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**Communications
Systems
Bulletin**

**IBM TOKEN-RING GATEWAY PERFORMANCE
AND CONNECTIVITY FOR THE
IBM 3174/3720/3725/3745**

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**IBM Token-Ring Gateway
Performance and
Connectivity
For The IBM
3174/3720/3725/3745**

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JUNE 1988

Abstract

The purpose of this document is to give the reader guidelines for selecting the appropriate communication controller IBM (3174-3720/25/45) for attachment to the IBM Token-Ring. It is to aid in understanding configurations of host attached or remote attached controllers. In order to make an initial decision, an understanding of the connectivity of each device and the different features, throughput capabilities, and requirements in each local and remote IBM Token-Ring network environment is needed. Various backup alternatives will also be reviewed. With this knowledge the proper IBM Token-Ring environment can be selected to meet the needs of the network.

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INTRODUCTION

In today's telecommunications environment there are many options to meet your networking needs. One of these options is the IBM Token-Ring. The four major IBM Token-Ring connectivity options that will be discussed in this document are IBM 3174, 3720, 3725 and 3745. Selection of one of these options will usually be determined by four considerations:

COST

FUNCTION

THROUGHPUT CAPACITY

BACKUP

This document will help provide an understanding of these considerations and connectivity options and give guidance in selecting the appropriate controller for attachment to the IBM Token-Ring.

Additional information can be obtained from the IBM Network Control Program Token-Ring Interface Planning and Implementation Document (GG-24-3110) and Performance Guidelines For 3x74 Attached Workstation (ZZ20-4167-5)

Introduction

**Connection Considerations
When Attaching the
IBM Token-Ring
to the
IBM 3174, 3720, 3725, 3745**

AGENDA

The objective of this presentation is to discuss the different selection criteria for attaching the IBM Token-Ring to an IBM 3174, 3720, 3725 or 3745. This presentation covers significant considerations such as connectivity, data throughput, performance, etc., to help in understanding the various considerations involved in choosing the appropriate controllers for attachment of the IBM Token-Ring.

Agenda

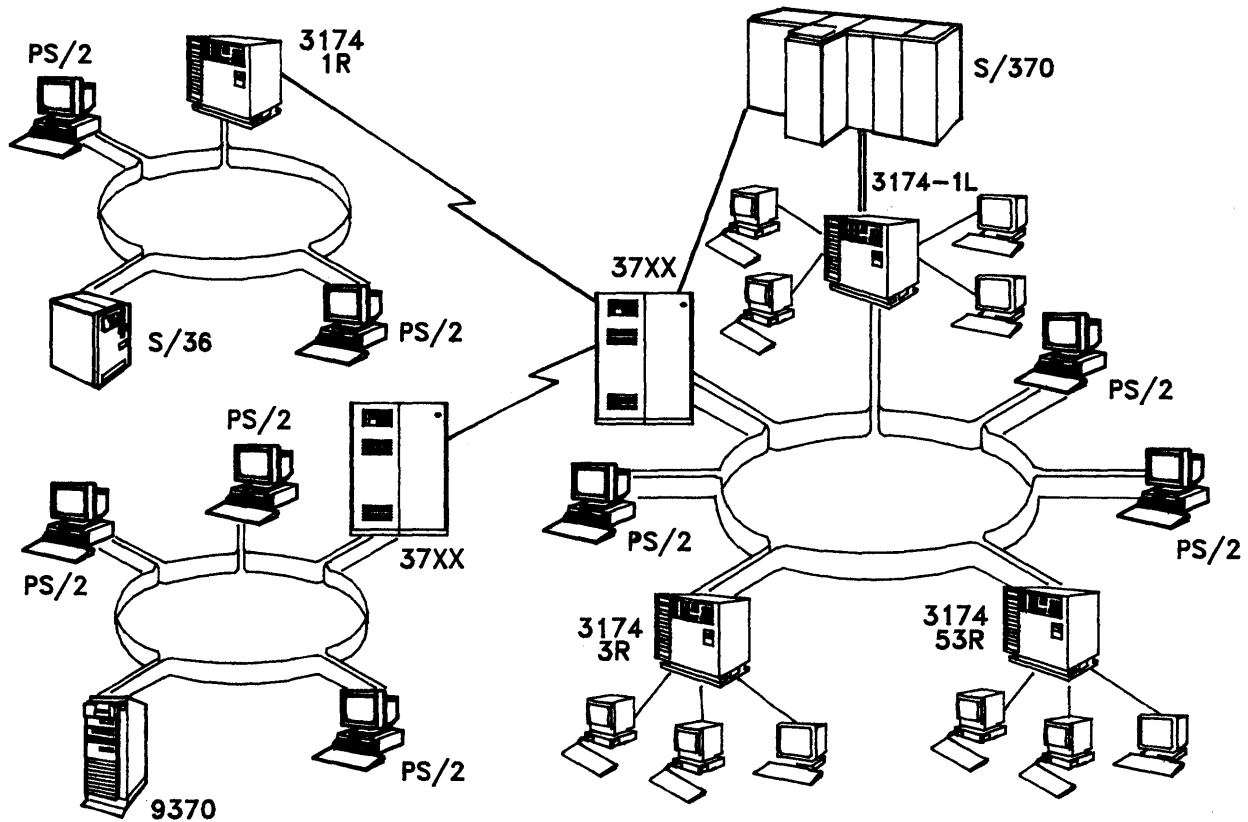
- IBM Token-Ring Attachment
3174 – 3720 – 3725 – 3745
 - Connectivity
 - Performance
 - Product Comparison
 - Backup Alternatives
 - Software Support (ACF/NCP)

IBM TOKEN-RING CONNECTIVITY

The IBM Token-Ring is a set of products developed to address the requirements for flexible communications between application systems and workstations within an establishment. The IBM Token-Ring was designed to support many types of devices and systems in environments ranging from network stations on a single ring to several interconnected rings. The IBM 3174-3720-3725-3745 provides attachment capabilities for channel attachment and remote communication link attachment to an IBM host processor.

IBM Token-Ring Connectivity

ESTABLISHMENT CONNECTIVITY

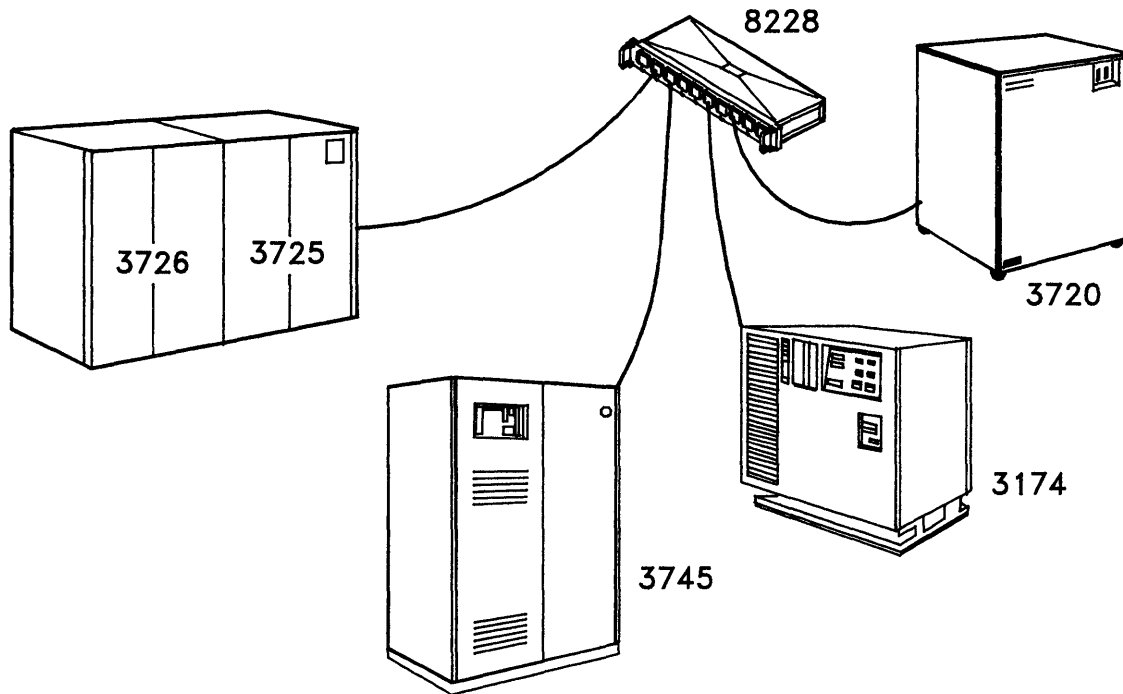


- Connectivity for Local and Remote Attachment:
 - 3174/1L Local
 - 3174-1R/51R Remote Token-Ring
 - 3174-3R/53R Token-Ring Attached Only
 - 3720/3725/3745 Local-Remote Attachment

IBM 3174 AND 3720/25/45 CONNECTION TO THE TOKEN-RING

The physical connection between the IBM 3174, 3720, 3725, 3745 and the IBM Token-Ring is provided by the IBM 8228 Multi-Station Access Unit (MSAU). This device is an eight lobe wiring concentrator that can be installed in a rack, in a wiring closet, or in a component housing that has been wall mounted or placed on a shelf or table. Each IBM 8228 allows up to eight attaching devices to have access to a Token-Ring . The IBM 8228 does not require an external power source for its operation. The IBM 8228s can be linked together to form rings that are larger than eight lobes by attaching the ring out (RO) receptacle of one 8228 to the ring in (RI) receptacle of another 8228.

