SVN   SWITCHED
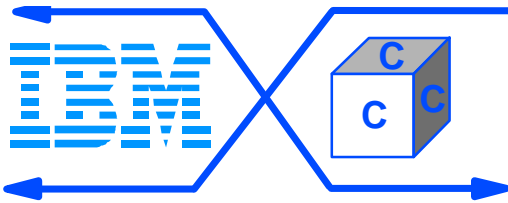## VIRTUAL
## NETWORKING

the BUSINESS of NETWORKING

REASONS for NETWORK CHANGE

- Capacity break down of departmental LAN model

    - Routers sufficient when 80% traffic stayed in department and 20% crossed routed backbone
    - **Network computing drives 80% traffic across backbone to support:**
        - Central Site Server Farms
        - Interdepartmental collaboration
        - Virtual services
        - Internet/Intranet Servers
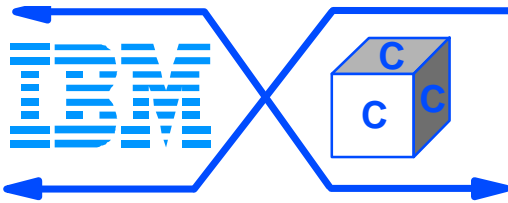
# REASONS for NETWORK CHANGE

- ■ Capacity break down of departmental LAN model

- ■ **Cost of administration rising**
  - − Mobility
  - − Distributed server maintenance
  - − Distributed work groups
  - − Complexity of filter management
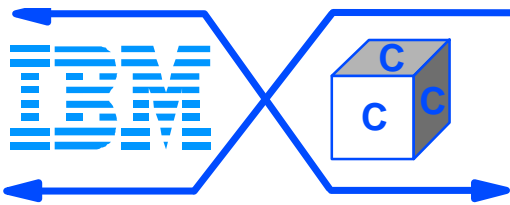
REASONS for NETWORK CHANGE

- Capacity break down of departmental LAN model
- Cost of administration rising
- **Enablement for new services**
  - Collaboration; e.g. white board, document consulting
  - Conferencing; voice/video
  - Multicast; e.g. information distribution
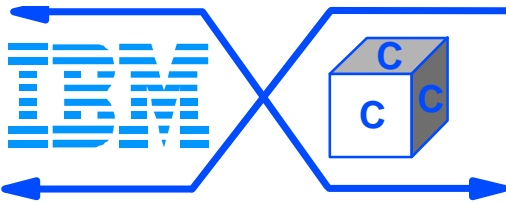 - Video distribution; e.g. training, CEO message
  - Secure networks
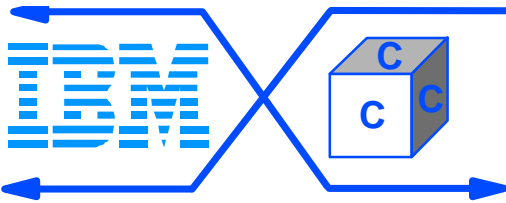
BANDWIDTH !

The BUSINESS ISSUES of Networking

....as the MOVE TOWARDS the Network Computing Model evolves...

### (....or "PRESSURES on the PLUMBING"...)

1. BOTTLENECKS ... at the key access points (Servers...)
2. new BandWidth hungry applications (Voice , Video , Multimedia)
3. "access to / availability to" INTERNET is becoming KEY PART
   of BUSINESS OPERATION
4. Quality of Service expectations of INTRANET , INTERNET becoming close to PHONE / POWER
5. SECURITY and ACCESS Control
6. MOBILITY of workforce
7. adding more BandWidth cannot be the solution
8. STANDARDS BASED solutions.... not PROPRIETARY
9. leave LEGACY applications , NETWORKS alone to evolve
10. have big investment in ROUTERS

"Route to the DESKTOP , SWITCH to the BACKBONE"

What are the key SWITCH FUNCTIONS required?

- Dynamics: Must keep work groups together even when **mobile** or distributed.
  - Requires dynamic VLANs (VIRTUAL LANS)

- Scaleability: Must be able to **span across the campus or the enterprise.**
  - Requires ROUTING broadcast reduction
  - Requires scaleable address resolution capability

- Switch Routing: Must move **traditional routing** out of the core of the network.
  - Requires scaleable switch routing
  - Must work with ATM and switch and shared LAN media

- Comprehensive: Must be able to support all media types.
  - Requires a single architecture between media.
  - Must use **standards based** approach for interoperability

- **Security , Redundancy**: Use MSS's Forum Compliant LAN EMULATION
  - utilize Redundant components for HIGH AVAILABILITY

IBM

SVN
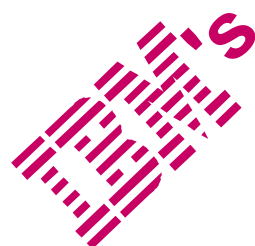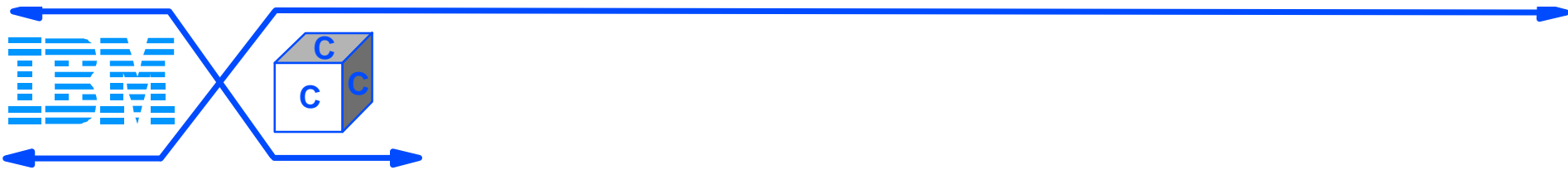
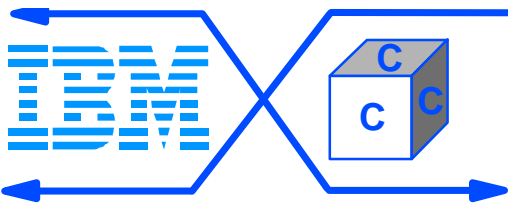## *Switched Virtual Networking*

....it's a philosophy

....it's the culture

....it's the rulebook

....it's the GAMEPLAN !
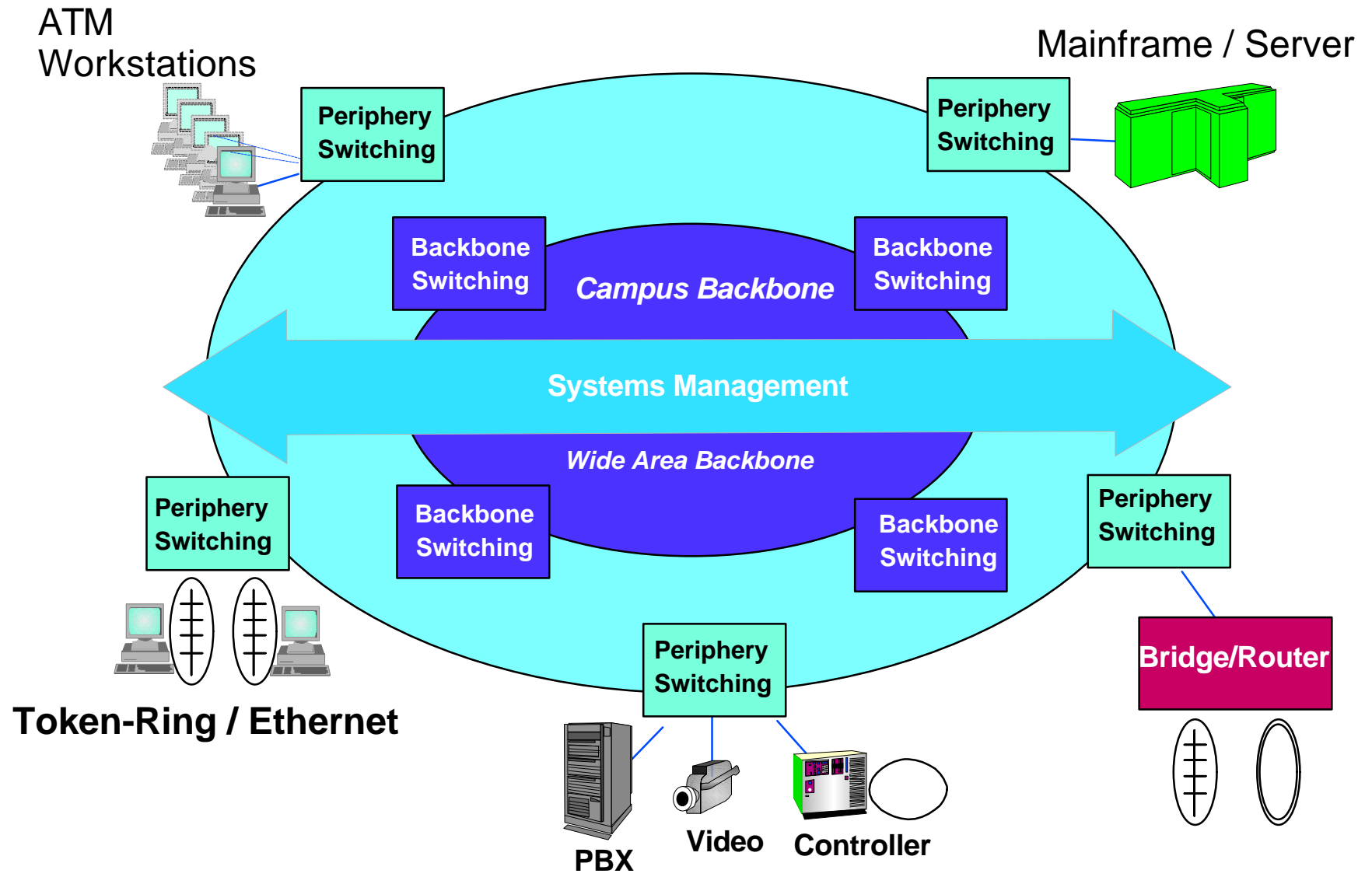
it is NOT .... a BOX
.... a PRODUCT

