ATM Networking with Magellan Vector for Service Provider Success

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NORTEL

NORTHERN TELECOM

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Agenda

Objective: Derive ATM edge switch product requirements by examining key service provider values of increasing sales and improving profitability

- **Defining the ATM Network**

- **Network and product requirements**
  - increase sales
  - improve profitability

- **Summary of Vector solution**

Wide Area Networking ATM Drivers

Industry Deregulation

Services growth:
- LAN Interconnect/ Frame Relay
- Internet Services
- Multimedia Services

ATM Business Data Market

Frame Relay

Other Services

ATM Services

ATM Transport Infrastructure Network

- Multiple Services
- Network
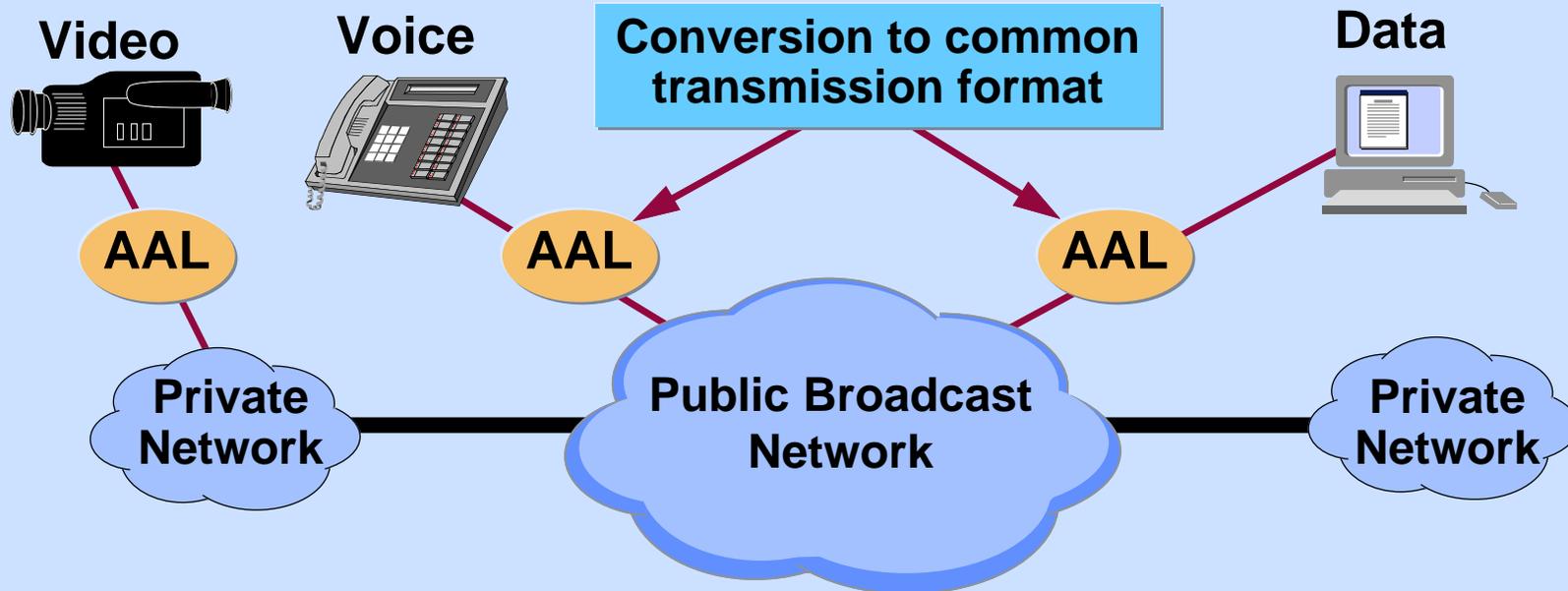- Consolidation

