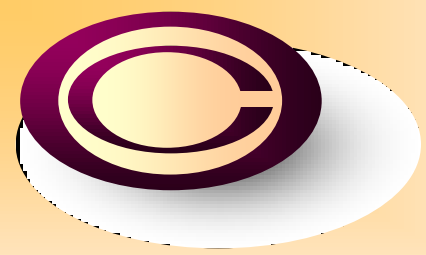


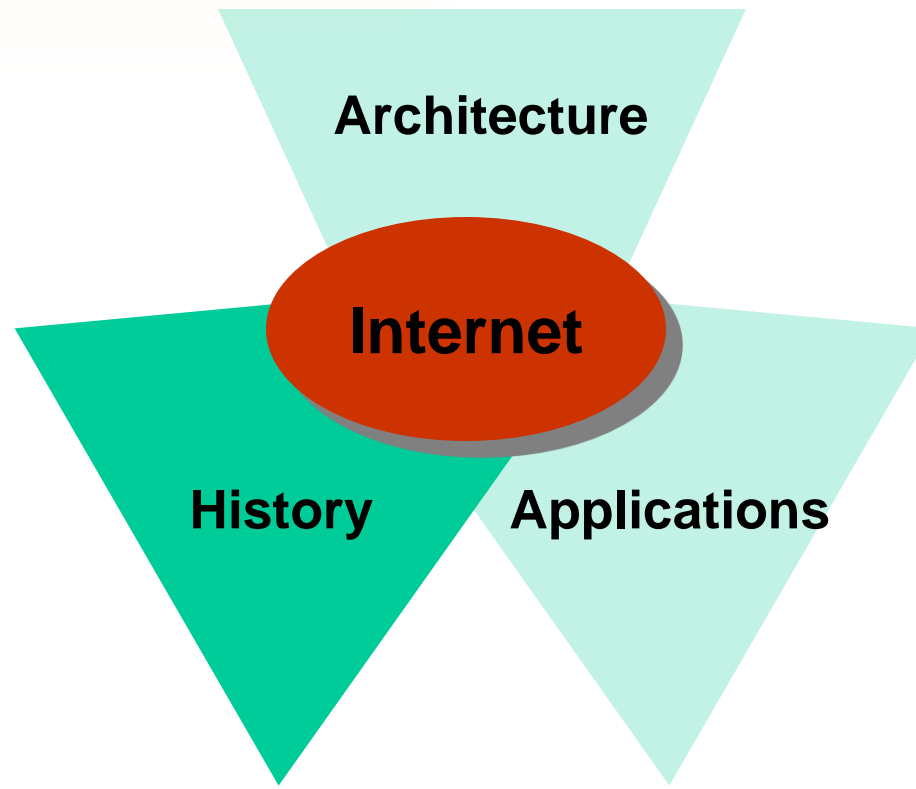
# Internet Basics

Mike O'Connor

October, 2008



# Agenda



# 50's & 60's

**JFK elected**

## **Late '50's**

ARPA (Advanced Research Projects Agency) founded. The development of information technologies is a primary focus.

## **Early '60's**

Packet-switching concept outlined by Paul Baran and his colleagues of the Rand Corporation.

## **1965**

ARPA sponsors a study entitled *A Cooperative Network of Time Sharing Computers*

## **1967**

ACM Symposium on Operating Principles, packet-switching plans presented

ARPA's university and commercial contractors attend meeting to discuss protocol for exchanging messages between computers

Concept for the ARPANET packet switch, the IMP (interface message processor), is developed

## **1968**

ARPA releases a Request for Quotation (RFQ) to build a network of 4 IMPs, with a possible growth to 19

## **1969**

DoD contracts a team of business, academic and government researchers to collaborate on the ARPANET

Four sites are chosen as the homes of the first ARPANET IMPs; UCLA, SRI, UCSB and the University of Utah

**John Glenn orbits the earth**

**JFK assassinated**

**First Xerox copier**

**RFK and MLK assassinated**

**Apollo landing**

# Early 70's

**“All in the family” TV show begins a 12-year run**

**Nixon reelected**

**Watergate break-in**

**Nixon resigns**

**Fall of Saigon, end of the Viet Nam war**

**1970**

Creation of the NCP (network control protocol), direct precursor to TCP

**1971**

Computers are now connect at nearly two dozen sites, including Harvard University and MIT

Protocols for remote terminal access (telnet) and file transfer (FTP) are defined by the Network Working Group (NWG)

**1972**

Public demonstration of ARPANET at International Conference on Computer Communications in Washington DC

First e-mail message is sent via the ARPANET by Ray Tomlinson of BBN

**1973**

ARPANET's first international connections between England and Norway

**1974**

Vint Cerf and Bob Kahn publish the paper defining Transmission Control Protocol (TCP), to allow computer communication across of system of networks

**1975**

Network grows beyond 63 IMPs, requiring a major change in standards for network addresses

# Late 70's

**Jimmy Carter is elected**

**1976**

First Internet routers developed by BBN, Stanford and University College, London

**First computerized word-processor**

CCITT defines X.25 protocol for public packet networks

AT&T Bell Labs develops UUCP (Unix to Unix copy protocol)

**Star Wars**

**1977**

First TCP for Unix (on a DEC PDP-11/44)

**Margaret Thatcher elected**

**1979**

USENET established

**Apocalypse Now**

# Early 80's

**Sony Walkman introduced in Japan**

**1980**

ARPANET now spans the country, connecting over 400 host computers at university, government and military sites. More than 10,000 people have access.

