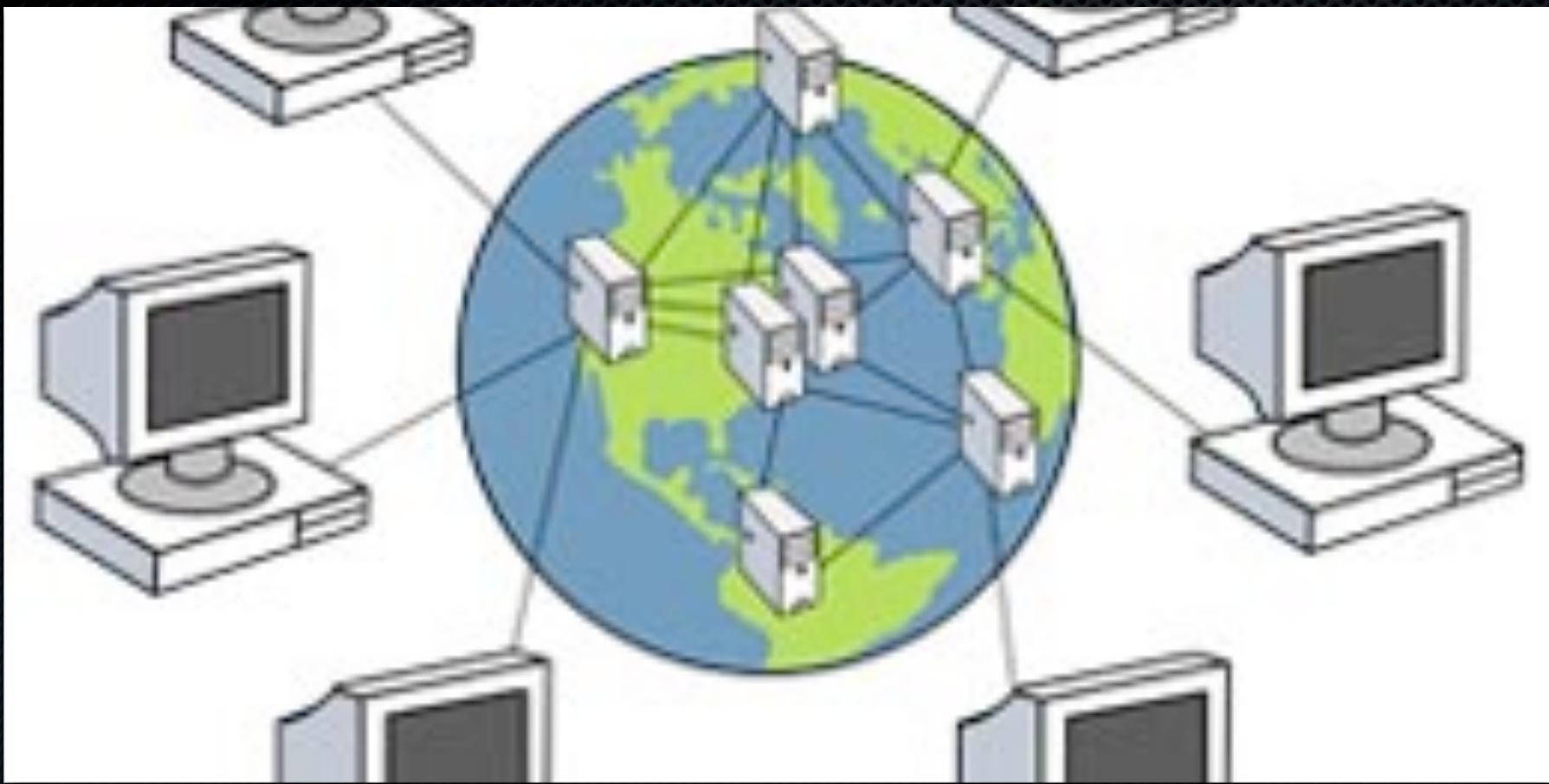


# Networks & Server Structures

Network Communications

Cloud Computing

Supervisory Organizations



# WAN Connection Types

# WAN

- In a LAN you control the cabling
- Must lease the cabling in a WAN from a 3rd party
- AKA:
  - Leased Line, Leased Circuit, Point to Point Link, WAN Link, Serial Link, 4-wire Circuit

# ISDN

- Isolated Subscriber Digital Network
- A circuit-switched telephone network system, designed to allow digital transmission of voice and data over ordinary telephone copper wires
- Up to 128kbps
- Faster than dial up - 56kbps

