

# IBM 3746 Nways Multiprotocol Controllers Models 900 and 950

February 16, 1998  
(Revision 6)

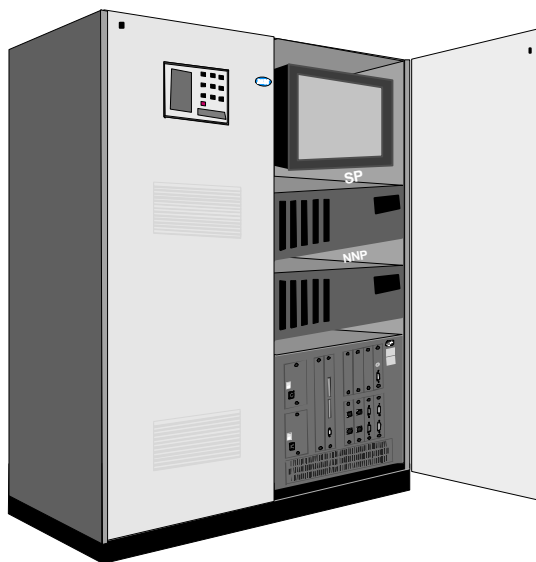


## Multiaccess Enclosure High Speeds WAN and LAN Support

# IBM 3746 - Why choosing an MAE ?



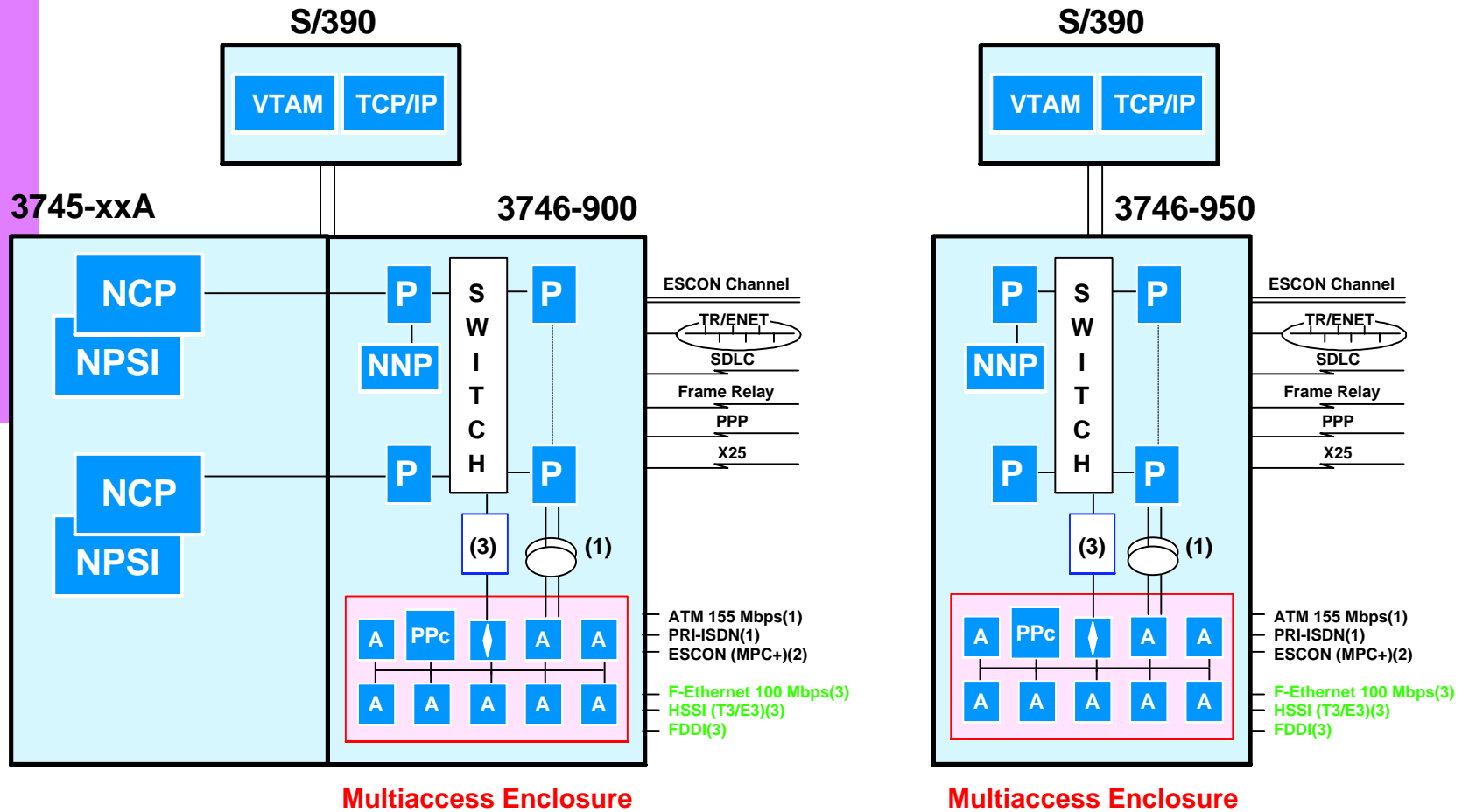
6/12/98



**Multiaccess  
Enclosure**

- Evolving technologies on the 374x
- Additional connectivity
- New networking functions
- Integration
- Serviceability
- Investment protection
- Future

# IBM 3746 - High Speed Multiaccess Enclosure



**P** Processor (+ Coupler)  
**A** Adapter (=Coupler)  
 Processor slot

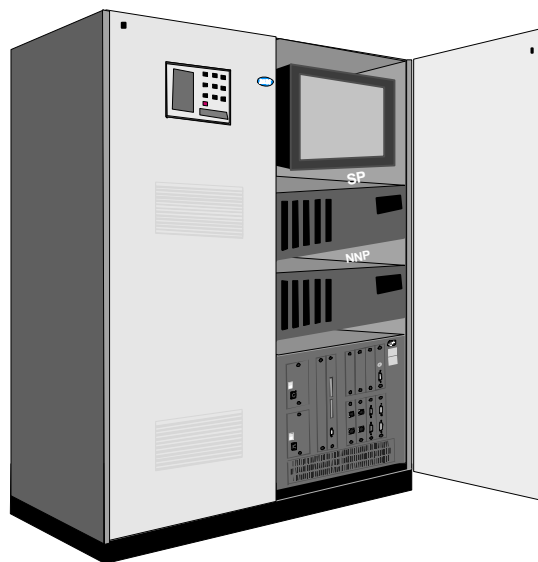
**NNP** Network Node Processor  
**PPc** Power Pc

(1) Available 6/30/97  
 (2) Available 9/16/97  
 (3) Available 6/12/98

# IBM 3746 - Extend 3746-9x0 Connectivity with Multiaccess Enclosure



6/12/98



**Multiaccess Enclosure**

- **Improved performance (x3+)**
  - Hardware coupling to 3746 switch
  - Offload Power PC routing protocols
- **Deep IP Integration**
  - Single IP image/router
  - Single configurator entry
  - MAE seen as a NEW SUPER processor
  - Distributed routing for IP
  - Release Token Ring requirements for IP between 3746/MAE
- **Investment protection**
  - Re-enforce 3746 strategic role
  - Field upgradable
  - Free upgrade to hardware coupling for FC3000
  - Reuse all MAE adapters

**New**

**New**

**The Path to the High Speeds**

# IBM 3746 - Extend 3746-9x0 Connectivity with Multiaccess Enclosure



**Multiaccess Enclosure**

- 8 new PCI adapter slots
- IBM Power PC engine (604, 200 MHz) **NEW**
- ATM 155 Mbps adapter (SMF/MMF)
  - Classical IP, LAN emul, native HPR
- PRI-ISDN adapters
- T1/E1/Ethernet/TR Adapters
- Channelized/Fractional T1/E1 **6/12/98**
- New ESCON adapter
  - IP, MPC+ for IP
  - MPC+ for HPR (VTAM V4R4)
    - Host CPU cycle savings
  - APPN, SNA Passthru
  - High Throughput
- HSSI (T3/E3) **6/12/98**
- Fast LAN adapter **6/12/98**
  - FDDI
  - F-ENET

The Path to the High Speeds

# IBM 3746 - Extend 3746-9x0 Connectivity with Multiaccess Enclosure



**Multiaccess Enclosure**

- Network Protocols

- APPN/HPR
- IP, IPX

- Peripheral SNA

- DLUR, DLSw

- Network functions

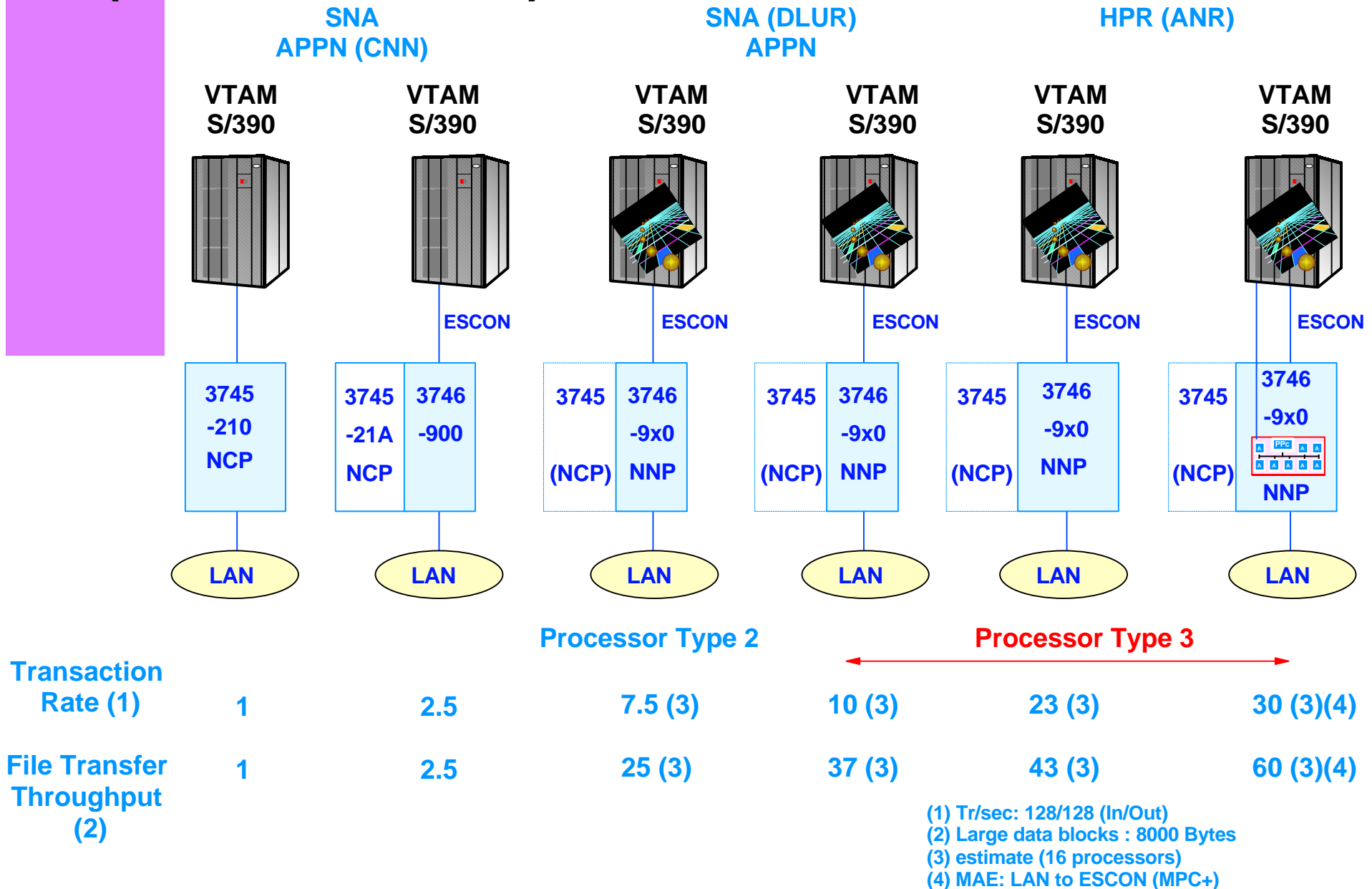
- TN3270e
- Enterprise Extender
- Network Dispatcher

