognized by Device Name). The number of sessions must match the MLT session assignment for each port.
	Note: With Configuration Support-B Release 2 and later you now define this parameter for ASCII Port Sets.
Port Type	This is an ASCII Device classification.

- 1 = 3270 Devices
- 2 = Switched Lines
- 3 = Direct Attachment
- 4 = Non-Switched modem

Modem Type	Enter the type of the modem to serve the ASCII devices. For 3270 devices, do not respond to this field.

1 = Hayes (or compatible).

2 = Micom (or compatible).

3 = IBM

4 = Other (Modems which have been determined to meet AEA specifications).

Password	This can be up to eight characters and is used to verify ASCII devices users. If nothing is entered, then a password is not requested. If entered, then a password is requested when the ASCII terminal connects to the 3174.

7.4.4.4 Port to Port Set Map

The next AEA customization panel is the Port to Port Set Map. This panel is used to assign AEA ports to the Port Sets defined in the previous panel.

The panel is divided into three sections. The first section is for 3270 ports, these are labelled under the heading **TA** and are divided into four groups of eight, aligned to the 3174 Terminal Adapter ports. The second section is for each of three possible AEAs and the third is a list of the valid Port Sets that you may use.

To customize this panel, enter the Port Set number you wish to use from the list at the bottom of the panel in the appropriate position for each 3174 port that you wish to be an AEA port.

This information is available from planning sheet 15 (or 15A and 15B) for 3270 ports and sheet 16 for ASCII ports.

```
┌──────────────────────────────────────────────────────────────────────────┐
│                    _____ AEA Port to Port Set Map _____              │
│                                                                            │
│  Type the port set number to group the 3174 ports                          │
│                                                                            │
│         3270 Ports        0   1   2   3   4   5   6   7                     │
│         26-00 to 26-07    1_  1_  1_  1_  1_  1_  1_  2_                     │
│         26-08 to 26-15    __  __  __  __  __  __  __  __                    │
│         26-16 to 26-23    __  __  __  __  __  __  __  __                    │
│         26-24 to 26-31    __  __  __  __  __  __  __  __                    │
│                                                                            │
│          AEA Ports                                                         │
│         21-00 to 21-07    3_  3_  4_  5_  6_  6_  7_  8_                     │
│         22-00 to 22-07    __  __  __  __  __  __  __  __                    │
│         23-00 to 23-07    __  __  __  __  __  __  __  __                    │
│                                                                            │
│         Port Sets                                                          │
│          1 = 3270DSP       2 = 3270PRT      3 = 3164DSP     4 = VT100D      │
│          5 = 4201          6 = DECHOST      7 = IBMIN       8 = DALLAS      │
│          9 =              10 =             11 =            12 =             │
│         13 =              14 =             15 =            16 =             │
│                                                                            │
└──────────────────────────────────────────────────────────────────────────┘
```

Figure 57. AEA Port To Port Set Map Panel

Figure 57 shows the Port Set Map used to generate our configuration.
(Compare with Figure 52 on page 167)

7.4.4.5 Station Set Definition (Q 721 -/Q 787)

The Station Set panel is used to define the characteristics of every component used by the·3174 AEA. These components being either displays, printers or hosts.

You can define up to 30 Station Sets, using the PF11 key to advance to subsequent panels. Use PF8 when you have finished. Two Station Sets are defined on each panel. The Station Set names, numbers, associated port sets and Station Set types you enter were assigned on planning sheets 15 and 16. Station Set types are listed in Table 6 on page 183 for reference. The remaining questions depend on the station type; you should use the *Planning Guide* for a list of those which are relevant if you are not sure.

For ASCII displays you may define the same Port Set name to several Station Sets. Doing this causes the user of an ASCII display on this Port Set to be prompted for the terminal type being used. A list of valid terminal types is presented. The name you enter for the Station Set name on this panel is the name that appears on the prompt screen.

In Configuration Support-B Release 2 there are several new questions on this panel. To illustrate this, see Figure 58 on page 178 and Figure 59 on page 178.

```
                _____AEA Station Set_____

1  721 - _____        722 - __   723 - _____
   725 - 1
   731 - 1    732 - 1    733 - 0   734 - _   735 - 0   736 - 1  737 - _
   741 - 000  742 - 015  743 - 1
   751 - _    752 - _____
   761 - 1    762 - 1    763 - 1   764 - 1
   771 - 1    772 - 1    773 - 1   774 - 1   775 - 1
   781 - 0    782 - 0    783 - 066

2  721 - _____          722 - __   723 - _____
   725 - 1
   731 - 1    732 - 1    733 - 0   734 -     735 - 0   736 - 1  737 - _
   741 - 000  742 - 015  743 - 1
   751 - _    752 - _____
   761 - 1    762 - 1    763 - 0   764 - 1
   771 - 1    772 - 1    773 - 1   774 - 1   775 - 1
   781 - 0    782 - 0    783 - 066
```

Figure 58. AEA Station Set Panel before Configuration Support-B Release 2

```
                _____ AEA Station Set _____

1  721 - _____      722 - __   723 - _____    725 - 1
   731 - 1    732 - 1    733 - 0    734 - _    735 - 0   736 - 1   73  - _
   741 - 000  742 - 015  743 - 1   744 - 0   745 - 0   746 - 0  0
   751 - _    752 - _____
   761 - 1    762 - 1    763 - 1    764 - 1    765 - 0
   771 - 1    772 - 1    773 - 1    774 - 1    775 - 1   776 - 1
   781 - 0  782 - 0  783 - 066  784 - 1   785 - 11111000   786 - 132   787 - 0


2  721 - _____      722 - __   723 - _____    725 - 1
   731 - 1    732 - 1    733 - 0    734 - _    735 - 0   736 - 1   737 - _
   741 - 000  742 - 015  743 - 1   744 - 0   745 - 0   746 - 0  0
   751 - _    752 - _____
   761 - 1    762 - 1    763 - 1    764 - 1    765 - 0
   771 - 1    772 - 1    773 - 1    774 - 1    775 - 1   776 - 1
   781 - 0  782 - 0  783 - 066  784 - 1   785 - 11111000   786 - 132   787 - 0
```

Figure 59. AEA Station Set Panel after Configuration Support-B Release 2

The station set definitions used in our example are shown in the following panels.

```
 _____AEA Station Set_____

1  721 - WTCXAA           _____   722 - 3H  723 - _____    725 - 1
     731 - 1    732 - 1   733 - 0   734 - _   735 - 0  736 - 1  737 - _
     741 - 001  742 - 015  743 - 1  744 - 0  745 - 0  746 - 0 0
     751 - _    752 - _____
       761 - 1    762 - 1   763 - 1   764 - 1  765 - 0
       771 - 1    772 - 1   773 - 1   774 - 1   775 - 1  776 - 1
       781 - 0  782 - 0  783 - 066  784 - 1  785 - 11111000  786 - 132  787 - 0


2  721 - DEC HOST          _____    722 - AH  723 - DECHOST_  725 - 1
     731 - 1    732 - 1   733 - 3   734 - 7   735 - 4  736 - 1  737 - 7
     741 - 000  742 - 015  743 - 0  744 - 0  745 - 0  746 - 0 0
     751 - 1    752 -
       761 - 1    762 - 1   763 - 0   764 - 1  765 - 0
       771 - 1    772 - 1   773 - 1   774 - 1   775 - 1  776 - 1
       781 - 0  782 - 0  783 - 066  784 - 1  785 - 11111000  786 - 132  787 - 0
```

Figure 60. AEA Station Set Panel (figure 1 of 5)

Station Set 1 - WTCXAA ITSC MVS 4: This station set defines the IBM host (Q 722 = 3H). Most of the other questions are disregarded for an IBM host. Q 721 is the Station Set Name. This name appears, as entered here, on the Connection Menu. The Connection Menu appears on an AEA terminal's screen if a default host destination was not defined for it. The Station Set Name should therefore be a meaningful one for the user.

Station Set 2 - DEC HOST: This is set up as a directly attached ASCII host. An ASCII host requires many options to be defined to the AEA, these are explained later in this section.

```
                    _____ AEA Station Set _____


3   721 - IBM IN                       722 - AH  723 - IBMIN      725 - 1
      731 - 1     732 - 1    733 - 3   734 - 6    735 - 2  736 - 1  737 - 6
      741 - 000  742 - 002  743 - 0   744 - 0   745 - 0   746 - 0 0
      751 - 1     752 - T9W5559960_____
        761 - 1   762 - 1    763 - 0    764 - 1   765 - 0
        771 - 1   772 - 1    773 - 1    774 - 1    775 - 1   776 - 1
        781 - 0  782 - 0  783 - 066  784 - 1  785 - 11111000  786 - 132  787 - 0


4   721 - 3270 DISPLAYS        ____    722 - 3D  723 - 3270DSP   725 - 1
      731 - 1     732 - 1    733 - 0   734 - _    735 - 0  736 - 1  737 - _
      741 - 000  742 - 015  743 - 1   744 - 0   745 - 0   746 - 0 0
      751 - 2     752 - _____
        761 - 1   762 - 1    763 - 1    764 - 1   765 - 0
        771 - 1   772 - 1    773 - 1    774 - 1    775 - 1   776 - 1
        781 - 0  782 - 0  783 - 066  784 - 1  785 - 11111000  786 - 132  787 - 0
```

Figure 61. AEA Station Set Panel (figure 2 of 5)

Station Set 3 - IBM INFORMATION NETWORK: This Station Set is defined for an Autodial feature. It defines what appears to the 3174 as an ASCII host. Actually, it defines a 3708 protocol converter whose local telephone number is 9-555-9960. As a result, this Station Set allows any display attached to the 3174, including 3270-type displays, to DIAL-OUT to the remote IBM host, using ASCII protocol for the dial link.

Note the syntax of question 752 (Phone Number). When autodial is used, a modified Hayes command set is used. In this example, the user is not allowed to enter the Hayes ATDT command. The user should use W's instead of commas for pause characters.

Station Set 4 - 3270 DISPLAYS: There are only four relevant questions to respond to for 3270 displays. They are the name, the station type of 3D, the Port Set name it will use and the Connection Menu option.

```
                      _____ AEA Station Set _____

5  721 - 3270 PRINTERS    _____     722 - 3P  723 - 3270PRT    725 - 0
    731 - 1    732 - 1    733 - 0    734 - _    735 - 0  736 - 1  737 - _
    741 - 000  742 - 015  743 - 1    744 - 0   745 - 0  746 - 0 0
    751 - _    752 - _____
      761 - 1    762 - 1    763 - 1    764 - 1    765 - 0
      771 - 1    772 - 1    773 - 1    774 - 1    775 - 1  776 - 1
      781 - 0  782 - 0  783 - 066  784 - 1  785 - 11111000  786 - 132  787 - 0


6  721 - 3164 DISPLAYS _____     722 - I3  723 - 3164DSP    725 - 1
    731 - 1    732 - 1    733 - 7    734 - _    735 - 3  736 - 1  737 - _
    741 - 000  742 - 015  743 - 0    744 - 0   745 - 0  746 - 0 0
    751 - _    752 - _____
      761 - 1    762 - 1    763 - 1    764 - 1    765 - 0
      771 - 1    772 - 1    773 - 1    774 - 1    775 - 1  776 - 1
      781 - 0  782 - 0  783 - 066  784 - 1  785 - 11111000  786 - 132  787 - 0
```

Figure 62. AEA Station Set Panel (figure 3 of 5)

Station Set 5 - 3270 PRINTERS: There are only three relevant questions to respond to for 3270 printers. They are the name, the station type of 3P and the Port Set name.

Station Set 6 - 3164 DISPLAYS: This Station Set defines a direct-attached 3164 running at 19.2Kbps. In this case, we are using one of the standard station types of I3. In this case, baud rate is set to 19,200, and parity to none. Obviously, the display must be set to match these parameters.

In our tests we actually used a 3151 terminal. If we had defined it as such using I2 or I3 station types, we would not get the operator information on the status line. We would have to toggle it on and off using the "ESC ?" keystroke sequence. (See Terminal User's Reference for Expanded Functions). We found, however, this doesn't highlight data because a 3164 is a color display and doesn't use highlighting.

If you are using Configuration Support-B Release 2 and later you can create a new UDT definition for a monochrome 3164 and the highlighting should then work.

```
                          _____ AEA Station Set _____


  7  721 - VT100 DISPLAYS_____     722 - V1  723 - VT100D__  725 - 1
        731 - 1    732 - 1   733 - 0   734 - _   735 - 0  736 - 1  737 - 6
        741 - 000  742 - 015  743 - 1  744 - 0  745 - 0  746 - 0 0
        751 - _    752 - _____
        761 - 1   762 - 1   763 - 1   764 - 1   765 - 0
        771 - 1   772 - 1   773 - 1   774 - 1   775 - 1   776 - 1
        781 - 0  782 - 0  783 - 066  784 - 1  785 - 11111000  786 - 132  787 - 0


  8  721 - 4201 PRINTERS_____     722 - AP  723 - 4201____  725 - 1
        731 - 1    732 - 1   733 - 7   734 - _   735 - 3  736 - 1  737 - _
        741 - 000  742 - 015  743 - 1  744 - 0  745 - 0  746 - 0 0
        751 - _    752 - _____
        761 - 1   762 - 1   763 - 1   764 - 1   765 - 0
        771 - 1   772 - 1   773 - 1   774 - 1   775 - 1   776 - 1
        781 - 0  782 - 0  783 - 066  784 - 1  785 - 11111000  786 - 132  787 - 0
```

Figure 63. AEA Station Set Panel (figure 4 of 5)

Station Set 7 - VT100 DISPLAYS: This Station Set defines a dial up port with autobaud/autoparity set. This means that the terminal may be set at any desired parity and baud rate and the control unit adjusts itself based upon the sequence "CR.CR" (where CR = Carriage Return) typed at the terminal.

Station Set 8 - 4201 PRINTER: This Station Set is for an ASCII printer for attachment to the 3270 host.

```
                    _____AEA Station Set_____

 9  721 - DALLAS DEC SYSTEM VT100_    722 - AH  723 - DALLAS__   725 - 1
        731 - 1    732 - 1    733 - 3   734 - 4   735 - 4  736 - 1  737 - 4
        741 - 001  742 - 015  743 - 0   744 - 0   745 - 0  746 - 0 0
        751 - 1    752 - T9W12145555555_____
          761 - 1    762 - 1    763 - 0   764 - 1  765 - 0
          771 - 1    772 - 1    773 - 1   774 - 1   775 - 1  776 - 1
          781 - 0  782 - 0  783 - 066  784 - 1  785 - 11111000  786 - 132  787 - 0


10  721 - _____    722 - __  723 - _____   725 - 1
        731 - 1    732 - 1    733 - 0   734 - _   735 - 0  736 - 1  737 - _
        741 - 000  742 - 015  743 - 1   744 - 0   745 - 0  746 - 0 0
        751 - _    752 - _____
          761 - 1    762 - 1    763 - 1   764 - 1  765 - 0
          771 - 1    772 - 1    773 - 1   774 - 1   775 - 1  776 - 1
          781 - 0  782 - 0  783 - 066  784 - 1  785 - 11111000  786 - 132  787 - 0
```

Figure 64. AEA Station Set Panel (figure 5 of 5)

Station Set 9 - DALLAS DEC SYSTEM VT100: The final Station Set is for another dial up ASCII host, this one using VT100 emulation.

The description of each field entry follows:

AEA Station Set Customizing Questions Description:

Q 721 - Station Set Name: This name is the identification for the Station Set. Use something unique and identifiable to your users as this name may appear on the terminal menus. See the note on ASCII displays on 177.

Q 722 - Station Type: Table 6 lists the current Station Types and the corresponding responses for Q722.

Table 6 (Page 1 of 2). AEA Station Types	
Station Set Type	Response
3270 Host	3H
3270 Display	3D
3270 Printer	3P
ASCII Host	AH
ASCII Printer	AP
ASCII Plotter	AL

Table 6 (Page 2 of 2). AEA Station Types	
ADDS View Point A-2	A2
ADDS View Point 78	A7
Esprit 78	E7
FTTERM Color	FC
FTTERM Monochrome	FM
Hazeltine 1500	E1
Hewlett Packard 2621 B	H2
IBM 3101	I1
IBM 3151/3161/3162/3163	I2
IBM 3151/3161/3162/3163	I3
IBM 3164	I4
IBM 3151/3161/3162/3163 with 3708 cartridge	I5
Lear Siegler ADM 11 or 12	L1
Lear Siegler ADM 3A or 5	L3
Lear Siegler ADM 1178	L7
Minitel 1B	M1
IBM 3162 model 870	R0
Cypress, Cedar and Juniper	R1
ANSI 3.64 Terminal.	S1
Televideo 912	T1
Televideo 970	T7
DEC VT100	V1
DEC VT241	V2
DEC VT52	V5
DEC VT220	V6
Tektronix 4205	X4
Wyse 50/60	W1
User Defined Table 1	U1
User Defined Table 2	U2
User Defined Table 3	U3
User Defined Table 4	U4
User Defined Table 5	U5
User Defined Table 6	U6

Q 723 - Port Set Name: The response for this question is up to eight alphanumeric characters (blanks permitted). The Port Set Name represents the Port Set to which this Station Set has been assigned. These names should correlate with your "AEA Port Set" panel entries.

Q 725 - Host Connection Menu Option: The answer for this question defines whether the display station user for this Station Set is able to select a host connection out of a Host Connection Menu which appears on the screen after IML.

- If 725 = 0, the user is not able to select a Host Connection.

  Host connection is established according to the Default Destination panel entries (see "AEA Default Destination Panel" on page 195).

- If 725 = 1, the display station user in this Station Set is allowed to select an alternate host connection from the Host Connection Menu.

The default answer for this question is 1.

Q 731 - Flow Control Type: The response for this question specifies the type of data flow control between the 3174 and the host, display station or printer.

Note: The correct flow control is essential, if an incorrect answer is entered it will probably cause overrun errors.

- 731 = 0, No Flow Control
- 731 = 1, Xon/Xoff
- 731 = 2, Data Terminal Ready (DTR) (non-switched port type only)
- 731 = 3, Clear To Send (CTS) (direct port types only)

The default response for 731 is 1.

Q 732 - Xon/Xoff Transmission Resumption Trigger: If Xon/Xoff is used, the response to this question indicates the signal which the 3174 must receive to resume transmitting after it has received Xoff. The response specifies whether transmission is resumed due to the AEA receipt of Xon or after the AEA receives any character.

- 732 = 1, Transmission Resume Trigger is any character received.
- 732 = 2, Transmission Resume Trigger is Xon only.

The default response for 732 is 1.

It is recommended that you use the default as this precludes display station "hang-ups" due to accidental transmission of Xoff.

Q 733 - Line Speed: This response defines the line speed of the Station Set. Options are:

- 0 = Autobaud/Autoparity
- 1 =   300 bps
- 2 =   600 bps
- 3 = 1200 bps

- 4 = 2400 bps
- 5 = 4800 bps
- 6 = 9600 bps
- 7 = 19200 bps

Default response for Q 733 = 0. A host or printer cannot use the default response. A line speed must be specified.

For a display, use this response to define either autobaud or the specific speed of the terminal (and ignore question 734). Autobaud also causes autoparity to be specified; see Q 735. If autobaud is not specified, all terminals using this Station Set must be set at the same speed. If the line speed specified is incorrect, the response to the transmission may be absent or garbled.

Since a host Station Set might support a range of terminal speeds, you define the lowest speed rate as the answer for this question and use question 734 to define the highest speed. For example, if the Station Set's first terminal is working at 300bps, the second at 600bps and the third at 9600bps, answer this question with "1" and for the upper limit define question 734 for 9600bps.

If the Host Station Set supports a single speed rate for every terminal rather than a range of speeds, you would define this speed and skip the next question number 734.

Q 734 - Line Speed (ASCII Host upper limit): This question is used with question 733 (lower speed limit). to define a range of supported speeds for an ASCII host.

Possible answers are:
- 2 = 600 bps
- 3 = 1200 bps
- 4 = 2400 bps
- 5 = 4800 bps
- 6 = 9600 bps
- 7 = 19200 bps

There is no default for question 734. A response is required only if a range of speeds needs to be specified.

Q 735 - Parity: The Parity question specifies the type of the parity check for a given Station Set (displays, hosts and printers).

If the previous question (Q 734) specified Autobaud/Autoparity, it must also be specified here for the same station.

The following are the valid responses for Q 735:
- 0 = Autobaud/Autoparity
- 1 = Odd
- 2 = Even

- 3 = None

- 4 = Space

- 5 = Mark

The default answer for question 735 is 0. This answer cannot be specified for ASCII hosts and/or printers. Only ASCII displays may get this default.

Notes:

1. If the parity specification is incorrect, the response to transmissions may be absent or garbled.

2. Some ASCII hosts may specify the use of "8-bit, no parity" but experience has shown that the 3174 will work on these systems using "7-bit space parity"

Q 736 - Stop Bits: The answer for this question specifies the number of Stop Bits required for ASCII operation.

Note: If the number of Stop Bits specified is incorrect, the response to transmissions may be absent or garbled.

The valid answers for this question are as follows:

- 1 = One Stop Bit

- 2 = Two Stop Bits

Default response is 1.

Q 737 - Maximum Modem Line Speed: The answer for this question determines the speed at which commands are sent to your modem. You must respond to this question if you have an IBM or Hayes modem on switched lines and responded to question 733 with a 0.

The valid answers for this question are as follows:

- 1 = 300 bps

- 2 = 600 bps

- 3 = 1200 bps

- 4 = 2400 bps

- 5 = 4800 bps

- 6 = 9600 bps

- 7 = 19200 bps

There is no default response to this question.

Q 741 - Switched Disconnect Timeout (3270 Host Only): This question provides additional security function in the event of disconnection of a switched line ASCII terminal. The response to this question specifies how long (in minutes) after disconnection, the AEA port associated with this station should be held available. This takes advantage of the host session timeout security feature. The appropriate answer must match the IBM system definitions for the host

session timeout security feature and should be provided by the IBM host system programmer.

The question applies only to 3270 hosts using BSC or local Non-SNA attachment method.

The answer for this question is a three digit number ranging from 000 to 254 (minutes). Leading zeroes are required.

The default answer for this question is 000.

Q 742 - Inactivity Timeout: The answer for this question defines the time which a host, display or printer are allowed to remain idle before the connection is broken. The answer represents minutes and leading zeroes are required.

The decision for this answer has to take into account the following values:

- Line (phone) cost

- Importance of this Station Set access

- Port Value (access of other display stations).

A valid answer for this question is a three digit number in the value of 000 to 254 (represents minutes).

The default answer is 015. If 000 is specified, it means indefinite Timeout (or no timeout definition). In other words, 000 means permanent connection (no break due to inactivity).

Q 743 - Prompt for Universal/Specific Keyboard Map: Using this question, the user of this given station, when initiating an operation, can be prompted with a selection menu. This menu asks whether a Specific or Universal keyboard is to be supported for the particular display.

If you decide not to display the prompt to the user, the keyboard behaves as a Specific Map definition.

The purpose of the menu is to distinguish between the definition of a Universal (common) keyboard map overlay for the given ASCII terminal or the definition of a Specific overlay.

The answer to this customizing question defines all ASCII terminals which are associated with this Station.

The Specific Overlay Map is recommended only if a few different types of ASCII terminals are in use. The Universal Keyboard Map is recommended if there are many different types of ASCII terminals which make use of this station set. The Specific Keyboard Map defines only the function type of keys (e.g. Cursor Movement Keys, PF keys).

It is assumed that all ASCII terminals use the same US English keyboards and therefore their character set as well as character layout is identical.

The valid answers are as follows:

- 0 = Do not display prompt

- 1 = Display prompt

The default answer for Question 743 is 1. If the answer to Question 743 is 0, the keyboard is mapped to the Specific Overlay Map.

For more information see GA23-0332 *Terminal User's Reference for Expanded Functions*.

Q 744 - Number of Bits per Character: This question is required when you answered Q 735 (parity), with a response of 3. The response to this question must be the same for all stations in a port set. The response can be:

- 0 = 7 bits per character

- 1 = 8 bits per character

The default response is 0.

If question 735 was answered with anything other than 3, then the frame includes the parity bit. 8-bit mark and space parity is not supported.

This question was added in Configuration Support-B Release 2 and later.

Q 745 - ASCII Display Character Set: This question applies only to ASCII displays, the response can be:

- 0 = US ASCII

- 1 = IBM 3101 CS1

- 2 = IBM 316X CS1 and CS2

- 3 = ISO 8859/1.2

- 4 = DEC MCS (requires 8 bit option on Q 744)

- 5 = DEC NRC

This question was added in Configuration Support-B Release 2 and later.

Q 746 - Translate Option: There is a two digit response required for this question. The first digit specifies the transmit table, and the second digit the receive table. The default is 0 0.

- 0 = Default table (US ASCII, CS1, CS1/2, ISO 8859, MCS, NRC)

- 1 = User-Defined Translate table 1

- 2 = User-Defined Translate table 2

- 3 = User-Defined Translate table 3

This question was added in Configuration Support-B Release 2 and later

Q 751 - Data Stream Supported by ASCII Host: This question specifies the Data Stream type of the ASCII host.

Valid answers for this question are as follows:

- 1 = Host uses VT100 Data Stream

- 2 = Host uses 3101 Data Stream

- 3 = Host uses DG 210 Data Stream
- 4 = Host uses VT220 7-bit Data Stream
- 5 = Host uses VT220 8-bit Data Stream

There is no default for this question.

Q 752 - ASCII Host Phone Number: This answer contains the phone number of the ASCII host. It is sent to an Autodial modem when a connection to this host is required.

This phone number can contain control characters which are used by the modem to perform certain operations (e.g. "wait for second Dial tone"). Another sample of a control character is "switch to Pulse dialing" which is required when a dial operation through some public networks is performed.

The Autodialing control characters for every modem are described in the following tables. If the precise character is not available, substituted characters are defined for every supported modem.

Note: A response of this question is required when the host is the default destination of an ASCII printer and the Port Type is switched

There is no default for this question.

The following table lists the characters used for the AEA supported modems and the substitute character used to customize the 3174.

Table 7. IBM and Hayes Modem Control Characters		
Function	Modem character	3174 character
Pause (wait for dial tone)		W
Switch to Pulse Dialing	P	P
Switch to Tone Dialing	T	T
Numbers Supported	0 9	0 9

Table 8. Micom Modem Control Characters		
Function	Modem character	3174 character
Pause (wait for dial tone)	K	K
Switch to Pulse Dialing	$	P
Switch to Tone Dialing	&	T
Numbers Supported	0 9	0 9

It is possible to embed the control character into the phone number string even if it does not have a 3174 substitution. This is possible by using the prefix X'nn' where X = Hexadecimal designator and nn = Hexadecimal Character's value.

The following is an example:

The Hayes string is defined like this: 'T9 WW P123 4567 X52'

This means that WW is the Substitution Control Character (,,) and X52 is the Hexadecimal number 52 (letter 'R')

The string will look like this: T9,,P1234567R

Q 761 - Auto Xon/Xoff (DEC VT 100 Data Stream): This field specifies whether Auto Xon/Xoff is active.

Following are the valid answers:

- 0 = Auto Xon/Xoff disabled

- 1 = Auto Xon/Xoff enabled

The default for this question is 1.

Q 762 - Wraparound Option (Dec VT100 Data Stream): This entry field specifies whether Wraparound option is operational.

Valid answers are as follows:

- 0 = Wraparound option disabled

- 1 = Wraparound option enabled

The default for this question is 1.

Q 763 - Newline Option (DEC VT100 Data Stream): This entry field identifies whether Newline option is available.

Valid answers are as follows:

- 0 = Newline option disabled

- 1 = Newline option enabled

The default for this question is 1.

Q 764 - Margin Bell (DEC VT100 Data Stream): This entry field identifies whether Margin Bell option is operational.

Valid answers are as follows:

- 0 = Margin Bell option disabled

- 1 = Margin Bell option enabled

The default for this question is 1.

Q 765 - DEC Host ASCII Character Set: This field identifies the character set used by the ASCII host using *DEC VT100* or *DEC VT220* data stream.

The response is:

- 0 = DEC NRC

- 1 = DEC MCS

The default response is 0.

This question was added in Configuration Support-B Release 2 and later.

Q 771 - Automatic Line Feed for Cursor Control (IBM 3101 Data Stream): This entry field identifies whether the Automatic Line Feed option is operational.

Valid answers are as follows:

- 0 = Automatic Line Feed option disabled

- 1 = Automatic Line Feed option enabled

The default for this question is 1.

Q 772 - Carriage Return/Carriage Return - Line Feed Selection (3101 Data Stream): This entry field identifies whether Carriage Return alone will occur or Carriage Return and Line Feed will occur.

Valid answers are as follows:

- 0 = Carriage Return

- 1 = Carriage Return and Line Feed

The default for this question is 1.

Q 773 - Automatic Line Feed for Cursor Control (3101 Data Stream): This entry field identifies whether the cursor automatically moves to the first character position on the next line after it reaches the 80th cursor position.

Valid answers are as follows:

- 0 = Automatic New Line disabled

- 1 = Automatic New Line enabled

The default for this question is 1.

Q 774 - Scrolling (3101 Data Stream): This entry field identifies whether scrolling is be supported for the display stations.

Valid answers are as follows:

- 0 = Scrolling disabled
- 1 = Scrolling enabled

The default for this question is 1.

Q 775 - Line Turnaround Character (3101 Data Stream): This entry field identifies the line turnaround character.

Valid answers are as follows:

- 0 = EOT (End Of Transmission)
- 1 = CR (Carriage Return)
- 2 = Xoff (Transmitter OFF)
- 3 = ETX (End Of Text)

The default for this question is 1.

Q 776 - IBM ASCII Host Character Set: The response to this question can be:

- 1 = ISO 8859/1.2
- 2 = IBM 3101 CSI
- 3 = IBM 316X CS1 and CS2

The default response is 1.

Q 781 - Attached Printer Prompt: The AEA supports an ASCII display and a printer attached to the display's auxiliary port, over a single communication link. The display and its attached printer appear as distinct LUs to the host. Printing can be accomplished from the ASCII display or initiated from the host.

If you respond to this question with a 1 (yes), the user is presented with a prompt at connection time which asks if a printer is attached to display. The user can then decide whether or not to let the AEA manage the attached printer.

Valid answers are as follows:

- 0 = No
- 1 = Yes
- 2 = Assumed (no prompt but printer attachment is assumed)

The default for this question is 0.

Note: If you have printers attached to ASCII displays, you must indicate an MLT level greater than zero in question 110.

Q 782 - Use Of Form Feed: This entry field identifies whether a printer can perform a Form Feed.

Valid answers are as follows:

- 0 = Printer does not support Form Feed

- 1 = Printer supports Form Feed

The default for this question is 0.

Q 783 - Page Length: This entry field defines the page length for an attached printer. If the printer does not support Form Feed, this count is used to emulate Form Feeds in the 3270 data streams.

Valid answers are numbers from 1 to 255. Leading zeroes must be used.

The default response for this question is 066.

Q 784 - Printer Character Set: The AEA provides the translate tables for printers, the options are:

- 1 = US ASCII

- 2 = ISO 8859/1.2

- 3 = DEC MCS

- 4 = PC code page 850

- 5 = User-Defined Translate table 1

- 6 = User-Defined Translate table 2

- 7 = User-Defined Translate table 3

The default response is 1.

This question was added in Configuration Support-B Release 2 and later.

Q 785 - Printer Character Set: This is an eight digit response of 0 or 1 (no, yes) for specifying printer options. The default is 11111000.

For a complete explanation of all the options see Question 785 in the *3174 Planning Guide Configuration Support-B Release 3*.

This question was added at Configuration Support-A Release 5.

Q 786 - Page Width: The response to this question can be any value in the range of 001 to 255 (use leading zeros).

The default response is 132.

This question was added in Configuration Support-B Release 2 and later.

Q 787 - LU 1 SCS Transparency Translation: This question determines how the printer *LU 1 SCS transparency data* is to be translated. The response can be:

- 0 = LU 1 transparent data is not translated

- 1 = LU 1 transparent data is translated

The default response is 0.

This question was added in Configuration Support-B Release 2 and later.

7.4.4.6 AEA Default Destination Panel

This panel is used to indicate the initial default connection and to define (for MLT devices) how many sessions are allowed. The Station Set number in the LT column determines for that MLT, what initial connection (default destination) is established. Blanks in any column means that the default destination is the Connection Menu.

In the following example, the 3270 PRINTER Station Set and the 3270 Single Session Station Set automatically connect to "WTCXAA ITSC MVS 4" (Station Set 1) by default. ALL OTHER LTs initially display the Connection Menu.

```
                        _____AEA Default Destination_____


 Station         Station Set        Session            Session
  Set              Name             Limit       LT1 LT2 LT3 LT4 LT5

    1       WTCXAA ITSC MVS 4          0          __  __  __  __  __
    2       DEC HOST                   0          __  __  __  __  __
    3       IBM INFORMATION NETWORK    3          1_  __  __  __  __
    4       3270 DISPLAYS              1          1_  __  __  __  __
    5       3270 PRINTER               1          1_  __  __  __  __
    6       3164 TERMINAL              3          1_  __  __  __  __
    7       VT100 TERMINAL             3          1_  __  __  __  __
    8       4201                       1          2_  __  __  __  __
    9       DALLAS DEC SYSTEM VT100     0          __  __  __  __  __
   10                                  0          __  __  __  __  __
   11                                  0          __  __  __  __  __
   12                                  0          __  __  __  __  __
   13                                  0          __  __  __  __  __
   14                                  0          __  __  __  __  __
   15                                  0          __  __  __  __  __
```

Figure 65. AEA Default Destination Panel

Field Name	Description
Station Set	This is the Station Set number which correlates with the Station Set definitions.
Station Set Name	In this field the user can recognize the Station Set type associated with this Station number.
Session Limit	This field relates to MLT Port Assignment specifications and should therefore match it.
Session	The LTx columns indicate what the connection default is for each Logical Terminal. In our example, Station Set 4 and Station Set 11 use a default connection to VM SYS1 RALYDPD. This is done for LT 1 only. Since all other "Session" fields are empty, the default for the other LT on Stations 4 and 11 (and all the others) is the Connection Menu.

7.5 User-Defined Tables

In Configuration Support-B Release 2 and later you can now define your own terminal and translate tables. These are referred to as:

UDT tables   User-Defined Terminal tables

UDX tables   User-Defined Translate tables

These tables are created under a customizing option in Configuration Support-B Release 2 and later. When you select "Configure AEA" from the customizing menu now, you get two additional options which permit you to define these tables.

7.5.1 User Defined Terminal Tables (UDT)

UDTs allow you to construct new ASCII device definitions in addition to the ones which come standard. You can either build the table from scratch or take an existing table and modify it.

UDTs can be used to attach terminals which may not normally function on the AEA. Up to six UDTs can be created and stored using station types U1 to U6. They are invoked by defining the terminal Station Set with the new station type label when customizing the Station Set.

7.5.2 UDT Attributes

Attributes which can be defined in a UDT include:

- Last line reserved for status.

  Used to indicate whether or not a display can use the 25th line for displaying the status.

- Status line character set.

  If a status line is available, this defines whether special characters can be displayed.

- Status line clear option.

  This provides options for clearing the status line from the display.

- Use Cursor Sequence on status line.

  Use to indicate the operation of the "set cursor" command on the status line.

- Scrolling on.

  Use to select whether the screen will scroll if a character is sent to the last cursor position.

- Cursor wraps at end of line.

  Use to get the cursor to move automatically to position 1 from position 80.

- Color supported.

- Cursor class.

  Indicates how the "set cursor" command is formatted.

- Cursor sequence.

This defines the actual hex sequence of characters to perform a "set cursor" command.

- Alternate screen size.

  Sets the station screen size.

- Graphics query reply.

- Graphics input wait time.

- Graphics input ending sequence.

- Graphics input length.

- Inbound Sequences.

  A panel used to map ASCII sequences to 3270 keystrokes.

- Outbound Sequences.

  A panel used to map ASCII sequences to 3270 screen and printer commands and orders.

7.5.3 User Defined Translate Tables (UDX)

When 3270 emulation is in use on a 3174, ASCII characters are translated to EBCDIC for transmission to the host and vice versa. The 3174 can support six standard translation tables. These are:

- US ASCII

- IBM 3101 CS1

- IBM 316x CS1 and CS2

- ISO 8859/1.2

- DEC MCS

- DEC NRC.

In addition up to three user defined translate tables can be defined. As with the UDT, the translate table used is specified in the Station Set definition.

When defining a UDX table, you are prompted for the following:

- UDX number (1-3)

- Name of the table

  An optional field, used only when customizing as a prompt.

- Language code

  Use the same code as used for the keyboard language.

- CECP support

- Model table number.

  A list of all available translate tables (including existing UDXs) upon which you can model your new definition.

After entering these values, the outbound and inbound translate tables are displayed based on the model chosen. These can now be modified and saved.

7.6 Operations

In this section, we will look at some of the aspects of using the AEA. For a detailed description on the use of the AEA terminals, see *3174 Terminal User's Reference for Expanded Functions*.

7.6.1 Keyboards

The ASCII keyboard is different from the 3270 keyboard and many of the 3270 keys just don't exist. In order to emulate a 3270 display correctly it is necessary to simulate these keys. The same is true for 3270 terminals emulating ASCII terminals.

Some of the special keystrokes required are covered in the following text.

7.6.1.1 3270 Special Keys

Table 9 shows the key sequences required for some common keyboard configurations to return to the Connection Menu using a 3270 display defined to the AEA.

Table 9. Hot Key for Returning to Connection Menu	
Keyboard Type	Key Sequence
Base 87 key (3278 type)	ALT + EOF + M
Converged 122/4 keys in 3278 emulation **1**	ALT + EOF + M
Converged 122/4 keys in native mode	ExSel then M
Enhanced 102/103 keys **2**	ExSel then M

Note: **1** The Converged keyboard is recognized by the CROSS shape of the Cursor Move Keys (arrows).

2 The Enhanced keyboard is recognized by the UPSIDE DOWN T shape of the Cursor Move Keys (arrows).

7.6.1.2 Special Control Sequences for 3270 Emulation

When using an ASCII display station emulating a 3270 terminal there are a number of special 3270 functions that a user may require. Some examples are:

- Return to Connection Menu
- 3270 Reset
- Operator Information Area Toggle
- Test Request
- Response Time Monitor (LTTI)
- 3270 Clear Screen.

The following table lists the key sequences required for these functions for most of the common ASCII terminals.

Terminal	Connection Menu	3270 RESET	OIA Toggle	TEST Request	RTM LTTI	3270 Clear
ADDS VP						
−A2	ESC B M	CTRL R	ESC ?	ESC T	ESC B −	CTRL C
−78	ALT Erase EOF M	RESET	ESC ?	TEST	ALT Erase EOF −	Clear
DEC VT52	CTRL B M	CTRL R	CTRL ?	ESC T	CTRL L −	CTRL C
− VT100	CTRL B M	CTRL R	ESC ?	ESC T	CTRL L −	CTRL C
− VT241	CTRL B M	CTRL R	ESC ?	ESC T	CTRL L −	CTRL C
ESPRIT 10/78	CTRL L M	RESET	ESC ?	TEST	CTRL L −	Clear
HZ1500	ESC B M	CTRL R	CTRL ?	ESC T	ESC B −	Clear
HP2621	CTRL B M	CTRL R	CTRL ?	ESC T	CTRL B −	CTRL C
IBM 3101	ALT L M	ALT R	ALT W	ALT T	ALT L −	Clear
IBM 3151 /3161/63	CTRL L M	CTRL R	ESC ?	CTRL T	CTRL L −	Clear
LEAR SGL −ADM 3A	ESC B M	CTRL R	ESC ?	ESC T	ESC B −	CTRL C
−ADM 5	ESC B M	CTRL R	ESC ?	ESC T	ESC B −	CTRL C
−ADM 11/ 12	ESC B M	CTRL R	ESC ?	CTRL T	ESC B −	Clear
−11/78	ALT Erase EOF M	RESET	ESC ?	TEST	ALT Eras ·EOF −	Clear
TVI 912C	CTRL B M	CTRL R	ESC ?	CTRL T	CTRL B −	CTRL C
TVI 970	CTRL B M	CTRL R	ESC ?	ESC T	CTRL B −	Clear

Figure 66. Special Keys for 3270 Emulation on ASCII Keyboards

7.6.2 AEA Operator Indicator Line

Some ASCII terminals have made provisions for an indicator line similar to 3270's. Others have not. Some of those that have indicator lines use symbols essentially equivalent to 3270 symbols. For these, indicator line mapping is easy. The problem appears with those ASCII displays which have only ASCII typical graphics or do not allow the use of the 25th screen line.

AEA mapping performs some translation that addresses an ASCII graphical symbol as similarly as possible to the required 3270 indicator and uses it for user notification.

In addition, the AEA provides a Status Inquiry key sequence that causes the required emulated Operator Information Area (Indicator Line) to appear on the ASCII's display's 24th line.

The Status Inquiry key sequence is usually "ESC ?." VT52 is the single known display that uses "CTRL + ?" as the Status Inquiry sequence.

When the Indicator Line uses the 24th line, normal keyboard operation is allowed except for keying on the 24th line.

To remove the Indicator Line from the display's 24th line and to refresh it, the user toggles the Status Inquiry key sequence again.

Status Inquiry is not available or needed on displays which are capable with the 25th Indicator Line.

The Print Ident function which allows Local Copy printer address reassignment is the single function which can be keyed into the Indicator Line.

In 3270 Emulation, changing the Local Printer address works a little differently. The cursor does not move to the printer address digits in the Indicator Line when Print Ident is invoked. Instead, the cursor remains where it was when Print Ident was pressed and the new keyed address digits appear in the proper location of the Indicator Line.

For more information please use GA23-0332 *Terminal User's Reference for Expanded Functions.*

7.7 Printers in the 3174 AEA Environment

7.7.1 3270 Printer Emulation
The 3174 AEA causes certain ASCII printers to appear as if they were 3287 printers with a 2K buffer. SCS support is also assumed.

When the 3270 host supports these emulated printers, the following 3287 functions are not supported:

- Extended Character Set Adapter (ECSA)

- Programmed Symbols (PS)

- SNA Character Stream (SCS) support for Structure Fields and Attribute Processing (SFAP)

- Data Analysis - APL

- Extended Print Buffer (EPB)

- Screen Image Print Operation of 480, 960, 2560 and 3564 bytes.

- Character Sets - ASCII-B, Data Analysis - APL/Text or Katakana

- World Trade Languages.

7.7.1.1 Printer Operating Functions

When the 3287 is emulated by an ASCII printer, the following functions are supported:

- Maximum Print Position (MPP) is always 132 - cannot be changed.

- Lines Per Inch (LPI) is the ASCII printer default at Power ON. If the ASCII printer provides line spacing control, it might be used. Page Length for the appropriate printer's station set is specified during Station Set customization (Q 783).

- The ASCII printer must be capable of receiving Dual Case data or be able to fold Upper Case characters into Lower Case and vice versa.

- If the ASCII printer does not support Form Feed, the 3174 AEA sends Line Feeds until the number of lines per Page Length is reached.

7.7.1.2 Host Datastream Printer Controls

The following DSC/DSE (LU3) orders are supported:

- CR - Carrier Return
- EM - End of Message
- FF - Form Feed
- NL - New Line

The following SCS (LU1) orders are supported:

- BEL - Sound Bell
- BS - Back Space (depends if the ASCII printer supports the BS order natively)
- CR - Carrier Return
- ENP - Enable Presentation
- FF - Form Feed
- HT - Horizontal Tab
- INP - Inhibit Presentation
- IRS - Interrecord Separator (always as New Line)
- NL - New Line
- SHF - Set Horizontal Format
- SVF - Set Vertical Format
- TRN - Transparent Mode
- VCS - Vertical Channel Select
- VT - Vertical Tab.

7.7.2 ASCII Printer Emulation

The 3174 AEA allows the 3287 type of printers to emulate ASCII printers. All ASCII character sets can be printed by these ASCII emulated printers. In addition, the AEA supports a very basic set of ASCII controls.

The following ASCII controls are supported:

Table 10. ASCII Control Codes Supported by 3287 Printers - ASCII Emulation		
Control Character	Hex Code	Action Taken
BEL	X'07'	Sound Audible Alarm
CR	X'0D	Carrier Return
FF	X'0C'	Form Feed
HT	X'09'	Tab Skip to next multiple of 8
LF	X'0A'	Line Feed
US	X'1F'	Carrier Return Line Feed
VT	X'0B'	Line Feed
Xoff (DC1)	X'11'	Request to the host: stop sending
Xon (DC3)	X'13'	Request to the host: resume transmission

7.7.2.1 ASCII Printers' Advanced Characteristics

Advanced ASCII printers' capabilities which are not supported on 3287 (e.g. Underscoring, Programmable Fonts, etc.) are not supported on the ASCII emulated printers.

7.7.2.2 ASCII Printers' Status Indication

Some ASCII printers send status indication to their hosts, these status indications announce events such as Out Of Paper, Buffer Full, etc.
If the ASCII emulated printer buffer is full, or any other Unready condition occurs, the AEA initiates a flow control indication (Xoff or DTR drop) but does not send the status to the ASCII host.

7.7.3 Local Copy in an AEA Environment

The use of ASCII and 3270 printers as copy printers for 3270 and ASCII displays (in any combination) is supported except for ASCII plotters. Use the Printer Authorization Matrix to set this up.

7.7.3.1 Printer Authorization Matrix (PAM)

During 3174 customization, the user may select the Define PAM option on the Customizing Control Diskette menu. This selection results with the following PAM panel. (This panel is changed in Configuration Support-B Release 4 to accommodate 64 port support.)

Note: For Configuration Support-B microcode, the PAM panels are accessed from the Define Devices option on the "Customizing Control Disk Menu".

```
┌─────────────────────────────────────────────────────────────────────┐
│          ____ PAM Definition ____                                     │
│                                                                       │
│  Entry   Printer      Mode        Class                               │
│          Port                     7         8                         │
│                                   01234 56789 012345                  │
│   1     _ - _          _          ..... ..... ......                  │
│   2     _ - _          _          ..... ..... ......                  │
│   3     _ - _          _          ..... ..... ......                  │
│   4     _ - _          _          ..... ..... ......                  │
│   5     _ - _          _          ..... ..... ......                  │
│                                                                       │
│                TA Display Port                   AEA Display Port     │
│  Entry                                                                │
│      26                                  26 21      22        23      │
│      0            1          2           3  0                         │
│      01234 56789 01234 56789 01234 56789 01 01234567 01234567 01234567│
│   1  ..... ..... ..... ..... ..... ..... .. ........ ........ ........│
│   2  ..... ..... ..... ..... ..... ..... .. ........ ........ ........│
│   3  ..... ..... ..... ..... ..... ..... .. ........ ........ ........│
│   4  ..... ..... ..... ..... ..... ..... .. ........ ........ ........│
│   5  ..... ..... ..... ..... ..... ..... .. ........ ........ ........│
│                                                                       │
│   Select=== ►                                                         │
│   (Message Area .........................................)            │
│   PF:   3=Quit 4=Default 10=Page Back   11=Page Fwd    12=Done        │
└─────────────────────────────────────────────────────────────────────┘
```

Figure 67. Printer Authorization Matrix Panel (Revised)

Printer Authorization Matrix Description: The PAM panel appears according to the user request. The structure of the panel varies according to the display's screen size (number of lines per screen).

You should refer to the PAM panel as if it were two screens. The upper part belongs to printer ports and the lower to display ports.

The differences among the screen sizes is expressed in the number of entry lines per screen.

In our example we can see five entries for printers and five entries for displays. This is typical for a Model 2 display (24 lines). The number of entries are related to the model number; if we have a Model 3 display (32 lines), then the number of entries would be 9 for printers and 9 for displays (per screen) etc. When PF11 is pressed (Page Forward), the next group of entries appears on the screen (a Model 2 will present entry numbers 6 to 10, a Model 3 entry numbers 10 to 18, etc.). Each time the user presses PF11, another group of entries is displayed on the screen.

The total number for each type of terminal may reach 47 entries for printers and 47 for displays. The total number of entries permitted depends on the 3174 model.

The following table defines the entries permitted for each 3174 model:

3174 Control Unit Model	Number of 3270 Printers	Number of ASCII printers
1L, 1R, 2R, 3R	*31	*24
51R, 52R	15	8
53R, 81R, 82R	7	0

Figure 68. Permitted PAM Entries per 3174 Model

Note: * The total number of entries allowed cannot exceed 47. Therefore, if 24 ASCII printers are assigned, only 23 3270 printers can be assigned.

If a user wants to move backwards to a previous entry panel, PF10 should be used.

Following are descriptions of each of the fields on the PAM panel:

Field   **Definition**

Entry   The entry field displays a number which represents the printer that the user assigns for Local Copy. The number of entries may range from 1 to 47. Special care should be taken when 3270 printers and ASCII printer entries are combined on the same 3174, the total number of both types should not exceed 47 entries.

Printer Port   The user must enter the Port Number for the printer. This entry has two separate fields: "HH-PP."