ATM Infrastructure Market

Service providers deploying ATM technology to:
- Offer new data services
- Maximize operational savings
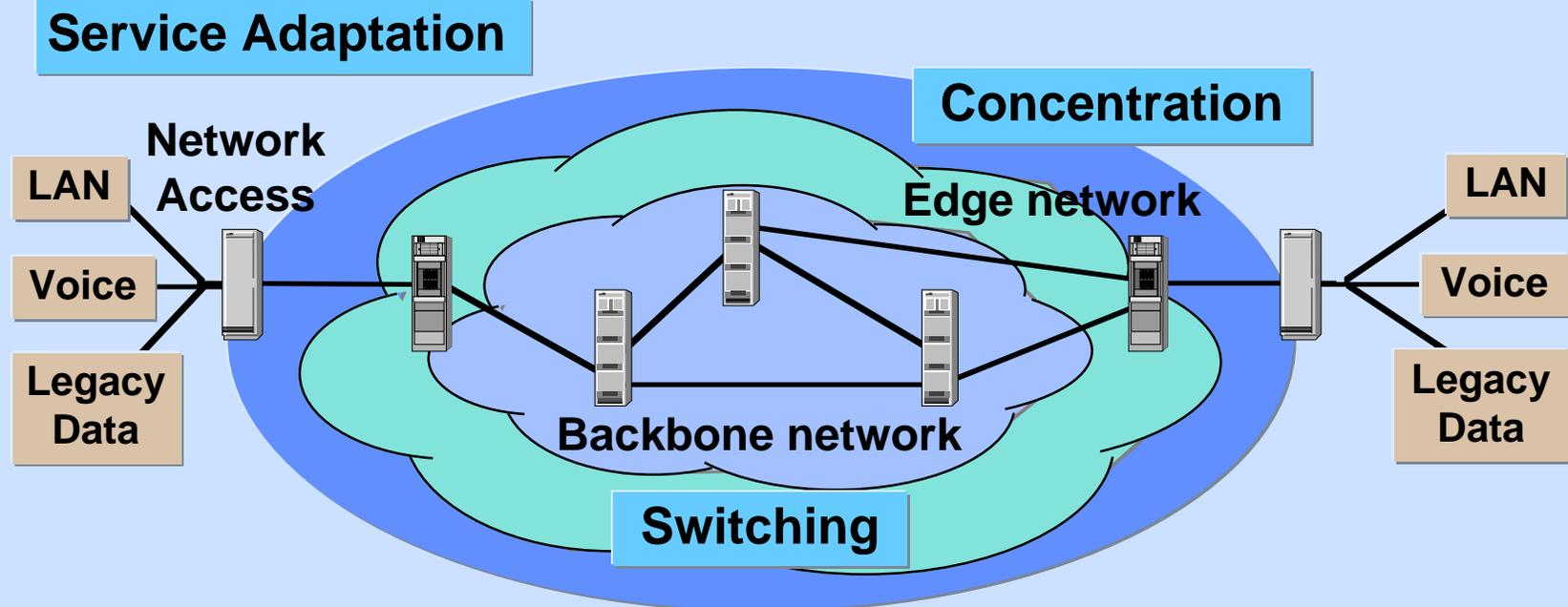- Provide infrastructure for services evolution

Why ATM?