IT IS .... how the boxes are all
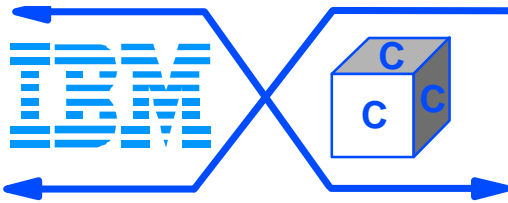**PUT TOGETHER**
.... how all the products
FIT TOGETHER

"...it's IBM's Networking FRAMEWORK to ENSURE STANDARDS based SWITCHING solutions..."

SVN

IBM

ATM Workstations

Mainframe / Server

Periphery Switching

Periphery Switching

Backbone Switching

Campus Backbone

Backbone Switching

Systems Management

Wide Area Backbone

Periphery Switching

Backbone Switching

Backbone Switching

Periphery Switching

Token-Ring / Ethernet

Periphery Switching

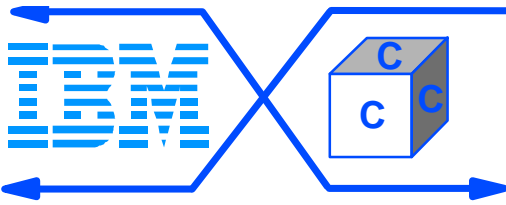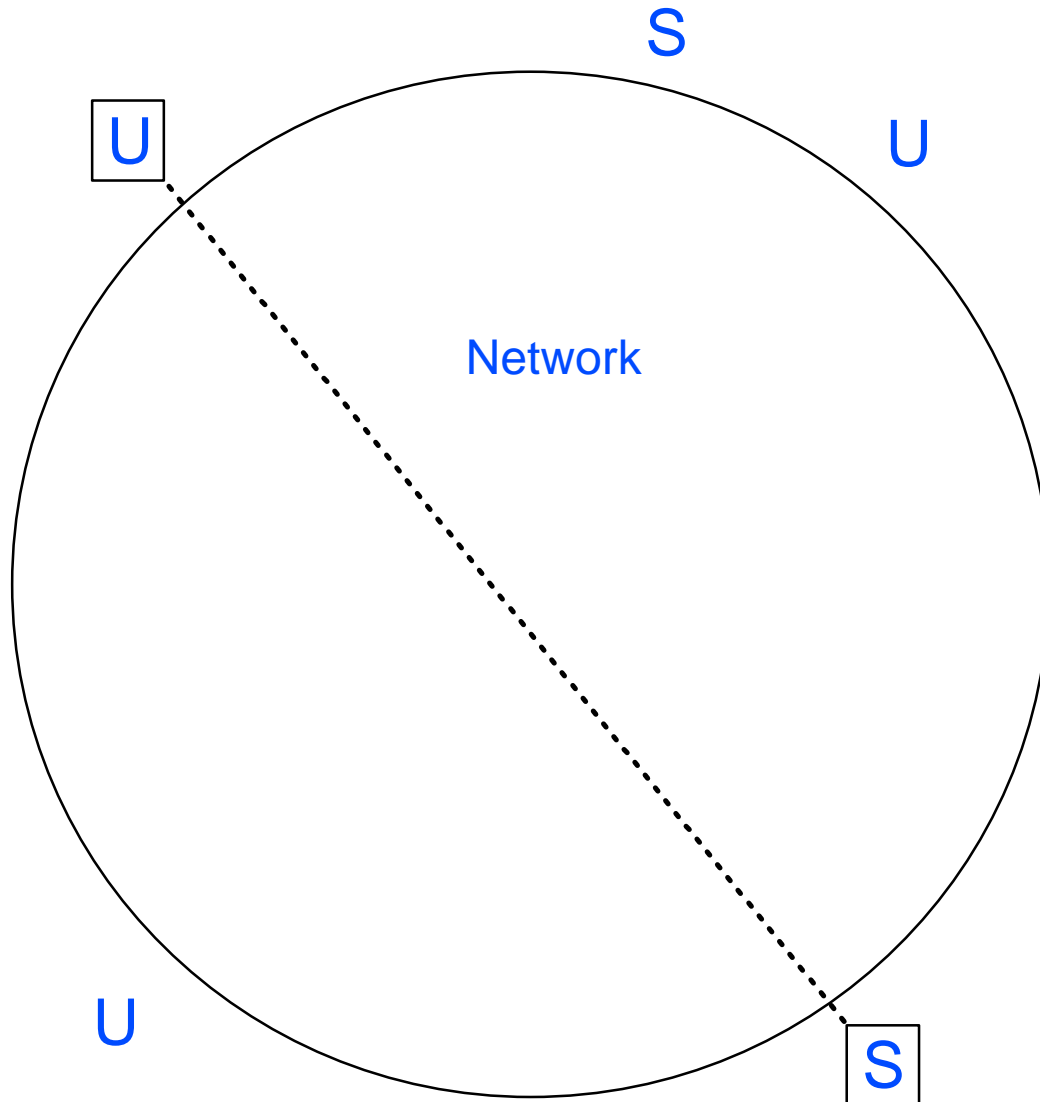Bridge/Router

