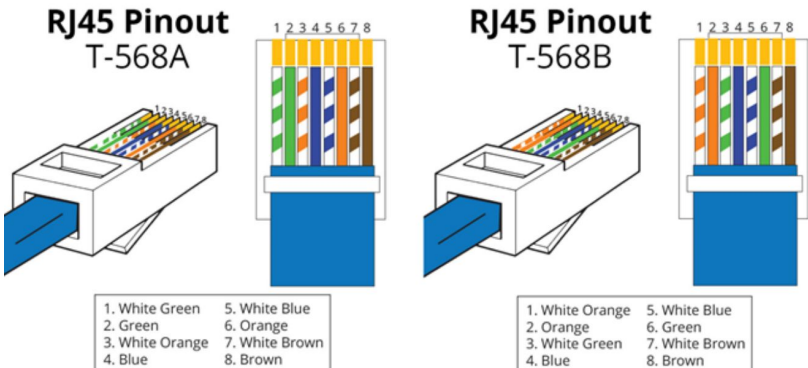
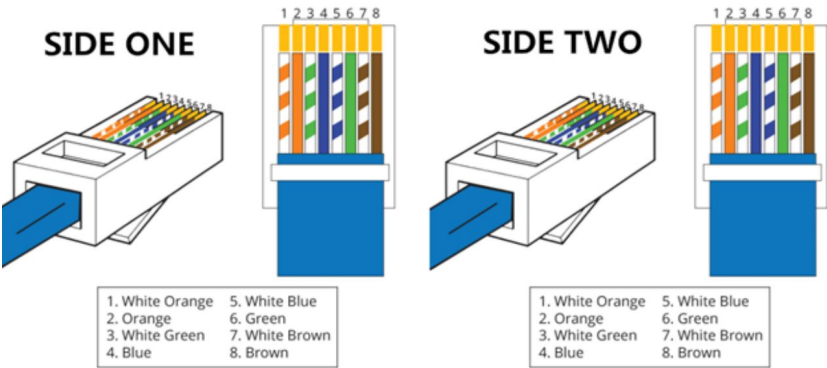
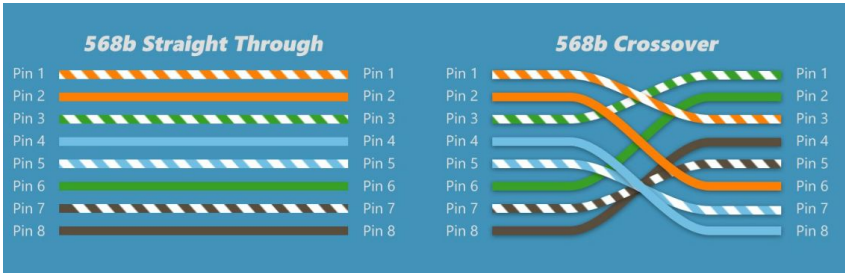
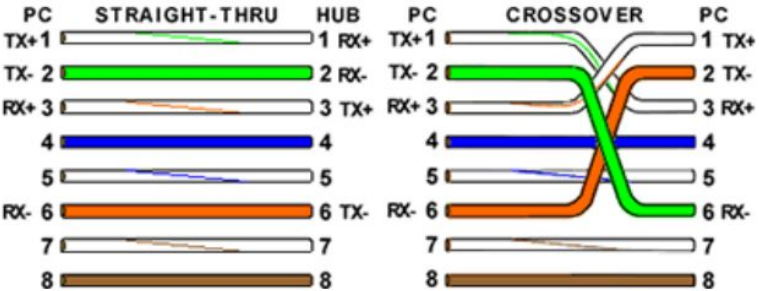


# Networks and Internet (Part 2)

# Crossover

- We want to connect 2 computers together, how do we do that?
- We could just connect them with an Ethernet cable, but there's an issue when connecting two computers together, what is it?