# DSL

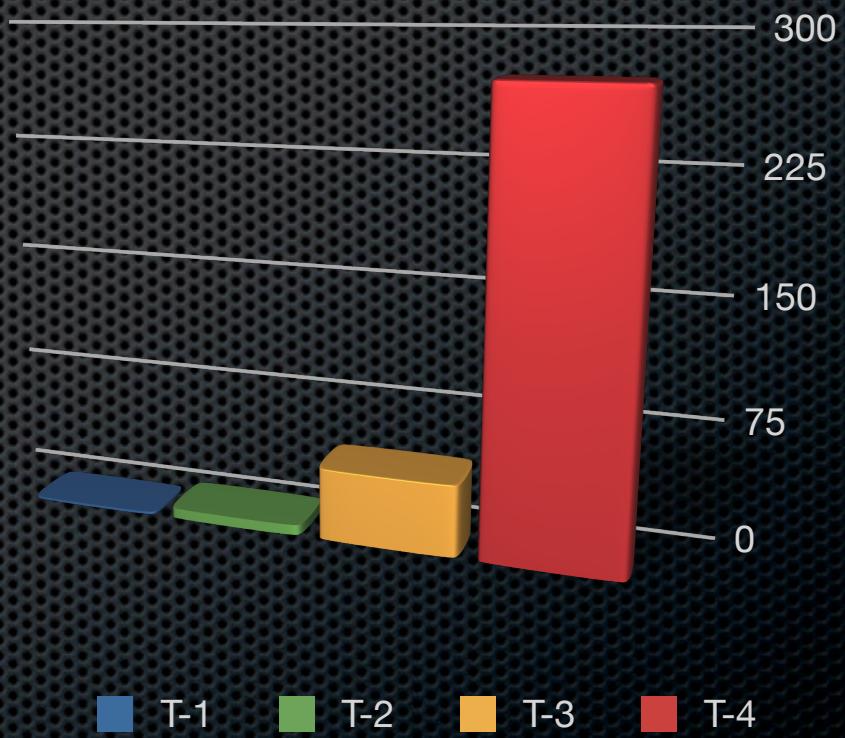
- Digital Subscriber Line
- Several different types - xDSL
  - ADSL - Asymmetric DSL
  - HDSL - Hi-Speed DSL
  - RADSL - Rate Adaptive DSL
  - SDSL - Symmetric DSL
  - VDSL - Very-high-speed DSL

# Digital Signal 0 (DS0)

- 64kbps
- Multiple DS0 lines can be multiplexed together
- 24 DS0s = DS1 = T1
- Up to 1.5Mbps

# T-Carrier Speeds

- ❖ T-1      1.54 Mbps
- ❖ T-2      6.312 Mbps
- ❖ T-3      44.736 Mbps
- ❖ T-4      274.176 Mbps



# Optical Carriers

- Synchronous Optical Networking (SONET)
- OC-1 - 51.84 Mbps
- OC-3 - 155.52 Mbps
- OC-12 - 622.08 Mbps
- OC-24 - 1.2 Gbps
- OC-192 - 9.6 Gbps
- OC-768 - 38 Gbps



# Cloud Computing

The most annoying term in IT

# What is Cloud Computing?

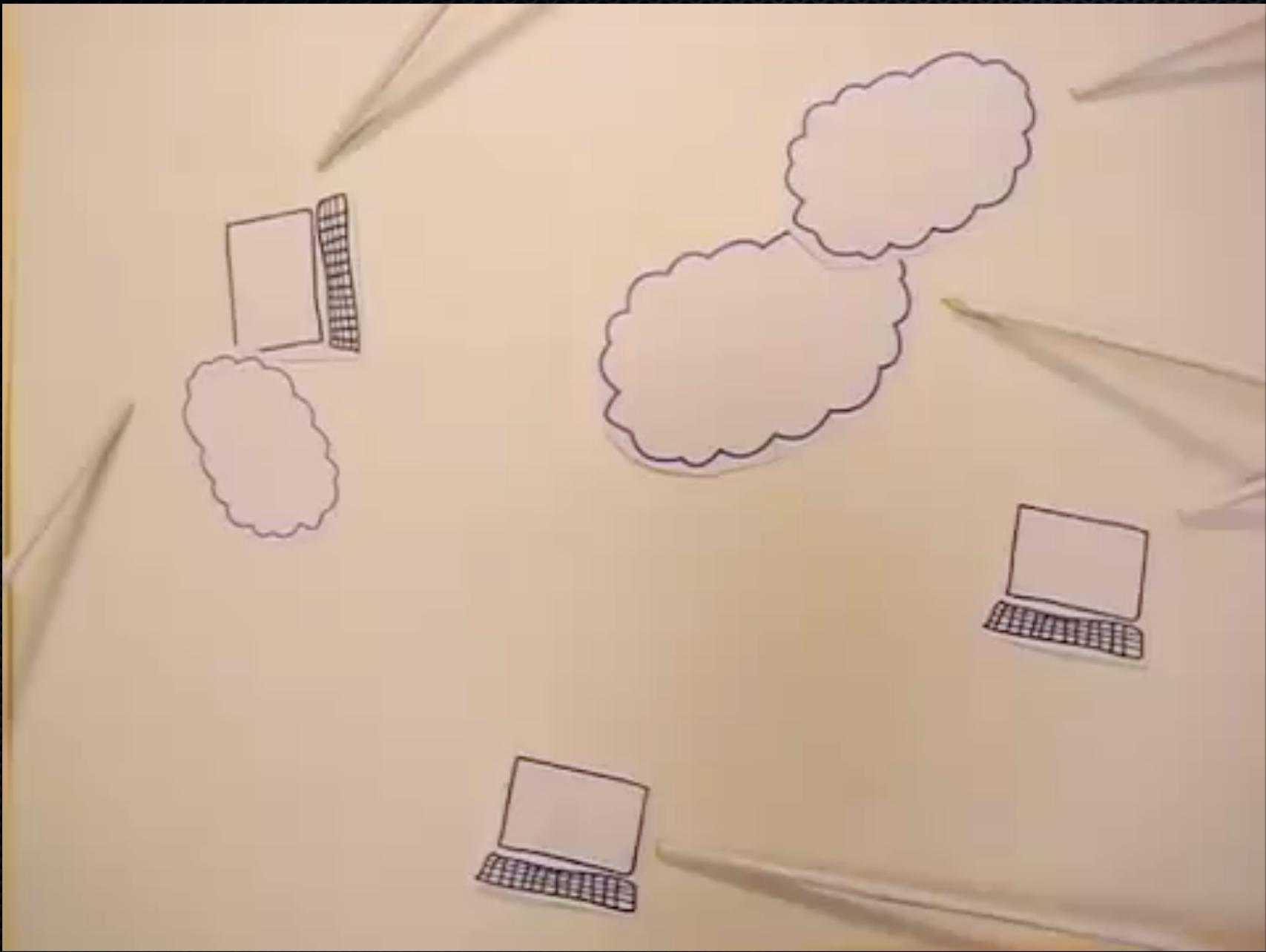
- Many different definitions
- ...all of which are more or less correct
- Unified theme is location independent computing