PBX

Video

Controller

The Network's Purpose

1. Find the source of information
2. Determine the path to follow
3. Send the information to user

S
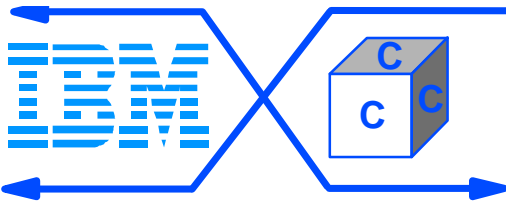
U

U

Network

U

S
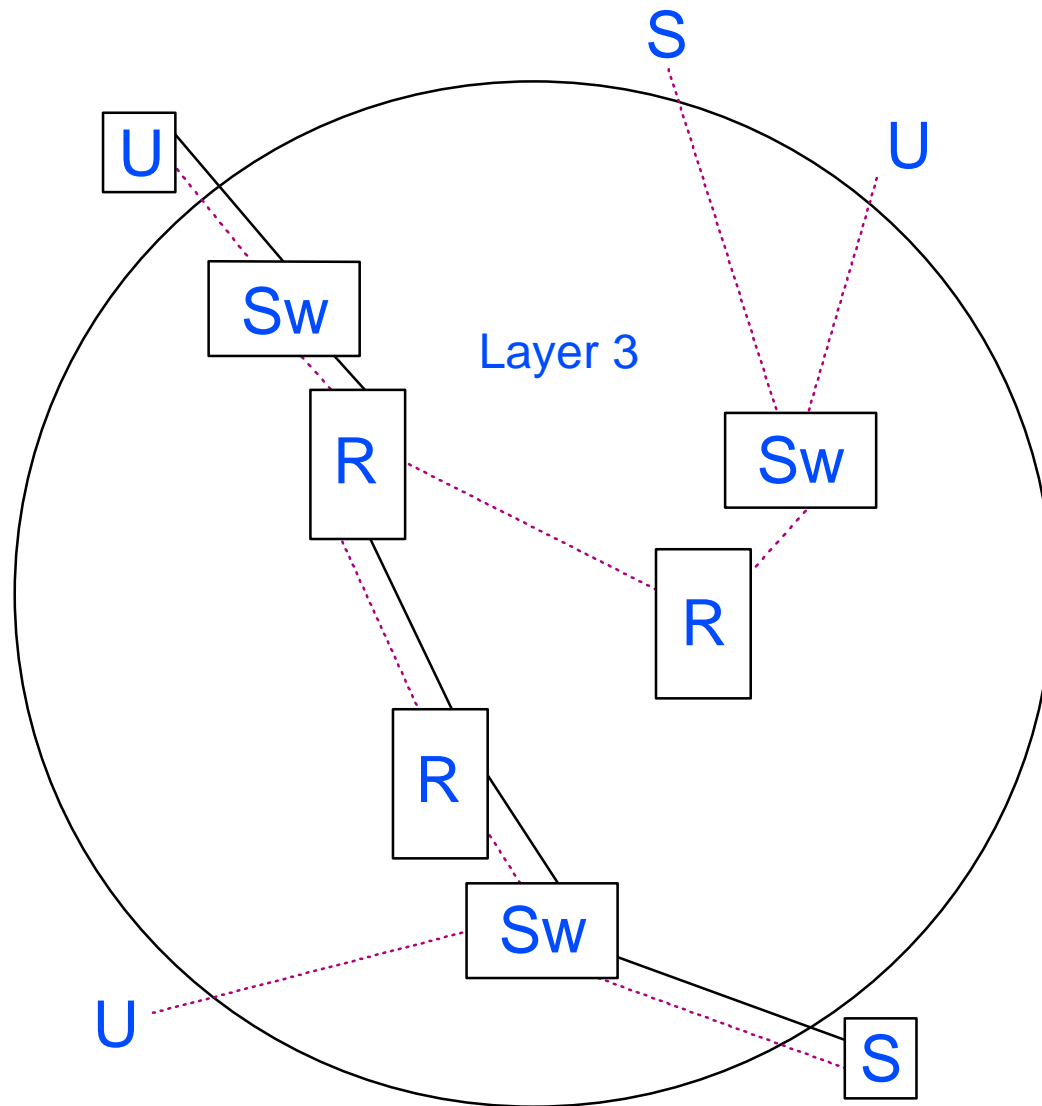
- Quite simply, networks exist because people (users of the network) want access to information (source of data)

U - User
S - Source
---- Information
     flow

The Routed Network

S

U

U

Sw

Layer 3

R

Sw
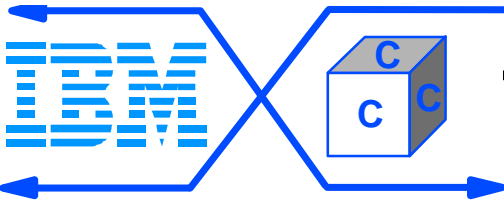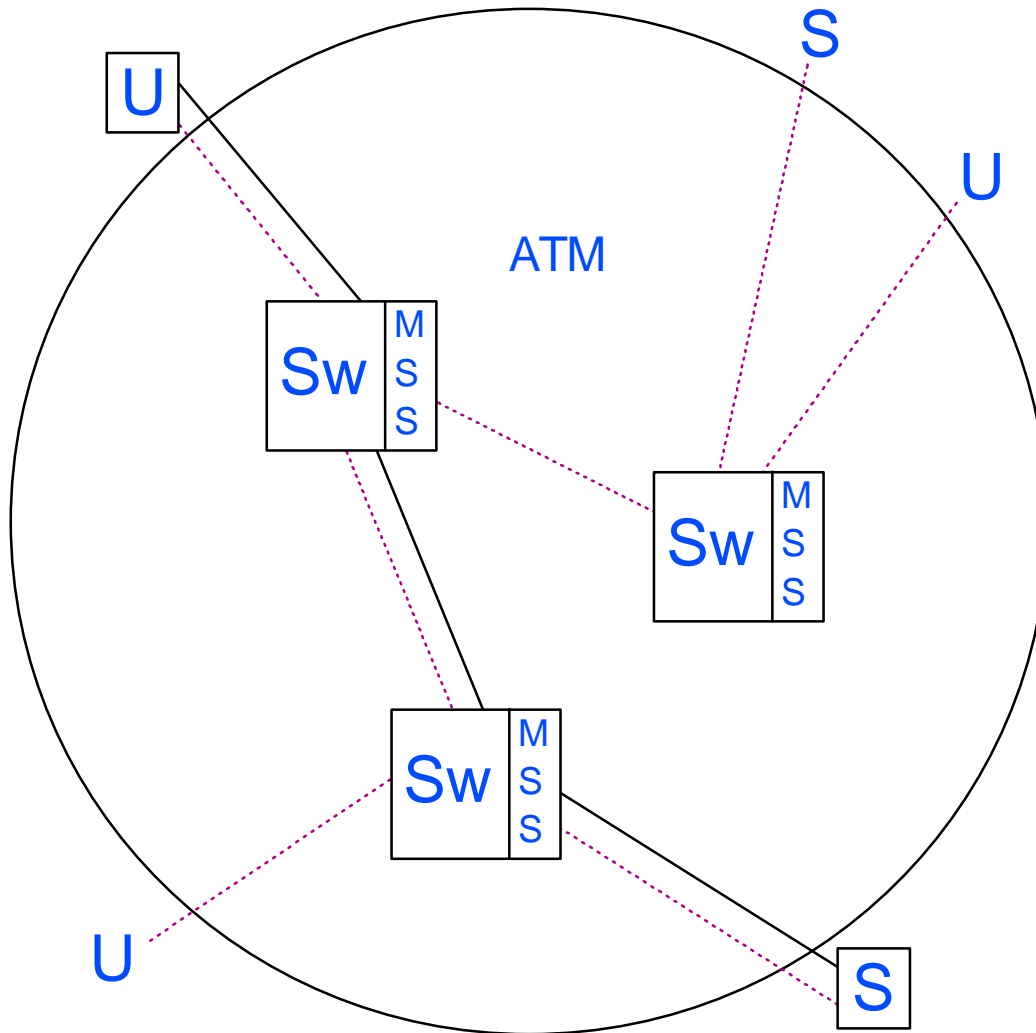
R

R

U

Sw

S

- Multiple platforms
- Continuing broadcast traffic to find server
  - managed by layer 3 subnets
- Each frame checked by every router in path
  - determines route for duration of flow
- Software based
- Can have single point of failure
- May be proprietary

U - User
S - Server
R - Router
Sw - Switch
---- Broadcast
— Path

The ATM/MSS Network: Resolution

ATM

S

U

U

Sw | M S S

Sw | M S S

Sw | M S S

U

S

- One platform
- Broadcast manager (BCM)
  - once server is found, ATM address 'stored' by MSS
  - future broadcasts converted to 'unicasts' based on knowledge of this address
- MSS determines path to server
  - this resolves ATM address, then 'Virtual Circuit' established between user & server
- Hardware based
- Redundancy of all critical MSS components
- Entirely based on open standards
  - LANE, NHRP, MPOA

U - User
S - Server
Sw - Switch
MSS - Multi-protocol
        Switched Services
---- Broadcast
— Path
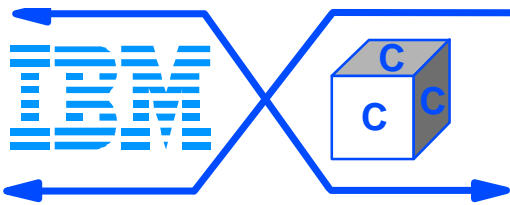
The ATM/MSS Network: Send Information

