

# TRANSMITTING DATA IN IT SYSTEMS

KEY METHODS AND  
TECHNOLOGIES FOR DATA  
COMMUNICATION



# CONNECTIVITY METHODS



# Bluetooth

## Wireless Device Connectivity

Bluetooth enables short-range wireless communication between devices like smartphones, headphones, and keyboards.

## Convenience and Mobility

Bluetooth eliminates cables, offering convenience and mobility for personal and wearable technology use.



# USB

## Data Transfer

USB provides a fast and reliable connection for transferring data between devices with ease and efficiency.

## Device Charging

USB cables are widely used for charging various electronic devices including smartphones and cameras.

## Peripheral Connectivity

USB enables connection of peripherals such as printers, external drives, and cameras to computers effectively.



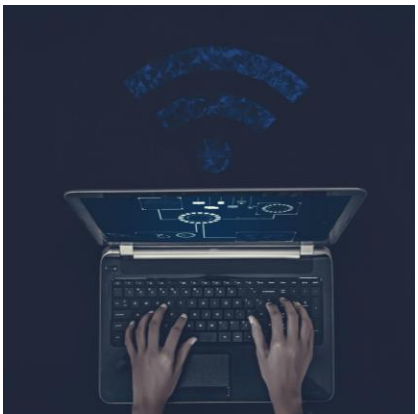
## Wireless Internet Access

Wi-Fi enables wireless internet connectivity, eliminating the need for physical cables in network access.



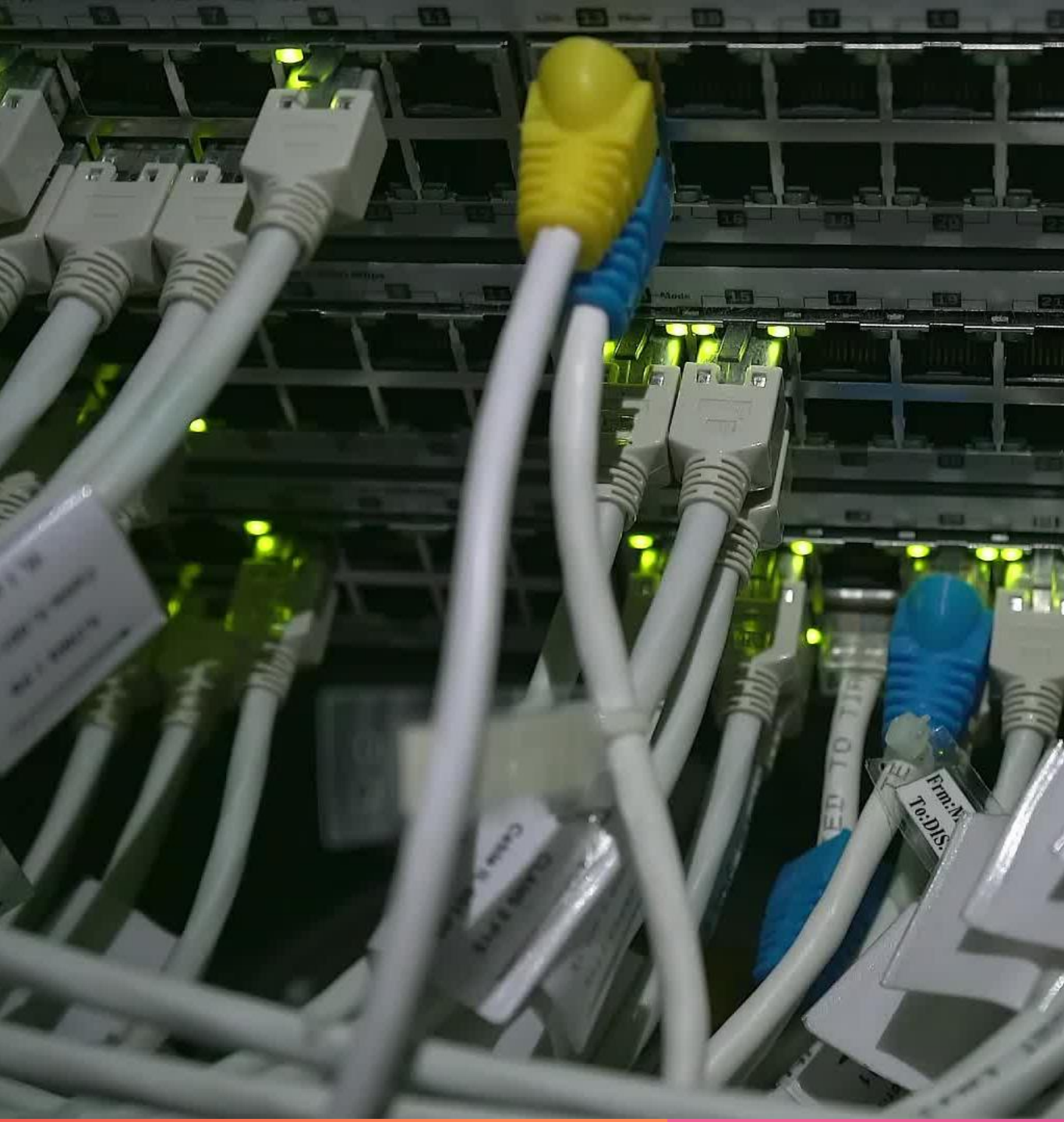
## Multi-Device Connectivity

Wi-Fi supports connection of multiple devices simultaneously to a single network for seamless communication.



