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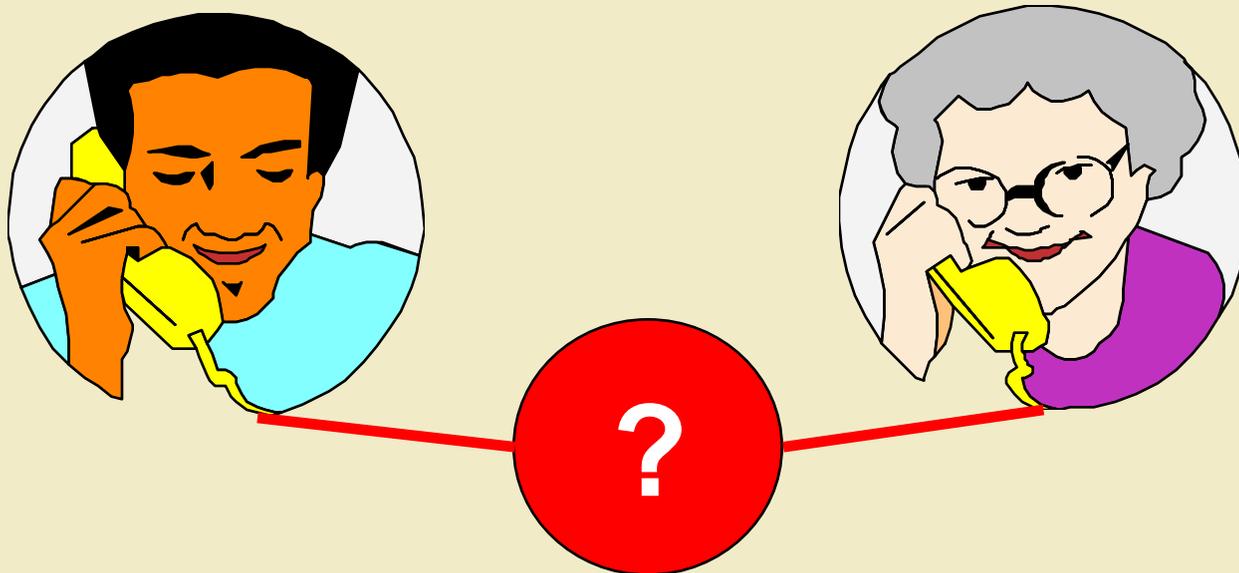
How Phone Systems Work

Carol Matthey
Deputy Bureau Chief
Common Carrier Bureau
FCC

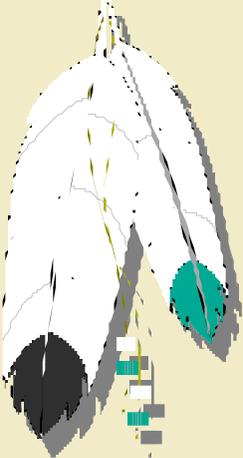
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How do phone calls get from one person to another?



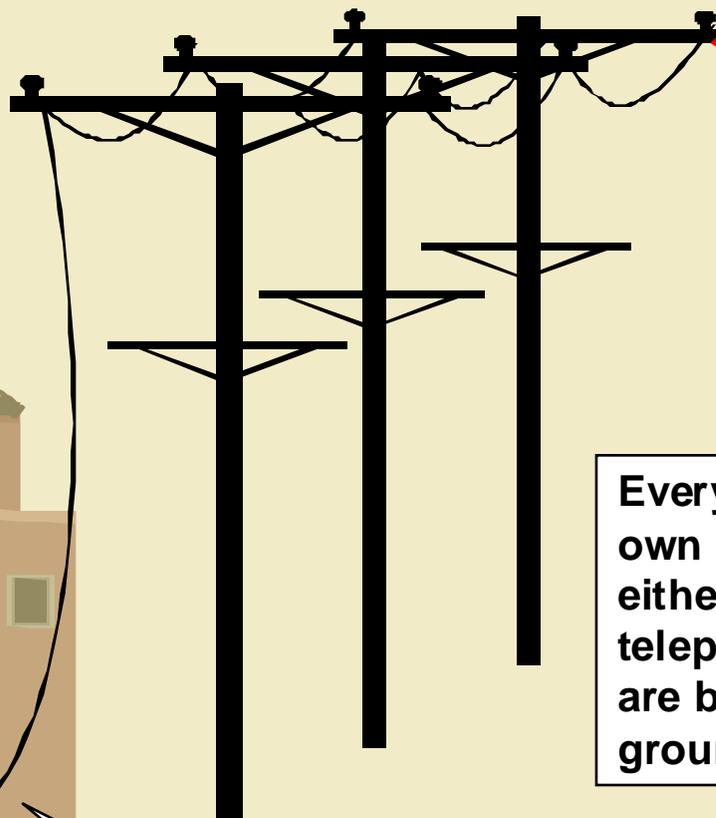
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But how does it get from here to Anne?



Every home has its own "line." Lines either hang from telephone poles or are buried in the ground.



The signal travels through the line inside the house and out to the wires on the telephone poles.