S

U

ATM

U

U

S

Sw | M S S

Sw | M S S

Sw | M S S
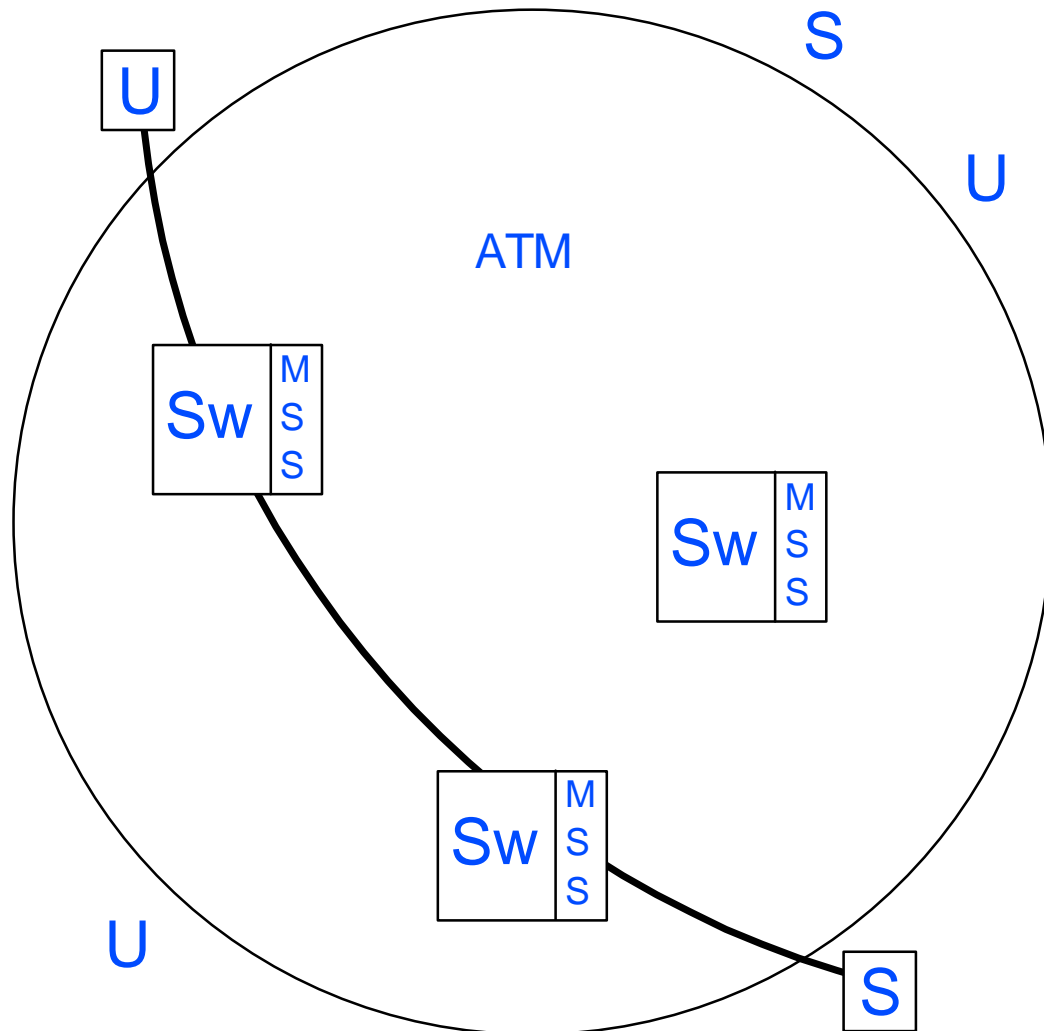
- The 'flat' network!
  - leverages switched infrastructure
  - connection oriented
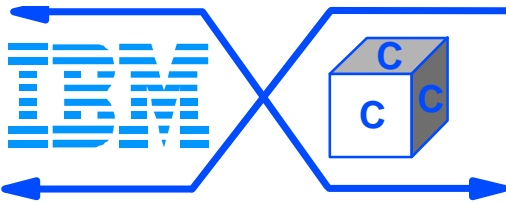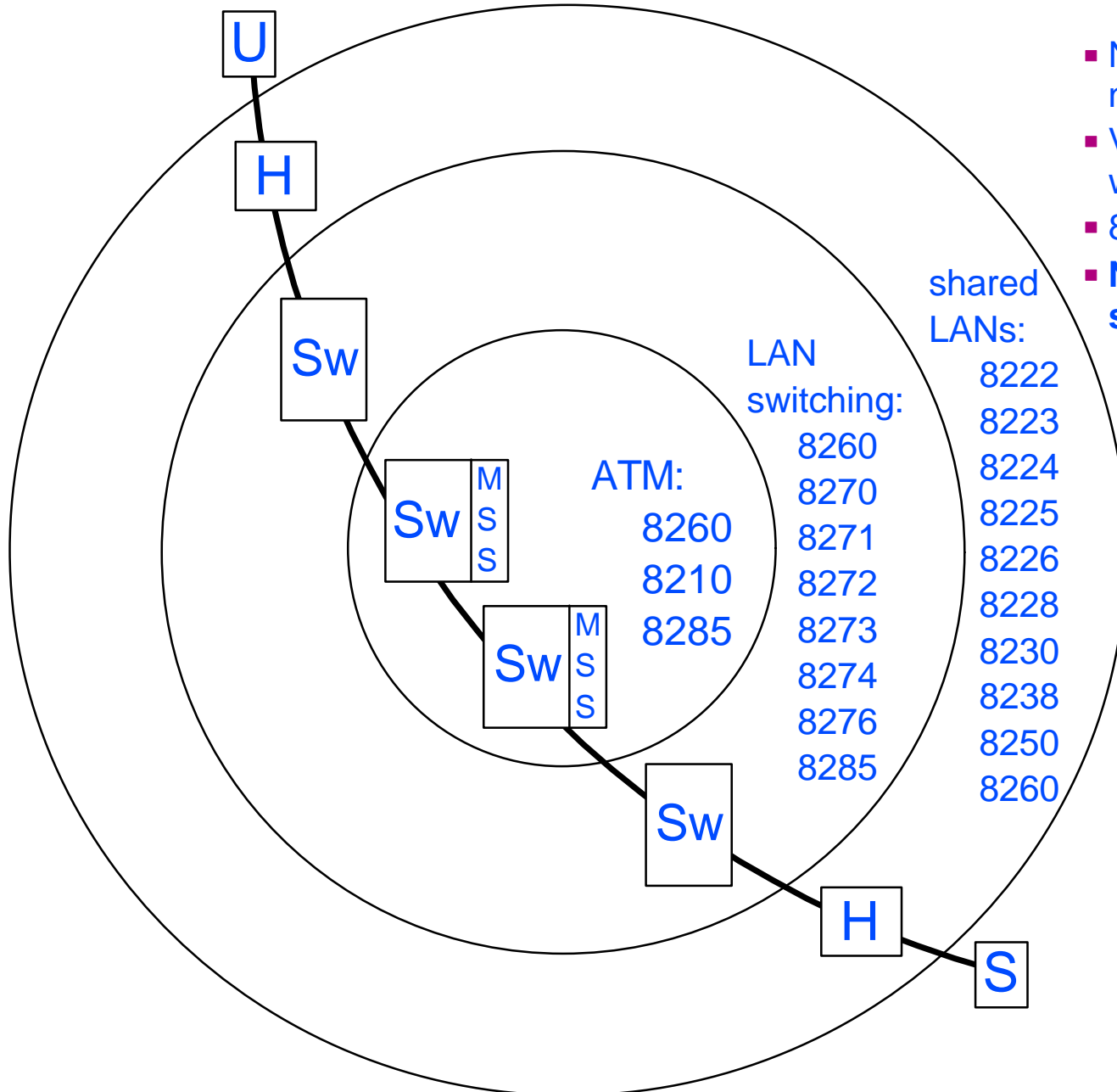 - broadcast traffic virtually eliminated
- ATM Quality of Service (QoS)
- *MSS solution available today!*
  - *Standards based!*

U - User
S - Server
Sw - Switch
MSS - Multi-protocol
      Switched Services
— Path

The MSS Campus Network: IBM Products

- No standalone Layer 3 routers needed!
- Variety of edge LAN switches w/ATM uplinks
- 8260: one platform solution
- **Note: includes new desktop switches (3Com)**

