IBM Networking Hardware Division

SNA Networking Today

SNA NETWORKING TODAY

CHOICES

CHOICES

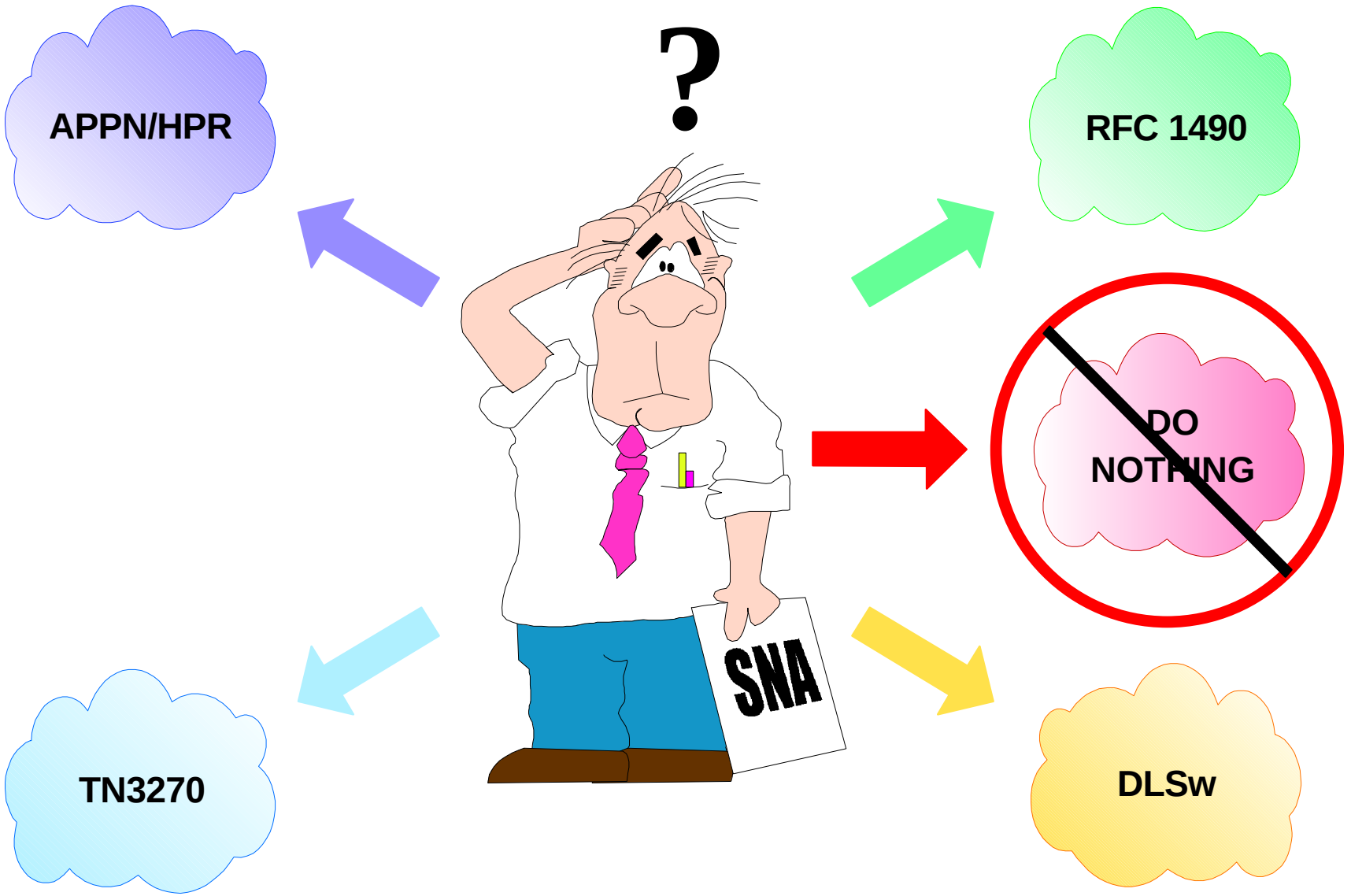
CHOICES

by David L. Travis

Agenda

- The Customer Dilemma
- Motivators and Enablers
- SNA Backbone Transport Option
  - Native
  - Encapsulation
  - Conversion
- Which Choice? - Why?
- Gateway Options
- Network Management
- Addendum - TCP-IP Mainframe Gateway Options

The Customer Dilemma



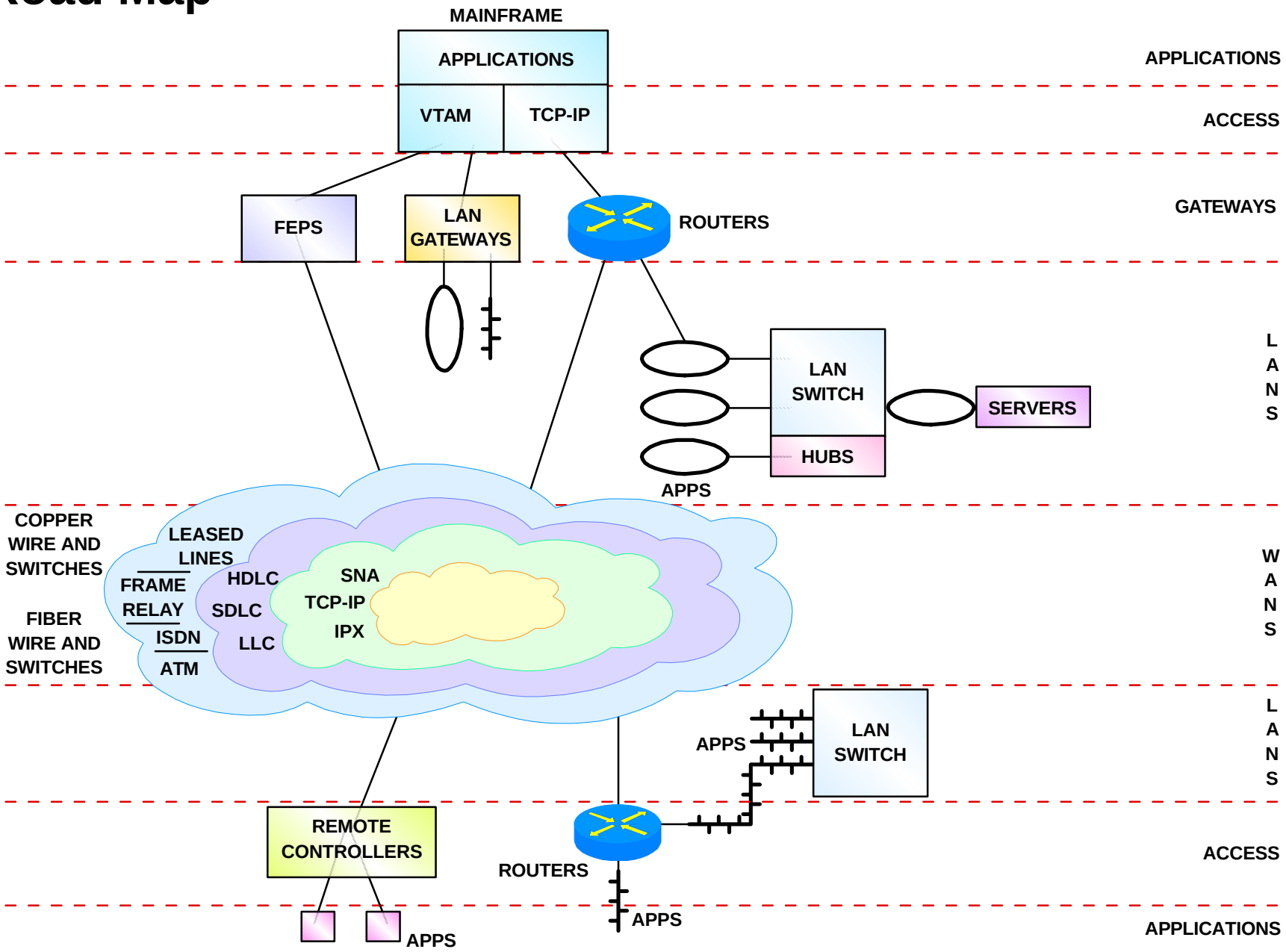
Motivators

- Downsizing
  - Lower Cost Computing
  - Increased Need for Distributed Computing
- Client / Server Application
  - Off the Shelf
  - Faster Development In House
  - Unique Niche Application
- WAN Services
  - Lower Cost Leased Lines
  - ISDN
  - Frame Relay
  - ATM

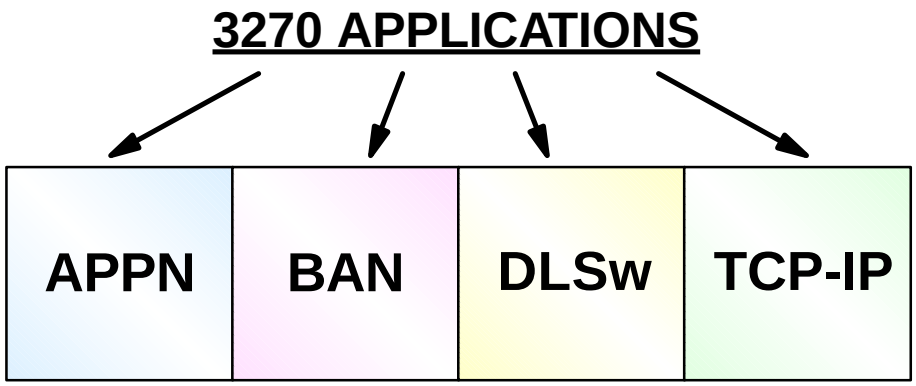
Migration Enablers

- APPN / HPR
- Data Link Switching
- RFC 1490 BAN / BNN
- Lower WAN Costs (Frame Relay, ISDN)
- More Mainframe Gateway Options
  - 3745
  - 3746 w/Nways 900
  - Nways 950
  - 2216
  - 3172
  - Others

Big Road Map



Applications Drive Networks



3270

LU/PU **TN3270**

- Applications Play A Key Role In Network Design Options
- Application Influencers
- Backbone Network Strategy
- End System Choices
  - 3270
  - APPC
  - TN3270

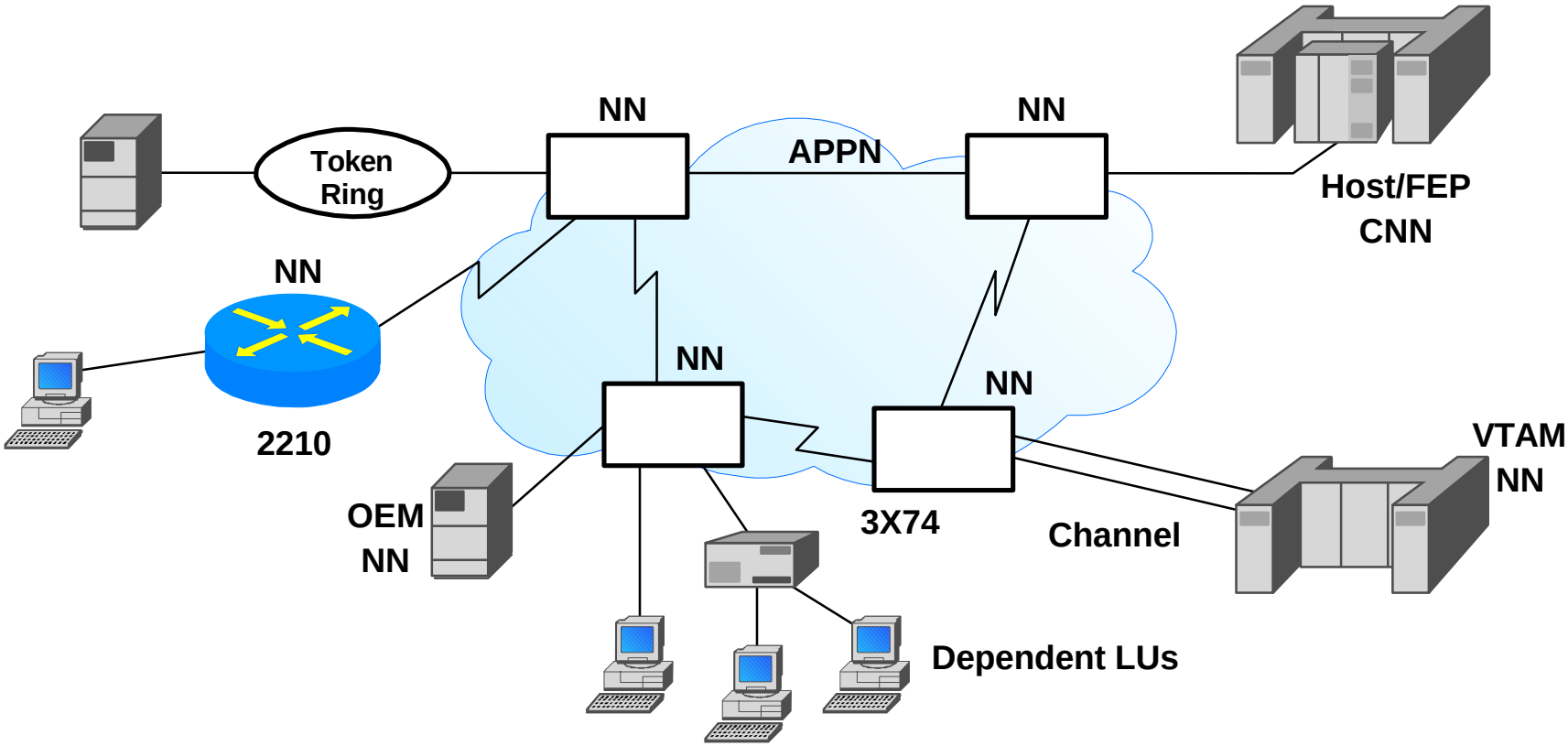
Three Backbone Options

- Native
  - APPN/HPR
- Encapsulation
  - RFC 1490 BAN
  - Data Link Switching
- Conversion
  - TN3270

