Introduction to Socket Programming

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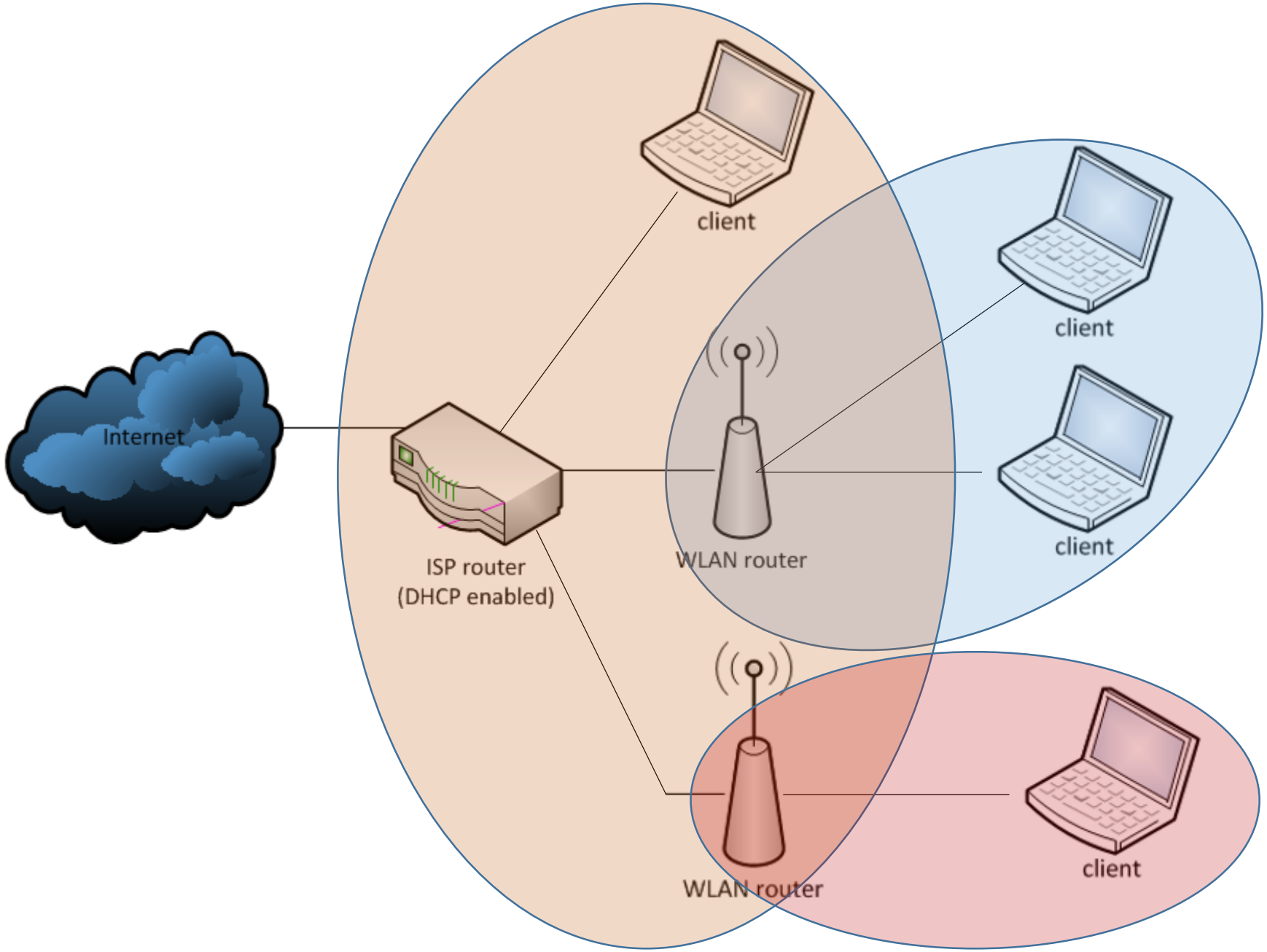
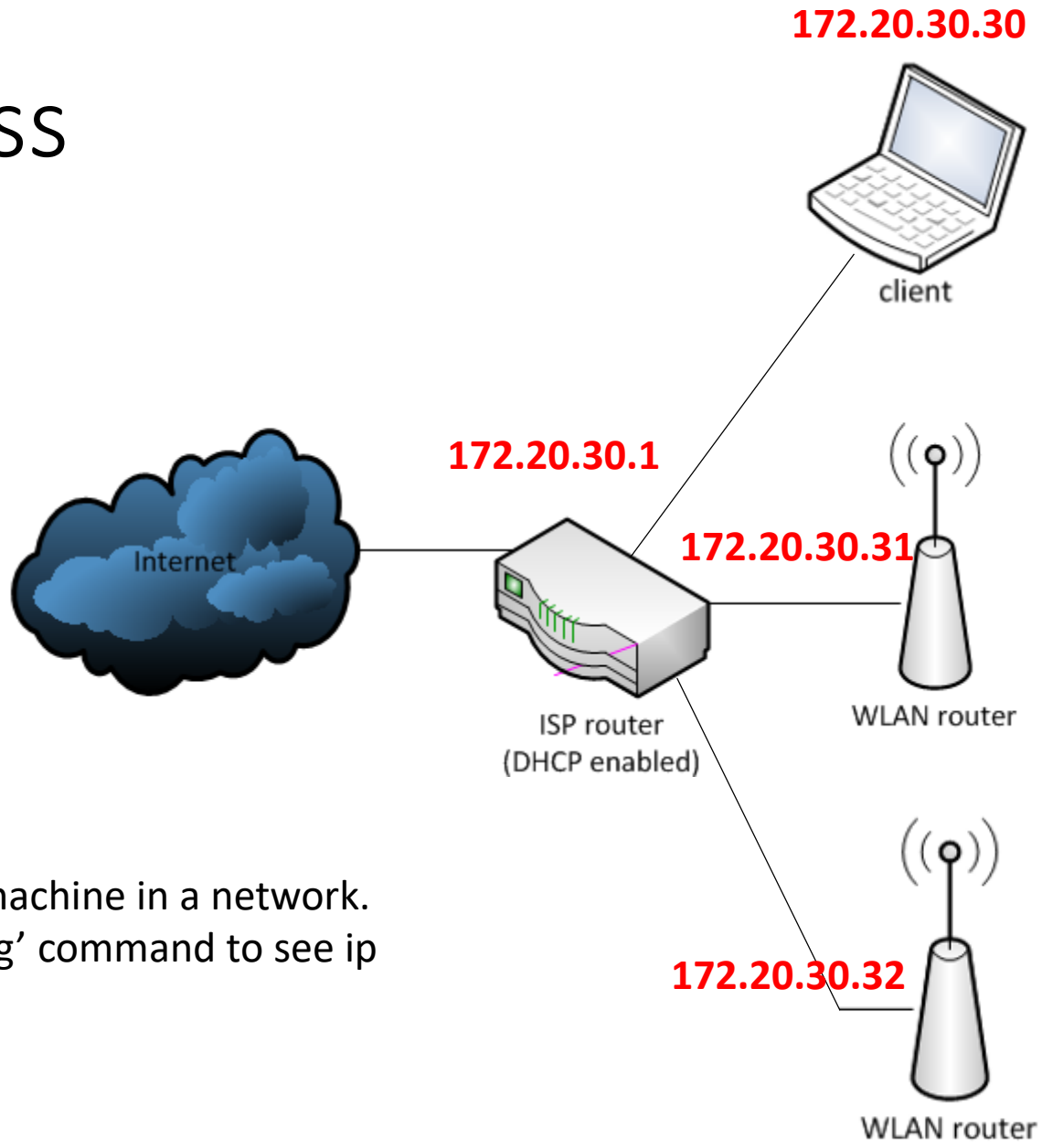
Network