U

H

Sw

Sw | MSS

Sw | MSS

Sw

H

S

ATM:
8260
8210
8285

LAN switching:
8260
8270
8271
8272
8273
8274
8276
8285

shared LANs:
8222
8223
8224
8225
8226
8228
8230
8238
8250
8260

U - User
S - Server
H - Hub
Sw - Switch
MSS - Multi-protocol
        Switched Services
— Path

IBM's Switched Virtual Networking   SVN
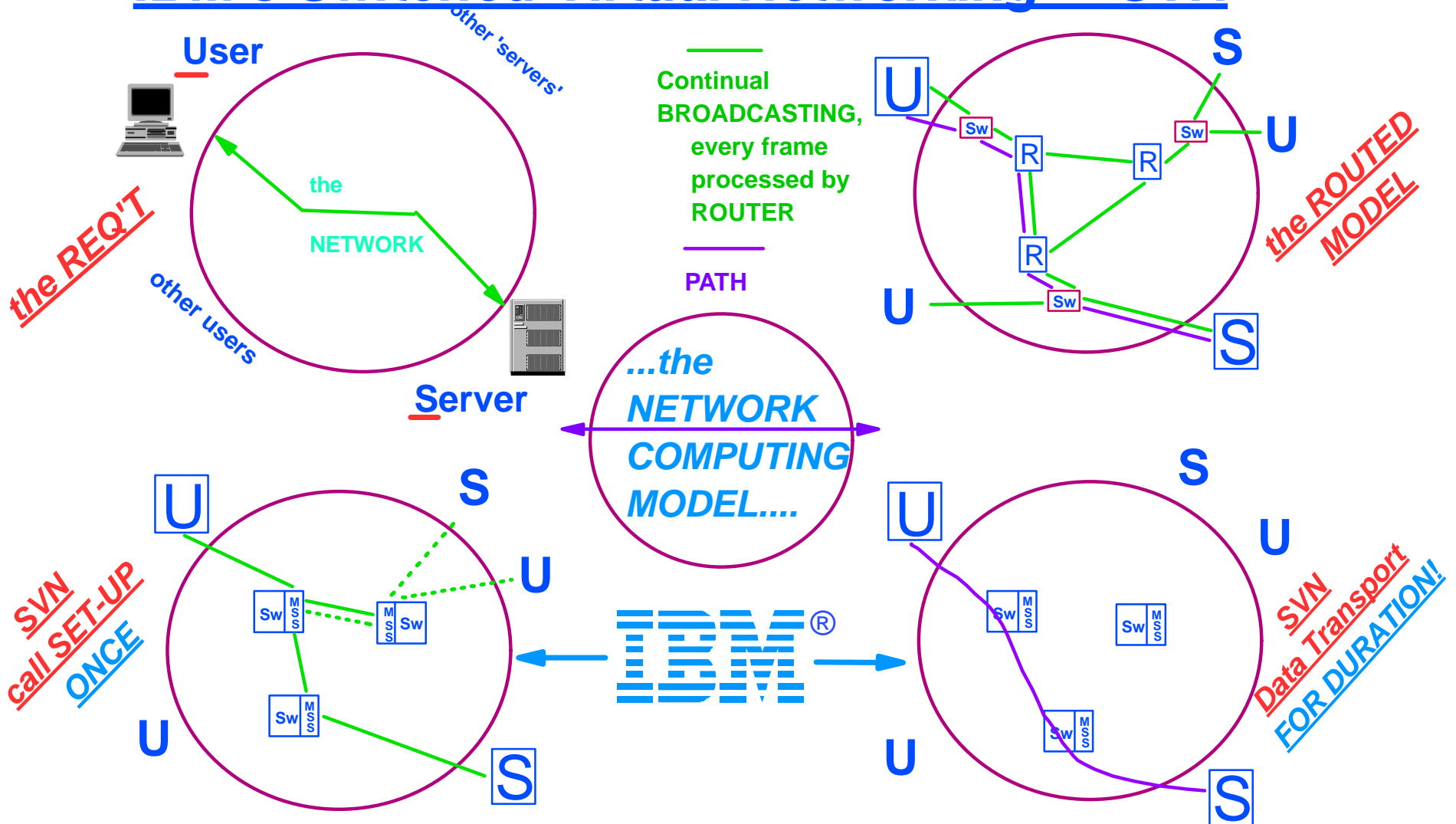
User

Server

other 'servers'

the NETWORK

other users

the REQ'T

——— Continual BROADCASTING, every frame processed by ROUTER

——— PATH

...the NETWORK COMPUTING MODEL....

U   S   U   the ROUTED MODEL   R   R   Sw   Sw   U   S

SVN call SET-UP ONCE

U   S   U   Sw MSS   MSS Sw   Sw MSS   U   S

IBM®

SVN Data Transport FOR DURATION!

U   S   U   Sw MSS   Sw MSS   Sw MSS   U   S

1. **SERVICES , ROUTE-PATH set up at INITIATION ,.... then CONNECTION oriented SWITCHED SESSION**
3. **SIMPLE MIGRATION path at INCREMENTAL pace ..... (workgroup , backbone at a time)**
4. **COLLABORATIVE applications (VIDEO conferencing , Multimedia)**
5. **MOBILE WORKFORCE access to Network,...NO ADMINISTRATIVE INTERVENTION**
6. **NEW SERVICES added (..... to the SERVER , away from the TRANSPORT PATH!)**
7. **STANDARDS BASED SOLUTIONS,... IETF , ATM Forum**

ROUTER MODEL

Work Group Switch — Router — Back-bone Switch — Router — Work Group Switch
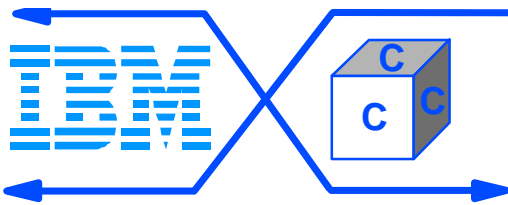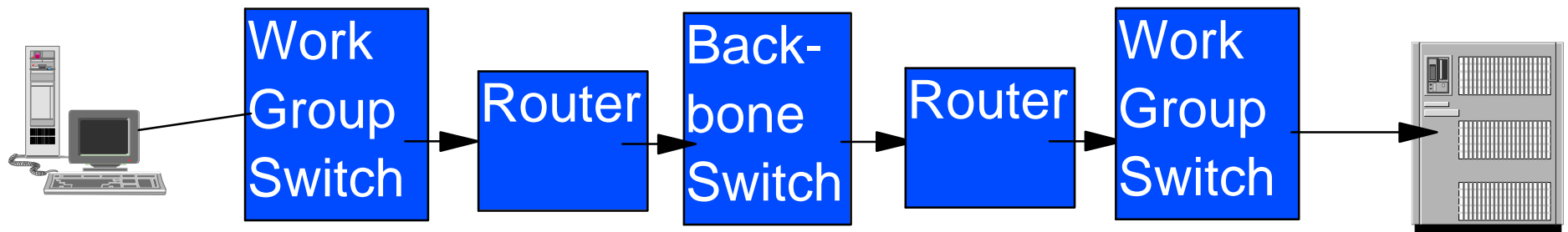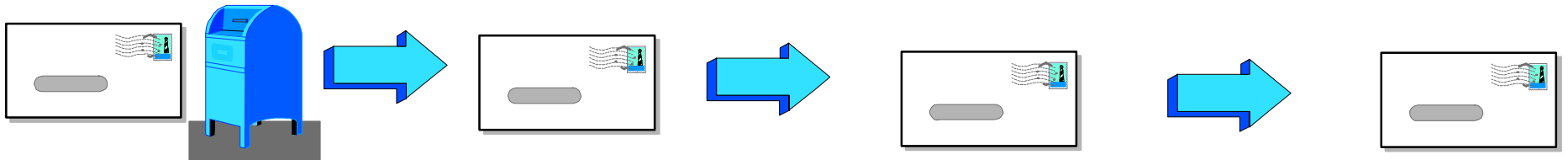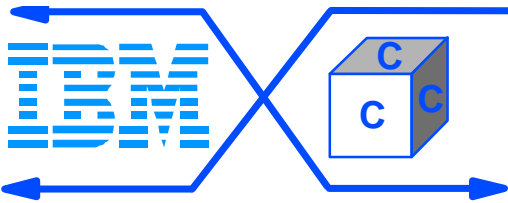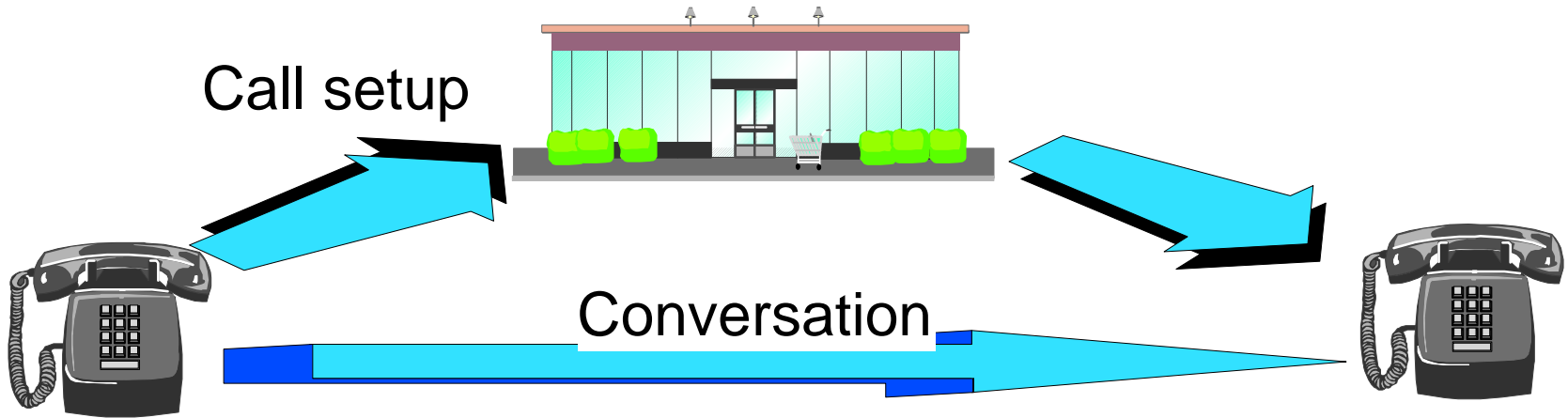
In router networks, **every packet is screened at every router hop** for specialized service processing. As services are added capacity drops and latency increases.

