MAX Product Line

- **MAX Product Line**
  - ◆ Chassis
  - ◆ Slot cards
  - ◆ Software
- **MAX Applications**

International

Ascend

ASCEND

MAX Product Line

■ **What is the MAX Product Line?**

    ◆ MAX products share a common software base that is in use in 28 out of the largest 30 ISPs in the world

    ◆ Most MAX products have expansions slots -- these accept a variety of slot cards, which are available across the entire MAX line

■ **What are the MAX products?**

    ◆ A range of WAN access products ranging from low-end chassis for small offices to mid-range chassis for ISP POPs

    ◆ Products that are available as modular systems or fixed configuration solutions

MAX Product Family

■ **Modular Systems**

    ◆ Low-end chassis

        ● MAX 200Plus

    ◆ Mid-range chassis

        ● MAX 1800

        ● MAX 2000

        ● MAX 4000 (International Only)
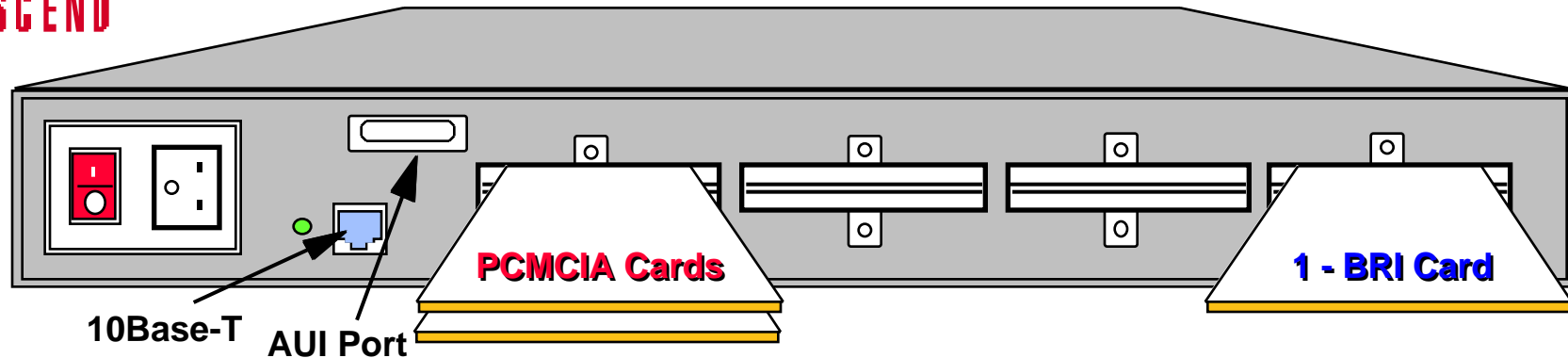
    ◆ High-end chassis

        ● MAX TNT

■ **Fixed Configuration/Semi-Modular Systems**

    ◆ MAX 2012/2024

    ◆ MAX 4048/4060,

    ◆ MAX 4030 (International Only)

MAX 200Plus

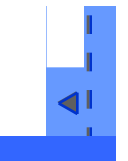**10Base-T**   **AUI Port**   **PCMCIA Cards**   **1 - BRI Card**

- ■ **Chassis with 8 PCMCIA slots**
  - ◆ Up to 8 PCMCIA analog modems (various vendors)
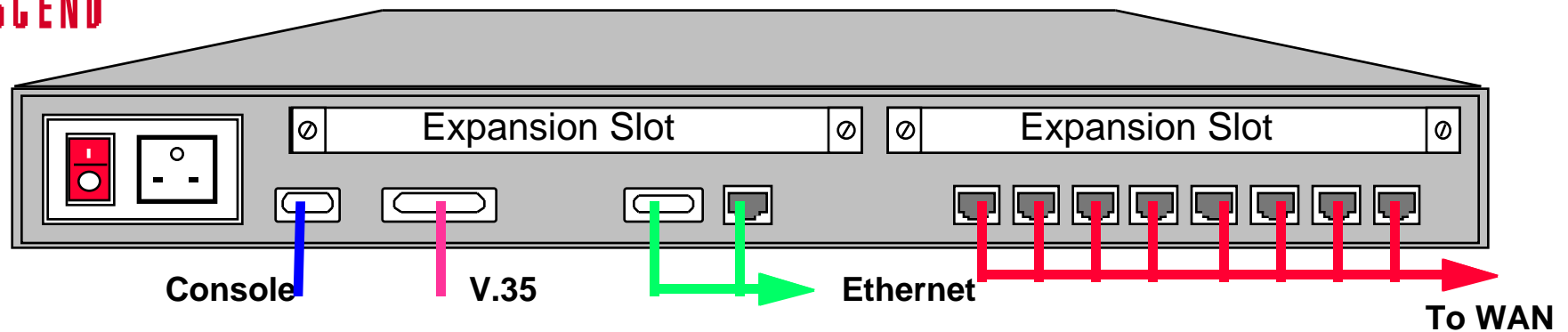 - ◆ Up to 4 ISDN BRI PCMCIA cards (from Ascend)
- ■ **Designed for small to mid-sized businesses**
  - ◆ Telecommuting
  - ◆ Internet access and remote access

MAX 1800

Expansion Slot   Expansion Slot

Console   **V.35**   **Ethernet**

To WAN

■ **8 BRI port with 2 expansion slots**

■ **Low cost unit for BRI concentration**

MAX 2000

Expansion Slot | Expansion Slot

Console   **V.35**   **AUI**   **10BaseT**

Ethernet connections To LAN   **T1/E1**   **Alarm Relay**
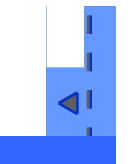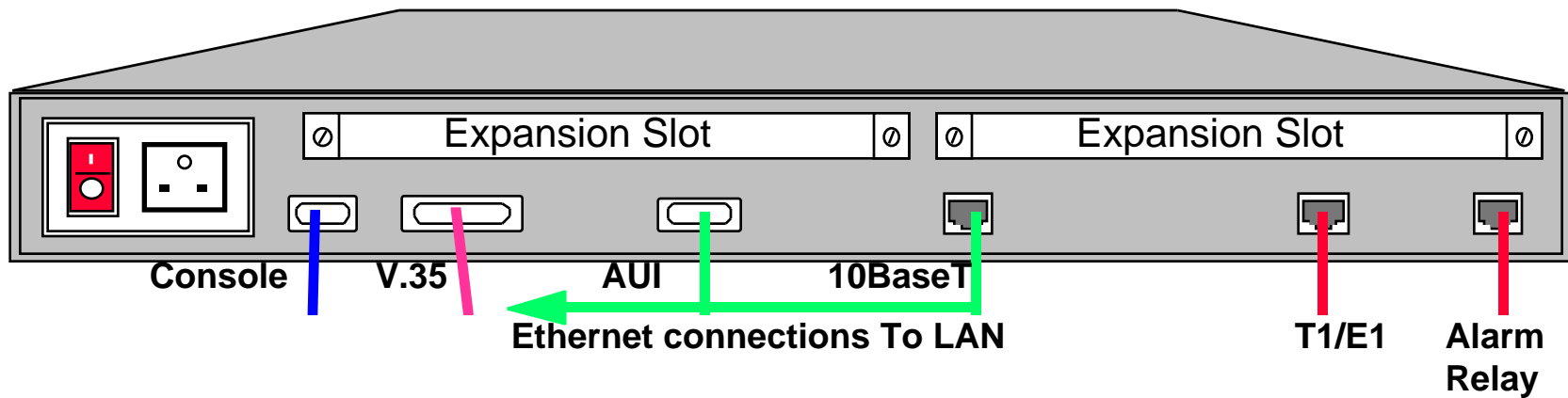
- **1 T1/E1 and 2 expansion slots**

- **V.35 or leased T1/E1**

MAX 4000

Expansion Slot	Expansion Slot
Expansion Slot	Expansion Slot
Expansion Slot	Expansion Slot