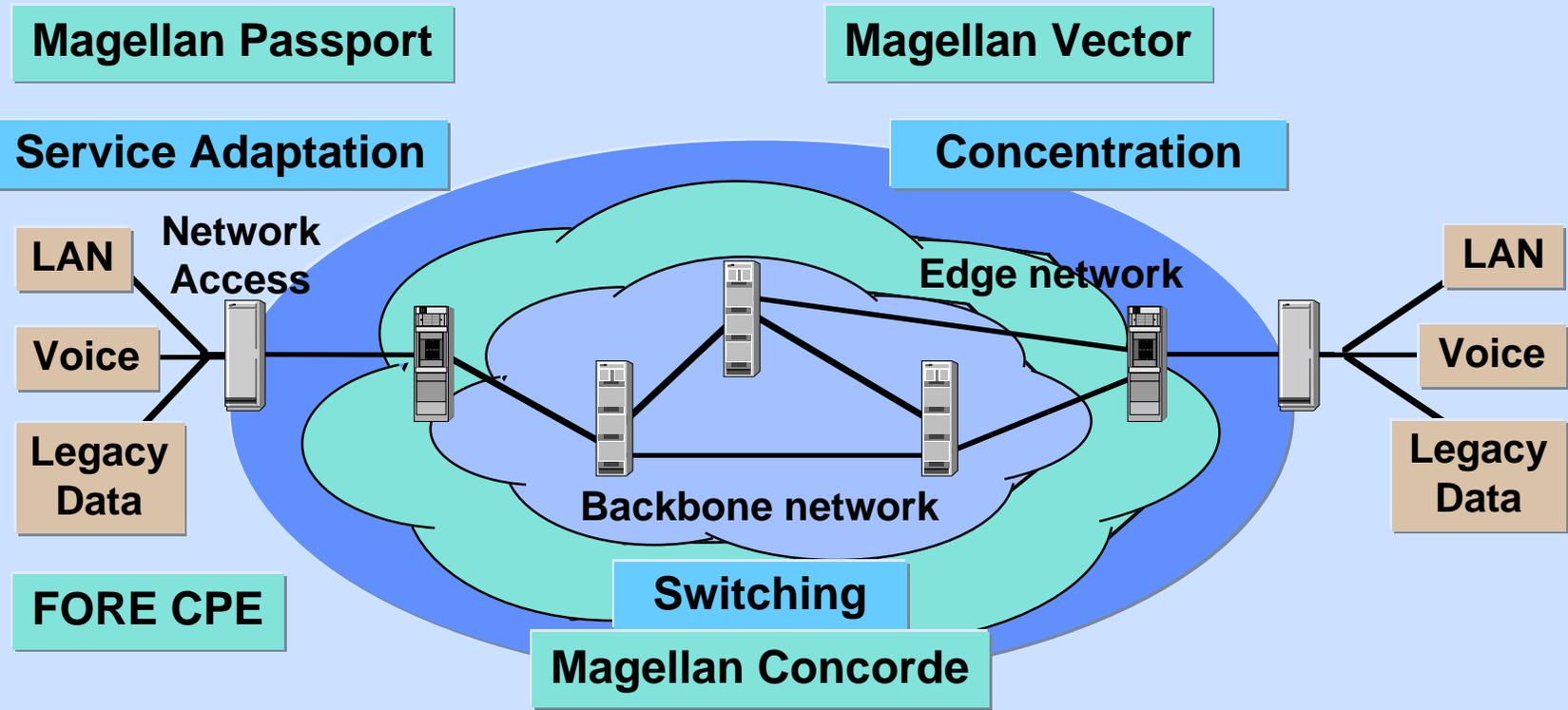**ATM introduces a technological discontinuity:**

- Single network infrastructure technology for all services
- Common networking technology for enterprise and service provider
- Operates over wide variety of access technologies

ATM Network Architecture

Service Adaptation

Concentration

Network Access

LAN

Voice

Legacy Data

Edge network

Switching

Backbone network

LAN

Voice

Legacy Data

- **Edge network: first layer of switching and concentration of ATM cells**
- **Backbone network: high capacity efficient cell switching for reliable, low latency transport**

Magellan ATM Network

Magellan Passport

Magellan Vector

Service Adaptation

Concentration

LAN

Network Access

Edge network

LAN

Voice

Voice

Legacy Data

Backbone network

Legacy Data

FORE CPE

Switching

Magellan Concorde

- **Nortel solutions span the network**
- **Nortel ATM edge switch: Magellan Vector**

Drivers: Edge Switch Market

- **Increasing bandwidth *requirements from enterprise because of***
  - increased desktop computing power
  - growing applications bandwidth demand
  - new applications e.g. WWW, groupware, video

- **Frame relay success**

- **Penetration of *ATM in enterprise***

- **Emergence of multimedia and carrier *managed services* for LAN, video**

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Service Provider Objectives
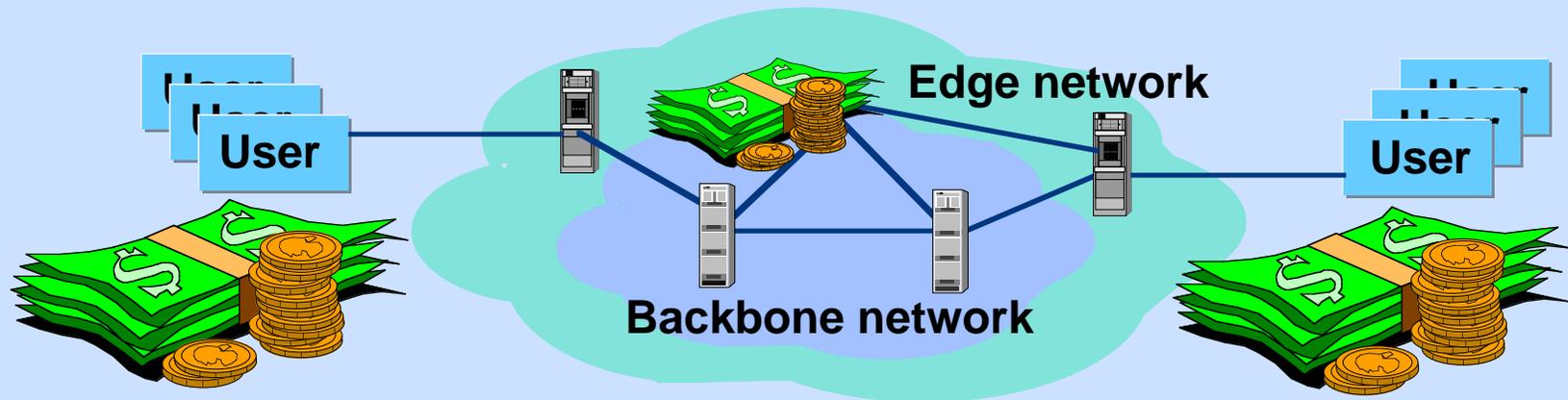
Edge network

