NORTEL
NORTHERN TELECOM

Magellan LAN Interconnection Products for the Enterprise

Tony Kourlas

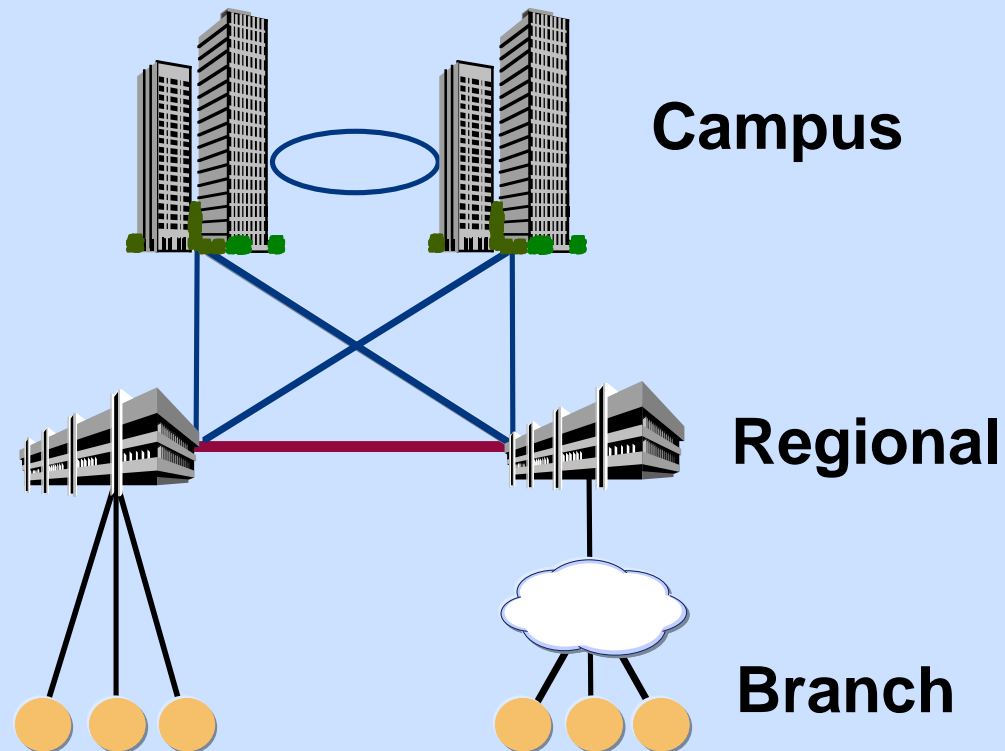**Product Manager, IBM and LAN Networking**

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INFORM '96

Agenda

- **Trends in network evolution**

- Magellan values: campus, regional, branch

- Magellan values: network-wide

- Evolution to ATM

Typical Network Architecture

Campus

Regional

Branch

Multi-level hierarchy with unique and common LAN interconnection requirements

Campus: In-Building Component

Campus FDDI

Routers

Departmental FDDIs

Workgroup switching hubs

Token ring and ethernet LANs
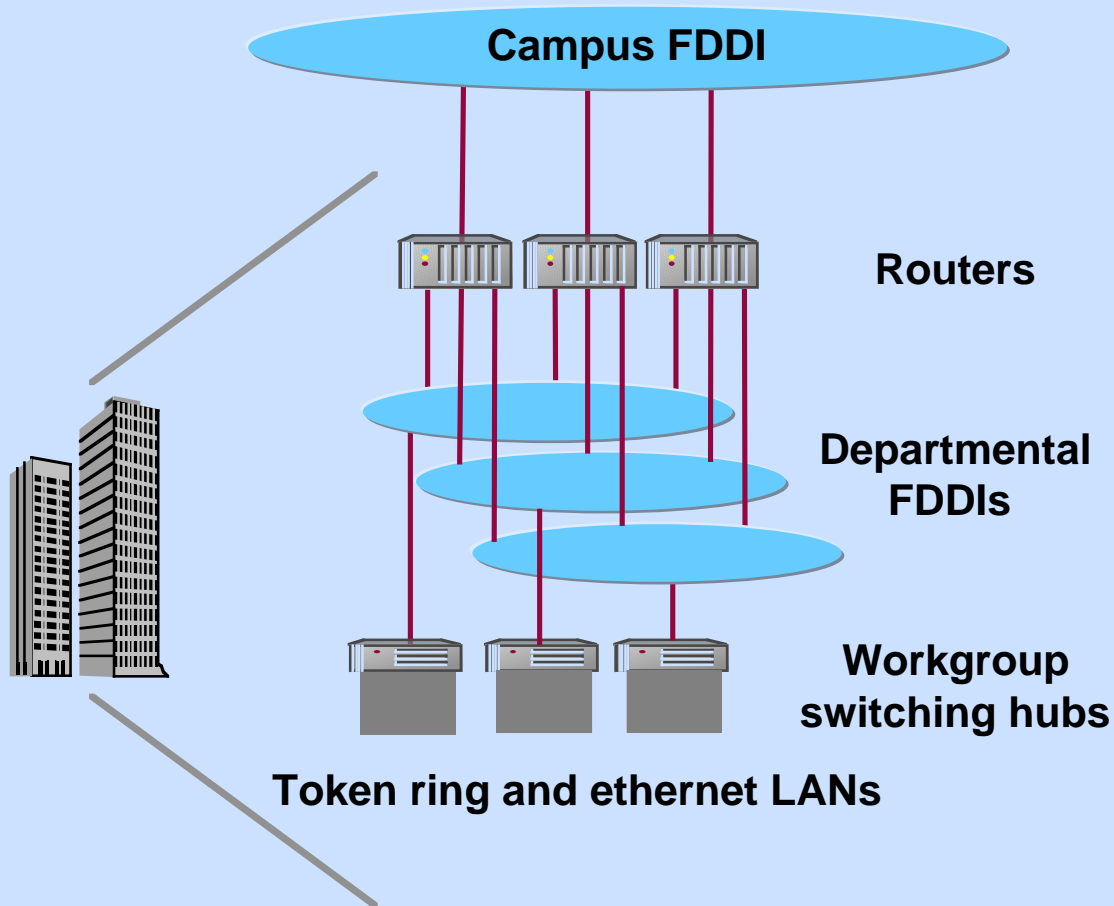
- **Trends**
  - **increasing network usage**
  - **increased delay sensitivity**
  - **bigger, faster, fewer boxes and servers**

- **Requirements**
  - **high-speed switching**
  - **high capacity/fanout**
  - **high availability**
  - **simplified network engineering and management**
  - **ATM migration path**

Campus: WAN/MAN Component

Backbone Core

- Voice
- Video
- Legacy

MAN and
WAN
Routers

MUX

Campus FDDI
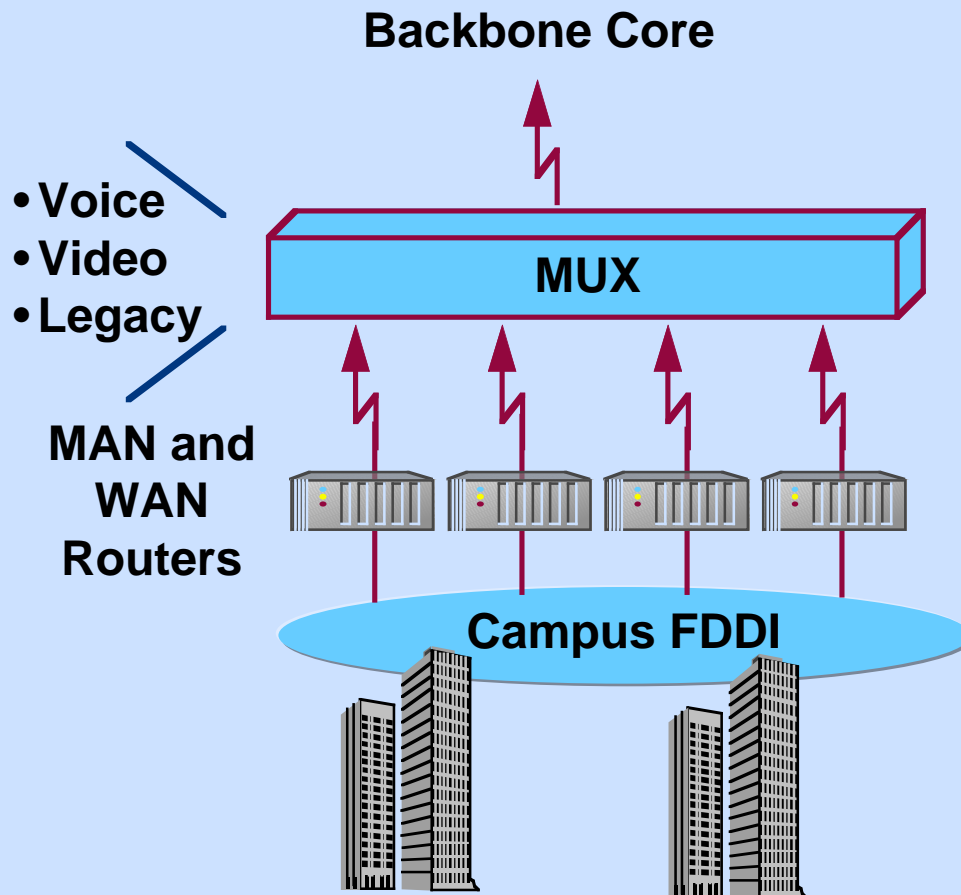
- Trends
  - increasing network usage
  - bigger, faster, fewer boxes
  - network/bandwidth consolidation

