Building the Enterprise Solution

Arno Schmidt

Assistant Vice President and Business Manager

Magellan Passport

There are major changes underway in the business of enterprise networking. These are being driven, in turn, by new approaches to the corporate organization and discontinuities in associated technologies. The new organizational approaches demand flattened structure, global geographic dispersion and services critical to business success. All of this requires corresponding high growth and performance within constrained budgets.

This presentation will examine the role of network communications and Magellan's commitment to helping enterprises, and their service providers, build cost-effective enterprise networking solutions during these turbulent times.

About the Presenter:

Arno Schmidt has held various positions in Bell Canada, BNR and Nortel over the last 22 years. Most recently he has managed businesses in Europe and North America in the PBX, Public Packet Network and Residential Broadband Access fields. He has also worked extensively in business development and planning.
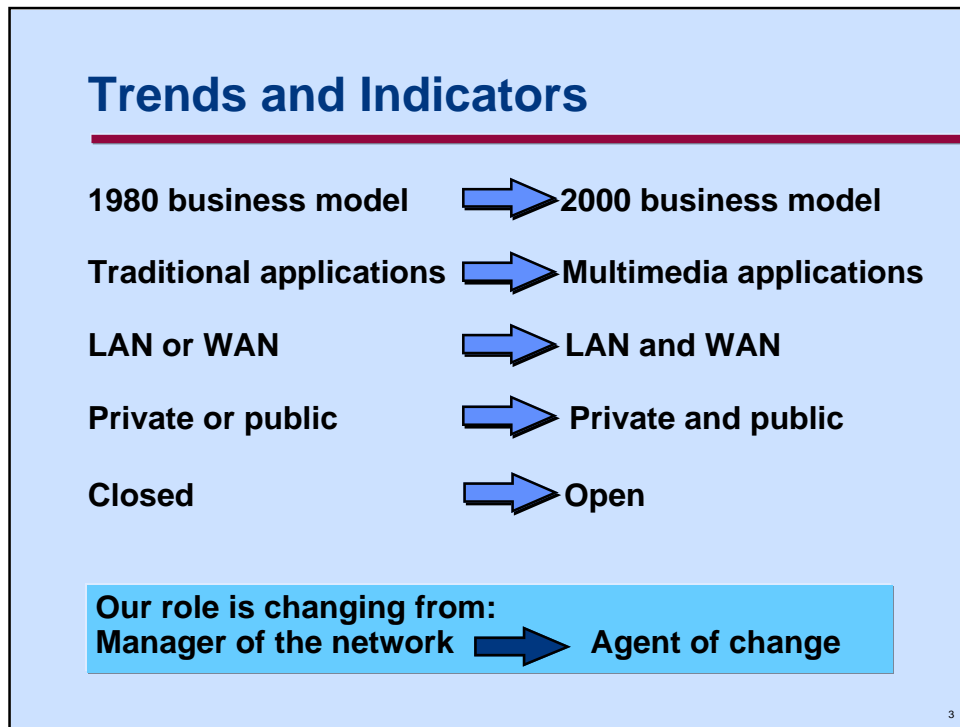
Currently he is responsible for the global Magellan Passport business.

Agenda

- **Trends and indicators**
- **The essence of enterprise networks**
- **How can Nortel help?**

2

Trends and Indicators

1980 business model → 2000 business model

Traditional applications → Multimedia applications

LAN or WAN → LAN and WAN

Private or public → Private and public

Closed → Open

Our role is changing from:
**Manager of the network** → **Agent of change**

Here are five trends we in Magellan have recognized based on discussions with our global base of customers. Each one will be reviewed in the next few charts.

We are seeing changes in the fundamental approach corporations like yours are taking in the way you do business with your vendors, your customers and internally. I've called this trend the change from the 80's business model to the model that will predominate in the year 2000.

The second trend we will examine is the rapid movement from traditional single media applications to multimedia.

Budgeting and planning is changing from LAN or WAN and Private or Public to an overall end-to-end viewpoint. Each of these two separate but inter-related trends will be covered as well. The fifth trend, best-in-class open multi-vendor interworking, is emerging as a way of selecting suppliers.

