# Networking Concepts: Edge, Hosts, Access Networks, Media, and FDM

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1 Network Edge

The **network edge** refers to the part of the network where end-users connect to the Internet. It includes **end systems** and the **access network** that links them to the core network.

> **Key Idea**
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> The network edge is "where users live" – smartphones, PCs, and servers connecting into the larger Internet.

End System (PC) → Access Network (ISP, Wi-Fi) → Internet Core

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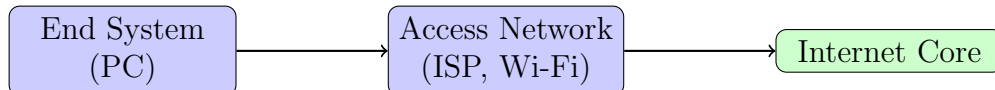
2 Hosts

Hosts (or end systems) are devices that generate or consume data on the Internet. They are located at the network edge.

- Examples: laptops, smartphones, servers, IoT devices.

- Identified using **IP addresses**.

- Run **applications** (e.g., web browsers, email clients).

> **Note**
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> All end systems connected to the Internet are called **hosts**, whether clients (users) or servers.

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3   Access Networks

Access networks connect hosts to the Internet service provider (ISP). They provide the "first hop" into the Internet.

Types of Access Networks

- **Home Access:** DSL, cable modem, fiber, Wi-Fi.

- **Enterprise Access:** Ethernet LANs, Wi-Fi.

- **Mobile Access:** 3G, 4G, 5G.

> **Analogy**
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> Access networks are like **driveways** connecting houses (hosts) to the **highway system** (the Internet core).

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4   Physical Media

Data transmission happens over a physical medium. This medium determines bandwidth, cost, and reliability.

Types of Physical Media

- **Guided Media:** Signals propagate along a solid medium.

  - Twisted pair copper wires.
  - Coaxial cable.
  - Optical fiber (high speed, long distance).

- **Unguided Media:** Signals propagate freely.

  - Radio spectrum (Wi-Fi, 5G).
  - Satellite links.

> **Key Point**
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> Choice of medium affects bandwidth, delay, cost, and coverage.

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5   Frequency Division Multiplexing (FDM)

Multiplexing allows multiple signals to share the same communication channel.

FDM Concept

- The channel's frequency spectrum is divided into non-overlapping bands.

- Each band carries a separate data stream.

- Common in radio, TV, and early telephone networks.

Analogy

FDM is like different **radio stations** sharing the same air. Each station uses a different frequency, so they don't interfere.

Visualization

Signal Power

Channel 1   Channel 2   Channel 3   Channel 4 → Frequency Spectrum

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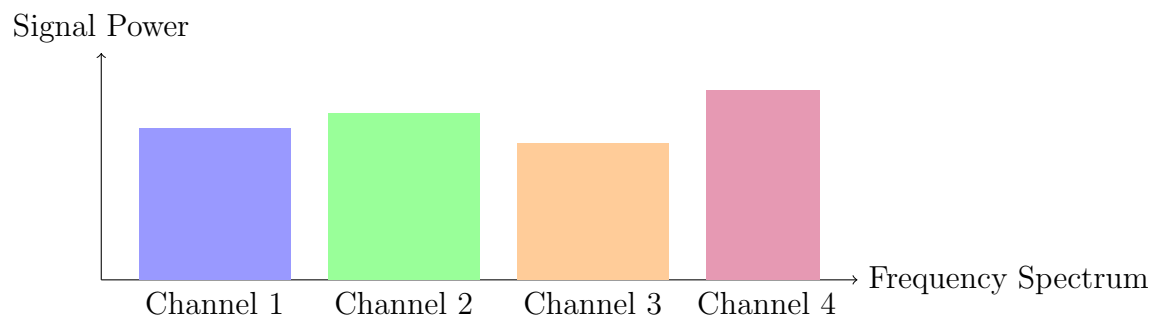
6 Conclusion

- The **network edge** connects hosts to the Internet.

- **Hosts** are end systems running applications.

- **Access networks** provide the first hop to ISPs.

- **Physical media** carry data signals.

- **FDM** allows multiple signals to coexist without interference.