HH = Hardware Group identifier:

• 26 or 27 for 3270 ports

• 21, 22, or 23 for ASCII ports.

PP = Printer Port - valid ports are 01 to 31 for 3270 ports and 00 to 07 for each one of the ASCII hardware group ports. Special care must be taken if MLT is enabled; all Port Assignment related specifications should be checked since they might cause problems if erroneously combined with PAM assignment.

Port 00 on either 3270 group cannot have a printer attached.

Following are samples of valid answers:

26-01 up to 26-31
21-00 up to 21-07
22-00 up to 22-07
23-00 up to 23-07.

Mode The valid entries for this field are as follows:

0 = System Print

1 = Local Copy Print

2 = Shared (System and Local)

Default mode is System Print, therefore a printer which is not defined in PAM operates under system control.

A printer in **System Print** mode is under host control. A printer in this mode is protected from local copy.

Local Copy mode is directed by the 3174, system printing is not possible on this kind of printer. If the printer is operating in a SNA environment, the host can initiate a local copy from a display buffer.

Local Copy invocation is done from the display keyboard "PRINT" key.

In **Shared** mode, the printer performs both Host Directed printing and Local Copy printing. The efficiency of Local Copy operation in Shared mode depends on the communication protocol.

In SNA, the printer may perform a Local Copy operation only if this given printer is not in session with the PLU.
If the Between Bracket option (Question 213) is selected during the 3174 customizing, the Local Copy cannot be performed while the printer is in an IN BRACKET state with the host PLU.

In Non-SNA, due to the longer session with the host application, Local Copy invocation is less efficient. Local Copy invocation while the printer is in session with the application is assumed to be user responsibility since he might perform a Local Copy operation while the printer is in the middle of a host application print job.

Class In this entry field(s) the user must enter "X" under the required class (or classes) number(s) defined for the printer.

Class numbers range from 70 to 85. The user may group
several printers together under a particular Classification
(Class). Class is applicable for a printer that serves several
displays for a certain reason (e.g. location, type of form
mounted, security, etc.).
Some printers may be defined under the same Class and serve
as a pool of printers for a certain group of users. The user
invokes Local Copy for Class operation by entering the Class
number in the Printer Address field on his screen (if it was
predefined during PAM customizing). The Class number in the
Printer Address field is modified by using the IDENT function.

3270 displays invoke IDENT by pressing the ALT + IDENT keys.
The ASCII display IDENT key location depends on the Keyboard
Map which the ASCII display uses. (For more information see
GA23-0332 *Terminal User's Reference for Expanded Functions*.)

Since the Printer Address field is in the display's Operator
Information Area (sometimes called the Indicator or Status
Line), the user may have problems with this field on ASCII
displays.

The Print Ident function which allows Local Copy printer
address reassignment is the single function which can be
keyed on the Indicator Line.
On an ASCII display which is emulating a 3270 display,
changing the Local Printer address works a little differently.
The cursor does not move to the printer address digits in the
Indicator Line when Print Ident is invoked. Instead, the cursor
remains where it was when Print Ident was pressed and the
new keyed address digits appear in the proper location of the
Indicator Line.

Display Port   "X" must be entered under the port for each display authorized
to use a particular printer for Local Copy.

More than one display may be assigned and authorized to
perform a Local Copy on a given printer.

**Displays cannot perform Local Copy on a printer assigned to
have an ASCII host destination as its Default Destination on
AEA Default Destination customizing panel.**

Select   This field may help the customizer during PAM definition. The
user may enter a LOCATE command if he wants to locate a
particular PAM entry number without having to scroll forward
or backward through several panels.

If, for instance, the user is searching for entry number 21, he
should use "L21" in the Select entry field. As soon as enter is
pressed, entry 21 is displayed.

7.8 AEA Graphics Support

The ASCII graphics support in Configuration Support-B Release 2 and later allows 3270 host programs, such as GDDM, to control specific AEA attached terminals in graphics mode. The AEA allows passthrough of terminal generated graphics input to the host application. These terminals are also supported for 3270 emulation and the 3174 maintains the terminal's display image independent of the graphic presentation space. The host application and the terminal are responsible for the graphic display space; graphics data is simply passed through the 3174 to the device. Graphics data requires the 8-bit character support of Configuration Support-B Release 2

Supported devices include:

- VT240/241

- Tektronix 4205.

Other devices may work but were not tested.

7.8.1 ASCII Plotter Support

ASCII plotter support is provided by the AEA. There are many types of plotters which will work; they are treated the same way as ASCII printers except that you cannot do a local print. Specify a device type of "AL" in Q722 to get ASCII plotter support.

The datastream used by the host application driving the plotter should be LU1 using the transparent-mode order. When customizing the 3174 AEA, specify 0 for Q787 (do not translate LU1 transparent data). Configured in this way, the host data is passed unchanged to the ASCII plotter.

7.9 AEA Security

The main security concerns introduced by the 3174 AEA are caused by the fact that an ASCII terminal user of a dial port is able to access a 3270 application. The 3174 and the communication application minimize this exposure in various methods. In addition to this, the user can define customizing parameters which affect security.

ALL of these parameters were mentioned earlier in this chapter. Following is a short summary of the parameters:

- Question 701 - ASCII Terminals Password (before Configuration Support-B Release 2)

- AEA Port Set Panel - Port Set Password (Configuration Support-B Release 2 and later)

  The ASCII terminal user is prompted to enter the password when he initiates the contact with the 3174 AEA. Any password entered incorrectly results in terminal disconnection.

- Question 725 - Station Set's parameters, Host Connection Menu Option

The answer the customizer selects for this question provides some AEA security classification by reducing the connection flexibility of a sensitive port.

- Question 741 - Station Set's parameters, Switched Disconnect Timeout

  An appropriate answer to this question can reduce the exposure of an unauthorized connection attempt when a connection with an authorized user is broken.

- Question 742 - Station Set's parameters, Inactivity Timeout

  The customizer must observe various considerations when this parameter is defined. An appropriate definition of this parameter reduces the. exposure of an attempt to use the idle state of the ASCII line by an unauthorized user.

Most ASCII printers do not have a keyboard. Therefore, they cannot use the password protection. Some 3270 environment applications like IMS queue print files until the destination printer is found. Since the connection with a switched line printer is not protected by the password, it is recommended not to use a switched line printer as a target for queued print files.

8. ESCON Connection

Currently, communications between IBM hosts and the channel attached 3174 is carried out in parallel across *bus* and *tag* cables. These cables are bulky and have (even with blue cables) distance and speed limitations. In most cases the 3174 can only be a few hundred feet from the CPU. This restricts the location of the control unit to the immediate proximity of the host.

A new approach to the interconnection of channels and devices is known as "*ESCON architecture*", which uses fiber-optic cables, instead of the bus and tag cables. This architecture increases the maximum distance possible between the CPU and the 3174, while providing faster communications for the locally attached user base.

ESCON Director: The ESCON Directors are central to implementing the switched point-to-point topology. We won't cover the director in any detail, the information here is purely to give an understanding of what function the director plays in the connectivity options announced in Configuration Support-B release 3 and the 3174-12L and 22L' models.

ESCON directors offer the following new functions:

- Multi-Access: When the director is inserted between channels and I/O controllers, each channel can connect, dynamically, to multiple controllers and other channels. For example, if a 60-port ES Connection Director Model 2 is attached to four channels, those four channels can access up to 56 control units. If a 3174 Controller is attached it can be accessed by all four hosts.

  The multi-access capability also reduces the need for manual switches, allowing control units that have a single ESCON adapter interface to access multiple ESCON channels on one or several systems without manual operation.

- Simplified Connectivity and Sharing: The director greatly reduces the number of channel adapters and physical cable connections required to share devices among multiple systems. One control unit connection to the ESCON director can provide all of the required connectivity for a multi-image configuration.

- Multiple Concurrent Operations: The directors can handle multiple concurrent data transfers. If the director is configured with 60 ports, 30 pairs of ports can actively transfer data at channel speeds.

- Less Disruptive Installation and Reconfiguration: The directors may be configured to allow new processors or I/O to be added to or deleted from the configuration, dynamically, without loss of system availability. Fiber optic cables may be plugged into the ESCON director while the systems are running.

  Additional configuration capabilities include partitioning the directors for isolating I/O devices or system images, dedicating paths through an ESCON Director, and storing alternate configurations.

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8.1.1 Models

The new models of the 3174 that support the ESCON Adapter are:

- Model 12L: ESA/390 SNA and non SNA
- Model 22L: ESA/390 SNA and non SNA (rack mounted).

Both of these models support:

- Eight host connections (via the ESCON director)
- 64 coax attached devices (with the port expansion feature)
- Single link multiple-host
- Multi-host Gateway
- 8K RU size.

These features are discussed in detail.

An existing channel attached 3174 cannot be upgraded to the new ESCON adapter.

New 3174s shipped with the ESCON Adapter are (unlike the existing channel attached units) customer installed, CSU.

The new ESCON Adapter uses the same slot in the 3174 as the Bus/Tag channel adapter, and they appear as logical equivalents. The fiber optic cable specified is standard 62.5/125 microns, although the 3174 supports 50/125 microns up to 2Km. A duplex to duplex 62.5/125 micron cable is supplied with the 3174 Controller.

8.1.2 Connectivity Options

The ESCON channel architecture has a new *switch* the ESCON Director which enables the 3174 to have multiple host connections and also acts as a repeater to further increase the maximum distance possible, with two directors in the path, you could have the 3174 located nine kilometers from the host machine.
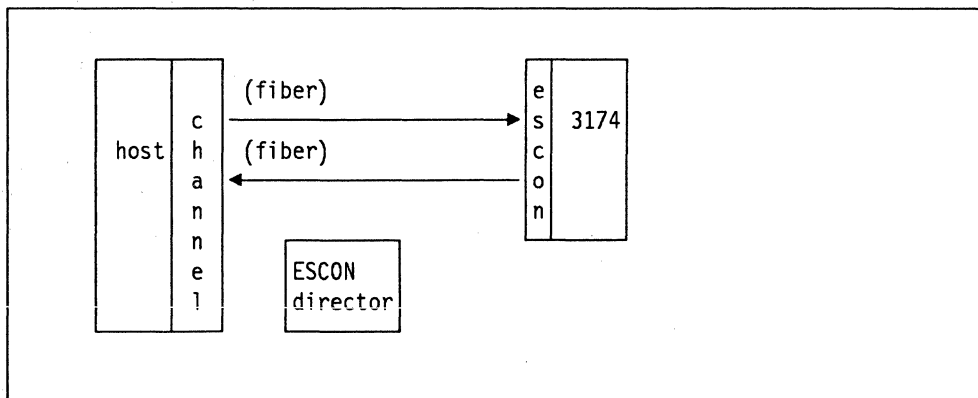
Figure 69. Basic ESCON Adapter Diagram.

8.1.2.1 Single Link Multi-Host

Utilizing the ESCON director, it is possible to connect the 3174 to eight physical hosts which are defined in the 3174 as logical connections.
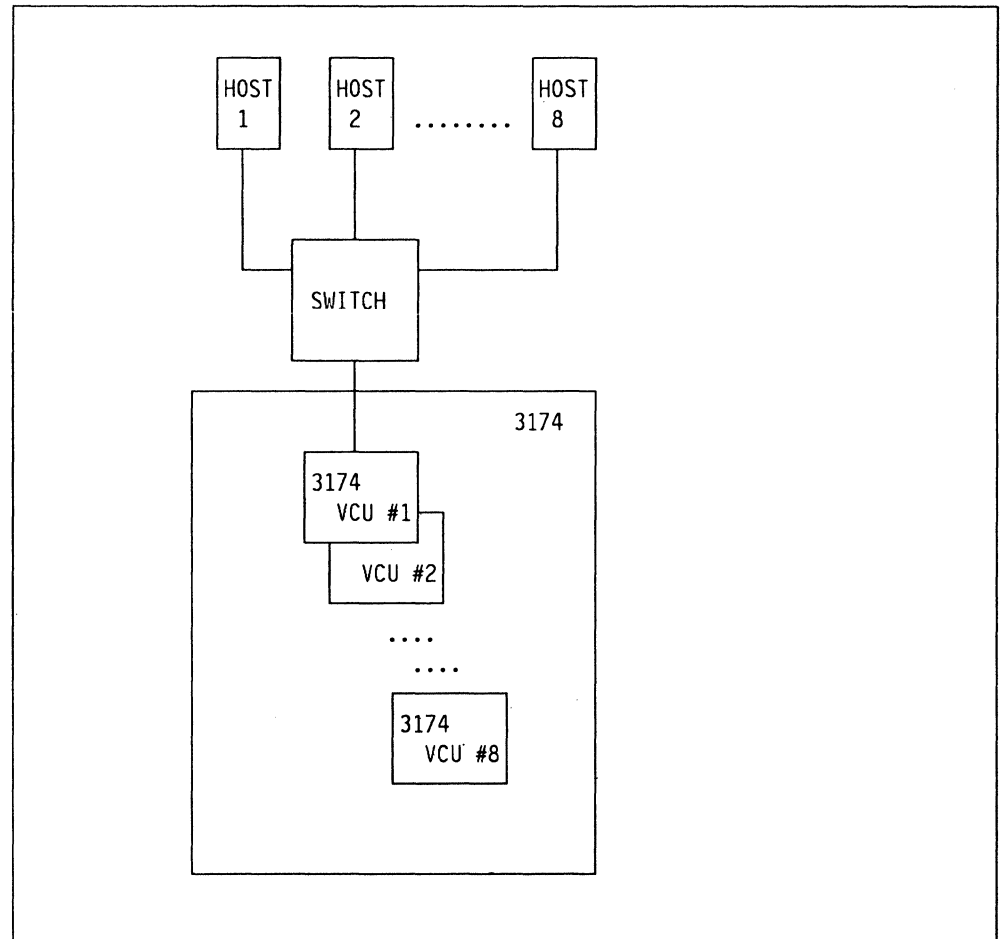
Figure 70. Single Link Multiple Upstream

This multiple host support is provided by introducing **Virtual Controllers** and **Physical Controllers**. Given the SNA architecture the controller can only ever be connected to one host, but using the director you can dynamically connect and disconnect to the hosts as required.

The virtual controller, VCU, is functionally a 3174 connected to on e and *only one* host over the ESCON channel. There can be up to eight VCUs inside the 3174, which means there can be eight logically connected hosts at one time.

The physical controller, PCU, is the physical 3174 itself, as well as the microcode that controls all the functions.

A user attached to one of the 3174 ports can now, by using the MLT support, *jump* between any five of the eight possible host connections.

8.1.2.2 Multi-Host Gateway

Below is an example using multiple host support through the gateway.

```
          ┌──────┐              ┌──────┐
          │ HOST │              │ HOST │
          │  A   │              │  B   │
          └──────┘              └──────┘
     link  │                        │  link
     addr1 │      ┌────────┐        │  addr2
           └──────│        │────────┘
                  │ SWITCH │
                  │        │
                  └────────┘
                       │
           ┌───────────────────────┐
           │  3174   Gateway        │
           │  ┌───────┐ ┌───────┐   │
           │  │ VGATE │ │ VGATE │   │
           │  │ sap 04│ │ sap 08│   │
           │  └───────┘ └───────┘   │
           └───────────────────────┘
                       │  address '400000000001'
           ┌───────────────────────┐
           │      token-ring        │
           └───────────────────────┘
                       │  address '4000000000002 04'
           ┌───────────────────────┐
           │      3174-13R          │
           │  ┌───────┐ ┌───────┐   │
           │  │ DSPU  │ │ DSPU  │   │
           │  │  #1   │ │  #2   │   │
           │  └───────┘ └───────┘   │
           └───────────────────────┘
```
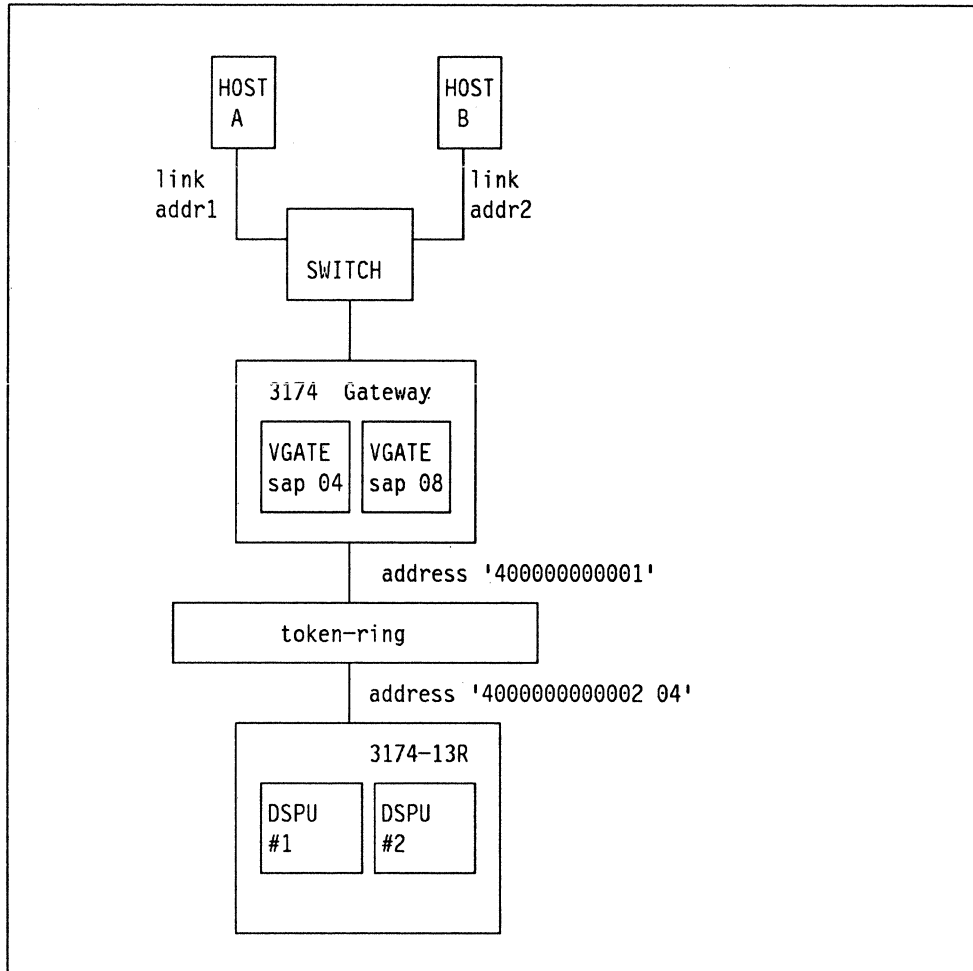
Figure 71. Single Link Multiple Upstream Gateway

Using the above diagram and the following table we can see that we are able to
define multiple link addresses with a single subchannel. Each link would be
associated with a different host in the ESCON network, and the subchannel
under that link address would be associated with a PU defined for a given host.

Link address		Sub/chan	T/R address
Local PU	01	C0	locally attached terminals
DSPU 1	01	C1	400000000002 04 (gtwy SAP 04)
Local PU	02	C0	locally attached terminals
DSPU 2	02	C1	400000000002 04 (gtwy SAP 08)

Figure 72. Addressing Example

8.1.3 Host Console Support.

Although the ESCON 3174 supports non-SNA channel links, there is currently no *host console* support using ESCON channels.

8.1.4 8K RU Size

The 8K byte RU capability is supported in various configurations based upon the type of devices supported through, or attached to the 3174 Controller. Following is a summary chart showing the level of 8K support.

Configuration	CUT/DFT Devices (transmit/receive)	T/R Devices (transmit/receive)
Base ESCON SNA (12L)	2048/8192	N/A
Base ESCON SLMH	2048/8192	N/A
Base T/R DSPU (X3R)	2048/8192	N/A
ESCON T/R gateway	2048/8192	8192/8192
ESCON SLMH T/R gateway	2048/8192	8192/8192

```
N/A     Not Applicable
ESCON   Enterprise Systems Connection
SLMH    Single Link Multi-Host
```

The following restrictions apply when configuring a Token-Ring Gateway with respect to 8K RU support:

- If you configure any DSPU with 8K RU support then the maximum number of DSPUs through the gateway is limited to 100, regardless of what the other DSPUs have been configured for. This is a restriction on the 4/16MB Token-Ring Adapter card.

- 8K RU capability is only supported when a 4/16MB Token-Ring Adapter is present, otherwise the configuration will be downgraded. This applies to the DSPUs as well as gateway configurations.

8.1.5 ESCON Customization

Prior to customization you should note that the panel on the front of the 3174 Controller has been changed and the *channel online/offline* switch is no longer present. You now key in a sequence on the front panel to achieve the same function.

On the 3174 Operator Panel key in:

```
"17XX"    where XX = '00' is switch offline
          and      = '01' is switch online
```

When the "offline" sequence is entered, communication with **all** hosts is terminated until either:

1. The 3174 is IMLed

2. The 3174 is IMLed remotely by NetView

3. The *online* sequence is entered on the keypad.

8.1.5.1 Question 100: Model

This will now accept "12L" or "22L" as the ESCON models. By coding one of these values you change the options in Question 101.

8.1.5.2 Question 101: Host Attachment

Question 101 is where you specify the host connection type. By coding "X2L" in Question 100, this panel is changed to offer:

```
Host Attached = 4  (ESCON NON-SNA Local Channel Attach)
Host Attached = 5  (ESCON SNA Local Channel Attach)
```

When this, and Question 100 have been set to support the ESCON Adapter the following questions are "hidden" from the customization panels and don't require an answer:

* Question 222: Support of Command Retry
* Question 223: Attention Delay Value
* Question 224: Mode of Data Transfer
* Question 225: Channel Burst Speed

8.1.5.3 Question 105: Upper Limit Address

This is a two character address to specify the address range.

Note

If you are going to use 8K RU sizes, as specified in Question 241 then there is a limitation of 100 DSPUs definable for gateway controllers, or a maximum value of X'64' difference between Question 104, and Question 105.

8.1.5.4 Question 240: Controller Logical Address

This address identifies the "logical controller" to its upstream host. The single character response can be "0-9" and "A-F". The default value on the 1A Host is "0"; all other hosts default to "X".

Note: This value must correspond to the "CUADDR" parameter of the CNTLUNIT macro in the IOCP

This question is only valid on the ESCON Models 12L and 22L.

8.1.5.5 Question 241: RU Maximum Size

This is where you set the RU size if you are going to use 8K RU size. The valid response is:

```
0 = 4KB  RU maximum
1 = 8KB  RU maximum

The default response is 0.
```

This question is only valid on the ESCON Models 12L and 22L.

8.1.5.6 Question 911: Ring Speed of the Gateway

If you are using 8K RU size (Question 241 = 1), then the response to this question cannot be "0".

Response:

```
0 = 4Mbps with normal token release
1 = 16Mbps with normal token release
2 = 16Mbps with early token release
```

Default is '0'.

8.1.5.7 Question 940: Ring Address Assignment

There is an additional response in the field "T (type) column" on the panel for each device specified on the ring. You now code which DSPUs support the 8K RU size.

Response:

```
0 = Workstation
1 = IBM 3174 Establishment Controller
2 = 8KB RU device
```

Default is '0'.

8.1.5.8 Question 941: Ring Transmission Definition

There is an additional response in the field "F (transmit I-frame size) column" on the panel for each device specified on the ring. You now code which DSPUs support the 8K RU size.

Response:

```
0 = 256 bytes
1 = 521 bytes
2 = 1033 bytes
3 = 2042 bytes
4 = 4105 bytes
5 = 8201 bytes
```

Default value is set by the "T" response in Question 940.

9. Multiple Logical Terminal (MLT)

This chapter contains the following sections:

- Introduction
- MLT Prerequisites
- MLT Storage Requirements for Configuration Support-A
- MLT Storage Requirements for Configuration Support-B
- Microcode Customizing
- MLT Operation
- Session Integration
- Local Copy Considerations.

9.1 Introduction

This section describes the MLT functions, storage requirements for planning and some typical configurations and customizations in various environments. It helps the reader to define his 3174 customizing panels in an easier way as well as make him more familiar with the MLT feature configurations and functions as a whole.

9.1.1 MLT Functions

The Multiple Logical Terminal function enables an IBM 3270 Control Unit Terminal (CUT) to interact with as many as five host sessions. Each session can be connected to a 3270 host while one session can be connected to an ASCII host. When the MLT feature is active, the display station screen and keyboard are owned by a single session at a time. This session is the *Active Session.* The other sessions are maintained by the IBM 3174 Establishment Controller and are called *Background Sessions.* A background session becomes active when the user jumps from one session to the other in a round robin fashion - using a key sequence called the **Change Screen Key.** The change screen key sequence varies by the device keyboard type.

Each session that is connected to a 3270 host requires that the 3174 host session address be known to the 3270 host. The host connections and associated host session addresses are defined during 3174 customizing procedures. The number of host sessions is limited by whether the type of host connection is SNA or non-SNA and by 3174 storage. A session that is connected to an ASCII host does not require that a 3270 host address be assigned to it. A session with an ASCII host requires that an Asynchronous Emulation Adapter (AEA) be installed in the 3174. Access to the ASCII host is defined through the 3174 customizing procedure.

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9.1.2 Supported 3270 Hosts

The 3174 to a 3270 host connection can be established across one of the following links:

- SNA Local Channel

- SNA Remote (SDLC)

- Non-SNA Local Channel

- Non-SNA Remote (BSC)

- X.21/X.25

- Token Ring.

9.1.3 Supported 3270 Hosts via CCA

In addition to the above connections if you have installed one of the Concurrent Communication Adapters (V.24, V.35, and X.21), you can have multiple sessions over:

- SNA Remote (SDLC)

- Non-SNA Remote (BSC)

- X.21/X.25.

9.1.4 Supported ASCII Hosts

The 3174 to ASCII Host connection requires the Asynchronous Emulation Adapter (AEA) feature (#3020) to be installed in the 3174. Access to the ASCII host is accomplished on a session basis through the connection menu or the default destination procedure which is an inherent part of the AEA customizing. Each ASCII host connection utilizes one 3174 AEA port.

9.1.5 Supported Devices

The following fixed function CUT displays are supported by MLT:

- 3178

- 3278 (excluding Model 1)

- 3179 (excluding Model G)

- 3279

- 3180

- 3191

- 3192 (excluding Model G)

- 3194 (operating in CUT mode).

- 3471

- 3472 (excluding Model G).

This includes all model types. Any other coax-attached terminal which fully emulates one of the supported displays above can also take advantage of the MLT capability.

DFT terminals are not affected by the MLT function. These devices cannot use the change screen key sequence to switch between MLT sessions; DFT terminals provide multiple sessions through their own microcode.

With Configuration Support-B Release 2 ASCII terminals can have MLT sessions; prior to Release 2, and with Configuration Support-A there was no MLT support although you did have an ASCII *Menu Panel* which gave you the ability to select what host sessions to connect to, but no jump facility.

3270 printers are limited to a single session only.

9.2 MLT Prerequisites

In order to plan for and install MLT in a 3174 environment, you should be familiar with its various storage requirements, weighting factors and configuration. The following section explains these issues.

If you have not planned for microcode customization, you may wish to do so before planning your controller's storage. Certain functions may require that additional storage features be installed in the controller.

Before you start planning, you need the following:

- "Storage Requirements Worksheet". You may wish to consult the *3174 Planning Guide*.

- Knowledge of the features and functions that are included in your configuration.

- The amount of storage installed in your controller. When shipped from IBM, Models 0XX, 5XX,and 8XX contain 1MB of base storage. Models 1XX, 2XX, 6XX, and 9XX contain 2MB of base storage.

Configuration Support-B allows more MLT sessions in less storage than Configuration Support-A and S.

While planning microcode customization, you identify the feature(s) and functions required for your configuration.

You need to plan for controller storage if your configuration includes any of the following:

- 3270 Token-Ring Gateway feature

- Multiple logical terminals (MLT)

- Central Site Change Management (CSCM)

- Asynchronous Emulation Adapter (AEA)

- Concurrent Communication Adapter (CCA)

- Single Link Multi-Host support (SLMH)

- Multi-Host Gateway

If sufficient storage is *not* installed in the controller, some support for the functions you planned will be deconfigured (function will not operate or will operate at a lower level) once the controller has been customized and IMLed.

9.2.1 MLT Storage Requirements and Weighting Factors

Maintaining multiple sessions requires 3174 storage for *presentation spaces* and *session level control storage.* For each session, the amount of presentation space is based on two characteristics of the associated display plus the required amount of control storage (1K per a secondary session).

The following list describes these values:

- Model Number - This directly relates to the maximum presentation space supported.

Model	Screen Size	Storage Required
Model 2	1920 24x80	(2k)
Model 3	2560 32x80	(4k)
Model 4	3440 43x80	(4k)
Model 5	3564 27x132	(4k)

Figure 73. Session Level Storage Requirements

- EAB/No EAB (Extended Attribute Buffer) - **if EAB is supported by the display then the Presentation Space requirement is doubled.**

  EAB, Extended Attribute Buffer refers to the ability of the display to allow extended highlighting (reverse video, blinking,and underscore), extended color (seven), and programmed symbols.

- Each secondary session requires an extra 1K of Control Storage per session. These considerations are unique to the secondary sessions. There are no extra storage requirements for the primary session (LT #1).

The accumulated storage required per port (or display) is called the *Weighting Factor* and is described later.

9.2.2 MLT Storage Requirements

The primary session does not require any additional storage. The following table describes the storage requirements and Weighting Factors for 3174 MLT.

To clarify the following table, consider a model 2 with EAB customized for two sessions. The primary session requires no additional storage. The first secondary session requires 2K for Model 2 Presentation Space, doubled due to EAB support, plus 1k extra Control Storage for a total of 5K. Therefore, the Weighting Factor is 5.

The general formula to follow is:

n(M x E + C) = Weighting Factor.

n= Number of Secondary Sessions (total number of Sessions - 1)

M = Display Model

E = EAB (Y=2, N=1)

C = 1 Secondary Session

C = 0 Primary Session.

9.2.3 MLT Storage Requirements for Configuration Support-A

Display Types	Number of Sessions Per Display				
	1	2	3	4	5
	Weighting Factors for Sessions per Disp				
Model 2, No EAB	0	3	6	9	12
Model 2, EAB	0	5	10	15	20
Model 3-5, No EAB	0	5	10	15	20
Model 3-5 EAB	0	9	18	27	36

Figure 74. MLT Storage Requirements, Configuration Support-A

9.2.3.1 Weighting Factor and MLT Support Level-A

The user should calculate all Weighting Factors for a given 3174. The sum of Weighting Factors for each display determines the required MLT Support Level of the 3174 running Configuration Support-A or S.

- A sum of Weighting Factors = <   0   =   MLT level 0
- A sum of Weighting Factors = <   64K   =   MLT level 1
- A sum of Weighting Factors = < 128K   =   MLT level 2
- A sum of Weighting Factors = < 416K   =   MLT level 3
- A sum of Weighting Factors = < 864K   =   MLT level 4
- A sum of Weighting Factors = < 1408K   =   MLT level 5

Note: Default MLT level is 0.

MLT Support Level One and Two are supported for all controller models. Level Three requires at least the 512K storage expansion feature and cannot be selected for 3174 Models 52R, 81R and 82R.

MLT Support Level One may coexist with the AEA feature. MLT Support Level Two requires at least 512K of storage expansion to coexist with the AEA on an early 3174 (IBM 3174 Establishment Controller has 2MB as standard).

MLT Support Level One and Two are supported for all controller models. Level Three requires 512K of storage expansion and cannot be selected for 3174 Models 52R, 81R and 82R.

9.2.3.2 MLT and Performance Considerations-A

Due to performance considerations and future expansion requirements, you should to refer to Figure 75 on page 223 when a MLT level is calculated and selected.

Maximum Storage Recommended means the higher recommended storage size that should be taken into account when a MLT level is selected.

Controller Storage Reserved is the actual storage size which is reserved for each MLT level. The difference between "Maximum Storage Allowed" and "Controller Storage Reserved" for MLT Level 3 is reserved for buffer management, control storage, and to ensure performance.

MLT Support Level	Maximum Storage Recommended	Controller Storage Reserved
0	0 K	0 K
1	64 K	64 K
2	128 K	128 K
3	416 K	512 K
4	864 K	1024 K
5	1408 K	1536 K

Figure 75. Determining the MLT Support Level Required

9.2.3.3 Session Limitations Configuration Support-A

- Only one session is supported for an ASCII display, but you can define an additional printer port (ASCII HAP).

- Up to five sessions are supported for a 3270 display.

- A maximum of 208 sessions are supported by the 3174 in the following structure:

```
5 Sessions x 32 Ports     = 160  +
24 ASCII ports + printer =  48  =  208 sessions
```

The number of sessions that can be used is affected by the amount of storage available, type of host attachment (up to 32 for non-SNA, 184 for SNA and up to 24 for ASCII host).

- An ASCII host session requires AEA in the 3174.

- A Secondary Session does not support Programmable Symbols. Programmable Symbols are supported only in the Primary Session.

9.2.4 MLT Storage Requirements for Configuration Support-B

Display Types	Number of Sessions Per Display				
	1	2	3	4	5
	Weighting Factors for Sessions per Disp				
Model 2, No EAB	0	0	0	0	2
Model 2, EAB	0	0	4	8	12
Model 3-5, No EAB	0	0	4	8	12
Model 3-5 EAB	0	8	16	24	32

Figure 76. MLT Storage Requirements, Configuration Support-B

Notes:

1. Table entries represent K bytes of storage. (1K = 1024 bytes.)

2. For ASCII devices choose model 2 no EAB, and ASCII with large screens choose model 3 no EAB.

9.2.4.1 Weighting Factor and MLT Support Level-B

The user should calculate all Weighting Factors for a given 3174. The sum of Weighting Factors for each display determines the required MLT Support Level of the 3174.

- A sum of Weighting Factors = <   0   =   MLT level 0
- A sum of Weighting Factors = <   64K   =   MLT level 1
- A sum of Weighting Factors = < 128K   = MLT level 2
- A sum of Weighting Factors = < 512K   =   MLT level 3
- A sum of Weighting Factors = < 896K   =   MLT level 4
- A sum of Weighting Factors = < 1152K   =   MLT level 5
- A sum of Weighting Factors = < 1536K   =   MLT level 6
- A sum of Weighting Factors = < 2048K   =   MLT level 7
- A sum of Weighting Factors = < 2688K   =   MLT level 8

Note: Default MLT level is 0.

For Configuration Support-B Release 4, you can choose a level or specify the exact amount of storage in kilobytes. This can prevent you from wasting storage. For example, if your storage requirements totaled 2050K, you would have to select Level 8, which allocates 2688K. Now you can specify 2050K exactly.

If CCAs are installed, do not count sessions assigned to secondary hosts when determining weighting factors for the base controller. Use the number of sessions on the primary host only to determine the weighting factors for the base controller.

9.2.4.2 Session Limitations Configuration Support-B

- Up to five sessions are supported for a 3270 display.

- Up to five sessions are supported for an ASCII display.

- A maximum of 440 sessions are supported by the 3174 in the following structure:

```
5 Sessions x 32 Ports     = 160 +
5 sessions x 24 ASCII ports = 120  =  280 sessions.
```

If you add the port expansion feature #3100:

```
5 Sessions x 64 Ports     = 320 +
5 sessions x 24 ASCII ports = 120  =  440 sessions.
```

The number of sessions which can be used is affected by the amount of storage available and the type of host attachment, SNA, Non-SNA, and ASCII.

- An ASCII host session requires AEA in the 3174.

- A Secondary Session does not support Programmable Symbols. Programmable Symbols are supported only in the Primary Session.

9.3 Storage Requirements - Summary

The following tables for Configuration Support-A and Configuration Support-B describe the 3174 Storage Requirements while taking into account some of the features which affect this issue. You should refer to the *3174 Planning Guide* for a definitive list of storage requirements for features such as Single Link Multi-Host, Concurrent Communications Adapters, and Multi-Host Gateway.

The user should match his controller's feature with the appropriate table in order to determine the amount of storage required for a given 3174.

9.3.1 Storage Requirements for Configuration Support-A

MLT Storage Requirements				
Function	BASE	CSCM RNC or CSC(DSK)	CSCM CSC (FD1)	CSCM CSC (FD2)
BASE	1MB	1MB	1.5MB	1.5MB
AEA	1MB	1.5MB	1.5MB	2MB
MLT1	1MB	1MB	1.5MB	1.5MB
MLT1, AEA	1MB	1.5MB	1.5MB	2MB
MLT2	1MB	1.5MB	1.5MB	2MB
MLT2, AEA	1MB	1.5MB	1.5MB	2MB
MLT3	1.5MB	1.5MB	2MB	2MB
MLT3, AEA	1.5MB	2MB	2MB	2.5MB
MLT4	2MB	2MB	2.5MB	2.5MB
MLT4, AEA	2.5MB	2.5MB	3MB	3MB
MLT5	2.5MB	2.5MB	3MB	3MB
MLT5, AEA	2.5MB	3MB	3MB	3.5MB

Figure 77. 3174 MLT Storage Requirements for Configuration Support-A

This chart has taken into account the volume of 0XX, 5XX, and 8XX 3174's having only 1MB of memory and the possibility of also having the 512K memory expansion feature, thus the 500K increments in the chart.

9.3.2 Storage Requirements for Configuration Support-B

MLT Storage Requirements				
Function	BASE	CSCM RNC or CSC(DSK)	CSCM CSC (FD1)	CSCM CSC (FD2)
BASE	2MB	2MB	2MB	2MB
AEA	2MB	3MB	3MB	3MB
MLT1	2MB	2MB	2MB	3MB
MLT1, AEA	3MB	3MB	3MB	3MB
MLT2	2MB	2MB	3MB	3MB
MLT2, AEA	3MB	3MB	3MB	3MB
MLT3	3MB	3MB	3MB	3MB
MLT3, AEA	3MB	3MB	3MB	4MB
MLT4	3MB	3MB	3MB	3MB
MLT4, AEA	4MB	4MB	4MB	4MB
MLT5	3MB	3MB	4MB	4MB
MLT5, AEA	4MB	4MB	4MB	4MB
MLT6	4MB	4MB	4MB	4MB
MLT6, AEA	4MB	4MB	4MB	5MB
MLT7	4MB	4MB	4MB	5MB
MLT7, AEA	5MB	5MB	5MB	5MB
MLT8	5MB	5MB	5MB	5MB
MLT8, AEA	5MB	5MB	6MB	6MB

Figure 78. 3174 MLT Storage Requirements for Configuration Support-B

9.3.3 Storage Expansion 1MB (#1012), 2MB (#1014), and 4MB (#1016).

These features provide additional control storage for function over the 2MB of base storage in the IBM 3174 Establishment Controller.

Feature #1016 is a PIM storage card and as such, is only available on the 2XX and 6XX range of controllers.

For the 2XX and 6XX range of IBM 3174 Establishment Controller the storage is on a plug-in-module (PIM), which plugs straight on to the planar board, saving the requirement to use one of the feature slots for a storage upgrade.

The storage expansion features are not available for Models 9XX.

9.3.4 Storage Expansion 512KB (#1011)

Feature #1011 is no longer available, but is included here for reference.

This feature provides an additional 512KB of control storage, for features, functions and RPQs that use more than the 1.0MB base storage in the 0XX, 5XX, and 8XX range of 3174's.

Since there are only three card slots on the large models and one slot on the medium models for storage expansion, one should consider using the 1.0MB Storage Expansion (#1012) or 2.0MB Storage Expansion (#1014). The storage expansion features are not available for Models 52R, 81R and 82R.

9.3.5 3174 MLT and Programmable Symbols (PS) Considerations

A Programmable Symbols screen should be assigned to the Primary Session only. While the Primary Session is in background, Programmable Symbols set update can occur.

9.4 Microcode Customization

MLT hardware installation is not required, the function is activated and
controlled by customizing responses only. The data flow of questions below is
followed by a description of each of the questions which are involved in MLT
customization.
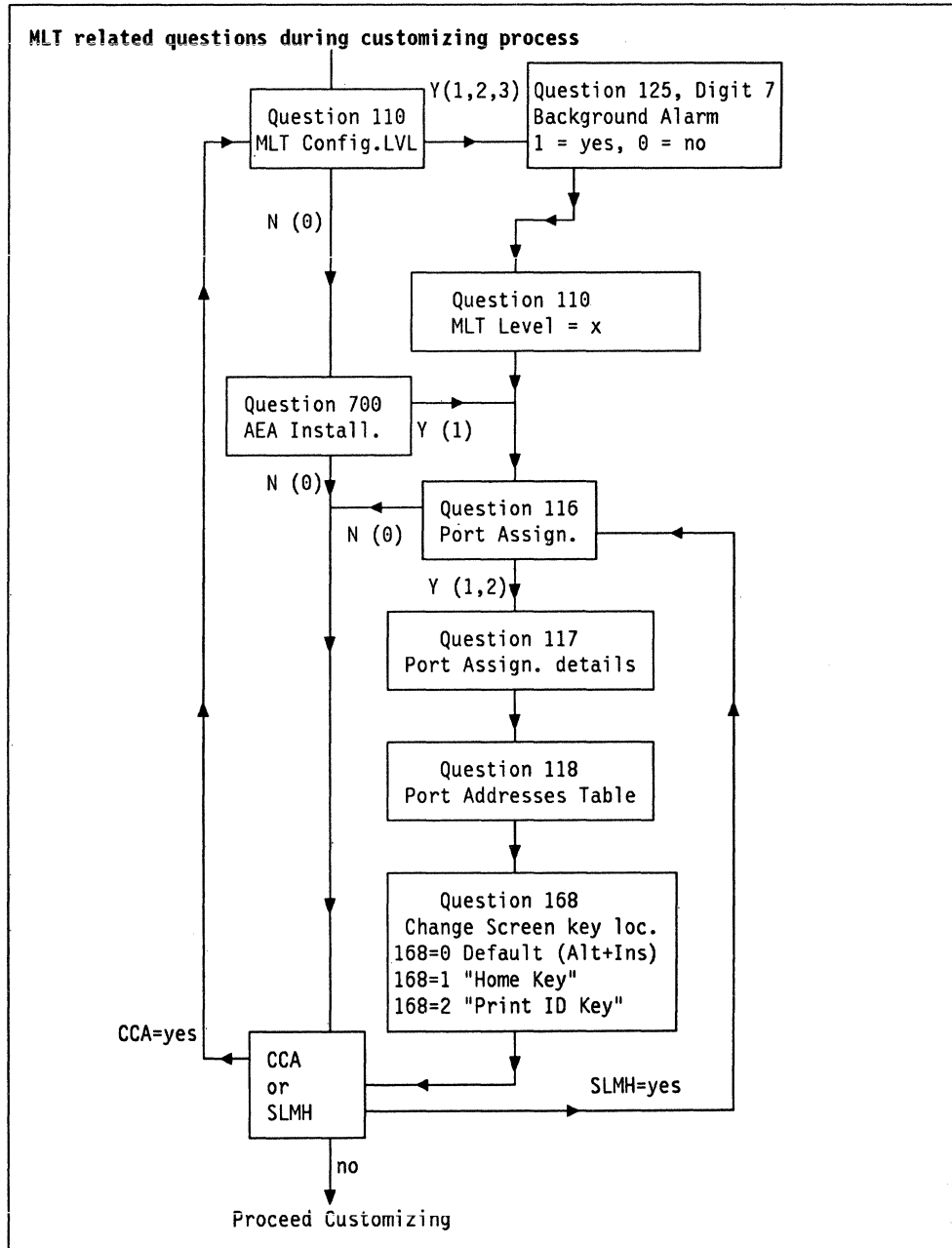
Figure 79. MLT Customizing Data Flow

9.4.1.1 Question 110

Customization Question 110 refers to the required MLT Configuration Level or storage amount. As was previously mentioned, there are eight levels of MLT Configuration support. Answering this question is the key point of the MLT feature. A 0 response means no MLT is required. For Configuration Support-B Release 4, a response of 00000 means no MLT.

In order to determine the required MLT level of support, the user should fill in the MLT worksheet.

9.4.1.2 Question 125

Digit number 7 of this customizing question relates to the existence of the display alarm sound for a session in a Background mode (Background Session).

The default response is 0.

- 0 = Background alarm is enabled

- 1 = Background alarm is disabled.

This option is affected only if MLT is configured. Answering with 1 results in the disabling of the alarm sound when a screen update occurs to a screen which is currently in a Background Session mode.

If alarm disable is not selected, the user might get confused due to unexpected alarm sounds during his operation.

Note: Background Session Alarm sound is automatically disabled if File Transfer Aid (digit number 6 of this customizing question) is selected as 1 (File Transfer Aid ON).

9.4.1.3 Question 700

Question 700 does not appear in any initial customization panel. The user has access to it only after selecting the "AEA Configure" option from the "Customize Control Diskette Menu" panel. "Customize Control Diskette Menu" is the screen that results from a selection of "Customize The Control Diskette" option on the "Master Menu".

Question 700 is the trigger for the AEA customizing questions. The 3174 AEA hardware adapter card(s) must be installed as a prerequisite for AEA microcode. The AEA code becomes active if the response to Question 700 is 1. If customizing for AEA, there are some additional panels and customizing questions to be answered and defined. These questions and panels are discussed in the section titled "Asynchronous Emulation Adapter". The user should refer to the AEA part of the document if AEA is intended to be customized. If the AEA hardware card is installed and the user prefers to ignore AEA code or to disable it, Question 700 should be answered with 0.

9.4.1.4 Question 116

This customizing question is the Individual Port Assignment Control. How you answer this question depends on the configuration support you are using.

Configuration Support A/S: If you will be providing the MLT function for CUT devices or if you will be attaching DFT devices such as the IBM 3290 Display Panel or the IBM 3270 Personal Computer, and using their multiple session facilities, then you have to use either option *1* or *2*. There are three possible responses to this question:

The first option *0* is the default and the easiest. If you take this option the customization process will automatically assign port addresses and you will not see panels :117 and :118. However, if you have a Model 0XX, 1XX, or 2XX, then 32 port addresses will be assigned, whether you need them (i.e., you have 32 devices attached) or not. This can be wasteful on addresses. A similar process is true of the Models 5XR/6XR and 8XR/9XR although in these cases only 16 addresses will be assigned to Models 5XR/6XR and 8 addresses to Models 8XR/9XR.

The *1* option allows you to specify just the number of sessions per port, and the customization program deals with the assigning of addresses. In order to do this simply fill in the number of sessions per port in column *#IS* on the *117:* Port Assignment Worksheet. You could put a *0* against any port not required at this time so that addresses will not be allocated to it. When you press *PF8* during the actual configuring process, you will see that the customization program has filled in panel *:118* for you. You cannot change panel *:118*, it is for your information only. If you wish to update this worksheet in the future by adding or removing devices and you use this option, all of the addresses will be re-assigned by the customization program. In order to avoid this and keep the address assignment of the unchanged devices the same as before, you need to use option *2* below.

Option *2* is useful for the reasons above and is additionally useful if you have DFT devices or if you are using the MLT function for CUT terminals with multiple sessions and you wish to control the port assignments of individual sessions. If you leave this up to the program, then the ports will be assigned as follows. First addresses will be assigned sequentially to all of the primary ports starting at port zero. Then starting at the next available address, addresses will assigned to the secondary ports. Obviously if you wish to use addressing other than this, you need to use this option.

When using this option you need to do just a little more than with option *1*. In this case you have to enter the port addresses on :117 Worksheet in decimal. Once again the customization program will fill out sheet :118 for you.

Configuration Support B: In Configuration Support B, the response to question 116 can be one to four alphanumeric digits. The four digits of this response are grouped into two pairs. The first (leftmost) pair represents the assignment of 3270 address. The second pair represents the assignment of AEA addresses. Depending on your configuration, you may not be specifying all four digits; you may have a one, two, or four-digit response. However, placement of the digits is crucial, so please make sure that you have done the necessary planning before starting this step.

The default response to question 116 is *0* The process for the default response in Configuration Support B is the same as that for Configuration Support A/S. You should use the default if you want only one 3270 address per port, do not want to plan for port assignment, and do not want any AEA addresses assigned.

You should use responses *1* or *2* if you plan to assign port addresses on a port-by-port basis, plan to use MLT on your CUT devices, plan to have ASCII devices access 3270 hosts, or plan to use DFTs with multiple interactive screens.

The *1* option allows you to specify just the number of sessions per port, and the customization program deals with the assigning of addresses. In order to do this simply fill in the number of sessions per port in column *#IS* on the *117:* Port Assignment Worksheet. You could put a *0* against any port not required at this time so that addresses will not be allocated to it. When you press *PF8* during the actual configuring process, you will see that the customization program has filled in panel *:118* for you. You cannot change panel *:118*, it is for your information only. If you wish to update this worksheet in the future by adding or removing devices and you use this option, all of the addresses will be re-assigned by the customization program. In order to avoid this and keep the address assignment of the unchanged devices the same as before, you need to use option *2* below.

Option *2* is useful for the reasons above and is additionally useful if you have DFT devices or if you are using the MLT function for CUT terminals with multiple sessions and you wish to control the port assignments of individual sessions. If you leave this up to the program, then the ports will be assigned as follows. First addresses will be assigned sequentially to all of the primary ports starting at port zero. Then starting at the next available address, addresses will assigned to the secondary ports. Obviously if you wish to use addressing other than this, you need to use this option.

