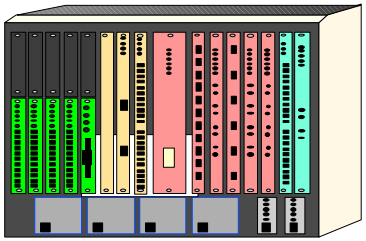
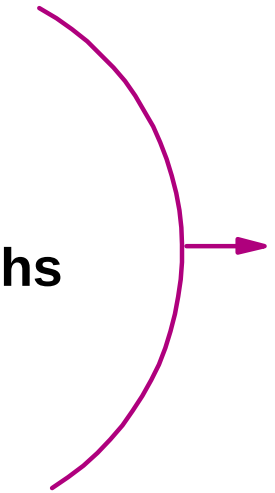


SIMPLIFYING the STRENGTH

SVN/MSS EARLY SUCCESS

- ✓ Grand show winner at Atlanta Network Expo/Interop '96
- ✓ Best of show Paris Interop '96
- ✓ Accelerated move to ATM backbones
- ✓ Installed in 60 customer sites in first 2 months
- ✓ 3x that rate thru 1st Quarter '97
- ✓ Certified / Tested at UNH INTEROP Testing

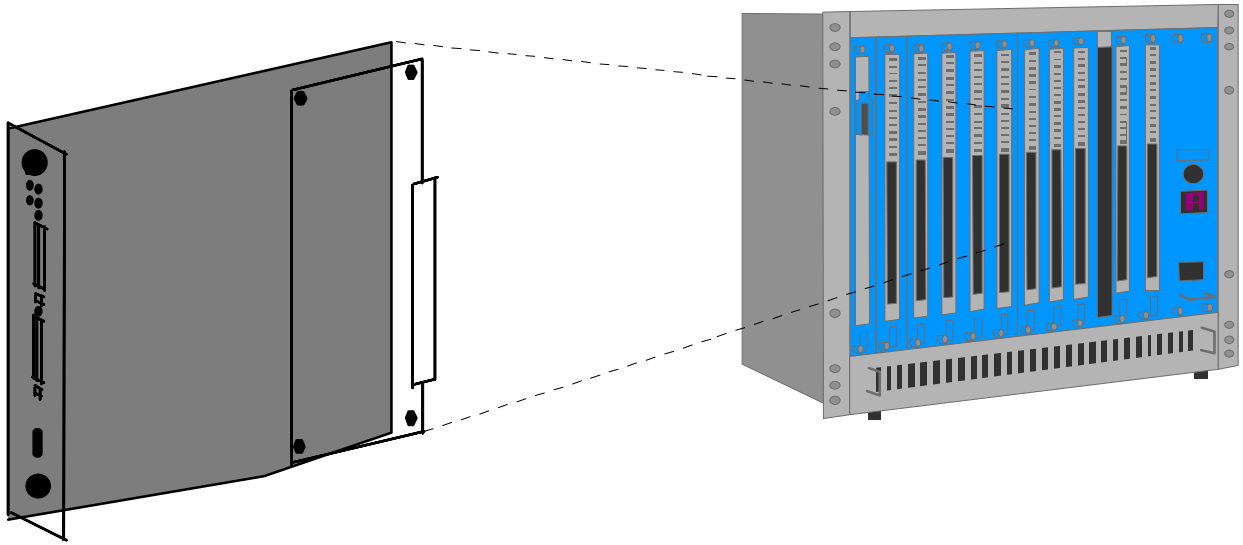


customers **ARE** spending their NEXT $$$ on SVN

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

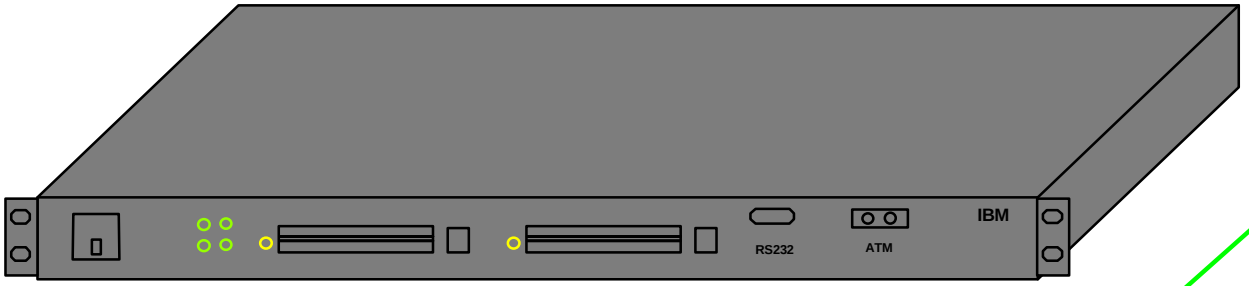
MSS PRODUCTS ... 8260 SERVER BLADE



- MSS Server Blade Components
  - RS 232 Serial Port
  - PCMCIA 1 - Voice/Fax Modem
  - PCMCIA 2 - 260M Hard Drive
  - PowerPC 603E with 512KB of L2 Cache
  - 32 MB Processor DRAM
  - 12 MB Flash
  - 8 MB ATM I/F Memory

MSS PRODUCTS ... STANDALONE SERVER

8210 ***...the MSS solution that works with some of the "other switches" that may be out there***



ALL = FORUM COMPLIANT implementations!

MSS Server Standalone Components

- RS 232 Serial Port
- PCMCIA 1 - Voice/Fax Modem
- PCMCIA 2 - 260M Hard Drive
- PowerPC 603E with 512KB of L2 Cache
- 12 MB Flash
- 32 MB Processor DRAM
- 1 or 2 ATM Ports (155Mb MMF or SMF)
- 8 MB ATM Interface Memory

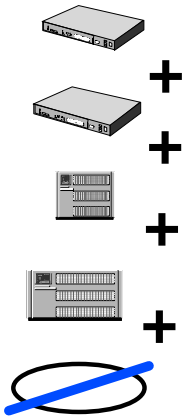
MSS (S/W) functions

1. **LAN Emulation SERVICES** **LANE**
   - **Server** **LES**
   - **Config'n Server** **LECS**
   - **Broadcast Unknown Server** **BUS**
2. **BROADCAST Mgr** **BCM**
3. **VLANs**
   - **Policy Based by PORT , MEDIA,P'COL**
   - **Routing (IP , IPX , Appletalk)**
   - **(5) ARP Server for CLASSICAL IP**
   - **(6) Super VLANs**
4. **NHRP Cut Thru Routing ...---} MPOA**