Overall, the role of the network manager is changing; he or she is becoming the agent of change—impacting how corporations do business.
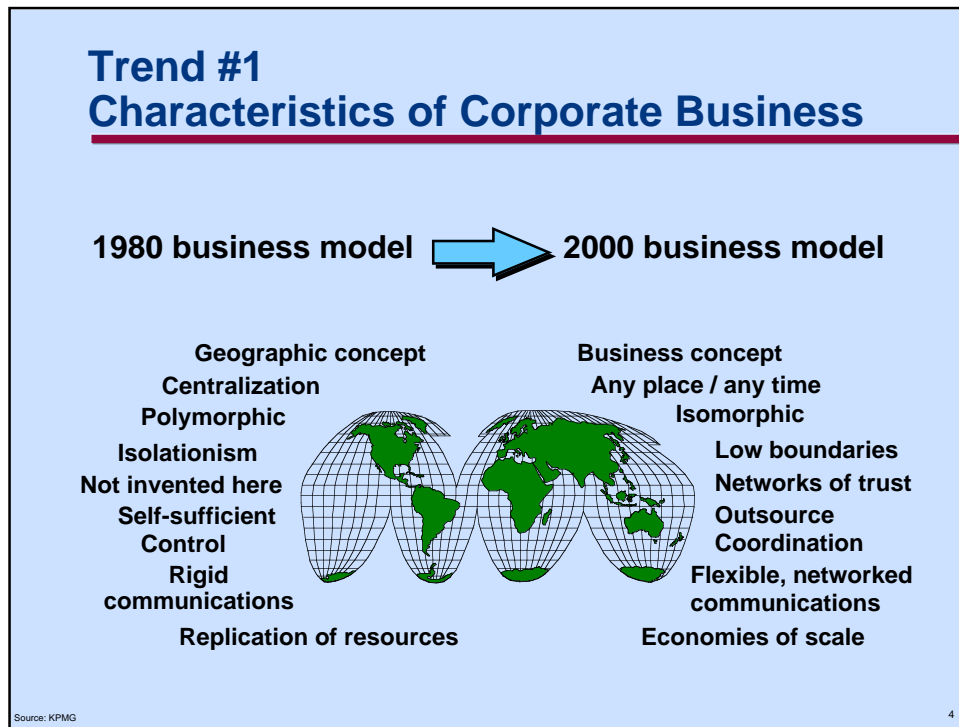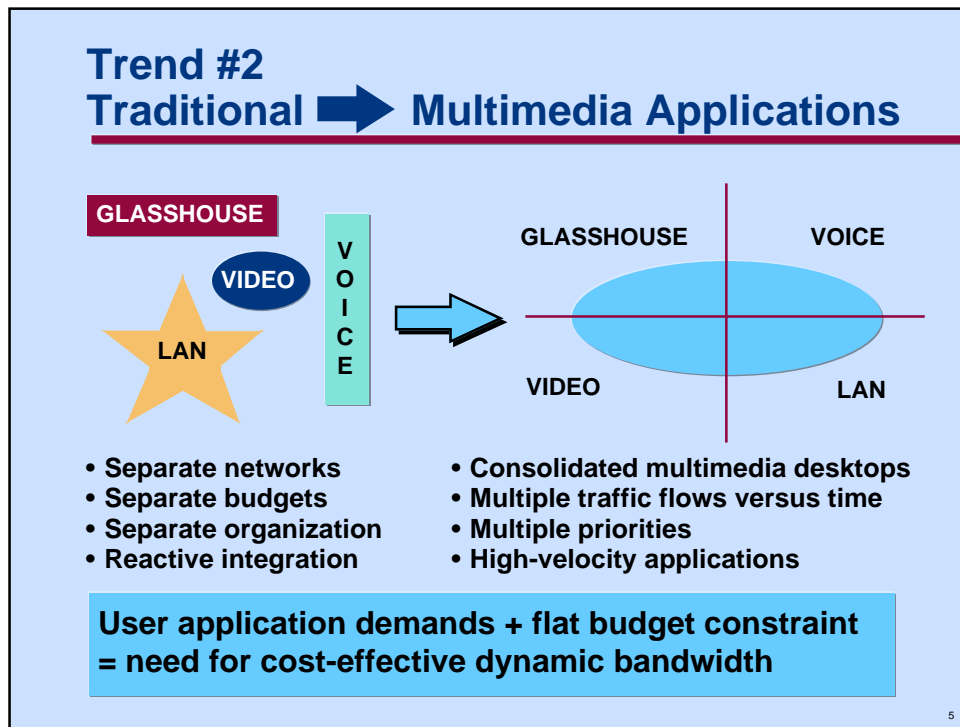
Corporations today are recognizing that they have to do business differently in order to survive.
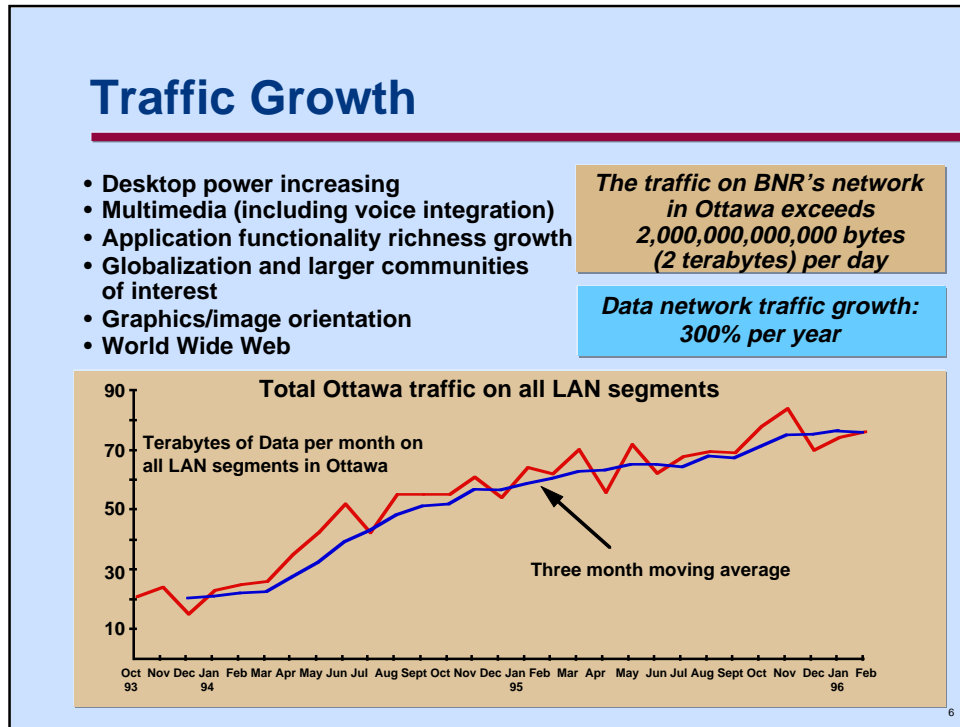
Many of our customers are looking at:

(i)   restructuring the organization with increased focus on the customer (e.g. getting away from product and geographic driven business units as was done by Johnson and Johnson). This leads to an increased need for networking among what were previously product silos.

(ii) establishing virtual corporation operating models (e.g. using networking to link suppliers and partners to deliver products more quickly, as is being done by Nortel)

(iii) reviewing how to reach customers (e.g. telemarketing, internet commerce/WWW servers for customer service). For example, Dupont closed thousands of sales offices and created virtual offices in the car seat. There are now also retail banks that only have electronic bank branches.

(iv) many corporations are looking at new (networked) technologies to enhance employee empowerment, skills and satisfaction (e.g. numerous companies are moving into multimedia-based training)

(v) often the above are coupled with outsourcing non-strategic and sometimes strategic activities.

