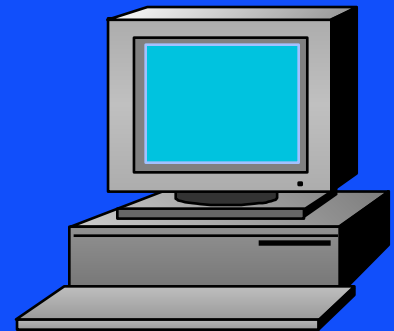

Simple ISDN Overview

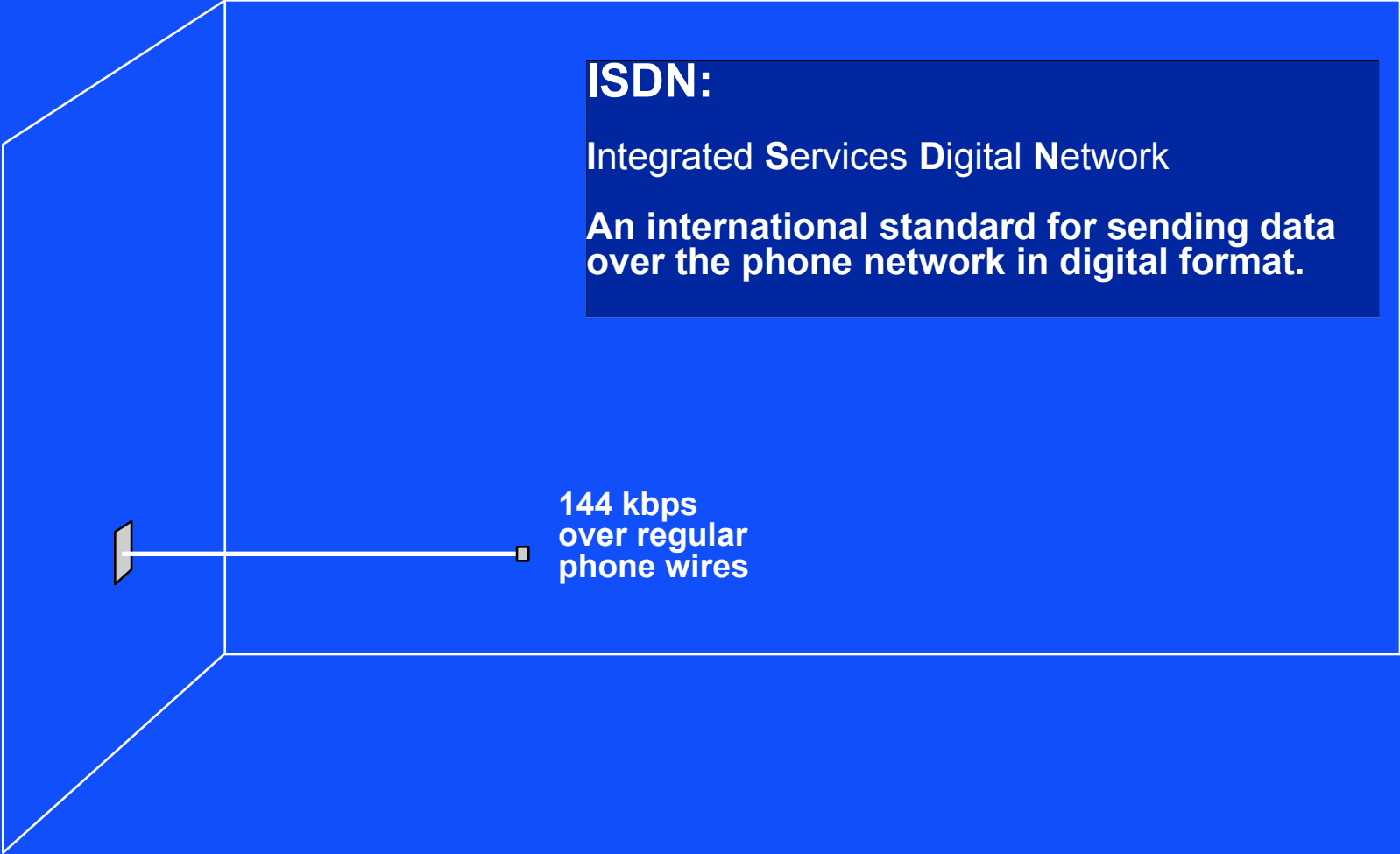


ISDN Defined

ISDN:

Integrated Services Digital Network

An international standard for sending data over the phone network in digital format.



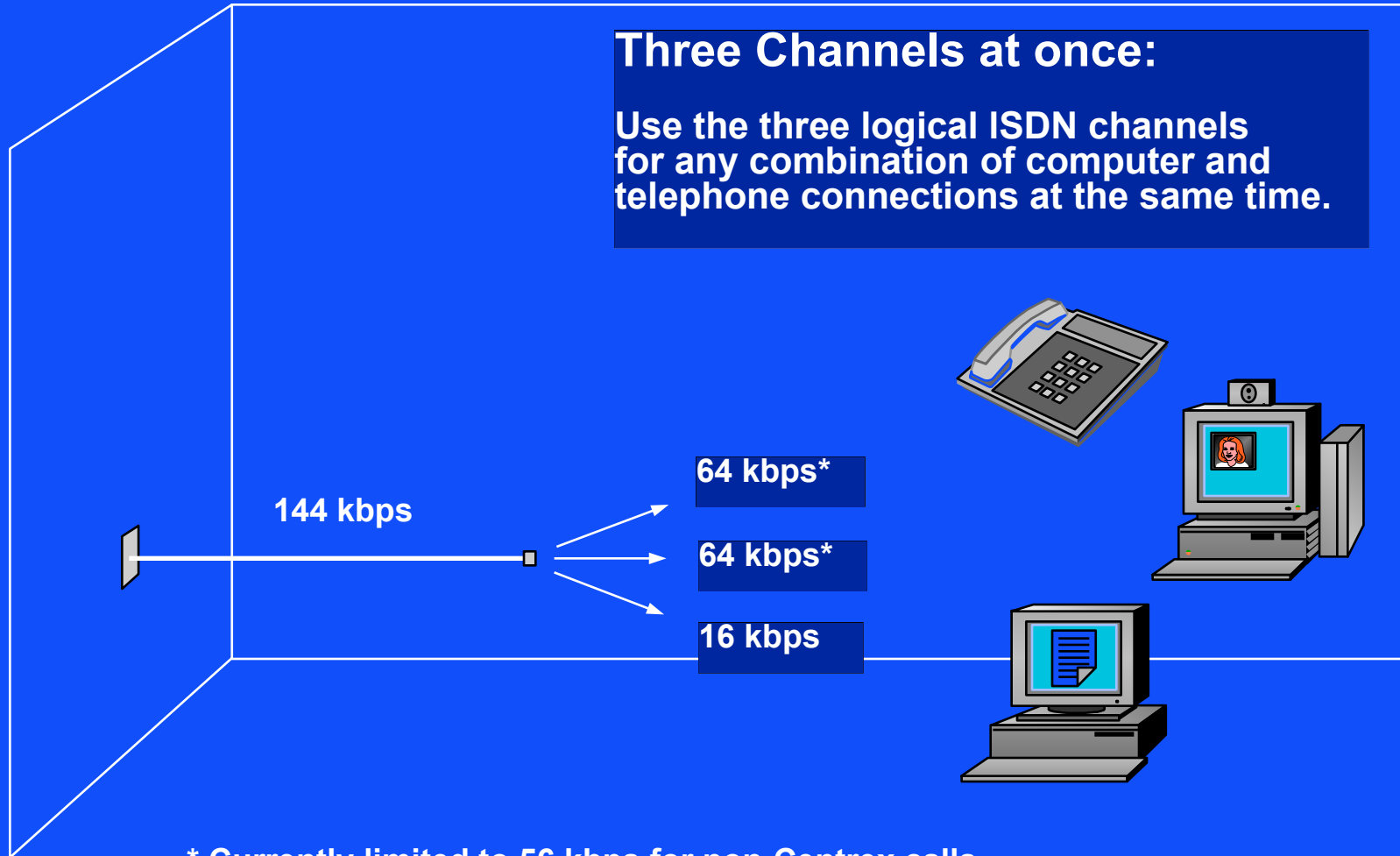
A diagram showing a white door on the left with a handle. A horizontal line extends from the handle to a small square on the right. The text '144 kbps over regular phone wires' is positioned to the right of the line.

**144 kbps
over regular
phone wires**

ISDN Channels

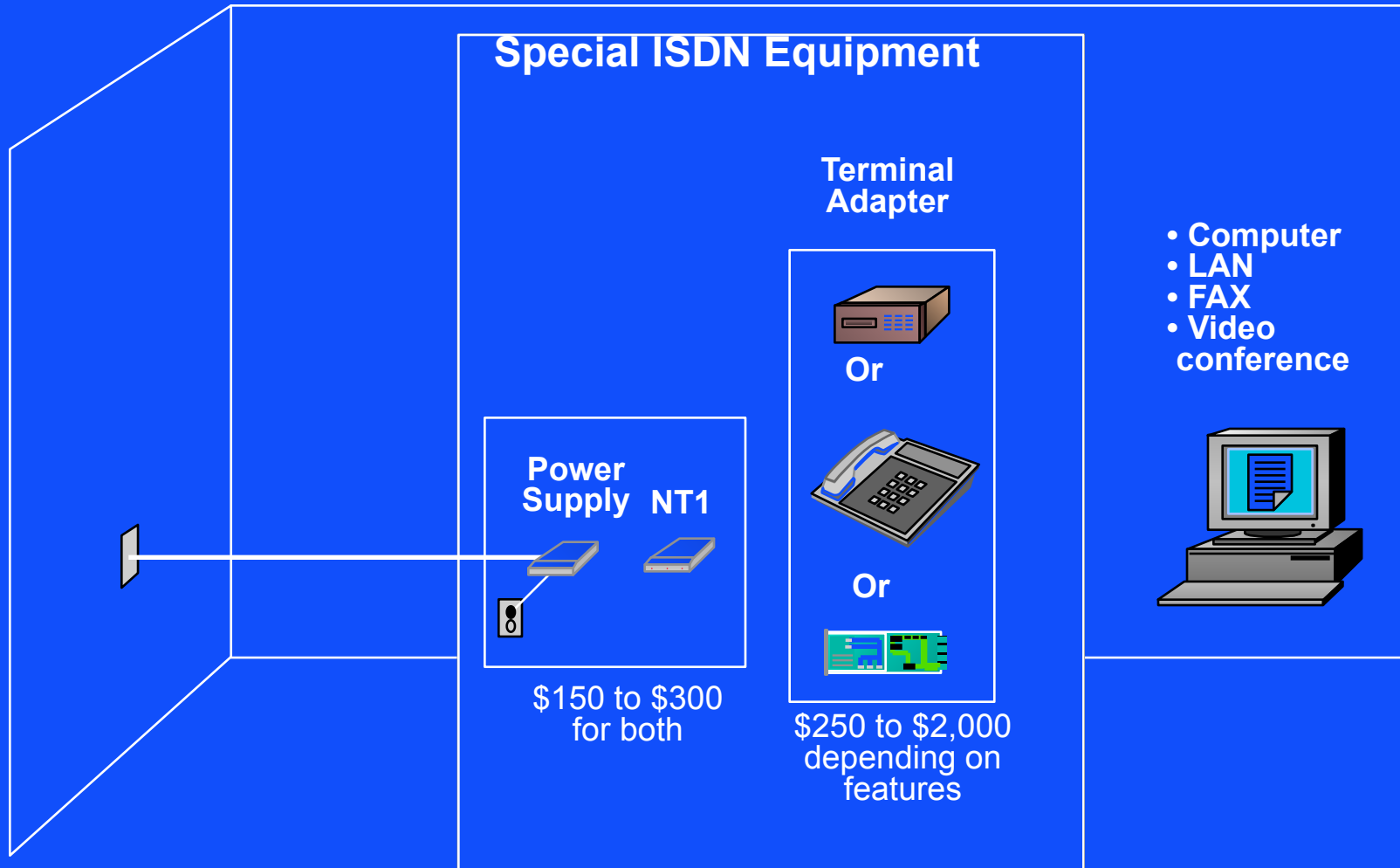
Three Channels at once:

Use the three logical ISDN channels for any combination of computer and telephone connections at the same time.

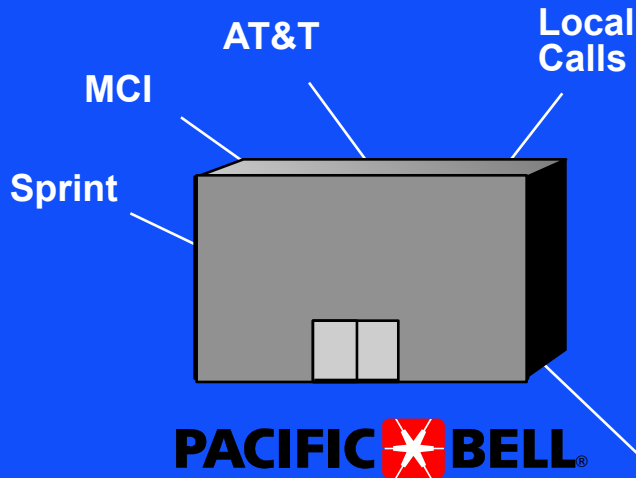


* Currently limited to 56 kbps for non-Centrex calls

ISDN Equipment



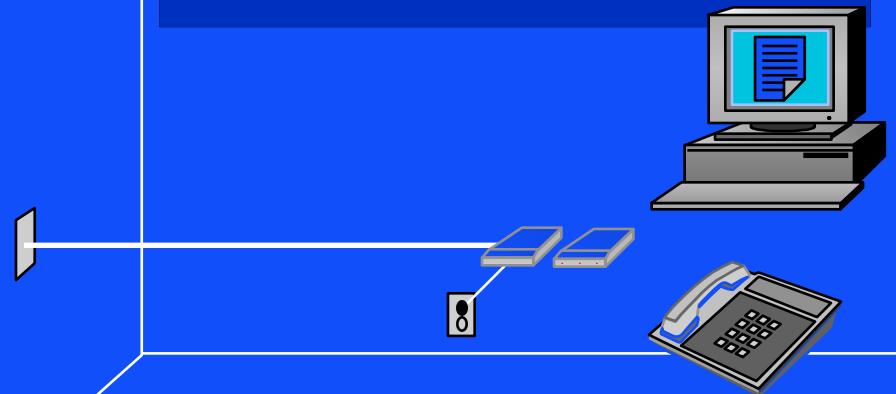
ISDN Calls to Anywhere



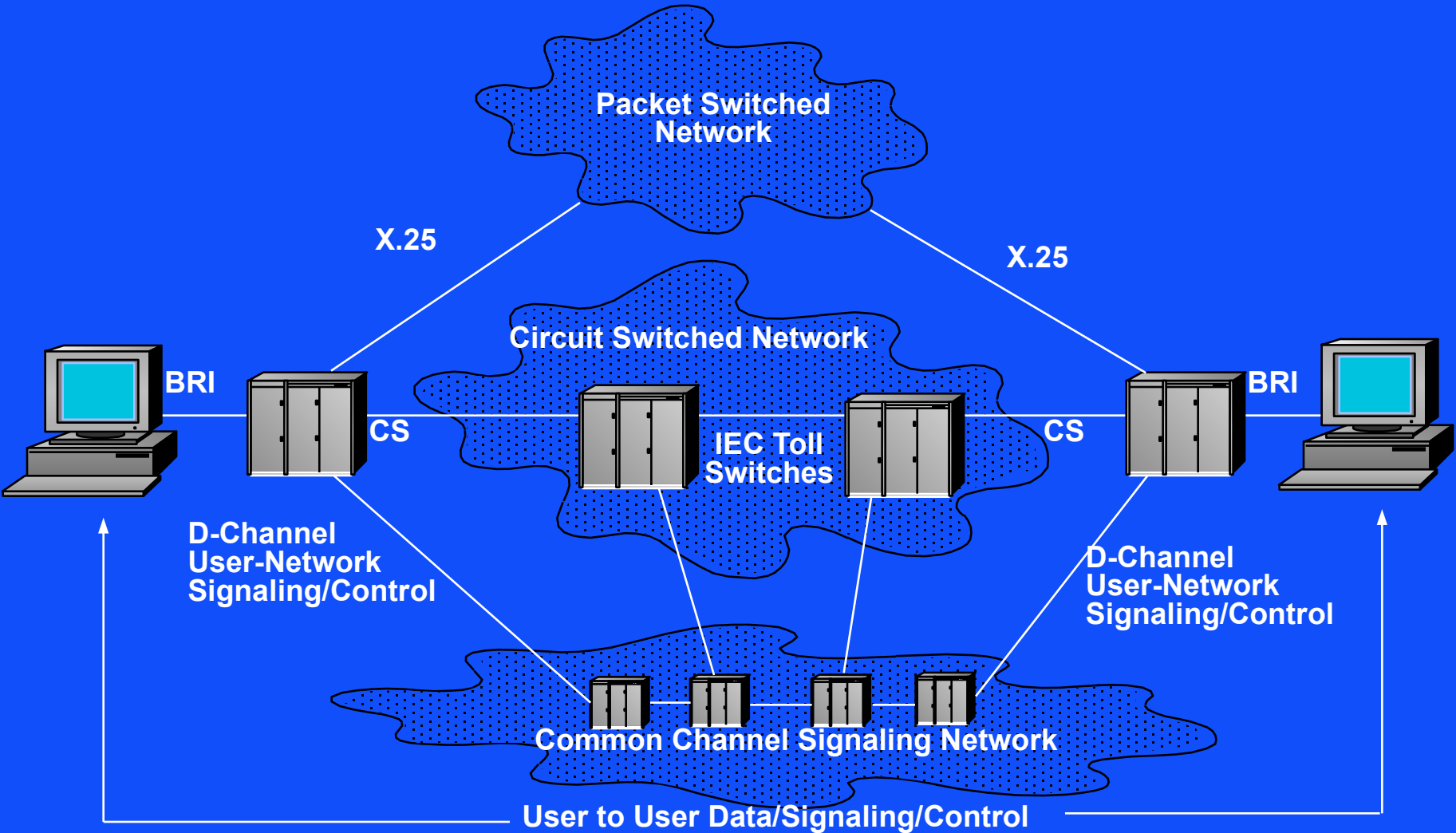
- Voice calls just like normal
- Data calls through a circuit switched data carrier
- Data calls compatible with Switched 56
- Packet calls through an X.25 Value Added Network (VAN)

Circuit Switched Data Carriers

- AT&T: 800-222-SW56
- Sprint: 800-776-1788 (rates)
800-778-8981 (person)
- MCI: 800-723-9965