Multiprotocol Switched Services

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

COMPETITION



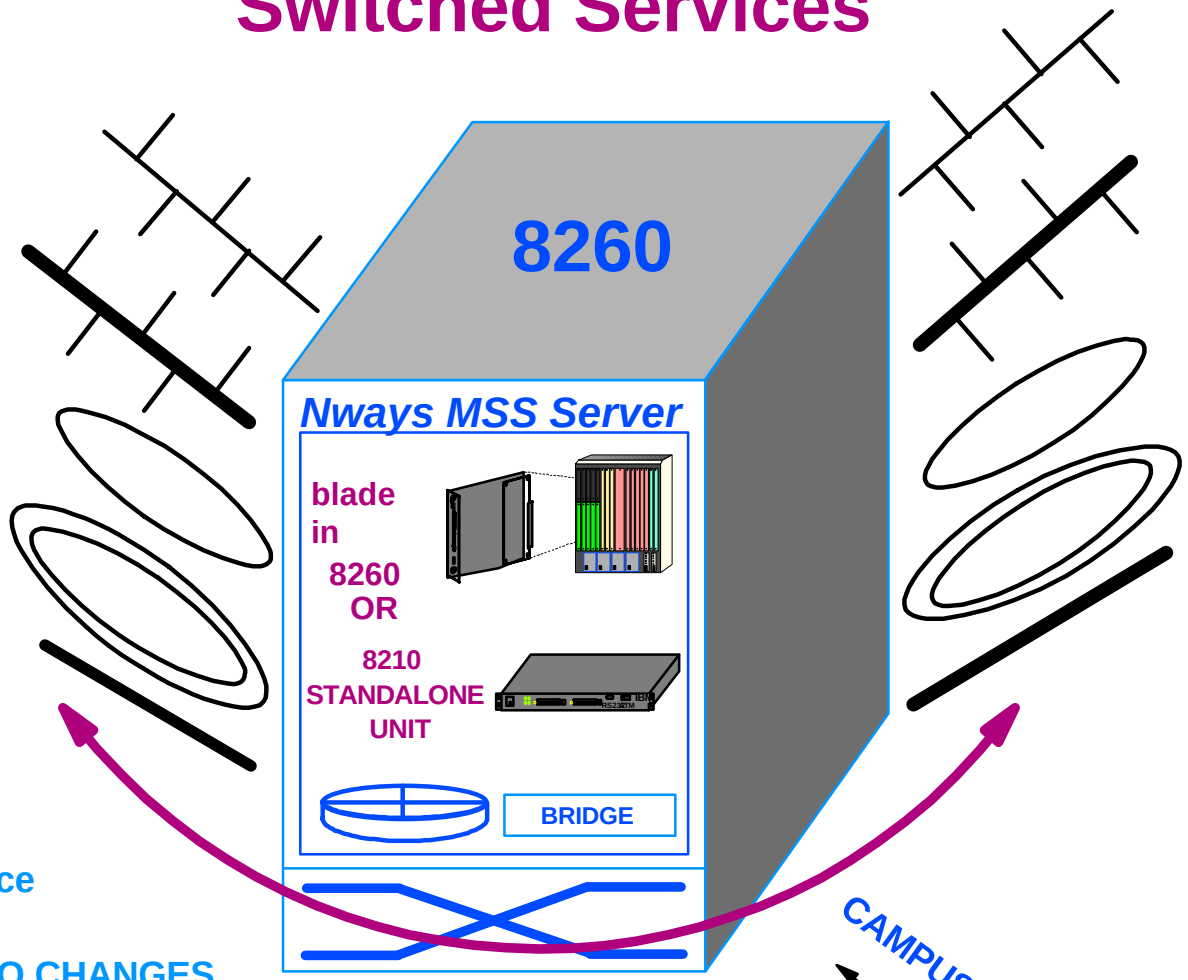
LAN Emulation Server

ARP Server for Classical IP

Policy-Based
Virtual LAN Support

Multiprotocol Routing
Bridging and Switching

Broadcast
Management



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

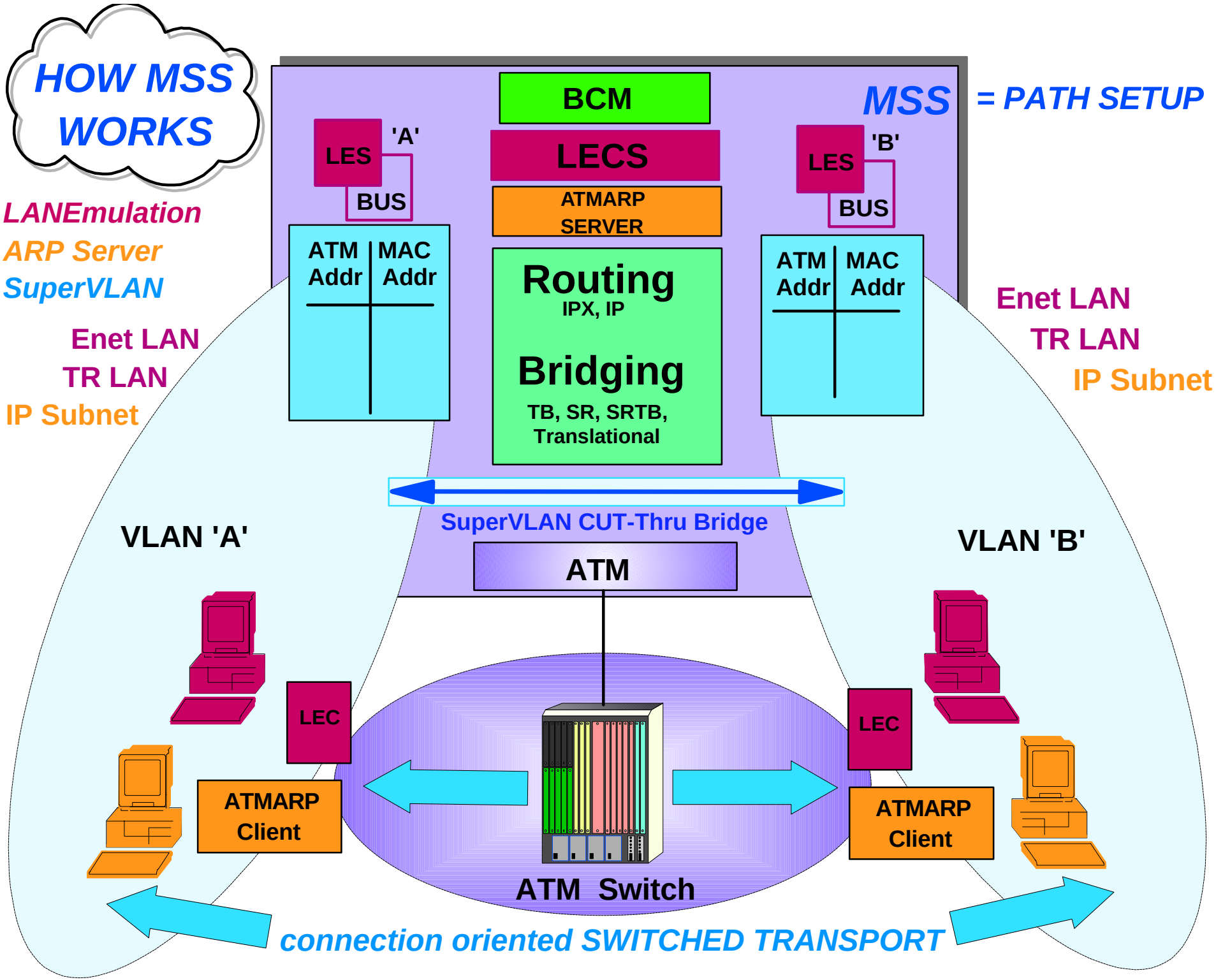
ARP Server for CLASSICAL IP
- switched path between IP subnets , NO CHANGES

POLICY-BASED VLANS
MOVES,ADDS,CHANGES, membership = LOGICAL

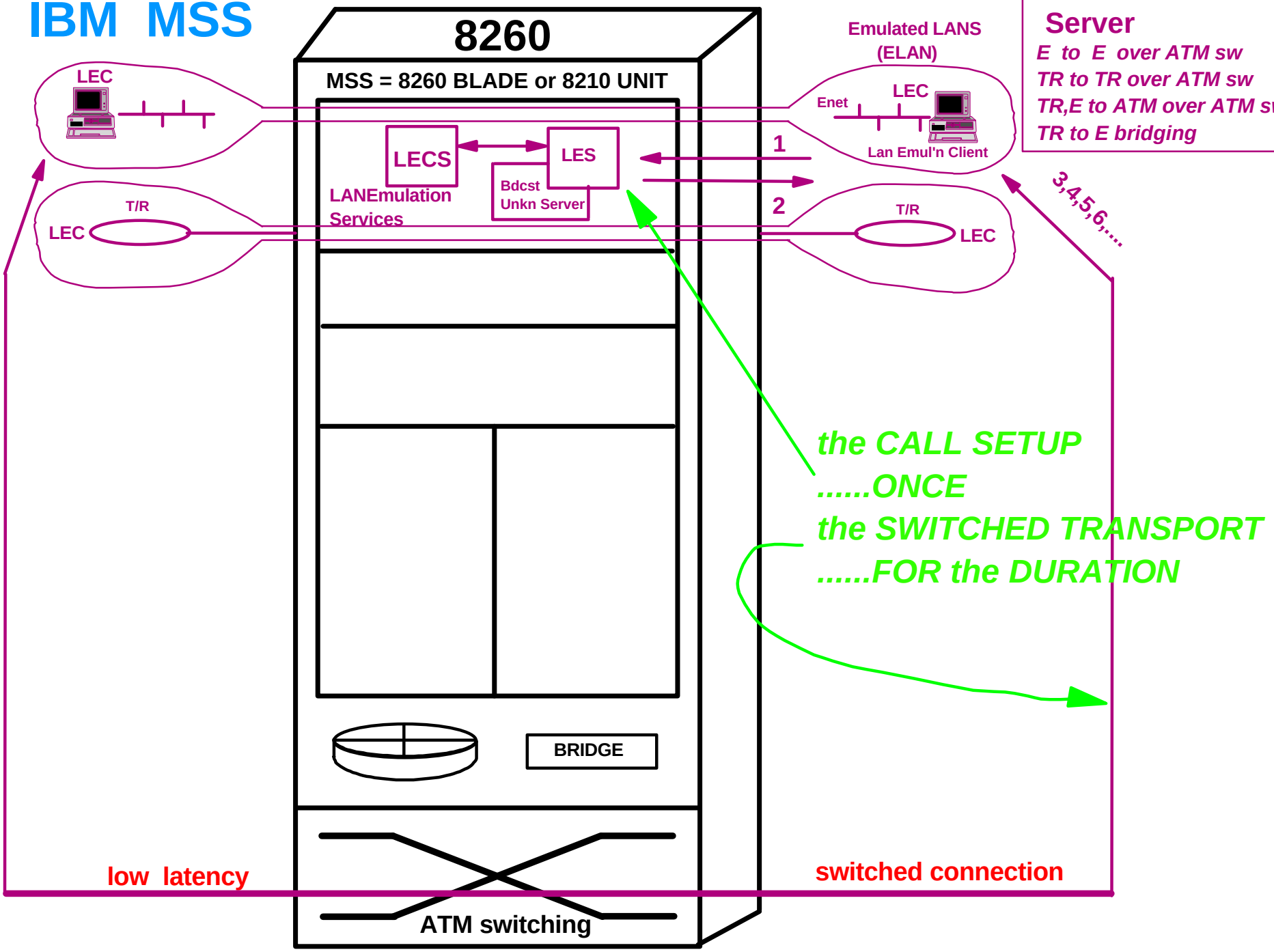
BROADCAST MANAGEMENT
- ONLY implementation to CONTROL broadcasts in VLAN

MULTIPROTOCOL Routing , Bridging , SWITCHING
- route determined ONCE by SERVER
- DATA transported via CONNECTION Oriented SWITCHED path

STANDARDS based...

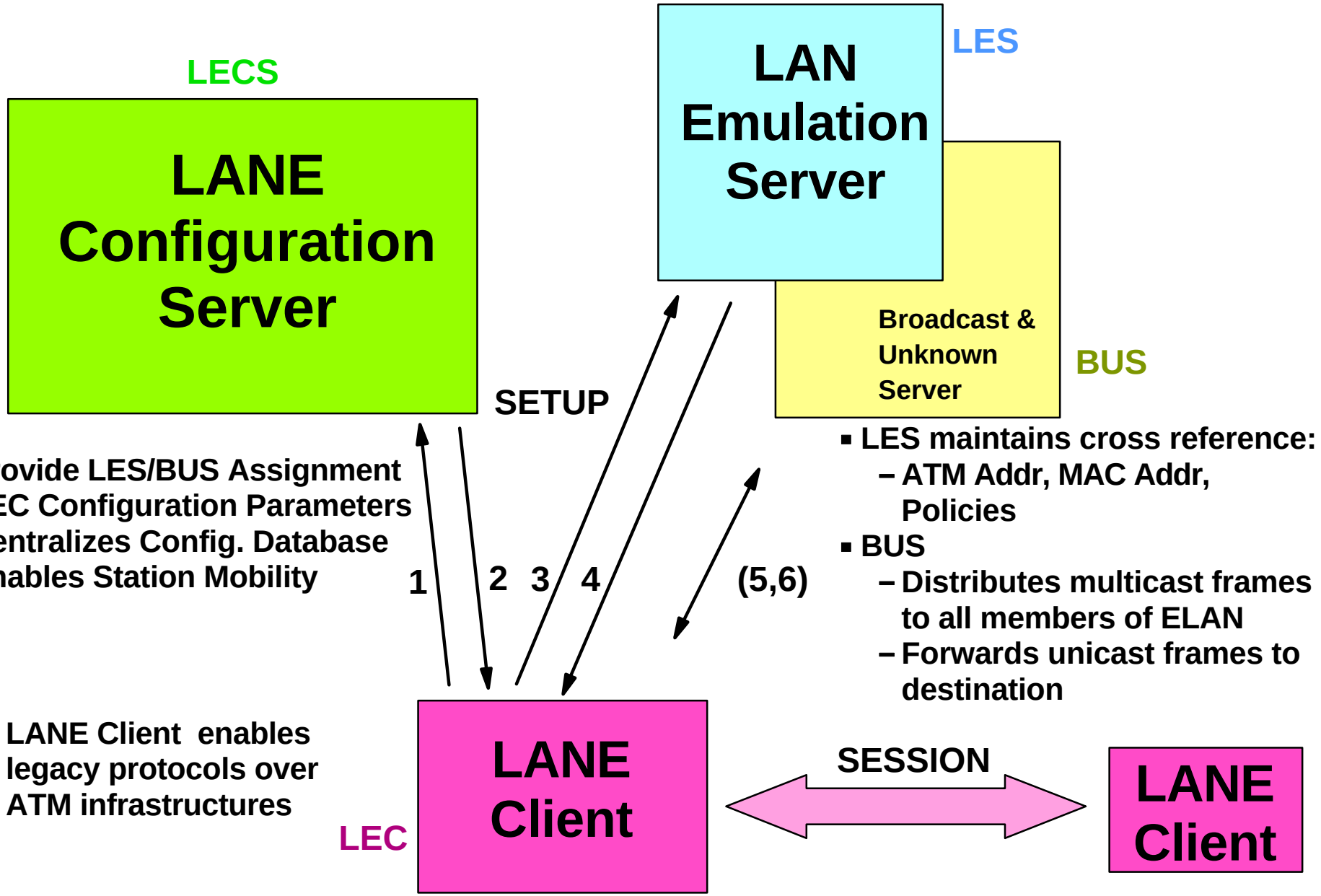

HOW MSS WORKS
LANEmulation
ARP Server
SuperVLAN
Enet LAN
TR LAN
IP Subnet
BCM
MSS
= PATH SETUP
LES
'A'
BUS
LECS
ATMARP SERVER
LES
'B'
BUS
ATM Addr
MAC Addr
ATM Addr
MAC Addr
Routing
IPX, IP
Bridging
TB, SR, SRTB, Translational
Enet LAN
TR LAN
IP Subnet
SuperVLAN CUT-Thru Bridge
VLAN 'A'
VLAN 'B'
ATM
LEC
LEC
ATMARP Client
ATMARP Client
ATM Switch
connection oriented SWITCHED TRANSPORT