SVN MODEL

Call setup

Conversation

SVN provides service at initiation then gets out of the way.

Network Server

Work Group Switch

Back-bone Switch

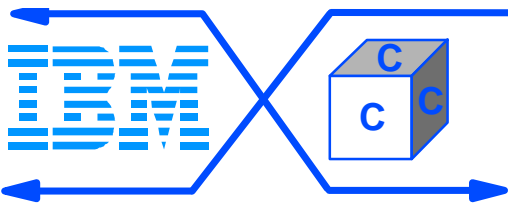Work Group Switch
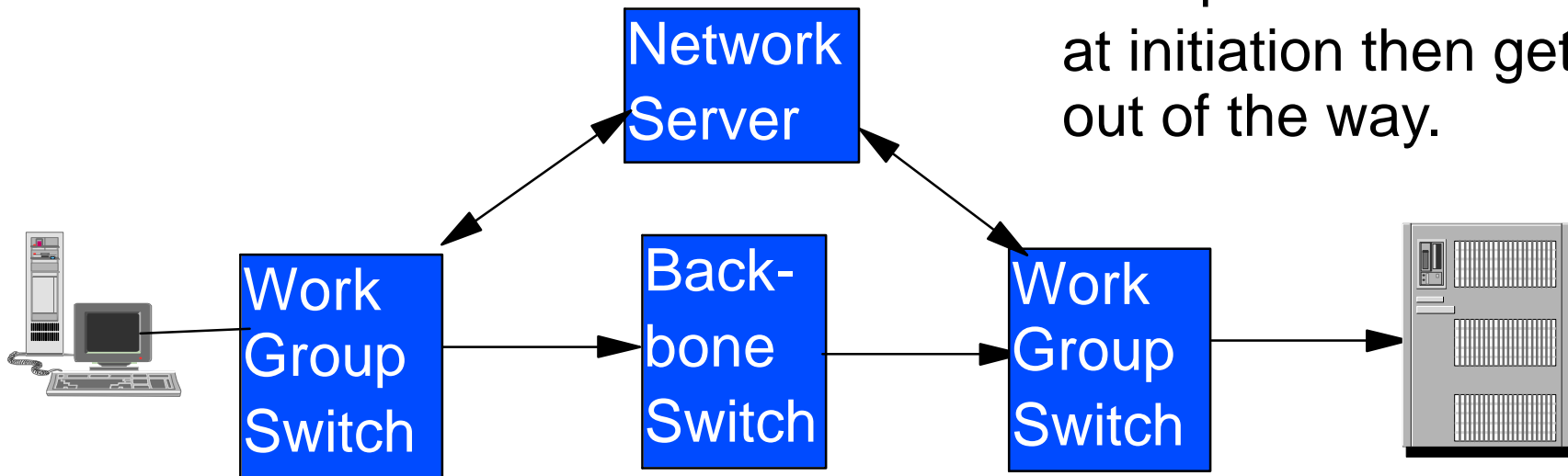
ROUTERS and ROUTING FUNCTION ?

**IBM's SVN Strategy does NOT REPLACE the NEED
for the ROUTING FUNCTION**

**the DIFFERENCE is PATH DETERMINATION and
SERVICES PROCESSING and
HOW IT's DONE**

	SVN	**ROUTER MODEL**
WHERE	in a SERVER	in every ROUTER
WHEN	at Connection SETUP	at every ROUTER
HOW OFTEN	ONCE	1/Packet/ROUTER

Why is SVN a better model for new services?

FILTERS   BROADCAST Processing
LANE Services   Address Resolution
QoS   Multicast

SVN
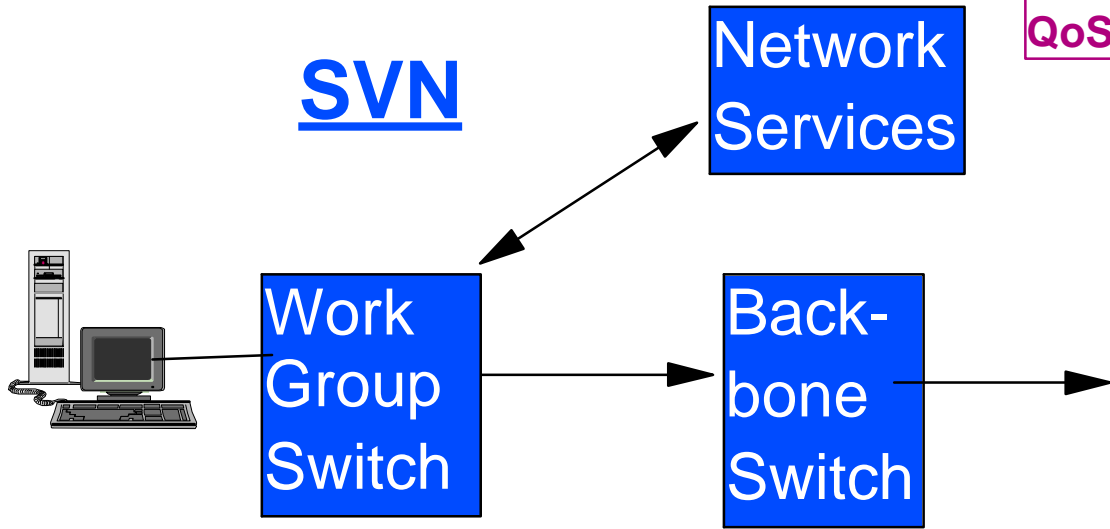
Network Services

New services are added to the Network Server in software.

Work Group Switch

Back-bone Switch

There is no need to change the switching code. This makes it easier to implement new functions.

Work Group Switch

Router

Back-bone Switch
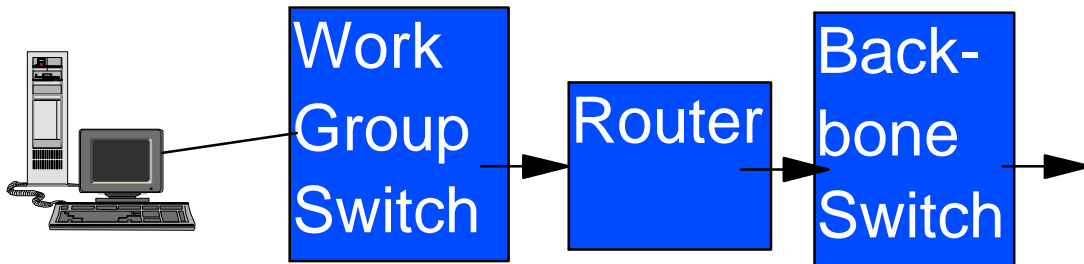
Introducing new functions often requires changes in the frame forwarding code. This introduces more risk to the customer and could require changes in hardware.