APPN

HPR

What APPN Offers

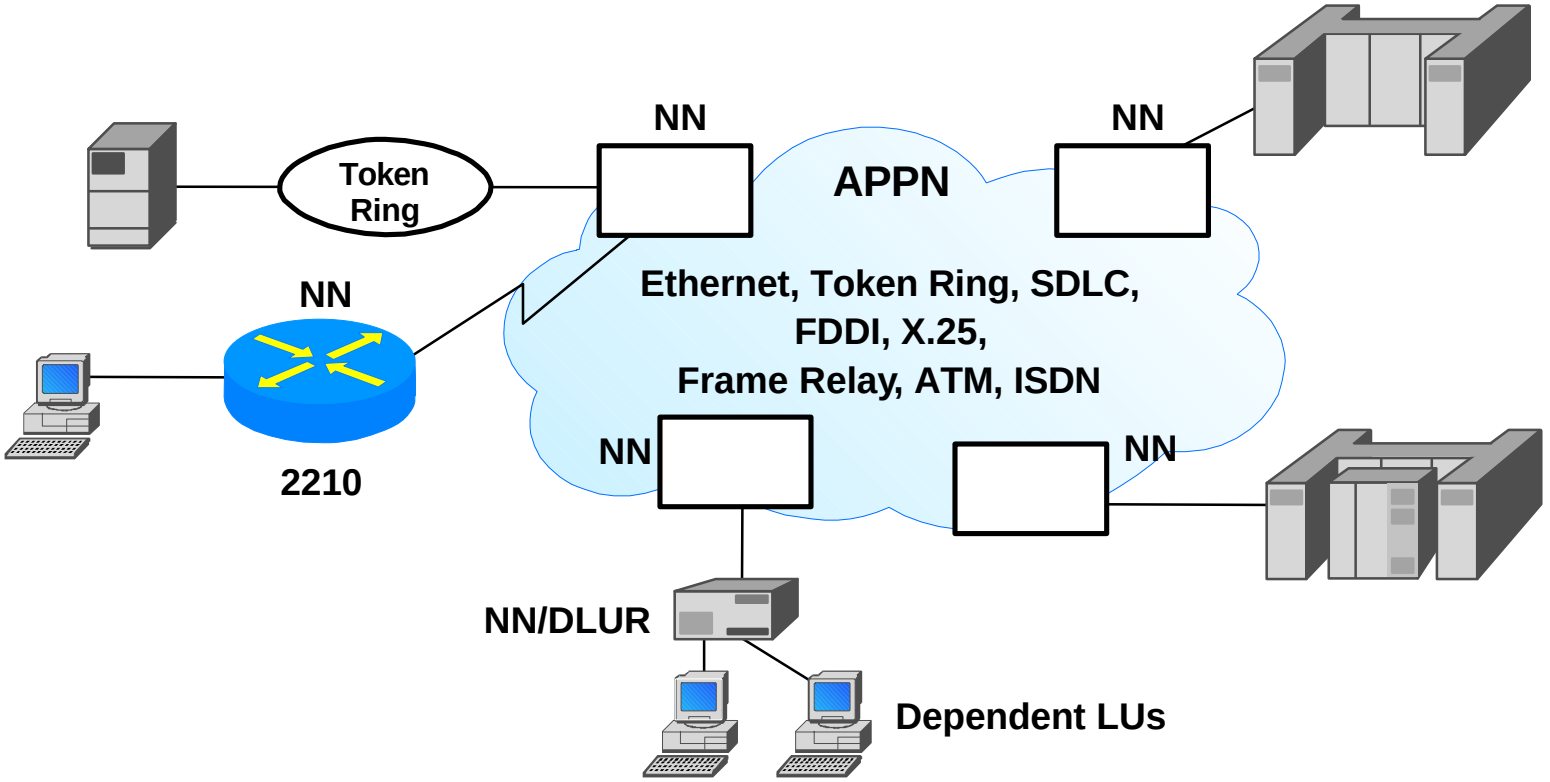


- Dynamic Directory and Routing
- Class of Service to the Branch Office
- Intermediate Session Routing

APPN Benefits

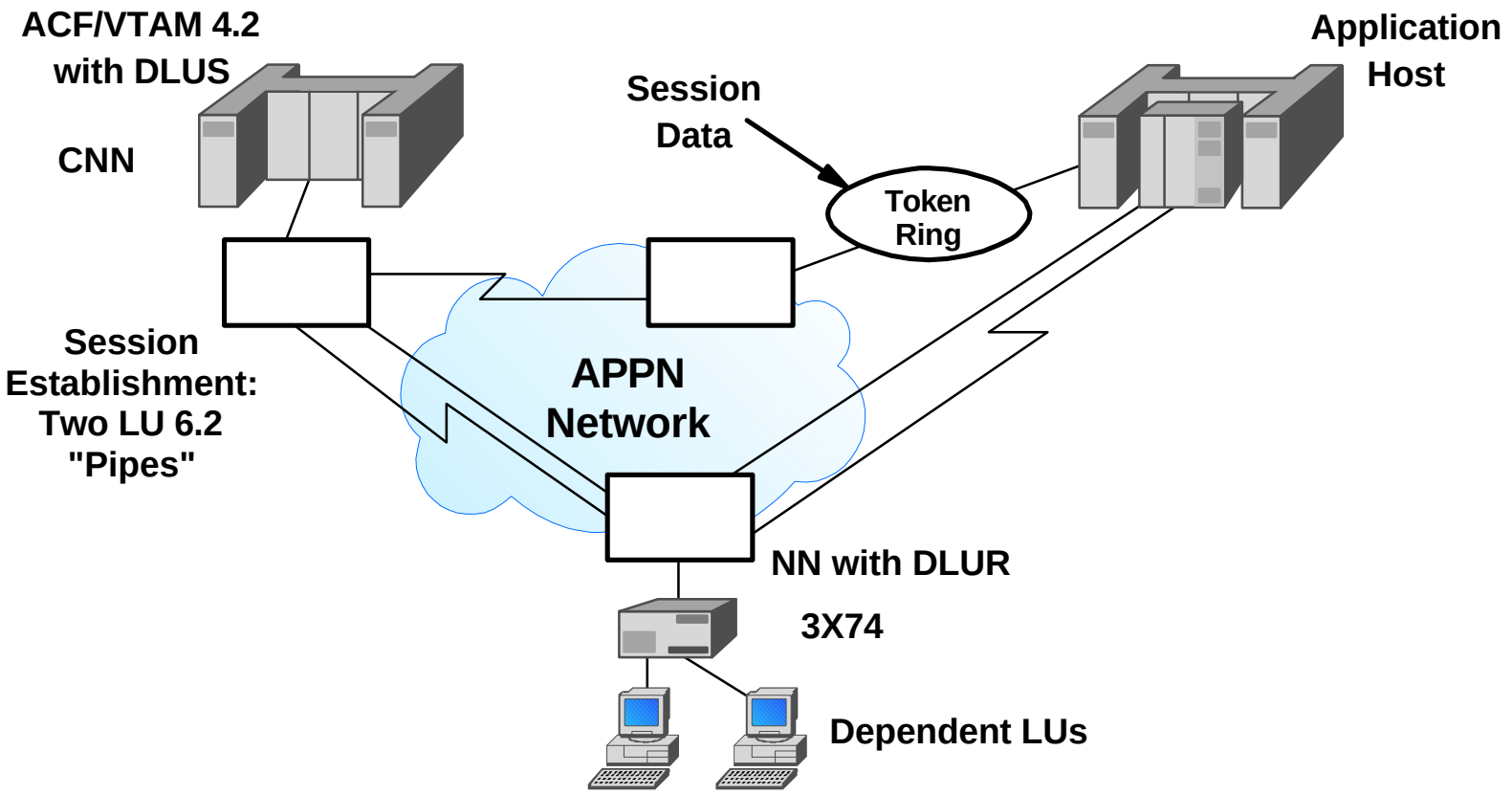
- Supports Multiple SNA Data Centers
- Minimal Overhead
- Flexible WAN Support
- Class of Service to the Branch

APPN Features



- SNA Routing Between Hosts/Data Centers
- SNA COS End to End
- Support for APPC and 3270 Applications

APPN Dependent LU Support



- Dependent LU Requester
  - APPN Support For Legacy Applications
  - Native SNA Routing and COS
  - No End-System Upgrades

IBM Products Supporting APPN/HPR

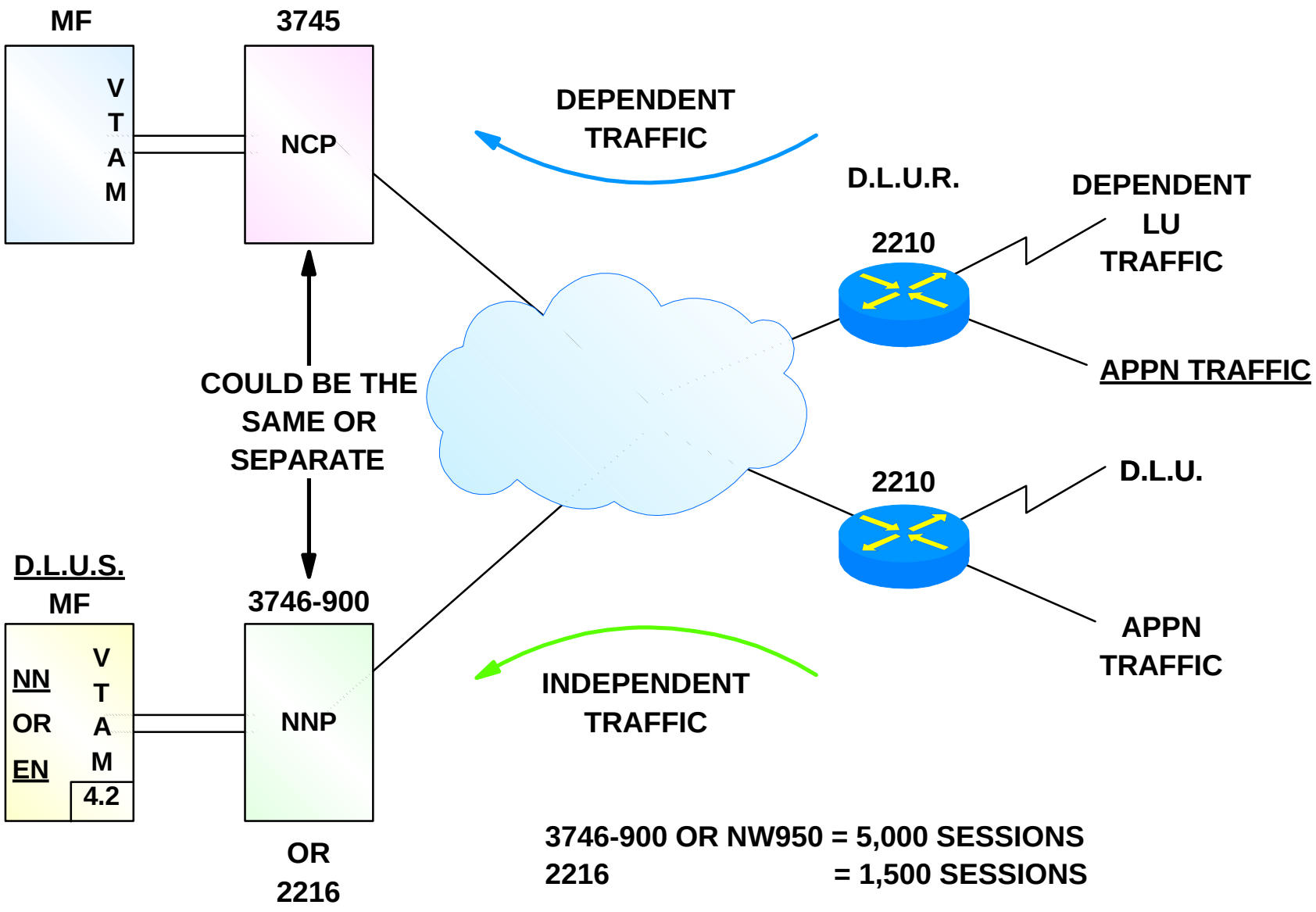
- VTAM
- 374X FEPS with N.N.P.
- 3174
- 2210
- 2216
- 2217
- PC's Defined as End Node (EN) or Network Node (NN)
- AS400

  etc.

  etc.

