

NHD

What's the reason for SVN/MSS success?

- ✓ **Current network model is insufficient** to support network computing.
- ✓ MSS/SVN is based on a significantly **different model** vs. router based networks.
- ✓ SVN/MSS can be placed into an existing network and can provide an **evolutionary path** to switched networks.
- ✓ SVN/MSS is the only **comprehensive** solution that enables this evolution to e-COMMERCE Networking

***Grand Show winner, Best of Show winner
at Interops***

- ✓ **Builds on 8260 SUCCESS but can interoperate with other VENDORS to achieve SVN strategy**



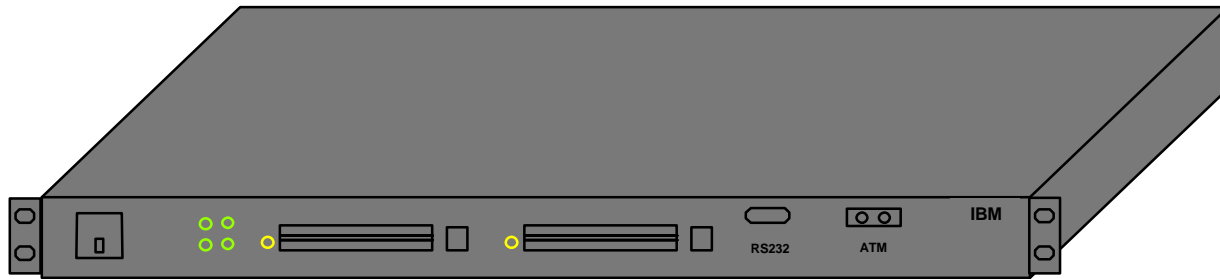
NOW.....
Single Slot !



1. *Workstation Access to MSS*
2. *Fast Processor*
3. *Tons of Memory*

8210

...the MSS solution that works with some of the "other switches" that may be out there

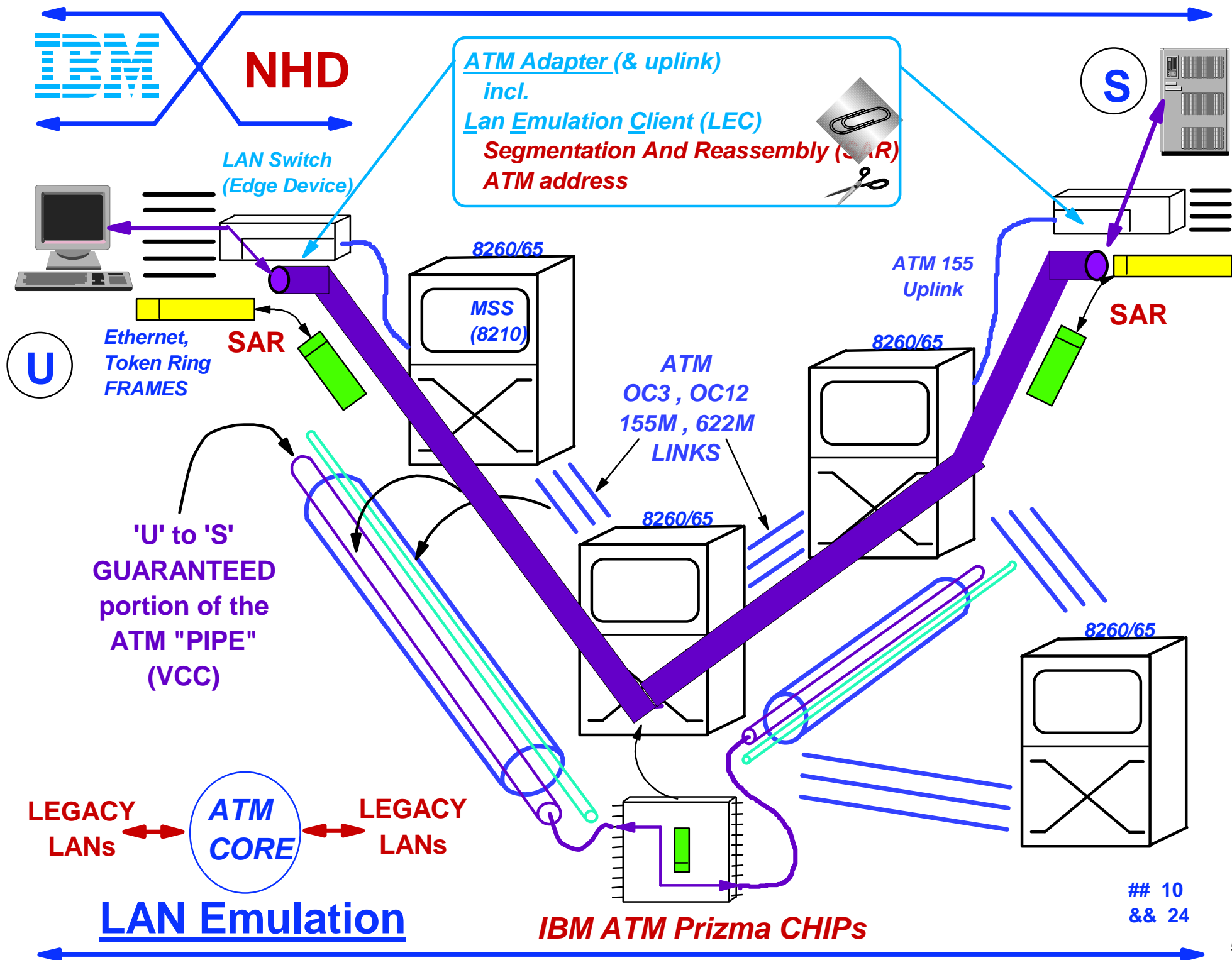


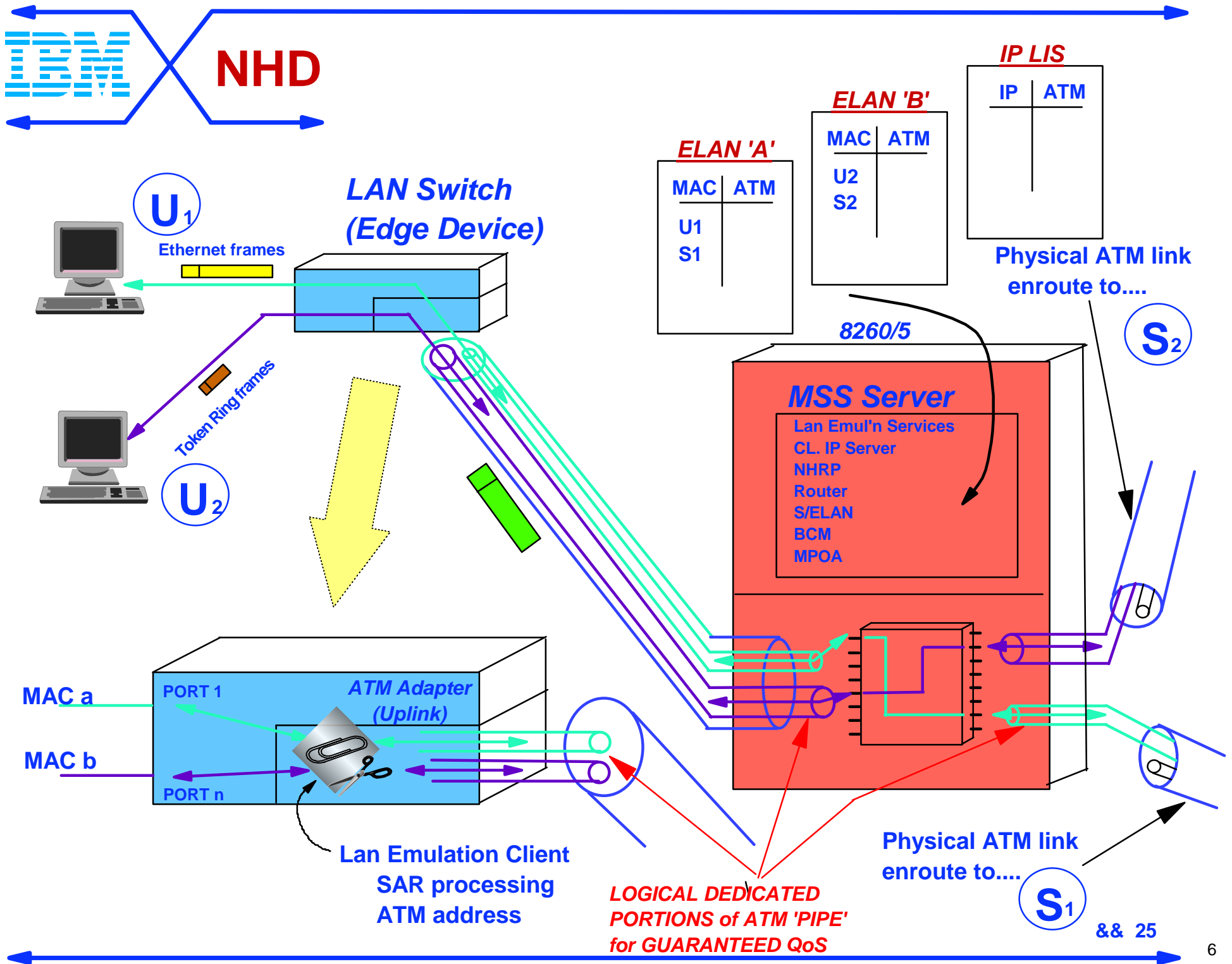
FORUM COMPLIANT implementations!...with ADDED VALUE options

Same as 8260/5 BLADE, but with ATM links

MSS (S/W) functions

- | | |
|-------------------------------------|--------|
| 1. LAN Emulation SERVICES | LANE |
| Server | LES |
| Config'n Server | LECS |
| Broadcast Unknown Server | BUS |
| 2. Classical IP ARP Server | |
| 3. Super ELANs | S/ELAN |
| 4. Broadcast Manager | BCM |
| 5. NHRP Cut Thru Routing | |
| 6. MSS Client | |
| 7. RouteServing Client with MSS 2.0 | |
| 8. MPOA Server | |





Multiprotocol Switched Services



MIGRATION ,....Routing to SWITCHING
LEGACY Network INVESTMENT PROTECTION
removes ROUTING from DATA PATH
new MULTIMEDIA applications

8265 HIGHLIGHTS

12.8 Gbps B/Plane
- non-blocking
56 x 155 Mbps OC3 ports
14 x 622 Mbps OC12 ports
Superior TRAFFIC Management

LAN Emulation Server

- NO change to N/W, migrate at own pace

CLASSICAL IP

- switched path between IP subnets , NO CHANGES

POLICY-BASED VLANS

MOVES,ADDS,CHANGES, membership = LOGICAL

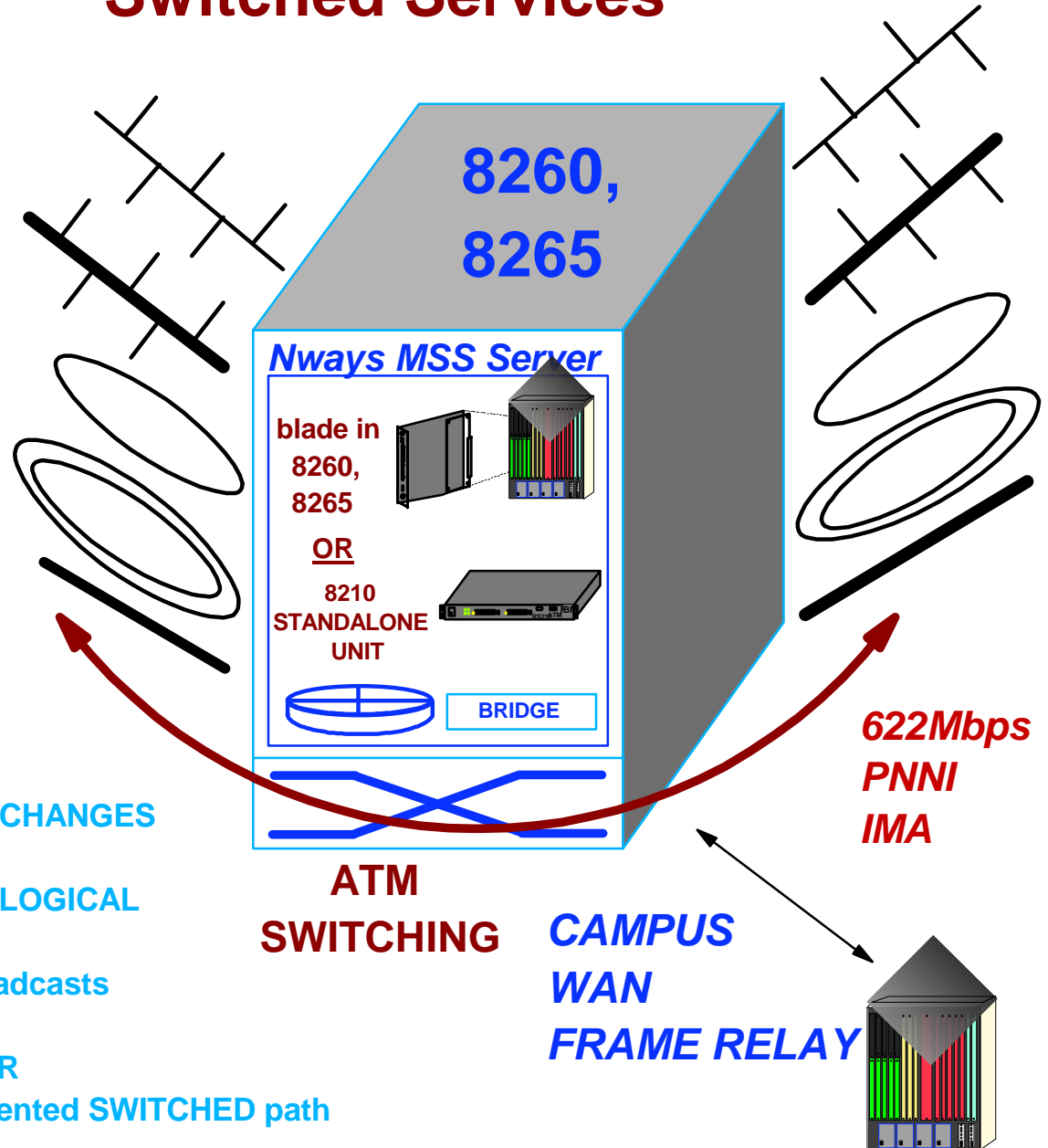
BROADCAST MANAGEMENT

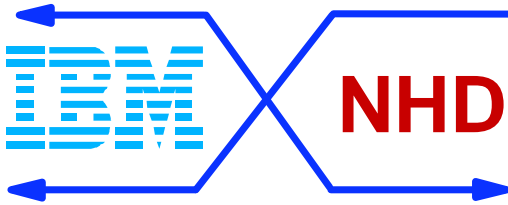
- ONLY implementation to CONTROL broadcasts