# Cloud Computing

- ⌘ The cloud is a metaphor for the internet due to its depiction in network diagrams and also the abstraction for the concealed infrastructure
- ⌘ Resources are dynamically scalable and often virtualized
- ⌘ Think “The Matrix”

# Cloud Computing

- Different types of cloud computing
  - Data storage & number crunching (Amazon Web Services)
  - Software as a Service (SaaS) - application is licensed for use as a service provided to customers on demand



# Cloud Benefits

- Reduced cost
- Increased storage
- Highly automated
- Flexibility
- More mobility
- Allows IT to shift focus



- [Gmail](#)  
Fast, searchable email with less spam
- [Google Talk](#)  
IM and call your friends through your computer
- [Google Calendar](#)  
Organize your schedule and share events with friends
- [Google Docs](#)  
Share online documents, presentations, and spreadsheets
- [Google Sites](#)  
Create websites and secure group wikis



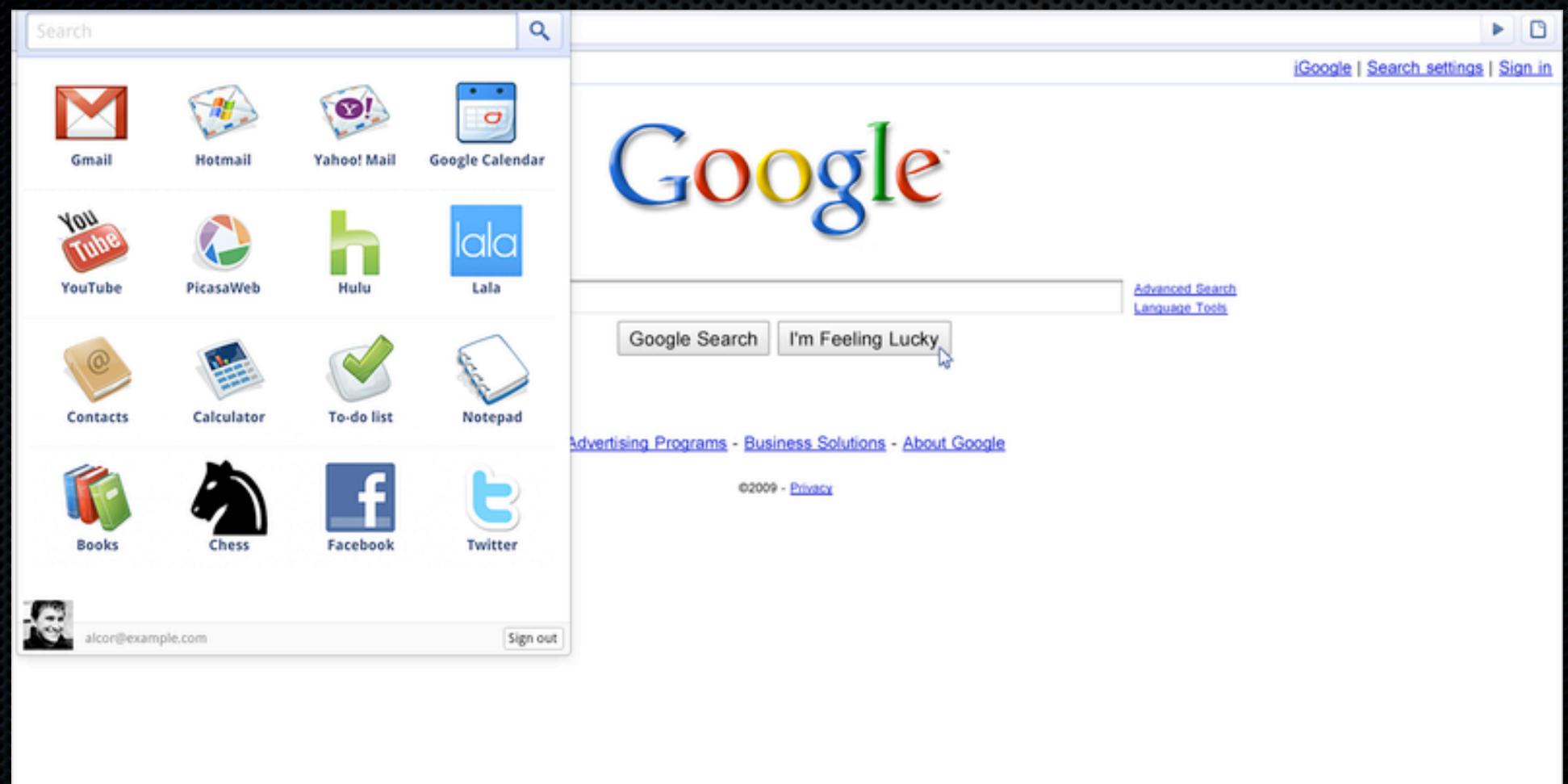
ADOBE® PHOTOSHOP® EXPRESS (now a part of [Photoshop.com](#))



