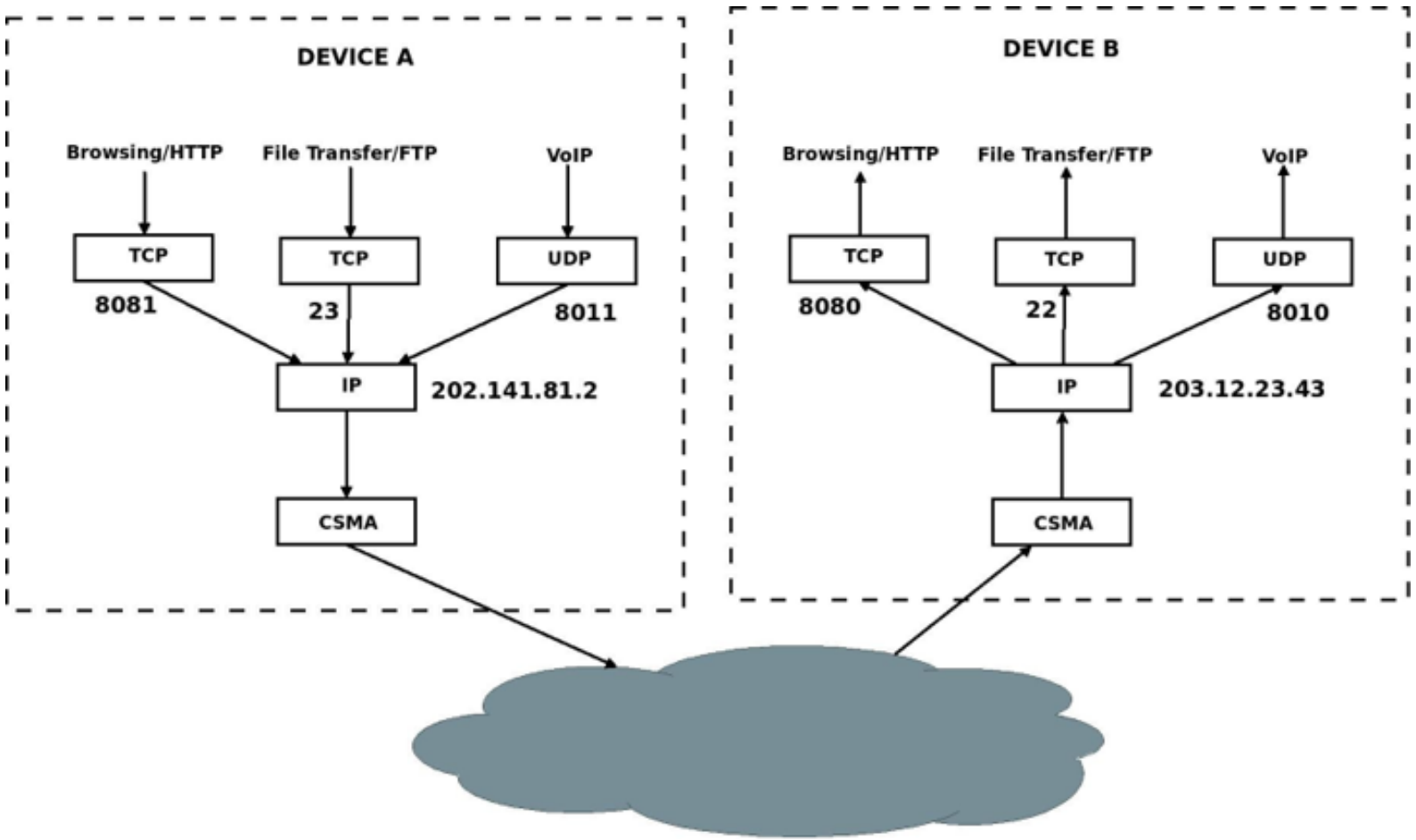