The bottom-line is that corporations, given intense competition in virtually all vertical segments, are looking at networking in quite a different way—as an enabler to deliver services more effectively, to reduce costs and increase profit/market share.
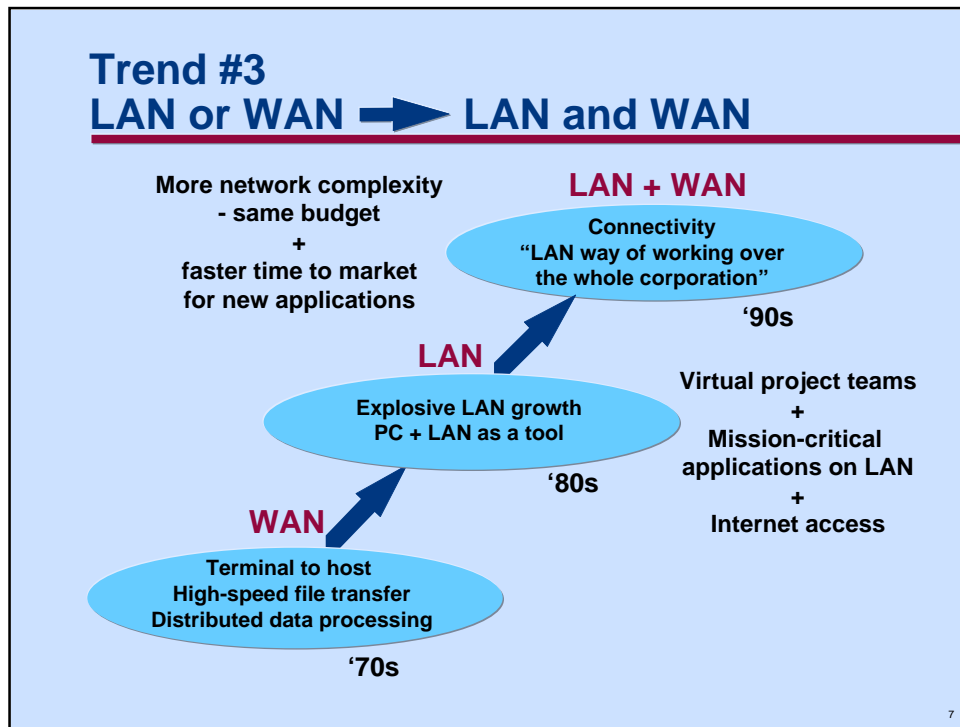
Trend #2
Traditional ➡ Multimedia Applications

GLASSHOUSE

VIDEO

VOICE

LAN

GLASSHOUSE   VOICE

VIDEO   LAN

• Separate networks
• Separate budgets
• Separate organization
• Reactive integration

• Consolidated multimedia desktops
• Multiple traffic flows versus time
• Multiple priorities
• High-velocity applications

User application demands + flat budget constraint = need for cost-effective dynamic bandwidth

5

Today, the trend is unmistakable . According to consultants, desktops equipped for multimedia have grown from 13% in 1993 to 32% in 1995 and projected to be 46% by the end of 1997.

Data traffic is increasing dramatically and users are demanding new applications be introduced quicker than ever before. Be it a small business office at a branch, an extended campus, or between major sites—there is a clear need for flexible, cost-effective support for growing multimedia applications.

Traffic Growth

- **Desktop power increasing**
- **Multimedia (including voice integration)**
- **Application functionality richness growth**
- **Globalization and larger communities of interest**
- **Graphics/image orientation**
- **World Wide Web**

The traffic on BNR's network in Ottawa exceeds 2,000,000,000,000 bytes (2 terabytes) per day

Data network traffic growth: 300% per year

Total Ottawa traffic on all LAN segments

Terabytes of Data per month on all LAN segments in Ottawa

Three month moving average

Oct 93, Nov, Dec, Jan 94, Feb, Mar, Apr, May, Jun, Jul, Aug, Sept, Oct, Nov, Dec, Jan 95, Feb, Mar, Apr, May, Jun, Jul, Aug, Sept, Oct, Nov, Dec, Jan 96, Feb

As an example, our own Nortel Technology's use of the Nortel GES network shows the growth of traffic in our business environment. More than two terabytes per day of traffic of multi-services data flowed in the Ottawa portion of the network alone!

Our moving average growth is 300% per year.

The third trend is the change from viewing investment in either the LAN or WAN to viewing both as a whole. The last two decades have seen a massive transformation of the corporate computing environment. There is an unmistakable trend toward higher bandwidth and switched LANs that will drive demand for higher bandwidth LAN/WAN backbone. The goal for wide area connectivity is highest performance for the dollar. There are a number of distinct environments, all impacted by burgeoning and largely unpredictable 'data' needs, where this transformation is indicated. For example:

- Workgroup networks moving rapidly to switched LANs

- Campus network: moving towards ATM when FDDI doesn't do the job

- Metro-area networks: large customers are deploying SONET/SDH rings, creating an extended campus.
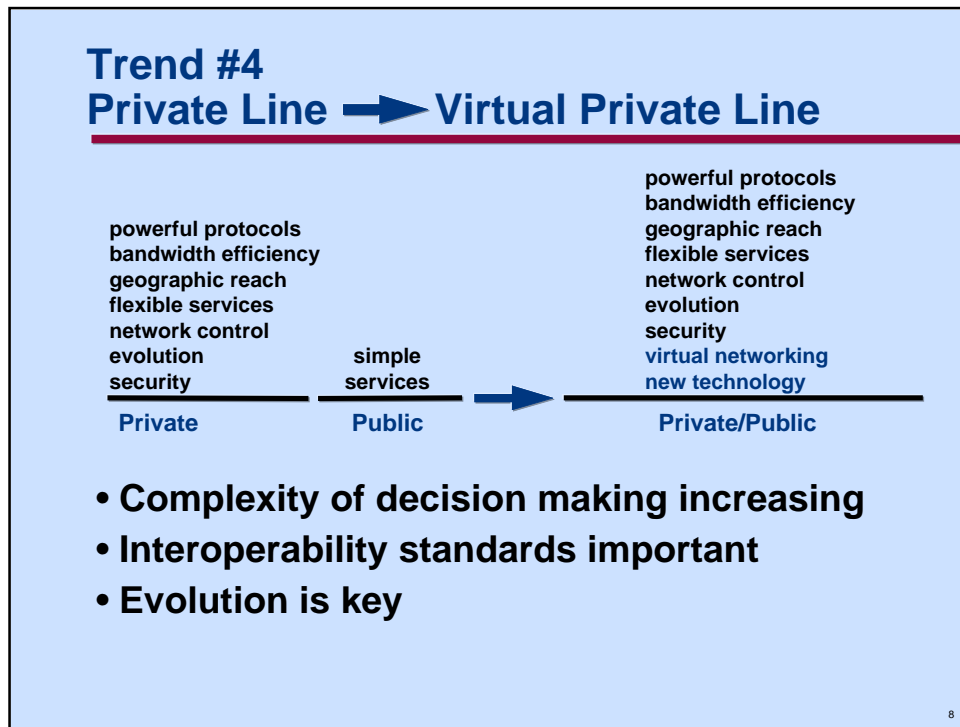
In all these cases we see a common need to remove bottlenecks in the bottom-up router/bridge networks of the 1980s.

