



# COMPUTER NETWORKS

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# Understanding Computer Networks



# Introduction to Computer Networks

- A computer network is a system that connects two or more computing devices for transmitting and sharing information.
- Efficient networking enables seamless communication and collaboration so that the customer service is more enhanced. Here, whenever there's a problem, the customer can instantly access your account details and resolve it.
- From online banking to streaming entertainment, digital services rely on robust networks. Fast data transfer, secure transactions, and uninterrupted connectivity are essential for delivering these services. Without efficient networking, our digital lives would be far less convenient.

# Exploring Network Types

## Local Area Network (LAN)

*This is a network that is confined geographically within a single building or site.*

*This is often used in small businesses, schools and homes.*

## Wide Area Network (WAN)

*This is a network that is spanned largely geographically, connecting networks across countries and continents, like the internet.*

# LAN

## Features

- High-speed communication within a small area
  - *Provide fast data transfer rates within a limited physical space, such as a building or campus.*
- Shared resources
  - *Devices connected to a LAN can share resources like printers, scanners, and files seamlessly.*
- Reliable connectivity
  - *Offer stable and dependable network connections for users and devices.*

## Uses

- *In-store operations*
  - *Retail stores uses LAN for inventory management and sales processing, etc.*
- *Customer access to digital books*
  - *Libraries and educational institutions use LAN to allow members to access digital resources like e-books and research materials.*
- *Classes on File downloading and configuration*
  - *Facilitate file sharing, software distribution, and collaborative learning among students and teachers.*

# WAN

## Features

- **Wide Geographical Connectivity**
  - Connect distant locations, bridging gaps across cities, countries, or even continents.
- **Flexibility**
  - They can operate over public or private communication channels, adapting to diverse network infrastructures.
- **Scalability and Adaptability**
  - Accommodating growth and changes in network requirements.

## Uses

- **Can link multiple stores**
  - Retail Can share data and communicate easily among different stores, regardless of their physical locations.
- **Online sales and digital downloads**
  - WANs empower businesses to offer these services efficiently.
- **Supports remote classes**
  - Connect students and educators across distant areas, enabling remote learning experiences.



Wide Area Network

# User Experience

- Speed – *This is how quickly data can be transmitted between geographically dispersed locations. Smooth browsing, fast downloads, and very responsive applications will contribute to a positive user experience.*
- Connectivity – *WAN ensures seamless connectivity across distant users. Digital content can be accessed by users, whether it's an e-book, streaming video, online shopping, without any interruptions.*
- Reliability – *Minimal downtime is essential for satisfaction of the users. To maintain reliability, WANs are designed with redundancy and failover mechanisms. So reliable WANs minimize disruptions and keep users connected.*

# Network Reliability

- WANs reliability depends on several factors. Regular maintenance, monitoring, and backup systems contribute to the overall reliability.
- When a network fails, it impacts user experience, productivity, and business operations.
- If an e-commerce platform experiences frequent outages, the customers will be frustrated and will hurt its revenue. So Organizations invest in robust WAN infrastructure to minimize failures and ensure continuous service.

# Performance

- Performance of WAN depend on various factors like distance, bandwidth and network connection.
- Optimizing WAN design—using efficient protocols, quality connections, and traffic prioritization—improves data transfer speed. Users benefit from quicker access to resources, whether it's downloading software updates or collaborating on shared documents.

# Strengths

## 1. Efficient Resource Sharing

- *Sharing of resources across geographically dispersed locations.*
- *Organizations can centralize data storage, applications, and services, leading to streamlined operations.*
- *For example, a multinational company can access a centralized database or cloud services from various branches worldwide.*

## 2. Enhanced Customer Experience

- *Facilitate seamless communication between distant offices, improving customer service.*
- *Customers experience faster response times, whether they interact with call centers, online services, or e-commerce platforms.*
- *This enhanced connectivity contributes to better customer satisfaction.*

## 3. Scalability

- *Can scale to accommodate growth without significant infrastructure changes.*
- *WANs adapt by connecting new branches or remote sites as an organization expands.*
- *Ensures that businesses can handle increased data traffic and user demands.*

# Weaknesses

## 1. Initial Setup Costs

- *Involves substantial upfront expenses when establishing.*
- *Costs include hardware such as (routers, switches), leased lines, and network design.*

## 2. Maintenance Complexity

- *Require ongoing management and maintenance.*
- *Troubleshooting issues across multiple locations can be complex.*
- *Organisations need to hire skilled IT personnel to keep track of these issues.*

## 3. Security Risks

- *Spanned in large areas, making them vulnerable to security threats.*
- *Transmitted data of public networks faces risks like interception, data breaches, and unauthorized access.*
- *Robust security measures need to be implemented to protect sensitive information.*

# Conclusion

Computer networks play a pivotal role in our interconnected world. They facilitate seamless communication, data sharing, and resource access.

It enables cloud computing, big data analysis, and the Internet of Things (IoT). However, networks faces issues which can be mitigated through timely patching and robust security measures.

It can have unauthorized access, data breaches, and network pose downtime risks. To face this, organisations must invest in comprehensive training, robust network setup, and vigilant monitoring.



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