

CS144: Reliable services

What abstraction does the Internet provide?

- “Best-effort” datagrams between hosts
 - What’s a “datagram”?
 - What’s “best-effort”?
- I sent you a datagram -- what can happen to it?

What can happen to a datagram?

- It gets delivered to the right destination! 👍
- It gets delivered to the wrong destination. 🤔
- The beginning gets delivered but not the end.
- It gets delivered with some bits flipped.
- It gets delivered more than once.
- It gets delivered after other (earlier-sent) datagrams were delivered.
- It gets delivered a year later.
- It never gets delivered.

Services: abstractions provided to clients/customers/callers

- Query
- Action
- Copy a string/blob/file
- Stream a sequence of bytes
- Get a recent piece of data (thermometer, videochat, screenshare)
- Agree on something
 - Did your bullet hit my character?
 - Did I pay you \$200?
 - Will we both invade tomorrow?

What a reliable service encounters a fault?

- Fail-fast: signal a failure
- Fail-safe: do something acceptable
- Fail-soft: run, but in degraded form
- Fail-bad: break the service guarantee

Techniques to manufacture reliability

- Remedies
 - Sequence numbers
 - Acknowledgments
 - Checksums/MACs
 - FEC
 - Retransmission
 - Heartbeats
- Correlated failure
- TCP/DNS
- Paradox of airplanes