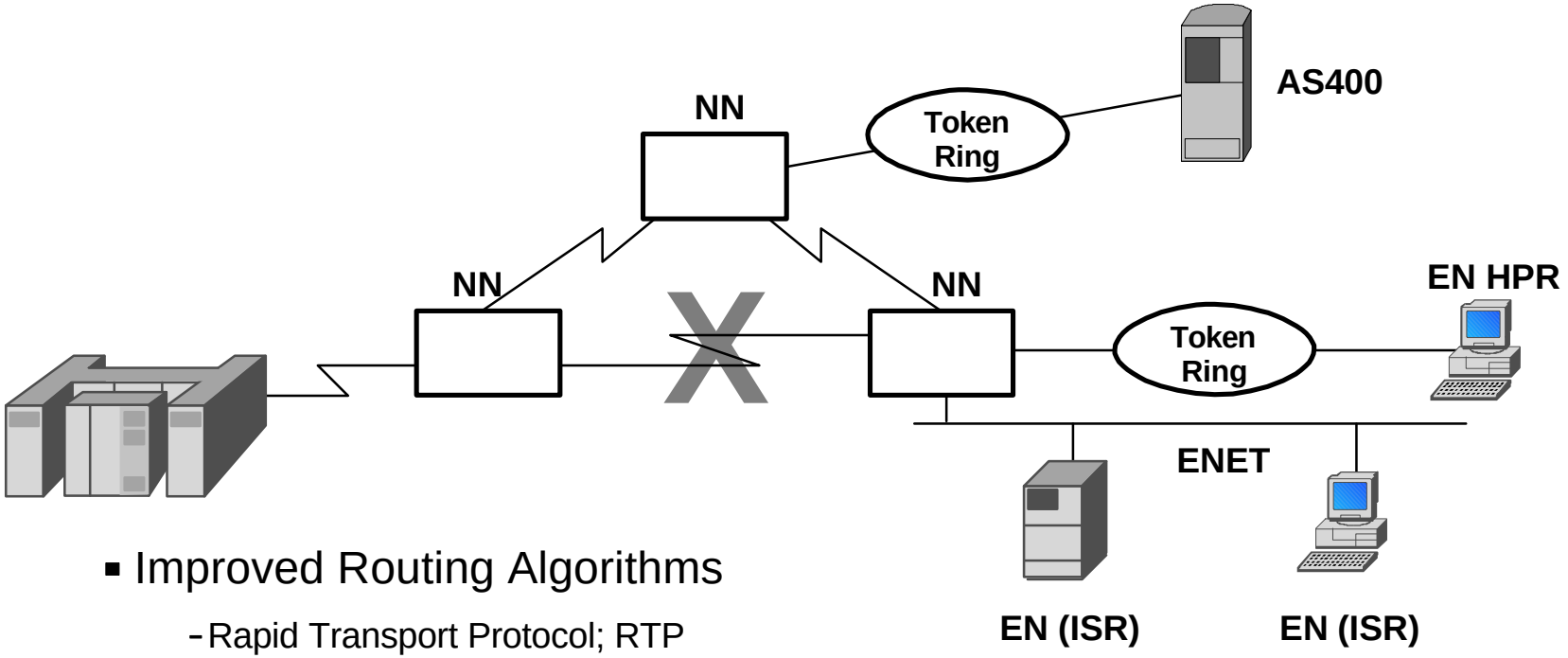
  etc.

APPN/HPR Network



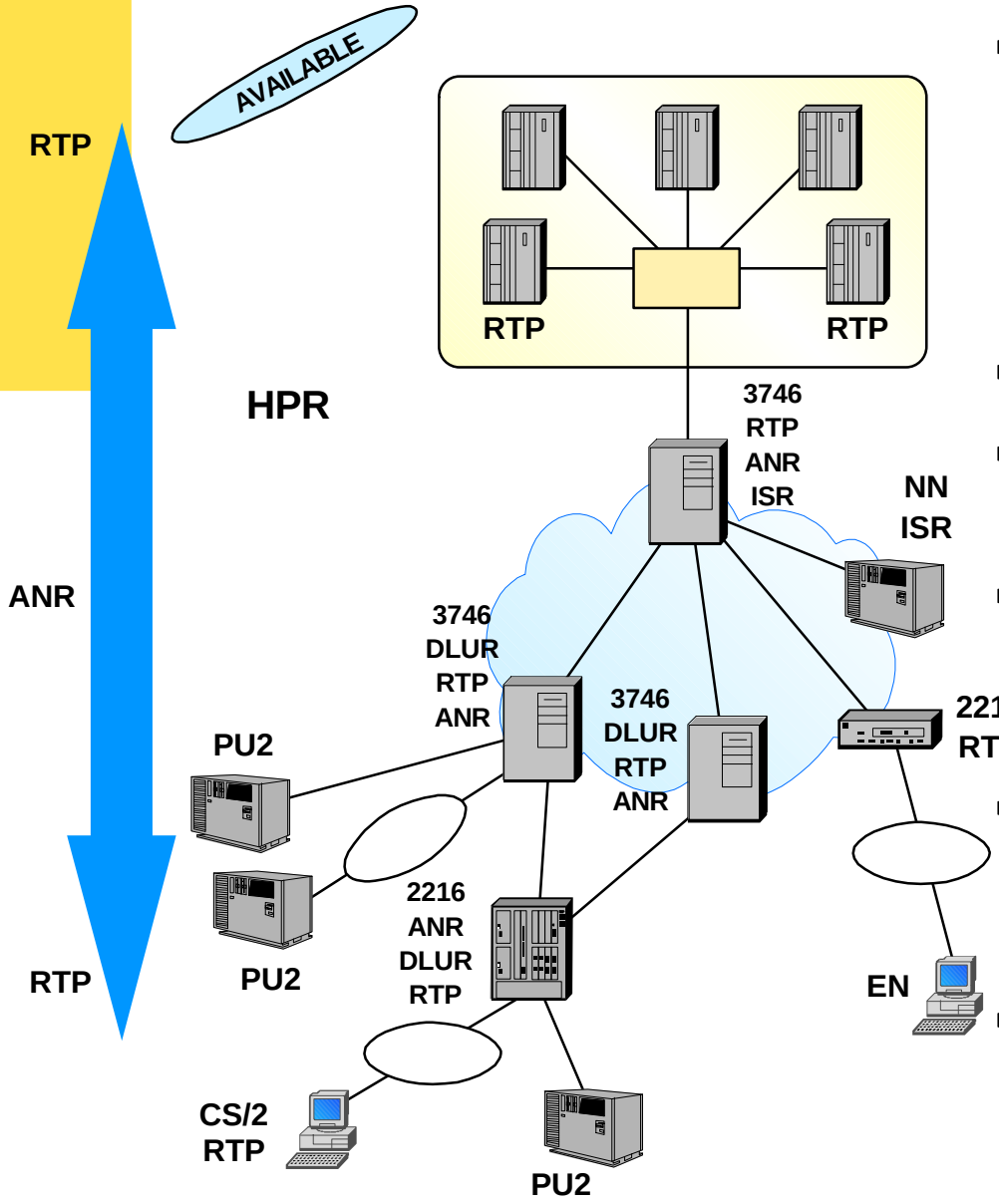
3746-900 OR NW950 = 5,000 SESSIONS
2216 = 1,500 SESSIONS

APPN High-Performance Routing (HPR)



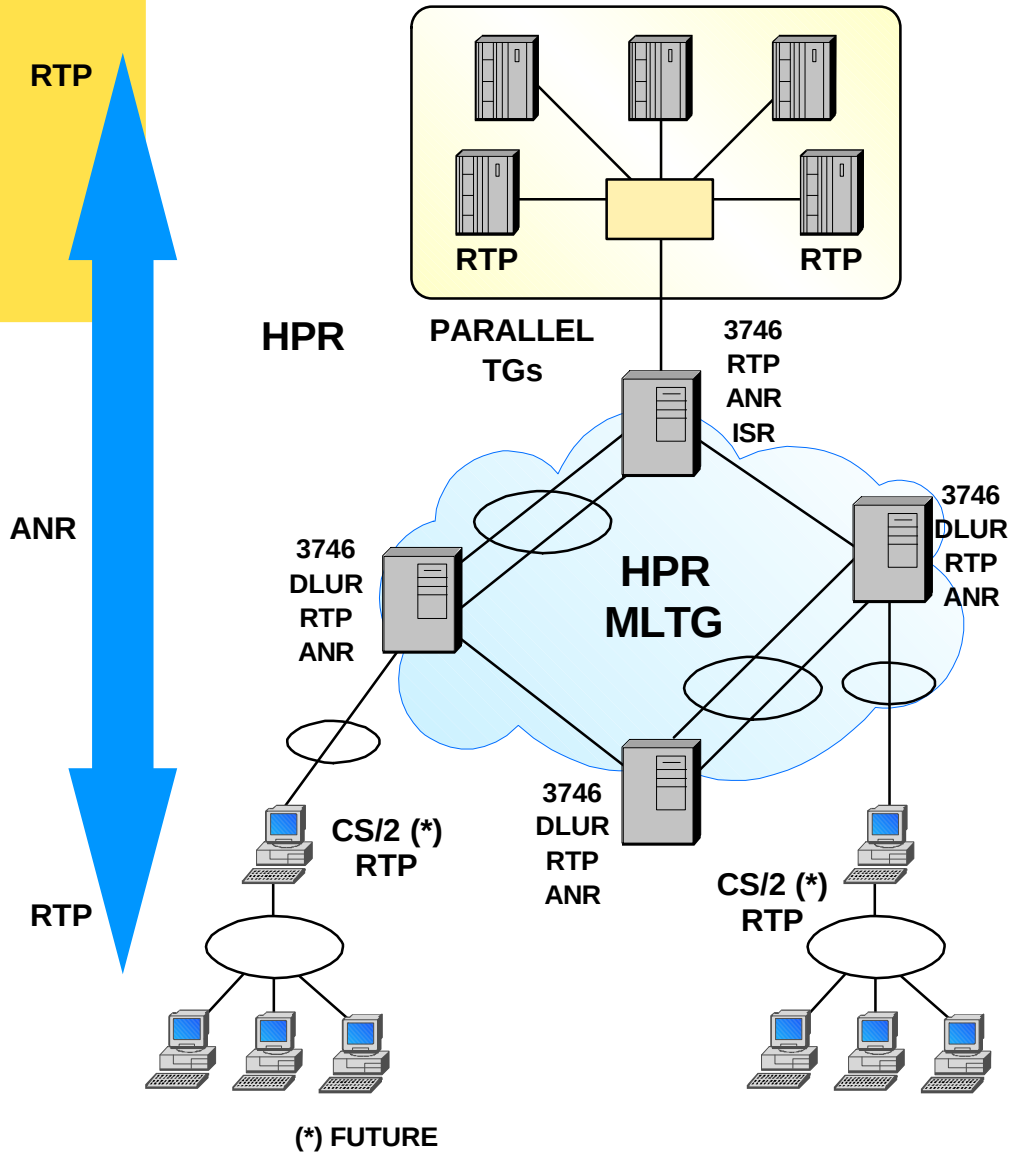
- Improved Routing Algorithms
  - Rapid Transport Protocol; RTP
  - End-to-End Processing
  - Automatic Network Routing: ANR
  - Node-to-Node Routing
- Enhanced Performance
- Non-Disruptive Rerouting Around Failed Links
- Adaptive Rate-Based Flow Control

IBM - HPR (100% Availability Solution)



- Network Availability
  - 24x7x365
  - HPR End to End Non-Disruptive Session Switching
  - Full APPN Dynamics for Routing
- DLUR Support for Non-APPN Nodes
- APPN Support (ISR) for Non-HPR Nodes
- Automatic Network Routing (ANR)
  - Fast Routing: x3 (vs APPN)
  - Unlimited Number of ANR Sessions
- Rapid Transport Protocol (RTP)
  - HPR Pipe for: Dependent PUs, APPN Nodes
  - End-to-End Error Recovery
- Adaptive Rate Based (ARB)
  - Network Congestion Control (End-to-End)
  - Maximizes Link Utilization

