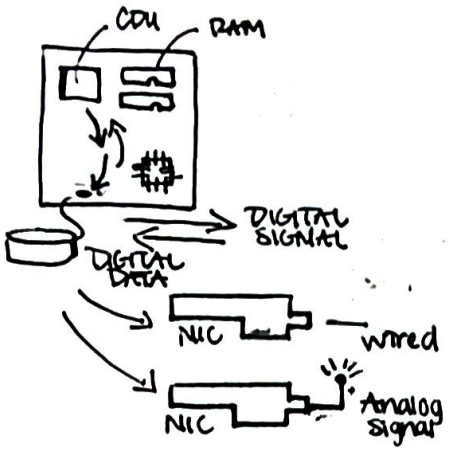
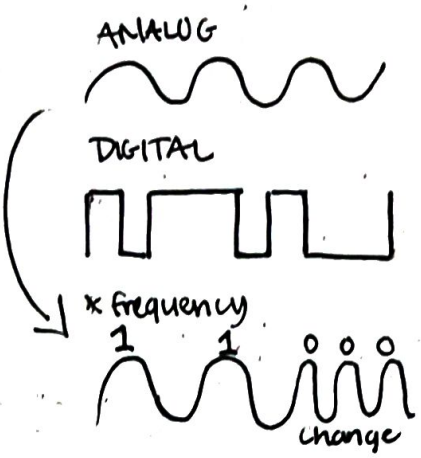
Cyber Notes
03/24

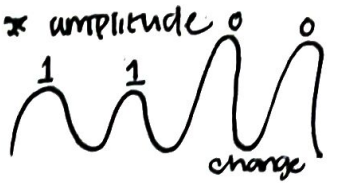
Analog Signal - sound
Common issue is SIGNAL - LOST





* if there is a frequency change, it's a 0!

* if there is a change, a 0!



If it is wireless, it is a signal! If it is inside a computer, it would be 1 and 0. on circuit tree

Numbering System

128	64	32	16	8	4	2	1
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0

* 8 bits is equal to 1 byte!

Hex Base 16
Numbers: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19
Letters: A, B, C, D, E, F, 1A, 1B, 1C, 1D, 1E, 1F

126.55.0.240	01111110 00110111 00000000 11110000
20.248.252.253	00010100 11111000 11111100 11110111
130.35.168.128	10000010 00100011 10101000 10000000

OSI Model breaks down communication to trouble shoot
7 layers

*There are rules for each layers.

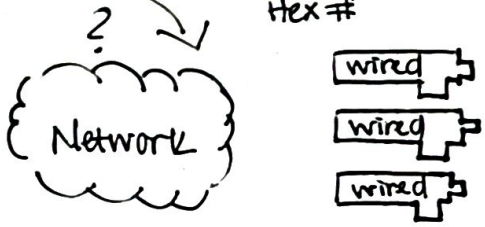
7	Application	→ FTP, SMTP, HTTP, SSH, DNS, HTTPS, DHCP
6	Presentation	→ Data Format Translation ≅ ASCII or unicode, Encryption, Compression
5	Session (Start/Maintain/Stop)	
4	Transport (TCP, UDP) "Reliability"	→ "Flow Control", sequencing
3	Network (IPv4, IPv6)	→ "Packet", uses router
2	Data Link (MAC) "frame"	→ media access control
1	Physical bits 1,0	→

3 Main cables

Wire
twisted pair } copper
coax
fiberoptic } glass plastic

wireless
antenna

MAC → Physical, Unique, Hex #

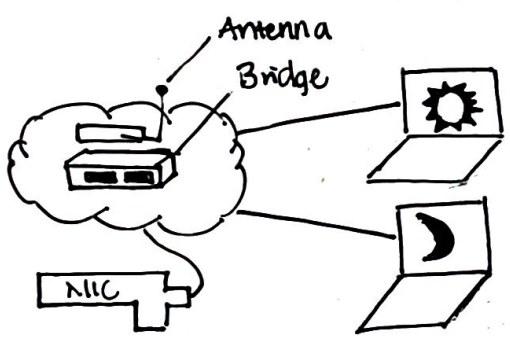


* ethernet is based on chaos theory

NIC: twisted pair, glass, antenna
Bridge: twisted pair, glass, antenna
Switch: twisted pair, glass, antenna
Access Point: antenna
} Devices

Data Link: "MAC", "frame", rules for sharing the media
(PHYSICAL ADDRESS)
1). Token (fairness)
2). Ethernet (chaos)