Robust cost-effective connectivity in the LAN and WAN is a critical requirement, be it:
- International connectivity: outsourcing is an option, given the complexities involved.

- Connectivity to branch/sales offices: technology of choice for LAN-driven traffic is frame relay with ISDN backup; but many companies are looking at T1 ATM justified on multimedia consolidation

- Connectivity to small office/home office (SOHO) including mobile users: ISDN is enjoying an upsurge.
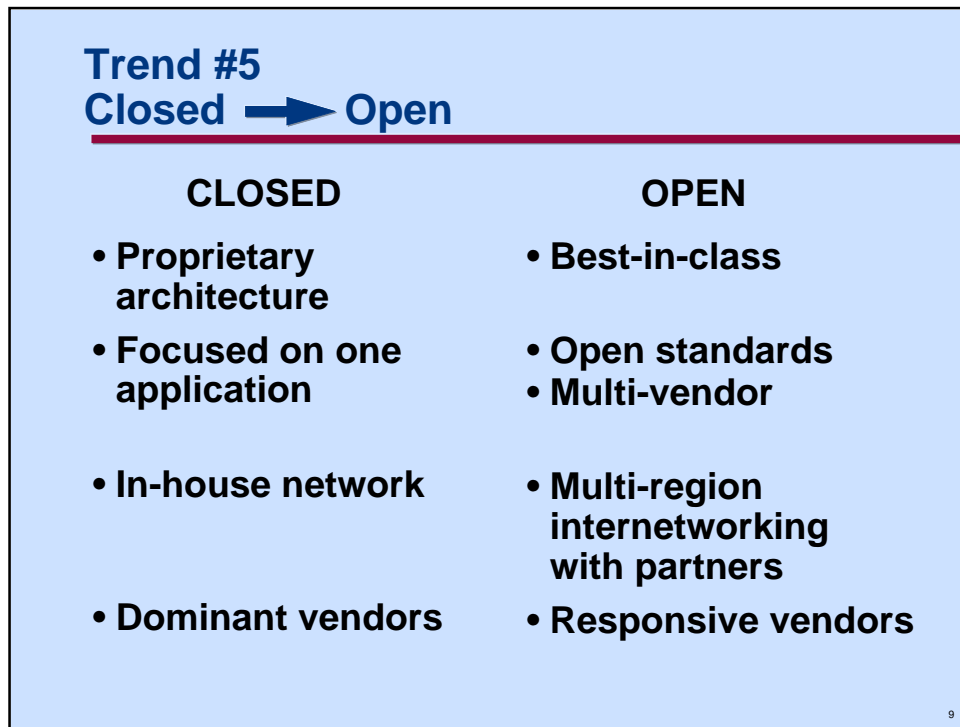
In the area of national connectivity, corporations are looking for the 'ATM deal' with their favorite service providers, anticipating better economics than leased line. ATM is viewed as a major element of the networks of the future.

One customer put it nicely: "I want a LAN way of working over my whole corporation."

Trend #4
Private Line ➤ Virtual Private Line

powerful protocols
bandwidth efficiency
geographic reach
flexible services
network control
evolution
security
virtual networking
new technology

powerful protocols
bandwidth efficiency
geographic reach
flexible services
network control
evolution
security

simple
services

Private   **Public**   **Private/Public**

- **Complexity of decision making increasing**
- **Interoperability standards important**
- **Evolution is key**

8

While private T1/E-1 mux networks over private lines were real growth opportunities in the 70s and 80s, today the growth is in the use of virtual private lines—primarily frame relay, to deal with LAN growth; and ultimately ATM, to accommodate the need to consolidate multimedia traffic. This is driven by the fact that frame relay and ATM are cheaper than private lines for a broad range of applications. Hence the value of private backbones over leased lines is diminishing. It's important to note that, virtual-private-line-based networks do not eliminate the need for CPE products, such as routers, FRADs and ATM enterprise switches. It's just that these have to be able to use virtual private line services, and optionally leased lines, effectively.
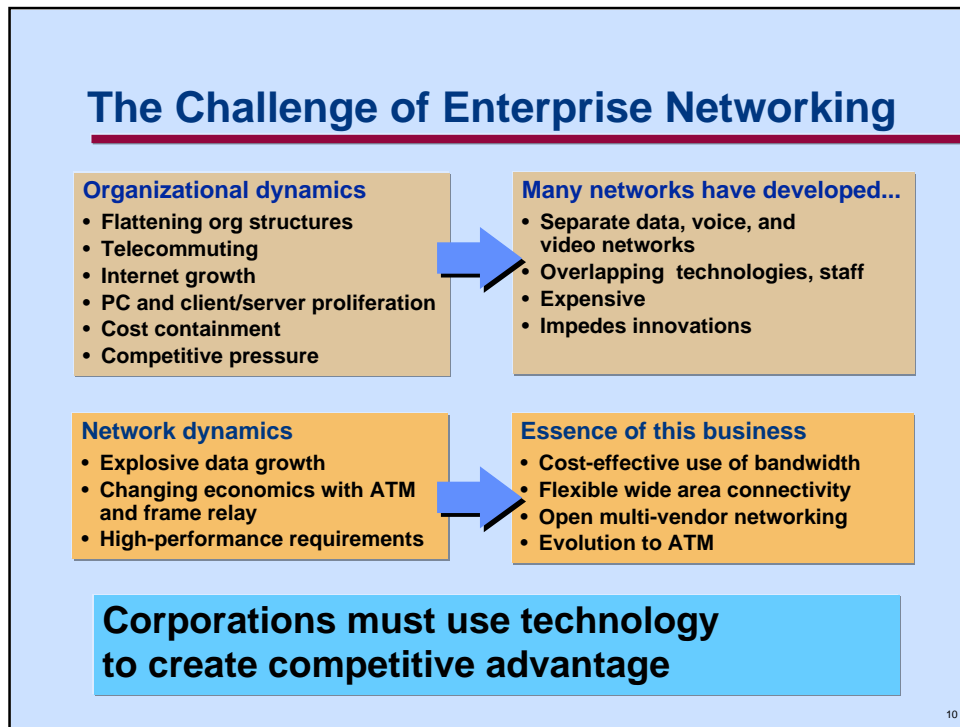
Trend #5
Closed ➔ Open

CLOSED	OPEN
• Proprietary architecture	• Best-in-class
• Focused on one application	• Open standards
	• Multi-vendor
• In-house network	• Multi-region internetworking with partners
• Dominant vendors	• Responsive vendors

9

You, our customers, have told us a lot about the fifth and last trend:

• The formation of virtual corporations and interworking between customers, suppliers and other company locations—means increased demand for multi-vendor open standards.

