FORE
SYSTEMS®

NØRTEL
NORTHERN TELECOM

FORE Systems & Nortel

A Partnership for
Seamless Networking

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The FORE Systems - Nortel Partnership

Presentation Objectives:

1. **Partnership Goals & Benefits**

2. **FORE & Nortel: Leading the ATM Networking Convergence**

3. **FORE ATM-based Customer Applications**
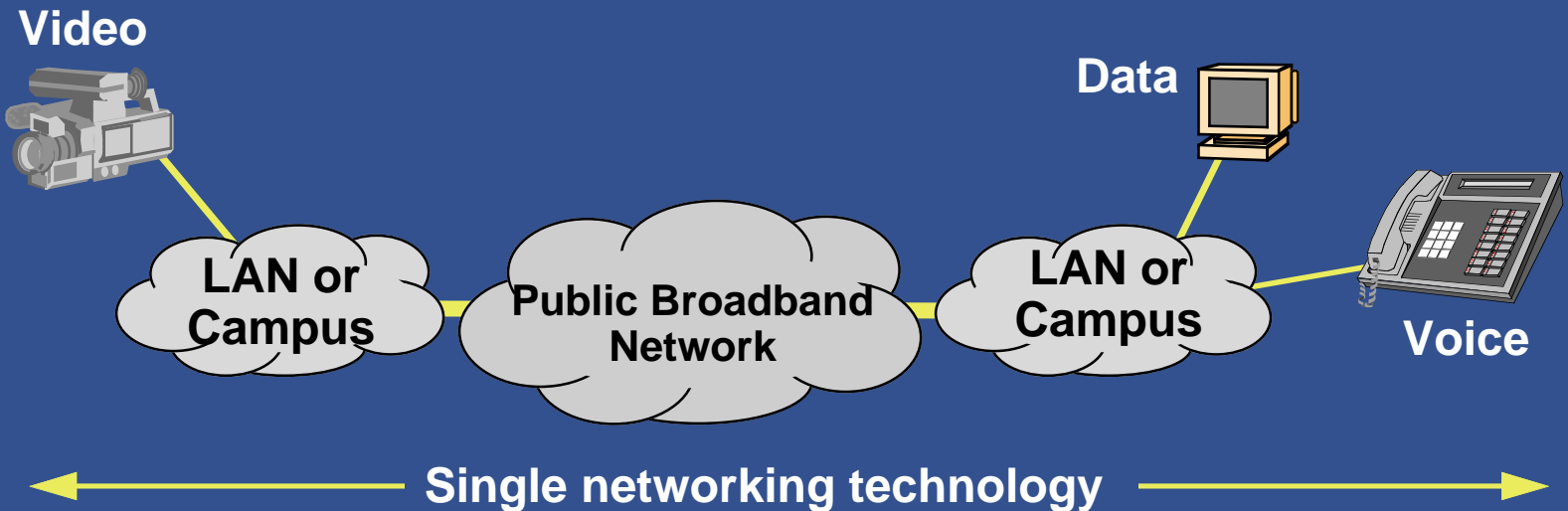
4. **The Reality of ATM: Check-points and Considerations**

ATM-focused networking through the LAN & WAN

Video

Data

LAN or Campus

Public Broadband Network

LAN or Campus

Voice

← **Single networking technology** →

Seamless ATM networking from desktop-to-desktop

- **Supports existing and future applications**
- **Reduces capital and operating cost**

Providing industry-best integrated solutions for ATM networking...

NORTEL
NORTHERN TELECOM

FORE SYSTEMS®

- ATM WAN & carrier grade switching

- First to deliver carrier-grade SVCs

- Best-in-class voice over ATM

- ATM evolution for legacy services

- ATM LAN & ATM WAN access networking

- World-wide leader in ATM CPE

- Best-in-class LAN ATM features

- ATM integration for legacy LAN devices

Leadership
Innovation
Quality
Responsiveness

End-to-end solutions through partnership

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The Nortel - FORE Systems ATM Networking Advantage

- Seamless ATM networking to the desktop
  - enabled by common software:

  ForeThought & *ForeView* -

  integrated <u>into</u> Magellan software, and <u>across</u> the *ENTIRE* network

- Advanced ATM features - SVCs, signalling, traffic management

- True interoperability and full feature *transparency*

Nortel / FORE ATM Portfolio

ForeThought / ForeView Software

Legacy Access:

LAN:

LAX-20   ES-38XX

PowerHub Line

WAN:

CellPath ATM Muxes

Workgroup / Desktop

ASX-200WG

ForeRunner Adapters
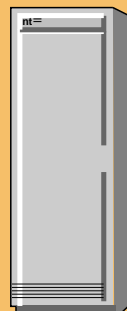
ATM Campus & WAN access
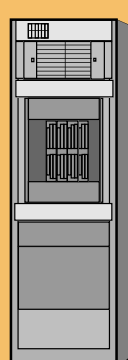
ASX-1000

ASX-200BX
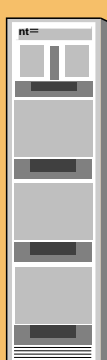
Passport
(Carrier and Multi-service ATM ENS)

Vector
(up to 5 Gbit/s)

ATM edge switch

Concorde
(up to 80Gbit/s)

High capacity ATM Backbone switch

End Users

Service Providers

Leadership

Innovation

Quality

Responsiveness

ATM Networking Solutions

ATM Workgroups

FORE products...

