

# MINNESOTA TECH FOR SUCCESS



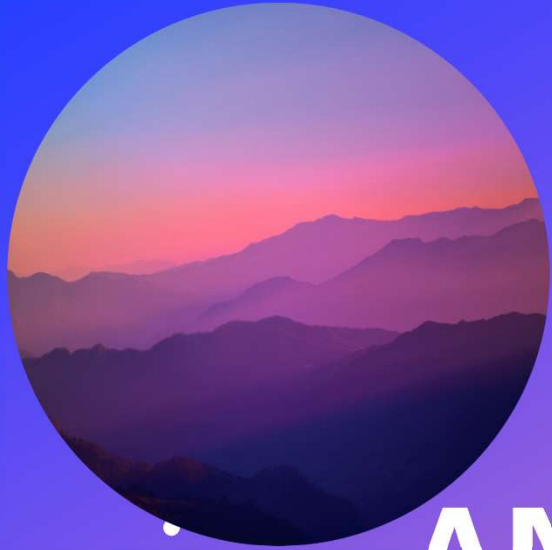
Week 8-10: Networking Basics

1/17/2024

# Agenda

- **Announcements**
- **Classroom (25 min)**
  - Introduction to Networking
  - Types of networks
- **Break (5 min)**
- **Warehouse (1.5 hrs)**
  - Recycling





# ANNOUNCEMENTS

Week 8



# Announcements for 1/17

- **Calendar**

- Next session: **Wednesday, 1/24/2024**
- Week 8-10: Networking Basics – Jan. 17th, 24th, & 31<sup>st</sup>
- Week 11-12: IT Security – Feb. 7th & 14th

# Values

- **R**espect
- **A**ccountability
- **I**mprovement
- **S**teadfast
- **E**ncouragement



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# + MODULE 2: NETWORKING AND SECURITY

Networking Basics



# Networking Basics Objectives:

- **Introduction to networking**
  - What computer networks are and their importance in connecting devices and sharing resources
- **Types of networks and their uses**
  - An overview of different network types and their practical applications
- **Common network devices and setups**
  - Introduction to common network hardware and how they are used in network configurations
- **Basic network problem-solving**
  - Identifying and addressing simple network issues

# NETWORKING BASICS

What is the internet?





# What is the internet?



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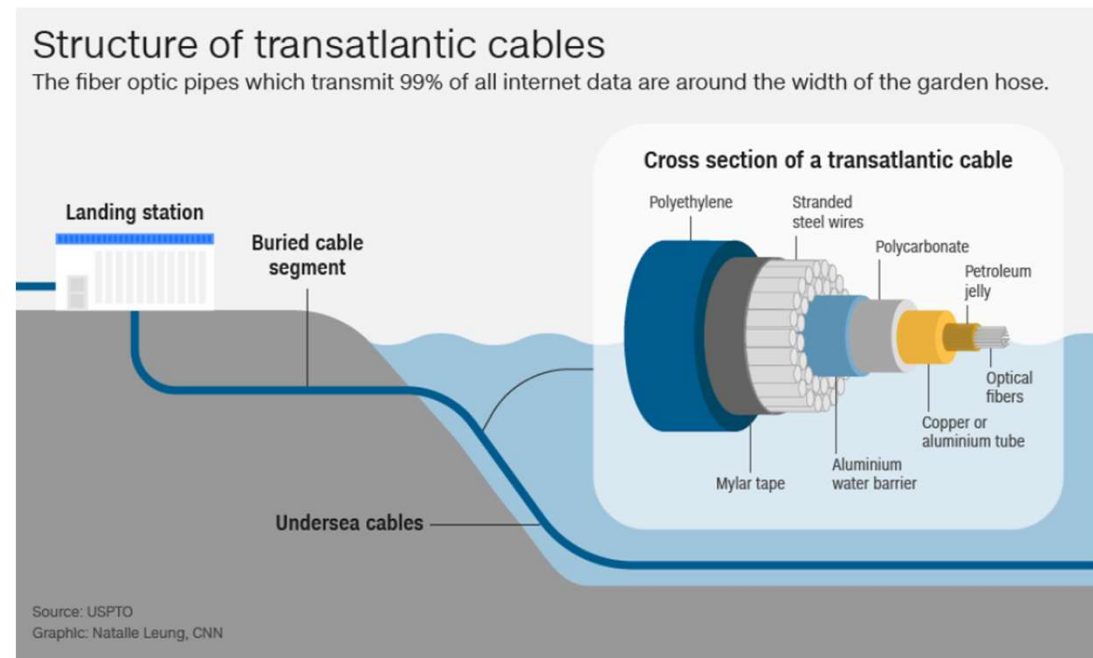
Internet