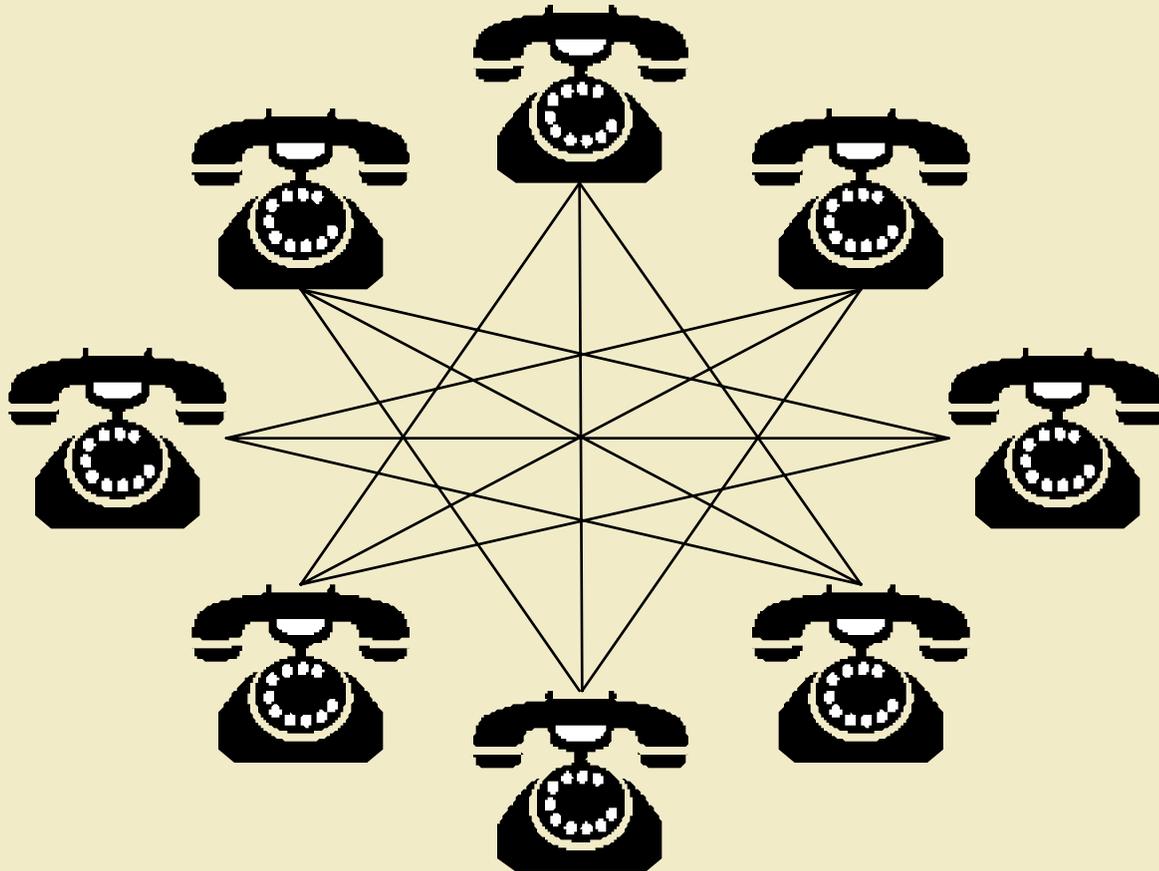
John picks up the phone and dials Anne's phone number.



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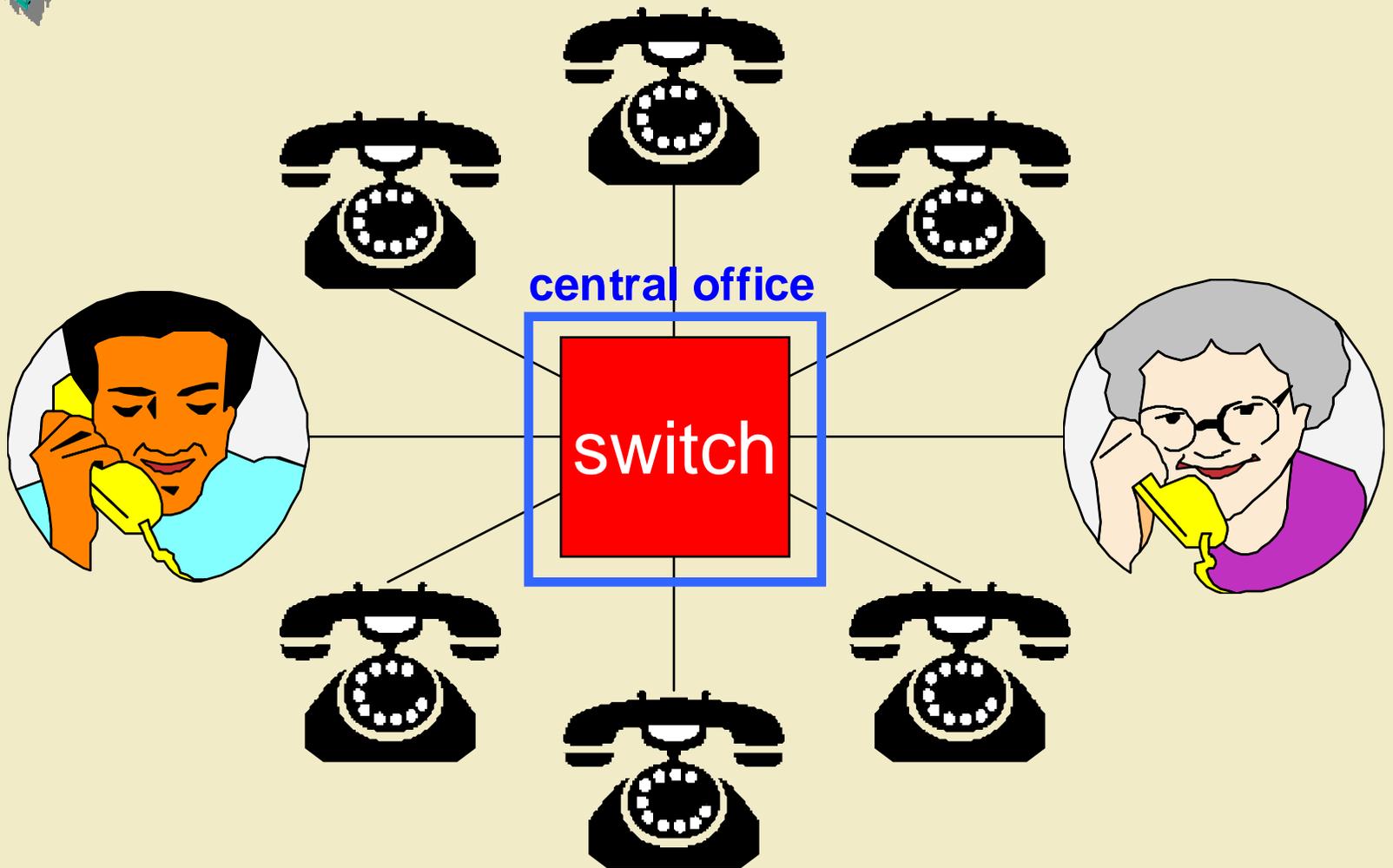


Early Telephone Connections...