When using this option you need to do just a little more than with option *1*. In this case you have to enter the port addresses on :117 Worksheet in decimal. Once again the customization program will fill out sheet :118 for you.

Option *SX* (where X equals a number from 1 to 5) should be used if: 1) you want to specify the number of addresses (1 to 5) to be assigned to each 3270 port, 2) you have answered question 110 with a non-zero response, 3) do not plan to have ASCII devices access 3270 hosts, and 4) plan to use DFTs with multiple interactive sessions. Note that the same number of addresses will be assigned to all 3270 ports and the addresses will be automatically assigned. Responses S1-S5 are only allowed on SNA host attachments.

The above responses do not result in AEA port address assignment. You should enter *SX AY* (where X and Y equal numbers from 1 to 5) if you want to· specify the number of addresses to be assigned to each 3270 port, the number of addresses to be assigned to each AEA port, and plan to have ASCII devices access 3270 hosts. The individual addresses are automatically assigned to each port. If you use this response, you should answer questions 110 and 703 with non-zero responses.

9.4.1.5 Question 117

Question 117 is the Port Assignment panel. It appears if the response for Question 116 was 1 or 2. One of these two answers causes a new panel to appear (after a successful completion of the user's "Host Panel"). For more details see the next section: "Port Assignment Panel".

9.4.1.6 Port Assignment Panel

The Port Assignment Panel is used to associate host Logical Units (LUs) with the 3174 physical ports. This panel is broken into two sections or Hardware Groups: hardware groups 26 or 27 which address 3174 ports, and hardware group 21 which addresses ASCII ports.

When assigning LUs to a 3174 port, it is very important to take into account which screen model is connected to each port. If an LU is defined as 3270 Model 3, 4 or 5 and is assigned to a 3278 Model 2 port, then every attempt to access an LU (or a Logical Terminal) that is bigger than the 3278 Model 2 capability results with a program check. Alternatively, if a display is connected to a particular port and is "Set Up" for a screen size (or model) larger than the LUs that are assigned to this port, then an automatic model change will occur whenever a change screen key is pressed and another session to a LT is invoked.

For example, we assign three LUs associated with one port, each defined with different screen sizes. LT1 is LU number 3 with 3270 Model 5 (132x27 character screen); LT2 is LU number 2 with 3270 Model 4 (80x43 characters); and LT3 is LU number 17 with 3270 Model 3 (80x32).

On this port we physically attach a 3192D set up as a Model 5. When we hot key from LT1 to LT2 to LT3, the display automatically selects the appropriate character generator and displays the proper number of lines and columns for each LT. In this way, a single 3192 display (set up as a Mod 5) can accommodate any screen size without going into set-up mode.

Port Assignment Panels

```
8K8CP999          _____ 117: Port Assignment _____    3174/P13808A
                                                                        
        Host addresses                          Host addresses
   Port IS  1   2   3   4   5        Port IS  1   2   3   4   5
   26-00 3 002 003 004 __ __         26-01 3 008 009 010 __ __
   26-02 3 011 012 013 __ __         26-03 3 014 015 016 __ __
   26-04 3 017 018 019 __ __         26-05 3 020 021 022 __ __
   26-06 3 023 024 025 __ __         26-07 1 026 __ __ __ __
   26-08 0 __ __ __ __ __            26-09 0 __ __ __ __ __
   26-10 0 __ __ __ __ __            26-11 0 __ __ __ __ __
   26-12 0 __ __ __ __ __            26-13 0 __ __ __ __ __
   26-14 0 __ __ __ __ __            26-15 0 __ __ __ __ __
   26-16 0 __ __ __ __ __            26-17 0 __ __ __ __ __
   26-18 0 __ __ __ __ __            26-19 0 __ __ __ __ __
   26-20 0 __ __ __ __ __            26-21 0 __ __ __ __ __
   26-22 0 __ __ __ __ __            26-23 0 __ __ __ __ __
   26-24 0 __ __ __ __ __            26-25 0 __ __ __ __ __
   26-26 0 __ __ __ __ __            26-27 0 __ __ __ __ __
   26-28 0 __ __ __ __ __            26-29 0 __ __ __ __ __
   26-30 0 __ __ __ __ __            26-31 0 __ __ __ __ __
```

Figure 80. Port Assignment Panel 3270

```
8K8CP999          _____ 117: Port Assignment _____    3174/P13808A
                                                                        
        Host addresses                          Host addresses
   Port IS  1   2   3   4   5        Port IS  1   2   3   4   5
   21-00 3 005 006 007 __ __         21-01 3 027 028 029 __ __
   21-02 3 030 031 032 __ __         21-03 3 033 034 035 __ __
   21-04 1 036 __ __ __ __           21-05 0 __ __ __ __ __
   21-06 0 __ __ __ __ __            21-07 0 __ __ __ __ __
   22-00 0 __ __ __ __ __            22-01 0 __ __ __ __ __
   22-02 0 __ __ __ __ __            22-03 0 __ __ __ __ __
   22-04 0 __ __ __ __ __            22-05 0 __ __ __ __ __
   22-06 0 __ __ __ __ __            22-07 0 __ __ __ __ __
   23-00 0 __ __ __ __ __            23-01 0 __ __ __ __ __
   23-02 0 __ __ __ __ __            23-03 0 __ __ __ __ __
   23-04 0 __ __ __ __ __            23-05 0 __ __ __ __ __
   23-06 0 __ __ __ __ __            23-07 0 __ __ __ __ __
```

Figure 81. Port Assignment Panel ASCII

Following is a description of each of the Port Assignment Panels fields:

Field	Description
117:	These panels were displayed on a NetView console using CSCF down to the 3174.
3174/ADDR	The ADDR field at the top of the screens is the PU name called when using CSCF.
Port	This field lists the port numbers assigned to terminals, beginning with port 26-00. The prefix "26" indicates that these terminals belong to Hardware Group "26" - terminal adapter. Hardware Groups "21", "22" and "23" indicate ASCII (AEA) adapter ports. For Configuration Support-B Release 4, the prefix can also be 27.
#IS	This field indicates the number of 3270 host sessions which were assigned to each port. For a display using MLT function, this number must correspond to the number of sessions that were assigned to this port (either DFT sessions or MLT sessions). For any other type of terminal (e.g. printers etc.) this number should be either 0 or 1. The default for Hardware Group "26" or "27" is 1 and could be defined up to 5. The default for Hardware Groups "21", "22" and "23" is 1 and could be defined up to 5.
LT1-LT5	This field shows the SNA addresses (which are using MLT) for the displays. The total sum of the primary and secondary addresses should equal the number of 3270 host sessions.

Note: AEA customization requires additional customizing questions to be answered and some additional panels to be defined.

9.4.1.7 Question 118

This question will display a fully "Protected Fields" screen. It should be used as a port assignment information and verification panel only. Entries cannot be made from this screen. If the user needs to modify an assignment of a 3174 port, he should use *PF 7* in order to step backward to Question 117. LT session addresses in Question 118 panel appear in hexadecimal values.

9.4.1.8 Question 168

This customization question provides a solution to a problem which was created by the fact that some 3278 Emulation programs do not pass the ALT+Insert keystroke to the 3174. Without this keystroke, the controller cannot execute the MLT session switching and actually is not supporting MLT. This problem exists in a few ASCII terminals as well and affects other functions in addition to MLT.

In order to solve the problem, the controller puts the terminal in "Extension Mode" which generates the required keystrokes. Since most of the known terminals support either Home key or Print ID key, these keys were chosen to reproduce the required keystroke for MLT session switching while in "Extension Mode."

Following are the required responses and their effect:

Question 168 = 0: If the user enters 168=0 (default), no action is taken. The terminal does not go into "Extension Mode" and the keystrokes are as in any regular 3270 terminal.

Question 168 = 1: If this is the selected response, *Home Key* generates the required ALT sequence. If the user wants to invoke the MLT change screen, he must press and release the Home key and then press the Insert key. This results with MLT "Change Screen" invocation. If the required operation is "Home," the Home key should be pressed twice.

Question 168 = 2: If this is the selected response, the *Print ID* key generates the required ALT sequence. If the users want to invoke MLT Change Screen, they must press and release the "Print ID" key and then press the Insert key. This results with MLT "Change Screen" invocation. If the required operation is "Print ID," the Print ID key should be pressed twice.

9.5 MLT Operation

9.5.1 Change Screen Key

The user will find the Change Screen Key (sometimes called the *Hot Key* or *Jump Key*) located in various key positions on different kind of keyboards. The location of this key depends on the type of the keyboard, the terminal's mode of operation (whether 3278 Emulation mode or Native mode) and on the answer to customizing question 168.

The table in Figure 82 on page 235 describes the expected location for the Change Screen Key for various keyboards.

Keyboard Type	Key Location
Base (87 keys) keyboard (3278 and similar)	ALT + Insert
- Question 168 = 1	ALT + Insert
- Question 168 = 2	ALT + Insert
Base (87 key) TEXT - QWERTY	ALT + PA2
- Question 168 = 1	ALT + PA2
- Question 168 = 2	ALT + PA2
*Converged (122/4 keys) keyboard	
- 3278 Emulation Mode	ALT + Insert
- Question 168 = 1	ALT + Insert
- Question 168 = 2	ALT + Insert and 1xIDENT - 1xINSERT
- Native Mode (TW, APL, DE etc)	ALT + PA2
- Question 168 = 1	ALT + PA2
- Question 168 = 2	ALT + PA2
**Enhanced (102/103 keys) keyboard	ALT + Home

Notes:

* The Converged keyboard is recognized by the CROSS shape of the Cursor Move Keys (arrows).

** The Enhanced keyboard is recognized by the UPSIDE DOWN T shape of the Cursor Move Keys (arrows).

Figure 82. Change Screen Key Location

9.5.2 Terminal's Model ID Determination

When the user sets the Model ID of the display (eg 3192, 3180 etc.), it is essential that the selected screen size matches the largest session with this terminal. That means that if one of the sessions on this display is equal to Model 4 size (80x43), the user should set the terminal's Model ID to 4.

If one of the sessions has the Create Partition capability which enables it to work in Extended - Explicit Partition mode, the user should select the appropriate model ID for Explicit Partition. Figure 83 indicates the Model IDs required for 3180 and 3192.

Display	Model ID Implicit	Model ID Explicit	Screen Size
3180	2	6	24 x 80
	3	7	32 x 80
	4	8	43 x 80
	5	9	27 x 132 or 24 x 80
3192/D	2	2+	24 x 80
	3	3+	32 x 80
	4	4+	43 x 80
	5	5+	27 x 132 or 24 x 80
3192/C	2	2+	24 x 80
	3	3+	32 x 80

Figure 83. Display Model ID Definition

9.6 Session Integration

9.6.1 Programmable Symbols (PS) Terminal

The first 3174 MLT session on each controller port is defined as the Primary Session (LT 1). If a PS screen is located on this port, it must always be assigned to the Primary Session only. When the Primary Session is in a Background Session, PS set screen update can occur.

During the Load PS operation, the Active Session's display screen will either go blank or flash momentarily. The Active Session is not affected except for the brief visual disruption which occurs during the Load PS operation.

9.6.2 Session Presentation Delay

When changing between sessions which are defined as different screen sizes, there will be a slight delay while the display switches to the new screen size.

9.6.3 Shift Lock, Caps Lock and APL On

Shift Lock, Caps Lock and APL On status are preserved for each session.

9.6.4 Entry Assist (DOC Mode)

Each session preserves its own Entry Assist format definitions. The user must set up each session that needs Entry Assist.

9.7 Local Copy Considerations

When Print Local copy is invoked and the printer is printing, the user is able to change sessions. It is not necessary to wait for print completion to change the session. As a matter of fact, it is possible to invoke a Local Copy on one session, change to the second session, invoke a Local Copy from there (it will wait in the queue until the first Local Copy is completed) and change to the third session while session one is still printing and session two is waiting in the queue.

CCA local copy

You should note that if a terminal has a session through a CCA, then local copy will only work if a printer is also assigned to a host via the CCA; local copy will not work if the screen is on a CCA session, and the printer is defined through the primary link. To have the facility for printing in both sessions, you would require two printers.

9.7.1 Printer Authorization Matrix (PAM)

The Printer Authorization Matrix (PAM) is defined during customization. PAM definitions are for a physical terminal port, therefore, all Secondary Sessions will have access to the printer that is defined for the Primary Session. If a Printer Identification (IDENT) change is done during a session, it affects all sessions on this port until the next IDENT is done.

When local copy is invoked in a session and the user jumps to another session (while the printer is still printing the previous session's invocation), the *Printer Printing* indicator (small square, one-of-two, on the right hand side of the Operator Information area, full square when the *Printer Printing* indication is ON) does not indicate the fact that the printer is still printing. This is usually the case when some terminals (in a single session) are assigned to a single printer. The MLT user has to be aware that although the "Printer Printing" indication is OFF, the printer might still be busy with a task from a previous session. The *Printer Busy* indication will indicate this fact to the user when he tries to invoke Local Copy.

10. Multi-Host Connectivity

This chapter discusses the multiple options available to you with the Concurrent Communication Adapter, Single Link Multi-Host connectivity, ESCON director, ASCII, X.25, and Single Link Multi-Host Gateway. Configuration Support-B is a requirement for these functions. For details on customization of these features, please see "Connectivity and Customization Examples" on page 253 in the following chapter.

10.1.1 Introduction to the Concurrent Communication Adapter

The Concurrent Communication Adapter provides multi-host support for enhanced, cost-effective and concurrent access to multiple physical hosts. This capability provides solutions to the 3174 requirements in the area of access to multiple applications, host application availability and network backup without re-IMLing the 3174. At least one increment of storage will also be required. Information is provided to help readers to plan and install a Concurrent Communication Adapter and understand the function and use of the CCA.

10.1.2 Concurrent Communication Adapter Function

With the Concurrent Communication Adapter, the 3174 is connected to each host via a separate teleprocessing link allowing independent access to each.

The Concurrent Communication Adapter is a hardware feature which provides the access to an additional 3270 host. Each Concurrent Communication Adapter looks like an additional 3174 Controller with its own microprocessor and control storage and its own teleprocessing interface. The Concurrent Communication Adapter communicates independently with different hosts using different network protocols. With SDLC and X.25 it can handle transmission speeds of up to 64Kbps and with BSC network protocol up to 19.2 Kbps.

There are two types of adapter: Type 1 and Type 2.

* The Type 1 CCA contains interfaces for remote link attachment using BSC, SNA/SDLC and X.25 network protocols.

* The Type 2 CCA contains an X.21 interface for remote attachment using SNA/SDLC and X.25 network protocols.

The number of Concurrent Communication Adapters that can be installed in a controller varies depending on the controller model, see "Hardware Features" on page 9 for details.

Displays attached to a 3174 Controller with the Concurrent Communication Adapter are able to concurrently access multiple 3270 applications in more than one host. It functions independently of host software switching. Control Unit Terminals (CUTs), which are configured as Multiple Logical Terminals (MLTs) during customization, and Distributed Function Terminals (DFTs) can exercise expanded connectivity options.

Direct-attached 3270 displays can access 3270 applications via the primary host link or the secondary host link(s) through the CCA. ASCII host applications can be accessed via the ASCII Emulation Adapter (AEA). ASCII displays can use the AEA for host sessions or the prime link.

239

```
        ┌───────────────┐              ┌───────────────┐
        │               │              │               │
        │    HOST A     │              │    HOST B     │
        │               │              │               │
        └───────┬───────┘              └───────┬───────┘
                │                              │
          Local │                        Remote│
          Channel                        TP
          Attached                       Link
                │                              │
        ┌───────┴───────────────────────┬─────┴──────┐
        │                               │            │
        │                               │            │
        │          3174-11L             │    CCA     │
        │                               │            │
        │                               │            │
        └────────┬──────────┬───────────┴────────────┘
                 │          │
          ┌──────┴───┐  ┌───┴──────┐
          │          │  │          │
          │   DFT    │  │   CUT    │
          │          │  │          │
          └──────────┘  └──────────┘
```
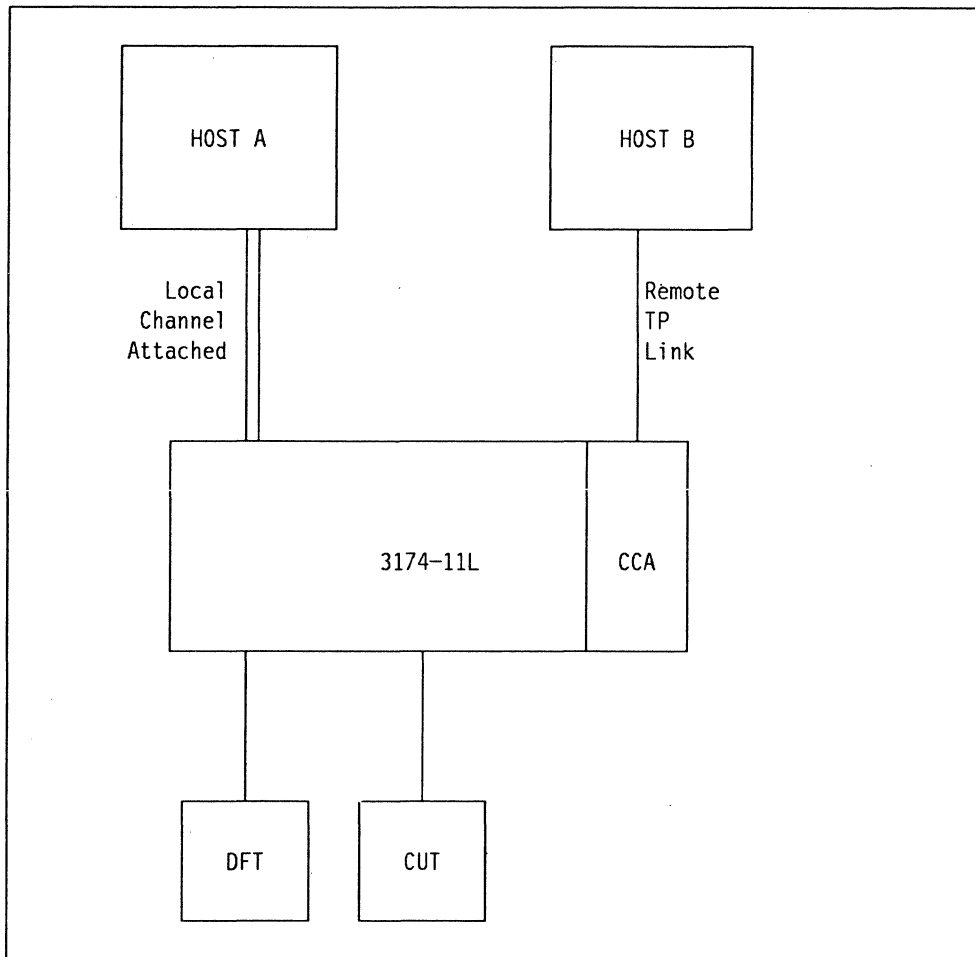
Figure 84. Concurrent Communication Adapter in the 3174 Control Unit

Figure 84 shows a 3174 channel-attached to a primary host system and
connected to a secondary host system via the Concurrent Communication
Adapter. Both Control Unit Terminals (CUT) and Distributed Function Terminals
(DFT) are attached to the 3174. The CUT displays are customized for MLT. The
primary host is "A" and the secondary host is "B." With the CCA, both the CUT
and DFT displays can access up to five applications distributed over either of
the two hosts.

Session alerts go to the host where the session is bound and hardware alerts
go to the primary host. It is therefore recommended that the primary host be
SNA since these alerts are only sent on SNA. 3174 SNA alerts are high-priority
events requiring immediate attention. The 3174 SNA alert function sends
problem determination information, collected by the 3174 Controller or entered
by an operator, to the hardware monitor component of the NetView program.

10.1.3 Supported Devices

The following devices are supported and enhanced by using the Concurrent Communication Adapter.

10.1.3.1 CUT Displays with Concurrent Communication Adapter

The following CUT displays are supported by the Concurrent Communication Adapter and Configuration Support-B:

- 3178
- 3179 except G
- 3180
- 3191
- 3192 except G
- 3471
- 3472.

The Multiple Logical Terminals (MLT) function allows CUT displays to act as multiple logical terminals. Each logical terminal has its own host address and can interact independently with its own host program. For CUTs using the MLT function, consult the *Multiple Logical Terminals Worksheets* in the *3174 Planning Guide* to ensure that you do not exceed the amount of storage reserved to support these displays; the "Number of Sessions" column on this worksheet contains the number of planned host sessions for each CUT display. For more information on Multiple Logical Terminals please refer "Multiple Logical Terminal (MLT)" on page 217.

Control Unit Terminals (CUT) can access one or more sessions per host via the Concurrent Communication Adapter, this depends on how many sessions per Logical Terminal (LT) have been specified during the customization of the 3174. By using the change screen key, a CUT can access the primary host system connected via the primary host link, any of the other hosts connected via the secondary host link and any ASCII host connected via an ASCII Emulation Adapter (AEA).

10.1.3.2 DFT Displays with Concurrent Communication Adapter

The following DFT displays are supported by the Concurrent Communication Adapter and Configuration Support-B:

- 3192 G   one host session and one printer session
- 3193   two host sessions
- 3194   four host sessions
- 3290   four host sessions
- 3472 G   five host sessions.

The multiple interactive sessions (MIS) capability allows DFT display stations to act as multiple logical terminals. Each logical terminal has its own address and can interact independently with its own host program.

When assigning addresses or allowing the customizing program to assign addresses to ports supporting DFTs, you should check the DFT supporting documentation regarding the number and type of sessions supported for that DFT; for example, some DFT displays may support only three host sessions and one printer session.

Displays with multiple session capabilities provide for limited switching capability and the level of switching depends on the primary host link protocol. When the primary link is SNA, DFTs have access to sessions on the primary link and any secondary link; when the primary link is non-SNA, DFTs have access only to sessions on the primary link.

10.1.3.3 3270 Printers and the 3174 Concurrent Communication Adapter

Printers connected to the 3174 using the Concurrent Communication Adapter have certain limitations. They cannot participate in multiple host access. A printer is assigned to the primary or secondary host system for which a printer authorization matrix has been setup. Then, it can only be accessed through that host's CCA. Local copy printing can be done from a display on the same host system CCA only. If you need to do any system printing, you can do it only from the host system to which the printer is attached. Please note that the printer authorization matrix cannot be loaded from the host system if the Concurrent Communication Adapter is installed.

10.1.4 Installation of CCA

The implementation of the Concurrent Communication Adapter can be divided into two sections, hardware installation and testing. For details on customizing the 3174 for the CCA, please see "Connectivity and Customization Examples" on page 253.

10.1.4.1 Hardware Installation

The Concurrent Communication Adapter feature can be installed in any available slot on the 3174, that is 11 - 17 (0XX models) or 11 - 15 (2XX models). Use the first available (unused) location. The IBM 3174 Establishment Controller is a customer setup unit and to install the Concurrent Communication Adapter feature #3050 is the customer's responsibility. See the *3174 Establishment Controller Concurrent Communication Adapter Installation and Removal Instructions Guide* or the *3174 Model 2XX Feature Installation and Removal Guide* for further instructions.

10.1.4.2 Verifying the Installation of the CCA

To do a verification test after the installation of the Concurrent Communication Adapter, see the *3174 Concurrent Communication Adapter Installation and Removal Manual* or the *3174 Model 2XX Feature Installation and Removal Guide*. These manuals provide step-by-step procedures to install, remove and perform verification tests on the Concurrent Communication Adapter in the 3174. Other online tests in case of CCA failure, faulty cables or faulty modems can be performed by following instructions in the *3174 Problem Determination Guide*. You may also refer to the *3174 Status Code* manual to inquire about status codes other than those you expect to result from a test performed.

10.1.4.3 Single Link Multi-Host Support

Single Link Multi-Host support is a microcode function for controllers attached to: the IBM Token-Ring Network as downstream physical units (DSPUs), an ESCON channel, or an X.25 network.

The following chart gives a guideline of the storage considerations when configuring for SLMH.

For detail of all the 3174 storage considerations refer to "Storage Charts" on page 339.

Table 11. Storage Requirements for Support B

FUNCTION	Weighting	NOTES
Single Link Multi-Host Support	54	With 1 Additional Host
Single Link Multi-Host Support	108	With 2 Additional Hosts
Single Link Multi-Host Support	162	With 3 Additional Hosts
Single Link Multi-Host Support	216	With 4 Additional Hosts
Single Link Multi-Host Support	270	With 5 Additional Hosts
Single Link Multi-Host Support	324	With 6 Additional Hosts
Single Link Multi-Host Support	378	With 7 Additional Hosts

10.2 Multi-Host Examples

10.2.1 Single Link Multi-Host Support

```
┌──────────────────────────────────────────────────────────────────┐
│                                                                    │
│   ┌──────────────┐      ┌──────────────┐      ┌──────────────┐    │
│   │              │      │              │      │              │    │
│   │    3270      │      │    3270      │      │    3270      │    │
│   │   HOST 1     │      │   HOST 2     │      │   HOST N     │    │
│   │              │      │              │      │              │    │
│   └──────┬───────┘      └──────┬───────┘      └──────┬───────┘    │
│          │                     │                     │            │
│   ┌──────┴───────┐      ┌──────┴───────┐      ┌──────┴───────┐    │
│   │  3174/37XX   │      │  3174/37XX   │      │  3174/37XX   │    │
│   │   Gateway    │      │   Gateway    │      │   Gateway    │    │
│   │              │      │              │      │              │    │
│   └──────┬───────┘      └──────┬───────┘      └──────┬───────┘    │
│          │                     │                     │            │
│   ┌──────┴─────────────────────┴─────────────┐      │            │
│   │            Token─ Ring                    ├──────┘            │
│   │                                           │                   │
│   └──────────────────┬────────────────────────┘                   │
│                      │                                             │
│   ┌──────────────────┴───────┐   ┌───────────┐                    │
│   │      3174 ─ X3R          ├───┤ Terminal  │                    │
│   └──────────────────────────┘   └───────────┘                    │
│                                                                    │
└──────────────────────────────────────────────────────────────────┘
```
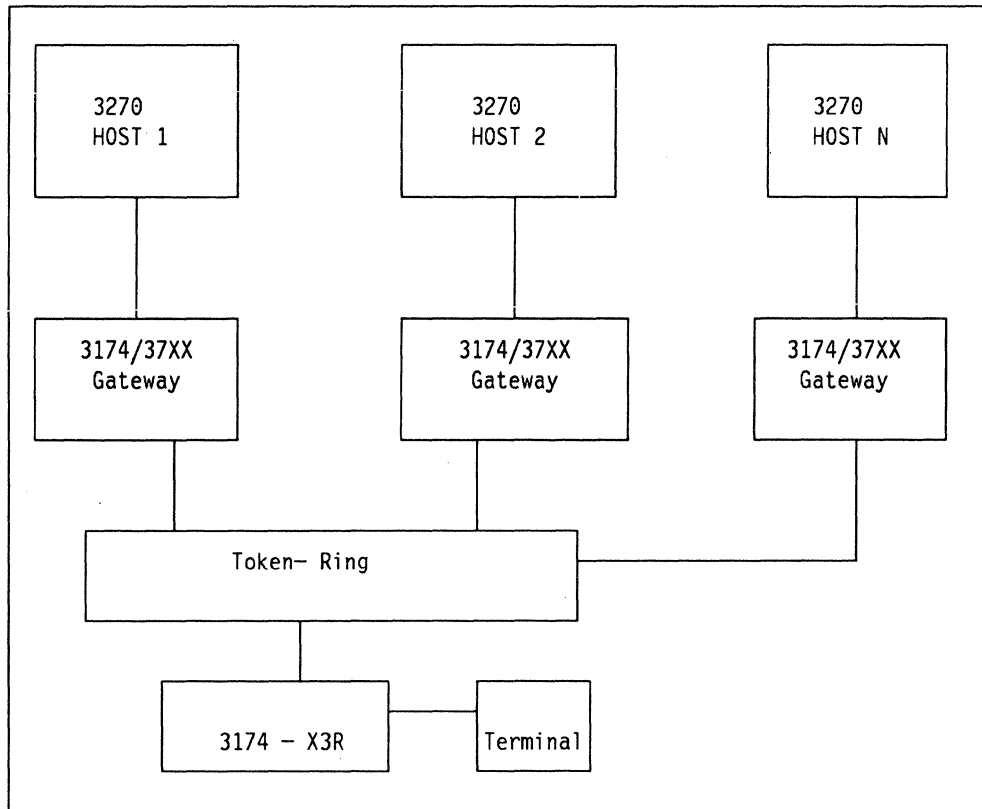
Figure 85. Single Link Multi-Host Connectivity

Communication with each 3270 host is accomplished through a gateway.
Access to eight 3270 hosts can be configured. However, each terminal can have
sessions with only five of those 3270 hosts. Please note that single link
multi-host is only available in Configuration Support B. It does not require the
use of the Concurrent Communication Adapter although the CCA can be used
in conjunction with Single Link Multi-Host Support; see Figure 86 on page 245.

For detail of the 3174 customization panels see "Connectivity and Customization
Examples" on page 253.

10.2.2 Single Link Multi-Host Support with CCA
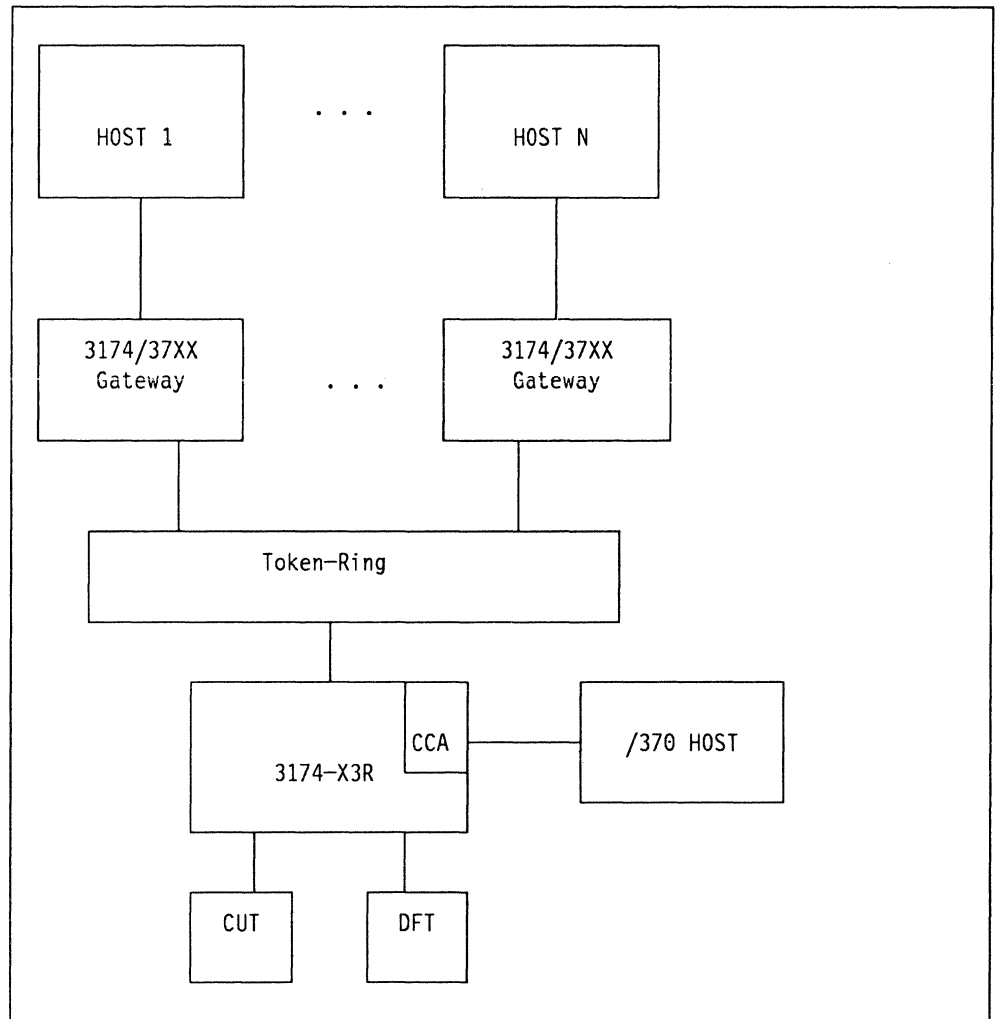
Figure 86. One CCA in a 3174 Control Unit Linked to a Token-Ring Network

Single link multi-host support together with Concurrent Communication Adapter is demonstrated in Figure 86. As in Figure 85 on page 244 we have the same SLMH support through the gateways, but in addition the terminals on the DSPU have an additional path through the Concurrent Communication Adapter to another host.

10.2.3 Single Link Multi-Host Support with AEA
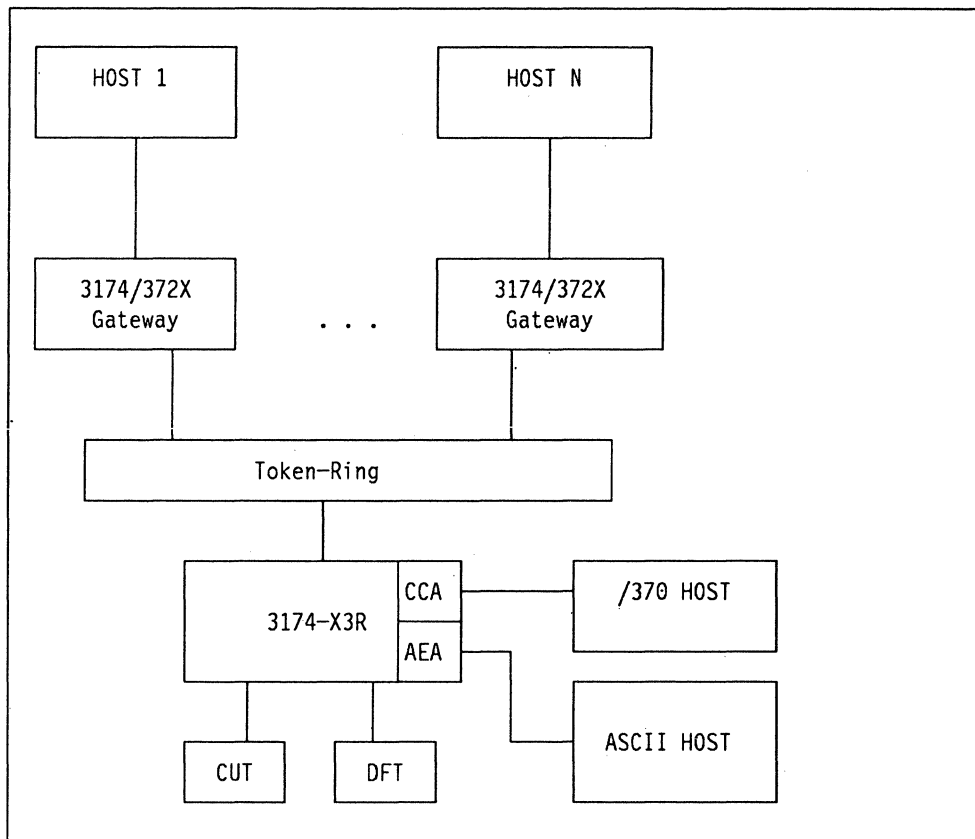
Figure 87. One CCA in a 3174 Control Unit with an AEA

The example in Figure 87 works on the same principle as the one in Figure 86 on page 245 except for the ASCII Emulation Adapter which has been added ASCII Host applications can now also be accessed. CUT displays could have one or more of their five sessions with an ASCII host. DFT displays cannot access an ASCII host. DFT/E displays can access ASCII host session. ASCII displays can only access ASCII applications or 3270 host programs attached via the primary host link. For more information regarding the AEA, please see the "Asynchronous Emulation Adapter (AEA)" on page 157. Please note that the installation of more than one communication adapter on the same 3174 could affect performance and end-user response times. Care should be taken when planning for storage requirements before installation of extra features and the customization of the 3174. If sufficient storage is not installed in the 3174, some support for the functions you planned will be deconfigured (function will not operate or will operate at a lower level) once the controller has been customized and IMLed.

10.2.4 Single Link Multi-Host Gateway
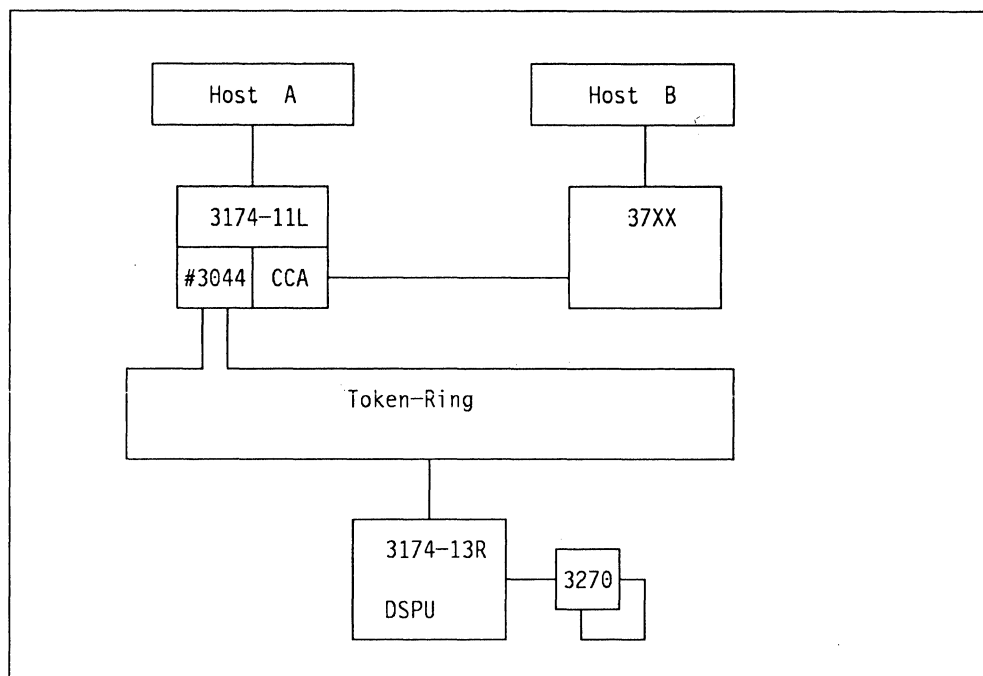
Figure 88. Single Link Multi-Host Gateway

With Configuration Support-B Release 3 connectivity options have been further enhanced by allowing a DSPU to access the CCAs installed on a 3174 gateway.

A terminal on the DSPU can access *Host A* through the gateway and up to the "primary" link, while having a second session to *Host B* through the CCA on the gateway controller using the MLT function.

Note

The maximum number of DSPUs that can access a SNA host through each Concurrent Communication Adapter is 50.

See the chapter "Connectivity and Customization Examples" on page 253, for detail of the 3174 customization panels, and NCP examples.

10.2.5 Single Link Multi-Host with ESCON

As discussed in the section "Single Link Multi-Host" on page 211, by using the ESCON director it is possible to have one 3174 connected to eight hosts.
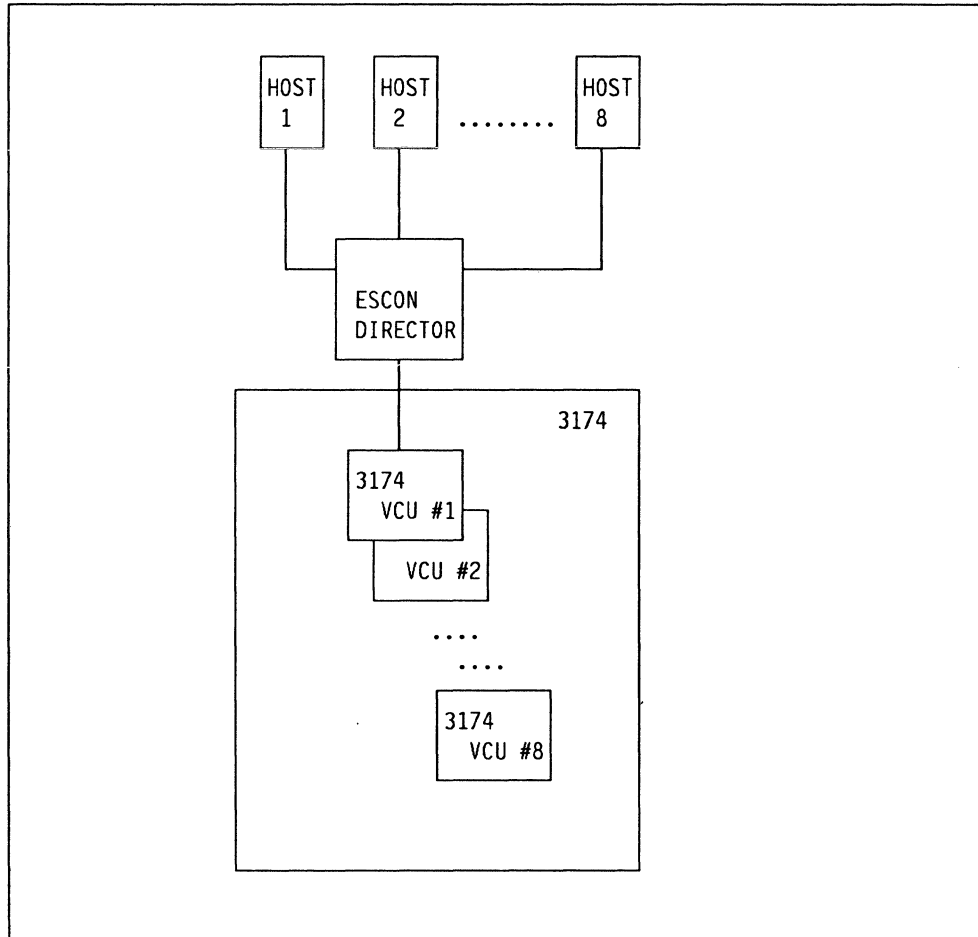
Figure 89. Single Link Multi-Host and ESCON

This example shows that each host has a connection to the one physical controller; its host connections are maintained by allocating a "virtual control unit" to support each host. By using the MLT sessions available any terminal can access up to five hosts.

10.2.6 Single Link Multi-Host Gateway with ESCON

Below is an example using multiple host support through the gateway.
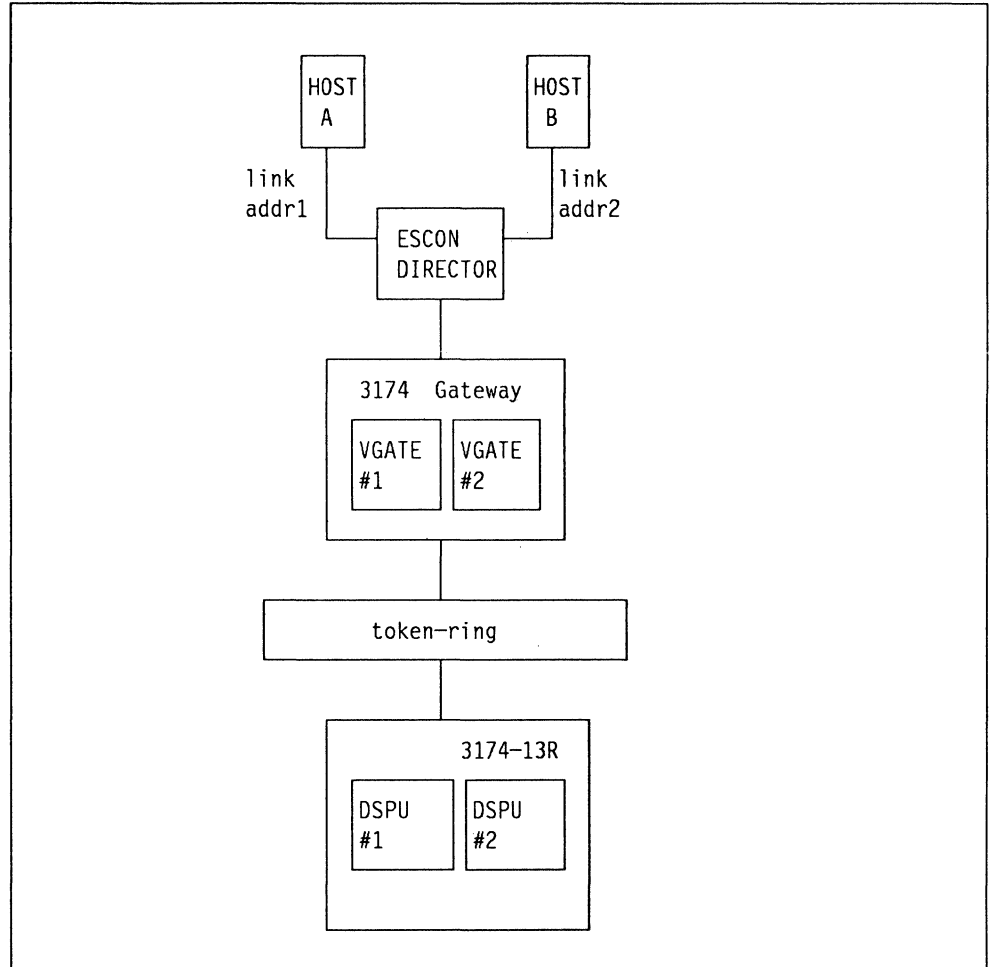
Figure 90. Single Link Multi-Host Gateway with ESCON

In this scenario the DSPU has two host sessions, both going through the same physical gateway, but maintained by two logical gateways. In this setup Host B uses gateway #2 to talk to DSPU #2, and is totally independent of Host A, The ESCON director is doing the routing in this example. This scenario is discussed in detail in "Multi-Host Gateway" on page 212, and the customization examples are in "Connectivity and Customization Examples" on page 253.

10.2.7 X.25 Single Link Multi-Host

The following diagram illustrates a possible use for the 3174 Controller SLMH support in an X.25 network.

You can define up to eight X.25 hosts over the 3174 primary communications adapter and up to four on each of the two possible CCAs. This makes a theoretical maximum of 16 X.25 hosts for each 3174.
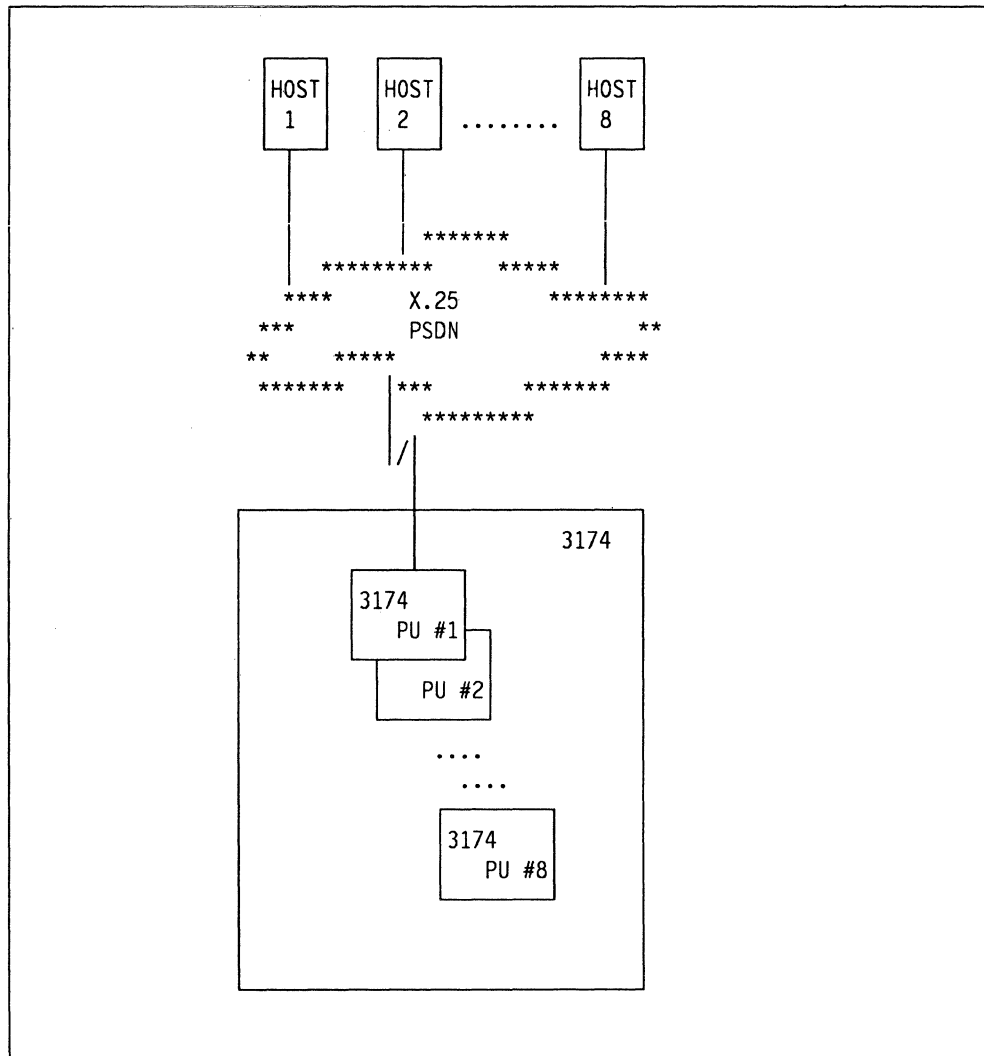
Figure 91. X.25 Single Link Multi-Host

For more information on X.25 SLMH refer to "3174 and X.25 Support" on page 133, and for customization detail see "Connectivity and Customization Examples" on page 253.