# Crossover

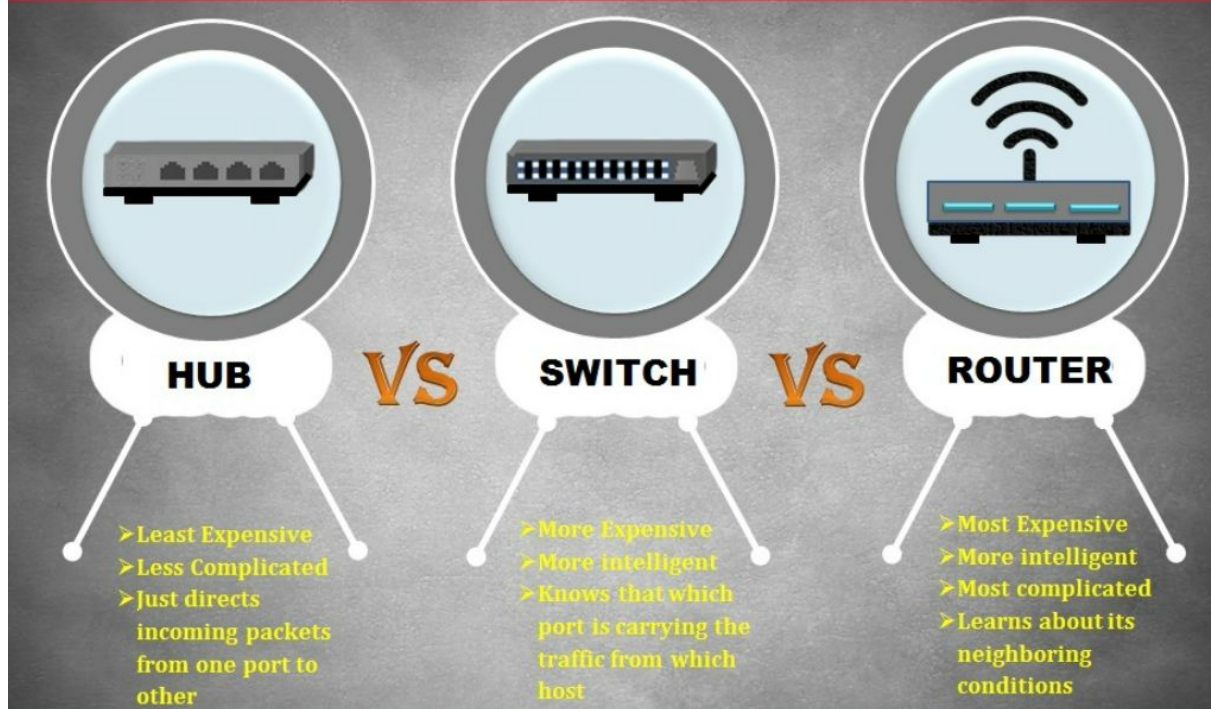


Straight Through

Crossover

# Crossover

## Differences between Hub, Switch and Router



# Connecting more than one device together

- The Internet is one VAST network of interconnect devices
- LAN (Local-Area Network) vs WAN (Wide-Area Network)



# IP Addresses

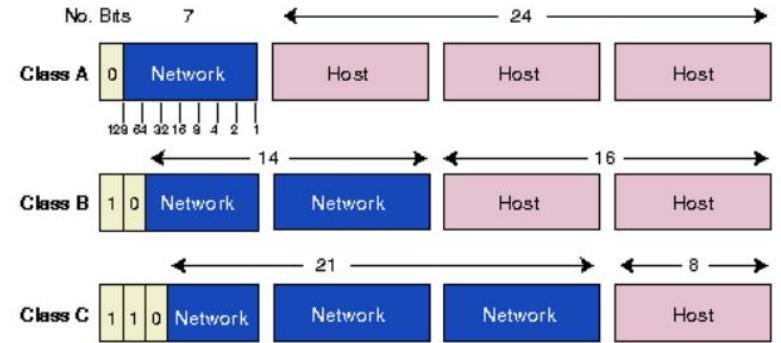
## Internet Address (IP)