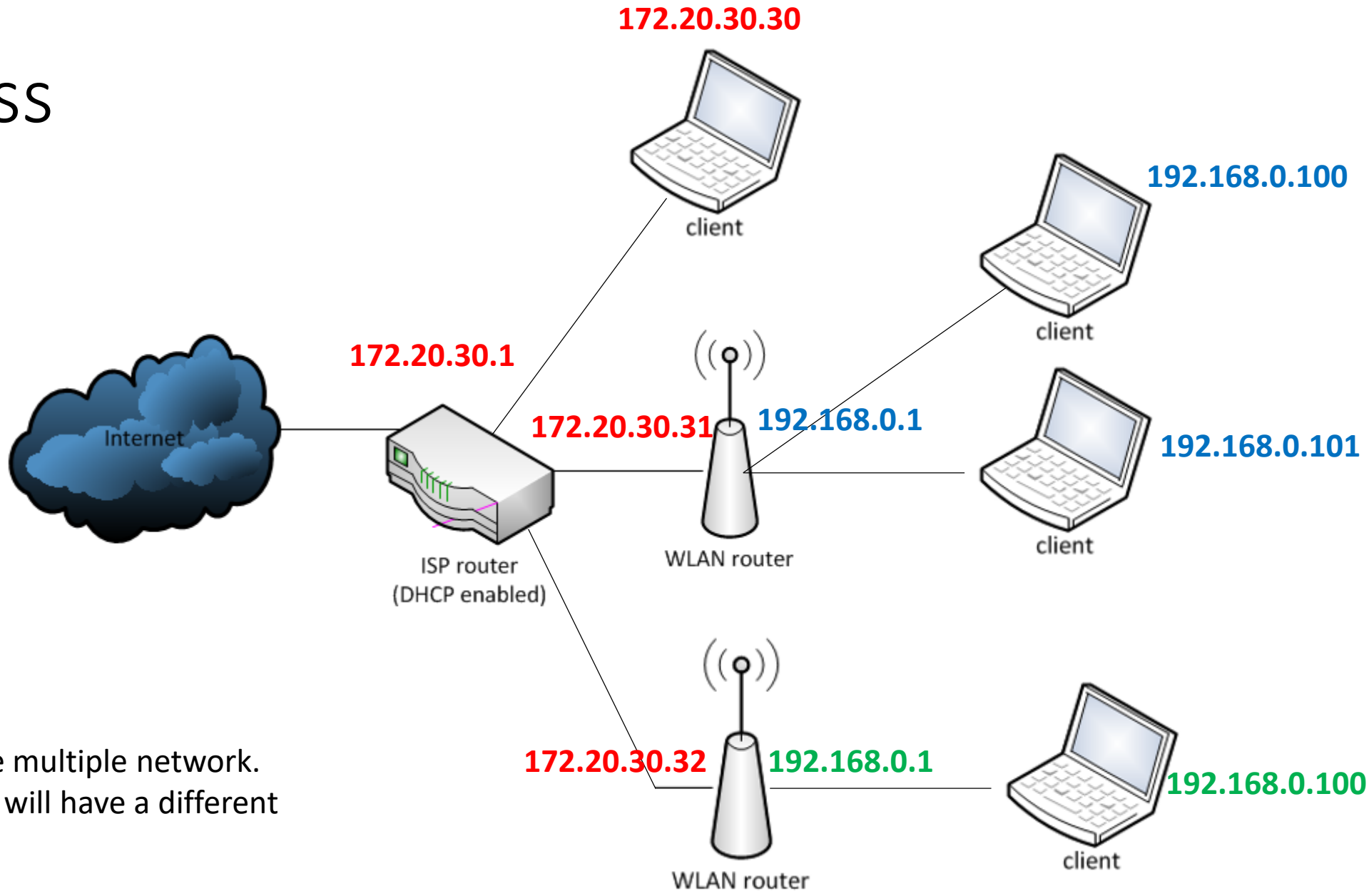

client
client
client
Internet
ISP router
(DHCP enabled)
WLAN router
WLAN router
client