6/12/98

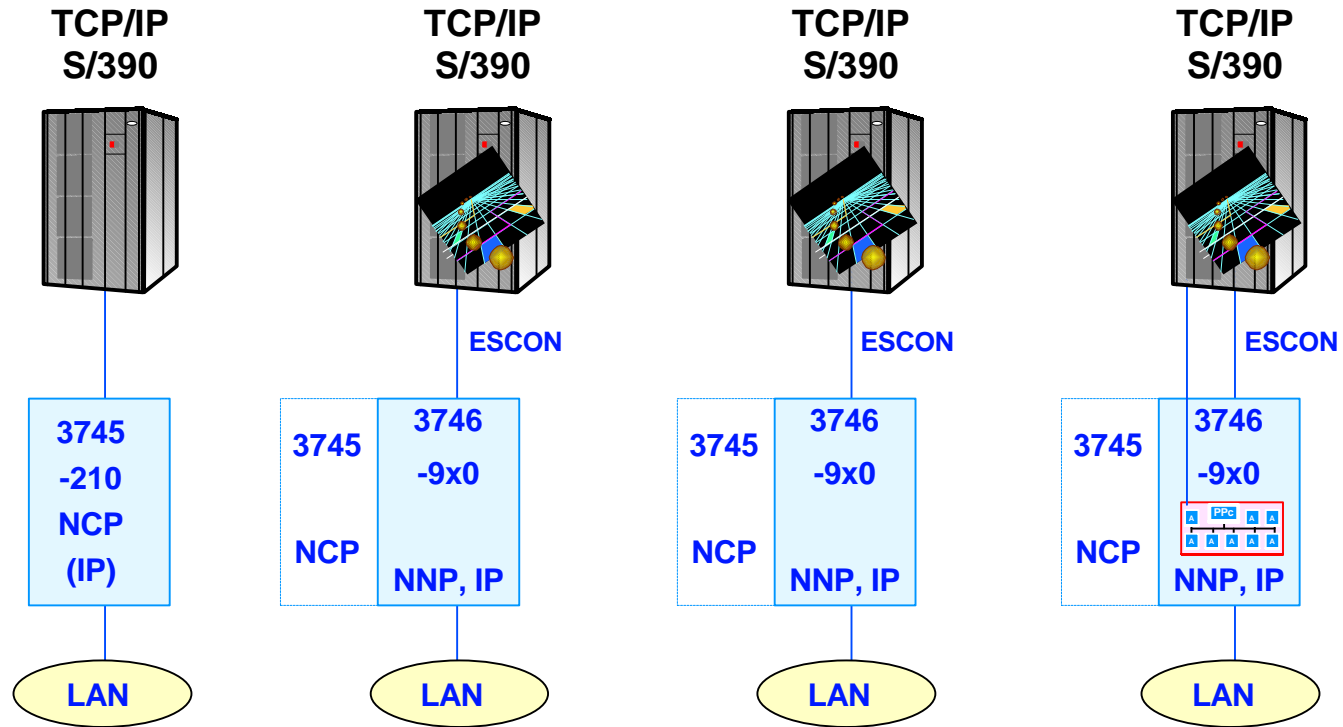
6/12/98

The Path to the High Speeds

# IBM 3746 - Performance Ratio (SNA/APPN/HPR)



# IBM 3746 - Performance Ratio (TCP/IP)



		Processor Type 2		Processor Type 3	
Transaction Rate (Telnet) (1)	1	18 (3)	25 (3)	60 (3)(4)	
File Transfer Throughput (FTP) (2)	1	34 (3)	40 (3)	60 (3)(4)	

(1) packets: IN=100 Bytes, OUT=1000 Bytes  
 (2) packets: 4000 Bytes  
 (3) estimates (16 processors)  
 (4) MAE: LAN to ESCON



# IBM 3746 - Multiaccess Enclosure (FC3000)

Available



**Multiaccess  
Enclosure**

- **System Management**
  - Dual APPN/HPR Control Point and IP Router
  - Centralized IP management
    - Netview for AIX
  - Dual APPN/HPR management
    - Netview for AIX for Multiaccess Enclosure resources
    - Netview/390 for remaining 3746 resources
  - Service Processor
    - Maintenance
    - Configurations
    - 3746 Management
  - OSPF recommended for IP traffic from Multiaccess Enclosure to 3746
- **Follows the IBM 2216 Platform Enhancements**
  - New Adapters
  - New Functions

# IBM 3746 - Multiaccess Enclosure Connectivity and Major Routing Protocols



			TCP/IP		VTAM		
Channel	ESCON	(2)	IP Gateway LCS	SNA Gateway LSA	APPN ISR	MPC+ (4)	DLSw
LAN	Token-Ring	(1)	Y	Y	Y	Y	Y
	Ethernet V2	(1)	Y	N	Y	Y	Y
	Ethernet 802.3	(1)	Y	Y	Y	Y	Y
	Fast Ethernet	(3)					
	PRI-ISDN	(1)	Y	Y	Y	Y	Y
	FDDI	(3)					
WAN	PPP	(1)	Y	N	Y	Y	Y
	FR -Bridged -Routed	(1)	N	N	Y	Y	Y
		(1)	Y	N	Y	Y	N
	SDLC	(1)	N	N	Y	N	Y
	X.25	(1)	Y	N	Y	N	Y
	ATM LANe	(1)	Y	Y	Y	Y	Y
	ATM Classical IP	(1)	Y	N	N	N	N
	HSSI T3/E3	(3)					

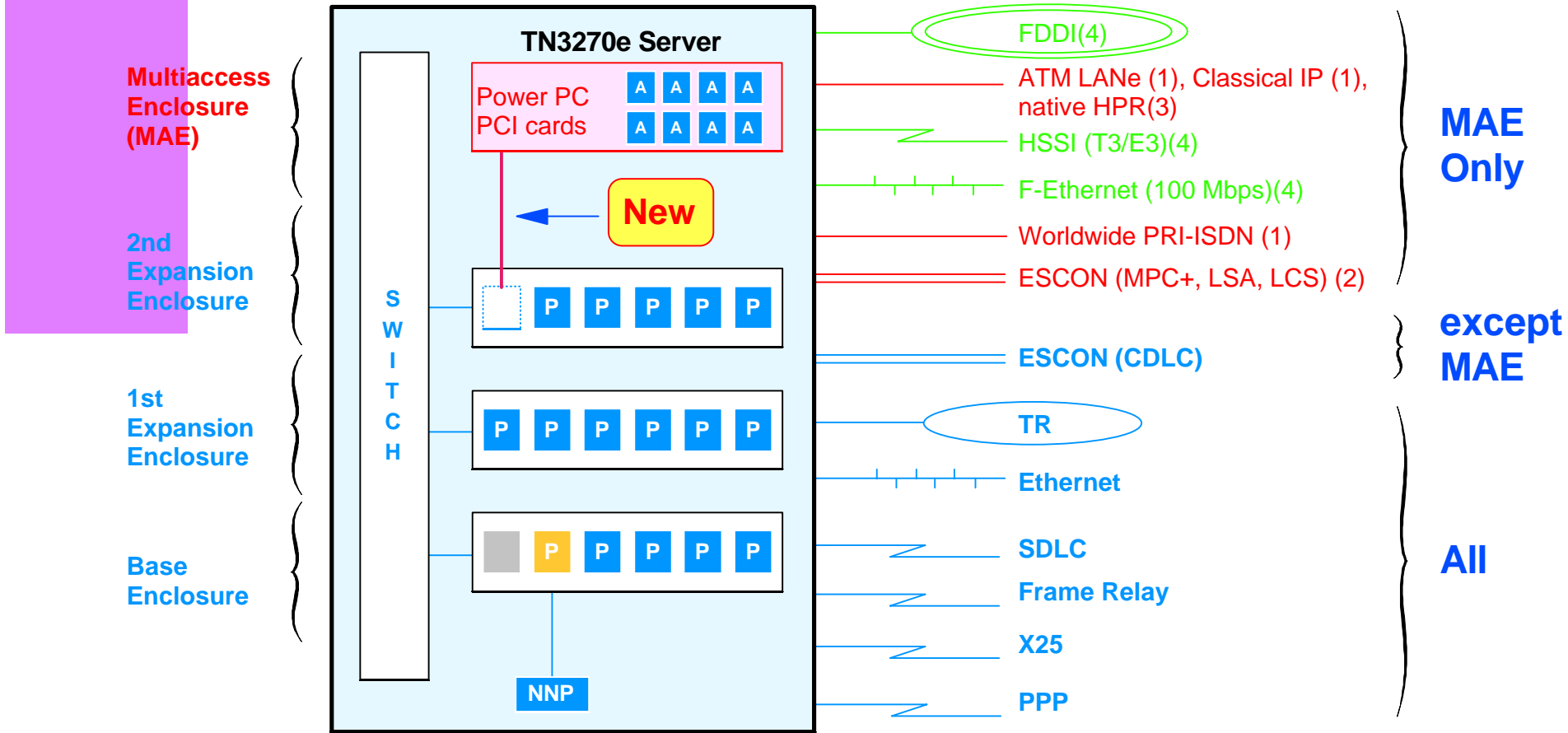
(1) Available 6/30/97    (2) Available 9/30/97    (3) available 6/12/98    (4) MPC+ IP available 6/12/98

# IBM 3746-9x0 - Connectivity "Inside"



6/12/98

3746-9x0

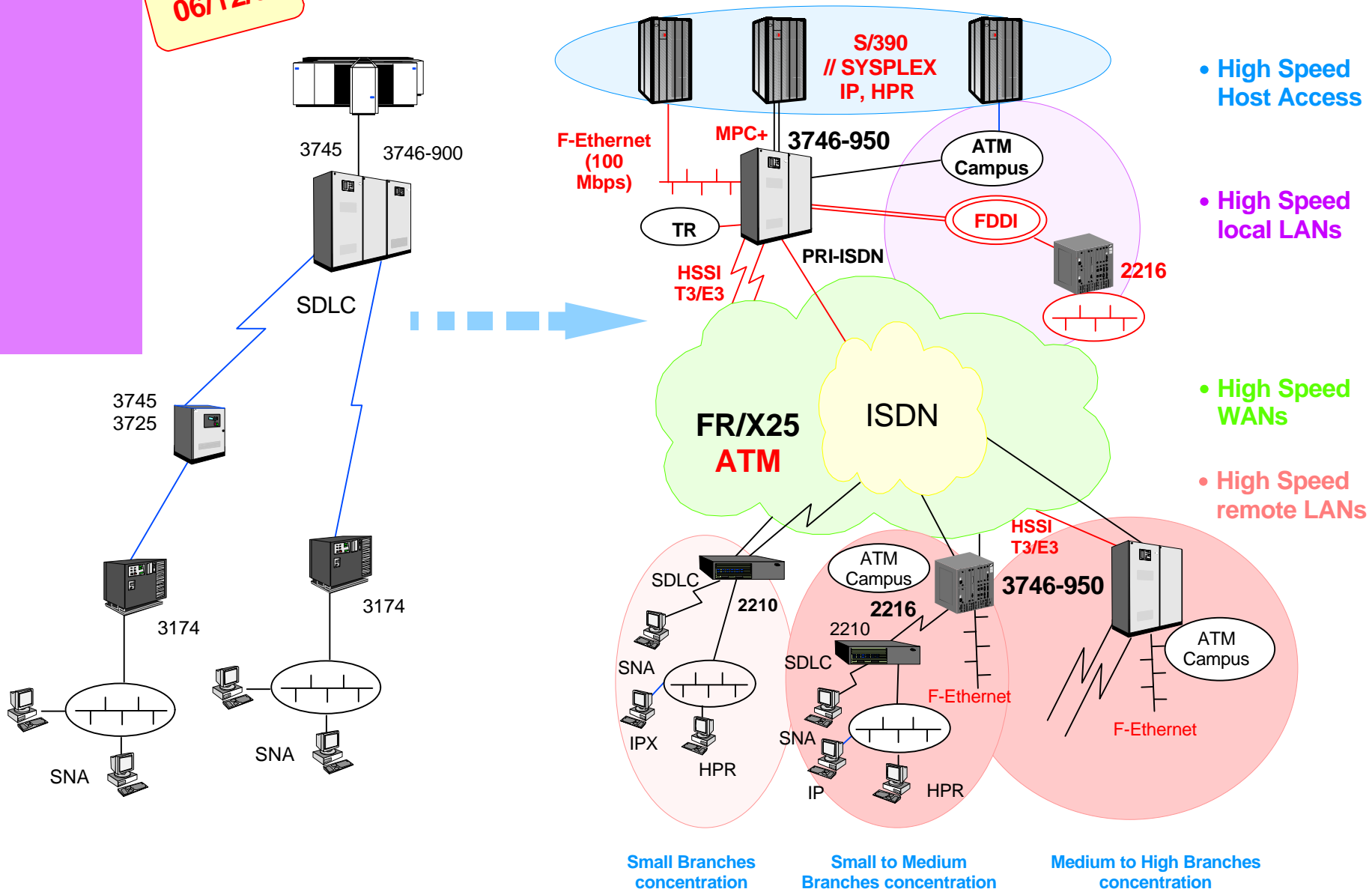


(1) Available 6/30/97    (2) Available 9/30/97    (3) Available 12/15/97    (4) Available 6/12/98