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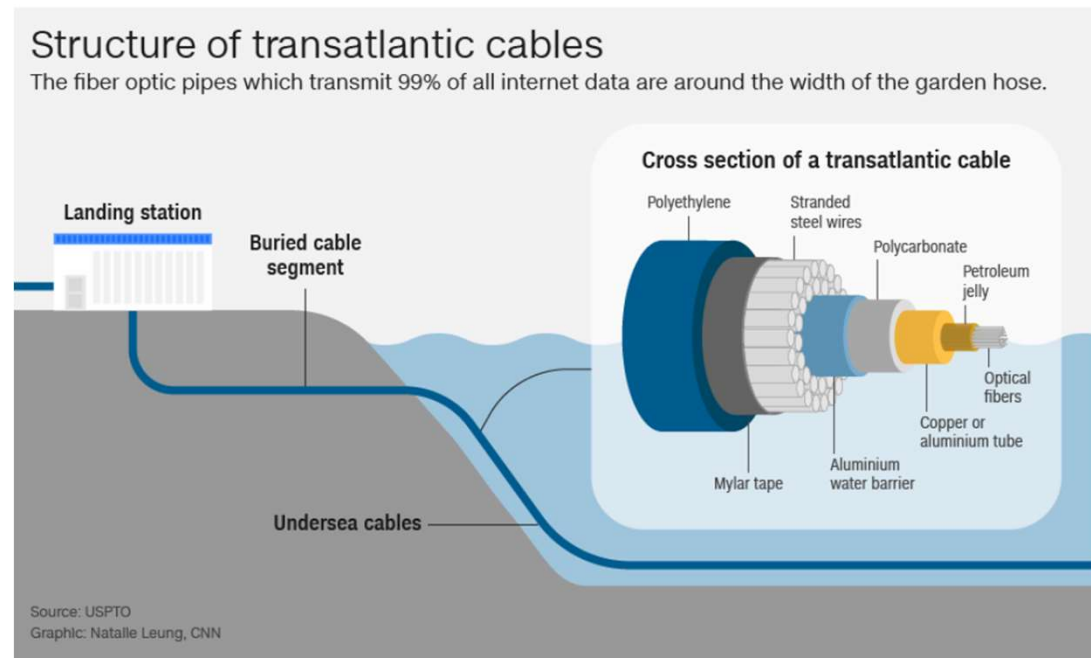
# Introduction to Networking: Underwater Cables

- The internet is connected by undersea cables
- More than 95% of international data is transmitted by wires at the bottom of the ocean called *submarine communications cables*
- These cables are hundreds of thousands of miles long and can lie 8000 meters below the surface



# Introduction to Networking: Underwater Cables

- As of 2019, around 380 underwater cables are in operation around the world
  - Spanning a length of over 1.2 million kilometers (745,645 miles)
- Two-thirds of cable failures are caused by accidental human activities, fishing nets and trawling and ships' anchors
  - The next largest cause is due to natural disasters



# NETWORKING BASICS

What is a computer network?



# Terms & Definitions

- **Computer Network** – group of two or more computers that are connected to each other (either wired or wireless) for transmitting, exchanging, or sharing data & resources
- **Internet** – global system of interconnected computer networks that uses the Internet Protocol suite (TCP/IP) to communicate between networks and devices
  - Contains a range of information resources and services such as hypertext documents and applications of the world wide web, email, telephone, file sharing

# Terms & Definitions

- **Intranet** – A computer network for sharing information, easier communication, collaboration tools, operational systems, and other computing services within an organization, usually to the exclusion of access by outsiders
- Uses the same technology based on the Internet protocol suite in contrast to public networks, such as the Internet

# Terms & Definitions

- **IP address** – Internet Protocol address - Set of rules governing the format of data sent via the internet or local network
  - The identifier that allows information to be sent between devices on a network: they contain location information and make devices accessible for communication
  - A unique string of characters that identifies each computer using the Internet Protocol to communicate over a network.

# Terms & Definitions

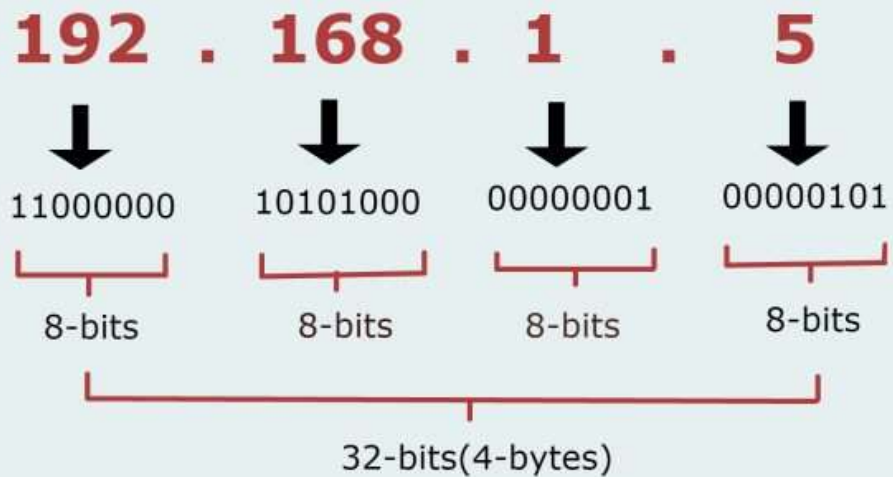
- **IPv4** – Internet Protocol version four
  - Introduced in 1981 by DARPA
  - 32-bit integers expressed in Decimal Notation.
  - Represented by 4 numbers separated by dots in the range of 0-255, which have to be converted to 0 and 1, to be understood by Computers