• At the same time, rapid advances in technology have resulted in the requirement of best-in-class, responsive vendors.

Many of our customers are setting these standards. We heard our customers request:

• that vendors form alliances to develop best-in-class products to meet different capacity requirements; and

• that vendors provide high quality support seamlessly across the network.

The Challenge of Enterprise Networking

Organizational dynamics
- Flattening org structures
- Telecommuting
- Internet growth
- PC and client/server proliferation
- Cost containment
- Competitive pressure

Many networks have developed...
- Separate data, voice, and video networks
- Overlapping technologies, staff
- Expensive
- Impedes innovations

Network dynamics
- Explosive data growth
- Changing economics with ATM and frame relay
- High-performance requirements

Essence of this business
- Cost-effective use of bandwidth
- Flexible wide area connectivity
- Open multi-vendor networking
- Evolution to ATM

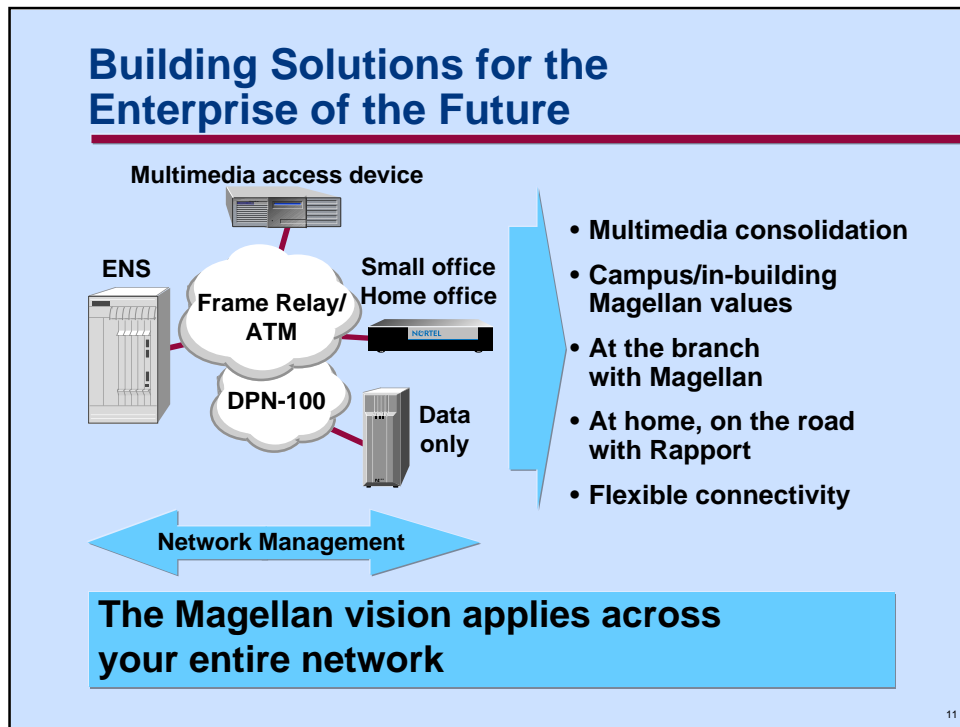**Corporations must use technology to create competitive advantage**

In summary, there are major changes emerging in corporations. The headlines today proclaim corporations are:

- downsized

- outsourced

- empowered employees

- focused on market

- fast to market

- faced with flat budgets

- enabled by technology
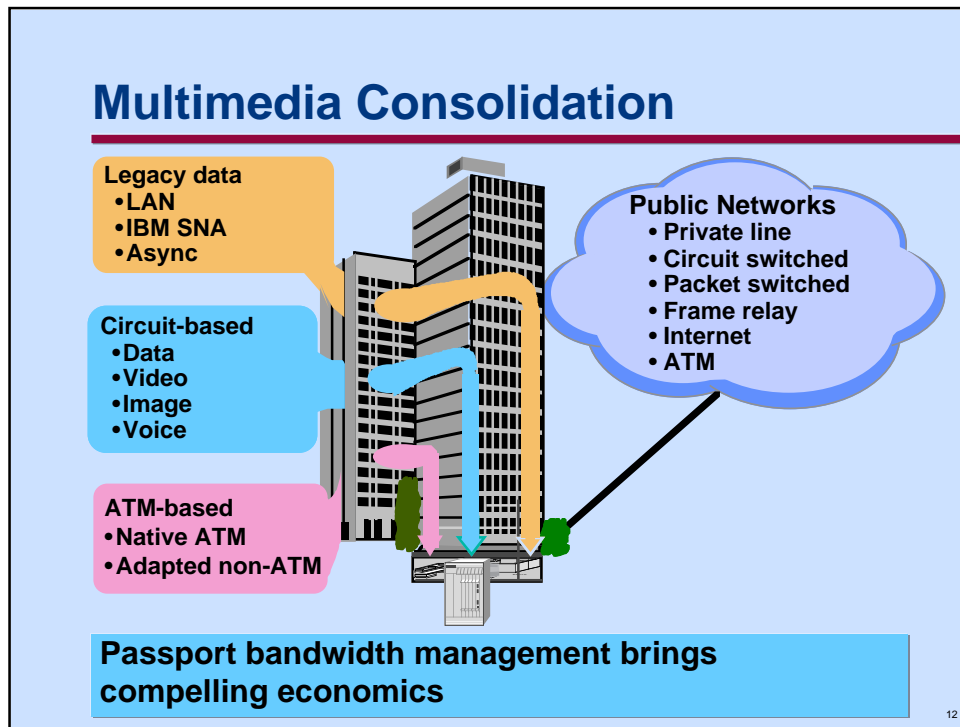
The resulting 'network dynamics' are demanding:

- data traffic growth is much higher than other traffic;

- bandwidth economics change with virtual private lines (ATM/frame relay services);

- network decisions are constrained by flat budgets;

- high performance is a key requirement; and

- networks must adapt economically to support these needs.

You want <u>flexible consolidated network</u> solutions, often global in scope, that are cost effective today and that will protect your investment as your needs evolve.