10.2.8 Multiple Connectivity

Below is an example using multiple CCAs that could, in practice connect to different customer networks. You have the "primary" connection into the 37XX and Host A. The user can then jump into the 9370 session on the first CCA, and then jump again into the X.25 network via the second CCA. Host A has no network definitions for either of the CCAs in this example.

```
  ┌─────────────┐      ┌──────────────┐
  │             │      │  ┌───┐       │
  │   Host A    │      │  │ICA│ 9370  │
  │             │      │  └───┘       │
  └──────┬──────┘      └────┬─────────┘
         │                  │      ********
         │                  │    *****      *****
  ┌──────┴──┐               │   ****  X.25   ****
  │  3745   │               │   **           ***
  └──────┬──┘               │    ****      *****
         │                  │     **********
         │                  │           │
         │                  │           │
        /│                 \│           │
         │                  │   ┌───────┘
         │                  │   │
  ┌───┐  │   ┌──────┬───┬───┐
  │ T ├──┼───┤ 3174 │ C │ C │
  └───┘  │   │      │ C │ C │
         │   │      │ A │ A │
             └──────┴───┴───┘
```
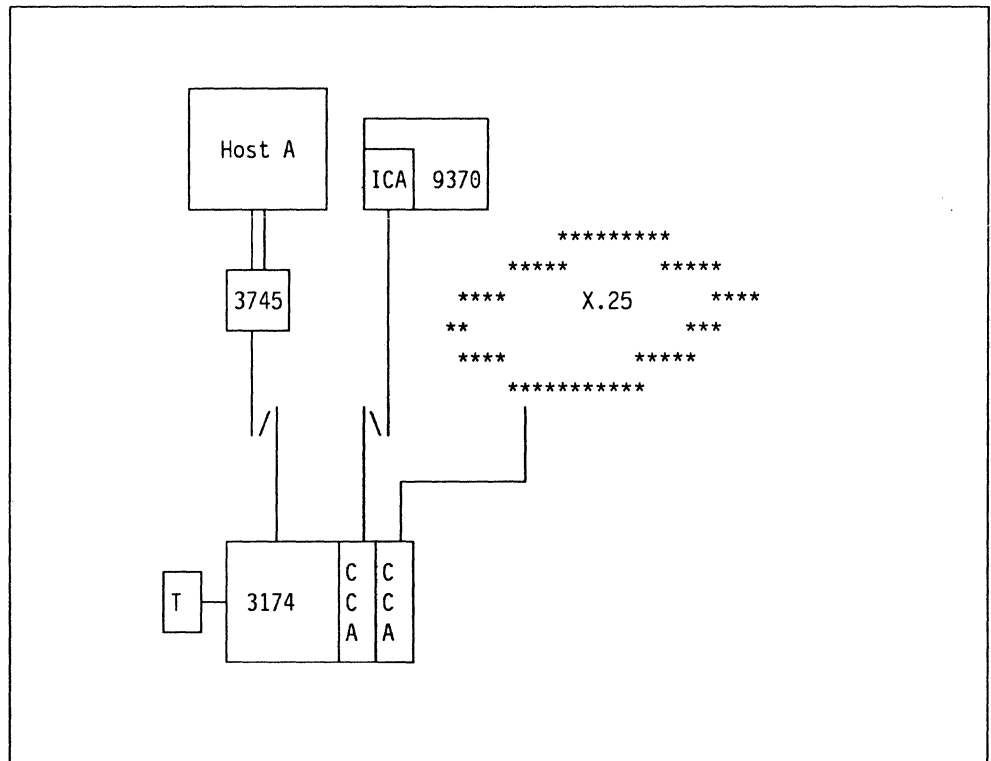
Figure 92. Multiple Connection Example

10.3 Customizing for Multiple Host

All the design scenarios shown here use the "Multi Host" function of the 3174 which has to be selected at the start of the 3174 customization.

```
BKBCP999 _____ Model / Attach _____ 3174/RAPP48



    098 -

    099 - DSPU WITH SLMH AND CCA

    100 - 13R

    101 - M




CMD===►
```

From the main selection menu, this panel is the first presented when customization has been selected.

- **Q.099** This question allows you to put "useful" reference information about the device, which can be viewed from a NetView CSCF screen.

- **Q.100** Here you code the model of 3174 being configured. We are customizing a 3174-13R, a downstream token-ring device.

- **Q.101** This is where you set the customization sequence for *multi-host* support. By coding a **M** to this question you are presented with the next panel.

This is the *Multi-Host Definition* panel.

- For host ID **1A** we code the *physical* link, in this example we specify a host attach of **7** to define this link for Token-Ring

- Host ID **2A** is a CCA link; as such, we have to specify its *physical* link in the host attach column, in our case a V.24 SDLC line.

- Host ID **1B** and **1C** are SLMH (logical) sessions, so they default to to the physical attributes of host *1A*.

```
BKBCP999 _____ Multi-Host Definition _____ 3174/RAPP48

Select a Host ID and press ENTER

Host    Adapter   Host      Hardware   Include   Host Descriptor
ID      Type      Attach    Group      in IML

1A                7                               GATEWAY_LINK_1_____
2A      1         2         51         1          CCA_HOST_LINK_2_____
3A      -         -         -                     _____
1B                                     1          GATEWAY_LINK_3_____
1C                                     1          GATEWAY_LINK_4_____
 -                                     -          _____
 -                                     -          _____
 -                                     -          _____
 -                                     -          _____
 -                                     -          _____

CMD===>
```

The *Host Descriptor* field is where you code a description of each host session. As you customize each host in turn by selecting the host ID in the command line, the descriptor field of the relevant host selected is displayed in all the panels, so you know what host you are defining.

Once a host has been selected, the customization process and panels are the same as if just coding a "standard" single link 3174.

11. Connectivity and Customization Examples

The following examples are configurations that were set up in the International Technical Support Center.

For a detailed account of a specific function you should consult the relevant chapter in this book, plus the *IBM 3174 Establishment Controller Planning Guide*.

```
          ┌──────────┐      ┌──────────┐
          │          │      │┌───┐     │
          │  Host A   │      ││ICA│ 9370│
          │          │      │└───┘     │
          └────┬─────┘      └──┬───────┘
               ║                │        ********
               ║                │      *****        *****
          ┌────╨────┐           │     ****    X.25     ****
          │  3745   │           │     **              ***
          └────┬────┘           │      ****        *****
               │                │        ***********
               │                │
              /│               \│        ┌───────┐
               │                │        │
               │                │        │
               │                └──────┐ │
          ┌────┴─────┬───┬───┐   ┌─────┘ │
     ┌──┐ │          │ C │ C │   │
     │T ├─┤  3174    │ C │ C │
     └──┘ │          │ A │ A │
          └──────────┴───┴───┘
```
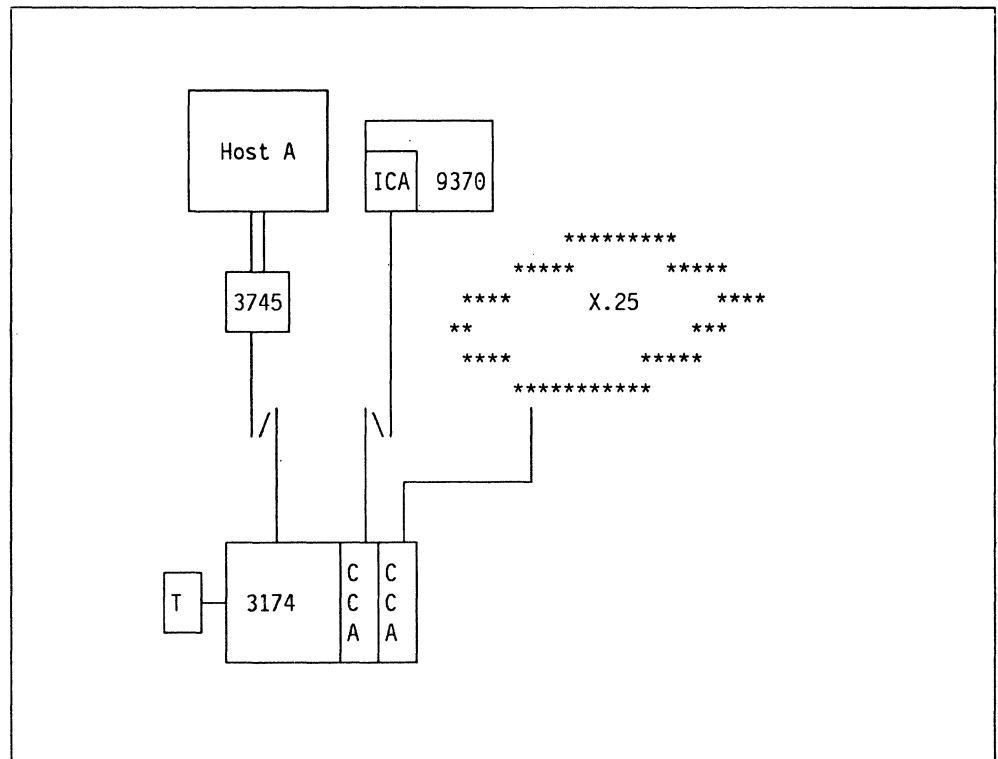
The format of all the examples is:

- A diagram of the scenario plus a brief description
- 3174 customization panels
- NCP and VTAM definitions.

All the 3174 panels used here were extracted from the 3174 to a NetView console using the CSCF function.
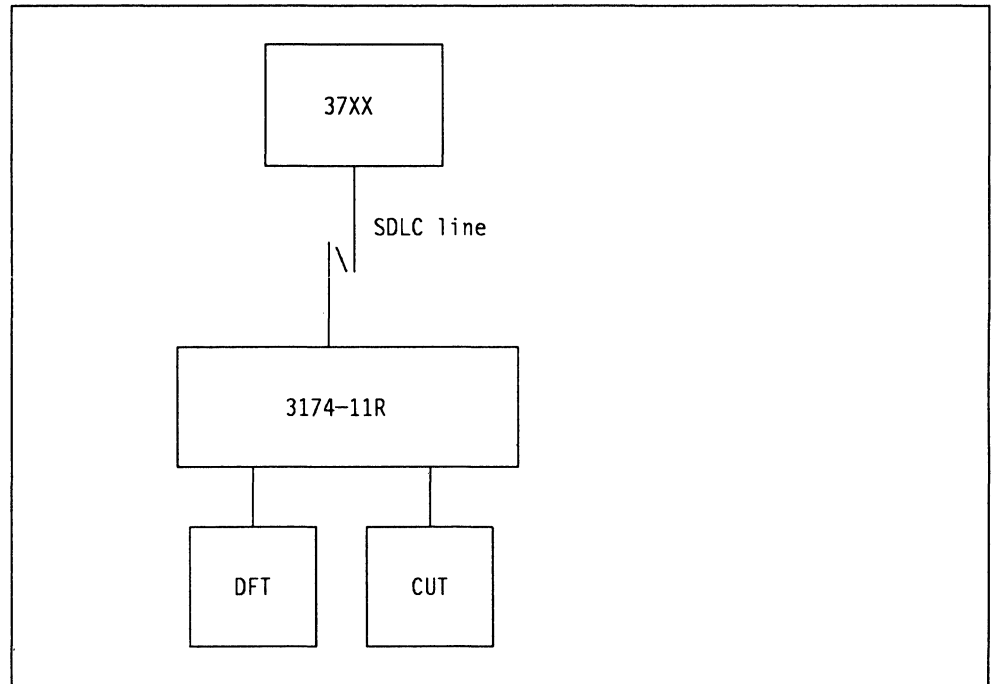
Figure 93. Remote 3174

This is an example of a remote 3174 connected over an SDLC line (line #08), attached to a 3725 running NCP V4.3.1.

This is the first panel required, it includes:

- Q.099 user information
- Q.100 state model of 3174 (remote V.24)
- Q.101 Host connection type (2=SDLC)

```
BKBCP999 _____ SDLC _____ 3174/P13088A

184 - C1          185 - 88      188 - 23N6583  118 - 1        116 - 1_ _

121 - 81          123 - 1       125 - 88188188  126 - 88888888  127 - 5 3

132 - 8 8 8 8      136 - 1 1 1 1  137 - 8 8 8 8   138 - 8

141 - A           158 - 8       165 - 1        166 - A        168 - 8

173 - 18188181     175 -         179 - 8 8 8

213 - 1           215 - 88888    228 - 8

318 - 8           313 - 1       317 - 8        318 - 8        348 - 8

365 - 8           378 - 1
```

This is where you define the SDLC line to the host.

- Q.104 PU polling address **1**

- Q.116 Port assignment, see "Planning for Port Assignment" on page 44.

```
BKBCP999 _____ 117: Port Assignment _____ 3174/P13088A

         Host addresses                    Host addresses
Port  IS 1  2   3  4  5           Port  IS 1  2   3  4  5
26-00 2 002 010 __ __ __          26-01 2 003 011 __ __ __
26-02 2 004 012 __ __ __          26-03 2 005 013 __ __ __
26-04 2 006 014 __ __ __          26-05 2 007 015 __ __ __
26-06 2 008 016 __ __ __          26-07 2 009 017 __ __ __
26-08 0 __ __ __ __ __            26-09 0 __ __ __ __ __
26-10 0 __ __ __ __ __            26-11 0 __ __ __ __ __
26-12 0 __ __ __ __ __            26-13 0 __ __ __ __ __
26-14 0 __ __ __ __ __            26-15 0 __ __ __ __ __
26-16 0 __ __ __ __ __            26-17 0 __ __ __ __ __
26-18 0 __ __ __ __ __            26-19 0 __ __ __ __ __
26-20 0 __ __ __ __ __            26-21 0 __ __ __ __ __
26-22 0 __ __ __ __ __            26-23 0 __ __ __ __ __
26-24 0 __ __ __ __ __            26-25 0 __ __ __ __ __
26-26 0 __ __ __ __ __            26-27 0 __ __ __ __ __
26-28 0 __ __ __ __ __            26-29 0 __ __ __ __ __
26-30 0 __ __ __ __ __            26-31 0 __ __ __ __ __
```

Here we define (on the host definitions still) that we are allocating two sessions to each terminal on ports 26-00 through 26-07. **2**

```
BKBCP999 _____ Logical Terminal Assignment _____ 3174/P13088A
                                          001=2

Port LT1 LT2 LT3 LT4 LT5          Port LT1 LT2 LT3 LT4 LT5

26-00 1A1 1A2 __ __ __            26-01 1A1 1A2 __ __ __
26-02 1A1 1A2 __ __ __            26-03 1A1 1A2 __ __ __
26-04 1A1 1A2 __ __ __            26-05 1A1 1A2 __ __ __
26-06 1A1 1A2 __ __ __            26-07 1A1 1A2 __ __ __
26-08 __ __ __ __ __              26-09 __ __ __ __ __
26-10 __ __ __ __ __              26-11 __ __ __ __ __
26-12 __ __ __ __ __              26-13 __ __ __ __ __
26-14 __ __ __ __ __              26-15 __ __ __ __ __
26-16 __ __ __ __ __              26-17 __ __ __ __ __
26-18 __ __ __ __ __              26-19 __ __ __ __ __
26-20 __ __ __ __ __              26-21 __ __ __ __ __
26-22 __ __ __ __ __              26-23 __ __ __ __ __
26-24 __ __ __ __ __              26-25 __ __ __ __ __
26-26 __ __ __ __ __              26-27 __ __ __ __ __
26-28 __ __ __ __ __              26-29 __ __ __ __ __
```

Here we are defining what sessions the coax attached devices will have. All the above terminals have two sessions 1A1 and 1A2, 1A1 will be the first active session when the terminal is powered on.

```
***********************************************************************
*  L13008 IS THE SUBAREA-LINE (1)
L13008    LINE ADDRESS=(08,HALF),ANS=CONTINUE,CLOCKNG=EXT,DUPLEX=(HALF),*
               ETRATIO=30,ISTATUS=ACTIVE,LPDATS=LPDA2,MAXPU=10,          *
               NPACOLL=YES,PAUSE=.5,SERVLIM=10,SPEED=9600,               *
               SRT=(,64)
***********************************************************************
*         SERVICE MACRO SPECIFICATION FOR SDLC (LINE 008)              *
***********************************************************************
          SERVICE MAXLIST=10,ORDER=(P13008A,RADP08B,P13008C,P13008D,P130*
               08E,P13008F)
***********************************************************************
P13008A  PU ADDR=C1, 1 DISCNT=(NO),MAXDATA=521,
               ISTATUS=ACTIVE,MAXOUT=7,
               PACING=0,PASSLIM=8,PUDR=YES,PUTYPE=2,RETRIES=(,4,5),
               SSCPFM=USSSCS,USSTAB=US327X,VPACING=0
T13008A1 LU LOCADDR=2 2
T13008A2 LU LOCADDR=3
T13008A3 LU LOCADDR=4
T13008A4 LU LOCADDR=5
T13008A5 LU LOCADDR=6
T13008A6 LU LOCADDR=7
T13008A7 LU LOCADDR=8
T13008A8 LU LOCADDR=9
T13008A9 LU LOCADDR=10
T13008AA LU LOCADDR=11
T13008AB LU LOCADDR=12
T13008AC LU LOCADDR=13
T13008AD LU LOCADDR=14
T13008AE LU LOCADDR=15
T13008AF LU LOCADDR=16
T13008B0 LU LOCADDR=17
***********************************************************************
```

Notes:

1 Question 104 should match the value of the PU ADDR.

2 The addresses defined in the 3174 panel should match the LU statements and the LOCADDR value specified.

11.2 Local 3174 with Concurrent Communication Adapter
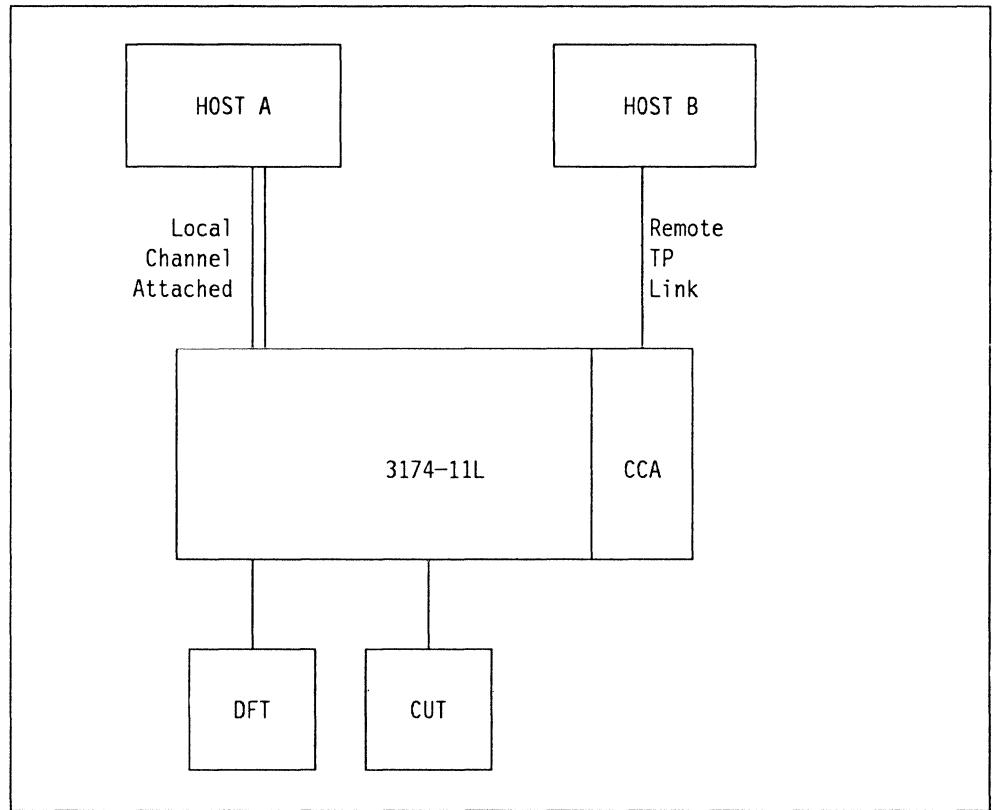
Figure 94. Concurrent Communication Adapter in the 3174

This example is a channel attached 3174 which has a Concurrent Communication Adapter installed. The CCA is attached to a SDLC line which goes back to host B; this could in fact be the same host and the same sessions, with the CCA being used as an alternate route to the channel.

This is the first panel where we set the host connectivity. In this example we have the CCA active, so we have to code Question 101 for multi-host support by coding an **M**.

```
BKBCP999 _____ Multi-Host Definition _____ 3174/RAPP40

Select a Host ID and press ENTER

Host  Adapter  Host     Hardware  Include   Host Descriptor
ID    Type     Attach   Group     in IML

1A             5                            LOCAL_HOST_LINK_____
2A    1        2        51        1         CCA_HOST_LINK_____
3A    -        -        —         -         _____
—                                -         _____
—                                -         _____
—                                -         _____
—                                -         _____
—                                -         _____
—                                -         _____
—                                -         _____
```

See the discussion in "Multi-Host Connectivity" on page 239 for a complete description of the multi-host customization panel. Here we are just defining our channel as an SNA link, and a CCA as a secondary SDLC link. **3**

```
BKBCP999 _____ Local (SNA) _____ 3174/RAPP40
         1A = LOCAL HOST LINK

104 - 40      105 - 00      108 - 23N6233  110 - 1      116 - 1_ __

121 - 01      123 - 0       125 - 00000000  126 - 00000000  127 - 0 0

132 - 0 0 0 0  136 - 1 1 1 1  137 - 0 0 0 0  138 - 0

141 - A       150 - 0       165 - 0        166 - A      168 - 0

173 - 00000000  175 -       179 - 0 0 0

213 - 1       215 - 00000   220 - 0

222 - 1       223 - 10      224 - 3        225 - 4
```

After selecting *1A* on the command line you are presented with the standard host panel for channel definitions. This would be customized referencing the VBUILD statement in VTAMLIST.

- Q.104 **1**

Note: You know what host you are defining by the information line at the top of the panel. This is taken from the descriptor field that you customized in the previous panel.

```
BKBCP999 _____ 117: Port Assignment _____ 3174/RAPP40
                   1A = LOCAL HOST LINK
         Host addresses                    Host addresses
Port IS 1   2    3 4 5       Port IS 1   2    3 4 5
26-00 2 002 010 __ __ __     26-01 2 003 011 __ __ __
26-02 2 004 012 __ __ __     26-03 2 005 013 __ __ __
26-04 2 006 014 __ __ __     26-05 2 007 015 __ __ __
26-06 2 008 016 __ __ __     26-07 2 009 017 __ __ __
26-08 0 __ __ __ __ __       26-09 0 __ __ __ __ __
26-10 0 __ __ __ __ __       26-11 0 __ __ __ __ __
26-12 0 __ __ __ __ __       26-13 0 __ __ __ __ __
26-14 0 __ __ __ __ __       26-15 0 __ __ __ __ __
26-16 0 __ __ __ __ __       26-17 0 __ __ __ __ __
26-18 0 __ __ __ __ __       26-19 0 __ __ __ __ __
26-20 0 __ __ __ __ __       26-21 0 __ __ __ __ __
26-22 0 __ __ __ __ __       26-23 0 __ __ __ __ __
26-24 0 __ __ __ __ __       26-25 0 __ __ __ __ __
26-26 0 __ __ __ __ __       26-27 0 __ __ __ __ __
26-28 0 __ __ __ __ __       26-29 0 __ __ __ __ __
26-30 0 __ __ __ __ __       26-31 0 __ __ __ __ __
```

Define how many sessions are available on the primary link; again, this will be specified in the VBUILD statement. **2**

Again, you know what host these definitions are for by the ID field at the top of the panel.

See "Planning for Port Assignment" on page 44 for details on this panel.

Local 3174 VTAM Definitions

```
*----------------------------------------------------------------------*
*          LOCAL 3274-1A DEFINITIONS FOR AOC                           *
*----------------------------------------------------------------------*
HSNA040 VBUILD TYPE=LOCAL
RAPP40   PU    CUADDR=E40 ▉ ,ISTATUS=ACTIVE,PUTYPE=2,MAXBFRU=10,*
               MODETAB=AMODETAB,DLOGMOD=M2SDLCQ,USSTAB=US327X,          *
               VPACING=0
*
RAPT400 LU     LOCADDR=2 ▉
RAPT401 LU     LOCADDR=3
RAPT402 LU     LOCADDR=4
RAPT403 LU     LOCADDR=5
RAPT404 LU     LOCADDR=6
RAPT405 LU     LOCADDR=7
RAPT406 LU     LOCADDR=8
RAPT407 LU     LOCADDR=9
RAPT408 LU     LOCADDR=10
RAPT409 LU     LOCADDR=11
RAPT4010 LU    LOCADDR=12
RAPT4011 LU    LOCADDR=13
RAPT4012 LU    LOCADDR=14
RAPT4013 LU    LOCADDR=15
RAPT4014 LU    LOCADDR=16
RAPT4015 LU    LOCADDR=17
*----------------------------------------------------------------------*
```

Notes:

▉ Question 104 should match the CUADDR value in the VBUILD statement as shown above.

▉ The port definitions defined on the 3174 port assignment panel should match the LOCADDR values as defined in the VBUILD for all the LUs.

▉ All the definitions so far have been for the *primary link;* we selected this by typing *1A* on the multi-host panel. On the following pages we discuss the CCA definitions.

```
┌─────────────────────────────────────────────────────────┐
│  BKBCP999  ──────────── SDLC ──────────── 3174/RAPP40     │
│                    2A = CCA HOST LINK                      │
│                                                            │
│   104 - C1      105 - 00              110 - 1    116 - 1_ _ │
│                                                            │
│                        125 - 00*****0         127 - 0 0    │
│                                                            │
│                                               139 - 00     │
│                                                            │
│                 150 - 0    165 - 1                         │
│                                                            │
│                            179 - 0 0 0                     │
│                                                            │
│   213 - 1       215 - 00000  220 - 0                       │
│                                                            │
│   310 - 0       313 - 1    317 - 0    318 - 0    340 - 0   │
│                                                            │
│   365 - 0       370 - 1                                    │
│                                                            │
└─────────────────────────────────────────────────────────┘
```

Here we define the secondary host link; in our case this is a SDLC defined V.24 link. **4**

- Q.104 **5**

Note: The host descriptor ID is now showing "2A = CCA HOST LINK" on the information line.

```
┌─────────────────────────────────────────────────────────┐
│  BKBCP999  ─────── 117: Port Assignment ─────── 3174/RAPP40 │
│                    2A = CCA HOST LINK                      │
│           Host addresses                 Host addresses    │
│  Port IS 1  2  3  4  5        Port IS 1  2  3  4  5        │
│  26-00 2 002 010 __ __ __     26-01 2 003 011 __ __ __     │
│  26-02 2 004 012 __ __ __     26-03 2 005 013 __ __ __     │
│  26-04 2 006 014 __ __ __     26-05 2 007 015 __ __ __     │
│  26-06 2 008 016 __ __ __     26-07 2 009 017 __ __ __     │
│  26-08 0 __ __ __ __ __       26-09 0 __ __ __ __ __       │
│  26-10 0 __ __ __ __ __       26-11 0 __ __ __ __ __       │
│  26-12 0 __ __ __ __ __       26-13 0 __ __ __ __ __       │
│  26-14 0 __ __ __ __ __       26-15 0 __ __ __ __ __       │
│  26-16 0 __ __ __ __ __       26-17 0 __ __ __ __ __       │
│  26-18 0 __ __ __ __ __       26-19 0 __ __ __ __ __       │
│  26-20 0 __ __ __ __ __       26-21 0 __ __ __ __ __       │
│  26-22 0 __ __ __ __ __       26-23 0 __ __ __ __ __       │
│  26-24 0 __ __ __ __ __       26-25 0 __ __ __ __ __       │
│  26-26 0 __ __ __ __ __       26-27 0 __ __ __ __ __       │
│  26-28 0 __ __ __ __ __       26-29 0 __ __ __ __ __       │
│  26-30 0 __ __ __ __ __       26-31 0 __ __ __ __ __       │
└─────────────────────────────────────────────────────────┘
```

This panel defines how many host sessions are allocated on the secondary CCA link.

We are defining 16 host sessions here but we are assigning those sessions to only eight coaxial ports in this example, 26-00 through 26-07. **6**

See "Planning for Port Assignment" on page 44 for detail on this panel.

```
┌─────────────────────────────────────────────────────────┐
│  BKBCP999  ─────── Logical Terminal Assignment ─── 3174/RAPP40 │
│                            801=2                           │
│                                                            │
│  Port LT1 LT2 LT3 LT4 LT5     Port LT1 LT2 LT3 LT4 LT5    │
│                                                            │
│  26-00 1A1 1A2 2A1 2A2 ___    26-01 1A1 1A2 2A1 2A2 ___   │
│  26-02 1A1 1A2 2A1 2A2 ___    26-03 1A1 1A2 2A1 2A2 ___   │
│  26-04 1A1 1A2 2A1 2A2 ___    26-05 1A1 1A2 2A1 2A2 ___   │
│  26-06 1A1 1A2 2A1 2A2 ___    26-07 1A1 1A2 2A1 2A2 ___   │
│  26-08 __ __ __ __ __         26-09 __ __ __ __ __        │
│  26-10 __ __ __ __ __         26-11 __ __ __ __ __        │
│  26-12 __ __ __ __ __         26-13 __ __ __ __ __        │
│  26-14 __ __ __ __ __         26-15 __ __ __ __ __        │
│  26-16 __ __ __ __ __         26-17 __ __ __ __ __        │
│  26-18 __ __ __ __ __         26-19 __ __ __ __ __        │
│  26-20 __ __ __ __ __         26-21 __ __ __ __ __        │
│  26-22 __ __ __ __ __         26-23 __ __ __ __ __        │
│  26-24 __ __ __ __ __         26-25 __ __ __ __ __        │
│  26-26 __ __ __ __ __         26-27 __ __ __ __ __        │
│  26-28 __ __ __ __ __         26-29 __ __ __ __ __        │
└─────────────────────────────────────────────────────────┘
```

Here we allocate at the *Port* level, what sessions each terminal will have.

In our example, all the sessions are defined the same, each terminal when powered on will come up with session *1A1* on the screen. By using the change screen key they will then have session *1A2* (still on the channel link), then sessions *2A1*, and *2A2* on the CCA link.

```
**********************************************************************
*  L1300A IS THE SUBAREA-LINE (1)
L1300A    LINE ADDRESS=(0A,HALF),ANS=CONTINUE,CLOCKNG=EXT,DUPLEX=(HALF),
             ETRATIO=30,ISTATUS=ACTIVE,LPDATS=LPDA2,MAXPU=10,
             NPACOLL=YES,PAUSE=.5,SERVLIM=10,SPEED=9600,
             SRT=(,64)
**********************************************************************
*         SERVICE MACRO SPECIFICATION FOR SDLC (LINE 00A)           *
**********************************************************************
          SERVICE MAXLIST=10,ORDER=(P1300AA,RADP0AB,P1300AC,P1300AD,P130*
             0AE,P1300AF)
**********************************************************************
P13008A  PU ADDR=C1, ▐5▌ DISCNT=(NO),MAXDATA=521,
             ISTATUS=ACTIVE,MAXOUT=7,
             PACING=0,PASSLIM=8,PUDR=YES,PUTYPE=2,RETRIES=(,4,5),
             SSCPFM=USSSCS,USSTAB=US327X,VPACING=0
T13008A1 LU LOCADDR=2 ▐6▌
T1300AA2 LU LOCADDR=3
T1300AA3 LU LOCADDR=4
T1300AA4 LU LOCADDR=5
T1300AA5 LU LOCADDR=6
T1300AA6 LU LOCADDR=7
T1300AA7 LU LOCADDR=8
T1300AA8 LU LOCADDR=9
T1300AA9 LU LOCADDR=10
T1300AAA LU LOCADDR=11
T1300AAB LU LOCADDR=12
T1300AAC LU LOCADDR=13
T1300AAD LU LOCADDR=14
T1300AAE LU LOCADDR=15
T1300AAF LU LOCADDR=16
T1300AB0 LU LOCADDR=17
**********************************************************************
```

Notes:

▐4▌ This is the CCA secondary link definition; this panel was selected by typing *2A* on the command line on the "multi-host" definition panel.

▐5▌ As in the channel definitions on the previous page Question 104 is the host polling address; on the CCA this is the ADDR value from the PU definition.

▐6▌ As before, you customize the 3174 "Port Assignment" panel with the same number of devices as specified in the LU statement of the NCP for this line.

11.3 Single Link Multi-Host

11.3.1 Token-Ring SLMH
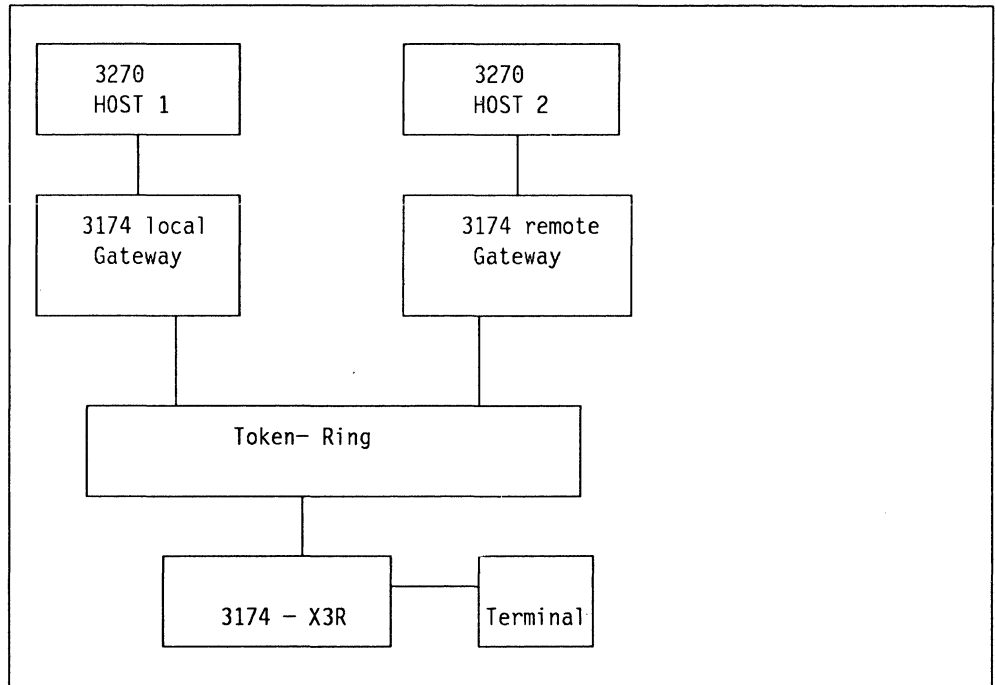
Figure 95. Single Link Multi-Host Connectivity

In this example we have a DSPU (3174-13R) that's set up to have two host sessions over the Token-Ring. The terminal on the DSPU has one session over the *local* gateway and another over the *remote* gateway.

For complete details on how to customize a gateway you should refer to "3174 Gateways" on page 60.

```
BKBCP999 _____ Model / Attach _____ 3174/RAPP41




  098 -

  099 - DSPU WITH SLMH

  100 - 63R

  101 - M


```
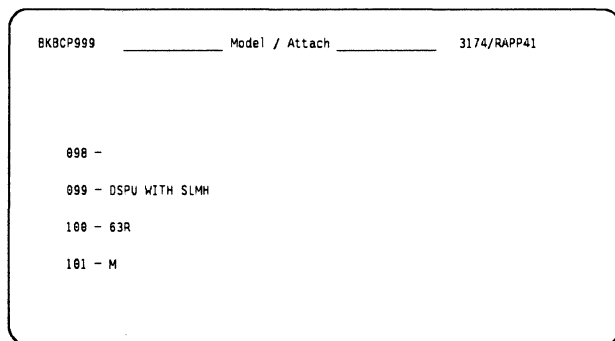
This DSPU will have connections for two hosts; we code **M** to give us the multi-host panel.

```
┌─────────────────────────────────────────────────────────┐
│  BKBCP999    _____ Multi-Host Definition _____    3174/RAPP41 │
│                                                         │
│  Select a Host ID and press ENTER                       │
│                                                         │
│  Host   Adapter   Host      Hardware   Include   Host Descriptor │
│  ID     Type      Attach    Group      in IML                    │
│                                                         │
│  1A       .        7  .                         LOCAL_GATEWAY_LINK__ │
│  2A       _        _         _          _       _____ │
│  3A       _        _         _          _       _____ │
│  1B       _        _         _          I       REMOTE_GATEWAY_LINK_ │
│  ─                           _          _       _____ │
│  ─                           _          _       _____ │
│  ─                           _          _       _____ │
│  ─                           _          _       _____ │
│  ─                           _          _       _____ │
│  ─                           _          _       _____ │
│  ─                           _          _       _____ │
└─────────────────────────────────────────────────────────┘
```

Here we code the multi-host definitions; unlike the CCA example where we used *2A*, and *3A*, we are now coding for SLMH and are using the **same** physical link, so we add the second host as *1B*

```
┌─────────────────────────────────────────────────────────┐
│  BKBCP999    _____ Token-Ring Network _____    3174/RAPP41 │
│                     1A = LOCAL GATEWAY                    │
│                                                         │
│  106 - 4000 3174 9999 04    107 - 4000 0000 3174 04    108 - 23V2645 │
│                                                         │
│  110 - 1                    116 - 2_ __                 │
│                                                         │
│  121 - 01      123 - 1      125 - 00000000    126 - 00000000   127 - 5 3 │
│                                                         │
│  132 - 0 0 0 0              136 - 1 1 1 1     137 - 0 0 0 0    138 - 0 │
│                                                         │
│  141 - A                   165 - 0          166 - A          168 - 0 │
│                                                         │
│  173 - 00000000            175 -            179 - 0 0 0 │
│                                                         │
│  213 - 1                   215 - 00000      220 - 1     │
│                                                         │
│  382 - 2057                383 - 2          384 - 2     │
└─────────────────────────────────────────────────────────┘
```

This panel is displayed after we select *1A* on the command line of the previous panel. Here we set the *first or primary* link definitions. We are now specifying Token-Ring Adapters instead of polling addresses, as the SNA conversion has already been done in the gateway. See "3174 Gateways" on page 60 for details on coding the gateway.

- Q.106 **1**
- Q.107 **2**

```
┌─────────────────────────────────────────────────────────┐
│  BKBCP999    _____ 117: Port Assignment _____    3174/RAPP41 │
│                     1A = LOCAL GATEWAY                    │
│              Host addresses              Host addresses  │
│  Port  IS  1   2   3   4   5    Port  IS  1   2   3   4   5 │
│  26-00 1 002  __  __  __  __    26-01 1 003  __  __  __  __ │
│  26-02 1 004  __  __  __  __    26-03 1 005  __  __  __  __ │
│  26-04 1 006  __  __  __  __    26-05 1 007  __  __  __  __ │
│  26-06 1 008  __  __  __  __    26-07 1 009  __  __  __  __ │
│  26-08 1 010  __  __  __  __    26-09 1 011  __  __  __  __ │
│  26-10 1 012  __  __  __  __    26-11 1 013  __  __  __  __ │
│  26-12 1 014  __  __  __  __    26-13 1 015  __  __  __  __ │
│  26-14 1 016  __  __  __  __    26-15 1 017  __  __  __  __ │
│  26-16 0  __  __  __  __  __    26-17 0  __  __  __  __  __ │
│  26-18 0  __  __  __  __  __    26-19 0  __  __  __  __  __ │
│  26-20 0  __  __  __  __  __    26-21 0  __  __  __  __  __ │
│  26-22 0  __  __  __  __  __    26-23 0  __  __  __  __  __ │
│  26-24 0  __  __  __  __  __    26-25 0  __  __  __  __  __ │
│  26-26 0  __  __  __  __  __    26-27 0  __  __  __  __  __ │
│  26-28 0  __  __  __  __  __    26-29 0  __  __  __  __  __ │
│  26-30 0  __  __  __  __  __    26-31 0  __  __  __  __  __ │
└─────────────────────────────────────────────────────────┘
```

Here we are configuring one host session for each of the 16 ports; this matches the value in the VBUILD. **3**

Local Gateway Panels

```
┌─────────────────────────────────────────────────────────┐
│ BKBCP999            _____ Local (SNA) _____      3174/RAPP40 │
│                                                             │
│  104 - 40      105 - 46     108 - 23N6233  110 - 0      116 - 0 _ │
│                                                             │
│  121 - 01      123 - 0      125 - 00030000 126 - 00000000  127 - 5 3 │
│                                                             │
│  132 - 0 0 0 0 136 - 1 1 1 1 137 - 0 0 0 0  138 - 0      │
│                                                             │
│  141 - A       150 - 1      165 - 0        166 - A      168 - 0 │
│                                                             │
│  173 - 00000000 175 -       179 - 0 0 0    │
│                                                             │
│  213 - 1       215 - 00000  220 - 1        │
│                                                             │
│  222 - 1       223 - 10     224 - 3        225 - 4     │
└─────────────────────────────────────────────────────────┘
```

```
┌──────────────────────────────────────────────────────┐
│ BKBCP999          _____ 940: Ring Address Assignment _____    3174/RAPP40 │
│                                                          │
│  S     Ring Address   SAP   T      S     Ring Address   SAP   T │
│  40    4000 0000 3174  04                                 │
│  41    4000 3174 9999  04   1      42    XXXX XXXX XXXX  04   1 │
│  43    XXXX XXXX XXXX  04   0      44    XXXX XXXX XXXX  04   0 │
│  45    XXXX XXXX XXXX  04   0      46    XXXX XXXX XXXX  04   0 │
│                                                          │
└──────────────────────────────────────────────────────┘
```

In this panel from the gateway 3174 we see that Questions 104-105 specify the range of addresses through the gateway. These addresses are the same range as specified in the VBUILD statement.

Here we see the correlation between the SNA address *E41* and the Token-Ring Adapter. PU *RAPP41* has a token-ring address "400031749999". **1**

The gateway *E40* has a token-ring address of "40000003174". **2**

Local 3174 Definitions from VTAM

```
*-------------------------------------------------------------------------*
HSNA040 VBUILD TYPE=LOCAL
RAPP40   PU     CUADDR=E40 2 ,ISTATUS=ACTIVE,PUTYPE=2,MAXBFRU=10,
                MODETAB=AMODETAB,DLOGMOD=M2SDLCQ,USSTAB=US327X,
                VPACING=0
*
RAPT400 LU      LOCADDR=2
RAPT401 LU      LOCADDR=3
  :             :
RAPT40E LU      LOCADDR=17
*-------------------------------------------------------------------------*
RAPP41   PU     CUADDR=E41 1 ,ISTATUS=ACTIVE,PUTYPE=2,MAXBFRU=10,
                MODETAB=AMODETAB,DLOGMOD=M2SDLCQ,USSTAB=US327X,
                VPACING=0,SECNET=YES
*
RAPT410 LU      LOCADDR=2
RAPT411 LU      LOCADDR=3
  :             :
RAPT41E LU      LOCADDR=17 3
*-------------------------------------------------------------------------*
```

Notes:

1 Q.106 is the token-ring address of the DSPU whose real SNA address is CUADDR=E41.

2 Q.107 is the token-ring address of the upstream gateway.

3 LU definitions for the DSPU.

```
BKBCP999 _____ Token-Ring Network _____ 3174/RAPP41
                  18 = REMOTE GATEWAY

106 - 4000 3174 9999 04    107 - 4000 1111 3174 04

                          116 - 1_ __

                          125 - 00*****0                127 - 0 0


                          165 - 0

                                              179 - 0 0 0

                          215 - 00000        220 - 0      221 - 0

302 - 2057                383 - 2
```

Here we define our connection to "Host 2," the remote gateway. As with the local gateway definitions we code the token-ring address of the DSPU and the token-ring address of the *remote* gateway.

- Q.106 **4**
- Q.107 **5**

```
BKBCP999 _____ 117: Port Assignment _____ 3174/RAPP41
                  18 = REMOTE GATEWAY
        Host addresses                    Host addresses
Port IS 1  2  3  4  5             Port IS 1  2  3  4  5
26-00 1 002 __ __ __ __           26-01 1 003 __ __ __ __
26-02 1 004 __ __ __ __           26-03 1 005 __ __ __ __
26-04 1 006 __ __ __ __           26-05 1 007 __ __ __ __
26-06 1 008 __ __ __ __           26-07 1 009 __ __ __ __
26-08 1 010 __ __ __ __           26-09 1 011 __ __ __ __
26-10 1 012 __ __ __ __           26-11 1 013 __ __ __ __
26-12 1 014 __ __ __ __           26-13 1 015 __ __ __ __
26-14 1 016 __ __ __ __           26-15 1 017 __ __ __ __
26-16 0 __ __ __ __ __            26-17 0 __ __ __ __ __
26-18 0 __ __ __ __ __            26-19 0 __ __ __ __ __
26-20 0 __ __ __ __ __            26-21 0 __ __ __ __ __
26-22 0 __ __ __ __ __            26-23 0 __ __ __ __ __
26-24 0 __ __ __ __ __            26-25 0 __ __ __ __ __
26-26 0 __ __ __ __ __            26-27 0 __ __ __ __ __
26-28 0 __ __ __ __ __            26-29 0 __ __ __ __ __
26-30 0 __ __ __ __ __            26-31 0 __ __ __ __ __
```

We configure one host session for each of the 16 ports, on the remote host. This value equals the LU definitions in the NCP for PU RADP08B. **6**

```
BKBCP999 _____ Logical Terminal Assignment _____ 3174/RAPP41
                                              001=2

Port LT1 LT2 LT3 LT4 LT5           Port LT1 LT2 LT3 LT4 LT5

26-00 1A1 1B1 __ __ __             26-01 1A1 1B1 __ __ __
26-02 1A1 1B1 __ __ __             26-03 1A1 1B1 __ __ __
26-04 1A1 1B1 __ __ __             26-05 1A1 1B1 __ __ __
26-06 1A1 1B1 __ __ __             26-07 1A1 1B1 __ __ __
26-08 1A1 1B1 __ __ __             26-09 1A1 1B1 __ __ __
26-10 1A1 1B1 __ __ __             26-11 1A1 1B1 __ __ __
26-12 1A1 1B1 __ __ __             26-13 1A1 1B1 __ __ __
26-14 1A1 1B1 __ __ __             26-15 1A1 1B1 __ __ __
26-16 __ __ __ __ __               26-17 __ __ __ __ __
26-18 __ __ __ __ __               26-19 __ __ __ __ __
26-20 __ __ __ __ __               26-21 __ __ __ __ __
26-22 __ __ __ __ __               26-23 __ __ __ __ __
26-24 __ __ __ __ __               26-25 __ __ __ __ __
26-26 __ __ __ __ __               26-27 __ __ __ __ __
26-28 __ __ __ __ __               26-29 __ __ __ __ __
```

Using the LTA panel we now assign two host sessions to each coax port.

- *1A1* for Host 1.
- *1B1* for Host 2.