3174 and 3720, 3725, 3745 Connection to Token-Ring



- Controllers are Connected via IBM 8228 Multi-Station Access Unit
- Power is Provided by the Attaching Device
- Provides Physical and Logical Ring Topology (8 Workstations)
- 260 Connections Per Token-Ring

3720/3725 TOKEN-RING SUBSYSTEM

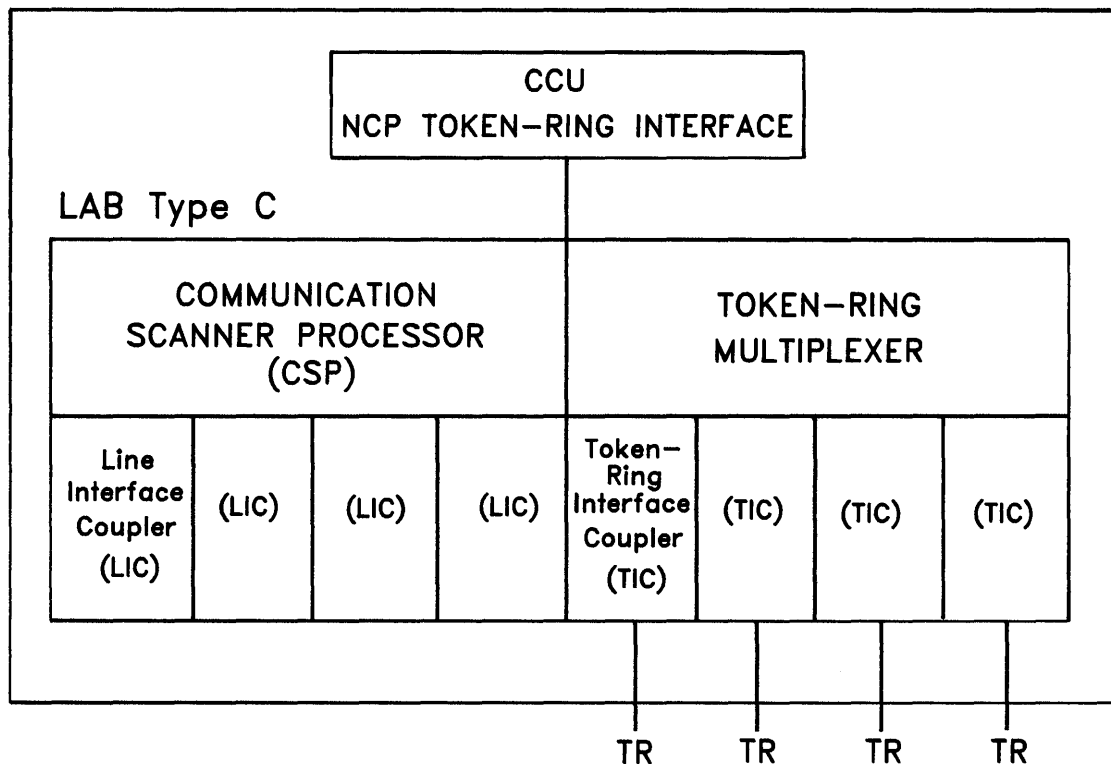
The 3725 IBM Token-Ring Subsystem (TRSS) consists of Line Attachment Bases type C (LAB C) and their components. The Line Attachment Base (LAB) is the major packaging unit of the TRSS. The LAB C contains one communication scanner and one Token-Ring Multiplexer. The LAB C supports four Token-Ring interface couplers (TIC) and up to 16 medium speed lines (up to 19.2Kbps).

The 3720 Token-Ring Subsystem (TRSS) consist of one Token-Ring Multiplexer (TRM) that controls one or two Token-Ring interface couplers (TIC). The IBM Token-Ring Subsystem consists of a Token-Ring multiplexer (TRM) plus a Token-Ring interface coupler (TIC). A TIC contains a microprocessor under control of resident microcode. The TIC communicates with the TRM card across a bus interface for data transfer. Each TIC represents one physical Token-Ring connection; more than one TIC can be connected to the same Token-Ring. The data rate supported on the IBM Token-Ring is 4 million bits per second.

The Token-Ring multiplexer controls the data exchange between the Token-Ring interface coupler and control subsystem memory. A Token-Ring interface coupler monitors the ring activity and supports the ring protocols.

ACF/NCP V4R2 supports The IBM 3720/3725 Token-Ring Subsystem.
ACF/NCP V5R1-R2/R2.1 supports The IBM 3720 Token-Ring Subsystem.

3720/3725 Token-Ring Subsystem



- IBM 372X Token-Ring Subsystem
 - Token-Ring Multiplexer
 - Token-Ring Interface Couplers
- Supported by ACF/NCP V4R2 (3720/3725)
- Supported by ACF/NCP V5R1-R2/R2.1 (3720)

IBM 3745 TOKEN-RING SUBSYSTEM

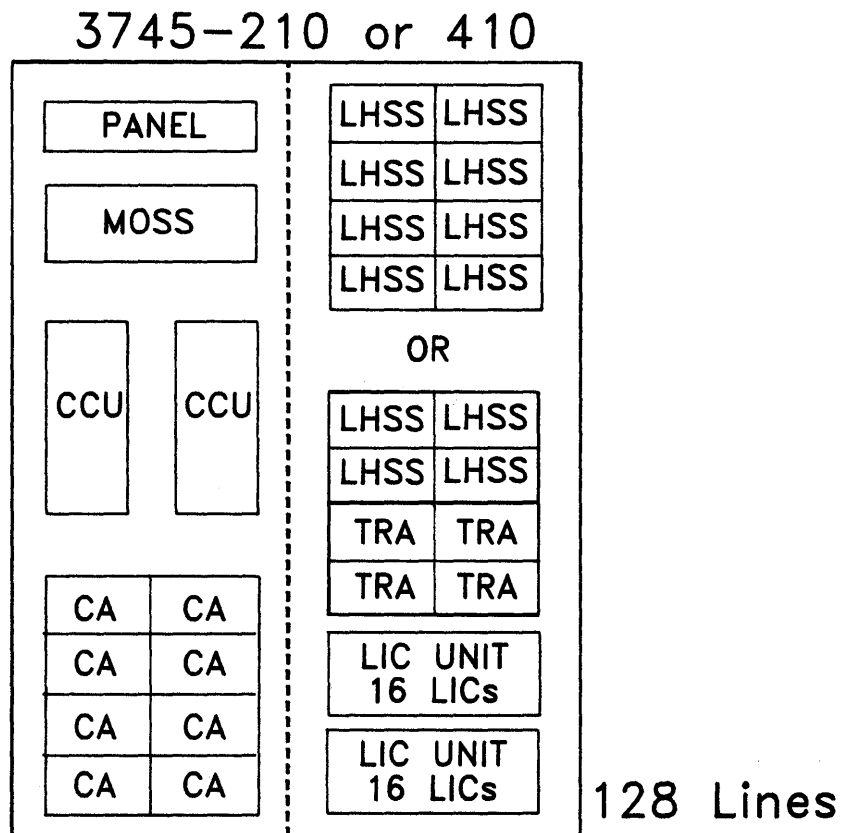
The 3745 Token-Ring Subsystem (TRSS) attaches a maximum of eight Token-Rings. The Token-Ring system consists of up to four Token-Ring adapters. Each adapter can attach to two Token-Ring networks operating at four million bits per second.

The interface to external equipment is the Token-Ring Interface Coupler (TIC).

IBM Token-Ring adapter consists of a Token-Ring Multiplexer (TRM) plus a Token-Ring Interface Coupler (TIC). A TIC contains a microprocessor under control of resident microcode. The TIC communicates with the TRM card across a bus interface for data transfer. Each TIC represents one physical Token-Ring connection. More than one TIC can be connected to the same Token-Ring. The data rate supported on the IBM Token-Ring is 4 million bits per second.

The Token-Ring Multiplexer controls the data exchange between the Token-Ring Interface Coupler and control subsystem memory. A Token-Ring Interface Coupler monitors the ring activity and supports the ring protocol.

3745 Token-Ring Subsystem



- IBM Token-Ring Subsystem
 - Token-Ring Multiplexer
 - Token-Ring Interface Coupler (TIC)
- Four Token-Ring Adapters
 - Each Adapter Supports Two TICs
- IBM 3745 is Supported by ACF/NCP V5R1, V5R2

TOKEN-RING ATTACHMENT TO THE 37XX

The Token-Ring Subsystem (TRSS) allows the IBM 3720, 3725 model 1 and 2, and 3745 communication controller to attach to the IBM Token-Ring. The 3745 Token-Ring subsystem has four adapters which can attach up to eight IBM Token-Rings. Each adapter supports two Token-Ring Interface Couplers.

There are two main components to the TRSS:

1. Token-Ring Multiplexer (TRM)
2. Token-Ring Interface Coupler (TIC)

Token-Ring Subsystem provides a Token-Ring Multiplexer (TRM) that can attach up to four TICs. Only one TRSS is supported in the 3725 model 1 and 2; the 3726 can support either one or two TRSS within the expansion frame. The 3725 with a 3726 expansion frame will support a maximum of 2 TRSS. The 3720 supports one TRSS.

The 3720-11 (local) and 3720-12 (remote) support the attachment of two Token-Ring Interface Couplers and up to 16 medium speed lines (up to 19.2Kbps).

ACF/NCP supports a Boundary Network Node (BNN) interface to support communications with devices attached to a Token-RING network. ACF/NCP V5R2.1 does support Intermediate Network Nodes (INN) facility of ACF/NCP to another ACF/NCP through a Token-Ring network which means that it is possible to connect ACF/NCPs using the Token-Ring network.

Token-Ring Attachment to the 37XX

- Maximum Number of IBM Token-Ring Attachments:

-3720	2 Token-Rings
-3725-2	4 Token-Rings
-3725/3726	8 Token-Rings
-3745	8 Token-Rings
- The 3725 Line Attachment Base (Lab Type C)
 - 16 Communication Lines
 - 4 Token-Ring Interface Couplers
- The 3725/26 Supports 2 Lab Type C
 - One in 3725, One or Two in the 3726
- 3745 Supports Four Token-Ring Adapters in the Base Frame
 - Each Adapter Supports Two Token-Ring Interface Couplers

IBM TOKEN-RING SOFTWARE

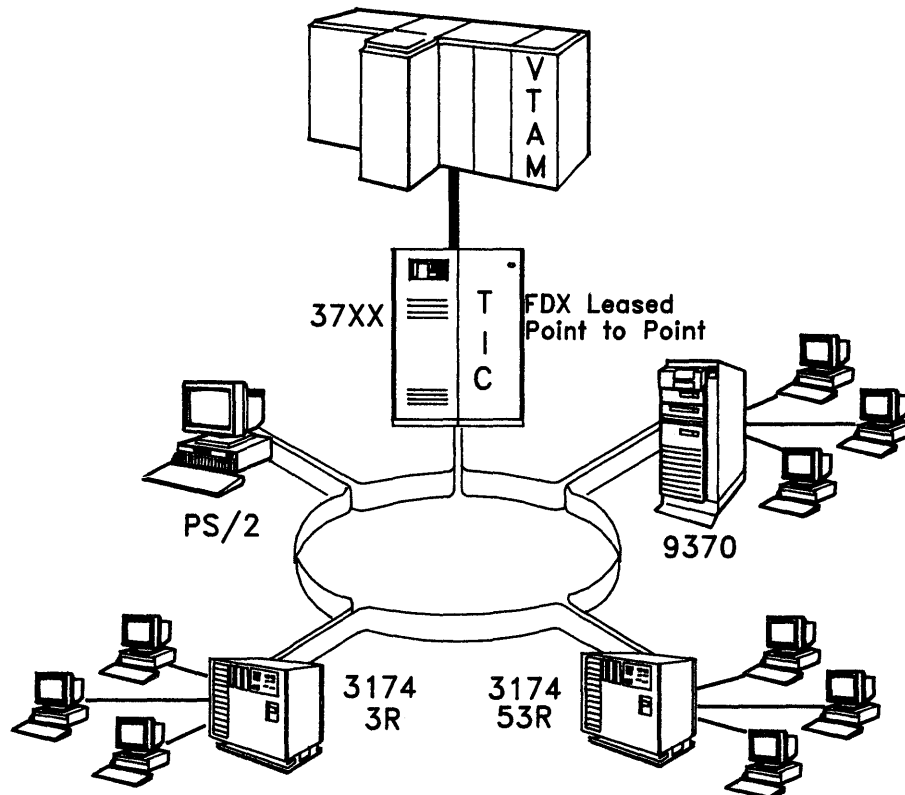
Each physical unit to an IBM Token-Ring network is viewed by ACF/VTAM as a leased line full-duplex point to point line. Each logical connection to the IBM Token-Ring network station is viewed by ACF/VTAM as a switched half duplex point-to-point line and is defined in ACF/VTAM as an ACF/VTAM switched major node. With this approach, the Token-Ring is transparent to ACF/VTAM and IBM subsystems.