# Terms & Definitions: IPv4



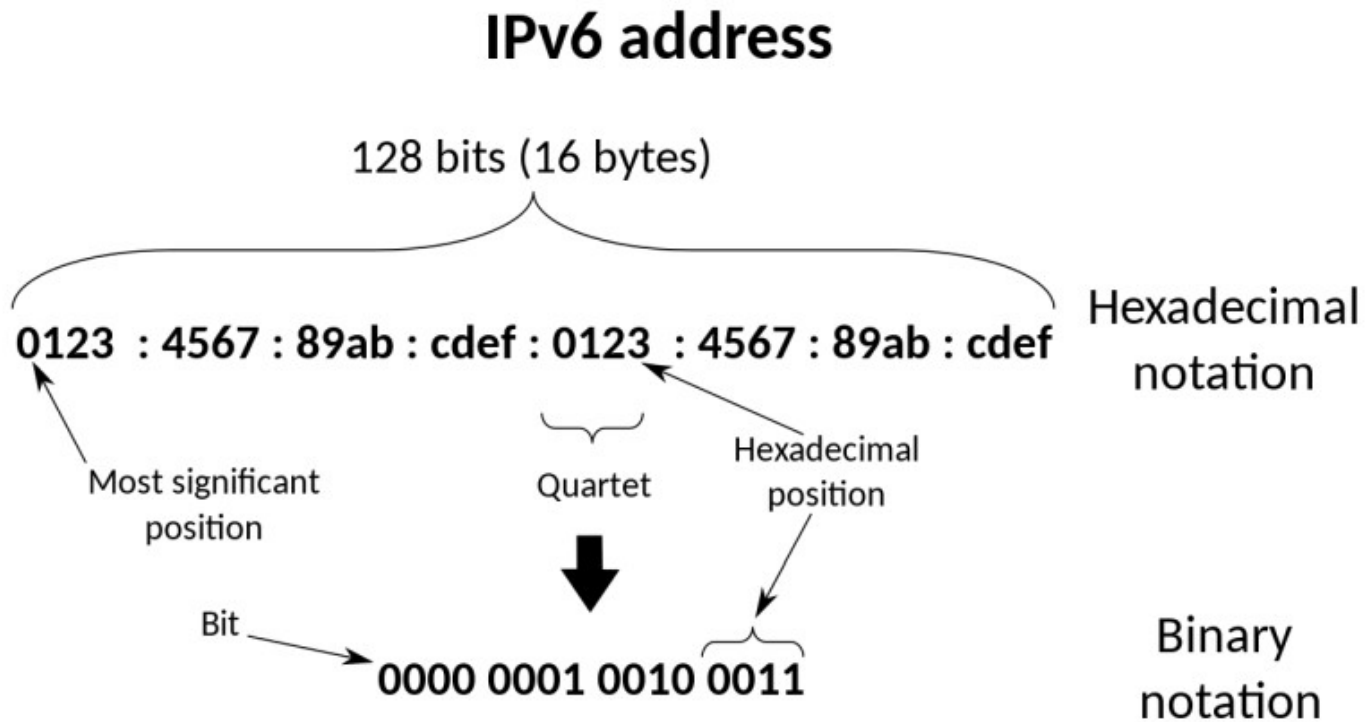
**IPV4 address represented in dotted-decimal notation**



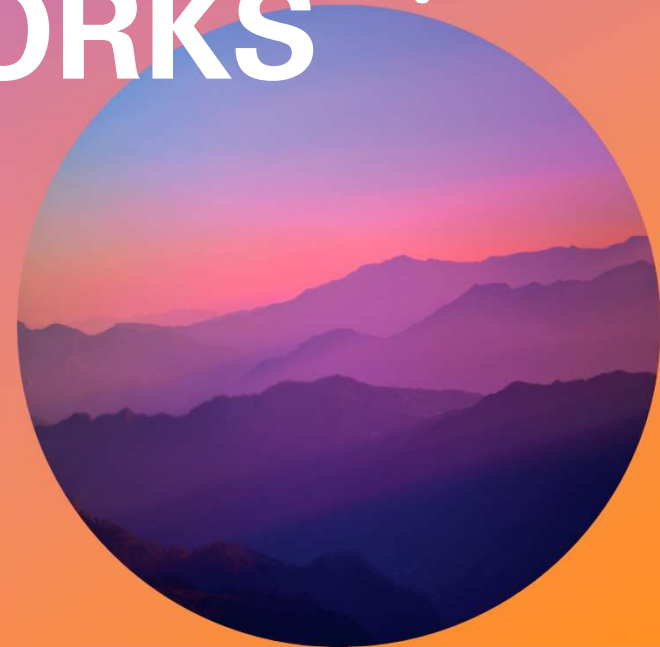
# Terms & Definitions

- **IPv6** – Internet Protocol version six
  - Introduced in December 1995 by Internet Engineering Task Force
  - 128-bit integers expressed in Decimal Notation; more complexity and efficiency
  - Represented by a group of 8 hexadecimal numbers separated by colons in the 128 bits of 0s and 1s