WIKIPEDIA

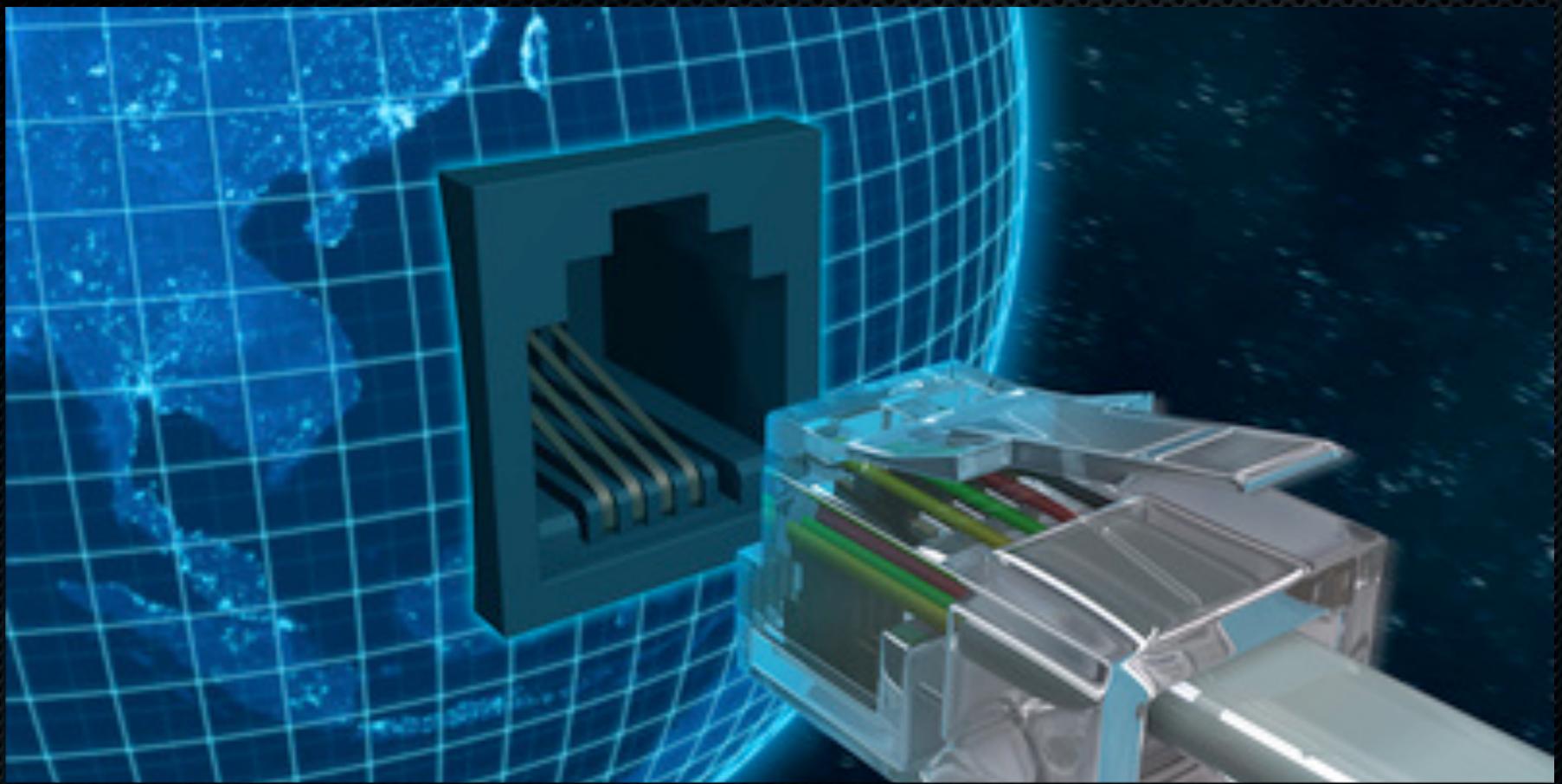
facebook

# Google Chrome OS



- “The interesting thing about cloud computing is that we’ve redefined cloud computing to include everything that we already do. I can’t think of anything that isn’t cloud computing with all of these announcements. The computer industry is the only industry that is more fashion-driven than women’s fashion. Maybe I’m an idiot, but I have no idea what anyone is talking about. What is it? It’s complete gibberish. It’s insane. When is this idiocy going to stop?
- “We’ll make cloud computing announcements. I’m not going to fight this thing. But I don’t understand what we would do differently in the light of cloud computing other than change the wording of some of our ads. That’s my view.”