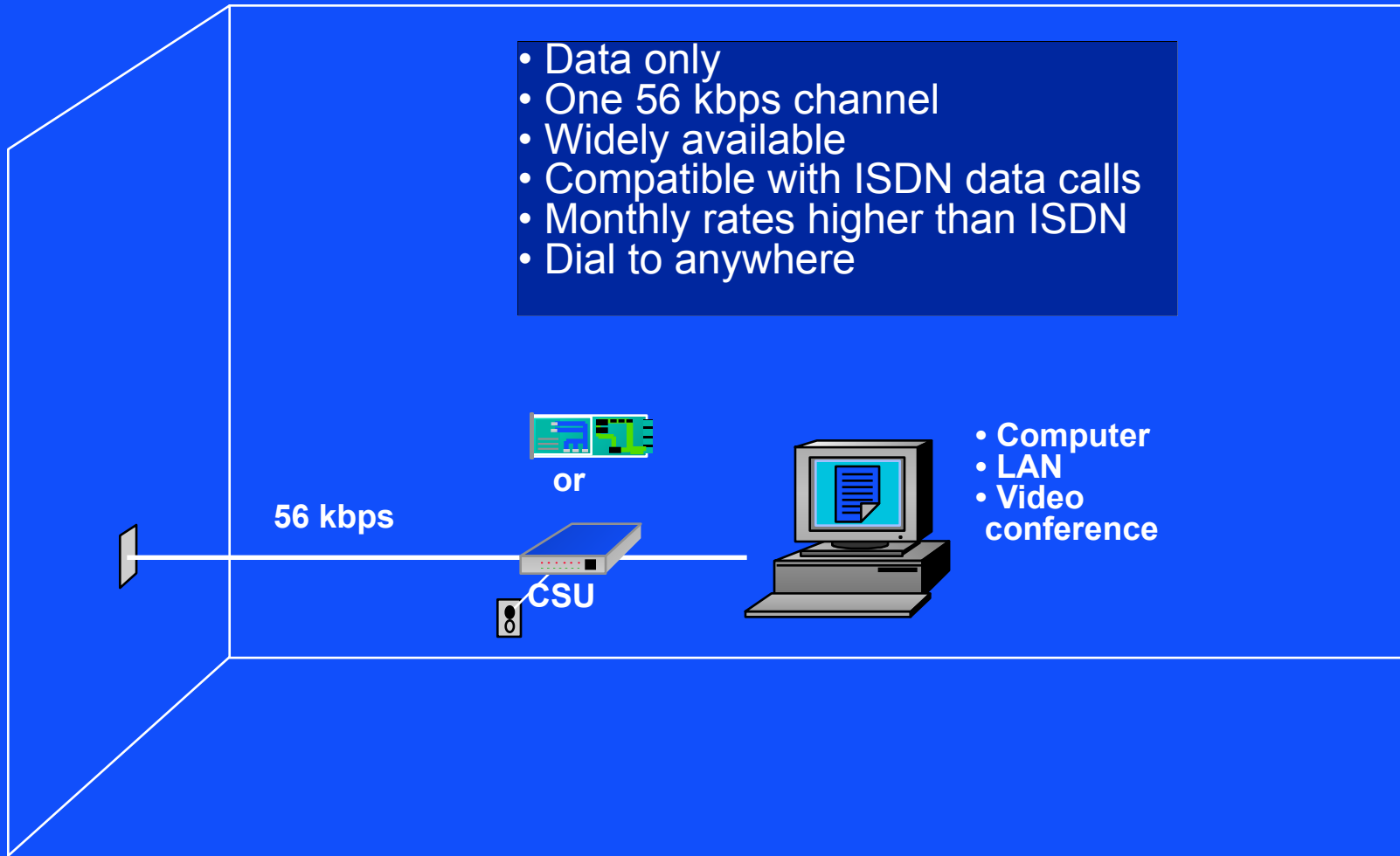


ISDN Network View



Switched 56 - Defined

- Data only
- One 56 kbps channel
- Widely available
- Compatible with ISDN data calls
- Monthly rates higher than ISDN
- Dial to anywhere



Switched Digital Data Services

Technology	Pacific Bell Products	Installation	Monthly
ISDN BRI (Basic Rate Interface)	Centrex ISDN <ul style="list-style-type: none"> • Includes Centrex service • Minimum of 2 lines 	\$150* plus \$70 for Centrex line with \$200/\$400 initial Centrex Establishment	\$31.65 + usage**
	SDS-ISDN <ul style="list-style-type: none"> • Single line ISDN for business • Includes 1MB business line 	\$125* plus \$70.75 for 1MB	\$24.82 + usage \$26.09 if multiple lines
	Home ISDN <ul style="list-style-type: none"> • Single line ISDN for home 	\$125* plus \$34.75 for 1MR	\$24.50 + usage***
	X.25 Packet Option <ul style="list-style-type: none"> • Available for all ISDN services above 	\$25 for each terminal	\$4 for each terminal
Switched 56	SDS-56 <ul style="list-style-type: none"> • Switched 56 for business 	\$500*	\$45 + usage
	CenPath <ul style="list-style-type: none"> • For Centrex customers only • From a DMS-100 switch 	\$190	\$39.65 + usage

* Waived for a 2 year in-service period

** Usage sensitive for out-of-Centrex calls only

***Usage charged between 8 AM and 5PM, Monday through Friday

Centrex IS Prices

	Per Line Charges	
	<u>Monthly</u>	<u>One-time</u>
Centrex	\$15.65	\$70
Centrex IS (2B+D signalling)	\$16.00	\$150 (waived for 2 year commitment)
D-Channel Packet option	\$4.00	\$25

- \$200 one-time Centrex establishment charge for new customers
- Minimum of two lines
- Centrex IS charges are in addition to Centrex charges

- Combines previous feature packages A, B, C and D into one
- Local loop extension without additional charge (where feasible)
- Existing customers grandfathered. Changes and additions allowed.
- Available to non-ISDN central offices by connections to other offices

Usage Charges: Pacific Bell Voice Rates (ZUM & TOLL)

If you are in an area that has ZUM calling rates, your calls to nearby areas are charged the following rates:

Zone	Mileage	Day		Evening*		Night and Weekend**	
		1st Min.	Add'l Min.	1st Min.	Add'l Min.	1st Min.	Add'l Min.
1	0-7.99	\$0.0333	\$0.0105	\$0.0233	\$0.0073	\$0.0133	\$0.0042
2	8.01-12.99	\$0.0333	\$0.0105	\$0.0233	\$0.0073	\$0.0133	\$0.0042
3	13.01-16.00	\$0.0808	\$0.0181	\$0.0565	\$0.0126	\$0.0323	\$0.0072

Message Toll Rates (Note: 13 - 16 mile rates replaced by ZUM rates if you are in a ZUM area)

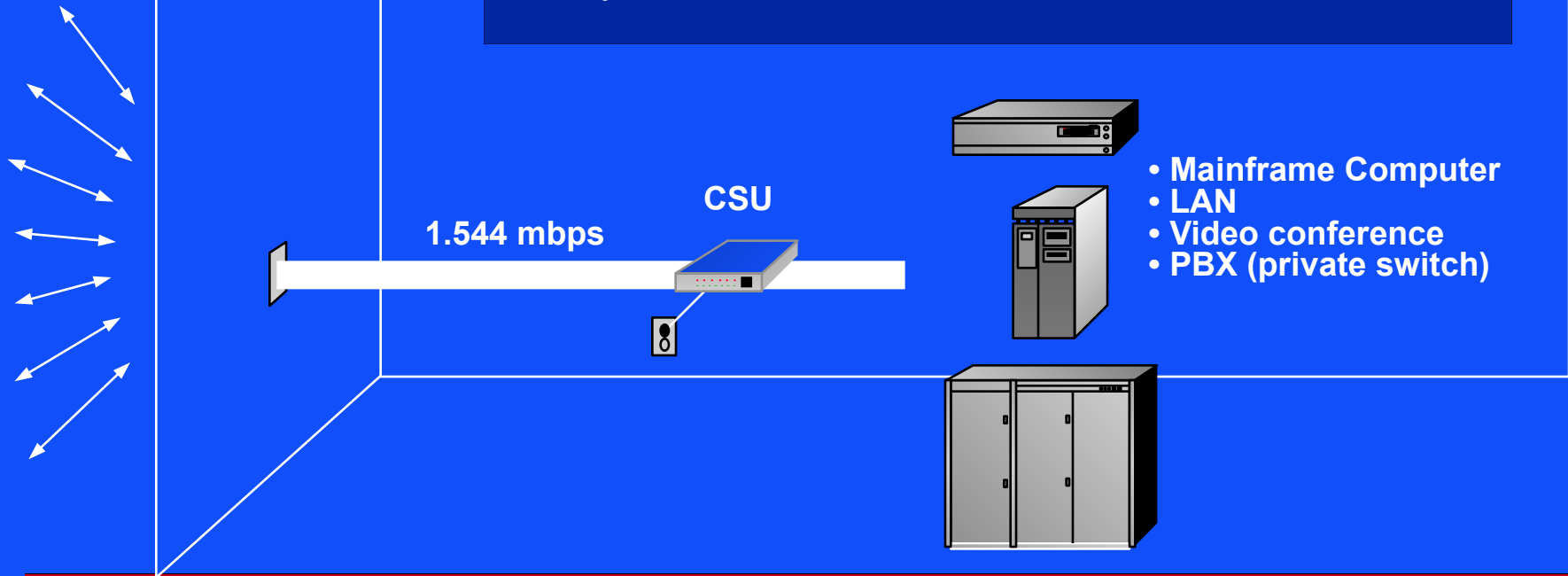
Mileage	Day		Evening*		Night and Weekend**	
	1st Min.	Add'l Min.	1st Min.	Add'l Min.	1st Min.	Add'l Min.
13-16	\$0.114	\$0.070	\$0.0914	\$0.0560	\$0.0684	\$0.0420
17-20	\$0.114	\$0.070	\$0.0914	\$0.0560	\$0.0684	\$0.0420
21-25	\$0.136	\$0.114	\$0.1088	\$0.0912	\$0.0816	\$0.0684
26-30	\$0.136	\$0.114	\$0.1088	\$0.0912	\$0.0816	\$0.0684
31-40	\$0.136	\$0.114	\$0.1088	\$0.0912	\$0.0816	\$0.0684
41-50	\$0.147	\$0.125	\$0.1176	\$0.1000	\$0.0882	\$0.0750
51-70	\$0.147	\$0.125	\$0.1176	\$0.1000	\$0.0882	\$0.0750
over 70	\$0.147	\$0.136	\$0.1176	\$0.1088	\$0.0882	\$0.0816

* Monday - Friday, 5 pm to 11 pm

** Mon - Friday, 11 pm to 8 am plus Saturday, Sunday and Holidays

PRI (Primary Rate Interface)

- Good for aggregating calls to host computers, PBXs, LANs
- 24 channels of 64 kbps each
- One channel can be used for signaling
- Mix data, voice and B channel packet
- Public switched access
- Requires special conditioned T1 lines (1.544 mbps) with B8ZS and Extended Super Frame (ESF)
- Compatible with ISDN & Sw 56 calls