# Terms & Definitions: IPv6



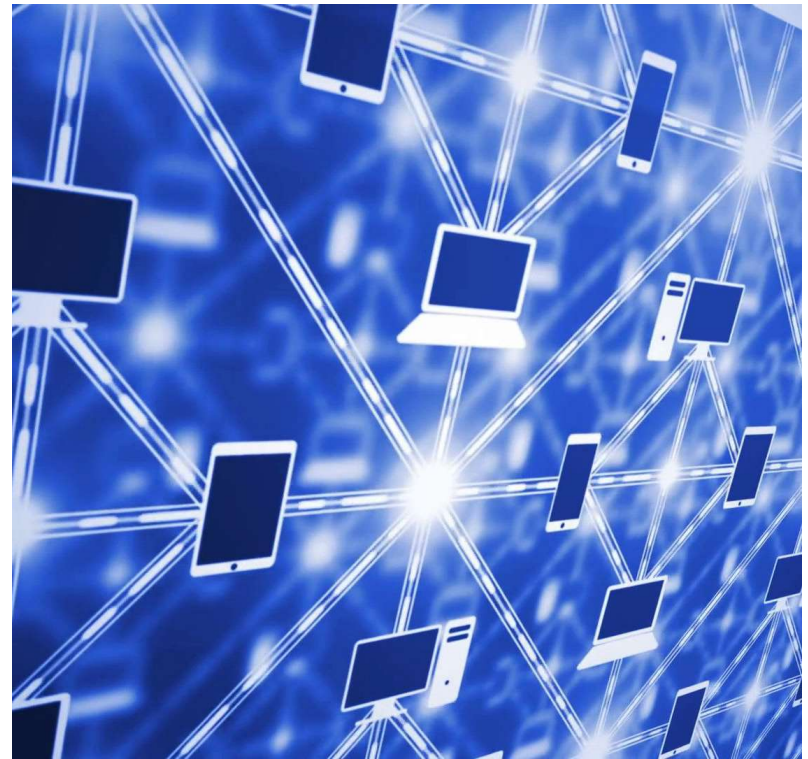
# TYPES OF NETWORKS



# Types of Networks\*

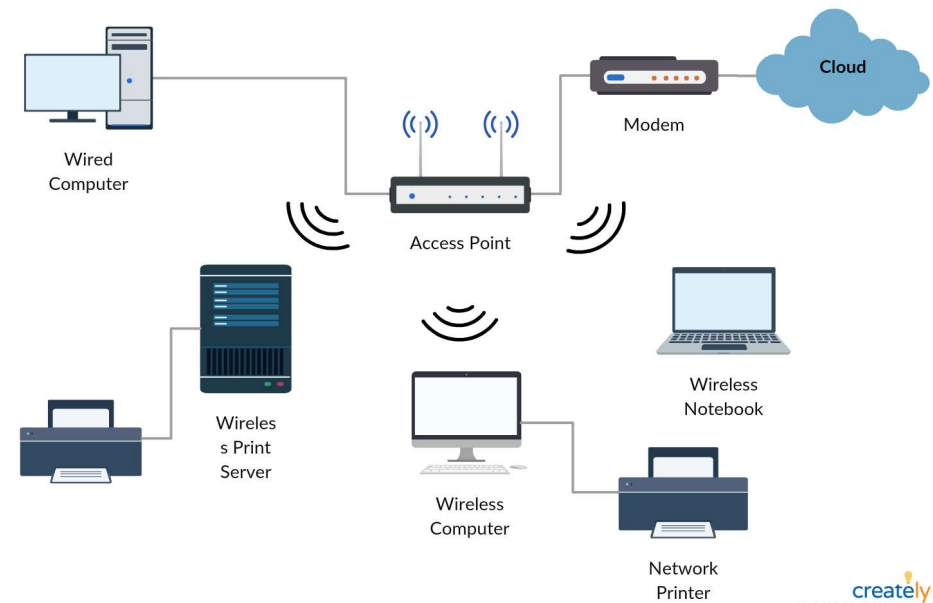
- **LAN** (local area network)
- **WLAN** (wireless local area network)
- **WAN** (wide area network)
- **PAN** (personal area network)
- **HAN** (home area network)
- **MAN** (metropolitan area network)
- **CAN** (campus area network)
- **SAN** (storage area network)
- **VPN** (virtual private network)