ASX-200 WG

ASX-200 WG

ASX- 1000

ATM Workgroups

Passport

Vector

PBX

Video Codec

Powerhub

Native LAN

Native LAN

Passport

Vector

Concorde

CellPath ATM Mux

T1 Muxes
Video Codecs
FRADS / PBXs
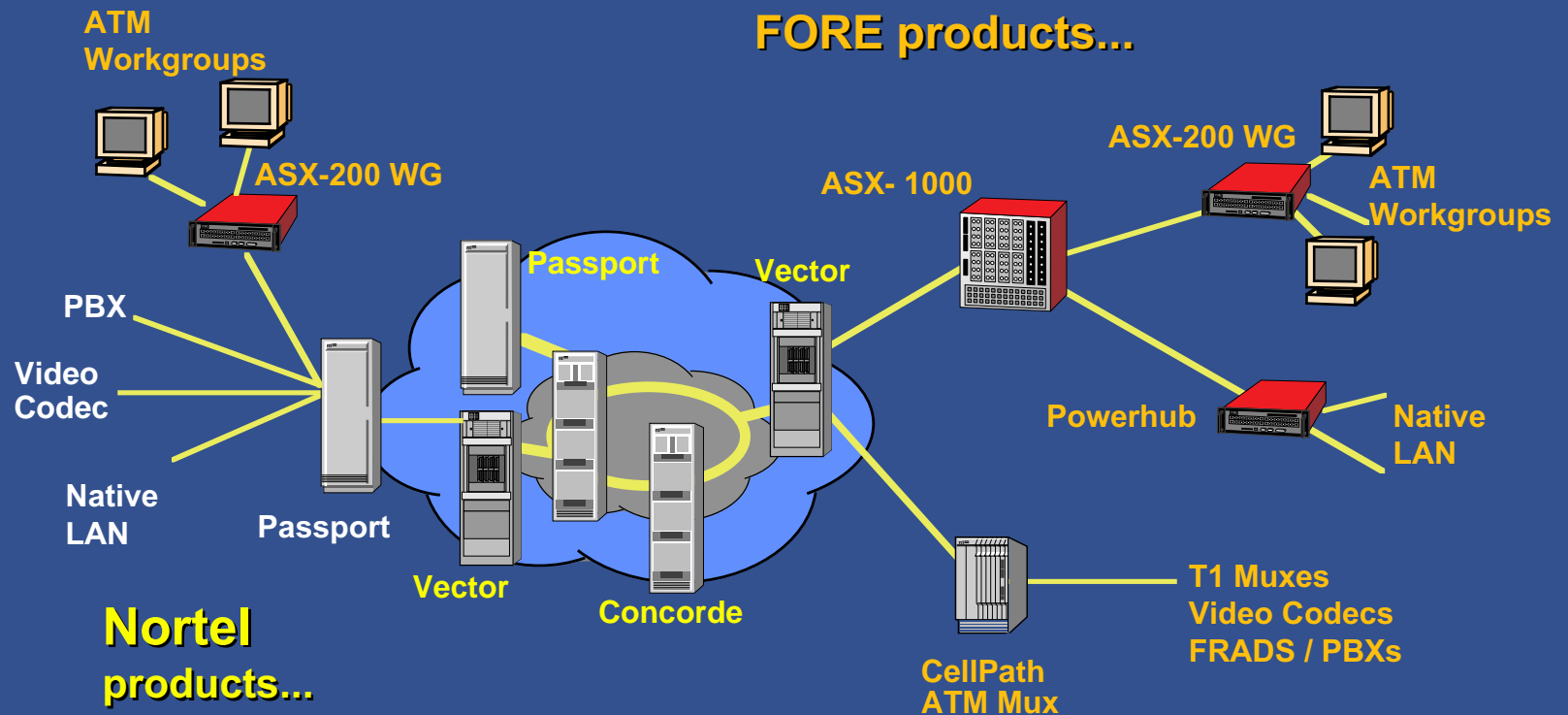
Nortel products...

- **Enterprise-wide communication**
- **Seamless operations and service delivery**
- **Standards-based portfolio with proven interoperability**

All Roads Lead To ATM
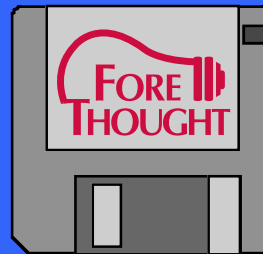
Leadership
Innovation
Quality
Responsiveness

Today's Typical Network Approach

Video Network
- Monitor
- Camera Video Server
- Workstation
- Monitor
- Camera
- Camera
- Monitor
- Workstation

Data Network
- Statistical Multiplexer
- Token Ring
- Ethernet
- Ethernet
- FDDI
- Statistical Multiplexer

Voice Network
- Voice PBX
- T1 Channel Bank
- Voice PBX
- T1 Channel Bank
- T1 Channel Bank
- Voice PBX
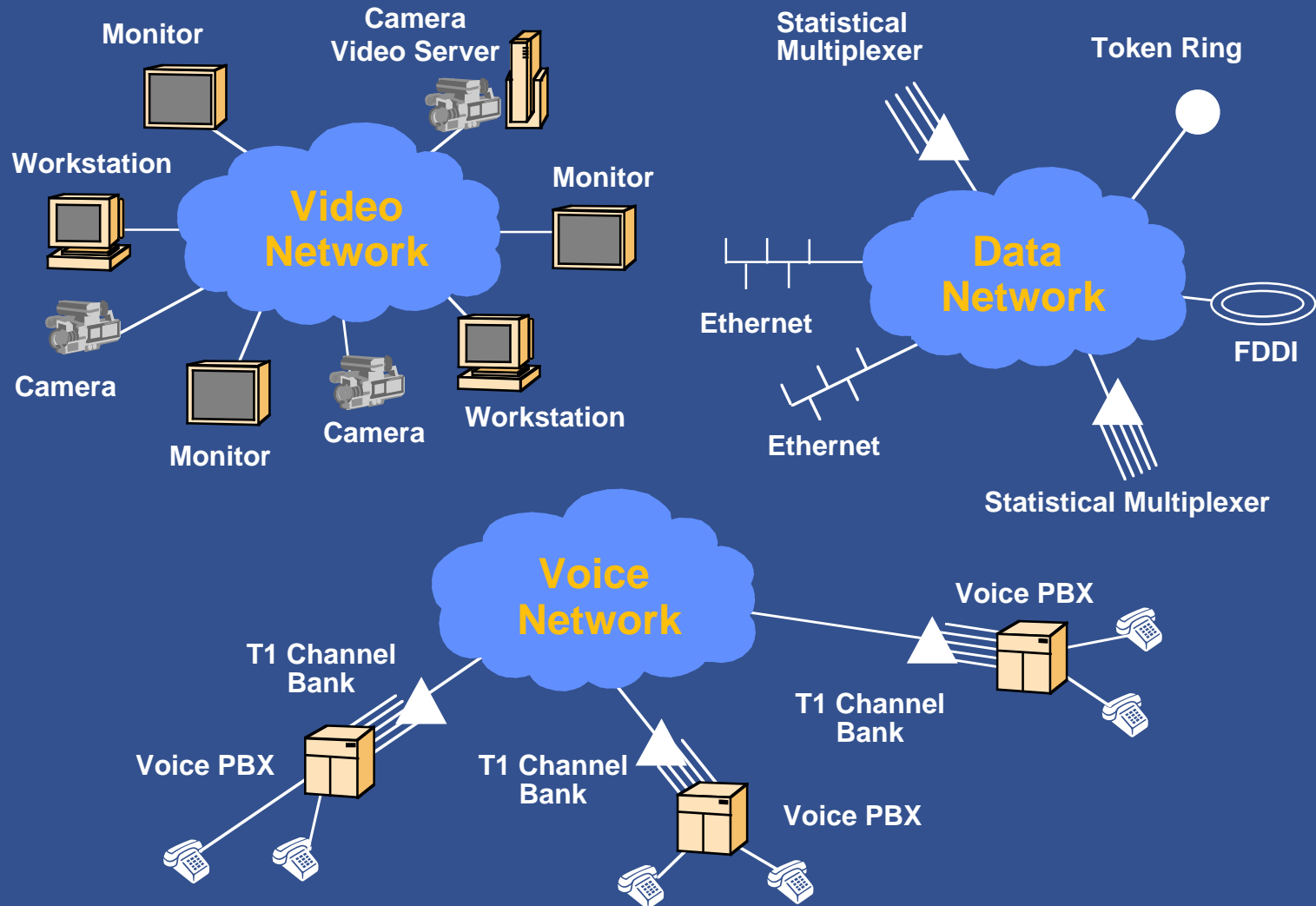
Leadership
Innovation
Quality
Responsiveness