IBM MSS



Multiprotocol Switched Services

LAN Emulation Service Components

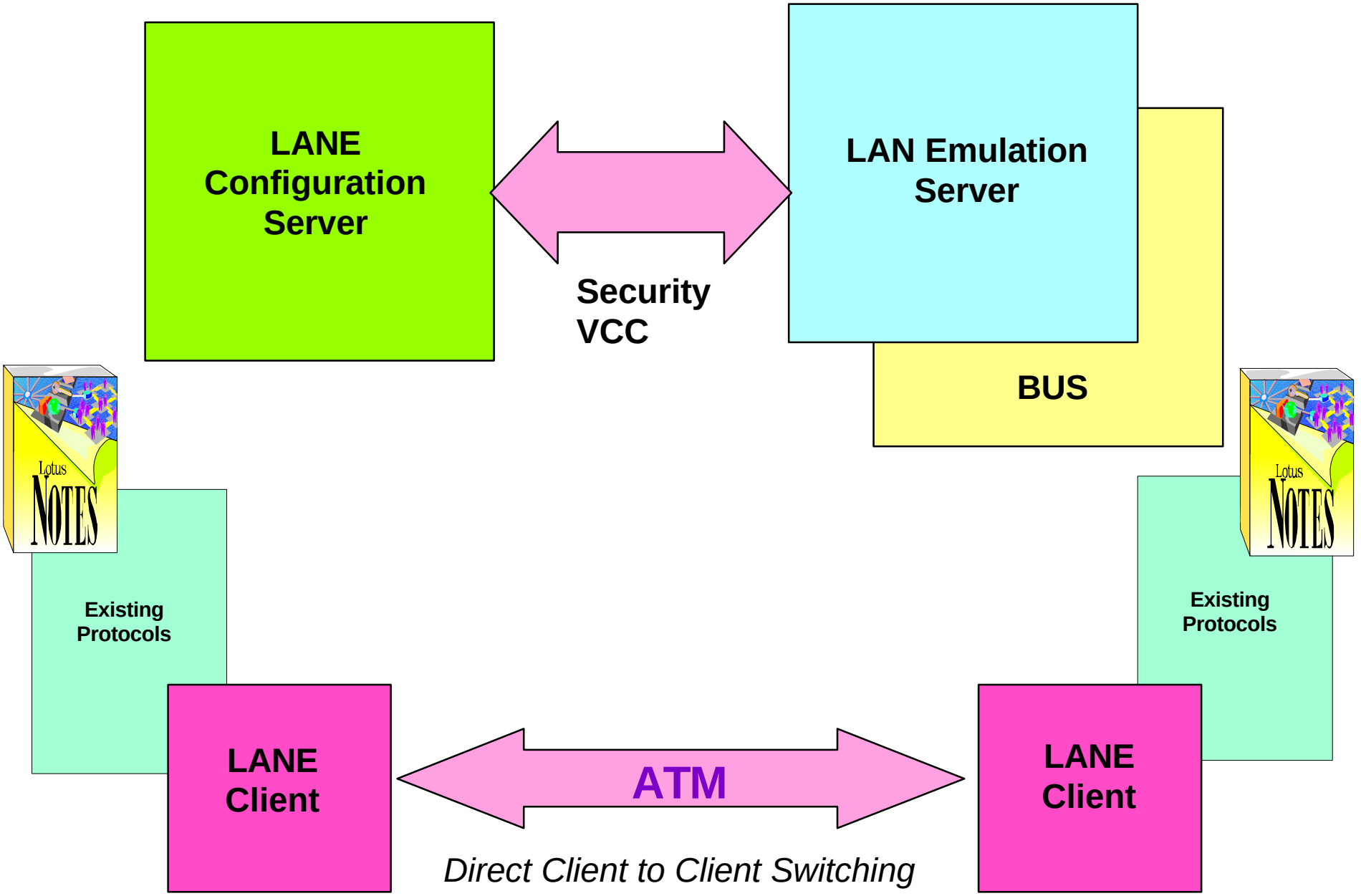


- Provide LES/BUS Assignment
- LEC Configuration Parameters
- Centralizes Config. Database
- Enables Station Mobility

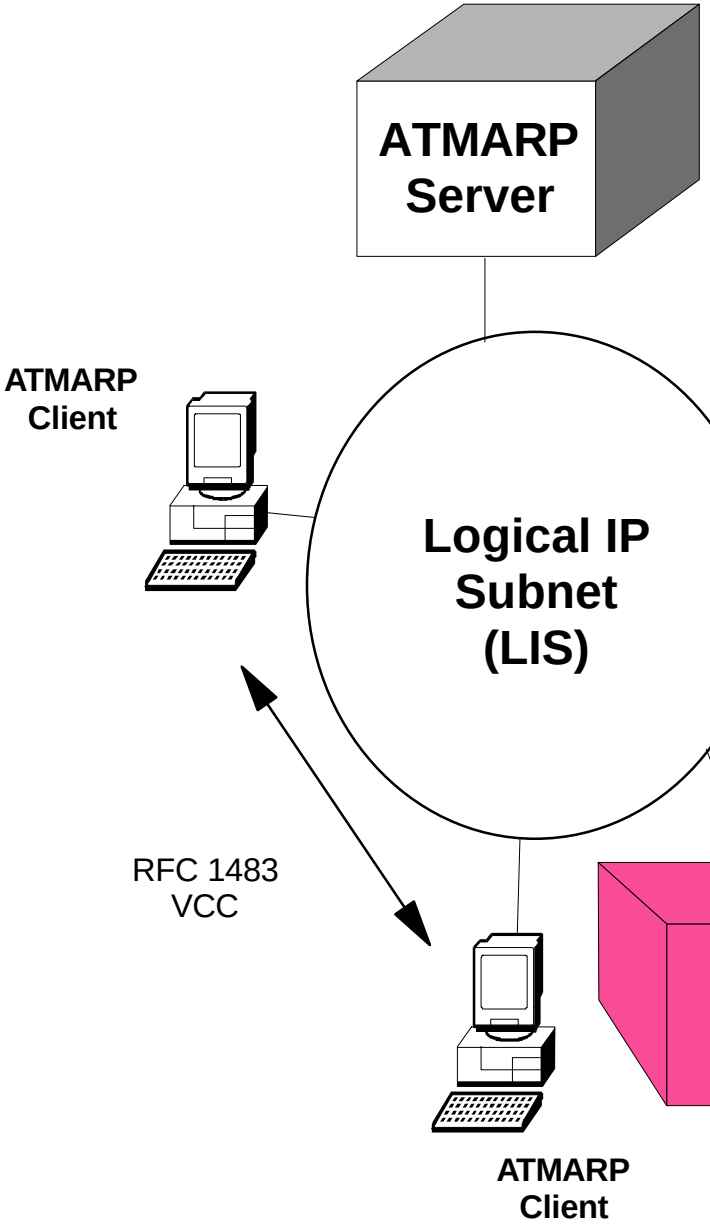
- LES maintains cross reference:
  - ATM Addr, MAC Addr, Policies
- BUS
  - Distributes multicast frames to all members of ELAN
  - Forwards unicast frames to destination

- LANE Client enables legacy protocols over ATM infrastructures

MSS Security VCC



ARP Server for CLASSICAL IP



Another VLAN Implementation

- Subnet membership independent of physical location
- Subnet scalability

Simpler than LANE

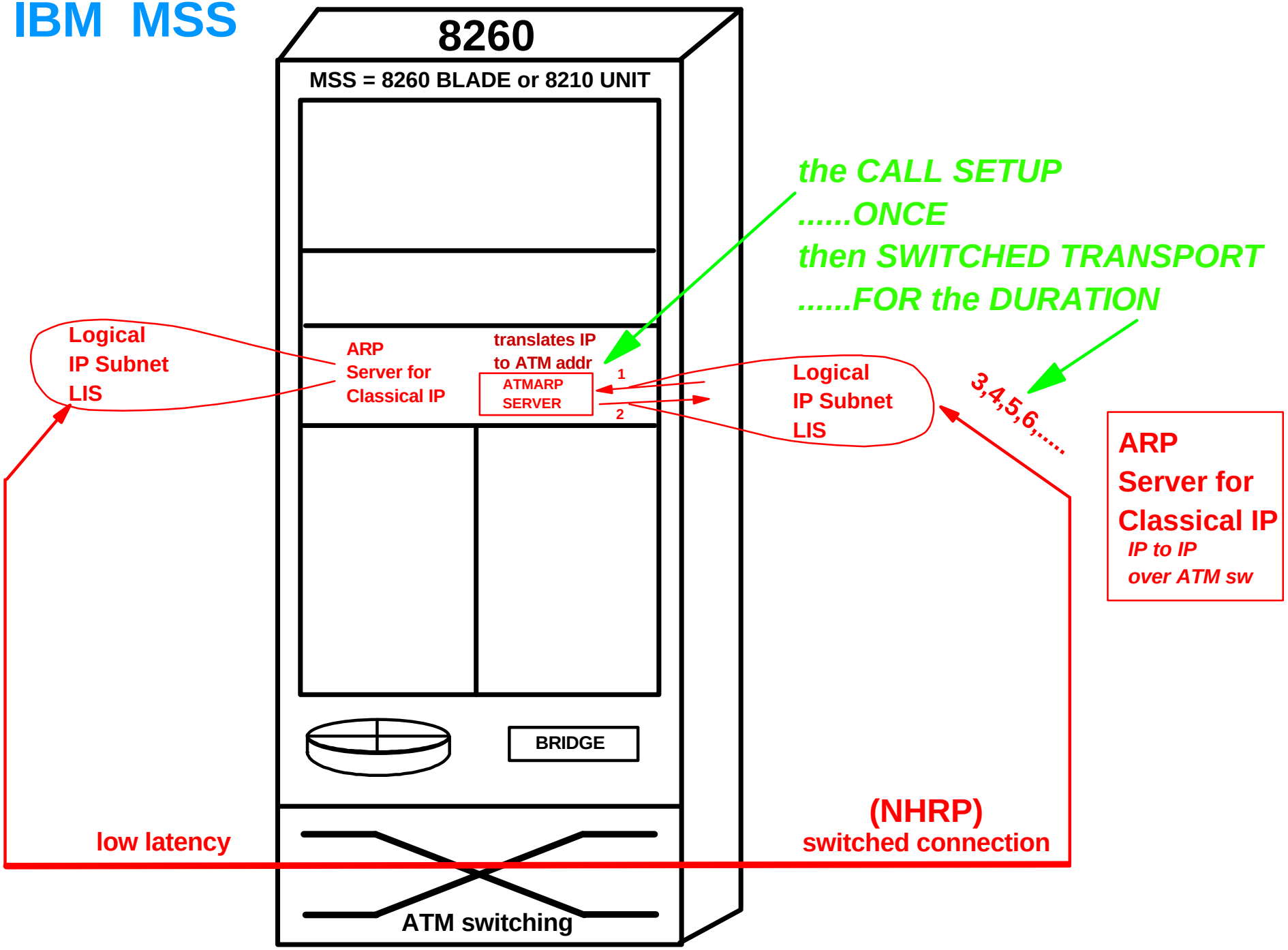
- Easier to implement
- Better performance
- Fewer resources (VCs)

But less function....