The Token-Ring supports predefinition of logical links for Token-Ring devices. The addition of new terminals does not require definition and generation of a new NCP module. If there is a requirement to add additional workstations to the Token-Ring to access the host, this can be accomplished by inserting the workstation on to the Token-Ring. This does not require a new ACF/NCP generation. Terminal definitions can be dynamically added to ACF/VTAM while ACF/VTAM is running.

Note: The IBM Token-Ring supports up to 260 physical units on one IBM Token-Ring.

Token-Ring Software

Implementation on the 3720, 3725, 3745



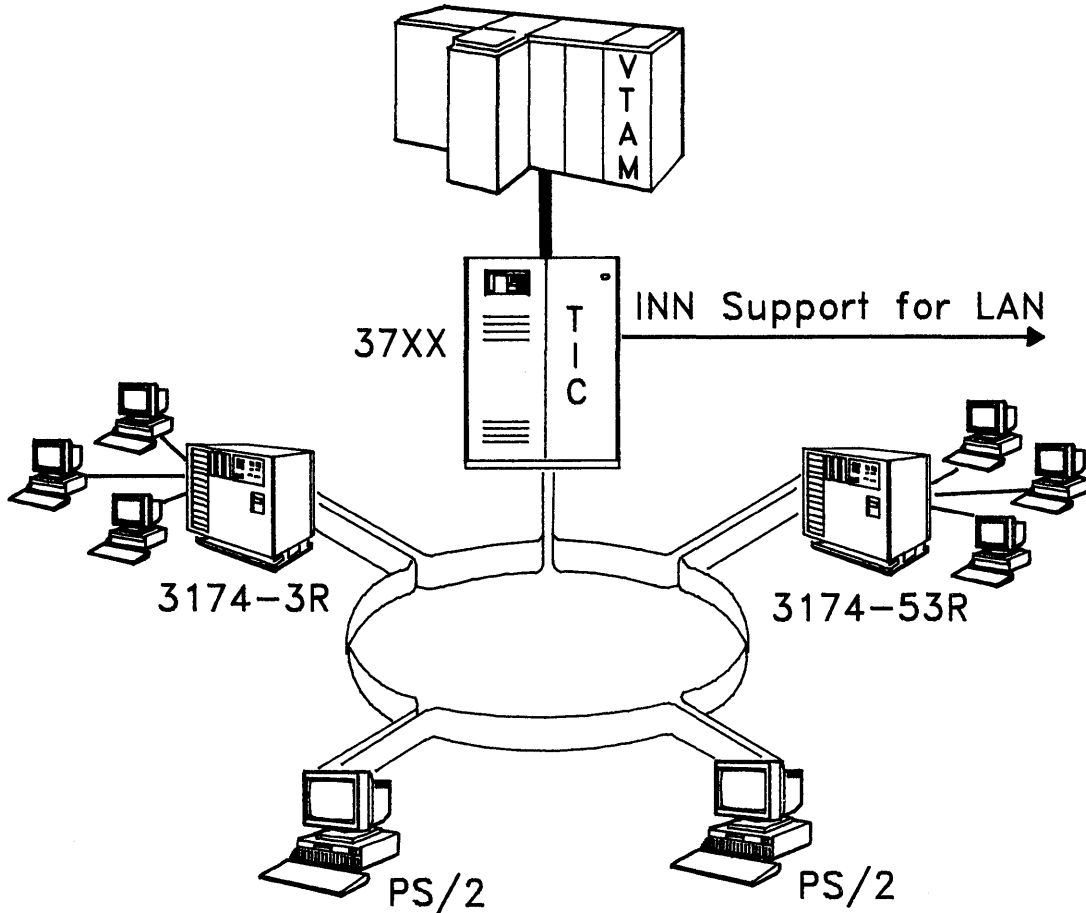
- Each Physical Connection is Viewed by ACF/VTAM as a Leased FDX Point to Point Communication Line
- Each Logical Connection to a Network Station is Viewed by ACF/VTAM as a Switched Major Node HDX Point to Point Communication Line
- ACF/NCP Token-Ring Support is Transparent to ACF/VTAM and the IBM Host Subsystem

37XX TOKEN-RING ATTACHMENT BENEFITS

ACF/NCP provides an SNA gateway for Token-Ring devices to enter the SNA backbone network to support a large range of connectivity options. Token-Ring attachments on the 3745 Communication Controller will support up to 1500 physical units. ACF/NCP V4R2, V4R3 and V4R3.1 will support as many physical units that storage will allow.

The 3720 and 3745 is supported by ACF/NCP V5R1, V5R2 and V5R2.1, and supports as many physical units as storage will support. Preparing physical units will reduce the amount of ACF/NCP generations required. Terminals can be dynamically added to ACF/VTAM.

37XX Token-Ring Attachment Benefits



- Provides an SNA Gateway for the Token-Ring
- Dynamic Definition of Devices Supported
- Allows Pre-Definition of Token-Ring Devices
- Addition of New Terminals without Having to SYSGEN a New ACF/NCP Module

Local 3720, 3725, 3745 Token-Ring Performance

This Data is to be Used as a Guideline Only

ASSUMPTIONS

- Attached are typical performance numbers for local 3720, 3725 and 3745 with Token-Ring attachment. The following configurations were compared:
 - Channel attached 37XX with ACF/NCP program product
- 3720/3725
 - 2 to 15 3174-R cluster controllers attached to the token-ring
 - 32 workstations attached to each 3174 controller
- 3745
 - 3 to 48 3174-R cluster controllers attached to the token-ring.
 - 32 workstations attached to each 3174 controller
- RU size 256 bytes
- Message size: input 40 bytes, output 1200 bytes.
- Maximum frame size for the PC in this model is 256 bytes on the token-ring. The PCs are using 3270 Emulation Program.
- 12000 transactions per hour per 3174 controller (assumes 32 CRT's per controller, 404 transactions per hour per CRT or 6.7 transactions per minute per CRT).

The performance numbers have been obtained with SNAP/SHOT simulation runs. They are based on preliminary performance information for the ACF/NCP program product and may vary somewhat from actual performance.

The response time reported is the time from the time an input message leaves the 3174 to the token-ring, until the output message has been returned to the 3174. It does not include any delays in the host for application processing, etc.

Local 3720, 3725 Token-Ring Performance

	Transactions Per Second	37XX CCU Util. %	Token-Ring Util. %	Response Time, Sec.
Local 3720	5	29	1.6	0.2
	10	58	3.2	0.2
	15	85	4.8	0.5
Local 3725	10	22	3.2	0.1
	20	41	6.4	0.1
	30	58	9.4	0.1
	40	77	12.7	0.2

- Channel Attached 3720, 3725
Token-Ring Performance
 - Dynamic Growth of the Network
 - Subsecond Response Time

Local 3720, 3725, 3745 Token-Ring Performance

This Data is to be Used as a Guideline Only

ASSUMPTIONS

- Attached are typical performance numbers for local 3720, 3725 and 3745 with Token-Ring attachment. The following configurations were compared:
 - Channel attached 37XX with ACF/NCP program product
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 - 3 to 48 3174-R cluster controllers attached to the token-ring.
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The performance numbers have been obtained with SNAP/SHOT simulation runs. They are based on preliminary performance information for the ACF/NCP program product and may vary somewhat from actual performance.

The response time reported is the time from the time an input message leaves the 3174 to the token-ring, until the output message has been returned to the 3174. It does not include any delays in the host for application processing, etc.

Local 3745 Token-Ring Performance

	Transactions Per Second	37XX CCU Util. %	Token-Ring Util. %	Response Time, Sec.
Local 3745	10	13	3.2	0.1
	20	27	6.4	0.1
	30	40	9.4	0.1
	40	52	12.7	0.1
	50	66	15.9	0.1
	60	79	19.1	0.2

- Channel Attached 3745
Token-Ring Performance
 - Dynamic Growth of the Network
 - Subsecond Response Time

Remote 3720, 3725, 3745 Token-Ring Performance

This Data is to be Used as a Guideline Only

ASSUMPTIONS

- Remote 37XX with Token-Ring Attachment
- Attached are typical performance numbers for remote 3720, 3725 and 3745 with Token-Ring attachment. The following configurations were compared:
- Remote 3720, 3725 or 3745 with ACF/NCP program product
 - 1 to 4 links to the 3720, number and speed as indicated
 - 1 to 2 links to the 3725, number and speed as indicated
 - 1 to 4 links to the 3745, number and speed as indicated
 - 3 to 48 3174-R cluster controllers attached to the token-ring
 - 32 workstations attached to each 3174 controller
- RU size 256 bytes
- Maximum frame size for the PC in this model is 256 bytes on the token-ring. The PCs are using 3270 emulation program.
- 12000 transactions per hour per 3174 controller (assumes 32 CRT's per controller, 404 transactions per hour per CRT or 6.7 transactions per minute per CRT).

The performance numbers have been obtained with SNAP/SHOT simulation runs. They are based on preliminary performance information for the ACF/NCP program product and may vary somewhat from actual performance.

The response time reported is the time from the time an input message leaves the 3174 to the token-ring, until the output message has been returned to the 3174. It does not include any delays in the host for application processing, etc.

Remote 3720, 3725 Token-Ring Performance

	Number & Speed of Links	Transact. Per Sec.	37XX CCU Util. %	Avg. Link Util. %	Tkn Ring Util. %	Response Time, Sec.
Remote 3720	2 56Kb Links	5	23	45	1.6	0.4
	3 56Kb Links	10	45	60	3.2	0.4
	4 56Kb Links	15	66	66	4.8	0.5
Remote 3725	1 256Kb Link	10	22	39	3.2	0.2
	1 256Kb Link	20	39	77	6.4	0.2
	2 256Kb Links	30	56	57	9.4	0.2
	2 256Kb Links	40	75	77	12.7	0.3

- Remote 3720, 3725 Token-Ring Performance

- Dynamic Growth of the Network
- Subsecond Response Time
- Fewer ACF/NCP System Generations

Remote 3720, 3725, 3745 Token-Ring Performance

This Data is to be Used as a Guideline Only

ASSUMPTIONS

- Remote 37XX with Token-Ring Attachment
- Attached are typical performance numbers for remote 3720, 3725 and 3745 with Token-Ring attachment. The following configurations were compared:
- Remote 3720, 3725 or 3745 with ACF/NCP program product
 - 1 to 4 links to the 3720, number and speed as indicated
 - 1 to 2 links to the 3725, number and speed as indicated
 - 1 to 4 links to the 3745, number and speed as indicated
 - 3 to 48 3174-R cluster controllers attached to the token-ring
 - 32 workstations attached to each 3174 controller
- RU size 256 bytes
- Maximum frame size for the PC in this model is 256 bytes on the token-ring. The PCs are using 3270 emulation program.
- 12000 transactions per hour per 3174 controller (assumes 32 CRT's per controller, 404 transactions per hour per CRT or 6.7 transactions per minute per CRT).