**MTV premiers**

**1981**

Computers at 200 sites are linked via the ARPANET

The change from NCP to TCP is mandated by Jan. 1, 1983

**Prince Charles and Princess Di are married**

**1982**

US Department of Defense decides to build the Defense Data Network, based on ARPANET technology

**E.T., The Extra Terrestrial**

**1983**

ARPANET splits into ARPANET and MILNET

TCP/IP is established. The Internet is now in place

**US invades Grenada**

Domain name server protocol developed at the University of Wisconsin

MCI Mail launched

**Mikhail Gorbachev takes over, introduces glasnost (openness) & perestroika (restructuring)**

**1984**

Root domain name server established

Number of ARPANET hosts passes 1,000

# Late 80's

**1st "personal" laser printer  
Apple Laser Writer - \$7,000**

**We Are the World**

**"Just Say No"**

**George Bush elected**

**Internet is used as a  
tool of student revolt  
in China**

**Sex, Lies and Videotape**

**1986**

The National Science Foundation implements the NSFNET, a system of regional networks of routers connected over a backbone network

**1987**

There are now 4000 bulletin boards linked by hobbyist networks

Merit Networks Inc., together with IBM and MCI, win contract to manage the NSF backbone

**1988**

The ARPANET averages 77,448,692 packets per day

The dismantling of the ARPANET begins

**1989**

The ARPANET ceases to exist

Number of hosts on the Internet passes 100,000

The number of requests for on-line files via FTP and Info-Server averages 1,000 per month

# Early 90's

**1990**

The Electronic Frontier Foundation is founded

**1991**

Commercial Internet Exchange (CIX) is formed

Gopher is introduced, developed at the University of Minnesota

WAIS (wide area information search) is released

**1992**

The Internet links more than 17,000 networks in 33 countries

World Wide Web is launched

**1993**

NSF creates the InterNIC

More than 1,500,000 hosts on the Internet

**1994**

Commercial users out-number research and academic users by 2-to-1 ratio

Mosaic eclipses Gopher, and the Web becomes the most rapidly-expanding application in history

**1995**

Popular media "discover" the Internet

NSFNET reverts to research-only network, main US traffic routed through interconnected network providers

**The Savings and Loan scandal**

**The Gulf War**

**Bill Clinton elected**

**Jerry Garcia dies**

**Forrest Gump**



# Late 90's

**Hubble telescope**

**Mishaps on the Mir  
space station**

**Hong Kong returned  
to Chinese rule**

**Northern Ireland  
peace plan**

**Titanic**

**Frank Sinatra dies**

**1996**

30,000,000 Internet hosts

Spam (unsolicited email messages) becomes a serious problem on the Internet

Communications Decency Act, a bill aimed at controlling Web content, is passed

Java introduced

**1997**

Pretty Good Privacy (PGP) software introduced

Communications Decency Act declared unconstitutional

Domain-names are sold for over \$100,000

Streaming media (RealVideo, etc.) is introduced

**1998**

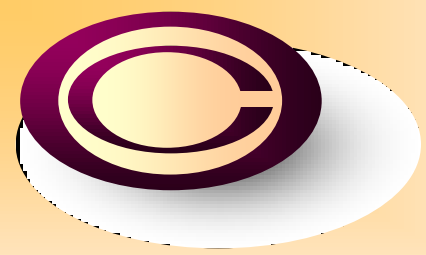
Netscape loses the browser battle to Microsoft

Matt Drudge publishes early reports of Clinton's affair with Monica Lewinski, and the Starr Report is released first to the Internet