## Essential for Various Environments

Wi-Fi is crucial in homes, schools, and businesses for online access and resource sharing.



# Ethernet

## Wired Network Connection

Ethernet uses physical network cables to connect devices for stable and secure communication.

## High-Speed Performance

Ethernet provides high-speed data transfer suitable for demanding environments like offices and data centers.

## Reliability and Stability

Ethernet is preferred for critical applications due to its consistent and reliable connectivity.

# MEETING NEEDS WITH CONNECTION TYPES



# Different Needs

## Wireless Convenience

Wireless connections offer mobility and ease of use, favored by individuals for everyday tasks and flexibility.

## Wired Speed and Security

Wired connections provide faster data transfer and enhanced security, making them ideal for organisational use.

## User-specific Requirements

Choosing between connection types depends on the specific needs and priorities of users or businesses.



# Wireless Benefits

## Enhanced Mobility

Wireless technology enables users to move freely without physical cable restrictions, increasing mobility.

## Flexibility in Usage

Wireless connectivity provides flexibility and ease of access in various environments, supporting dynamic usage.



# Wired Benefits

## Speed Advantage

Wired connections offer faster data transfer speeds compared to wireless alternatives.

## Stable Performance

Wired networks provide consistent and reliable performance with minimal interruptions.

## Reduced Interference

Wired connectivity is less prone to interference from other devices or physical obstacles.

## Ideal for High Bandwidth

Wired connections are suitable for high bandwidth tasks requiring secure and fast data transmission.

# **IMPLICATIONS AND PERFORMANCE**



# Choosing Connection Types

## Impact on Performance

Selecting the appropriate connection type improves speed and reliability significantly.

## User Experience Enhancement

Correct connection choices lead to smoother and more consistent user interactions.

## Consequences of Poor Choices

Inappropriate connection types cause slow speeds and frequent disruptions.



# Speed Differences

## Ethernet Speed Advantage

Ethernet connections generally provide faster and more stable speeds than wireless connections like Wi-Fi.

## Wi-Fi Speed Variability

Wi-Fi speeds can vary depending on distance, interference, and router quality, often slower than Ethernet.

## Choosing Connection Types

Understanding speed differences helps select the best connection for tasks requiring high bandwidth or mobility.



# Ease of Setup

## Wireless Setup Simplicity

Wireless connections typically require minimal physical setup, making them convenient and quick for users.

## Wired Setup Requirements

Wired connections often need cables and infrastructure, which can require more effort and planning to install.

## Environmental Impact on Setup

The ease of setup varies by environment, influencing the choice between wired and wireless connectivity.

# Improving IT Systems



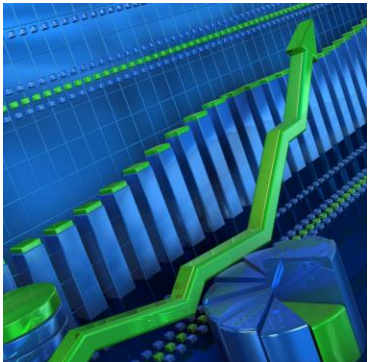
## Efficient Data Transmission

Choosing the right connection ensures fast and reliable data transfer across IT systems.



## Supporting User Needs

Effective IT connections support diverse user requirements for better system usability.



## Enhancing System Performance

Proper connection methods boost overall IT system performance and reliability.



# B2: NETWORKS

Understanding the structure and  
function of connections

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# NETWORK CONCEPTS



# What is a network?

## **Definition of Network**

A network connects multiple devices enabling communication and data sharing between them.