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Modern Switching





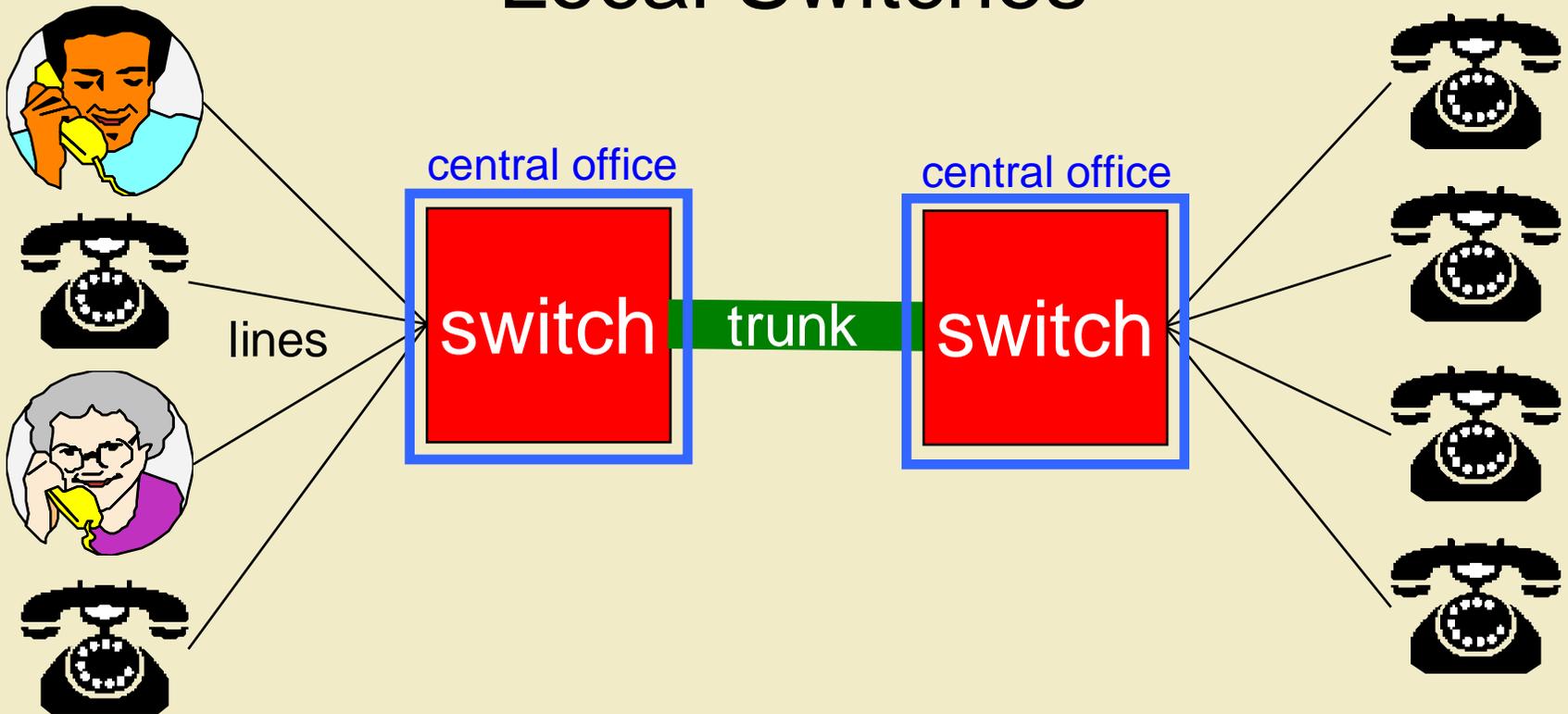
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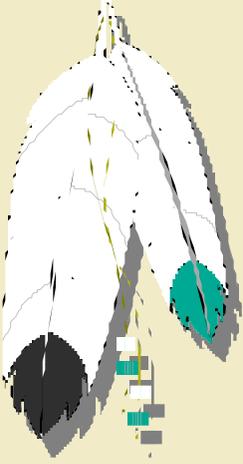
Central Office Switches

- Large computers
- Interpret dialed digits
- Connect lines to other lines
- Provide advanced calling features (call waiting, caller ID, voicemail, etc)
- Connect lines to trunks: connections between switches

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Connections Between Local Switches