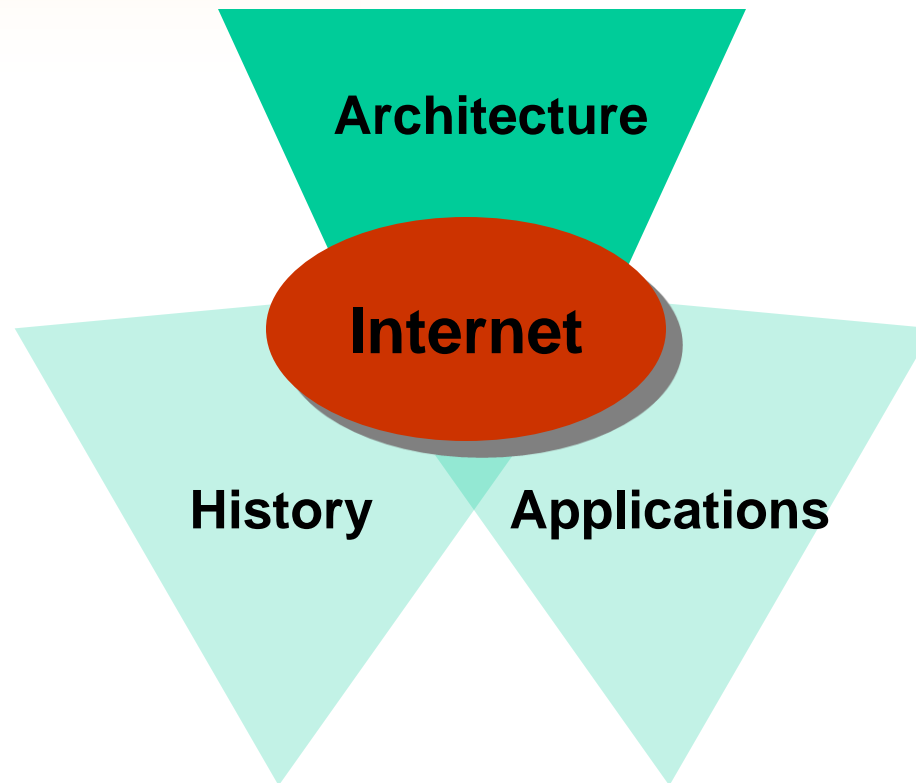
Winter Olympics on the Net

Live Web-cast of a birth

Domain name system privatized



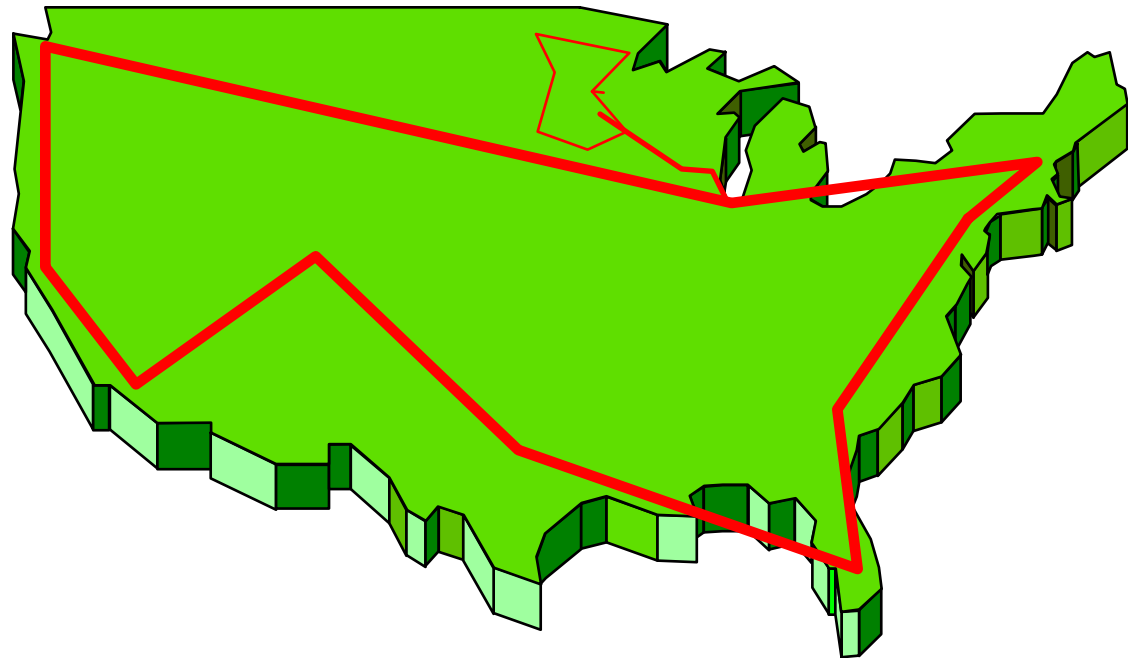
# Agenda



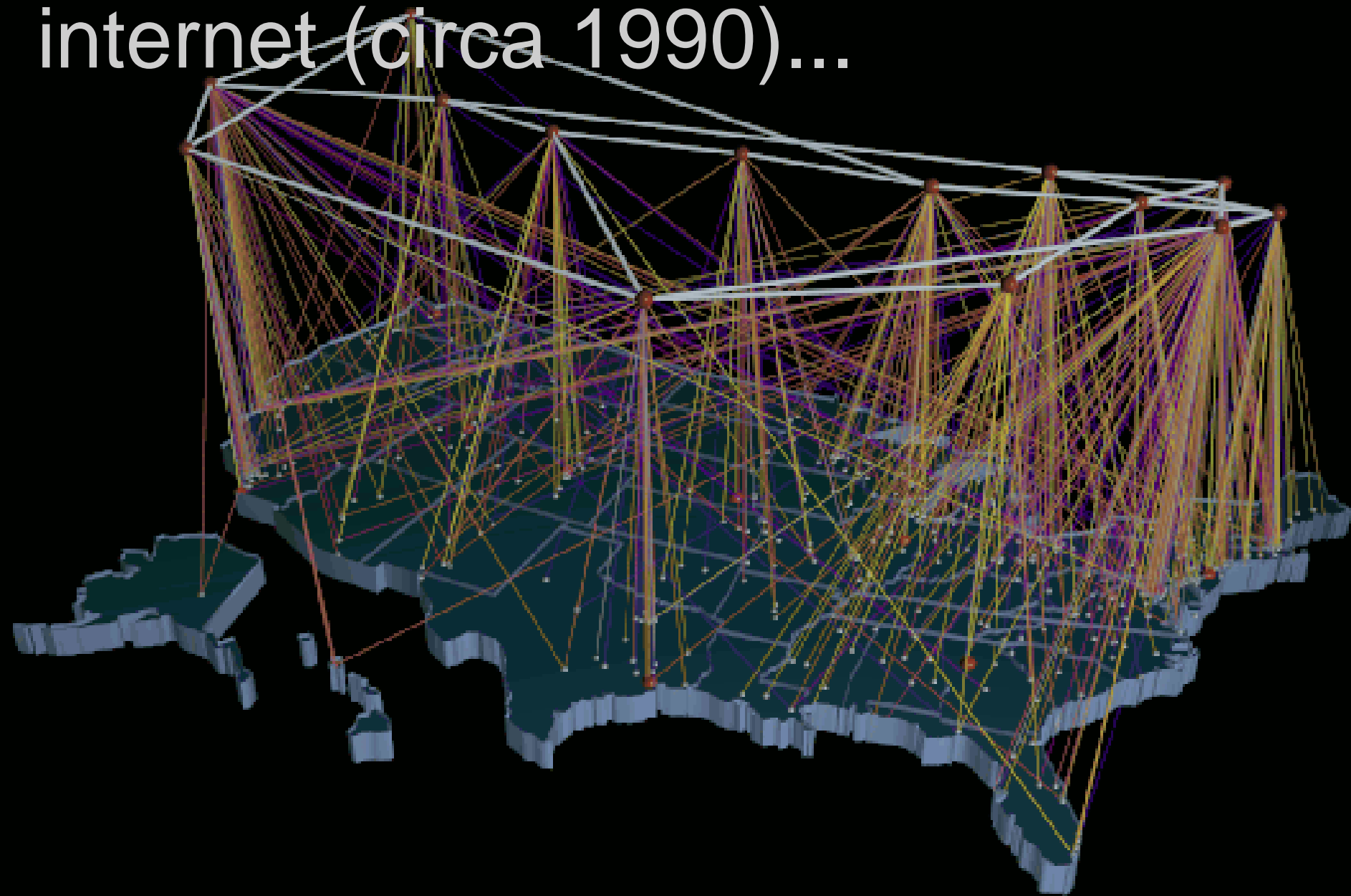
# An internet is many things, depending on your point of view.