## **Purpose of Networks**

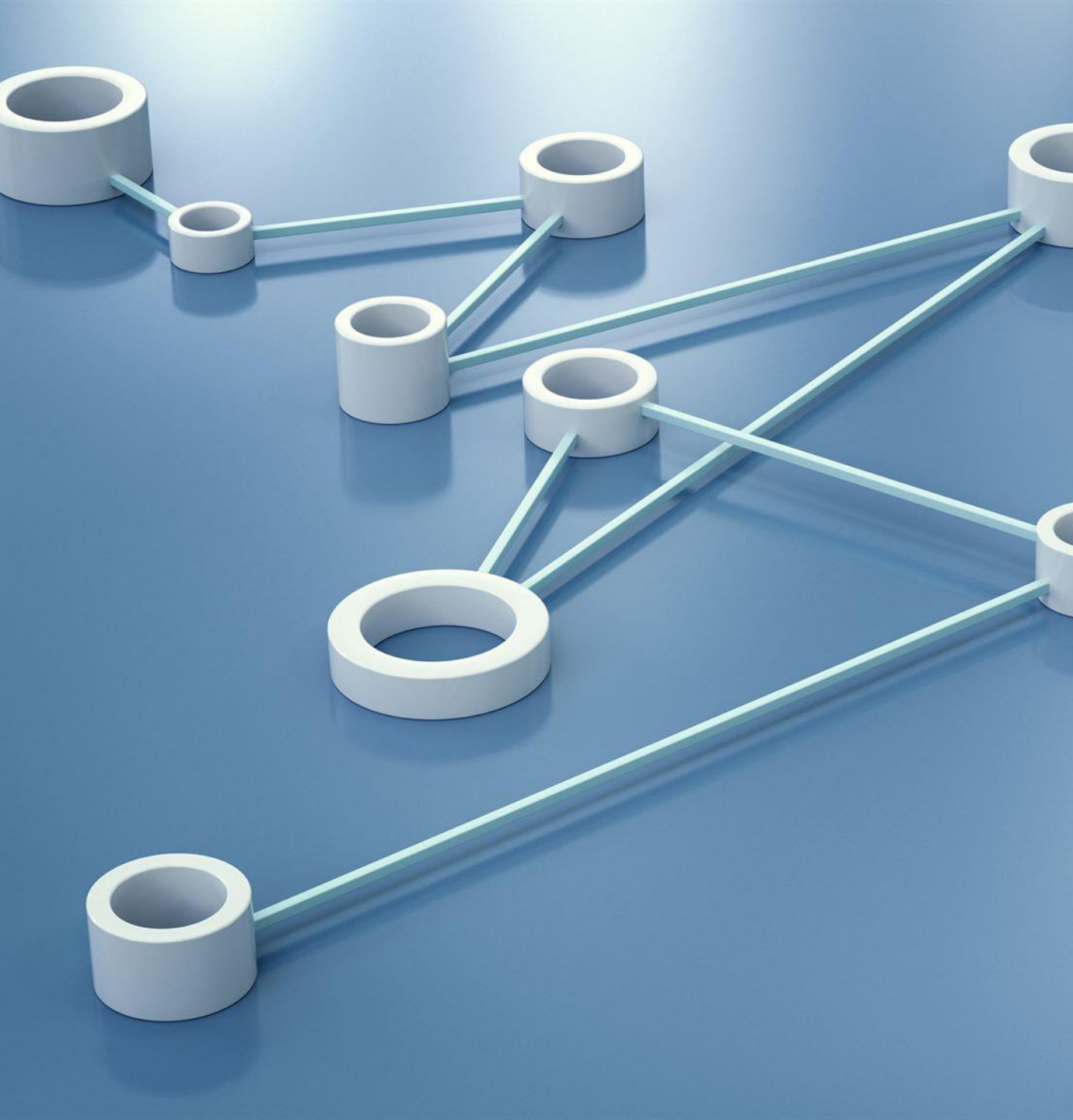
Networks allow devices to share data and resources, enhancing efficiency and collaboration.

## **Network Usage Areas**

Networks are commonly used in homes, schools, and businesses for various communication needs.



# NETWORK TOPOLOGIES



# Star topology

## Central Hub Role

The central hub connects all devices in a star network and manages data traffic.

## Device Connectivity

Each device connects individually to the central hub, ensuring dedicated communication paths.

## Fault Tolerance

Failure of one device does not affect the operation of other devices in the network.



# Ring topology

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## **Network Structure**

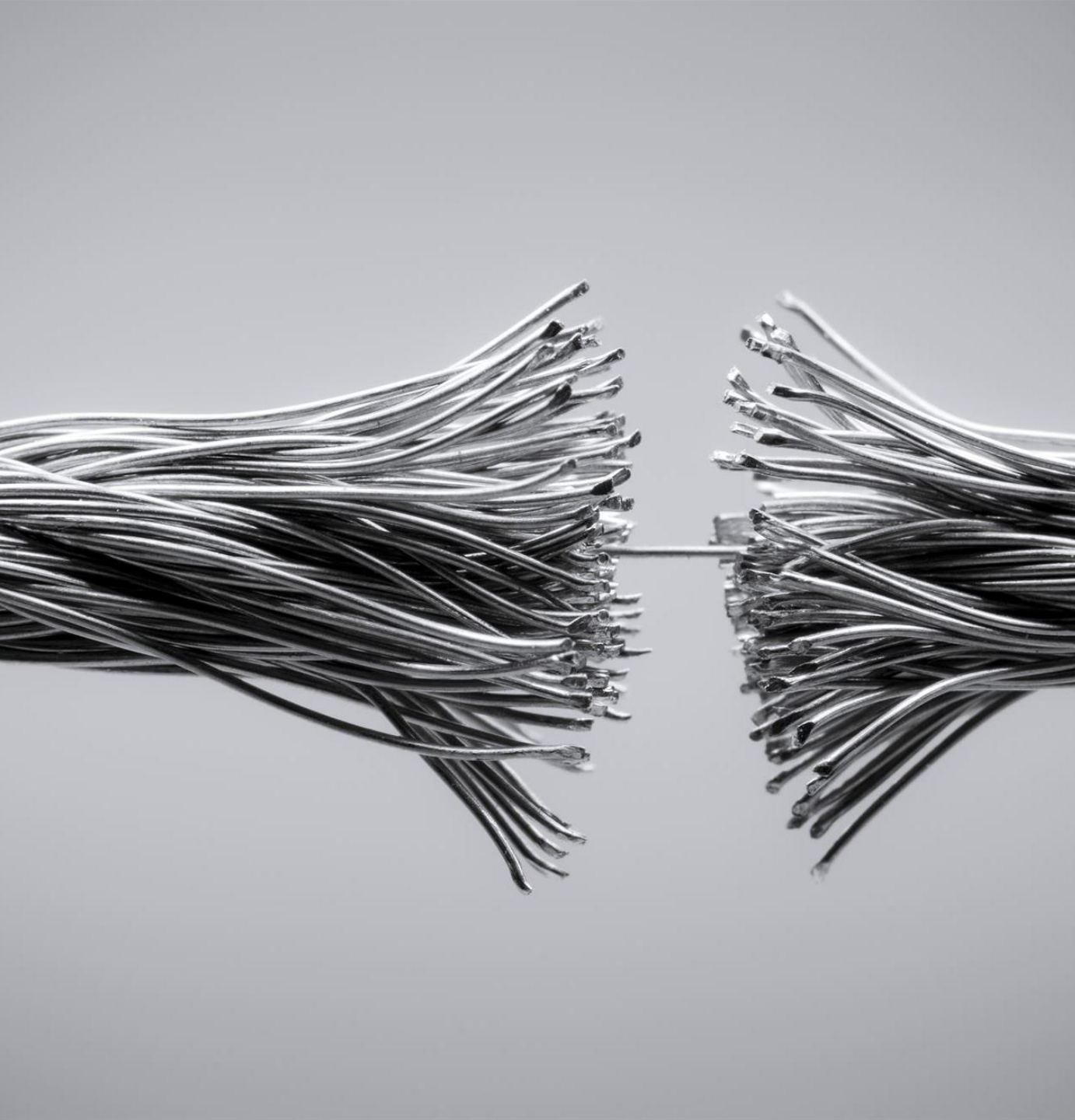
Devices are connected in a closed loop forming a ring structure facilitating data flow.