- Requirements
  - high capacity/fanout
  - high availability
  - simplified network engineering
  - security / firewalls
  - bandwidth management and end-to-end COS
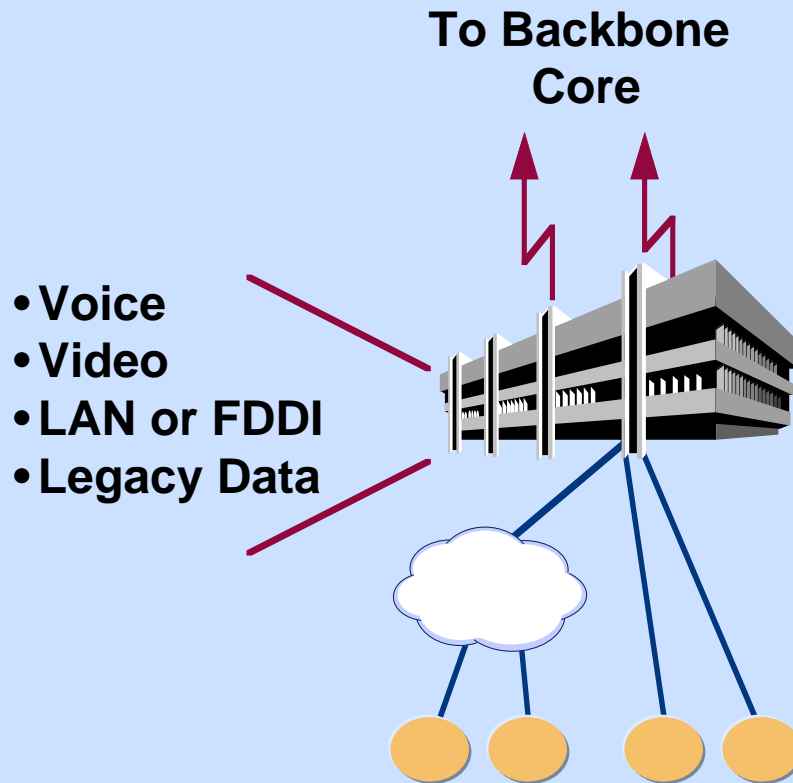 - ATM migration path

Branch Office

Voice

Fax

LAN

SNA/X.25/ Legacy

Telephone Network

Router Network

SNA/X.25 Network
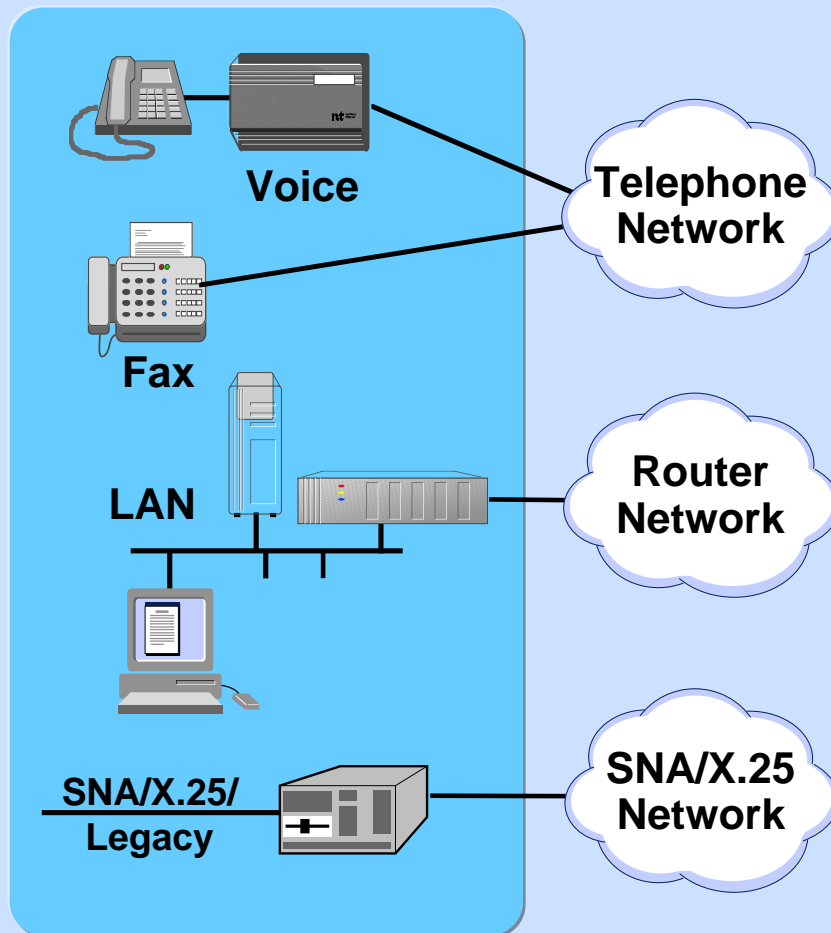
- **Trends**
  - **corporate cost-cutting**
  - **network/bandwidth consolidation**
  - **public/private hybrid**
  - **simplicity**
  - **new service offerings**
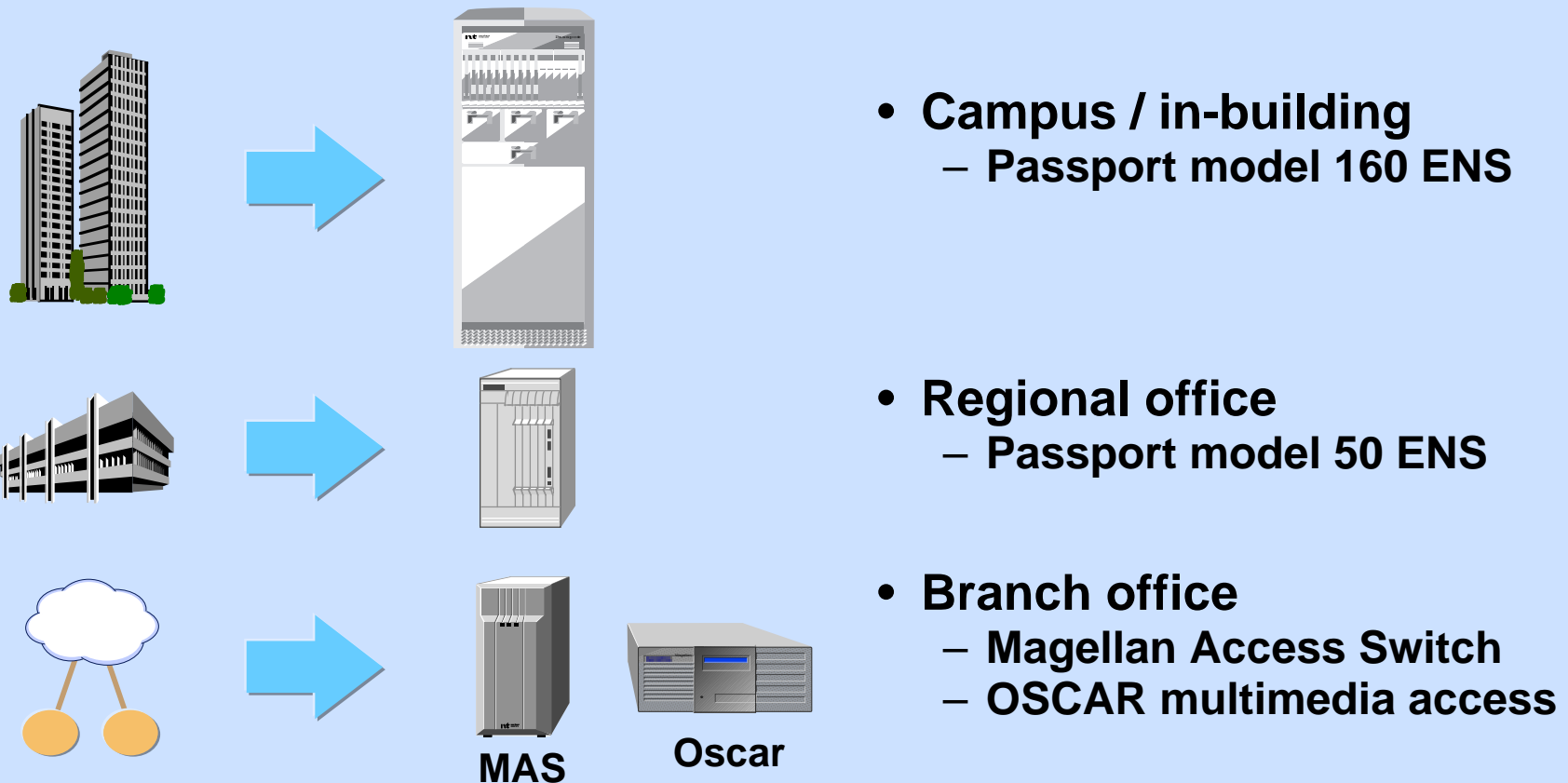
- **Requirements**
  - **optimum bandwidth utilization**
  - **bandwidth management and COS**
  - **high availability and redundancy**
  - **standards-based**
  - **simple network engineering**
  - **simple to set up and manage**

