Grade 12 A/L ICT · Lesson 6

6.8 Transport Protocols: TCP and UDP

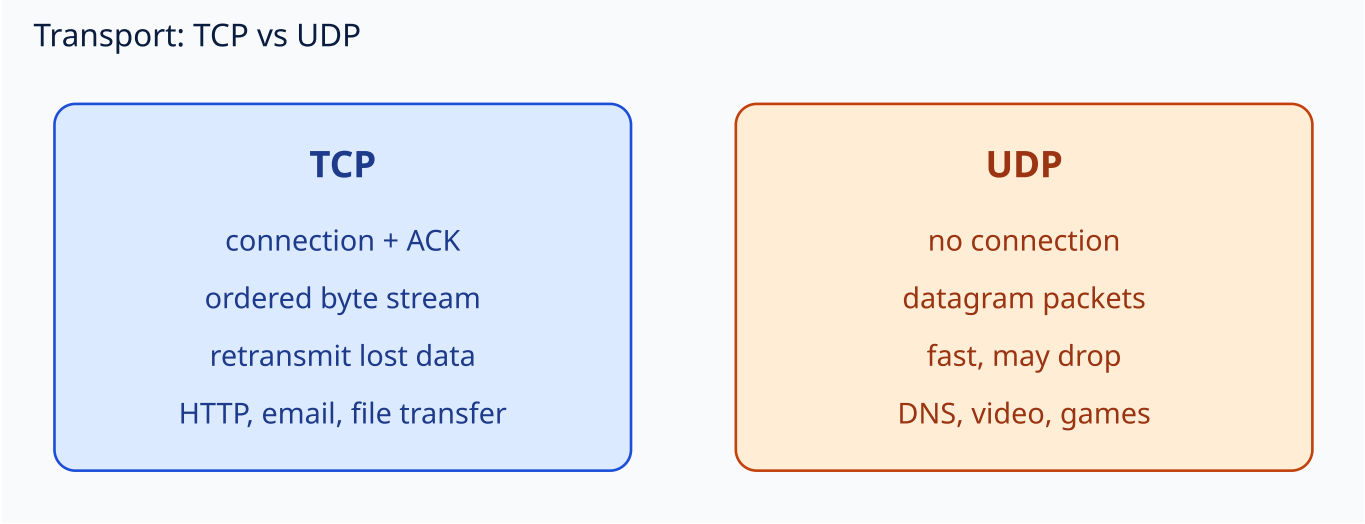
Syllabus 6.8. IP delivers to a host; **transport** delivers to an **application process** using **ports**. **UDP** is simple; **TCP** is connection-oriented and reliable.

1. Process to process

Many apps share one IP. **Port numbers** multiplex conversations (e.g. 80/443 web, 53 DNS).

2. UDP and TCP

UDP: connectionless, low overhead, unreliable – DNS, some streaming. **TCP**: connection-oriented, reliable, ordered – HTTP, email, file transfer.



TCP reliable stream vs UDP datagrams

💡 IP = host; port = process/app endpoint.

🧱 **Worked example: DNS query → often UDP/53 (one packet). Web download → TCP/80 or 443 (ordered, retransmitted).**
UDP = fast, no connection. TCP = reliable byte stream.

🚀 **Beyond the syllabus (2026 update)** *Not required for the exam – read for interest.* QUIC/HTTP3 over UDP is beyond the syllabus.

Key Words

Transport layer – Process-to-process delivery.

Port – Number identifying an endpoint.

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Multiplexing – Many apps sharing one IP.	**UDP** – Unreliable datagram transport.
TCP – Reliable connection-oriented transport.	**Datagram** – Independent UDP packet.
Connection – TCP session setup.	**Reliable delivery** – TCP retransmits lost data.
HTTP – Often uses TCP ports 80/443.	**DNS** – Often uses UDP port 53.
Endpoint – IP + port pair.	**Overhead** – Extra header/control cost.

Sample Q&A

1. Why ports?

> **Answer:** Many processes share one IP.

2. UDP properties?

> **Answer:** Connectionless, low overhead, unreliable.

3. TCP properties?

> **Answer:** Connection-oriented, reliable, ordered.

4. UDP app example?

> **Answer:** DNS (often).

5. TCP app example?

> **Answer:** HTTP / email.

6. IP alone enough?

> **Answer:** No – need ports for apps.