Backbone network

BUSINESS OBJECTIVE: Maximize success	
Increase Sales: • Competitive differentiation	Improve Profitability: • Manage cost of service delivery

- **Service provider must run a profitable business**
- **Maximize success using technology/product solution best meeting needs**

Increase Sales

"How can a service provider deliver an attractive service against competing service providers and service options?"

- Increase sales through *competitive differentiation* by.....
  - offering right set of core and value-added *ATM services*
  - utilizing flexible billing as competitive differentiator
  - providing superior performance

Keep existing customers; expand usage; attract new customers

Differentiation: Services

Applications

- **Initially business data**
- **Video**
- **Voice**

Services

- **Effective cell-relay services**
- **LAN services**

Capabilities

- **Advanced traffic management capabilities**
- **SVCs**
- **Range of physical interfaces**

Traffic Management for Services Differentiation

"How do traffic management capabilities contribute to service provider differentiation?"

User requested class of service:
- Data 1, 2, 3...
- FR/ATM
- Channel extension
- LAN emulation
- Voice 1, 2, 3...
- Video 1, 2, 3...
- Conferencing
- Multimedia 1, 2, 3 ...

Network Engineering

Network Level Controls

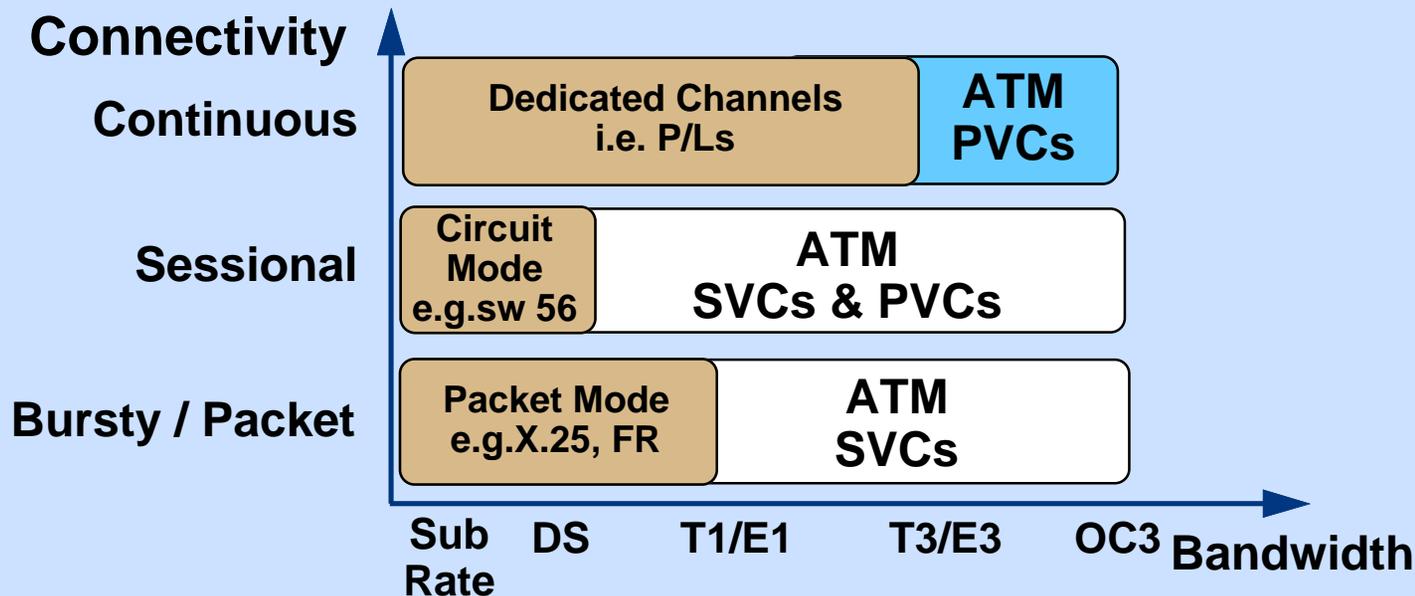**Node Level Controls**

Service attributes provided:
- Traffic class
  - CBR, VBR, ABR, UBR
- Traffic characteristics
  - pt-to-pt, pt-to-mpt
  - symmetric/asymmetric
  - PCR, SCR, burst tolerance
- QOS
  - delay
  - delay variation
  - loss

Multiple classes and qualities of service provider flexibility in meeting service needs

SVCs for Service Differentiation

"Can differentiation be achieved with ATM by providing superior connection flexibility and end user control?"

Connectivity

Continuous	Dedicated Channels i.e. P/Ls	ATM PVCs
Sessional	Circuit Mode e.g.sw 56	ATM SVCs & PVCs
Bursty / Packet	Packet Mode e.g.X.25, FR	ATM SVCs

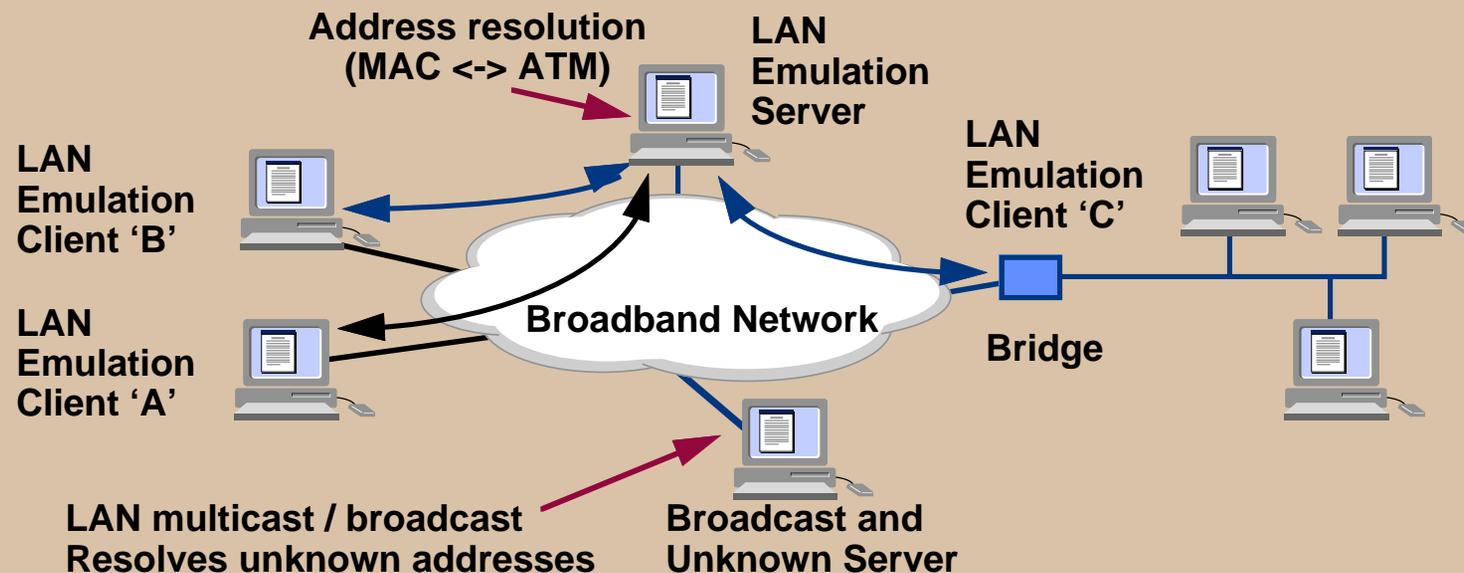Sub Rate   DS   T1/E1   T3/E3   OC3   **Bandwidth**

ATM SVCs provide:

- Flexible access to larger community for ATM connectivity
- Elimination of lead time associated with provisioning PVCs
- Finer granularity and more flexibility in billing

Service Example: LAN emulation

"How can a service provider handle business data in the wide area?"