IBM 3746 - HPR MultiLink Transmission Group

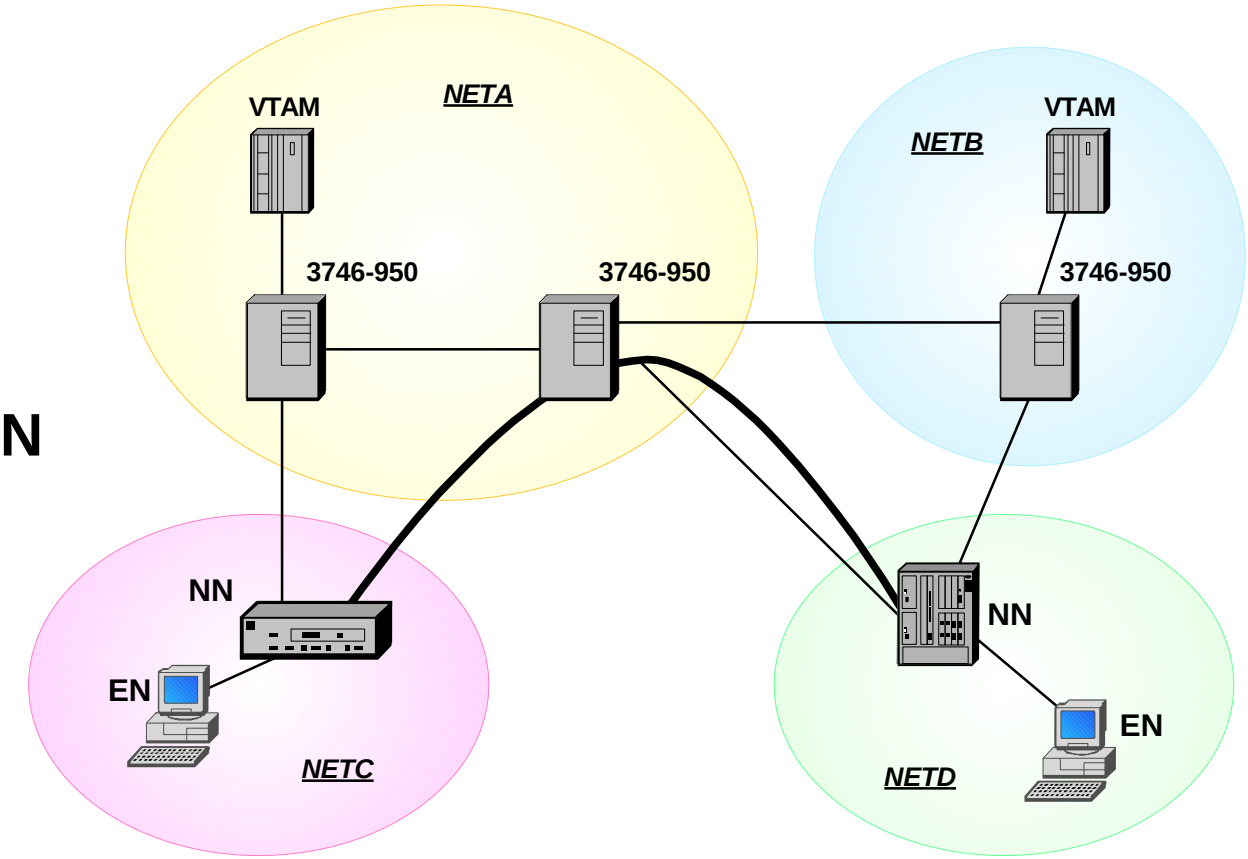


- Higher Bandwidth
  - Multiple Physical Links = 1 Single Logical Link (MLTG)
- Increased Bandwidth Per Session
  - Packets Distributed Over Multiple Links
- Additional Bandwidth On Demand
  - Dynamic Adding/Deleting (Switched) Links
- Load Balancing
  - Weighting Mechanism Between Links of Different Speed
- Data Resequencing by RTP End Points
  - Use of MLTG Indicator
- Topology Database Update (TDU)
  - When Individual TG Add / Delete
  - To Change MLTG Characteristics
- MLTG On SDLC, FR, X.25, TR/Ethernet
  - Parallel TGs on ESCON Channels

IBM 3746 - Extended Border Node

PREVIEW

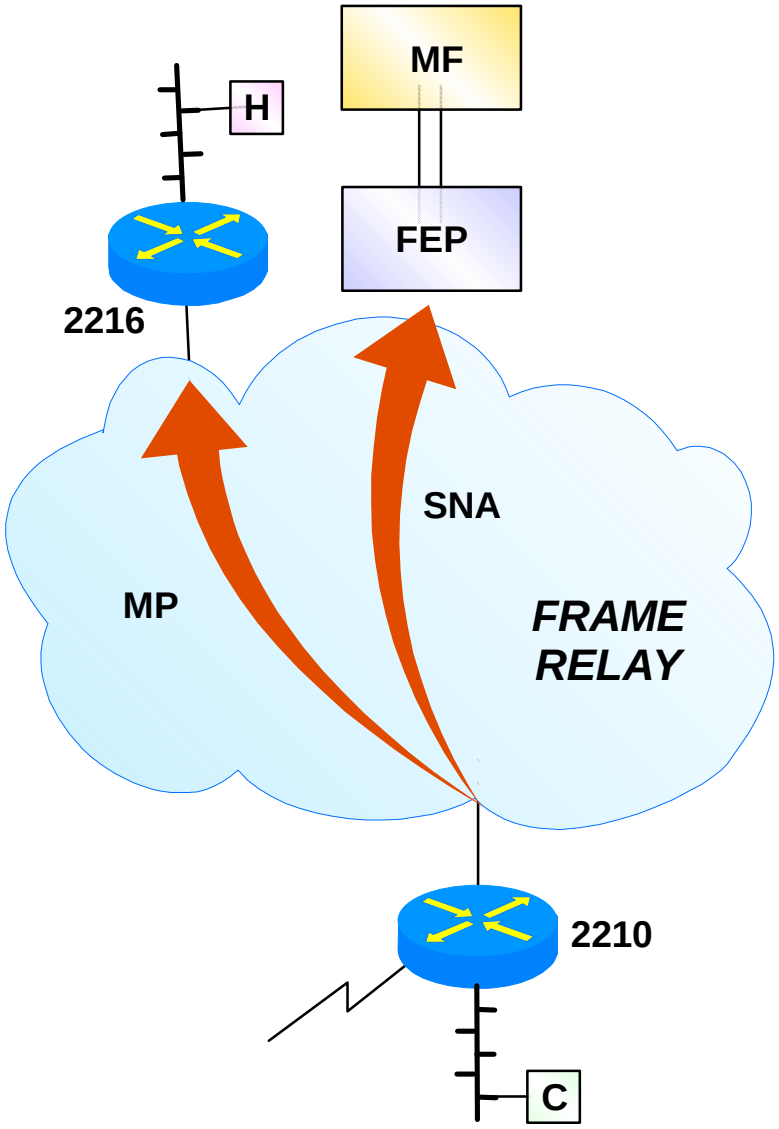
EBN



- Link Different APPN Domains
- Allow SNA Environment Migration
- Allow Multiple SNA Domains Migration
  - SNI
- Offload VTAM Cycles
  - EBN Offloaded From VTAM
- Tremendous APPN Scalability Improvement

FRAME RELAY

Frame Relay Using RFC 1490



- Converts LAN and SDLC to RFC 1490 Frame Relay Format
- Boundary Access Node (BAN)
- Bounds Network Node (BNN)
  - Requires SAP Multiplexing (More Load on the Router)

IBM Products Supporting RFC 1490

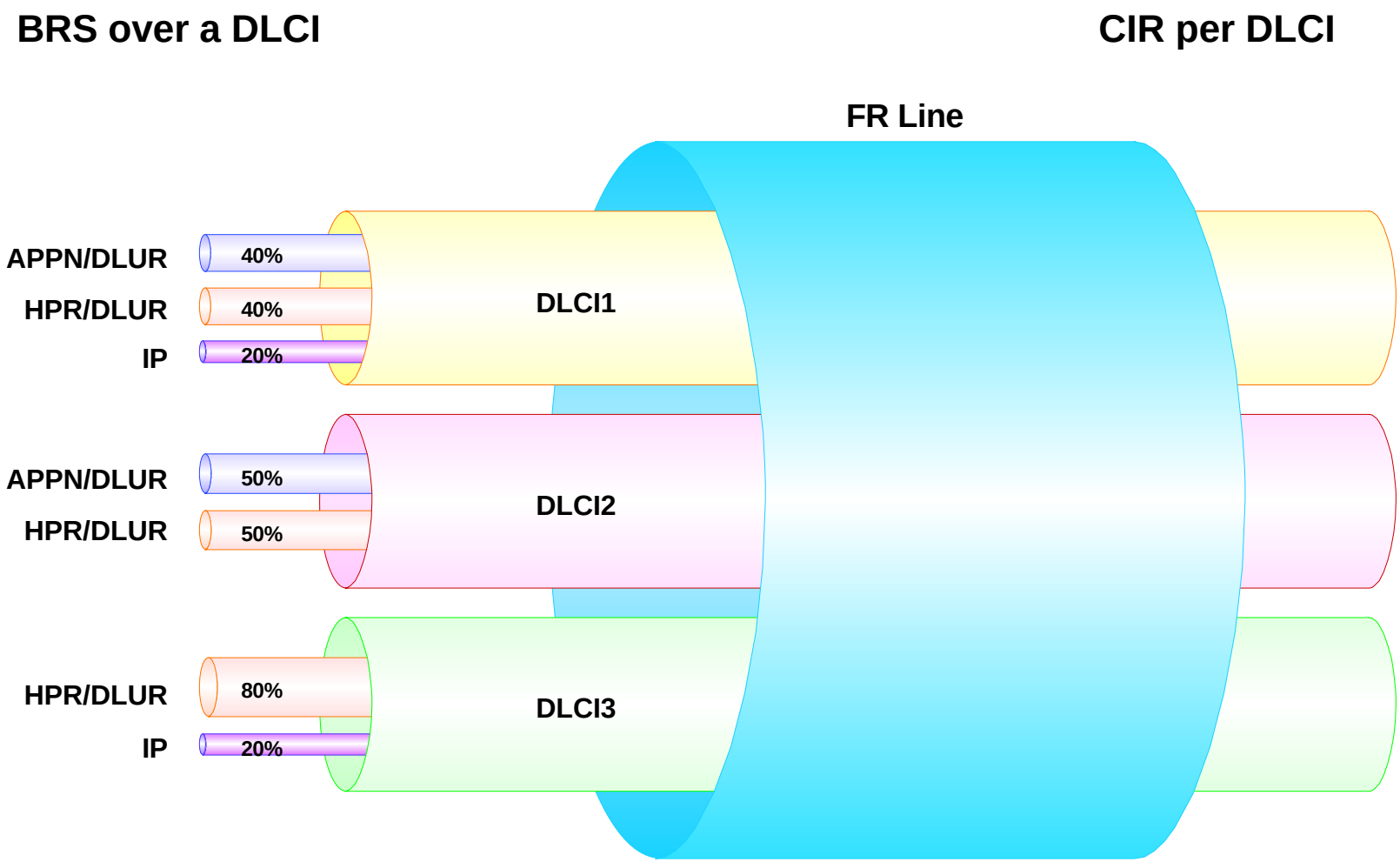
- RFC 1490 Compliant
  - SNA/DLUR, APPN, IP, HPR
  - Multiple Downstream PUs Per DLCI
  - Single or Multiple Protocols Per DLCI
  - FR-BAN For 2210, 2218, 2216
  - FR-BNN For 2217, 3174, 2216
  - FR-BAN For Remote 37xx (INN)

IBM 3746 - Frame Relay (CIR+)

Frame Relay Bandwidth Management
Frame Relay Best of Breed
Optimization

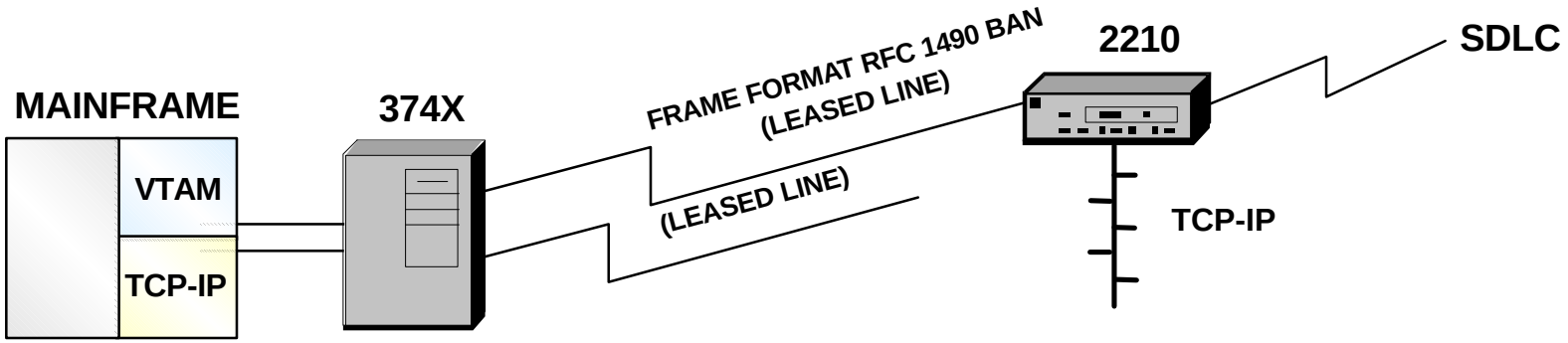
- Bandwidth Reservation System
  - DLCI Optimization
  - Reserver Percentage of Bandwidth
  - At Protocol Level
    - DLUR/APPN
    - HPR
    - IP
  - At IP Application Level
    - UDP
  - Common BRS With IBM 2210, IBM 2216
- Committed Information Rate
  - FR Trunk Optimization
  - Reserve Percentage of Bandwidth
  - Used Only in Case of Congestion