Terminal   **V.35 Serial**

Ethernet Connectors to LAN

MAX 4000 T1/E1/PRI to WAN or PBX

Alarm Relay
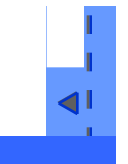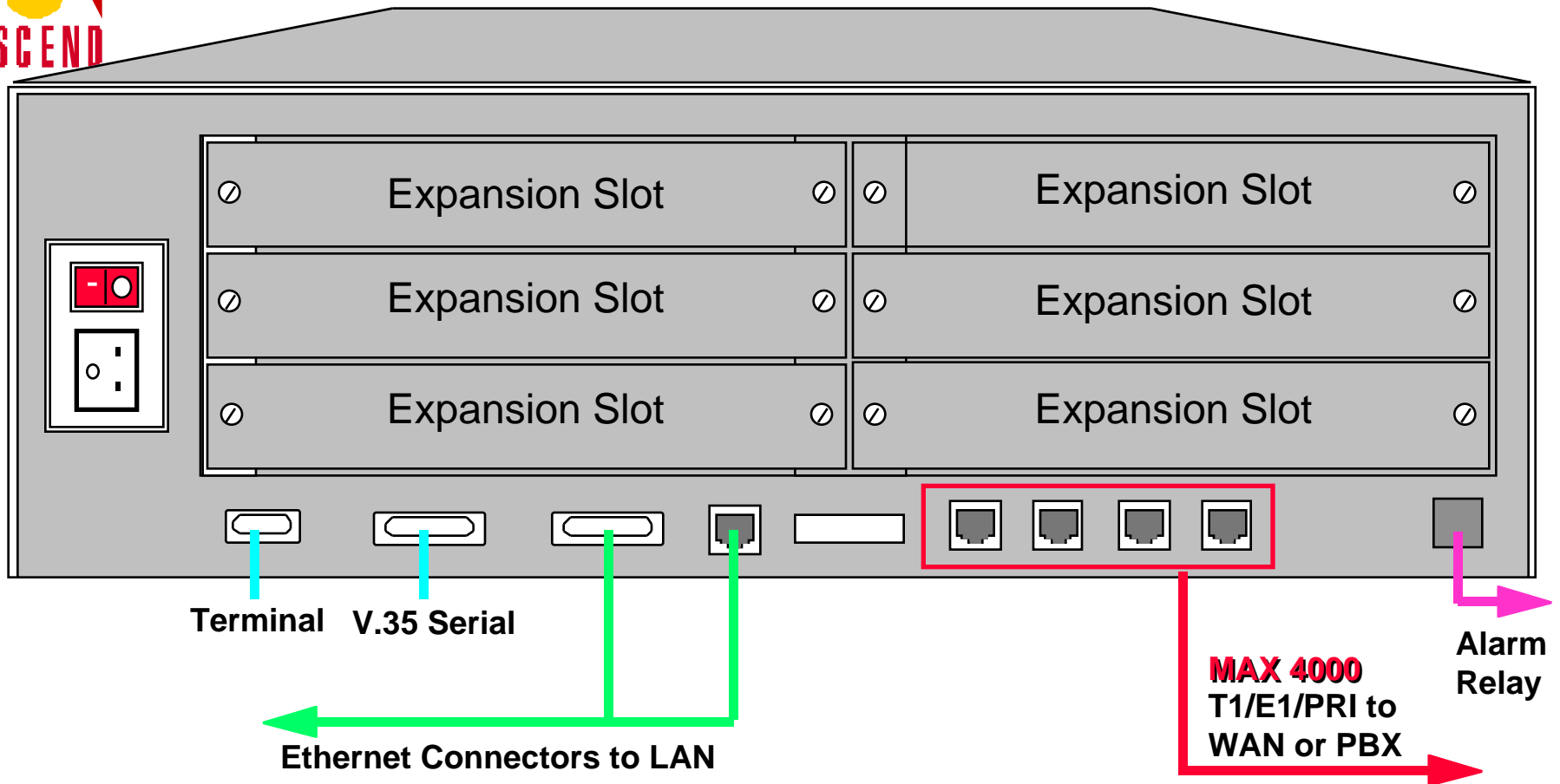
■ **MAX 4000 -- 4 T1/E1s**

MAX 2012/24

12-modem Series56 card   **Expansion Slot**

Console   **V.35**   **AUI**   **10BaseT**   **T1/E1**   **Alarm Relay**

Ethernet connections To LAN
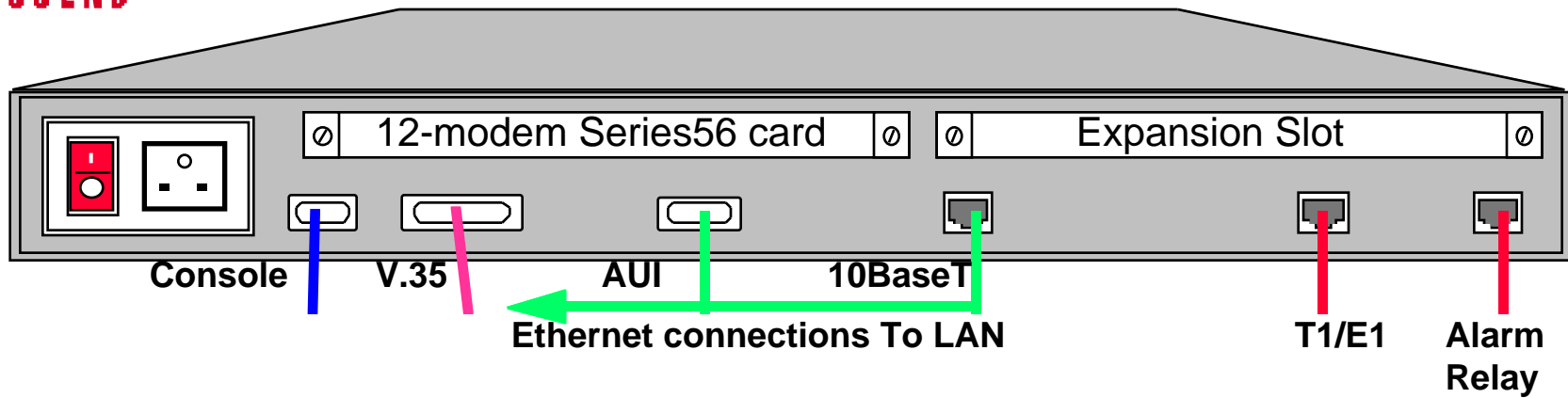
- **Configurations**
  - ◆ MAX 2012, with available expansion slot for Series56, IMUX, BRI, or V.110 slot card
  - ◆ MAX 2024 with 24 Series56 digital modems
- **Includes bundled software (RNS, firewall) for corporations**

MAX 4048/4060 & 4030

16-modem Series56 card	
16-modem Series56 card	
16-modem Series56 card	16-modem Series56 card (4060)

Terminal **V.35 Serial**

Ethernet Connectors to LAN

T1/E1/PRI

Alarm Relay
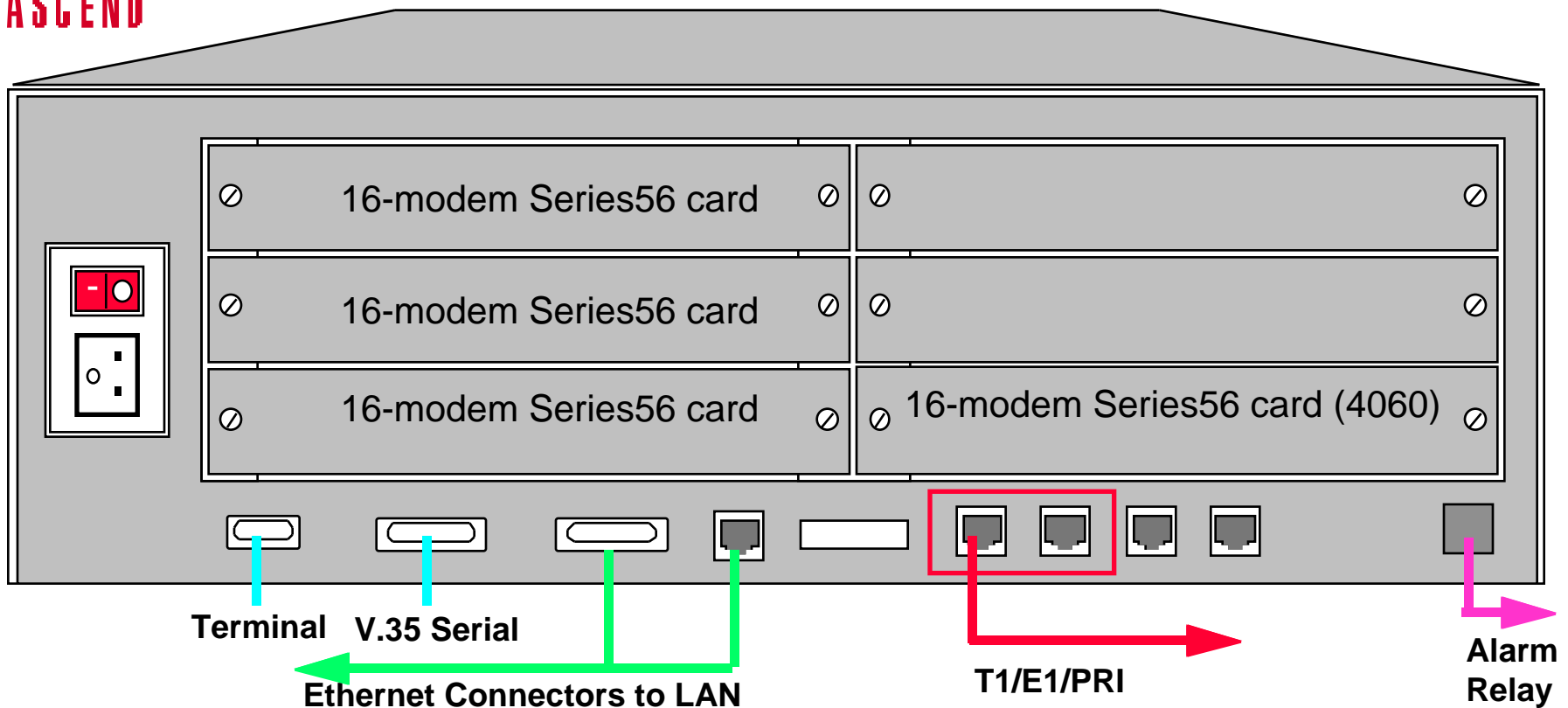
- ■ **MAX 4030 - 2 E1s, 30 Series56 digital modems**