It's a physical network of networks

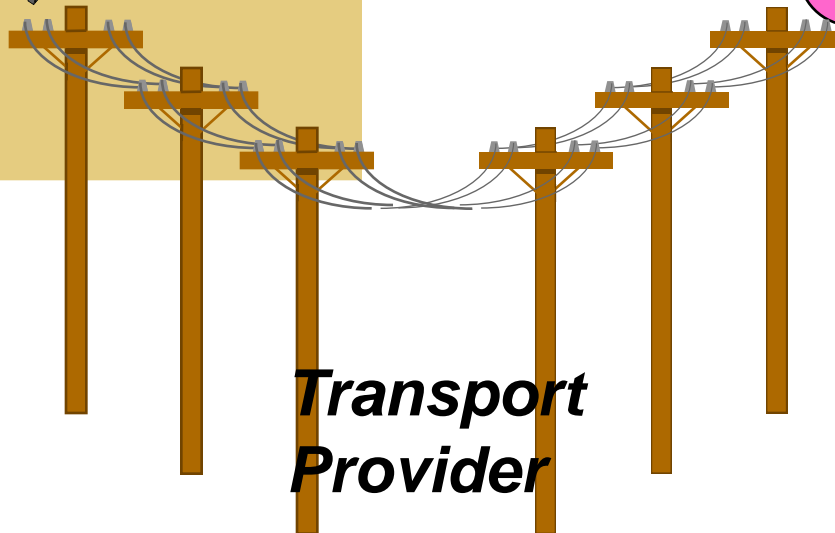
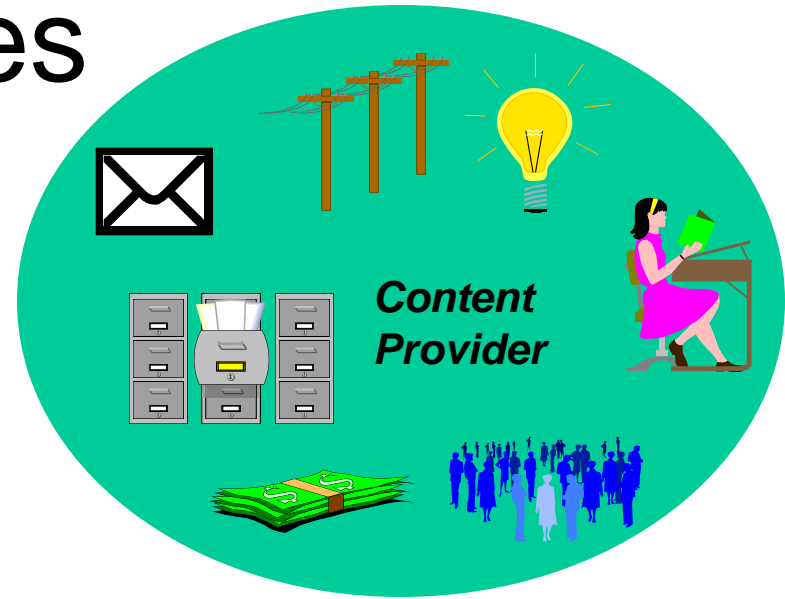
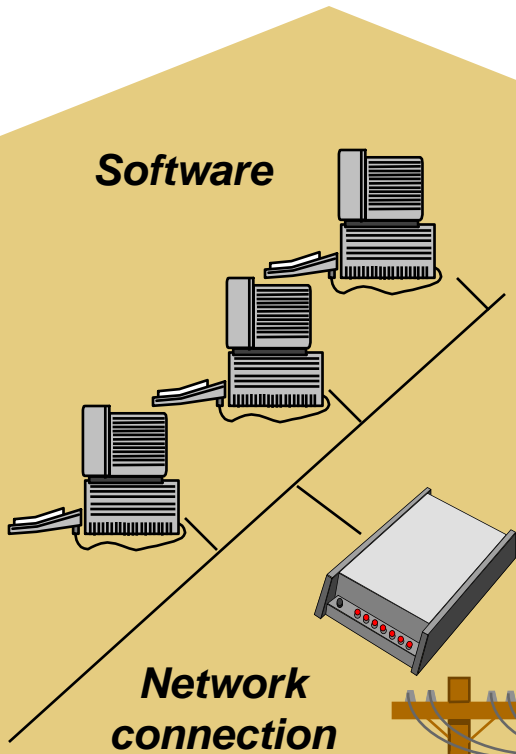
- Started by the military (ARPANET)
- Subsidized in the US by NSF
- Connects many networks worldwide