IP Address



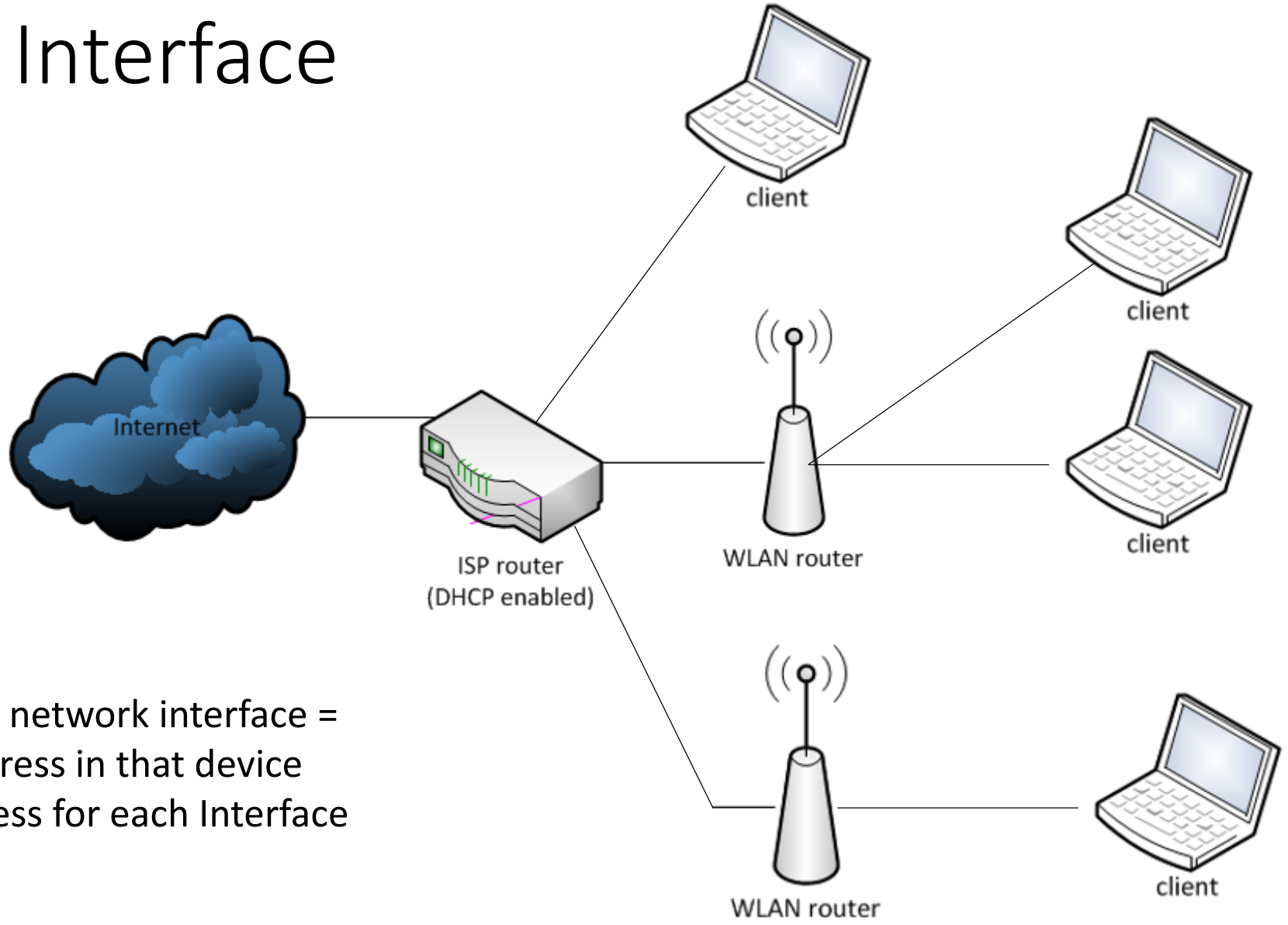
- Identification of a machine in a network.
- ‘ipconfig’ or ‘ifconfig’ command to see ip address.

IP Address



A machine may have multiple network. For each network, it will have a different IP address.

Network Interface



- Number of active network interface = number of ip address in that device
- Different IP Address for each Interface

Port

- Endpoint/channel for communication for different programs
- 2^16 ports, some are reserved
- A computer process must acquire a port for network communication
- A logical construct

- ‘netstat’ command to see ports in use

Connection Establishment

- You need (IP address, Port) to establish a connection to remote PC
- A program must be running to that PC to accept your connection
- Some program must be running on that port

- Example: buet.ac.bd:443
- Error for, buet.ac.bd:120

Socket

- Represents a single connection between two network applications
- Number of connection = number of sockets
- A socket must have these informations to communicate
  - Remote IP
  - Remote Port
  - Local Port
- A socket need these bufferes to operate
  - Input buffer
  - Output buffer

Socket vs Port

- Multiple sockets can be using same ports
- But a port must be acquired by only one program

A TCP socket is an endpoint instance defined by an IP address and a port in the context of either a particular TCP connection or the listening state.

A port is a virtualisation identifier defining a service endpoint (as distinct from a service instance endpoint aka session identifier).

A TCP socket is not a connection, it is the endpoint of a specific connection.

There can be concurrent connections to a service endpoint, because a connection is identified by both its local and remote endpoints, allowing traffic to be routed to a specific service instance.