LAN emulation service:
an efficient multimedia bridge between ethernet and token ring, and ATM CPE

Address resolution (MAC <-> ATM)

LAN Emulation Server

LAN Emulation Client 'C'

LAN Emulation Client 'B'

LAN Emulation Client 'A'

Broadband Network

Bridge

LAN multicast / broadcast Resolves unknown addresses

Broadcast and Unknown Server

SVCs are a prerequisite to support a LAN emulation service

Differentiation: Billing

"**What options does a service provider have for billing customers for the services provided?**"

Billable attributes:

- Connection call/connection set-up parameters

- Connection usage parameters

- Connection quality of service parameters

- Connection distance

- Service options e.g. LAN emulation; per videoconference

Flexible billing capability enables:

- Differentiated ATM service pricing
- Customer-specific usage reports

Differentiation: Performance

"How can a service provider ensure that customers realize the responsiveness they expect from an ATM network?"

Performance a function of:

- Traffic capabilities matched to service need
- Flexible quality of service options
- Fast connection set-up
  - low per-connection set-up delay
  - aggregate handling of high number of connections
- Network reliability
- Efficient network design and engineering

Performance facilitated by effective ATM networking
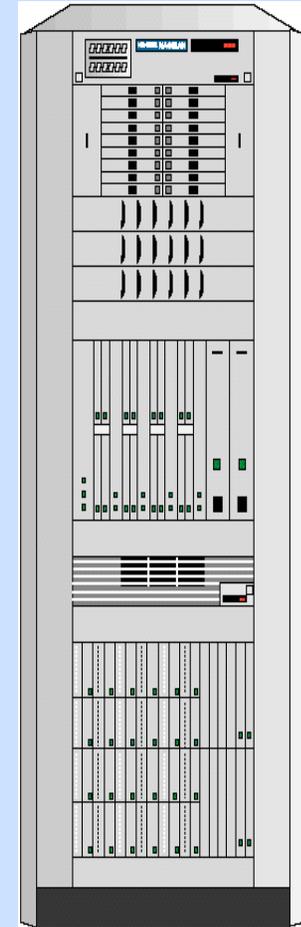
Increase Sales with Vector

Services:

- Cell relay (VBR, CBR, UBR, ABR)
- Best-in-class SVC and traffic management functionality
- Product plans in partnership with customers

Billing:

- PVCs, SVCs, Smart PVCs

Performance:

- Highly reliable traffic management
- Effective ATM signaling and routing
- Reliability through redundancy

Vector provides service provider differentiation today!

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- **Summary of Vector solution**
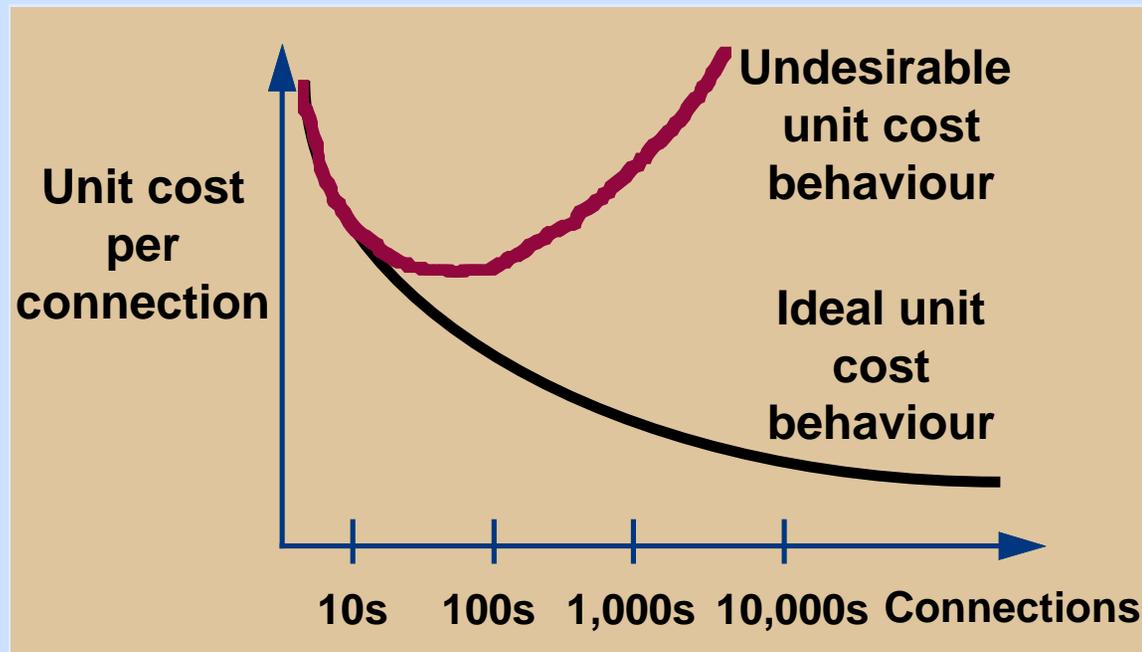
BUSINESS OBJECTIVE: Maximize success	
Increase Sales: • Competitive differentiation	**Improve Profitability:** • Manage cost of service delivery