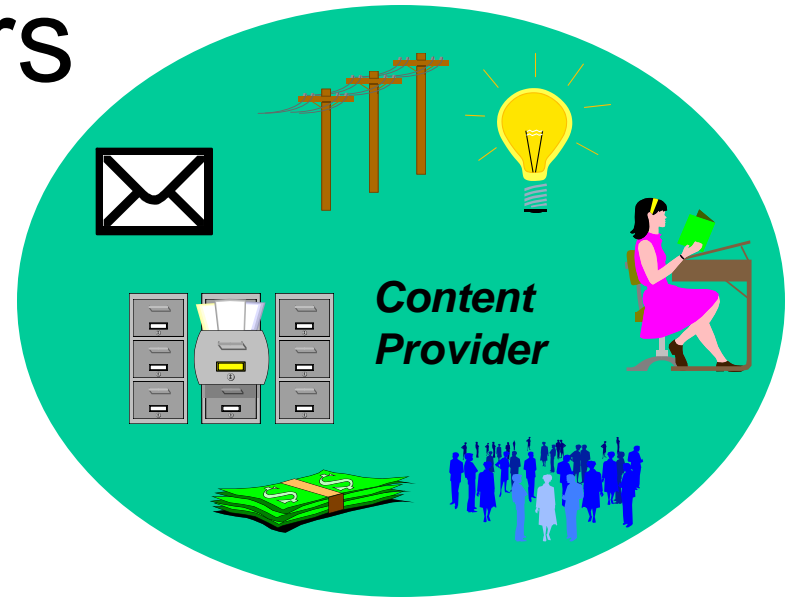
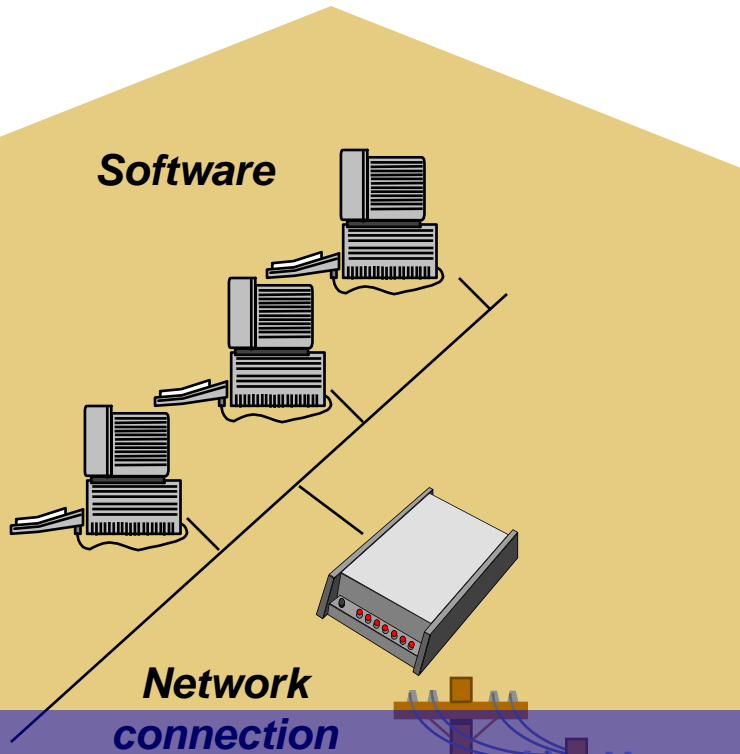
Here's a neat view of THE internet (circa 1990)...



# The pieces



# The layers



***Physical layer***

***Transport Provider***

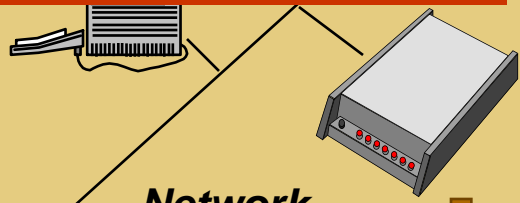
# The layers

**Big stuff;**

- **Wires**
- **Right-of-way**

**Big issues;**

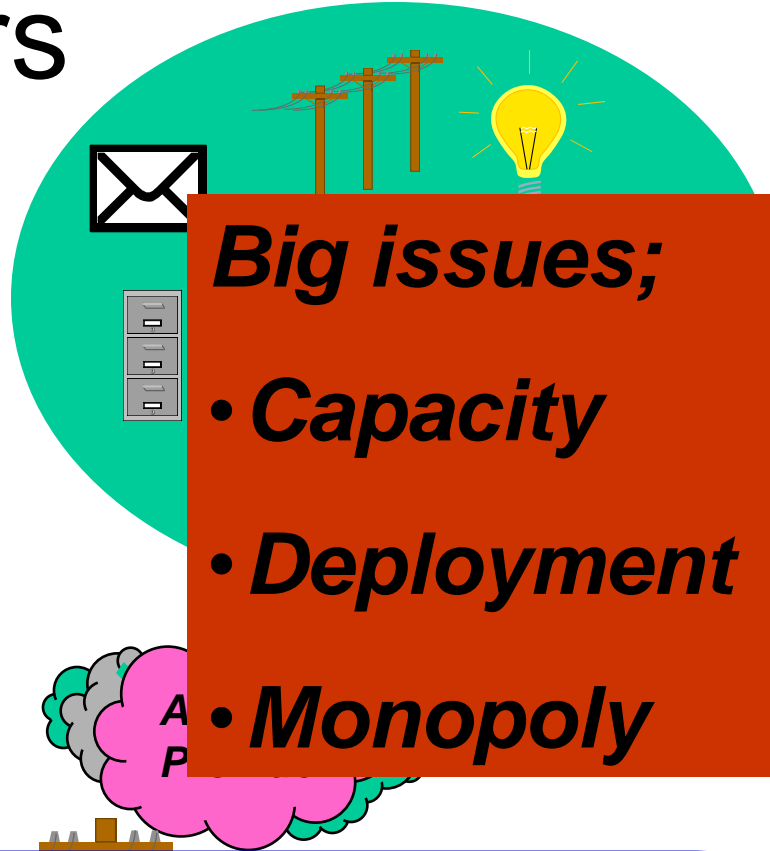
- **Capacity**
- **Deployment**
- **Monopoly**