The FORE-Nortel ATM Networking Advantage

Monitor
Camera Video Server
Workstation
Statistical Multiplexer
Token Ring
Ethernet
Workstation
Monitor
ATM WAN Backbone
FDDI
Statistical Multiplexer
T1 Channel Bank
Voice PBX
T1 Channel Bank
Meridian PBX

Leadership
Innovation
Quality
Responsiveness

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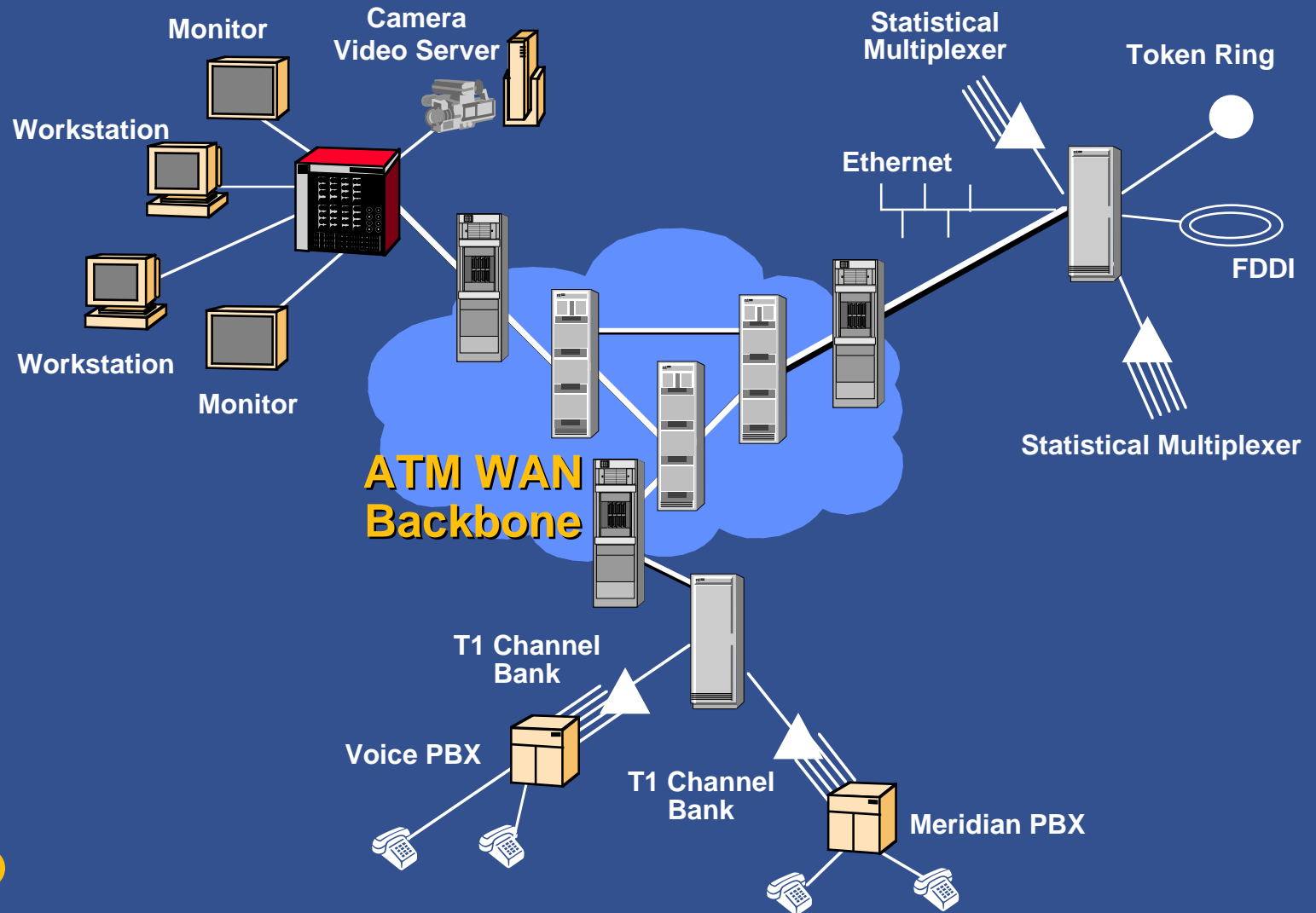
The Benefits of ATM