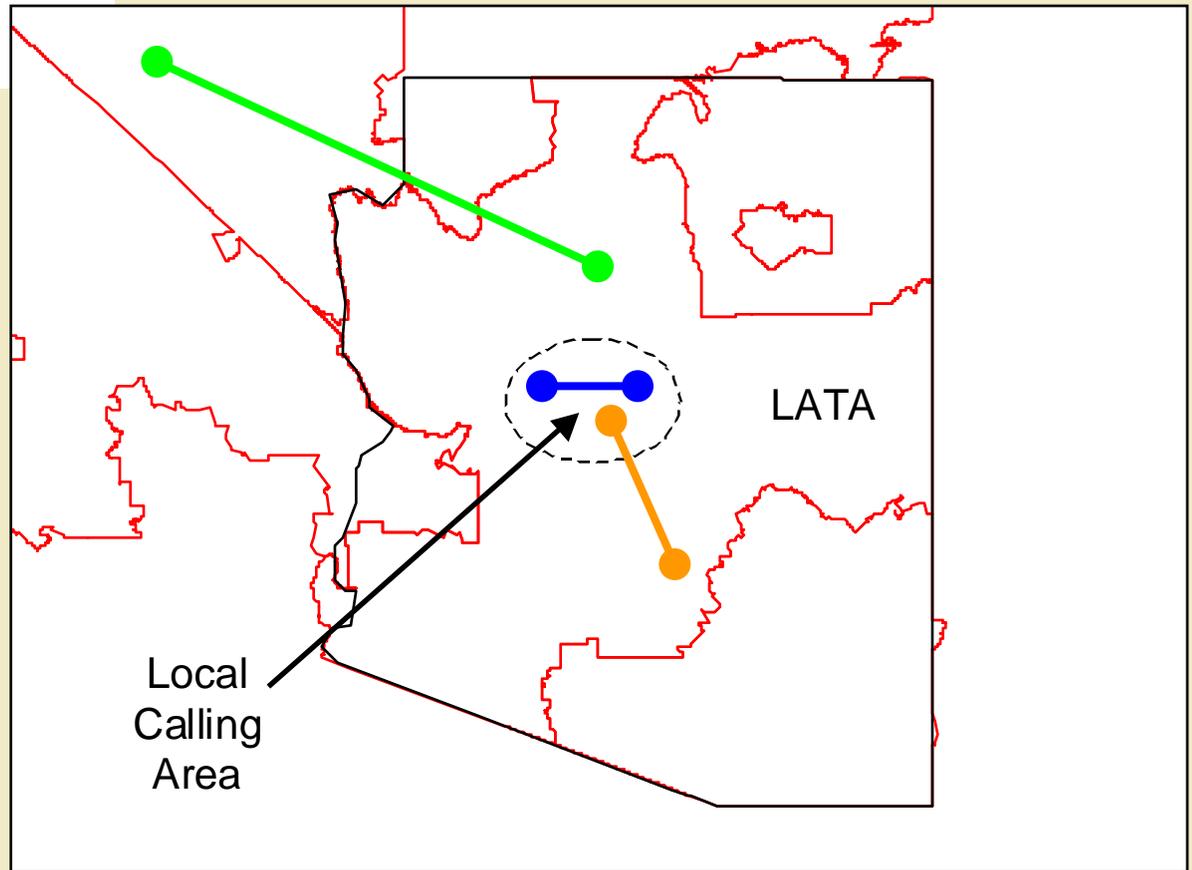
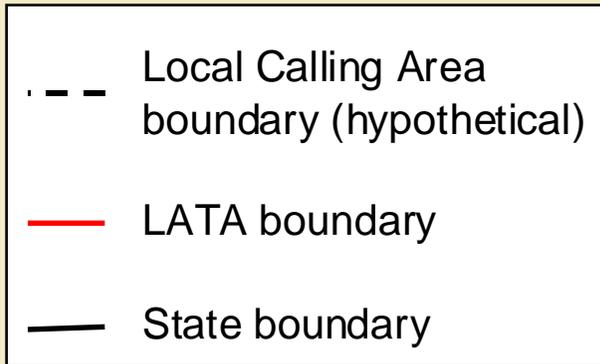
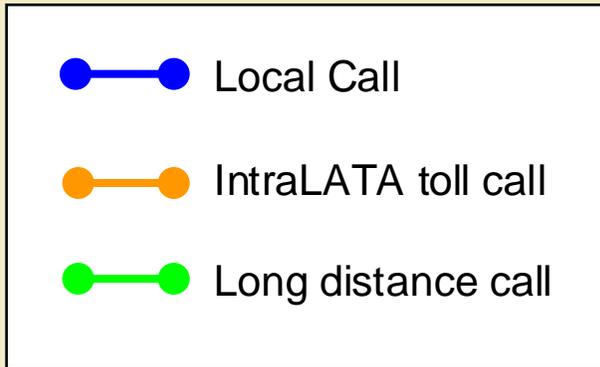
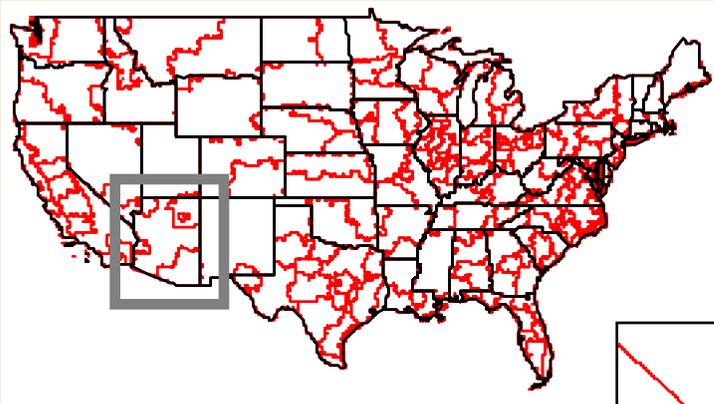