PRI Pricing

23 B + D

Package 1
\$750 install
\$220/month

+

**T1
associated
costs**

24 B

Package 2
\$750 install
\$220/month

+

**T1
associated
costs**

**23 B +
backup
D channel**

Package 3
\$750 install
\$270/month

+

**T1
associated
costs**

Options

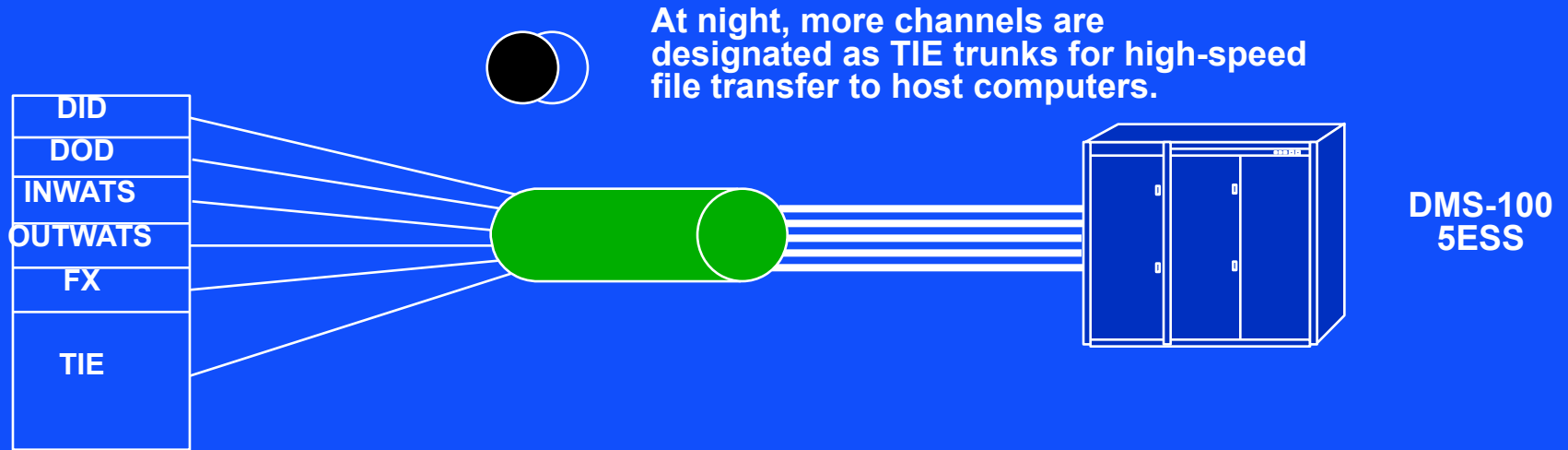
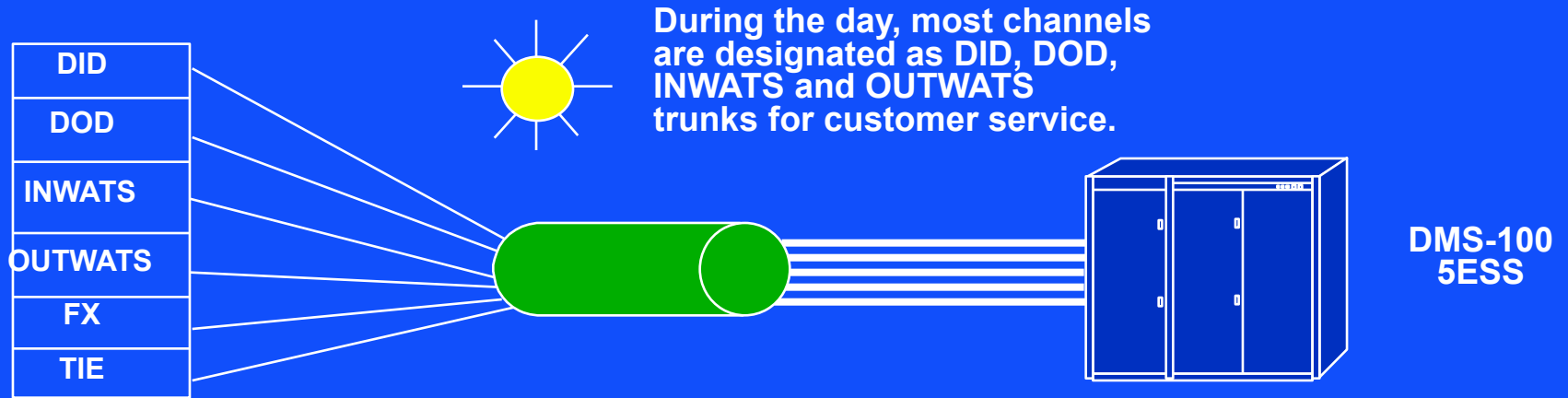


- B channel is 64 kbps for data or voice
- D channel is for signaling only
- Backup D channel is in case the facility with the main signaling channel goes down.

PRI Pricing - continued

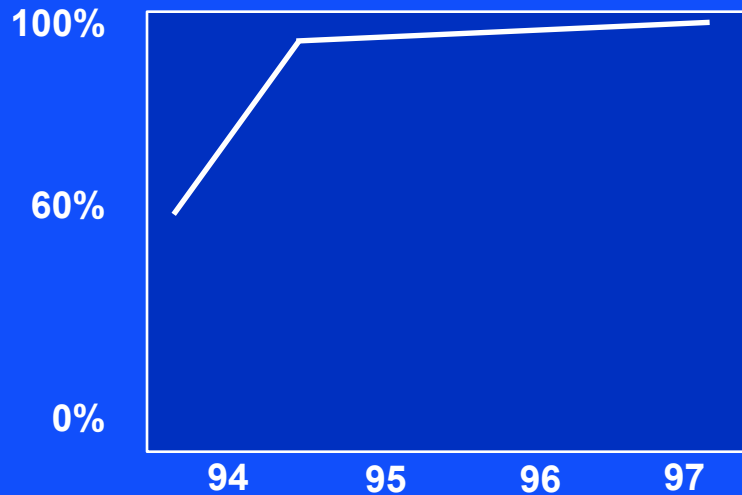
Description	Monthly Recurring	Non Recurring
Network Ring Again (DMS only)	\$20	\$125
Private Facility Connection	\$100	\$250
User to User Information	\$10	\$125
Alternate Routing	\$10	\$150
Dialing Plan	\$75	\$200
Calling Name Display	\$20	\$125
Message Waiting Indicator	\$20	\$125
PRI Subgroup	\$10	\$125
B Channel Packet Service	\$150	\$275
Closed User Group	\$5	\$125
Permanent Virtual Circuit	\$5	\$125
Additional Logical Channel	\$5	\$125
Non-PBX FXS/FPS Termination	\$15	\$70

Primary Rate Flexible Trunking



ISDN Service Availability

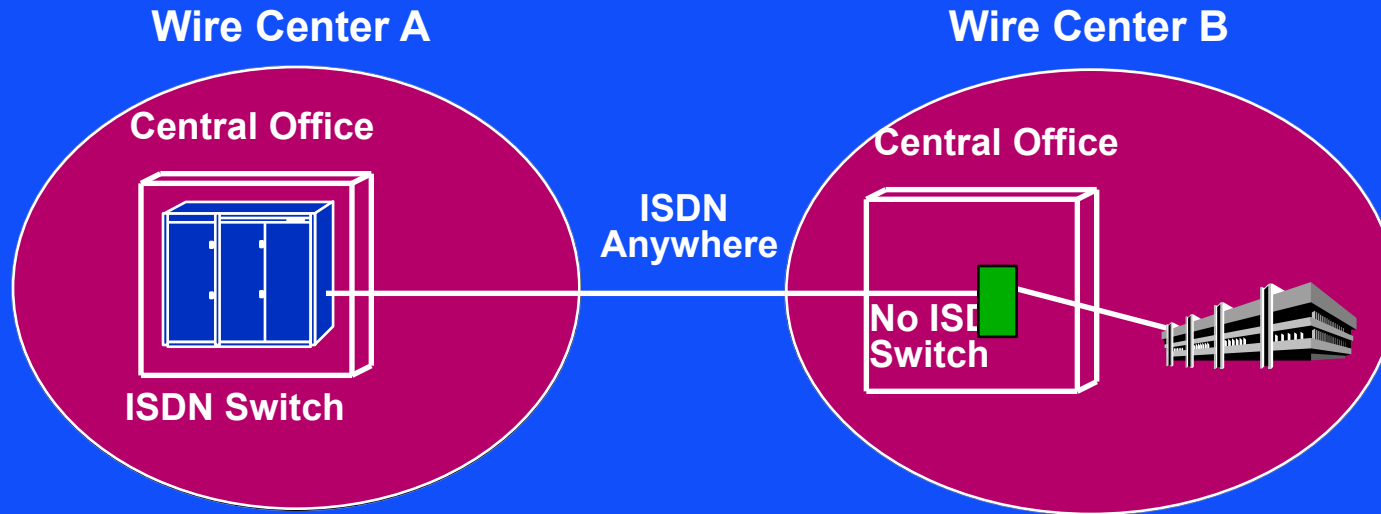
California ISDN (BRI) Availability (estimated)



- Call 800-995-0346 to check ISDN availability
- Or call the Pacific Bell BBS at 510-277-1037 or 800-336-1037
- Or contact your Pacific Bell Account Team
- Switched 56 data is widely available already
- Other states and countries have compatible service offerings

ISDN Lines in service as of 12/94: 20,000+

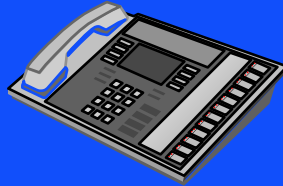
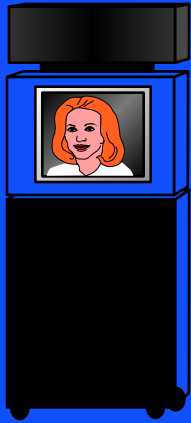
Alternate Serving Arrangement (ASA)



- **ASA extends ISDN availability (90%+)**
- **No extra cost for customers served by ASA**
- **Calling areas and usage charges are based on Host switch**
- **Customers must take a number change and be re-homed when local switch is upgraded**

ISDN Applications

ISDN is the most economical solution for a number of growing areas:

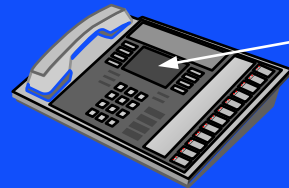


Telecommuting, work-at-home
Healthcare -- remote diagnostics
Electronic publishing
Video conferencing
Voice applications -- lots of extra features
LAN to LAN connectivity (bridging, routing)
Screen sharing -- groupware
Multimedia
High speed document transfer
Dial back-up and overflow for dedicated lines

Voice Applications with ISDN

- Up to 64 call appearances (phone numbers) can be assigned to one ISDN line. The called number shows up on screen when the the phone rings.
- Great for roommates, shared phones in the lab, small businesses, receptionist, customer service.
- Hold, transfer, three-way calling, call-pickup

ISDN
Telephone



Called number
displayed here

If they dialed...

510-555-1234
510-555-1235
510-555-1236
510-555-1237
etc. up to 64 numbers



You could answer...

“Hello, Sales Department.”
“Hello, Bob speaking.”
“Hello, Technical Support.”
“Hello, Alice’s line. Bob speaking.”