- **Improves performance of existing applications**

- **Integrates voice, video and data networks**

- **Enables new applications**

- **Easily accommodates future growth**

**ATM increases productivity
and saves money**
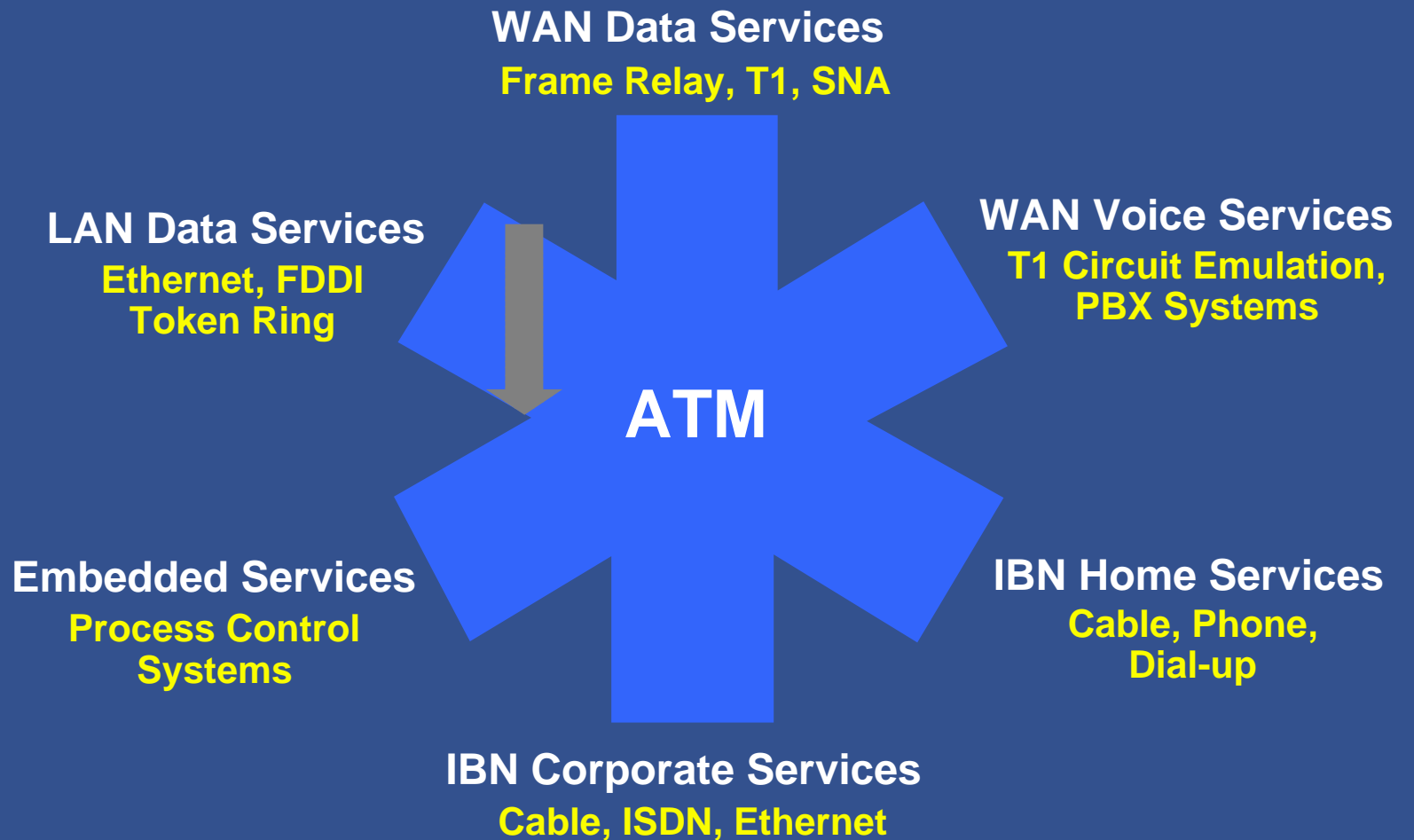
ATM – The Convergence

WAN Data Services
Frame Relay, T1, SNA

LAN Data Services
Ethernet, FDDI
Token Ring

WAN Voice Services
T1 Circuit Emulation,
PBX Systems

ATM

Embedded Services
Process Control
Systems

IBN Home Services
Cable, Phone,
Dial-up

IBN Corporate Services
Cable, ISDN, Ethernet
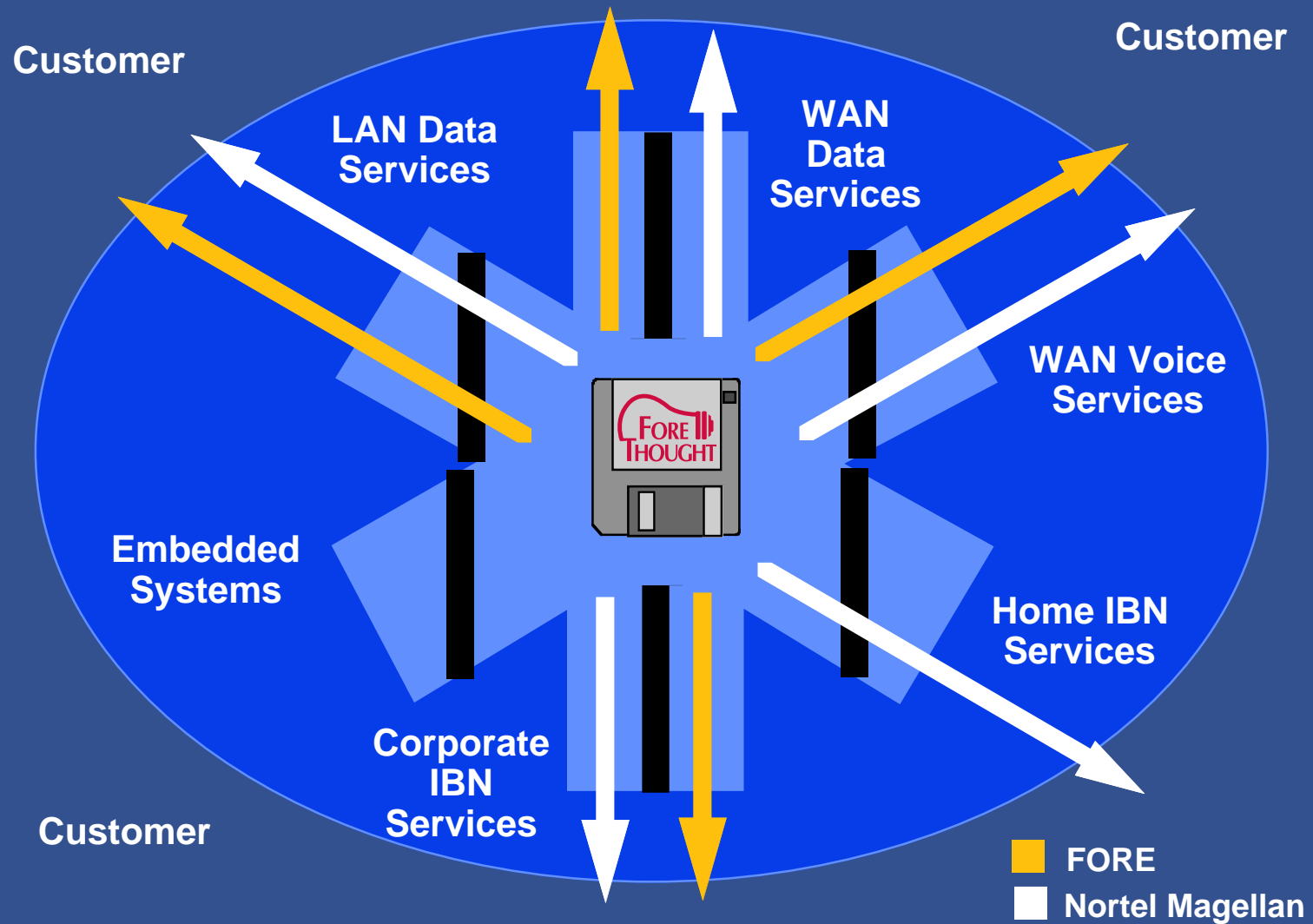
ForeThought Partners
(The FORE-Nortel Advantage)

FORE THOUGHT SOFTWARE

LAN DataServices

Cabletron

Hewlett Packard

Auspex

Tricord

ODS

Allied Telesyn

Madge Networks

Data General

Maximum Strategy

EMC

WAN Data Services

ADC Kentrox

Premisys

Sprint

NTT

Ameritech

SwissTel

WAN Voice Services

Mitel

ADC Kentrox

Premisys

Home Integrated Broadband Services

Microsoft/TCI

Southwestern Bell