\*List is non-exhaustive



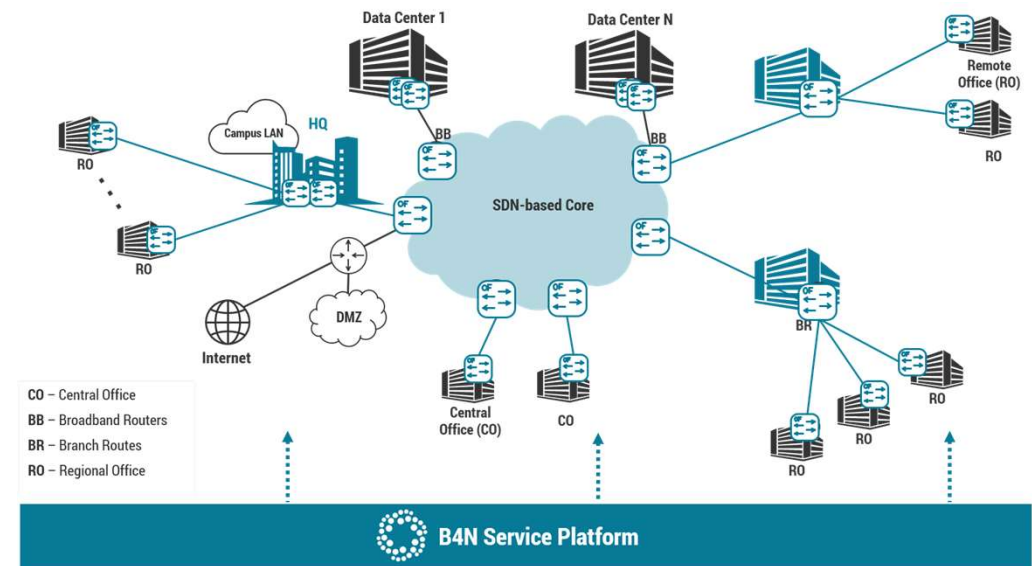
# Types of Networks: LAN & WLAN

- **Local Area Network (LAN)** -Connects computers over a relatively short distance to share data, files, and resources
- May connect all the computers in an office building, school, or hospital
- Typically, are privately owned and managed
- **Local Area Network (WLAN)**
  - A LAN where connections between devices on the network are made wirelessly



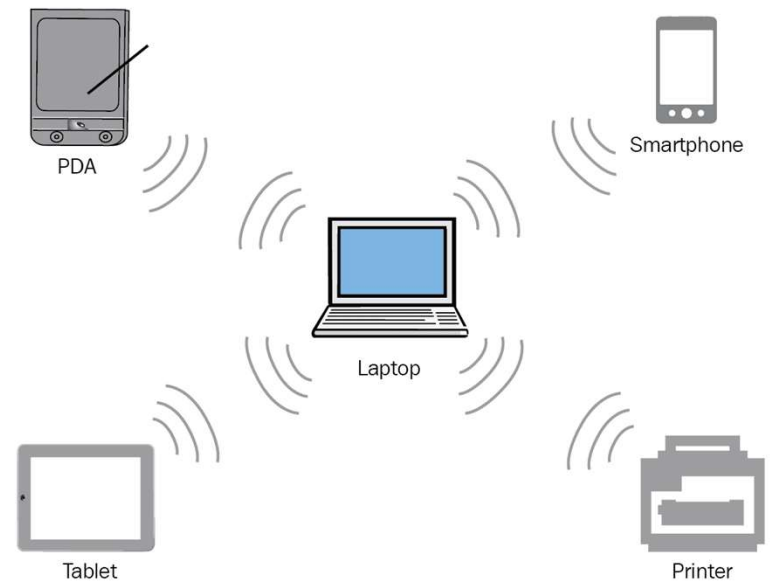
# Types of Networks: WAN

- **WAN (wide area network)** - Connects computers over a wide area (i.e. from region to region or continent to continent)
- The internet is the largest WAN, connecting billions of computers worldwide
- Collective or distributed ownership models for WAN management



