Telecomms Cheat Sheet T2

Key Differences (Basic Explanation):

Feature	Stop-and-Wait	Sliding Window
Frames sent at a time	1 frame at a time	Multiple frames at a time
Efficiency	Low	High
Waiting time	Idle time while waiting for ACK	Continuous frame transmission
Ideal for	Small-distance networks	Long-distance, high-speed networks

Key Differences Between ARQ (Automatic Repeat reQuest) Protocols:

Feature	Stop-and-Wait ARQ	Go-Back-N ARQ	Selective Repeat ARQ
Frames sent at a time	1 frame at a time	Multiple frames	Multiple frames
Retransmission	Retransmits single frame	Retransmits from the error onward	Only retransmits the erroneous frame
Efficiency	Low	Medium	High
Complexity	Simple	Moderate	Complex
Best for	Small-distance networks	Medium-distance networks	Long-distance, high-speed networks

Layer	Function	Data Unit	Protocols & Devices
1. Physical	Transmits raw bits	Bits	Ethernet, USB, Hubs
2. Data Link	Frame synchronization & error detection	Frames	MAC, PPP, Switches
3. Network	Routing and IP addressing	Packets	IP, ICMP, Routers
4. Transport	End-to-end communication	Segments	TCP, UDP, Firewalls
5. Session	Session management	Data	NetBIOS, RPC
6. Presentation	Data translation & encryption	Data	JPEG, TLS, SSL
7. Application	User-facing applications	Data	HTTP, FTP, SMTP

Key Differences: Circuit vs Virtual Circuit vs Datagram Switching

Feature	Circuit Switching	Virtual Circuit Switching	Datagram Switching
Connection Type	Connection-oriented	Connection-oriented	Connectionless
Path	Fixed physical path	Logical path (shared physical lines)	Independent, dynamic path
Data Unit	Continuous data stream	Packets	Packets
Reliability	Highly reliable	Reliable, ordered delivery	Less reliable (packets can be lost)
Efficiency	Inefficient bandwidth usage	More efficient due to shared paths	Most efficient for bursty traffic
Delay	Low once circuit is established	Low, as packets follow the same path	Higher due to dynamic routing
Example	Telephone calls	Frame Relay, MPLS	Internet, IP protocol

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✅ 📚 **Real-world Analogy:**

- **Circuit Switching → Train route** 🚂
    - One continuous route is reserved from start to end.
- **Virtual Circuit Switching → Bus route with stops** 🚌
    - The bus follows the same route, but the road is shared with other vehicles.
- **Datagram Switching → Postal system** 📦
    - Each letter (packet) can take a different route to the same destination.