Improve Profitability

"How can a service provider ensure declining marginal costs as the number of users and volume of traffic increase??"

Unit cost per connection

Undesirable unit cost behaviour

Ideal unit cost behaviour

10s   100s   1,000s 10,000s Connections

Cost components:

- Facilities
- Operations
- Equipment

Manage fixed and variable costs to improve profitability
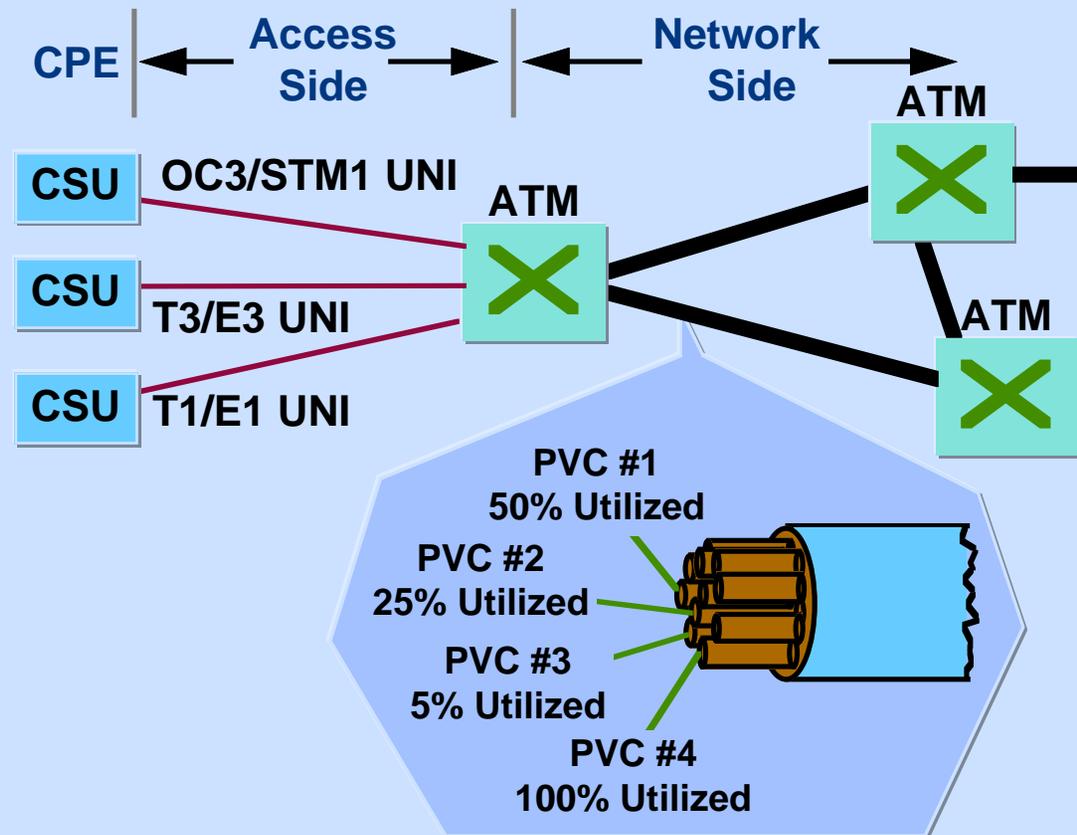
Cost Factors for Facilities

Factors

Access Side:

range of interfaces

access concentration

utilization of bandwidth

Network Side:

utilization of bandwidth

route selection

size of trunk interface

interoperability

CPE ← **Access Side** → ← **Network Side** →

ATM

CSU **OC3/STM1 UNI**

ATM

CSU

T3/E3 UNI

ATM

CSU **T1/E1 UNI**

ATM

PVC #1
50% Utilized

PVC #2
25% Utilized

PVC #3
5% Utilized

PVC #4
100% Utilized

Manage facilities costs on both access and network side

Solutions for Facilities

	Factors	Solutions
Access Side:	range of interfaces	copper and fiber interfaces
	access concentration	packaging of low speed interfaces
	utilization of bandwidth	SVCs for bandwidth on demand
Network Side:	utilization of bandwidth	traffic management
	route selection	shortest path end-to-end routing
	size of trunk interface	OC12 NNI for efficient trunking in N.A.
	interoperability	NNI standards

Facilities costs inversely related to intelligence within network

Operations Cost Factors and Solutions

"Once a service provider has deployed the switches and facilities, isn't the operations overhead minimal?"