MCQ

1. Ports identify

A. chair heights
B. fiber brands
C. cable colours
D. application endpoints on a host
E. font names

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2. UDP is

A. connectionless datagram service
B. always a topology
C. a hub flood
D. a MAC type
E. a subnet mask

3. TCP is

A. always wireless only
B. a hub flood
C. a bus cable
D. reliable connection-oriented byte stream
E. a parity bit

4. DNS commonly uses

A. only VGA
B. only PSTN voice
C. only USB power
D. only HDMI
E. UDP (often port 53)

5. Web HTTP commonly uses

A. only ALOHA
B. only coax colours
C. only parity
D. only hubs
E. TCP

6. Multiplexing means

A. boiling water
B. deleting MAC
C. painting switches
D. sharing one IP among apps via ports
E. cutting fiber

7. Without ports

A. gravity fails
B. host cannot tell which app gets the data
C. light stops
D. screens invent pixels
E. cables vanish

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8. TCP retransmission helps

A. set wallpapers
B. rename folders
C. brew tea
D. recover lost segments
E. change cable paint

9. Which term means: “Process-to-process delivery”?

A. Datagram
B. Multiplexing
C. Transport layer
D. Reliable delivery
E. Endpoint

10. Which term means: “Number identifying an endpoint”?

A. Connection
B. Port
C. UDP
D. HTTP
E. Overhead

11. Which term means: “Many apps sharing one IP”?

A. Reliable delivery
B. DNS
C. Multiplexing
D. Transport layer
E. TCP

12. Which term means: “Unreliable datagram transport”?

A. UDP
B. HTTP
C. Datagram
D. Endpoint
E. Port

13. Which term means: “Reliable connection-oriented transport”?

A. DNS
B. TCP
C. Multiplexing
D. Connection
E. Overhead

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14. Which term means: “Independent UDP packet”?

A. Datagram
B. Reliable delivery
C. Transport layer
D. UDP
E. Endpoint

15. Which term means: “TCP session setup”?

A. HTTP
B. TCP
C. Connection
D. Overhead
E. Port

16. Which term means: “TCP retransmits lost data”?

A. Multiplexing
B. Datagram
C. DNS
D. Transport layer
E. Reliable delivery

17. Which term means: “Often uses TCP ports 80/443”?

A. Port
B. Connection
C. HTTP
D. Endpoint
E. UDP

18. Which term means: “Often uses UDP port 53”?

A. Overhead
B. DNS
C. TCP
D. Reliable delivery
E. Multiplexing

19. Which term means: “IP + port pair”?

A. Endpoint
B. Transport layer
C. Datagram
D. HTTP
E. UDP

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20. Which term means: “Extra header/control cost”?

A. Port
B. Connection
C. DNS
D. TCP
E. Overhead

Structured Questions

1. Explain process-to-process delivery. *(2 marks)*

> IP to host; ports to apps.

2. Define multiplexing with ports. *(2 marks)*

> Apps distinguished by port numbers.

3. UDP: properties + apps. *(2 marks)*

> Connectionless/unreliable; DNS, streaming.

4. TCP: properties + apps. *(2 marks)*

> Reliable connection; HTTP, email.

5. Why both UDP and TCP? *(2 marks)*

> Trade simplicity vs reliability.

Summary

- Ports select applications.
- UDP = simple datagrams.
- TCP = reliable streams.
- DNS often UDP; web often TCP.
- Transport sits above IP.

MCQ answer key – 6.8

1. **D** – App endpoints.
2. **A** – Datagram.
3. **D** – Reliable stream.
4. **E** – UDP 53.
5. **E** – TCP.
6. **D** – Many apps.
7. **B** – Which app?

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8. **D** – Reliability.
9. **C** – Transport layer – Process-to-process delivery.
10. **B** – Port – Number identifying an endpoint.
11. **C** – Multiplexing – Many apps sharing one IP.
12. **A** – UDP – Unreliable datagram transport.
13. **B** – TCP – Reliable connection-oriented transport.
14. **A** – Datagram – Independent UDP packet.
15. **C** – Connection – TCP session setup.
16. **E** – Reliable delivery – TCP retransmits lost data.
17. **C** – HTTP – Often uses TCP ports 80/443.
18. **B** – DNS – Often uses UDP port 53.
19. **A** – Endpoint – IP + port pair.
20. **E** – Overhead – Extra header/control cost.

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