MULTIPROTOCOL over ATM (MPOA)

- route determined ONCE by MSS SERVER

- DATA transported via CONNECTION Oriented SWITCHED path





SHORTCUT thru next 28 pages
(pages 10-37)

Detailed
Pages

1. CLASSICAL IP (CIP)

(11-12)

- allows IP endstations to communicate over SWITCHED LAYER 2 ATM core

2. LAN Emulation (LANE)

(13-15)

- allows LEGACY LAN endstations to communicate over SWITCHED LAYER 2 ATM core
- endstations become "members" of Emulated LANS (ELANs)

3. SECURITY VCC

(16)

- forces additional criteria on endstation's qualification to become member of ELAN

4. SUPER VLAN (S/VLAN , S/ELAN)

(17-24)

- allows endstations in different ELANS to communicate over LAYER 2 ATM

5. BROADCAST MANAGER (BCM)

(25-26)

- additional facility of MSS that learns broadcasting patterns, and suppresses certain broadcasts to endstations that BCM knows they are not intended for

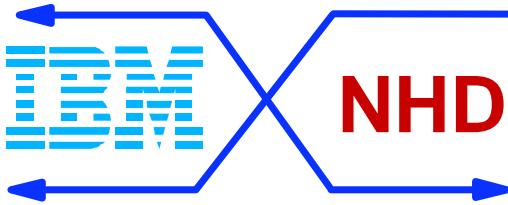
6. NHRP

(27-28)

- method of "searching for" destination endstation via LAYER 3 IP Routing and returns discovered destination's ATM address to ROUTE SERVER (ie.,MSS), for use in setting up switched ATM sessions

= UNIQUE IBM Implementations
ADDED VALUE EXTENSIONS to STANDARDS

11
&& 27



SHORTCUT thru next 28 pages
(pages 10-37)

Detailed
Pages

7. **MSS CLIENT**

(27)

- distributes portions of MSS SERVER to LAN SWITCH (Edge Device)
- allows LAYER 2 ATM session to be set-up from Edge Device

8. **ROUTESWITCHING CLIENT**

(27)

- distributes NHRP CLIENT right out to S/W "shim code" in ENDSTATION
- allows LAYER 2 ATM session to be set-up from End Station (ie. ZERO-HOP Routing)

9. **MPOA**

(29-30)

- Multi-Protocol Over ATM
- allows ENDSTATIONS of ANY PROTOCOL to have Layer 2 ATM Switched connection after Virtual Routing (NHRP) sets up path

10. **MSS DOMAIN CLIENT**

- a H/W Routing Engine in the EDGE Device (...But NOTHING to do with MSS !)

11. **MIGRATION EASE**

(31-35)

- allows conversion from LAN SEGMENTS to ELANs and IP Subnets to Classic IP LIS's at own pace, while continuing to use ROUTING function
- a H/W Routing Engine in the EDGE Device (...But NOTHING to do with MSS !)

12. **REDUNDANCY of MSS**

(36)

- allows MSS function to be DISTRIBUTED to BACKUP / STANDBY nodes for use when PRIMARY MSS facility fails

= UNIQUE IBM Implementations
ADDED VALUE EXTENSIONS to STANDARDS

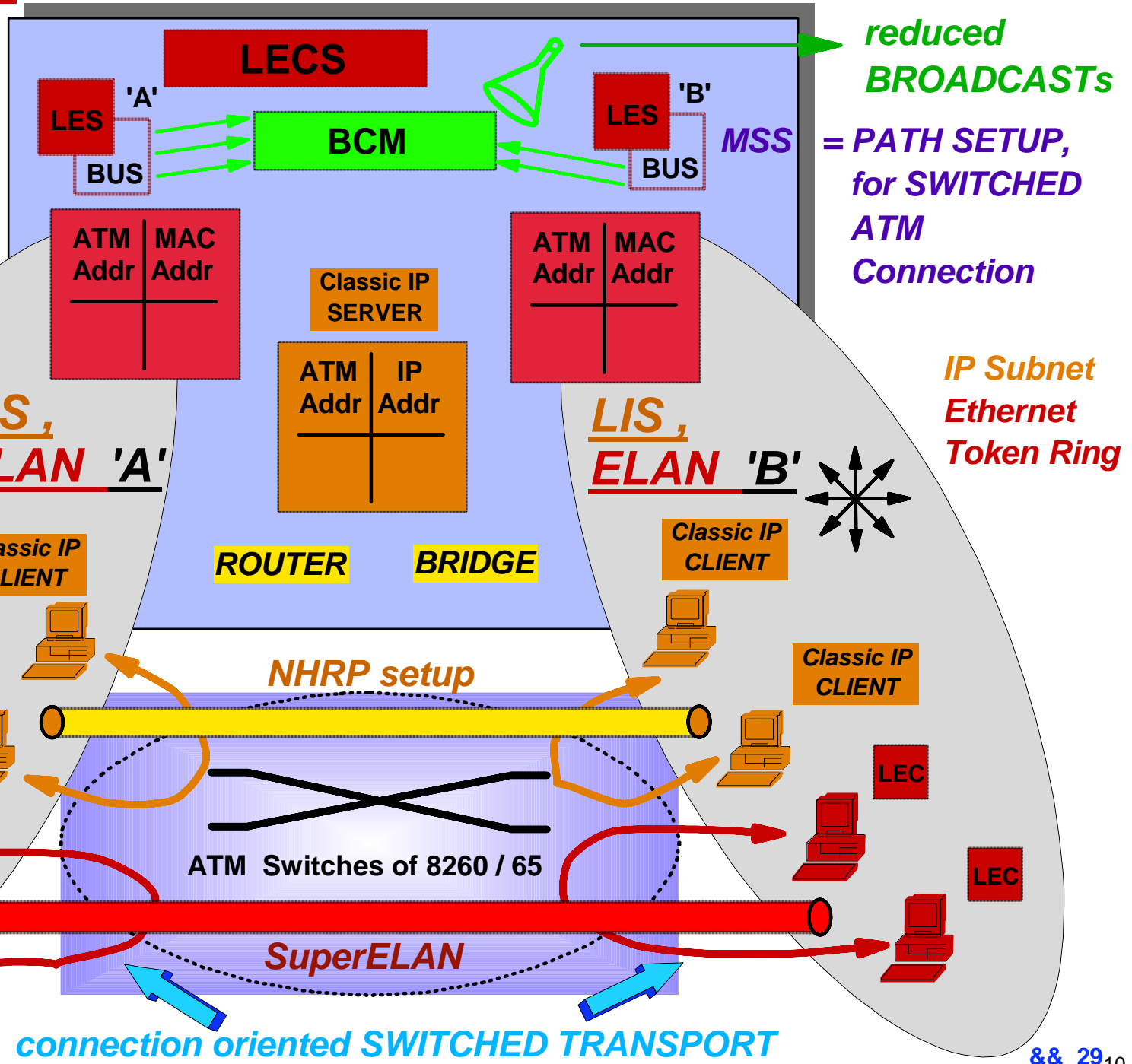
12
&& 28

Classical IP , LAN Emulation

NHRP , SuperELAN

MSS Basic Building Blocks

IP Subnet
Ethernet
Token Ring



reduced BROADCASTS

= PATH SETUP, for SWITCHED ATM Connection

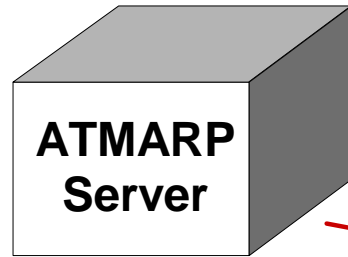
IP Subnet
Ethernet
Token Ring

ATM connection oriented SWITCHED TRANSPORT



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CLASSICAL IP



Another "VLAN-like" Implementation

- Subnet membership independent of physical location
- Subnet scalability

*in MSS,....
(IP - ATM addr tables)
of
LIS Members*

Simpler than LANE

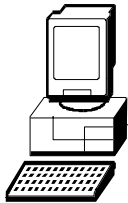
- Easier to implement
- Better performance
- Fewer resources (VCs)

IP	ATM

But less function....

- IP Only
- ATM Only
- No Broadcasts (get with MARS)
- No Configuration Server

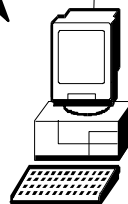
Classic IP Client



Logical IP Subnet (LIS)

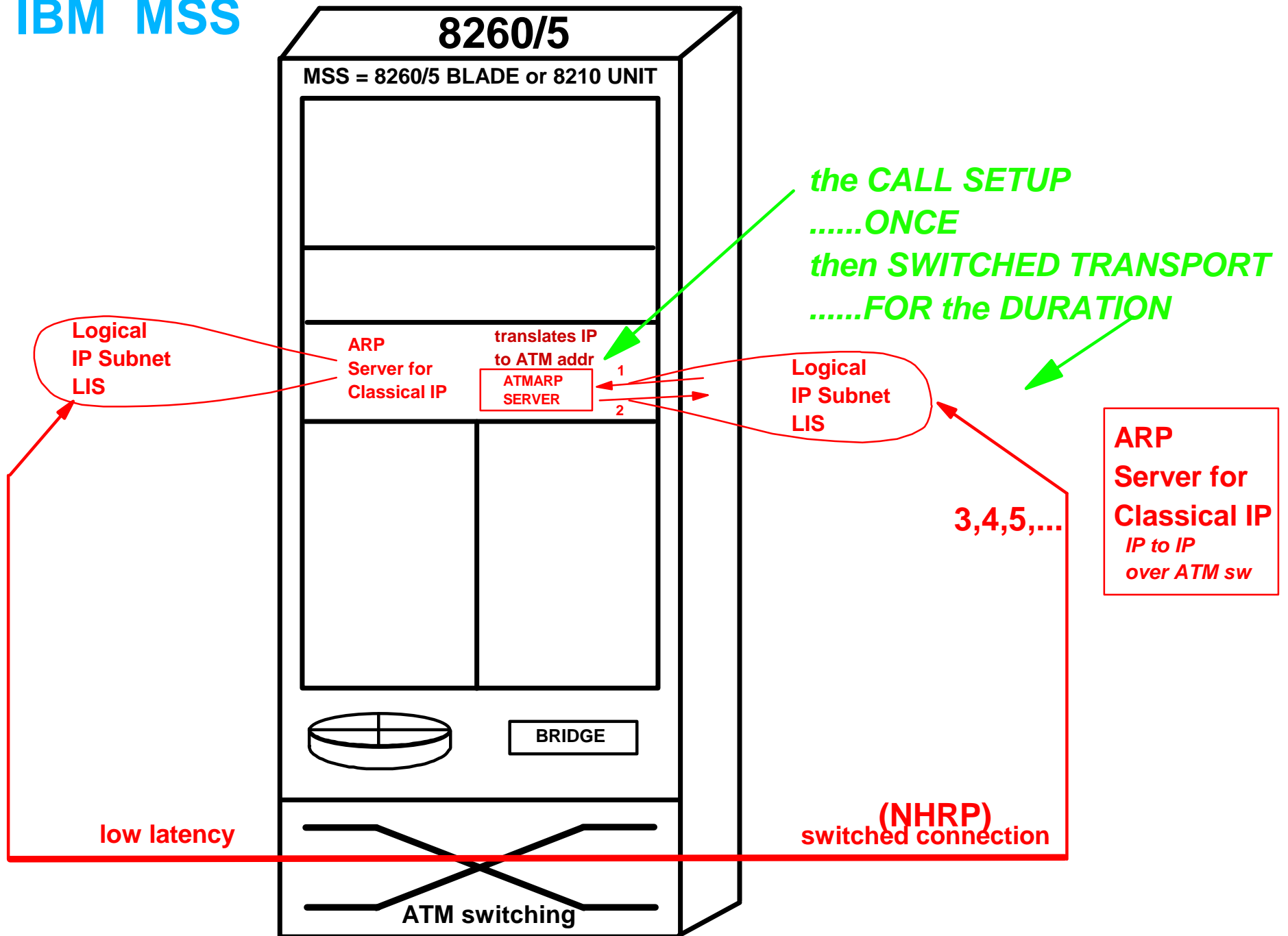
RFC 1483 VCC

*IP to IP
communication
over
ATM Transport*

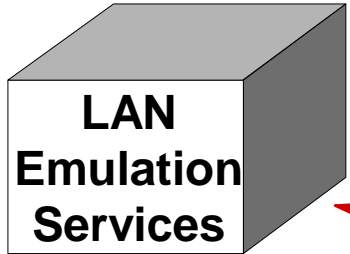


Classic IP Client

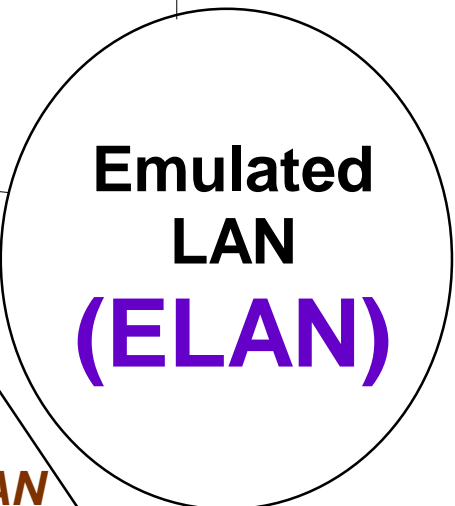
IBM MSS



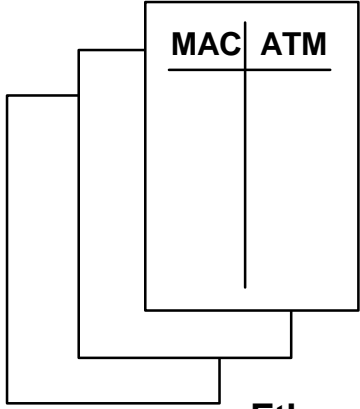
Multiprotocol Switched Services



in MSS,....
LAN Emulation Configuration Server **LECS**
LAN Emulation Server **LES**
Broadcast + Unknown Server **BUS**