Factors:	Solutions:
provisioning connections	SVCs; automated PVC provisioning
bringing up new nodes	automated network configuration
system upgrades	non-service-disrupting software and equipment upgrades
fault management	multiple levels of redundancy to minimize service impact of fault conditions
network engineering for growth	equipment and facility information analysis to optimize network engineering

Manage operations costs through automation and information analysis

Cost Impact of Evolution

"Once a service provider has purchased ATM edge switches, wouldn't equipment costs drop to a minimum?"

Evolution perspective:	Requirement:
meshed edge switches will increasingly home onto backbone ATM switch	supplier with broad portfolio encompassing range of ATM networking equipment standards-based interoperability
edge switches will need to handle increasing traffic growth	expandable capacity modular equipment design
edge switches will need to accommodate more services	sophisticated basic traffic management flexible interface solutions

Strategy for long-term effectiveness:
network solutions with evolvable components
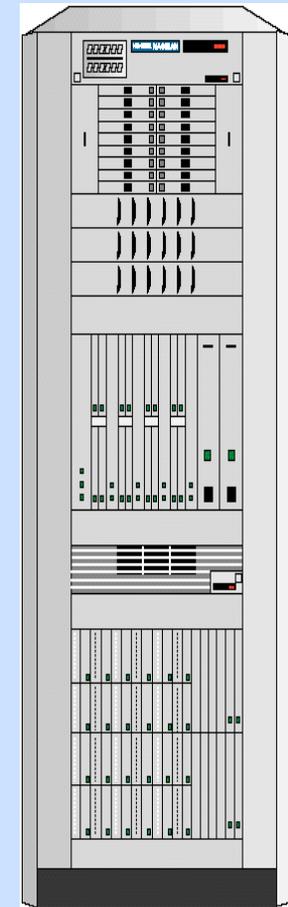
Manage Profitability with Vector

Facilities:

- **T1/E1 through OC12/STM4 interfaces; fan-in shelf**
- **Mature SVCs**
- **SPANS PNNI routing evolving to PNNI**
- **Sophisticated traffic management**

Operations:

- **Automated configuration; smart PVCs**
- **Redundancy**
- **Performance management**

Evolvable Platform:

- **Capacity upgrades**
- **New services (FUNI, CES)**
- **Interworking with Magellan Passport and Concorde**

Vector enables service providers to manage costs and increase profitability

Magellan Vector Delivers!

Improve Sales - Differentiation

Services:
- Business data; ATM services
- Capabilities: SVCs, traffic management
- Interfaces: T1/E1, T3/E3, J2, OC3/STM1, OC12/STM4

Billing: PVCs and SVCs; flexible

Performance: best-in-class

Improve Profitability

Facilities: SVCs; fan-in; routing and traffic management;

Operations:
- Automated configuration and provisioning
- Redundancy; performance monitoring

Vector's differentiation and cost management features maximize service provider success

Nortel - FORE Systems Partnership

FORE SYSTEMS®

- Workstation ATM adapters
- ATM LAN and WAN access switches
- Legacy LAN ATM access switches

ATM CPE Focus

NORTEL

- ATM CO backbone switches
- ATM CO edge switches
- Frame Relay switches

ATM CO Focus

Leverage combined strengths of FORE Systems and Nortel
- End-to-end solutions
- Common software platform
- ATM service consistency

Accelerate ATM market growth
- First to market with ATM standards-based features
- Extended ATM capabilities
- Advanced LAN capabilities to WAN

Conclusions

- Service provider equipment decisions must contribute to business case by generating revenues and/or minimizing costs

- Desired ATM edge switch attributes can be derived using these values

- Today's Vector enables service providers to differentiate their services and manage costs

- Vector will evolve in accordance with business priorities of Nortel's ATM customers

Vector gives service providers a valuable set of current and planned capabilities with which to deploy a profitable ATM network