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Local Phone Service

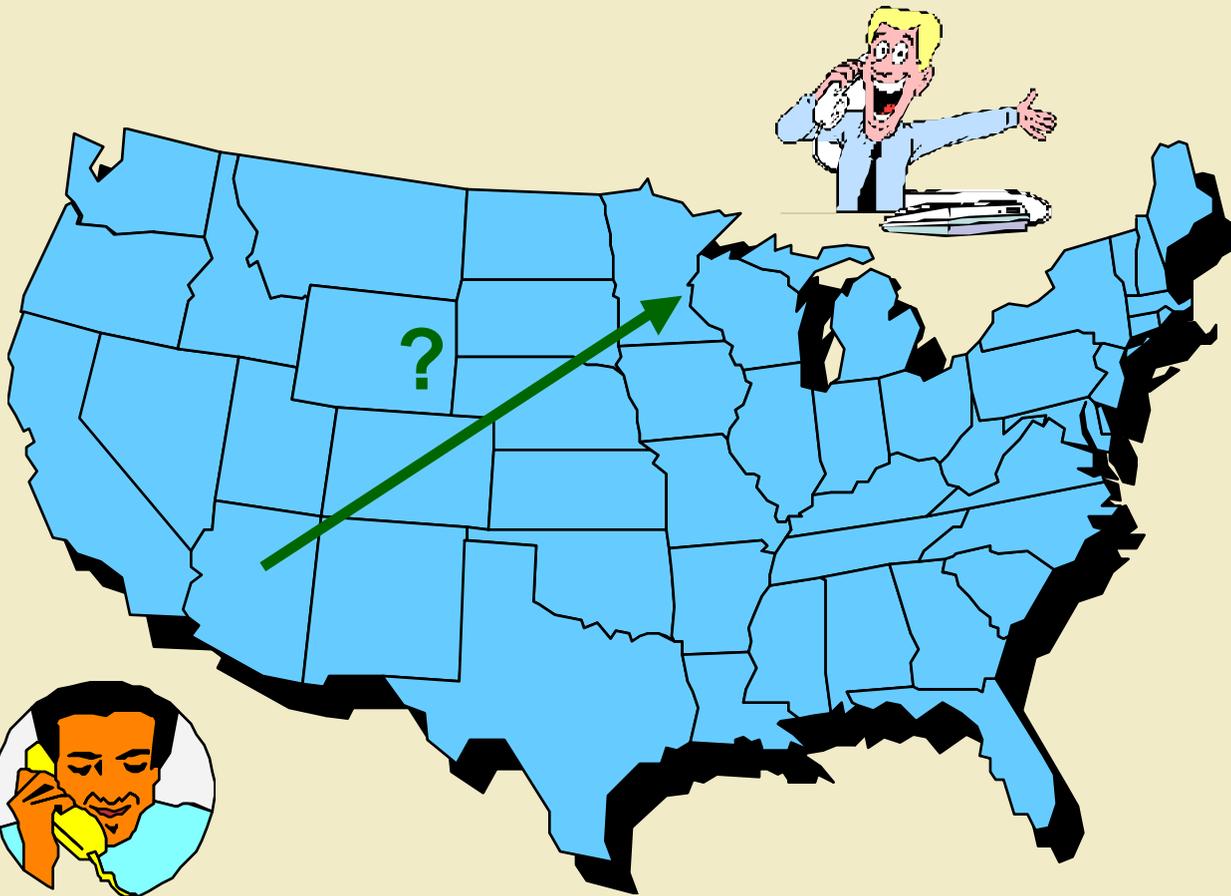
- Calls carried by the “LEC” (Local Exchange Carrier)
- Fees
 - monthly charge for basic service
 - charge includes either
 - dial tone with fee for each call (least expensive), OR
 - set number of calls, OR
 - unlimited local calls (most expensive)
 - Lifeline reduces charge for qualifying low-income customers

Local Calling Areas and LATAs



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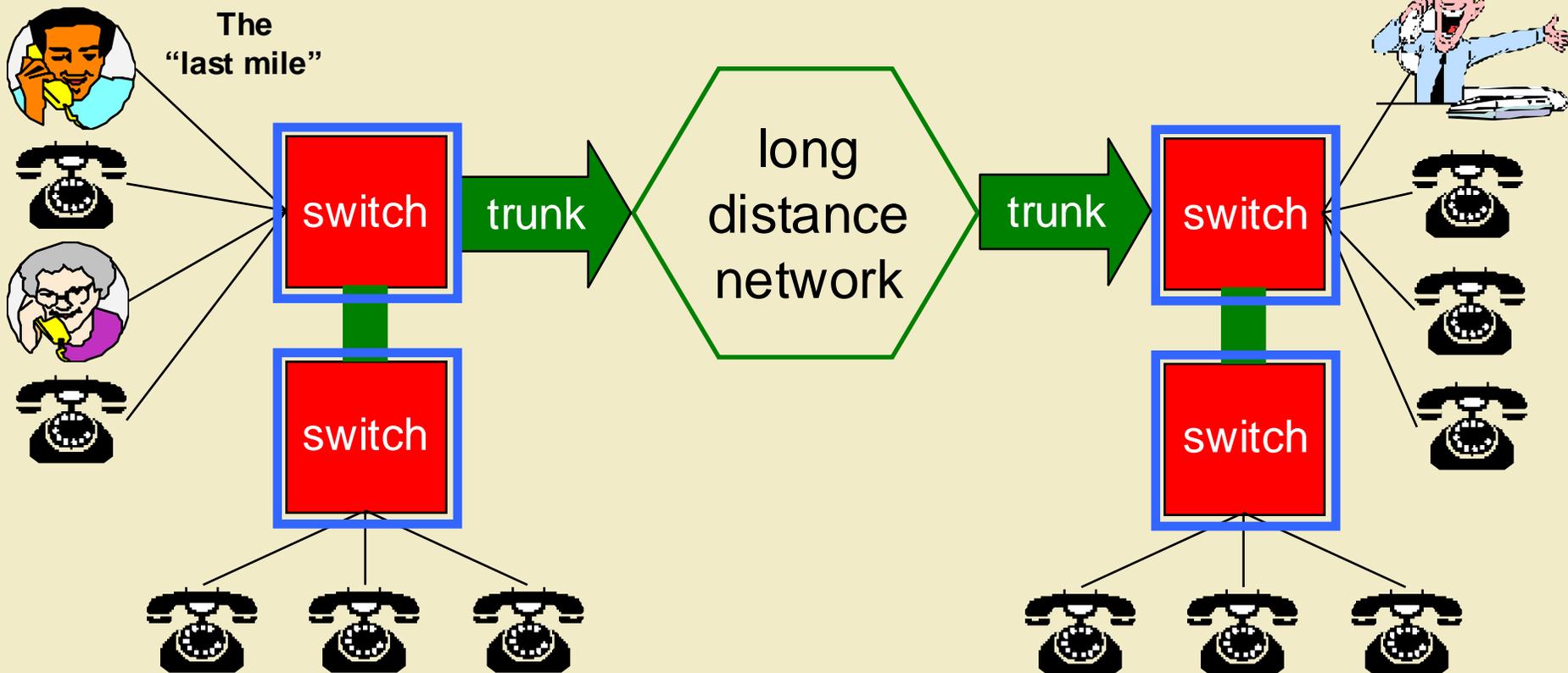
How does John in Arizona
call Tom in St. Paul?