Hewlett Packard

General Instrument

Corporate Integrated Broadband Services

Allegheny Health, Education, and Research Foundation

Embedded Systems

Avid

Silicomp

QNX

LanQuest

Leadership
Innovation
Quality
Responsiveness

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FORE ATM-based Customer Applications

Allegheny Health Education and Research Foundation

Pittsburgh

Philadelphia

Allegheny General Hospital

(Penn Access)

(Eastern Telelogic)

Medical College of PA (Bala Division) Network Management

Medical College of PA (Henry Ave. Division)

Allegheny Center (Network Management)

45 Mbps DS-3 Link

Medical College of PA (Queen Lane Division)

AHERF Corporate Headquarters

Hahnemann University

St. Christopher's Hospital

Doctor's Office

Doctor's Office

FUTURE?

Remote Medical Facility

Applications

- **Distance learning**
- **Medical imaging**
- **Remote patient diagnosis**
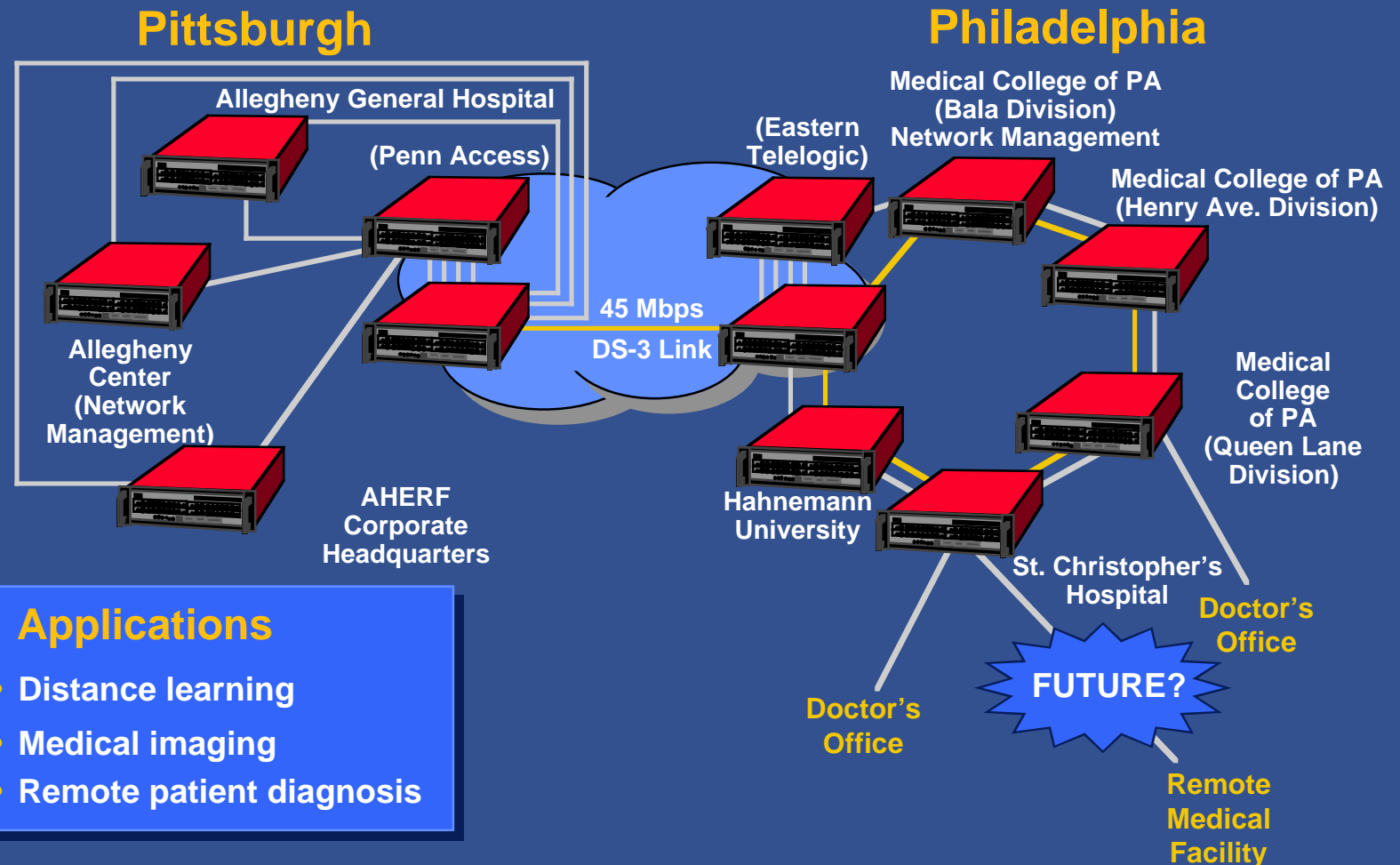
All Switches are *ForeRunner* ASX-200BX ATM Switches