- ■ **MAX 4048 -- 2 T1s, 48 Series56 digital modems**

- ■ **MAX 4060 -- 2 E1s, 60 Series56 digital modems**

MAX Family Overview Chart

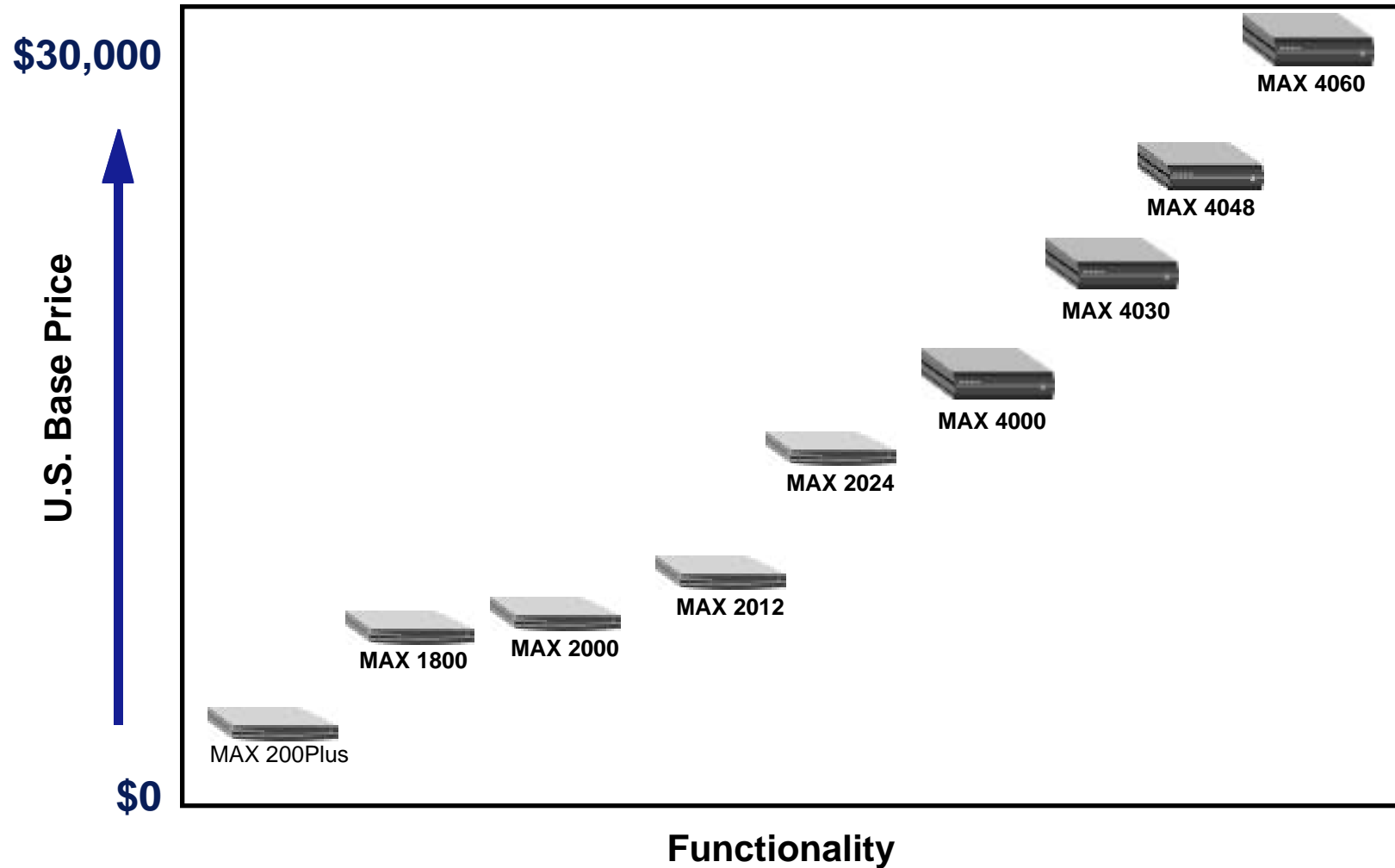| Product	MAX 200Plus	MAX 1800	MAX 2000	MAX 2012/24	MAX 4000	MAX 4002	MAX 4004	MAX 4030	MAX 4048	MAX 4060
E1	0	0	0	1	4	0	0	0	0	2
T1 with int'd CSUs	0	0	1	1	4	2	4	2	2	0
ISDN BRI (S/T)	up to 4	8	0	0	up to 40	up to 40	up to 40			
ISDN BRI (U)	up to 4	8	0	0	0	0	0			
ISDN PRI	No	No	1	1	4	2	4	2	2	2
Ethernet	1	1	1	1	1	1	1	1	1	1
High-Speed Serial	No	1	1	1	1	1	1	1	1	1
Hybrid Analog & Digital Access	No	Included	Included	Optional	Optional	Optional	Optional	Included	Included	Included
Frame Relay Software	0	Optional	Optional	Optional	Optional	Optional	Optional	Included	Included	Included
Digital Modem Capacity	8*	16	24	12/24	72	48**	72	96***	48	60
Concurrent Digital Sessions	8	16	24	12/24	96	48***	96	96***	48	60
Expansion Slots	8 or PCMCIA	2	2	2	6	6	6	6	6	6
IMUX Ports	0	2	2	2	6	6	6	6	6	6

North America Only

* Supports analog PCMCIA modems   ** Up to 72 with upgrade options   *** Up to 96 with upgrade options

MAX Family Pricing

$30,000

U.S. Base Price

MAX 4060

MAX 4048

MAX 4030

MAX 4000

MAX 2024

MAX 2012

MAX 2000

MAX 1800

MAX 200Plus

$0

Functionality

MAX and TNT Price/Modem

U.S. List Price

- $1,200
- $1,000
- $800
- $600
- $400
- $200
- $-

High-End Chassis

Mid-Range Chassis

Fixed/Semi-modular Configurations

Low-End Chassis

$1,082

$825
$791
$777
$733
$704
$700
$694
$690
$611
$586
$580
$550 $548
$525

Product (# modems)

MAX 200Plus (8)
MAX 2012 (12)
MAX 2024 (24)
MAX 4048 (48)
MAX 4060 (60)
MAX 1800 (16)
MAX 2000 (24)
MAX 4000 (60)
TNT (48)
TNT (96)
TNT (144)
TNT (336)
TNT (672)

Page 12

MAX Slot Cards
For MAX Expansion Slots

- **Series56 Digital Modems**

    - ◆ Available in 8-, 12- or 16-port densities

- **V.34 Digital Modems**

    - ◆ Available in 8- or 12-port densities

- **IDSL (MAX 400X only)**

- **BRI (Network Services or Terminal)**

- **IMUX**

    - ◆ 2-port IMUX cards for videoconferencing/backup & overflow
    - ◆ 6-port IMUX cards for videoconferencing

- **HDLC (MAX 400X only)**

- **V.110 (GSM)**

- **Personal Handy-Phone System (Japan)**

MAX Product Line
Protocol Support

■ **Routed LAN protocols**

◆ TCP/IP via RIP, RIP2, OSPF

◆ AppleTalk and IPX (with Remote Networking Software)

■ **Bridged LAN Protocols**

◆ All (with Remote Networking Software)

■ **WAN Protocols**

◆ PPP, SLIP, C-SLIP, Async PPP, Sync PPP, X.25 PAD, X.25 over B-channel, V.110, V.120, D4 framing (T1/E1), G703/732 framing (R1), Frame Relay PVC, PPP-FR gateway, Frame Relay NNI, ISDN signaling (with Hybrid Access X000), ARA (with Remote Networking Software)

◆ Modem support

◆ K56flex, X2 (via V.34), V.34, MNP 10-EC, MNP, V.42bis, fax modem dial out to 14.4 Kbps

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MAX Product Line
Protocol Support (continued)

■ **Bandwidth management**

◆ Multilink PPP (MP), Multilink Protocol Plus (MP+), Bandwidth Allocation Control Protocol (BACP), TCP header compression, data compression (Ascend/Microsoft/STAC V9)

◆ Security

◆ RADIUS, Ascend Access Control (optional), Secure Access Firewall (optional), TACACS, TACACS+, Password Authentication Protocol (PAP), Challenge Authentication Protocol (CHAP), token card, Calling Line ID (CLID), packet filtering, SNMP, console management (VT-100), PPP callback, user authentication

◆ Virtual Private Networking (Optional)

◆ Ascend Tunneling Management Protocol (ATMP), Point-to-Point Tunneling Protocol (PPTP), Layer 2 Tunneling Protocol (L2TP), IPSec

MAX Product Line
Protocol Support (continued)

■ **Remote Networking Software (Optional)**

  ◆ Transparent Bridging

  ◆ Multiprotocol Routing: Adds routing support for IPX and AppleTalk

  ◆ Multiprotocol Access: Async IPX with local spoofing, AppleTalk Remote Access 1.0 & 2.0

  ◆ MAXDial

  ◆ MAXLink Pro

■ **Management**

  ◆ NetClarity, Java Configurator, Telnet, NASI, SNMP MIB-2, PPP LQM, Frame Relay Annex D, Frame Relay ITU Annex A, Frame Relay ANSI Annex D