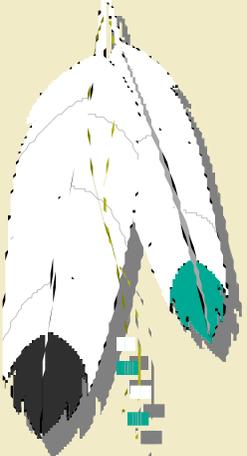
INDIAN TELECOM TRAINING INITIATIVE 2000

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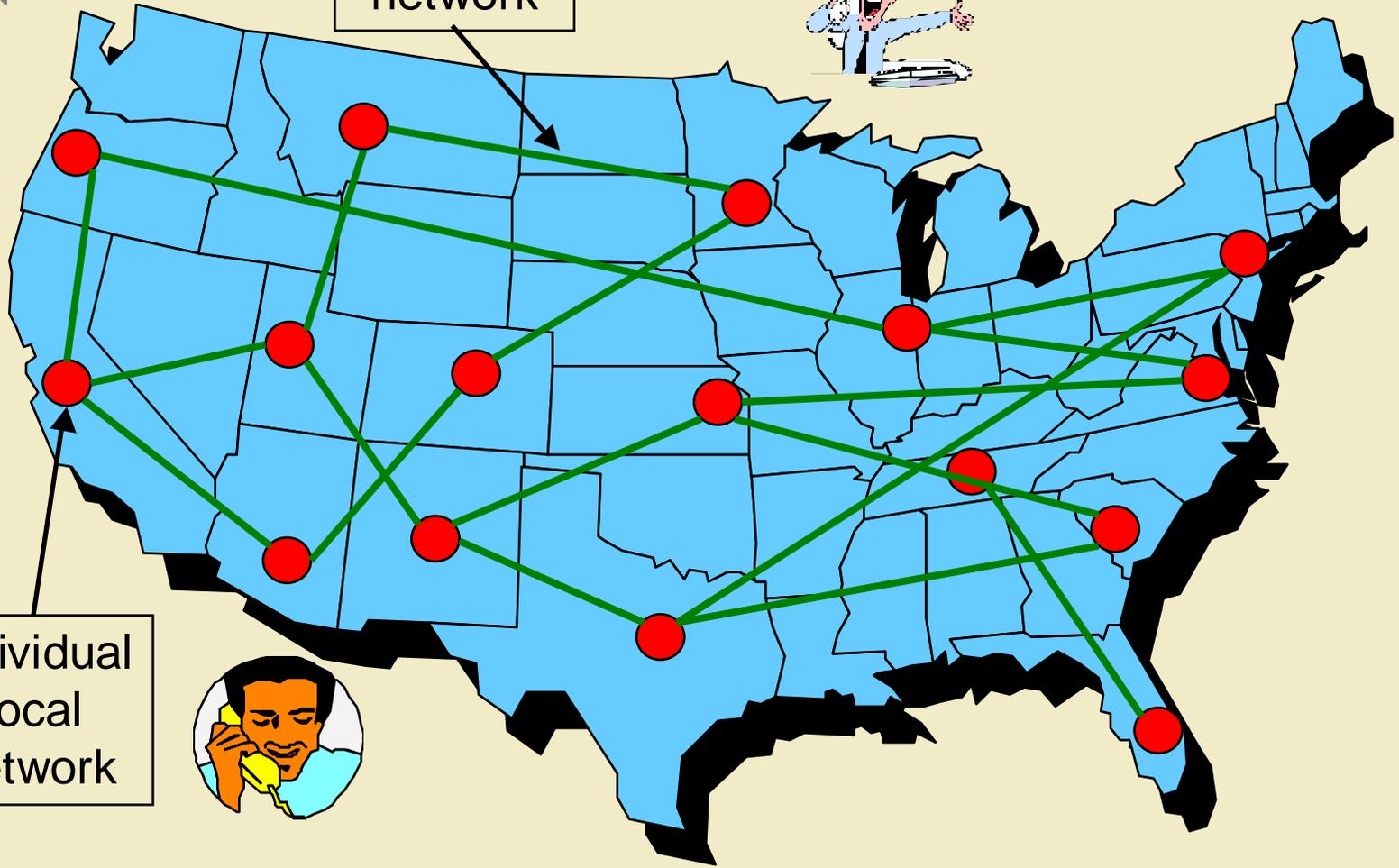
Long Distance Connection



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long distance network



individual local network



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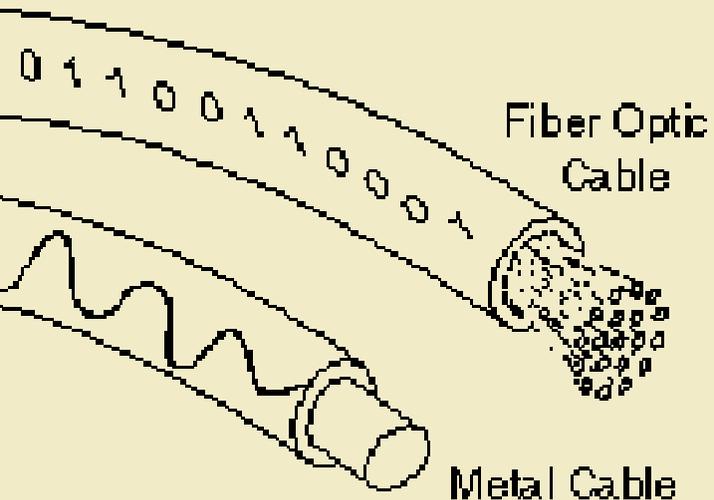
Long Distance Phone Service