The performance numbers have been obtained with SNAP/SHOT simulation runs. They are based on preliminary performance information for the ACF/NCP program product and may vary somewhat from actual performance.

The response time reported is the time from the time an input message leaves the 3174 to the token-ring, until the output message has been returned to the 3174. It does not include any delays in the host for application processing, etc.

Remote 3745 Token-Ring Performance

	Number & Speed of Links	Transact. Per Sec.	37XX CCU Util. %	Avg. Link Util. %	Tkn Ring Util. %	Response Time, Sec.
Remote 3745	1 256Kb Link	10	14	44	3.2	0.2
	1 256Kb Link	20	27	86	6.4	0.2
	2 256Kb Links	30	40	64	9.4	0.3
	3 256Kb Links	40	53	58	12.7	0.3
	3 256Kb Links	50	67	72	15.9	0.3
	4 256Kb Links	60	80	65	19.1	0.4

- Remote 3745 Token-Ring Performance

- Dynamic Growth of the Network
- Subsecond Response Time
- Fewer NCP System Generations

- Supports 16 T1s (8 Active)

3720/3725/3745 SUMMARY

The 37xx products with their pre-gen capability and Token-Ring attachability provide features to accommodate dynamic network growth. The high speed bandwidth capability of the 3720, 3725, 3745 provides subsecond response time from local (channel attached) workstations or remote workstations. In a Token-Ring environment the network can grow dynamically while allowing a reduction in the number of required ACF/NCP gens.

When considering a 37xx product on the IBM Token-Ring, one of the first considerations is whether the 37xx is going to be channel attached or used as a remote concentrator. The second consideration would be how much data throughput is there going to be. A third consideration would be how many devices are going to be on the Token-Ring. The 3725 ACF/NCP V4R2 supports 1500 physical units and can address up to 32,767 logical units.

The IBM 3720 is often an excellent choice as a remote communication concentrator that can provide added function by attachment to an IBM Token-Ring. If increased data throughput and device connectivity is required the IBM 3725 models 1 or model 2 may be a better choice. The IBM 37xx also provides the capability to dynamically recover from a Token-Ring Interface Coupler failure or ACF/NCP failure when attached to the Token-Ring. The 3745 with its increased data throughput and high speed T1 links can provide subsecond response time from remote locations.

3720/3725/3745 Summary

3720

- Designed for Network Nodes with Lower Data Throughput Requirements
- Provides Rich Network Functional Capability in Remote Environments
- Installable in an Office Environment

3725

- Supports Larger Data Throughput Requirements
- Small Incremental Cost to Upgrade Installed 3725
- Provides Multiple Backup Alternatives

3745

- Has One or Two Central Control Units (CCU's) to Support Very Large Data Networks
- Data Streaming Channels for Quicker Access to Host Data
- Increased Token-Ring Interface Coupler Performance

-
- ACF/NCP V4R2 Supports up to 1500 Physical Units (3720/3725)
 - ACF/NCP V5R1 and V5R2 Support the 3720 and 3745
 - Fewer NCP Generations
 - Multiple Host Access

3174 LOCAL AND REMOTE ATTACHMENT

IBM Token-Ring Network offerings continue to be enhanced with additional connectivity options. In addition to channel and link attachment capabilities, the IBM 3174 also supports the IBM Token-Ring Network.

The IBM 3174 can participate in an IBM Token-Ring network in three ways:

IBM 3174 Model 3R and 53R can attach to a host via an IBM 3720, 3725, or 3745, with the Token-Ring Coupler or via The IBM 3174 1L with the gateway feature. These Models when attached to the opposite end of the Token-Ring from the computer can extend the sub-second response time normally associated with channel attached Control Units to 3174's at distances limited only by the IBM Cabling System topology (several miles).

IBM 3174 Model 1L (SNA configured), with the IBM 3270 Token Ring gateway feature can provide a direct connection for a Token-Ring Network to a System/370-architecture channel. This permits the attachment of a variety of workstations and Control Units, including S/36, IBM PC as well as, 3174 Models 3R and 53R on a Token-Ring to local System/370-type SNA hosts.

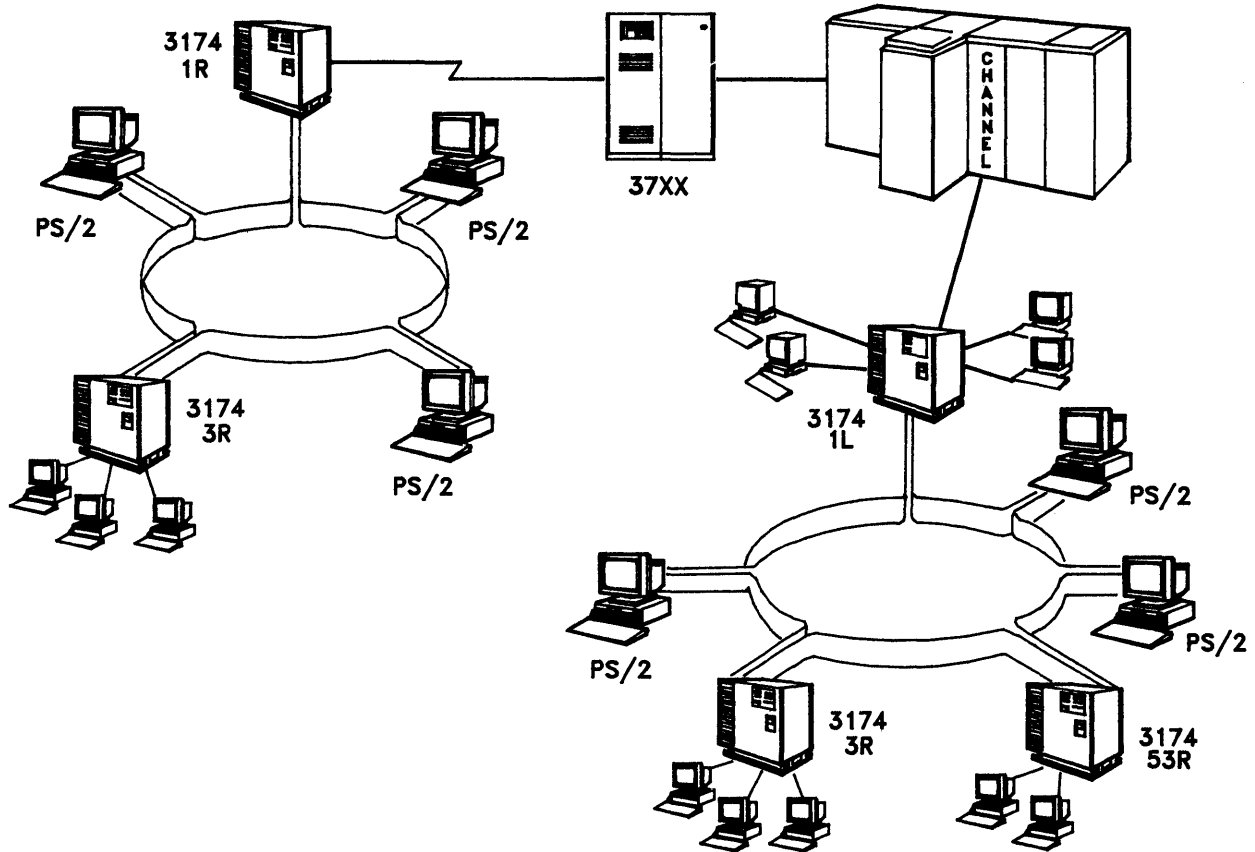
The 3174-1R and 3174-51R control unit can be remotely connected to a 37xx Communication Controller and provide remote Token-Ring connectivity. 3174-1R/51R supports the same IBM Token-Ring option as the 3174-1L.

Up to 140 physical units on the ring (both workstations and 3174's Model 3R and 53R) can communicate with the host via 3174 Model 1L. Thus, with 3174's on the ring, a large number of attachments is conceivable. (32 devices, times 140 3174's per gateway machine). This is a theoretical maximum, certainly not a practical one. Each situation must be evaluated individually to determine specific performance characteristics, but a reasonable estimate would be ten 3174 Model 3R's or twenty Model 53R's per Token-Ring

The 3174-1L provides an inexpensive technique for attaching Token-Ring networks directly to the channel of an IBM host (without the need for a communications controller.) The Model 3R/53R serves as a downstream Token-Ring node when communicating via IBM 3720/25/45 Communications Controllers or IBM 3174 Model 1L gateway.

Used in combination, (3174 Model 1L as a Gateway machine, with Model 3R/53R downstream controllers) customers can extend sub-second response times to distant terminals and reduce Control Unit costs at the same time. For example, rather than using a Model 1L for each 32 terminals, one Model 1L gateway control unit could be used to attach multiple Model 3R's.

3174 Local and Remote Attachment



- 3174-01L Locally Attached
 - Requires Feature #3025
 - Configuration Support "S"
- 3174-01R/51R Remote Attached
 - Requires Feature #3025
 - Configuration Support "S"
- 3174-03R and 53R
 - Configuration Support "A"
 - Token-Ring Attachable only

LOCAL ATTACHED 3174-1L

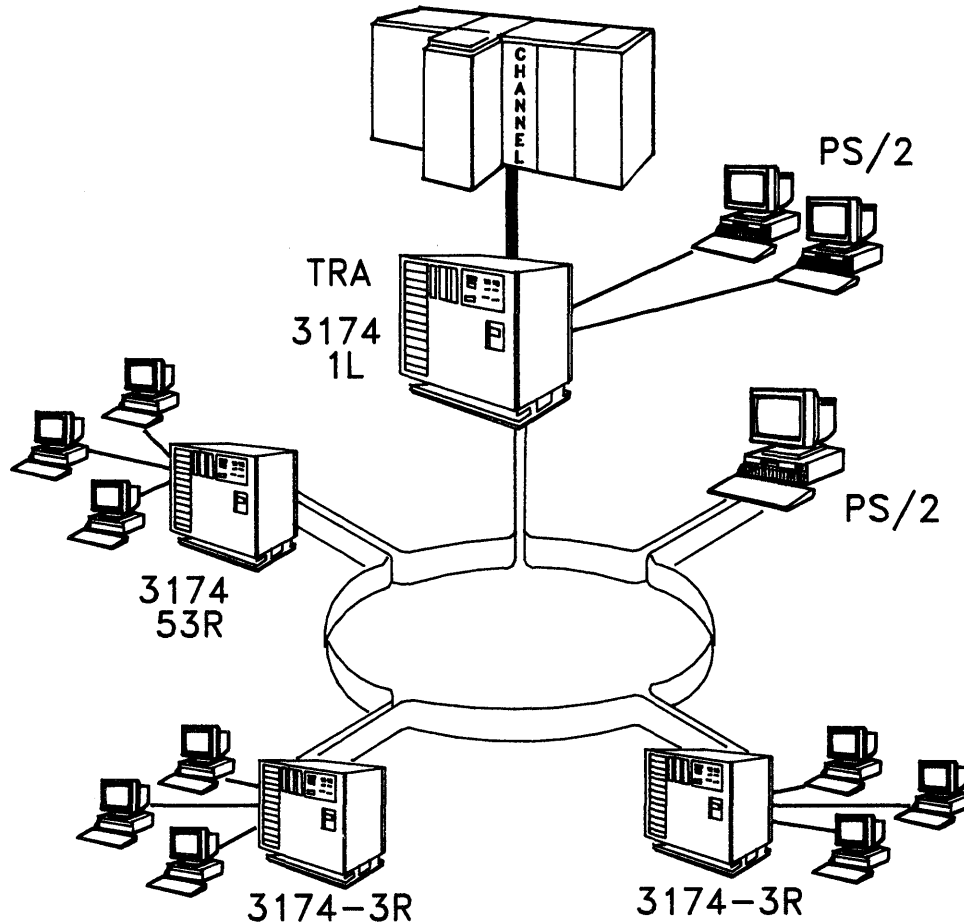
IBM Token-Ring Network offerings continue to be enhanced with additional connectivity options. In addition to channel and link attachment capabilities, the IBM 3174 also supports the IBM Token-Ring Network.