## **Data Flow Direction**

Data travels in a single direction around the ring, passing through each connected device.

## **Network Failure Impact**

Failure of a single device can disrupt the entire network, causing communication to stop.



# Bus topology

## **Single Shared Cable**

Bus topology uses one continuous cable that connects all network devices in a linear arrangement.

## **Shared Communication Path**

All devices share the same cable for communication, which can cause collisions and bandwidth sharing.

## **Single Point of Failure**

If the main cable breaks, the entire network stops functioning, causing complete communication loss.

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# **TYPES OF NETWORKS**



# Personal Area Network (PAN)

## Definition of PAN

Personal Area Network connects devices located close to each other for seamless communication.

## Common Devices in PAN

Phones, tablets, and smartwatches commonly use PAN for wireless data exchange and syncing.

## Short Distance Technology

PAN operates over short distances typically using technologies like Bluetooth for connectivity.



# Local Area Network (LAN)

## Local Device Connectivity


LAN connects multiple devices within a single location such as homes or offices efficiently.

## Common LAN Locations

LANs are commonly implemented in home and office environments for reliable network access.

## File and Printer Sharing

LAN enables fast sharing of files and printers among connected devices improving productivity.



# Wide Area Network (WAN)

## Wide Distance Connectivity

WAN connects devices over large geographical distances, enabling communication across cities and countries.

## Office Network Linking

WAN links office locations in different cities to facilitate data sharing and communication.

## Internet as Largest WAN

The internet is the largest example of a WAN, connecting billions of devices worldwide.



# Virtual Private Network (VPN)

## **Secure Private Network**

A VPN establishes a secure and private network connection over the internet, protecting user data from unauthorized access.

## **Remote Data Protection**

VPNs safeguard data integrity and privacy when users work remotely by encrypting internet traffic.

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# **FACTORS AFFECTING NETWORK CHOICE**

# User needs and specifications



## User Needs Impact

Different user needs drive the choice of network technology based on required features and performance.

## Speed Requirements

Some users prioritize fast speed to support activities like streaming and gaming for better performance.

## Security Importance

Security is critical for users needing safe connections to protect data and privacy during communications.

## Specifications Matter

Technical specifications such as speed and range influence the suitability of a network for different environments.

# Connectivity and cost

## Types of Connectivity

Wired connections provide stable and reliable links between devices, ensuring consistent performance.

## Wireless Connectivity

Wireless connections offer flexibility and mobility, enabling devices to connect without physical cables.

## Cost Considerations

Setup costs vary between network types, with some being more affordable depending on infrastructure needs.





# Efficiency and compatibility

## **Network Efficiency**

Efficient networks provide fast and reliable data transmission to ensure smooth connectivity.

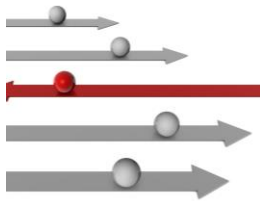
## **Device Compatibility**

Compatibility ensures different devices can seamlessly communicate and work together on the network.

## **Choosing a Network**

Both efficiency and compatibility are crucial factors to consider when selecting an optimal network.

# Implementation factors



## **Timescales**

Timescales indicate the duration needed to complete the setup process during implementation.



## **Testing**

Testing ensures the system or network functions correctly before full deployment.



## **Downtime**

Downtime refers to periods when the network or service is unavailable during implementation.



# Productivity and security

## Enhanced Productivity

Reliable networks enable efficient communication and collaboration, boosting overall productivity in the workplace.