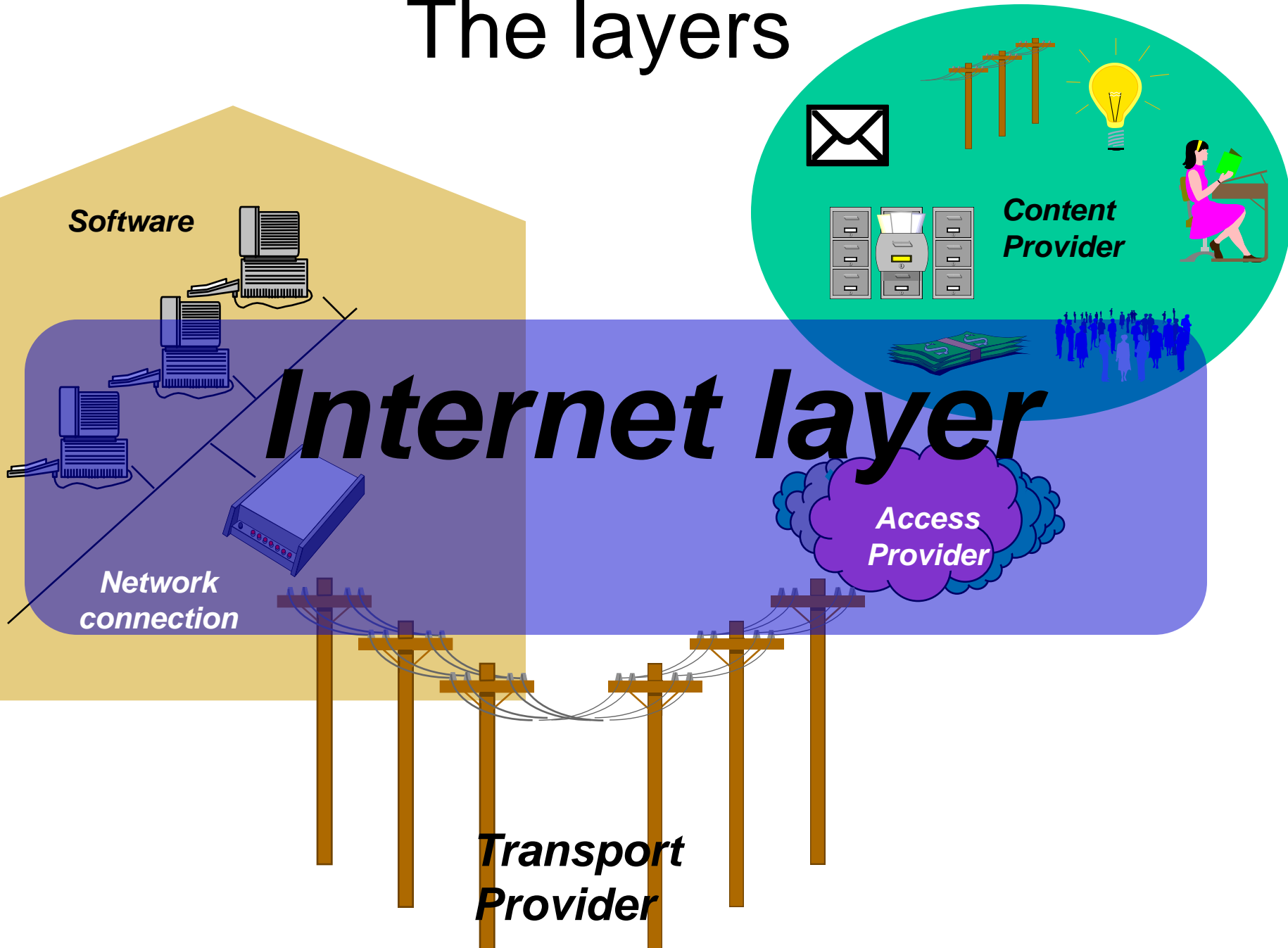
*Network connection*

# **Physical layer**

*Transport Provider*

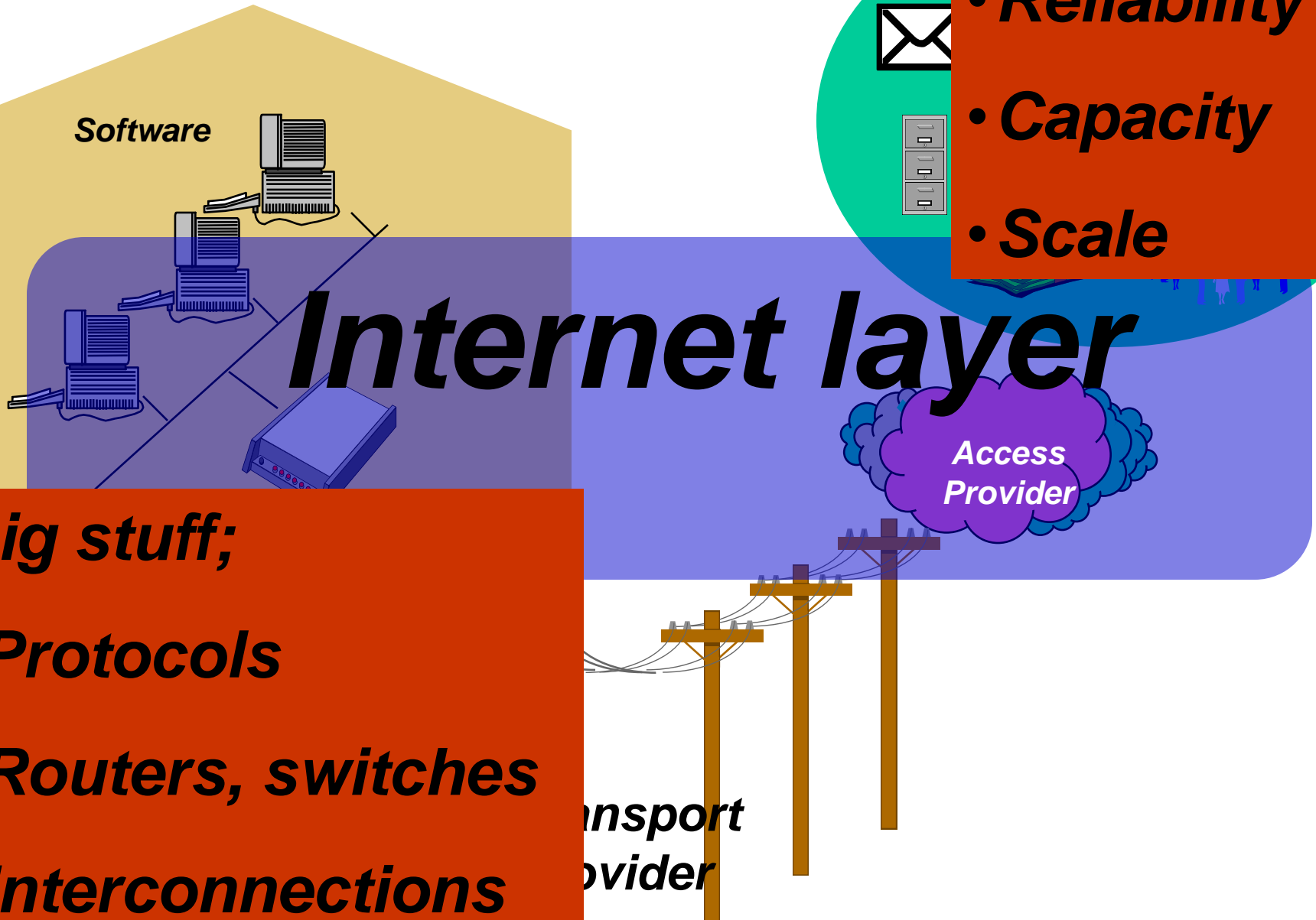


# The layers





# The layers



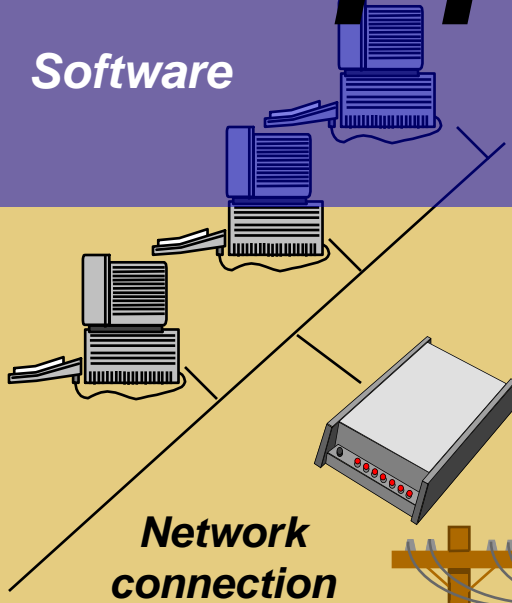
**Big stuff;**

- **Protocols**
- **Routers, switches**
- **Interconnections**

# The layers

## *Application layer*

*Software*

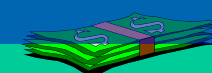


*Network connection*

*Content Provider*



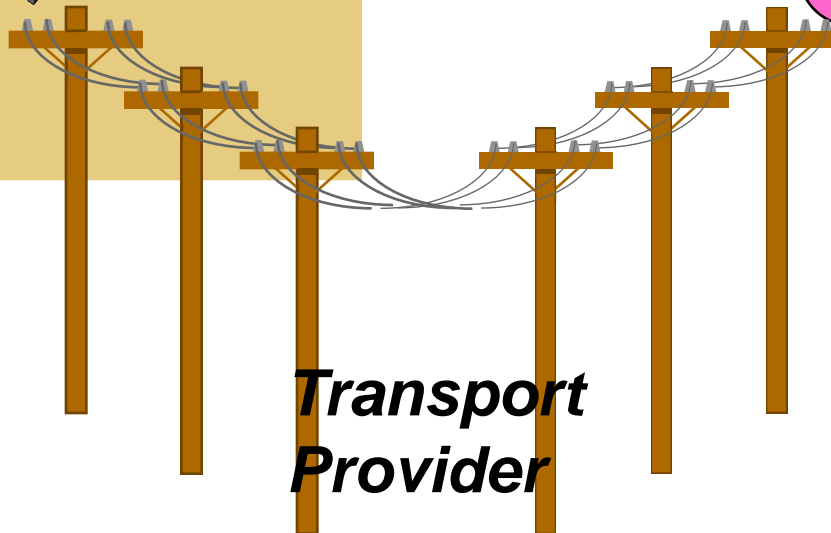
*Content Provider*



*Access Provider*



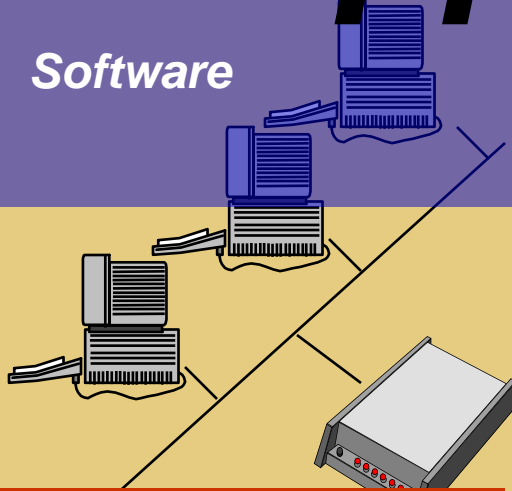
*Transport Provider*



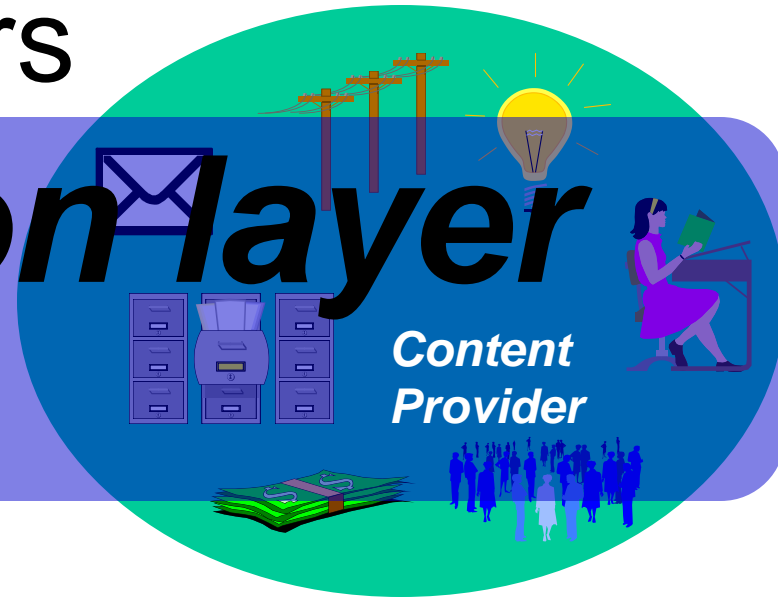
# The layers

## *Application layer*

*Software*



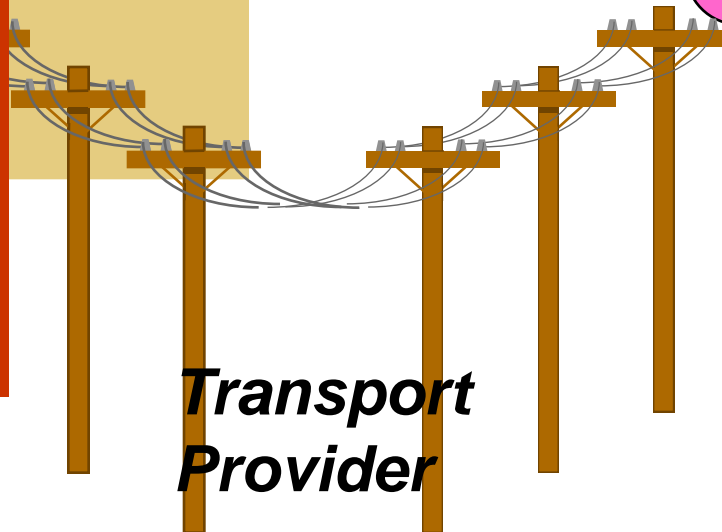