Virtual Key System



- No KSU at your premises
- Central receptionist for call coverage
- Display features
- Single key access to features
- Integration with analog sets for busy lamp fields
- Integration with data
- Fast, quiet, reliable

Enhanced Call Handling Capability



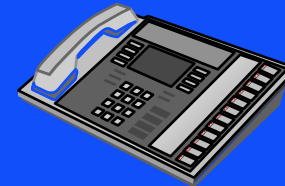
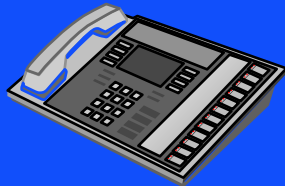
- ☐ Call identification and preview (within the same Centrex)
- ☐ Multiple and shared call appearances
- ☐ Secondary directory numbers

Multiple and Shared Call Appearances

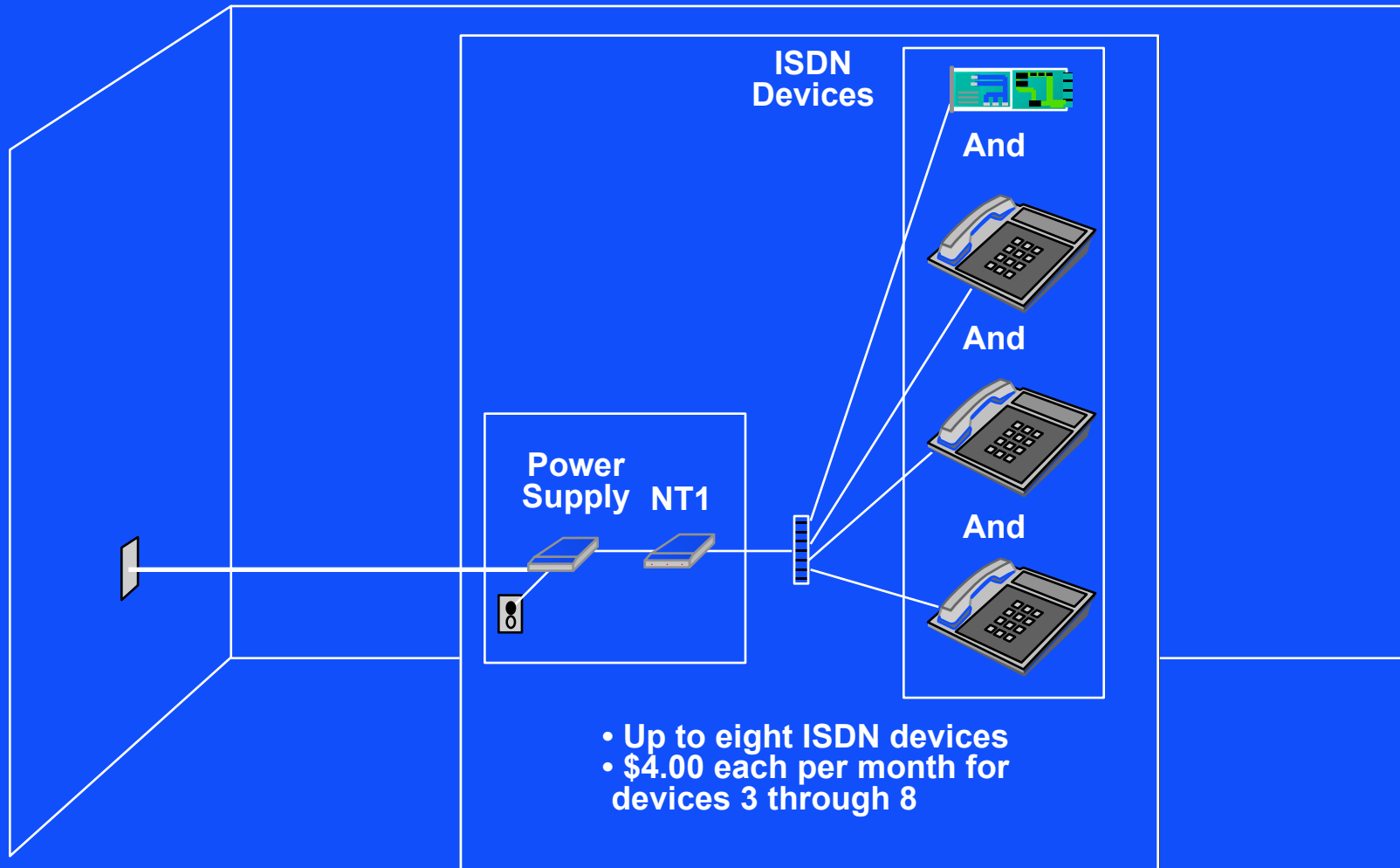
Capabilities vary by Central Office

●	1	777-1111 Primary DN
●	2	777-1111 Multiple CA
●	3	777-1111 Multiple CA
●	4	777-1122 Shared CA
●	5	777-1122 Shared CA
●	6	777-1133 Secondary CA
●	7	
●	8	
●	9	
●	10	

●	1	777-1122 Primary DN
●	2	777-1122 Multiple CA
●	3	777-1122 Multiple CA
●	4	777-1111 Shared CA
●	5	777-1111 Shared CA
●	6	777-1134 Secondary CA
●	7	777-1135 Analog CA
●	8	777-1136 Analog CA
●	9	777-1137 Analog CA
●	10	777-1138 Analog CA



ISDN Contention

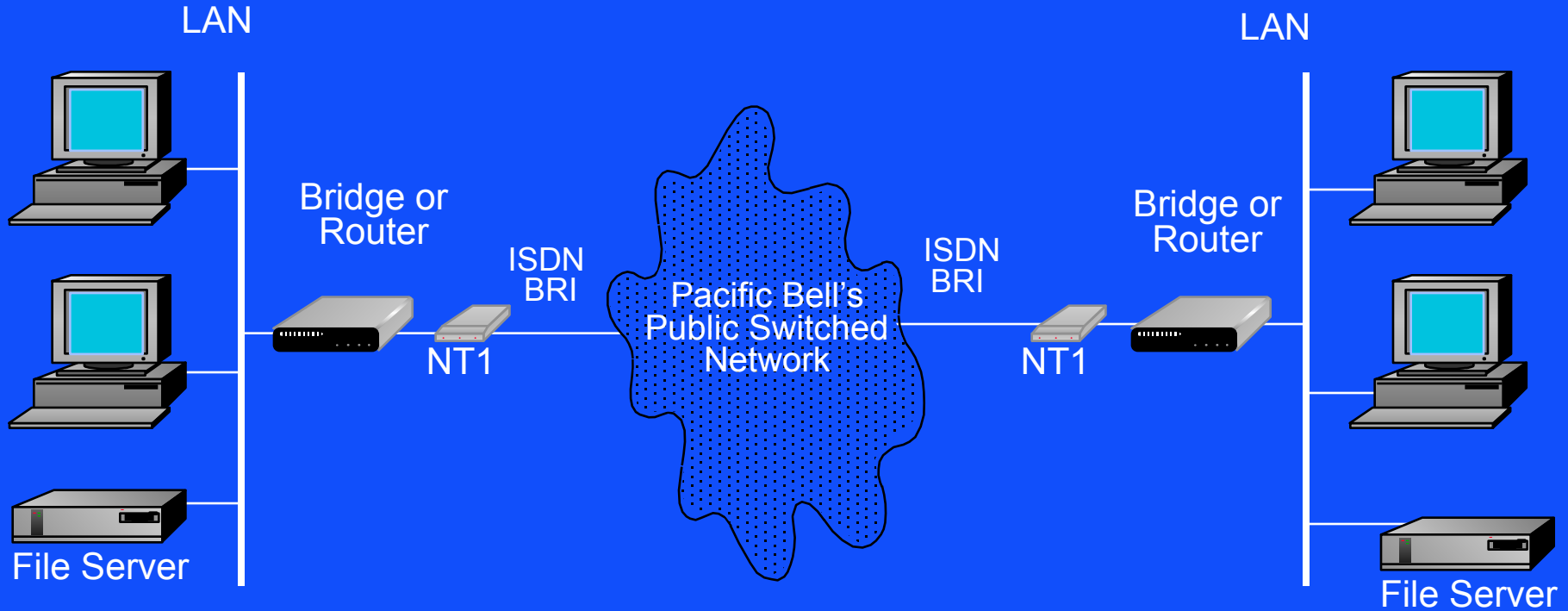


National ISDN

- Proprietary ISDN offered today from 5ESS (AT&T) and DMS 100 (NTI)
- National ISDN 1, 2, 3 designed to standardize ISDN protocols
- NI1 available late 1994 at Pacific Bell
- National ISDN 1, 2, 3 focus on robust data standards and applications
- VKS (virtual key service) efforts aim towards NI3 and beyond

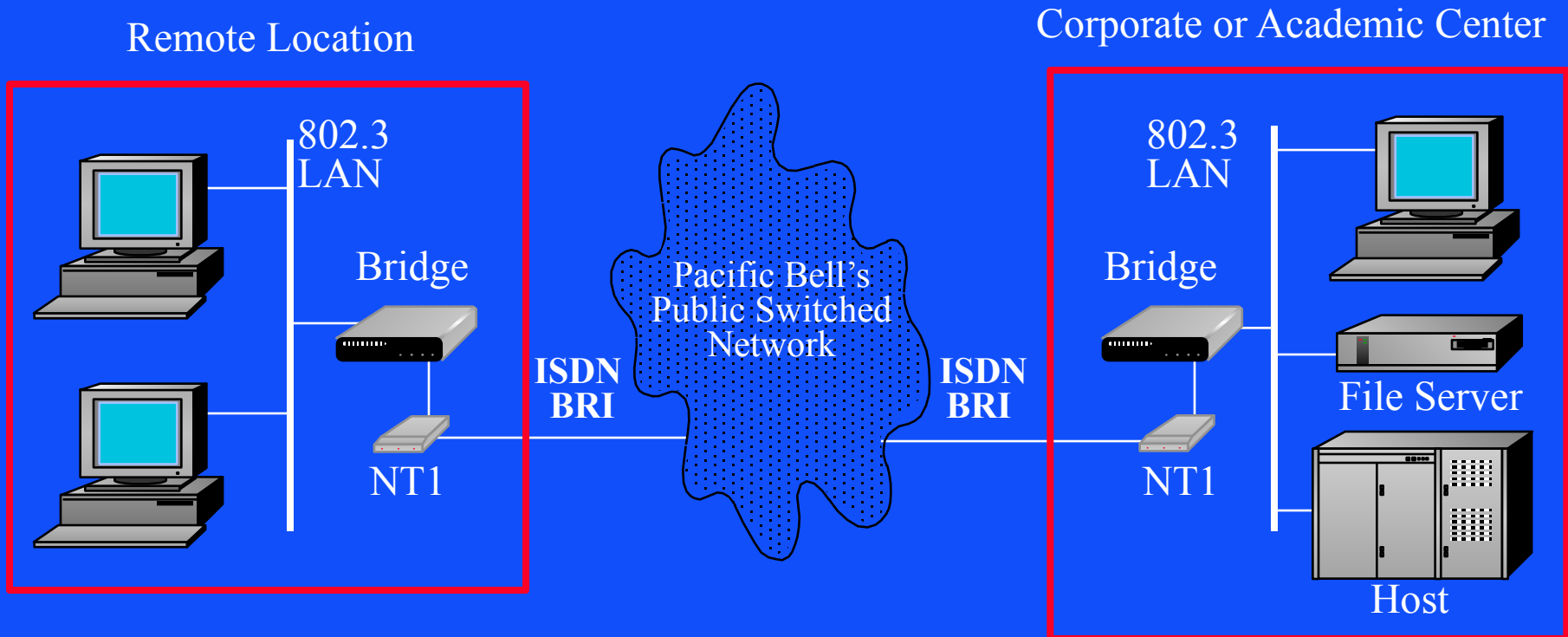


LAN to LAN Connectivity



Connect LANs at speeds up to 112/128 kbps.
The ISDN call is automatically made by the bridge
or router only when data needs to be sent across
LANs.

