

Data Networking, VPNs, and the Integration of Voice and Video



THE GUARDIANS OF DATA

OVERVIEW



- **Who is Norlight?**
- **Data networking via private and virtual private networks**
- **Streaming Video technology**
- **The future of data/video/audio over various networking technologies**
- **Questions**

JCI CORPORATE OVERVIEW

- Norlight is a wholly owned subsidiary of **Journal Communications, Inc. (JCI)**
- JCI is America's oldest employee-owned corporation, employing over 6,000 people
- JCI operations are located throughout the United States and in France
- Annual revenues are in excess of \$600 million
- JCI is a growing diversified communications and media company with seven operating entities

JCI CORPORATE OVERVIEW

- **Norlight Telecommunications Inc.** is a full-service telecommunications provider focused on the carrier and business telecommunications markets.
- **Journal Broadcast Group Inc.** owns and operates television and radio stations across the United States.
- **Journal Sentinel Inc.** publishes the Milwaukee Journal Sentinel.
- **IPC Communication Services** specializes in the production and distribution of materials and services for the computer industry, and printing of association publications.
- **Add Inc.** publishes targeted niche products, shoppers, and weekly newspapers, and operates printing plants across nine states.
- **NorthStar Print Group Inc.** manufactures a variety of high-quality printed products.
- **PrimeNet Marketing Services** provides a variety of direct marketing services.

HISTORY OF NORLIGHT

- Norlight has been providing innovative telecommunications services since 1972
- The largest Midwest Regional Network: Fiber Optic, Digital Microwave and Satellite uplink facilities
- Norlight serves three markets: Carrier, Satellite & Video, and Commercial Services

LINES OF BUSINESS



Satellite & Video Business Group

Full service Teleport, offering satellite transmission to broadcast, entertainment and sports industries, educational institutions, and businesses

Wholesale Business Group

Traditional and non-traditional carrier services, engineering and technical services

Commercial Business Group

Frame Relay, Internet, Private Line Switched & Dedicated Long Distance

Commercial Services

- Private Line

- Voice

- Data

- Video



- Entities served:

