

CISC 7332X T6

Data Link Protocols: Framing

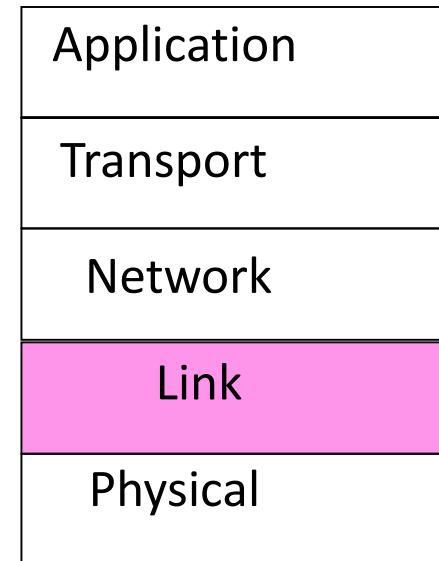
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Data Link Layer

- Responsible for delivering frames of information over a single link
 - Handles transmission errors
 - Regulates the flow of data



Design Issues in Data Link Layer

- Discussed
 - Concept of frames
 - Error control
- Framing methods
- Possible services
- Data link protocols and flow control

Outline

- Framing methods
 - Byte or bit counts
 - Sentinel methods
 - Byte stuffing
 - Bit stuffing
 - Timing methods

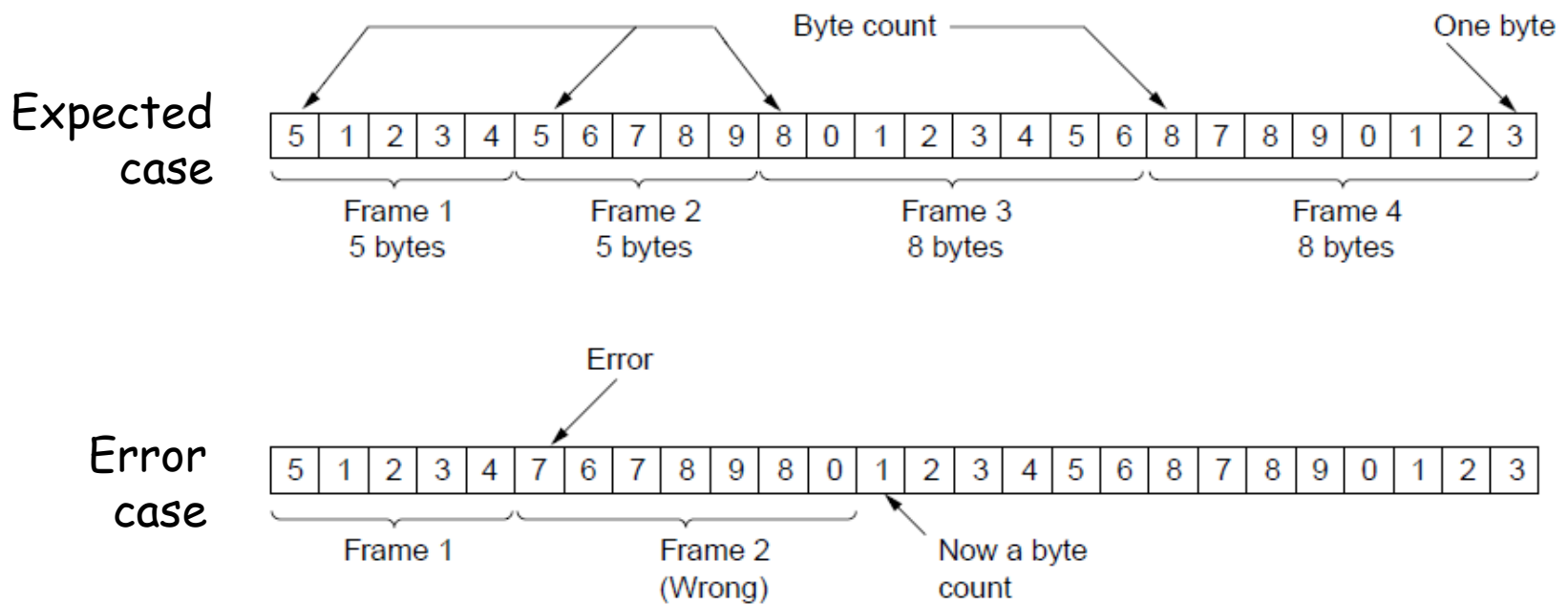
Framing Methods

- Framing
 - Breaking up bit streams into frames
- Methods
 - Byte count
 - Flag bytes with byte stuffing
 - Flag bits with bit stuffing
 - Physical layer coding violations
 - Use non-data symbol to indicate frame