- IP Only
- ATM Only
- No Broadcasts (coming w/MARS)
- No Configuration Server

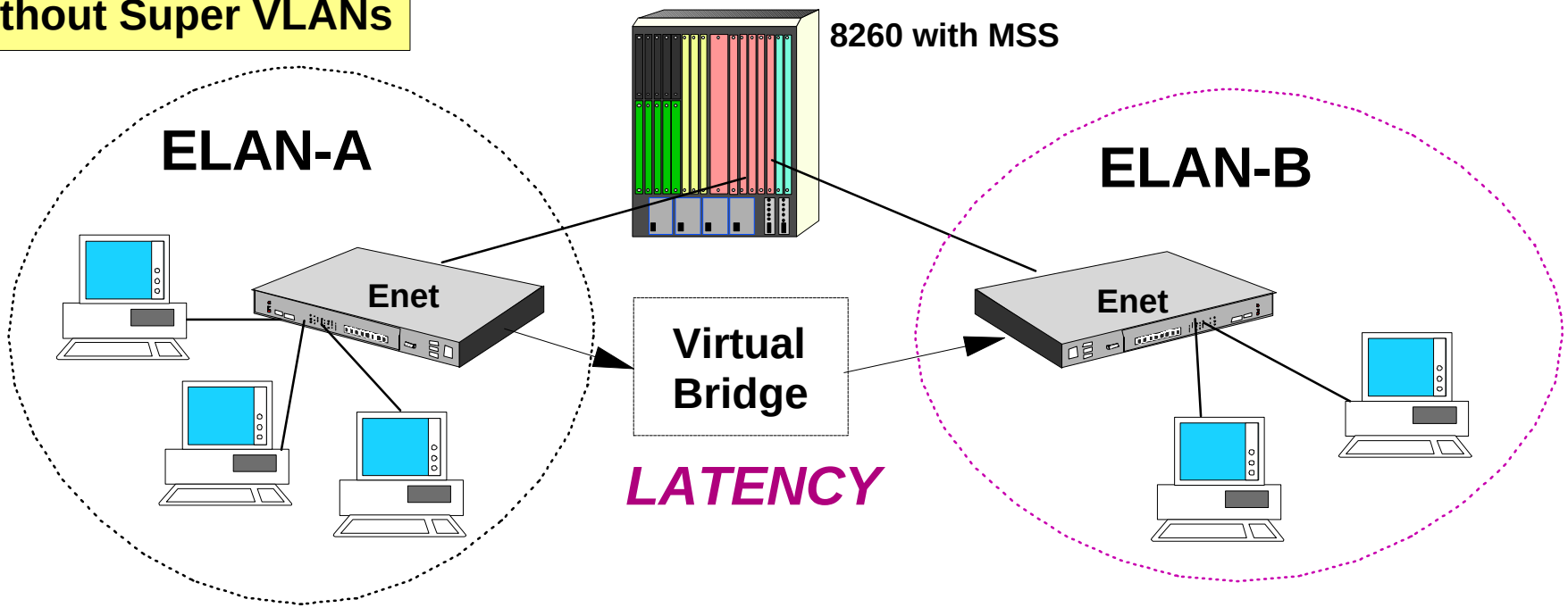
  Logical moves require client reconfig

IBM MSS

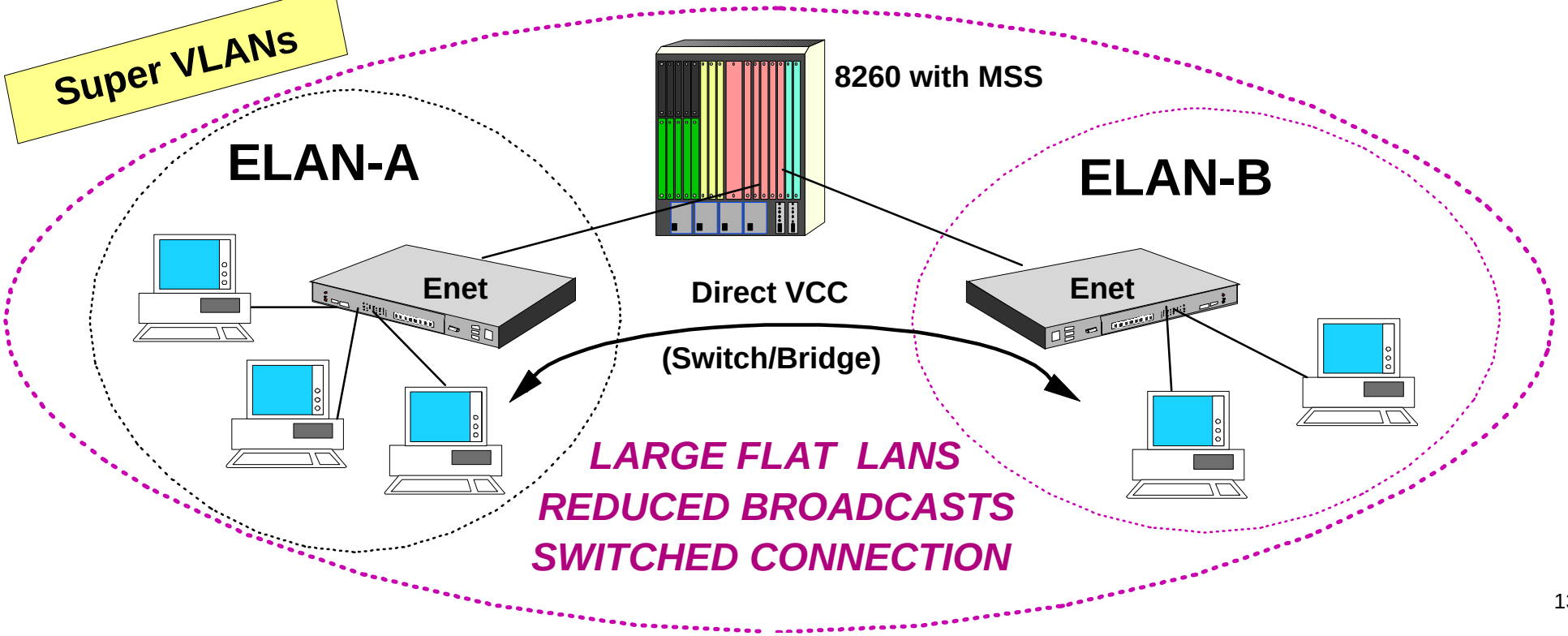


Multiprotocol Switched Services

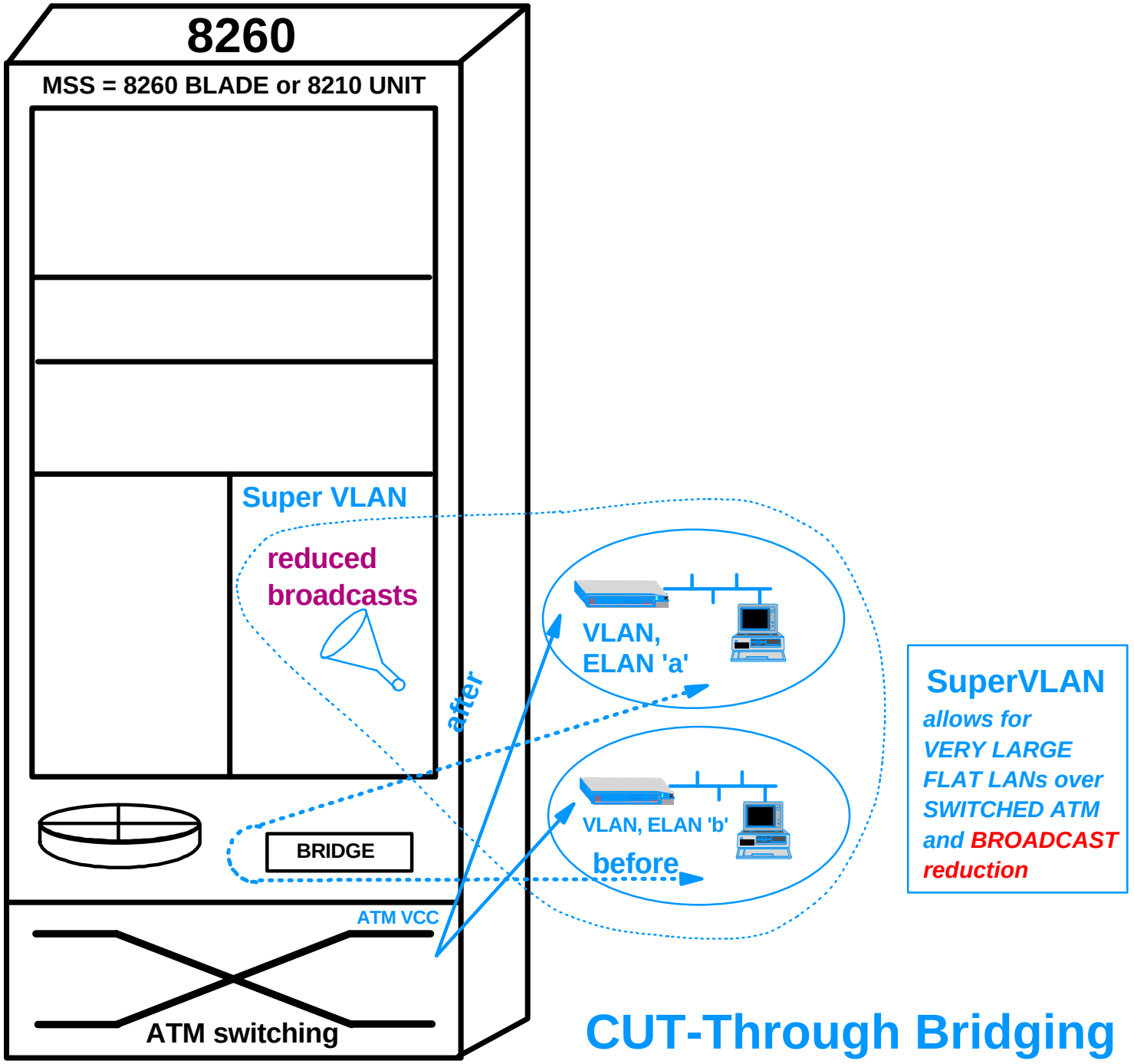
Without Super VLANs



Super VLANs

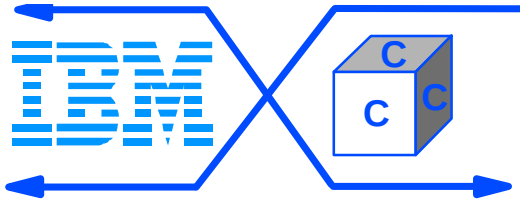


IBM MSS



CUT-Through Bridging

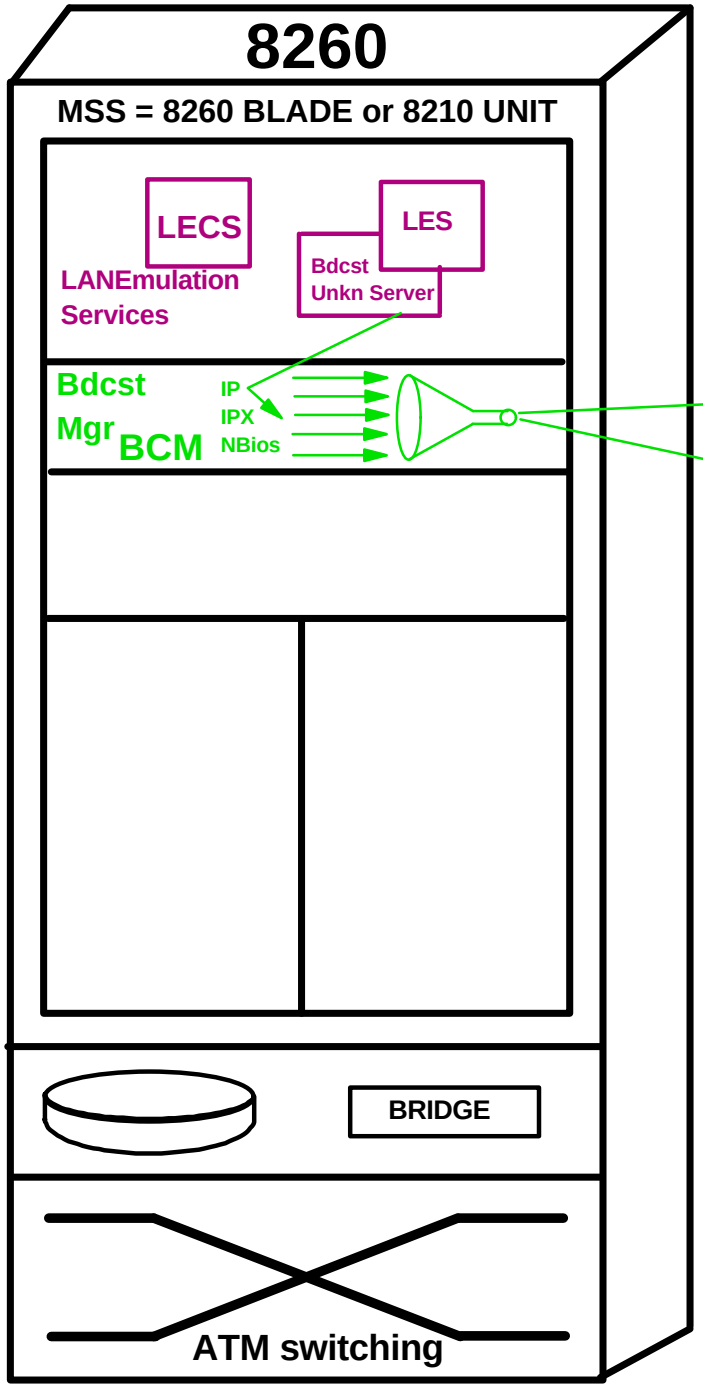
Multiprotocol Switched Services



Super VLAN Value

- **Scaleability:**
  - Problem: Flat LANS don't scale
  - Super VLAN: Enables VLANs to be grouped into LARGE VLANs
- **Gigabit throughput**
  - Problem: Routers are bottlenecks going between campus segments
  - Super VLAN: Will establish ATM switched connections between ELAN segments