# IBM 3746 - Network Computing Solution



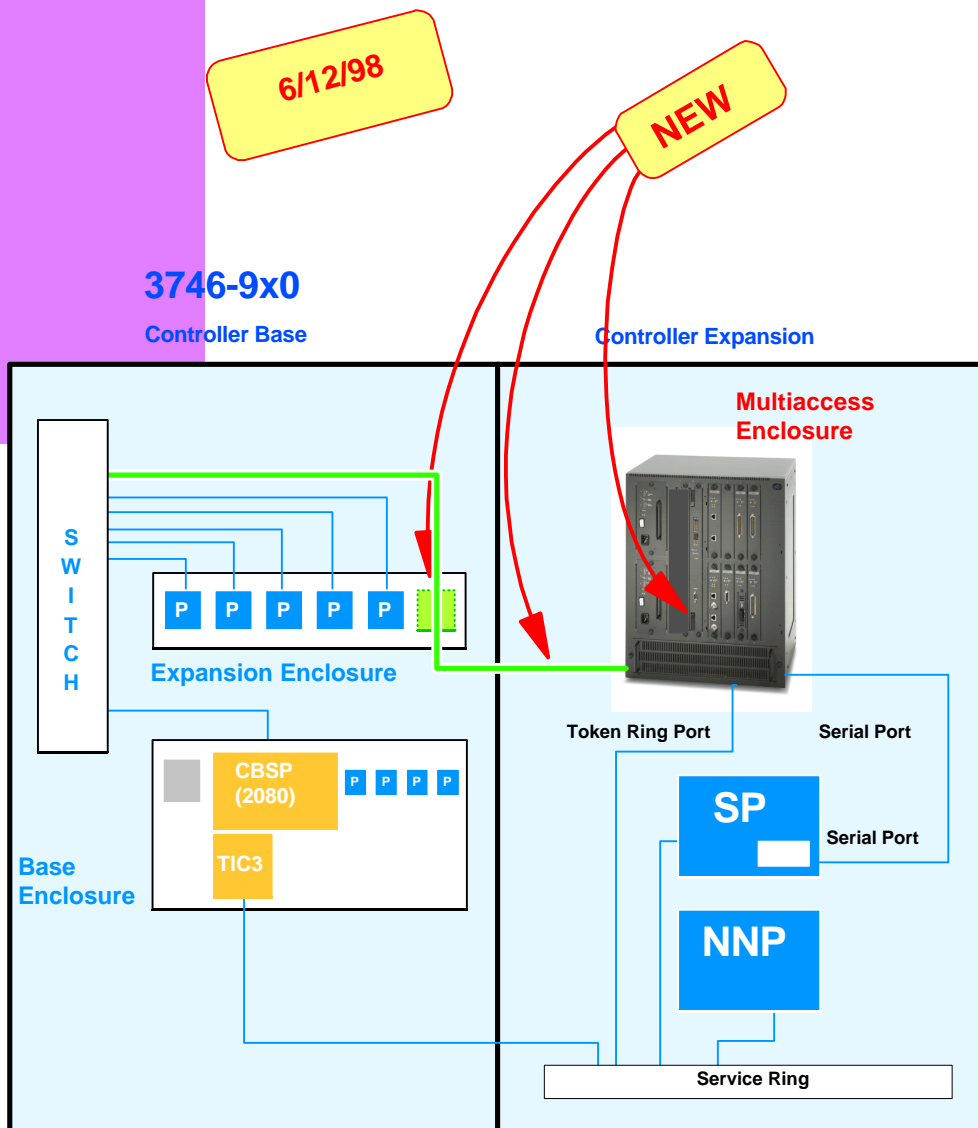
06/12/98



- High Speed Host Access
- High Speed local LANs
- High Speed WANs
- High Speed remote LANs

# IBM 3746 - Multiaccess Enclosure Enhancements (FC #3001)

- MAE hardware coupling
  - 2 cards provided
    - Switch Interface Extended (3746)
    - Switch Access Card (MAE)
  - MAE can be 6 meters away of the 3746 (cable = 9m)
- MAE IP resources
  - Own by 3746 IP "Control Point"
  - Configured from Service Processor
  - Single Router IP image
  - Single Router IP management
- MAE maintained from Service Processor
- Pre-requisites
  - 3746-900 + NNP or 3746-950
  - 3746 IP Routing (FC #5033)
  - SP upgrade for FC#5020 => FC#5052, FC#5021: 96MB, 2GBHDD, CD-ROM
  - 1 x 3746 Processor slot
- MAE Direct Attach Upgrade
  - 2 cards + cable + mcode
- MAE 3001 TR kit (FC#5713)
  - APPN/DLUR, HPR, SNA subarea



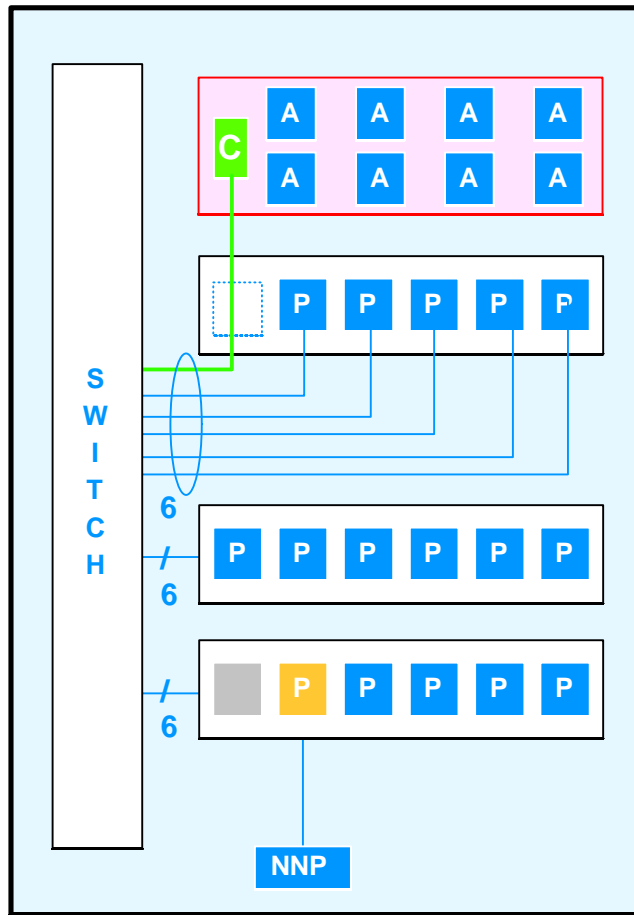
# IBM 3746-9x0 - Multiaccess Enclosure



6/12/98

3746-9x0

Multiaccess Enclosure  
2nd Expansion Enclosure  
1st Expansion Enclosure  
Base Enclosure



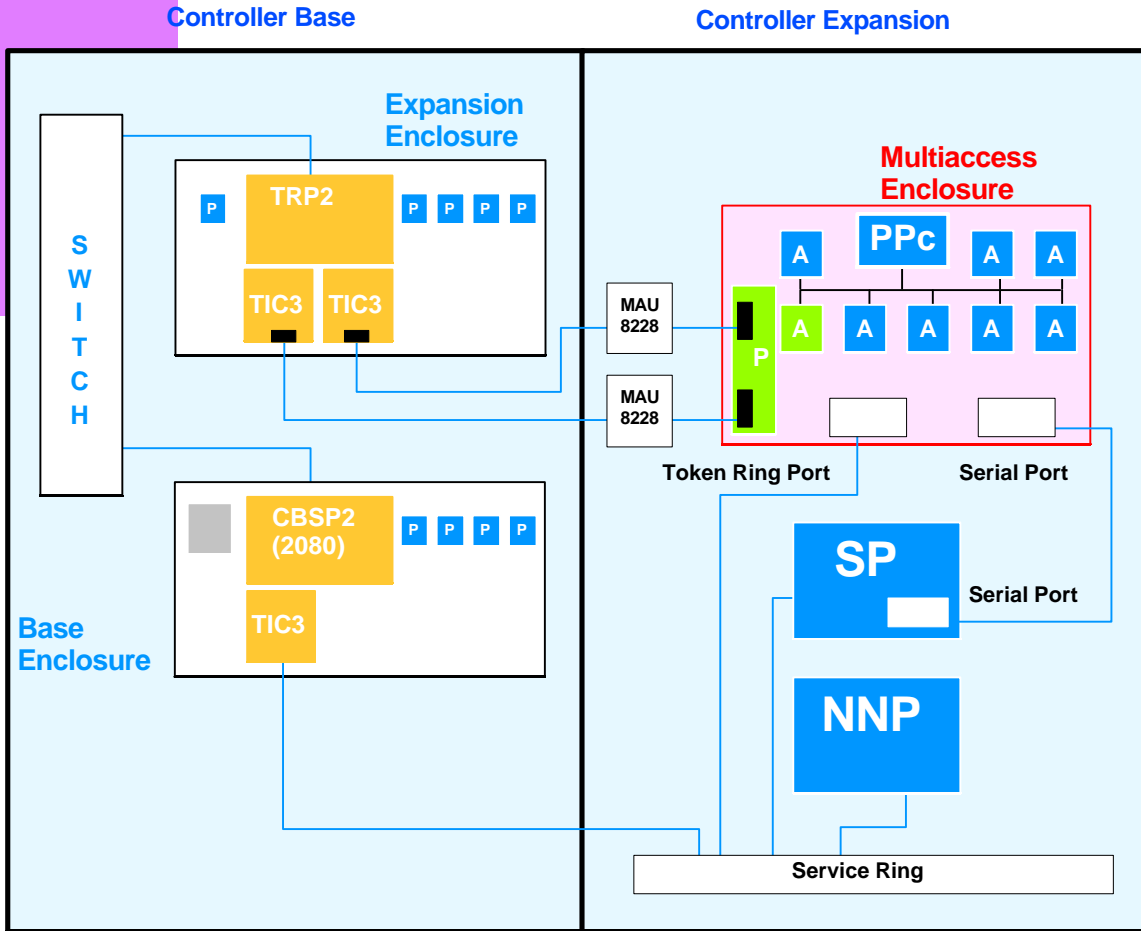
- Field upgrade (EC) at no charge for existing MAE customers
- Direct Hardware Coupling to Switch
  - 3+ times performance (for IP traffic between MAE and other enclosures) **New**
  - More PCI adapter capacity (8 User slots)
  - 1 EMPTY Processor slot used in anyone 3746 Enclosure
- Higher speed 3746-9x0 Connectivity
  - FDDI
  - HSSI (T3/E3 speeds)
  - Fast Ethernet **New**
  - Native HPR over ATM
- Improved Management Solution
  - Single Router Image (IP)
  - Single Configurator Platform

The Highway for High Speed Server Access

# IBM 3746-9x0 - Technical Implementation of **IBM** Multiaccess Enclosure (FC #3000)

Available

3746-9x0



- **Multiaccess Enclosure feature (FC #3000)**
  - Similar to 2216 base
    - (Power PC, 8 PCI Adapters slots)
  - Includes Licensed Internal Code (IP, APPN/HPR,...)
  - Cables to Service Ring and SP
  - MAE 3000 TR Kit (SC#9713)
    - MAU (8228)
    - Cable to MAU
    - Qty = 0\*, 1, 2