Router

Bypassing router significantly reduces delay!

Router BB

- 10m Hub to Router BB
- 100 EN sw to Rtr BB
- 100 EN hub to Rtr BB

ATM BB

- 100 EN Sw to ATM Sw
- IP Sw 25 to 155 ATM
- ATM 25 to 155 BB
- ATM 155 to 155 BB

Micro Seconds Delay

| 0 | 200 | 400 | 600 | 800 | 1,000 |
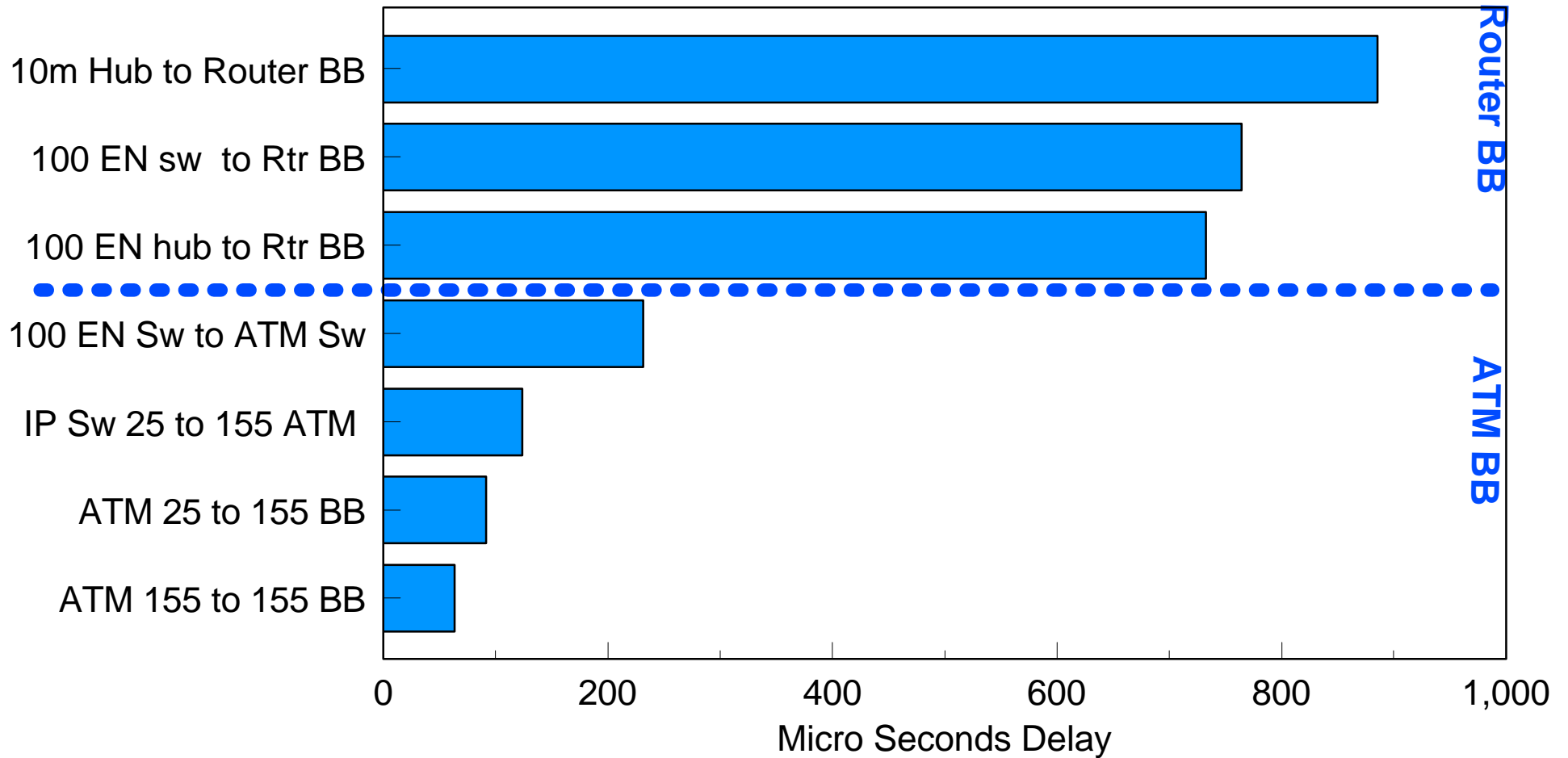
Configuration: 16 desktops per floor
3 Floors to a building
Source: INfonetics Research 12/96 Data Communications

ROUTER , 8260 Switch Throughput Comparison

PACKETS per SECOND

Effective Throughput

unavailable throughput...
pay for LARGER B/W ?!
- more ROUTERS ?!

5,000,000	
4,000,000	
3,000,000	
2,000,000	
1,000,000	
0	

Router   Big Router   Really Big Router   **IBM 8260 ATM SWITCH with MSS**   **SUPER 8260 ATM SWITCH**
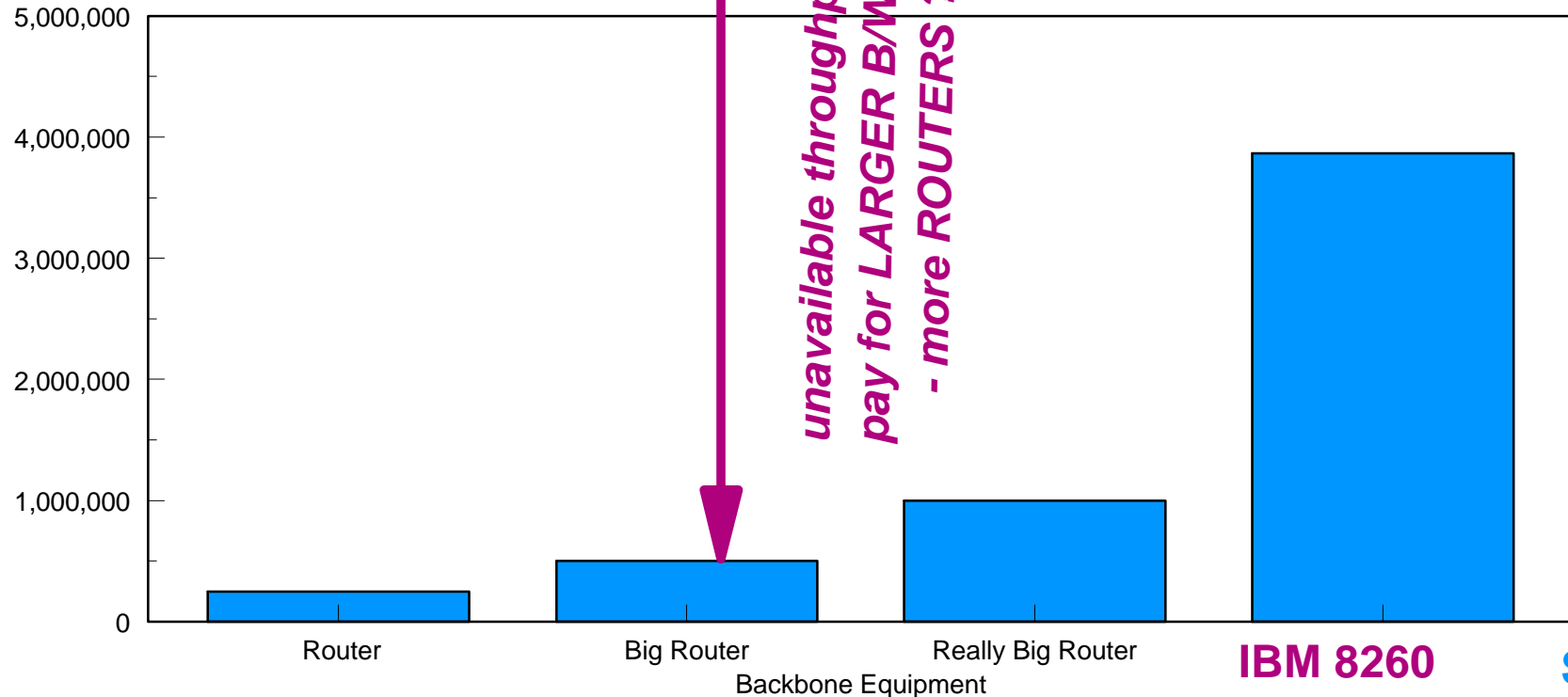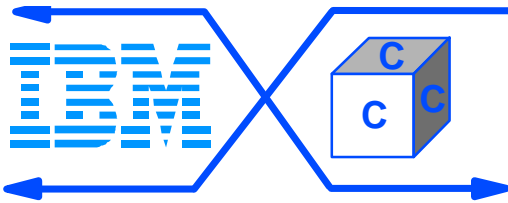
Backbone Equipment