- **Intercampus VLANs**
  - Problem: VLANs allow too much broadcast/address resolution overhead to grow beyond a single campus
  - Super VLAN: Keeps most overhead local

IBM MSS



Filtered,
Directed
Unicasts

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

EXCLUSIVE

" 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

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

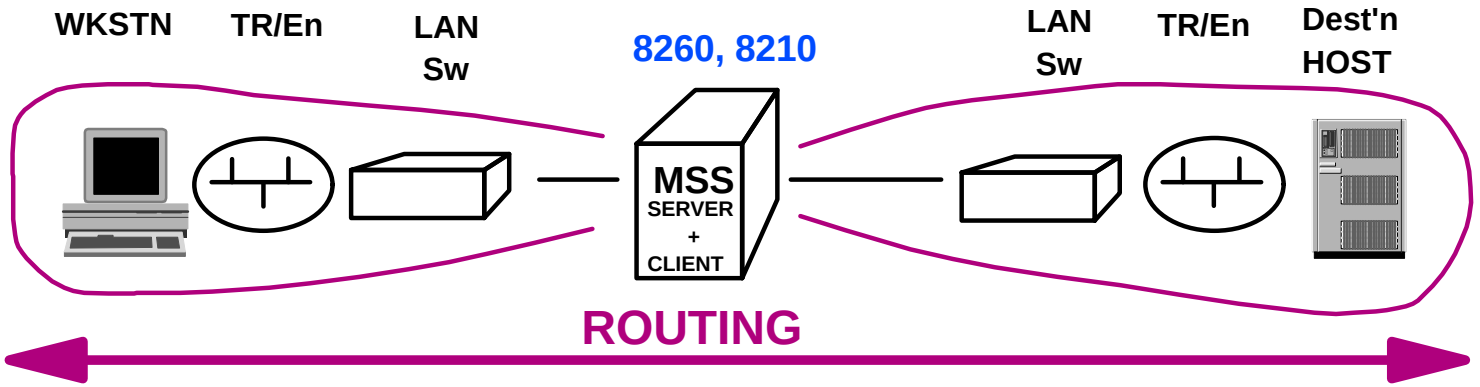
- ⋆ RIPs and SAPs are forwarded only to servers and routers

NetBIOS

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

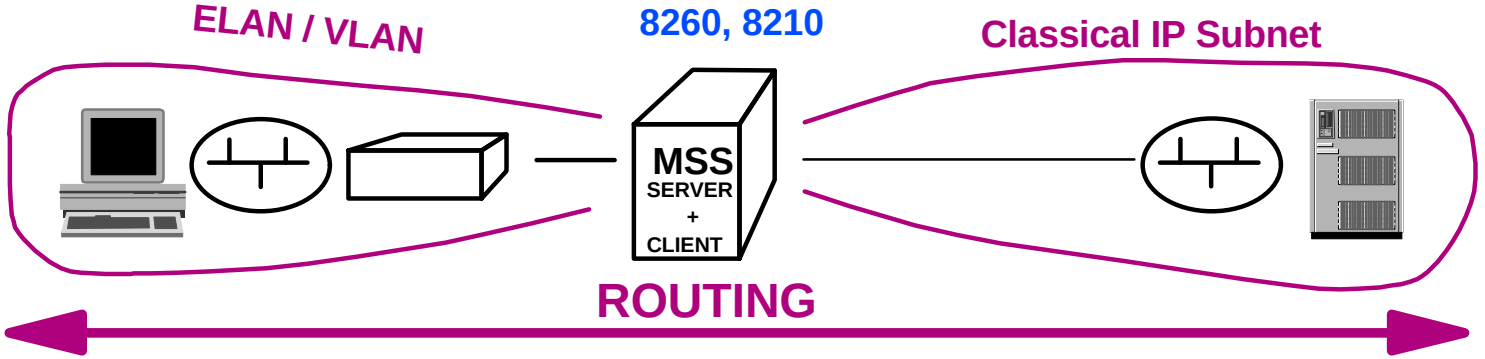
MSS Implementation

MIGRATION steps

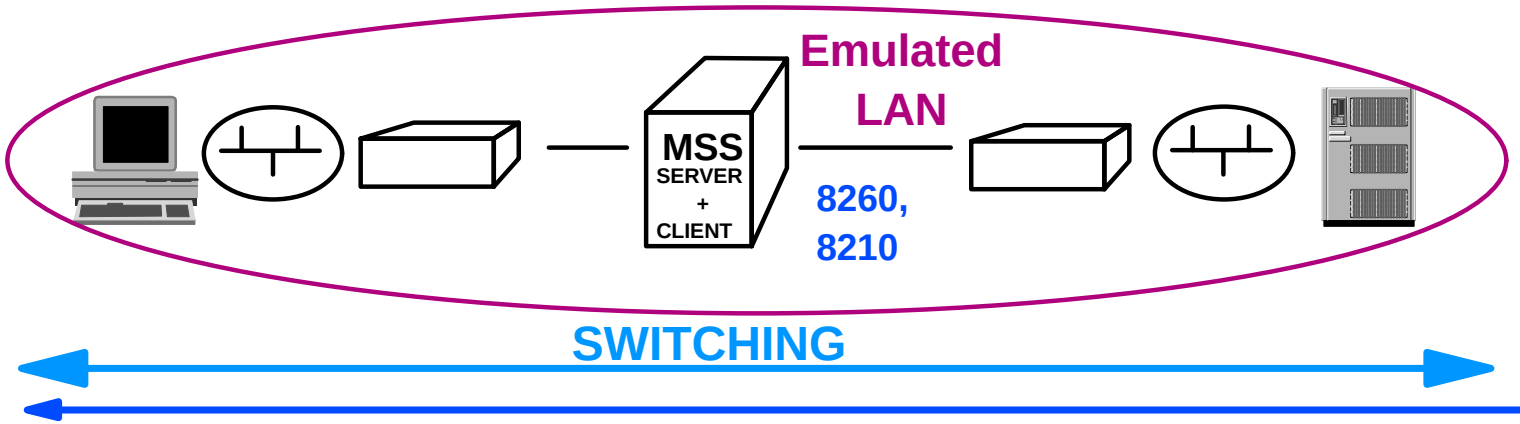


VLAN ROUTER (Mult. Domain)