Network card can have twisted pair OR antenna, could be connected with access point



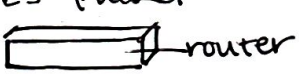
Bridges, Access Point, and Switches forward "frame"

IPv4: [X.X.X.X]
[129.9.32.1]

Presentation
1). Data Format Translation → ASCII
2). Encryption → UTF (unicode)
3). Compression

REMEMBER
1). FTP (20,21)
2). SMTP (25)
3). HTTP (80)
4). SSH (22)
5). DNS (53)
6). HTTPS (443)
7). DHCP (67,68)
} Applications

Network (LOGICAL ADDRESS)
Router ROUTES "packet" or information

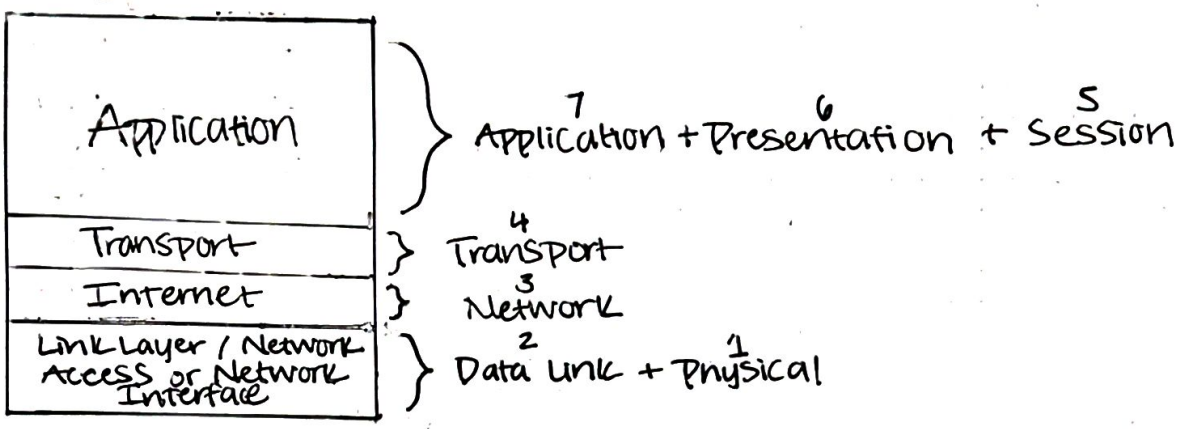


Transport
"Reliability" (applies to TCP)
TCP, UDP → datagram (UNreliable)
↓
segment

TCP: hand shaking, email, and Sequencing

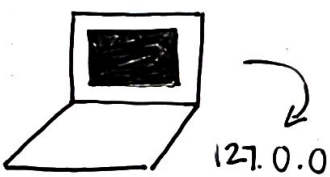
Network
IP address MUST be unique! or else the network would go crazy
IPv6 will add something on the back of UTC
IPv6 will also possibly use a MAC address, 126 bits!

TCP-IP Model



03/25 class

IPv4 uses dotted decimal notation
127.XX.XX.XX -> "loopback", TESTING

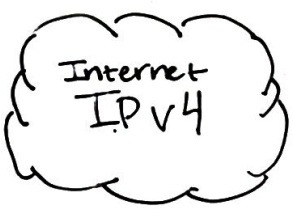


127.0.0.1 is used to ping yourself. NOT assigned as IP add to anyone

Syntax X.X.X.X
1.0.0.1 (first device)
1.0.0.2
1.0.0.3

223.255.255.254 (last device)

Not enough IP addresses for all appliances



CLASS
A: 10.X.X.X
10.255.256.254
B: 172.16.X.X
172.32.X.X
C: 192.168.X.X
192.168.X.X

192.168.255.254

IPv6 has 128-bits

X.X.X.X.
IIII.IIII.IIII.IIII IPv4

X.X.X.X.....X
IIII.IIII.IIII.IIII.....IIII IPv6

1). has 8 blocks (quatets)
2). block = 16 bits
3) Uses Hex
4). 2^{128} = 128 bits