Regional Office

To Backbone Core

- Voice
- Video
- LAN or FDDI
- Legacy Data

- **Scaled down in-building, or large branch**

- **Requirements**
  - high availability
  - simple network engineering
  - security/firewalls
  - ATM migration path
  - sophisticated bandwidth management
  - scalable platform
  - LAN/WAN interface and protocol diversity
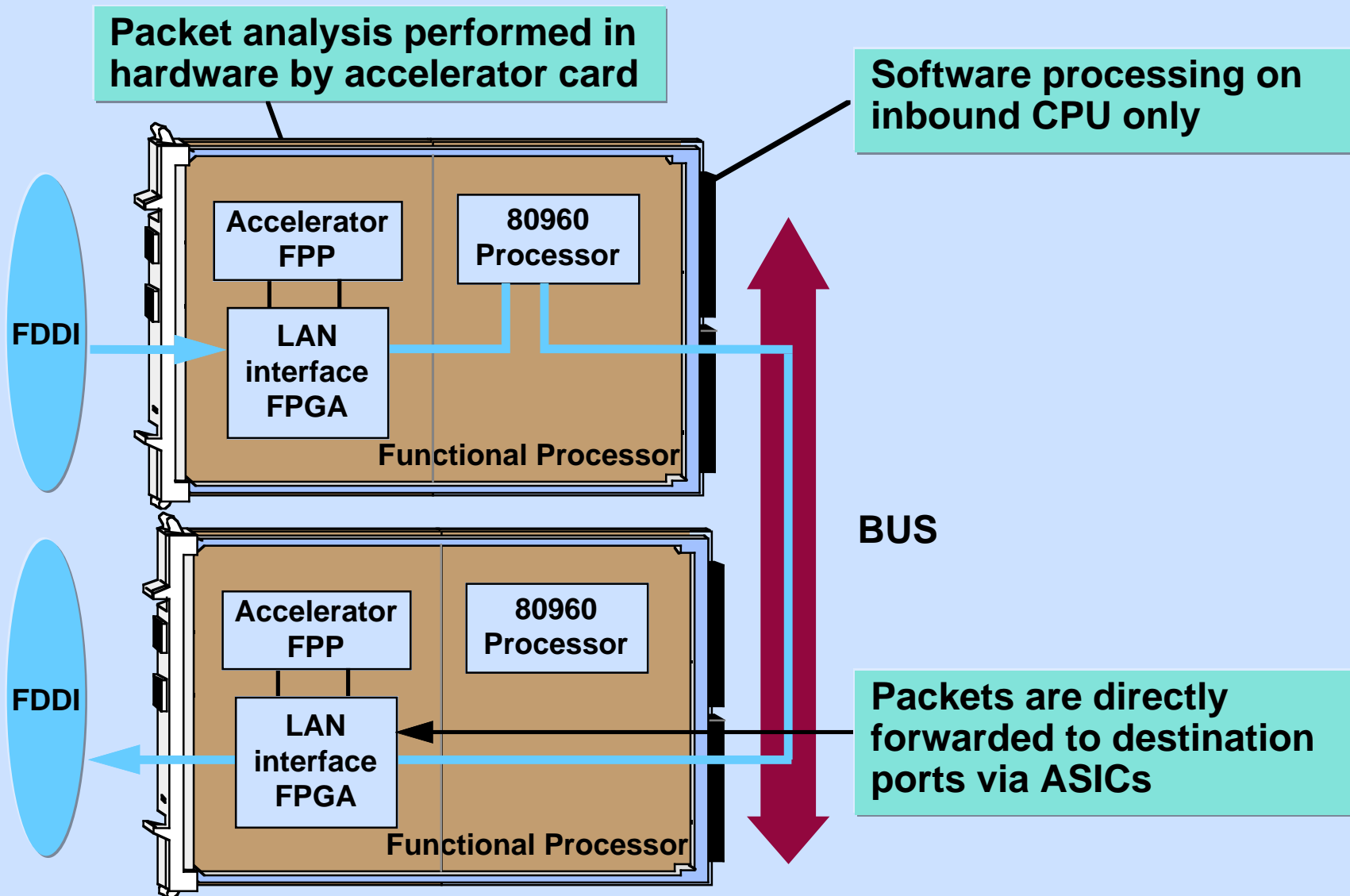
Magellan InterLAN Portfolio

- **Campus / in-building**
  - **Passport model 160 ENS**

- **Regional office**
  - **Passport model 50 ENS**

- **Branch office**
  - **Magellan Access Switch**
  - **OSCAR multimedia access**

MAS   **Oscar**

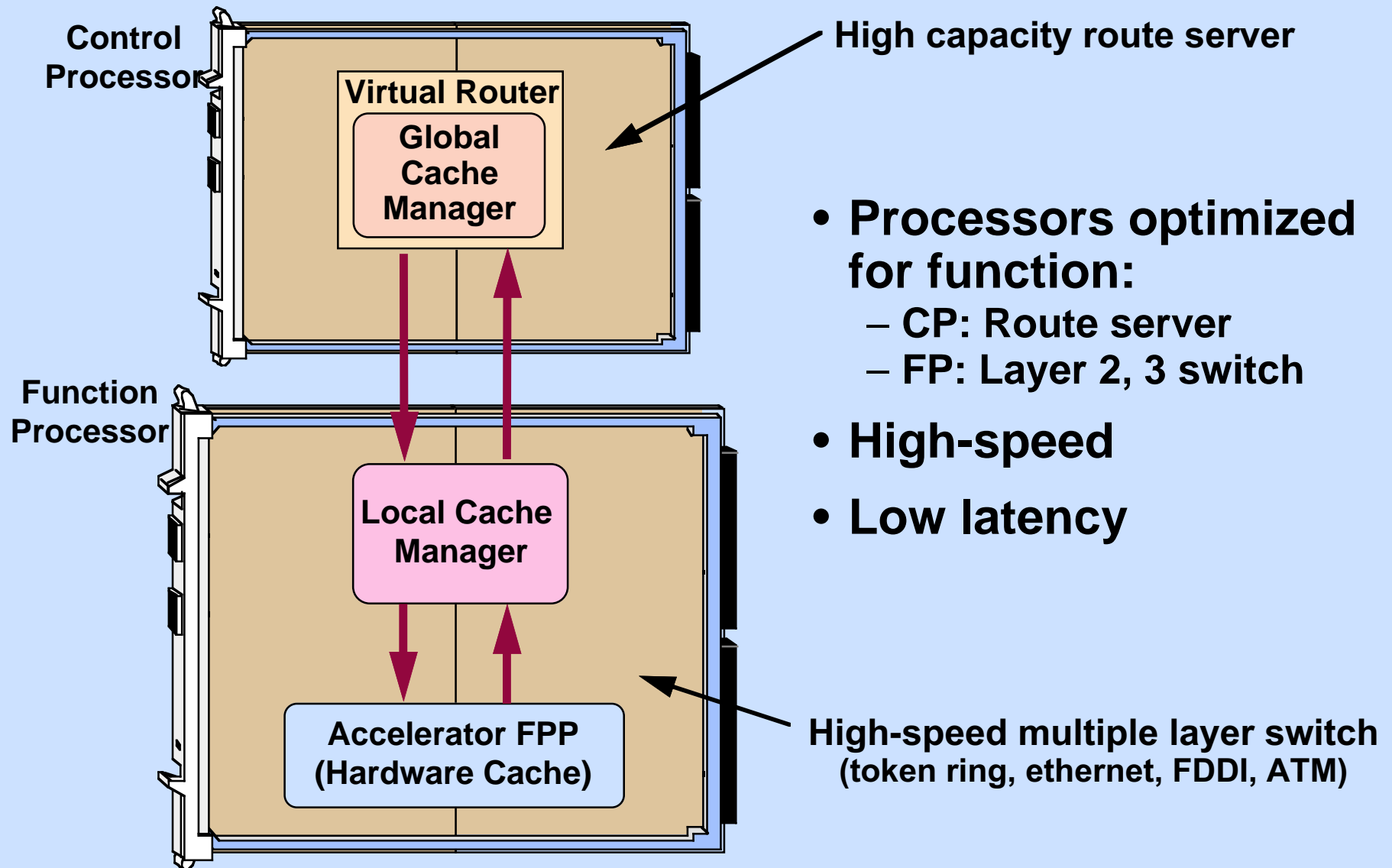**Magellan products designed to fit each level in the network hierarchy**

Agenda

- **Trends in network evolution**

- **Magellan values: campus**

  – **high-speed switching**
  – **high-capacity/fanout**
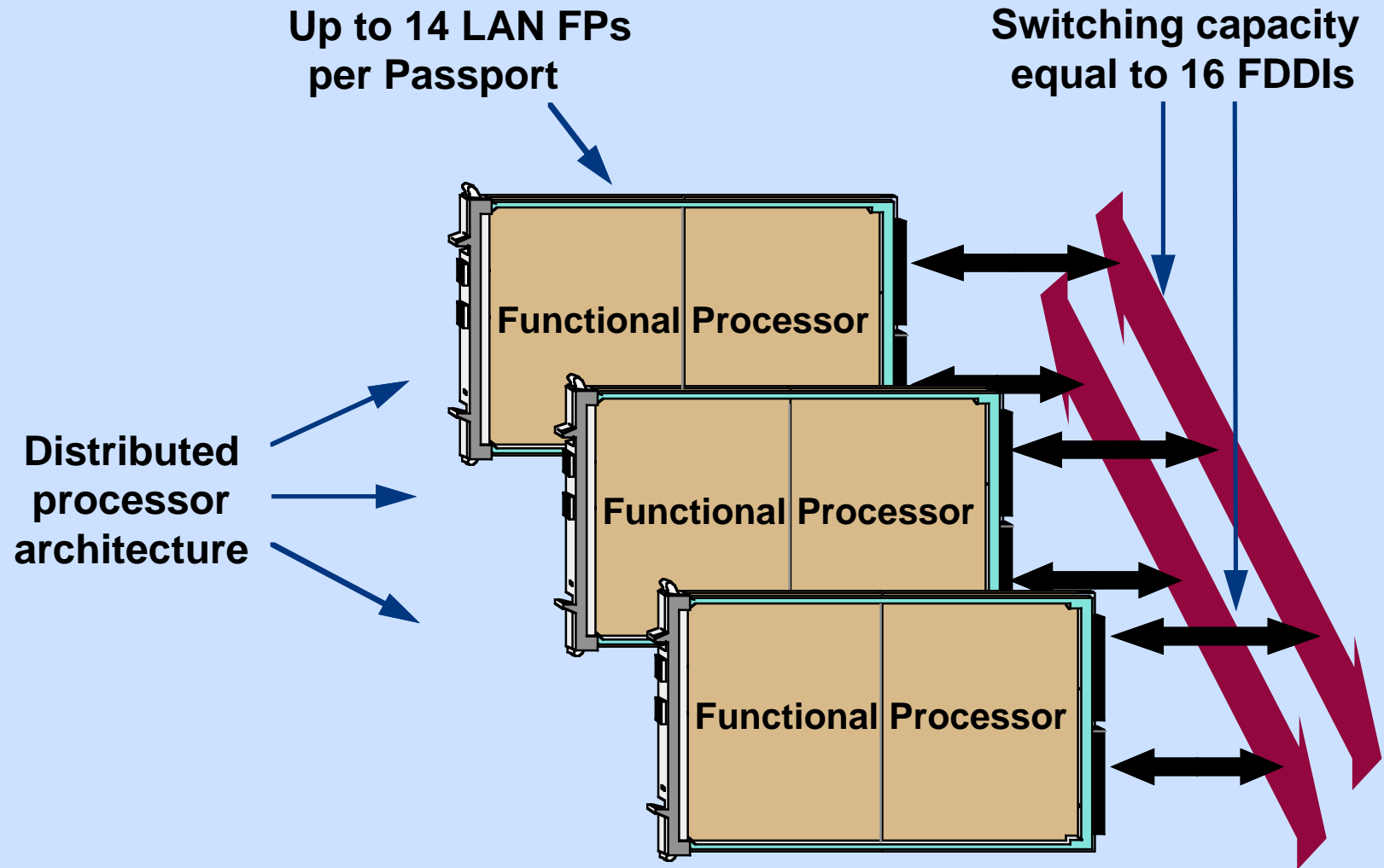 – **high-availability**