TR-TR
EN-EN
TR-EN

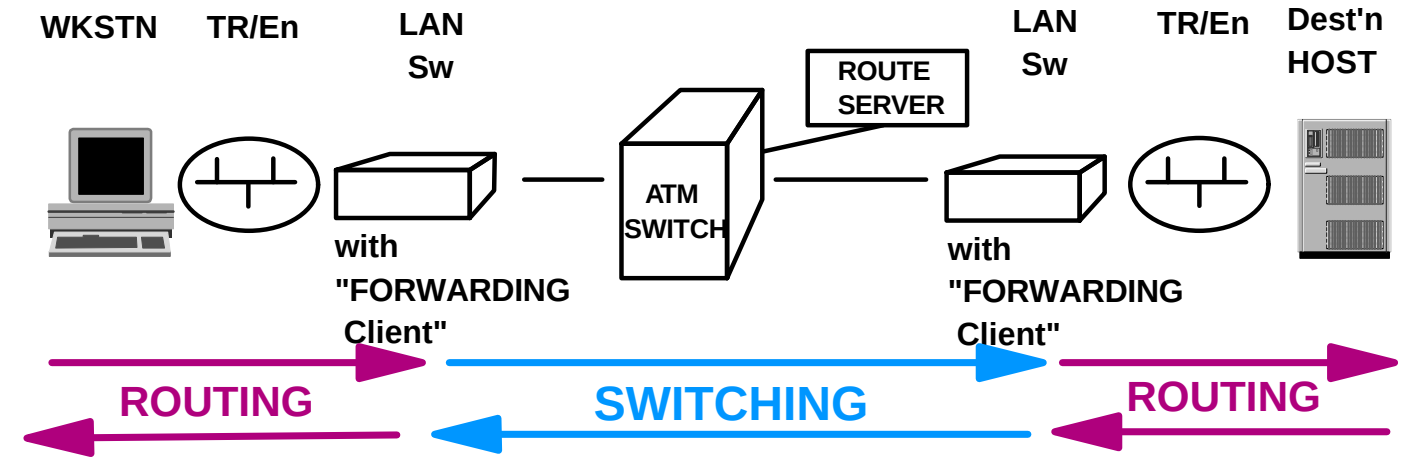


LANE to Classical IP

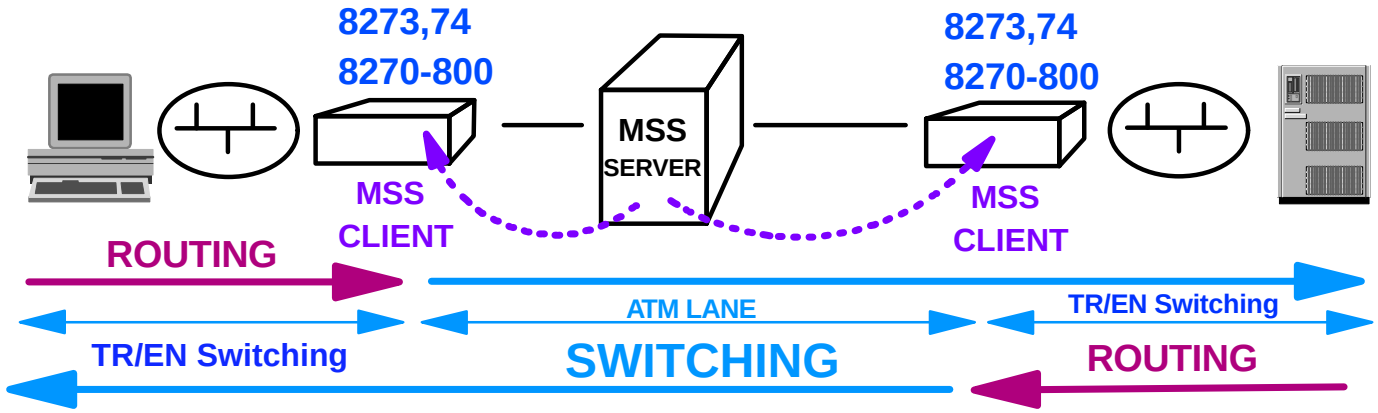


Forum Compliant LAN Emulation

CUT-Thru ROUTING

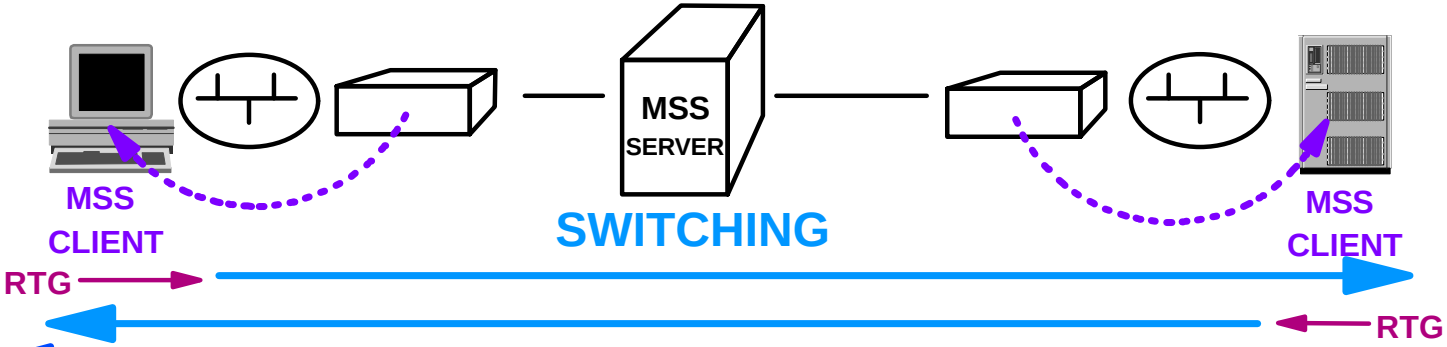


Multi-HOP Routing



ONE HOP ROUTING

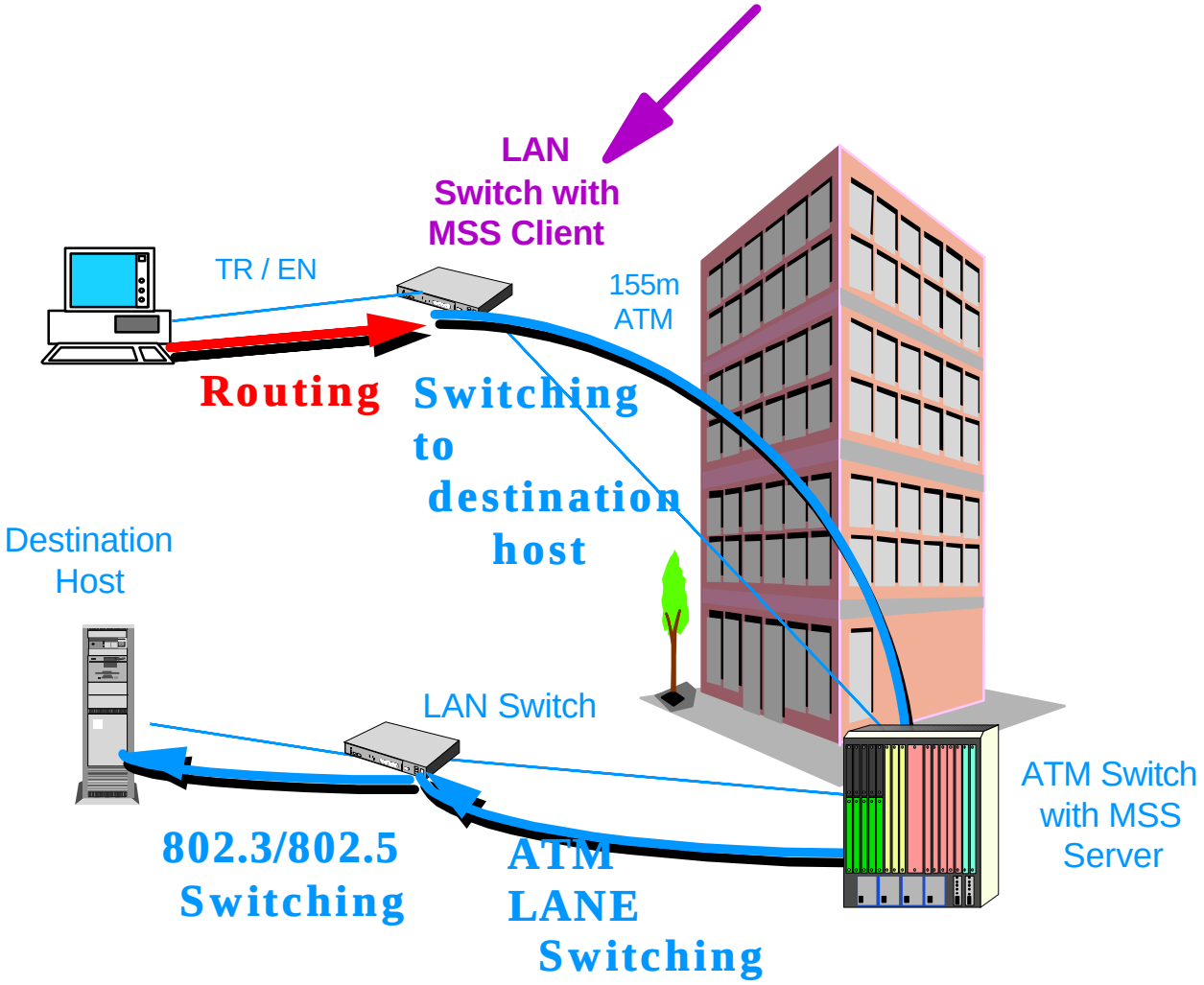
(coming soon)



ZERO HOP ROUTING: ROUTE SWITCHING

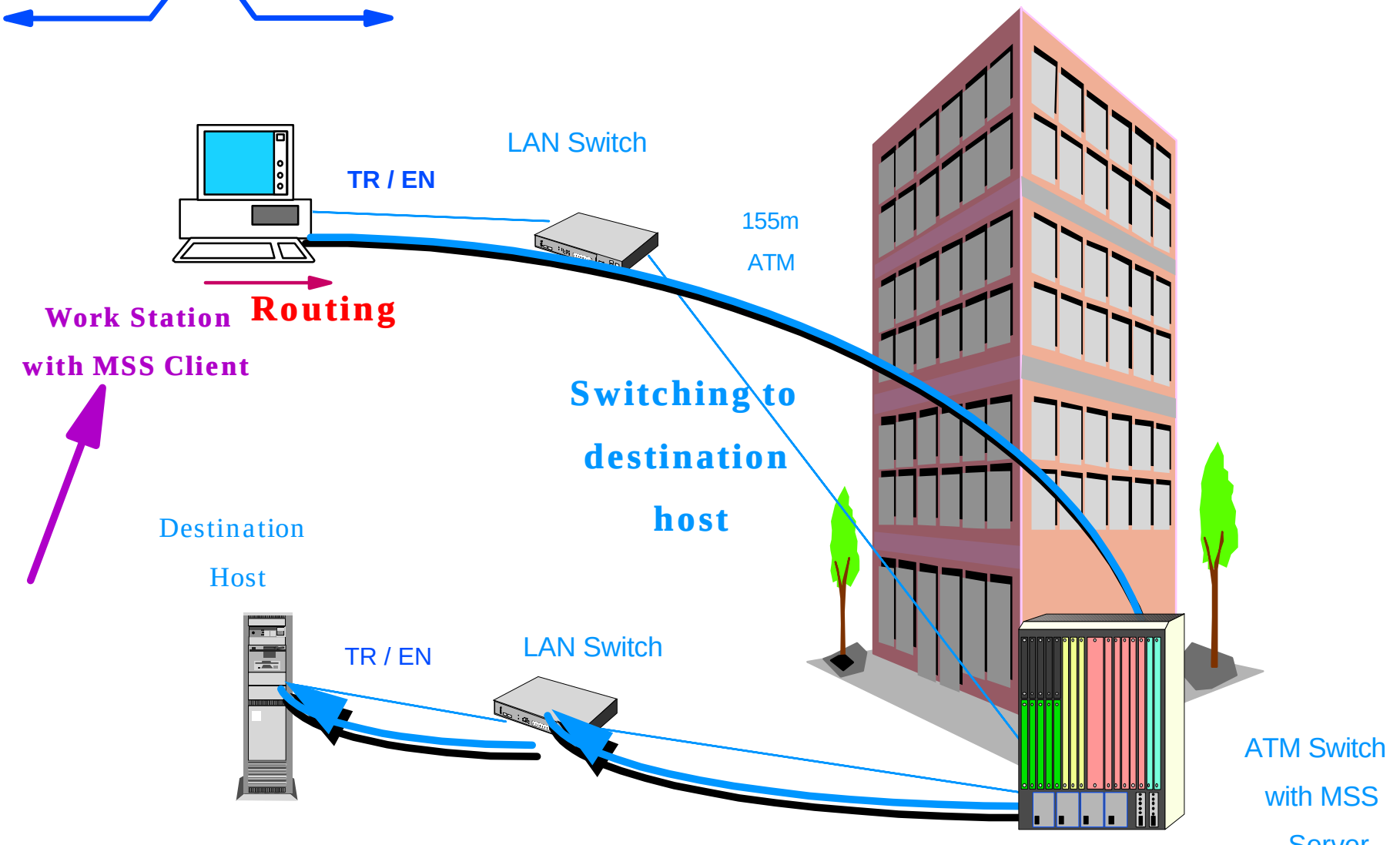
(coming soon)