▪ Larry Ellison: CEO, Oracle



# Network Communication Methods

# Network Communications

- ❖ Unicast
  - ❖ 1 to 1
- ❖ Multicast
  - ❖ 1 to more than 1
- ❖ Broadcast
  - ❖ 1 to all

# Token Based Media Access

- ⌘ Only the node holding the token can transmit on the network
- ⌘ Deterministic Network
- ⌘ Each computer is guaranteed access to the media even when traffic is high
- ⌘ Inefficient when traffic is low - nodes have to wait their turn
- ⌘ Software required for each node and requires reconfiguring when a node is added or removed

# CSMA/CD

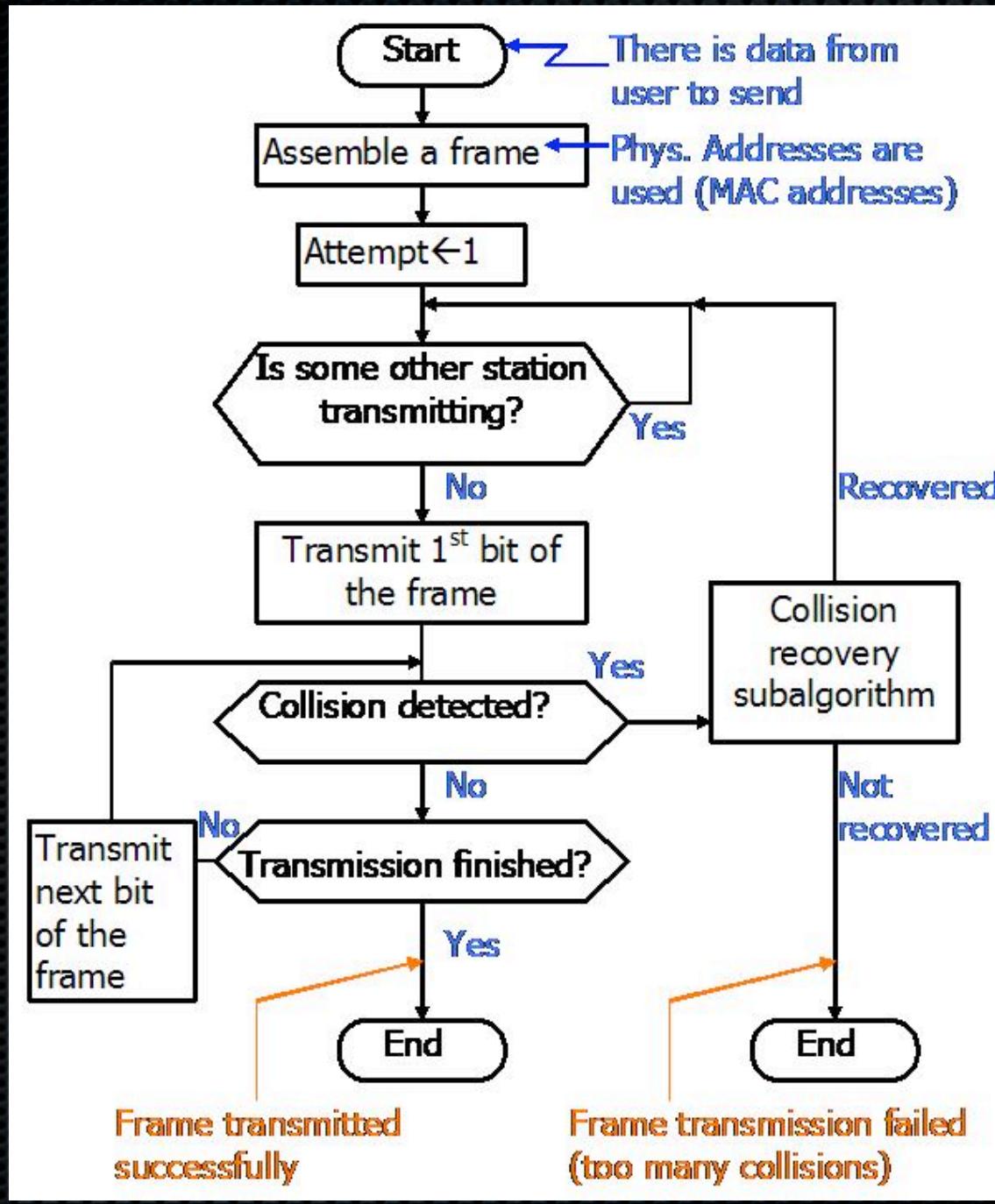
- Carrier Sense Multiple Access Collision Detection
- Contention based media access method
- Nodes can transmit whenever they have data

# Collision

- Collisions occur on Ethernet based networks
- What is a collision?
  - When 2 or more electrical signals travel over the same wire, both electrical signals are distorted

# CSMA/CD

- Steps
- Node has data to transmit
- Node determines if the media is available
- If so, the node transmits the data
- Node determines if a collision occurred by detecting the fragmented data that results from the collision
- If a collision occurred, the node waits a random back-off period, then repeats the process until successful



# CSMA/CA

- Carrier Sense Multiple Access Collision Avoidance
- Contention based media access method
- Nodes can transmit whenever they have data
- Used on wireless networks