- Add-on to local service
- Long distance carriers
 - AT&T, MCI WorldCom, Sprint, and hundreds of smaller companies
 - pay “access charges” to LECs for completing their long distance calls
- Fees
 - per-minute charges for long distance calls
 - additional to monthly charge for basic local service
 - have decreased in price over time

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Fiber Optics

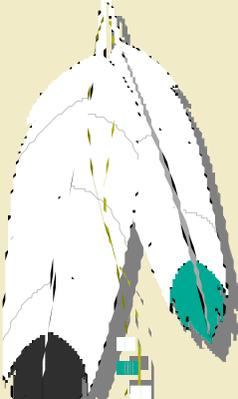
- hair-thin strands of glass
- signals travel as waves of light
- 100% digital
- faster, more reliable, and can carry more information than copper wires



- used in long distance networks, the Internet backbone, and local switch trunks
- many large urban businesses also use fiber lines to connect to the local switch

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Computers Use Phone Lines to Connect to the Internet

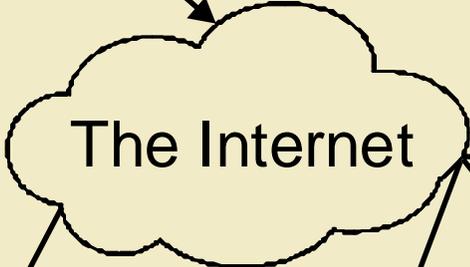


The **modem** inside the computer connects to the phone line, and dials the phone number of the user's ISP to connect to the Internet.

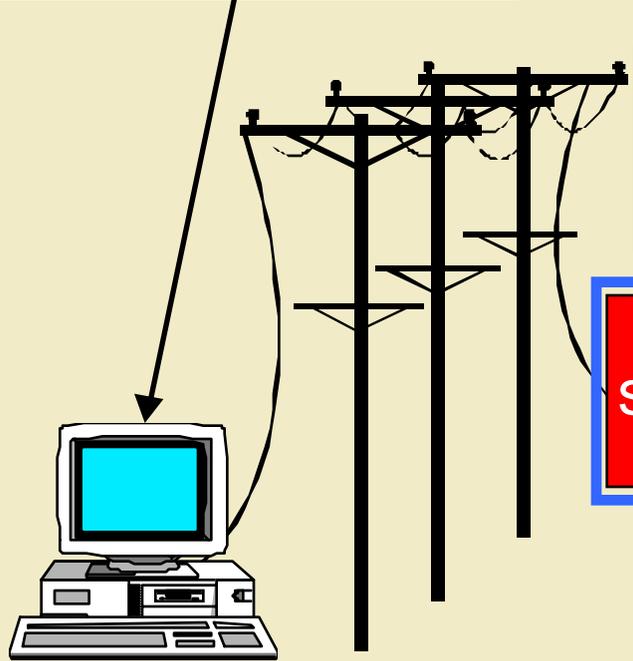
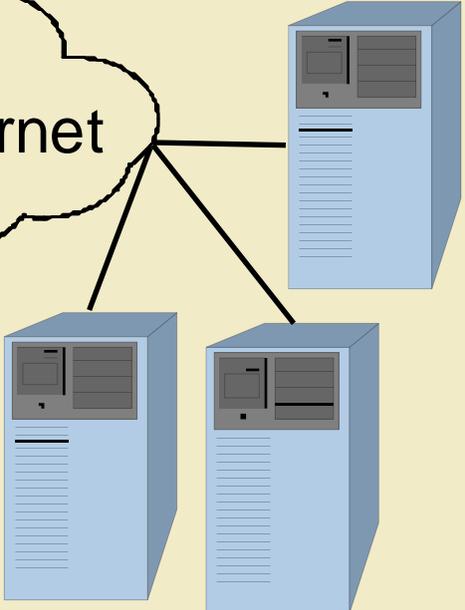
The **Internet** backbone is made up of packet switches, routers, peering sites/NAPs, and extensive fiber networks that send data from ISPs to Web servers and back again.

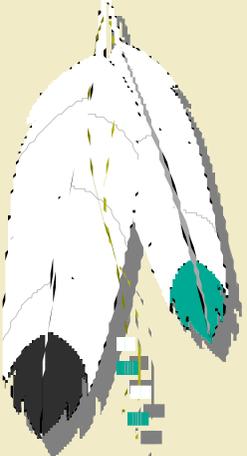
Web servers store the content that users access through the Internet. Every web site is stored on a Web server.

The local **switch** sends the "call" through the local phone lines to the ISP.