## Data Security

Robust security measures protect data from hackers and viruses, ensuring information safety and trust.



# **NETWORK PERFORMANCE**



# How network features affect performance

## **Network Speed Importance**

High network speed enables faster data transfer and improves overall user experience and productivity.

## **Network Type Impact**

Different network types affect connectivity quality and performance in various environments and applications.

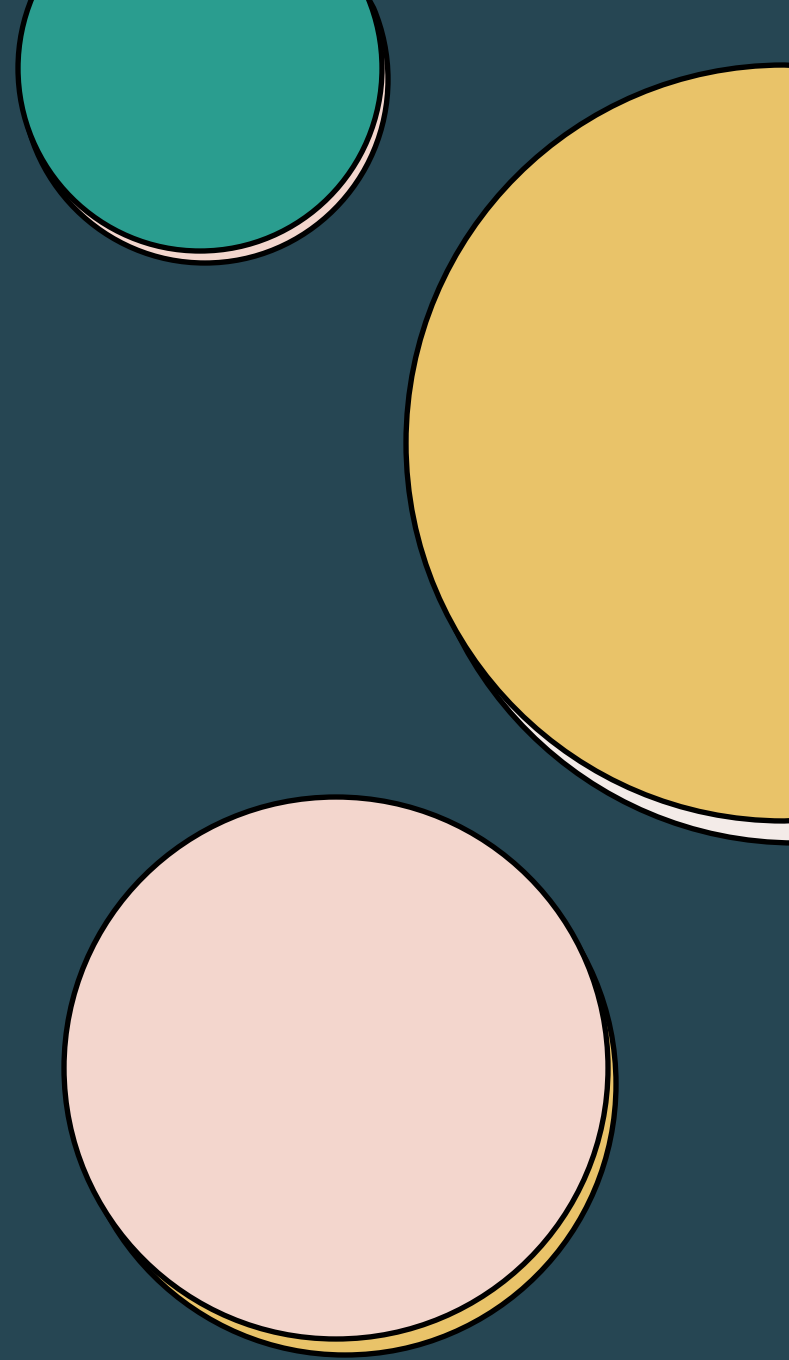
## **Network Layout Design**

A well-designed network layout ensures smooth data flow and minimizes bottlenecks, enhancing efficiency.

# B3: Issues Relating to Transmission of Data

Challenges in Reliable and Secure Data Transfer

# Protocols for Data Transmission





# Email Protocols

## **SMTP for Sending Emails**

SMTP protocol is responsible for sending email messages from the sender to the recipient's mail server efficiently.

## **POP for Receiving Emails**

POP protocol downloads emails to a device, allowing offline access but limiting synchronization across devices.

## **IMAP for Email Synchronization**

IMAP protocol stores emails on the server enabling access and synchronization from multiple devices.