IBM 3746 - Frame Relay CIR+

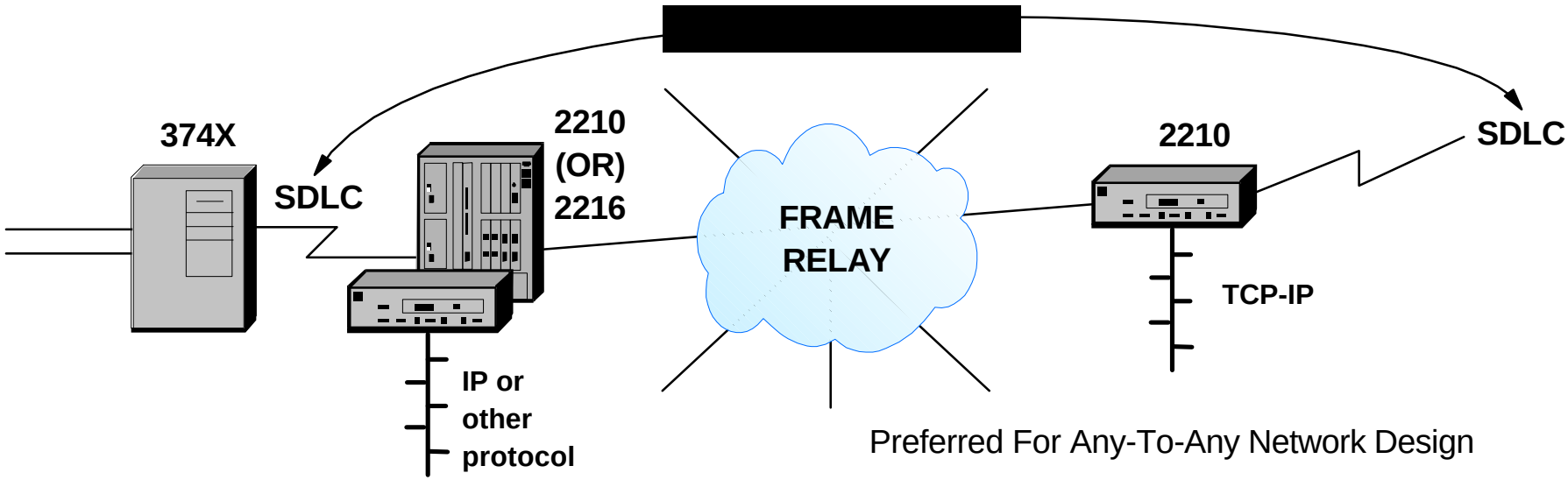


Other Frame Relay Options

1.) Running Frame Relay Format on SDLC Leased Lines



2.) Data Link Switching Over Frame Relay (No BAN or BNN)



Preferred For Any-To-Any Network Design

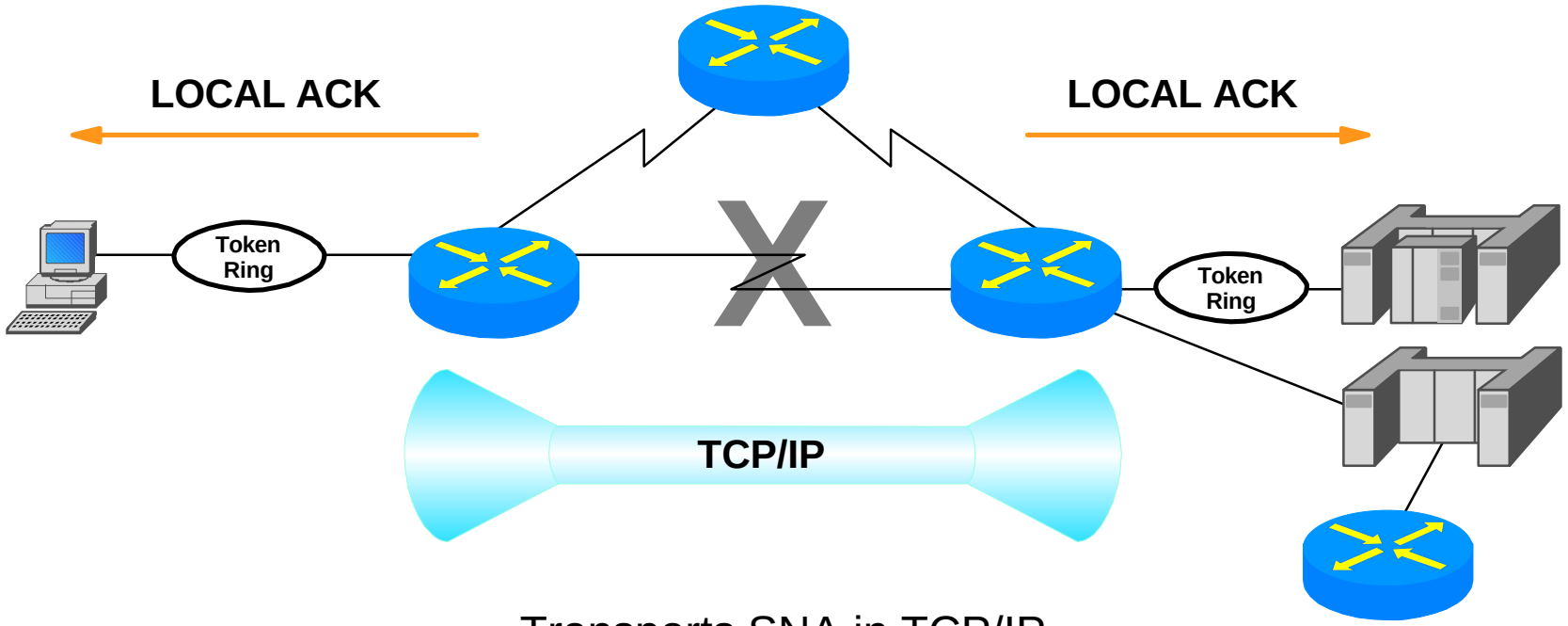
RFC 1490 Benefits And Considerations

- Benefits
  - Standards Based
  - Minimum Overhead
  - Supported Directly By FEP/NCP
  - Supported By Many IBM Communication Products
  - Data Center Partitioning
- Considerations
  - This Is Frame Relay **-ONLY-**
  - Required Specific Level NCP

DATA-LINK SWITCHING

DLSw

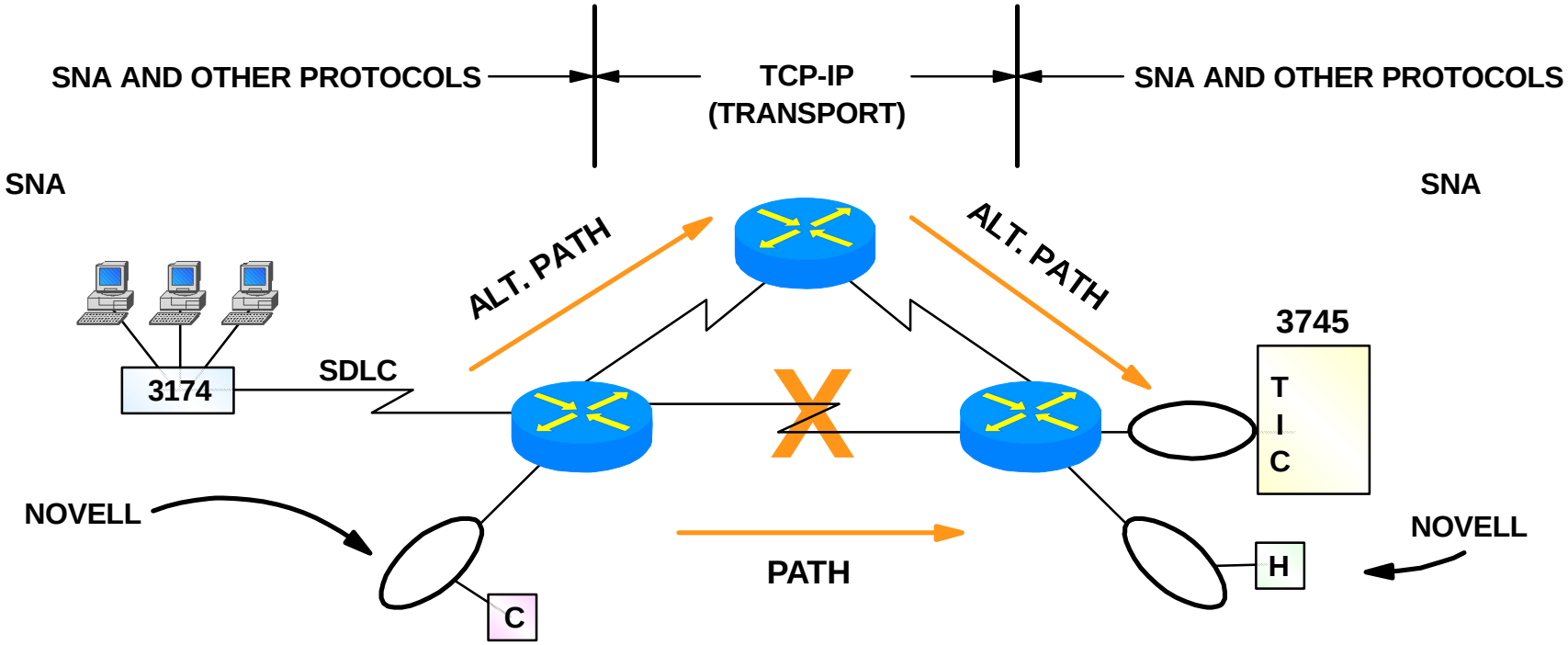
DLSw - RFC 1795



- Transports SNA in TCP/IP
- Locally Terminates Data Links
- Dynamically Finds SNA and NetBIOS Resources

Benefits Of Data Link Switching

- Resolves Some Architectural Limitations of SRB (Source Route Bridging)
- Transports Multiprotocol
- Dynamically Routes Around Failed Lines
- Standards Based RFC 1795
- Supports LLC2 and SDLC
- Supports All LANS and WANS

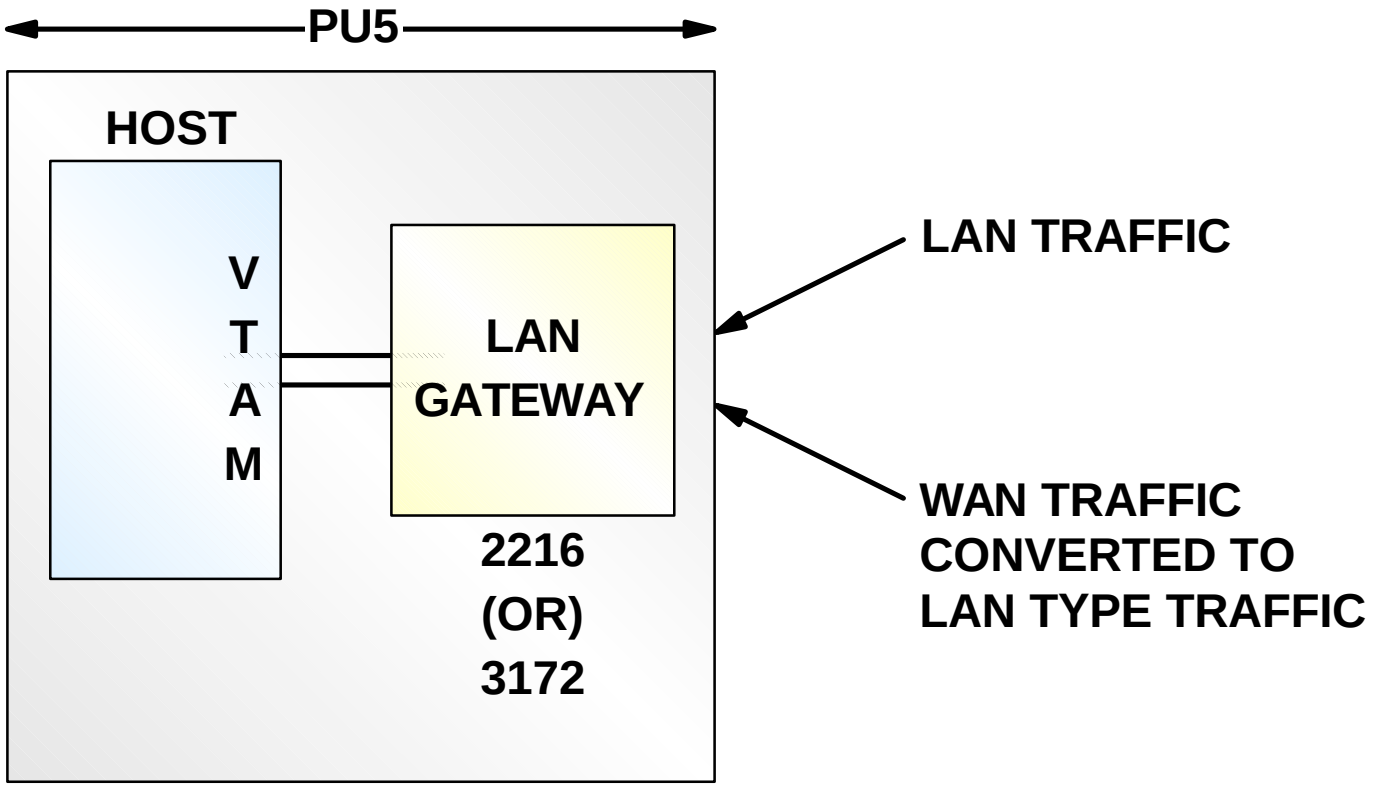


Data Link Switching - Key Features

- SDLC Tunneled in TCP-IP
- SDLC Conversion to LLC2
- LLC2 Tunneled in TCP-IP
- Bridging Features
  - TB (Transparent Bridging)
  - SRB (Source Route Bridging)
  - SRT (Source Route Transparent Bridging)
- SDLC and LLC2 Local Acknowledgments
- Dial Back-up

X.C.A. (External Channel Adapter)

ESTABLISHED IN VTAM RELEASE 3.4.1.