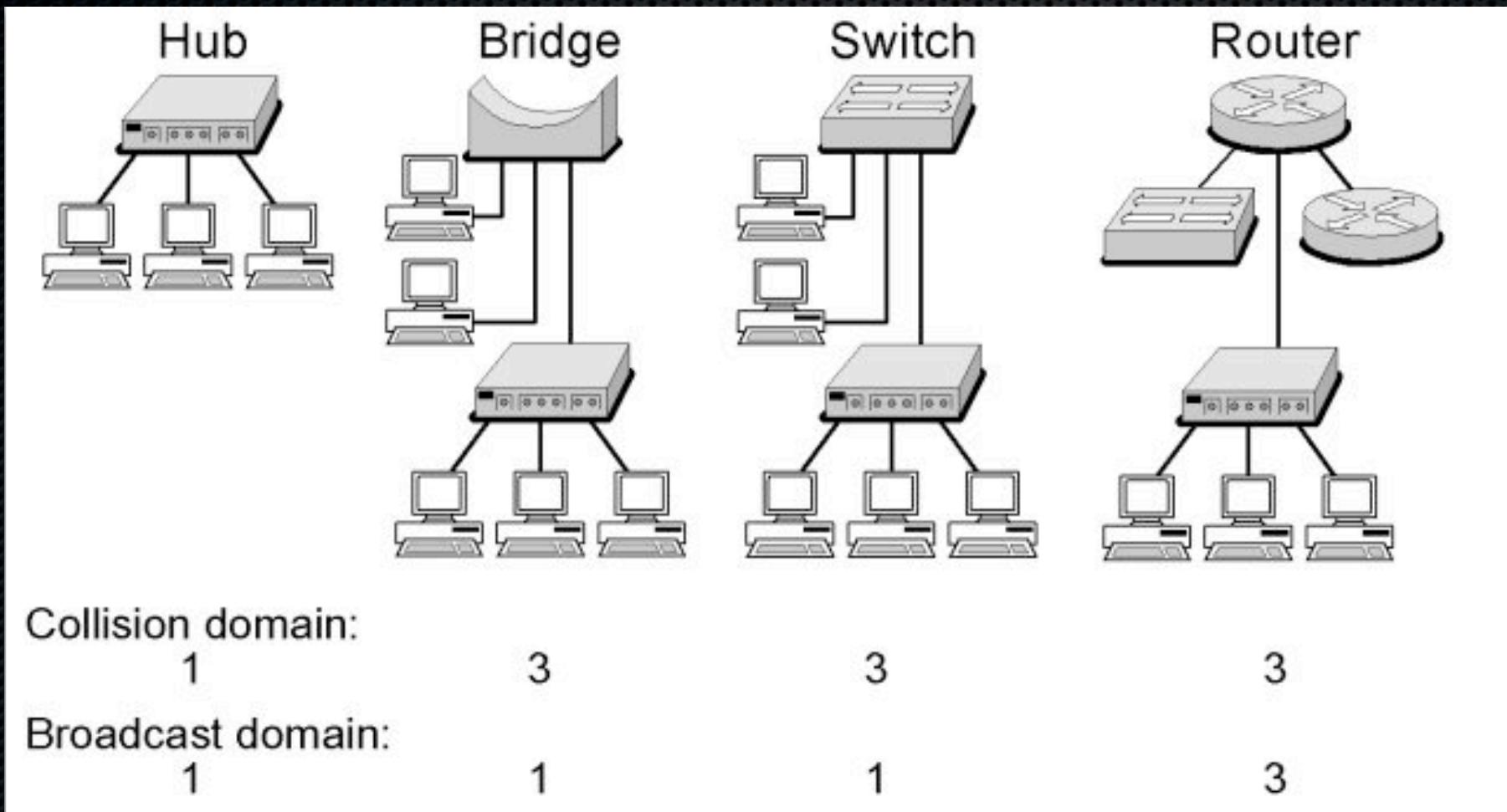
# CSMA/CA

- ✖ Steps
- ✖ Node has data to transmit
- ✖ Node determines if the media is available
- ✖ If so, the node transmits a jam signal which advertises its intent to transmit data
- ✖ Node waits until all nodes should have had time to receive the jam signal
- ✖ Node transmits data
- ✖ While transmitting, node monitors the media for a jam signal from another node. If received, it stops transmitting and retries after a random delay

# Collision Domain

- A physical network segment where data packets can "collide" with one another for being sent on a shared medium
- Also known as a Contention Domain