There can only be one listener socket for a given address/port combination.

https://stackoverflow.com/questions/152457/what-is-the-difference-between-a-port-and-a-socket

Connect Two PC

1. A listens for connection in a port (6666) using a Server Socket

Connect Two PC

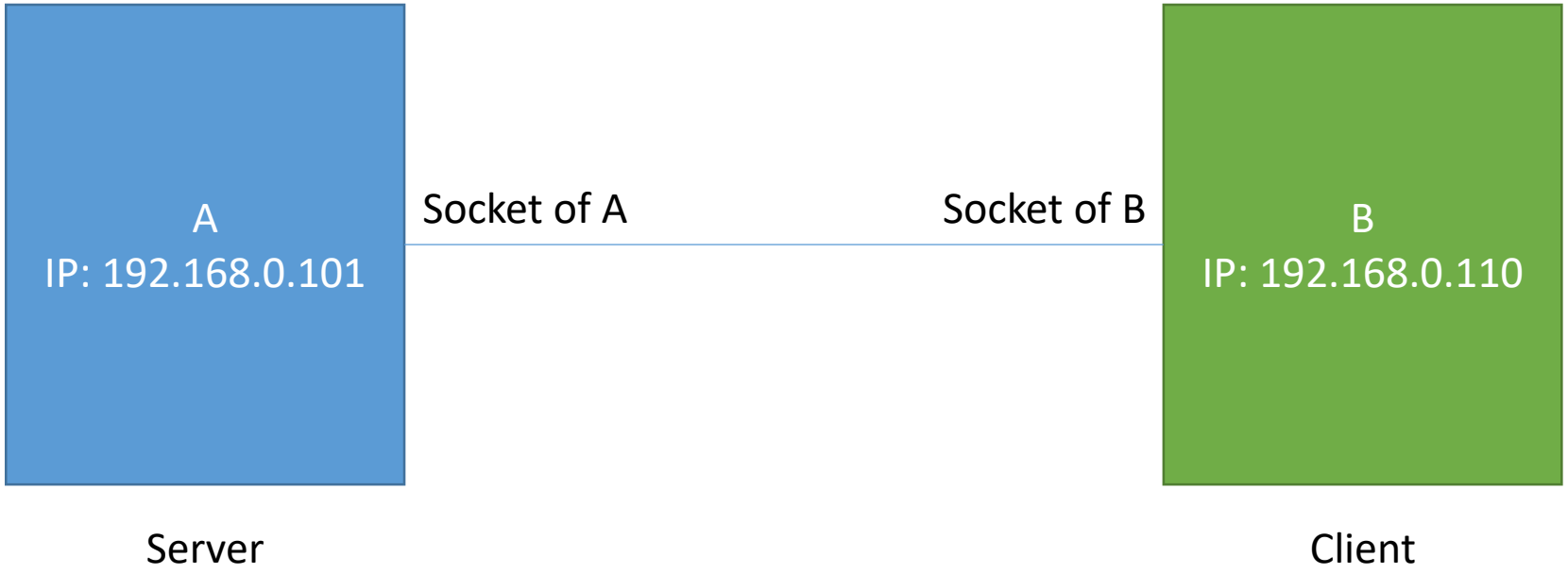
2. B tries connect to A using (192.168.0.101, 6666)