Leadership

Innovation

Quality

Responsiveness

16

US Government ATDNet

Applications

- **Cross agency collaboration**
- **Video conferencing**
- **Supercomputing**
- **Data modeling**
- **File transfer**
- **Imaging**

ForeRunner **ATM Switches**

Agencies

- **NRL**
- **DARPA**
- **NSA**
- **NASA**
- **DIA**
- **DISA**

OC-3c

ForeRunner **ATM Switches**

OC-48

OC-3c

ForeRunner **ATM Switches**

OC-3c

SONET Mux

Prime Contractor – Bell Atlantic > 300 Switches

Leadership

Innovation

Quality

Responsiveness

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NAME.Revision #.Code
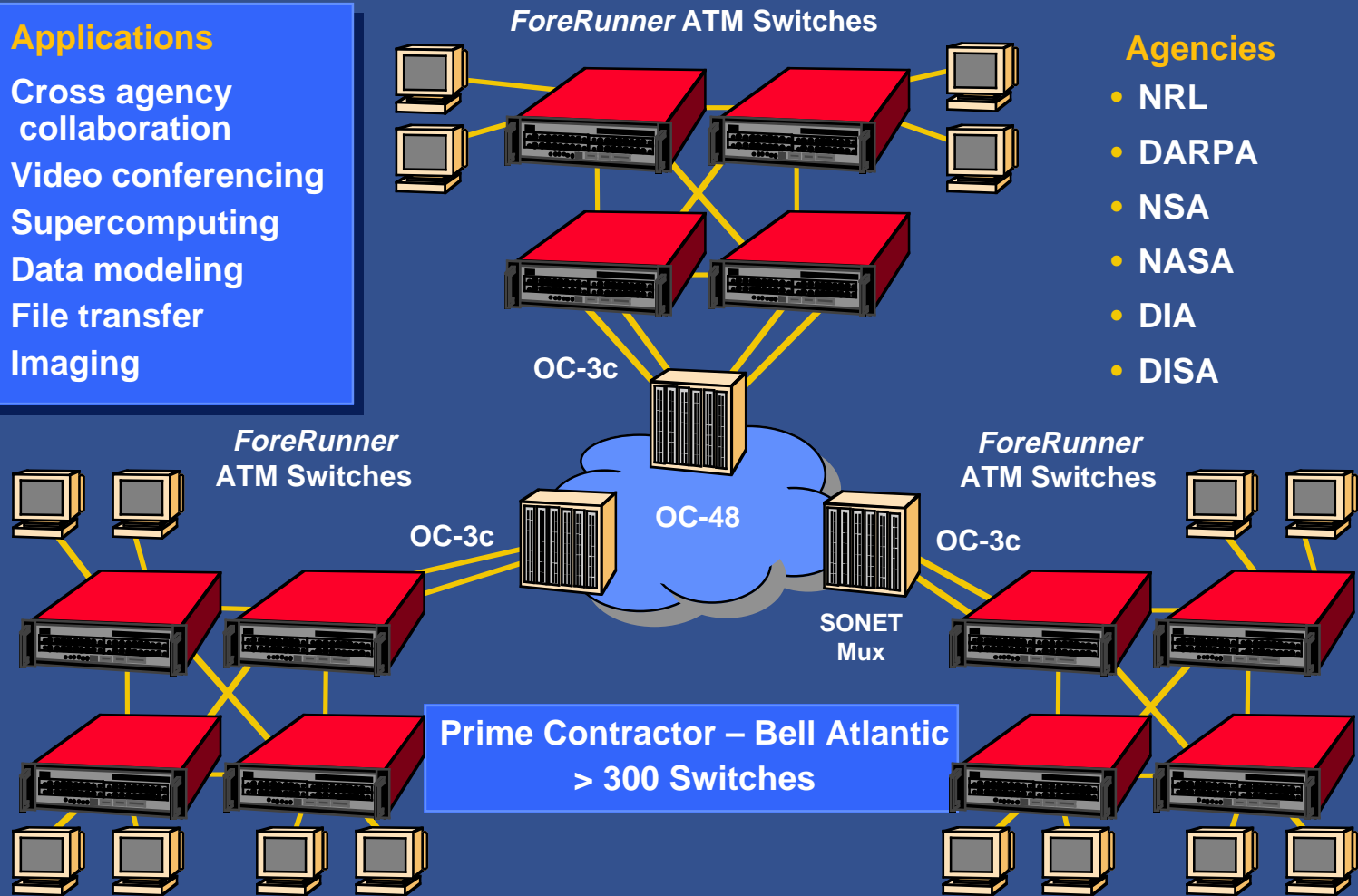
European Synchrotron Radiation Facility

All switches are *ForeRunner* ASX-200BX ATM Switches

Ethernet
UNIX Workstation
VME Crates LynxOS
FDDI
Token Ring
LAN Access Device
UNIX Workstation
VME Crates LynxOS
UNIX Workstation
VME Crates LynxOS
Ethernet
VME Crates LynxOS
Ethernet
LAN Access Device
FDDI
Token Ring
VME Crates LynxOS
UNIX Workstation
VME Crates LynxOS
UNIX Workstation
VME Crates LynxOS
UNIX Workstation
UNIX Workstation
LAN Access Device
FDDI
Token Ring

