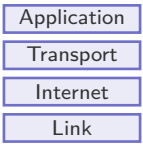
Communication & Protocols

A-Level Computer Science ▪ Topic 14

A-Level Computer Science



What we will cover

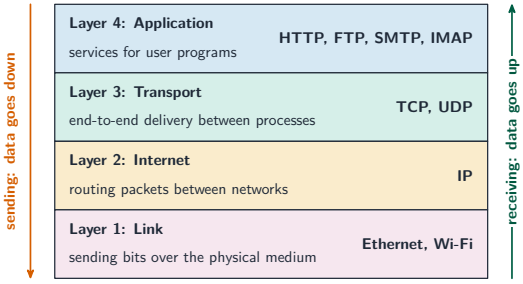
1. Why protocols?
2. Layered protocols
3. The TCP/IP suite
4. Application protocols
5. Circuit vs packet switching
6. Recap

Why protocols are needed

A **protocol** 协议 is an agreed set of rules for communication – format, timing, error checking, and order.

> Without a shared protocol two devices cannot understand each other, even on the same wire. It is the common language of the network.

Layered protocols



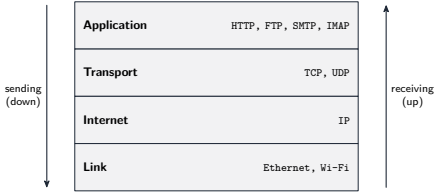
cable modem

The TCP/IP suite

Four layers:

- Application – HTTP, FTP, SMTP
- Transport – TCP (reliable) or UDP (fast)
- Internet – IP routes packets by address
- Link – the physical network

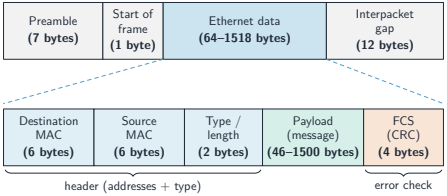
TCP 传输控制协议 guarantees order and delivery; **IP** 网际协议 just addresses and routes each packet independently.



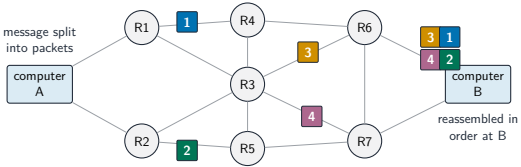
Common application-layer protocols

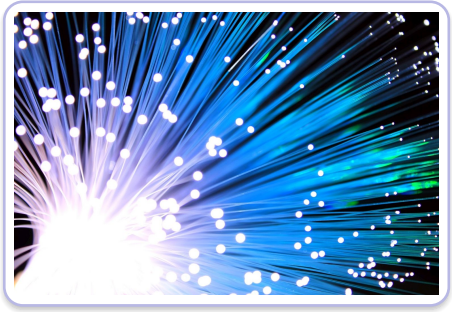
- HTTP/HTTPS – web pages (HTTPS adds TLS)
- FTP – file transfer
- SMTP – sending email; POP3/IMAP – receiving
- DNS – names to IP addresses

Each runs on a known port: HTTP 80, HTTPS 443, so the receiver knows which service to hand the data to.



Circuit vs packet switching





fibre optic cable

Topic 14 – key takeaways

1 Protocols

agreed rules – the network's language

2 Layers

each does one job – abstraction

3 TCP/IP

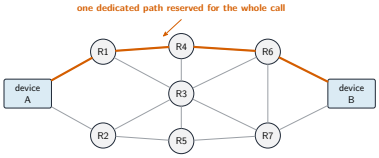
App / Transport / Internet / Link

4 Switching

packets route independently, around faults

Check yourself

1. What does a protocol define?
2. Which layer does IP sit in?
3. TCP or UDP for guaranteed delivery?
4. One advantage of packet switching?



Answers **1.** rules for communication **2.** Internet **3.** TCP **4.** routes around faults