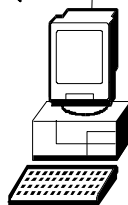


in MSS,....
(MAC - ATM addr tables)



"groups" of endstations that form "logically , commonly" attached connections become MEMBERS of Emulated LANS

Legacy Frame LAN to Legacy Frame LAN communication over ATM Transport

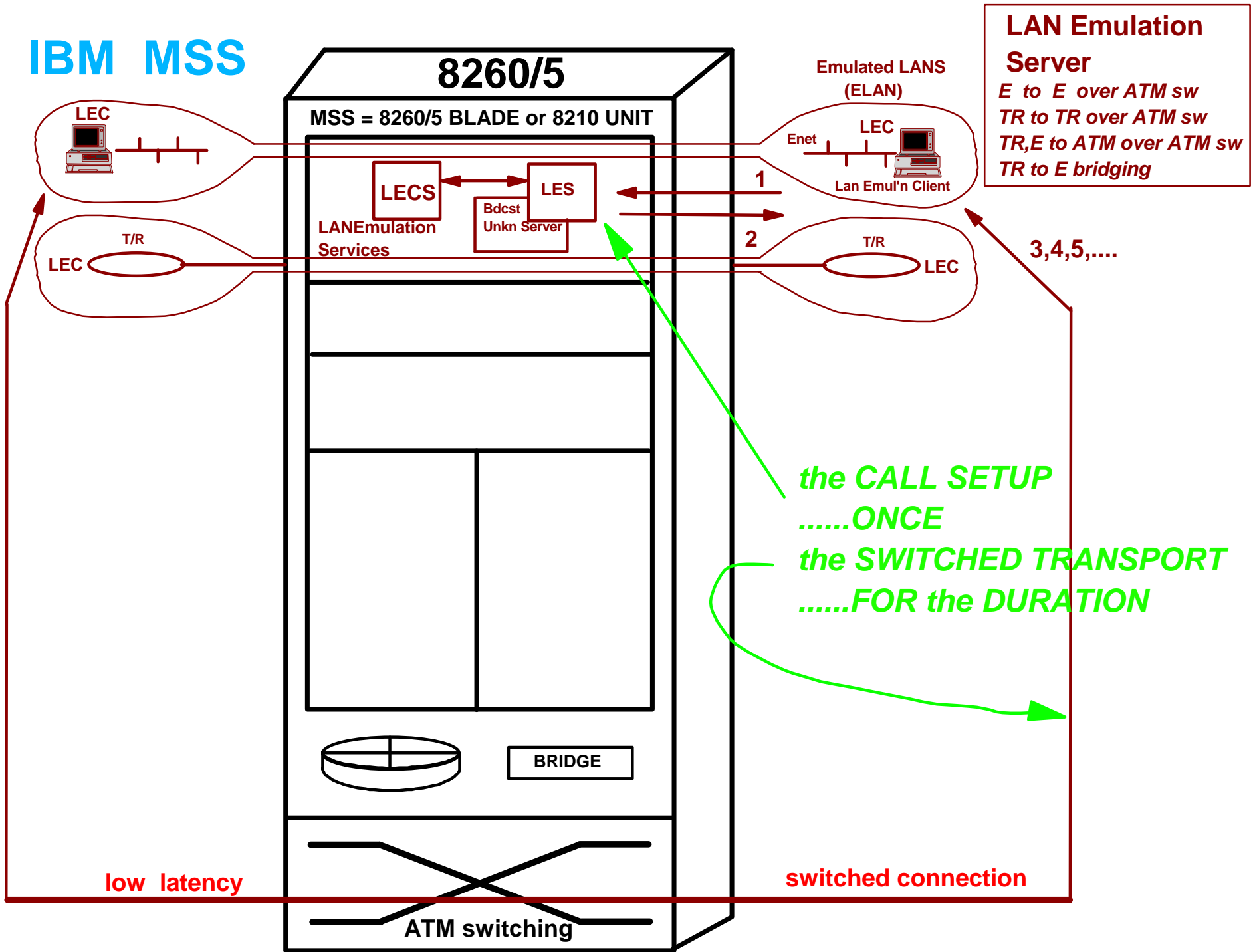


LAN Emulation Client (LEC)

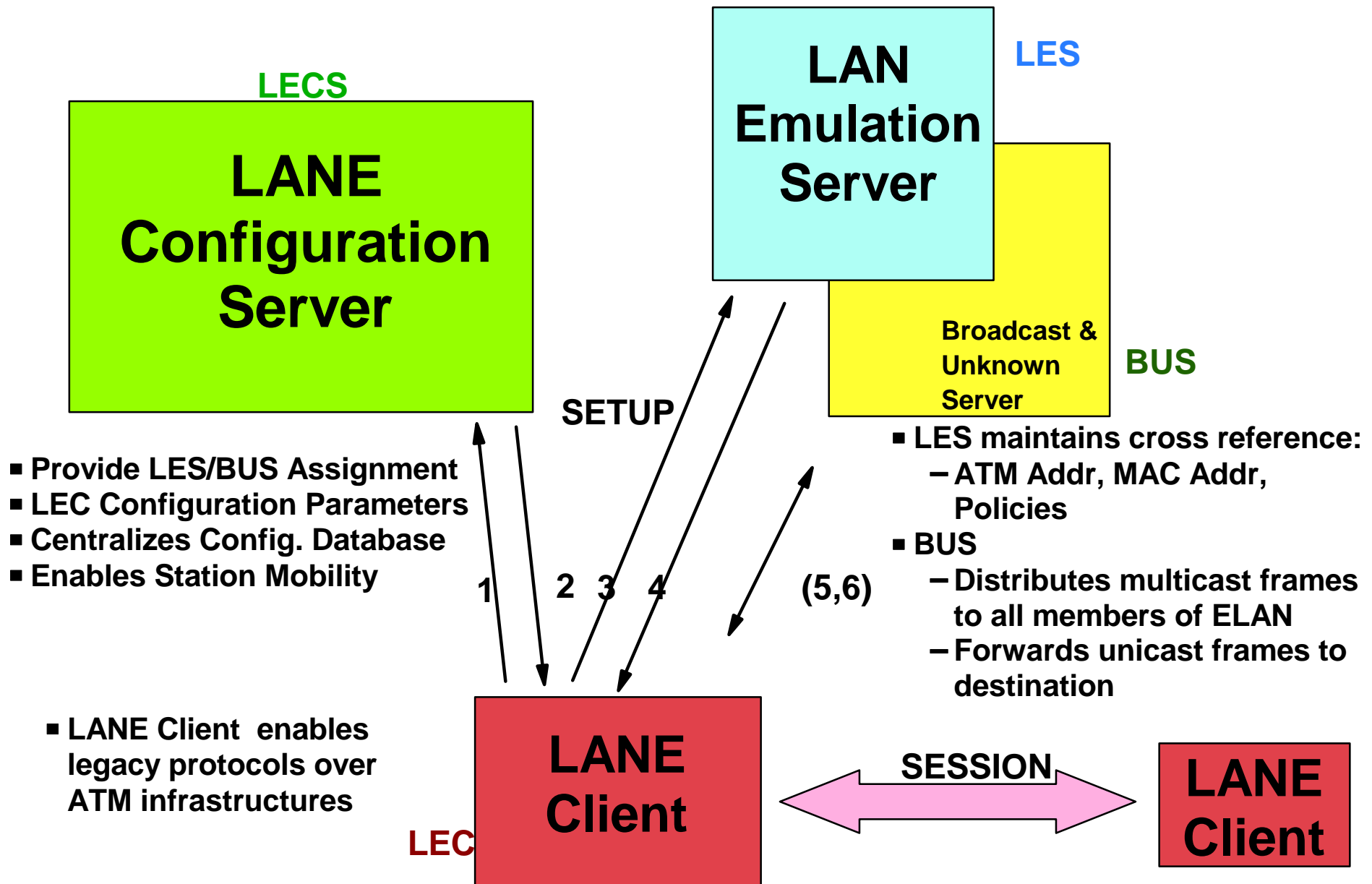
in ATM Endstation, or more likely, in EDGE LAN Switch

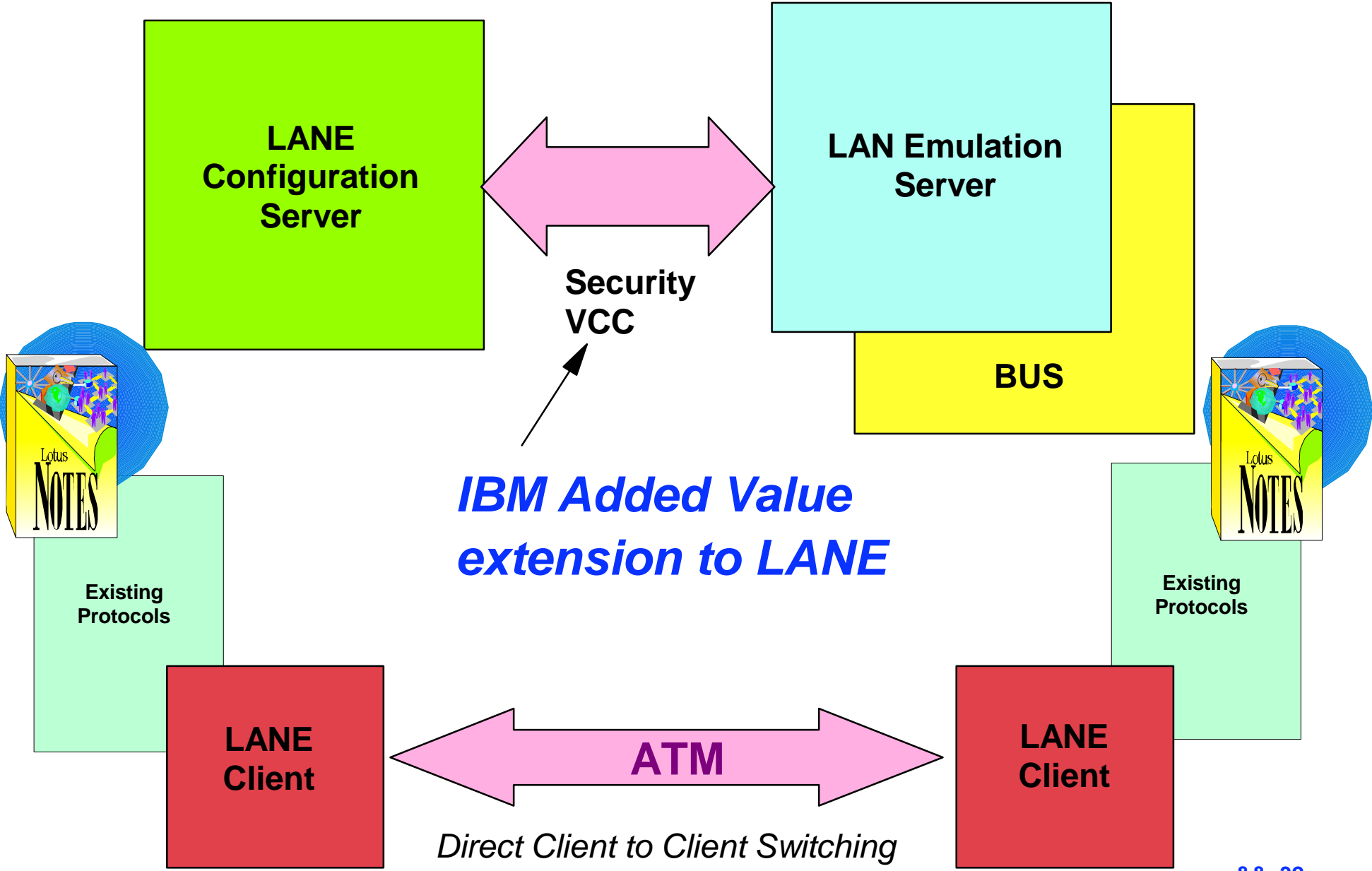
- Ethernet , Token Ring Endstations
- ATM core transport
- uses RFC 1483 "packet formatting" for EN / TR at edge