Note:
This is also known as "SNA Pass Thru".

DEVICES CONFIGURED IN VTAM AS SWITCHED MAJOR NODE.

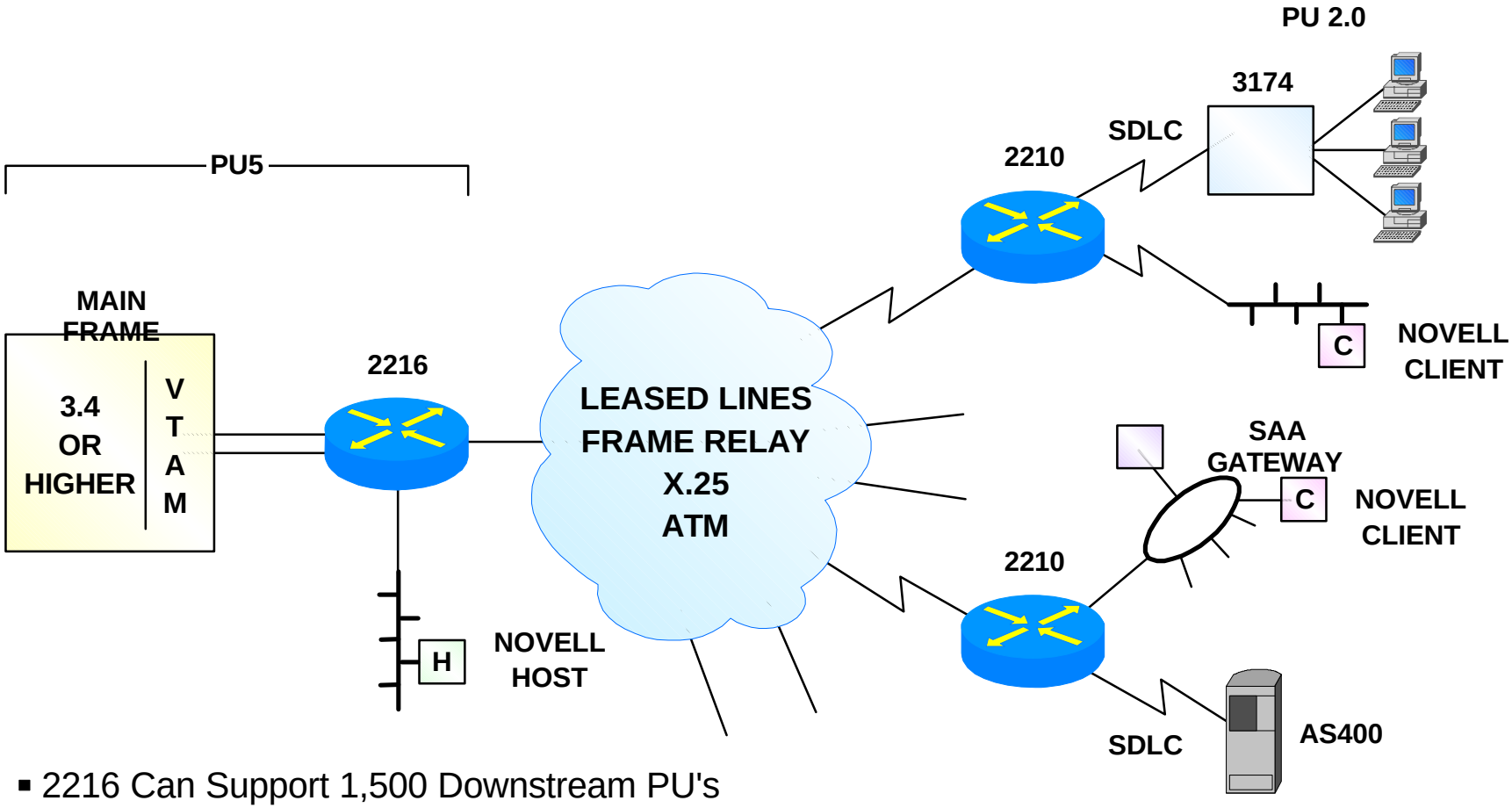
IBM Products Supporting Common Routing Code

- 2210 (All Models)
- 2216
- 6611 (All Models)

Supports DLSw Version 2.0

- 8260 (MSS Blade in 8260)
- 8210 (MSS) Multiprotocol Switching Services

2216 / 2210 (DLS With XCA)



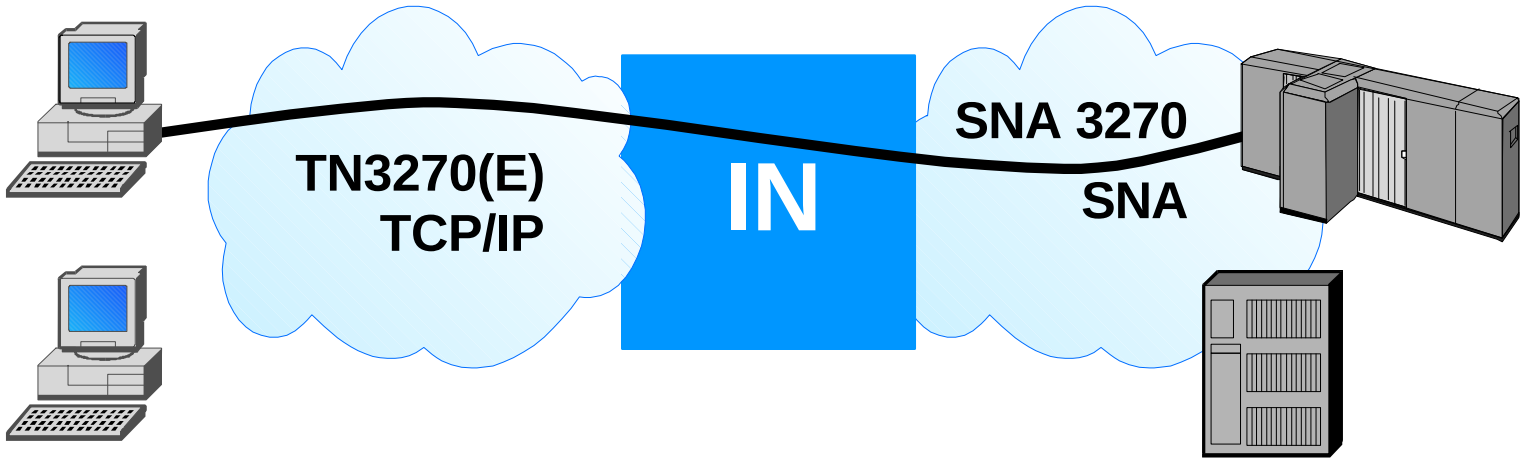
- 2216 Can Support 1,500 Downstream PU's
- SNA Routing Done by VTAM
- Other Routing Protocols Done by Routers
- No NCP Required
- PU Defined in VTAM as Switched Major Node (Limiting VTAM Gens)

DLSw Benefits

Benefits	Considerations
Nondisruptive Rerouting around Link Failures	Higher Per-Frame Overhead
Dynamic Search With Minimal Broadcasts	No Native SNA Routing/COS
Any WAN Media	

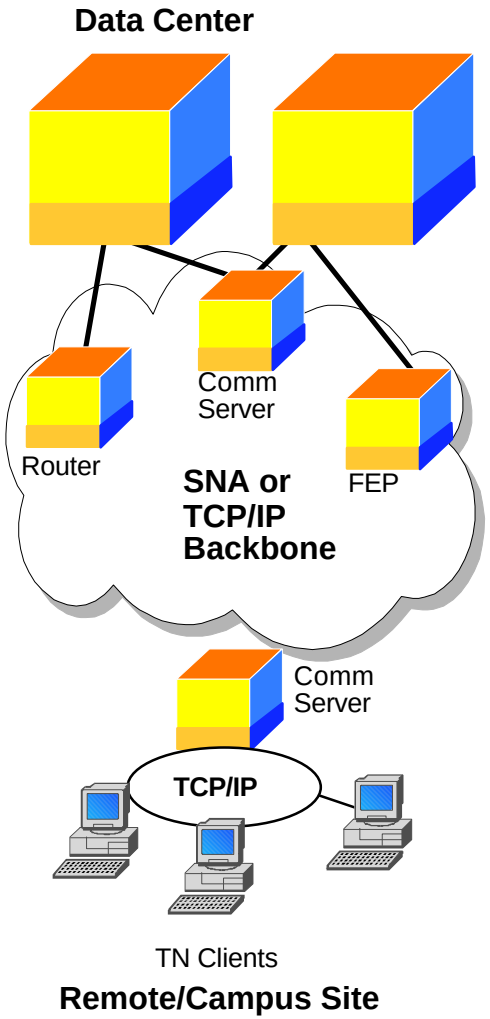
TN 3270

What Is A Telnet Server?



- Gateway That Enables Clients and Workstations on a TCP/IP Network to Access Applications in an SNA Network
  - 3270 Applications on a Mainframe in an SNA Network
  - 5250 Applications on an AS/400 System in a Peer-to-Peer Network
- Provides TCP/IP to SNA Protocol Conversion for SNA 3270 and 5250

Where can a TN Server be?



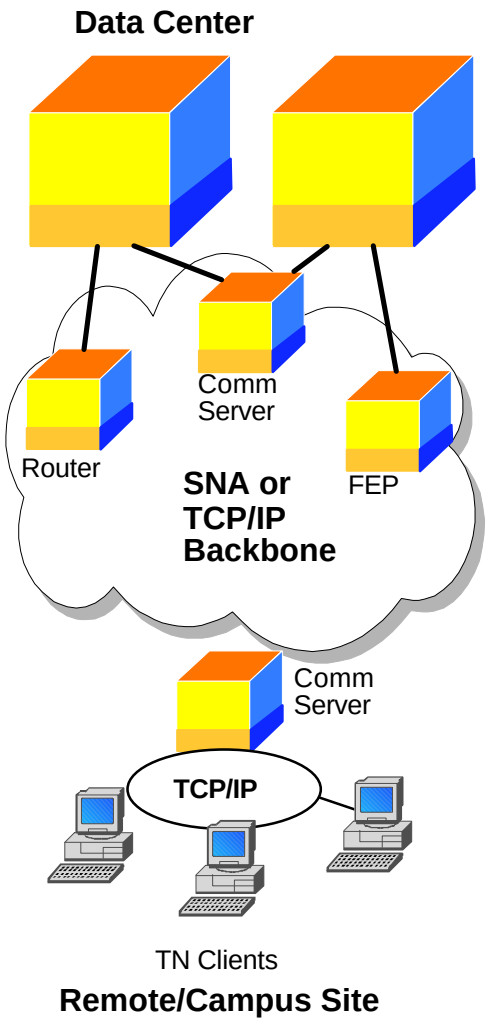
Data Center:

- On-board mainframe gateway
- Channel Attached Communications Server gateway
- Channel-attached gateway or router

Remote Site:

- Remote Communications Server gateway

The Total TN Server Solutions Available from IBM



TCP/IP for Mainframe:

- TCP/IP for MVS
- TCP/IP for VM
- CS for OS/390
- CS for MVS/ESA

...where you want it!