Byte Count

- Frame begins with a count of the number of bytes in it
 - Simple, but difficult to resynchronize after an error
 - Rarely used by itself

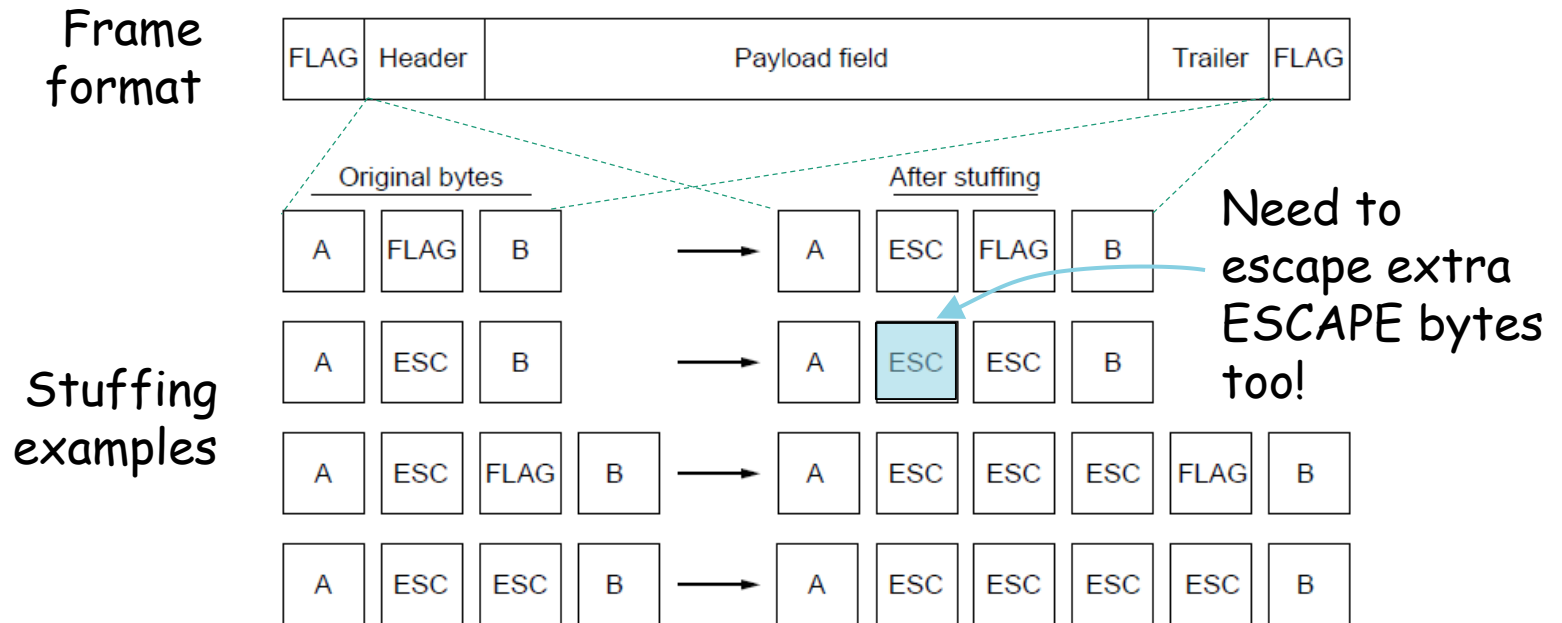
Byte Count: Example



Byte Stuffing

- Special flag bytes (or sentinel) delimit frames
 - “Data” cannot contain the flag bytes
 - i.e., occurrences of flags in the data must be stuffed (escaped)
 - Longer (due to stuffing), but easy to resynchronize after error

Byte Stuffing: Example



Bit Stuffing

- Stuffing done at the bit level:
 - Example:
 - frame flag has six consecutive 1s
 - On transmit, after five 1s in the data, a 0 is added
 - On receive, a 0 after five 1s is deleted

Bit Stuffing: Example

Data bits 0 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 0 1 0

Transmitted bits with stuffing 0 1 1 0 1 1 1 1 1 0 1 1 1 1 1 0 1 1 1 1 1 0 1 0 0 1 0

Stuffed bits

Questions?

- Concept of framing
- Framing methods
 - Byte count
 - Byte stuffing
 - Bit stuffing