Connect Two PC

3. A accepts B’s connection

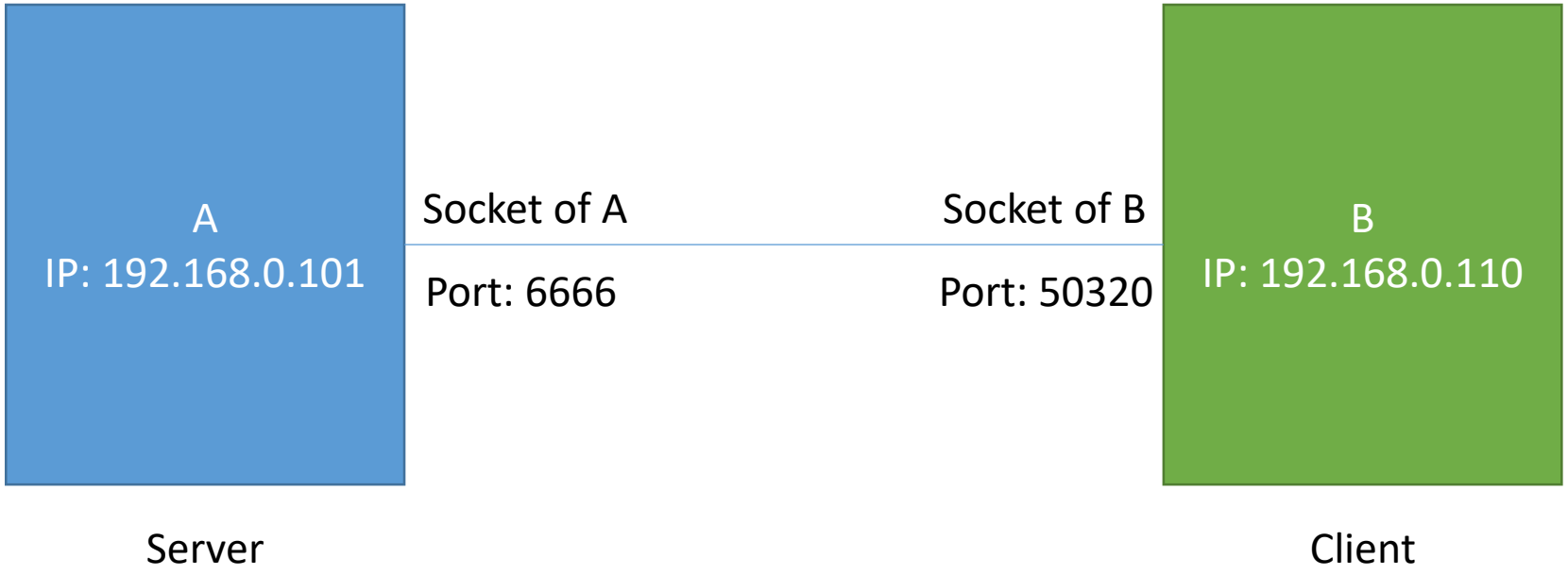
Connect Two PC

4. Both of them has a socket of their own



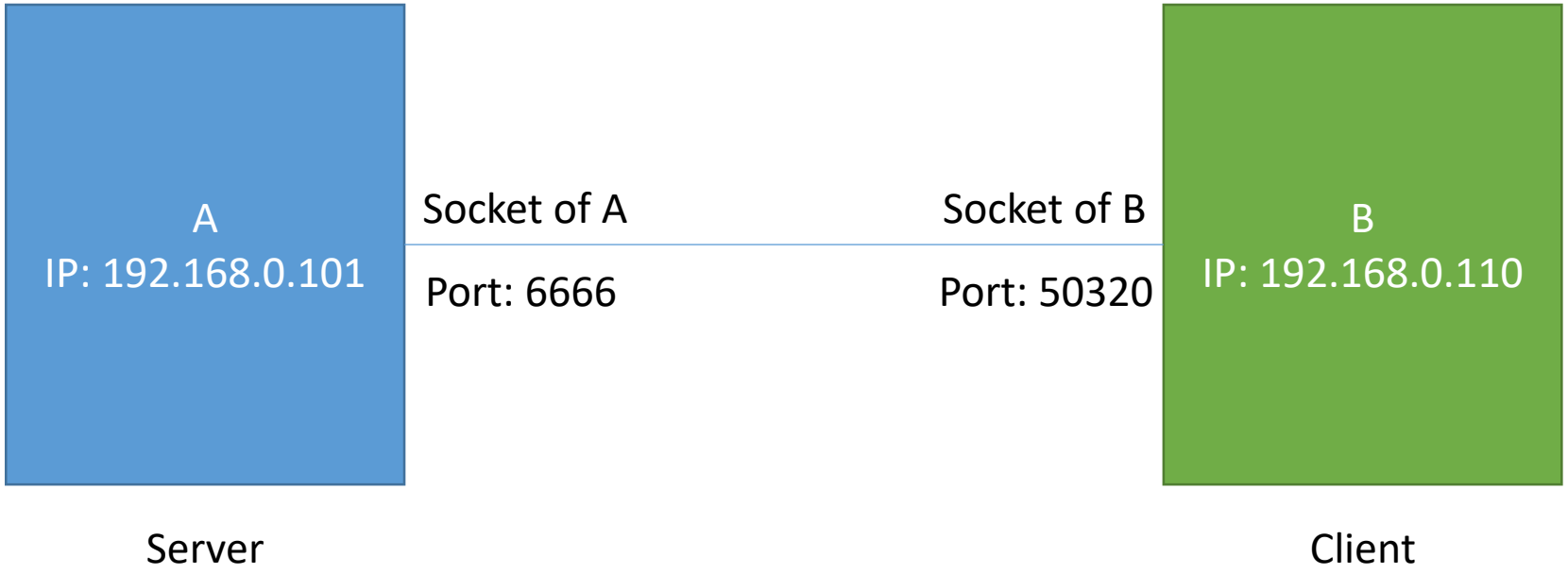
Connect Two PC

5. Both of them knows each other's IP address and Port