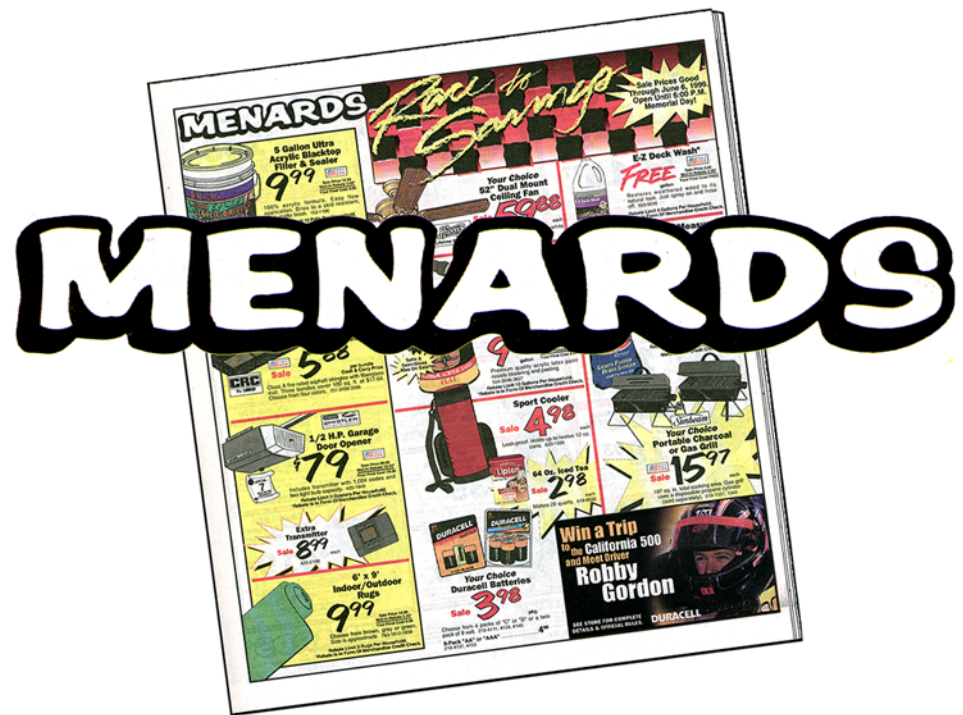
- Businesses

- Local Governments

- Educational Institutions

Commercial Services

- Frame Relay/ATM
- High Speed Internet Access

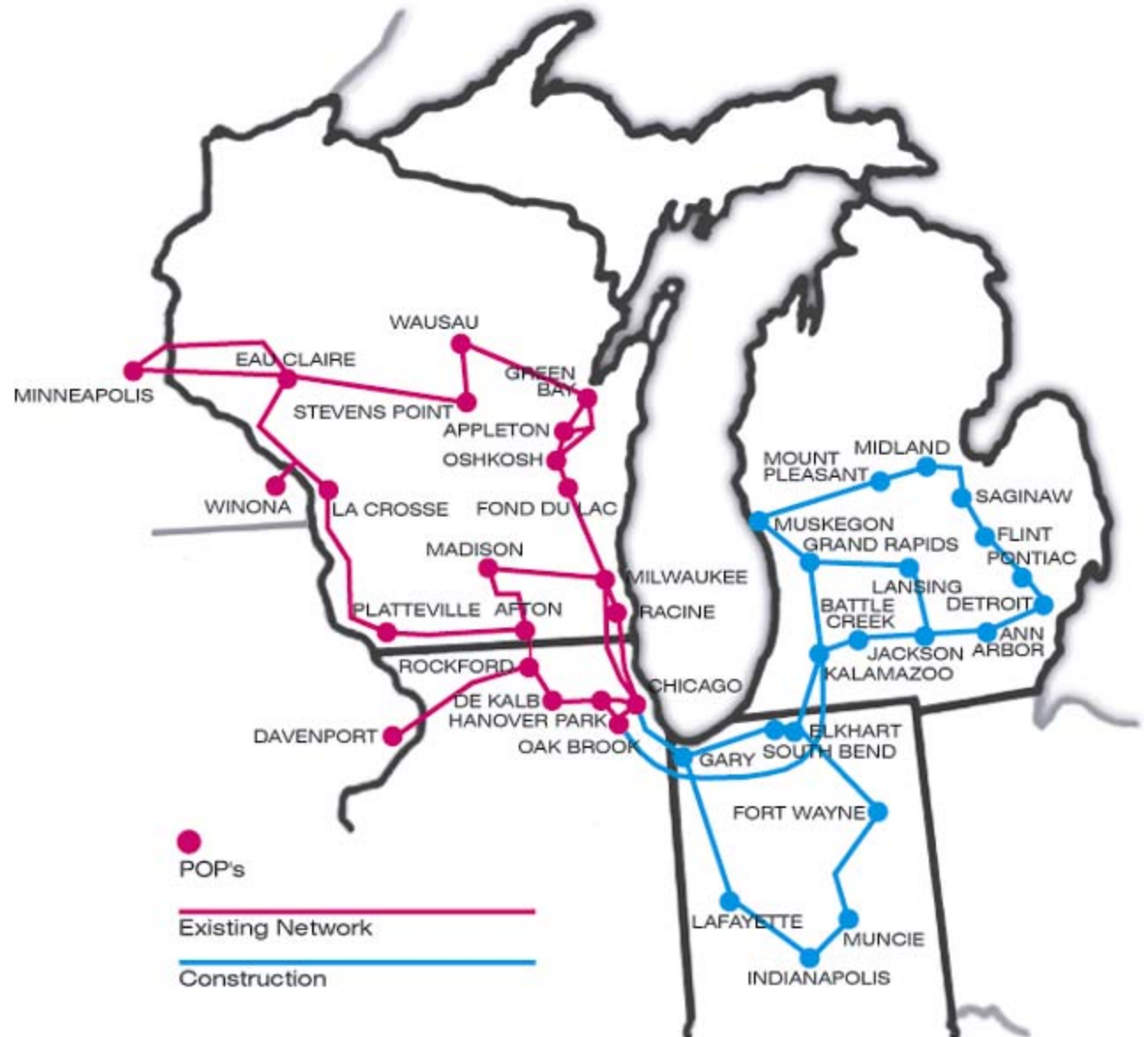


CARRIER SERVICES

- Dedicated, point-to-point private lines
- Wide regional distribution
- Highly reliable network
- Customized solutions



NETWORK CONSTRUCTION



NETWORK INFRASTRUCTURE

System/Network quality considerations



- Redundant fiber optic routes
- Separate fiber entrance into any POP
- Uninterruptable power systems
- Fire suppression system
- SONET based technology
- Digital crossconnect equipment

NETWORK MANAGEMENT

- Redundant alarm and control systems
- Secure facilities
- Access limited to authorized company personnel
- Environmentally secure location



TELECOMMUNICATIONS TRENDS

- **Consolidation among carriers**
- **Emerging technologies**
- **Increasing demand for bandwidth**

THE CHANGING FACE OF TELECOMMUNICATIONS

**LOCAL
TELCO**

**LONG DISTANCE
COMPANY**

**INTERNET
PROVIDER**

**DATA
PROVIDER**

TELECOM'S

**ONE STOP
SHOP**



EMERGING TECHNOLOGIES

- Next Generation Network Design

- Packet network

- Asynchronous Transfer Mode (ATM) - based networks
 - Internet Protocol (IP) - based networks