(\*) No traffic between MAE and other enclosures

# IBM 3746-9x0 - Multiaccess Enclosure (1/2) (FC #3000)



Available

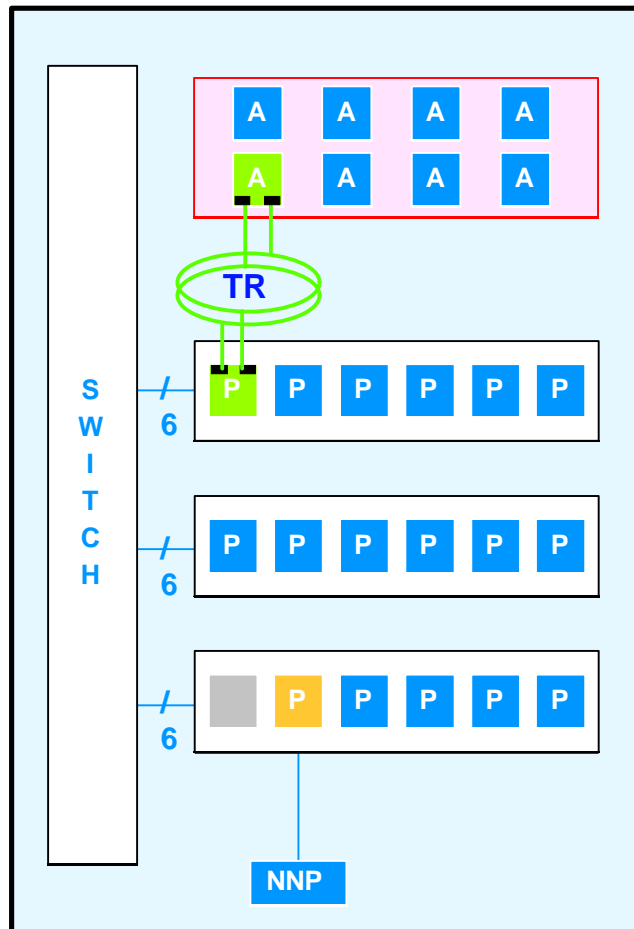
3746-9x0

Multiaccess Enclosure

2nd Expansion Enclosure

1st Expansion Enclosure

Base Enclosure



- Multiaccess Enclosure feature (FC 3000)
  - Power PC base
  - PCI adapters
  - 7 slots for user traffic
  - 1 slot for internal TR connection
- Pre-requisites
  - 3746-900+NNP or 3746-950
  - IP Routing Feature
  - 2 x Token-Ring Couplers (TIC3) (if required)
    - Can spread load across different TRP3s
  - 1 TR Adapter (FC 3280) in Multiaccess Enclosure (if required)
  - PCI slot #1 (reserved)
  - For installed SPs
    - See SP, NNP requirement chart



# IBM 3746-9x0 - Multiaccess Enclosure (2/2) (FC #3000)



Available

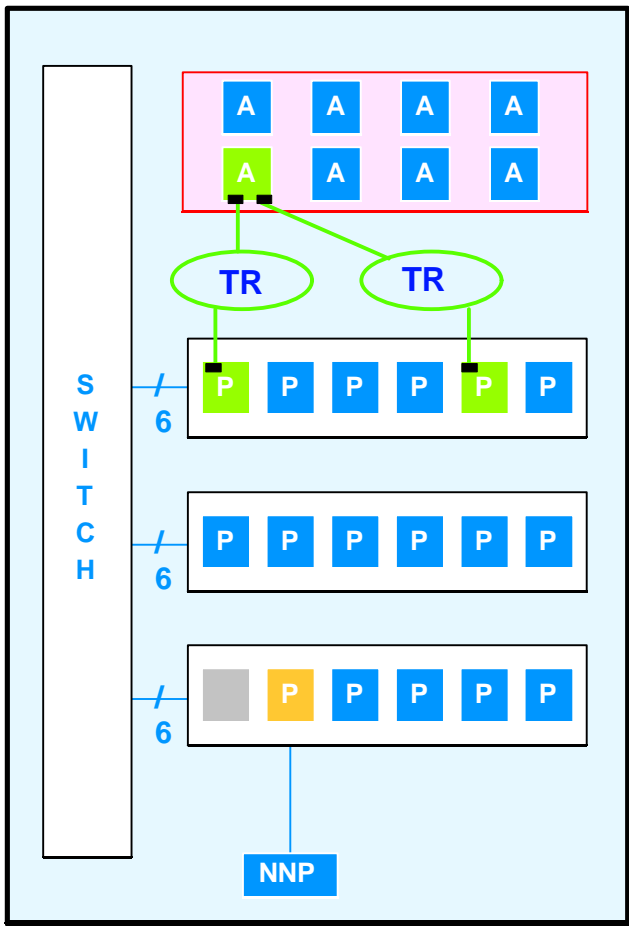
3746-9x0

Multiaccess Enclosure

2nd Expansion Enclosure

1st Expansion Enclosure

Base Enclosure



- Follows the 2216 platform enhancements
  - New adapters
  - New functions

- System Management
  - Dual APPN/IP Control Points
  - OSPF recommended for IP traffic on Multiaccess Enclosure to 3746

- Performance (Data Throughput, Transaction/sec, PPS)
  - port-to-port within Multiaccess Enclosure :
    - ▶ Equivalent to 2216
  - between Multiaccess Enclosure and other enclosures
    - ▶ Equivalent to TRP2/3 or 2 x TRP2/3s (\*)
    - ▶ Dedicated TRP2/3s may be required for Performance

(\*) File transfer may be limited by TR media (about 2 x 16 mbps), if 2 x TRP2/3s are used

# IBM 3746 - SP, NNP Requirements for MAE



**SP**

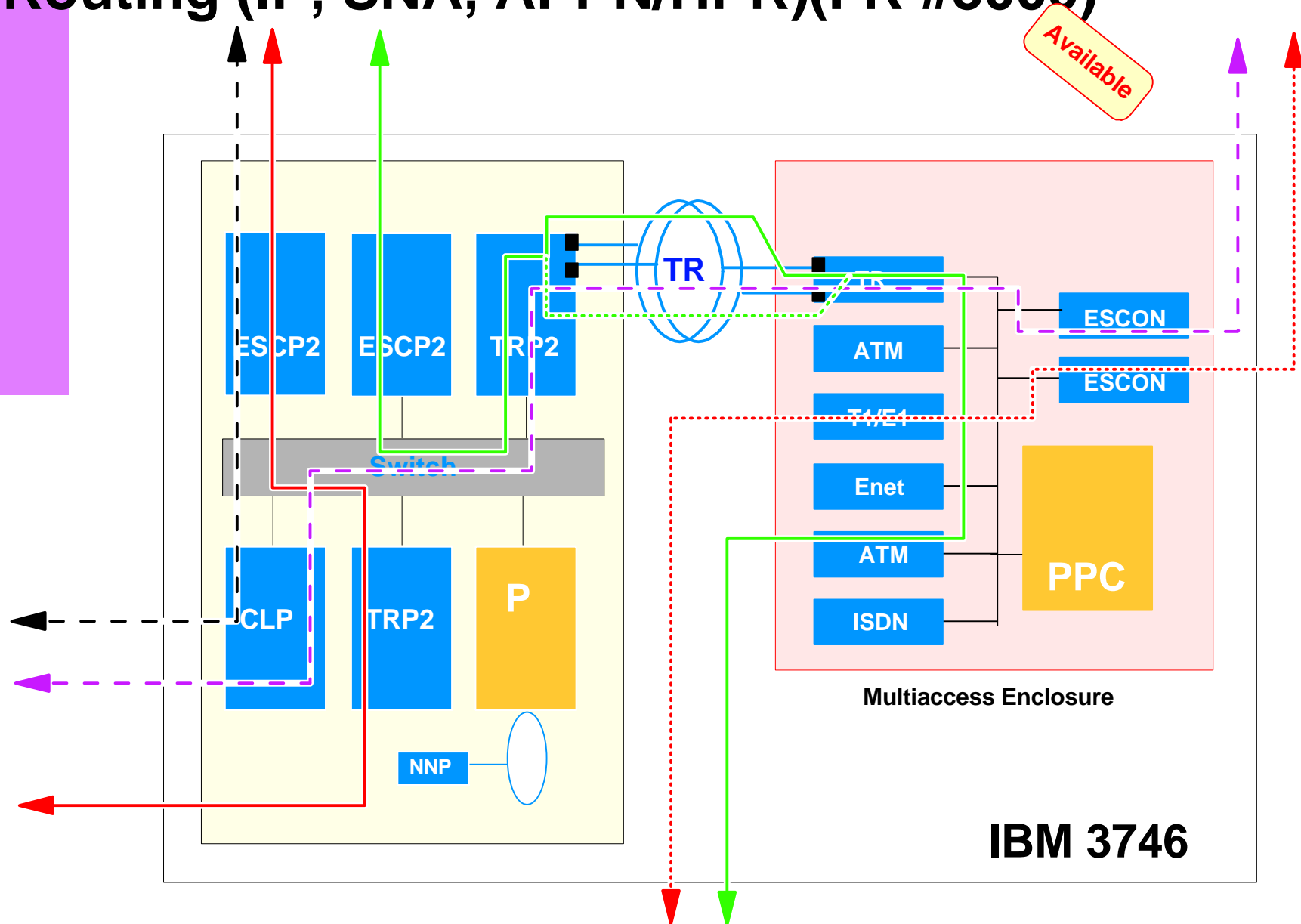
**NNP**

3746 Functions	FC #5020	FC #5021			FC #5052 (SP Type 2)	FC #5022	FC #5122 (NNP Type 2)
needed :	(9577) 486-33Mhz	(9585) 486-66Mhz	(3172) P/N 41H7520 486-66Mhz	(3172) P/N 55H7630 P-90Mhz	7585 <b>(CURRENT)</b> P-200Mhz	(3172) P-90Mhz	(7585) <b>(CURRENT)</b> P-200Mhz
MAE (FC #3000)	FC #5052	FC #5028 FC #5026	FC #5028	FC #5028	Yes	Yes	Yes
MAE (FC #3001) MAE Extended Function (FC #5804, FC #5805, FC #5806)	FC #5052	(1) FC #5026 FC #5028 FC #5051	(1) FC #5028 FC #5051	FC #5028 FC #5051	Yes	Yes	Yes