MAX Product Line
Ultimate Access Functionality

■ **Remote Networking Software**

■ **Virtual Private Networking**

■ **Security Options**

 ◆ Secure Access Firewall

 ◆ RADIUS and Ascend Access Control

■ **Software Options**

 ◆ Hybrid Access™ X000

 ◆ MAX Stack

■ **Extensive Management Capability**

 ◆ NetClarity

 ◆ Java Configurator

Software Bundles
Remote Networking Software

■ **Remote Networking Software**

♦ Software solution for corporate multiprotocol environments

♦ Transparent Bridging

♦ Multiprotocol Routing

● Adds IPX and AppleTalk routing

♦ Multiprotocol Access

● Adds IPX and AppleTalk Remote Access

♦ Client Dial Software

● MAXDial

● MAXLink Pro

MAX Product Line
Remote Networking Software - MAXDial

Internet

Analog

Online Services

Corporate Headquarters

T1/E1/PRI

T1/E1/PRI

PSTN

ISDN BRI

Telecommuter

MAX

Dial/FAX Out

Pipeline 25-P*x*
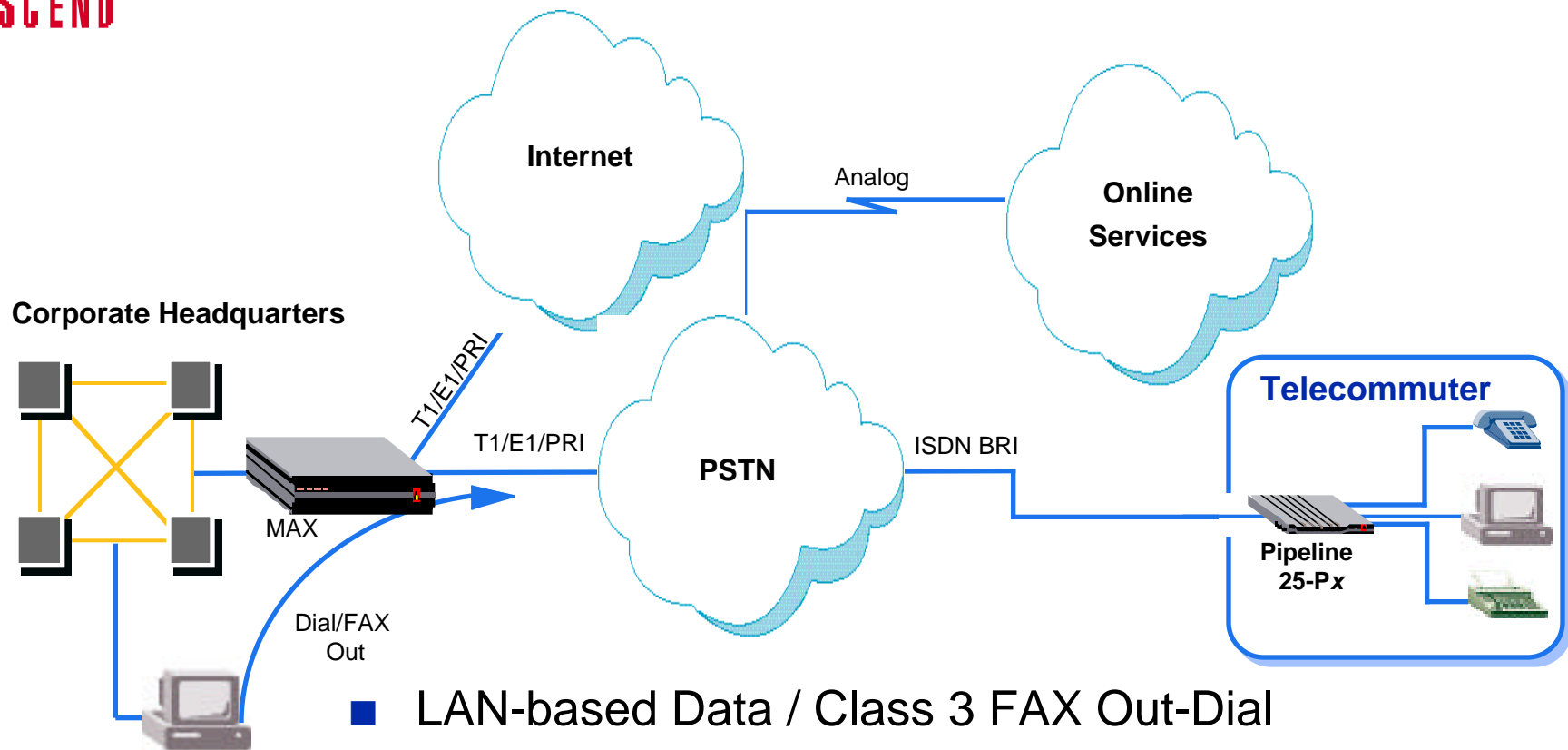
- LAN-based Data / Class 3 FAX Out-Dial
- Multiprotocol Support
- DOS, Win 3.X, Win95 Support
- Easy Installation and Maintenance
- Call Activity Audit Capability

MAX Product Line
Remote Networking Software - MAXLink Pro

Corporate LAN

MAX

T1/E1/PRI

Carrier Services

Analog

Mobile User

Modem

Laptop with MAXLink Pro

Home User

ISDN BRI

Pipeline 75

Remote User

Analog

Modem

PC with MAXLink Pro
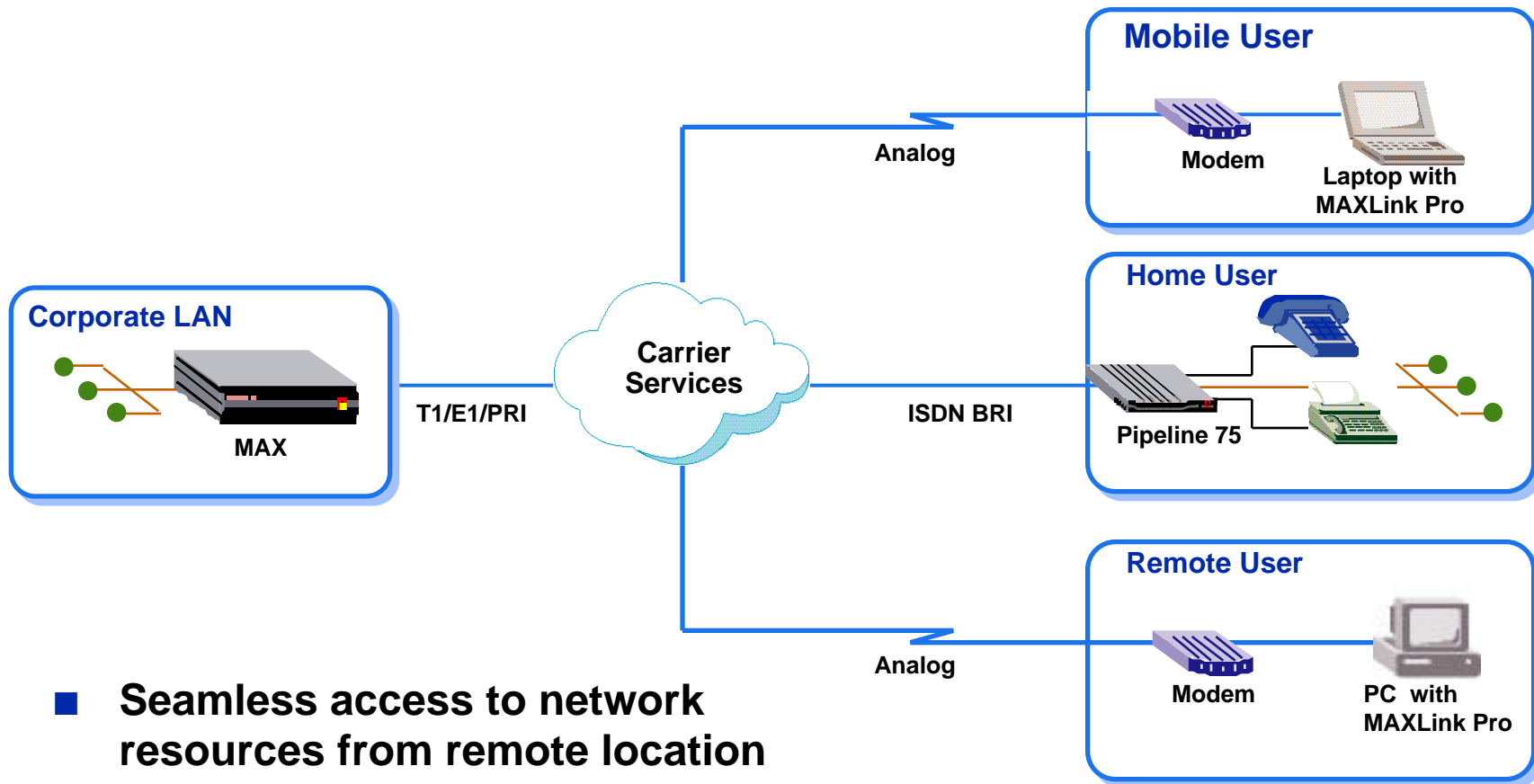
- ■ **Seamless access to network resources from remote location**
- ■ **Award-winning complement of software included**

Page 22

©1997, Ascend Communications, Inc

MAX Product Line

Virtual Private Networking

- **Ascend Tunneling Management Protocol (ATMP)**
  - ◆ GRE tunneling
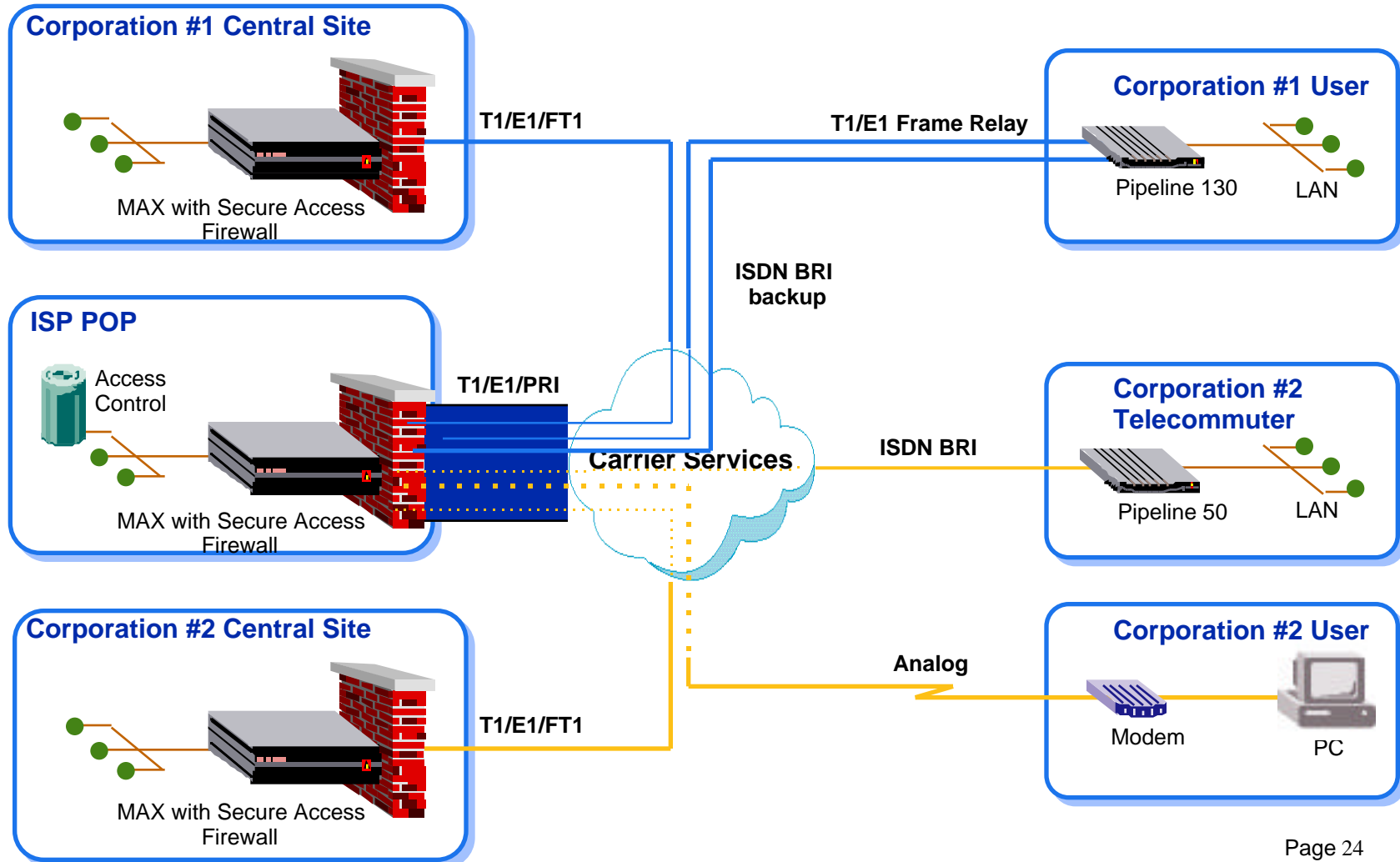 - ◆ Mobile-IP
  - ◆ IPX protocol spoofing