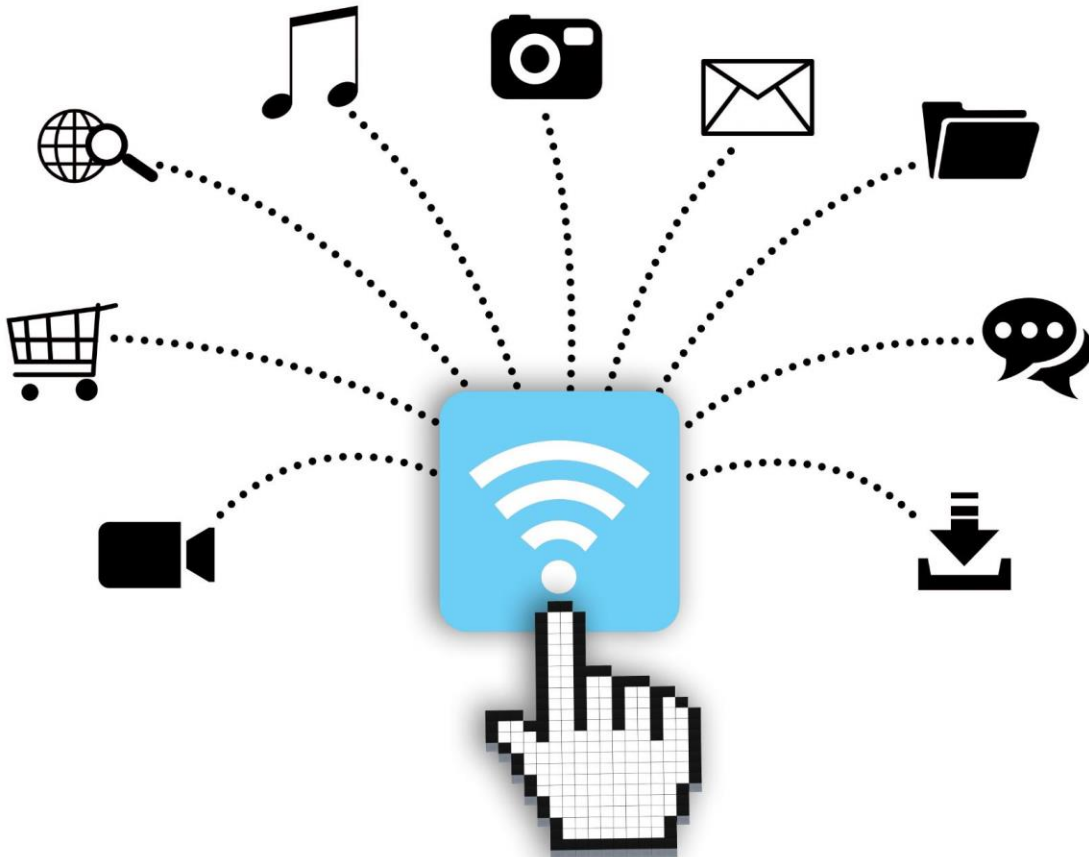
# Voice and Video Calls

## Internet Protocol Usage

Voice and video calls rely on internet protocols to enable seamless real-time communication between users.

## Real-Time Communication

Protocols ensure audio and video data transmission happens quickly and clearly in real time.





# Web Page Protocols

## HTTP Basics

HTTP is the fundamental protocol used to access and transmit web pages across the internet.

## HTTPS Security

HTTPS encrypts data during transmission, ensuring privacy and protection from cyber threats online.



# Secure Payment Systems

## Special Protocols

Secure payments rely on special protocols that protect sensitive information during transactions.