↑  
**Recommended**

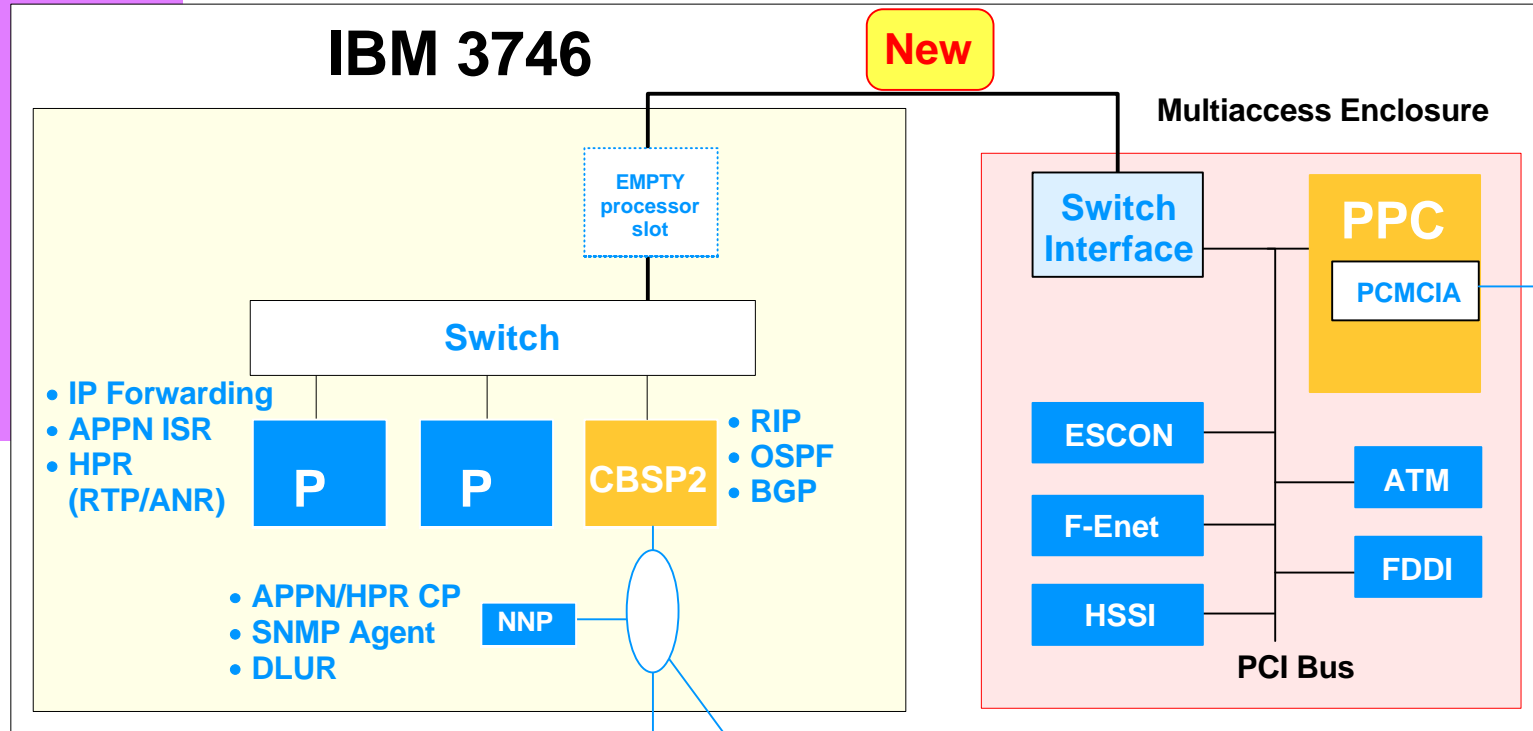
- (1) **Recommended alternative** : replace this SP by SP Type 2 (FC #5052) for better response time at the operator console
- (2) No Requirement on NNP

# IBM 3746 - Multiaccess Enclosure Traffic Routing (IP, SNA, APPN/HPR)(FR #3000)



# IBM 3746 - Enhanced Multiaccess Enclosure (FC #3001)

6/12/98



- IP Forwarding
- APPN ISR
- HPR (RTP/ANR)

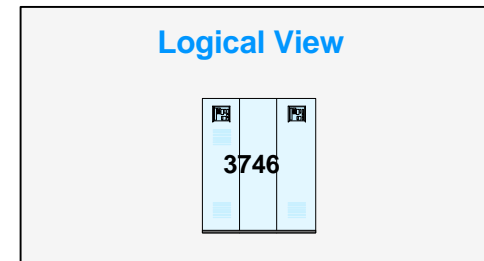
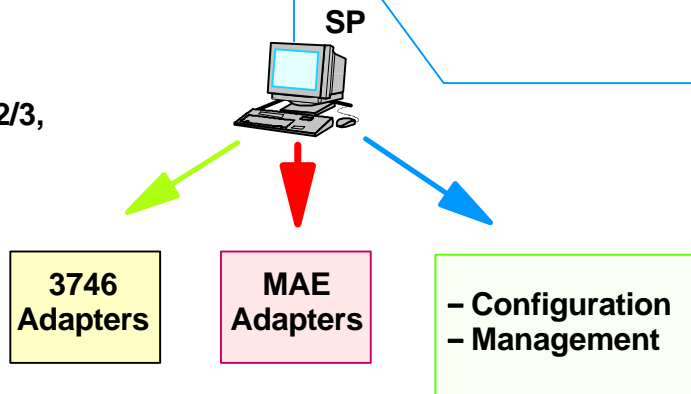
- RIP
- OSPF
- BGP

- APPN/HPR CP
- SNMP Agent
- DLUR

- IP Forwarding
- IPX, Decnet, Appletalk, ...
- Bridging
- DLSW
- TN3270
- Enterprise extender
- Network dispatcher

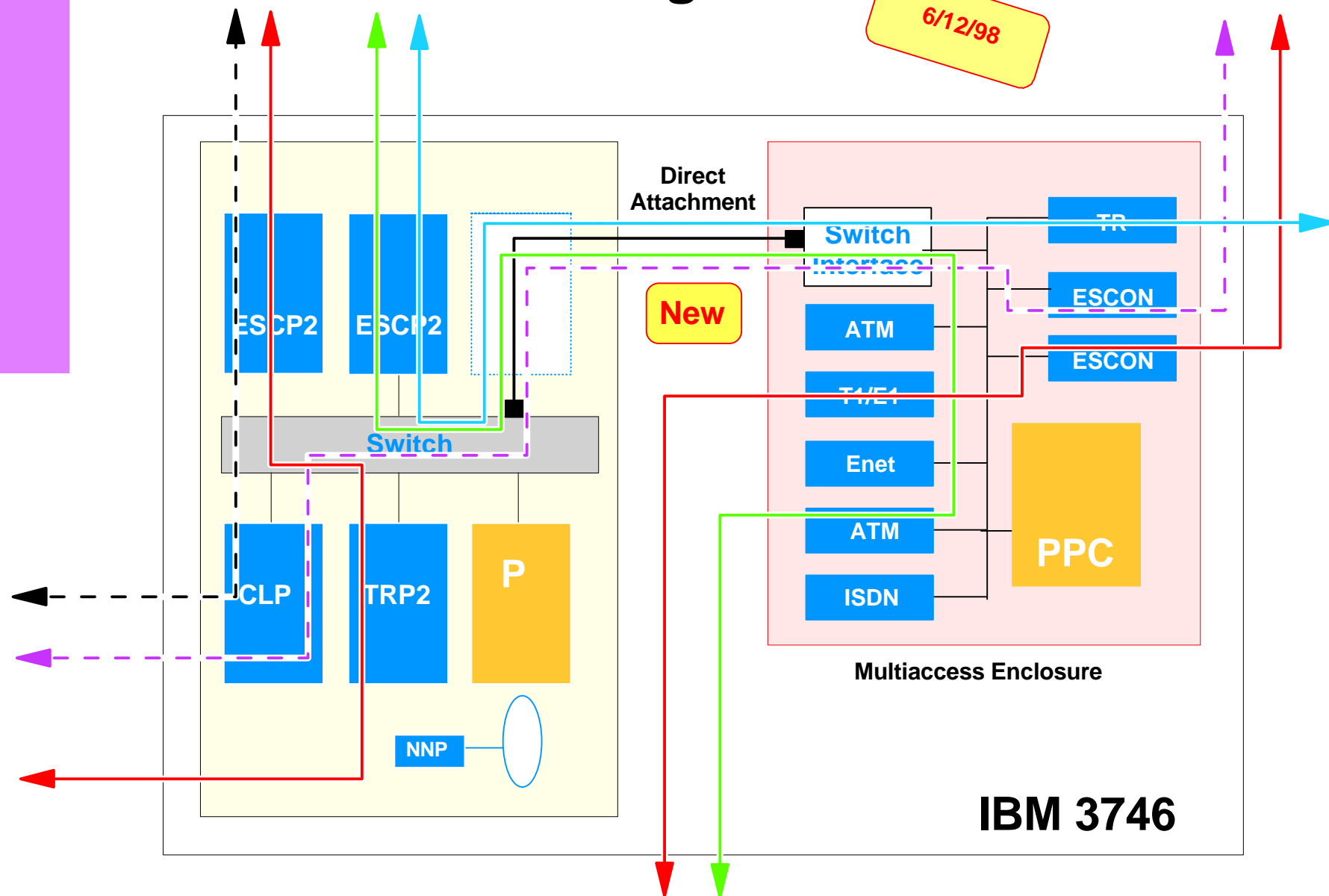
- APPN (ISR)
- HPR (RTP/ANR)
- SNMP Agent