- IBM 3174 Model 1L (SNA configured), with the IBM 3270 Token Ring gateway feature can provide a direct connection for a Token-Ring Network to a System/370-architecture channel. This permits the attachment of a variety of workstations and control units, including S/36, IBM PC as well as, 3174 Models 3R and 53R on a Token-Ring to local System/370-type SNA hosts.

The 3174-1L provides an inexpensive technique for attaching Token-Ring networks directly to the channel of an IBM host. The Model 3R/53R serves as a downstream Token-Ring node when communicating via IBM 3720/25/45 Communications Controllers or IBM 3174 Model 1L gateway.

Used in combination, (3174 Model 1L as a Gateway machine, with Model 3R/53R downstream controllers) customers can extend sub-second response times to distant terminals and reduce Control Unit costs at the same time. For example, rather than using a Model 1L for each 32 terminals, one Model 1L gateway control unit could be used to attach multiple Model 3R's.

Local Attached 3174-1L



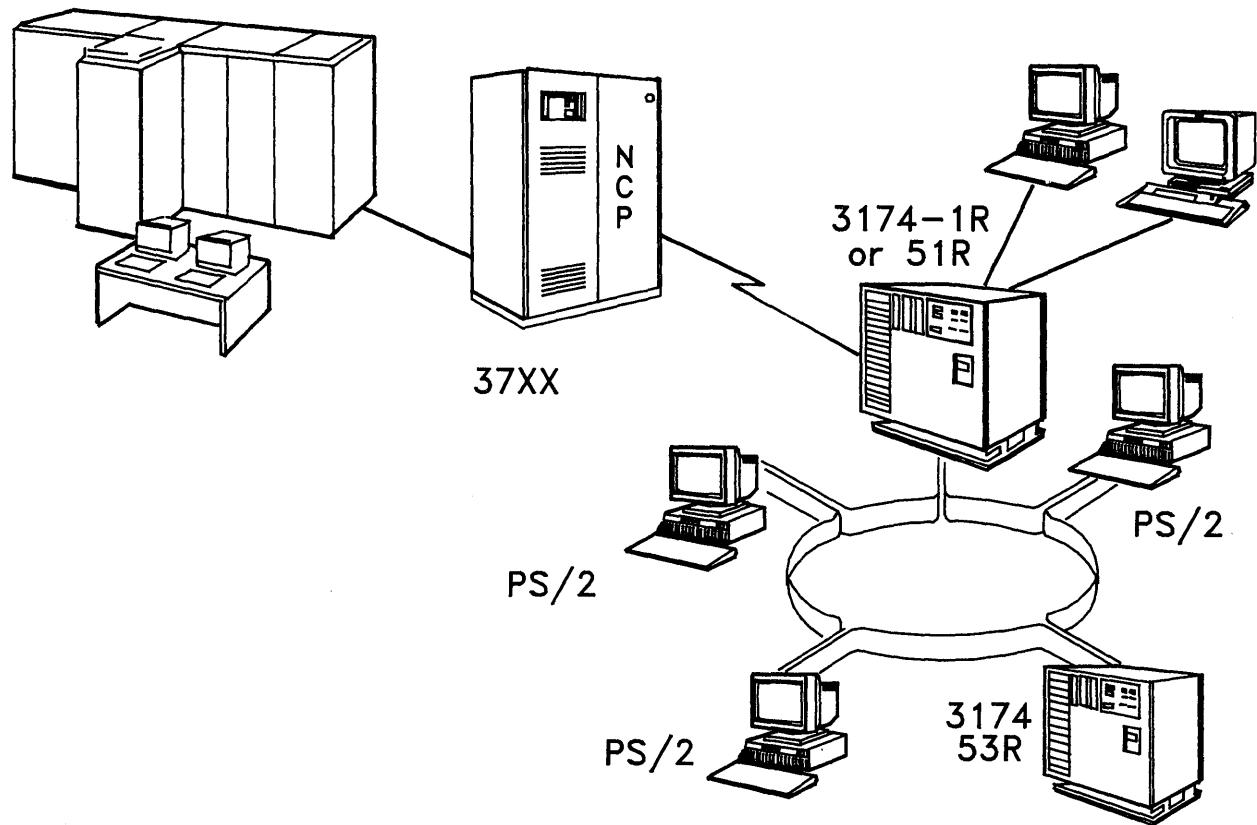
- One SNA Host Channel Connection
- Supports One IBM Token-Ring
- Each Physical Unit on the Token-Ring is Viewed by the Channel as a Separate SNA Controller

REMOTE ATTACHED 3174-1R/51R

The IBM Token-Ring network 3270 gateway feature (#3025) provides remote link attachment. This capability will be available on subsystem control unit remote attached models 1R, 2R, 51R, and 52R using SNA/SDLC protocols on non-switched facilities. With this feature installed the 3174 can communicate with IBM 308x, 3090, 4361/4381, or 9370 hosts via 3720, 3725 or 3745 communication controllers. It can also communicate with 4361 or 9370 hosts via communication features in those products' integrated communication adapter (ICA).

This IBM Token-Ring gateway (models 1L and 1R, 2R, 51R, 52R) provides communication between an IBM host and up to 140 Token-Ring attached physical units as PU 2.0 nodes. Devices and workstations attached to the 3174 and those attached to the Token-Ring can operate concurrently with this feature installed. The number of devices using this capability is dependent on available 3174 storage and may be affected by performance constraints. The IBM 3174 requires the function provided by storage expansion feature (#1011 or #1012). This feature can be set up in the field by the customer.

Remote Attached 3174-1R/51R



- Supports SDLC HDX up to 64Kbps
- Supports Leased Line with Switched Network Backup (SNBU)
- Each Physical Unit on the Token-Ring is Viewed by Network Control Program as a Multi-Drop Controller

3174 LOCAL/REMOTE TOKEN-RING PERFORMANCE

The 3174-1L and 3174-51R is the remote IBM Token-Ring gateway to an SNA environment. In the following foils on 3174-R gateway, each chart show four response time curves. The charts show one curve for 1.2 transactions per minute, one curve for 6.7 transactions per minute, and one curve for interactive traffic.

By examining each chart it becomes easy to see that as the line speed is increased, and using the same input parameters, the higher line speeds will give you better terminal response times.

The observation that can be made is that neither the IBM Token-Ring nor the remote 3174-1R/51R will be the limiting factor for terminal response time.

One of the limitations will be the speed of the upstream SDLC communication link. When configuring the 3174 the number of PUs that are going to be attached to the Token-Ring is a major consideration. There are several other considerations to examine :

- RU SIZE
- MESSAGE SIZE
- TRANSACTIONS PER SECOND PER PU
- FILE TRANSFER

It is important to consider the above factors when configuring a remote 3174-1R/51R. The performance information has been obtained with SNAP/SHOT Simulation runs. They are based on preliminary performance information and may vary somewhat from actual performance.

3174 Local/Remote Token-Ring Performance

- Observations

- Response Time Heavily Depends on Speed of Upstream Links
- Proper Configuration of 3174 Based on Speed of Upstream Links
- 3174-L is not Usually a Limiting Factor for Response Time
- IBM Token-Ring is not Usually a Limiting Factor for Response Time

Local 3174-1L Token-Ring Performance

This Data is to be Used as a Guideline Only

ASSUMPTIONS

- The following chart relates 3174-1L Utilization, Token-Ring Utilization, and Response Time as a function of the transaction rate.
- Each transaction is 40 bytes inbound to the host and 1400 bytes outbound to the terminal.
- Up to 140 PCs and 3174-3Rs may communicate with the host via the 3174 Token-Ring Gateway. The Chart is valid for different mixtures of PCs and 3174-3Rs, where the sum is less than 140.
- The maximum frame size transmitted on the Token-Ring by the 3174-1L Gateway is 2042 data bytes, so that the outbound message from the host to the terminal is transmitted as a single frame.

The response time is the elapsed time beginning with the input message leaving the device (PC or 3174-1R) and ending with the response message arriving at the device. It includes no host delay and no delay in the device.

Local 3174-1L Token-Ring Performance

	Transactions Per Second	3174 CU Util. %	Token-Ring Util. %	Response Time, Sec.
Local 3174 1L	5	6	1.5	0.1
	10	12	3.0	0.1
	20	25	6.0	0.1
	50	62	15.1	0.1