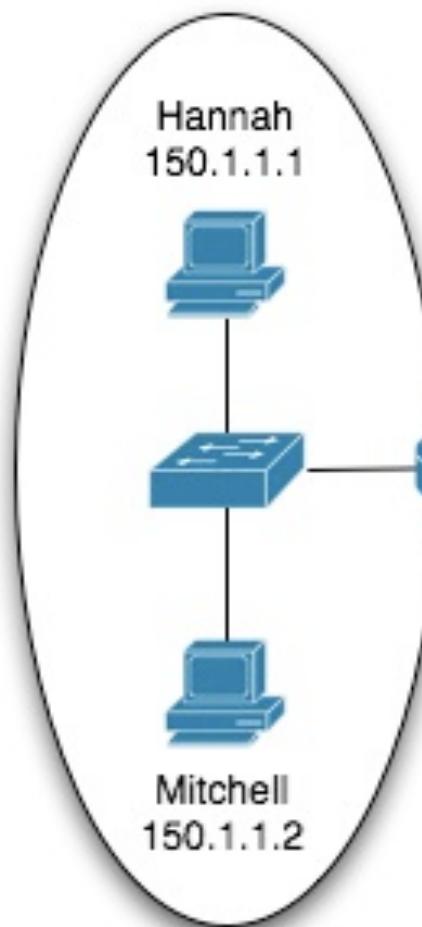
# Collision Domain



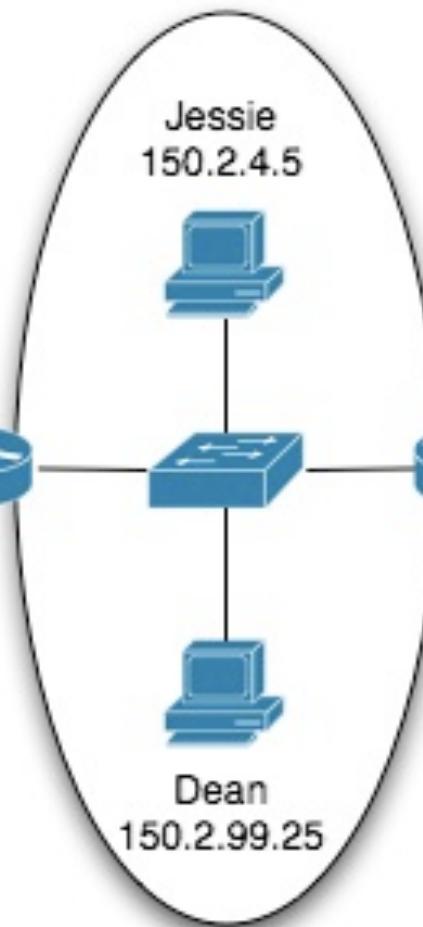
# Subnet

- 2 Functions
  - Make the network traffic more efficient by reducing the size of collision domains
  - Minimize the number of wasted IP addresses

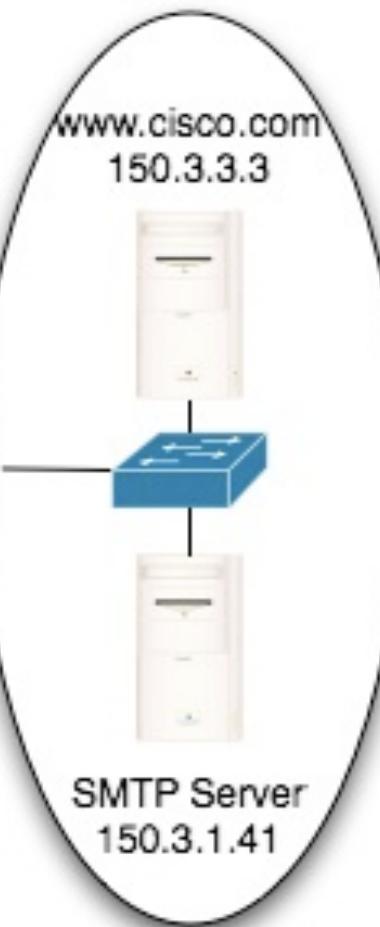
Available  
Addresses: 65,534  
Used: 3



Available  
Addresses: 65,534  
Used: 4



Available  
Addresses: 65,534  
Used: 3



Network 150.1.0.0  
All Addresses Between  
150.1.0.1 and  
150.1.255.254

Network 150.2.0.0  
All Addresses Between  
150.2.0.1 and  
150.2.255.254

Network 150.3.0.0  
All Addresses Between  
150.3.0.1 and  
150.3.255.254

Available  
Addresses: 254  
Used: 3

Hannah  
150.1.1.1



Mitchell  
150.1.1.2

Available  
Addresses: 254  
Used: 4

Jessie  
150.1.2.5



Dean  
150.1.2.55

Available  
Addresses: 254  
Used: 3

www.cisco.com  
150.1.3.3



SMTP Server  
150.1.3.41

Network 150.1.1.0  
All Addresses Between  
150.1.1.1 and  
150.1.1.254

Network 150.1.2.0  
All Addresses Between  
150.1.2.1 and  
150.1.2.254

Network 150.1.3.0  
All Addresses Between  
150.1.3.1 and  
150.1.3.254

# Subnetting

	<b>Dot-decimal Address</b>	<b>Binary</b>
Full Network Address	192.168.5.10	11000000.10101000.00000101.00001010
Subnet Mask	255.255.255.0	11111111.11111111.11111111.00000000
Network Portion	192.168.5.0	11000000.10101000.00000101.00000000
Host Portion	0.0.0.10	00000000.00000000.00000000.00001010

# Binary AND-ing

- 2 rules:
- Zero AND any value equals zero
- One AND one equals one

0	0	1	1
↓	↓	↓	↓
<hr/>			
0	1	0	1
0	0	0	1

	<b>Dot-decimal Address</b>	<b>Binary</b>
Full Network Address	192.168.5.130	11000000.10101000.00000101.10000010
Subnet Mask	255.255.255.192	11111111.11111111.11111111.11000000
Network Portion	192.168.5.128	11000000.10101000.00000101.10000000



# Subnetting Example

# Subnetting

1. Write out default subnet mask in binary.
2. Determine how many bits you need to steal from the host portion of the default subnet mask.
3. Convert new subnet mask into decimal.
4. Determine what the subnets increment by (look at the binary place value of the last 1 in the subnet mask)  
Write out subnet ID's.
5. Write out broadcast IP's.
6. Fill in the range between to find the usable IP addresses.