Google IP4 Address

216.58.216.164

Google IP6 Address

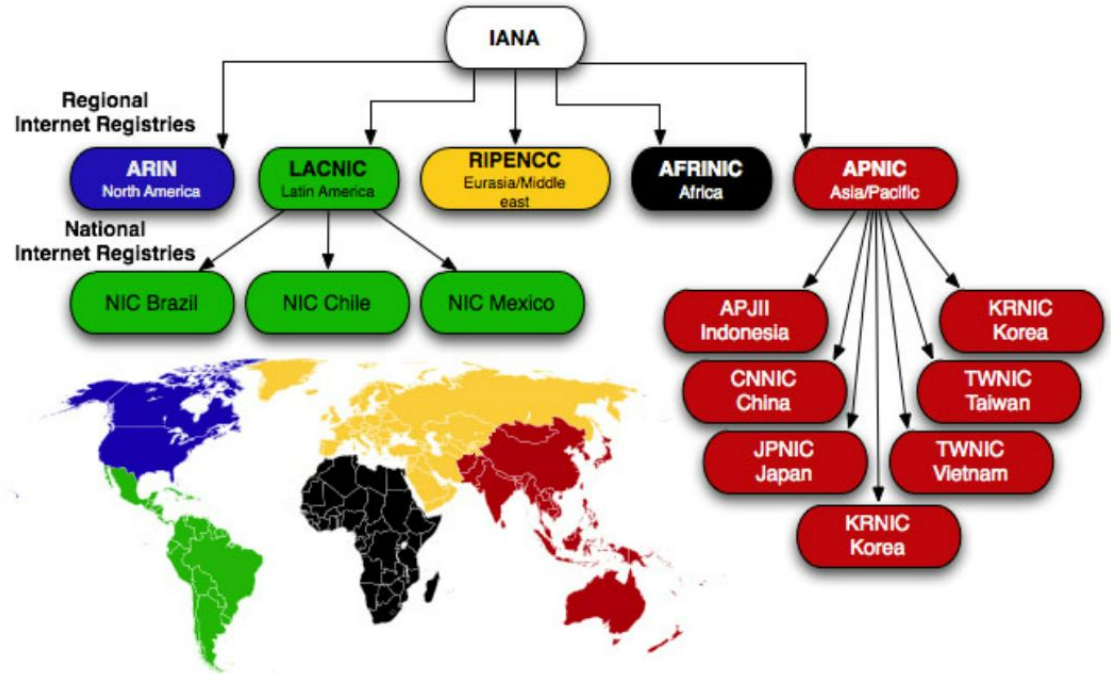
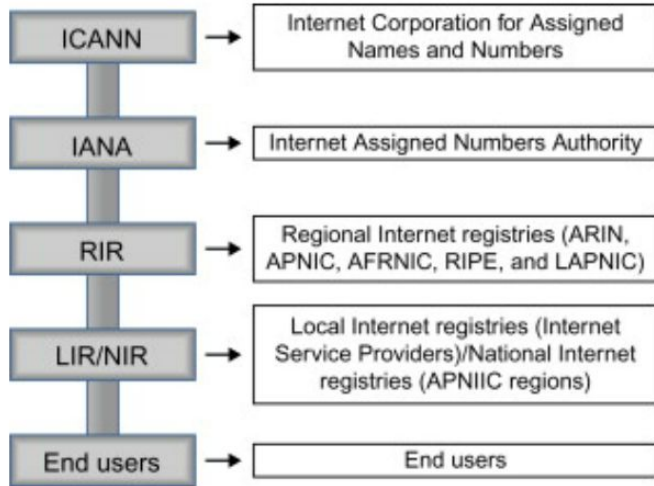
2607:f8b0:4005:805::200e



Five Different Classes of IPv4 Addresses

Class	First Octet decimal (range)	First Octet binary (range)	IP range	Subnet Mask	Hosts per Network ID	# of networks
Class A	0 – 127	0XXXXXXXX	0.0.0.0-127.255.255.255	255.0.0.0	$2^{24} - 2$	$2^7$
Class B	128 – 191	10XXXXXXXX	128.0.0.0-191.255.255.255	255.255.0.0	$2^{16} - 2$	$2^{14}$
Class C	192 – 223	110XXXXXX	192.0.0.0-223.255.255.255	255.255.255.0	$2^8 - 2$	$2^{21}$
Class D (Multicast)	224 – 239	1110XXXXX	224.0.0.0-239.255.255.255			
Class E (Experimental)	240 – 255	1111XXXXX	240.0.0.0-255.255.255.255			

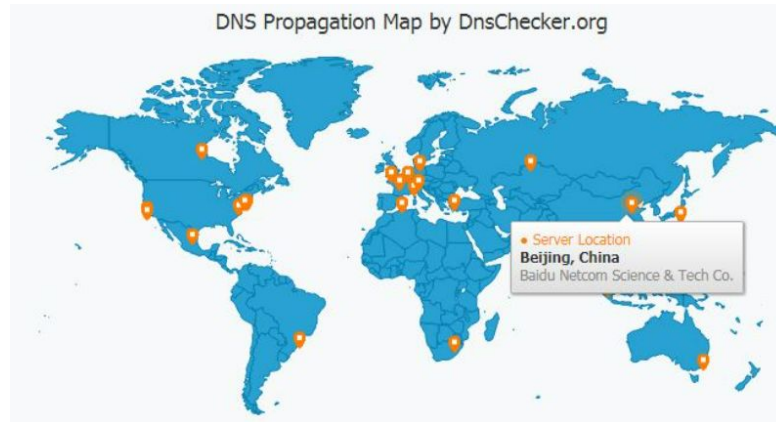
# IP Address



<https://www.iana.org/numbers>

# Domain Name System

- But don't we use names in our browsers?
- How do we go from names to numbers?
- The Domain Name System





# Parallel Computing and Supercomputing

- Most software is run on a single core in a single computer
- Parallelization is running a single program (or piece of software) on multiple cores
- Must be able to “split” program/computations into “pieces”
- Example:
  - We want to compute a students grade average (Exam1, Exam2, and Exam3)
  - $Average = (Exam1 + Exam2 + Exam3) / 3$
  - Can we parallelize the above computation?
  - What if we want to find the whole class average (we need to find the same average for all students and then compute the overall average of all students), can we parallelize this?
  - What if we want to find the average of all students in a school? in a state? the country?

# Wireshark and DNS

- Wireshark allows you to analyze network traffic
- Wireshark: <https://www.wireshark.org/4>
- DNS Lookup: <https://www.whatismyip.com/>