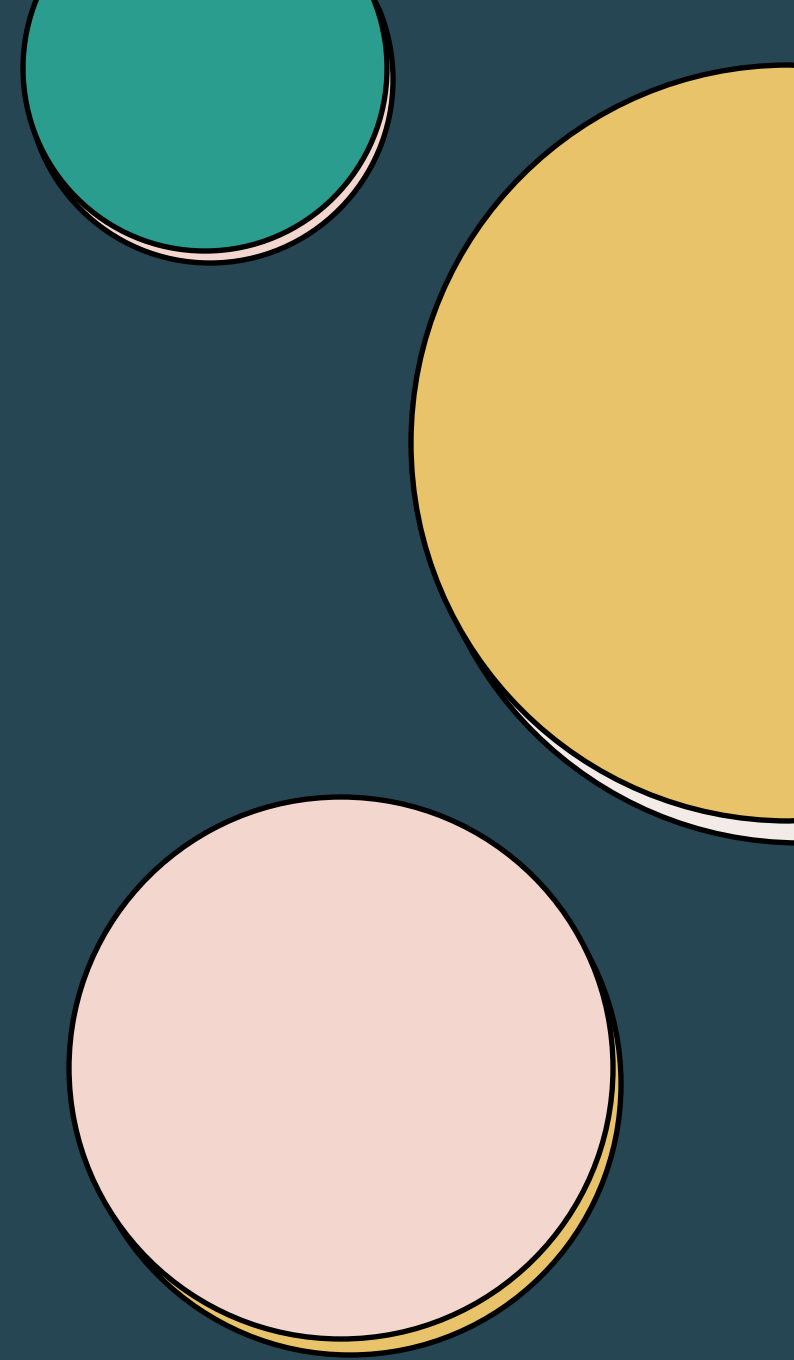
## Protecting Sensitive Data

Protocols safeguard credit card details and personal information from exposure and theft.

## Fraud Prevention

Secure payment systems help prevent fraud and ensure safe online transactions for users.

# Security and Performance in Data Transmission





# Security Considerations

## Importance of Secure Transmission

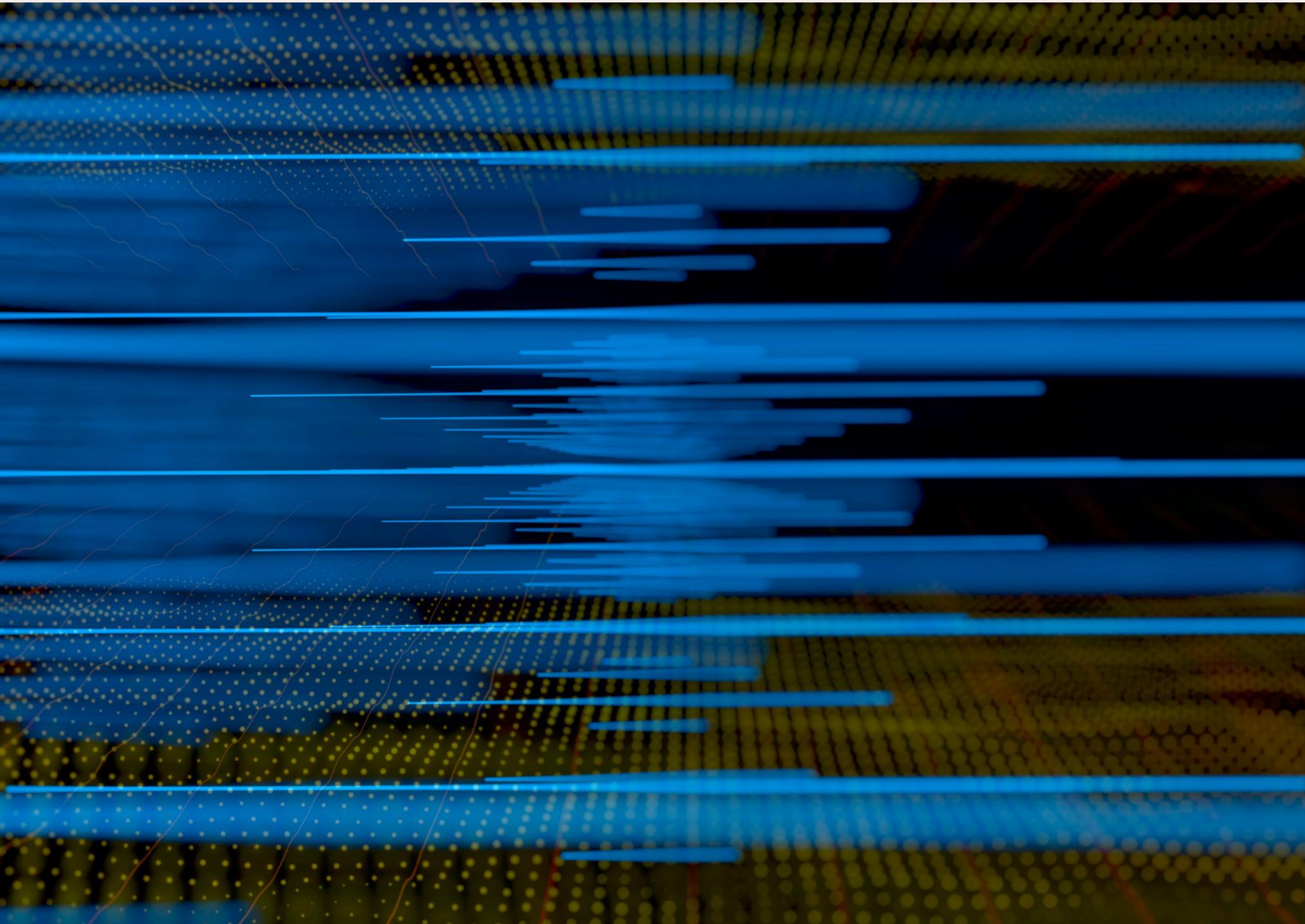
Ensuring data transmission is secure protects information from interception and tampering.