Remote Gateway Panels

```
BKBCP999 _____ Token-Ring Gateway _____ 3174/P13008A

900 - 4000 1111 3174 04    905 - 1         908 - IBMLAN

911 - 2                    912 - 00
```

```
BKBCP999 _____ 940: Ring Address Assignment _____ 3174/P13008A

S     Ring Address   SAP  T     S     Ring Address   SAP  T
C1   4000 1111 3174  04
C2   4000 3174 9999  04   0     C3   XXXX XXXX XXXX  04   0
C4   XXXX XXXX XXXX  04   0     C5   XXXX XXXX XXXX  04   0
C6   XXXX XXXX XXXX  04   0
```

Question 900 on the *remote 3174 gateway* definitions is where we define the token-ring address of its gateway. **5**

Here we code the token-ring addresses for our DSPU, the PU *RADP08B, (C2)* has an address of '400031749999'. **4**

NCP Source Example

```
****************************************************************
*
L13008   LINE ADDRESS=(08,FULL),ANS=CONTINUE,CLOCKNG=EXT,DUPLEX=(FULL),*
              ETRATIO=30,ISTATUS=ACTIVE,LPDATS=LPDA2,MAXPU=10,NPACOLL=*
              YES,PAUSE=.5,SERVLIM=10,SPEED=9600,SRT=(,64)
****************************************************************
P13008A  PU ADDR=C1 5 ,DISCNT=(NO),MAXDATA=521,MAXOUT=7,PACING=0,*
              PASSLIM=8,PUDR=YES,PUTYPE=2,RETRIES=(,4,5),SSCPFM=USSSCS,*
              USSTAB=US327X,VPACING=0,GP3174=AE
T13008A0 LU LOCADDR=2
T13008A1 LU LOCADDR=3
   :        :
T13008AE LU LOCADDR=17
****************************************************************
RADP08B  PU ADDR=C2 4 ,DISCNT=(NO),MAXDATA=265,MAXOUT=7,PACING=0,*
              PASSLIM=8,PUDR=YES,PUTYPE=2,RETRIES=(,4,5),SSCPFM=USSSCS,*
              USSTAB=US327X,VPACING=0,GP3174=AE
RADT08B0 LU LOCADDR=2
RADT08B1 LU LOCADDR=3
   :        :
RADT08BE LU LOCADDR=17 6
****************************************************************
```

Notes:

4 Q.106 is the token-ring address of the DSPU who's real SNA address is ADDR=C2.

5 Q.107 is the token-ring address of the upstream gateway.

6 LU definitions for the DSPU.

11.3.2 Token-Ring SLMH with CCA
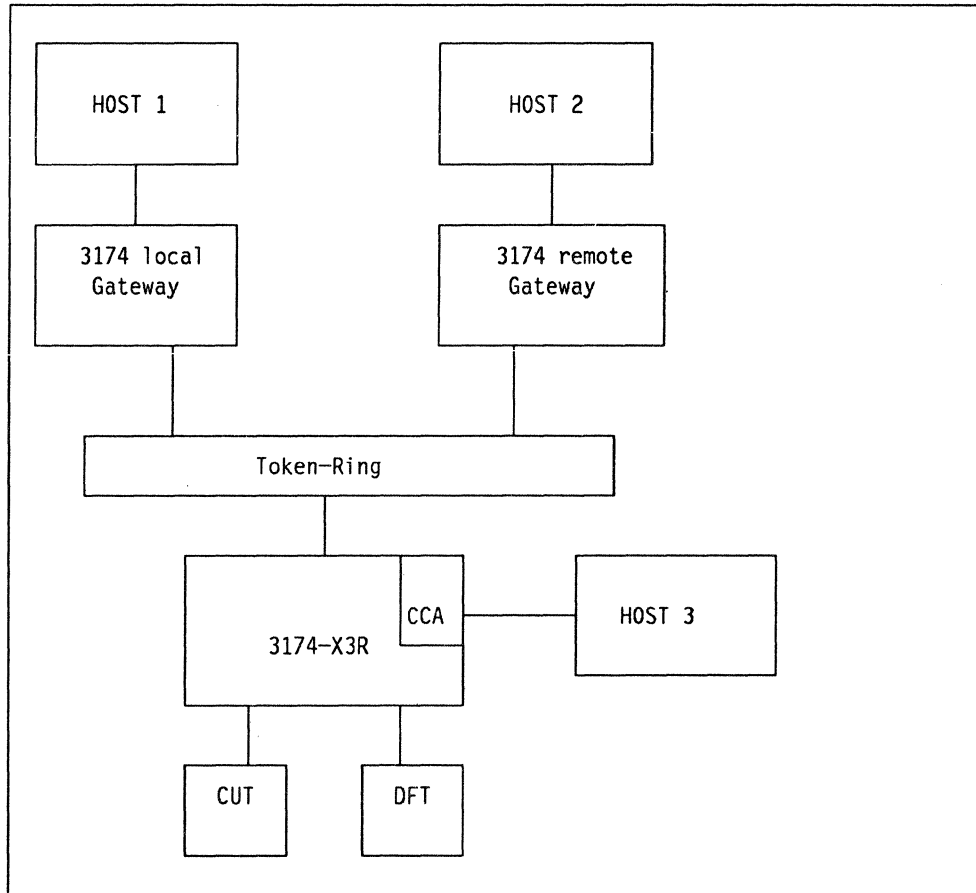
Figure 96. One CCA in a DSPU 3174 Linked to a Token-Ring with SLMH

This example is exactly the same as Figure 95 on page 265 but with the addition of a Concurrent Communication Adapter in the DSPU for a third host connection. This CCA link is a SDLC, V.24 line to an NCP, and as such is totally independent of the *primary* 3174 host connection.

The customization examples shown in "Single Link Multi-Host" on page 265 are exactly the same for the SLMH definitions here. The addition of the Concurrent Communication Adapter will require a change in the "Multi-Host Definitions" panel to add the third host.

```
BKBCP999 _____ Multi-Host Definition _____    3174/RAPP41

Select a Host ID and press ENTER

Host   Adapter   Host      Hardware   Include    Host Descriptor
 ID     Type    Attach      Group     in IML

 1A               7                              LOCAL_GATEWAY_LINK__
 2A       1       2          51         1        CCA LINK_____
 3A       -       -          —          -
 1B       -       -          —          1        REMOTE_GATEWAY_LINK_
 —                                      -        _____
 —                                      -        _____
 —                                      -        _____
 —                                      -        _____
 —                                      -        _____
 —                                      -        _____
 —                                      -        _____
```

After specifying **M** to Question 101, we are presented with this panel. Here we code the SLMH definitions *(1A, 1B)* and the CCA host *(2A)*.

```
BKBCP999 _____ SDLC _____    3174/RAPP41
                2A = CCA LINK

104 - C1    105 - 00                110 - 1    116 - 1_ _

                       125 - 00*****0          127 - 0 0

                                               139 - 00

            150 - 0    165 - 1

                       179 - 0 0 0

213 - 1     215 - 00000  220 - 0

310 - 0     313 - 1    317 - 0    318 - 0    340 - 0

365 - 0     370 - 1
```

After selecting *2A* on the command line of the "Multi-Host Definition" panel, we now customize the link from the CCA to Host 3. These definitions and the NCP examples are shown in "Local 3174 with Concurrent Communication Adapter" on page 259.

```
BKBCP999 _____ Logical Terminal Assignment _____    3174/RAPP41
                                              801=2

Port LT1 LT2 LT3 LT4 LT5          Port LT1 LT2 LT3 LT4 LT5

26-00 1A1 1B1 2A1 __ __           26-01 1A1 1B1 2A1 __ __
26-02 1A1 1B1 2A1 __ __           26-03 1A1 1B1 2A1 __ __
26-04 1A1 1B1 2A1 __ __           26-05 1A1 1B1 2A1 __ __
26-06 1A1 1B1 2A1 __ __           26-07 1A1 1B1 2A1 __ __
26-08 1A1 1B1 2A1 __ __           26-09 1A1 1B1 2A1 __ __
26-10 1A1 1B1 2A1 __ __           26-11 1A1 1B1 2A1 __ __
26-12 1A1 1B1 2A1 __ __           26-13 1A1 1B1 2A1 __ __
26-14 1A1 1B1 2A1 __ __           26-15 1A1 1B1 2A1 __ __
26-16 __ __ __ __ __              26-17 __ __ __ __ __
26-18 __ __ __ __ __              26-19 __ __ __ __ __
26-20 __ __ __ __ __              26-21 __ __ __ __ __
26-22 __ __ __ __ __              26-23 __ __ __ __ __
26-24 __ __ __ __ __              26-25 __ __ __ __ __
26-26 __ __ __ __ __              26-27 __ __ __ __ __
26-28 __ __ __ __ __              26-29 __ __ __ __ __
```

After defining the CCA host session as in "Local 3174 with Concurrent Communication Adapter" on page 259 and the SLMH sessions as in "Single Link Multi-Host" on page 265 we now assign the three host sessions to the 3174 coax ports.

Using the LTA panel we now assign two host sessions on the SLMH *(1A1, 1B1)* for each logical terminal, and a third host session *(2A1)* for the CCA link.

11.3.3 Token-Ring SLMH Gateway

Figure 97. Single Link Multi-Host Gateway

In this example the DSPU has two host connections. One over the channel link to Host A, and the second over the *gateway's* CCA to Host B.

Both the DSPU and the gateway will have multi-host support. The gateway 3174-11L will require the CCA to be configured, and the DSPU 3174-63R will require SLMH support.

Definitions for the Gateway 11L

```
BKBCP999 _____ Multi-Host Definition _____ 3174/RAPP40

Select a Host ID and press ENTER

Host    Adapter   Host      Hardware   Include   Host Descriptor
ID      Type      Attach    Group      in IML
1A                5                               LOCAL_HOST_LINK____
2A      1         2         51         1          CCA_HOST_LINK_____
3A      -         -         -          -          _____
-                            -         _____
-                            -         _____
-                            -         _____
-                            -         _____
-                            -         _____
-                            -         _____
```

On this panel (for the gateway box) we have to customize for the Concurrent Communication Adapter.

We define host *1A* as channel attached, and host *2A* as an SDLC line over the CCA.

The locally attached terminals are customized in the usual way, see "Local 3174 with Concurrent Communication Adapter" on page 259 for details.

```
BKBCP999 _____ Local (SNA) _____ 3174/RAPP40
              1A = LOCAL HOST LINK

104 - 40      105 - 46      108 - 23N6233   110 - 1      116 - 1_

121 - 01      123 - 0       125 - 00000000  126 - 00000000  127 - 0 0

132 - 0 0 0 0 136 - 1 1 1 1 137 - 0 0 0 0   138 - 0

141 - A       150 - 1       165 - 0         166 - A      168 - 0

173 - 00000000 175 -        179 - 0 0 0

213 - 1       215 - 00000   220 - 0

222 - 1       223 - 10      224 - 3         225 - 4
```

For the *channel* host 1, we define the host parameters as defined in the VBUILD statement.

- Q.104 Controller address **1**
- Q.105 Upper limit address **2**
- Q.150 Define this host as a gateway **3**

```
BKBCP999 _____ SDLC _____ 3174/RAPP40
              2A = CCA HOST LINK

104 - C1      105 - C6                    110 - 1      116 - 1_ _

                            125 - 00*****0              127 - 0 0

                                                        139 - 00

              150 - 1       165 - 1

                            179 - 0 0 0

213 - 1       215 - 00000   220 - 0

310 - 0       313 - 1       317 - 0        318 - 0      340 - 0

365 - 0       370 - 1
```

For the *CCA* host 2, we define the host parameters as defined in the NCP gen.

- Q.104 Controller address **4**
- Q.105 Upper limit address **5**
- Q.150 Define this host as a gateway too **3**

Local 3174 Definitions

```
HSNA040 VBUILD TYPE=LOCAL
RAPP40   PU     CUADDR=E40 [1] ,ISTATUS=ACTIVE,PUTYPE=2,MAXBFRU=10,
                MODETAB=AMODETAB,DLOGMOD=M2SDLCQ,USSTAB=US327X,
                VPACING=0
*
RAPT400 LU      LOCADDR=2
RAPT401 LU      LOCADDR=3
   :               :
RAPT40E LU      LOCADDR=17
*----------------------------------------------------------------------*
RAPP41   PU     CUADDR=E41 [2] ,ISTATUS=ACTIVE,PUTYPE=2,MAXBFRU=10,
                MODETAB=AMODETAB,DLOGMOD=M2SDLCQ,USSTAB=US327X,
                VPACING=0,SECNET=YES
*
RAPT410 LU      LOCADDR=2
RAPT411 LU      LOCADDR=3
   :               :
RAPT41E LU      LOCADDR=17
*----------------------------------------------------------------------*
```

NCP definitions

```
L13008   LINE ADDRESS=(08,FULL),ANS=CONTINUE,CLOCKNG=EXT,DUPLEX=(FULL),*
              ETRATIO=30,ISTATUS=ACTIVE,LPDATS=LPDA2,MAXPU=10,NPACOLL=*
              YES,PAUSE=.5,SERVLIM=10,SPEED=9600,SRT=(,64)
***********************************************************************
P13008A  PU ADDR=C1 [4] ,DISCNT=(NO),MAXDATA=521,MAXOUT=7,PACING=0,*
              PASSLIM=8,PUDR=YES,PUTYPE=2,RETRIES=(,4,5),SSCPFM=USSSCS,*
              USSTAB=US327X,VPACING=0,GP3174=AE
T13008A0 LU LOCADDR=2
T13008A1 LU LOCADDR=3
   :          :
T13008AE LU LOCADDR=17
***********************************************************************
RADP08B  PU ADDR=C2 [5] ,DISCNT=(NO),MAXDATA=265,MAXOUT=7,PACING=0,*
              PASSLIM=8,PUDR=YES,PUTYPE=2,RETRIES=(,4,5),SSCPFM=USSSCS,*
              USSTAB=US327X,VPACING=0,GP3174=AE
RADT08B0 LU LOCADDR=2
RADT08B1 LU LOCADDR=3
   :          :
RADT08BE LU LOCADDR=17
***********************************************************************
```

Notes:

[1] & [4] Q.104 is the polling address for each host.

[2] & [5] Q.106 specifies the address range using the gateway.

[3] Q.150 must be specified as 1, on *both* gateway host definitions as we want the DSPU to be able to use the CCA.

Host 1, Channel Gateway

```
BKBCP999            _____ Token-Ring Gateway _____      3174/RAPP40
                    1A = LOCAL HOST LINK

900 - 4000 0000 3174 04    905 - 1          900 - IBMLAN

911 - 1
```

```
BKBCP999            _____ 940: Ring Address Assignment _____      3174/RAPP40
                    1A = LOCAL HOST LINK

   S    Ring Address    SAP  T     S    Ring Address    SAP  T
   40   4000 0000 3174  04
   41   4000 3174 9999  04   1     42   XXXX XXXX XXXX  04   1
   43   XXXX XXXX XXXX  04   1     44   XXXX XXXX XXXX  04   0
   45   XXXX XXXX XXXX  04   0     46   XXXX XXXX XXXX  04   0
```

Host 2, CCA Gateway

```
BKBCP999            _____ Token-Ring Gateway _____      3174/RAPP40
                    2A = CCA HOST LINK

900 - 4000 0000 3174 08    905 - 1          900 - IBMLAN

911 - 1          912 - 00
```

```
BKBCP999            _____ 940: Ring Address Assignment _____      3174/RAPP40
                    2A = CCA HOST LINK

   S    Ring Address    SAP  T     S    Ring Address    SAP  T
   C1   4000 0000 3174  08
   C2   4000 3174 9999  04   0     C3   XXXX XXXX XXXX  04   0
   C4   XXXX XXXX XXXX  04   0     C5   XXXX XXXX XXXX  04   0
   C6   XXXX XXXX XXXX  04   0
```

On Host 1's *(channel gateway)* definitions we code the *gateway's token-ring address* in Question 900. **6**

On the panel displayed for Question 940 we have the first entry filled in for SNA address *40*.

S	Ring Address	Sap
40	4000 0000 3174	04 **6**
41	4000 3174 9999	04 **8**

SNA addr *41* is where we define the DSPU token-ring address.

On Host 2's *(CCA gateway)* definitions we again code the *gateway's token-ring address* in Question 900. **7**

On the panel displayed for Question 940 we have the first entry filled in for SNA addr *C1*.

S	Ring Address	Sap
C1	4000 0000 3174	08 **7**
C2	4000 3174 9999	04 **8**

SNA addr *C2* is where we define the DSPU token-ring address.

Notes:

6 You should note that the token-ring address is the same for both gateway definitions, but the **SAP ID is 04 for host 1.**

7 You should note that the token-ring address is the same for both gateway definitions, but the **SAP ID is 08 for host 2.**

8 The DSPU defined in both gateways has the same token-ring address and SAP ID.

DSPU Definitions

```
BKBCP999 _____ Multi-Host Definition _____ 3174/RAPP41

Select a Host ID and press ENTER

Host    Adapter   Host      Hardware   Include   Host Descriptor
ID      Type      Attach    Group      in IML

1A                7                               CHANNEL_GATEWAY____
2A       _        _         __         _          _____
3A       _        _         __         _          _____
1B                                     1          CCA_GATEWAY_____
__                                     _          _____
__                                     _          _____
__                                     _          _____
__                                     _          _____
__                                     _          _____
__                                     _          _____
```

Here we are defining the SLMH function.

Host *1A* and a "host attach" definition of **7** sets the upstream link as a Token-Ring Adapter.

Host *1B* is the session that will use the CCA of the gateway, see the next panels.

```
BKBCP999 _____ Token-Ring Network _____ 3174/RAPP41
               1A = CHANNEL GATEWAY

106 - 4000 3174 9999 04   107 - 4000 0000 3174 04   108 - 23V2645

110 - 1                   116 - 1_ __

121 - 01      123 - 1     125 - 00100100   126 - 00000000   127 - 0

132 - 0 0 0 0             136 - 1 1 1 1     137 - 0 0 0 0    138 - 0

141 - A                   165 - 0          166 - A          168 - 0

173 - 10100101           175 -             179 - 0 0 0

213 - 1                   215 - 00000       220 - 0

382 - 2057               383 - 2           384 - 2
```

Here we are defining *host 1A's* session.

- Q.106 4000 3174 9999 04 **8**
- Q.107 4000 0000 3174 04 **6**

Here we see the connection between the DSPU's first host connection to the gateway's *channel* defined link.

```
BKBCP999 _____ Token-Ring Network _____ 3174/RAPP41
               1B = CCA GATEWAY

106 - 4000 3174 9999 04   107 - 4000 0000 3174 08

                          116 - 1_ __

                          125 - 00*****0                   127 - 0 0

                          165 - 0

                                          179 - 0 0 0

                          215 - 00000      220 - 0         221 - 0

382 - 2057               383 - 2
```

Here we are defining *host 1B's* session.

- Q.106 4000 3174 9999 04 **8**
- Q.107 4000 0000 3174 08 **7**

Here we see the connection between the DSPU's second host connection to the gateway's *CCA* defined link.

11.3.4 Token-Ring SLMH Gateway with ESCON
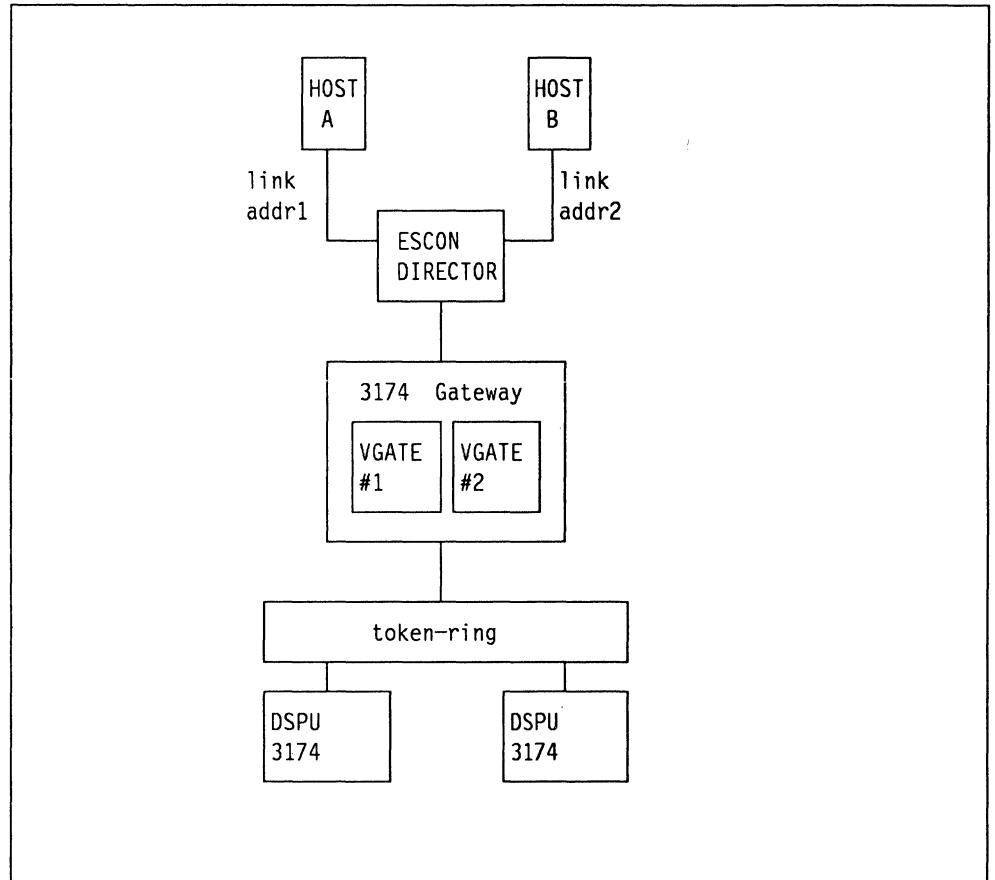
Figure 98. Single Link Multi-Host Gateway with ESCON

Here we are connecting a 3174-12L ESCON model to a ESCON Director and connecting to two hosts. The gateway has two *logical* gateways defined, one to each host.

As with the other SLMH examples we code a **M** to define the 3174 for multi-host connections.

```
BKBCP999              Model / Attach           3174/CSE60




098 -

099 - ESCON 3174 MULTIPLE GATEWAY

100 - 12L

101 - M
```

You should note that by coding the model as **12L** you default to the ESCON value of channels for the host connection value.

```
BKBCP999 _____ Multi-Host Definition _____ 3174/CSE60

Select a Host ID and press ENTER

Host    Adapter   Host     Hardware   Include   Host Descriptor
ID      Type      Attach   Group      in IML

1A                5                              PRIMARY_SNA_CH30____
__      _         _        __         _         _____
1B      _         _        __         1         VCU2_1B_CH37_____
__                         __         _         _____
__                                    _         _____
__                                    _         _____
__                                    _         _____
__                                    _         _____
__                                    _         _____
__                                    _         _____
```

On this panel we define the primary host as **5** for SNA Channel attach, in our case this goes to the **ESCON Director**. Host *1B* will default to the same.

```
BKBCP999 _____ Local (SNA) _____ 3174/CSE60
               1A = PRIMARY SNA CH30

104 - 60      105 - 6F      108 - 1234567   110 - 1        116 - 1_ _

121 - 01      123 - 0       125 - 00000100  126 - 00000000 127 - 0 0

132 - 0 0 0 0 136 - 1 1 1 1 137 - 0 0 0 0   138 - 0

141 - A       150 - 1       165 - 0         166 - A        168 - 1

173 - 00000000 175 -        179 - 1 0 1

213 - 1       215 - 00000   220 - 3

240 - 0       241 - 1
```

Selecting the *Primary Host* this panel is displayed:

- Q.104 **1** Controller address
- Q.105 **2** Upper Limit address
- Q.150 Define this host as a gateway
- Q.240 **3** Controller Logical address
- Q.241 **4** Maximum RU size.

```
BKBCP999 _____ 117: Port Assignment _____ 3174/CSE60
               1A = PRIMARY SNA CH30
          Host addresses                        Host addresses
Port IS 1  2  3  4  5               Port IS 1  2  3  4  5
26-00 1 002 __ __ __ __             26-01 1 003 __ __ __ __
26-02 1 004 __ __ __ __             26-03 1 005 __ __ __ __
26-04 0 __ __ __ __ __              26-05 0 __ __ __ __ __
26-06 0 __ __ __ __ __              26-07 0 __ __ __ __ __
26-08 0 __ __ __ __ __              26-09 0 __ __ __ __ __
26-10 0 __ __ __ __ __              26-11 0 __ __ __ __ __
26-12 0 __ __ __ __ __              26-13 0 __ __ __ __ __
26-14 0 __ __ __ __ __              26-15 0 __ __ __ __ __
26-16 0 __ __ __ __ __              26-17 0 __ __ __ __ __
26-18 0 __ __ __ __ __              26-19 0 __ __ __ __ __
26-20 0 __ __ __ __ __              26-21 0 __ __ __ __ __
26-22 0 __ __ __ __ __              26-23 0 __ __ __ __ __
26-24 0 __ __ __ __ __              26-25 0 __ __ __ __ __
26-26 0 __ __ __ __ __              26-27 0 __ __ __ __ __
26-28 0 __ __ __ __ __              26-29 0 __ __ __ __ __
26-30 0 __ __ __ __ __              26-31 0 __ __ __ __ __
```

Here we are just coding for a sample of four "local" attached terminals on the *primary host*.

```
BKBCP999 _____ Token-Ring Gateway _____ 3174/CSE60
               1A = PRIMARY SNA CH30

900 - 4000 0000 0000 04   905 - 1        900 - IBMLAN

911 - 2
```

- Q.900 T/R address of the gateway *SAP 04 for Host A*
- Q.911 Ring speed

```
BKBCP999            940: Ring Address Assignment _____    3174/CSE60
                 1A = PRIMARY SNA CH30

    S    Ring Address    SAP  T      S    Ring Address    SAP  T
    60  4000 0000 0000   04          
    61  4000 0000 0001   04   0     62  4000 0000 0002   04   0
    63  4000 0000 0003   04   0     64  4000 0000 0004   04   0
    65  XXXX XXXX XXXX   04   0     66  XXXX XXXX XXXX   04   0
```

Here we see the T/R address "4000 0000 0000" for the host A link. **1** with the SAP ID of "04".

Here we define the DSPUs token-ring addresses.

```
BKBCP999          941: Ring Transmission Definition _____    3174/CSE60
                 1A = PRIMARY SNA CH30

    S    Ring Address    SAP  F  W    S    Ring Address    SAP  F  W
    60  4000 0000 0000   04             
    61  4000 0000 0000   04   5  2   62  4000 0000 0002   04   5  2
    63  4000 0000 0003   04   5  2   64  4000 0000 0004   04   5  2
    65  XXXX XXXX XXXX   04   5  2   66  XXXX XXXX XXXX   04   5  2
```

You should note here the extra value that can be specified in the **F** field; a value of 5 indicates an 8K RU size, and can only be specified if O 241 **4** was set to 1.

Local 3174 Definitions for Primary Host

```
LSE00     VBUILD TYPE=LOCAL
CSE60     PU     CUADDR=E60 1 ,DISCNT=NO,ENCR=OPT,ISTATUS=ACTIVE,
                 PACING=0,PUTYPE=2,SSCPFM=FSS,VPACING=0,
                 MODETAB=LMT3270
SE0601    LU     LOCADDR=2,ISTATUS=ACTIVE
SE0602    LU     LOCADDR=3,ISTATUS=INACTIVE
SE0603    LU     LOCADDR=4,ISTATUS=INACTIVE
SE0604    LU     LOCADDR=5,ISTATUS=INACTIVE
   :                :
CSE6F     PU     CUADDR=E6F 2 ,DISCNT=NO,ENCR=OPT,ISTATUS=ACTIVE,
                 PACING=0,PUTYPE=2,SSCPFM=FSS,VPACING=0,
                 MODETAB=LMT3270
SE06F1    LU     LOCADDR=2,ISTATUS=ACTIVE
SE06F2    LU     LOCADDR=3,ISTATUS=INACTIVE
SE06F3    LU     LOCADDR=4,ISTATUS=INACTIVE
SE06F4    LU     LOCADDR=5,ISTATUS=INACTIVE
```

Notes:

1 This is the CUADDR value from VTAM.

2 Matches the upper range of devices defined through the gateway for the primary host.

3 This value is used by the ESCON director. The value can be in the range of "0-F"; the 15 possible addresses are used to switch between the hosts connected to the director. For the *Primary Host* we are on CHIPID 30 and in the **CNTLUNIT macro of the IOCP, CUADD=0** so we set Q.240 to "0". **VTAM CUADDR 60 - 6F are set on CHIPID 30 for Host A.**

4 This sets the RU size.

Definition Panels for Host B

```
┌─────────────────────────────────────────────────────────┐
│ BKBCP999            _____ Local (SNA) _____   3174/CSE60 │
│                  1B = VCU2 1B CH37                       │
│                                                         │
│  104 - 00      105 - 8F                        116 - 1_ _ │
│                                                         │
│                          125 - 00*****0        127 - 0 0 │
│                                                         │
│                                                         │
│                150 - 1      165 - 0                      │
│                                                         │
│                             179 - 1 0 1                  │
│                                                         │
│                215 - 00000  220 - 3        221 - 0       │
│                                                         │
│                                                         │
│  240 - 7                                                │
│                                                         │
└─────────────────────────────────────────────────────────┘
```

Here we see the panel for Host B when we select *1B* from the main screen:

* Q.104 **1** We are defining the CU address for Host B.

* Q.105 **2** Again the same upper limit range as in Host A.

* Q.150 Define this host as a gateway.

* Q.240 **3** Controller Logical Address .

```
┌─────────────────────────────────────────────────────────┐
│ BKBCP999          _____ Token-Ring Gateway _____  3174/CSE60 │
│                  1B = VCU2 1B CH37                       │
│                                                         │
│  900 - 4000 0000 0000 08    905 - 1'      908 - IBMLAN   │
│                                                         │
│  911 - 2                                                │
│                                                         │
│                                                         │
│                                                         │
└─────────────────────────────────────────────────────────┘
```

Here for Host B we set the **same** token-ring address as host A but with a **SAP ID 08**.

```
┌─────────────────────────────────────────────────────────┐
│ BKBCP9          _____ 940: Ring Address Assignment _____  3174/CSE60 │
│                  1B = VCU2 1B CH37                       │
│                                                         │
│  S    Ring Address    SAP  T     S    Ring Address  SAP  T │
│  80   4000 0000 0000  08                                 │
│  81   4000 0000 0001  04  0     82   4000 0000 0002  04  0 │
│  83   4000 0000 0003  04  0     84   4000 0000 0004  04  0 │
│  85   XXXX XXXX XXXX  04  0     86   XXXX XXXX XXXX  04  0 │
│                                                         │
└─────────────────────────────────────────────────────────┘
```

Here we define the DSPUs for *Host B*, these definitions are the same as for Host A.

```
┌─────────────────────────────────────────────────────────┐
│ BKBCP999          ____ 941: Ring Transmission Definition ____  3174/CSE00 │
│                  1B = VCU2 1B CH37                       │
│                                                         │
│  S    Ring Address    SAP  F  W   S    Ring Address  SAP  F  W │
│  80   4000 0000 0000  08                                 │
│  81   4000 0000 0001  04  5  2   82   4000 0000 0002  04  5  2 │
│  83   4000 0000 0003  04  5  2   84   4000 0000 0004  04  5  2 │
│  85   XXXX XXXX XXXX  04  5  2   86   XXXX XXXX XXXX  04  5  2 │
│                                                         │
└─────────────────────────────────────────────────────────┘
```

As in the example for Host A we define the "ring transmission definitions," all the values are the same except the gateway SAP ID.

```
BKBCP999            _____ 117: Port Assignment _____      3174/CSE60
                          18 = VCU2 18 CH37
              Host addresses                        Host addresses
Port  IS  1  2  3  4  5              Port  IS  1  2  3  4  5
26-00 1 002 __ __ __ __              26-01 1 003 __ __ __ __
26-02 1 004 __ __ __ __              26-03 1 005 __ __ __ __
26-04 0 __ __ __ __ __               26-05 0 __ __ __ __ __
26-06 0 __ __ __ __ __               26-07 0 __ __ __ __ __
26-08 0 __ __ __ __ __               26-09 0 __ __ __ __ __
26-10 0 __ __ __ __ __               26-11 0 __ __ __ __ __
26-12 0 __ __ __ __ __               26-13 0 __ __ __ __ __
26-14 0 __ __ __ __ __               26-15 0 __ __ __ __ __
26-16 0 __ __ __ __ __               26-17 0 __ __ __ __ __
26-18 0 __ __ __ __ __               26-19 0 __ __ __ __ __
26-20 0 __ __ __ __ __               26-21 0 __ __ __ __ __
26-22 0 __ __ __ __ __               26-23 0 __ __ __ __ __
26-24 0 __ __ __ __ __               26-25 0 __ __ __ __ __
26-26 0 __ __ __ __ __               26-27 0 __ __ __ __ __
26-28 0 __ __ __ __ __               26-29 0 __ __ __ __ __
26-30 0 __ __ __ __ __               26-31 0 __ __ __ __ __
```

```
BKBCP999          _____ Logical Terminal Assignment _____     3174/CSE60
                                        801=2
Port  LT1 LT2 LT3 LT4 LT5             Port  LT1 LT2 LT3 LT4 LT5
26-00 1A1 1B1 __ __ __                26-01 1A1 1B1 __ __ __
26-02 1A1 1B1 __ __ __                26-03 1A1 1B1 __ __ __
26-04 __ __ __ __ __                  26-05 __ __ __ __ __
26-06 __ __ __ __ __                  26-07 __ __ __ __ __
26-08 __ __ __ __ __                  26-09 __ __ __ __ __
26-10 __ __ __ __ __                  26-11 __ __ __ __ __
26-12 __ __ __ __ __                  26-13 __ __ __ __ __
26-14 __ __ __ __ __                  26-15 __ __ __ __ __
26-16 __ __ __ __ __                  26-17 __ __ __ __ __
26-18 __ __ __ __ __                  26-19 __ __ __ __ __
26-20 __ __ __ __ __                  26-21 __ __ __ __ __
26-22 __ __ __ __ __                  26-23 __ __ __ __ __
26-24 __ __ __ __ __                  26-25 __ __ __ __ __
26-26 __ __ __ __ __                  26-27 __ __ __ __ __
26-28 __ __ __ __ __                  26-29 __ __ __ __ __
```

Again as with Host A, just four local terminal definitions.

We now define the locally attached terminals to have one session on each host.

Local 3174 Definitions for Host 1B

```
LSE01    VBUILD TYPE=LOCAL
CSE80    PU     CUADDR=E80 █1 ,DISCNT=NO,ENCR=OPT,ISTATUS=ACTIVE,
                PACING=0,PUTYPE=2,SSCPFM=FSS,VPACING=0,
                MODETAB=LMT3270
SE0801   LU     LOCADDR=2,ISTATUS=ACTIVE
SE0802   LU     LOCADDR=3,ISTATUS=INACTIVE
SE0803   LU     LOCADDR=4,ISTATUS=INACTIVE
SE0804   LU     LOCADDR=5,ISTATUS=INACTIVE
   :            :
CSE8F    PU     CUADDR=E8F █2 ,DISCNT=NO,ENCR=OPT,ISTATUS=ACTIVE,
                PACING=0,PUTYPE=2,SSCPFM=FSS,VPACING=0,
                MODETAB=LMT3270
SE08F1   LU     LOCADDR=2,ISTATUS=ACTIVE
SE08F2   LU     LOCADDR=3,ISTATUS=INACTIVE
SE08F3   LU     LOCADDR=4,ISTATUS=INACTIVE
SE08F4   LU     LOCADDR=5,ISTATUS=INACTIVE
```

Notes:

█1 This is the CUADDR value from VTAM.

█2 Matches the upper range of devices defined through the gateway for host 1B.

█3 This is the CUADD value as set in the IOCP for the controller defined for *Host 1B* we are on CHIPID 37 and CUADD = 7 so Q.240 is set to "7". **CUADDR 80 - 8F are set on CHIPID 37 for Host B**

9032 ESCON Director Matrix

```
-1.0-----------------9032 ACTIVE MATRIX------------------------------

  ==>                        9832 Name: 3174 Development

 Addr    Address Name        H B C  E0 1 2 3 4 5 6 7 8 9 A B C D E F
-E0 VM_SYSA_CH2001_____     _ _ _   a a a P a a a a a a a a a a a a
-E1 _____          _ _ _   a a a a a a a a a a a a a a a a
-E2 PRINTER07_____        _ B _    a a a a a a a a a a a a a a a a
-E3 _____          _ _ _   a a a a a a a a a a a a a a a a
-E4 _____          _ _ _   a a a a a a a a a a a a a a a a
-E5 _____          _ _ _   a a a a a a a a a a a a a a a a
-E6 _____          _ _ _   a a a a a a a a a a a a a a a a
-E7 _____          _ _ _   a a a a a a a a a a a a a a a a
-E8 _____          _ _ _   a a a a a a a a a a a a a a a a
-E9 _____          _ _ _   a a a a a a a a a a a a a a a a
-EA _____          _ _ _   a a a a a a a a a a a a a a a a
-EB _____          _ _ _   a a a a a a a a a a a a a a a a
-EC _____          _ _ _   a a a a a a a a a a a a a a a a
-ED _____          _ _ _   a a a a a a a a a a a a a a a a
-EE SNA_60-80(Q240=0-7)_      _ _ _   a a a a a a a a a a a a a a a a
-EF _____          _ _ _   a a a a a a a a a a a a a a a a

 F1=Help      F3=End       F6= Process
 F7=Backward  F8=Forward   F10=Left        F11=Right
```

```
-1.0-----------------9032 ACTIVE MATRIX------------------------------

  ==>                        9832 Name: 3174 Development

 Addr    Address Name        H B C  F0 1 2 3 4 5 6 7 8 9 A B C D E F
-F0 _____          _ _ _   \ a a a a a a a a a a a a a a a
-F1 _____          _ _ _   a \ a a a a a a a a a a a a a a
-F2 _____          _ _ _   a a \ a a a a a a a a a a a a a
-F3 _____          _ _ _   a a a \ a a a a a a a a a a a a
-F4 CHIPID_30_(Q240=0)__      _ _ _   a a a a \ a a a a a a a a a a a
-F5 CHIPID_31_(Q240=1)__      _ _ _   a a a a a \ a a a a a a a a a a
-F6 _____          _ _ _   a a a a a a \ a a a a a a a a a
-F7 _____          _ _ _   a a a a a a a \ a a a a a a a a
-F8 CHIPID_37_(Q240=7)__      _ _ _   a a a a a a a a \ a a a a a a a
-F9 _____          _ _ _   a a a a a a a a a \ a a a a a a
-FA _____          _ _ _   a a a a a a a a a a \ a a a a a
-FB _____          _ _ _   a a a a a a a a a a a \ a a a a
-FC _____          _ _ _   a a a a a a a a a a a a \ a a a
-FD _____          _ _ _   a a a a a a a a a a a a a \ a a
-FE _____          _ _ _   a a a a a a a a a a a a a a \ a
-FF _____          _ _ _   a a a a a a a a a a a a a a a \

 F1=Help      F3=End       F6= Process
 F7=Backward  F8=Forward   F10=Left        F11=Right
```

From the two screens shown above, extracted from the ESCON director control console we can see the attachments for our setup.

- On **port EE** (physical port) into the ESCON director we have a fiber channel from our gateway 3174-12L. **5**

- On **port F4** we have a fiber channel from **Host A** on CHIPID 30.

- On **port F8** we have a fiber channel from **Host B** on CHIPID 37.

Notes:

1 Define the lower address range.

2 Define the upper address range.

3 This value matches that in **Q.240** for each "logical" device (VCUs) associated with the one physical device.

5 Defines which **physical** port on the ESCON director the 3174 definitions are associated with.

IOCP Definitions

```
*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
        CHPID PATH=((30)),TYPE=S,SWITCH=00
        CHPID PATH=((37)),TYPE=S,SWITCH=00
*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
*                  CHPID 30 CHANNEL 30 CONTROL UNITS                  *
*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
        CNTLUNIT CUNUMBR=3000,        3174 SNA    ADDRESS=3000    +
                 UNIT=3705,                                       +
                 PATH=30,                                         +
                 LINK=(F1),                                       +
                 CUADD=0,                                         +
                 UNITADD=((00,1))
                     *                    *           *
                     *                    *           *
                     *                    *           *
                     *                    *           *

        CNTLUNIT CUNUMBR=3003,        3174 SNA    ADDRESS=3060-306F+
                 UNIT=3705,                                       +
                 PATH=30,                                         +
                 LINK=(EE), 5                              +
                 CUADD=0, 3                                +
                 UNITADD=((60,16)) 1 2
*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
*                  CHPID 37 CHANNEL 37 CONTROL UNITS                  *
*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
        CNTLUNIT CUNUMBR=3700,        3174 SNA    ADDRESS=3700    +
                 UNIT=3705,                                       +
                 PATH=37,                                         +
                 LINK=(F1),                                       +
                 CUADD=7,                                         +
                 UNITADD=((00,1))
                     *                    *           *
                     *                    *           *
                     *                    *           *
                     *                    *           *

        CNTLUNIT CUNUMBR=3703,        3174 SNA    ADDRESS=3780-308F+
                 UNIT=3705,                                       +
                 PATH=37,                                         +
                 LINK=(EE), 5                              +
                 CUADD=7, 3                                +
                 UNITADD=((80,16)) 1 2
*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*=*
```

DSPU Definitions

```
BKBCP999 _____ Multi-Host Definition _____ 3174/CSE64

Select a Host ID and press ENTER

Host   Adapter   Host      Hardware   Include   Host Descriptor
ID     Type      Attach    Group      in IML

1A               7                              HOST_A_____
2A       _       _          _         _         _____
3A       _       _          _                   _____
1B                                    1         HOST_B_____
__                                    _         _____
__                                    _         _____
__                                    _         _____
__                                    _         _____
__                                    _         _____
__                                    _         _____
```

Here we are defining the SLMH function.

Host *1A* and a "host attach" definition of **7** sets the upstream link as a Token-Ring Adapter.

Host *1B* will default to the same.

```
BKBCP999          ¯¯ _____ Token-Ring Network _____ 3174/CSE64
                    1A = HOST  A

106 - 4000 0000 0004 04   107 - 4000 0000 0000 04   108 - 23V2645

110 - 1                   116 - 1_ __

121 - 01      123 - 1     125 - 00100100          126 - 00000000   127 - 0

132 - 0 0 0 0             136 - 1 1 1 1           137 - 0 0 0 0    138 - 0

141 - A                   165 - 0                 166 - A          168 - 0

173 - 10100101           175 -                    179 - 0 0 0

213 - 1                   215 - 00000             220 - 0

302 - 2057               303 - 2                  304 - 2
```

Here we are defining *host 1A's* session.

- Q.106 4000 0000 0004 04

- Q.107 4000 0000 0000 04

Here we see the connection between the DSPU's first host connection to the gateway's *Host A* defined link. The gateways SAP ID is set to 04.

```
BKBCP999          _____ Token-Ring Network _____ 3174/CSE64
                    1B = HOST  B

106 - 4000 0000 0004 04   107 - 4000 0000 0000 08

                          116 - 1_ __

                          125 - 00****0                           127 - 0 0

                          165 - 0

                                                 179 - 0 0 0

                          215 - 00000             220 - 0          221 - 0
302 - 2057               303 - 2
```

Here we are defining *host B's* session.

- Q.106 4000 0000 0004 04

- Q.107 4000 0000 0000 08

Here we see the connection between the DSPU's second host connection to the gateway's *Host B* defined link. In this case the SAP ID of the gateway is 08.

11.4 X.25 SLMH

Figure 99. X.25 Single Link Multi-Host

In the test example we configured the 3174 to have five host sessions, four
sessions are defined as PVCs, and one as an SVC. In the environment of the
ITSC we had to code all of the PVCs over one MCH. In a situation like the
diagram above, you would in fact code one PVC in each NPSI for the individual
hosts.

Please refer to "3174 and X.25 Support" on page 133 for more complete detail.

As we are configuring for SLMH we code a **M** for
Question 101.

```
BKBCP999  _____ Multi-Host Definition _____    3174/XP13008A

Select a Host ID ard press ENTER

Host   Adapter   Host     Hardware   Include   Host Descriptor
ID     Type      Attach   Group      in IML

1A               3                              X25_PRIMARY_HOST_A__
2A       -       -          -          -        _____
3A       -       -          -          -        _____
1B                                     1        X25_HOST_B_____
1C                                     1        X25_HOST_C_____
1D                                     1        X25_HOST_D_____
1E                                     1        SWITCHED X25 _____
—                                      -        _____
—                                      -        _____
—                                      -        _____
—                                      -        _____
—                                      -        _____
```

Here we name the X.25 hosts we wish to access from this controller.

As this is a SLMH configuration, we have only one physical link, so we define *1A* and add *1B, 1C, 1D* and *1E*. Make sure to specify *Include in IML* otherwise you will not be able to use the hosts you define.

For host *1A*, specify **3** under host attach for X.25; the others will default.

```
BKBCP999  _____ X.25 _____    3174/XP13008A
                    1A = X25 PRIMARY HOST A

104 - C1        108 - 23N6503   110 - 6        116 - S1 __

121 - 01        123 - 0         125 - 00000000 126 - 00000000  127 - 0 0

132 - 0 0 0 0   136 - 0 0 0 0   137 - 0 0 0 0  138 - 0

141 - A         165 - 1         166 - A        168 - 0

173 - 00000000  175 -           179 - 0 0 0

213 - 1         215 - 00000     220 - 0        365 - 0

370 - 0         372 - 0 0
```

For the *primary host A* you code the questions to match the parameters defined in the NCP gen on Host A for this 3174.

- Q.104 controller address **1**

```
BKBCP999  _____ 117: Port Assignment _____    3174/XP13008A
                    1A = X25 PRIMARY HOST A
         Host addresses                    Host addresses
Port  IS 1  2  3  4  5       Port  IS 1  2  3  4  5
26-00 1 002 __ __ __ __      26-01 1 003 __ __ __ __
26-02 1 004 __ __ __ __      26-03 1 005 __ __ __ __
26-04 1 006 __ __ __ __      26-05 1 007 __ __ __ __
26-06 1 008 __ __ __ __      26-07 1 009 __ __ __ __
26-08 1 010 __ __ __ __      26-09 1 011 __ __ __ __
26-10 1 012 __ __ __ __      26-11 1 013 __ __ __ __
26-12 1 014 __ __ __ __      26-13 1 015 __ __ __ __
26-14 1 016 __ __ __ __      26-15 1 017 __ __ __ __
26-16 1 018 __ __ __ __      26-17 1 019 __ __ __ __
26-18 1 020 __ __ __ __      26-19 1 021 __ __ __ __
26-20 1 022 __ __ __ __      26-21 1 023 __ __ __ __
26-22 1 024 __ __ __ __      26-23 1 025 __ __ __ __
26-24 1 026 __ __ __ __      26-25 1 027 __ __ __ __
26-26 1 028 __ __ __ __      26-27 1 029 __ __ __ __
f6-28 1 030 __ __ __ __      26-29 1 031 __ __ __ __
26-30 1 032 __ __ __ __      26-31 1 033 __ __ __ __
```

For *Host A* we are coding 32 sessions, one for each physical port of the 3174.

The address in column 1 relates to the *LOCADDR* in the LU definitions on the NCP. **2**

NCP Example for the First PVC

```
**********************************************************************
XL13008A X25.LINE LCN=1, [6]   FIRST PVC                    *
                DSTNODE=BNN,                                    *
                LLC=LLC3,                                       *
                TYPE=P,                                         *
                VCCINDX=1
**********************************************************************
XP13008A X25.PU PUTYPE=2,                                       *
                ISTATUS=ACTIVE,                                 *
                ADDR=C1, [1]                           *
                MAXDATA=265,                                    *
                MAXOUT=7,                                       *
                SSCPFM=USSSCS,                                  *
                MODETAB=AMODETAB,                               *
                USSTAB=US327X
**********************************************************************
T13008A1 X25.LU LOCADDR=2,DLOGMOD=M2SDLCQ
T13008A2 X25.LU LOCADDR=3,DLOGMOD=M2SDLCQ
    :           :
    :           :
T1308A32 X25.LU LOCADDR=33,DLOGMOD=M2SDLCQ [2]
**********************************************************************
```

PU definition "XP13008A" for host A.

Notes:

[1] Question 104 relates to the polling address specified in the PU definitions.

[2] On the 3174 panel code the number of sessions as there are LU definitions.

[6] Question 402 defines the virtual circuit number used for this host.

X.25 Panels for Host B

```
BKBCP999 _____ X.25 _____ 3174/XP13008A
            1B = X25 HOST B

104 - C1                              116 - S1 _

                        125 - 00*****0            127 - 0 0


            165 - 1

                        179 - 0 0 0

            215 - 00000   220 - 0      221 - 0

370 - 0     372 - 0 0
```

On this panel we code the required parameters for *host B*.

- Q.104 controller address **1**

This parameter should match that of the NCP for this PU.

```
BKBCP999 _____ 117: Port Assignment _____ 3174/XP13008A
                1B = X25 HOST B
            Host addresses                    Host addresses
Port  IS  1  2  3  4  5         Port  IS  1  2  3  4  5
26-00 1 002 __ __ __ __         26-01 1 003 __ __ __ __
26-02 1 004 __ __ __ __         26-03 1 005 __ __ __ __
26-04 1 006 __ __ __ __         26-05 1 007 __ __ __ __
26-06 1 008 __ __ __ __         26-07 1 009 __ __ __ __
26-08 1 010 __ __ __ __         26-09 1 011 __ __ __ __
26-10 1 012 __ __ __ __         26-11 1 013 __ __ __ __
26-12 1 014 __ __ __ __         26-13 1 015 __ __ __ __
26-14 1 016 __ __ __ __         26-15 1 017 __ __ __ __
26-16 1 018 __ __ __ __         26-17 1 019 __ __ __ __
26-18 1 020 __ __ __ __         26-19 1 021 __ __ __ __
26-20 1 022 __ __ __ __         26-21 1 023 __ __ __ __
26-22 1 024 __ __ __ __         26-23 1 025 __ __ __ __
26-24 1 026 __ __ __ __         26-25 1 027 __ __ __ __
26-26 1 028 __ __ __ __         26-27 1 029 __ __ __ __
26-28 1 030 __ __ __ __         26-29 1 031 __ __ __ __
26-30 1 032 __ __ __ __         26-31 1 033 __ __ __ __
```

As with the primary host we entered **S1** for Question 116, but we can configure a new port assignment for this host if desired.