Building Solutions for the Enterprise of the Future

Multimedia access device

ENS

Frame Relay/ ATM

Small office Home office

NORTEL

DPN-100

Data only

- **Multimedia consolidation**
- **Campus/in-building Magellan values**
- **At the branch with Magellan**
- **At home, on the road with Rapport**
- **Flexible connectivity**

Network Management

The Magellan vision applies across your entire network

11

Nortel believes that Magellan, and its alliance partners, can deliver products to fulfill the network vision that will best support the needs you, our customers, have defined.

Before I get to the examples, let me relate our vision to the trends we've just reviewed.

Multimedia Consolidation

Legacy data
• **LAN**
• **IBM SNA**
• **Async**

Public Networks
• **Private line**
• **Circuit switched**
• **Packet switched**
• **Frame relay**
• **Internet**
• **ATM**

Circuit-based
• **Data**
• **Video**
• **Image**
• **Voice**

ATM-based
• **Native ATM**
• **Adapted non-ATM**

Passport bandwidth management brings compelling economics

12

Multimedia consolidation via ATM enterprise network switching enables corporations to cost effectively handle the new services and highly dynamic bandwidth growth in the first two trends we reviewed. Passport is our flagship, focusing on consolidation of a variety of traffic types onto the wide area in order to efficiently support the increasingly dynamic nature of business. With a single network infrastructure, Passport enables the network to grow and change in step your business, as traditional applications are supplanted by multimedia application needs.

The following interfaces and functionality are provided:

- InterLAN switching: (developed in conjunction with our partners NSC/Storage Technolgies) our implementation of cell-based multi-protocol routing.

- Voice networking (with SVCs): an alternative to voice VPNs but with improved economics. We support all major options: PVC/SVC and CBR/VBR since there are applications for all of these.

- Meridian Passport is indicative of the trend for PBXs to have cost-effective ATM WAN interfaces. Magellan Passport voice networking will be an important transition strategy to support your investment in your existing base of PBXs through standards-based solutions.

- Native ATM switching for ATM video, ATM voice and transparent ATM LAN support

- Standards-based circuit emulation (including value-adds such as idle suppression) are important to ensure that all existing isochronous applications are cost effectively supported in this new enterprise networking strategy
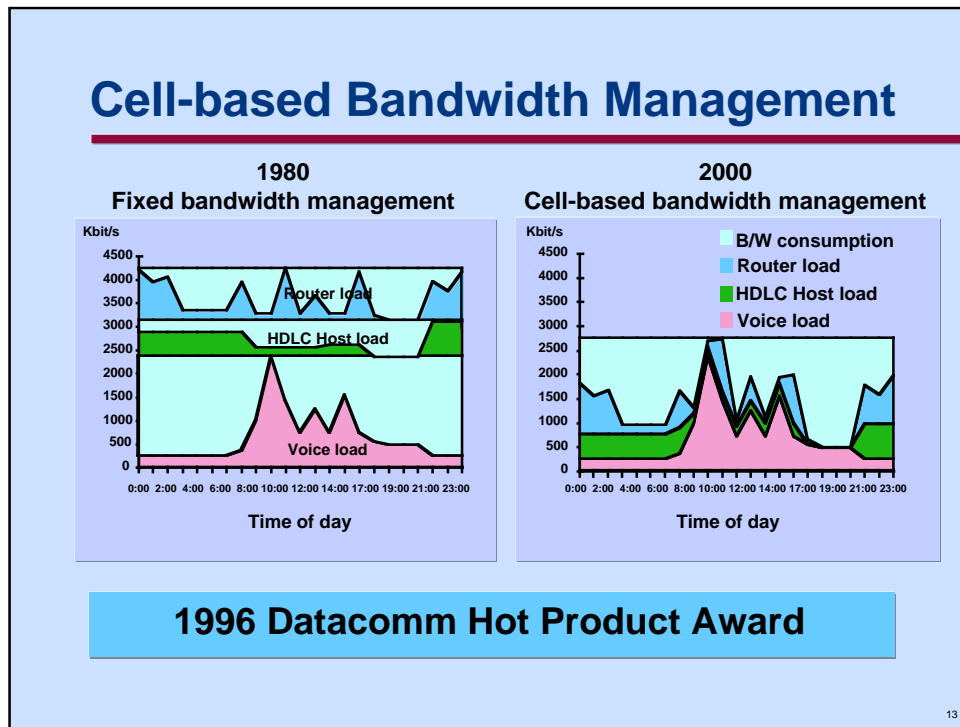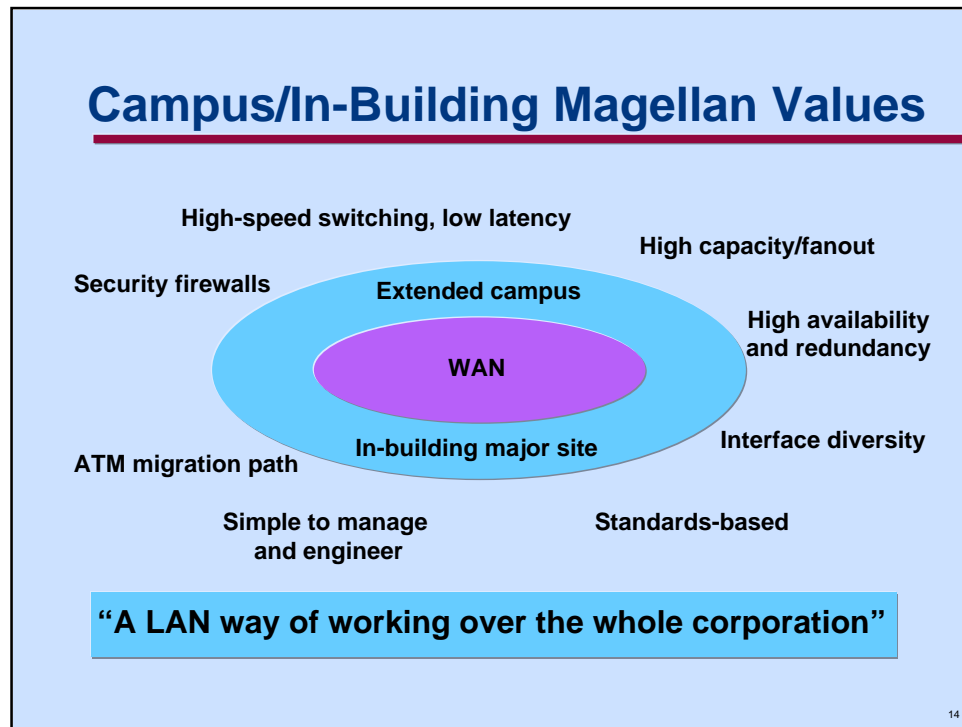
The new economics of multimedia networking are creating the opportunity for the enterprise manager to address his networking costs even in the absence of multimedia applications.