IBM MSS

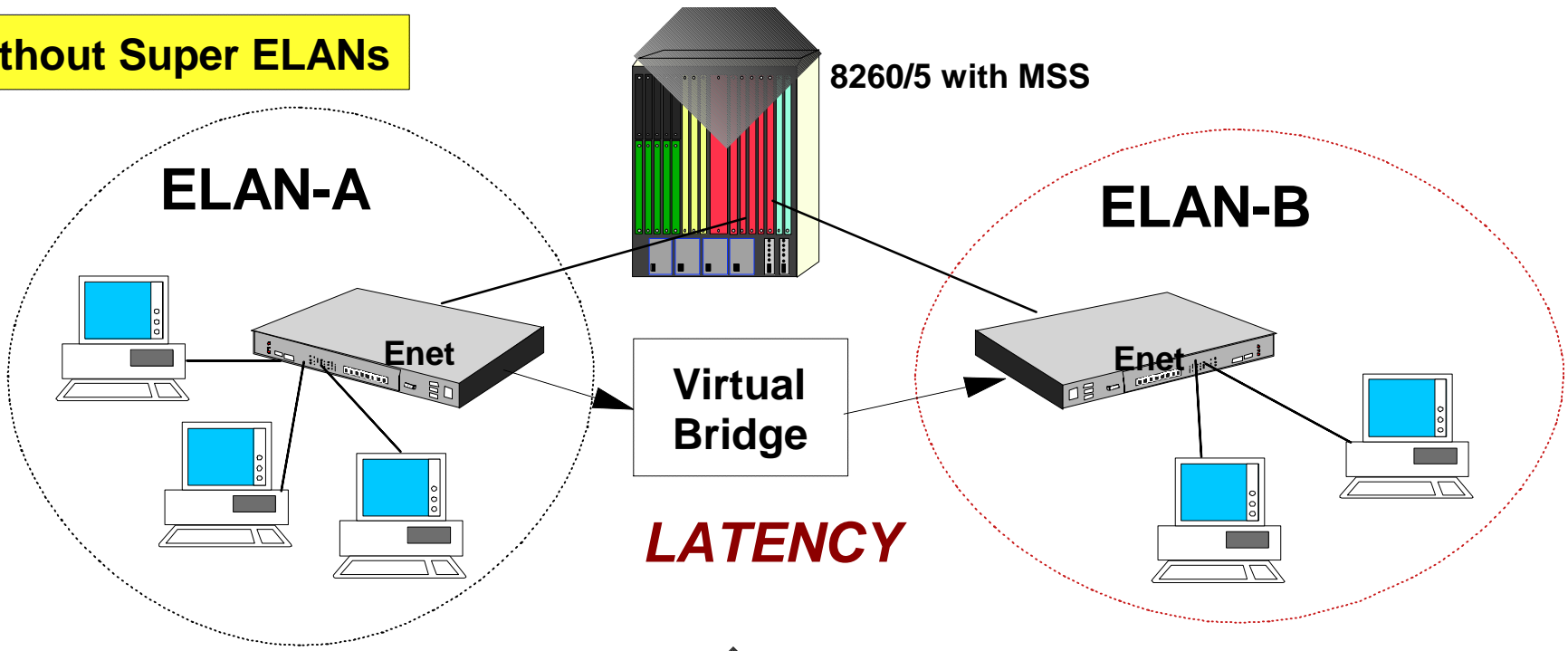


Multiprotocol Switched Services

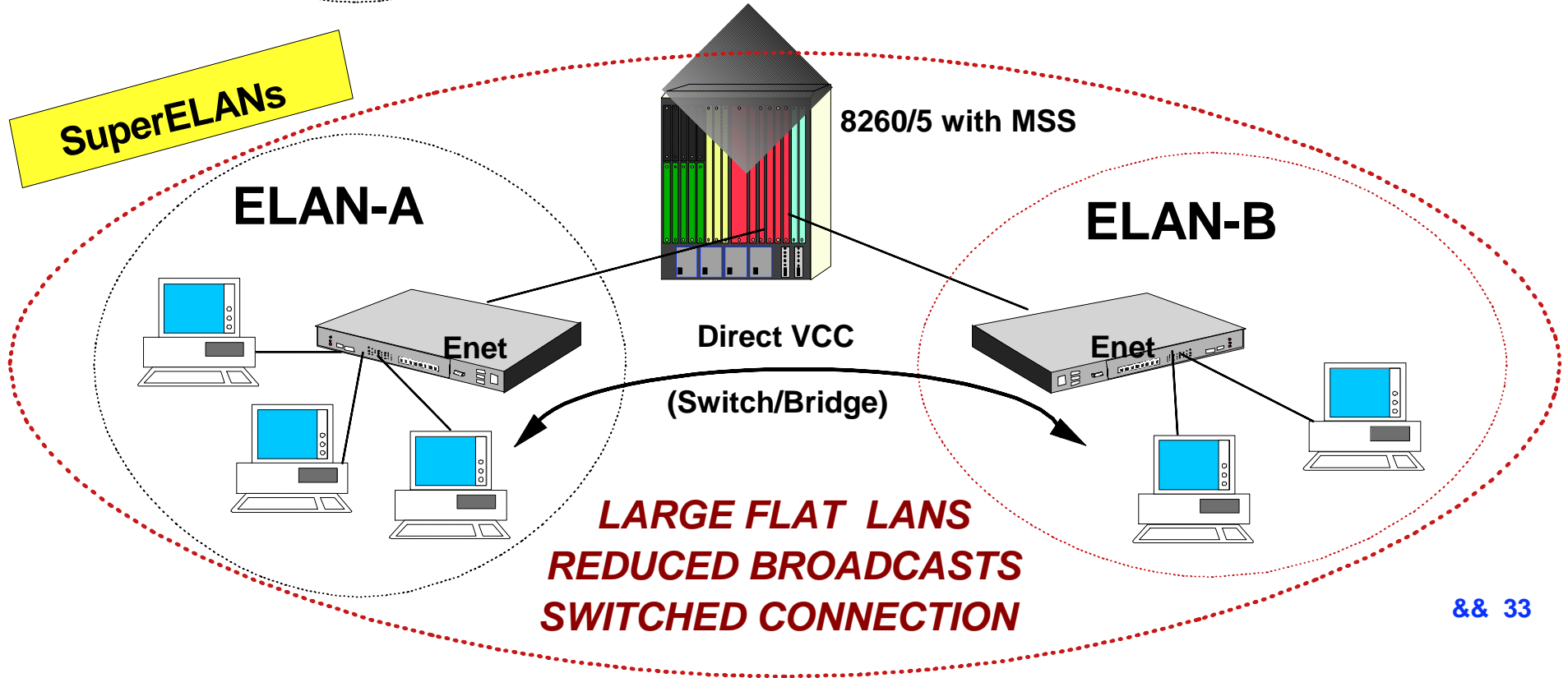


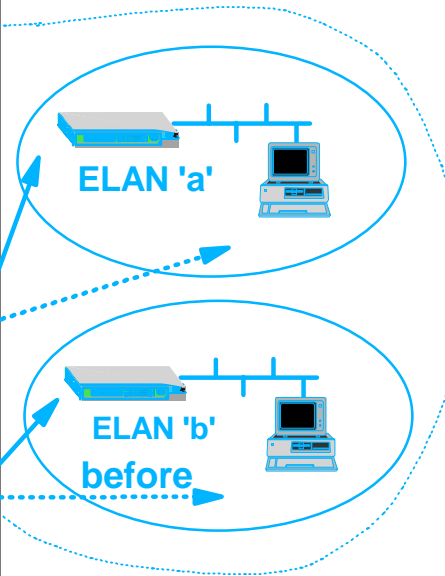
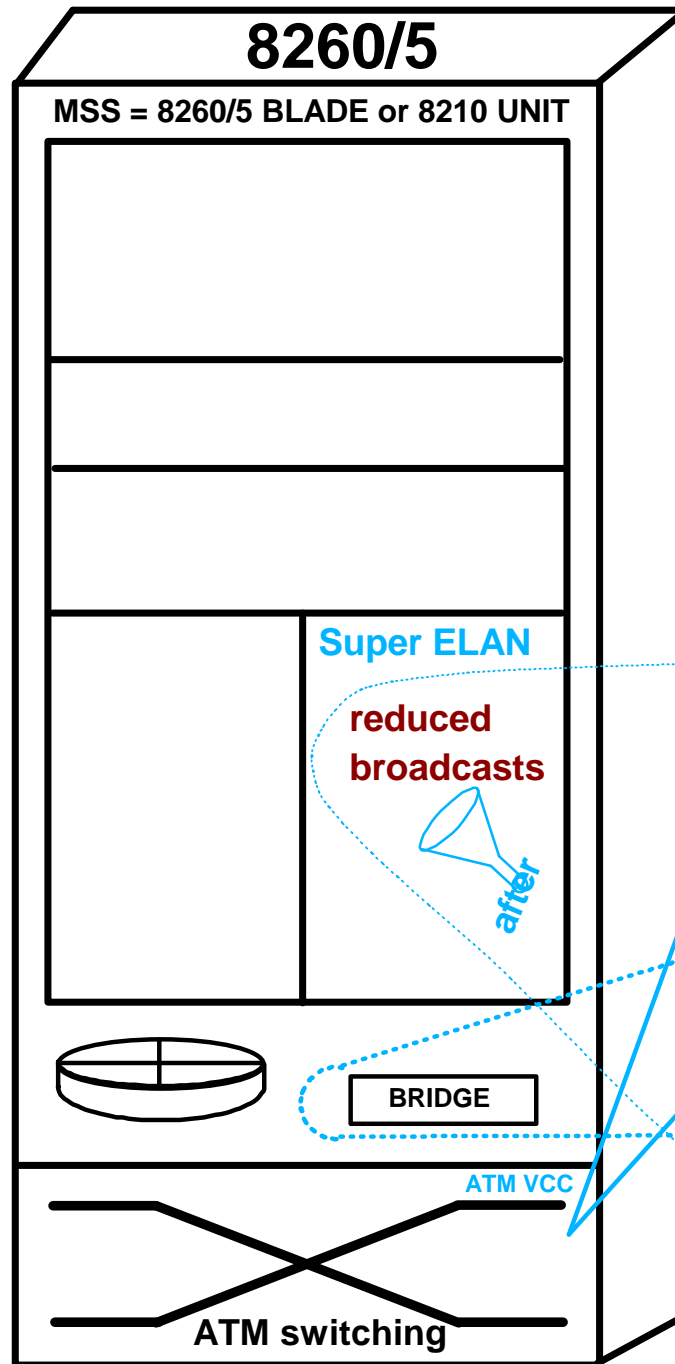


Without Super ELANs



SuperELANs

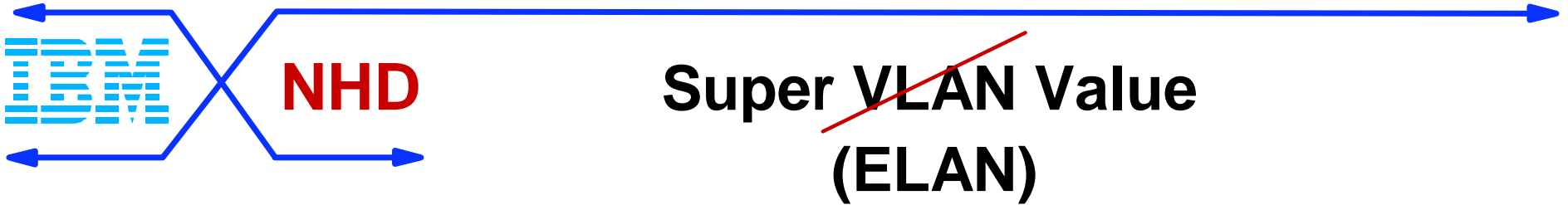




SuperELAN
allows for
VERY LARGE
FLAT LANs over
SWITCHED ATM
and **BROADCAST**
reduction

CUT-Through Bridging

Multiprotocol Switched Services



■ **Scaleability:**

- Problem: Flat LANS don't scale
- Super ELAN: Enables ELANs to be grouped into LARGE ELANs

■ **Gigabit throughput**

- Problem: Routers are bottlenecks going between campus segments
- Super ELAN: Will establish ATM switched connections between ELAN segments

■ **Intercampus VLANs**

- Problem: VLANs need too much broadcast/address resolution overhead to grow beyond a single campus
- Super ELAN: Keeps most overhead local



VLAN ... Virtual LAN

- a "GROUPING" of workstations, end-stations, hosts that are in the SAME BROADCAST DOMAIN.
 - i.e. a broadcast frame is received by ALL members of the VLAN
- Member stations administratively grouped by various criteria
 - ports , addresses , protocols , etc.
 - and *capabilities of vendors' products*. (proprietary pending 802.1q)
- Broadcast containment typically managed by creating smaller domains of "like , resource-sharing, or collaborating" users.
- Does not scale to large networks.

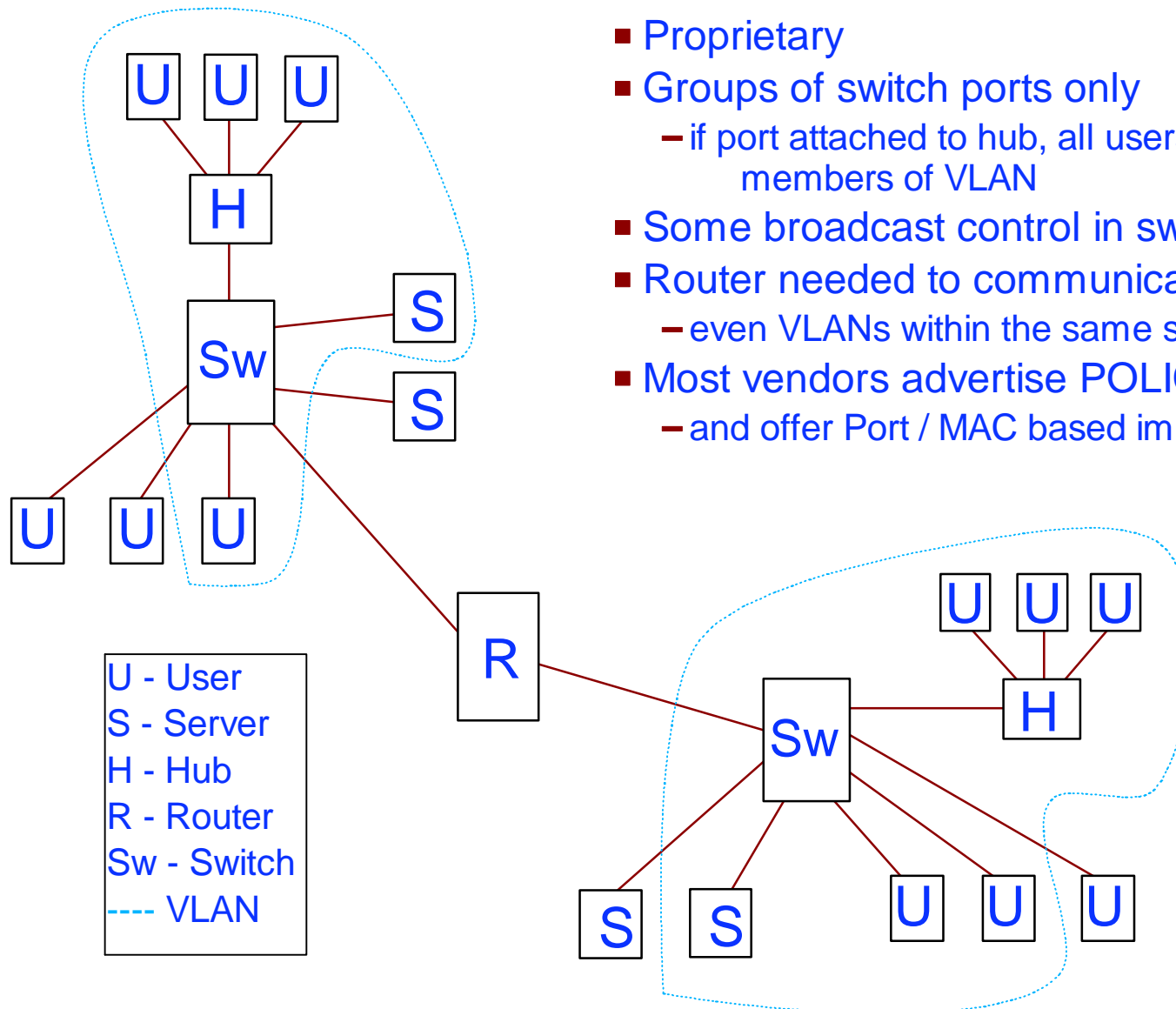
ELAN ... Emulated LAN

- also a "GROUPING" of workstations, end-stations, hosts that are in the SAME BROADCAST DOMAIN.
- BUT, because of the "one to one" connection orientation of the sessions set up by LANE, (and Classic IP)
 - the broadcasts can be intercepted, and directed to target devices
- Eliminates disruption to all other devices in the Emulated LAN.