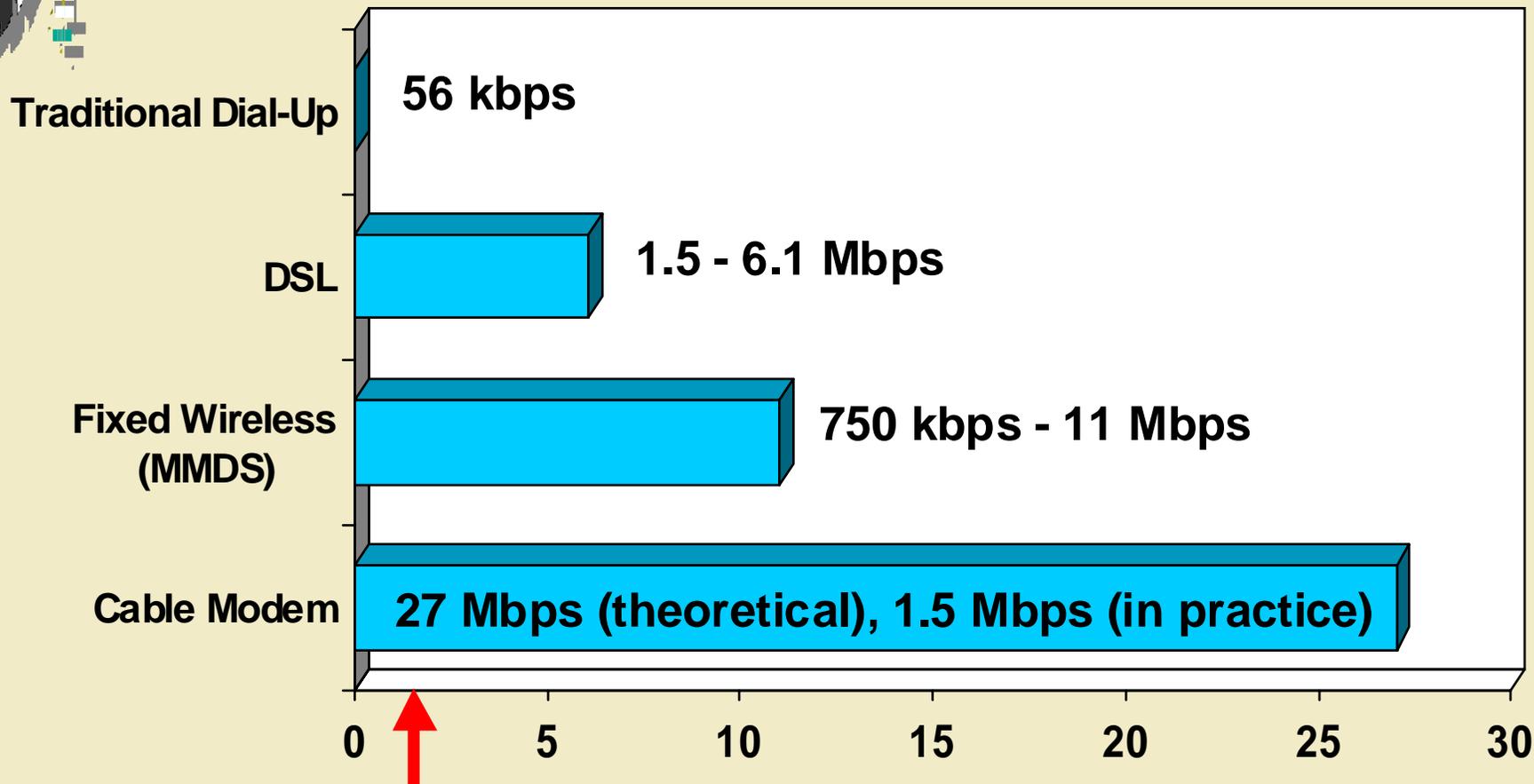
The **ISP's** modems and servers then connect the user to the Internet.





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Internet Speeds (Maximum Download)



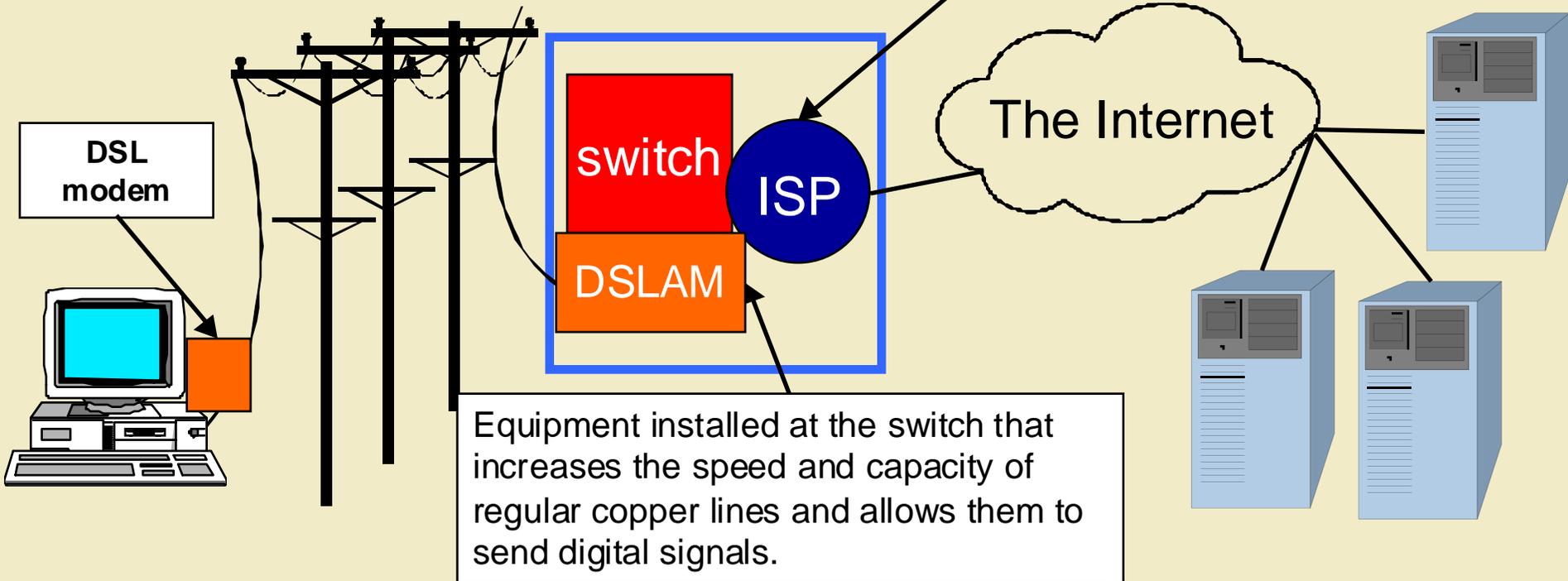
“Broadband” Service: at least 2 Mbps

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DSL (Digital Subscriber Line)

Most DSL users must be within 18,000 feet of the DSL-equipped central office.

A user's DSL provider may also be his/her ISP, and the connection to the Internet usually begins here.



Equipment installed at the switch that increases the speed and capacity of regular copper lines and allows them to send digital signals.



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For more information
about the FCC:

See: <http://www.fcc.gov>

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