## Network Security Risks

Different networks have unique vulnerabilities that must be addressed to prevent breaches.

## Use of Encryption and Protocols

Encryption and secure protocols protect data from hackers and unauthorized access effectively.



# Bandwidth and Latency

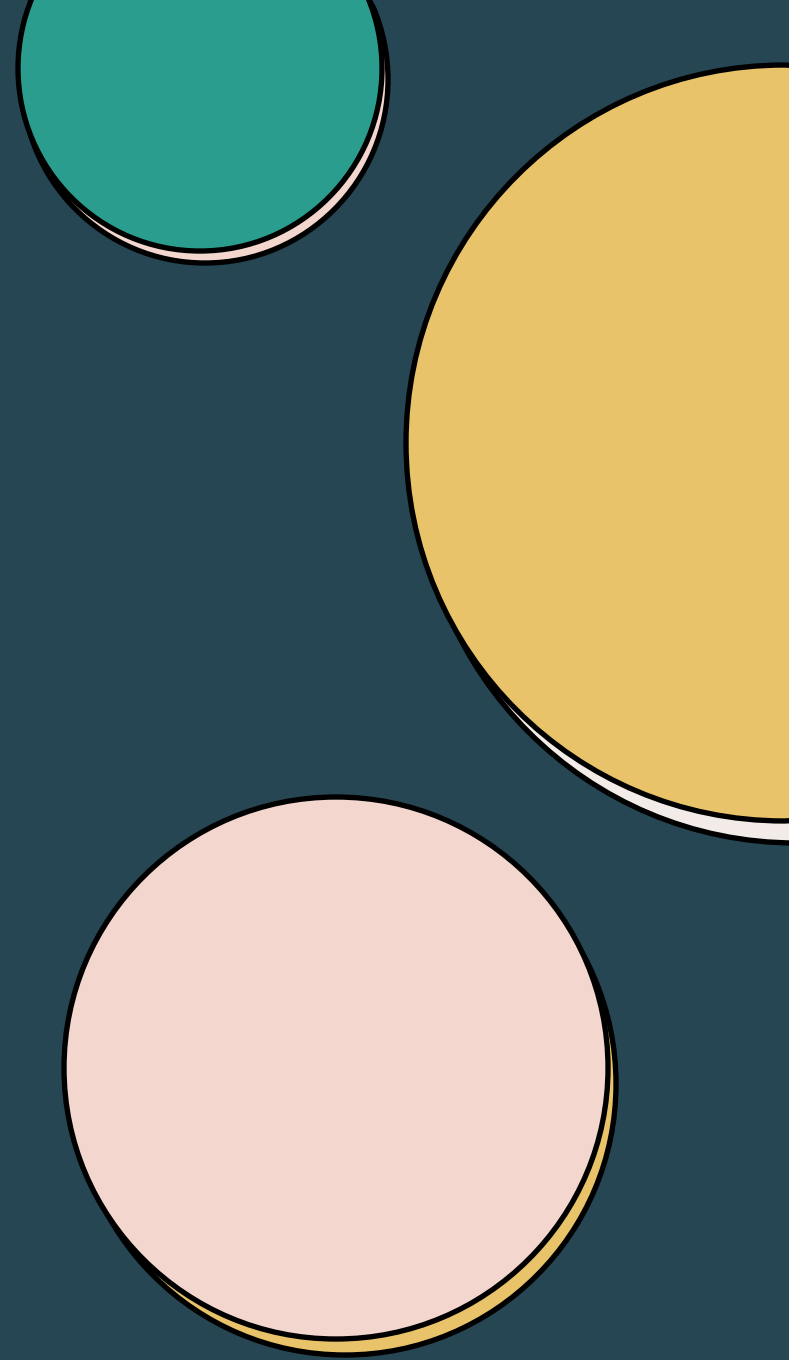
## Bandwidth and Data Speed

Higher bandwidth enables more data to be transmitted simultaneously, increasing overall data speed.

## Latency and System Performance

Lower latency results in quicker response times, improving system performance and user experience.

# File Types and Compression



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# Common File Formats

## Image File Formats

Image files commonly use JPG and PNG formats for quality and compression balance.

## Audio File Formats

Audio files utilize MP3 and WAV formats for music and sound recordings.

## Video File Formats

Video files often use MP4 and AVI formats for playback compatibility.

## App Installation Formats

Apps use specific file formats for installation affecting size and compatibility.



# Compression Types

## Lossy Compression

Lossy compression reduces file size by removing some data, resulting in quality loss for images, audio, and video.

## Lossless Compression

Lossless compression preserves all original data, maintaining quality for documents and software files.



# Use of Codecs

## Function of Codecs

Codecs compress and decompress audio and video files to facilitate efficient transmission and playback.

## Improved Media Transmission

Using codecs enables easier sending and streaming of media over the internet by reducing file size.

## Quality and Efficiency

Selecting the right codec improves media quality while minimizing bandwidth and storage requirements.