One Hop Routing*



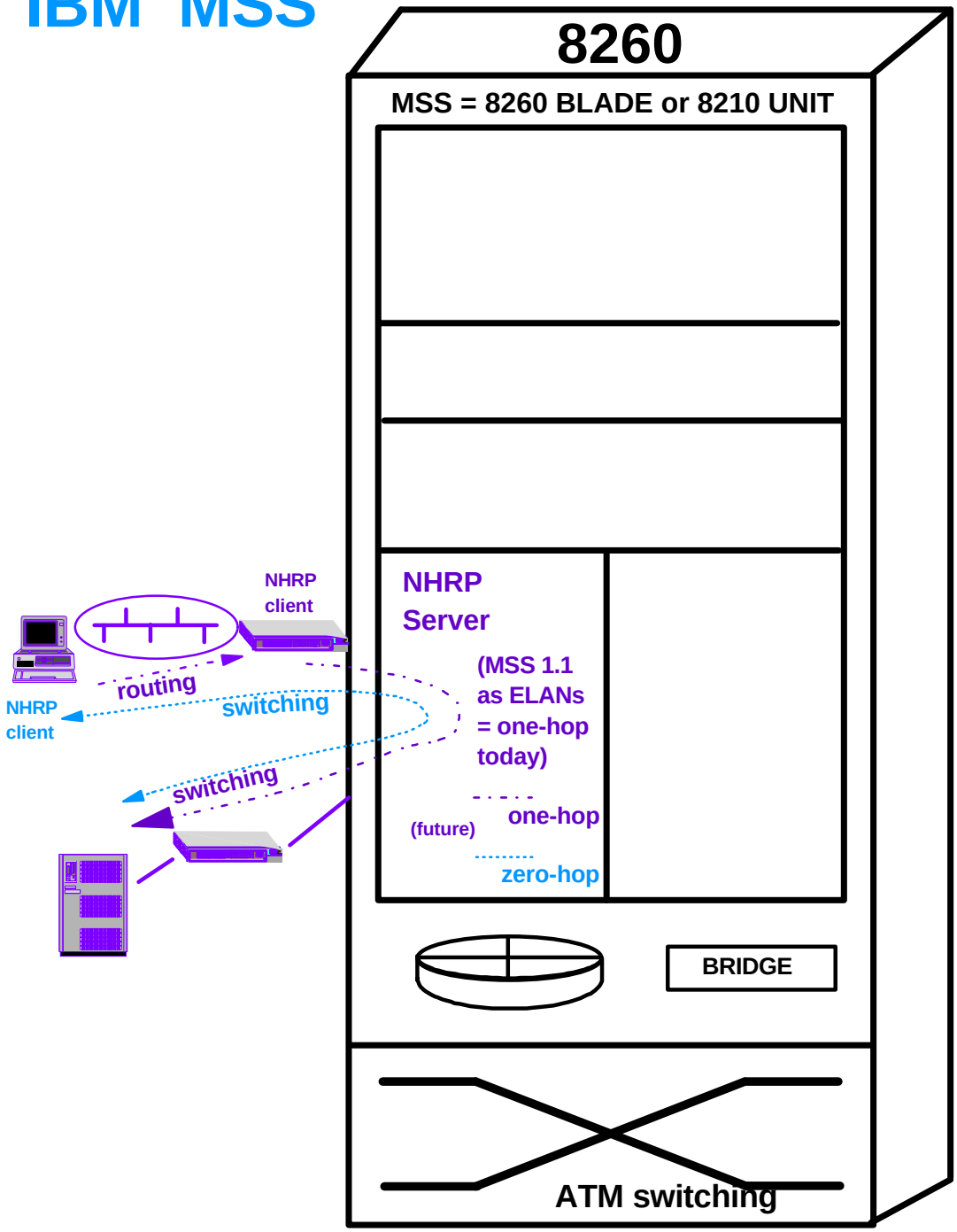
* Future

No Hop Routing *



* Future

IBM MSS



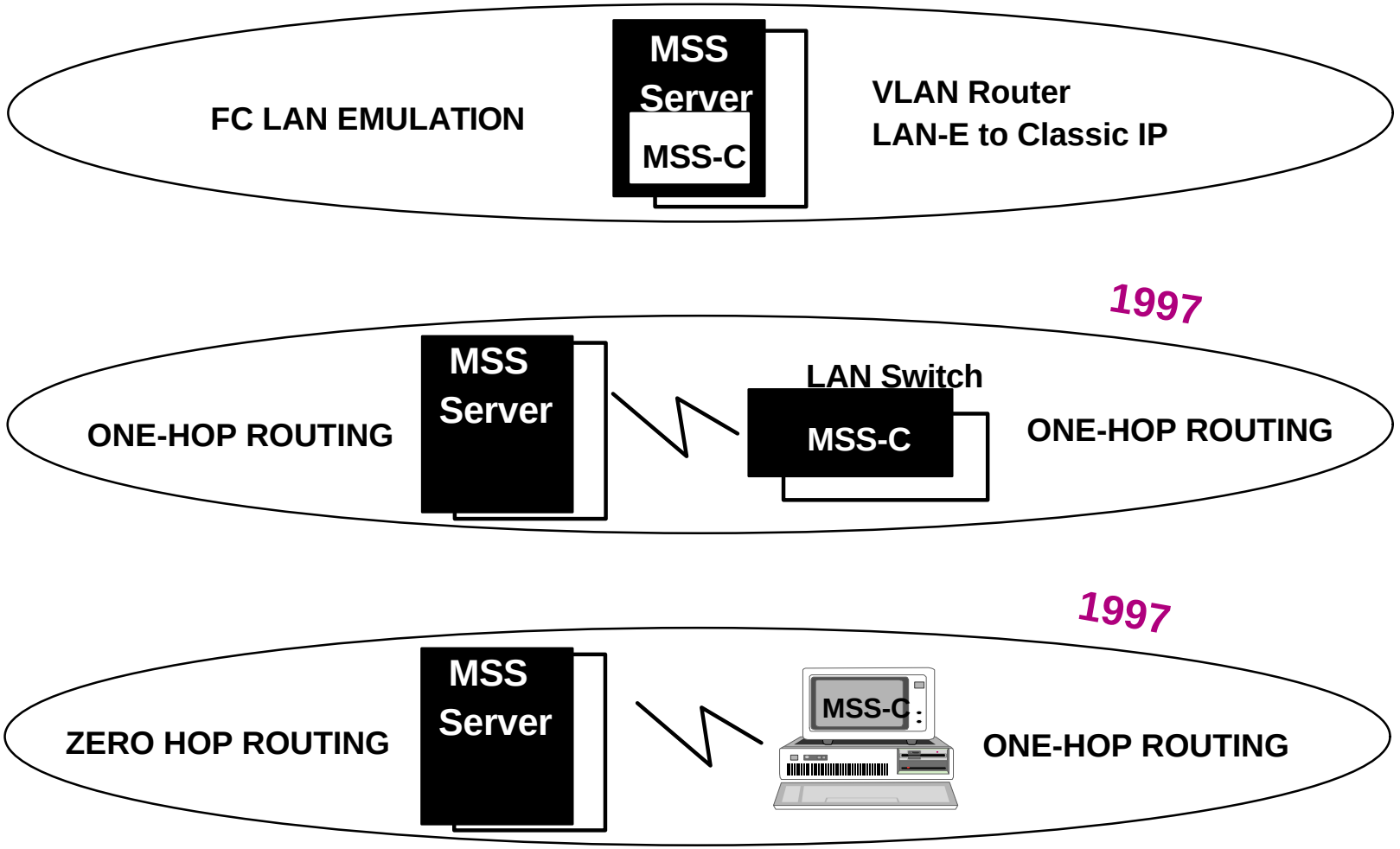
NHRP Cut-thru Routing allows for ZERO-HOP routing,SWITCHING from WKSTN to SERVER