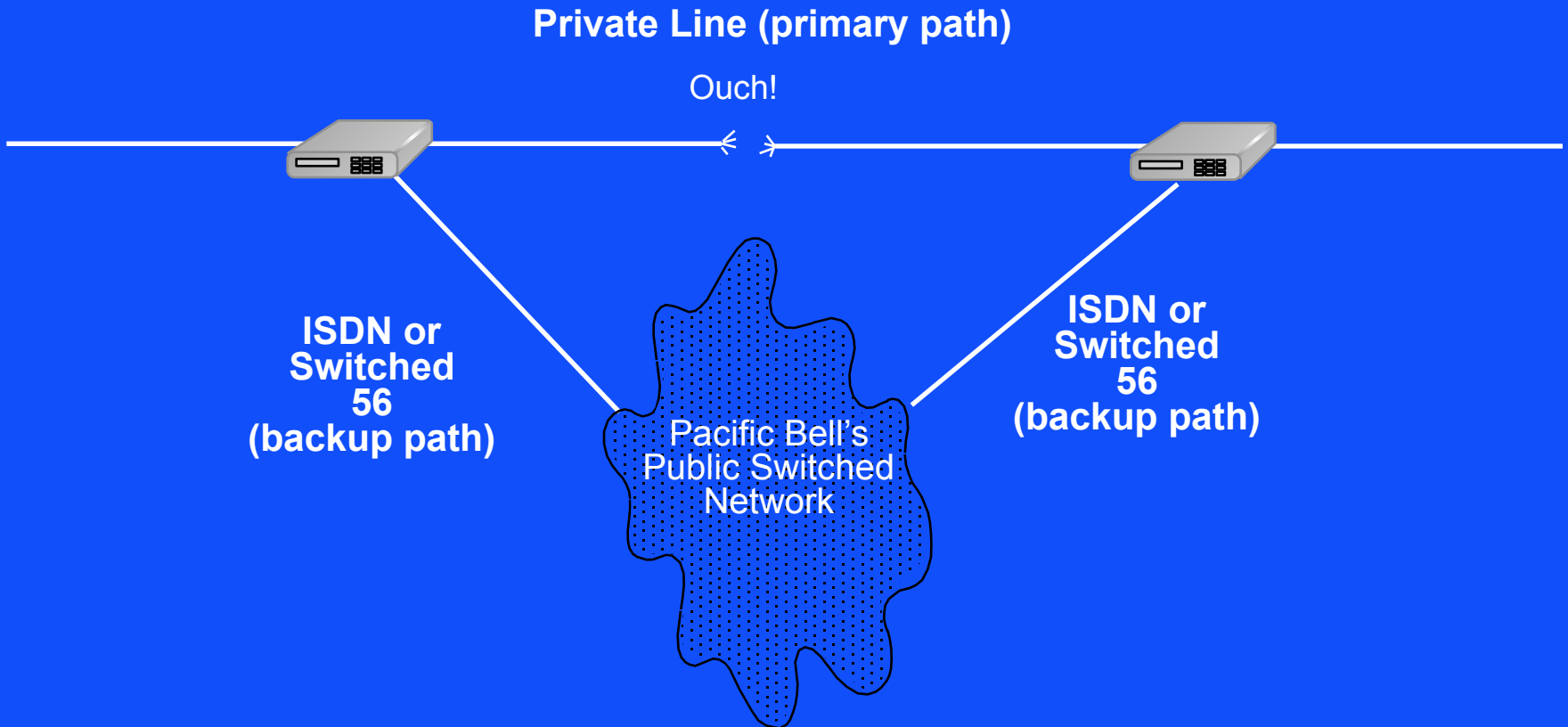
Remote LAN to Host LAN



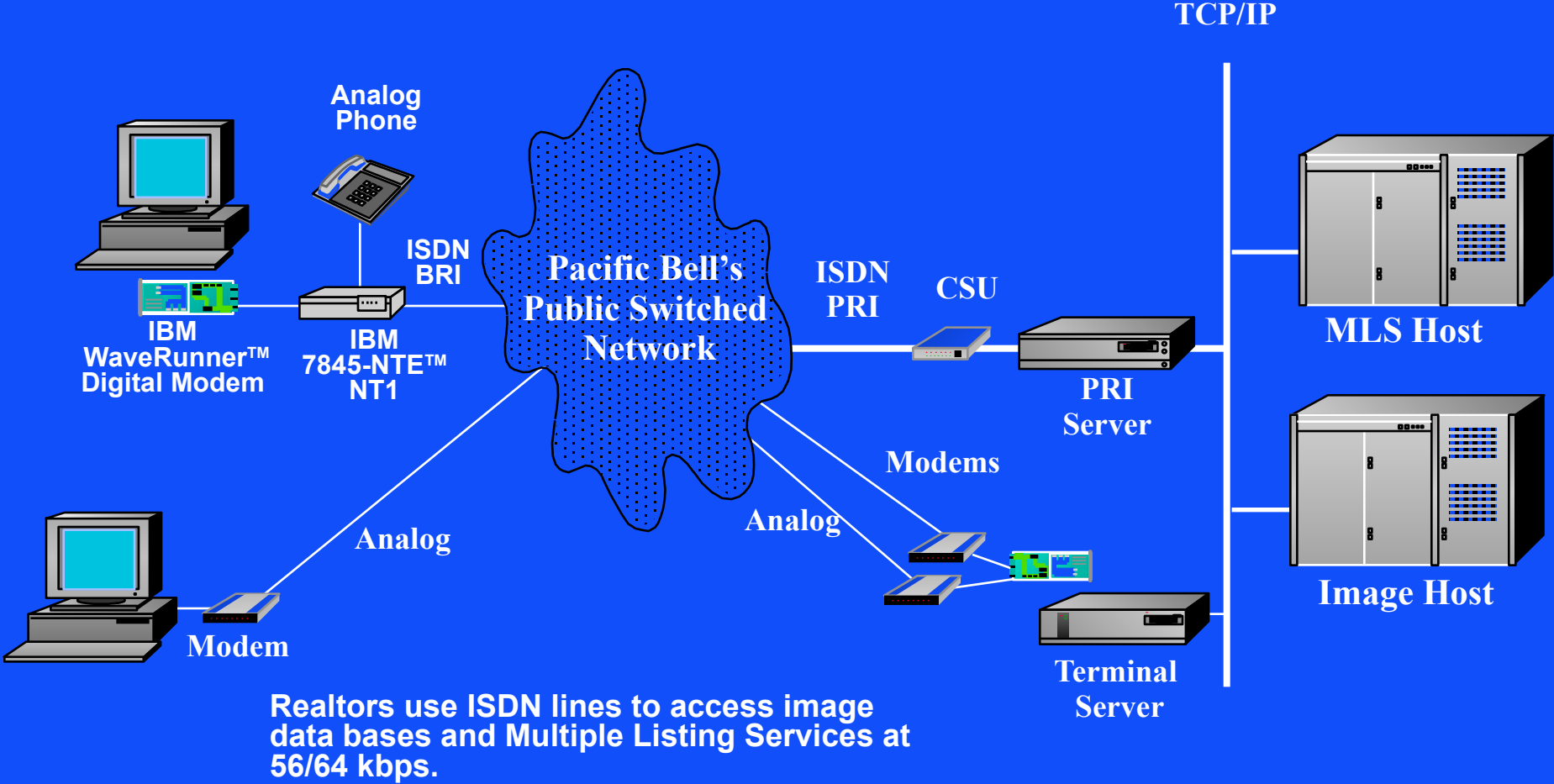
Connect remote LANs to Host LANs at speeds up to 112/128 kbps. The remote LAN does not require local file or mail services. The ISDN call is automatically made by the bridge or router only when data needs to be sent across LANs.