# Types of Networks: PAN

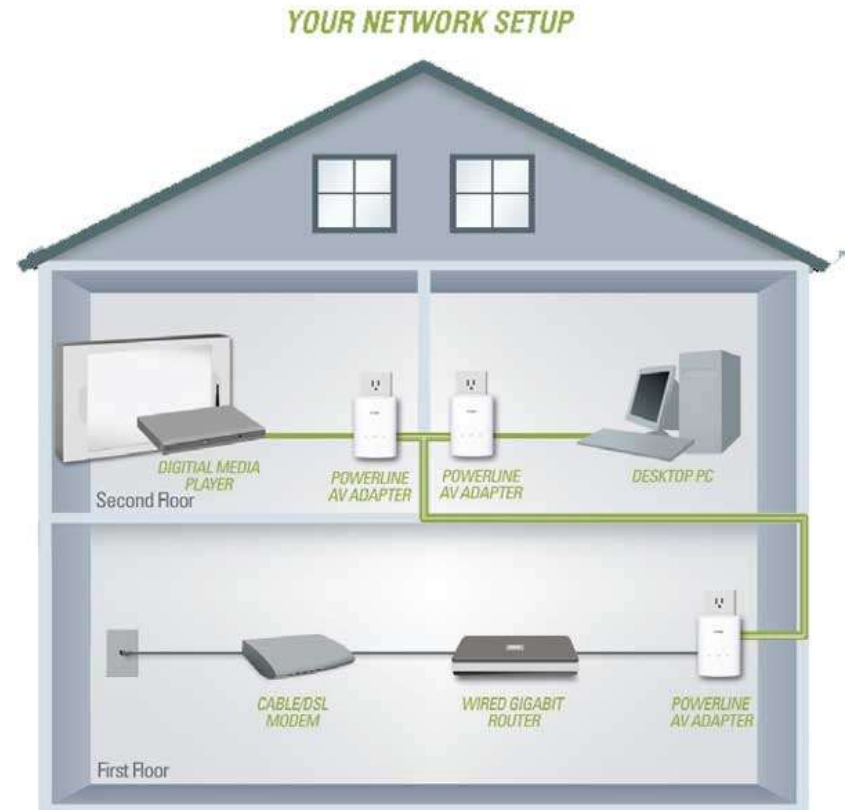
- **Personal Area Network (PAN)** - a computer network for interconnecting electronic devices within an individual person's workspace
- Among those personal devices, serves one person
- May connect to a higher-level network & internet where one main device serves a role as a gateway ( i.e. mobile hotspot)





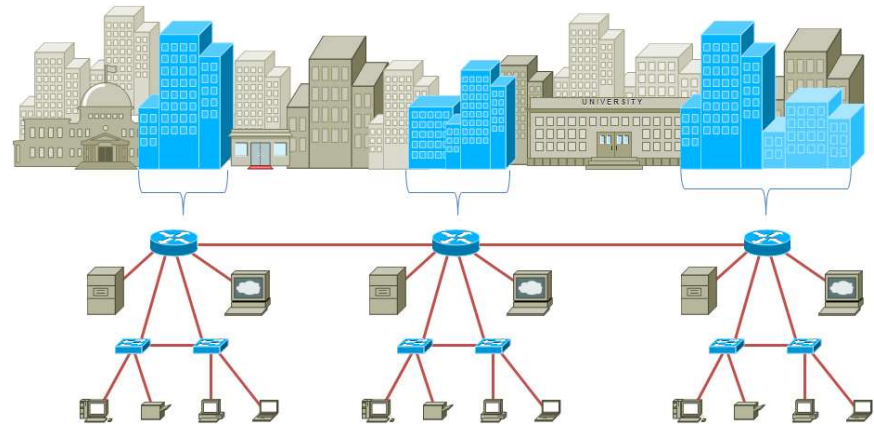
# Types of Networks: HAN

- **Home Area Network (HAN)** - a computer network for interconnecting electronic devices within close vicinity of a home
- Serves more than one person
- Capabilities can be used to increase the quality of life inside the home:
  - Automation of repetitive tasks
  - Increased personal productivity
  - Enhanced home security
  - Ease of access to entertainment



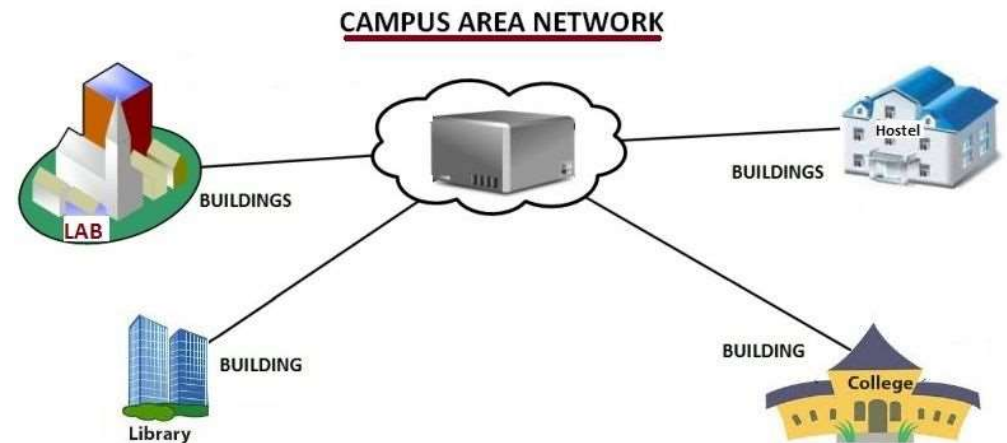
# Types of Networks: MAN

- **Metropolitan Area Network (MAN)**
- Typically larger than LANs but smaller than WAN
- Cities and government entities typically own and manage MANs