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Today's port-based VLANs...GOOD!



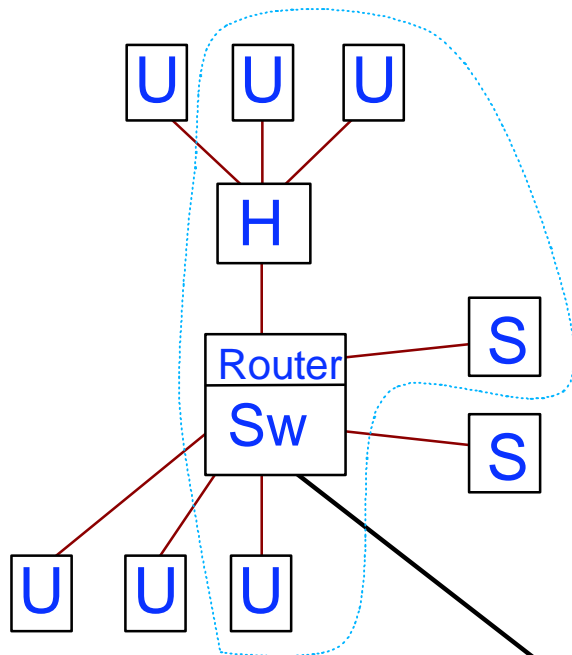
- Proprietary
- Groups of switch ports only
 - if port attached to hub, all users on that hub are members of VLAN
- Some broadcast control in switched environment
- Router needed to communicate between VLANs
 - even VLANs within the same switch
- Most vendors advertise POLICY BASED VLANs
 - and offer Port / MAC based implementations

U - User
S - Server
H - Hub
R - Router
Sw - Switch
--- VLAN



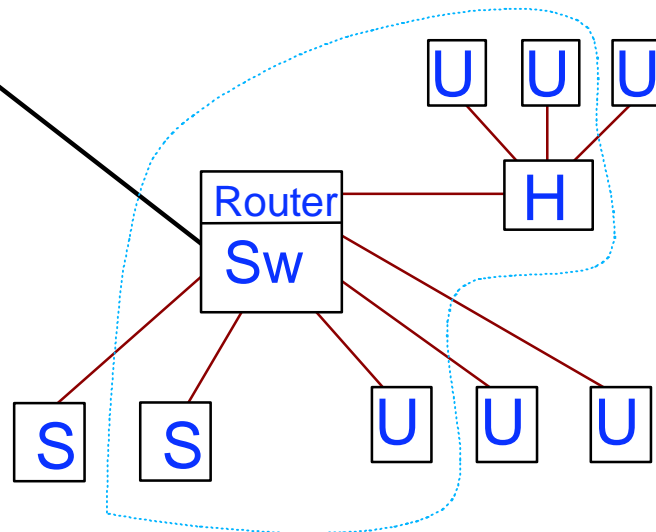
NHD

RouteSwitch VLANs...BETTER!



- Proprietary
- VLANs based on network addresses (MAC & Layer 3)
 - allows greater flexibility
- Policy or rules-based VLANs
 - membership 'rules', established by network management, based on combination of MAC and Layer 3 protocols
- Internal router
 - but router still needed to communicate between VLANs
- Trunking protocol
 - proprietary aggregate ATM or FDDI links between switches
- RouteSwitch Product Family:
 - 8273, 8274

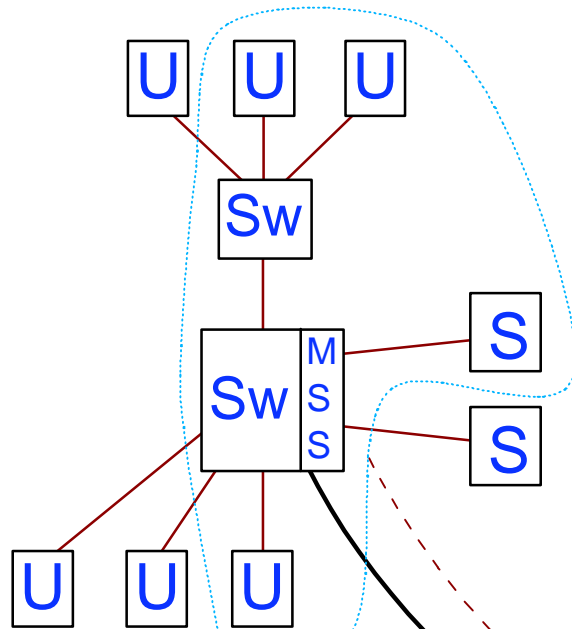
U - User
S - Server
H - Hub
Sw - Switch
--- VLAN
— Trunking Protocol



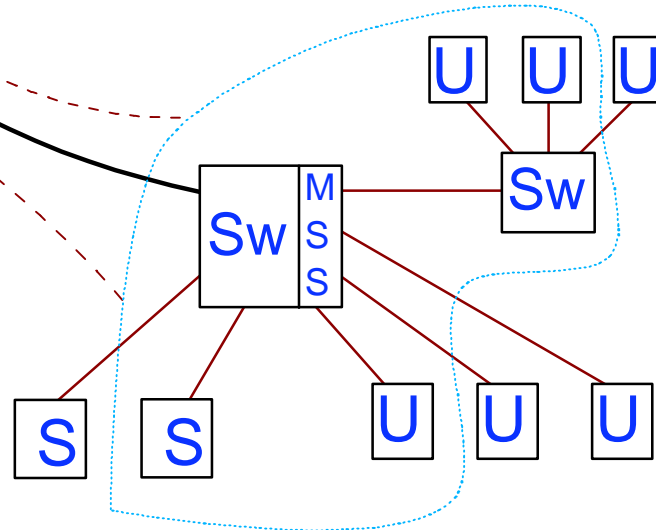
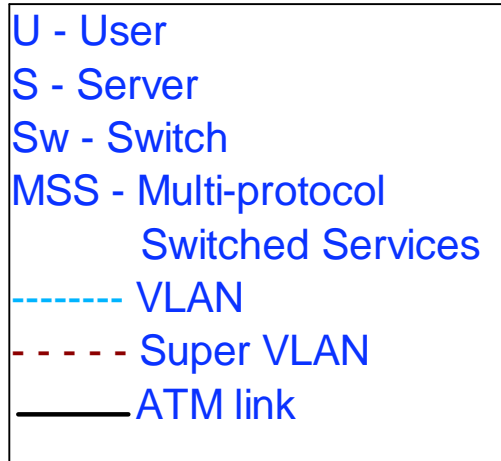


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MSS & Emulated LANs (LANE)...BEST!



- Standards-based LANE
 - MAC layer
- Router is eliminated!
 - Routing handled at network edge by MSS
- IBM MSS Exclusives:
 - Broadcast Management
 - ▶ significantly reduced broadcast traffic
 - Super VLANs
 - ▶ 'virtual circuit' between members of different VLANs
- ATM/MSS Product Family:
 - 8210, 8260, 8265, 8285





VLANs or MSS?

Proprietary VLANs

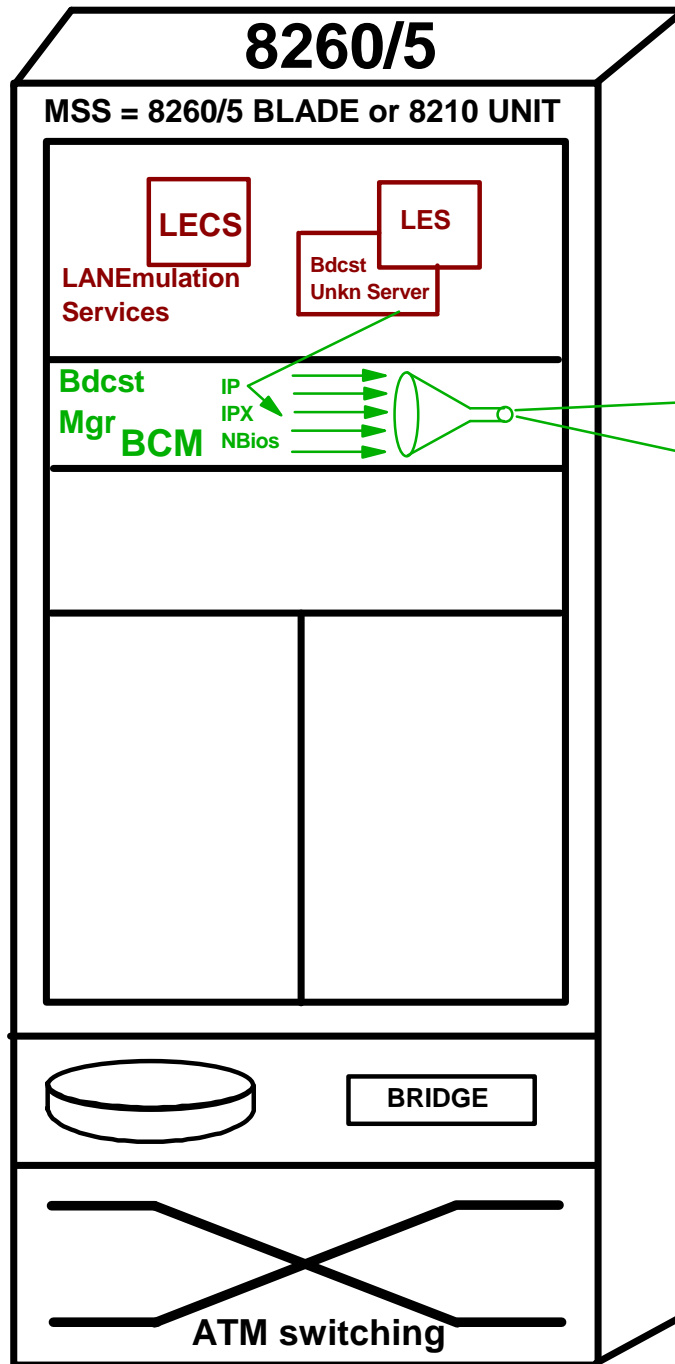
1. Switched VLANs
 - proprietary methods to group users based on network layers
 - physical, MAC, & Layer 3
2. Restrict & control broadcasts
 - not within VLANs, however
3. Administration
 - adds, moves and changes simplified
 - *but*, VLAN membership must still be tracked and maintained
4. Provides means of restricting access to parts of network
5. Router still needed
 - for communication between VLANs

Standard LANE with MSS

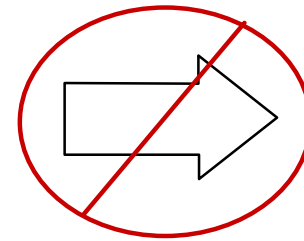
1. ATM VLANs with MSS
 - groups of users based on ATM standards
 - LAN Emulation (LANE)
2. *Eliminate* broadcasts w/BCM
 - even within Emulated LANs!
3. The 'flat' network
 - same administrative advantages
 - *and* the need for VLANs largely reduced due to BCM
4. Deploy ELANs *only* when access must be restricted
5. Super VLAN
 - ATM 'Virtual Circuit' between ELANs

Why implement proprietary VLANs ???

IBM MSS



"XYZ"
Bdcsts



"ABC"
Wkstns

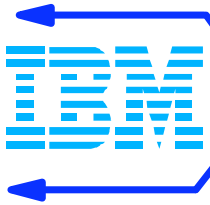
Filtered,
Directed
Unicasts

**BCM
Broadcast
Manager**
reduces ,filters
MULTICASTS to
directed endst'ns



" the **BROADCAST MANAGEMENT** implementation in IBM's MSS is it's **SILVER BULLET....LARGE FLAT LANs** with the major issue of **BROADCASTING SIGNIFICANTLY** reduced or gone!..."