Dial Backup/Overflow for Private Lines

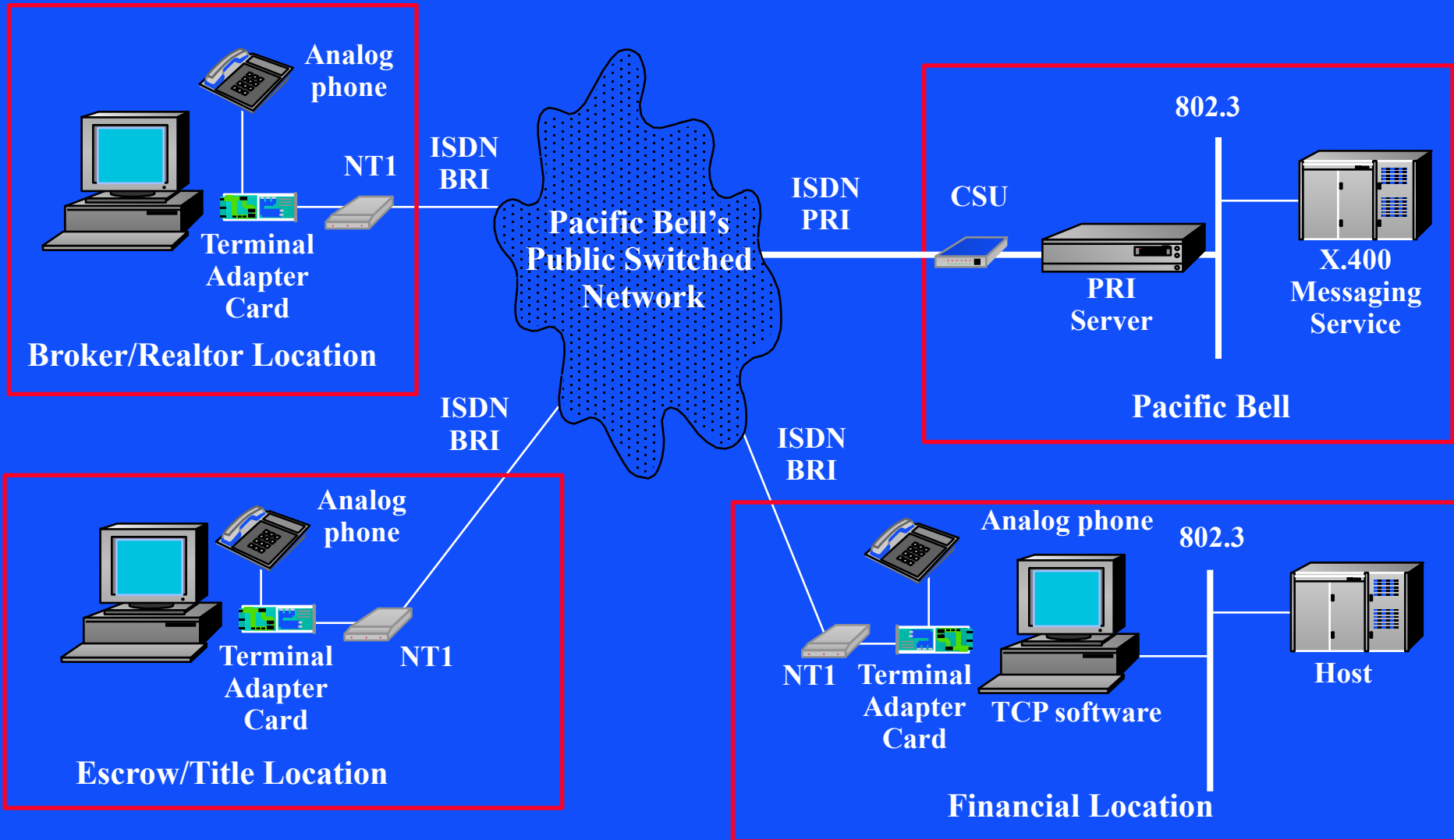
If the primary data line fails or overflows with data, smart electronics can automatically dial up another path over ISDN or Switched 56 lines. Usage charges accumulate only when the lines are used.



San Fernando Valley Board of Realtors



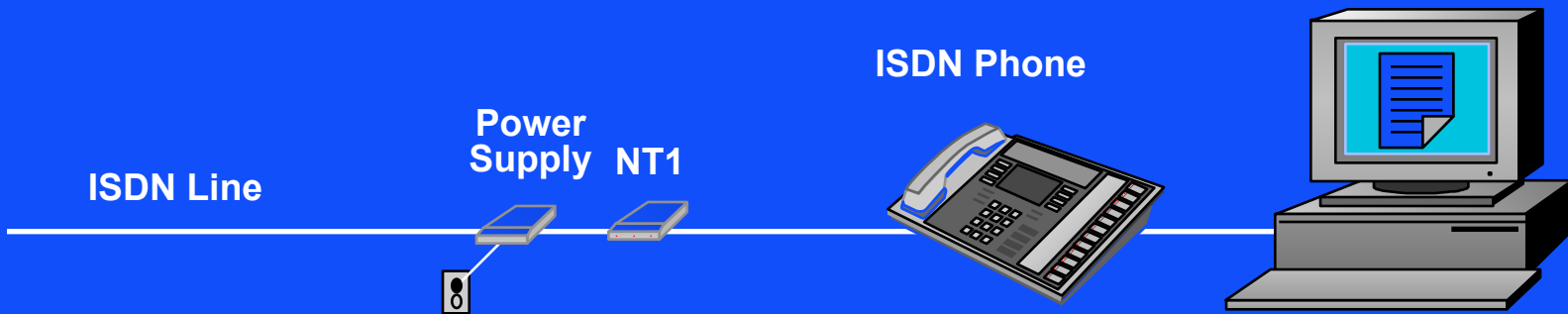
Business Transaction Network



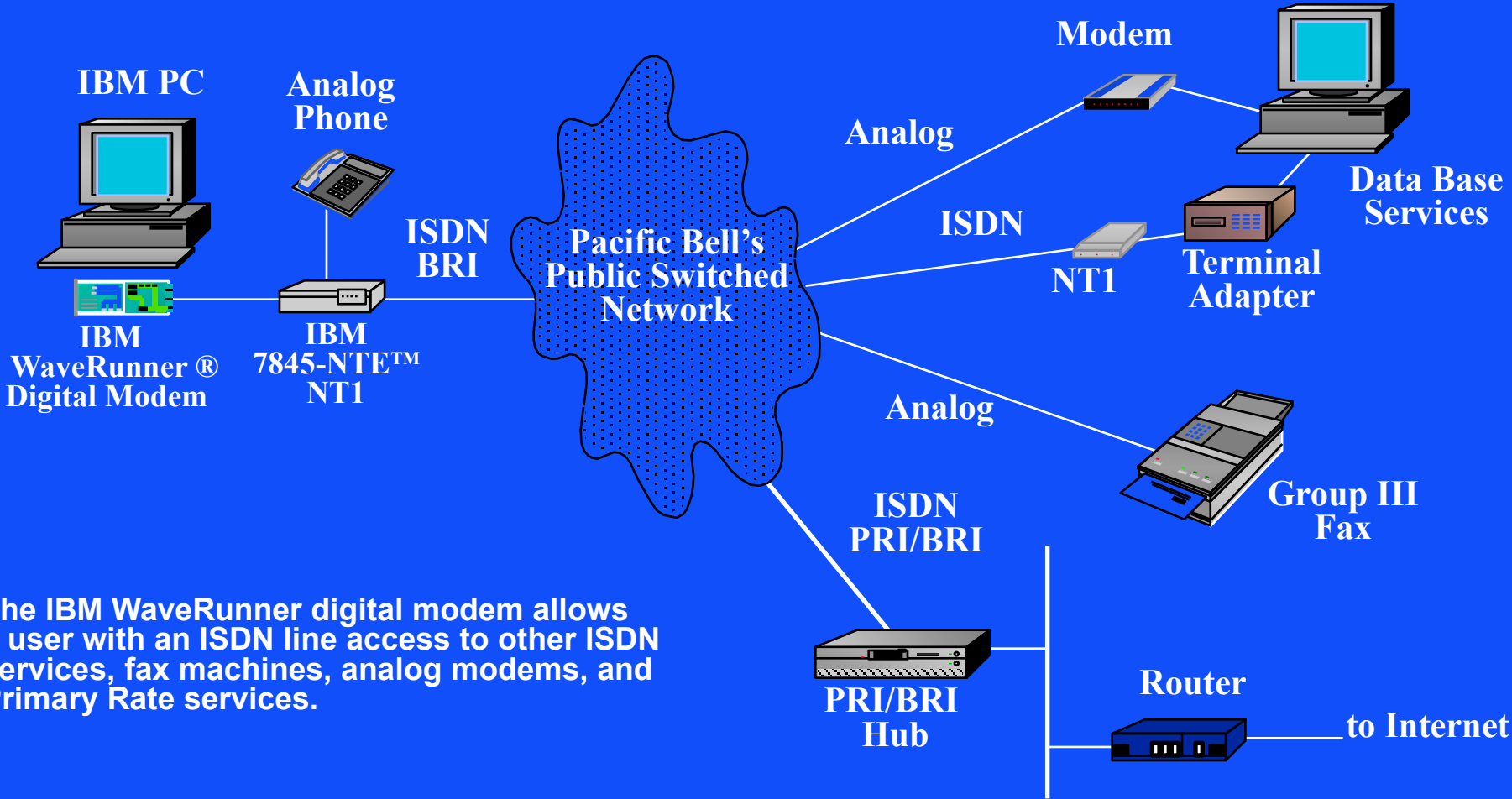
Telecommuting

Use your computer, fax and telephone at the same time over one ISDN line. Dial into your company's LAN or host computer or the Internet for work-at-home. Automatically redirect incoming 800 calls to workers at home.

High-speed file transfer,
document sharing,
Internet access, etc.