**P** Processor (ESCP2/3, TRP2/3, CLP/3)



# IBM 3746 - Enhanced Multiaccess Enclosure Traffic Routing

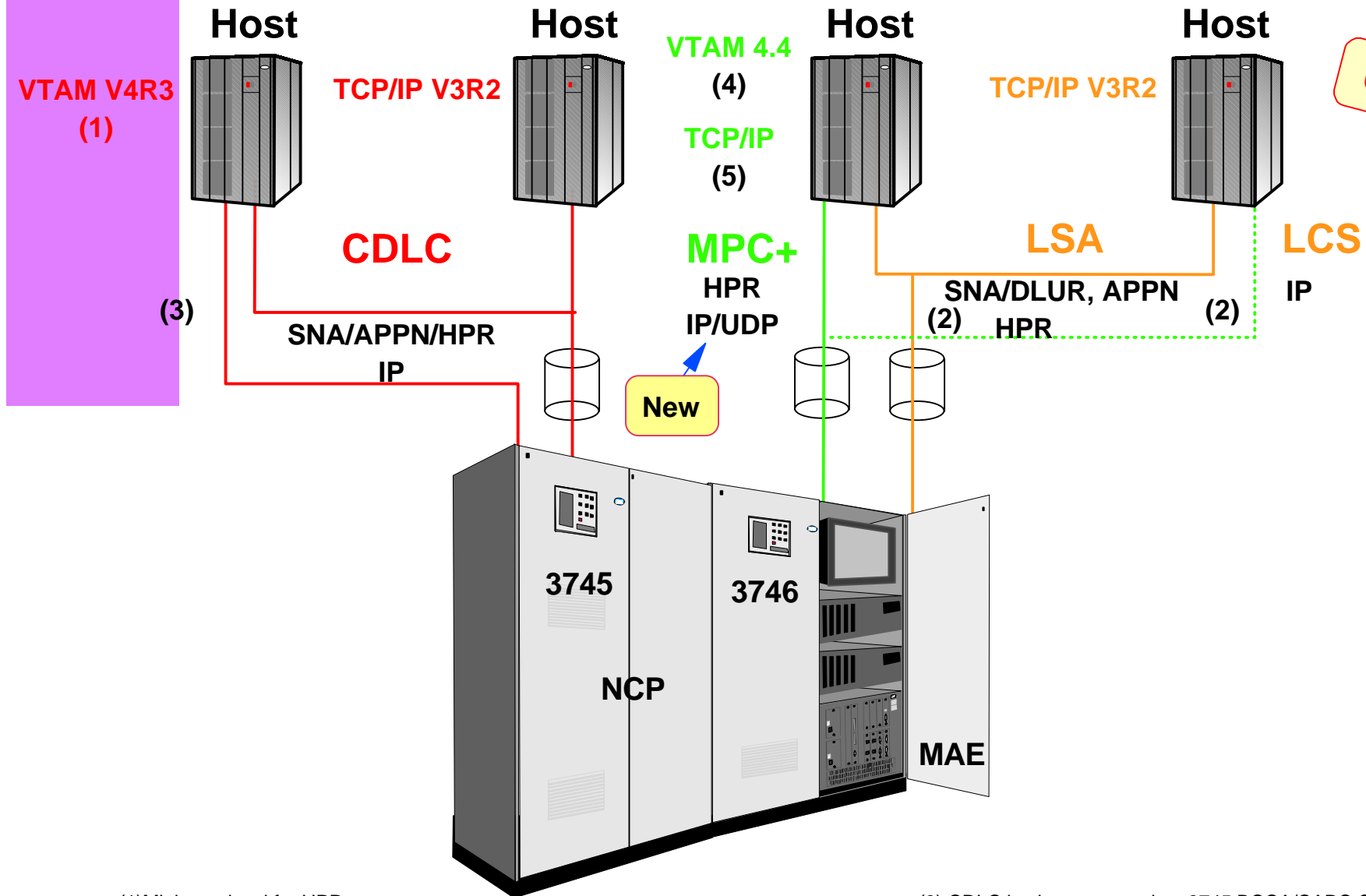
6/12/98



# IBM 3746 - ESCON Protocols



06/12/98



(1) Minimum level for HPR support

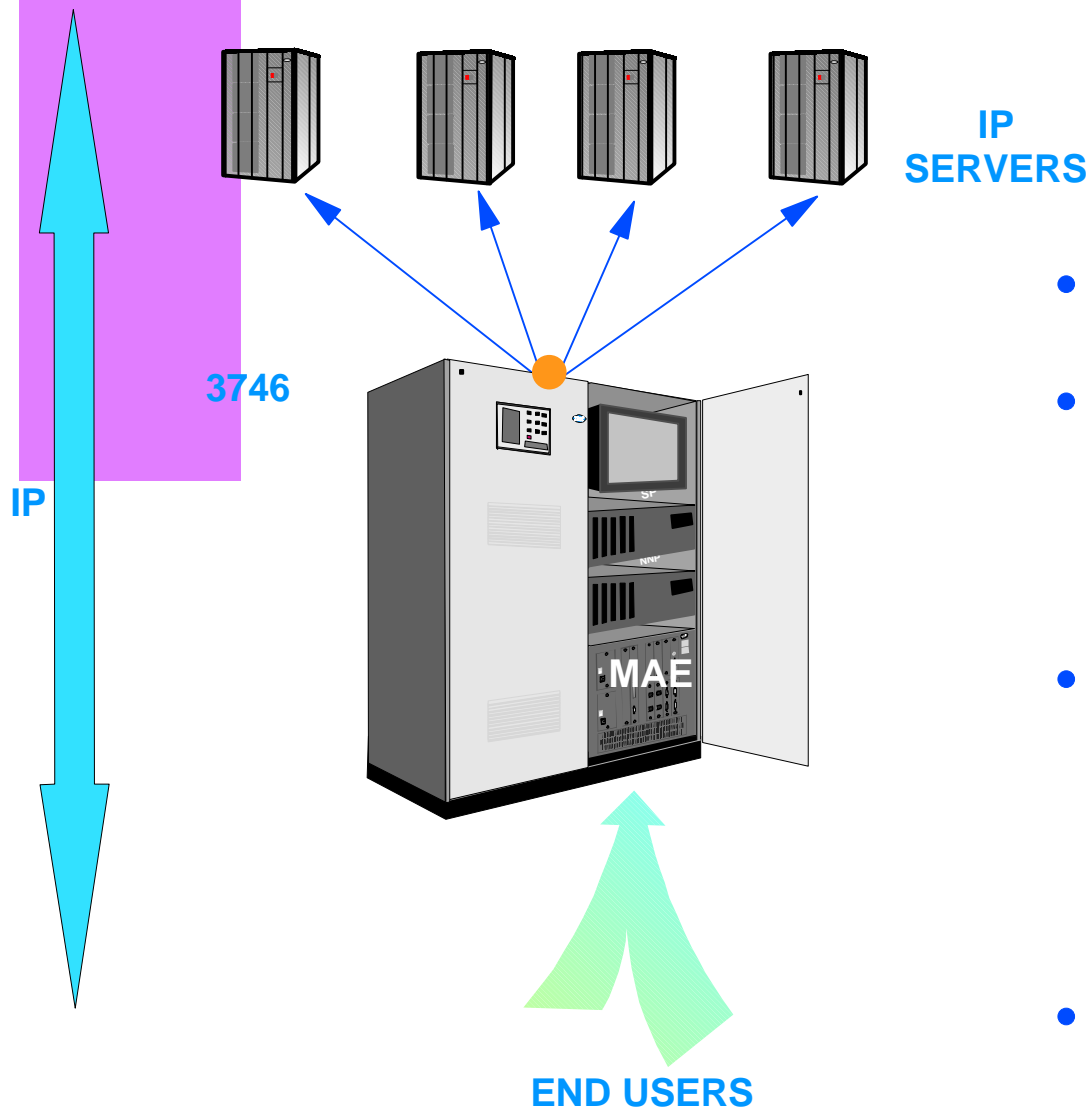
(2) Same ESCON can share MPC+, LSA and LCS during Migration period (Not Recommended for long term)

(3) CDLC is also supported on 3745 BCCA/CADS Channels

(4) Minimum level for MPC+ and HPR over LSA

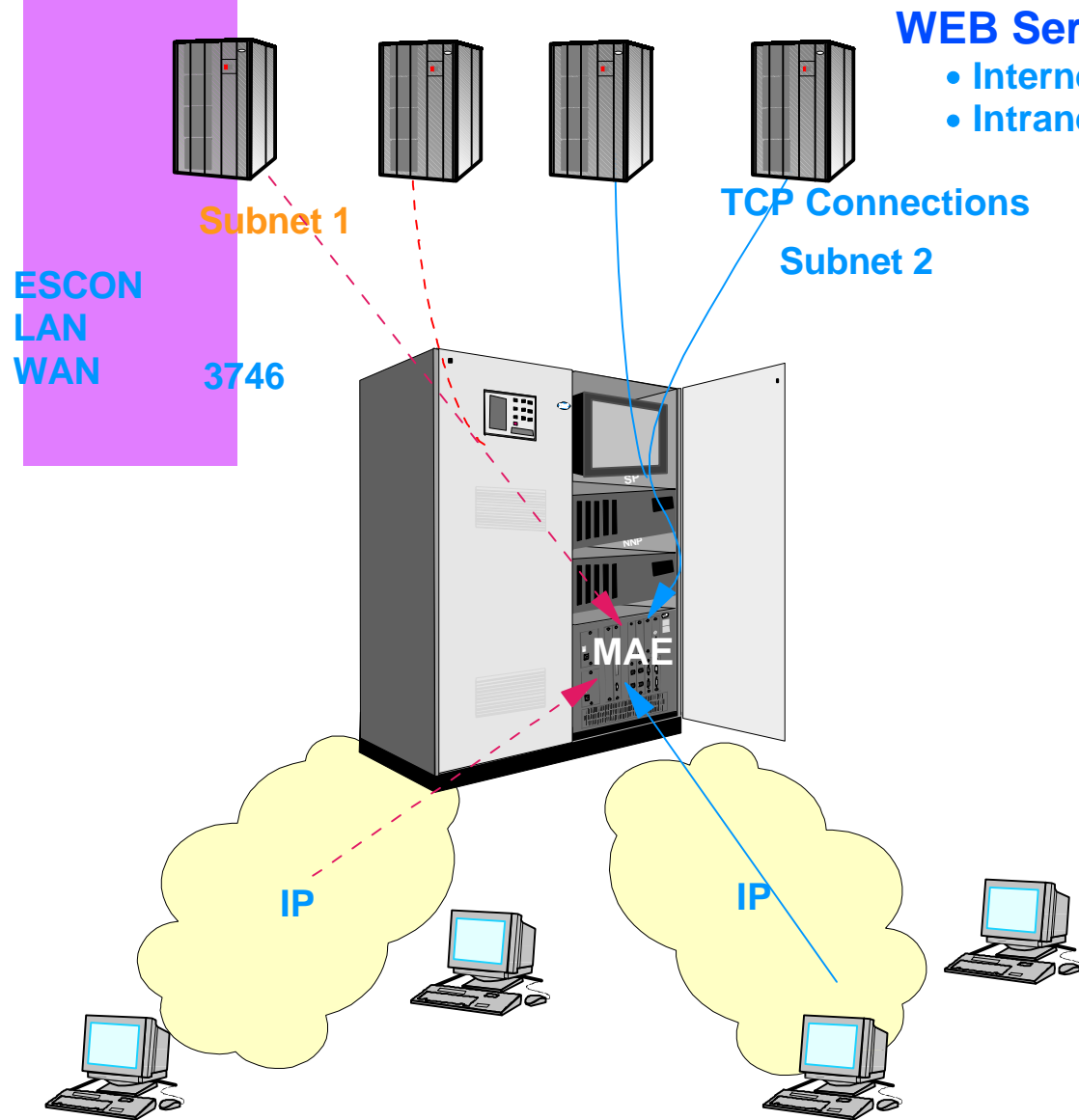
(5) OS/390 V2R5 Minimum level for IP over MPC+  
OS/390 V2R4 Minimum level for UDP over MPC+

# IBM 3746 - MAE Value add Function Network Dispatcher



- **IBM UNIQUE function**
- **Strengthen servers efficiency**
  - S/390
  - Other servers
- **Used by IBM for Web sites access**
  - 1996 olympic Web site
  - 1997 "Deep blue" Web site
- **Spray traffic load to the servers**
- **Single IP address**

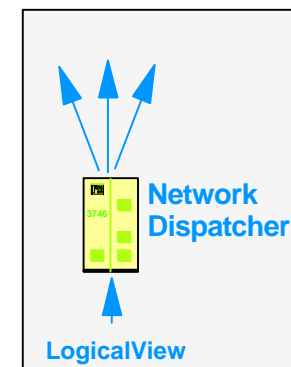
# IBM 3746 - MAE Value add Function Network Dispatcher



## WEB Servers

- Internet
- Intranet

- Allow IP packet balancing on Servers
  - Thru all interfaces
  - Including 3746 and MAE
  - Including ESCON/LAN
- Load balancing based on
  - Round robin algorithm
  - Failure of server (back-up)
  - No response from a server (back-up)
- End users will see/know a single IP address for the set of servers



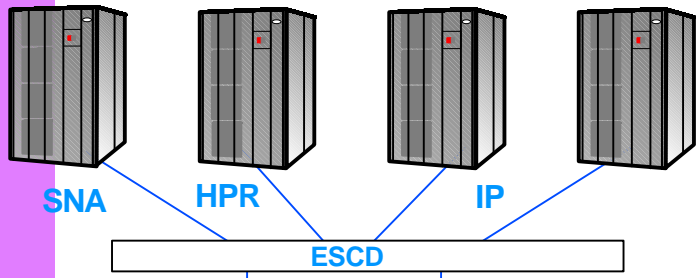


# IBM 3746 - ATM enhancements

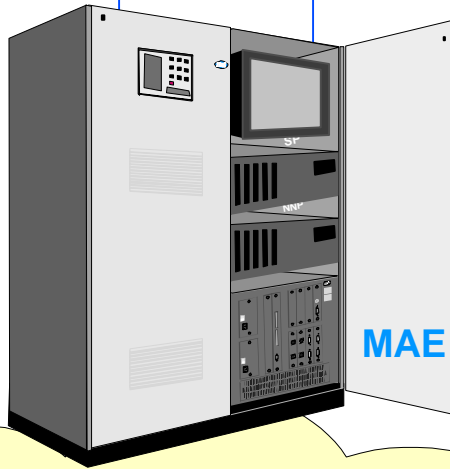


12/12/97

Parallel Sysplex



3746



TCP/IP  
MVS

New

New

New

- **New high performance ATM adapters**
  - SMF/MMF
  - 15% to 25% performance improvement for small packet
- **Native HPR thru ATM**
  - AIW 8192 compliant
  - No need of LAN emulation/classical IP
  - HPR benefits thru ATM network
- **Next Hop Resolution Protocol (NHRP) (FC #3000)**
  - Short cut router for IP over ATM
  - Zero Hop routing for end station with NHRP
- **3746 ATM full solution**
  - LAN emulation client
  - Classical IP
  - Native HPR over ATM