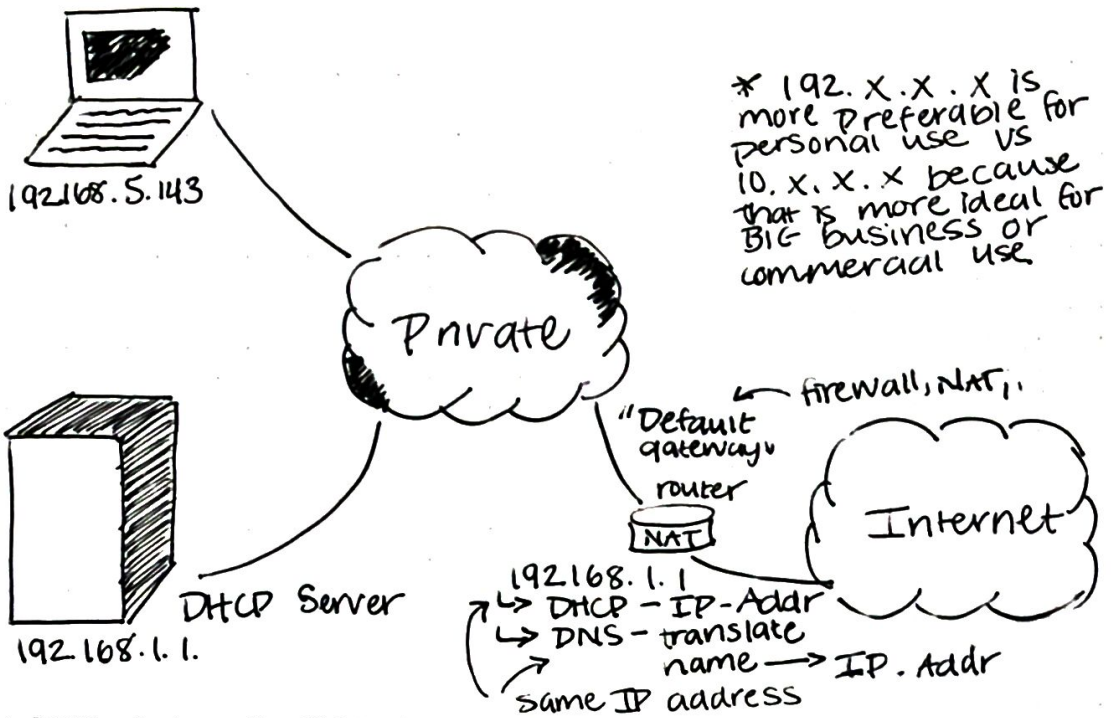
2 ways to get IP address
1). Manual configuration
2). Dynamic configuration

Another word for "rule" is "protocal"

Manual
192.168.0.1
192.168.0.2

192.168.0.10

Dynamic



* 192.x.x.x is more preferable for personal use vs 10.x.x.x because that is more ideal for BIG business or commercial use

IPv

DNS
If DNS is killed, whole network goes down.

2 commands in Linux in adjacent to ipconfig in Window
1). ip (option) (object) (subcommands)
2). if (

* know the diff between control c and z in linux!

WINDOW:	LINUX:
ipconfig /all	ip
	ifconfig

Permanent changes to network setting
1). nmcli (command line interface)
2). nmtui (text-based menu)
3). nmgui (graphic user interface)

* Which one of these commands would allow you to make network changes with text-based menu

Static — you don't want these to change because they are services

1). Email	192.168.8.1
2). File	192.168.8.2
3). Database	192.168.8.3
4). Printer	192.168.8.4

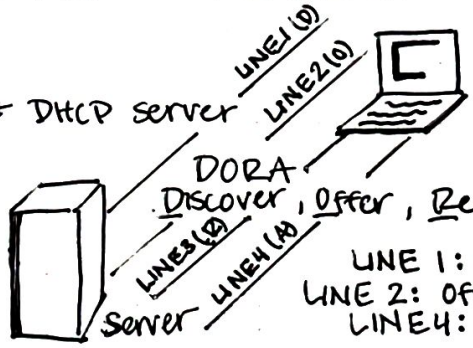
5). DHCP
6). DNS

DHCP Server
1). Gives out IP addresses
2). Subnet Mask ???
3). Gives default gateway → (1) router, (2) NAT, (3) firewall
4). DHCP Server (itself)
5). DNS server

Commands: LINUX → dhclient -r
WINDOW → ipconfig /Release
ipconfig /Renew

* Sometimes you can have 2 different DHCP server

Difference between
HOST (provides a service)
CLIENT (opposite of a server) ≠ server
DEVICE (server can be a device)



LINE 1: Discover
LINE 2: Offer LINE 3: Reques
LINE 4: Acknowledgement