We have coded for 32 host sessions, one on each physical port. **2**

The definitions are repeated for hosts *1C* and *1D* and are not shown here as the detail is the same.

NCP Example for PVC 2

```
***********************************************************************
XL13008B X25.LINE LCN=2, 6    SECOND PVC                              *
                 DSTNODE=BNN,                                            *
                 LLC=LLC3,                                               *
                 TYPE=P,                                                 *
                 VCCINDX=1
***********************************************************************
XP13008B X25.PU PUTYPE=2,                                                *
                 ISTATUS=ACTIVE,                                         *
                 ADDR=C1, 1                                      *
                 MAXDATA=265,                                            *
                 MAXOUT=7,                                               *
                 SSCPFM=USSSCS,                                          *
                 MODETAB=AMODETAB,                                       *
                 USSTAB=US327X
***********************************************************************
T13008B1 X25.LU LOCADDR=2,DLOGMOD=M2SDLCQ
T13008B2 X25.LU LOCADDR=3,DLOGMOD=M2SDLCQ
    :            :
T1308B32 X25.LU LOCADDR=33, 2  DLOGMOD=M2SDLCQ
***********************************************************************
```

PU definition "XP13008B" for host B.

Notes:

1 Question 104 relates to the polling address specified in the PU definitions.

2 On the 3174 panel code the number of sessions as there are LU definitions.

6 Question 402 defines the virtual circuit number used for this host.

X.25 Panels for the Switched Host

```
BKBCP999 _____ X.25 _____ 3174/XP1300BA
              1E = SWITCHED X25

104 - C1                              116 - S1 _

                       125 - 00*****0              127 - 0 0

          165 - 1

                       179 - 0 0 0

          215 - 00000   220 - 0      221 - 0

370 - 0   372 - 0 0
```

We now code the required parameters for the *switched host*.

- Q.104 controller address **1**

For X.25 this is the secondary station address.

```
BKBCP999 _____ 117: Port Assignment _____ 3174/XP1300BA
                 1E = SWITCHED X25
          Host addresses                    Host addresses
Port IS 1  2  3  4  5           Port IS 1  2  3  4  5
26-00 1 002 __ __ __ __         26-01 1 003 __ __ __ __
26-02 1 004 __ __ __ __         26-03 1 005 __ __ __ __
26-04 1 006 __ __ __ __         26-05 1 007 __ __ __ __
26-06 1 008 __ __ __ __         26-07 1 009 __ __ __ __
26-08 1 010 __ __ __ __         26-09 1 011 __ __ __ __
26-10 1 012 __ __ __ __         26-11 1 013 __ __ __ __
26-12 1 014 __ __ __ __         26-13 1 015 __ __ __ __
26-14 1 016 __ __ __ __         26-15 1 017 __ __ __ __
26-16 1 018 __ __ __ __         26-17 1 019 __ __ __ __
26-18 1 020 __ __ __ __         26-19 1 021 __ __ __ __
26-20 1 022 __ __ __ __         26-21 1 023 __ __ __ __
26-22 1 024 __ __ __ __         26-23 1 025 __ __ __ __
26-24 1 026 __ __ __ __         26-25 1 027 __ __ __ __
26-26 1 028 __ __ __ __         26-27 1 029 __ __ __ __
26-28 1 030 __ __ __ __         26-29 1 031 __ __ __ __
26-30 1 032 __ __ __ __         26-31 1 033 __ __ __ __
```

As with the other hosts we entered **S1** for Question 116, which means we have auto-configured for 32 host sessions, one on each physical port. **2**

NCP Example of the Switched SVC

```
X25.VC LCN=(5,10), 8        6 SVC'S
       VCCINDX=1,
       NCPGRP=X2508P1,
       OUFINDX=1,
       CALL=OUT,             NPSI INITIATES CALL
       TYPE=S
*************************************************************
X25.VC LCN=(11,15),         5 SVC'S
       VCCINDX=1,
       NCPGRP=X2508P2,
       OUFINDX=1,
       CALL=INOUT,           CALLS BOTH WAYS
       TYPE=S
*************************************************************
X25.VC LCN=(16,20),         5 SVC'S
       VCCINDX=1,
       NCPGRP=X2508P3,
       OUFINDX=1,
       CALL=IN,              REMOTE DTE INITIATES CALL
       TYPE=S
*************************************************************
```

VTAM Definitions for the Switched SVC

```
SWX25TES VBUILD MAXGRP=15,              REQUIRED NUMBER OF PATH GROUPS*
                MAXNO=15,               REQUIRED NUMBER OF DIALNO     *
                TYPE=SWNET              REQUIRED
**
X25PUE   PU     ADDR=C1, 1
                IDBLK=017,
                IDNUM=00000,
                DISCNT=YES,
                MAXOUT=7,
                MAXDATA=255,
                MODETAB=AMODETAB,
                MAXPATH=20,
                VPACING=0,
                PUTYPE=2,
                SSCPFM=USSSCS,
                DLOGMOD=M2SDLCQ,
                USSTAB=US327X
**
PATHX251 PATH   DIALNO=2222222222*317411111130101, 3
                GRPNM=X2508P1,
                GID=1,
                PID=1

**
PATHX252 PATH   DIALNO=2222222222*317411111130101,
                GRPNM=X2508P2,
                GID=1,
                PID=2
**
PATHX253 PATH   DIALNO=2222222222*317411111130101,
                GRPNM=X2508P3,
                GID=1,
                PID=3
**
T13008E1 LU     LOCADDR=2
T13008E2 LU     LOCADDR=3
T13008E3 LU     LOCADDR=4
    :              :
T1308E32 LU     LOCADDR=33 2
```

Notes:

1 The address parameter should match on Q 104 and the NCP PU definition.

2 These values should match.

3 For an explanation of the dial parameter refer to *X.25 NPSI Planning and Installation*, Chapter 5.

It should be noted, that the switched example and its definitions shown here are included as an example, and were not tested.

The secondary screens for X.25 are shown here for host 1A (PVC), host 1B, and host 1E (SVC). Note that for 1B, the Logical Channel Identifier is "0002." The additional PVC connections we configured used "0003" and "0004" for 1C and 1D respectively.

Some of these parameters will be common for all X.25 hosts, others are unique and need to be defined for each X.25 host customized.

```
BKBCP999 _____ 332: X.25 Options _____ 3174/XP1300BA
                    1A = X25 PRIMARY HOST A

    400 - 00 0 0      401 - 1      402 - 0001

    409 - 10101010    420 - 00000000         421 - 00000000

    423 -                          424 -

    430 - 1           431 - 0      432 - 02    433 - 2

    434 - 1           435 - 02

    440 - 9           441 - _      442 - ___

    450 - 0010        451 - 05     452 - _____   453 - 10000000

    461 - 0005        462 - 0010   463 - 0011   464 - 0020

    465 - 0021        466 - 0030
```

This panel is for *host A's* X.25 options.

- Q.401, Circuit type **5**

  We code a **1** to define this host as a PVC.

- Q.402, Logical Channel **6**

  This defines the logical channel ID, in our example logical channel 01.

- Questions 461 to 466 channel definitions **7**
- Q.461 Lowest incoming channel **8**

```
BKBCP999 _____ 332: X.25 Options _____ 3174/XP1300BA
                    1B = X25 HOST B

                      401 - 1      402 - 0002

    409 - 10101010    420 - 00000000         421 - 00000000

    423 -

    430 - 1                        432 - 02

    440 - 9           441 - _      442 - ___

                                   452 - _____   453 - 00000000
```

This is the X.25 options for *host B*.

- Q.401, Circuit type

  We code a **1** to define this host as a PVC.

- Q.402, Logical Channel

  This defines the logical channel ID, in our example logical channel 02.

```
BKBCP999 _____ 332: X.25 Options _____ 3174/XP1300BA
                    1E = SWITCHED X25

                      401 - 4      402 -

    409 - 10101010    420 - 00000000         421 - 00000000

    423 - 3174_____

    430 - 1                        432 - 02

    440 - 9           441 - _      442 - ___

                                   452 - _____   453 - 00000000
```

This is the X.25 options panel for the *switched 1E* host.

- Q.401, Circuit type **5**

  We code a **4** to define this host as a "two-way call SVC."

- Q.402, Logical Channel **7**

  The LCN used for this session will be taken from the pool we defined in questions 461-466, depending on the type of call.

```
BKBCP999 _____ Logical Terminal Assignment _____ 3174/XP13898A
                                        801=1

  Port LT1 LT2 LT3 LT4 LT5            Port LT1 LT2 LT3 LT4 LT5

26-00 1A1 1B1 1C1 1D1 1E1          26-01 1A1 1B1 1C1 1D1 1E1
26-02 1A1 1B1 1C1 1D1 1E1          26-03 1A1 1B1 1C1 1D1 1E1
26-04 1A1 1B1 1C1 1D1 1E1          26-05 1A1 1B1 1C1 1D1 1E1
26-06 1A1 1B1 1C1 1D1 1E1          26-07 1A1 1B1 1C1 1D1 1E1
26-08 1A1 1B1 1C1 1D1 1E1          26-09 1A1 1B1 1C1 1D1 1E1
26-10 1A1 1B1 1C1 1D1 1E1          26-11 1A1 1B1 1C1 1D1 1E1
26-12 1A1 1B1 1C1 1D1 1E1          26-13 1A1 1B1 1C1 1D1 1E1
26-14 1A1 1B1 1C1 1D1 1E1          26-15 1A1 1B1 1C1 1D1 1E1
26-16 1A1 1B1 1C1 1D1 1E1          26-17 1A1 1B1 1C1 1D1 1E1
26-18 1A1 1B1 1C1 1D1 1E1          26-19 1A1 1B1 1C1 1D1 1E1
26-20 1A1 1B1 1C1 1D1 1E1          26-21 1A1 1B1 1C1 1D1 1E1
26-22 1A1 1B1 1C1 1D1 1E1          26-23 1A1 1B1 1C1 1D1 1E1
26-24 1A1 1B1 1C1 1D1 1E1          26-25 1A1 1B1 1C1 1D1 1E1
26-26 1A1 1B1 1C1 1D1 1E1          26-27 1A1 1B1 1C1 1D1 1E1
26-28 1A1 1B1 1C1 1D1 1E1          26-29 1A1 1B1 1C1 1D1 1E1
```

Finally, having defined five X.25 hosts (1A - 1E), we allocate one session to each of the five possible logical terminals for each of the 32 available ports. **4**

Notes:

4 This panel prioritizes what sessions each terminal will have on the change screen key, each host session was defined in **2**

5 Host 1A is using a PVC (question 401 = 1). On this screen you will also have to define a pool of SVCs if you plan to respond to question 401 with a response other than "1" for any of the other X.25 hosts.

6 Question 402 defines the virtual circuit number used for this host.

7 It is important to keep in mind the total number of PVCs you will be using before assigning values to 461-466. See the VTAM definitions on the previous page for an example

8 We will have four PVCs and one SVC connection, therefore we begin numbering the SVCs in question 461 at "0005" to make sure that the numbering will be in the correct sequence.

These are the complete definitions used to test X.25 SLMH. It is not a true to life scenario as all the hosts are actually the same host but it illustrates how to configure the 3174. In reality, if all the hosts were using NPSI, then you would just code one of the PUs below in each of the NPSIs for the individual X.25 hosts.

Extracts from this gen were used as inserts on the previous pages.

```
*************************************************************************
*       NCP/NPSI DEFINITIONS FOR X.25 MULTI-HOST TESTING          *
*************************************************************************
NCPBUILD BUILD -ADD THE FOLLOWING STATEMENTS                        *

              X25.PREFIX=X,      ALL NAMES START WITH X             *
              X25.IDNUMH=02,     MUST MATCH WITH SWITCH MAJOR NODE ID*
              X25.SNAP=YES,      SNAP TRACE INCLUDED                *
              X25.MCHCNT=1,      NUMBER OF PHYSICAL LINKS           *
              X25.MAXPIU=5K      LESS THAN MAXBFRU TIMES UNITSZ
*
*************************************************************************
*       X.25 NETWORK
*************************************************************************
X3174     X25.NET CPHINDX=1,                                       *
                  NETTYPE=1,                                       *
                  OUHINDX=1,                                       *
                  DM=YES
*
          X25.VCCPT INDEX=1,                                       *
                    MAXPKTL=128,                                   *
                    VWINDOW=3,        PACKET LEVEL WINDOW 3         *
                    INSLOW=(100,50)
*************************************************************************
*       FIRST MCH
*************************************************************************
MCH01     X25.MCH   ADDRESS=08,       CONTROLLER LINE ADDRESS       *
                    ANS=STOP,                                       *
                    LCGDEF=(0,4),     4 PVC                         *
                    FRMLGTH=259,      256 + 3 (PACKET HEADER)       *
                    MWINDOW=7,        FRAME WINDOW SIZE             *
                    STATION=DCE,      USED TO SIMULATE X.25 NETWORK *
                    ENABLTO=3,                                      *
                    DSABLTO=3,                                      *
                    TDTIMER=1,                                      *
                    TPTIMER=3,                                      *
                    NPRETRY=10,                                     *
                    NDRETRY=1,        CODED TO MATCH  STATION=DCE   *
                    SUBADDR=NO,                                     *
                    LLCLIST=(LLC3),                                 *
                    LCN0=NOTUSED,                                   *
                    DBIT=NO,                                        *
                    PAD=NO,                                         *
                    PKTMODL=8,                                      *
                    GATE=NO,                                        *
                    ITRACE=YES,                                     *
                    SPEED=9600,       DEFAULT                       *
                    T1TIMER=1
*************************************************************************
*
```

```
       X25.LCG LCGN=0              LOGICAL CHANNEL GROUP ZERO
*
**********************************************************************
*     X.25 LINE / PU / LU MACROS                    (LINE 008)
*     EACH LINE DEFINES A PVC
**********************************************************************
XL13008A X25.LINE LCN=1,           FIRST PVC                       *
               DSTNODE=BNN,                                        *
               LLC=LLC3,                                           *
               TYPE=P,                                             *
               VCCINDX=1
**********************************************************************
XP13008A X25.PU PUTYPE=2,                                          *
               ISTATUS=ACTIVE,                                     *
               ADDR=C1,                                            *
               MAXDATA=265,                                        *
               MAXOUT=7,                                           *
               SSCPFM=USSSCS,                                      *
               MODETAB=AMODETAB,                                   *
               USSTAB=US327X
**********************************************************************
T13008A1 X25.LU LOCADDR=2,DLOGMOD=M2SDLCQ
T13008A2 X25.LU LOCADDR=3,DLOGMOD=M2SDLCQ
T13008A3 X25.LU LOCADDR=4,DLOGMOD=M2SDLCQ
T13008A4 X25.LU LOCADDR=5,DLOGMOD=M2SDLCQ
T13008A5 X25.LU LOCADDR=6,DLOGMOD=M2SDLCQ
T13008A6 X25.LU LOCADDR=7,DLOGMOD=M2SDLCQ
T13008A7 X25.LU LOCADDR=8,DLOGMOD=M2SDLCQ
T13008A8 X25.LU LOCADDR=9,DLOGMOD=M2SDLCQ
T13008A9 X25.LU LOCADDR=10,DLOGMOD=M2SDLCQ
**********************************************************************
XL13008B X25.LINE LCN=2,           SECOND PVC                      *
               DSTNODE=BNN,                                        *
               LLC=LLC3,                                           *
               TYPE=P,                                             *
               VCCINDX=1
**********************************************************************
XP13008B X25.PU PUTYPE=2,                                          *
               ISTATUS=ACTIVE,                                     *
               ADDR=C1,                                            *
               MAXDATA=265,                                        *
               MAXOUT=7,                                           *
               SSCPFM=USSSCS,                                      *
               MODETAB=AMODETAB,                                   *
               USSTAB=US327X
**********************************************************************
T13008B1 X25.LU LOCADDR=34,DLOGMOD=M2SDLCQ
T13008B2 X25.LU LOCADDR=38,DLOGMOD=M2SDLCQ
T13008B3 X25.LU LOCADDR=42,DLOGMOD=M2SDLCQ
T13008B4 X25.LU LOCADDR=46,DLOGMOD=M2SDLCQ
T13008B5 X25.LU LOCADDR=50,DLOGMOD=M2SDLCQ
T13008B6 X25.LU LOCADDR=54,DLOGMOD=M2SDLCQ
T13008B7 X25.LU LOCADDR=58,DLOGMOD=M2SDLCQ
T13008B8 X25.LU LOCADDR=62,DLOGMOD=M2SDLCQ
T13008B9 X25.LU LOCADDR=66,DLOGMOD=M2SDLCQ
**********************************************************************
XL13008C X25.LINE LCN=3,           THIRD PVC                       *
               DSTNODE=BNN,                                        *
               LLC=LLC3,                                           *
```

```
                        TYPE=P,                                               *
                        VCCINDX=1
***********************************************************************
XP13008C X25.PU PUTYPE=2,                                                      *
                        ISTATUS=ACTIVE,                                       *
                        ADDR=C1,                                             *
                        MAXDATA=265,                                         *
                        MAXOUT=7,                                            *
                        SSCPFM=USSSCS,                                       *
                        MODETAB=AMODETAB,                                    *
                        USSTAB=US327X
***********************************************************************
T13008C1 X25.LU LOCADDR=35,DLOGMOD=M2SDLCQ
T13008C2 X25.LU LOCADDR=39,DLOGMOD=M2SDLCQ
T13008C3 X25.LU LOCADDR=43,DLOGMOD=M2SDLCQ
T13008C4 X25.LU LOCADDR=47,DLOGMOD=M2SDLCQ
T13008C5 X25.LU LOCADDR=51,DLOGMOD=M2SDLCQ
T13008C6 X25.LU LOCADDR=55,DLOGMOD=M2SDLCQ
T13008C7 X25.LU LOCADDR=59,DLOGMOD=M2SDLCQ
T13008C8 X25.LU LOCADDR=63,DLOGMOD=M2SDLCQ
T13008C9 X25.LU LOCADDR=67,DLOGMOD=M2SDLCQ
***********************************************************************
XL13008D X25.LINE LCN=4,              FOURTH PVC                              *
                        DSTNODE=BNN,                                         *
                        LLC=LLC3,                                            *
                        TYPE=P,                                              *
                        VCCINDX=1
***********************************************************************
XP13008D X25.PU PUTYPE=2,                                                      *
                        ISTATUS=ACTIVE,                                       *
                        ADDR=C1,                                             *
                        MAXDATA=265,                                         *
                        MAXOUT=7,                                            *
                        SSCPFM=USSSCS,                                       *
                        MODETAB=AMODETAB,                                    *
                        USSTAB=US327X
***********************************************************************
T13008D1 X25.LU LOCADDR=36,DLOGMOD=M2SDLCQ
T13008D2 X25.LU LOCADDR=40,DLOGMOD=M2SDLCQ
T13008D3 X25.LU LOCADDR=44,DLOGMOD=M2SDLCQ
T13008D4 X25.LU LOCADDR=48,DLOGMOD=M2SDLCQ
T13008D5 X25.LU LOCADDR=52,DLOGMOD=M2SDLCQ
T13008D6 X25.LU LOCADDR=56,DLOGMOD=M2SDLCQ
T13008D7 X25.LU LOCADDR=60,DLOGMOD=M2SDLCQ
T13008D8 X25.LU LOCADDR=64,DLOGMOD=M2SDLCQ
T13008D9 X25.LU LOCADDR=68,DLOGMOD=M2SDLCQ
***********************************************************************
*
        X25.END
*
***********************************************************************
```
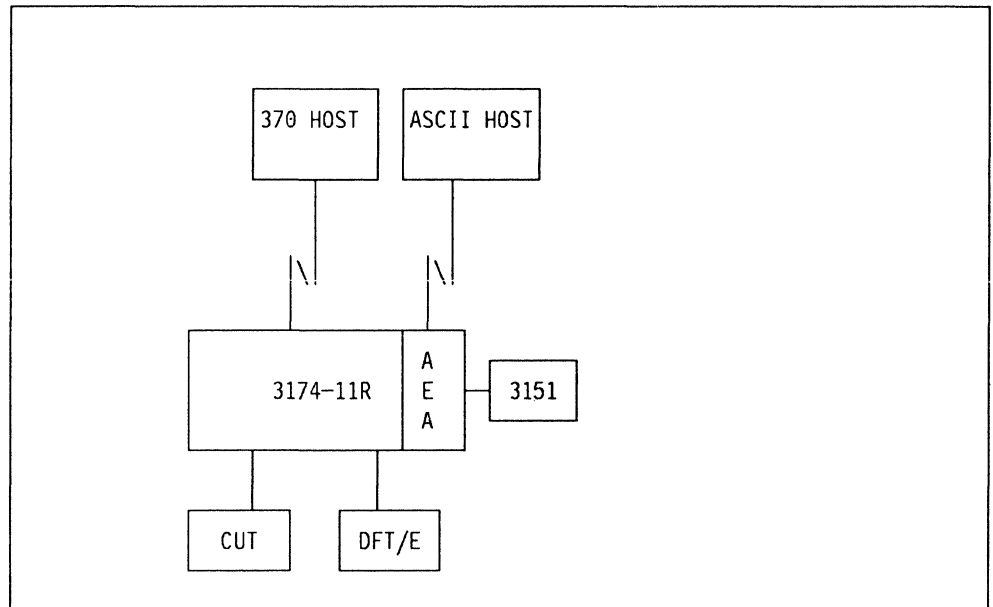
11.5 3174 with AEA

Figure 100. Remote 3174 with an AEA

Due to the nature of AEA connections and the complexity of the required parameters of the OEM hosts, the connectivity example is discussed in "Asynchronous Emulation Adapter (AEA)" on page 157 where we can go into more detail and fuller explanations of individual parameters.

12. Local Format Storage

With the introduction of Configuration Support-B Release 2 we now have the facility of coding for Local Format Storage (LFS); prior to Configuration Support-B Release 2 this function was only available in *RPQ # 8X0024*.

12.1 Overview

The 3174 local format storage feature provides the ability for the host controlled loading of presentation screen formats (MAPs), into the 3174 Controller storage. These MAPs can be presented on any *CUT* terminal, or emulated CUT device (this includes AEA attached terminals). DFT devices are not supported unless they have a CUT mode session available (like the 3472-G).

In an environment where remote terminals are heavily utilized, and you have the potential for line bottlenecks, or even high Front End Processor (FEP) utilization, LFS can be reviewed against potential hardware upgrades. For example, if you were running a low speed line out to a remote location using a fairly heavy transaction rate, it might not come as a surprise to find the line utilization high; the normal reaction might be to look at a line speed upgrade, data compression techniques, or splitting the terminals over another controller. Each of these solutions have hardware costs involved, and can impact other users going through the FEP.

By utilizing the local format storage feature you can reduce the amount of data sent down the line by keeping the "most commonly used" screen formats at the 3174. Not only will this reduce the line overhead in terms of raw data sent; but has the potential to improve user response times and improve the FEP utilization which can have an impact on the whole network.

The local format storage feature uses new and existing 3270 data stream structured fields to control the *loading* and *host initiated presentation* of stored MAPs. The local format storage feature supports the 3270 data stream architecture for format presentation as implemented by CICS, but a user can provide his own format presentation support using 3270 data stream if required.

Formats may be:

- Added

- Replaced

- Deleted

Formats groups may be deleted, and format storage may be reset at any time under the control of the host. The formats are stored in RAM only.

Local format storage function is supported on multi-host and SLMH configured 3174s, but has no support for Non-SNA configurations.

Presentation of a stored format can be initiated by a host command, and presentation of selected "local" formats can be initiated by a user, provided local format selection has been enabled.

12.2 Description

There are three main stages for local format storage implementation:

1. Creating the formats to be downloaded

2. Distributing the formats to the 3174 Controller

3. Invoking the formats.

This section discusses each of these stages.

12.2.1 Format Creation

Format creation is the responsibility of the user. How this is done depends on the transaction management system, and mapping service used. The 3174 local format storage feature requires that the maps to be stored contain exact 3270 data streams that will be sent to the terminals, local format storage will make no modifications to a map for device specific characteristics. Nor will it attempt to decide what version of a map to present if multiple copies exist, except in the case of multi-host support, where you might want to override *primary* host loaded maps. See "Override Selection" on page 305 for an explanation of override.

To date, CICS has the only existing 370 host support for local format storage. CICS with standard Basic Mapping Support (BMS) commands allows the user to create the exact 3270 data stream formats needed by the 3174 local format storage

12.2.1.1 Format Storage Size

The average size of a screen format is in the region of 500 bytes. Added to this you have a *format control header* which is another 50 bytes. When planning for the LFS customization on the 3174 see "3174 Customization" on page 306, you should consider how many MAPs you are planning and how many directories to determine what storage allocation you will be required to reserve.

12.2.2 Distributing the Formats

It is the users responsibility to distribute the formats to the 3174. The 3174 local format storage receives the formats on the SNA LU session with an address of **LOCADDR = 1**. This is not a valid terminal address range; it is reserved for controller services only. This LU address supports a *LU type 2* session and expects to receive a subset of the 3270 data stream and commands that are necessary to support the distribution of the formats.

12.2.2.1 Setup

After creating the required MAPs, you then want to load them onto a 3174. A user written *format distribution transaction* is self-initiated, and is responsible for the distribution of the MAPs. The 3174 Controller replies to each format load request.

The CICS user would have to consider the following coding requirements and understand the basic flow of the *format distribution transaction*:

- Customize the 3174 for local format storage

- Define a "display" to VTAM with an address = 01

- Define a "display" to CICS with an address = 01

- Define to CICS the MAP distribution transaction for *automatic transaction initiation* with the display defined on address '01'.

12.2.2.2 Data Flow

The sequence expected during a format load is:

- The host issues an *ACTLU* for the LU on address "01".

  If the local format storage feature, or other LU = 01 service is present the controller responds positively (powered on), otherwise the *ACTLU* is rejected.

- A *bind* is sent by the host to LU = 01 (LU type 2, default bind).

  The bind is accepted by the controller if the local format storage feature is present, and the session is not already bound (other LU = 01 services).

- *Start data transfer* (SDT) is sent by the host.

- The distribution transaction then begins:

  - The host sends the formats with destination and origination addresses plus the *load format storage* structured field.

  - The controller and the local format storage feature replies to each *load format storage* structured field by sending back the destination and origin addresses and an exception status report.

- This sequence is repeated until all the formats have been transmitted to the controller.

  Note: A *load format storage structured field* must be sent with every screen format, and after **every** format has been transmitted the *distribution program* must wait for the controller to reply before the next format can be sent.

- Upon completion of the download, the session with LU = 01 must be terminated with an *unbind*.

12.2.2.3 Format Presentation

The first point to note here is that when downloading screen formats, you can have several "format groups," each having a selection of specific MAPs unique to each group. With this in mind there are two actions required to invoke the screen MAPs at the terminal.

- Select the format group.

  This is the first structured field sent by the host. As stated above, the MAPs are stored in memory using a *directory structure* in which the group name identifies a directory that has all the MAPs sent with the download sequence for that specific named group.

The *select format group* command assigns a directory to be searched when the "presentation" command is subsequently sent. Only the selected group is searched for a screen format; you can select another group directory by issuing another *select format group* command. There are no "default" group names, so a specific directory must be selected before the host can select a screen format.

- Present Format.

  There are two present format structured fields:

  — Absolute
  — Relative.

  These two structured fields are used to select the MAP name of the screen format to be presented. Present Relative format is the structure predominantly used by CICS in BMS (basic mapping support).

  Both the *present absolute* and *present relative* structured fields are sent with the presentation command specifying a 3270 data stream *write* or *erase/write* and contain a 3270 data stream WCC byte.

Using the names supplied from these structured fields, local format storage will search the selected group directory for the named screen format.

When the screen format has been found, the format presentation command (write, erase/write) and the WCC are extracted from the *present format structured field* and applied to the located 3270 data stream (screen map), and passed to *outbound data stream processing* as if the data had just been received from the host.

12.2.2.4 Operator Selection

Because the stored screen format is really a *group name* and *format name*, the user does not necessarily know the stored format name. To accommodate operator selection of formats, you can, at the load phase, specify the format as "operator selectable" and specify a *local name*.

The search will then be made at presentation time for a format with the *local* name (a pseudonym for a group and format name), or with the *local* name that is a member of the currently selected group. The function can be selected in two ways:

- Via the data stream.

  Operator selected formats can be enabled from the host application.

- As a customization option.

  The user can, at a "clear unformatted" screen, enter data; this data is considered to be a request for a screen format. The eight byte field is assumed to be the *local name* and the search will be initiated.

  If the *local name* format is not found in the 3174 LFS buffer the request is sent to the host as a normal request.

12.2.2.5 Override Selection

In a multi-host environment where the 3174 local format storage feature is configured to have the *primary host* manage the screen formats, you have the option to override the selection. On the secondary host you can download additional formats into its private LFS buffer.

When a presentation request is sent down from the secondary host, it will search its *own* LFS buffer, and directory first, if the required format is not there it will then search in the primary LFS buffer. With this facility it is possible to have two formats with the same name, the primary will be over-ridden when the secondary downloads its copy of the same *named* format, although the physical layout of the format could be different.

12.3 Multi-Host and LFS

The local format storage feature can be enabled on any multi-host 3174 or SLMH 3174 to perform the same functions as can be set on the primary host link. If you are using LFS on a secondary host session, you must have LFS set on the primary session too.

There are three levels of support for local format storage in a multi-host environment:

1. Shared resource

   You can share the screen formats between the primary host and the secondary hosts. In this setup a screen format for a host session other than the primary will fetch the screen format from the primary hosts LFS buffer.

2. Shared resource with load option

   You can define the 3174 to have a private LFS buffer for each upstream host session, and still share the primary LFS buffer. In this scenario the local format storage feature would, from a request on a secondary host, search its own private LFS buffer, and if the screen format wasn't found it would then search in the primary host's LFS buffer.

3. Individual resource

   In this setup each host session will use its own MAPs. The screen formats will be loaded to and presented from the private LFS buffer assigned to each host. Each host is independent of the primary host's local format storage function.

The following section discusses how these configurations are set.

12.4 3174 Customization

The local format storage function is set in the 3174 by your answer to **Question 179: Local Format Storage.**

The default response is **0 0 0**

The First digit enables the feature:

0 = No LFS feature
1 = Formats can be loaded to a LFS buffer for this host
2 = Formats will be managed by host 1A, this host
    may present formats only.
3 = Formats are managed by host 1A, this host can
    also load formats into its own LFS buffer.

A response of 2, or 3 is valid only on a secondary host.

The Second digit is for operator selected features:

0 = Operator selected formats are disabled for this host
1 = Operator selected formats are enabled for this host

The Third digit is for LFS storage allocation on each host:

0 = No storage allocated
1 = 64K
2 = 128K
3 = 256K
4 = 512K
5 = 1024K
6 = 1536K.

See "Format Storage Size" on page 302 for guidance.

Note: The response to this field must be **0** if in *digit 1* the response is 0 (no LFS), or 2 (host 1A manages the formats).

12.4.1 SNA Sense Codes

The following codes are the SNA sense codes; these are generally set when there is a problem with the "structured fields."

```
X '0868' - No formats loaded
X '0869' - Format not found
X '087A' - Format processing error
X '1001' - Data stream error
X '1003' - Function not supported
X '1005' - Parameter error
X '1009' - Format group not selected
```

For more information on sense codes you should refer to the *VTAM Messages and Codes* manual (SC23-0114).

12.4.2 Performance

The local format storage feature should improve the overall display response time as the most common screens can be kept down at the 3174 controller, and hence reduce the amount of transmitted data over a communications link.

Points to consider when evaluating the local format storage feature might be listed as the example below:

- One 3174 IML per month

- 70 formats stored at a time

- Average format size is 500 bytes

- 30 terminals per controller

- One format per terminal, presented every 45 seconds (eight hour shift).

If you assume the above transaction rates, and a screen size of 1920 bytes, you can start to make "pencil" calculations that will show a line utilization saving around the 20% range. This will obviously vary greatly from location to location, and be dependent on the installation's application environment.

13. Network Management

This chapter discusses the components of network management specific to the 3174. These are:

- Remote Console Facility

- Vital Product Data and Network Asset Management.

Central Site Customization (CSCU) is also an integral part of network management. This subject is covered in the ITSC Red Book, *NetView Distribution Manager Release 2 and 3174 Central Site Change Management Implementation Guide.*

13.1 Remote Console Facility

The 3174 Controller has a range of tests and diagnostics available online. These are accessible from any CUT mode terminal attached to a coax port on the controller. This implies that you need to be on site to do this. For the help desk operators or central site support staff, this is not always possible and the situation often develops into someone being led through the procedure over the telephone. This is less than ideal.

The remote console facility was introduced with Configuration Support-B Release 2 and it was enhanced to include a remote IML capability in Configuration Support-B Release 3. Now Help Desk operators and Central Site staff can perform online tests for any 3174 in the network from their own NetView terminal.

The facility works in conjunction with a host application and is available in NetView as a command processor called CSCF (Central Site Console Facility).

CSCF is standard in NetView V2 but for V1, it requires that an SPE (Small Programming Enhancement) be installed. This SPE is in the form of three PTFs shown below in Table 12 on page 310.

Table 12. NetView PTFs Required for CSCF			
Operating System	Product Number	APAR	PTFs
MVS/XA	5665-362	OY26579	UY90507 UY90508 UY90509
MVS/ESA	5685-152	OY26617	UY90510 UY90511 UY90512
VM	5664-204	VM39206	UV90514 UV90515 UV90516

CSCF uses an exchange of data streams structured on FSTA or Full Screen Transport Architecture. This is a new SNA data stream definition designed especially for this purpose. As it is SNA, this function is only available on SNA controllers. (This includes X.25.) The data sent to the 3174 is in the form of an FSTA request and the returned data is also in FSTA format. NetView translates this into the 3270 data stream for display on a NetView terminal. NetView maintains templates of the 3174 test panels so that it is not necessary to transmit everything on the screen, only the variable data.

Once CSCF is invoked, the NetView operator will be in test mode on the 3174 almost as if he or she were actually using local test mode. The tests can be performed step by step from the menu or using the fast path.

13.1.1 Using CSCF

Here is an example of the use of CSCF to remotely monitor a 3174.

To initiate /tests for the controller P13008A, type in:

```
CSCF PU=P13008A
```

on the NetView command line.

The NetView console displays the screen shown in Figure 101 on page 311.

```
BKBCP200 _____ 3174 Test Menu (1TEST) _____ 3174/P13008A

    Test      Description                                (page 1 of 2)

      0       Terminal check
      1       Display event logs and response time log
      2       Display configuration panels
      3       3270 device status information
      4       Reset logs and cable errors
      5       Display vital data
      6       Display Control Areas
      7       Color convergence
      8       Extended functions and program symbols
      9       Token-Ring tests
     10       Port wrap tests
     11,p     Trace control (p=password)
     12       Asynchronous emulation adapter tests
     A,n      Alert to Host ID n (n=1A-1H,2A-2D,3A-3D)
     D,n      Dump device on port n (n=0-31)


CMD===>
PF1= HELP              PF2= END           PF3= RETURN         PF6= ROLL
PF8= FORWARD                                                  PF12= RETRIEVE
```

Figure 101. NetView CSCF Panel - Page 1

Note that this is "page 1 of 2." Pressing PF8 will send out a request for *page 2* shown in Figure 102.

```
BKBCP218 _____ 3174 Test Menu (1TEST) _____ 3174/P13008A

    Test      Description                                (page 2 of 2)

     13       Enterprise Systems Connection Adapter Tests
     14       3174 Operator Functions









CMD===>
PF1= HELP              PF2= END           PF3= RETURN         PF6= ROLL
PF7= BACKWARD                                                 PF12= RETRIEVE
```

Figure 102. NetView CSCF Panel - Page 2

From the menu, tests can be selected. If you already know what the test number is, then you can enter the fastpath. For example, to display logged events for port 1, enter:

/1,4,1,26

You can also invoke tests directly from the initial CSCF command by entering in the following format. To do the same test as above, type:

CSCF PU=P13008A OP=(/1,4,1,26)

The resulting screen, either way, is shown in Figure 103.

```
BKBCP202            _____ Log Records - PN 1 , HG 26 _____    3174/P13008A

(Day/Time since last POR: 014/05:35)
Day Time  SC   QA PHG_PN CHG_PN ID HA  Extended data bytes (B1-B16)
                                         B1   B3   B5   B7   B9   B11  B13  B15
014 04:15 0410 07  11      26_01 1A 003






PHG_PN=PrimaryHG_PN     HG=Hardware Group   SC=Status Code  ID=Host ID
CHG_PN=ConnectionHG_PN  PN=Port Number      QA=Qualifier    HA=Host Address


CMD===>
PF2= END                      PF3= RETURN                   PF6= ROLL
PF11= Test Menu                                             PF12= RETRIEVE
```

Figure 103. NetView CSCF Panel - Port Error Example

Note: CSCF is available automatically in Configuration Support-B Release 2. There is nothing to customize. However, if you want to use the remote IML capability in Configuration Support-B Release 3, it is necessary to code an online password in question 098 on the customization panel. Otherwise, the 3174 does not allow this function.

13.2 Network Asset Management

The ability to retrieve PU controller related information from the 3174 Controller such as serial number and microcode level has been around for some time now. (The serial number is kept in the controller as a result of your response to customization question 108.) This was supported in NetView by the "NPDA CTRL" command. NetView would issue this request to the 3174 in the form of an SNA command called an NMVT.

It is desirable to be able to also solicit this information at the terminal level in order to achieve online inventory control. The collected data, being processed centrally, can be used for recording the terminal inventory and tracking movements.

13.2.1 Vital Product Data

When an IBM 3270 terminal is powered on, control information is sent to the controller to establish the appropriate controller-terminal protocol. In this way the 3174 knows what devices are attached to it at any time.

The ability to retrieve this to the host has been provided in the 3174 Controller microcode since Release 4.0 of Configuration Support-A and Configuration Support-S. To retrieve the serial number of a terminal requires that the terminal provide this to the controller and so there was a corresponding upgrade to terminal equipment required as well. This, however, was a hardware upgrade and was limited to devices manufactured after January 26, 1988. The data that is kept in the device is called "Vital Product Data" or VPD.

All is not gloom if you have older terminals. The controller can at least recognize the device type and whether it is powered on or off (it will keep an entry for the last powered-on device on that port) and you can manually enter the serial number.

The change to full support was introduced half way in the life of the IBM 319X terminals. All IBM 3270 terminals manufactured since January 26, 1988 support the collection of "Vital Product Data" or VPD.

13.2.2 Extended VPD

The current 3472 models also support extended VPD. This, used in conjunction with Configuration Support-B Release 2 and higher, allows a more sophisticated implementation of asset management.

Extended VPD allows the data to be stored in the terminal in a format specified by you. You can have up to eight fields of user data in addition to the basic VPD. These fields include a label, which is generated at customization time, and a data field, which is entered by the terminal user. The scenario then is this: The network planner defines the labels using fields such as "Name," "Department," "Location" etc. When a terminal is connected to the controller, the user should be requested to go into setup mode or /5 test and enter the data in the data fields corresponding to these labels. This data is stored in the terminal and is recorded on the 3174 Control disk so if the terminal is moved to another controller, the new location will be easily noted.

The data once entered is then available for display on an "ad hoc" basis by a NetView operator or it may be routinely collected by NetView automatically and stored in a data base for later analysis by a reporting program such as IBM Service Level Reporter (SLR).

The following table summarizes some of the products which provide VPD data to NetView and the level of detail for each.

Table 13. VPD Functions Supported on IBM Products					
PRODUCT	MACH TYPE	MODEL	SERIAL	S/WARE DATA	Ext. VPD
3174 R4	YES	YES	YES	NO	NO
3174 B R2	YES	YES	YES	NO	YES
3191 Mod D,E,L **1**	YES	YES	YES	NO	NO
3192 NOT Mod G **1**	YES	YES	YES	NO	NO
3194 Mod C,D,H **1**	YES	YES	YES	NO	NO
3471 **1**	YES	YES	YES	NO	NO
3472 **1**	YES	YES	YES	NO	YES
OS/2-EE **1** **2**	NO	YES	YES	NO	NO
OS/2-EE 1.2 **2**	YES	YES	YES	YES	NO
3720/NCP 5.2	YES	YES	YES	YES	NO
3725/NCP 4.3	YES	YES	YES	YES	NO
3745/NCP 5.2	YES	YES	YES	YES	NO
5822 DSU	YES	YES	YES	NO	NO
586x modems	YES	YES	YES	NO	NO
786x modems	YES	YES	YES	NO	NO
3179 1 **1**	YES	NO	NO	NO	NO
3180 1 **1**	YES	YES	NO	NO	NO
3191 A,B **1**	YES	NO	NO	NO	NO
3192 G **1**	YES	YES	NO	NO	NO
3193 Mod 10,20 **1**	YES	YES	NO	NO	NO
3194 H50 **1**	YES	YES	NO	NO	NO
3290 **1**	YES	NO	NO	NO	NO
3720/NCP 4.2	NO	NO	NO	YES	NO
3725/NCP 4.2	NO	NO	NO	YES	NO

Note:

1 = 3174 attached

2 = PS/2, PC-AT, PC-XT.

13.2.3 Collecting Vital Product Data

Whether you use extended VPD or basic VPD, the information can be either displayed locally or retrieved by NetView.

A sample of the VPD data as it appears on a screen in test mode on the 3174 is shown in Figure 104. This can be retrieved by CSCF.

```
_____ Port Vital Data - PN 01, HG 26 _____


                         Device-defined          User-defined

Device type:             3472                       ____
Model number:            G00                        ___
Plant of manufacture:    NO                         __
Serial number:           NRN22CB                    _____
Release level:           000
Engineering change data: 0220890720000

                                      B1 B2 B3 B4 B5 B6 B7 B8 B9 B10
Device characteristics (hexadecimal): 05 11 81 04 40 00 10 00 1F 80

* = data not supplied by device

Location  Raleigh ITSC_____



CMD===>
 PF: 3=Quit      7=Back    8=Fwd                    12=Test Menu
```

Figure 104. VPD Displayed from 3174 Test

To interrogate devices from NetView, use the VPDCMD command. The format is

```
VPDCMD ALL,RAPP40
```

where ALL will retrieve all devices on the PU named RAPP40. The resulting information sent to Netview is shown in Figure 105 on page 316. (Comments have been added.)

```
VPDCMD ALL RAPP40
DWO0009I REQUEST 'ALL' ACCEPTED FOR RAPP40   , REQID = 0005


* 3174 VPD
DWO100I REQID 0005 :  ORIG PU RAPP40   CNFG PU RAPP40   CH/LINK 0E40   PU ISTPUS25
DWO102I REQID 0005 :  IBM-HW M/T = 3174 MDL = 11L MFG = 23 S/N = 00N6233


* 3179 on port 00 (serial number was entered manually)
DWO100I REQID 0005 :  ORIG PU RAPP40   CNFG LU RAPT400  PU RAPP40 CH/LINK 0E40      PU ISTPUS25
DWO101I REQID 0005 :  PORT = 000 PWROS = Y PWROL = Y
DWO105I REQID 0005 :  PHY = 'Raleigh ITSC
DWO102I REQID 0005 :  IBM-HW M/T = 3179 MDL = *** MFG = ** S/N = 0086293


* 3472 G on port 01 (serial number retrieved from the device)
DWO100I REQID 0005 :  ORIG PU RAPP40   CNFG LU RAPT401  PU RAPP40 CH/LINK 0E40      PU ISTPUS25
DWO101I REQID 0005 :  PORT = 001 PWROS = N PWROL = Y
DWO105I REQID 0005 :  PHY = 'Raleigh ITSC
DWO102I REQID 0005 :  IBM-HW M/T = 3472 MDL = G00 MFG = NO S/N = NRN22CB


* Nothing on this port
DWO100I REQID 0005 :  ORIG PU RAPP40   CNFG LU RAPT402  PU RAPP40 CH/LINK 0E40      PU ISTPUS25
DWO101I REQID 0005 :  PORT = 002 PWROS = N PWROL = N
DWO102I REQID 0005 :  MIX-HW M/T = 0000 MDL = *** MFG = ** S/N = *******


* 3472 F on port 03 (serial number retrieved from the device)
DWO100I REQID 0005 :  ORIG PU RAPP40   CNFG LU RAPT403  PU RAPP40 CH/LINK 0E40      PU ISTPUS25
DWO101I REQID 0005 :  PORT = 003 PWROS = Y PWROL = Y
DWO105I REQID 0005 :  PHY = 'Raleigh ITSC
DWO102I REQID 0005 :  IBM-HW M/T = 3472 MDL = F00 MFG = 23 S/N = 00F0678


* 3471 on port 04 (serial number entered manually)
DWO100I REQID 0005 :  ORIG PU RAPP40   CNFG LU RAPT404  PU RAPP40 CH/LINK 0E40      PU ISTPUS25
DWO101I REQID 0005 :  PORT = 004 PWROS = Y PWROL = Y
DWO105I REQID 0005 :  PHY = 'Raleigh ITSC
DWO102I REQID 0005 :  IBM-HW M/T = 3471 MDL = *** MFG = ** S/N = 88Y8778
```

Figure 105. NetView Message Response from VPD Command

NetView provides sample CLISTs to retrieve the VPD data from the network and store it in SMF records. The formats of these records in NetView Version 1 Release 3 are documented in the *NetView Administration Reference* (SC31-6014).

Once you have the data stored as SMF records, you can use SLR or an equivalent product to generate the Network Asset Management reports.

13.3 Using Network Asset Management Effectively

Network Asset Management is greatly enhanced by the use of VPD.

To use Network Asset Management or NAM effectively requires planning and procedure documentation by the network planners of the organization but it can potentially be very powerful if implemented correctly. It may save countless hours in tracking down terminals that have been moved when inventory time comes around. Consider some of capabilities of an effective implementation of NAM. You can use it to:

- Dynamically build a configuration table and solicit product information from your network.

- Interactively determine the network location of a missing or moved network resource.

- Uniquely identify each supported resource in the network.

- Automatically build a list of (VPD supported) network resources including their location and how they are attached to the system.

- Determine where device serial number XXXXXXX is located and show how it is connected to the system (LU name, PU name, line name and NCP name).

- Determine 3174 ports that have not had recent power-on activity, to assist in the identification of unused ports.

Appendix A. IBM 3174 Controller Adapters

A.1 IBM 3174 Large Controller Card and Adapter Functions

The following is a description of the adapters that may be installed in various models of the IBM 3174. It is useful to know the hardware group and recommended position of each card and adapter for problem determination purposes, so this information is also included.

Each card has a position in the 3174 logic board recommended by IBM. Apart from certain adapters such as the Channel Adapter they can be thought of as conventional positions rather than mandatory. However conventions are always helpful if problems arise. The number of the position that a particular card should be fitted to is included in the installation instructions with each card.

Each of these cards is a Field Replaceable Unit (FRU) and as such each has a FRU type number.

A.1.1 Processor Card

- Use .... Base - All Models

- Type Number .... 9500 or 9501

- Position 18

- Hardware Group 87

This card contains the 3174 microprocessor, a timer, a pluggable 16K x 18 ROS module, and other timing and control logic. It also contains logic for single-bit per halfword memory error correction and double-bit memory error detection. A red light emitting diode (LED) on the card blinks during diagnostic testing to indicate that the card logic is operational.

A.1.2 512K Storage Card

- Use .... Optional - Models 1L, 1R, 2R, 3R - Not for models 11L, 11R, 12R, 13R

- Type Number 9051

- Position .... 19 or 20

- Hardware Group 87

This card contains 23 modules of 256K x 1 memory and switching logic to provide 512K of usable storage, six-bit error correction code, single-bit error correction, and double-bit error detection.

A.1.3 1.0M Storage Card

- Use .... Base - Models 1L, 1R, 2R, 3R; Optional - Models 1L, 1R, 2R, 3R, 11L, 11R, 12R, 13R

- Type Number 9052

- Position .... 19 or 20

- Hardware Group 87

This card contains 46 modules of 256K x 1 memory and switching logic to provide 1.0M of usable storage, six-bit error correction code, single-bit error correction, and double-bit error detection.

A.1.4 2.0M Storage Card

- Use .... Base - Models 11L, 1xR; Optional - Models 1L/11L, 1R/11R, 2R/12R, 3R/13R

- Type Number 9053

- Position 17

- Hardware Group 87

This card contains 92 modules of 256K x 1 memory and switching logic to provide 1.0M of usable storage, six-bit error correction code, single-bit error correction, and double-bit error detection.

A.1.5 Disk Adapter (File Adapter)

- Use .... Base - All Models

- Type Number .... 9120 or 9154

- Position 21

- Hardware Group 01/26

The 9120 adapter provides read/write control for the two diskette or fixed disk drives that can be installed in the 3174. In addition, the 9154 adapter provides for 3270 Terminal Attachment.