Leadership
Innovation
Quality
Responsiveness

Applications
- **ATM LAN**
- **LAN-LAN Internetwork**

Monterey Bay Aquarium Research Institute (MBARI)

Applications

- **Distance Learning**

Large-screen Video

Large-screen Video

Video Workstation with ATM Adapter

Video Workstation

ForeRunner **ATM Switches**

Monterey Bay

Monterey Bay Aquarium

Tech Museum San Jose, CA

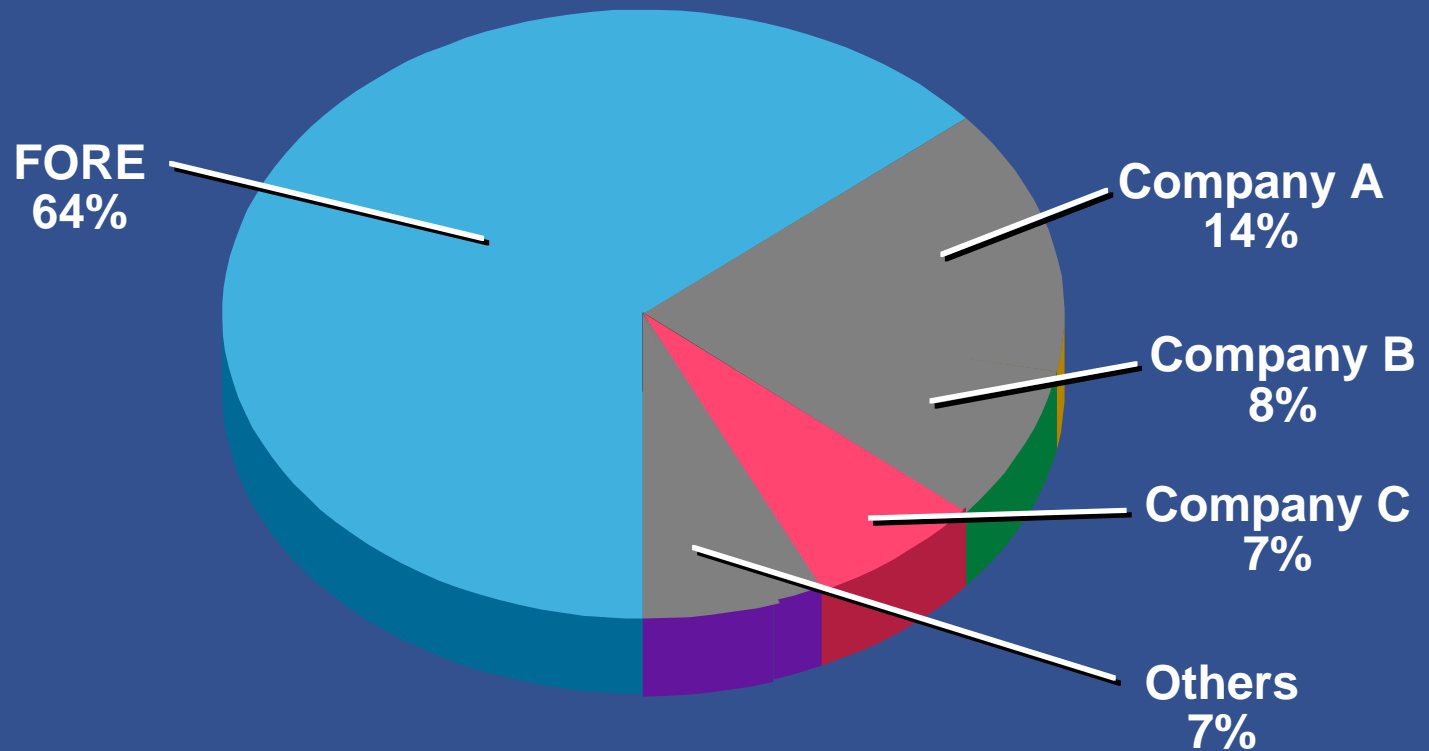**"Ventana" camera**

Remotely Operated Vehicle
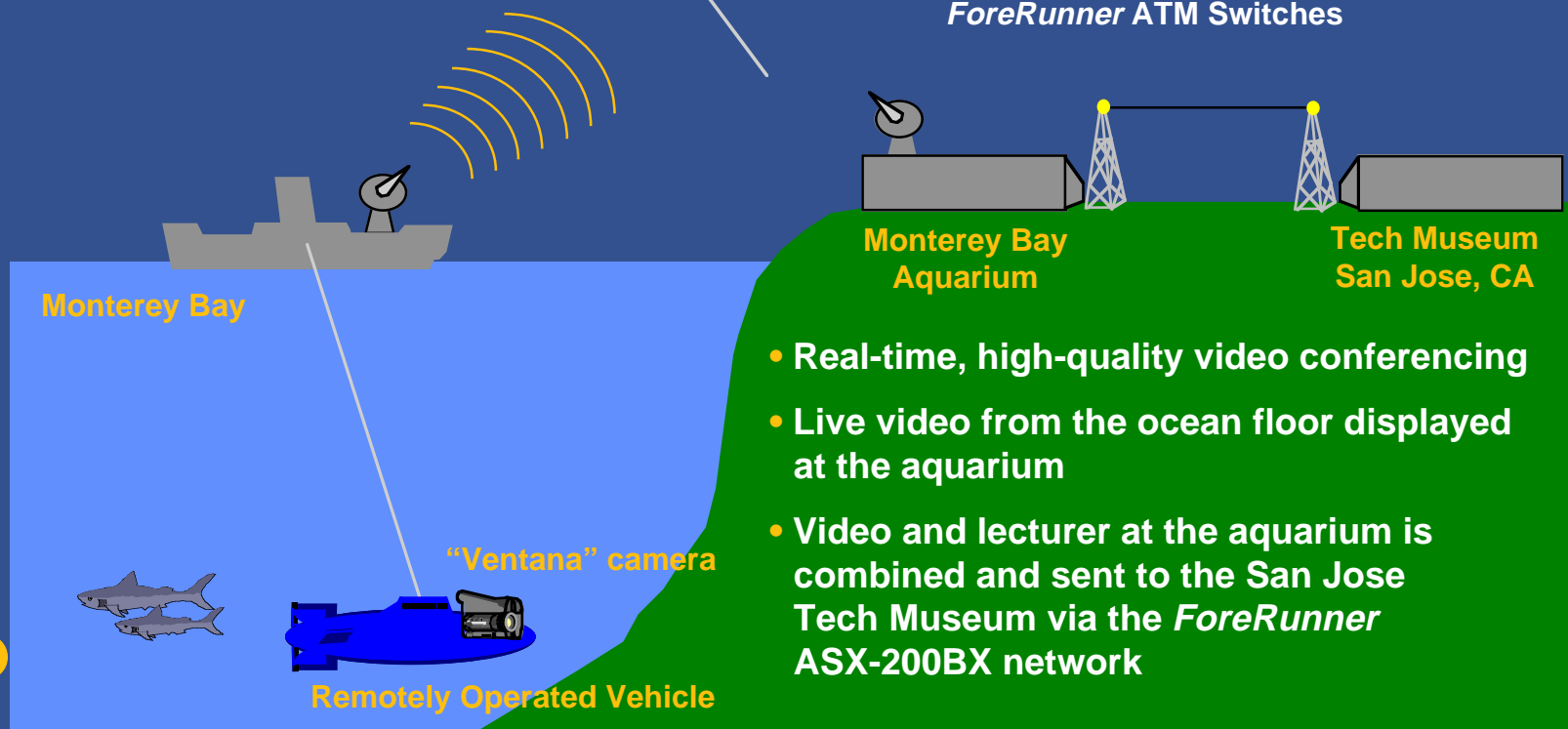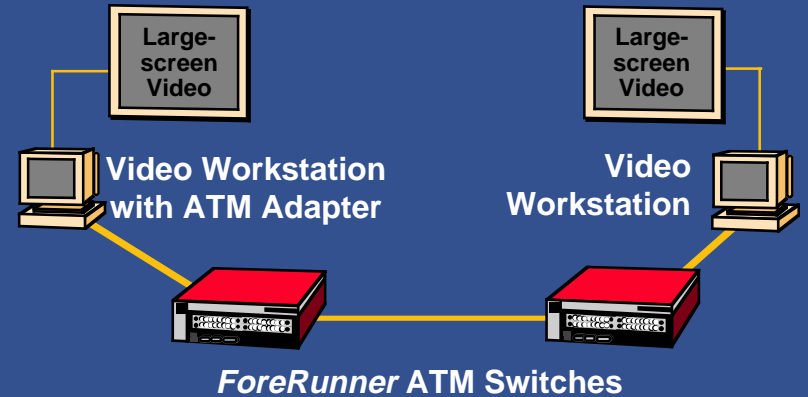
- **Real-time, high-quality video conferencing**

- **Live video from the ocean floor displayed at the aquarium**

- **Video and lecturer at the aquarium is combined and sent to the San Jose Tech Museum via the *ForeRunner* ASX-200BX network**

FORE Systems –
The ATM CPE Market Leader

1994-1995 Worldwide ATM Switch Market Shares by End-User Revenue

FORE
64%

Company A
14%

Company B
8%

Company C
7%

Others
7%

Leadership

Innovation

Quality

Responsiveness

Source: Dataquest (October 1995)

The Reality Of ATM

Decision Checkpoints:

- **Standards**

- **Interoperability**

- **Network Management**

- **Cost of Ownership**

The Reality Of ATM:
ATM Forum & ITU-T Standards

Standards Parameter	Status	FORE-Nortel Compliant
Physical Layer Interfaces	defined	✔
ATM Layer Specifications	defined	✔
ILMI Specification	defined	✔
LAN Emulation 1.0	defined	✔
UNI 3.0 Signaling	defined	✔

ForeThought – The Value-Added

Features

- **Bandwidth management**
- **"Per application" QoS**
- **IP multicast over ATM**
- **Distributed intelligence**
- **Intelligent VLANs at multiple protocol levels**