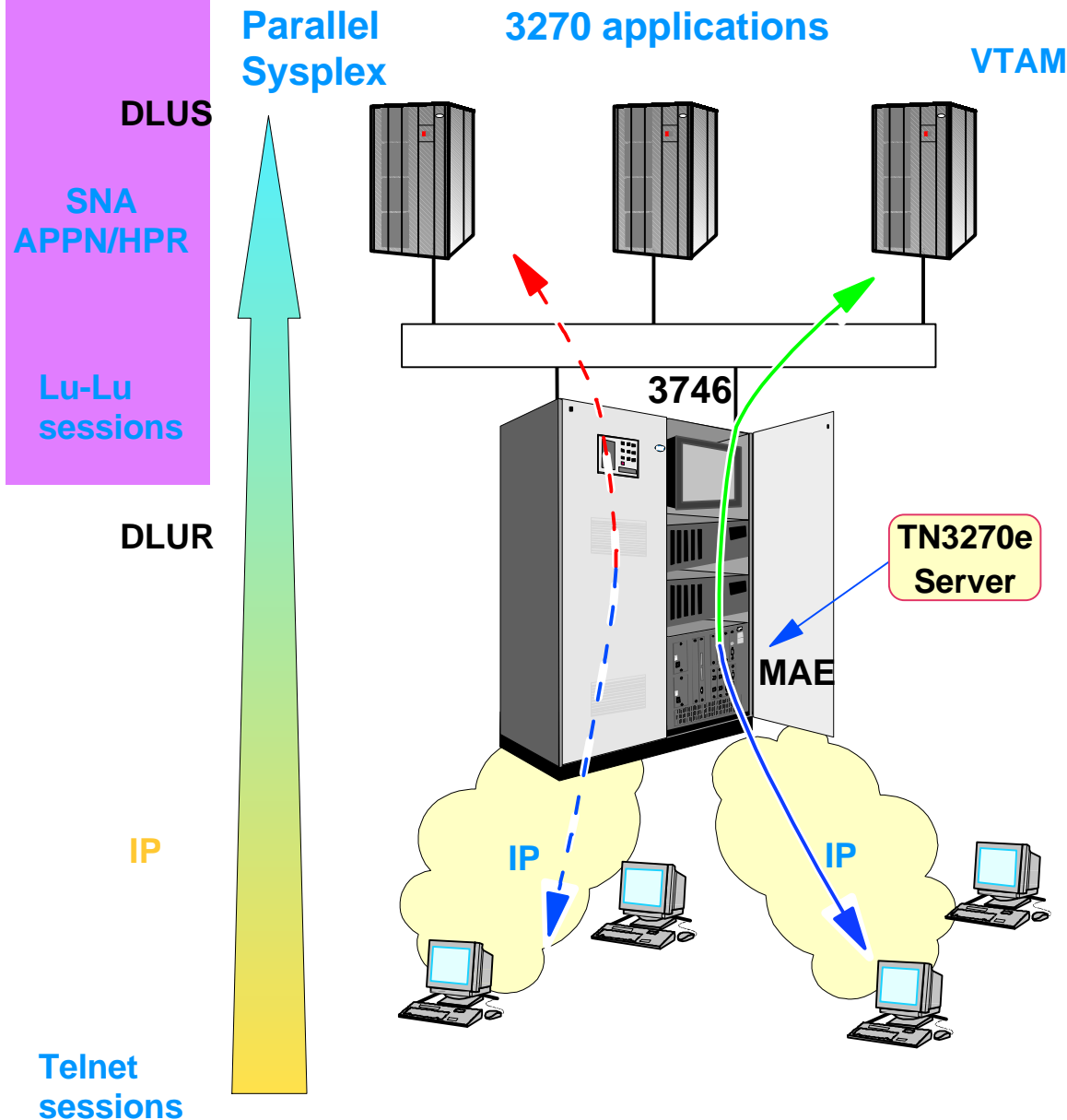
CAMPUS ATM WAN  
155 Mbps Network



# IBM 3746 - TN3270e Server



06/12/98



- Complement TN3270e IBM Solution
- Offload Mainframe from TCP/IP cycles
  - Max 4000 Telnet sessions
  - < 1.9\$ per session
- APPN/HPR benefits from TN3270e Server up to the application
  - DLUR/APPN used for upstream SNA
  - Along with Parallel Sysplex
- Support RFC 1576, 1646, 1647
- Prerequisites:
  - FC #3000 or FC #3001
  - NNP + IP Routing
  - FC #5806 + FC #5804
  - VTAM DLUS Function

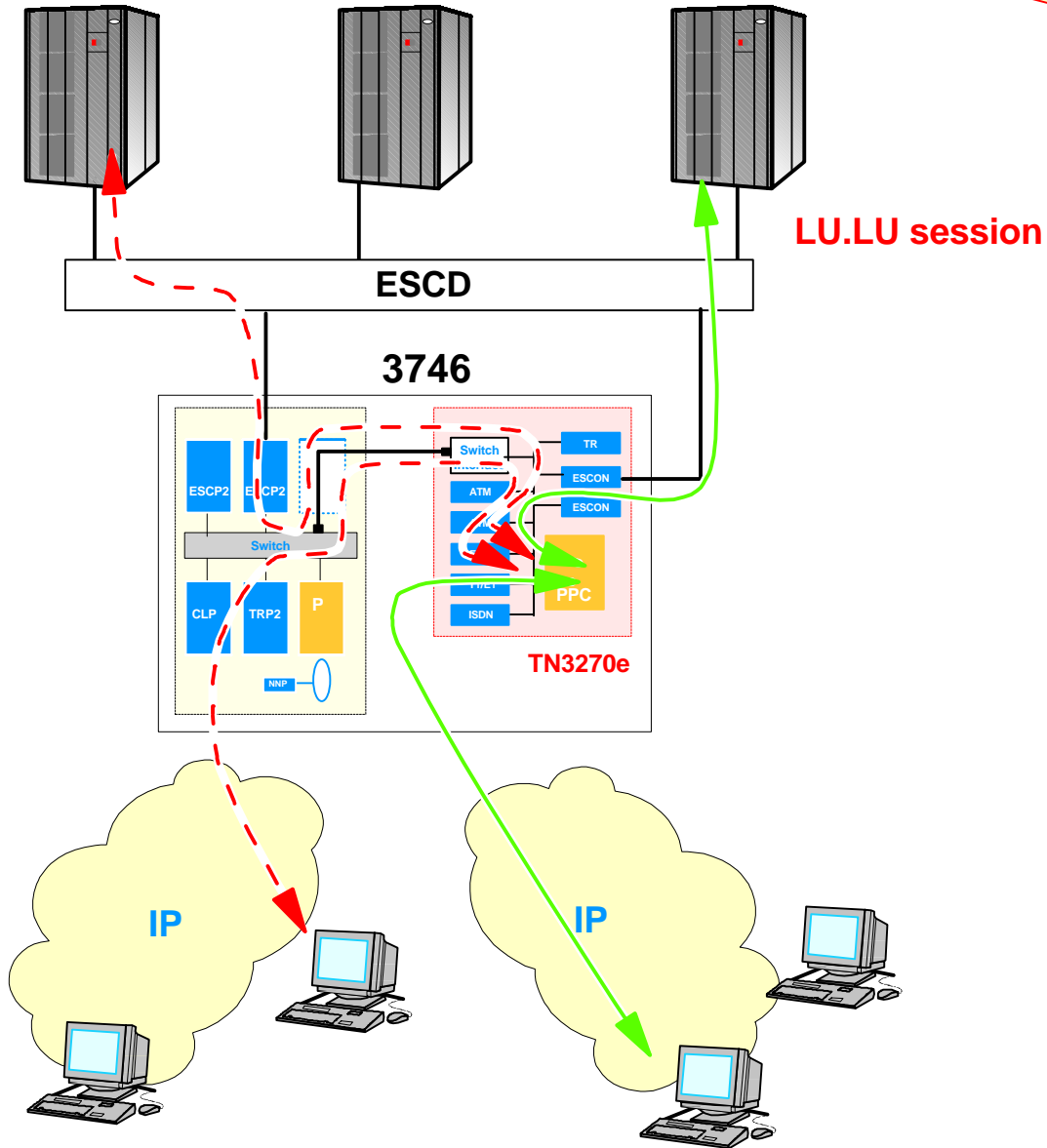
# IBM 3746 - TN3270e Server Data Path



06/12/98

Parallel Sysplex

3270 application



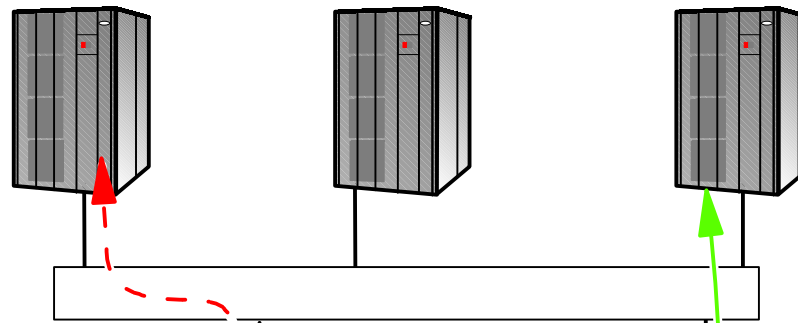
SNA

TCP/IP

# IBM 3746 - DLSw

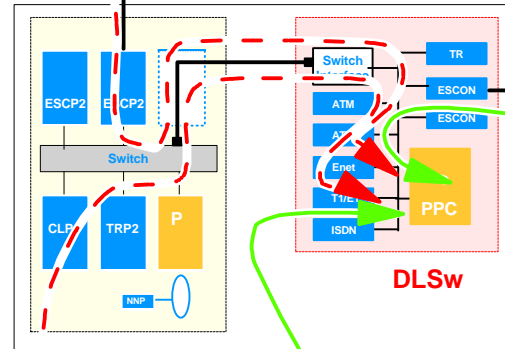


SNA  
HPR  
APPN



Parallel  
Sysplex

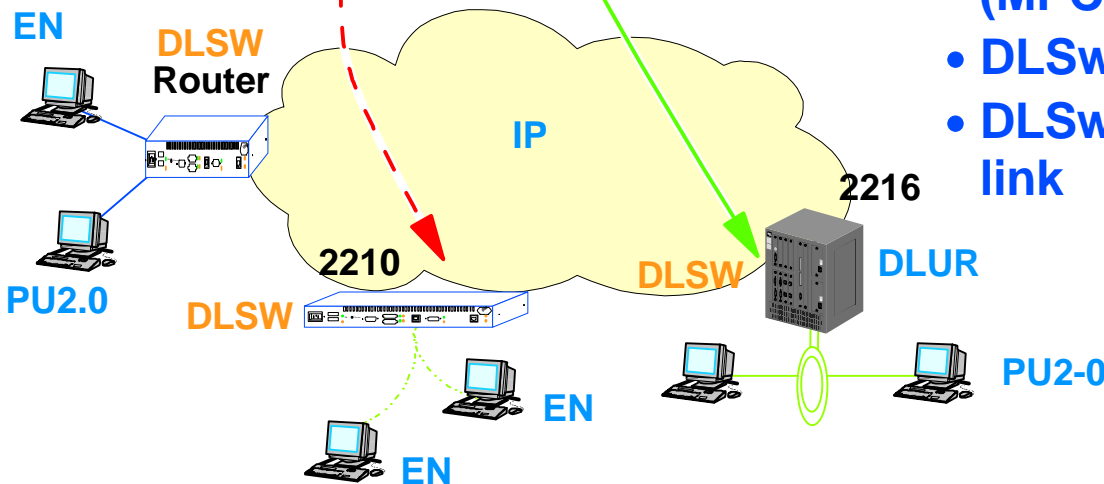
3746



DLSw

- Transport SNA/APPN traffic over IP network
- Remove need of a Front end Router
- Help customers with Router Backbone installed
- APPN/HPR over ESCON (MPC+, CDLC, LSA)
- DLSw V2
- DLSw packets over any 3746 link