A.1.6 Terminal Adapter

- Use .... Base - All Models

- Type Number .... 9150 or 9154

- Position .... 22, 23 or 24

- Hardware Group .... 26 or 27

This adapter provides buffering and control for attachment of up to 32 category-A displays, printers, and workstations. Each of the four BNC top-card connectors provides a path to one terminal, or to one IBM 3299 Terminal Multiplexer, or to one Terminal Multiplexer Adapter. Signals from each port contains addressing for up to eight terminals. Attachments can be up to 4920 feet (1.5 km) from the 3174 when coaxial cable is used to attach them, or up to

3280 feet (1 km) when IBM Cabling System Data Grade Media is used. A balun is needed at the terminal end of the connection, but none is needed at the 3174 end when Cabling System media is used. Diagnostic wrap capability, under microcode program control, is provided at the driver/receiver output. Logic for Driver/receiver wrapping, timeout delay selection, and addressed cable protocol are also included on the card.

Note: When a 3299 model 32 is attached to port 0, 32 terminals can be attached to the 3299. The remaining ports of the Terminal Adapter cannot be used.

A.1.7 Port Expansion Feature

- Use .... Models 11L, 11R, 12R, 13R

- Type Number 9155

- Position .... 22 or 23

- Hardware Group .... 26 or 27

This adapter provides the connection for an additional 32 ports for attachment of category-A displays, printers, and workstations. Each of the four BNC top-card connectors provides a path to one terminal, or to one IBM 3299 Terminal Multiplexer, or to one Terminal Multiplexer Adapter. Signals from each port contains addressing for up to eight terminals. Attachments can be up to 4920 feet (1.5 km) from the 3174 when coaxial cable is used to attach them, or up to 3280 feet (1 km) when IBM Cabling System Data Grade Media is used. A balun is needed at the terminal end of the connection, but none is needed at the 3174 end when Cabling System media is used. Diagnostic wrap capability, under microcode program control, is provided at the driver/receiver output. Logic for Driver/receiver wrapping, timeout delay selection, and addressed cable protocol are also included on the card.

Note: When a 3299 model 32 is attached to port 0, 32 terminals can be attached to the 3299. The remaining ports of the Terminal Adapter cannot be used.

A.1.8 Terminal Multiplexer Adapter

- Use .... Optional - All Models

- Type Number 917X

- Position .... Variable

- Hardware Group .... 26 or 27

This adapter performs the same functions as an external IBM 3299 Model 2 Terminal Multiplexer. Input to the card is via a short length of RG-62A/U cable between a Terminal Adapter port and the top BNC connector on this card. The input signals contain addressing to select one of the eight possible BNC output driver/receiver ports. Terminals can be up to 4920 feet (1.5 km) from the 3174 unit when coaxial cable is used to attach them, or up to 3280 feet (1 km) when IBM Cabling System Data Grade Media is used. A balun is needed at the terminal end of the connection, but none is needed at the control unit end when Cabling System media is used. Diagnostic wrap capability, under microcode program control, is provided at the driver/receiver output.

Note: With the Port Expansion feature, up to eight TMAs can be installed depending on the number of other optional features already installed.

A.1.9 Channel Adapter

- Use .... Base - Model 1L/11L
- Type Number 9210
- Position 11
- Hardware Group 16

This adapter provides S/370-type channel host communications. Attachment to selector, byte multiplexer, and block multiplexer channels is supported. SNA or non-SNA operational mode is selectable via microcode. When in SNA mode the 3174 operates as a single-address controller. When in non-SNA mode the 3174 unit operates as a shared multiple address unit, using one of two address ranges - one for up to 16 devices, and one for up to 32 devices. The channel address is selectable via microcode in both modes. The mode of data transfer two and from the channel, which is also microcode-selectable, may be either Data-Chain Interlocked or High-Speed Transfer.

A.1.10 Channel Interface Driver/Receiver Card

- Use .... Base - Model 1L/11L
- Type Number 9230
- Position 10
- Hardware Group 16

This card is used in conjunction with the Channel Adapter. It provides driver/receiver signal conversion for the S/370-type bus and tag lines between the host channel and the Channel Adapter. The card also contains solid state Select Out bypass relays.

A.1.11 Type-1 Communications Adapter (V.24/V.35)

- Use .... Base - Model 1R/11R; Optional Model 1L/11L, 3R/13R
- Type Number 9253
- Position 22
- Hardware Group 11

This adapter provides CCITT V.24/V.28 (EIA RS-232D) and CCITT V.35 electrical interfaces to connect the 3174 to a modem or other signal converter. A 25-pin D-shell connector is provided on the card to connect the communications cable. Adapter logic works in byte-PIO mode when BSC protocols are used, and in byte-CHIO mode for other protocols. The desired interface (V.24/V.28 or V.35) and the operational speed are selected under microcode program control. External clocking is required.

A.1.12 Type-1 Concurrent Communication Adapter (V.24/V.35)

- Use .... Optional - Model 1L/11L, 1R/11R, 2R/12R, 3R/13R

- Type Number 9263

- Position .... 11 - 17

- Hardware Group 51

This adapter provides CCITT V.24/V.28 (EIA RS-232D) and CCITT V.35 electrical interfaces to connect the 3174 to a modem or other signal converter. A 25-pin D-shell connector is provided on the card to connect the communications cable.

Each Concurrent Communication Adapter provides an additional 3174 controller appearance in a single 3174. This is accomplished by having a separate microprocessor, control storage and TP interface. External clocking is required.

A.1.13 Type-2 Communications Adapter (X.21)

- Use .... Base - Model 2R/12R; Optional Model 1L/11L, 3R/13R

- Type Number 9273

- Position 22

- Hardware Group 11

This adapter provides CCITT V.11 (X.21) electrical interface to connect the 3174 to an X.21 network or other signal converter providing a compatible interface. A 25-pin D-shell connector is provided on the card to connect the communications cable. Adapter logic works in byte-CHIO mode supporting SNA/SDLC protocols. The operational speed is selected under microcode program control. External clocking is required.

A.1.14 Type-2 Concurrent Communication Adapter (X.21)

- Use .... Optional - Model 1L/11L, 1R/11R, 2R/12R, 3R/13R

- Type Number 9267

- Position .... 11 - 17

- Hardware Group 52

This adapter provides CCITT V.11 (X.21) electrical interface to connect the 3174 to an X.21 network or other signal converter providing a compatible interface. A 25-pin D-shell connector is provided on the card to connect the communications cable.

Each Concurrent Communication Adapter provides an additional 3174 controller appearance in a single 3174. This is accomplished by having a separate microprocessor, control storage and TP interface. External clocking is required.

A.1.15 Type-3 Communications Adapter (IBM Token Ring)

- Use .... Base - Model 3R; Optional Model 1L, 1R, 2R

- Type Number 9350

- Position .... 11 - 17

- Hardware Group 31

This adapter provides an IEEE 802.5 (ECMA 89) standard interface to an IBM Token-Ring Network. Baseband communications at 4M bps is supported. The adapter contains a microprocessor, memory, ROS, and other logic to provide the physical interface, link clocking, serialization/deserialization, link address recognition, frame structuring/stripping, and error checking. A nine-pin connector is provided to attach the communication cable.

A.1.16 Type-3A Dual Speed Communications Adapter (IBM Token Ring)

- Use .... Base - Model 13R; Optional Model 1L, 1R, 2R, 3R, 11L, 11R, 12R

- Type Number 9351

- Position .... any slot

- Hardware Group 31

This adapter provides an IEEE 802.5 (ECMA 89) standard interface to an IBM Token-Ring Network. Baseband communications at 4 or 16 Mbps is supported. The speed is a customization option as well as the "Early Token Release" function. The adapter contains a microprocessor, memory, ROS, and other logic to provide the physical interface, link clocking, serialization/deserialization, link address recognition, frame structuring/stripping, and error checking. A nine-pin connector is provided to attach the communication cable.

A.1.17 Asynchronous Emulation Adapter

- Use .... Optional - All Models

- Type Number 9331

- Position 14,13,12

- Hardware Group 21,22,23

This adapter provides eight ASCII start/stop ports. The adapter contains a microprocessor and memory, which is loaded from a feature DASD. A short cable between the 3174 logic board and a panel containing eight 25-pin D-shell connectors carries signals to and from the adapter. The adapter performs protocol conversion to allow certain ASCII devices to communicate with IBM hosts, and certain IBM terminals to communicate with ASCII hosts. The EIA RS-232D interface is selected under microcode program control.

A.1.18 Fiber-Optic Terminal Adapter

- Use .... Optional - Models 11L, 11R, 12L, 12R, 13R, 21L, 21R, 22L

- Type Number 9750

- Position .... 11 - 17

- Hardware Group .... 26 or 27

This adapter provides the ability to attach an 3299 Terminal Multiplexer Model 032 to large cluster 3174 models via 62.5/125 micron fiber-optic media at a distance of up to 1,500 meters (4,920 ft). It can also be used with 100/140 micron and 50/125 micron fiber-optic cable. This adapter does not extend the 3174 controller's ability to support more ports (thirty-two without 3270 Port Expansion Feature, sixty-four with 3270 Port Expansion Feature). Support for multiple Fiber Optic Terminal Adapter features allows multiple groups of up to eight devices to be connected to a 3174 via fiber-optic cable. When connected this way, only the first eight ports (0-7) on the attached 3299 Terminal Multiplexer Model 032(s) are active.

A.1.19 Encrypt/Decrypt Adapter

- Use .... Optional - Models 1R, 2R, 3R

- Type Number 9030

- Position 24

- Hardware Group 46

This adapter provides the logic to encrypt and decrypt data traffic between SNA nodes according to the United States National Bureau of Standards Data Encryption (DES) algorithm. (Encryption is not available to terminals operating in DFT mode.) The card contains a 4.14V mercury battery, oscillator, control logic, storage for the crypto master key, and a security keyhole to prevent unauthorized access to the adapter.

A.2 IBM 3174 Medium Controller Feature Slots

Two feature slots are available in Models 51R, 52R, 61R and 62R.

Slot 4 can contain: Asynchronous Emulation Adapter

Type 3A Dual Speed (16/4 Mbps) Communication Adapter

Type 1 Concurrent Communication Adapter

Type 2 Concurrent Communication Adapter.

Slot 5 can contain: Type 3A Dual Speed (16/4 Mbps) Communication Adapter

Type 1 Concurrent Communication Adapter

Type 2 Concurrent Communication Adapter.

Note: Configuration Support-B is not supported on model 52R; therefore, the Concurrent Communication Adapter is not supported.

One feature slot is available in Models 53R and 63R.

Slot 2 can contain: Asynchronous Emulation Adapter

Type 1 Concurrent Communication Adapter

Type 2 Concurrent Communication Adapter

Type 1 Alternate IML Communication Adapter

Type 2 Alternate IML Communication Adapter.

3174 Model 61R, 62R, 63R use "Plug in Module" (PIM) storage expansion. Hence no slot is needed for storage expansion in these controllers.

A.3 IBM 3174 Rack Mounted Controller Feature Slots

Five feature card slots are provided on Models 21L and 21R. Four feature card slots are provided on Models 22L. The following feature adapters can be inserted into any of the available feature slots:

- Asynchronous Emulation Adapter
- Type 3A Dual Speed (16/4) Communication Adapter
- Type-1 Concurrent Communication Adapter
- Type-2 Concurrent Communication Adapter
- Terminal Multiplexer Adapter
- Fiber-Optic Terminal Adapter.

Appendix B. 3174 Feature Table

The following tables list, by model, the hardware and combination hardware/microcode features that are supported on the controller. The first table shows large-cluster models; the second table shows medium- and small-cluster models. To support some of the features, many of the models require additional storage.

Table 14. Features Supported by Models 1L through 23R													
Feature	1L	1R	2R	3R	11L	11R	12L	12R	13R	21L	21R	22L	23R
1MB Base Storage	B	B	B	B	X	X	X	X	X	X	X	X	X
2MB Base Storage	X	X	X	X	B	B	B	B	B	B	B	B	B
Storage Expansion	O	O	O	O	O	O	O	O	O	O	O	O	O
1.2MB Diskette Drive	B	B	B	B	X	X	X	X	X	X	X	X	X
2.4MB Diskette Drive	O	O	O	O	B	B	B	B	B	B	B	B	B
20MB Fixed Disk	O	O	O	O	O	O	O	O	O	O	O	O	O
Terminal Adapter	B	B	B	B	B	B	B	B	B	B	B	B	B
Terminal Adapter (3270 Port Expansion Feature)	X	X	X	X	O	O	O	O	O	O	O	O	O
Fiber Optic Terminal Adapter	O	O	O	O	O	O	O	O	O	O	O	O	O
Terminal Multiplexer Adapter*	O	O	O	O	O	O	O	O	O	O	O	O	O
Channel Adapter	B	X	X	X	B	X	X	X	X	B	X	X	X
ESCON Adapter	X	X	X	X	X	X	B	X	X	X	X	B	X
Type 1 Communication Adapter	O	B	X	O	O	B	O	X	O	X	B	B	B
Type 2 Communication Adapter	O	X	B	O	O	X	O	B	O	X	X	X	X
Type 3A Communication Adapter (Token-Ring Adapter)	O**	O**	O**	B	O**	O**	O**	O**	B	O**	O	O**	B
Token-Ring 3270 Gateway	O	O	O	X	O	O	O	O	X	O	O	O	X
Asynchronous Emulation Adapter	O	O	O	O	O	O	O	O	O	O	O	O	O
Concurrent Communication Adapter	O	O	O	O	O	O	O	O	O	O	O	O	O

Legend:

    B = Base
    O = Optional
    X = Not Available on this model

* Although not a feature of the 3174, the 3299 Terminal Multiplexer provides a similar function as the Terminal Multiplexer Adapter and is supported by all models of the 3174.
** When this adapter is present and you specify the actual model number during customization, the 3174 can only be customized as a gateway. To use as just a Token-Ring attached controller, the model designation must be changed during customization.

Table 15. Features Supported by Models 51R through 92R

Feature	51R	52R	53R	61R	62R	63R	81R	82R	90R	91R	92R
1MB Base Storage	B	X	B	X	X	X	B	B	X	X	X
2MB Base Storage	X	X	X	B	B	B	X	X	B	B	B
Storage Expansion	O	O	O	O	O	O	X	X	X	X	X
1.2MB Diskette Drive	B	B	B	X	X	X	B	B	X	X	X
2.4MB Diskette Drive	O	O	O	B	B	B	X	X	B	B	B
20MB Fixed Disk	O	O	O	O	O	O	X	X	X	X	X
Terminal Adapter	B	B	B	B	B	B	B	B	B	B	B
Terminal Adapter (3270 Port Expansion Feature)	X	X	X	X	X	X	X	X	X	X	X
Fiber Optic Terminal Adapter	X	X	X	X	X	X	X	X	X	X	X
Terminal Multiplexer Adapter*	X	X	X	X	X	X	X	X	X	X	X
Channel Adapter	X	X	X	X	X	X	X	X	X	X	X
ESCON Adapter	X	X	X	X	X	X	X	X	X	X	X
Type 1 Communication Adapter	B	X	X	B	X	X	B	X	B	B	X
Type 2 Communication Adapter	X	B	X	X	B	X	X	B	X	X	B
Type 3A Communication Adapter (Token-Ring Adapter)	O**	X	B	O**	O**	B	X	X	B***	X	X
Token-Ring 3270 Gateway	O	O	X	O	O	X	X	X	B	X	X
Asynchronous Emulation Adapter	O	O	X	O	O	C	X	X	X	X	X
Concurrent Communication Adapter	O	X	X	O	O	O	X	X	X	X	X

Legend:

  B = Base
  O = Optional
  X = Not Available on this model

*   Although not a feature of the 3174, the 3299 Terminal Multiplexer provides the same function as the Terminal Multiplexer Adapter and is supported by all models of the 3174.
** When this adapter is present and you specify the actual model number during customization, the 3174 can only be customized as a gateway. To use as just a Token-Ring attached controller, the model designation must be changed during customization.
*** This model can only be customized as a gateway.

Appendix C. 3174 Physical Specifications

C.1 3174 Large Cluster Models 11L, 12L, 11R, 12R, 13R, and 0xx

- Width: 700 mm (27.5 in.)
- Depth: 460 mm (18   in.)
- Height: 636 mm (25   in.)
- Weight: 50 kg (110   lbs.)
- Heat output: 375 watts (1280 BTU/hr)

  Airflow: 2.8 m(3)/min (100 cfm) forced air
- Power Consumption: 0.54 kVA
- Power Supply: Specific to country of installation

C.2 3174 Rack Mounted Models 21L, 22L, 21R, and 23R

- Width: 445 mm (17.5 in.)
- Depth: 527 mm (20.7 in.)
- Height: 254 mm (10   in.)
- Weight: 29.5 kg (65   lbs.)
- Heat output: 210 watts (720 BTU/hr)

  Airflow: 2.0 m(3)/min (70 cfm) forced air
- Power Consumption: 0.54 kVA
- Power Supply: Specific to country of installation

C.3 3174 Medium Cluster Models 61R, 62R, 63R, and 5xR

- Width: 445 mm (17.5 in.)
- Depth: 608 mm (20   in.)
- Height: 191 mm (7.5 in.)
- Weight: 22.7 kg (50 lbs.)
- Heat output: 185 watts (631 BTU/hr)

  Airflow: 1.4 m(3)/min (50 cfm) forced air
- Power Consumption: 0.32 kVA
- Power Supply: Specific to country of installation

C.4 3174 Small Cluster Models 90R, 91R, ,92R, and 8xR

- Width: 406 mm (16.   in.)
- Depth: 425 mm (16.75 in.)
- Height: 120 mm (4.75 in.)
- Weight: 8.0 kg (18 lbs.)
- Heat output: 78 watts (265 BTU/hr)

  Airflow: 0.14 m(3)/min (5 cfm) forced air
- Power Consumption: 0.12 kVA @ 60 Hz, 0.14 kVA @ 50 Hz
- Power Supply: Specific to country of installation

Appendix D. IBM 3174 Large Controller Plug Chart

The following chart shows the card locations recommended for all 3174-1xx features depending on the model. The hardware group and the type numbers as shown in the online test 'Hardware Configuration' are shown too.

Card Loc.	Model	Function	HW Group	Hardw.Type
11	x1L	NLCA Adapter	16	9210
	0xR 1xR	Type 3A Adapter	31	9351
12	x1L S/#3026,B/#3044	Type 3A Adapter (Token Ring)	31	9351
	x1L 0xR 1xR	ASCII Emul. Adapt.	23	9331
13	x1L 0xR 1xR	ASCII Emul. Adapt.	22	9331
14	x1L 0xR 1xR	ASCII Emul. Adapt.	21	9331
15	x1L 0xR 1xR	TMA Adpt.—Port 0	26/27	917X
16	x1L 0xR 1xR	TMA Adpt.—Port 8	26/27	917X
TMA Ports 16 & 24		Install remaining TMA's after all other cards are installed in the next open card location using the following TMA priority sequence 11,23,12,17,24,13		
17	x1L 0xR 1xR	2 MEG Memory	87	9053
18	x1L 0xR 1xR	Engine	87	9500/1
19	x1L 0xR 1xR	1 MEG Memory	87	9052
20	01L 0xR	512K Memory	87	9051
	x1L 0xR 1xR	1 MEG Memory	87	9052
21	x1L 0xR 1xR	File Adapter	01	9120
22	x1L 03/13R	Terminal Adapt.	26	9150
	x1L 1/11R 3/13R	PCA-1 EIA/V.35	11	9253
	x1L 2/12R 3/13R	PCA-2 X.21	11	9273
23	1/11R 2/12R	Terminal Adapt.	26	9150
any	x1L 0xR 1xR	CCA-1	51	9263
any	x1L 0xR 1xR	CCA-2	52	9267

Appendix E. VTAM APARs for the 3174 Gateway

The following lists of APARs describe VTAM related problems that can occur when running the IBM Token-Ring Network 3270 Gateway feature on an IBM 3174. The APAR lists are categorized by operating system and VTAM level. The program fix for these problems must be applied when installing the feature. Contact the IBM Support Center to obtain the appropriate fix for your environment.

Table 16. Channel Related VTAM Problems

SYSTEM/VTAM LEVEL	APAR	COMMENTS
MVS/VTAM 2.1	OY02441	605I MSG at console on CONNECT-IN.
MVS/VTAM 2.2	OY02441	605I MSG at console on CONNECT-IN.
	OY03563	Connect-Disconnect loop.
MVS/370/VTAM 3.1	OY02796	Lost "CONNECT-IN" ... no MSG.
	OY02763	605I MSG at console on CONNECT-IN.
	OY03568	Connect-Disconnect loop.
MVS/370/VTAM 3.1.1	OY02796	Lost "CONNECT-IN" ... no MSG.
	OY02763	6051 MSG at console on CONNECT-IN
	OY03568	Connect-Disconnect loop.
MVS/XA/VTAM 3.1	OY02761	Lost "CONNECT-IN" ... no MSG.
	OY02762	MSG at console on CONNECT-IN.
	OY03567	Connect-Disconnect loop.
MVS/XA/VTAM 3.1.1	OY02761	Lost "CONNECT-IN" ... no MSG.
	OY02762	605I MSG at console on CONNECT-IN.
	OY03567	Connect-Disconnect loop.
VM/VTAM 3.1.1	VM27218	Lost "CONNECT-IN" ... no MSG.
	VM27263	Connect-Disconnect loop.
VSE/VTAM 3.1	DY36460	Lost "CONNECT-IN" ... no MSG.
	DY36372	Connect-Disconnect loop.

Table 17. Alerts Related VTAM Problems

SYSTEM/VTAM LEVEL	APAR	COMMENTS
MVS/370/VTAM 3.1	OZ97610	NPDA picture incorrect for loc cnt
	OY02866	NPDA/NLDM RECFMS hangs
MVS/370/VTAM 3.1.1	OZ97610	NPDA picture incorrect for loc cnt
	OY02866	NPDA/NLDM RECFMS hangs
MVS/XA/VTAM 3.1	OZ97323	NPDA picture incorrect for loc cnt
	OY03072	NPDA/NLDM RECFMS hangs
MVS/XA/VTAM 3.1.1	OZ97323	NPDA picture incorrect for loc cnt
	OY03072	NPDA/NLDM RECFMS hangs
VM/VTAM 3.1	VM26515	NPDA/NLDM RECFMS hangs
VM/VTAM 3.1.1	VM26700	NPDA picture incorrect for loc cnt
	VM26515	NPDA/NLDM RECFMS hangs
VSE/VTAM 3.1	DY35804	NPDA picture incorrect for loc cnt
	DY36276	NPDA/NLDM RECFMS hangs
VSE/VTAM 2.1	DY35968	NPDA/NLDM RECFMS hangs

Table 18. Other VTAM Related Problems

SYSTEM/VTAM LEVEL	APAR	COMMENTS
MVS/370/VTAM 3.1	OY00747	Corrupted data on READ.
MVS/370/VTAM 3.1.1	OY00747	Corrupted data on READ.
MVS/XA/VTAM 3.1	OZ97661	Corrupted data on READ.
MVS/XA/VTAM 3.1.1	OZ97661	Corrupted data on READ.
VM/VTAM 3.1.1	VM26630	Corrupted data on READ.
VSE/VTAM 3.1	DY36136	Corrupted data on READ.

Table 19. Channel Related VTAM Problems, Configuration Support-B1 and S5	
SYSTEM/VTAM LEVEL	**APAR**
MVS/370/VTAM 3.2	OY19979
MVS/370/VTAM 2.2	OY18497
MVS/XA/VTAM 3.2	OY18496
MVS/XA/VTAM 3.1.1	OY18496
VM/VTAM 3.1.1	VM33635
VSE/VTAM 3.0/3.2	DY37950
VSE/VTAM 2.1	DY37799

Appendix F. Storage Charts

The charts here mainly apply to Configuration Support-B as we are referencing Concurrent Communication Adapters, LFS, and SLMH. Where a chart is for Configuration Support-A it will be stated as such.

To calculate what storage will be required in the 3174 you should work on the following guide:

Total A = * Base weighting, Figure 107 on page 340.
Total B = * SLMH support, Figure 108 on page 340.
Total C = * MLT level, Figure 109 on page 342.
Total D = * T/R Gateway, Figure 110 on page 343.
Total E = * CSCM, Figure 111 on page 344.
Total F = * LFS, Figure 112 on page 344.

TOTAL = sum of the above values (total 3174 requirement).

Add together the totals from the charts on the following pages for each function you require; then when you have the final totals, select the storage requirement from the chart in Figure 106.

F.1 Total Storage Requirements

Calculated Storage Weighting	Actual Storage
2048 or LESS	2.0 MB total storage required.
greater than 2048 and less than 3032	3.0 MB total storage required.
greater than 3032 and less than 4056	4.0 MB total storage required.
greater than 4056 and less than 5080	5.0 MB total storage required.
greater than 5080 and less than 6104	6.0 MB total storage required.

Figure 106. Total Storage Requirements

F.2 Base Storage Requirements

function	storage weighting	notes
BASE	1661	storage requirement for CS.B
AEA	309	add to base if AEA installed
AEA MLT	216	add to base and AEA value if MLT function is selected for AEA screens
MULTI—HOST	159	add to above weights if CCA or multi—host support is required

A. TOTAL =	add required values together.

Figure 107. Base Storage Requirements

F.3 Single Link Multi-Host Storage Requirement

function	storage weighting	notes
SLMH	54	with 1 additional host
SLMH	108	with 2 additional hosts
SLMH	162	with 3 additional hosts
SLMH	216	with 4 additional hosts
SLMH	270	with 5 additional hosts
SLMH	324	with 6 additional hosts
SLMH	378	with 7 additional hosts

B. TOTAL =	Select ONE of the above values.

Figure 108. Single Link Multi-Host Support

F.4 MLT Storage Requirements

Display Types	Number of Sessions Per Display				
	1	2	3	4	5
	Weighting Factors for Sessions per Disp				
Model 2, No EAB	0	0	0	0	2
Model 2, EAB	0	0	4	8	12
Model 3, No EAB	0	0	4	8	12
Model 3, EAB	0	8	16	24	32
Model 4, No EAB	0	0	4	8	12
Model 4, EAB	0	8	16	24	32
Model 5, No EAB	0	0	4	8	12
Model 5, EAB	0	8	16	24	32

The user should calculate the Weighting Factors for every terminal that will be attached to the 3174. For example if there were 32 terminals (Model 5 with EAB) with FOUR sessions each, the weighting factor would be 768. That would be a MLT requirement of level 4.

Note:

- Model 2 = 24 x 80   (1920) screen size

- Model 3 = 32 x 80   (2560) screen size

- Model 4 = 43 x 80   (3440) screen size

- Model 5 = 27 x 132 (3564) screen size

Now with the total screen weighting select which MLT level is required from the list below:

- A sum of Weighting Factors = < 0 = MLT level 0
- A sum of Weighting Factors = < 64K = MLT level 1
- A sum of Weighting Factors = < 128K = MLT level 2
- A sum of Weighting Factors = < 512K = MLT level 3
- A sum of Weighting Factors = < 896K = MLT level 4
- A sum of Weighting Factors = < 1152K = MLT level 5
- A sum of Weighting Factors = < 1536K = MLT level 6
- A sum of Weighting Factors = < 2048K = MLT level 7
- A sum of Weighting Factors = < 2688K = MLT level 8

function	storage weighting	notes
MLT level 1	64	
MLT level 2	128	The MLT level to be selected can be determined using the two previous tables, select the screen size and number of sessions and then check the weight against the MLT level required.top
MLT level 3	512	
MLT level 4	896	
MLT level 5	1152	
MLT level 6	1536	
MLT level 7	2048	
MLT level 8	2668	

C. TOTAL =	Select ONE MLT value.

Figure 109. MLT Storage Requirements

F.5 Token-Ring Gateway Storage Requirements

If the 3174 is being used as a gateway on a Token-Ring you should select a value from one of the charts below, depending on whether the controller is *local* or *remote*.

function	storage weighting	notes
local gateway	512	with up to 28 DSPU's
local gateway	1024	with up to 72 DSPU's
local gateway	1536	with up to 116 DSPU's
local gateway	2048	with up to 140 DSPU's
local gateway	2560	with up to 200 DSPU's
local gateway	3072	with up to 250 DSPU's

D.1   TOTAL =   Select ONE value for LOCAL G/W or,

function	storage weighting	notes
remote gateway	512	with up to 72 DSPU's
remote gateway	1024	with up to 140 DSPU's
remote gateway	1536	with up to 250 DSPU's

D.2   TOTAL =   Select ONE value for REMOTE G/W

Figure 110. Token-Ring Gateway Storage Requirements

F.6 Central Site Change Management Storage Requirements

function	storage weighting	notes
CSCM	186	3174 has only diskette drives installed.
CSCM FD1	267	3174 has one 20 MB fixed disk installed.
CSCM FD2	347	3174 has two 20 MB fixed disk installed.

E. TOTAL =	Select value that matches.

Figure 111. Central Site Change Management Storage Requirements

F.7 Local Format Storage Requirements

function	storage weighting	notes
LFS	77	allows up to 64K of format storage allocation.
LFS	141	allows up to 128K of format storage allocation.
LFS	269	allows up to 256K of format storage allocation.
LFS	525	allows up to 512K of format storage allocation.
LFS	1037	allows up to 1024K of format storage allocation.
LFS	1548	allows up to 1536K of format storage allocation.

F. TOTAL =	Select value that matches MAP requirement.

Figure 112. Local Format Storage Requirements

F.8 Quick Reference Chart Configuration Support-B

MLT Storage Requirements				
Function	BASE	CSCM RNC or CSC(DSK)	CSCM CSC (FD1)	CSCM CSC (FD2)
BASE	2MB	2MB	2MB	2MB
AEA	2MB	3MB	3MB	3MB
MLT1	2MB	2MB	2MB	3MB
MLT1, AEA	3MB	3MB	3MB	3MB
MLT2	2MB	2MB	3MB	3MB
MLT2, AEA	3MB	3MB	3MB	3MB
MLT3	3MB	3MB	3MB	3MB
MLT3, AEA	3MB	3MB	3MB	4MB
MLT4	3MB	3MB	3MB	3MB
MLT4, AEA	4MB	4MB	4MB	4MB
MLT5	3MB	3MB	4MB	4MB
MLT5, AEA	4MB	4MB	4MB	4MB
MLT6	4MB	4MB	4MB	4MB
MLT6, AEA	4MB	4MB	4MB	5MB
MLT7	4MB	4MB	4MB	5MB
MLT7, AEA	5MB	5MB	5MB	5MB
MLT8	5MB	5MB	5MB	5MB
MLT8, AEA	5MB	5MB	6MB	6MB

Figure 113. 3174 MLT Storage Requirements for Configuration Support-B

F.9 MLT Storage Requirements for Configuration Support-A

Display Types	Number of Sessions Per Display				
	1	2	3	4	5
	Weighting Factors for Sessions per Disp				
Model 2, No EAB	0	3	6	9	12
Model 2, EAB	0	5	10	15	20
Model 3-5, No EAB	0	5	10	15	20
Model 3-5 EAB	0	9	18	27	36

Figure 114. MLT Storage Requirements, Configuration Support-A

F.10 Weighting Factor and MLT Support Level-A

The user should calculate all Weighting Factors for a given 3174. The sum of Weighting Factors for each display determines the required MLT Support Level of the 3174 running Configuration Support-A or S.

- A sum of Weighting Factors = < 0 = MLT level 0
- A sum of Weighting Factors = < 64K = MLT level 1
- A sum of Weighting Factors = < 128K = MLT level 2
- A sum of Weighting Factors = < 416K = MLT level 3
- A sum of Weighting Factors = < 864K = MLT level 4
- A sum of Weighting Factors = < 1408K = MLT level 5

F.11 Gateway Requirements for Configuration Support-S

Feature	Number of DSPU's			
	28	72	116	140
	Storage required in MB.			
LOCAL gateway	0.5	1	1.5	2
REMOTE gateway	0.5	0.5	1	1

Figure 115. Gateway Storage Requirements, Configuration Support-S

F.12 Quick Reference Chart Configuration Support-A

MLT Storage Requirements				
Function	BASE	CSCM RNC or CSC(DSK)	CSCM CSC (FD1)	CSCM CSC (FD2)
BASE	1MB	1MB	1.5MB	1.5MB
AEA	1MB	1.5MB	1.5MB	2MB
MLT1	1MB	1MB	1.5MB	1.5MB
MLT1, AEA	1MB	1.5MB	1.5MB	2MB
MLT2	1MB	1.5MB	1.5MB	2MB
MLT2, AEA	1MB	1.5MB	1.5MB	2MB
MLT3	1.5MB	1.5MB	2MB	2MB
MLT3, AEA	1.5MB	2MB	2MB	2.5MB
MLT4	2MB	2MB	2.5MB	2.5MB
MLT4, AEA	2.5MB	2.5MB	3MB	3MB
MLT5	2.5MB	2.5MB	3MB	3MB
MLT5, AEA	2.5MB	3MB	3MB	3.5MB

Figure 116. 3174 MLT Storage Requirements for Configuration Support-A

Appendix G. Examples of 3174 VTAM/NCP Definitions

This appendix contains VTAM and NCP definition examples for local channel attached SNA- and non-SNA-3270 devices as well as for devices attached to a SDLC link, to an X.25 connection and to the Token-Ring Network.

G.1 Local 3174 Definitions (SNA)

PU Definition

```
*──────────────────────────────────────────────────────*
*          LOCAL 3174 DEFINITIONS                       *
*──────────────────────────────────────────────────────*
LOCCOLOR VBUILD   TYPE=LOCAL
LOCAPU   PU       CUADDR=05E,ISTATUS=ACTIVE,PUTYPE=2,MAXBFRU=10,      *
                  MODETAB=MT327X
```

LU Definition

```
LOC791   LU       LOCADDR=2,VPACING=4,DLOGMOD=T3279M3,USSTAB=US327X
LOC32872 LU       LOCADDR=3,VPACING=4,DLOGMOD=T3287M2C
LOC793   LU       LOCADDR=4,VPACING=4,DLOGMOD=T3279M2,USSTAB=US327X
LOC794   LU       LOCADDR=5,VPACING=4,DLOGMOD=T3279M2,USSTAB=US327X
LOC795   LU       LOCADDR=6,VPACING=4,DLOGMOD=T3279M4E,USSTAB=US327X
LOC32876 LU       LOCADDR=7,VPACING=4,DLOGMOD=T3287M2C,USSTAB=US327X
LOC32877 LU       LOCADDR=8,VPACING=4,DLOGMOD=T3287M2C
LOC798   LU       LOCADDR=9,VPACING=4,DLOGMOD=T3279M4,USSTAB=US327X
```

Note: The ACF/VTAM Installation manual describes the definition of Local SNA major nodes.

G.2 Local 3174 Terminal Definition (Non-SNA)

```
**********************************************************************
*                                                                    *
*  LOCAL 3270 TERMINAL DEFINITION                                    *
*                                                                    *
**********************************************************************
         LBUILD
H11L420  LOCAL CUADDR=420,TERM=3277,                                  X
               MODETAB=AMODETAB,LOGAPPL=SAMON11,USSTAB=US3270,        X
               ISTATUS=ACTIVE,SPAN=(SPH11L),DLOGMOD=M2BSCNQ
*              STATOPT=('3277 420 -SYS3')
H11L421  LOCAL CUADDR=421,TERM=3277,                                  X
               MODETAB=AMODETAB,LOGAPPL=SAMON11,USSTAB=US3270,        X
               ISTATUS=ACTIVE,SPAN=(SPH11L),DLOGMOD=M2BSCNQ
*              STATOPT=('3277 421 -SYS3')
.
.
.
H11L42F  LOCAL CUADDR=42F,TERM=3286,FEATUR2=(MODEL2),                 X
               MODETAB=AMODETAB,ISTATUS=INACTIVE,                     X
               SPAN=(SPH11L)
*              STATOPT=('3286 42F -SYS3')
H11L430  LOCAL CUADDR=430,TERM=3277,                                  X
               MODETAB=AMODETAB,USSTAB=US3270,LOGAPPL=SAMON11,        X
               ISTATUS=ACTIVE,SPAN=(SPH11L),DLOGMOD=M3BSCQ
*              STATOPT=('3277 430 -SYS3')
H11L431  LOCAL CUADDR=431,TERM=3277,                                  X
               MODETAB=AMODETAB,USSTAB=US3270,LOGAPPL=SAMON11,        X
               ISTATUS=ACTIVE,SPAN=(SPH11L),DLOGMOD=M3BSCQ
*              STATOPT=('3277 431 -SYS3')
H11L436  LOCAL CUADDR=436,TERM=3277,                                  X
               MODETAB=AMODETAB,USSTAB=US3270,DLOGMOD=M3BSCNQ,        X
               ISTATUS=ACTIVE,SPAN=(SPH11L)
*              STATOPT=('3277 436 -SYS3')
H11L437  LOCAL CUADDR=437,TERM=3277,                                  X
               MODETAB=AMODETAB,USSTAB=US3270,DLOGMOD=M3BSCNQ,        X
               ISTATUS=ACTIVE,SPAN=(SPH11L)
*              STATOPT=('3277 437 -SYS3')
.
.
.
.
```

Note: The ACF/VTAM Installation manual describes the definition and filing of local terminals.

G.3 SDLC 3174 Definitions

G.3.1 SDLC Group Specification for 3174
                    GDSL   (definition model)

```
*********************************************************************
*         GROUP MACRO SPECIFICATIONS FOR SDLC LINES              *
*********************************************************************
G13S1    GROUP LNCTL=SDLC,          SYNCHRONOUS DATA LINK              X
               DUPLEX=FULL,         REQUEST TO SEND ALWAYS UP          X
               NRZI=YES,                                               X
               REPLYTO=1,           1 SECOND FOR SDLC                  X
               RETRIES=(7,4,5),     7 RETRIES PER SECOND FOR 5 TIMES   X
               TYPE=NCP             NCP ONLY
*********************************************************************
```

G.3.2 Line Macro for SDLC 3174
                    LSD3174   (definition model)

```
*********************************************************************
*              SDLC 3174                                         *
*********************************************************************
*         LINE MACRO SPECIFICATION     SDLC LINK 000   MODEM     *
*********************************************************************
L13000   LINE  ADDRESS=(000,FULL),  FULL DUPLEX                       X
               ATTACH=MODEM,        MODEM  ATTACH                     X
               OWNER=M11,                                             X
               ANS=CONTINUE,        DON'T BREAK CROSS DOMAIN SESSIONS X
               CLOCKNG=EXT,         MODEM ATTACHED                    X
               NRZI=YES,                                              X
               ISTATUS=ACTIVE,                                        X
               DUPLEX=(FULL),       REQUEST TO SEND ALWAYS UP         X
               ETRATIO=30,          DEFAULT                           X
               MAXPU=1,             ALLOW NO MORE THAN 1 PU  ON LINE  X
               SERVLIM=10,                                            X
               SRT=(,64),                                             X
               SPEED=9600
*              STATOPT='3174 LINE'
```

G.3.3 SDLC Service Macro Specifications Remote 3174
                    SERVICE   (definition model)

```
*********************************************************************
*         SERVICE MACRO SPECIFICATION FOR SDLC (LINE 000)        *
*********************************************************************
         SERVICE ORDER=(P13000A),                                    X
               MAXLIST=1
```

G.3.4 3174 PU/LU Specifications for PU3174
CBS3174   (definition model)

```
**********************************************************************
*        PU/LU SPECIFICATIONS FOR PU3174                            *
**********************************************************************
P13000A  PU      ADDR=C1,              CLUSTER ADDRESS = C1          X
                 MAXDATA=265,          MAXIMUM AMOUNT OF DATA        X
                 MAXLU=64,             MAXIMUM LUS ON THIS PU        X
                 MAXOUT=7,             MAX SDLC FRAMES BEFORE RESPONSE  X
                 PACING=0,             PACING SET BY BIND IMAGE      X
                 PASSLIM=8,                                          X
                 PUDR=YES,                                           X
                 PUTYPE=2,                                           X
                 RETRIES=(,4,5),       7 RETRIES PER SECOND FOR 5 TIMES  X
                 DISCNT=(NO),          (V) VTAM                      X
                 ISTATUS=ACTIVE,       (V) VTAM                      X
                 VPACING=0             (V) VTAM
T1300002 LU      LOCADDR=02,           3278                          X
                 MODETAB=AMODETAB,                                   X
                 DLOGMOD=M2SDLCNQ,                                   X
                 ISTATUS=ACTIVE        (V) VTAM
*
T1300003 LU      LOCADDR=03,           3278                          X
                 MODETAB=AMODETAB,                                   X
                 DLOGMOD=M2SDLCNQ,                                   X
                 ISTATUS=ACTIVE        (V) VTAM
*
T1300004 LU      LOCADDR=04,           3287                          X
                 MODETAB=AMODETAB,                                   X
                 DLOGMOD=M3287SCS,                                   X
                 ISTATUS=ACTIVE        (V) VTAM
*
T1300005 LU      LOCADDR=05,           3179G                         X
                 MODETAB=AMODETAB,                                   X
                 DLOGMOD=M2SDLCNQ,                                   X
                 ISTATUS=ACTIVE        (V) VTAM
*
T1300006 LU      LOCADDR=06,           3270PC                        X
                 MODETAB=MTPSPC,                                     X
                 DLOGMOD=PCMODE,                                     X
                 ISTATUS=ACTIVE        (V) VTAM
*
T1300007 LU      LOCADDR=07,           3270PC                        X
                 MODETAB=MTPSPC,                                     X
                 DLOGMOD=PCMODE,                                     X
                 ISTATUS=ACTIVE        (V) VTAM
*
T1300008 LU      LOCADDR=08,           3270PC                        X
                 MODETAB=MTPSPC,                                     X
                 DLOGMOD=PCMODE,                                     X
                 ISTATUS=ACTIVE        (V) VTAM
*
```

G.4 X.25 Definitions

This section includes VTAM and the NCP NPSI definitions used for testing the X.25 functions referenced in this manual.

G.4.1 Single Host Testing

The single host testing was performed using NPSI V1.4.2.

```
**********************************************************************
* X25 NPSI R 4.2 STAGE1 INPUT                                       *
*                                                                   *
* THIS GENERATION IS FOR 1 MCH LINK.                               *
* FOR:                                                              *
*                                                                   *
* CPU TO 3174  PVC  AND SVC; WITH QLLC CONTROL FOR BOTH.           *
*                                                                   *
*        X25BUILD - THIS MACRO DESCRIBES THE GENERATION PROCESS.   *
*                                                                   *
**********************************************************************
X25R41  X25BUILD IDNUMH=01,      ID FOR NON-SNA SWITCHED SUPPORT      C
                 MAXPIU=4K,      MAXIMUM PIU LENGTH                   C
                 MCHCNT=1,       1 MCH LINK DEFINED                   C
                 MODEL=3725,     3725                                 C
                 SNAP=NO,        SNAP FACILITY OFF                    C
                 SRCHI=X25BLK1,  STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)C
                 SRCLO=X25TBL1,  STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)C
                 SRCPRFX=X25,    STAGE 2 OUTPUT TABLES & BLOCKS PREFIX C
                 VERSION=V4,     NPSI RELEASE 4.2 ONLY                C
                 TYPSYS=OS       MVS 3.8 WITH ACF/VTAM V3
**********************************************************************
*      X25 NET - DESCRIBES THE PPSN.                                *
**********************************************************************
NETX25  X25NET  DM=YES,          LAPB DM COMMAND                      C
                NETTYPE=1,       TYPE 1 TYMNET NETWORK                C
                CPHINDX=2,       2 ENTRIES IN VIRTUAL CIRCUIT TABLE   C
                OUHINDX=1        1 ENTRY IN THE OPTIONAL FACILITY TABLE
**********************************************************************
*    X25VCCPT - VIRTUAL CIRCUIT CONNECTION PARAMETERS TABLE.        *
**********************************************************************
        X25VCCPT INDEX=1,        TABLE ENTRY NUMBER                   C
                 MAXPKTL=128,    MAXIMUM PACKET LENGTH EXCL PACKET HDR C
                 INSLOW=(25,0),  FREE BUFFER PERCENTAGE               C
                 VWINDOW=2       PACKET TRANSMIT/RECEIVE WINDOW SIZE
**********************************************************************
*    X25OUFTT - SVC USER FACILITIES AND CALL USER DATA TABLE.       *
**********************************************************************
        X25OUFT INDEX=1          TABLE ENTRY NUMBER                   *
**********************************************************************
*      X25MCH - DESCRIBE THE PHYSICAL MULTICHANNEL LINK.            *
*              DTE END 15                                           *
**********************************************************************
        X25MCH ADDRESS=15,       3725  FDX LINE ADDRESS               C
               FRMLGTH=259,      MAXIMUM FRAME LENGTH (+3 BYTE PKT HDR)C
               LCGDEF=0(20),     LOGICAL CHAN GRP 0, UP TO CHAN 12    C
               MWINDOW=7,        LINK ACCESS FRAME WINDOW SIZE (HDLC) C
               ANS=STOP,         AUTO NETWORK SHUTDOWN DECISION       C
               ENABLTO=3,        ENABLE TO 3 SECONDS                  C
               DSABLTO=3,        DISABLE TO 3 SECONDS                 C
```

```
                    DBIT=NO,            DELIVERY CONFIRMATION BIT SUPPORTED   C
                    GATE=NO,            GATE OR DATE FUNCTION SUPPORTED       C
                    SUBADDR=NO,         SUBADDRESING                         C
                    LCN0=NOTUSED,       LOGICAL CHANNEL 0 NOT USED            C
                    LLCLIST=(LLC3),       SVC'S TYPES SUPPORTED               C
                    NDRETRY=2,          NP/TP SEQUENCE EXECUTED               C
                    NPRETRY=10,         I OR U FRAME TIMOUT RECOVERY          C
                    PAD=INTEG,          PAD FUNCTION     SUPPORTED            C
                    TRAN=ODD,           NO TRANSLATION IF NO PAD FUNCTION     C
                    PKTMODL=8,          MODULO 8 PACKET NUMBERING             C
                    STATION=DTE,        NETWORK CONNECTION                    C
                    SPEED=9600,         PHYSICAL LINK SPEED                   C
                    TDTIMER=2,          TIME (SECS) BETWEEN ND RETRANSMISSIONSC
                    TPTIMER=3.0         X25 T1 TIMER IN SECS
***********************************************************************
*      X25LCG - DESCRIBE THE LOGICAL CHANNEL GROUP.                  *
***********************************************************************
          X25LCG LCGN=0            LOGICAL CHANNEL GROUP NUMBER
***********************************************************************
*    PU/LU MACRO SPECIFICATION FOR 3174 LOGICAL CHANNEL 4 (PVC)      *
***********************************************************************
XL15004  X25LINE LCN=1,                                                  C
                 DSTNODE=BNN,                                            C
                 LLC=LLC3,                                               C
                 TYPE=P,                                                 C
                 VCCINDX=1
*
XP15004 X25PU   PUTYPE=2,         ATTACH TO AN X.25/SNA 3174            C
                ADDR=C1,          STATION ADDRESS                      C
                MAXDATA=265,      DEPENDANT ON PU CONSTRAINTS           C
                PASSLIM=7,        MAXIMUM PIU SEGMENTS IN TRANSMISSION  C
                MAXOUT=7,         MAXIMUM SDLC FRAMES BEFORE LINK RESP  C
                ISTATUS=ACTIVE,   ACTIVATE AT INITIALIZATION            C
                SSCPFM=USSSCS,    LOGON FORMAT                          C
                MODETAB=MT3274C2, MODE TABLE REFERENCE FOR VTAM         C
                DLOGMOD=T3278M2,  MODE TABLE REFERENCE FOR VTAM         C
                USSTAB=US327X     USS TABLE REFERENCE FOR VTAM
*
XT1541   X25LU LOCADDR=2,         ADDRESS OF LU                        C
               ISTATUS=ACTIVE     ACTIVATE WITH PU
XT1542   X25LU LOCADDR=3,         ADDRESS OF LU                        C
               ISTATUS=INACTIVE   ACTIVATE WITH PU
***********************************************************************
*      X25VC - DESCRIBE RESERVE PVCS                                 *
***********************************************************************
          X25VC  LCN=(2,10),      LOGICAL CHANNELS WITHIN A GROUP       C
                 TYPE=P,          V C TYPE - P=PERMANENT, S=SWITCHED    C
                 VCCINDX=1,       INDEX IN CONNECTION PARAMETER TABLE   C
                 LLC=LLC0         LOGICAL LINK CONTROL
***********************************************************************
*      X25VC - DESCRIBE THE SWITCHED VIRTUAL CIRCUITS                *
***********************************************************************
          X25VC  LCN=(11,20),     LOGICAL CHANNELS WITHIN A GROUP       C
                 NCPGRP=X25S01B,  TO ASSOCIATE WITH VTAM PATH STMT      C
                 TYPE=S,          V C TYPE - P=PERMANENT, S=SWITCHED    C
                 VCCINDX=1,       INDEX IN CONNECTION PARAMETER TABLE   C
                 CALL=INOUT,      INCOMING AND OUTGOING CALLS ACCEPTED  C
                 OUFINDX=1        INDEX IN USER TABLE
***********************************************************************
```

```
*       X25END - NPSI GENERATION END, NAME MEMBERS FOR STAGE 2 OUTPUT.*
***********************************************************************
              X25END INCPRFX=X25,        STAGE 2 OUTPUT MEMBERS PREFIX        C
                     LSTUACB=YES,         NPSI SUPPLY LASTUACB MACRO          C
                     NCPSTG1=X25NCP1,     STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)C
                     X25VTAM=YES,         VTAM ACCEPT ADDRESS=NONE & AUTO=YES  C
                     INCHI=X25HJI1,       STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)C
                     INCL2HI=X25HII1,     STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)C
                     INCINIT=X25INI1,     STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)C
                     INCL2LO=X25LOI1,     STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)C
                     ORDINIT=X25INO1,     STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)C
                     ORDHI=X25HJO1,       STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)C
                     ORDL2HI=X25HIO1,     STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)C
                     ORDL2LO=X25L1        STAGE 2 OUTPUT MEMBER NAME (1 = GENNO)
              END
***********************************************************************
```