Multiprotocol Switched Services

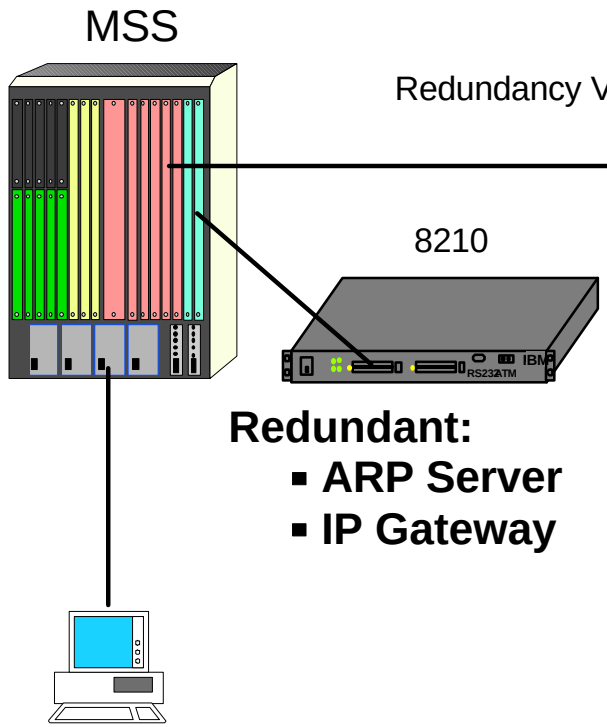
MSS CLIENT Implementation

SINGLE DOMAIN
TR-TR or Enet - Enet

Multiple DOMAIN
TR-TR or Enet - Enet
TR - Enet



MSS REDUNDANCY



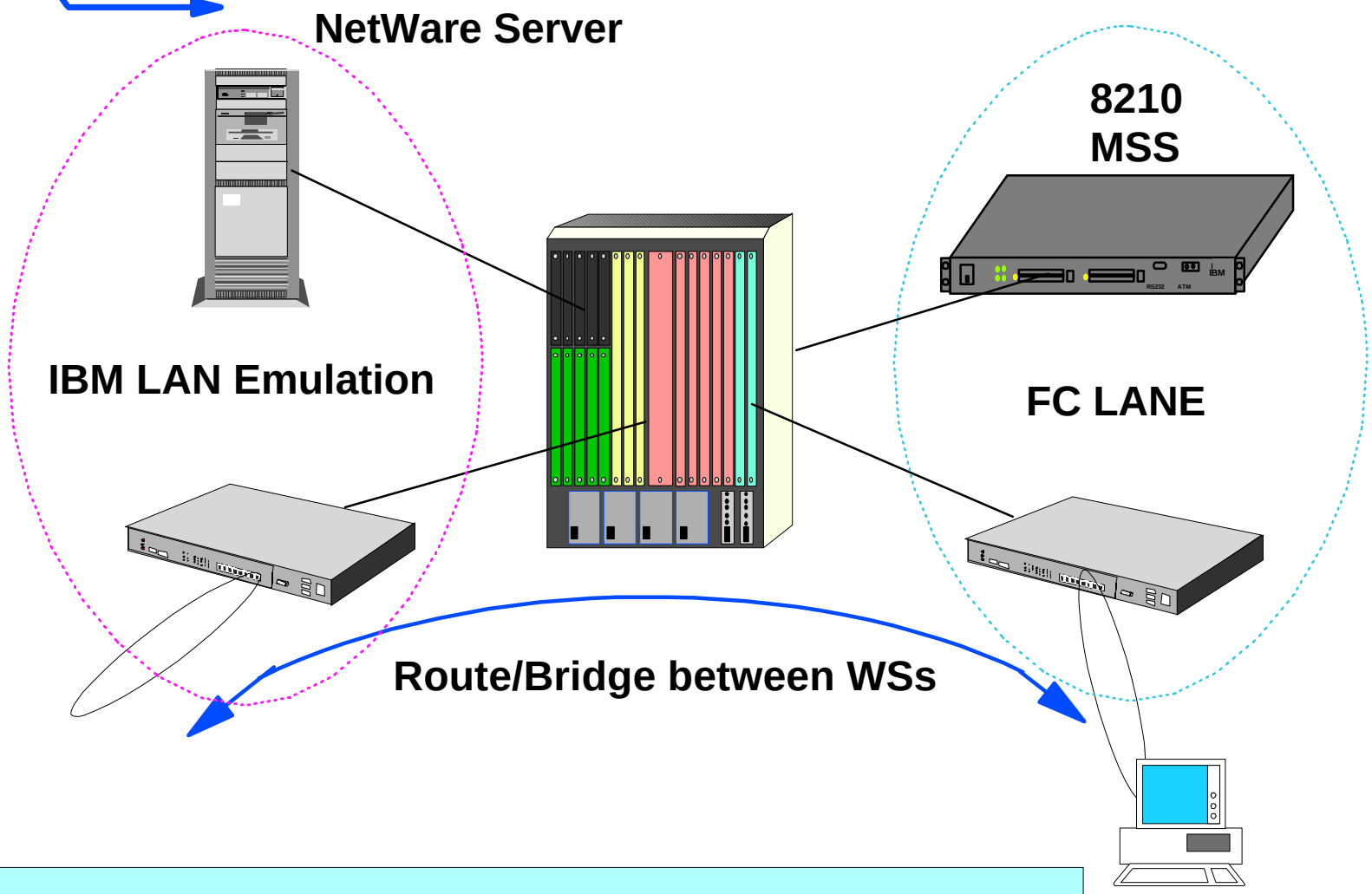
Redundant:
- **ARP Server**
- **IP Gateway**

Redundant/Distributed:
- **LECS**
- **LES/BUS**
- **IP Gateway**

Redundant Services:
- ARP Server/IP Gateway*
  - Must be on same switch
- LECS/LES/BUS/BCM
  - Could be on same or different systems
- LANE/CIP routing
- Automatic recovery

Distributed Services
- LES/BUS/BCM

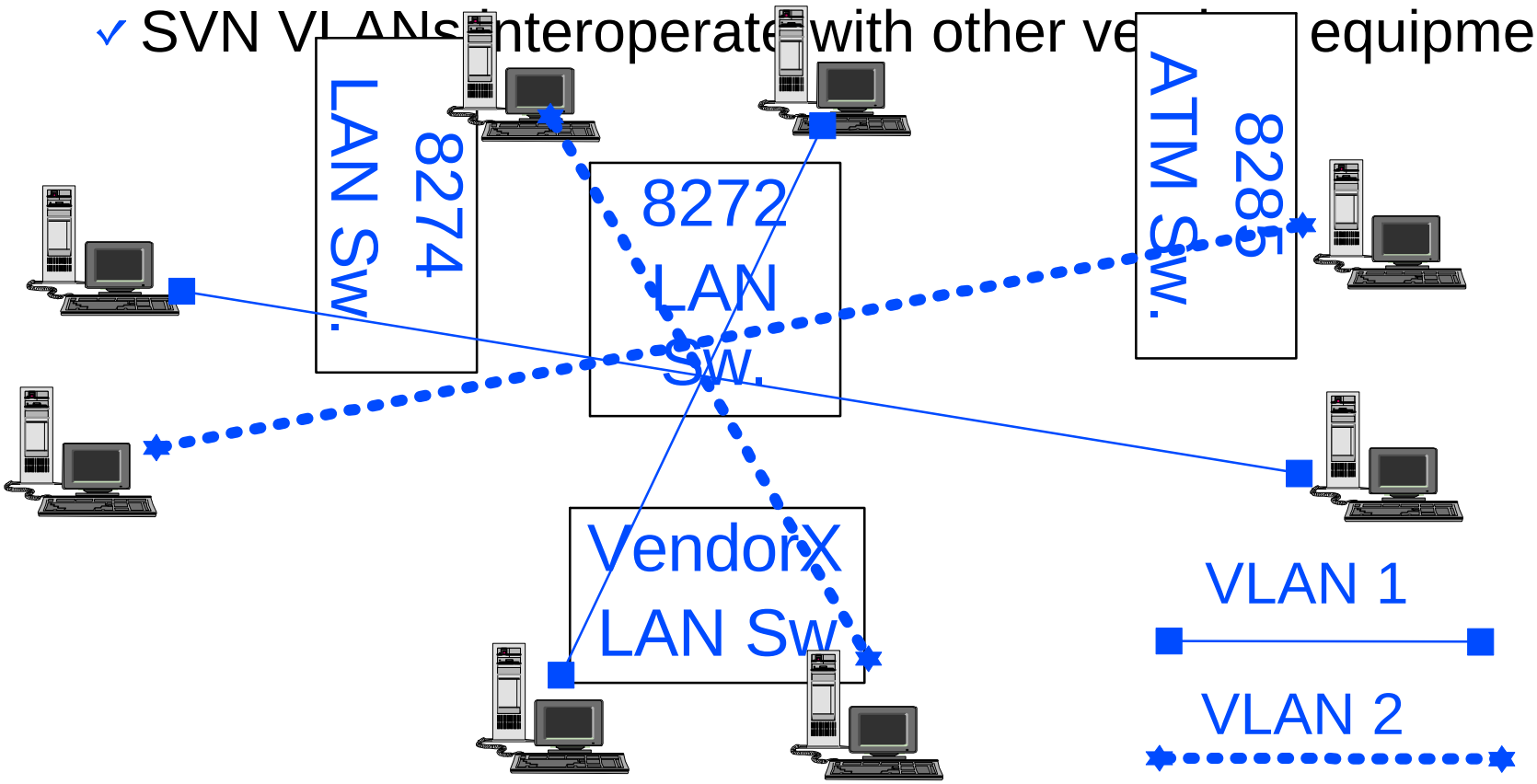
* MSS 1.1



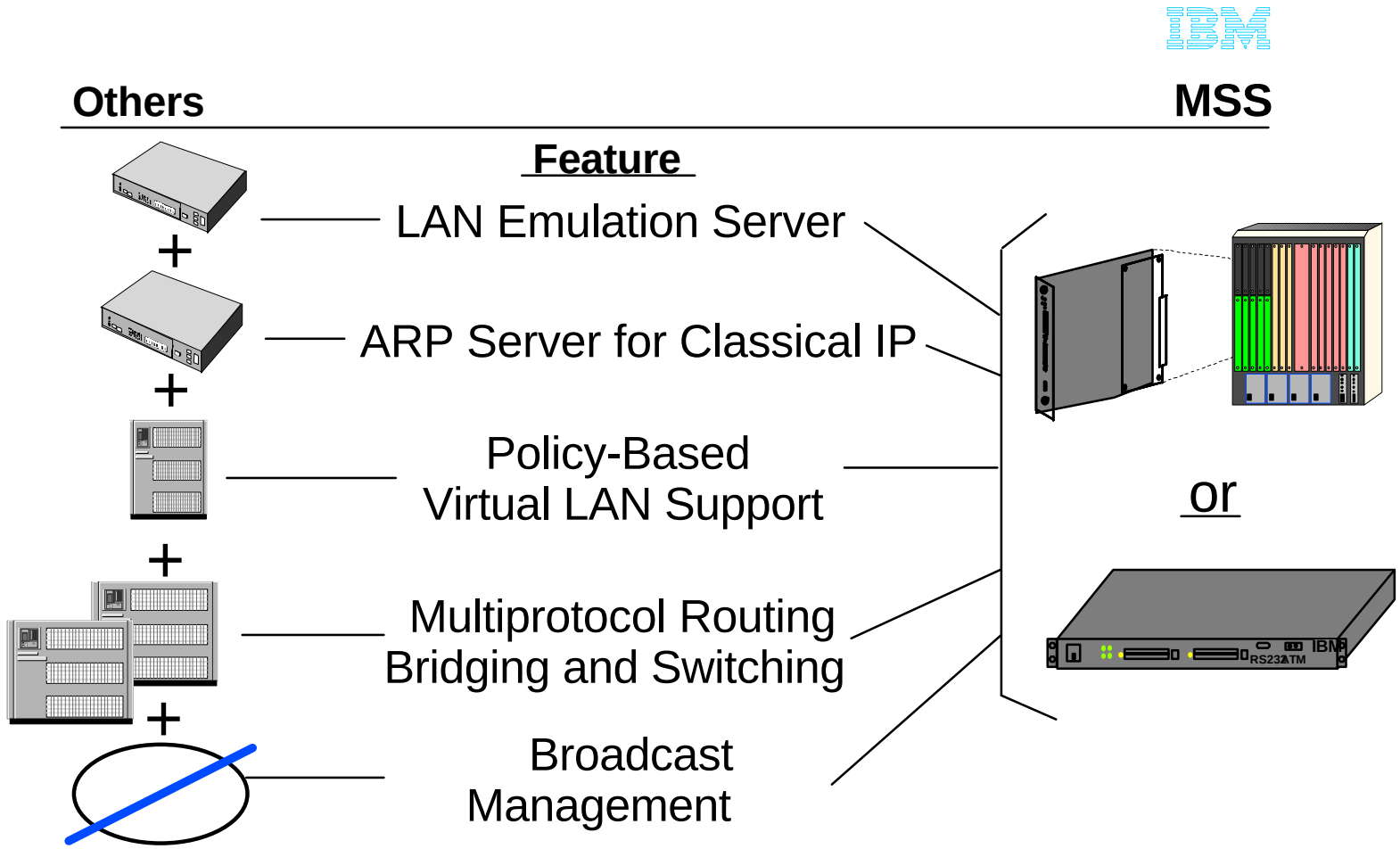
Migrate easily from IBM LAN Emulation to Forum Compliant LAN Emulation

VLANs

- SVN VLANs can contain LAN and ATM attached devices
- SVN VLANs can contain shared or switched LANs.
- SVN VLANs interoperate with other ve equipment.



Nways MSS Server



IBM Multiprotocol Switched Services

- ✓ Comprehensive solution for all LAN types
  - MSS leverages NHRP for both ATM, Token Ring, Ethernet, Shared/Switched for gigabit routing
  - MSS provides VLANs that cross shared/switched LAN and ATM
- ✓ Scaleable / Reliable LANE solution
  - MSS has cross domain gigabit switching
  - MSS provides dynamic filtering between domains
  - MSS provides fully redundant LANE services
- ✓ Broadcast management within a VLAN
  - Provides broadcast reduction between AND within a VLAN
  - SVN provides broadcast protection for IP , IPX , N/Bios , and T/R
- ✓ Tested Multivendor interoperability
  - MSS has been tested by the NIA (http://www.nia-alliance.com)
  - MSS built on existing standards not proprietary marketectures
- ✓ Truly Multiprotocol
- ✓ **Available TODAY**