

nkaliyamurthy 2/04/2025 ↻



Discussion Topics:

- o How does data get from one computer to another on the Internet and what is the role of IP addresses in the transmission of data on the Internet?
- o How do you think routers and switches work on the Internet to facilitate the flow of data between different networks?

↻ THE NOT-SO WINDOW NEAR GROUP 2/4/25 11:41AM

To understand how IP Addressing contributes to the functionality of a network, let us think about what an IP is before developing those questions. From the website fortinet.com [0], an Internet Protocol is an identifying number given to every device whether it is a laptop, a TV, or even a toy connected to the internet. It effectively contributes to finding data or content by making every machine easily identifiable thanks to their address. It includes information such as the address and the host of a network. The fact that each device has a unique identifier assigned is crucial for communication among devices.

IP addresses formats such as the most well-known IPv4, which has a dotted-decimal format (meaning that is a numerical data composed of decimal digits separated with dots) with four numbers representing 8-bit fields. Each 8-bit field represents a byte of the IP address (*Oracle*) [1], where IPv6 can have an alphabetical hexadecimal notation for each field separated by a colon.

IPv4 has a 32-bit address length allowing the existence of 4.3 billion unique addresses going from 0.0.0.0 to 255.255.255.255, where IPv6 is a 128-bit (16 bytes) address that can be represented like

2001:0db8:0000:0000:0000:ff00:0042:8329. You can have 4 types of IP addresses for different uses: Public (accessible all over the internet), Private (Used for devices within private networks), Static (Fixed and manually assigned) and Dynamic (Automatically assigned and can change).

For routers, you can compare all the students in this room as the laptop, which are all on a table that you can compare as an switch. Those switch give a general information sent to the teacher, that can be compare as a router that can communicate to an other classroom, so an another teacher.

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↻ CYBER STUDENTS AND SOHAAN 2/4/25 11:25AM

- for data to get across the internet, it needs to travel through lots of

different networks, since the internet is constructed several thousands if not millions of networks. [1]

- Data is split into packets within a network and is then assigned a packet "header" which is checked by the receiving computer network so it knows what to do with the packet.
- A message or email is broken up into packets and then translated into bits which are then sent to the receiving machine.
- The packets end up in their correct destination through a series of routers and switches on the way to the receiving machine.
- IP addresses are unique to every single network and device that ever connects to the internet.

Ip Addresses are separated into IPv4 addresses and IPV6 addresses. The addresses uses Subnet masks, breaking the networks into groups to reduce congestion on a network.

-TCP defines how a device should transmit data, a TCP is split into 4 layers, Datalink; how data should be transmitted. Internet; which controls the movements of packets across a network. Transport; responsible for providing a reliable connection and dividing the data into packets. And Application; the layer where a user will interact with the most such as an email or a messaging platform.

- IPV4 uses 32-bit binary numbers to form a unique IP address for a user.
- IPV6 is 128-bit that identifies a device, due to the increased bit space, over trillions of devices can connect to the internet as there was concern for that IPV4 would run out of space.
- A switch connects network devices and allows them to connect and communicate,

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🔗 **TEAM MIDDLE** 2/4/25 11:24AM

When data is sent over the Internet, it is broken into small pieces called packets. These packets travel from your computer to the destination computer through a network of routers and servers.

The data travel process

- Breaking Data into Packets: Large files or messages are split into small packets.
- Adding Destination Info: Each packet gets a label with the sender's and receiver's addresses.
- Routing Through Networks: The packets move through different routers,

which decide the best path to send them.

- Reaching the Destination: Once all packets arrive, they are reassembled into the original message.

An IP address is like a home address for computers. Every device connected to the Internet has a unique IP address. It helps identify where data should be sent and received, just like a postal address helps deliver mail.

An example of when you visit a website:

- First your computer sends a request to the website's IP address.
- Then the website's server sends the data back to your IP address.
- And then your browser displays the webpage.

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Valiant Urchin 2/4/25 11:25AM

The TCP/IP is a suite of communication protocols that are used to connect devices on a network and transmit data between them. It determines how the data is exchanged by providing an information channel that gives information on how the data is broken into packet, and how it is addressed, transmitted and sent to the specified destination. It requires little central management and provided reliable network communication as it can recover automatically from the failure of any device on the network.

TEAM PUNCTUAL 2/4/25 11:20AM

Team Punctual

Routers connect to wan and are in most homes switches are usually lan based
Data sent via packets with source and destination addresses, which are redirected by routers until the destination is reached

Hardware and software stds - transmission mediums and protocols agreed. Ip addresses have a logical structure helping to describe 'how' to get data to its destination, which routers primarily assist with, choosing where to send based on the destination address.

