

# Internet and Networking Notes #2

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## Types of Networks

### LAN (Local Area Network)

- Small scale network topology typically only containing one router
- Used for small businesses, homes, and schools

## **WAN (Wide Area Network)**

- Composed of LANs connected together wirelessly via routers
- Used for wide-scale networks, such as towns or school systems

## **Tracing packets**

### **Traceroute**

- You can see all of the “hops” that a packet takes to get to its destination using traceroute
- This includes the IP address of each router that the packet passes through and the time it takes for the packet to get to each router

## **The Internet**

### **Internet Protocol (IP)**

- IP is the protocol that allows computers to communicate with each other
- All packets must meet the IP protocol in order to be sent over the internet
  - For example, there is a limit to the size and number of packages you can send at once

## **Types of Protocols in Packets**

### **IP Packets**

- IP packets consist of an IP header that contains metadata about the packet and the data that the packet is carrying
- They also have a data payload containing the data that the packet is carrying
- Because IP packets are barebones by themselves, we made TCP and UDP to add more functionality to them

### **UDP Packets (User Datagram Protocol)**

- UDP packets are typically used for applications that require low latency and high bandwidth
- They consist of a UDP header containing metadata and the data payload
  - The UDP header contains the source and destination ports, the length of the packet, and the checksum

- The checksum is used to verify that the packet has not been corrupted
- There is no guarantee that UDP packets will arrive at their destination, and they are not guaranteed to arrive in order
- UDP packets are typically used for streaming which does not require a constant connection

## **TCP Packets (Transmission Control Protocol)**

- TCP packets are typically used for applications that require a constant connection
- They consist of a TCP header containing metadata and the data payload
  - The TCP header contains the source and destination ports, the sequence number, the acknowledgement number, the length of the packet, and the checksum
  - The checksum is used to verify that the packet has not been corrupted
  - The sequence number is used to keep track of the order of the packets
  - The acknowledgement number is used to acknowledge the receipt of a packet
  - This is known as the “three way handshake”
- TCP packets are guaranteed to arrive at their destination and they are guaranteed to arrive in order

## **Domains**

### **Domain Name System (DNS)**

- The Internet has a special way to map IP addresses to domain names, which are easier for people to remember

### **Domain Structure**

- Top Level Domains are the highest level of domains
  - For example, .com, .org, .edu, .gov, .net,
- Second Level Domains are the second highest level of domains, containing the name of the organization
  - For example, google.com, microsoft.com, apple.com, amazon.com, facebook.com
- Third Level Domains are the third highest level of domains, containing the name of the website and a subdomain of the parent
  - For example, drive.google.com, docs.microsoft.com, support.apple.com

## **The OSI (Open System Interconnection) Model**

- A conceptual framework for compartmentalizing all of the different network processes and protocols
- The physical layer is all the physical components that make up the network and the data that is sent over cables (bits)
- The data link layer is the layer that is responsible for sending data over the physical layer
- The network layer is the layer that is responsible for sending data over the data link layer and routing data to the correct destination
- The transport layer consists of protocols that are responsible for sending data over the network layer such as TCP and UDP
- The session layer is responsible for establishing and maintaining connections between applications known as a “session”
- The presentation layer is responsible for converting data from one format to another
- The application layer is the layer that is responsible for sending data over the presentation layer and is the layer that applications interact with