*Content Provider*



*Access Provider*



*Transport Provider*

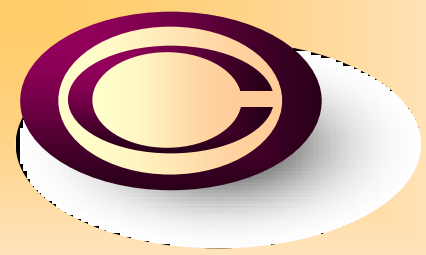


*Big stuff;*

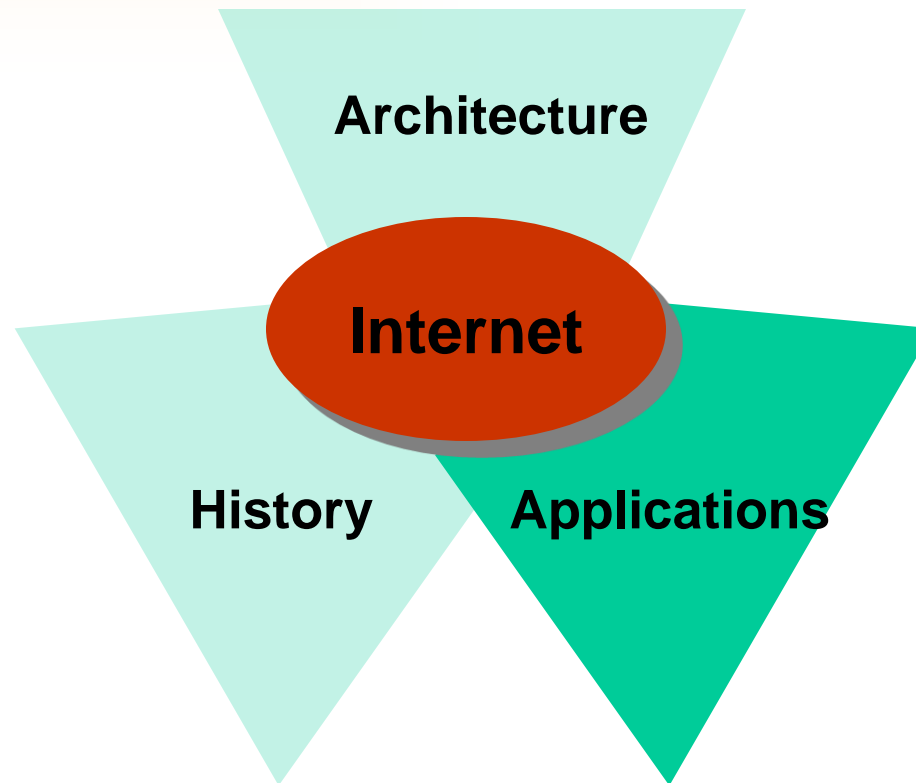
- *Software*
- *Data*

*Big issues;*

- *Ease of use*
- *Privacy*
- *Security*

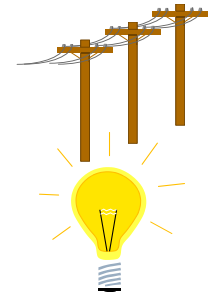


# Agenda



# Applications

- Email, messaging, VoIP
- Remote computing
- Media
- File sharing
- Search
- Discussions, communities
- E-Commerce



# Impact on users

**Commerce**

**Digital Divide**

The Internet changes business, trade, shopping, production, employment, and investment

How might the Internet encourage a flattening of the socio-economic hierarchy, to what extent might certain groups be "left behind", and what is the opportunity-cost of allowing the gap between "haves" and "have nots" to widen?

**Neighborhood**

**Architecture**

The Internet changes civic layout, architecture, public spaces, and local informal communities

**Internet**

**History**

**Applications**

**Education**

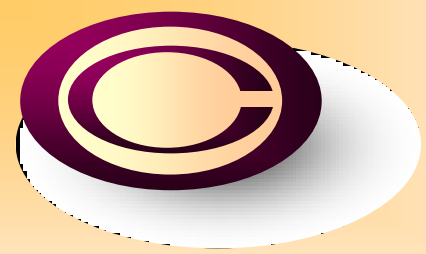
**Globalization**

**Governance**

The Internet changes knowledge production, the value of information and the system of education.

The Internet accelerates globalization. What might be the impact on a community? What can a community do to better position itself for the changes to come?

The Internet changes decision-making, collection of taxes, public services, community development organizations



# Questions?