Multiprotocol Switched Services



NHD

BCM , Broadcast Management

Manage protocol broadcast traffic

- ★ BUS receives all BROADCASTS
- ★ Stations receive only the broadcasts they need
- ★ Thresholds for allowable broadcast rate

IP Networks

- ★ ARPs are 'unicasted' to intended workstation

IPX Networks

- ★ RIPs and SAPs are forwarded only to servers and routers

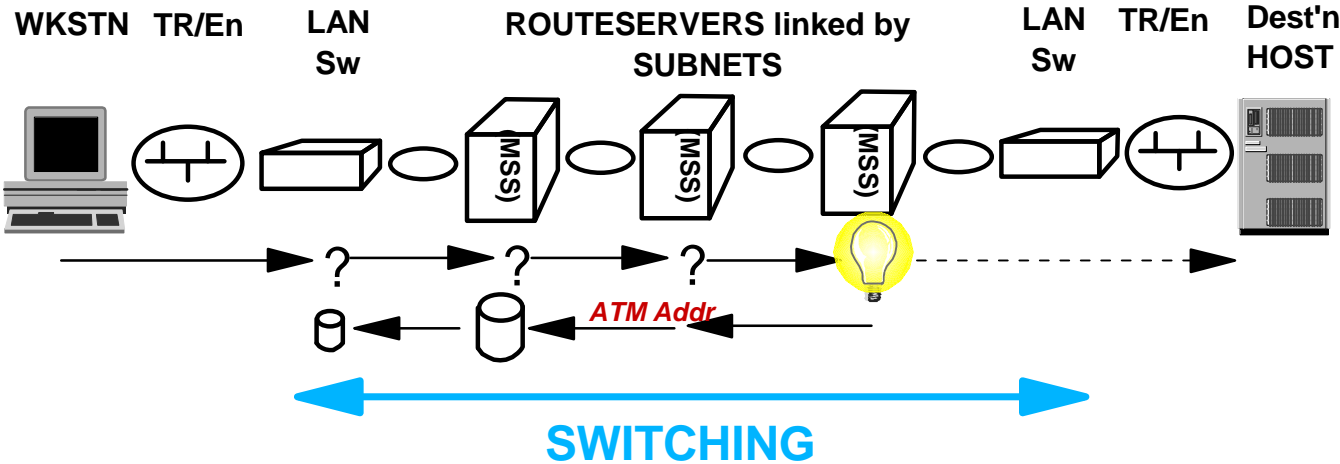
NetBIOS

- ★ NetBIOS name caching
- ★ Filtering of repeated transmission of multicast frames



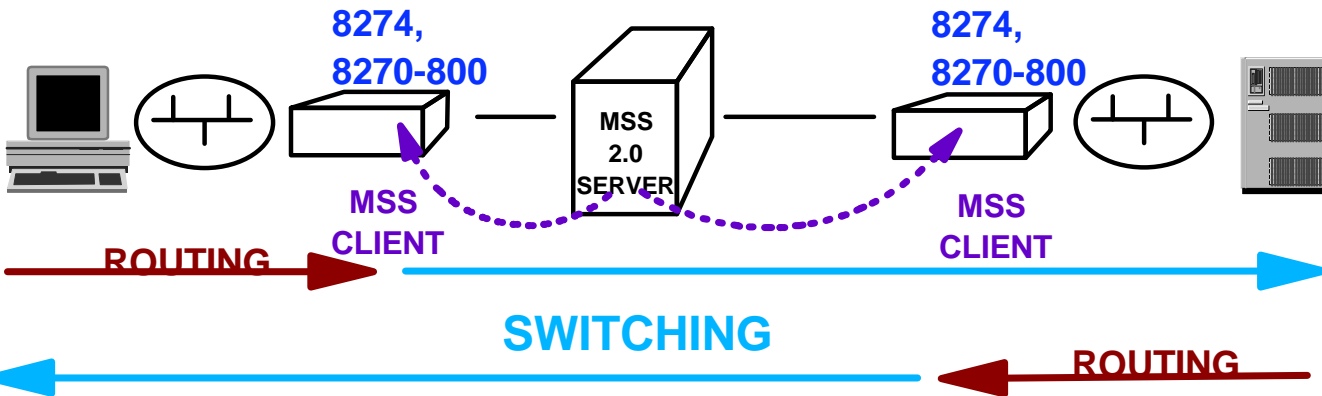
NHD

SHORT CUT ROUTING with NHRP

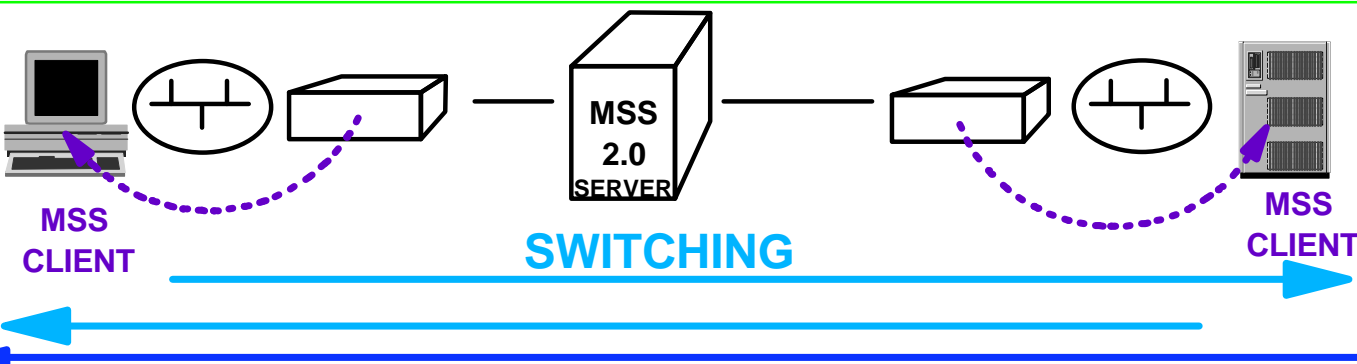


THE NHRP process

NOW, Move NHRP Client further OUT to EDGE

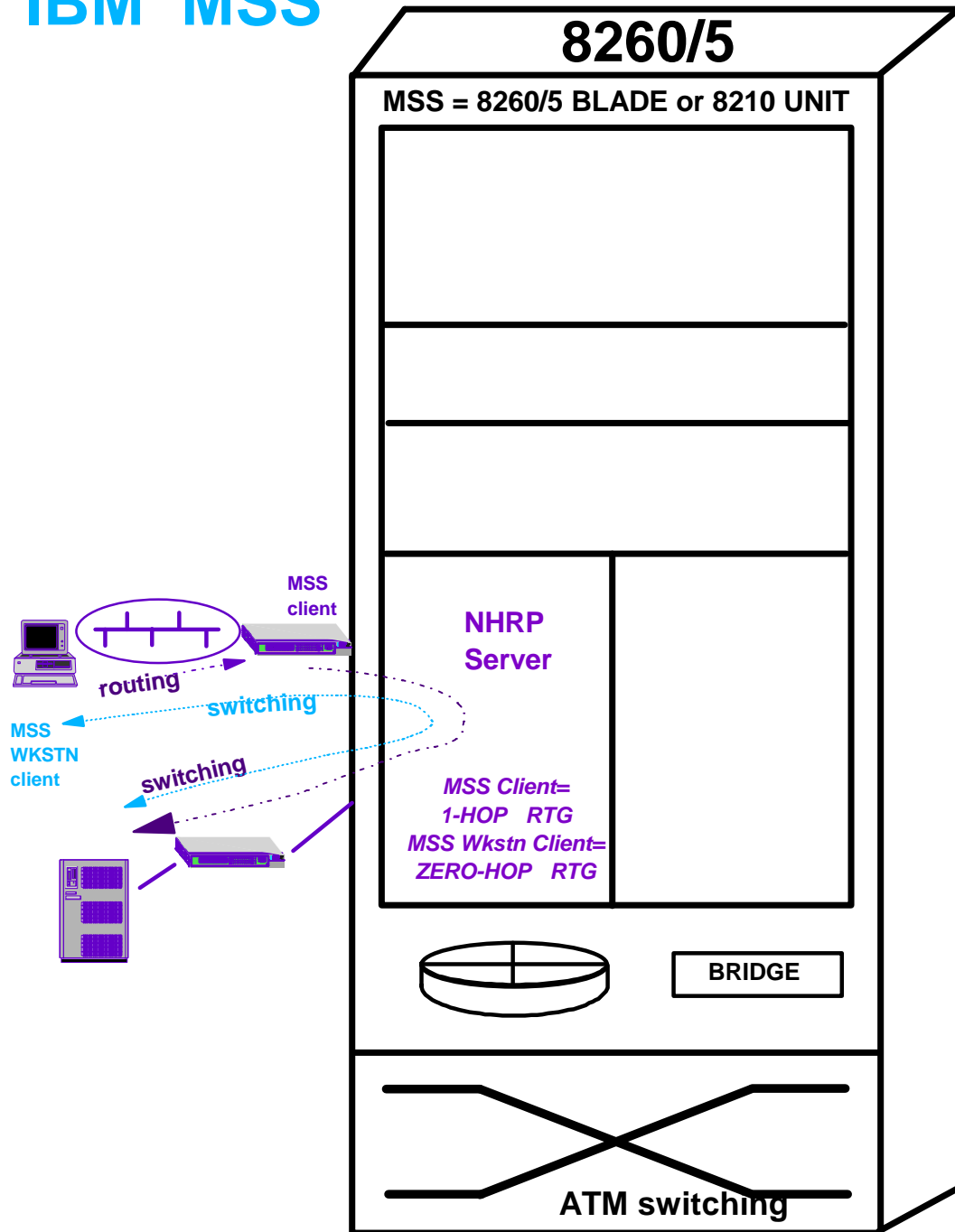


EDGE SW
ONE HOP ROUTING,
with MSS Client and MSS 2.0



ZERO-HOP ROUTING,
with MSS Workstation Client
MSS RouteSwitching Cl.
IP Switching Client
Zero-Hop Routing Client

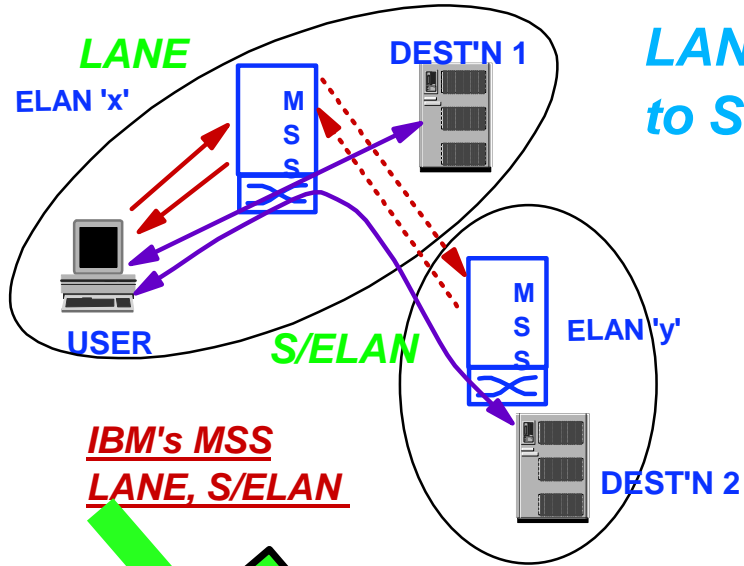
IBM MSS



NHRP Cut-thru Routing the 'searching' and addr resolution process to allow IP - IP transport over ATM

Multiprotocol Switched Services

IBM **NHD** **LANE to NHRP to MPOA**

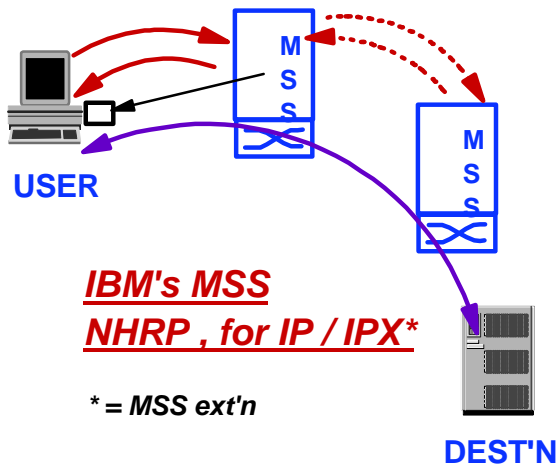


LANE (& S/ELAN) allow End-station to Server layer 2 switching

NHRP sets up IP reach and search to provide ZERO-HOP Routing

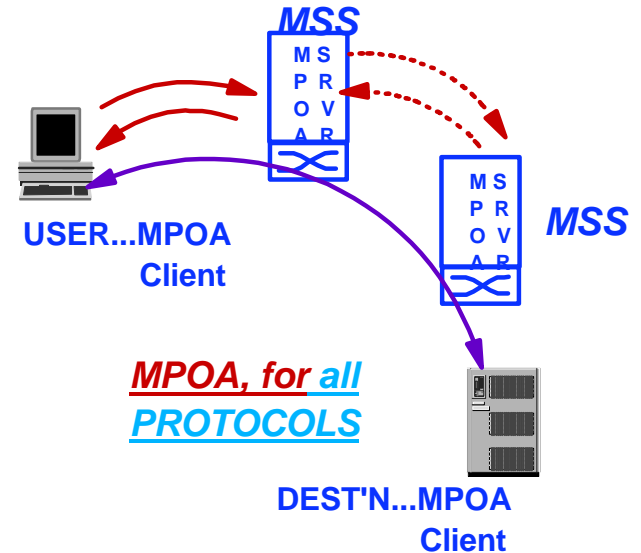
Using NHRP again, MPOA SERVERS will set up Switched connection SHORTCUTS for MPOA Clients