- Channel Attached 3174-1L
 - No ACF/NCP Generations
 - Subsecond Response Time

Remote 3174-XR Token-Ring Performance

This Data is to be Used as a Guideline Only

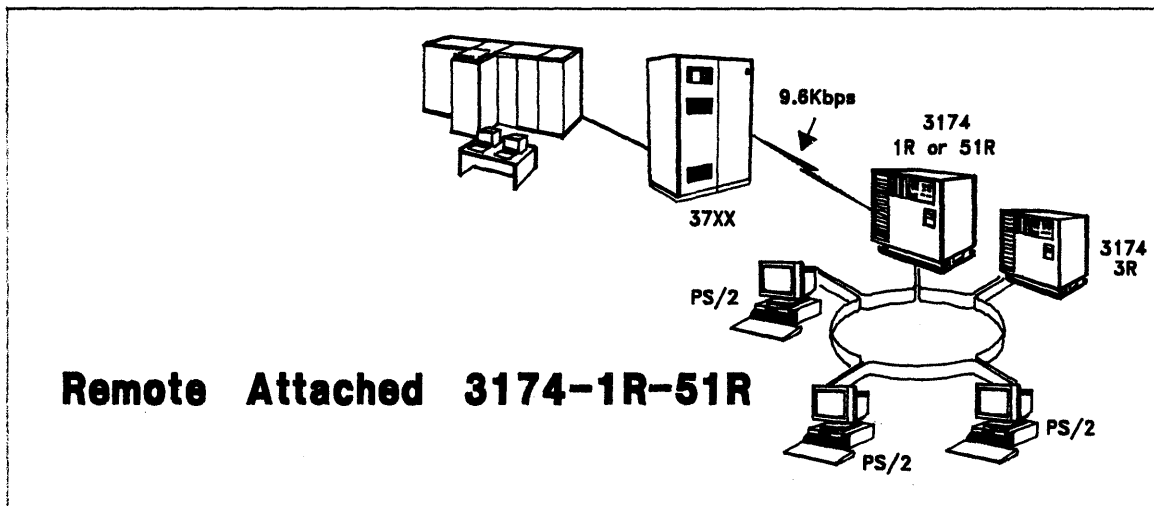
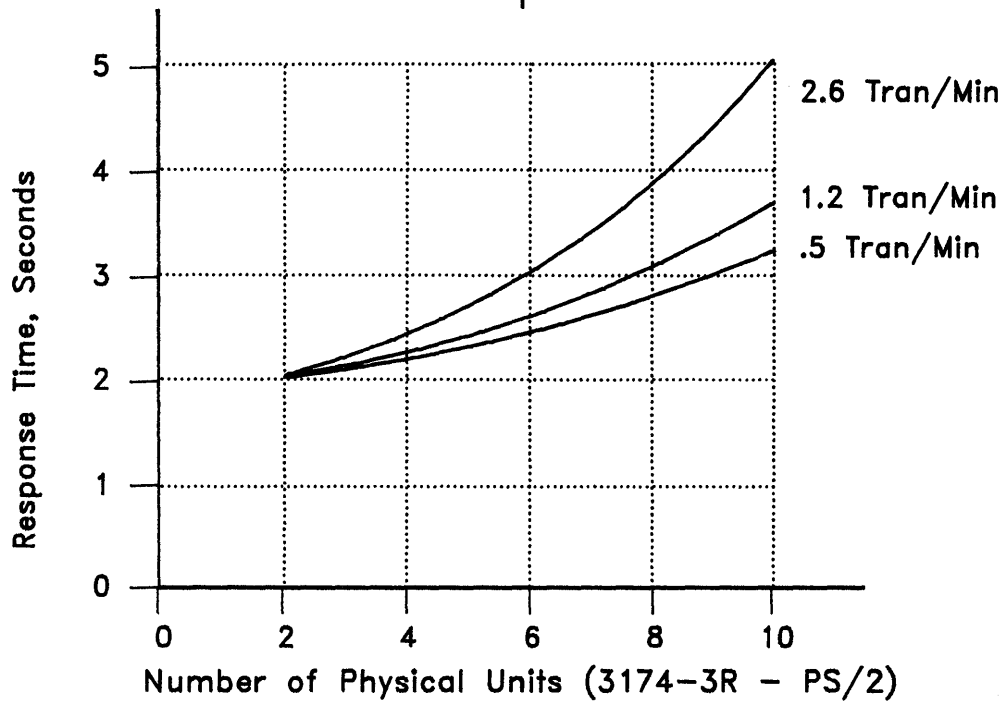
ASSUMPTIONS

- The configuration consists of a host with 3725 remotely connected to a 3174-1R via a point-to-point SDLC line. The 3174-1R has the Token-Ring Gateway feature and is connected via the Token-Ring to PCs and 3174-3Rs.
- The charts show response times as a function of line speed (9.6 Kbps, 19.2 Kbps, and 56 Kbps), the transaction rate, and the number of physical units attached to the Token-Ring (PCs or 3174-3Rs).
- Each transaction is 40 bytes inbound to the host and 1400 bytes outbound to the terminal.
- The response time is the elapsed time beginning with the input message leaving the device and ending with the response message arriving at the device. It includes a host delay of 100 ms and no delay in the device.
- The maximum frame RU size transmitted on the SDLC line is 512 bytes.

The performance information has been obtained with a discrete event simulation model. It is based on preliminary performance information and may vary somewhat from actual performance. The results are especially sensitive to changes in the assumptions.

3174 9600 bps Interactive Performance

Type 1200-A Interactive Transactions
9600 bps Line



Remote 3174-XR Token-Ring Performance

This Data is to be Used as a Guideline Only

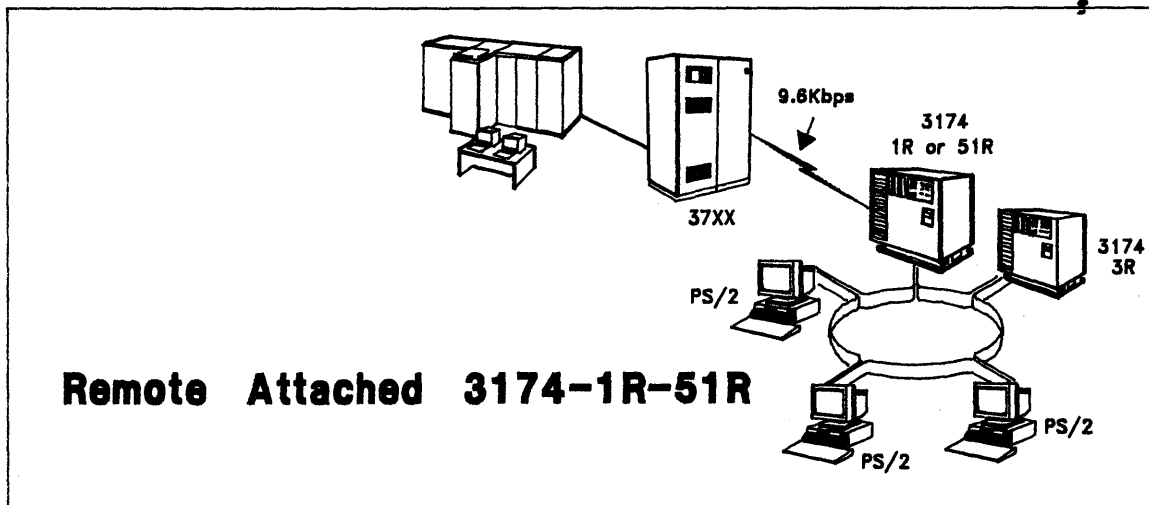
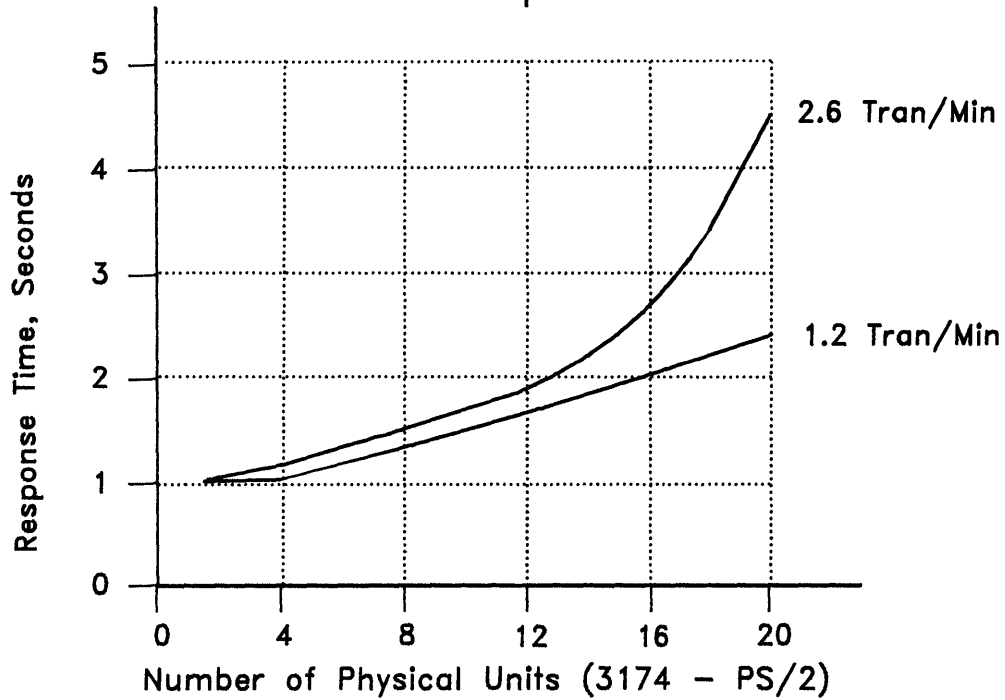
ASSUMPTIONS

- The configuration consists of a host with 3725 remotely connected to a 3174-1R via a point-to-point SDLC line. The 3174-1R has the Token-Ring Gateway feature and is connected via the Token-Ring to PCs and 3174-3Rs.
- The charts show response times as a function of line speed (9.6 Kbps, 19.2 Kbps, and 56 Kbps), the transaction rate, and the number of physical units attached to the Token-Ring (PCs or 3174-3Rs).
- Each transaction is 40 bytes inbound to the host and 1400 bytes outbound to the terminal.
- The response time is the elapsed time beginning with the input message leaving the device and ending with the response message arriving at the device. It includes a host delay of 100 ms and no delay in the device.
- The maximum frame RU size transmitted on the SDLC line is 512 bytes.

The performance information has been obtained with a discrete event simulation model. It is based on preliminary performance information and may vary somewhat from actual performance. The results are especially sensitive to changes in the assumptions.