- **Frame Relay Direct**

- **Point-to-Point Tunneling Protocol (PPTP)**

- **Layer 2 Tunneling Protocol (L2TP)**

- **IPSec**

- **Raw TCP tunneling**

- **IP Direct**

- **Extended RADIUS authentication and profile management**

- **Futures: L2F**

MAX Product Line

Virtual Private Networking

Corporation #1 Central Site

MAX with Secure Access Firewall

T1/E1/FT1

T1/E1 Frame Relay

Corporation #1 User

Pipeline 130   LAN

ISDN BRI backup

ISP POP

Access Control

T1/E1/PRI

MAX with Secure Access Firewall

Carrier Services

ISDN BRI

Corporation #2 Telecommuter

Pipeline 50   LAN

Corporation #2 Central Site

T1/E1/FT1

MAX with Secure Access Firewall

Analog

Corporation #2 User

Modem   PC

Page 24

MAX Product Line
Security

■ **Secure Access Firewall**

- ◆ Dynamic "stateful inspection" firewall

- ◆ Explicit permit and deny

- ◆ Rules adapt to type of traffic

  - ● Network address, host names, UDP, TCP, ICMP, source/destination ports, send/receive direction, TCP session state, time, application port number, etc.

  - ● Eliminates need for proxy application gateway

- ◆ Secure Access Manager (configuration utility)

- ◆ Comprehensive audit trails for tracking
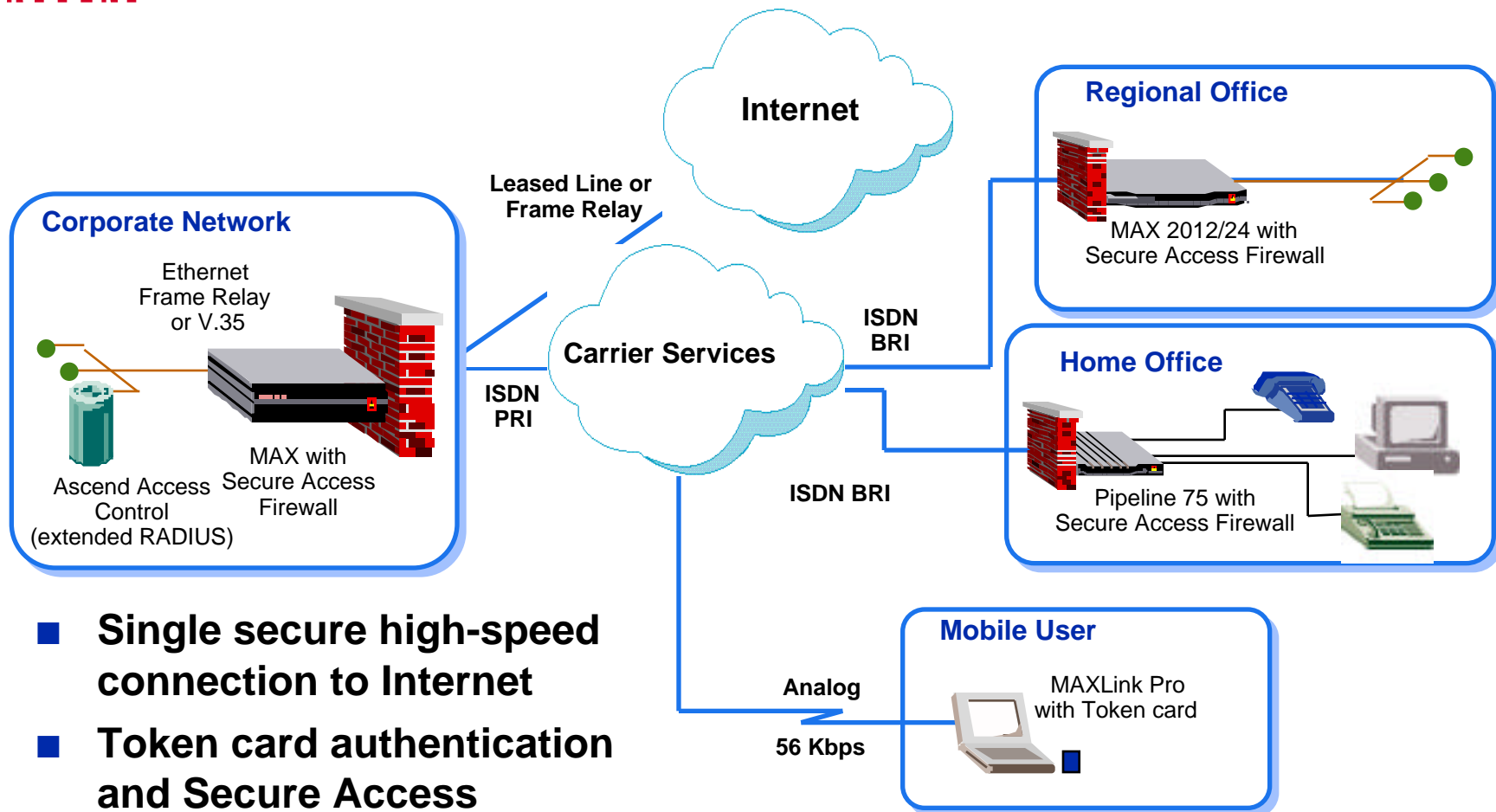
■ **RADIUS**

■ **Access Control (extended RADIUS)**

- ◆ Over 120 RADIUS extensions

MAX Product Line

Security Options - Corporate Internet Gateway

Internet

Regional Office

MAX 2012/24 with
Secure Access Firewall

**Leased Line or
Frame Relay**

Corporate Network

Ethernet
Frame Relay
or V.35

Carrier Services

**ISDN
BRI**

Home Office

**ISDN
PRI**

MAX with
Secure Access
Firewall

Ascend Access
Control
(extended RADIUS)

ISDN BRI

Pipeline 75 with
Secure Access Firewall

■ **Single secure high-speed connection to Internet**

■ **Token card authentication and Secure Access Firewall and Extended RADIUS Capabilities**