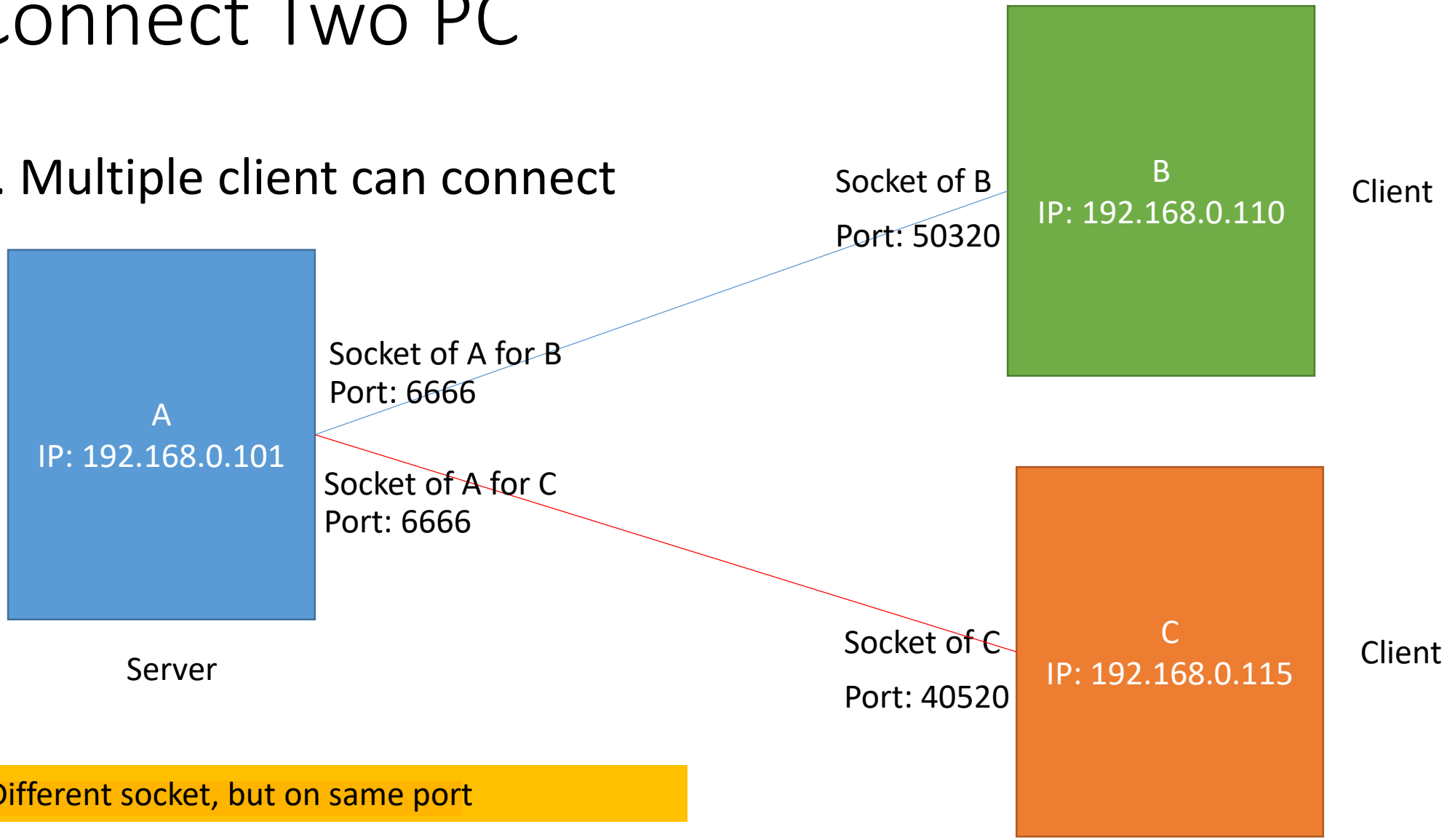
Connect Two PC

6. Server keeps listening on same port for new connection



Connect Two PC

7. Multiple client can connect



Different socket, but on same port

TCP

- This whole thing is done using Transmission Control Protocol