- **Magellan values: network-wide**

- **Evolution to ATM**

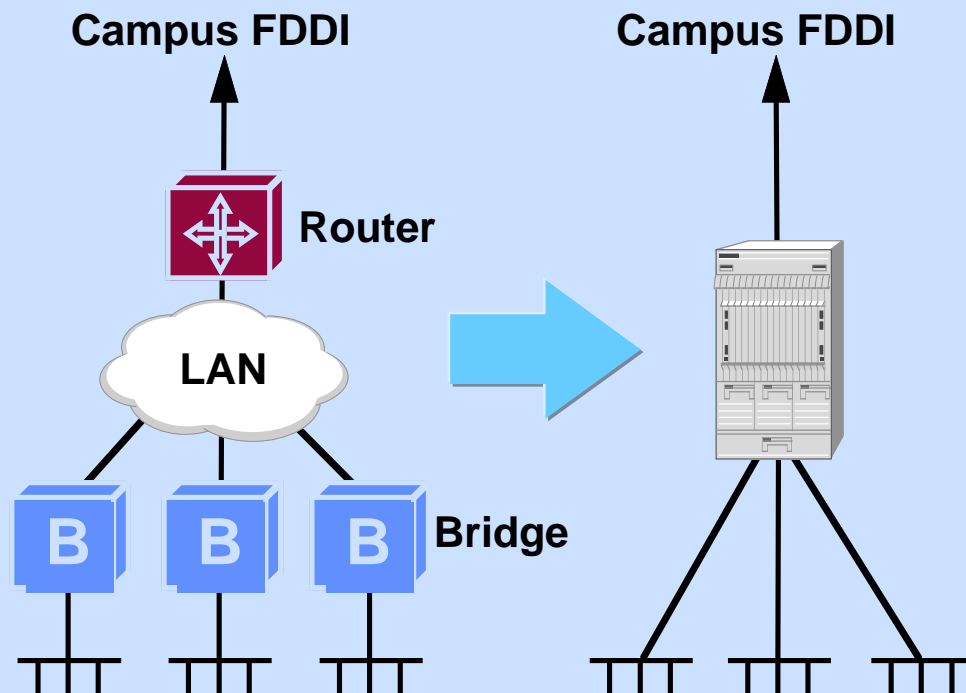# Designed for High-speed Switching: Distributed Processor Architecture

Packet analysis performed in hardware by accelerator card

Software processing on inbound CPU only

FDDI

Accelerator FPP

80960 Processor

LAN interface FPGA

Functional Processor

BUS

FDDI

Accelerator FPP

80960 Processor

LAN interface FPGA

Functional Processor

Packets are directly forwarded to destination ports via ASICs

Designed for High-speed Switching: Route Server and Multiple Layer Switch

Control Processor

Virtual Router

Global Cache Manager

High capacity route server

Function Processor

Local Cache Manager

Accelerator FPP (Hardware Cache)

High-speed multiple layer switch
(token ring, ethernet, FDDI, ATM)

- **Processors optimized for function:**
  - CP: Route server
  - FP: Layer 2, 3 switch
- **High-speed**
- **Low latency**

11

High Capacity / Fanout

Up to 14 LAN FPs per Passport

Switching capacity equal to 16 FDDIs

Distributed processor architecture

Functional Processor

Functional Processor

Functional Processor

High Capacity / Fanout: Collapsing Multi-port Bridges

Campus FDDI

Router

LAN

B **B** **B** **Bridge**

Campus FDDI

- **Combines high performance routing with multi-port bridging**

- **Replaces multi-box bridge/ router configurations:**
  - reduces maintenance/costs
  - eliminates upgrade downtime
  - simplifies management

- **1.6 Gbit backplane improves performance versus LAN**

- **Passport redundancy features ensure high availability**

High Availability: LAN FP Sparing

- **Non-stop design philosophy**
- **Active and standby FPs share MAC address**
- **No proprietary protocols, no frustrated users**

Campus FDDI

Active FP

Backup FP

Passport Bus
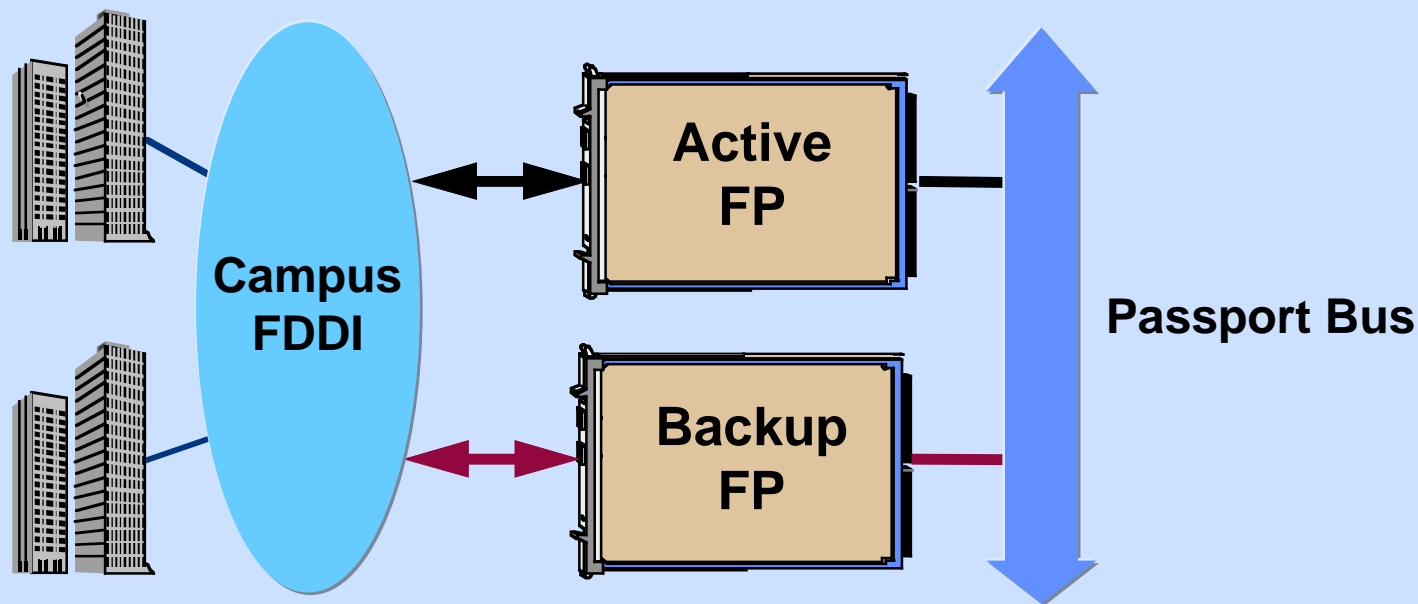
Automatic cutover should primary LAN FP fail

Agenda

- **Trends in network evolution**

- **Magellan values: regional**
  - LAN/WAN interface and protocol diversity
  - scalable platform

- **Magellan values: network-wide**

- **Evolution to ATM**

LAN/WAN Interface and Protocol Diversity

Routing Protocols

- OSPF
- EGP
- APPN
- RIP
- Appletalk II+

Network Protocols

- TCP/IP
- IPX
- Appletalk+

WAN Protocols

- PPP
- X.25
- Frame relay (1490)
- ATM UNI (1483) +
- SMDS +

Bridging Protocols

- Transparent (802.1d)
- Translational (8209, ENET/ FDDI)
- Source route
- Source route transparent

Functional Processors

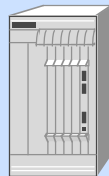- Token ring, ethernet, FDDI
- T1/E1, T3/E3, V35/V11
- OC3/STM1+

+ Planned Capability

Scalable Platform

Passport model 160
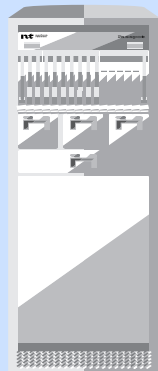
Passport model 50

- **Passport model 160**
  - 16 slots

- **Passport model 50**
  - 5 slots

- **Unified architecture**
  - provides upgrade path
  - protects investment

- **Multiple fanout choices**

**Designed to meet current capacity/fanout requirements, and to grow with your network**

Agenda

- **Trends in network evolution**

- **Magellan values: branch**
  - **MAS LAN services**
  - **Oscar LAN services**

