

Networking



Concept

What is a network?

LAN - Local Area Network

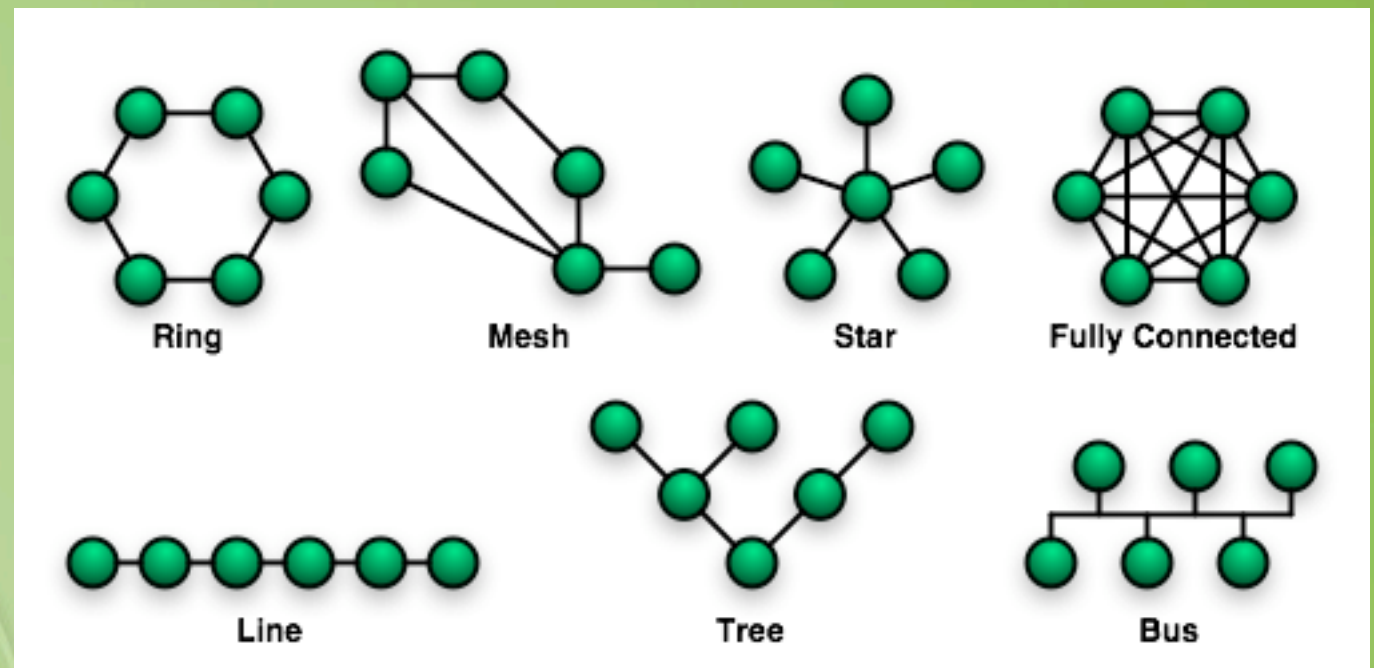
WAN - Wide Area Network

Client/Server vs Peer-to-Peer



Network Topologies (Areas, Towns)

- Ring
- Star, Hub/Spoke
- Bus
- Meshed (full, partial)
- Tree
- Hybrid



Layer Architecture

- Models that help bring all the pieces together
- OSI vs TCP/IP architecture

OSI	TCP/IP
Application (HTTP, FTP, DNS...)	Application (HTTP, FTP, DNS, SSL, SIP...)
Presentation (SSL, WEP...)	
Session (NetBIOS, SIP...)	
Transport (TCP, UDP...)	Transport (TCP, UDP...)
Network (IP, ICMP...)	
Data Link (ARP, MAC address...)	Internet (IP, ICMP...)
Physical (DSL, wireless...)	Link (ARP, MAC address...)

IP addresses (buildings, houses)

- What is an IP address?
- Public - assigned by IANA
 - Regional - AfriNIC, ARIN, RIPE, APNIC, LACNIC
- Private - reserved (RFC1918)
 - 10.0.0.0/8
 - 172.16.0.0/12
 - 192.168.0.0/16
- Notations
 - Dot decimal: 192.168.100.1
 - Binary:



1	1	0	0	0	0	0	0	.	1	0	1	0	1	0	0	0	.	0	1	1	0	0	1	0	0	.	0	0	0	0	0	0	0	1
128	64	32	16	8	4	2	1	.	128	64	32	16	8	4	2	1	.	128	64	32	16	8	4	2	1	.	128	64	32	16	8	4	2	1

128+64=192	.	128+32+8=168	.	64+32+4=100	.	1
------------	---	--------------	---	-------------	---	---

Subnets

- What is a subnet?
- Subnet mask?
 - A method of describing the network (or subnetwork) and its hosts.

1	1	1	1	1	1	1	1	.	1	1	1	1	1	1	1	1	.	1	1	1	1	1	1	1	.	0	0	0	0	0	0	0	0					
128	64	32	16	8	4	2	1	.	128	64	32	16	8	4	2	1	.	128	64	32	16	8	4	2	1	.	128	64	32	16	8	4	2	1				
255								.		255								.		255								.		0								

- network is all 1's and hosts are all 0's
 - a /24 will have all 0's in last octet = 254 hosts
 - Why 254 and not 256?
 - » .0 is the network ID and .255 is the broadcast address, therefore not usable as a host, or IP address

Ports (doors and windows)

- 1-65535
- <IP address>:<port number>
- common ports and services offered
 - 80 http
 - 443 https/ssl
 - 25 smtp/mail
 - 21 ftp
 - 23 telnet
 - 53 dns
 - 3389 RDP

Common Services

- HTTP - Hypertext Transfer Protocol
- HTTPS - HTTP over Secure Socket Layer(SSL)
- FTP - File Transfer Protocol
- DHCP - Dynamic Host Configuration Protocol
- DNS - Domain Name Service
- SMTP - Simple Mail Transfer Protocol
- RDP - Remote Desktop Protocol

Routing (Directions)

- Route tables
 - Gives us specific directions on how to get where
 - Default route - if no specific route, then go here
- Static vs Dynamic
- RIP (Distance-vector)
- OSPF (Link-state)

Security

- Why should we secure networks and how?
- Lock/close the doors and windows that you will never use.
- Ask who's at the door and what they want.
- Once verified, give them what they request
- Firewalls
 - Dedicated hardware/software that controls the flow of traffic
 - Allow or deny packets based on source and destination (both ports and IP)



Troubleshooting

- ICMP
 - Ping
 - Traceroute
- ifconfig (linux), ipconfig (windows)
- netstat (linux and windows)
- telnet <IP> <port>
- route (linux and windows)