Passport dynamically assigns bandwidth to various services whose peakedness varies, achieving major cost reductions by reducing the maximum overall demand.

The ability to compress voice and provide silence suppression on a class basis allows further efficiencies, in addition to cost reductions. You, our customers, have shared with us your business case analyses showing two year overall Passport network payback periods and as little as one year for incremental Passport network extensions.

Typically in a network where voice approaches 20% of the total bandwidth carried—the voice traffic rides for free!
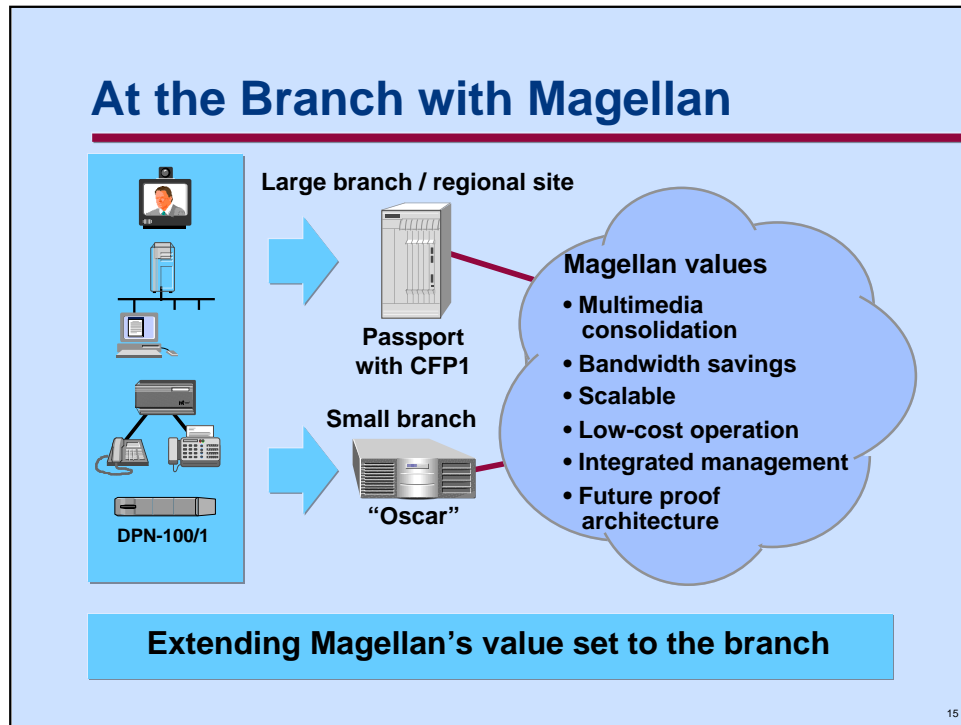
Passport's compression and bandwidth management technologies make ATM—even at low speeds—affordable.

Campus/In-Building Magellan Values

High-speed switching, low latency

High capacity/fanout

Security firewalls

Extended campus

High availability and redundancy

WAN

ATM migration path

In-building major site

Interface diversity

Simple to manage and engineer

Standards-based

"A LAN way of working over the whole corporation"

14

Passport supports the trend to a "LAN way of working over the whole corporation" by providing the interfaces and performance necessary for direct LAN attachment in campus and metro-area applications.

- Extended Campus Networks: Passport can act as a campus backbone in office towers and multi-building campus environments up to 1.6 Gbit/s. It can also act as a vehicle for extended campus or metro networking over SONET rings. At the same time, it can act as a wide-area network consolidation vehicle.

- In-building Networks: Passport can add value to in-building LANs, with Passport InterLAN switching. The Passport architecture can also support ATM LAN emulation functionality on a high performance robust platform. Nortel is also teaming with LAN market leaders, to add value to the Magellan portfolio. For example, we have teamed with:

  – FORE Systems to provide end-to-end ATM consistency via Forethought (aligning with standards as they emerge). This includes ATM LAN emulation, and ultimately pNNI and MPOA;

  – Cabletron with the intent of porting our network management applications onto the Spectrum Network Management system; and

  – NSC/Storage Technologies to provide centralized backup, archive management security.

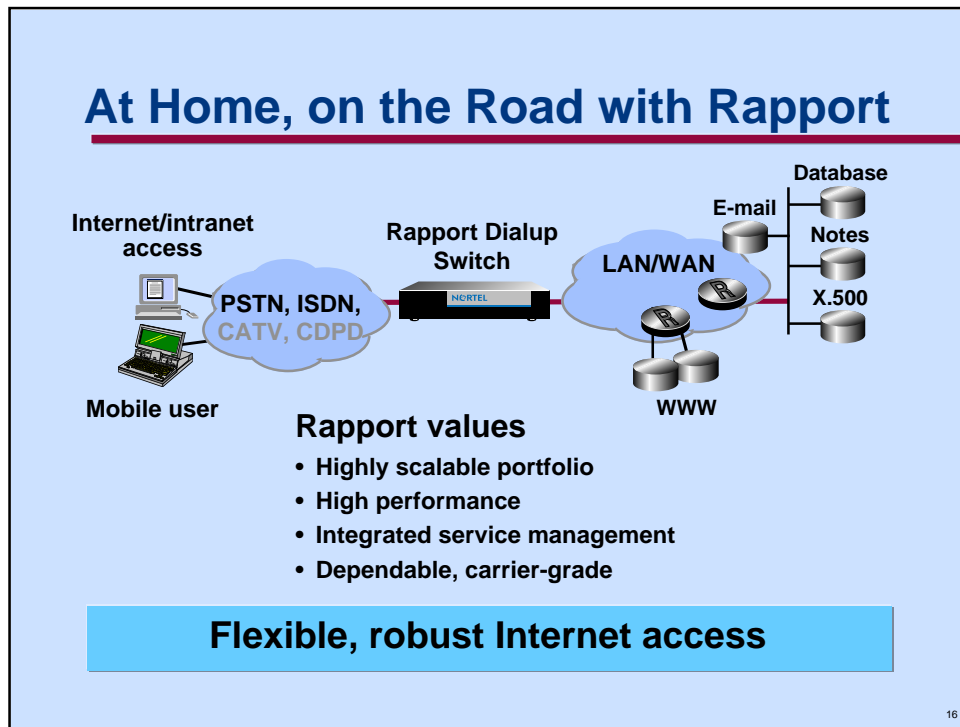All these partners have recently won best-in-class awards in their fields.