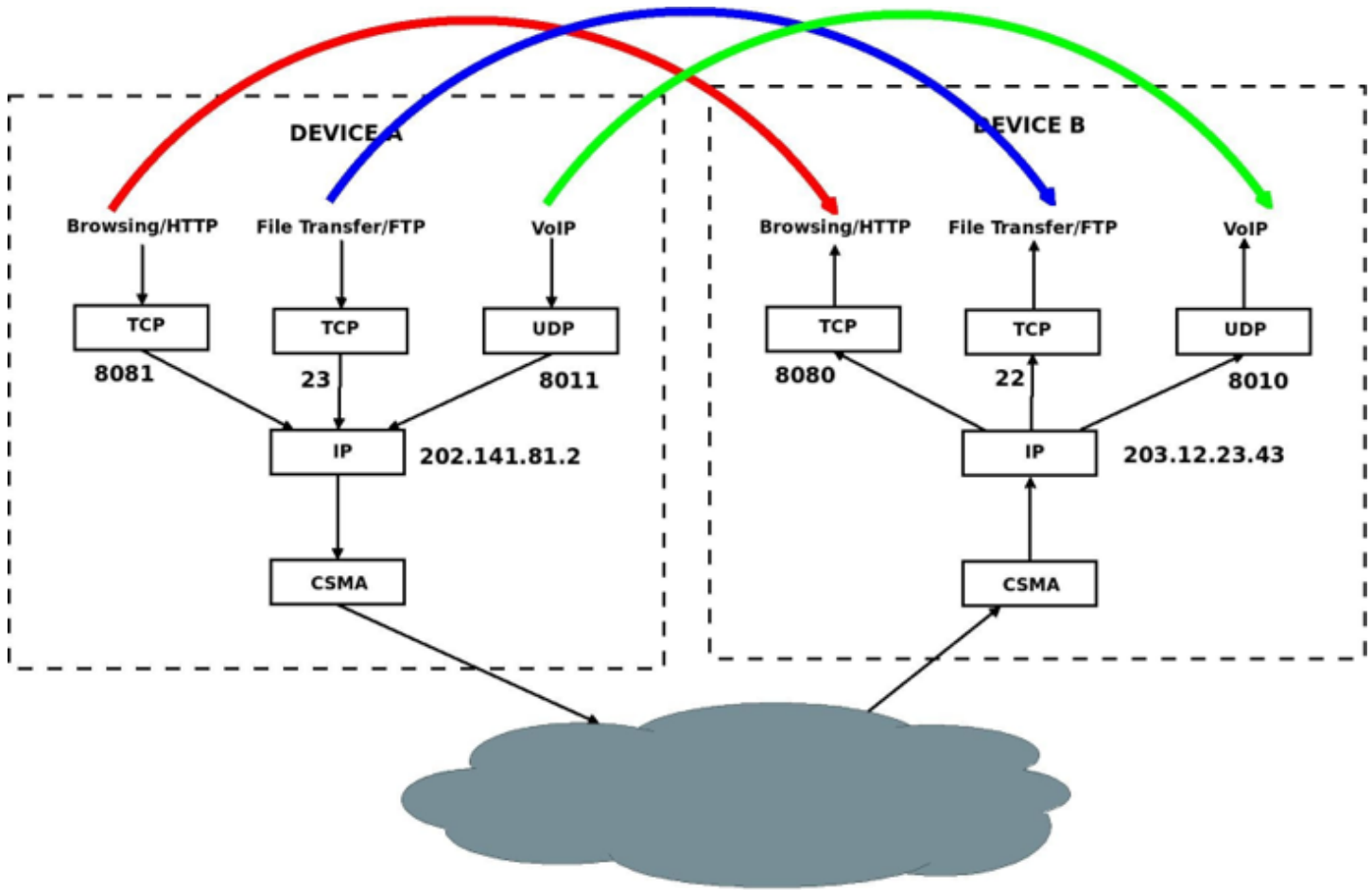
CS342 Tutorial