IBM's MSS LANE, S/ELAN



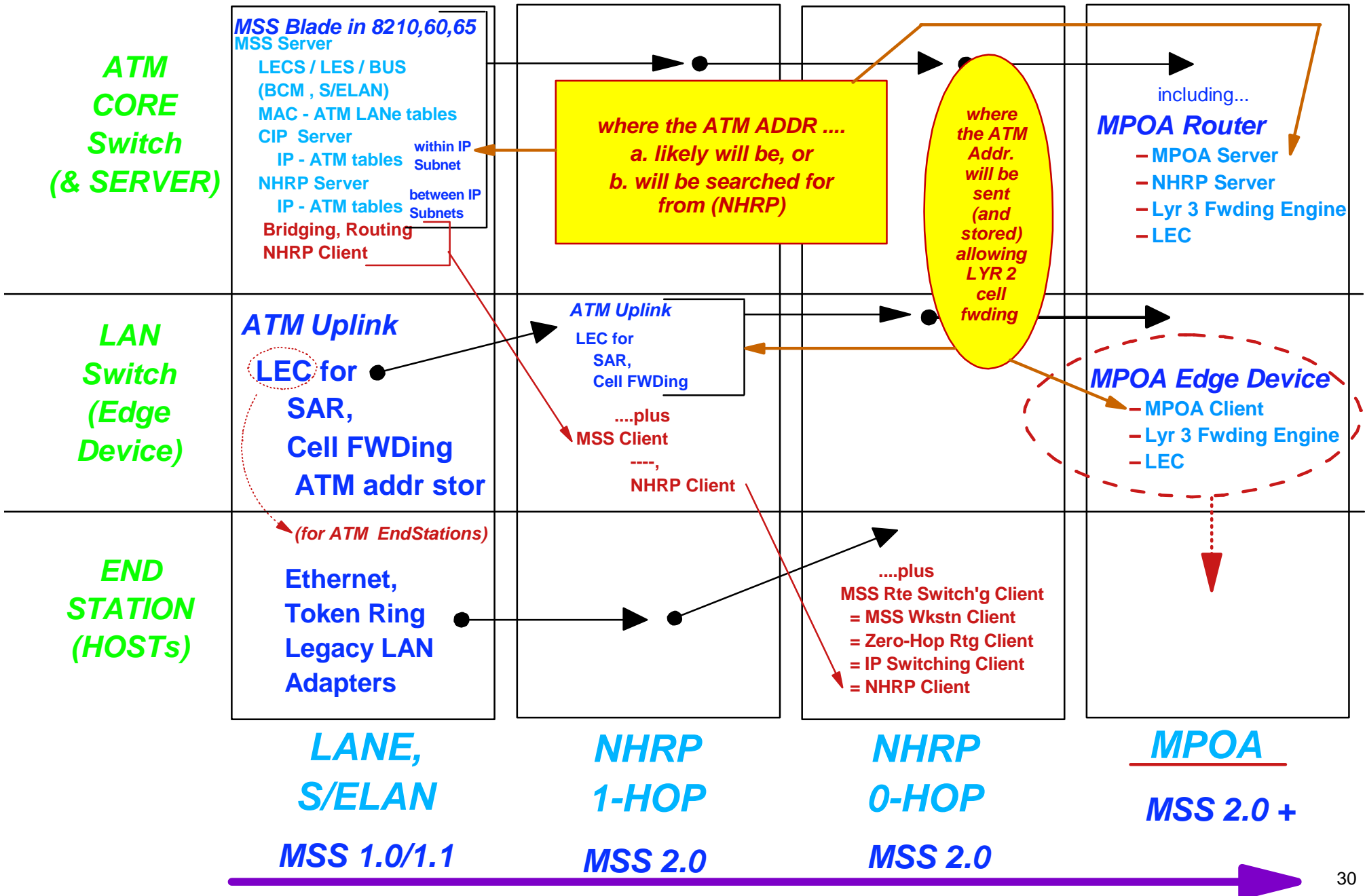
IBM's MSS NHRP, for IP / IPX*

* = MSS ext'n

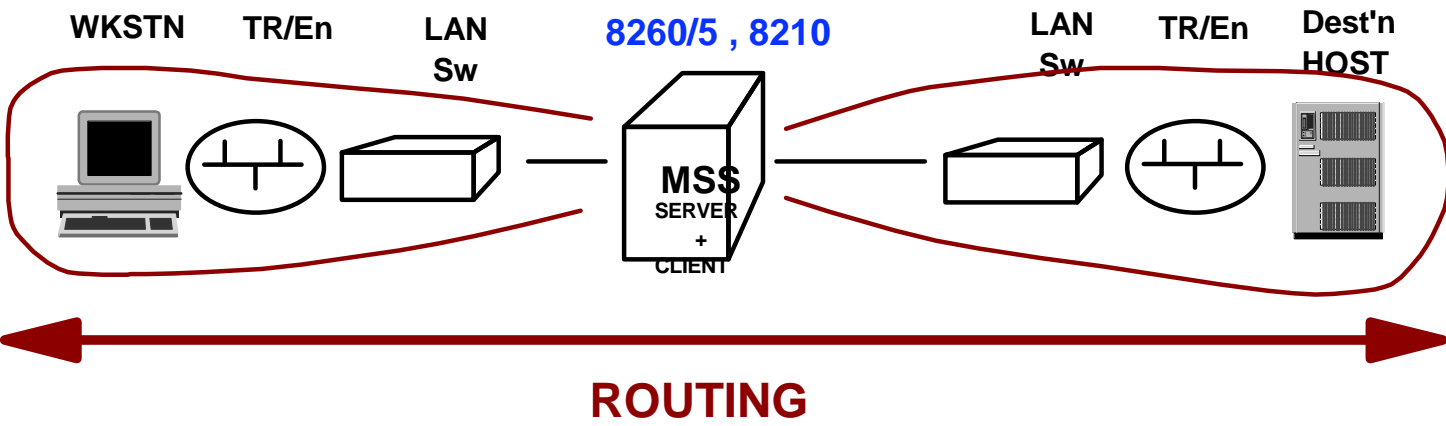


MPOA, for all PROTOCOLS

IBM's MSS Moves ROUTING Function to the EDGE



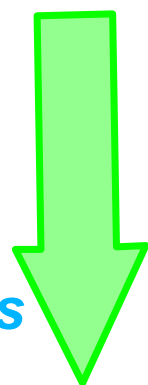
IBM **NHD** **MSS Implementation** **MIGRATION steps**



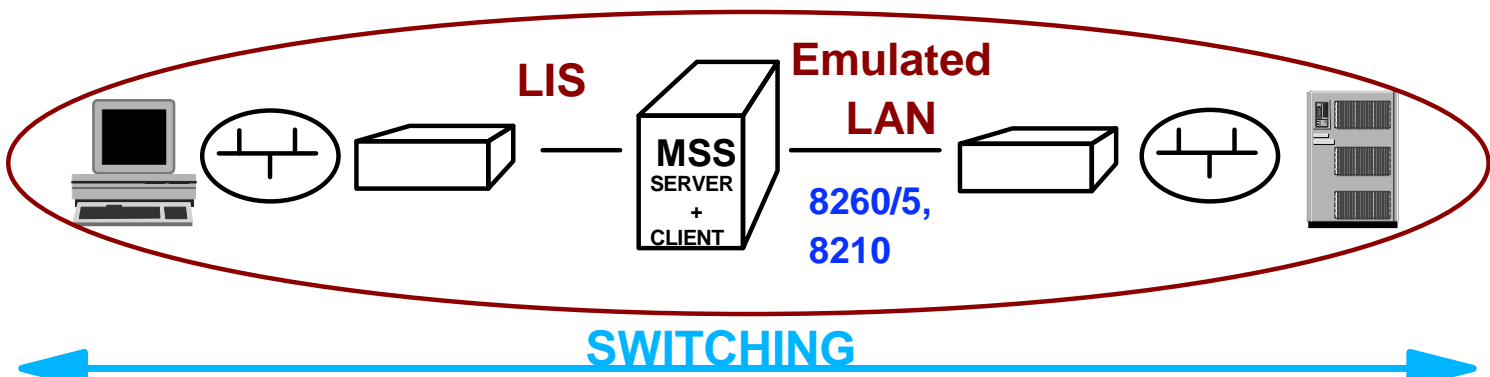
LAN- LAN ROUTING

TR-TR
EN-EN
TR-EN

Migrate IP Domains and LAN Segments
TO *Classical IP LIS's and Emulated LANs*

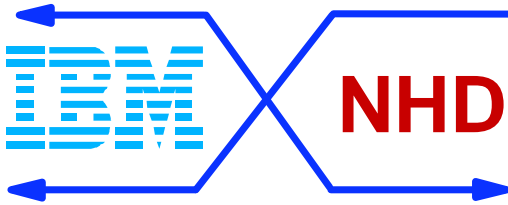


Endstation, Workgroup, "VLAN", at a time



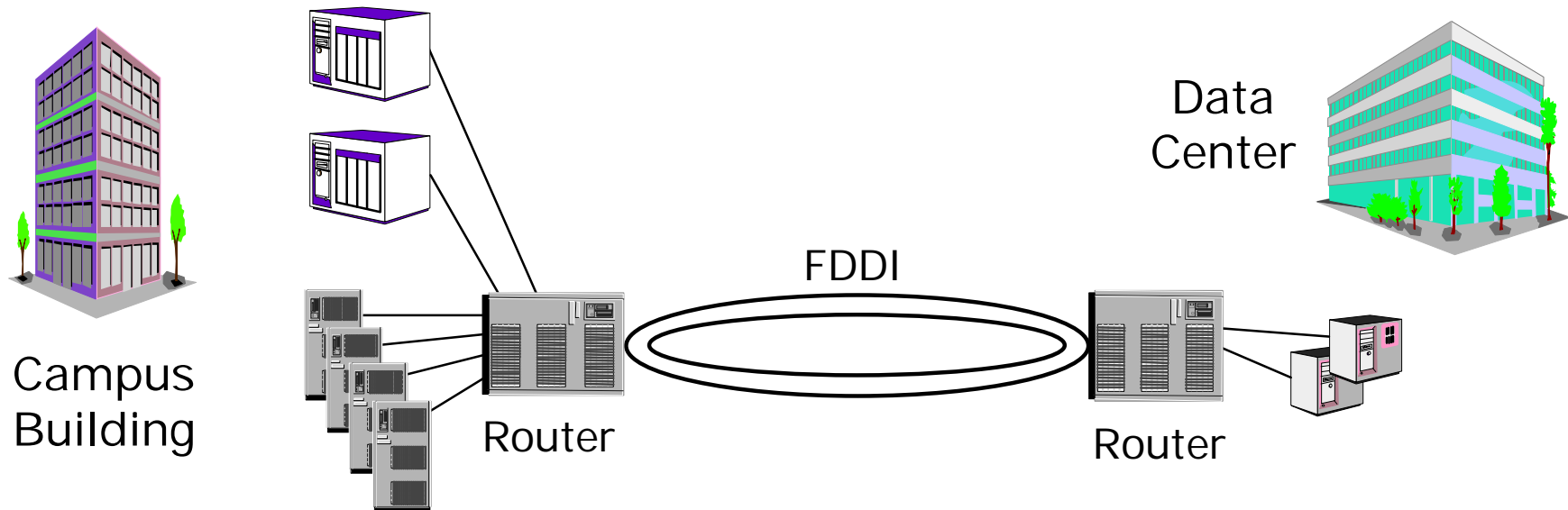
Forum Compliant LAN Emulation, Classic IP

&& 37



Migrating to MSS: Current Router Network

Migration goals:
Coexistence with current router backbone
Migration to ATM backbone & MSS by
incremental steps