At the Branch with Magellan

Large branch / regional site

Passport with CFP1

Small branch

"Oscar"

DPN-100/1

Magellan values

- • **Multimedia consolidation**
- • **Bandwidth savings**
- • **Scalable**
- • **Low-cost operation**
- • **Integrated management**
- • **Future proof architecture**

Extending Magellan's value set to the branch

15

Magellan branch access solutions extend corporate-wide multimedia networking to smaller sites.

We are working on a broad family of branch access devices that address a range of applications from data-only to multimedia and have a range of price points and capacities to economically meet user requirements at all locations within the enterprise. To ensure interoperability, standard encapsulations are used.

Our solutions include:

- • Passport model 50 with CFP1 will be available in early 1997 to address the multimedia needs of large branches or regional sites. CFP1 is a new Passport functional processor which combines the functionality of a control processor— four WAN ports and two LAN ports on a single card.

- • A data-only FRAD which can run over public frame relay and leased lines at speeds up to T1, with ISDN backup

- • And, for multimedia applications, a new Magellan family member, project name "Oscar," is now under development. This multimedia access device will be able to run over leased lines (using frame/cell trunks), public frame relay, and public ATM with ISDN backup.
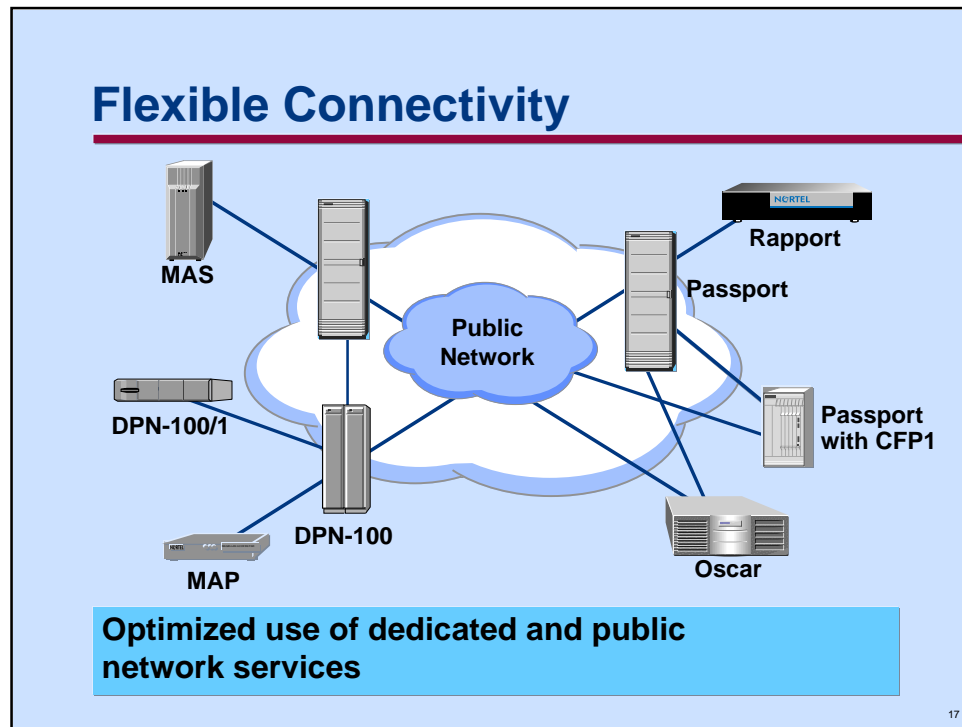
At Home, on the Road with Rapport

Internet/intranet access

Rapport Dialup Switch

PSTN, ISDN, CATV, CDPD

LAN/WAN

Database

E-mail

Notes

X.500

WWW

Mobile user

Rapport values

- **Highly scalable portfolio**
- **High performance**
- **Integrated service management**
- **Dependable, carrier-grade**

Flexible, robust Internet access

16

As discussed earlier, corporations increasingly expect employees to work at home, and be more mobile. They also want to provide customers and suppliers with easy access to information.

The Rapport Dialup Switch, the result of our teaming with Shiva, is our flagship platform for analog dial and ISDN LAN access to the Internet or the enterprise LAN environment. This capability leads the industry in scalability, from eight to 672 users, integrates Nortel-developed wide area network technologies and eases the management of Internet or intranet access services.

To date, Shiva has won more than 14 separate industry awards in the remote access category.

We are also examining FRA data and high-speed cable and Telco/PTT emerging access technologies to see where we can help.

Flexible Connectivity

MAS — Rapport — Passport — Public Network — DPN-100/1 — Passport with CFP1 — DPN-100 — MAP — Oscar

Optimized use of dedicated and public network services

17

The Magellan portfolio has broad public network interworking capabilities to address the trend of augmenting or replacing private lines with a mixture of private and public services. Enterprises will need to select their core facilities based on a variety of criteria such as price, level of redundancy needed, support for bursty traffic and the expected size of peaks, delay characteristics. Passport offers the customer the ability to make use of fully-dedicated facilities, public network services or a combination of the two.

- Passport-to-Passport at narrowband to broadband speeds, via leased line (ATM and frame/cell) and via ATM for multimedia; and for InterLAN switching, via frame relay, X25 and SMDS. This flexibility is a key differentiator against ATM-only network architectures.

- Passport to branches and SOHO via frame relay, X25, PSTN and ISDN—ultimately carrying these over an ATM interface (e.g. via frame relay/ATM interworking).

- Integrated access/trunking over ATM and frame relay and multi-vendor interoperability via standard RFCs and AALs.

All this boils down to the ability to add and vary access and WAN connectivity to customers suppliers and partners in step with your business needs.

The seven key values of our vision can be stated as follows:

- Robust wide area high-performance networking

- Dynamic and effective use of bandwidth and public services

- Extensive traffic management capabilities and class of service support

- Open multi-vendor networking

- Scalability in speed and network size

- Evolution to ATM

- Comprehensive open management

We at Nortel Magellan Networks look forward to helping you meet the challenges of the enterprise networking business.