Router assumes 64 byte packets
8260 assumes 96 byte packets (64 byte packets would yield same number)

.....not to mention the $$$$ _8260_ **vs.**   _1010 / 7507_
      (12 x OC3 ports)
      $ 76 K   **vs.**   **$ 86 K**
      91   **vs.**   **146**   **(equal redun'y)**

- ## Flat LANs
  - – Problem: Flat LANs lack scaleability
- ## Edge Switch/Core Switch with 1 Arm Router
  - – The links to the router become the bottleneck
- ## Hardware Router model
  - – Challenges in adding new services
- ## Switched Virtual Services model
  - – Routing and switching provide integrated services

IBM's Switched Virtual Networking   SVN
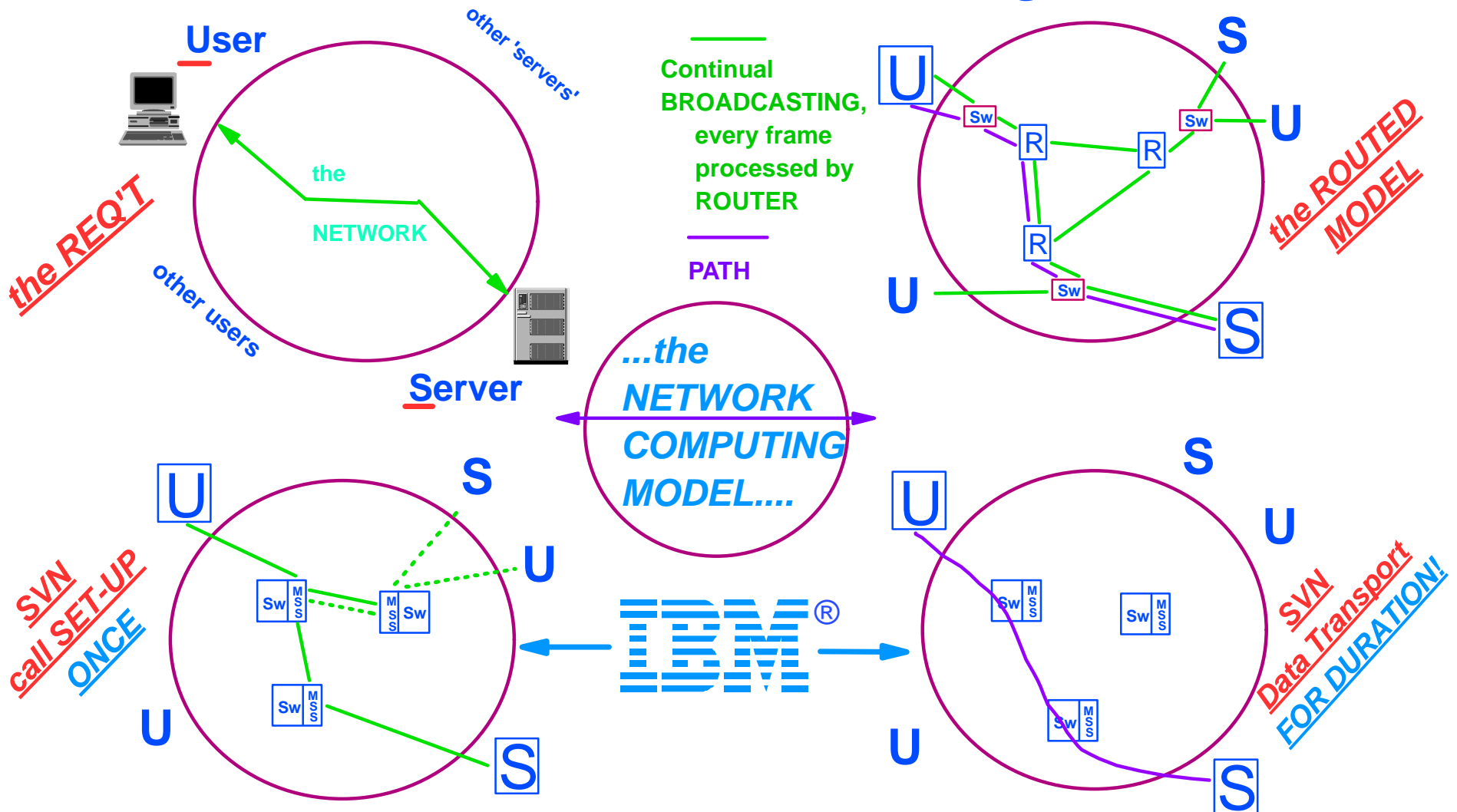
User

other 'servers'

the

NETWORK

the REQ'T

other users

Server

Continual
BROADCASTING,
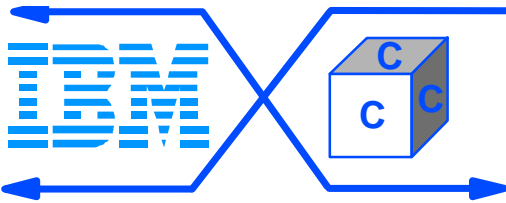every frame
processed by
ROUTER

PATH

U
Sw
R
R
Sw
U
S
U
S

the ROUTED MODEL

...the
NETWORK
COMPUTING
MODEL....

U
S
U
Sw MSS
MSS Sw
Sw MSS
S
U

SVN call SET-UP ONCE

IBM®

U
S
U
Sw MSS
Sw MSS
Sw MSS
S
U

SVN Data Transport FOR DURATION!

1. **SERVICES , ROUTE-PATH set up at INITIATION ,.... then CONNECTION oriented SWITCHED SESSION**
3. **SIMPLE MIGRATION path at INCREMENTAL pace ..... (workgroup , backbone at a time)**
4. **COLLABORATIVE applications (VIDEO conferencing , Multimedia)**
5. **MOBILE WORKFORCE access to Network,...NO ADMINISTRATIVE INTERVENTION**
6. **NEW SERVICES added (..... to the SERVER , away from the TRANSPORT PATH!)**
7. **STANDARDS BASED SOLUTIONS,... IETF , ATM Forum**

The BUSINESS ISSUES of Networking

....as the MOVE TOWARDS the Network Computing Model evolves...

(....or "PRESSURES on the PLUMBING"...)

.... and the OSCAR goes to ....

IBM MSS !

Data Communications
LAN TIMES
GRAND WINNER 96
NETWORLD™+INTEROP™
ATLANTA-PARIS

Business Issue	Solution
1. BOTTLENECKS ... at the key access points (Servers...)	8260 MSS , LAN Sw , Super 8260
2. new BandWidth hungry applications (Voice , Video , Multimedia)	ATM 25,155,622
3. "access to / availability to" INTERNET is becoming KEY PART of BUSINESS OPERATION	SVN , ATM QoS , MSS , ARIS
4. Quality of Service expectations of DATA N/W , INTERNET becoming close to PHONE / POWER	SVN , MSS redundancy
5. SECURITY and ACCESS Control	LECS, Policy based VLAN
6. MOBILITY of workforce	IBM VLAN membership
7. adding more BandWidth cannot be the solution	BCM , SuperVLANs
8. STANDARDS BASED solutions.... not PROPRIETARY	ATM Forum Compliant , IETF
9. leave LEGACY applications , NETWORKS alone to evolve	LAN Emul'n, Classical IP SERVERs
10. have big investment in ROUTERS	Migration scenarios ,"ATM around"

WHERE SHOULD YOU SPEND YOUR NEXT NETWORKING $?

  - a bigger or another ROUTER ?

  - OR....moving towards SWITCHING, and IBM''s SVN ?