EXISTING TECHNOLOGY



NEW TECHNOLOGY

- Internet



THE CHANGING FACE OF TELECOMMUNICATIONS



Courtesy: Cisco

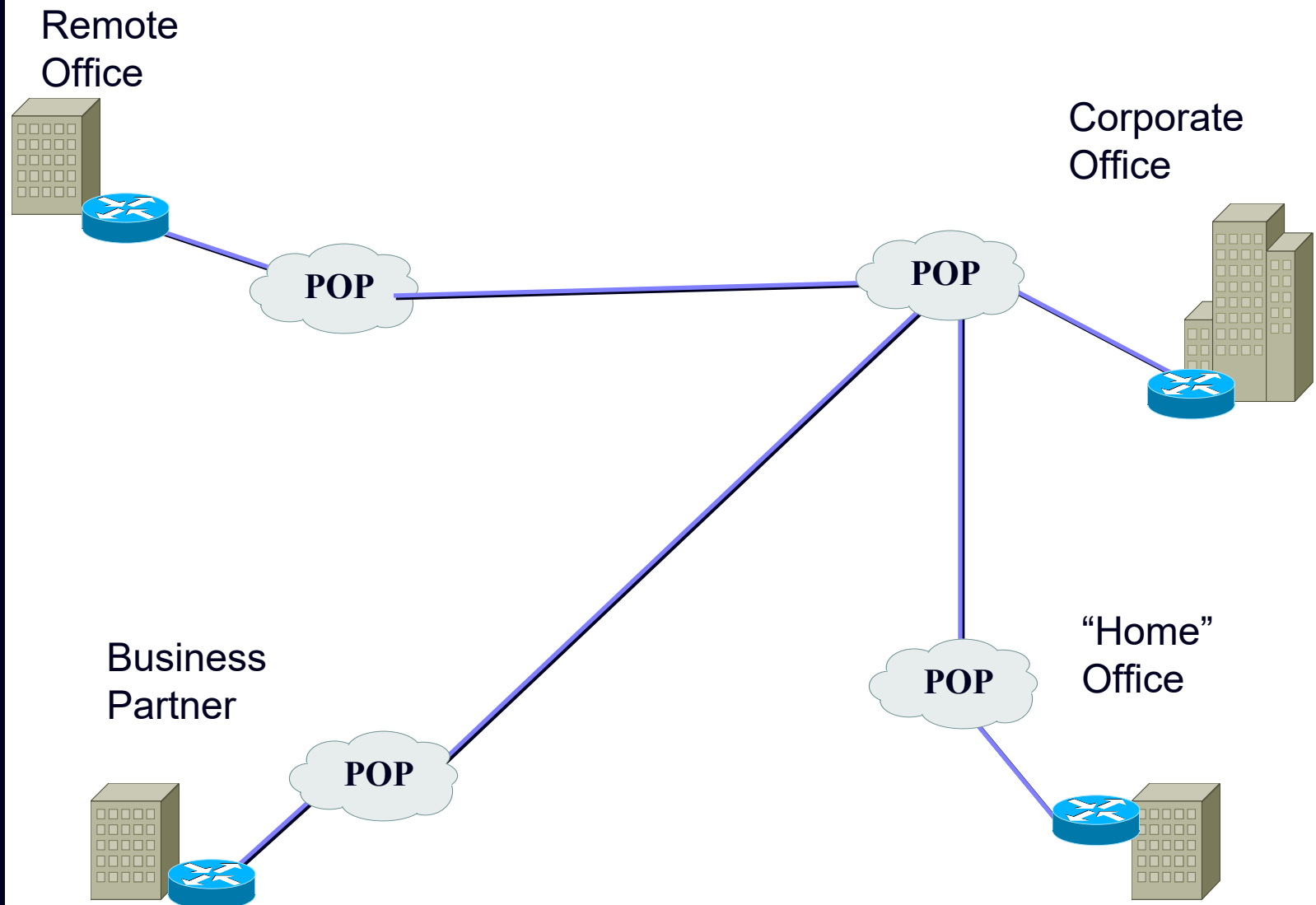
What is a VPN?

***“Customer connectivity
deployed on
a shared infrastructure with
the same policies as a private
network”***

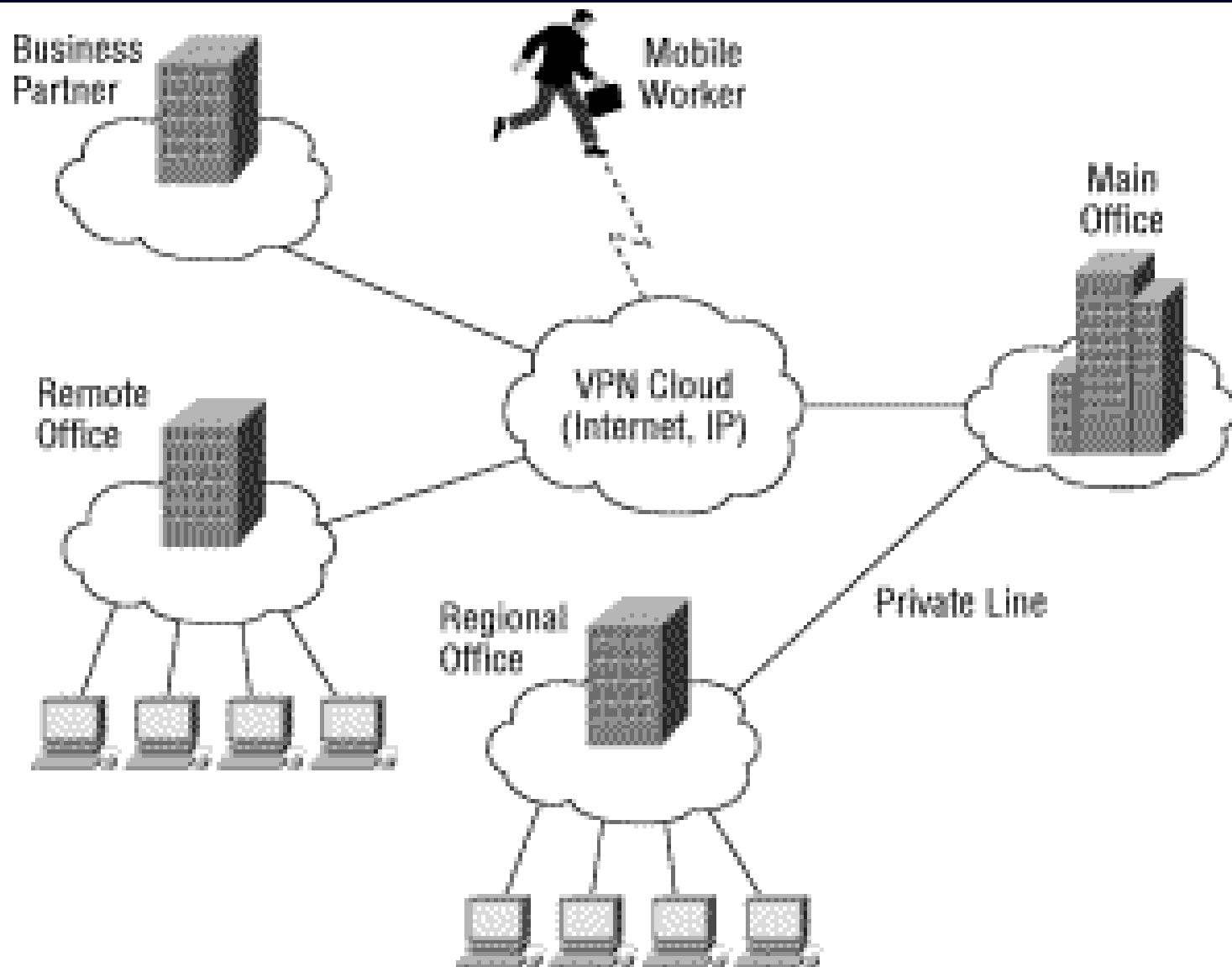
What is a VPN?