- **Magellan values: network-wide**

- **Evolution to ATM**

MAS LAN Services:
Intelligent Source Route Bridging

SNA/LAN consolidation for the branch

TR

DPN-100

Virtual Ring

TR

TR
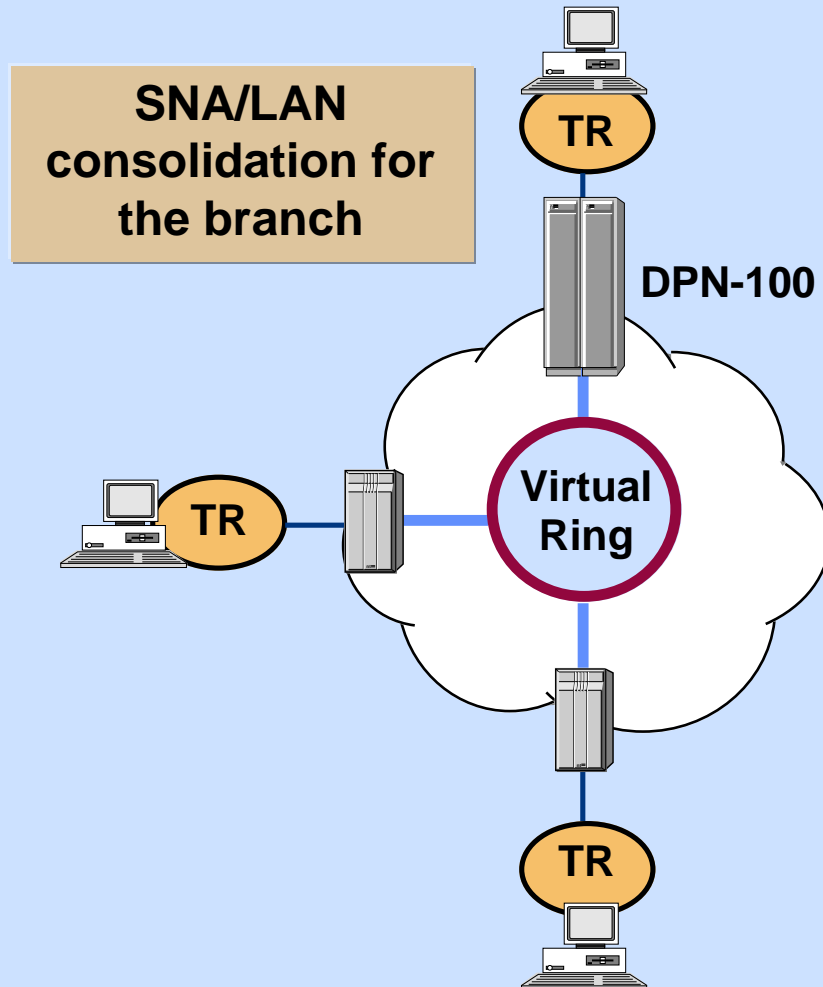
- **Combines routing strengths with bridging simplicity**

- **Easy to deploy and manage – plug in and forget**

- **Simplifies network engineering**
  - **virtual ring interconnects LANs**
  - **extends hop count**

- **Optimizes bandwidth utilization**
  - **minimizes broadcast traffic**
  - **proxy broadcasts and filters**
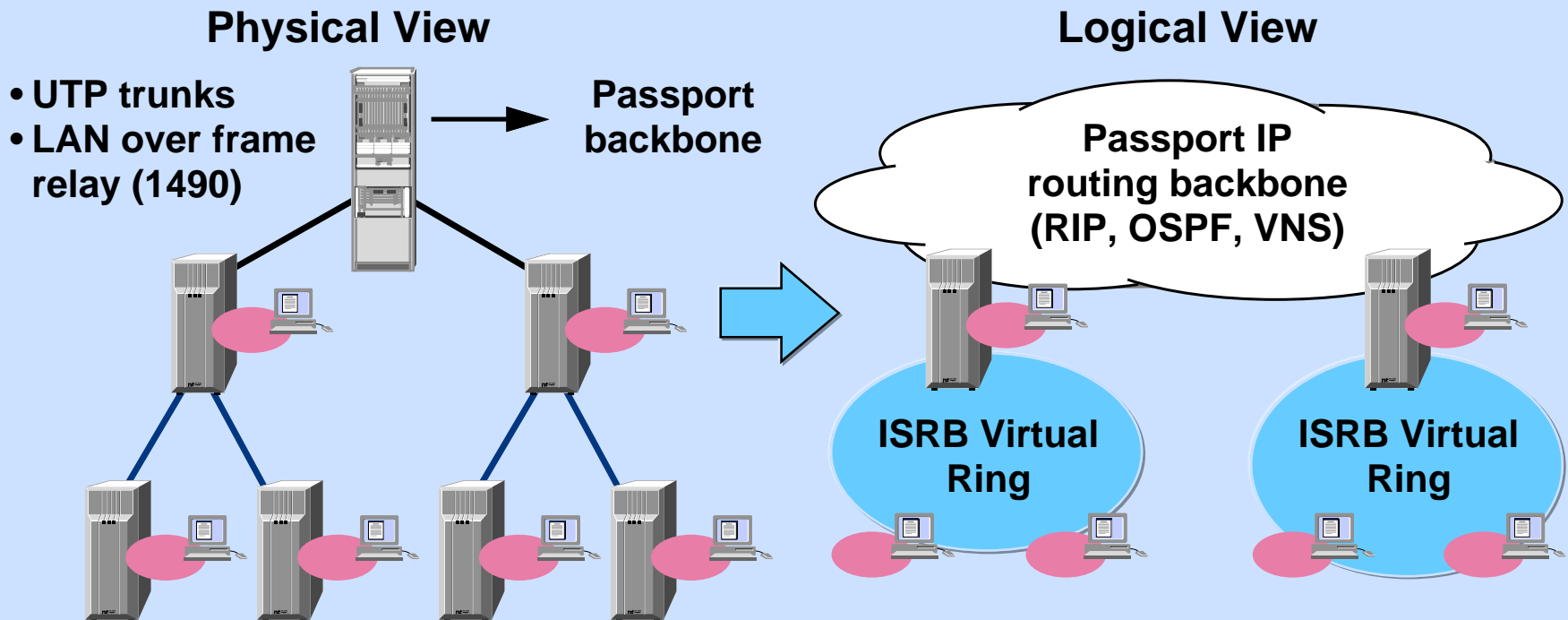 - **MAC header compression**

Oscar LAN Services

Passport Backbone Network

Leased Line | **ISDN Backup**

Token Ring   **Ethernet**
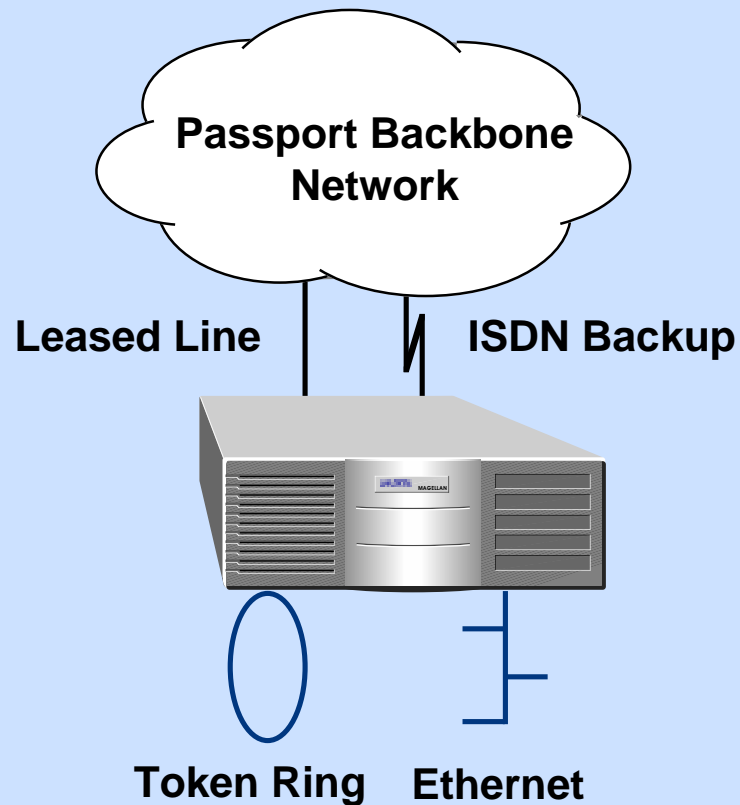
- **Full featured frame relay bridge/router**
  - **Token Ring, Ethernet**
  - **IP, IPX routing**
  - **RIP, OSPF, Easy Router™**

- **Standards-based RFC 1490 encapsulation**

- **Data compression optimizes bandwidth**

- **ISDN backup for maximum availability**

Multimedia branch access

Agenda

- **Trends in network evolution**

- **Magellan values: campus, regional, branch**

- **Magellan values: network-wide**
  - simplified network engineering
  - security and firewalls
 - bandwidth management and COS

- **Evolution to ATM**

Simplified Network Engineering: MAS/Passport Interworking

Physical View

Logical View

- UTP trunks
- LAN over frame relay (1490)

Passport backbone

Passport IP routing backbone (RIP, OSPF, VNS)

ISRB Virtual Ring

ISRB Virtual Ring

**Branches with MAS/DPN-100**

- **Connects ISRB virtual rings to IP router backbone**
- **Simplifies branch setup**
- **Simplifies networking engineering**

Simplified Network Engineering: Oscar/Passport Interworking

Passport

TR

OSCAR

FR

Router

IP, IPX, Bridging, OSPF, RIP, VNS
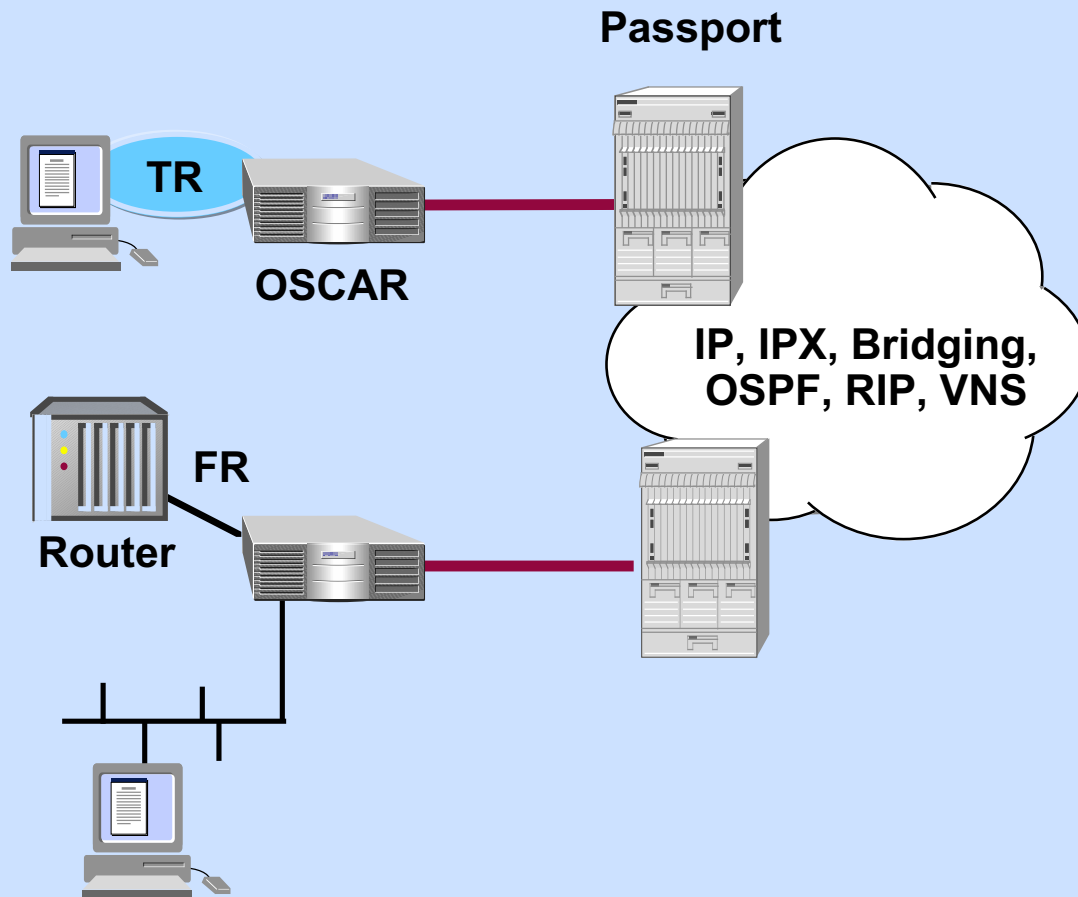
- **Full interworking with Passport ILS**