In an ACF/VTAM switched major node:

```
X3174     VBUILD MAXGRP=5,                 REQUIRED                         X
                 MAXNO=12,                 REQUIRED                         X
                 TYPE=SWNET                REQUIRED
*
XP3174    PU     ADDR=C1,                                                   X
                 IDBLK=017,                Same as 3274                     X
                 IDNUM=A0076,              user defined                     X
                 DISCNT=YES,                                                X
                 MAXDATA=265,                                               X
                 MAXOUT=7,                                                  X
                 PASSLIM=7,                                                 X
                 MODETAB=MT3274C2,                                          X
                 MAXPATH=6,                                                 X
                 VPACING=0,                                                 X
                 PUTYPE=2,                                                  X
                 SSCPFM=USSSCS,                                             X
                 DLOGMOD=T3278M2,                                           X
                 USSTAB=US327X
*
PAT3174   PATH   DIALNO=31060019833,       Host DTE address, LLC type 3     X
                 GRPNM=X25S01B,            association to NCP/NPSI group     X
                 GID=2,                                                     X
                 PID=21
*
XT3174    LU     LOCADDR=2
XT3174A   LU     LOCADDR=3
```

G.4.2 Multi-host Testing

The multihost testing was performed using NPSI V2.1 and ESA VTAM V3.3

```
*************************************************************************
*       NCP/NPSI DEFINITIONS FOR X.25 MULTI-HOST TESTING             *
*************************************************************************
NCPBUILD BUILD -ADD THE FOLLOWING STATEMENTS                         *

                X25.PREFIX=X,      ALL NAMES START WITH X            *
                X25.IDNUMH=02,     MUST MATCH WITH SWITCH MAJOR NODE ID*
                X25.SNAP=YES,      SNAP TRACE INCLUDED               *
                X25.MCHCNT=1,      NUMBER OF PHYSICAL LINKS          *
                X25.MAXPIU=5K      LESS THAN MAXBFRU TIMES UNITSZ
*

*************************************************************************
*       X.25 NETWORK
*************************************************************************
X3174   X25.NET CPHINDX=1,                                          *
                NETTYPE=1,                                          *
                OUHINDX=1,                                          *
                DM=YES
*

        X25.VCCPT INDEX=1,                                          *
                MAXPKTL=128,                                        *
                VWINDOW=3,         PACKET LEVEL WINDOW 3            *
                INSLOW=(100,50)
*************************************************************************
*       FIRST MCH
*************************************************************************
MCH01   X25.MCH   ADDRESS=08,      CONTROLLER LINE ADDRESS          *
                ANS=STOP,                                           *
                LCGDEF=(0,4),      4 PVC                            *
                FRMLGTH=259,       256 + 3 (PACKET HEADER)          *
                MWINDOW=7,         FRAME WINDOW SIZE                *
                STATION=DCE,       USED TO SIMULATE X.25 NETWORK    *
                ENABLTO=3,                                          *
                DSABLTO=3,                                          *
                TDTIMER=1,                                          *
                TPTIMER=3,                                          *
                NPRETRY=10,                                         *
                NDRETRY=1,         CODED TO MATCH  STATION=DCE      *
                SUBADDR=NO,                                         *
                LLCLIST=(LLC3),                                     *
                LCN0=NOTUSED,                                       *
                DBIT=NO,                                            *
                PAD=NO,                                             *
                PKTMODL=8,                                          *
                GATE=NO,                                            *
                ITRACE=YES,                                         *
                SPEED=9600,        DEFAULT                          *
                T1TIMER=1
*************************************************************************
*

        X25.LCG LCGN=0             LOGICAL CHANNEL GROUP ZERO
*

*************************************************************************
*       X.25 LINE / PU / LU MACROS                    (LINE 008)
*       EACH LINE DEFINES A PVC
```

```
**********************************************************************
XL13008A X25.LINE LCN=1,          FIRST PVC                          *
               DSTNODE=BNN,                                          *
               LLC=LLC3,                                             *
               TYPE=P,                                               *
               VCCINDX=1
**********************************************************************
XP13008A X25.PU PUTYPE=2,                                            *
               ISTATUS=ACTIVE,                                       *
               ADDR=C1,                                              *
               MAXDATA=265,                                          *
               MAXOUT=7,                                             *
               SSCPFM=USSSCS,                                        *
               MODETAB=AMODETAB,                                     *
               USSTAB=US327X
**********************************************************************
T13008A1 X25.LU LOCADDR=2,DLOGMOD=M2SDLCQ
T13008A2 X25.LU LOCADDR=3,DLOGMOD=M2SDLCQ
T13008A3 X25.LU LOCADDR=4,DLOGMOD=M2SDLCQ
T13008A4 X25.LU LOCADDR=5,DLOGMOD=M2SDLCQ
T13008A5 X25.LU LOCADDR=6,DLOGMOD=M2SDLCQ
T13008A6 X25.LU LOCADDR=7,DLOGMOD=M2SDLCQ
T13008A7 X25.LU LOCADDR=8,DLOGMOD=M2SDLCQ
T13008A8 X25.LU LOCADDR=9,DLOGMOD=M2SDLCQ
T13008A9 X25.LU LOCADDR=10,DLOGMOD=M2SDLCQ
**********************************************************************
XL13008B X25.LINE LCN=2,          SECOND PVC                         *
               DSTNODE=BNN,                                          *
               LLC=LLC3,                                             *
               TYPE=P,                                               *
               VCCINDX=1
**********************************************************************
XP13008B X25.PU PUTYPE=2,                                            *
               ISTATUS=ACTIVE,                                       *
               ADDR=C1,                                              *
               MAXDATA=265,                                          *
               MAXOUT=7,                                             *
               SSCPFM=USSSCS,                                        *
               MODETAB=AMODETAB,                                     *
               USSTAB=US327X
**********************************************************************
T13008B1 X25.LU LOCADDR=34,DLOGMOD=M2SDLCQ
T13008B2 X25.LU LOCADDR=38,DLOGMOD=M2SDLCQ
T13008B3 X25.LU LOCADDR=42,DLOGMOD=M2SDLCQ
T13008B4 X25.LU LOCADDR=46,DLOGMOD=M2SDLCQ
T13008B5 X25.LU LOCADDR=50,DLOGMOD=M2SDLCQ
T13008B6 X25.LU LOCADDR=54,DLOGMOD=M2SDLCQ
T13008B7 X25.LU LOCADDR=58,DLOGMOD=M2SDLCQ
T13008B8 X25.LU LOCADDR=62,DLOGMOD=M2SDLCQ
T13008B9 X25.LU LOCADDR=66,DLOGMOD=M2SDLCQ
**********************************************************************
XL13008C X25.LINE LCN=3,          THIRD PVC                          *
               DSTNODE=BNN,                                          *
               LLC=LLC3,                                             *
               TYPE=P,                                               *
               VCCINDX=1
**********************************************************************
XP13008C X25.PU PUTYPE=2,                                            *
               ISTATUS=ACTIVE,                                       *
```

```
                      ADDR=C1,                                               *
                      MAXDATA=265,                                           *
                      MAXOUT=7,                                              *
                      SSCPFM=USSSCS,                                         *
                      MODETAB=AMODETAB,                                      *
                      USSTAB=US327X
          ***********************************************************************
          T13008C1 X25.LU LOCADDR=35,DLOGMOD=M2SDLCQ
          T13008C2 X25.LU LOCADDR=39,DLOGMOD=M2SDLCQ
          T13008C3 X25.LU LOCADDR=43,DLOGMOD=M2SDLCQ
          T13008C4 X25.LU LOCADDR=47,DLOGMOD=M2SDLCQ
          T13008C5 X25.LU LOCADDR=51,DLOGMOD=M2SDLCQ
          T13008C6 X25.LU LOCADDR=55,DLOGMOD=M2SDLCQ
          T13008C7 X25.LU LOCADDR=59,DLOGMOD=M2SDLCQ
          T13008C8 X25.LU LOCADDR=63,DLOGMOD=M2SDLCQ
          T13008C9 X25.LU LOCADDR=67,DLOGMOD=M2SDLCQ
          ***********************************************************************
          XL13008D X25.LINE LCN=4,              FOURTH PVC                    *
                      DSTNODE=BNN,                                           *
                      LLC=LLC3,                                              *
                      TYPE=P,                                                *
                      VCCINDX=1
          ***********************************************************************
          XP13008D X25.PU PUTYPE=2,                                          *
                      ISTATUS=ACTIVE,                                        *
                      ADDR=C1,                                               *
                      MAXDATA=265,                                           *
                      MAXOUT=7,                                              *
                      SSCPFM=USSSCS,                                         *
                      MODETAB=AMODETAB,                                      *
                      USSTAB=US327X
          ***********************************************************************
          T13008D1 X25.LU LOCADDR=36,DLOGMOD=M2SDLCQ
          T13008D2 X25.LU LOCADDR=40,DLOGMOD=M2SDLCQ
          T13008D3 X25.LU LOCADDR=44,DLOGMOD=M2SDLCQ
          T13008D4 X25.LU LOCADDR=48,DLOGMOD=M2SDLCQ
          T13008D5 X25.LU LOCADDR=52,DLOGMOD=M2SDLCQ
          T13008D6 X25.LU LOCADDR=56,DLOGMOD=M2SDLCQ
          T13008D7 X25.LU LOCADDR=60,DLOGMOD=M2SDLCQ
          T13008D8 X25.LU LOCADDR=64,DLOGMOD=M2SDLCQ
          T13008D9 X25.LU LOCADDR=68,DLOGMOD=M2SDLCQ
          ***********************************************************************
          *
                X25.END
          *
          ***********************************************************************
```

G.5 Definitions for 3174 Token-Ring Network Models

This section includes sample VTAM and NCP definitions for:

- Local token-ring gateways

- Remote token-ring gateways

- DSPU devices.

G.5.1 VTAM Definitions for 3174 DSPU Attached via NTRI

VTAM definitions used for a switched major node for a downstream 3174-X3R via an NCP/NTRI gateway.

```
**********************************************************************
*                                                                    *
*           VTAM SWITCHED MAJOR NODE FOR NTRI WITH 3174              *
*                                                                    *
**********************************************************************
E13SW9   VBUILD MAXGRP=5,              REQUIRED                     X
                MAXNO=12,              REQUIRED                     X
                TYPE=SWNET             REQUIRED
**
E13PS09  PU     ADDR=13,              COULD BE ANYTHING (NOT USED) X
                IDBLK=017,            3274/3174 BURNED IN          X
                IDNUM=A0001,          SEE CUSTOMIZATION # 215      X
                DISCNT=NO,                                         X
                MAXOUT=1,                                          X
                MODETAB=AMODETAB,                                  X
                MAXPATH=2,                                         X
                VPACING=0,                                         X
                PUTYPE=2,                                          X
                SSCPFM=USSSCS,                                     X
                DLOGMOD=M2SDLCQ,                                   X
                USSTAB=US327X
**
E13D0901 PATH   DIALNO=0004400043301002,  TO 3174 MODEL 03R       X
                GRPNM=EG22L01,        LOGICAL GROUP OF TIC 1       X
                GID=1,                                             X
                PID=1
**
E13D0902 PATH   DIALNO=0004400033301004, TO PC WITH 3270 EMULATION X
                GRPNM=EG22L02,        LOGICAL GROUP OF TIC 2       X
                GID=1,                                             X
                PID=2,                                             X
                USE=NO                INITIALLY INACTIVE
**
E13L0902 LU     LOCADDR=2             FOR A DISPLAY
E13L0903 LU     LOCADDR=3             FOR A DISPLAY/PRINTER
E13L0904 LU     LOCADDR=4             FOR A DISPLAY/PRINTER
                -
                -
                -
**********************************************************************
```

G.5.2 NCP Definitions for 3174 DSPU

NCP definitions for a 3720 gateway to a 3174 DSPU.

```
*********************************************************************
G22XLLL  GROUP LNCTL=SDLC,REPLYTO=1
*********************************************************************
L22000   LINE  ADDRESS=(00,FULL),   LINE ADDRESS                    X
                ATTACH=DIR3725,      INN LINK                        X
                CLOCKNG=EXT,         REQUIRED FOR DIRECT             X
                DUPLEX=FULL,         MODEM STRAPPING IS FULL         X
                MONLINK=YES,         MONITOR LINK FOR ACTPU          X
                NRZI=YES,                                            X
                PAUSE=0.1,                                           X
                SDLCST=(SDL22PRI,SDL22SEC),                          X
                RETRIES=(7,3,5),                                     X
                SERVLIM=254,                                         X
                ISTATUS=ACTIVE       INITIAL STATUS
*********************************************************************
*        PU MACRO SPECIFICATION FOR THE ADJACENT 3720  SA12        *
*********************************************************************
P22000   PU    MAXOUT=7,            MAX PIU'S SENT BEFORE RESP REQ   X
                PUTYPE=4,            PHYSICAL UNIT TYPE LOCAL 3720    X
                ISTATUS=ACTIVE,      INITIAL STATUS                  X
                TGN=8,               TRANSMISSION GROUP 8            X
                ANS=CONTINUE         DON'T BREAK THE X-DOMAIN SESSIONS
*********************************************************************
*        PHYSICAL GROUP FOR TIC 1                                  *
*********************************************************************
EG22P01  GROUP ECLTYPE=PHYSICAL,    TIC DEFINITION                  X
                PUDR=NO,                                             X
                STATOPT='NTRI TIC1'
EL22017  LINE  ADDRESS=(17,FULL),   TIC ADDRESS                     X
                PORTADD=0,           FIRST  TIC                      X
                LOCADD=400012201001, LOCAL ADMIN. ADDRESS OF TIC     X
                RCVBUFC=4095,        NTRI RECEIVE BUFFER             X
                MAXTSL=1108          NTRI TRANSMIT DATA CAPACITY
EP22017  PU    ADDR=01
EU22017  LU    ISTATUS=INACTIVE,                                    X
                LOCADDR=0
*********************************************************************
*        LOGICAL  GROUP FOR TIC 1                                  *
*********************************************************************
EG22L01  GROUP ECLTYPE=LOGICAL,     DEFINE TERMINALS IN THE RING    X
                AUTOGEN=20,          LOGICAL CONNECTIONS             X
                MAXLU=20,            NUMBER OF LOGICAL UNITS         X
                PHYPORT=0,           FIRST  TIC                      X
                CALL=INOUT,          DIAL IN / DIAL OUT POSSIBILITY  X
                DIAL=YES,                                            X
                LINEADD=YES,                                         X
                LINEAUT=YES,                                         X
                MAXPU=1,                                             X
                PUTYPE=2
*********************************************************************
```

G.5.3 VTAM Definitions for 3174 Local Gateway and DSPUs

G.5.3.1 MVS environment

```
*------------------------------------------------------------------*
*           LOCAL 3174 DEFINITIONS                                 *
*           RAPP40    = 3174 LOCAL GATEWAY PU                       *
*           RAPP41-46 = DOWNSTREAM PU                               *
*------------------------------------------------------------------*
HSNA040 VBUILD TYPE=LOCAL
RAPP40   PU      CUADDR=E40,ISTATUS=ACTIVE,PUTYPE=2,MAXBFRU=10,     *
                 MODETAB=AMODETAB,DLOGMOD=M2SDLCQ,USSTAB=US327X,    *
                 VPACING=0
*
RAPT400 LU      LOCADDR=2
RAPT401 LU      LOCADDR=3,MODETAB=MTJS328X,DLOGMOD=SCS3262
RAPT401 LU      LOCADDR=3,MODETAB=MT4224,DLOGMOD=M4224
RAPT402 LU      LOCADDR=4
RAPT403 LU      LOCADDR=5
RAPT404 LU      LOCADDR=6
RAPT405 LU      LOCADDR=7
RAPT406 LU      LOCADDR=8
RAPT407 LU      LOCADDR=9
RAPT408 LU      LOCADDR=10
RAPT409 LU      LOCADDR=11
*------------------------------------------------------------------*
RAPP41   PU      CUADDR=E41,ISTATUS=ACTIVE,PUTYPE=2,MAXBFRU=10,     *
                 MODETAB=AMODETAB,DLOGMOD=M2SDLCQ,USSTAB=US327X,    *
                 VPACING=0,SECNET=YES
*
RAPT410 LU      LOCADDR=2
RAPT411 LU      LOCADDR=3,MODETAB=MTJS328X,DLOGMOD=SCS3262
RAPT412 LU      LOCADDR=4
RAPT413 LU      LOCADDR=5
RAPT414 LU      LOCADDR=6
RAPT415 LU      LOCADDR=7
RAPT416 LU      LOCADDR=8
RAPT417 LU      LOCADDR=9
RAPT418 LU      LOCADDR=10
RAPT419 LU      LOCADDR=11
*------------------------------------------------------------------*
RAPQ42   PU      CUADDR=E42,ISTATUS=ACTIVE,PUTYPE=2,MAXBFRU=10,     *
                 MODETAB=AMODETAB,DLOGMOD=M2SDLCQ,USSTAB=US327X,    *
                 VPACING=0,SECNET=YES
*
RAPT420  LU      LOCADDR=2
RAPT421  LU      LOCADDR=3
RAPT422  LU      LOCADDR=4
RAPT423  LU      LOCADDR=5
RAPT424  LU      LOCADDR=6
RAPT425  LU      LOCADDR=7
RAPT426  LU      LOCADDR=8
RAPT427  LU      LOCADDR=9
RAPT428  LU      LOCADDR=10
RAPT429  LU      LOCADDR=11
*------------------------------------------------------------------*
RAPP43   PU      CUADDR=E43,ISTATUS=ACTIVE,PUTYPE=2,MAXBFRU=10,     *
                 MODETAB=AMODETAB,DLOGMOD=M2SDLCQ,USSTAB=US327X,    *
```

```
                              VPACING=0,SECNET=YES
         *
         RAPT430   LU    LOCADDR=2
         RAPT431   LU    LOCADDR=3
         RAPT432   LU    LOCADDR=4
         RAPT433   LU    LOCADDR=5
         *-----------------------------------------------------------------*
         RAPP44    PU     CUADDR=E44,ISTATUS=ACTIVE,PUTYPE=2,MAXBFRU=10,         *
                          MODETAB=AMODETAB,DLOGMOD=M2SDLCQ,USSTAB=US327X,        *
                          VPACING=0,SECNET=YES
         *
         RAPT440   LU    LOCADDR=2
         RAPT441   LU    LOCADDR=3
         RAPT442   LU    LOCADDR=4
         RAPT443   LU    LOCADDR=5
         *-----------------------------------------------------------------*
         RAPP45    PU     CUADDR=E45,ISTATUS=ACTIVE,PUTYPE=2,MAXBFRU=10,         *
                          MODETAB=AMODETAB,DLOGMOD=M2SDLCQ,USSTAB=US327X,        *
                          VPACING=0,SECNET=YES
         *
         RAPT450   LU    LOCADDR=2
         RAPT451   LU    LOCADDR=3
         RAPT452   LU    LOCADDR=4
         RAPT453   LU    LOCADDR=5
         *-----------------------------------------------------------------*
         RAPP46    PU     CUADDR=E46,ISTATUS=ACTIVE,PUTYPE=2,MAXBFRU=10,         *
                          MODETAB=AMODETAB,DLOGMOD=M2SDLCQ,USSTAB=US327X,        *
                          VPACING=0,SECNET=YES
         *
         RAPT460   LU    LOCADDR=2
         RAPT461   LU    LOCADDR=3
         RAPT462   LU    LOCADDR=4
         RAPT463   LU    LOCADDR=5
         *-----------------------------------------------------------------*
```

G.5.3.2 VSE Environment

The following is an example of a typical VSE/VTAM B-book for a local SNA
Major Node containing a Gateway and two DSPUs.

```
CATALOG SNA3174.B
SNA3174  VBUILD TYPE=LOCAL

SNAE40    PU    CUADDR=E40,MODETAB=MODE3290,              GATEWAY         X
                PUTYPE=2,ISTATUS=ACTIVE,MAXBFRU=1
VSE3L000 LU     LOCADDR=2,                                                X
                SSCPFM=USSSCS,USSTAB=USSTAB,PACING=1,VPACING=2,           X
                ISTATUS=ACTIVE,LOGAPPL=MWTC,DLOGMOD=GMOD3E
VSE3L001 LU     LOCADDR=3,                                                X
                SSCPFM=USSSCS,USSTAB=USSTAB,PACING=1,VPACING=2,           X
                ISTATUS=ACTIVE,LOGAPPL=MWTC,DLOGMOD=GMOD3E
         LU     ...

SNAE41    PU    CUADDR=E41,MODETAB=MODE3290,              DSPU 1          X
                PUTYPE=2,ISTATUS=ACTIVE,MAXBFRU=1
VSE3L100 LU     LOCADDR=2,                                                X
                SSCPFM=USSSCS,USSTAB=USSTAB,PACING=1,VPACING=2,           X
                ISTATUS=ACTIVE,LOGAPPL=MWTC,DLOGMOD=GMOD3E
VSE3L101 LU     LOCADDR=3,                                                X
                SSCPFM=USSSCS,USSTAB=USSTAB,PACING=1,VPACING=2,           X
                ISTATUS=ACTIVE,LOGAPPL=MWTC,DLOGMOD=GMOD3E
         LU     ...

SNAE42    PU    CUADDR=E42,MODETAB=MODE3290,              DSPU 2          X
                PUTYPE=2,ISTATUS=ACTIVE,MAXBFRU=1
VSE3L200 LU     LOCADDR=2,                                                X
                SSCPFM=USSSCS,USSTAB=USSTAB,PACING=1,VPACING=2,           X
                ISTATUS=ACTIVE,LOGAPPL=MWTC,DLOGMOD=GMOD3E
VSE3L201 LU     LOCADDR=3,                                                X
                SSCPFM=USSSCS,USSTAB=USSTAB,PACING=1,VPACING=2,           X
                ISTATUS=ACTIVE,LOGAPPL=MWTC,DLOGMOD=GMOD3E
         LU     ...
```

G.6 AS/400

G.6.1 AS/400 Definitions for 3174-X3R DSPU

...

```
CRTLINTRN  LIND(TRNLINE) RSRCNAME(LIN041) ONLINE(*NO) +
           ADAPTADR(400010020001) EXCHID(05615078) +
           TEXT('TRN-Line AS/400 B50 ITSC')
```

...

G.6.2 AS/400 Controller and Device Descriptions

The next CL commands will create the AS/400 objects for the line, the remote
IBM 3174 controller, and connected devices.

...

```
CRTCTLRWS  CTLD(TRN3174) TYPE(3174) MODEL(0) +
           LINKTYPE(*TRLAN) SWLINLST(TRNLINE) +
           EXCHID(017FFFFF) ADPTADR(400000003174) +
           TEXT('3174-13R on Token Ring)

CRTDEVDSP  DEVD(TRN3179A) DEVCLS(*RMT) TYPE(3278) +
           MODEL(0) LOCADR(02) CTL(TRN3174) +
           TEXT('S1 of IBM 3179 at 3174-13R')

CRTDEVDSP  DEVD(TRN3179B) DEVCLS(*RMT) TYPE(3278) +
           MODEL(0) LOCADR(03) CTL(TRN3174) +
           TEXT('S2 of IBM 3179 at 3174-13R')

CRTDEVDSP  DEVD(TRN3191A) DEVCLS(*RMT) TYPE(3278) +
           MODEL(0) LOCADR(04) CTL(TRN3174) +
           TEXT('S1 of IBM 3191 at 3174-13R')

CRTDEVDSP  DEVD(TRN3191B) DEVCLS(*RMT) TYPE(3278) +
           MODEL(0) LOCADR(05) CTL(TRN3174) +
           TEXT('S2 of IBM 3191 at 3174-13R')

CRTDEVDSP  DEVD(TRN4224) DEVCLS(*RMT) TYPE(3287) +
           MODEL(0) LOCADR(0A) CTL(TRN3174) +
           TEXT('IBM 4224 at 3174 on TRLAN')
```

...

Abbreviations

Abbreviation	Meaning
A	
ACF/VTAM	Advanced Communications Function / Virtual Telecommunications Access Method
AEA	Asynchronous Emulation Adapter
ASCII	American National Standard Code for Information Interchange
C	
CCA	Concurrent Communication Adapter
CECP	Country Extended Code Page
CICS	Customer Information Control System
CID	Communication Identifier
CMEP	Change Management Entry Point
CMFP	Change Management Focal Point
COPT	Connection Options
CSCF	Central Site Control Facility
CSCM	Central Site Change Management
CSCU	Central Site Control Unit
CSU	Customer Setup
CUG	Closed User Group
CUT	Control Unit Terminal
D	
DFT	Distributed Function Terminal
DPC	Dual Purpose Connectors
DRD	Distributed Resource Directory
DSL	Downstream load
F	
FTA	Fiber Optic Terminal Adapter
FTTERM	File Transfer and Terminal Emulation program
G	
GIX	Generalized Interactive Executive
H	
HNAD	Host Network (DTE) Address
I	
IML	Initial Microprogram Load
IOF	Interactive Operator Facility
IOPT	Incoming Call Option

Abbreviation	Meaning
IPDS	Intelligent Printer Data Stream
J	
JCL	Job Control Language
K	
KDU	Keyboard Definition Utility
L	
LFS	Local Format Storage
LFU	Limited Function Utility
LIC	Licensed Internal Code
M	
MLT	Multiple Logical Terminals
MVS	Multiple Virtual Storage
MVS/ESA	Multiple Virtual Storage/Enterprise System Architecture
MVS/XA	Multiple Virtual Storage/Extended Architecture
N	
NAM	Network Asset Management
NCP	Network Control Program
NIA	Network Interface Adapter
NMVT	Network Management Vector Transport
NPKT	Negotiated Packet Size
NPSI	NCP Packet Switching Interface
NSCU	Network Site Control Unit
NVDM	NetView Distribution Manager
O	
OEM	Other Equipment Manufacturer
OOPT	Outgoing Call Option
P	
PAM	Printer Authorization Matrix
PIM	Plug In Module
PSDN	Packet Switched Data Network
PSH	Physical Services Header
PVC	Permanent Virtual Circuit
Q	
QLLC	Qualified Logical Link Control
R	
RPOA	Recognized Private Operating Authority

RPQ	Request for Price Quotation	**T**	
RR	Resource Repository	*TCF*	Transmission Control File
RTM	Response Time Monitor	*TCLS*	Throughput Class Negotiation
		TCP	Transmission Control Program
		TMA	Terminal Multiplexer Adapter
S			
SHM	Short Hold Mode		
SLMH	Single Link Multi-Host	**U**	
SNA	Systems Network Architecture	*UDT*	User Defined Terminal Table
SNAIDS	Systems Network Architecture / Distribution Services	*UDX*	User Defined Translate Table
SNAIFS	Systems Network Architecture / File Services	**V**	
SNAIMS	Systems Network Architecture / Management Services	*VPD*	Vital Product Data
SOEMI	Serial Original Equipment Manufacturer Interface	*VTAM*	Virtual Telecommunications Access Method
SVC	Switched Virtual Circuit		
		W	
		WCC	Write Control Character

Glossary

This glossary includes terms and definitions from the *IBM Dictionary of Computing: Information Processing, Personal Computing, Telecommunications, Office Systems, IBM-specific Terms*, SC20-1699.

The terms in this glossary are defined here as they apply to the 3270 Information Display System.

A

address. (1) A value that identifies a register, a particular part of storage, a data source, or a data sink. The value is represented by one or more characters. (2) To refer to a device or an item of data by its address. (3) In word processing, the location, identified by an address code, of a specific section of the recording medium or storage. (4) The location in the storage of a computer where data is stored. (5) In data communication, the unique code assigned to each device or work station connected to a network.

alternate 1 initial microcode load (Alt 1 IML). The action of loading the Utility microcode.

application. The use to which an information processing system is put, for example, a payroll application, an airline reservation application, or a network application.

application program. (1) A program written for or by a user that applies to the user's work, such as a program that does inventory control or payroll. (2) A program used to connect and communicate with stations in a network, enabling users to perform application-oriented activities.

asynchronous. (1) Without regular time relationship; unexpected or unpredictable with respect to the execution of program instructions. (2) In asynchronous data transmissions, data characters may be sent or received at any time; no modem clocking is used to establish bit timing.

Asynchronous Emulation Adapter (AEA). In the 3174 Establishment Controller, an adapter that enables an ASCII terminal to communicate with a 3270 host using the 3270 data stream, an ASCII terminal to communicate with an ASCII host through the 3174, and a 3270 terminal to communicate with an ASCII host using the DEC VT100 data stream or the IBM 3101 data stream.

attach. To connect a device logically to a 3174 adapter, so that it can communicate over the network.

attachment feature. The circuitry by which a cable from a local terminal or a modem for a remote terminal is attached to a 3792 Auxiliary Control Unit or a 3791 Controller.

attention identifier (AID). (1) A code in the inbound 3270 data stream that identifies the source or type of data that follows. (2) A character in a data stream indicating that the user has pressed a key, such as Enter, that requests an action by the system.

B

binary synchronous communications (BSC). Data transmission in which character synchronism is controlled by timing signals generated at the sending and receiving stations.

C

card. In the 3174 Establishment Controller, a unit of electronic circuitry contained in a plastic casing (or cassette) and providing the controller with a specialized function, for example, a Terminal Adapter or an Encrypt/Decrypt Adapter.

Central site change management (CSCM). A function of the 3174 microcode that tracks the microcode for each controller in a network and, in conjunction with NetView DM, electronically distributes and retrieves microcode changes for each controller.

central site customizing. The process of tailoring control unit microcode for each controller in a network, at the central site.

central site library. One or more Library disks that contain customizing data and label information for the controllers in a network.

channel-attached. Pertaining to attachment of devices directly by data channels (I/O channels) to a computer. Synonym for *local*. Contrast with *telecommunication-attached*.

channel-to-channel adapter. A hardware device that can be used to connect two channels on the same computing system or on different systems.

character set. (1) A defined collection of characters. (2) A group of characters used for a specific reason, for example, the set of characters a printer can print. (3) The collection of graphic characters required to support a specific language.

command. An instruction that directs a control unit or device to perform an operation or a set of operations.

communication adapter. (1) A circuit card with associated software that enables a processor, controller, or other device to be connected to a network. (2) See *EIA communication adapter*, *V.35 communication adapter*, and *X.21 communication adapter*.

Concurrent Communication Adapter (CCA). In the 3174 Establishment Controller, a communication adapter that, along with the necessary microcode, provides terminals attached to the 3174 the ability to concurrently access an additional 3270 host.

configuration. The arrangement of a computer system or network as defined by the nature, number, and chief characteristics of its functional units. More specifically, the term *configuration* may refer to a hardware configuration or a software configuration. See also *system configuration*.

Control (CTL) disk. A customized diskette or fixed disk containing the microcode that describes a particular controller's attached terminals, and its method of attachment to the host.

Control (CTL) diskette. A customized diskette containing the microcode that describes a particular controller's attached terminals, and its method of attachment to the host.

controller. A unit that controls input/output operations for one or more devices.

conversion. (1) In programming languages, the transformation between values that represent the same data item but belong to different data types. Information may be lost as a result of conversion because accuracy of data representation varies among different data types. (2) The process of changing from one method of data processing to another or from one data processing system to another. (3) The process of changing from one form of representation to another, for example, to change from decimal representation to binary representation.

create. In 3174 central site customizing, to create a library member for a network controller, and store the customizing data for that library member on a Library diskette.

customization. Procedures that tailor the control unit microcode to fit the various types of display stations and printers and the method of host attachment that a particular control unit will handle.

customizing display station. A display station used to perform the customizing procedures; this display

station must be attached to port 26-00 of the controller. Only these display stations can be used for customizing: a 3178, a 3179 Model 1 operating in native or 3279-emulation mode, a 3180 operating in native or 3278-emulation mode, a 3191, a 3192, a 3194 operating in control unit terminal (CUT) mode, a 3270 Personal Computer with 3278/3279 emulation, operating in CUT mode, a 3278 (except Model 1), a 3279, a 5550 family operating in CUT mode, a 6150 RT Personal Computer, and a 6151 RT Personal Computer.

customizing keyboard. A keyboard used to type in the customizing responses; this keyboard must be a Typewriter, Data Entry, APL (with APL off), or Text (with Text off) keyboard with a QWERTY layout. (On a QWERTY layout, the first six characters on the left side of the top row of alphabetic characters are Q, W, E, R, T, Y.)

D

data processing (DP). The systematic performance of operations upon data; for example, handling, merging, sorting, computing.

data stream. (1) All data transmitted through a data channel in a single read or write operation. (2) A continuous stream of data elements being transmitted, or intended for transmission, in character or binary-digit form, using a defined format. See also *data stream format*.

data stream format. In SNA, the format of the data elements (end-user data) in the request unit (RU). See also *3270 data stream* and *SNA character string (SCS)*.

data transfer. The movement, or copying, of data from one location and the storage of the data at another location.

destination. Any point or location, such as a node, station, or a particular terminal, to which information is to be sent.

device. A mechanical, electrical, or electronic contrivance with a specific purpose.

disk. A direct-access data storage medium, which may be either flexible (diskette) or hard (fixed disk).

diskette. A flexible magnetic disk enclosed in a protective container.

diskette drive. The mechanism used to seek, read, and write data on diskettes.

disk image. Stored data originally held on a diskette but which may be copied onto a fixed disk.

display field. (1) An area in the display buffer that contains a set of characters that can be manipulated or operated upon as a unit. (2) A group of consecutive characters (in the buffer) that starts with an attribute character (defining the characteristics of the field) and contains one or more alphanumeric characters. The field continues to, but does not include, the next attribute character.

display frame. (1) In computer graphics, an area in storage in which a display image can be recorded. (2) In computer micrographics, an area on a microform in which a display image can be recorded.

display station. An input/output device containing a display screen and an attached keyboard that allows a user to send information to or receive information from the system.

distributed function terminal (DFT). A programmable terminal that can perform operations previously performed by the control unit. These terminals can interpret the 3270 data stream themselves. Examples are the IBM 3270 Personal Computer and the 3290 Information Panel.

distributed function terminal (DFT) mode. A host-interactive mode that enables an IBM 3270 Information Display System customized in this mode to run as many as four host sessions. The sessions can emulate a 3178, 3179, 3278 Model 2, or 3279 Model S2A.

dot. One point in a printer or display block matrix.

downstream. (1) In the direction of data flow or toward the destination of transmission. (2) From the processor toward an attached unit or end user. (3) Contrast with *upstream*.

downstream load (DSL). The capability of a distributed function terminal to receive its control program from the control unit to which it is attached. A diskette containing the terminal's control program is loaded into the control unit.

E

EIA communication adapter. A communication adapter conforming to EIA standards that can combine and send information on two lines at speeds up to 19.2 kbps.

emulation. (1) The imitation of all or part of one system by another, primarily by hardware, so that the imitating system accepts the same data, executes the same programs, and achieves the same results as the imitated computer system. (2) The use of programming techniques and special machine features to permit a computing system to execute programs written for another system. (3) Imitation; for example, imitation of a computer or device.

(4) See *terminal emulation*. (5) Contrast with *simulation*.

event. (1) An occurrence or happening. (2) An occurrence of significance to a task; for example the completion of an asynchronous operation, such as an input/output operation.

F

field. See *display field*.

file. A named set of records stored or processed as a unit.

fixed disk. A rigid magnetic disk used in a fixed disk drive.

fixed disk drive. A disk storage device that reads and writes on rigid magnetic disks.

frame. (1) The portion of a tape, on a line perpendicular to the reference edge, on which binary characters can be written or read simultaneously. (2) A housing for machine elements. (3) The hardware support structure, covers, and all electrical parts mounted therein that are packaged as one entity for shipping. (4) A formatted display. See *display frame*.

G

gateway. (1) A functional unit that connects two computer networks of different network architectures.

Note: A gateway connects networks or systems of different architectures. A bridge interconnects networks or systems with the same or similar architectures.

generate. In 3174 central site customizing, to write a Control diskette containing the customizing data for a particular controller. Also, to print a mailing address label and a diskette label for a particular control unit.

get. In 3174 central site customizing, to select the type of data you want and store it in working copy.

H

host attachment. A mode of SNA communication in which the processor acts as a secondary SNA device.

host logical unit (LU). An SNA logical unit (LU) located in a host processor, for example, an ACF/VTAM application program.

host system. (1) A data processing system used to prepare programs and operating environments for use on another computer or controller. (2) The data

processing system to which a network is connected and with which the system can communicate. (3) The controlling or highest-level system in a data communication configuration; for example, a System/38 is the host system for the work stations connected to it.

I

initial microcode load (IML). The action of loading the operational microcode.

input/output (I/O). (1) Pertaining to a device whose parts can perform an input process and an output process at the same time. (2) Pertaining to a functional unit or channel involved in an input process, output process, or both, concurrently or not, and to the data involved in such a process. (3) Pertaining to input, output, or both.

interface. (1) A shared boundary between two functional units, defined by functional characteristics, common physical interconnection characteristics, signal characteristics, and other characteristics as appropriate. (2) A shared boundary. An interface may be a hardware component to link two devices or a portion of storage or registers accessed by two or more computer programs. (3) Hardware, software, or both, that links systems, programs, or devices.

K

keyboard definition. A customizing procedure for defining a maximum of four modified keyboard layouts for modifiable keyboards only. Most characters, symbols, and functions can be relocated, duplicated, or deleted from almost any keyboard position.

L

Library disk. A diskette or fixed disk that contains customizing data for some or all of the controllers in a network.

Library (CSL) diskette. A diskette that contains customizing data for some or all of the controllers in a network.

library member. A file located on a Library disk that contains customizing information for a controller in a network.

Limited Function Utility (LFU) diskette. A diskette that contains the microcode to run only a limited number of utilities. These are: Diagnostics, Copy Files, Encrypt/Decrypt Master Key, and Identify Customizing Keyboard. The Limited Function Utility diskette is used mainly in networks that are under central site control.

link. The logical connection between nodes including the end-to-end link control procedures.

local. Pertaining to a device accessed directly without use of a telecommunication line. Synonym for *channel-attached*. Contrast with *remote*.

location. With reference to a 3174, a place within the 3174 chassis where a particular card or adapter is inserted.

logical terminal (LT). In MLT, one of five sessions available to share one display station.

logical unit (LU). In SNA, a port through which an end user accesses the SNA network in order to communicate with another end user and through which the end user accesses the functions provided by system services control points (SSCPs). An LU can support at least two sessions, one with an SSCP and one with another LU, and may be capable of supporting many sessions with other logical units.

M

main storage. Program-addressable storage from which instructions and other data can be loaded directly into registers for subsequent processing.

mark. A symbol or symbols that indicate the beginning or the end of a field, a word, an item of data or a set of data such as a file, record, or block.

Master Control diskette. A diskette that contains the base microcode, any necessary patches, RPQs, and modified keyboard tables.

memory. Program-addressable storage from which instructions and other data can be loaded directly into registers for subsequent execution or processing. Synonymous with *main storage*.

microcode. (1) One or more microinstructions. (2) A code, representing the instructions of an instruction set, that is implemented in a part of storage that is not program-addressable. (3) To design, write, and also to test one or more microinstructions.

multidrop (network). A network configuration in which there are one or more intermediate nodes on the path between a central node and an endpoint node.

N

NetView. A comprehensive network management product that is the basis for central control of both systems for network operations. It supersedes NCCF, NPDA, NLDM, and NPM.

network. (1) An arrangement of nodes and

connecting branches. Connections are made between data stations. (2) A configuration of data processing devices and software connected for information interchange.

Network Control Program (NCP) node. In SNA products, a subarea node that contains an ACF/NCP program but not a system services control point (SSCP).

node. An end point of a link or a junction common to two or more links in a network.

P

pacing. (1) A technique by which a receiving station controls the rate of transmission of a sending station to prevent overrun. (2) In SNA, a technique by which a receiving component controls the rate of transmission of a sending component to prevent overrun or congestion.

parallel. (1) Pertaining to a process in which all events occur within the same interval of time, each handled by a separate but similar functional unit; for example, the parallel transmission of the bits of a computer word along the lines of an internal bus. (2) Pertaining to concurrent or simultaneous operation of two or more devices or to concurrent performance of two or more activities in a single device. (3) Pertaining to concurrent or simultaneous occurrence of two or more related activities in multiple devices or channels. (4) Pertaining to the simultaneity of two or more processes. (5) Pertaining to the simultaneous processing of the individual parts of a whole, such as the bits of a character and the characters of a word, using separate facilities for the various parts. (6) Contrast with *serial*.

parameter. (1) A variable that is given a constant value for a specified application and that may denote the application. (2) An item in a menu for which the user specifies a value or for which the system provides a value when the menu is interpreted. (3) Data passed between programs or procedures.

physical unit (PU). In SNA, the component that manages and monitors the resources (such as attached links and adjacent link stations) of a node, as requested by an SSCP through an SSCP-SSCP session.

port. (1) An access point for data entry or exit. (2) A connector on a device to which cables for other devices such as display stations and printers are attached.

printer authorization matrix (PAM). A matrix stored in the controller that establishes printer assignment and classification.

program access (PA) key. On a display device keyboard, a key that produces a call to a program that performs display operations. See also *program function (PF) key*.

program function (PF) key. On a display device keyboard, a key that passes a signal to a program to call for a particular display operation. See also *program access (PA) key*.

protocol. (1) A set of semantic and syntactic rules that determine the behavior of functional units in achieving communication. (2) In SNA, the meanings of and the sequencing rules for requests and responses used for managing the network, transferring data, and synchronizing the states of network components.

put. In 3174 central site customizing, to store data from the working copy into a library member.

R

register. A storage device having a specified storage capacity such as a bit, byte, or computer word, and usually intended for a special purpose.

remote. Pertaining to a system, program, or device that is accessed through a telecommunication line.

request for price quotation (RPQ). An alteration or addition to the functional capabilities that the controller provides.

ring interface adapter. A device that assumes the basic data transmission functions of node, such as frame recognition, address decoding, error checking, buffering of frames, fault detection, and, in Token-Ring Networks, token generation.

ring network. A network configuration where a series of attaching devices are connected by unidirectional transmission links to form a closed path.

routing. (1) The assignment of the path by which a message will reach its destination. (2) In SNA, the forwarding of a message unit along a particular path through a network, as determined by parameters carried in the message unit, such as the destination network address in a transmission header.

S

segment. A section of cable between components or devices on the network. A segment may consist of a single patch cable, multiple patch cables connected, or a combination of building cable and patch cables connected.

serial. (1) Pertaining to a process in which all events occur one after the other; for example, serial

transmission of the bits of a character according to V24 CCITT protocol. (2) Pertaining to the sequential or consecutive occurrence of two or more related activities in a single device or channel. (3) Pertaining to the sequential processing of the individual parts of a whole, such as the bits of a character or the characters of a word, using the same facilities for successive parts. (4) Contrast with *parallel*.

server. On a local area network, a data station that provides facilities to other data stations, for example, a file server, a print server, or a mail server.

session. (1) In network architecture, an association of facilities necessary for establishing, maintaining, and releasing connections for communication between stations. (2) In MLT, synonymous with logical terminal (LT). (3) In SNA, a logical connection between two network addressable units that can be activated, tailored to provide various protocols, and deactivated as requested.

simulation. (1) The representation of selected characteristics of the behavior of one physical or abstract system by another system. In a digital computer system, simulation is done by software; for example, (a) the representation of physical phenomena by means of operations performed by a computer system, and (b) the representation of operations of a computer system by those of another computer system. (2) Contrast with *emulation*.

SNA character string (SCS). A character string composed of EBCDIC controls, optionally intermixed with end-user data, that is carried within a request/response unit.

sort. In 3174 central site customizing, to arrange a list of library members according to date, name, or microcode level.

staging adapter. (1) An addition to a System/370 Model 158 or 168 Integrated Storage Control (ISC) feature that enables the integrated storage control to operate in a 3850 Mass Storage System. (2) An IBM 3850 Model 3 Storage Control, which is a 3830 Model 2 Storage Control that has been modified to operate in a 3850 Mass Storage System.

station. (1) An input or output point of a system that uses telecommunication facilities; for example, one or more systems, computers, terminals, devices, and associated programs at a particular location that can send or receive data over a telecommunication line. (2) A location in a device at which an operation is performed, for example, a read station. (3) In SNA, a link station.

storage. A unit into which recorded text can be entered, in which it can be retained and processed,

and from which it can be retrieved. See also *memory*.

subsystem. A secondary or subordinate system, or programming support, usually capable of operating independently of or asynchronously with a controlling system. The 3174 and its attached terminals are an example of a subsystem.

system configuration. A process that specifies the devices and programs that form a particular data processing system.

system services control point (SSCP). In SNA, the focal point within an SNA network for managing the configuration, coordinating network operator and problem determination requests, and providing directory support and other session services for end users of the network. Multiple SSCPs, cooperating as peers, can divide the network into domains of control, with each SSCP having a hierarchical control relationship to the physical units and logical units within its domain.

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

T

telecommunication-attached. Pertaining to the attachment of devices by teleprocessing lines to a host processor. Synonym for *remote*. Contrast with *channel-attached*.

terminal. In data communication, a display station or printer capable of sending or receiving information.

terminal emulation. The capability of a microcomputer, personal computer, 3270 CUT mode display station, 3270 printer, ASCII display station, or ASCII printer to operate as if it were a particular type of terminal linked to a processing unit and to access data.

terminal multiplexer. A device, such as the 3299 Terminal Multiplexer, for interleaving the signals for many devices onto a single coaxial cable.

terminal multiplexer adapter (TMA). This adapter is connected to the terminal adapter in the 3174 and provides control for a maximum of eight terminals.

token. In a local area network, the symbol of authority passed among data stations to indicate the station temporarily in control of the transmission medium.

Note: A token is a particular message or bit pattern that signifies permission to transmit.

Token-Ring Network. (1) A ring network that allows unidirectional data transmission between data stations by a token-passing procedure over one transmission medium so that the transmitted data returns to the transmitting station. (2) A network that uses a ring topology, in which tokens are passed in a circuit from node to node. A node that is ready to send can capture the token and insert data for transmission.

type. In the 3174 Establishment Controller, the identifying number of a card. For example, 9150 is the type number of the terminal adapter in the 3174.

U

update. In 3174 central site customizing, to tailor a library member's customizing data, in working copy, and put it back to the library diskette.

upgrade. In 3174 central site customizing, to select a library member and upgrade its data to the microcode level of the Central Site Customizing Procedure diskette.

upstream. (1) In the direction opposite to data flow or toward the source of transmission. (2) Toward the processor from an attached unit or end user. (3) Contrast with *downstream*.

Utility disk. A diskette or fixed disk that contains the microcode necessary to run various utilities, for example, to copy portions of a diskette for a backup diskette.

Utility (UTL) diskette. A diskette that contains the microcode necessary to run various utilities, for example, to copy portions of a diskette for a backup diskette.

V

V.35 communication adapter. A communication adapter that can combine and send information on one line at speeds up to 64 kbps, and conforms to the CCITT V.35 standard.

W

working copy (WC). In 3174 central site customizing, a set of customizing data and label data held in main storage, which is tailored to reflect a network controller's attached terminals, its method of host attachment, and other pertinent information.

write. To make a permanent or transient recording of data in a storage device or on a data medium.

X

X.21 communication adapter. A communication adapter that can combine and send information on one line at speeds up to 64 kbps, and that conforms to CCITT X.21 standards.

X.25. In data communication, a recommendation of the CCITT that defines the interface between data terminal equipment and packet switching networks.

3

3270 data stream. (1) The commands, control codes, orders, attributes, and data or structured fields for 3270 devices, that are transmitted inbound to an application program or outbound to a terminal. (2) Data being transferred from or to an allocated primary or tertiary device, or to the host system, as a continuous stream of data and 3270 Information Display System control elements in character form.

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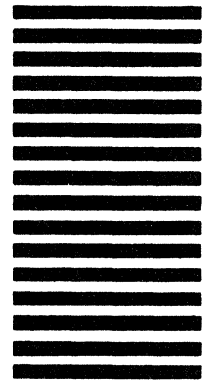
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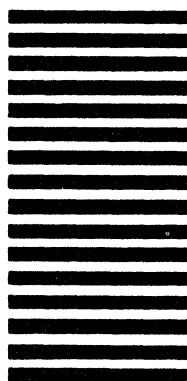
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