Traditional

Network



What is a VPN?

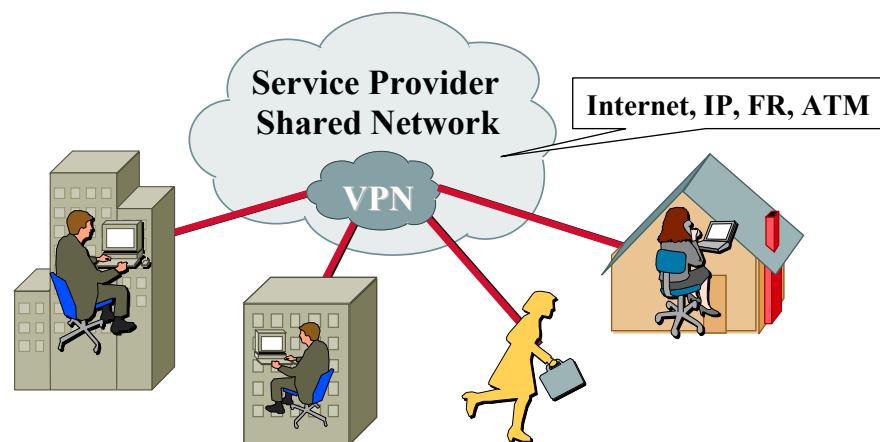


The Evolution of VPNs

- According to the Gartner Group by 2003 100% of enterprises will supplement their WAN infrastructures with VPNs
- Evolution
 - VPNs: Originally private voice networks
 - Traditional Model: leased lines to connect routers
 - Secure, reliable, expensive
 - PVCs on Frame Relay/ATM
 - Fourth Generation: IP Based

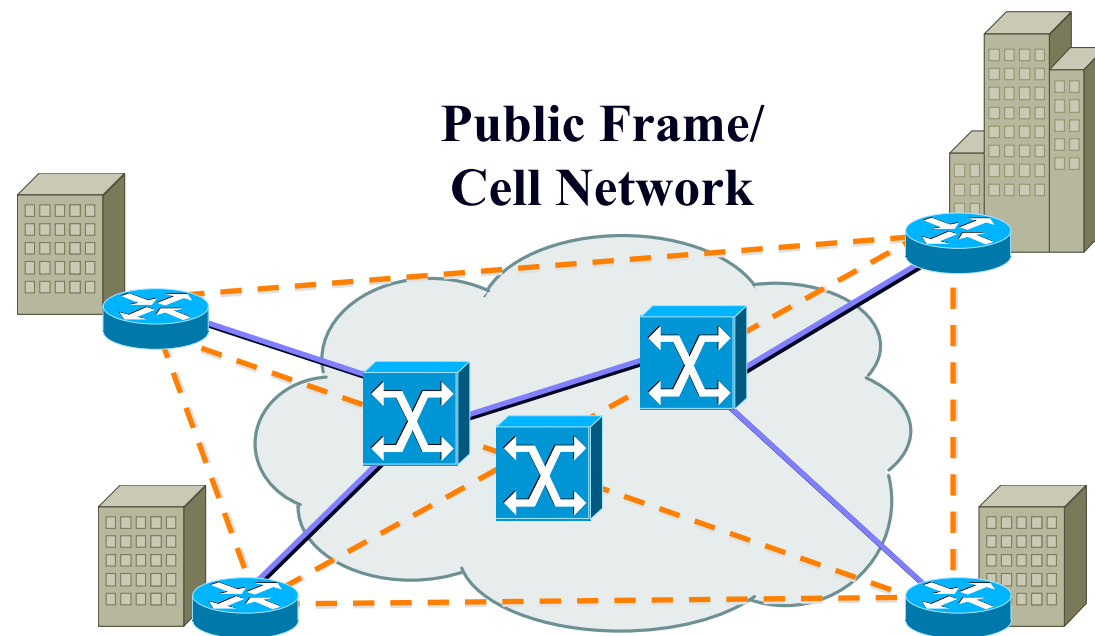
Types of VPNs

- Access VPN
 - Enterprise remote access
- Intranet VPN
 - Branch offices
- Extranet VPN
 - Business-to-business