# CIDR Notation

- Classless Inter-Domain Routing
- Count the number of 1's in the subnet mask
- 192.168.0.32 255.255.255.0
  - CIDR = 192.168.0.32/**24**
  - There are 24 1's in the subnet mask



# Supervisory Organizations

Like a boss

# ICANN

- Internet Corporation for Assigned Names and Numbers
- Manages the assigning of IP addresses and domain names
- Formed in 1998
- A private, non-profit corporation with participants from all over the world dedicated to keeping the Internet secure, stable and interoperable



# IEEE

- Institute of Electrical and Electronics Engineers
- Private non-profit organization
- Advances technological innovation related to electricity
- Formed in 1963



IEEE

# ANSI

- American National Standards Institute
- Private non-profit organization
- Formed in 1918
- Oversees the development of voluntary consensus standards for products, services, processes, systems, and personnel in the United States



# ISO

- International Organization for Standardization
- Formed in 1947
- Based in Geneva, Switzerland
- Promotes worldwide standards
- Composed of representatives from various national standards organizations



# W3C

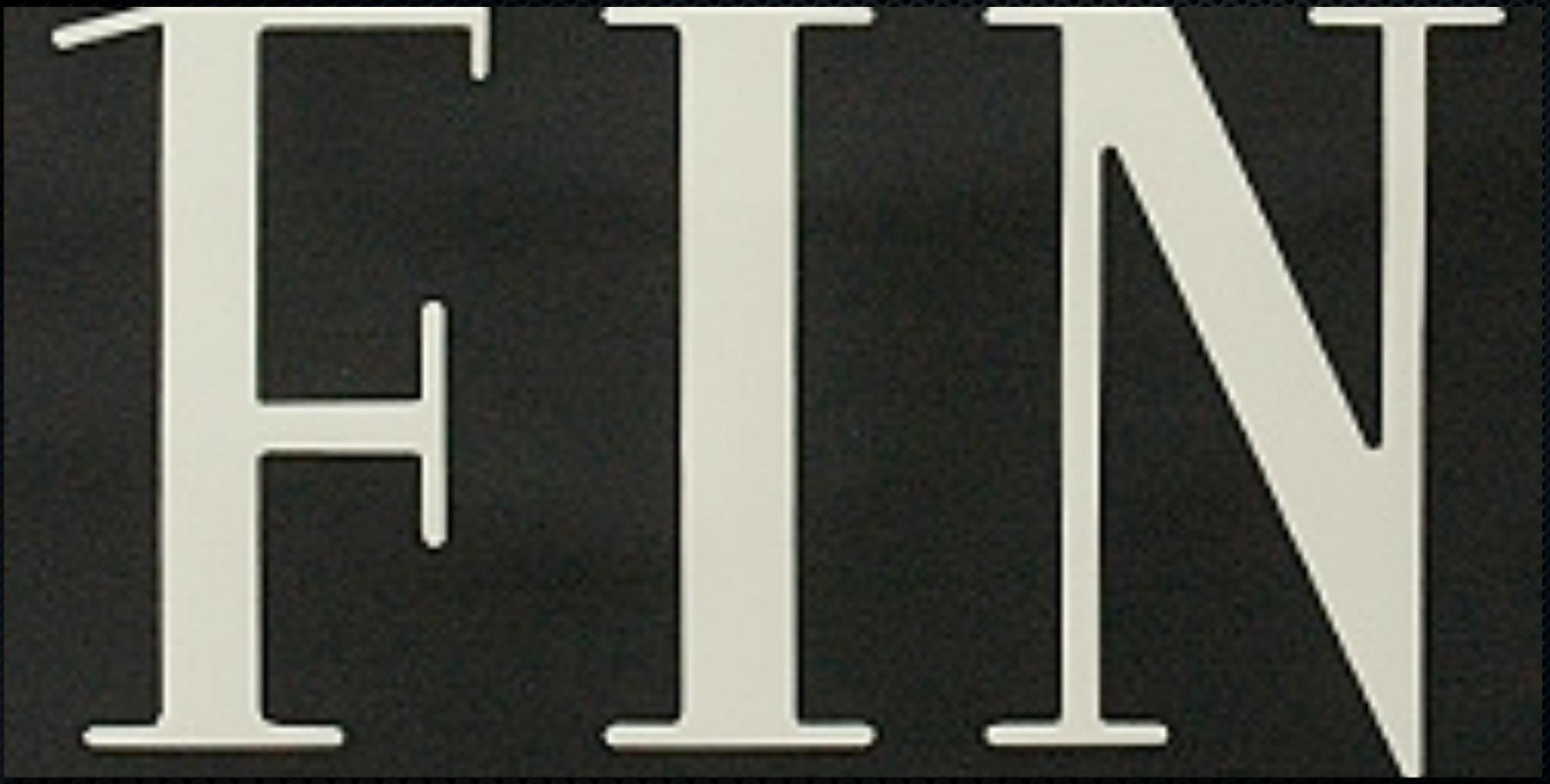
- World Wide Web Consortium (W3C)
- Main international standards organization for the World Wide Web
- Founded in 1994 by Tim Berners-Lee
- Created to ensure compatibility and agreement among industry members in the adoption of new standards



# IETF

- Internet Engineering Task Force
  - Develop standards to improve Internet usability
  - Works closely with W3C and ISO





Copyright Full Sail University

All rights are reserved by Full Sail University. Do not distribute, duplicate or otherwise alter this content without prior written consent of Full Sail University.