Introduction to Socket Programming

Application in TCP/IP

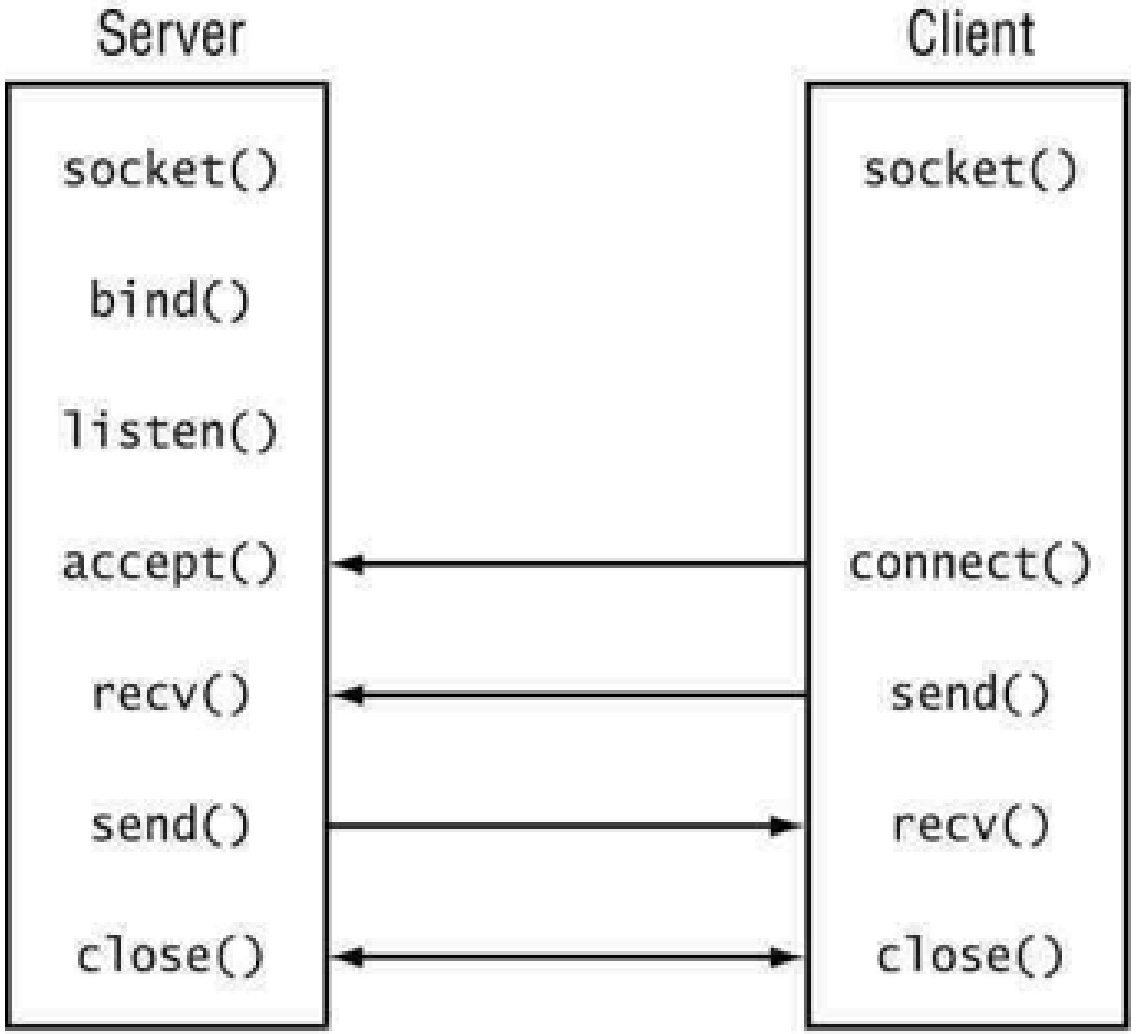


What are Sockets?



Socket Programming Framework/API

- A set of **system calls** to get the service from TCP/IP protocol stack.



- The Internet is a trade-off between performance and reliability - **Can you say why?**

- Some application requires fine grained performance (example - multimedia applications), while others require reliability (example - file transfer)

- Transport layer supports two services - Reliable (TCP), and Unreliable (UDP)
- Two types of sockets:

Stream Socket (SOCK STREAM): Reliable, connection oriented (TCP based)

Datagram Socket (SOCK DGRAM): Unreliable, connection less (UDP based)

Socket API

`int s = socket(domain, type, protocol);` - Create a socket

- domain: Communication domain, typically used AF_INET (IPv4 Protocol)
- type: Type of the socket - SOCK STREAM or SOCK DGRAM
- protocol: Specifies protocols - usually set to 0

`int status = bind(sockid, &addrport, size);` - Reserves a port for the socket.

- sockid: Socket identifier
- addrport: struct sockaddr_in - the (IP) address and port of the machine (address usually set to INADDR_ANY chooses a local address)
- size: Size of the sockaddr structure

struct sockaddr_in

- Sin_family : Address family, AF INET for IPv4 Protocol
- Sin_addr.s_addr: Source address, INADDR_ANY to choose the local address
- Sin_port: The port number

We need to use htons() function to convert the port number from **host byte order** to **network byte order**.

```
struct sockaddr in serveraddr; int port = 3028;
serveraddr.sin_family = AF_INET;
Serveraddr.sin_addr.s_addr = INADDR_ANY;
Serveraddr.sin_port = htons(port);
```

Listen and Accept a Socket Connection

```
struct sockaddr_in cli_addr;
listen(sockfd,5);
clilen = sizeof(cli_addr);
newsockfd = accept(sockfd,(struct sockaddr *) &cli_addr,  &clilen);
```

Active Open and **Passive Open**

The server needs to announce its address, remains in the open state and waits for any incoming connections - Passive Open

The client only opens a connection when there is a need for data transfer - Active Open

Connection is initiated by the client

Data Transfer through Sockets

For SOCK STREAM:

```
read(newsockfd,buffer,255);
write(newsockfd,"I got yourmessage",18);
```

For SOCK DGRAM:

```
recvfrom(sock,buf,1024,0,(struct sockaddr *)&from,&fromlen);
sendto(sock,"Got your message",17,0,(struct sockaddr*)&from,fromlen);
```