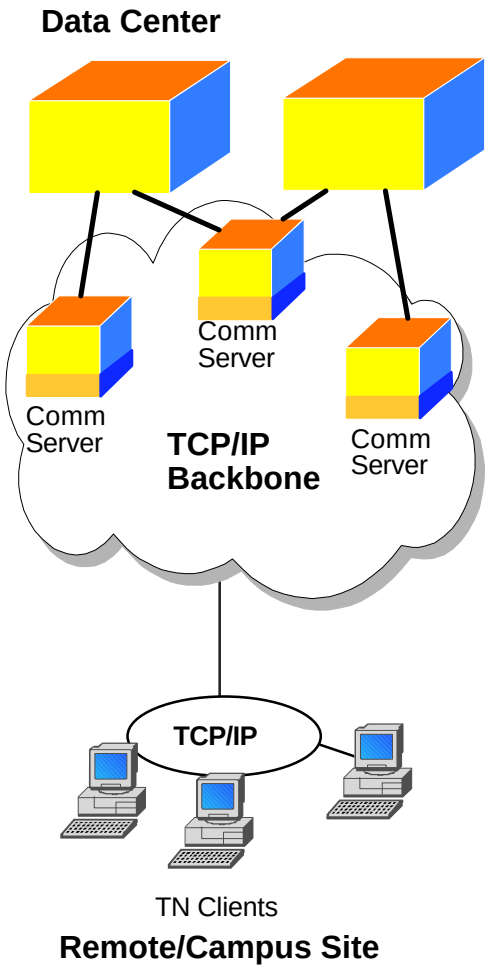
TN Server:

- TCP/IP for Mainframe
- CS for AIX with SNA Client Access
- CS for NT
- CS for OS/2 Warp
- NetWare for SAA
- Previewed:
  - 2216
  - 3746 900/950

Emulation:

- Host On-Demand
- Personal Communications
- Other TN3270 Clients

Data Center: Comm Server Gateway options



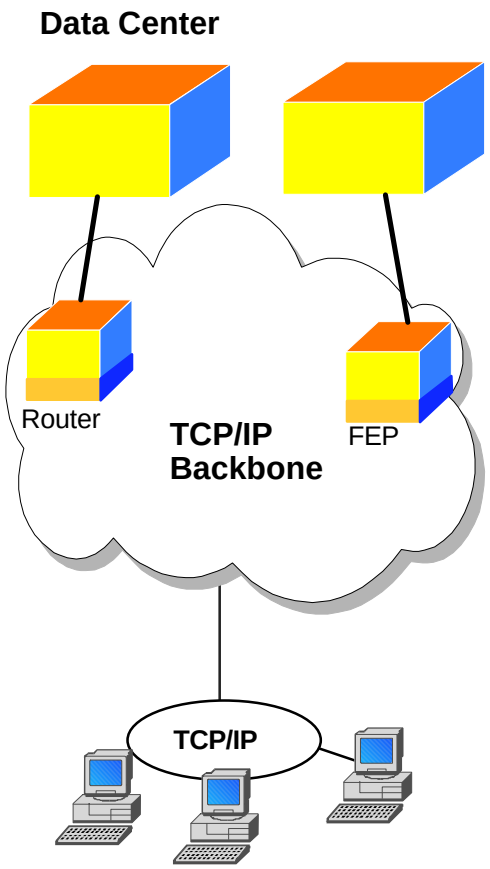
TN Server:

- CS for AIX with SNA Client Access
- CS for NT
- NetWare for SAA

Influencers:

- + Host CPU workload reduction
- + TN3270E support
- + Enterprise gateway to S/390 and AS/400 applications
- + Large number of sessions; Load balancing available on some platforms
- + TCP/IP backbone
- + Higher performance (vs remote)
- – Increased network complexity; multiple TN servers may be necessary

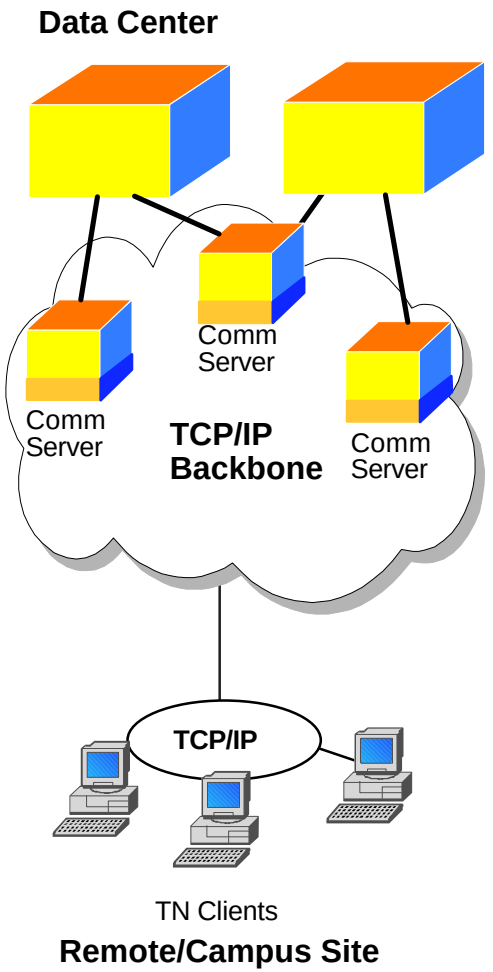
Data Center: Channel-Attached Gateway or Router



TN Server:

- **2216**
- **3746 900/950 (MAE)**

Data Center: Channel Attached Comm Server Gateway



- Influencers:
  - ***CS for AIX with SNA Client Access***
  - + Dynamic Load balancing across multiple servers, supporting tens of thousands of concurrent sessions
  - + Scalability and power for RS/6000 hardware; Single server capable of supporting 10,000+ TN sessions
  - + High availability of SMP hardware
  - + Channel MPC support (2H97 plan)
  - + Response Time Monitoring support
  - + APPN and AnyNet support
  - – TN clients can't utilize APPN network

Strengths of IBM's TN3270 solutions

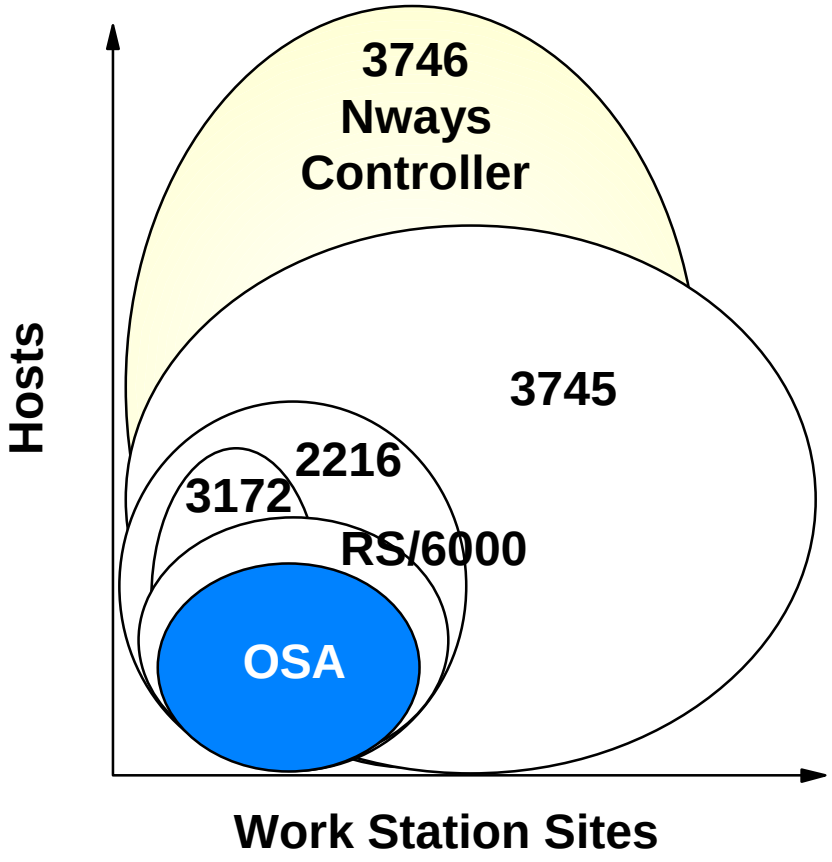
- Total Solution from a single vendor
- Support for MVS, VM and VSE
- Enterprise Gateway Support for S/390s and AS/400s
  - TN Server
  - SNA Gateway
  - Multiprotocol support
- Solution Scalable to Customer needs
- Host On-Demand Java-based emulator supported by all Communications Servers
- Both TCP/IP and SNA backbones supported
- TN Server where you want it
- Multiple platform support

Network Design Factors

	NATIVE	ENCAPSULATION		CONVERSION
	APPN	**RFC 1490 BAN**	**DLSw+**	**TN3270**
Client	SNA	SNA	SNA	TCP/IP
SNA Application Support	All	All	All	3270 Only
NetBIOS Support	No	No	Yes	No
WAN Options	Most	Frame Relay-Only	Most	Most
SNA Session Routing	Yes	No	No	Between Mainframes
Traffic Prioritization	COS	BRS	BRS	BRS
Other Issues			Encapsulation Overhead	End-to-End SNA Visibility
Environment	Predominantly SNA	Maintain FEPs with Frame Relay	Multiprotocol	Predominantly TCP/IP

IBM GATEWAY OPTIONS

S/390 Server Access Options from IBM



Protocols Supported

- **TCP/IP**
- **SNA, APPN, HPR**

Channel Protocols

- **CDLC, LSA, LCS, MPC**

S/390 Cycles

Throughput/Capacity

Connectivity

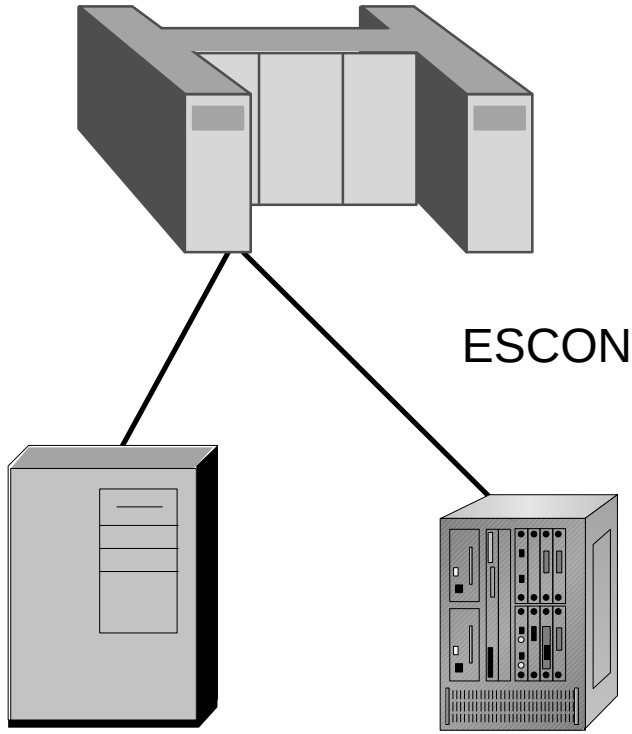
Scalability

Investment Protection

Network Management

Cost of Ownership

S/390 Server Channel Attach Directions



- Access to VTAM and TCP/IP Host Apps
  - LANs (TR, EN, 100 EN, FDDI)
  - WANs (FR, PPP, SDLC, X.25, ISDN)
  - ATM (Classical IP or Lane)
- Up to 4 ESCON Channels
- Up to 32 LPARs per Adapter
- SNMP MIB Support
- Channel Protocols
  - MPC+ (Multi-Path Channel)
    Requires ACF/VTAM 4.4 on VM, MVS, VSE
    Supports APPN/HPR (TCP-IP near future)
  - LCS-LAN Channel Station For TCP/IP only
    Up to 16 LAN Appearances per Adapter
    Full Advantage of IP Routing Code (routing algorithms, filtering capabilities, etc.)
  - LSA -Link Services Architecture
    SNA only (SubArea and APPN/ISR)
    Requires VTAM 3.4 on VM, MVS, VSE

The 3746
with NWAYs 900 Switch
and Multi-access Enclosure
is

NOT

your Father's F.E.P.

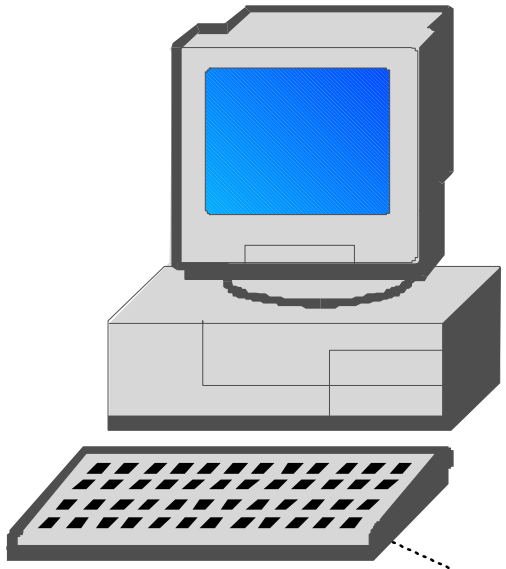
IBM Channel Protocols

CDLC (Channel Data Link Control)
LSA (Link Station Adapter)
LCS (Link Channel Station) - used for TCP/IP
MPC (Multi Path Channel)
MPC+