- **Full integration with Passport FR service**

- **Added value with Oscar-to-Oscar connectivity**

Simplified Network Engineering: Virtual Networking System (VNS)

VNS single hop backbone

Logical LAN

RIP

RIP

RIP
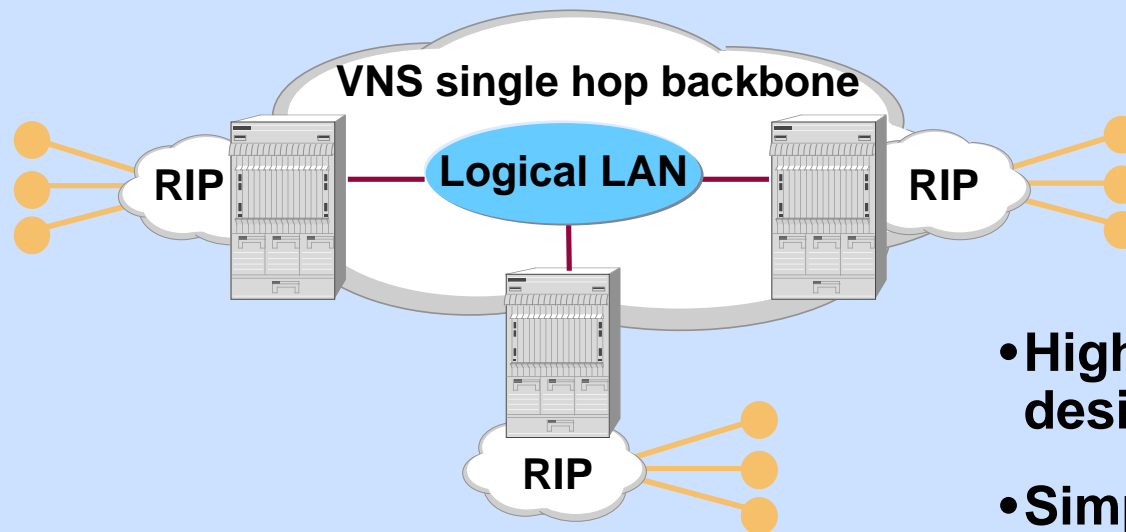
- **High-performance design**
- **Simplified administration**
- **Large network scalability**
- **Independent from backbone technology**

X

X

Edge Routing

Backbone Switching

Simplified Network Engineering: Virtual Networking System

User Community A

User Community B
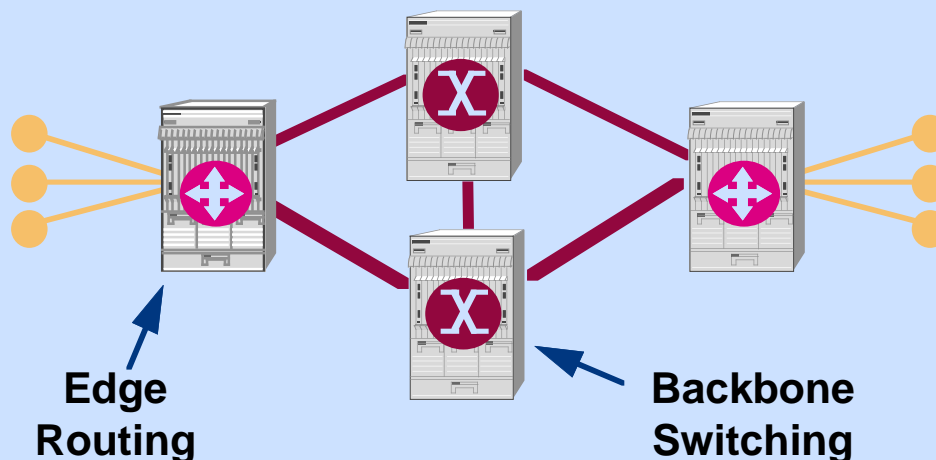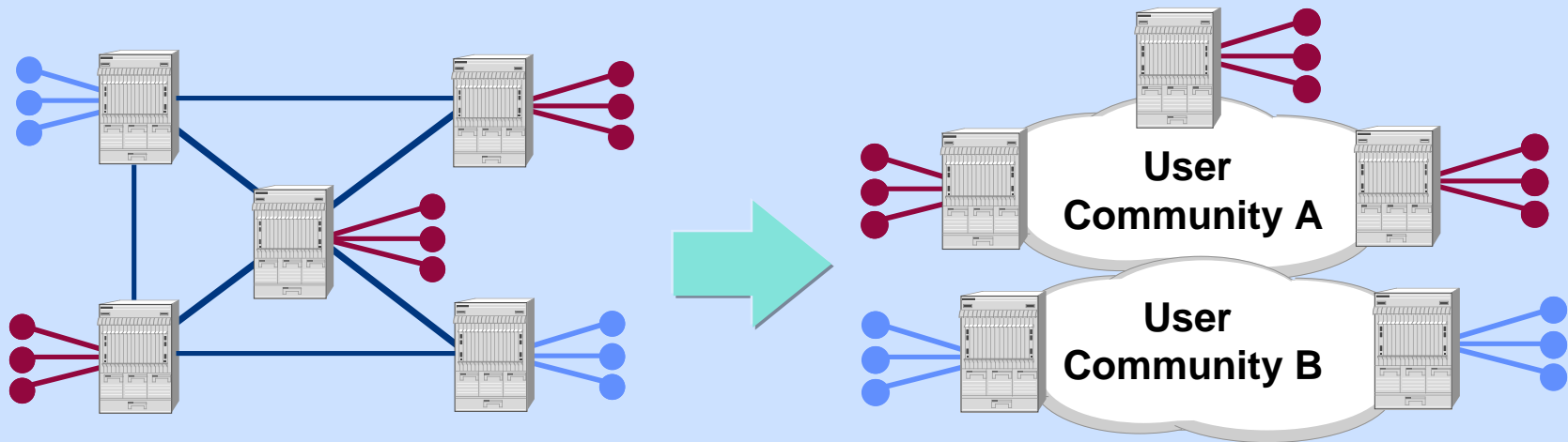
• **Multiple logical networks over same backbone**

• **Traffic separation for:**
  - **multiple internal networks**
  - **class of service offerings**
  - **security**

Simplified Network Engineering Consolidation at Campus/Regional
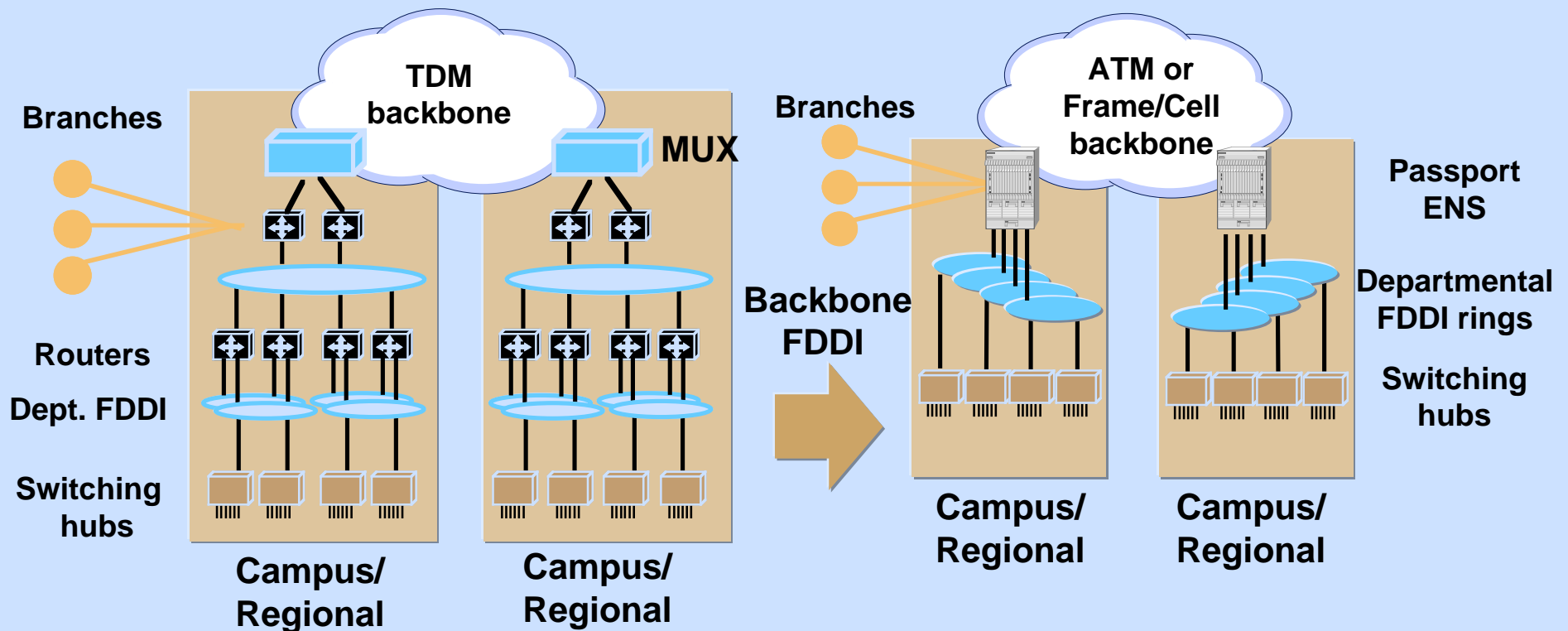
- **Simpler network topology**
- **Fewer boxes to manage**
- **Higher-performance**
- **Evolution path to ATM**