Mobile User

Analog

56 Kbps

MAXLink Pro
with Token card
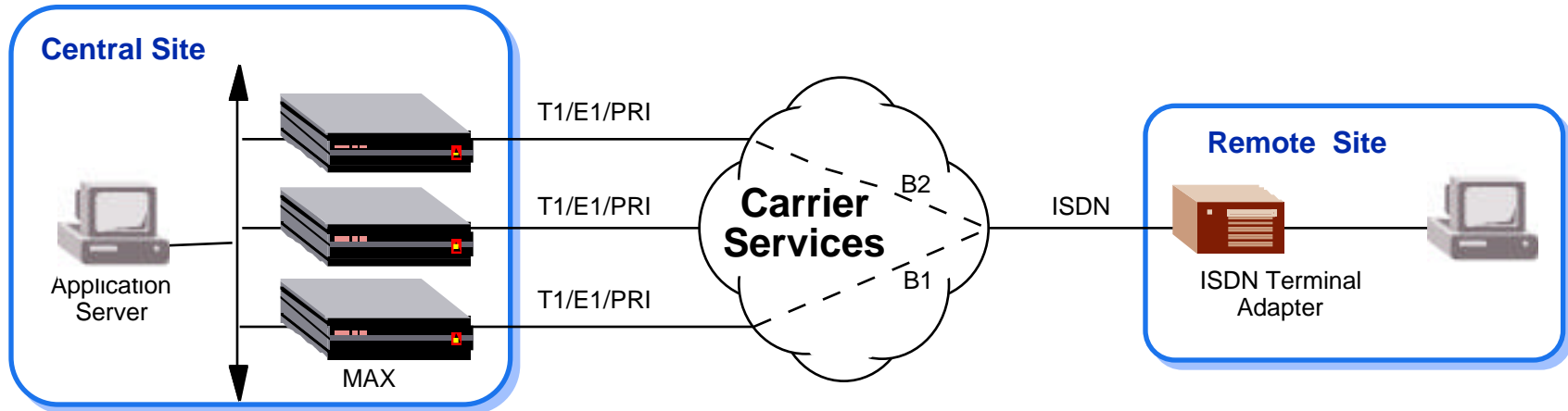
Page 26

Software Bundles
Hybrid Access X000

- **Software solution allows variety of access connectivity**

- **Digital Access**

  - 64 Kbps B-channels for ISDN

  - 64 Kbps Frame Relay

  - Up to 96 remote sessions

- **ISDN PRI signaling**

  - Enables PRI signaling for T1/E1 ports

- **Frame Relay support**

  - Up to 4096 PVCs with RADIUS authentication

  - Frame Relay Forum NNI and UNI

  - Line rates of 8Mbps over V.35 interface

MAX Product Line
MAX Stack

Central Site

T1/E1/PRI

T1/E1/PRI

T1/E1/PRI

Application Server

MAX

Carrier Services

B2

B1

ISDN

Remote Site

ISDN Terminal Adapter

■ **Multiple MAX system operating as single logical unit**

■ **Shared-resource operation**

◆ Shared IP pools

◆ MP, MP+ and BACP calls span stack

◆ Single virtual Network Access Switch

◆ Scalable architecture using software

Ascend Management

Extensive Management Capabilities

■ **Java Configurator**

  ◆ Installation and configuration utility

■ **NavisAccess (formerly NetClarity)**

  ◆ Discovery and Mapping

  ◆ Element Management

  ◆ Summary View

  ◆ Configuration Management

  ◆ Fault Management

  ◆ Performance Management

  ◆ Capacity Planning

  ◆ Security and Accounting
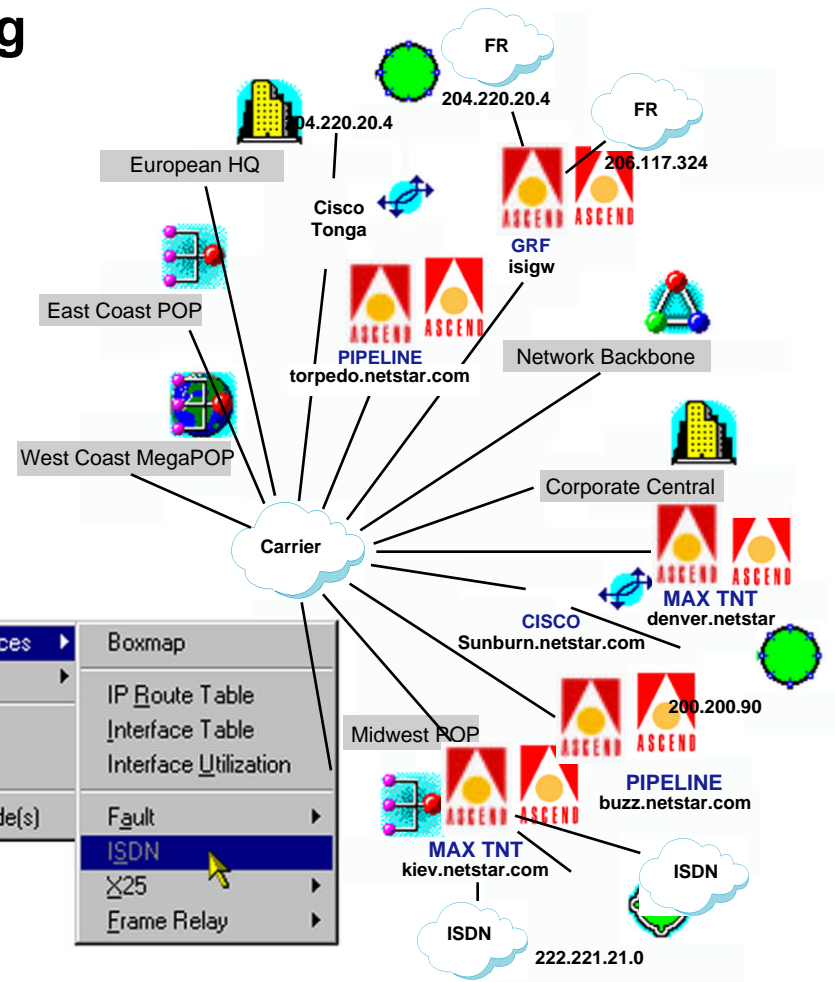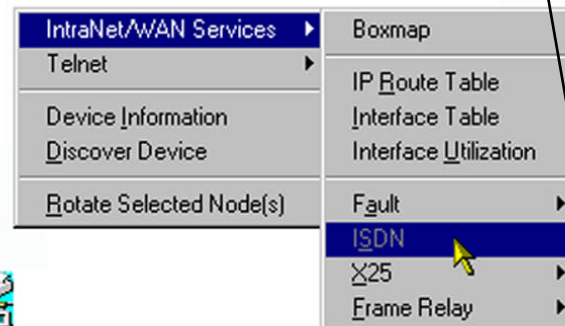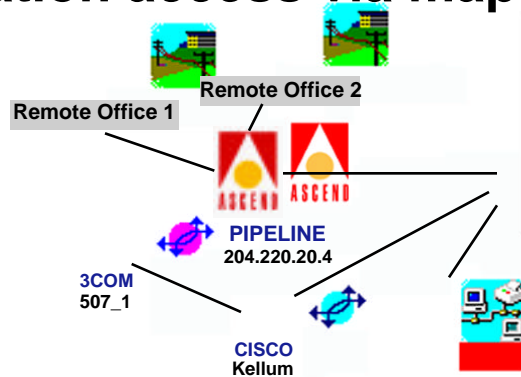
NavisAccess
Discovery and Mapping

■ **Utilizes HPOV discovery and mapping**

■ **Augments HPOV with multi-layer hierarchical map**

  ◆ Network Layer: IP

  ◆ Link Layer: Frame Relay, ISDN

  ◆ Physical Layer: DS1, E1, PRI, BRI, xDSL

■ **Application access via map**

FR
204.220.20.4
FR
204.220.20.4
206.117.324
European HQ
Cisco Tonga
GRF isigw
East Coast POP
PIPELINE torpedo.netstar.com
Network Backbone
West Coast MegaPOP
Corporate Central
Carrier
MAX TNT denver.netstar
CISCO Sunburn.netstar.com
200.200.90
Midwest POP
PIPELINE buzz.netstar.com
MAX TNT kiev.netstar.com
ISDN
ISDN
222.221.21.0

Remote Office 2
Remote Office 1
PIPELINE 204.220.20.4
3COM 507_1
CISCO Kellum

IntraNet/WAN Services ▶ | Boxmap
Telnet ▶ | IP Route Table
| Interface Table
Device Information | Interface Utilization
Discover Device |
Rotate Selected Node(s) | Fault ▶
| ISDN
| X25 ▶
| Frame Relay ▶
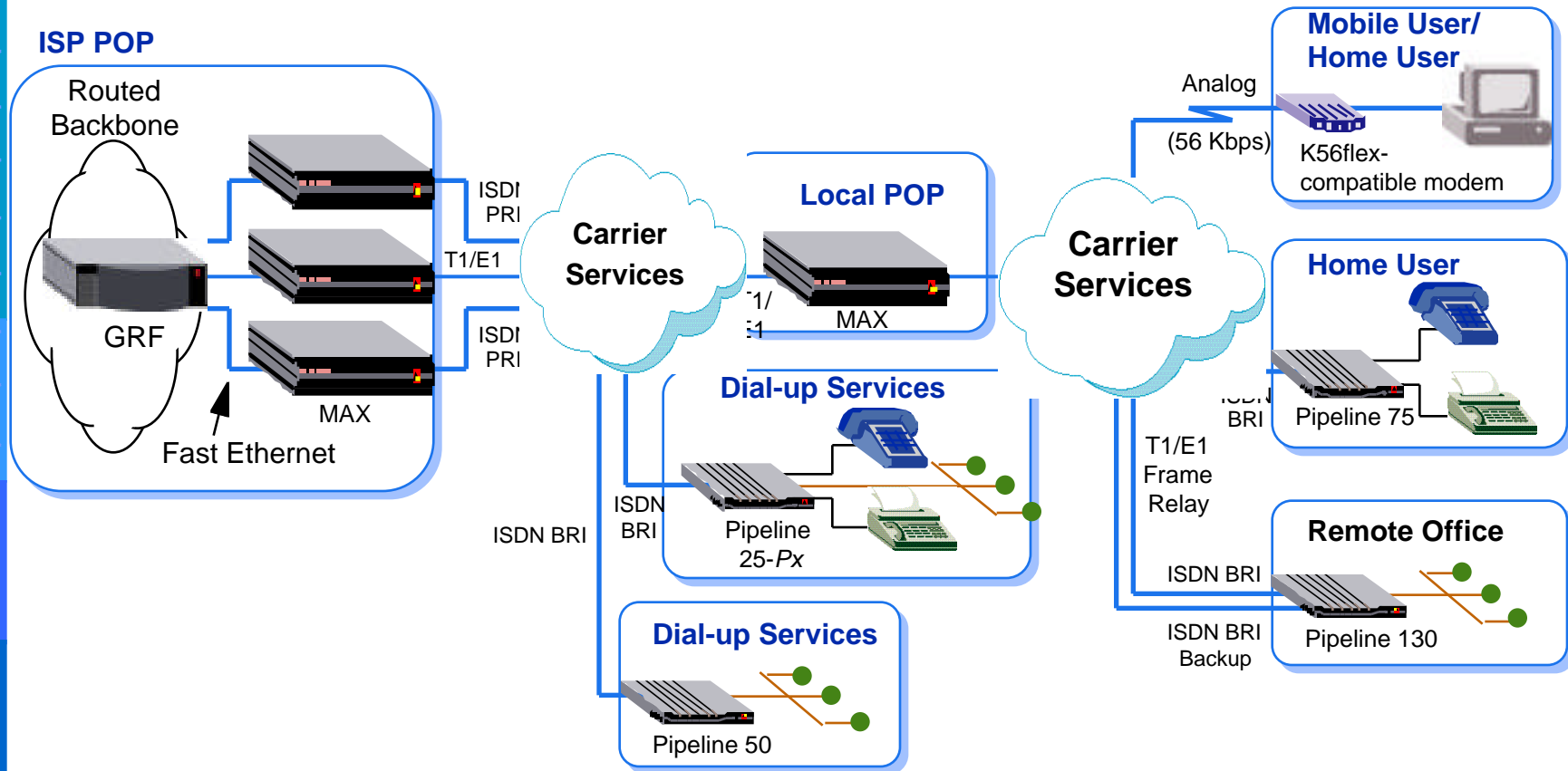
MAX Product Line
Target Applications

- **Fully-featured WAN Access Switches for:**
  - ◆ Carrier and Internet Service Provider POPs
  - ◆ Corporate remote and Internet access

- **Ideal Platform for ISPs and Carriers**
  - ◆ Low entry price with high-end feature set
  - ◆ Easy set-up using Java Configurator
  - ◆ Extensive network design flexibility as network grows
  - ◆ Extensive POP management with multi-vendor support

