Telecomms Cheat Sheet T1

1️⃣ Data Communication Basics

- **Telecommunication**: Communication over a distance (e.g., telephony, TV).
- **Data Communication**: Exchange of data between two devices via a medium.
- **Key Components**:
  - **Message**: Data (text, audio, video, etc.)
  - **Sender & Receiver**: Devices involved in communication
  - **Transmission Medium**: Twisted pair, coaxial cable, fiber-optic, radio waves
  - **Protocols**: Rules for communication

2️⃣ Transmission Modes

- **Simplex**: One-way communication (e.g., TV, radio).
- **Half-Duplex**: Two-way, but only one at a time (e.g., walkie-talkies).
- **Full-Duplex**: Two-way simultaneous communication (e.g., phone calls).

3️⃣ Network Topologies

Topology	Advantages	Disadvantages
Bus	Simple, low cost	Failure in cable disrupts network
Star	Easy to manage, scalable	Hub failure affects entire network
Ring	Efficient, minimal collisions	Single point of failure disrupts entire network
Tree	Hierarchical, easy expansion	Complex wiring, expensive
Hybrid	Combines advantages of other topologies	Complex setup

4️⃣ Network Types (Based on Coverage)

- **LAN (Local Area Network)**: Within a building/campus (e.g., office network).
- **MAN (Metropolitan Area Network)**: Covers a city (e.g., cable TV networks).
- **WAN (Wide Area Network)**: Covers large areas (e.g., the internet).

5️⃣ Switching Techniques

Switching Type	Description	Pros	Cons
Circuit Switching	Dedicated path set up before communication (e.g., telephone calls)	Reliable	High setup time
Message Switching	Entire message stored & forwarded at each node	No need for a dedicated path	High delay
Packet Switching	Message split into packets for faster transmission	Efficient, fast	Possible packet loss

6️⃣ Packet Switching Types

Type	Description	Key Features
Datagram (Connectionless)	No dedicated path, packets take different routes	Fast, less reliable, used in the Internet
Virtual Circuit (Connection-Oriented)	Fixed path for a session	Reliable, used in ATM (telephone networks)

Switching Techniques:

Type	How it Works	Example	Pros	Cons
Circuit Switching	Creates a **dedicated path** before communication starts	Telephone Calls	Reliable	Wastes resources
Message Switching	Stores and forwards **entire messages** from one switch to another	Telegraph, Post Office	No dedicated path needed	Slower due to storage
Packet Switching	Breaks data into **small packets**, sends separately, and reassembles	Internet, 4G, 5G	Fast, efficient	Possible packet loss