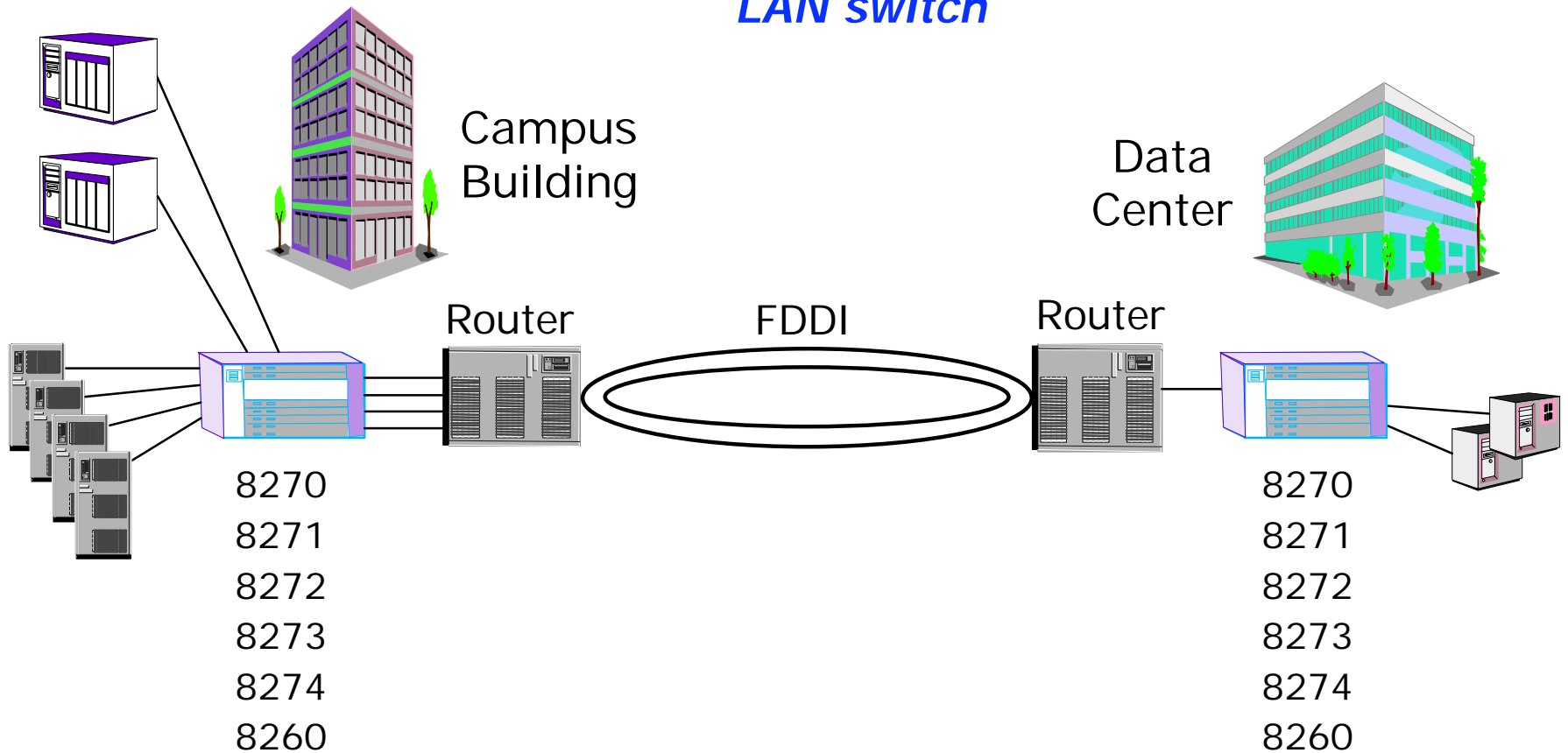




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Migrating to MSS: Step 1

Alleviate sever and desktop congestion with ATM capable LAN switch
LAN switch



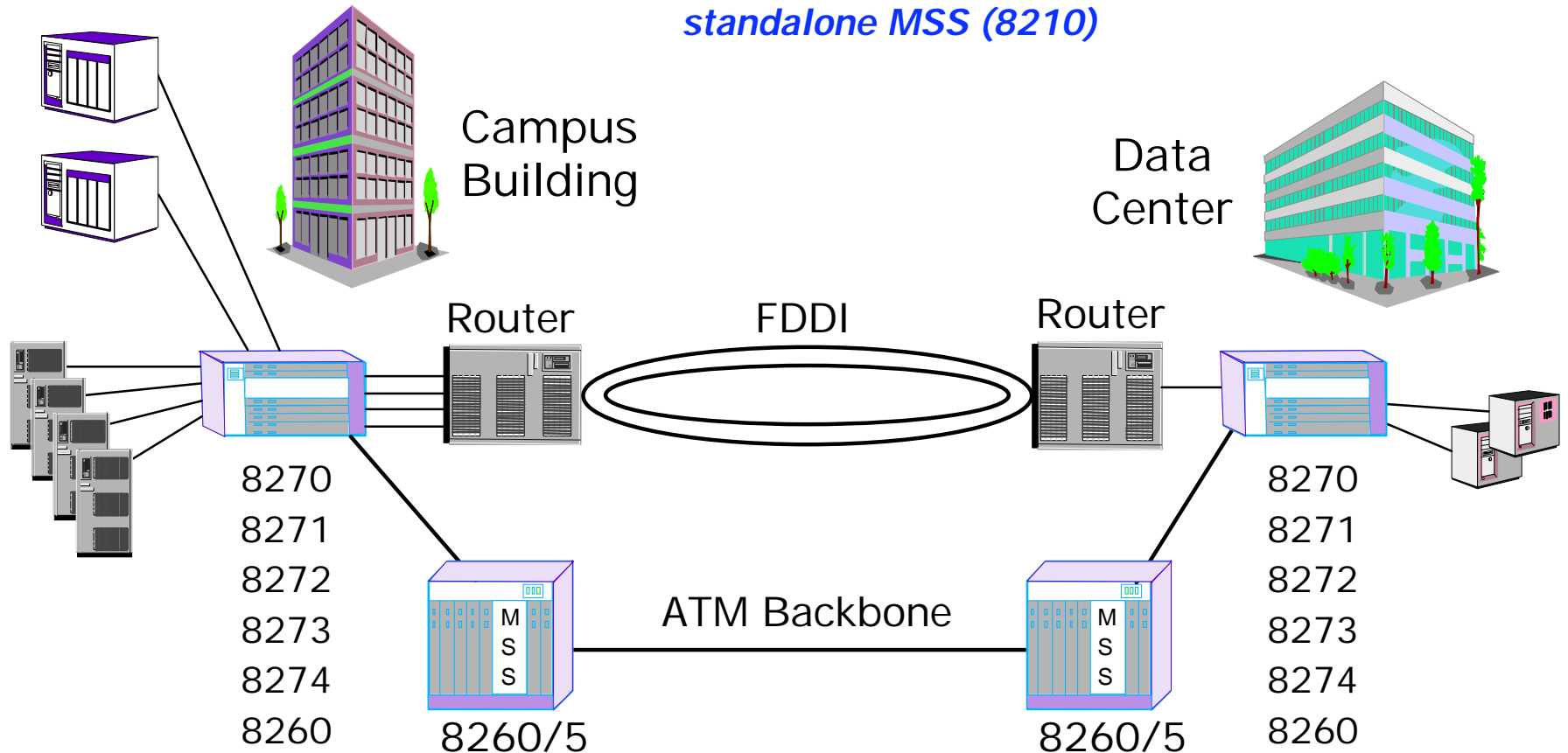


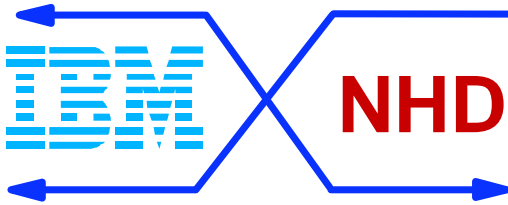
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Migrating to MSS: Step 2

*Add ATM backbone for capacity
Begin staged migration to ATM:*

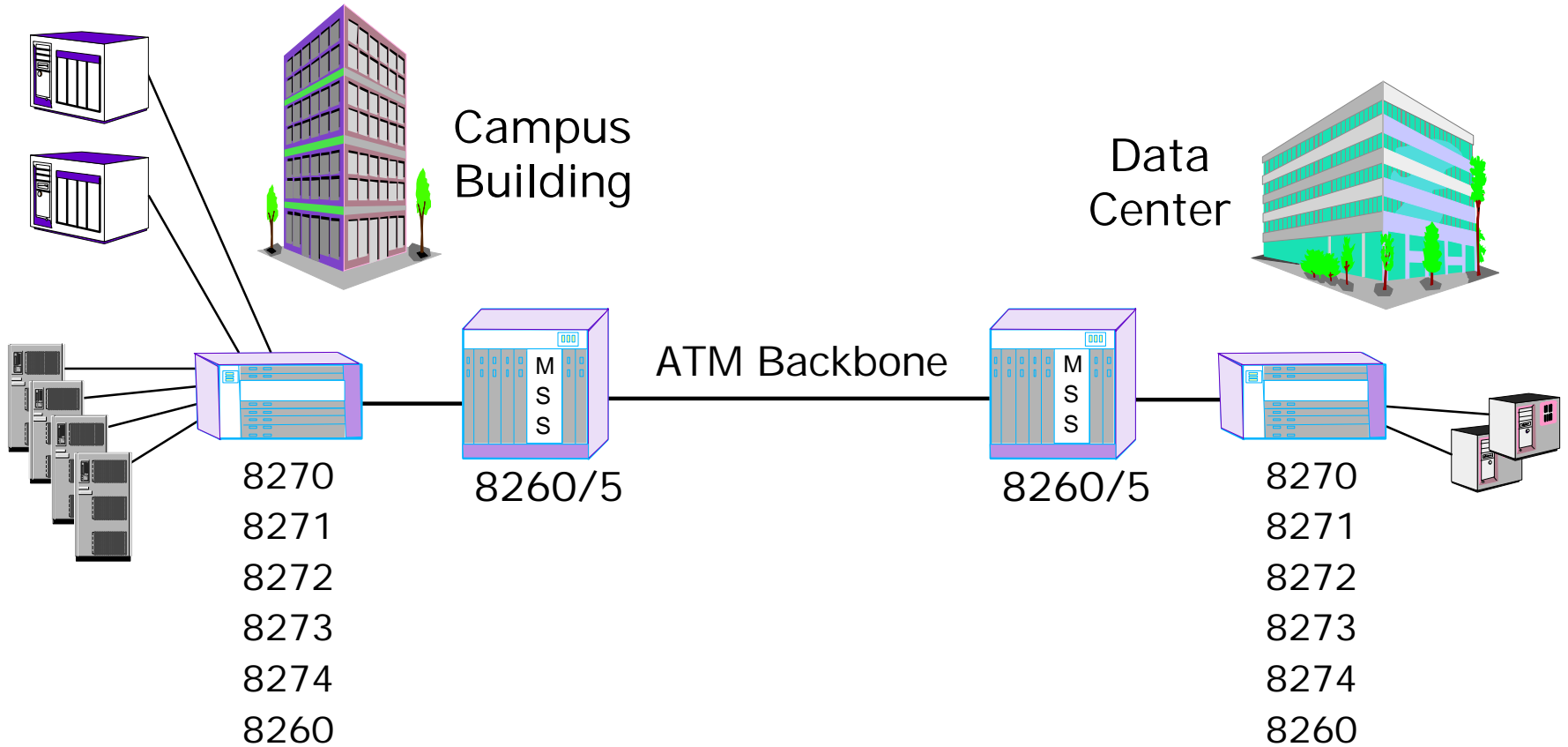
- 1. Switch Bridged Traffic over ATM Backbone*
- 2. Introduce VLANs and deploy Broadcast Manager to reduce reliance on router*
- 3. NOTE: FDDI interface also available on standalone MSS (8210)*





Migrating to MSS: Step 3

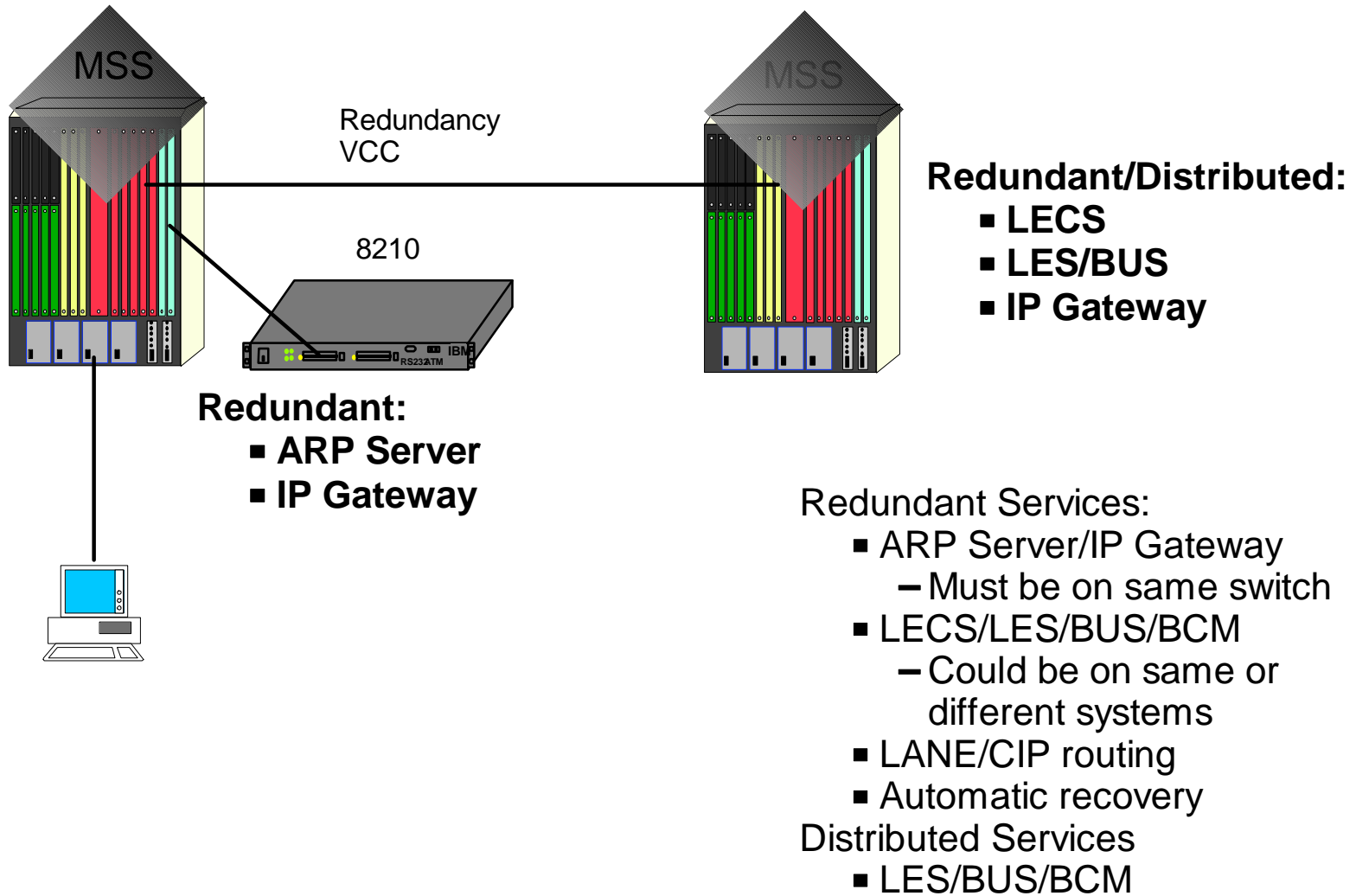
*Completed migration to ATM backbone
w/MSS
Re-deploy routers to remaining legacy
subnets*





NHD

MSS REDUNDANCY





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IBM Multiprotocol Switched Services

SUMMARY

"The BAKERS' DOZEN"

1. End to End SWITCHING
minimal change to existing LEGACY LANs
8260/5 with MSS , ATM uplinks in LAN Switches
2. INDUSTRY STANDARD SOLUTIONS
LANE , CIP
3. ADDED VALUE extensions
Super VLAN , BCM , Security VCC , Redundancy
4. MIGRATE at your own PACE
"surround and CONQUER the BOTTLENECK"
IP Subnet , Domain , Segment1:1 mapping to LIS's, ELANs
5. Largest # of ELANs , VERY LARGE LANs with SELAN
CALL SET-UP rate = 200/sec ,... ie. 12,000/min (8265)
6. Flexible design with ELANs vs. port based VLANs
NO ROUTING
7. 8265 " BEST in INDUSTRY"
155 Mbps BACKBONE access , 622 Mbps CORE links
12.8 Gbps non-blocking BACKPLANE
8. LAYER 3 SWITCHING ?
YES , it is ,..... for FRAME tech'y ? 8274 HRE
9. ZERO HOP ROUTING with MSS 2.0 and ROUTESWITCHING CLIENT, 1 HOP with MSS Client
10. Reduced Broadcasting , more B/W for YOUR workload !!
11. 8210 = "the real sleeper"
we won't punish you for past MISTAKES in your LAN implem'n !!
MSS with MULTIVENDOR switches already installed
12. ROUTING ,.../ YES ,.... if you MUST !!
13. So GOOD ,3COM and XYPAN wanted it badly!