- **Well-suited for Corporate and Business Applications**
  - ◆ Multiprotocol access and multiprotocol routing support
  - ◆ Extensive access functionality / flexibility
  - ◆ Network management with performance analysis tools

MAX Application
ISP POP Concentration

ISP POP

Routed
Backbone

GRF

MAX

Fast Ethernet

ISDN PRI

T1/E1

ISDN PRI

**Carrier
Services**

ISDN BRI

Local POP

T1/E1

MAX

Dial-up Services

Pipeline
25-*Px*

ISDN
BRI

Dial-up Services

Pipeline 50

**Carrier
Services**

**Mobile User/
Home User**

Analog

(56 Kbps)

K56flex-
compatible modem

Home User

ISDN
BRI

Pipeline 75

T1/E1
Frame
Relay

Remote Office
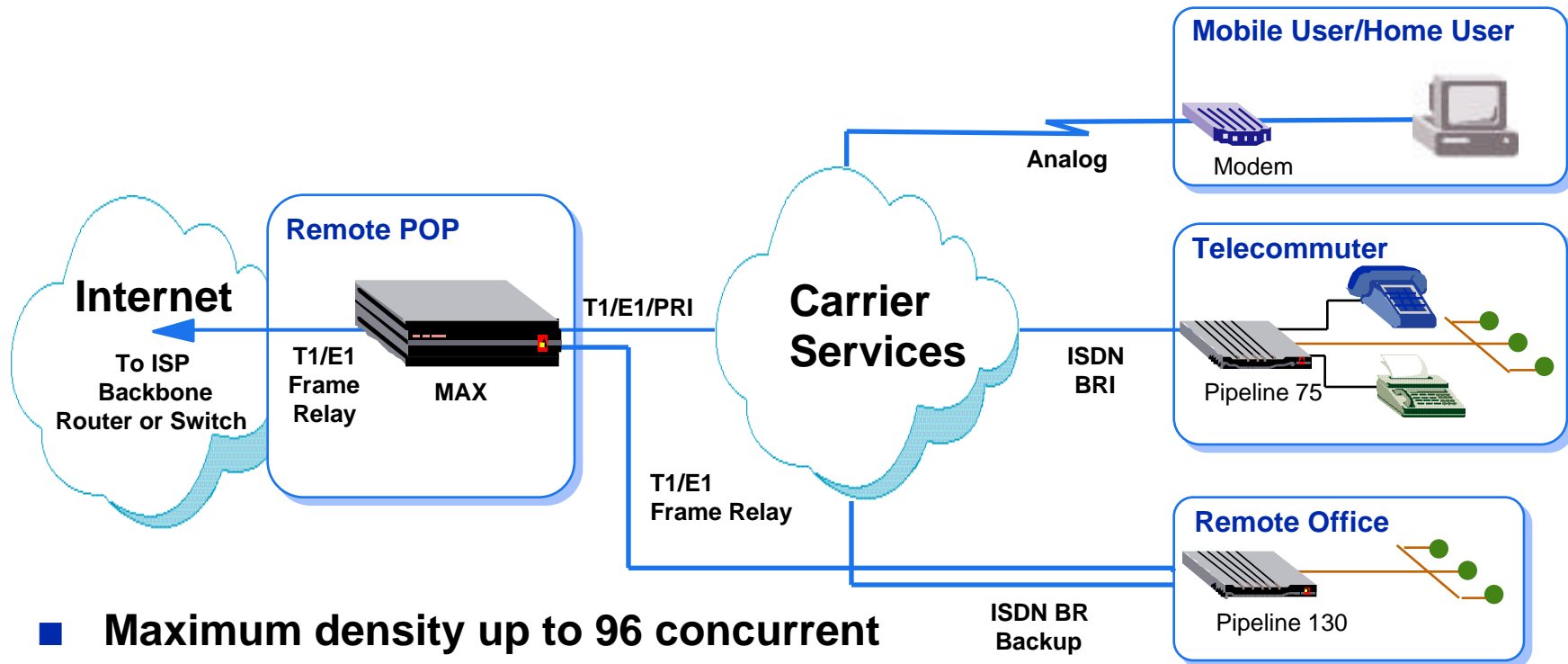
ISDN BRI

ISDN BRI
Backup

Pipeline 130

- **Provide dialed and leased services**
- **Concentration of local POPs**

- **High-density session terminations**
- **Redundant networking**

MAX Application
ISP Remote POP

Mobile User/Home User

Analog

Modem

Remote POP

Internet

To ISP
Backbone
Router or Switch

T1/E1
Frame
Relay

MAX

T1/E1/PRI

**Carrier
Services**

ISDN
BRI

Telecommuter

Pipeline 75

T1/E1
Frame Relay

ISDN BR
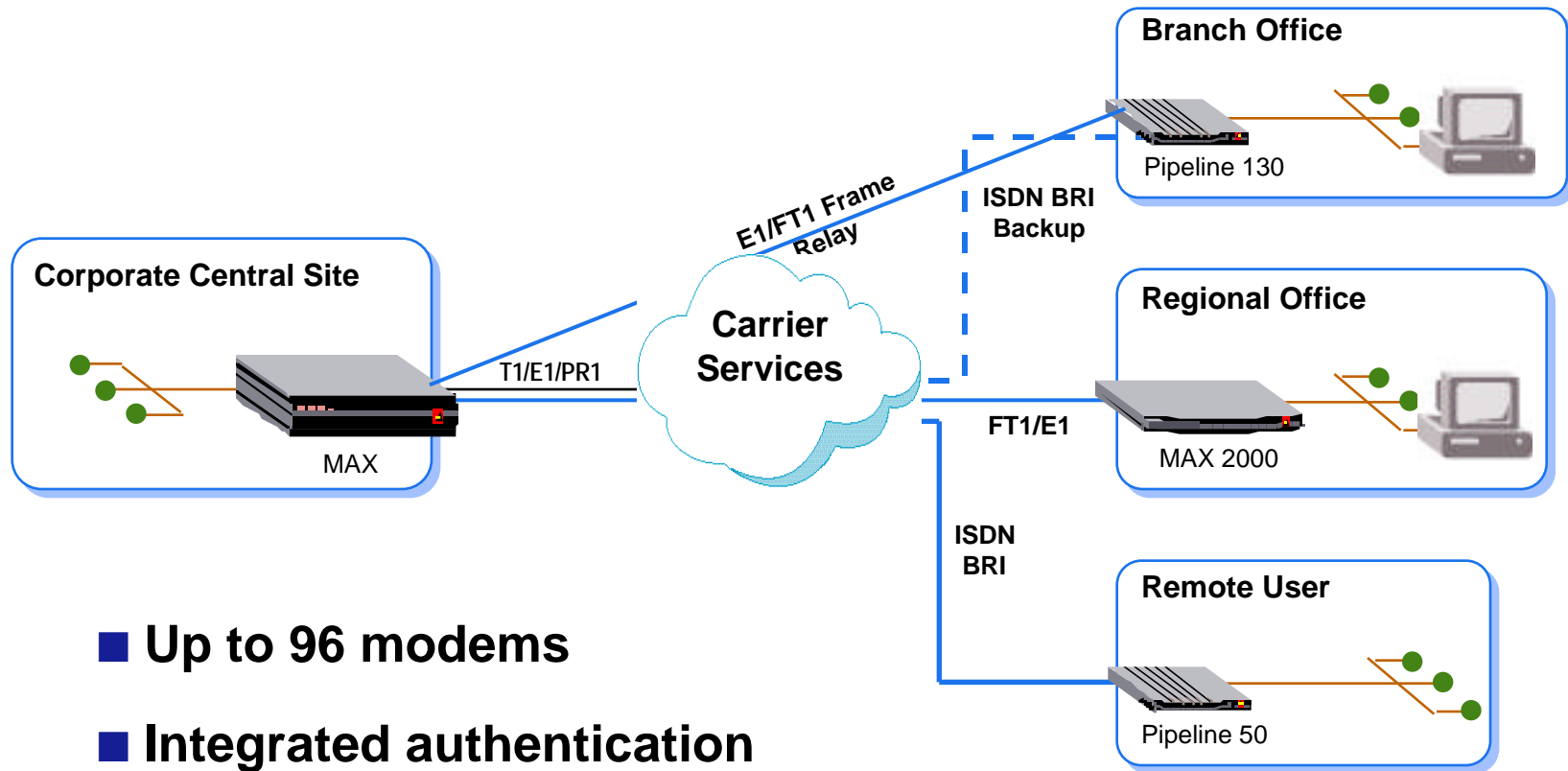Backup

Remote Office

Pipeline 130

- **Maximum density up to 96 concurrent sessions**
- **Provide dialed and leased services**
- **Analog and digital sessions**
- **K56flex / V.34 modems, ISDN and Frame Relay**