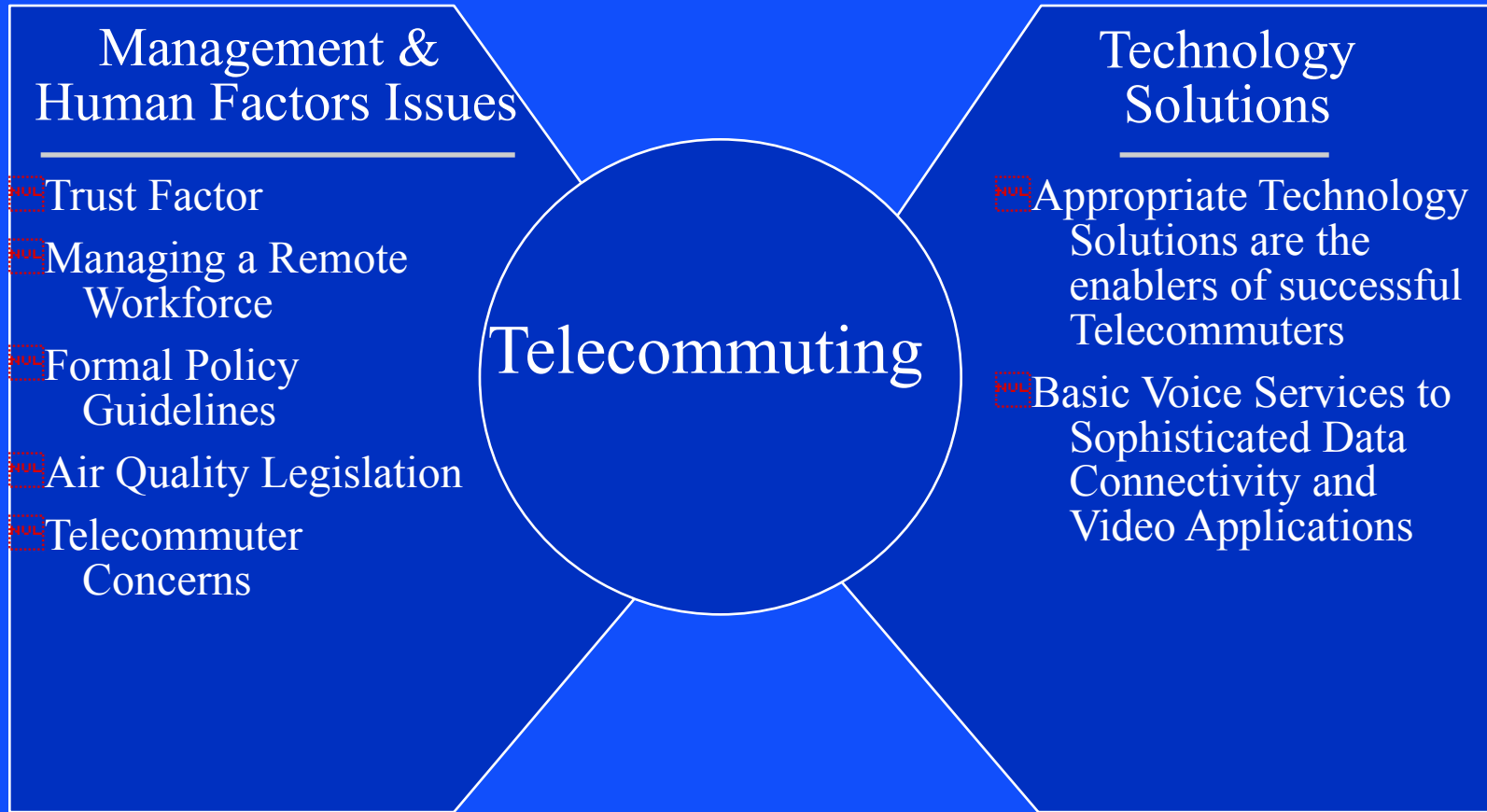


Remote Home/Office Access



The IBM WaveRunner digital modem allows a user with an ISDN line access to other ISDN services, fax machines, analog modems, and Primary Rate services.

Pacific Bell and Telecommuting



Focus on the Complete Solution

Telecommuting Hotline

**For assistance in setting up a
telecommuting program in
your company**

or

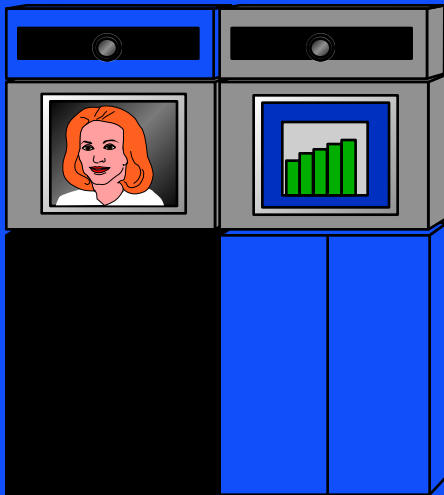
**for a free copy of the Pacific
Bell Telecommuting
Resource Guide**

CALL

1-800-378-1980

Video Conferencing Over ISDN

- Share documents
- Collaborate on designs
- Reduce travel expenses
- Speed up projects



Room Sized*



PC Based
(\$2,000 plus PC)

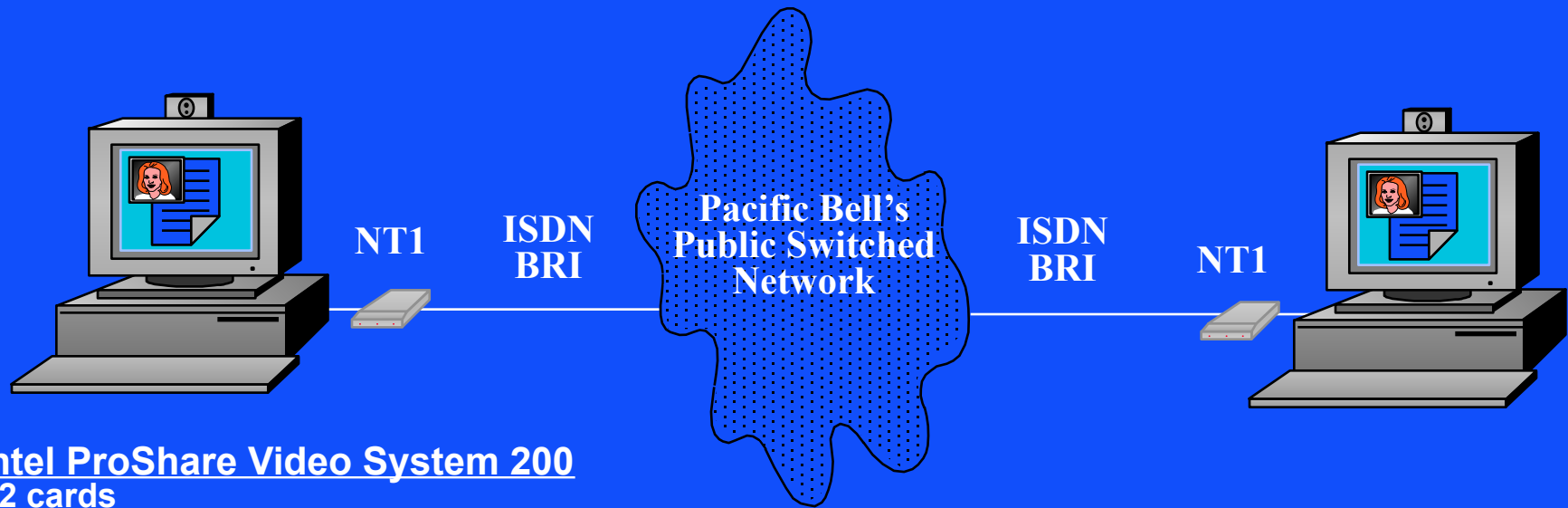


Portable*

*Higher-end applications may use multiple ISDN lines for higher clarity or use other high-speed Pacific Bell data services.

Desktop Video Conferencing Over ISDN

Economical desktop video systems allow users to view each other and work on documents.

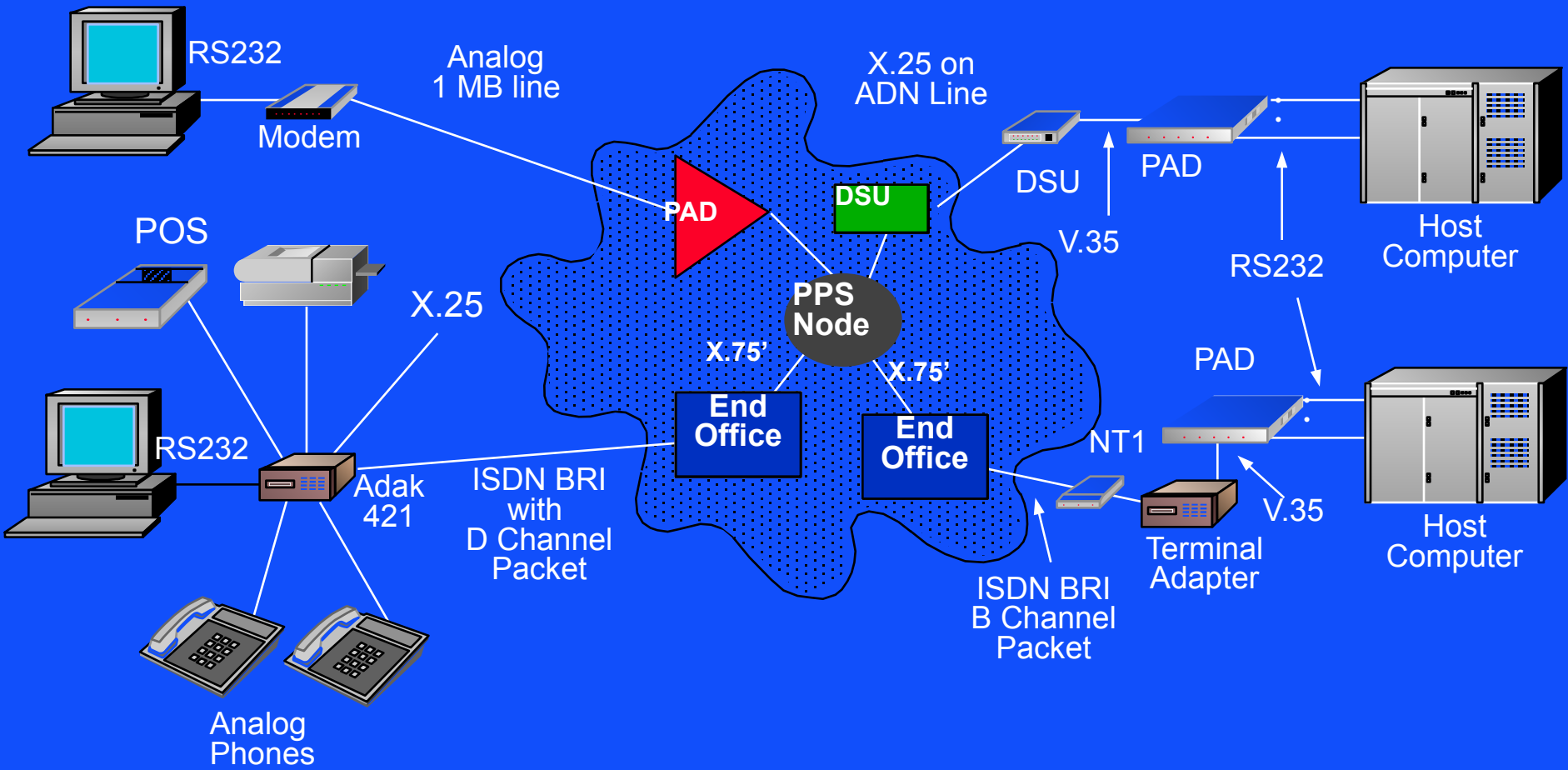


Intel ProShare Video System 200

- 2 cards
- Camera
- Earphone/microphone
- Works on an IBM compatible 486 DX PC

Point of Service

“The Network”



For More Information

Pacific Bell Applications BBS

510-277-1037 for modems
800-336-1037

510-823-4888 for ISDN calls

Internet

Gopher: <gopher.pacbell.com>
WWW: <http://www.pacbell.com>

Questions about the BBS

Applications Lab 510-823-1663