3174 19200 bps Interactive Performance

Type 1200-A Interactive Transactions
19.2 Kbps Line



Remote 3174-XR Token-Ring Performance

This Data is to be Used as a Guideline Only

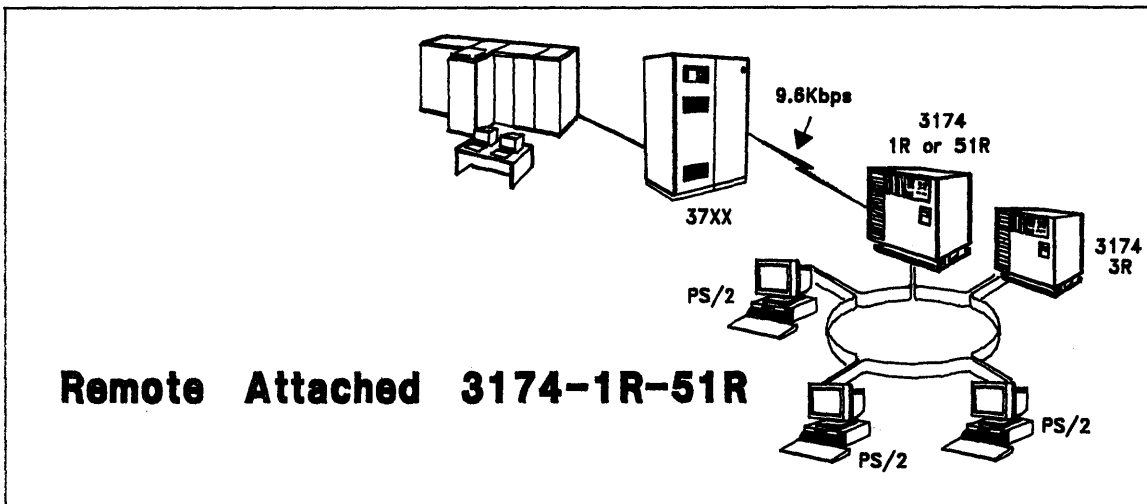
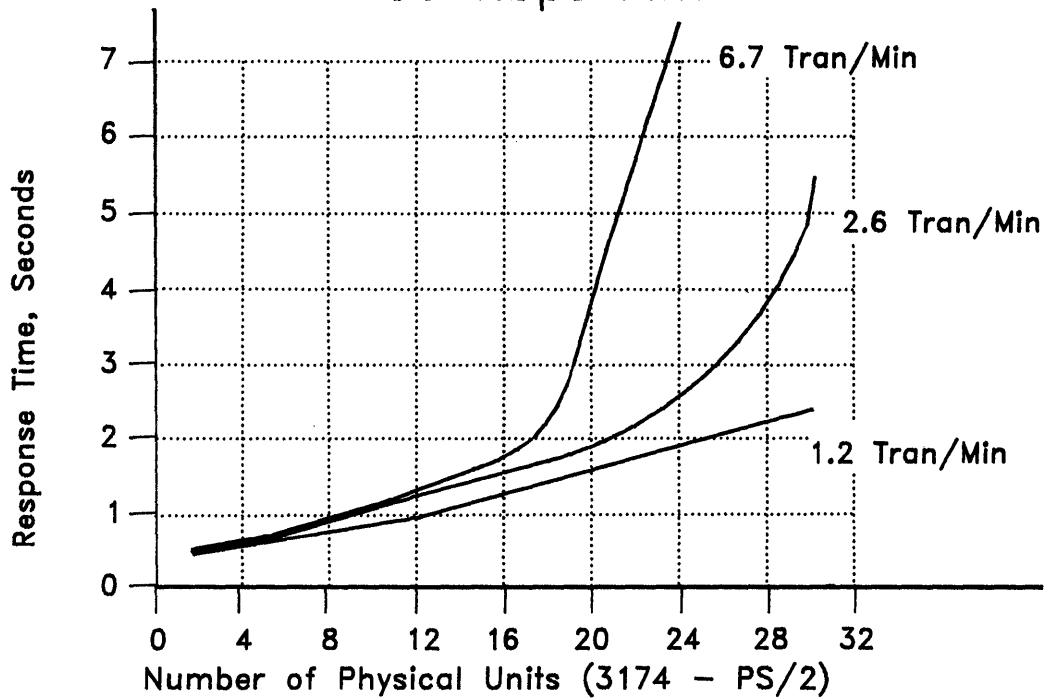
ASSUMPTIONS

- The configuration consists of a host with 3725 remotely connected to a 3174-1R via a point-to-point SDLC line. The 3174-1R has the Token-Ring Gateway feature and is connected via the Token-Ring to PCs and 3174-3Rs.
- The charts show response times as a function of line speed (9.6 Kbps, 19.2 Kbps, and 56 Kbps), the transaction rate, and the number of physical units attached to the Token-Ring (PCs or 3174-3Rs).
- Each transaction is 40 bytes inbound to the host and 1400 bytes outbound to the terminal.
- The response time is the elapsed time beginning with the input message leaving the device and ending with the response message arriving at the device. It includes a host delay of 100 ms and no delay in the device.
- The maximum frame RU size transmitted on the SDLC line is 512 bytes.

The performance information has been obtained with a discrete event simulation model. It is based on preliminary performance information and may vary somewhat from actual performance. The results are especially sensitive to changes in the assumptions.

3174 56000 bps Interactive Performance

Type 1200-A Interactive Transactions
56 Kbps Line



3174 SUMMARY

The 3174-11 channel attached control unit can support up to 140 PUs and one IBM Token-Ring attachment. The performance of the 3174 depends on the type of transaction being performed.

- Interactive
- File Transfer
- Image

It will also depend on the devices that will be used on the Token-Ring. The IBM 3174-3R or 53R and PCs have different channel unit control block (UCB) requirements. A 3174-3R or 53R uses only one unit control block (UCB) for its attached terminals on a channel; a PC will use one unit control block for each PC attached to the IBM Token-Ring if the PC is going to be a PU and LU.

The 3174-1L supports smaller Token-Ring networks when there is not a requirement to support a large number of end users (example: a network that needs 1500 end user attachments). The 3174-1L will support a high volume of interactive traffic, file transfer and graphics traffic. When considering a 3174-1L determine what the customer requirements are for the number of end users, and the type of data that will be sent to the host.

The 3174-1R and the 3174-51R supports remote Token-Ring connectivity. It supports up to 140 PUs using a communication link up to 64Kbps. The limiting factor on the remote 3174 will usually be the line speed of the up stream SDLC communication link.

3174 Summary

- Allows Users to Take Advantage of Shared Token-Ring Resources
- Supports Base 3174 Functions
- Supports Either Local or Remote Token-Ring Attachment
 - Attaches up to a Maximum of 140 Physical Units
 - Protects Investment in Existing 3270 Applications
- Low Cost High Performance Local Gateway
 - Supports High Volume of File Transfer Activity
 - Supports High Data Throughput in a Graphics Environment
- Provides Excellent Migration Path for Intelligent Workstations to the IBM Token-Ring

BACKUP ALTERNATIVES

The objective of this section of the presentation is to address backup alternatives for 3173-1L and the 3174-1L and the 3720, 3725 or 3745 and the IBM Token-Ring.

Backup Alternatives

- 3174 Backup Alternatives
- 3720, 3725, 3745 Backup Alternatives
- Backup of Multiple IBM Token-Rings

3174 BACKUP

A second 3174 (with the Gateway feature) can be IMLed and brought on-line with the same Token-Ring address as a previously activated 3174 gateway.

Insertion of the backup 3174 into the same ring as the operational gateway will cause an 881-01 SSC indication. But the adapter will be closed, and the controller functions of the 3174 will continue. Therefore, the backup gateway can be performing useful work of supporting 3270 terminals.

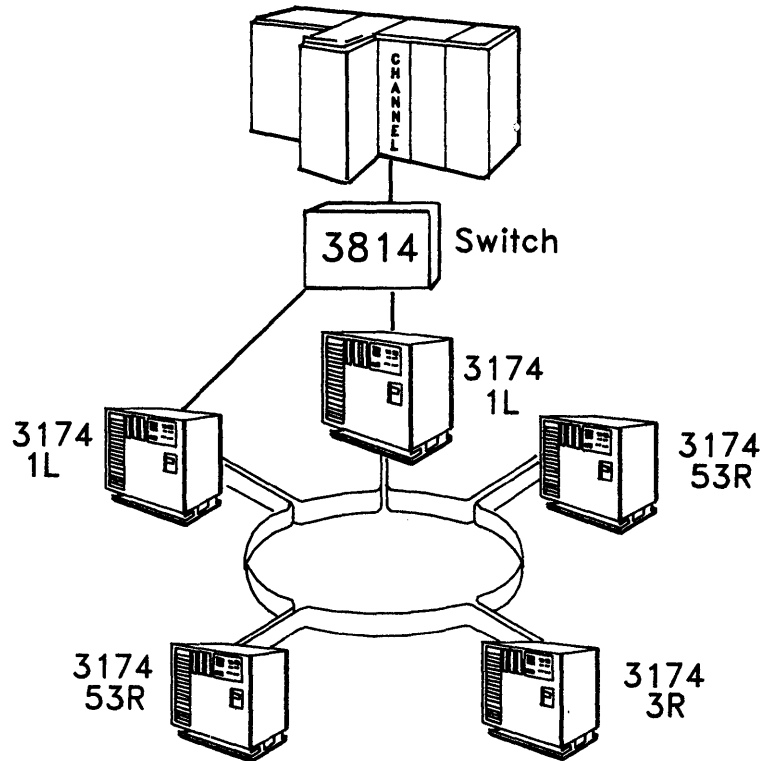
On each attempt to establish a connection with a Token-Ring down-stream PU, the 3174 microcode checks the status of the Token-Ring adapter. If the adapter is closed, it will attempt to open it and then proceed with the connection establishment. The primary gateway is activated and connections are established to the Token-Ring PUs.

The backup gateway is activated, displays 881-01, closes its adapter, but remains operational as a 3174. The primary gateway fails. The primary's Token-Ring adapter must de-insert from the ring or be forced to de-insert. The only action required of the network operator is to activate a backup Local SNA Major Node that defines the Token-Ring Network nodes as channel attached through the backup gateway.

The first connection establishment request will cause the 3174 microcode to check its adapter status, issue an adapter OPEN (which should succeed), and proceed with connection establishment. Of course, if the same PU and LU names are used in the backup major node, the original major node would first have to be deactivated to ACF/VTAM.

An additional feature of this scenario is that if the primary gateway and backup gateway are attached to different S/370 channels (a reasonable way to configure for backup), both 3174s could be IMLed with the IDENTICAL customized control diskette, using the same sub-channel addresses on different channels. This is an advantage because a separate customization for the backup configuration would not be required. All that is required is to customize the primary, copy the diskette, and slip it into the diskette drive of the backup

3174 Backup



- Using an IBM Channel Switch to Replace a 3174 on the IBM Token-Ring
 - Alternate 3174 Has the Same Token-Ring Addresses Defined
 - Can be Used for Additional Capacity (Addresses Must be Changed)

3720/25/45 TIC BACKUP

In case of a TRM failure, all the logical links in session with the two TICs will become inactive. There is no possible backup in case of TRM failure if TICs are on the same TRM. In case of a TIC failure, it makes no difference whether they are not on the same TRM. (There are no generation parameters related to the TRM)

Session initialized by remote terminal (incoming call for NTRI)

If the session fails due to a TIC failure, the terminal must re-establish the session using the operational TIC address, i.e., send a test resolve to do that, this terminal has to know the address of the backup TIC which will allow it to gain access to the same host.