MAX Application
Corporate Remote Access

Branch Office

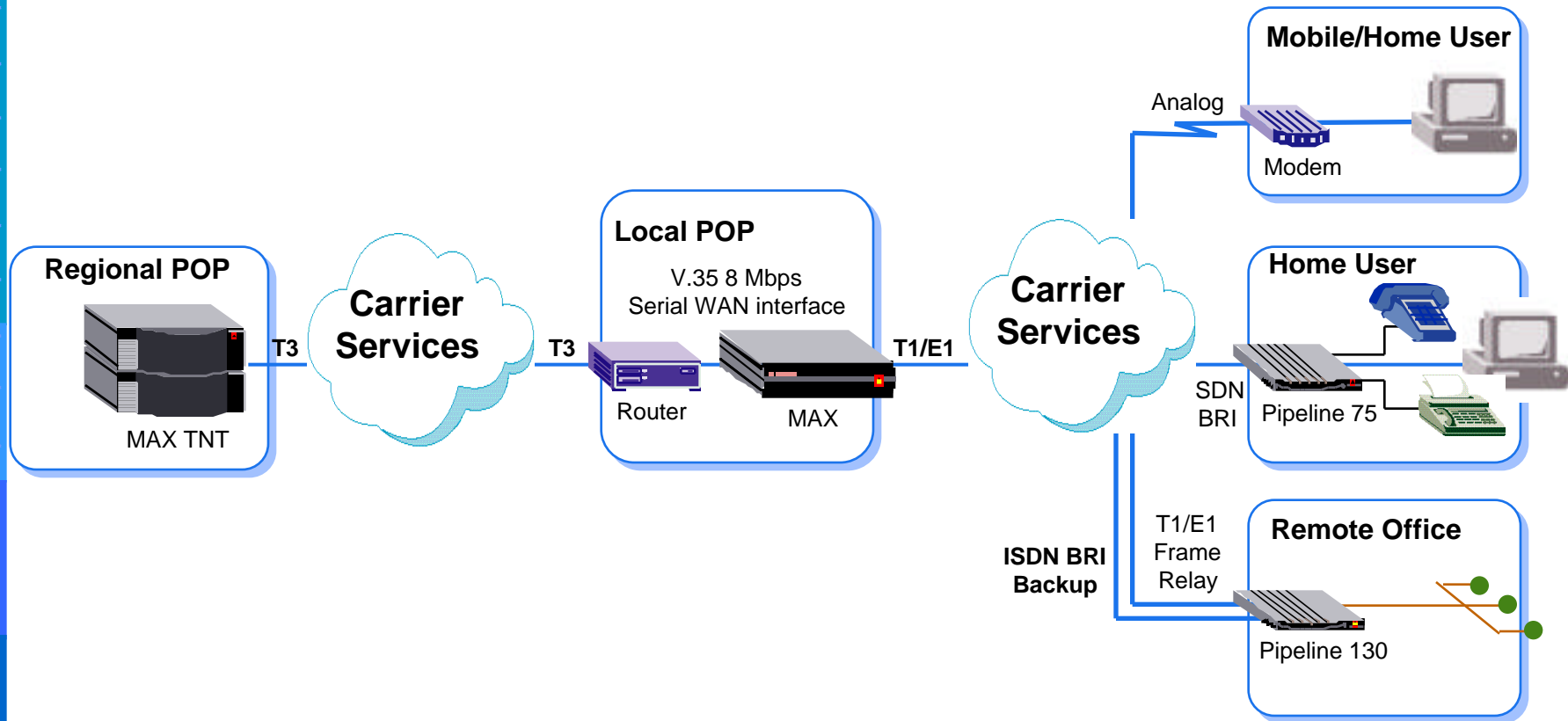Pipeline 130

E1/FT1 Frame Relay

ISDN BRI Backup

Corporate Central Site

T1/E1/PR1

MAX

Carrier Services

Regional Office

FT1/E1

MAX 2000

ISDN BRI

Remote User

Pipeline 50

■ **Up to 96 modems**

■ **Integrated authentication**

MAX Application
Frame Relay Backhaul via V.35 Interface

Mobile/Home User

Analog

Modem

Local POP

Regional POP

V.35 8 Mbps
Serial WAN interface

**Carrier
Services**

T3

**Carrier
Services**

T3

T1/E1

Home User

MAX TNT

Router

MAX

SDN
BRI

Pipeline 75

**ISDN BRI
Backup**

T1/E1
Frame
Relay

Remote Office

Pipeline 130

■ **8 Mbps Serial WAN Interface**

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MAX Application
Frame Relay Switching

Regional Office

Frame
Relay

Pipeline 130

ISDN BRI
Backup

Internet POP

V.35 8 Mbps
Serial WAN Interface

Mobile User

Analog

**Carrier
Services**

T1/E1

**To FR
Backbone**

Modem

Laptop with
MaxLink Pro

PRI

Frame Relay
Switch

MAX

Telecommuter

ISDN BRI

Pipeline 75
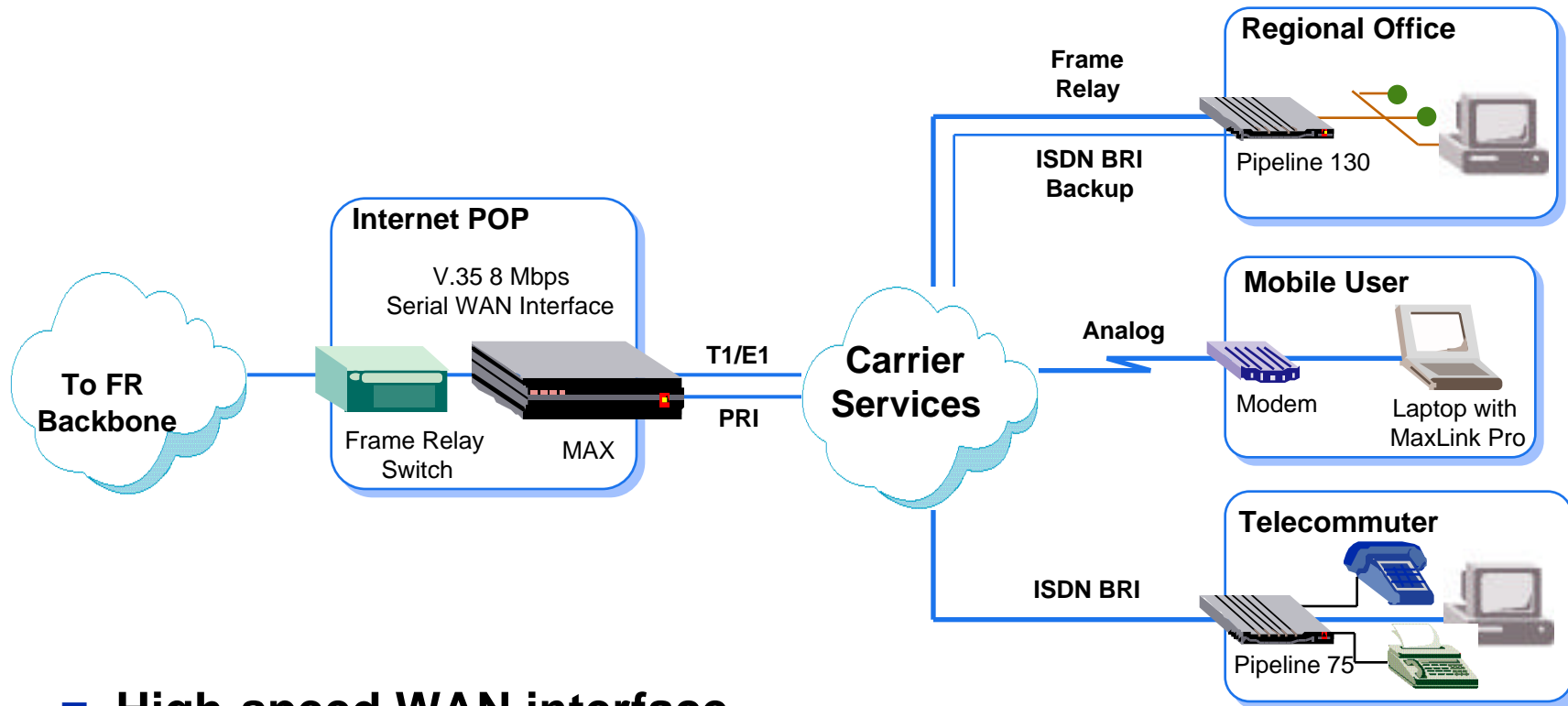
■ **High-speed WAN interface**

■ **UNI and NNI standard**

MAX Application
Videoconferencing

Central Site

Workstations

Videoconferencing

ISDN
BRI

BRI to
Desktop

MAX

T1, E1,
PRI, BRI

**Carrier
Services**

Remote Site

ISDN
BRI

ISDN TA

Videoconferencing
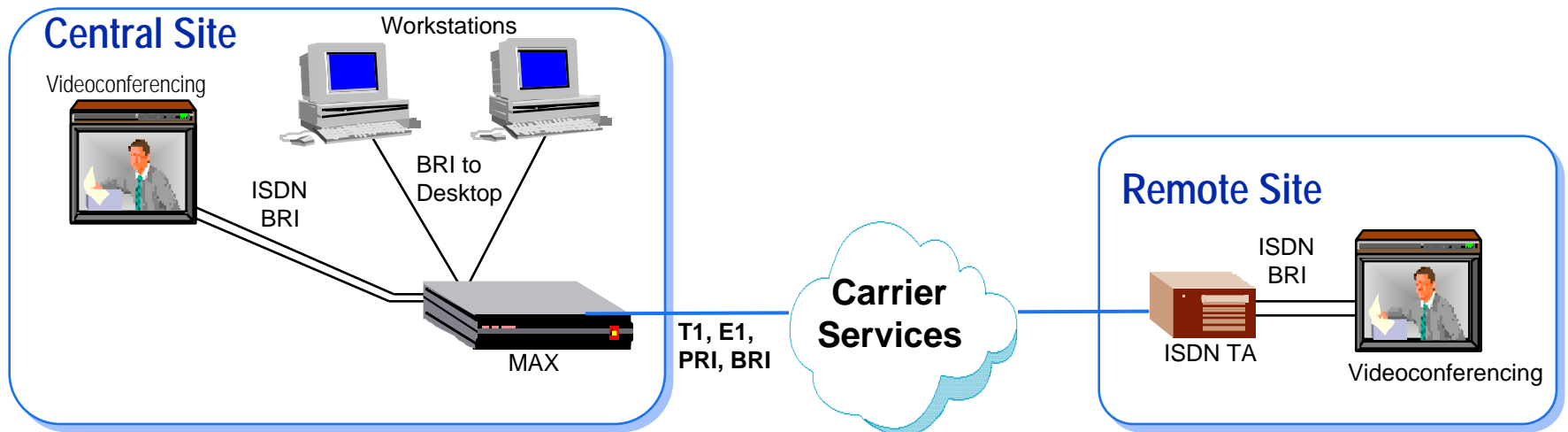
MAX Application
Backup and Overflow

Headquarters

Corporate backbone

MAX

T1/E1/ PRI

Leased Circuit

Switch Circuits

T1/E1/ PRI

MAX

Remote Office

http://www.ascend.com