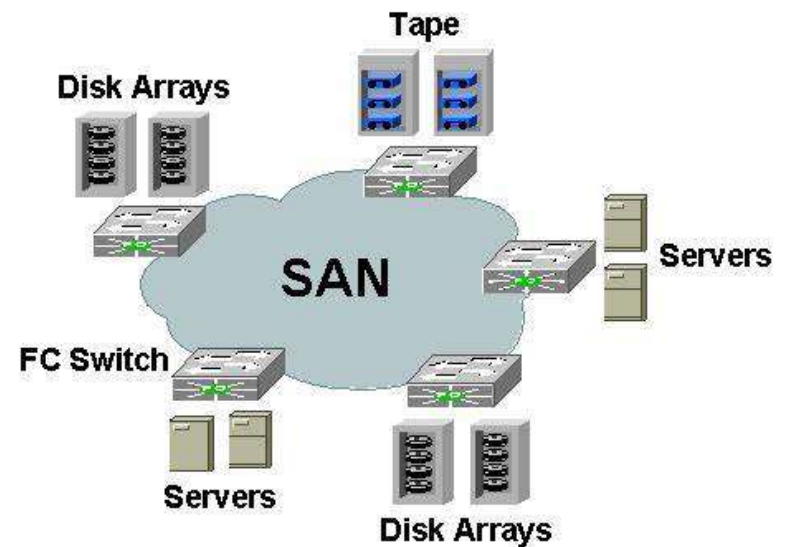
# Types of Networks: CAN

- **Campus Area Network (CAN)** - larger than a LAN but smaller than a WAN
- Serve sites such as colleges, universities, and business campuses
- Can also be known as a corporate area network



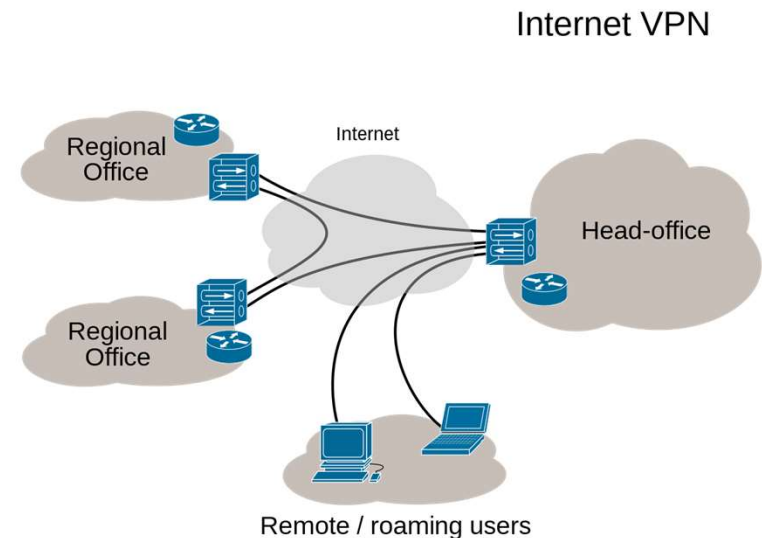
# Types of Networks: SAN

- **Storage Area Network (SAN)** – provides access to consolidated block-level storage
- Used to access data storage devices (ex disk arrays, tape libraries) from servers
  - Devices appear to the OS as direct-attached storage



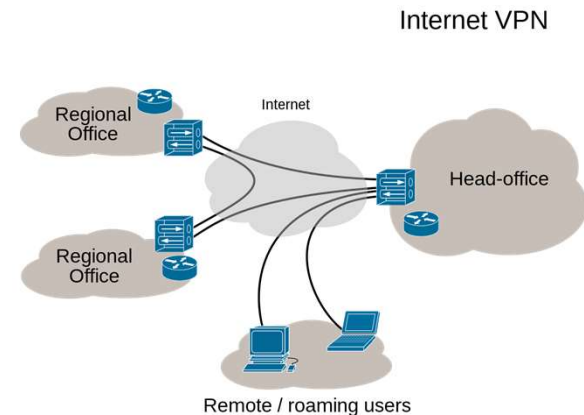
# Types of Networks: VPN

- **Virtual Private Network (VPN)** – a secure & private encrypted connection between a device and another network over an unsecure public network (Ex. internet)
- Can extend access to a private network to users who do not have direct access to it
  - Ex. an office network allowing secure access from off-site over the Internet.



# Types of Networks: VPN Configurations

- **Remote access (host-to-network)** - Connect a computer to a local area network. Provides access to an enterprise network, such as an intranet.
  - For remote workers, or to enable a mobile worker to access necessary tools without exposing them to the public Internet.
- **Site-to-site** - Connects two networks and expands a network across geographically disparate offices or connects a group of offices to a data center installation.
- **Extranet-based site-to-site** - joins sites belonging to multiple organizations.