IP

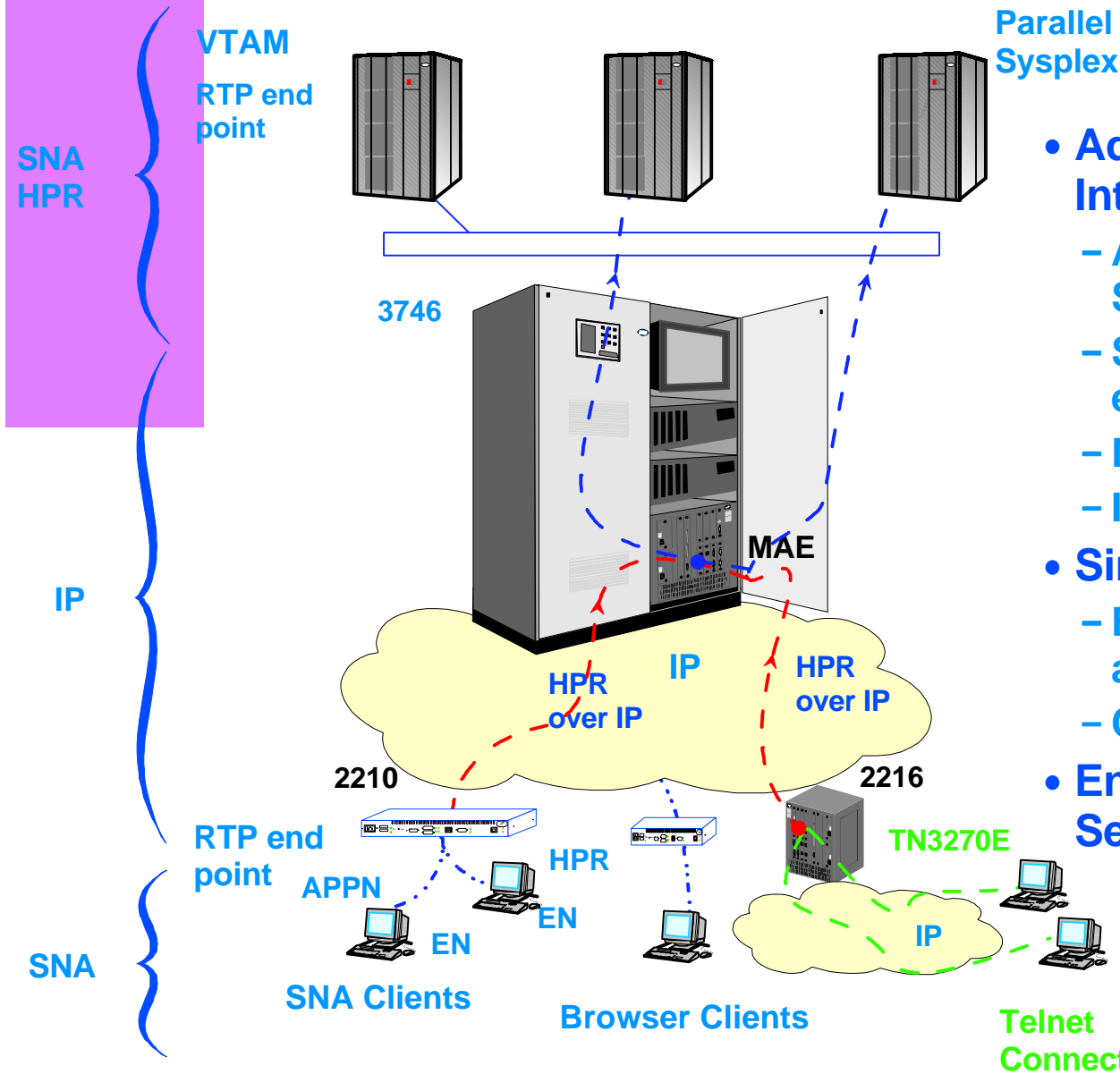


SNA

# IBM 3746 - Value add Function - Enterprise Extender

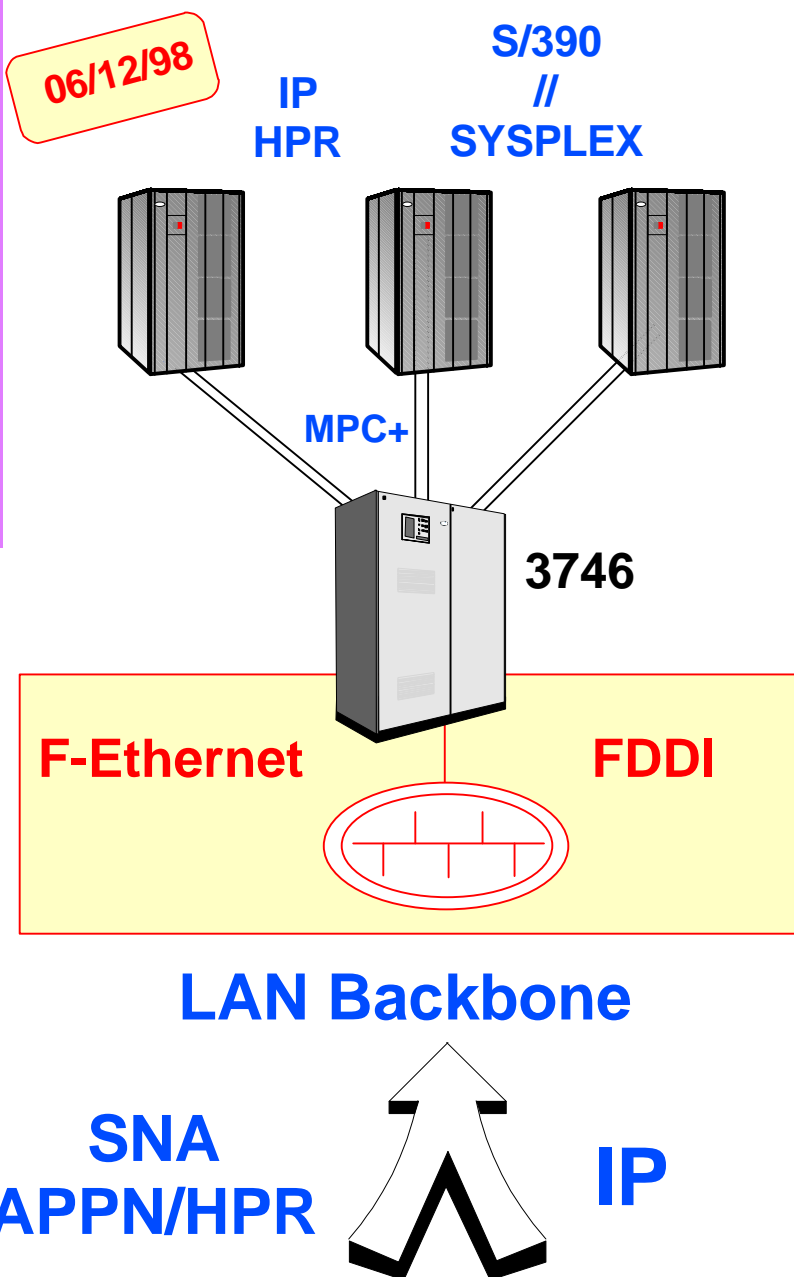


06/12/98



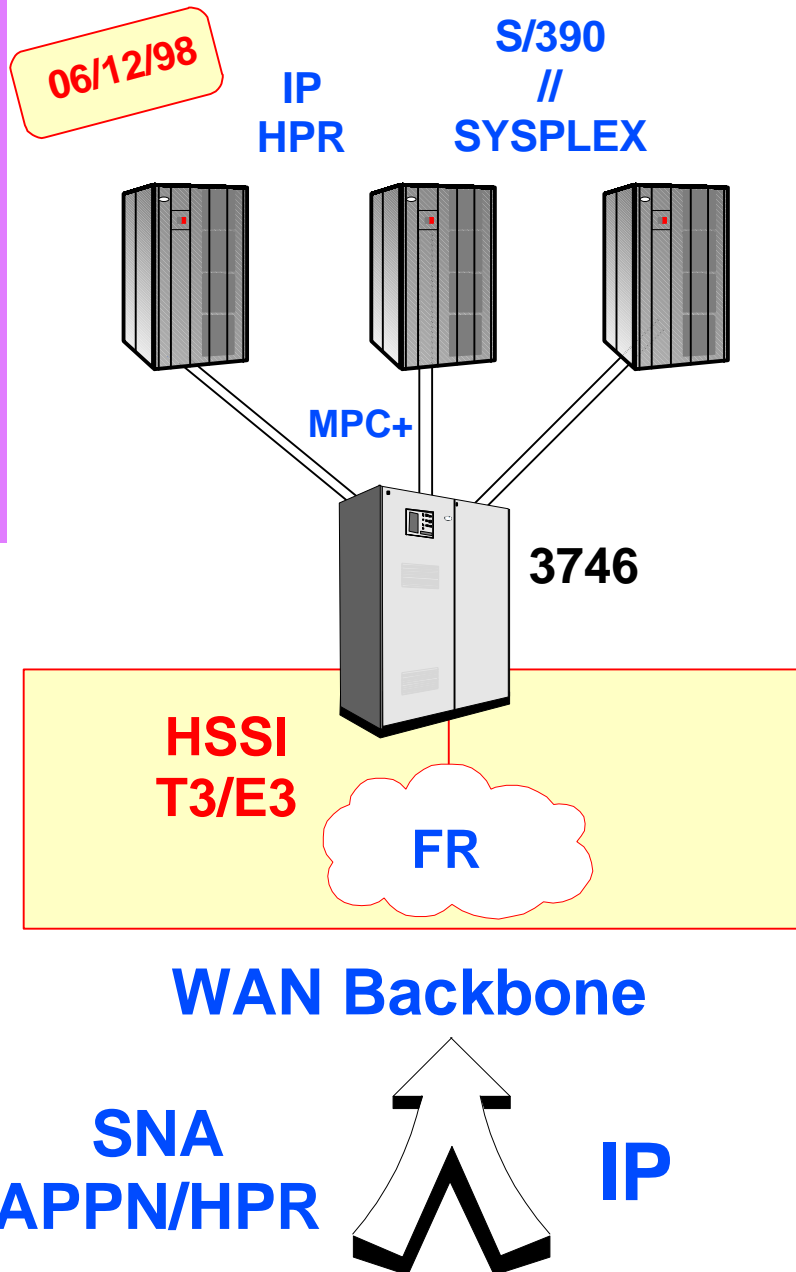
- **Advanced SNA and IP Integration Technology**
  - Along with SNA Parallel Sysplex
  - Scalable and cost effectiveness
  - Data prioritization end-to-end
  - IP network failure protection
- **Simple HPR Extensions**
  - Based on open HPR architecture
  - Contributing to AIW and IETF
- **Enable Distributed TN3270e Server**

# IBM 3746 - High Speed LAN (FDDI, F-ENET)



- Collapse high Speed LAN Backbones
- Efficient S/390 Servers High Speed LAN Access
- Fast Ethernet (FC #3288)
  - 10Mbps/100Mbps
  - Auto-negotiation
  - Hdx, Fdx
  - Standards:
    - IEEE 802.3 (10Mbps)
    - IEEE 802.3u (100Mbps)
  - Shielded RJ-45 connector
- FDDI Multi Mode Fiber (FC #3286)
  - 100Mbps
  - Standards:
    - ISO 9314-1
    - ISO 9314-2
    - ISO/IEC 9314-3
    - Station Management Rev 7.3
  - MMF SC media connector

# IBM 3746 - High Speed Serial Interface (HSSI)

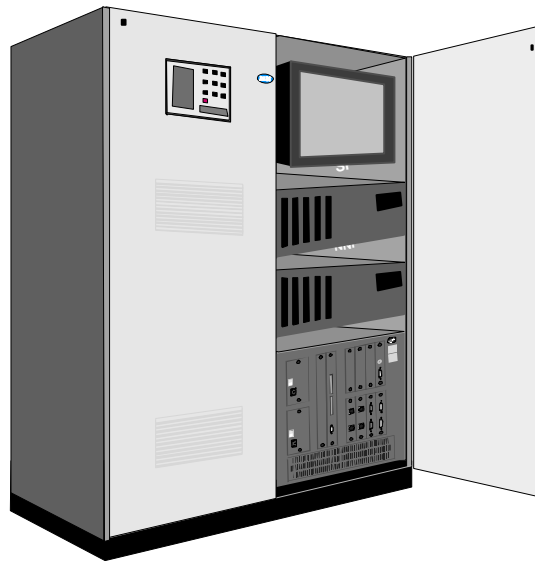


- One HSSI DCE Attachment per Adapter
  - DCE Interface
  - T3/E3 Speed
- Network Speed Range
  - 1.544Mbps up to 52Mbps
- Standards:
  - ANSI/EIA/TIA 612
  - ANSI/EIA/TIA 613
- 4.6m Cable provided
- Data Center Interconnection
- Cost Effective Consolidation of many FR connections
- Pre-requisites:
  - FC #3000 or FC #3001
  - FC #5805
  - FC #3289

# IBM 3746 - Multiaccess Enclosure



06/12/98



Multiaccess  
Enclosure

The Path to the High Speeds

- Strengthen 3746 connectivity/scalability
  - Add 8 new adapter capacity
  - Deliver High Speed Connectivity
  - Add new ESCON capabilities
    - MPC+ for APPN/HPR, IP and UDP
    - SNA passthrough (3172 like)
  - Expand Protocols/interface support
    - TN3270e Server, Enterprise Extender, IPX, DLSW
    - WW ISDN, more T1/E1
- Strengthen 3746 performances
  - MAE directly connected to the 3746 switch
  - Deliver high speed adapters
    - ATM, FDDI, HSSI, F-ENET
- Strengthen 3746 Server Access functions
  - Network Dispatcher for Intranet/Internet
  - TN3270e Server for SNA applications
  - Fast data transfer (ESCON, ATM)
  - Enterprise Extender for SNA benefits over IP infrastructure



# IBM 3746 - Field Evolution