	VTAM Cycles Used
CDLC	1
LSA	2.5
MPC	1.9
MPC+	0.6

NETWORK MANAGEMENT

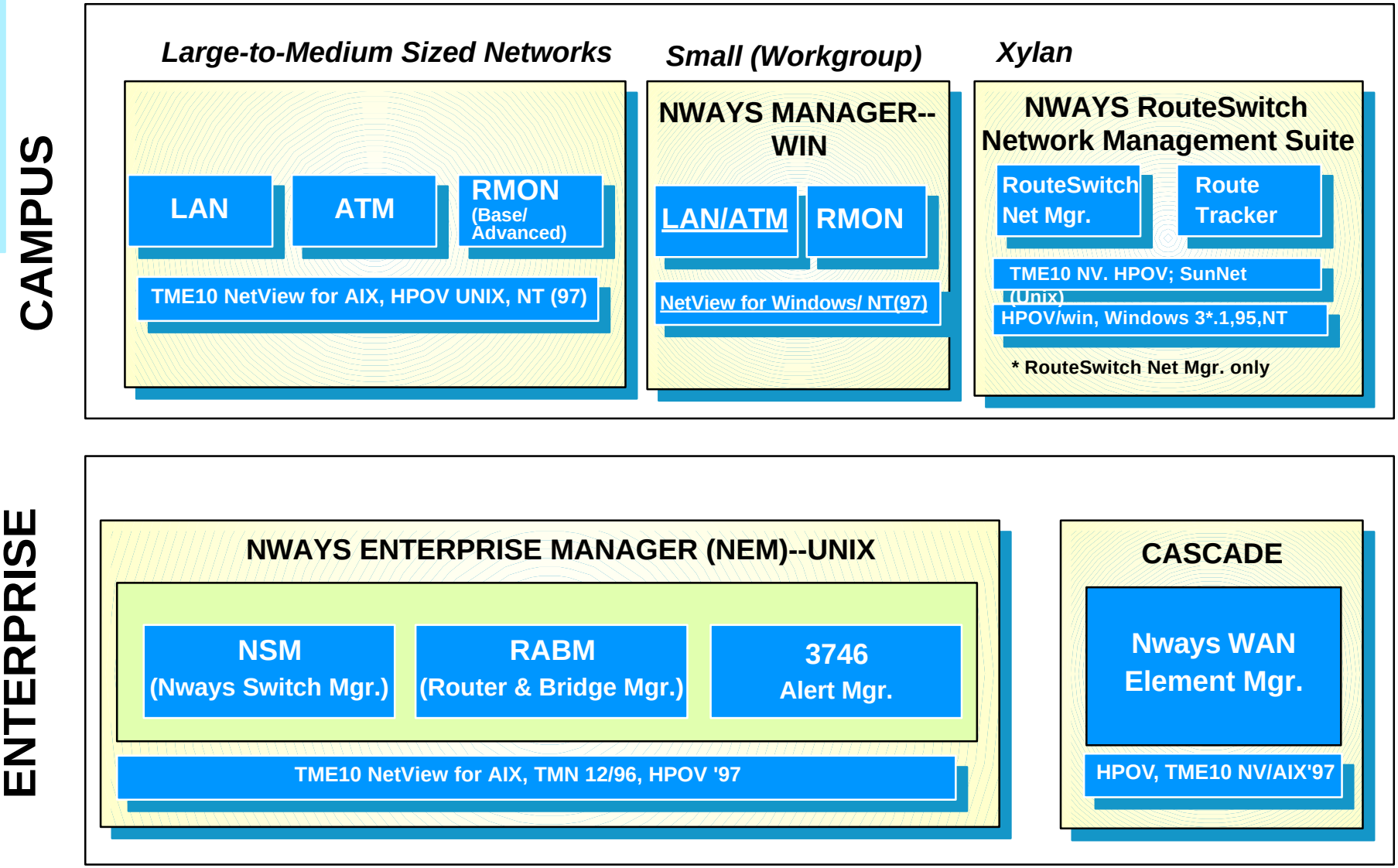
Nways Manager Product Positioning



Network Management Station

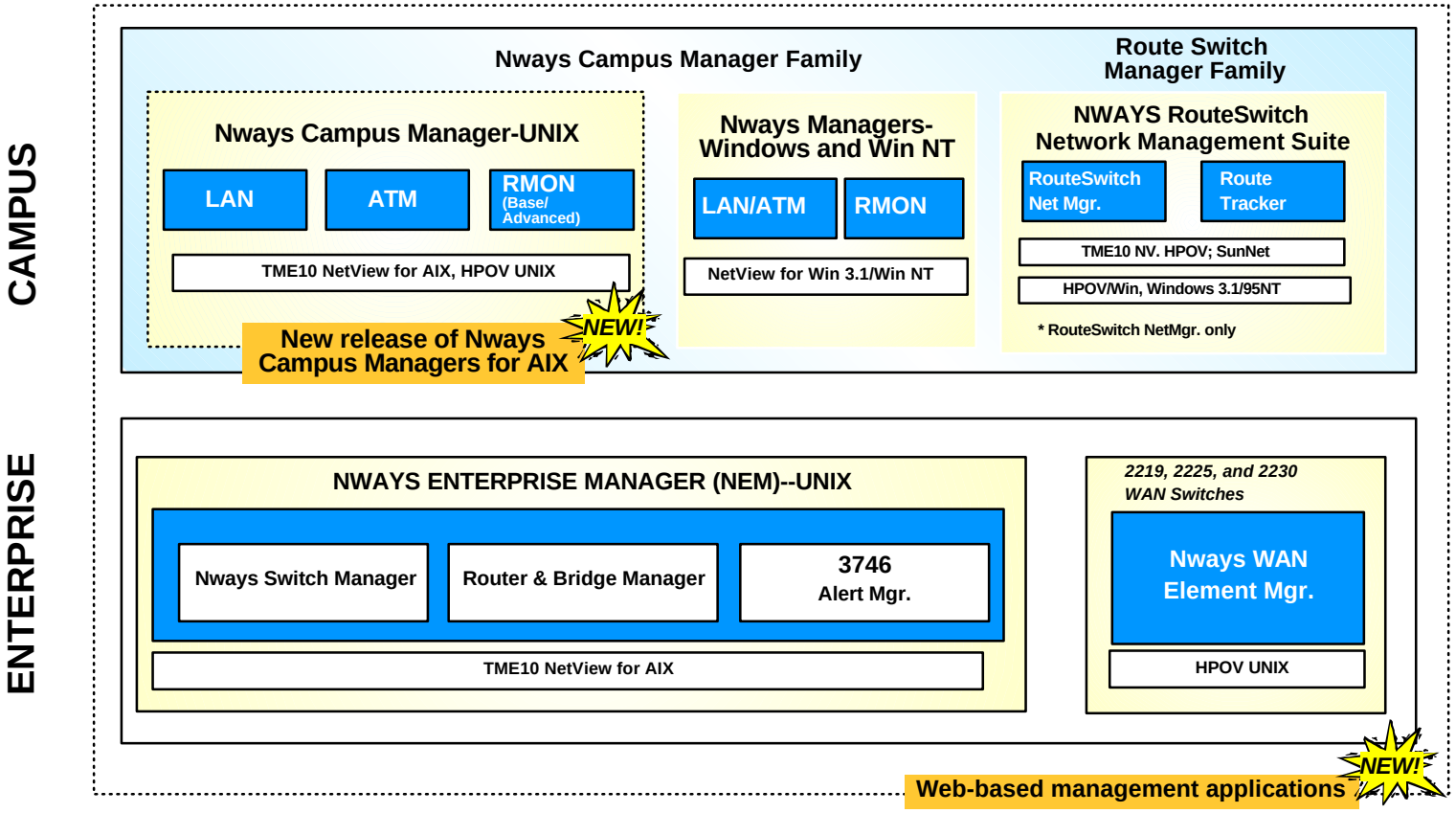
Network Management Applications	**Nways Managers**
Network Management Platforms	**TME 10 NetView, HP OpenView**
Operating Systems	**AIX, HPUX, SunOS, Win3.x/95/NT**
Hardware Platforms	**Risc6000, HP, SUN, PC, ...**

Network Management Products



Nways Manager Previews

- Advanced traffic monitoring will let you make decisions based on a total view of the network and applications
- Web-based management will turn every authorized browser into a management console

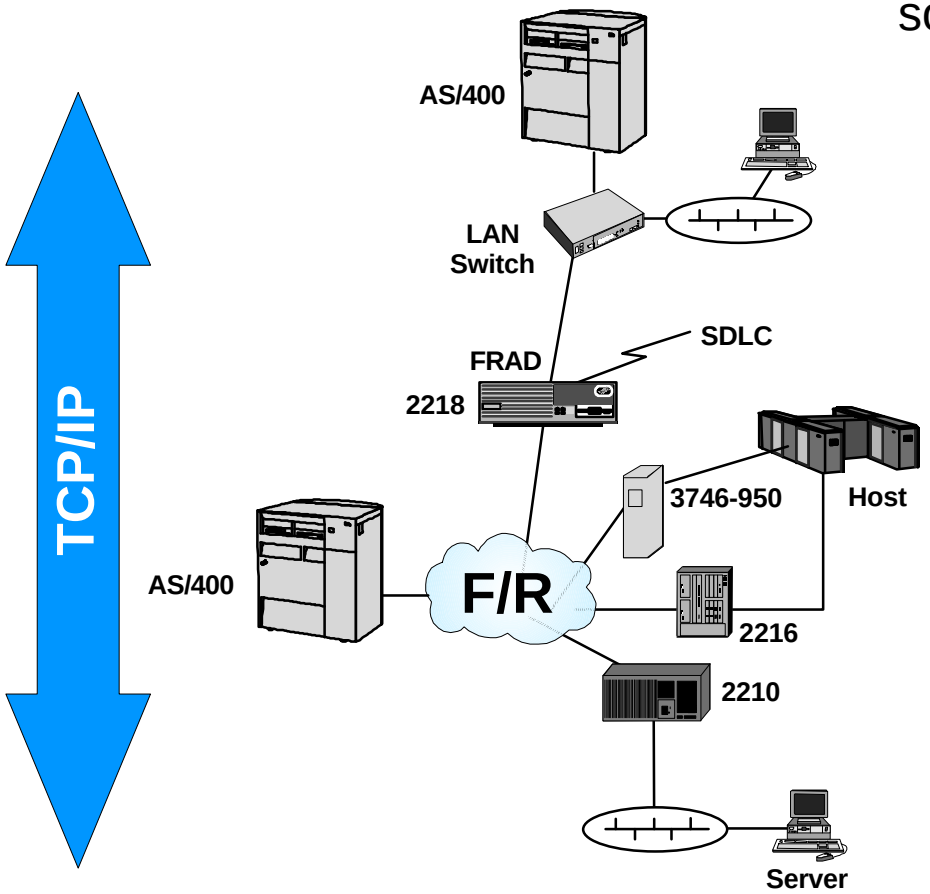


ADDENDUM

TCP - IP
MAINFRAME GATEWAY
OPTIONS

- IBM Mainframe TCP-IP Software Options
  - TCP - IP for MVS
  - TCP - IP for VM
  - CS for OS/390
  - CS for MVS/ESA
- IBM TCP-IP Gateway Options
  - 3172
  - 2216
  - 3746/900 w/NNP
  - NW 950 w/NNP
  - Risc 6000

IBM TCP/IP Commitment



- Comprehensive TCP/IP network solutions
  - Standards based
  - Across entire communications product line
    - Application platforms
    - VM, MVS, OS/2, DOS/Windows, AS/400, RS/6000
    - Routers
    - 2216, 2210
    - Nways Controller, 3745/46, 3172,3174
    - Management
    - SNMP agents
    - Host NetView
    - NetView/6000
    - NetView for Windows
    - NetView for OS/2
    - AIX Router and Bridge Manager/6000

IBM TCP/IP Networking Capabilities

	0S/400	TCP/IP for VM/ESA	TCP/IP for MVS & OpenEdition	AIX/6000	TCP/IP for OS/2 V2	OS/2 Warp BonusPak	OS/2 Warp Connect	TCP/IP for DOS & Windows	Internet Connection for Windows
FTP C/S	AV	AV	AV	AV	AV	C	AV	AV	C
TELNET C/S	AV	AV	AV	AV	AV	C	AV	C	C
SMTP C/S	AV	AV	AV	AV	AV	C	AV	AV	C
NFS C/S	S	S	S	AV	AV	---	AV+	C	---
LPR/LPD	AV	AV	AV	AV	AV	---	AV	AV	---
REXEC C/S	---	AV	AV	AV	AV	---	AV	C	---
Name Server	FV	AV	AV	AV	AV	---	AV-	---	---
RouteD	FV	AV	AV	AV	AV	---	AV	AV	---
SNMP Monitor	FV	AV	AV	AV	AV	---	AV	---	---
SNMP Agent	AV	AV	AV	AV	AV	---	AV	AV	---
CICS/IMS Sockets	AC	AC	AV	AC	AC	---	AC	AC	---
X-Windows C/S	FV	C	C	AV	AV	---	AV+	**	**
OSF/Motif	FV	AV	AV	AV	AV	---	AV+	---	---
RPC	FV	AV	AV	AV	C+	---	AV	AV	---
NCS	---	AV	AV	---	---	---	---	---	---
NDB	---	S	S	C+	---	---	C+	C+	---
Kerberos C/S	FV	AV	AV	AV	AV	---	---	---	---
WinSock 1.1	AV	---	---	AV	---	---	AV	AV	AV
WebC/S	S-FV	FV	S-FV	FV	---	C	AV	---	AV
Secure Web C/S	C-FV	FV	S-FV	FV	---	---	FV	---	FV
Gopher	---	FV	---	---	AV	AV	AV	---	AV
NewsReader	---	FV	---	---	AV	AV	AV	---	AV
MIME Mail	---	---	---	---	AV	AV	AV	---	AV
Archie	---	---	---	AV	---	AV	AV	---	AV
T-R/Ethernet	AV	AV	AV	AV	AV	---	AV	AV	FV
X.25	AV	AV	AV	AV	AV	---	AV+	**	FV
IEEE 802.3	AV	AV	AV	AV	AV	---	AV	AV	FV
FDDI	AV	AV	AV	---	AV	---	AV	---	FV
SNALink	---	AV	AV	---	---	---	AV+	---	---
HYPERchannel	---	AV	AV	AV	---	---	---	---	---
SLIP/PPP	---	---	---	---	AV	AV	AV	SLIP	AV
COAX (3270)	---	AV	AV	---	---	---	---	---	---

+ = Cooperative software (RS/6000)
*** = Available through third party**
**** = Working w/ third parties**

AV = Available
FV = Future Version
++ = CICS for FTP client

C = Client
S = Server
D = Daemon

AC = Access to CICS apps