Session initialized by the host application

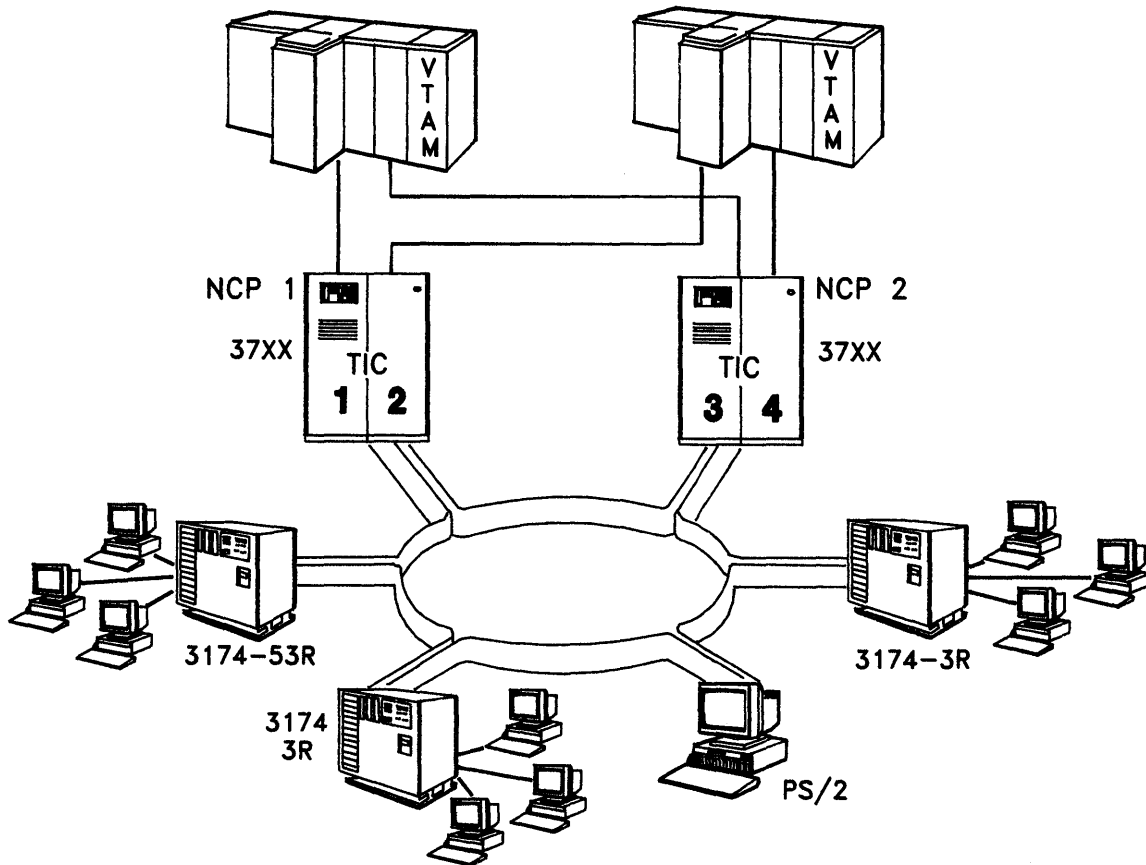
Prior to that session establishment, the leased line corresponding to the operating TIC has to be activated. The TIC which is going to be used for backup has to be made operational by ACF/NCP, and must be inserted on the Token-Ring.

ACF/VTAM defines workstations as switched major nodes. These definitions contain the dial digits, which are the telephone numbers used to call through a switched network. This telephone number is meaningless for a Token-Ring, but the dial digits are used to gather information (address for example) of the Token-Ring station accessible to the host. Remember each Token-Ring station is seen as a switched resource to ACF/VTAM and ACF/NCP.

An entry is defined as a switched major node for each of the "stations" on a Token-Ring. It gives to NTRI (ACF/NCP code) the Token-Ring address of the station and also the address of the TIC to be used for the session between the host and the station.

3720/25/45 TIC Backup

Multi-Host Token-Ring Interface Coupler Backup



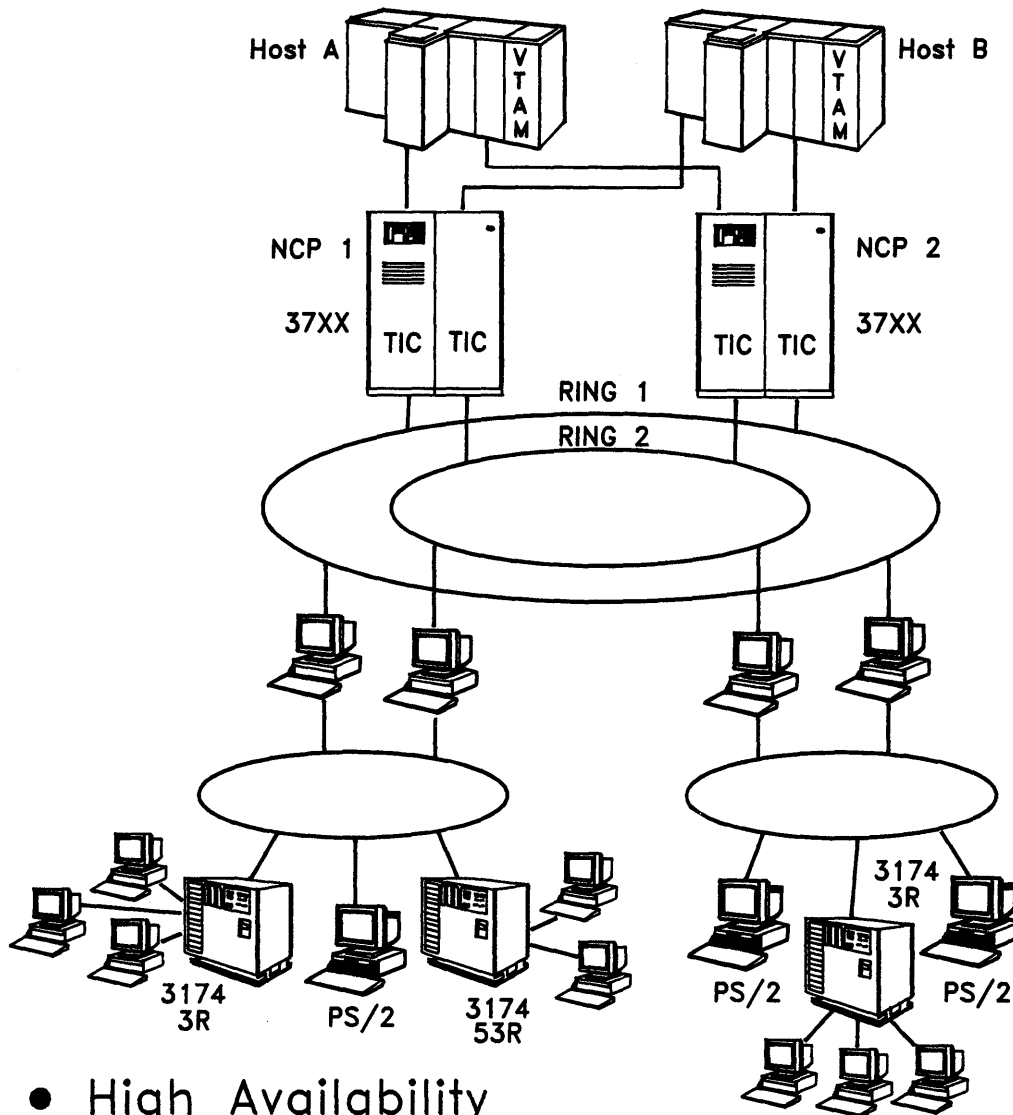
- TIC's in Another Communications Controller Can be Used for Backup
 - Sessions in the Failing TIC Must be Restarted

BACKUP FOR MULTIPLE IBM TOKEN-RINGS

This configuration offers high availability because of the backup capability for either a host or Token-Ring failure. If a failure occurred on host 1, backup host 2 still has its connection to terminals in session with it. Applications on host 1 can be transferred to host 2, and the session can be reestablished. This configuration also offers additional capacity because the utilization of two backbone rings is automatically balanced through the IBM Token-Ring network.

Backup for Multiple IBM Token-Rings

Multi-Host Multiple BackBone Rings



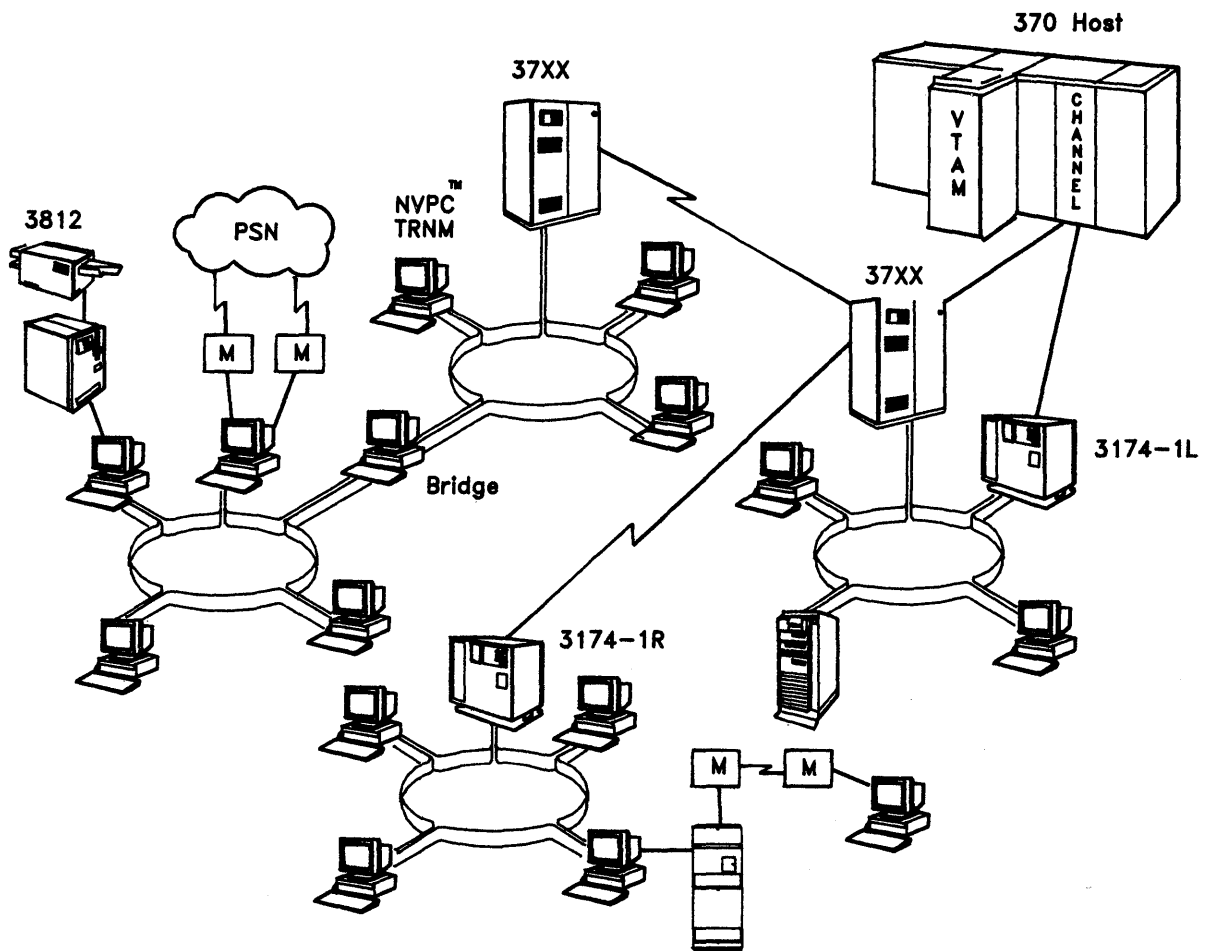
- High Availability
- Additional Capacity
- Auto - Balancing Token-Ring Network

IBM ENTERPRISE NETWORK

With the increased complexity of connecting work stations together in today's environment the IBM 3174, 3720, 3725, 3745 and IBM Token-Ring provides flexibility and many connectivity options. The IBM Token-Ring can share resources and provide a common link to the IBM host. The 3720 and the 3174 1R and 51R are connectivity options for smaller IBM Token-Ring requirements. The 3725, 3745 and the 3174 1L should be considered for larger Token-Ring environments.

The Enterprise Network Solution

IBM Token-Ring Network



"COMMUNICATION THROUGH IBM CONNECTIVITY"

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