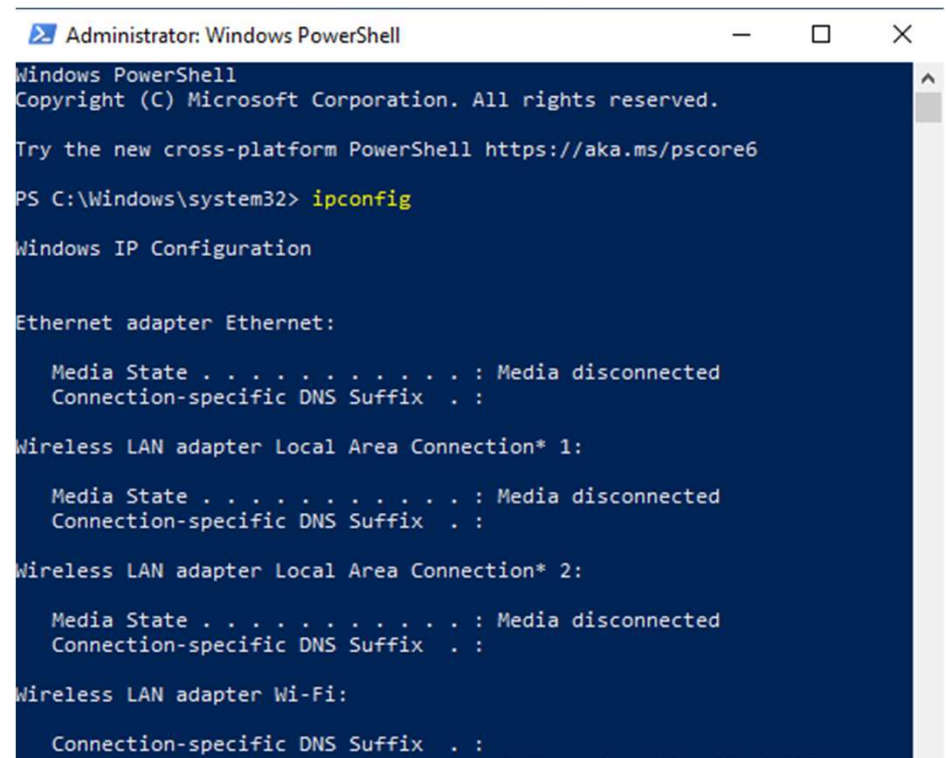
# ACTIVITY

Find your ip address



# Activity: Find your IP address

1. Type: [Windows] + [x]
2. Select Windows PowerShell (Admin)
3. Type: `ipconfig`
4. Under Wireless LAN adapter Wi-Fi, locate:
  1. IPv4 Address



```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Windows\system32> ipconfig

Windows IP Configuration

Ethernet adapter Ethernet:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

Wireless LAN adapter Local Area Connection* 1:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

Wireless LAN adapter Local Area Connection* 2:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

Wireless LAN adapter Wi-Fi:

    Connection-specific DNS Suffix  . :
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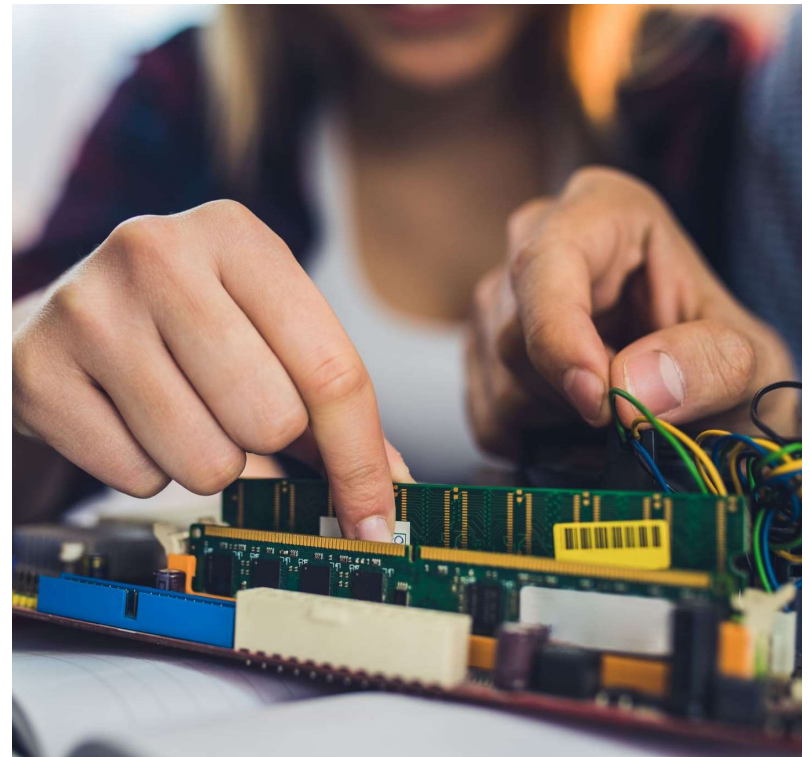


# WAREHOUSE



# Warehouse Activity

- 1:30-3:00pm
- Parting/recycling



# BREAK

5 minutes