- ***ForeThought* PNNI**

Leadership
Innovation
Quality
Responsiveness

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NAME.Revision #.Code

The Reality of ATM:
ATM Interoperability

Cer
FORE^TIFIED - FORE-Nortel Interoperable

DEC	AT&T	Lucent
Hewlett-Packard	Fibercom	Stratacom
IBM	Fujitsu	TRW
Cabletron	General DataComm	Bell Atlantic
Cisco	GTE	MFS Datanet
NetEdge	Newbridge	Pacific Bell
ODS		Sprint
ADC Kentrox		WilTel

The Reality of ATM: Network Management

ForeView Network Management Software

ForeView Network Management

Capability

- **Network discovery and mapping**
- **Inventory management**
- **Virtual circuit tracing**
- **Performance monitoring**
- **PVC and SPVC configuration**

Compatability

- **HP OpenView**
- **SunNet manager**
- **IBM NetView/6000**
- **WindowsNT**
- **Standalone version**

The Reality of ATM:
The Cost of Ownership

Where are the Savings?

- Cost/Capacity: switch vs. router

- Cost for Services: ATM WAN vs. conventional

- Elimination of overlay networks

- Elimination of multiple links between nodes

ATM is the most economical way to increase network capacity and services

The FORE-NORTEL Partnership: The *New* Realities of ATM

- **Standards** ⟶ **ATM Forum defined**

- **Interoperability** ⟶ **FORE Cer TIFIED**

  ⟶ *ForeThought* **Partners**

- **Network management** ⟶ *ForeView* **NMS**

- **Cost of ownership** ⟶ **Demonstrable savings & improved productivity**

All Roads Lead To ATM

FORE
SYSTEMS®

FORE THOUGHT

Seamless...
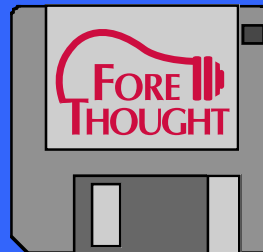
ATM Networks

N⊘RTEL
NORTHERN TELECOM

Leadership
Innovation
Quality
Responsiveness