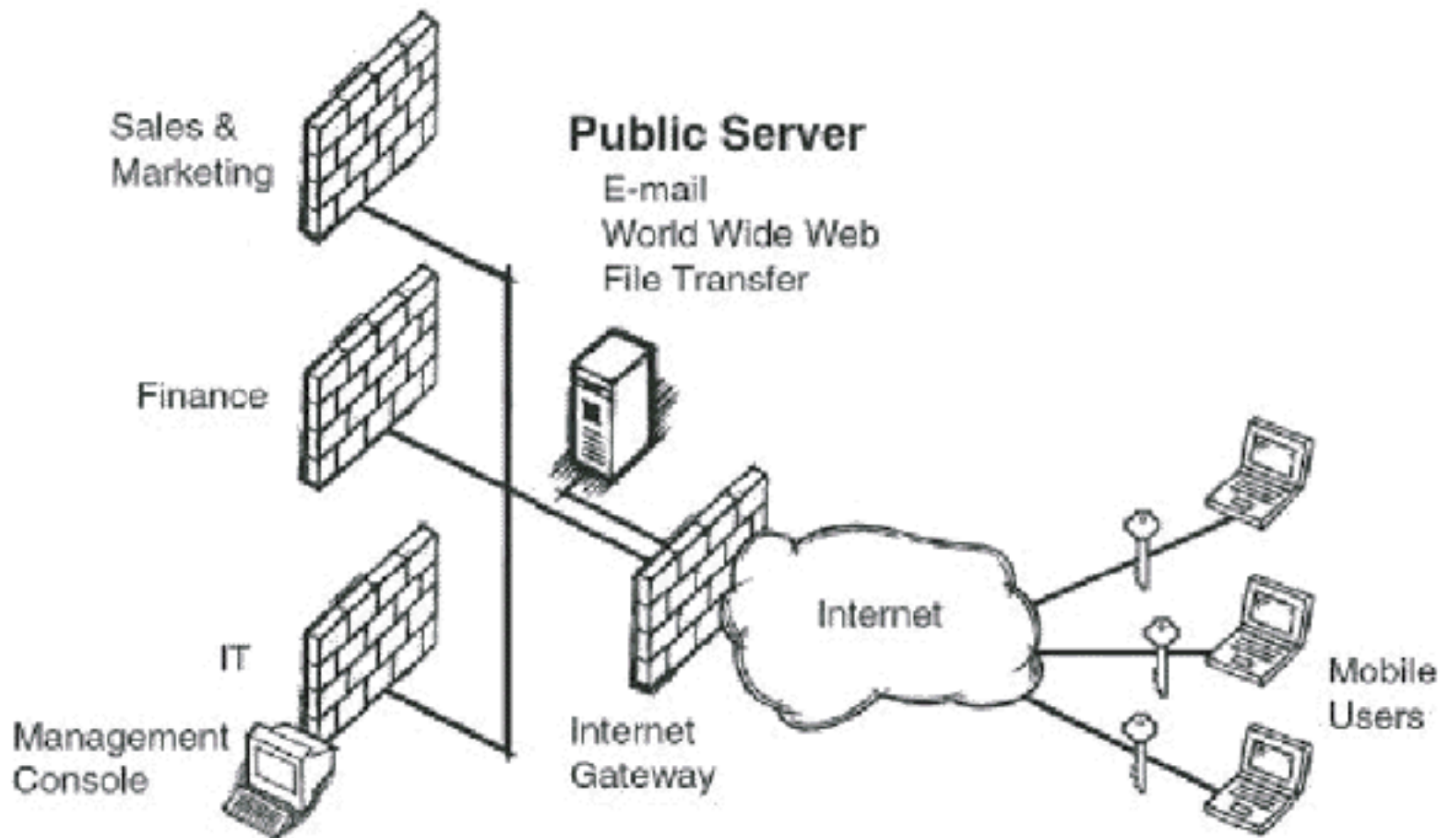


Intranet VPN Service

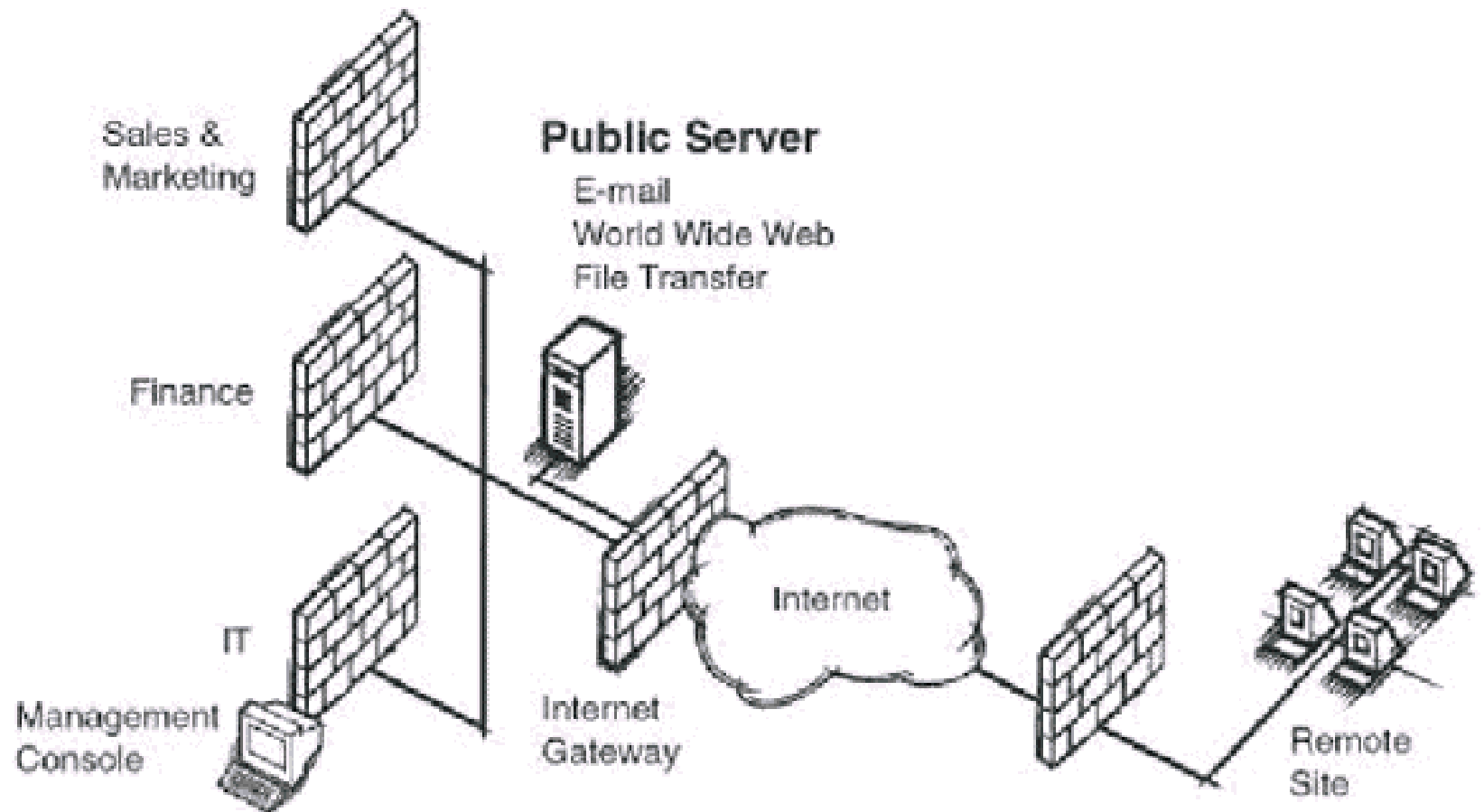
- Frame Relay/ATM Virtual Circuits



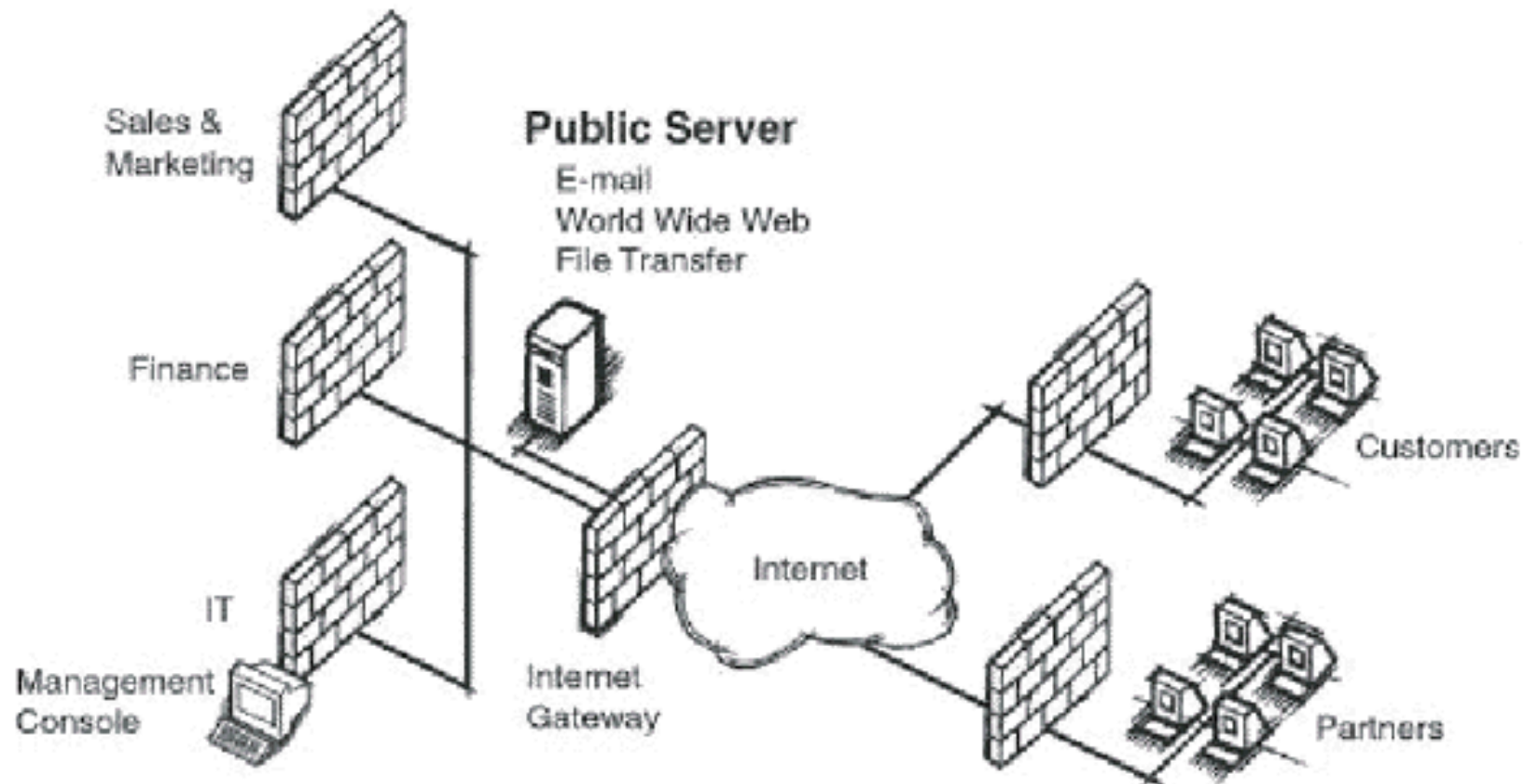
Remote Access VPN Service



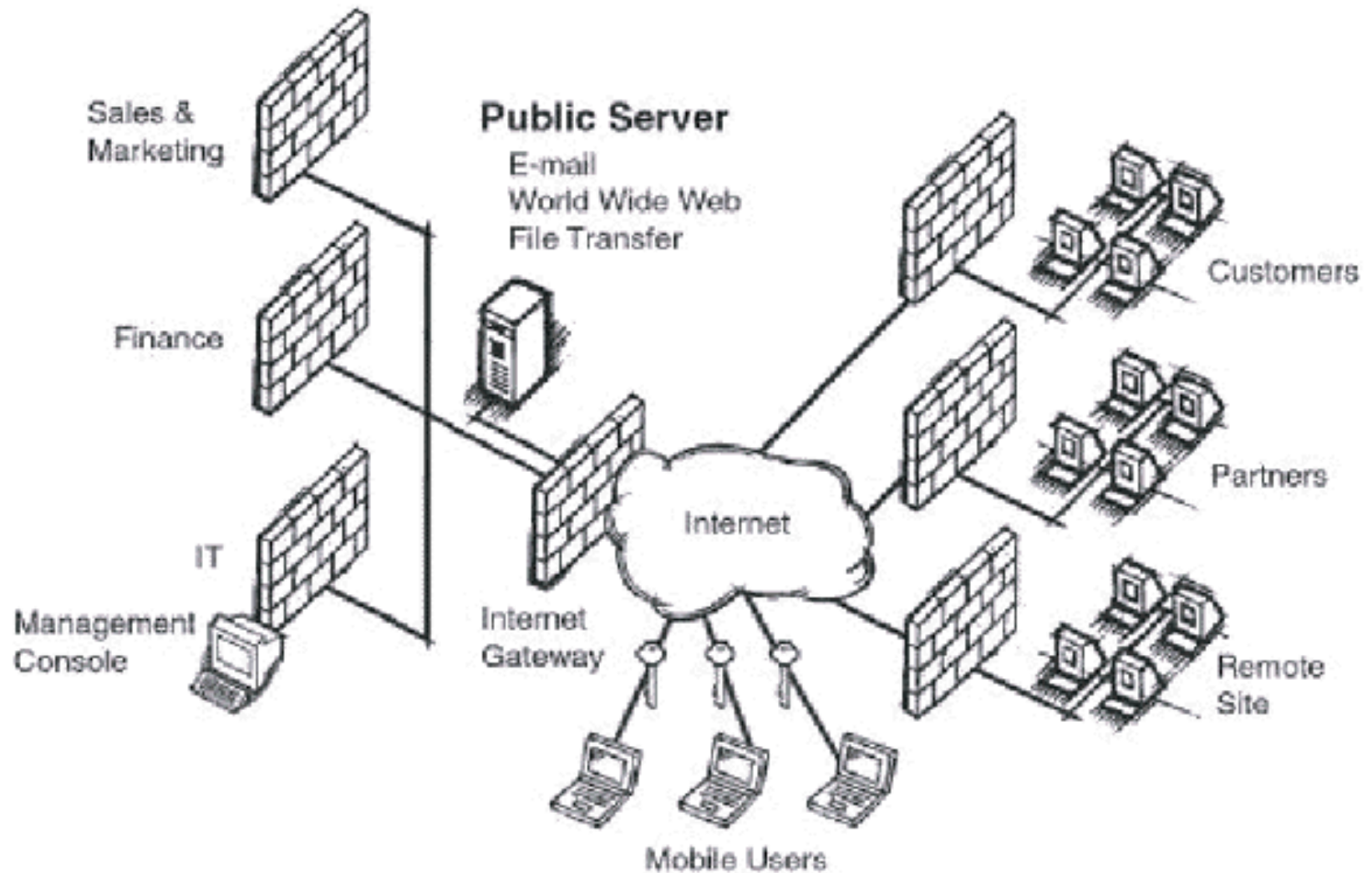
Intranet VPN Service



Extranet VPN Service



Hybrid VPN Service



Factors for Success (failure)

- Security
- Performance
- Availability

Security and VPNs

- Encryption
- Authentication
- Firewalls

Performance of VPNs

- Bandwidth
- Delay/jitter
- Frame loss/error rates
- Quality of Service
- Security vs. Performance issues
- Performance guarantees

Availability of VPNs

- CPE
- Dial-back-up
- Alternative WAN access
- Cost factors

Streaming Video over VPNs

- Video files have been **too large** and unwieldy to run in real time over small internet pipes or even over most corporate networks (Intranets)
- Not ready for prime time?