Simplified Network Engineering: Domain Bridging

Workgroup A

FDDI, FR, ATM
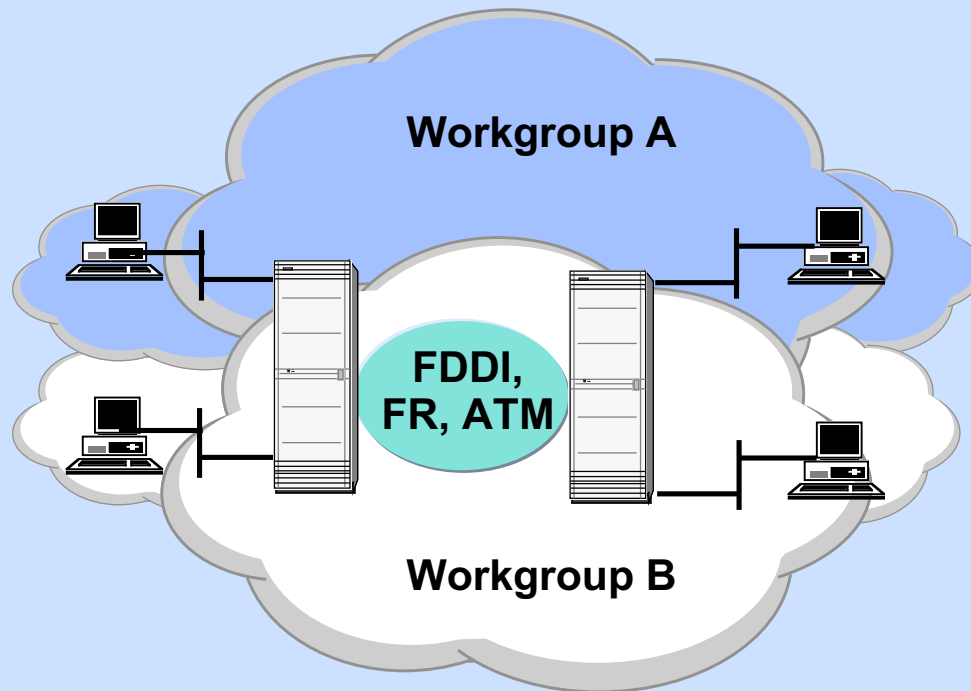
Workgroup B

- **Simplifies network engineering**
  - extends scalability of bridging
  - allows creation of virtual workgroups across campus/ MAN
  - minimizes adds/moves/changes
- **Improves traffic management**
  - isolates multicast chatter
- **Enhances traffic security**

Secure workgroups across campus/regional

Security and Firewalls

Internet

Corporate Backbone

Campus/ Regional

LAN

Branch
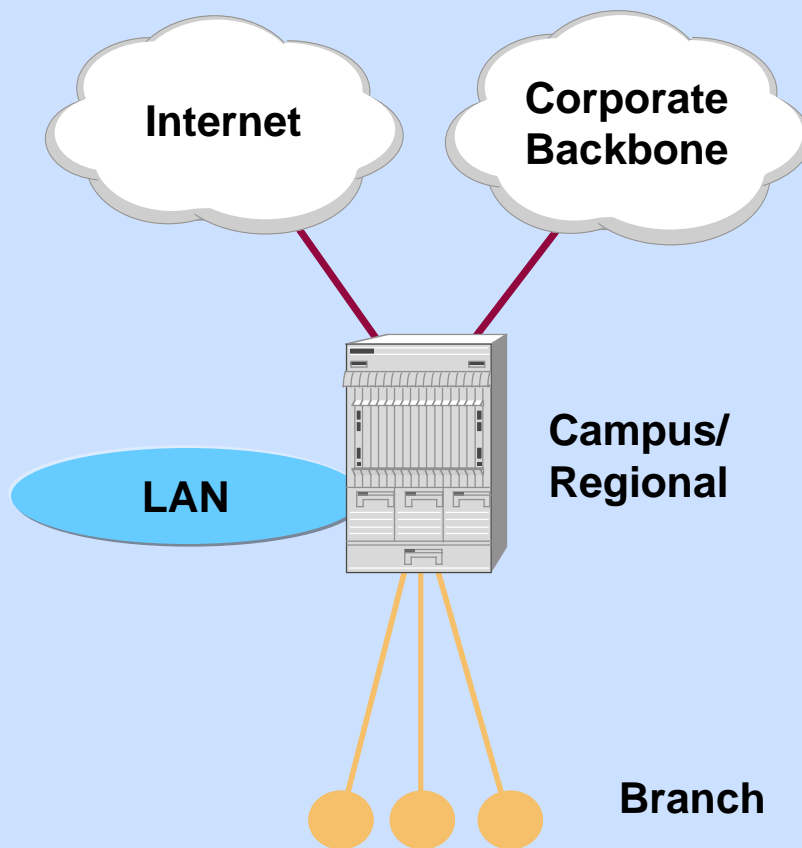
- **Networks opened to external access**

- **Need for access control and monitoring**

- **Passport filtering facility best in class**
  - filter on any pattern
  - take any overt/covert action
  - architected for performance

Best-in-class security and statistics functions
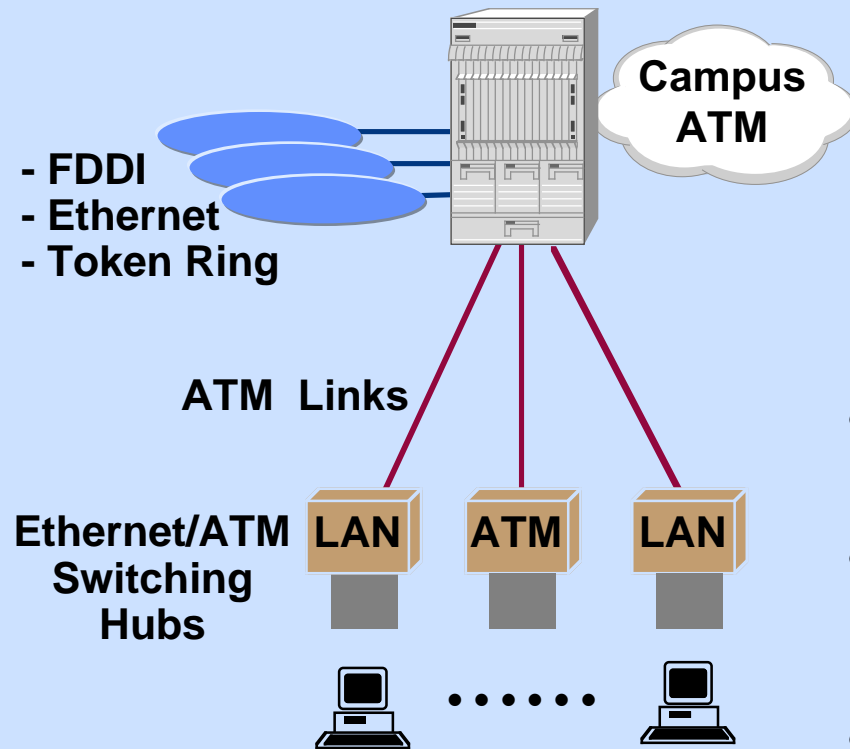
Bandwidth Management and COS

- **SNA/LAN/voice consolidation**

- **Dynamic bandwidth allocation**

- **Multiple Priority System**

- **End-to-end prioritization**

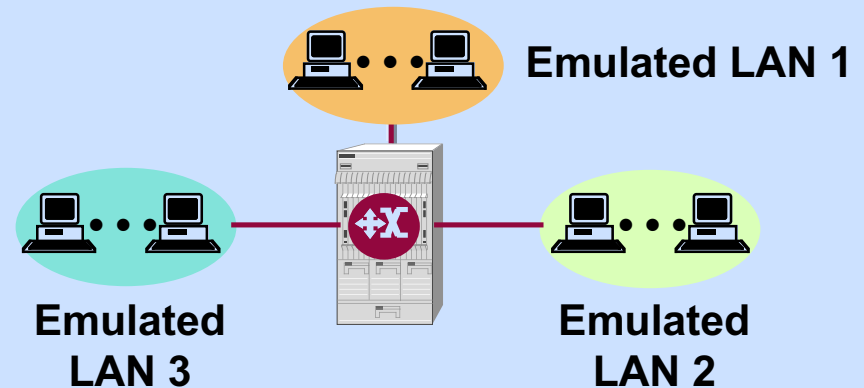- **Congestion management and avoidance**

Agenda

- **Trends in network evolution**

- **Magellan values: campus, regional, branch**

- **Magellan values: network-wide**

- **Evolution to ATM**
  - **in-building/campus**
  - **campus/WAN**

Evolution to ATM: In-Building/Campus

LANE: Physical View

LANE: Logical View

- FDDI
- Ethernet
- Token Ring

Campus ATM

ATM Links

Ethernet/ATM Switching Hubs

LAN   ATM   LAN

• • • • • •

Emulated LAN 1

Emulated LAN 3

Emulated LAN 2

- • **Migration from FDDI or collapsed router to ATM**

- • **ATM Forum LAN emulation**
  - – simplifies network engineering
  - – protects investment in legacy LANs