Breaking data into smaller packets, typically under the transmission mediums MTU, and packets can be reassembled at destination. IP address identify endpoints on networks, every endpoint must have unique address relative to its network.

Two types of IP addressing - IPv4 is 32 bit, IPv6 is 128 bit. IPv6 is being adopted but ipv4 is still common.

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TEAM 1 2/4/25 11:17AM

The way data gets from one computer to another on the internet is governed by the TCP/IT protocol.

The data transmission is carried out at the internet layer of this protocol.

When data is sent it gets broken down into data packets and are then passed to the Internet layer.

Data packets contain a header with the destination IP address. Which is then forwarded through a series of routers.

Packets may take different routes to the destination depending on internet traffic

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Whimsical Puffin 2/4/25 11:22AM

Switches connect multiple devices together to form a network. Routers connect multiple switches (networks) together, to form an internet (network of networks).

ABCDEF 2/4/25 11:17AM

Group ABCDEF

ABCDEF 2/4/25 11:20AM

The IP address acts like a unique identifier, allowing data to be sent to and received from specific devices. When data is sent from one device to another, it travels through multiple networks. The IP address helps in routing this data through various network nodes until it reaches its destination. Routers use the destination IP address to determine where to forward data packets.

Data is broken down into packets. Each packet includes both the sender's and receiver's IP addresses within its header, ensuring that when the packet travels through the internet, it can be reassembled in the correct order at the destination.

In summary, an IP address is crucial for ensuring that data packets reach their intended destination accurately and efficiently across the complex network of the internet.

ABCDEF 2/4/25 11:28AM

Switches:

When a device sends data, the switch records the source MAC address and the port it's connected to in its MAC address table (or CAM table).

When data comes in, the switch looks at the destination MAC address in the frame. If it knows the port for this MAC address, it forwards the frame only to that port, reducing unnecessary network traffic.

Routers:

Routers use routing tables to determine the best path for data to travel from source to destination. These tables can be manually configured or built dynamically through routing protocols like OSPF, BGP, or RIP.

When a packet arrives, the router examines its destination IP address, decides where to send it next based on its routing table, and forwards the packet accordingly.

Routers often serve as the gateway between public and private networks, translating private IP addresses to public ones for internet communication.

In summary, switches efficiently manage data within a network by forwarding based on MAC addresses, while routers manage data between networks using IP addresses, ensuring accurate and efficient data transfer across potentially complex network architectures.

ABCDEF 2/4/25 11:37AM

The TCP/IP model, unlike the OSI model, consists of four layers, which are designed to handle specific functions of data communication. Here's an explanation of each TCP layer:

Link Layer :

This layer deals with the physical transmission of data between nodes within a network. It's concerned with the hardware and software elements that interface with the network medium.

Divides data into frames suitable for network transmission.

Uses mechanisms like CRC (Cyclic Redundancy Check) to detect transmission errors.

Internet Layer:

The Internet Layer is responsible for sending packets from the source network to the destination network, which could be on different networks.

Assigning and managing IP addresses for routing packets across networks.

Breaking down large packets into smaller ones to fit the constraints of the underlying network.

↩ **BEN ROBERTS (2205382)** 2/4/25 11:14AM

IP Addresses

Data travels in the form of packets which are small units of data, reassembled at their destination. Packets will contain all aspects necessary for communication.

Necessary bits for communication including: IP Address, Length, Payload. Header and Trailer act as the start point and end point of communication which helps the receiving party to understand where it's come from.

IPv4 and IPv6 serve a similar purpose of being used in routing, but IPv4 is a 32bit value with a limit of roughly four billion units, while IPv6 is 128-bit and can cover a much larger number of devices.

Switches and Routers

Routers act as a gateway to the internet by connecting LANs to other LANs. The Switch operates at the data link layer (level 2) and facilitates communication within the same LAN using MAC addresses to forward data to the appropriate device.

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Courteous Jellyfish 2/4/25 11:24AM

The Internet's functionality depends on the structured flow of data, enabled by IP addressing, routers, and switches. IP addresses ensure unique identification and efficient routing, while subnetting and IPv6 adoption enhance scalability and security. As network demands grow, optimizing IP allocation and leveraging advanced networking technologies will be critical to sustaining Internet connectivity.

↩ **PLAYFUL OTTER** 2/4/25 11:14AM

Lectures Group :

Logical Addressing - Public/ Private IP Address
Identify the Source and Destination
Data Packets - Encryption

OSI Model - 7 Layers
Physical - Data Link - Network - Transport
- Session - Presentation - Application:

Switches work in Layer 2 - Data Link
Routers work in Layer 3 - Network

Routing helps to reach different networks

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