Streaming Video over VPNs

- Availability of bandwidth
 - Backbone bandwidth
 - OC48 -> OC192 ->???
 - Access bandwidth
 - v.90 -> ISDN -> DSL ->???
- Advances in technology
 - Moore's Law

Streaming Video Products

- CVideoNow
- Microsoft NetShow
- Real(Video)
- StreamWorks
- TrueStream
- VDOLive
- VivoActive
- Vosaic MediaSuite

Streaming Video Technology

- Wavelet
- MPEG...
- H.263...
- G.723...
- ???????

Quality vs. Bandwidth vs. Horsepower

- Low end
 - 8 kbps
 - 2 fps
 - 176 x 144 pixels (1/12 VGA)
- High end (today!)
 - 300 kbps
 - 30 fps
 - 320 x 240 pixel (1/2 VGA)

Hardware and Software

- Server
 - High-end “PC” -> Sun Ultra Sparc
 - Lots of RAM and DISK Space
 - Solaris, NT, AIX, UNIX...
- Encoder
 - Interface card \$250 ->
- Player
 - \$20 ->

Convergence!



Telephone Networks

Public Voice
Infrastructure
1876–Today



Cable Networks

Public Video
Infrastructure
1948–Today

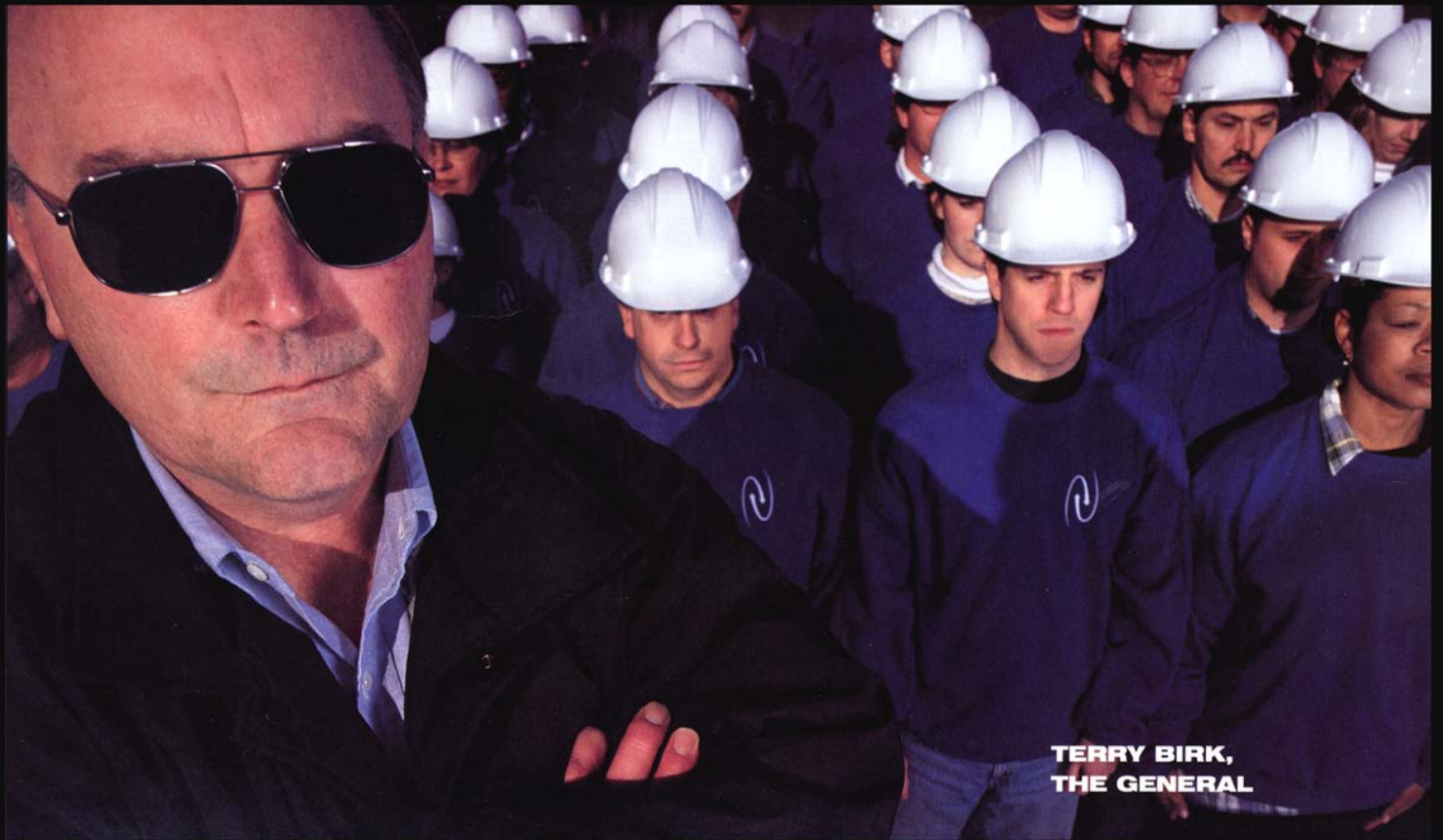


Internet

Public Data
Infrastructure
1969–Today

NORLIGHT TELECOMMUNICATIONS

Thank
You



TERRY BIRK,
THE GENERAL

THE GUARDIANS OF DATA



Questions?