- • **Passport role**
  - – routing between ELANs for scalability
  - – high-speed switching and/or routing between ELANs and legacy LANs
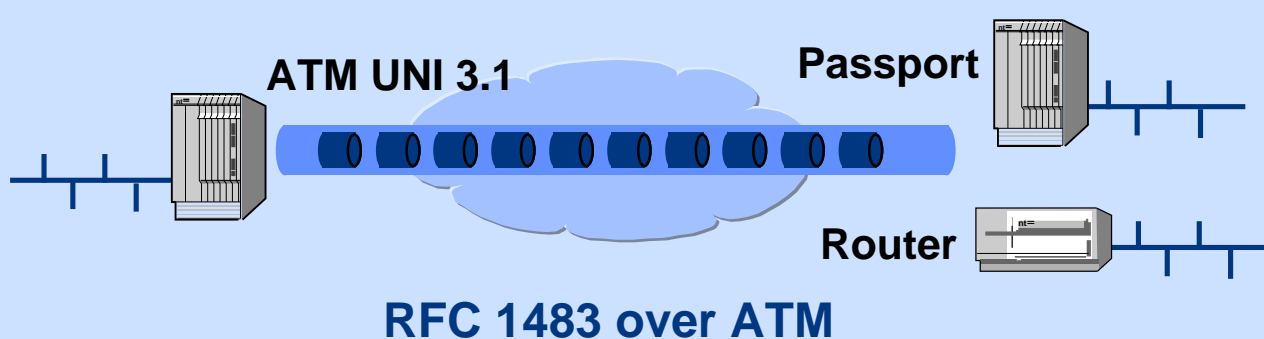 - – Edge switch—interwork with Concorde, Vector, FORE and others

Evolution to ATM: Campus/WAN

Passport Frame/Cell Trunking
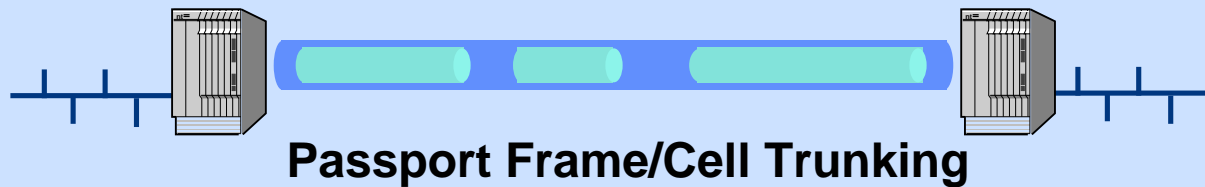
- Optimum bandwidth efficiency for sub-T3, data-intensive voice/data links

ATM UNI 3.1
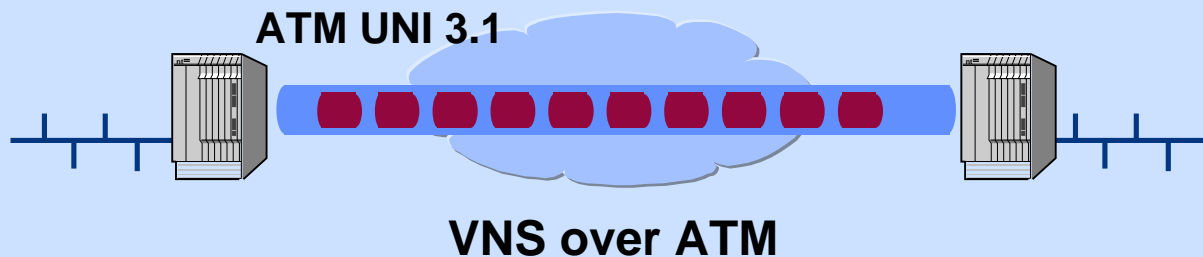
VNS over ATM
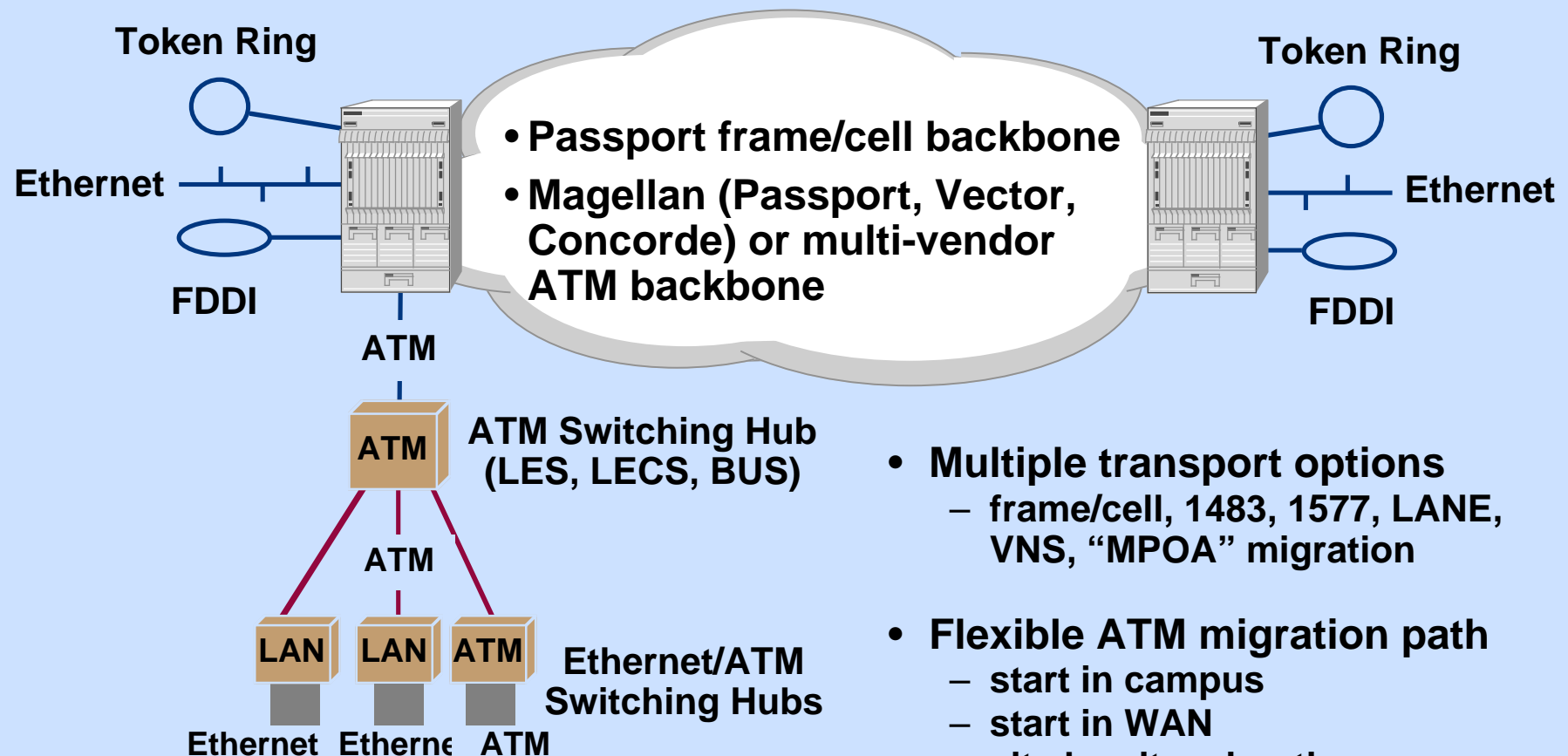
- VNS over ATM logical trunks
- ATM ENS

ATM UNI 3.1

Passport

Router

RFC 1483 over ATM

- Industry standard for multi-protocol encapsulation in ATM
- ATM ENS
- Interoperability with third-party ATM routers
- Optional use of RFC 1577 with ATM SVCs

Flexible Evolution to ATM

Token Ring

Ethernet

FDDI

ATM

- **Passport frame/cell backbone**
- **Magellan (Passport, Vector, Concorde) or multi-vendor ATM backbone**

Token Ring

Ethernet

FDDI

ATM

ATM Switching Hub (LES, LECS, BUS)

ATM

LAN **LAN** **ATM**

Ethernet/ATM Switching Hubs

Ethernet **Ethernet** **ATM**

- **Multiple transport options**
  - **frame/cell, 1483, 1577, LANE, VNS, "MPOA" migration**

- **Flexible ATM migration path**
  - **start in campus**
  - **start in WAN**
  - **site by site migration**
  - **can retain legacy LANs**

Summary
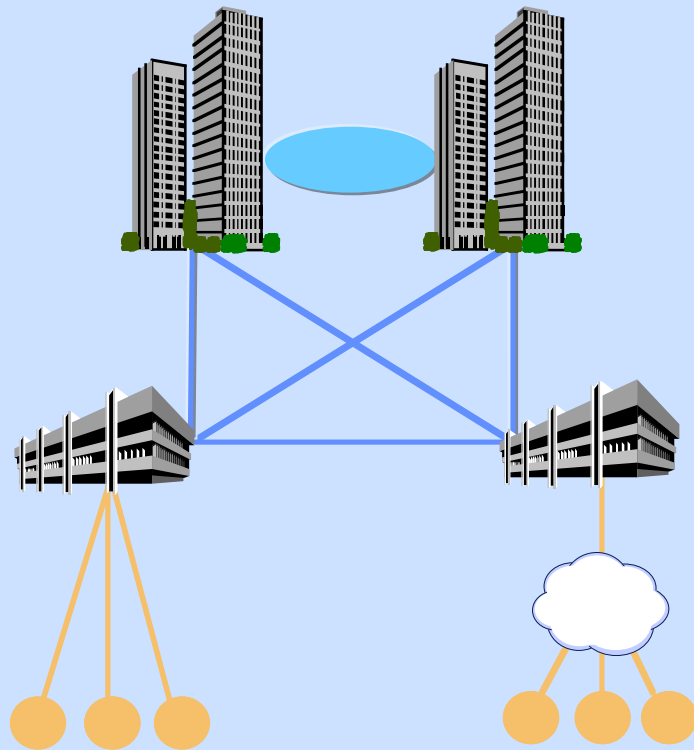
Magellan InterLAN products

- **Optimized for campus, regional, and branch applications**

- **Synergistic, network-wide solutions**

- **Flexible ATM evolution path**