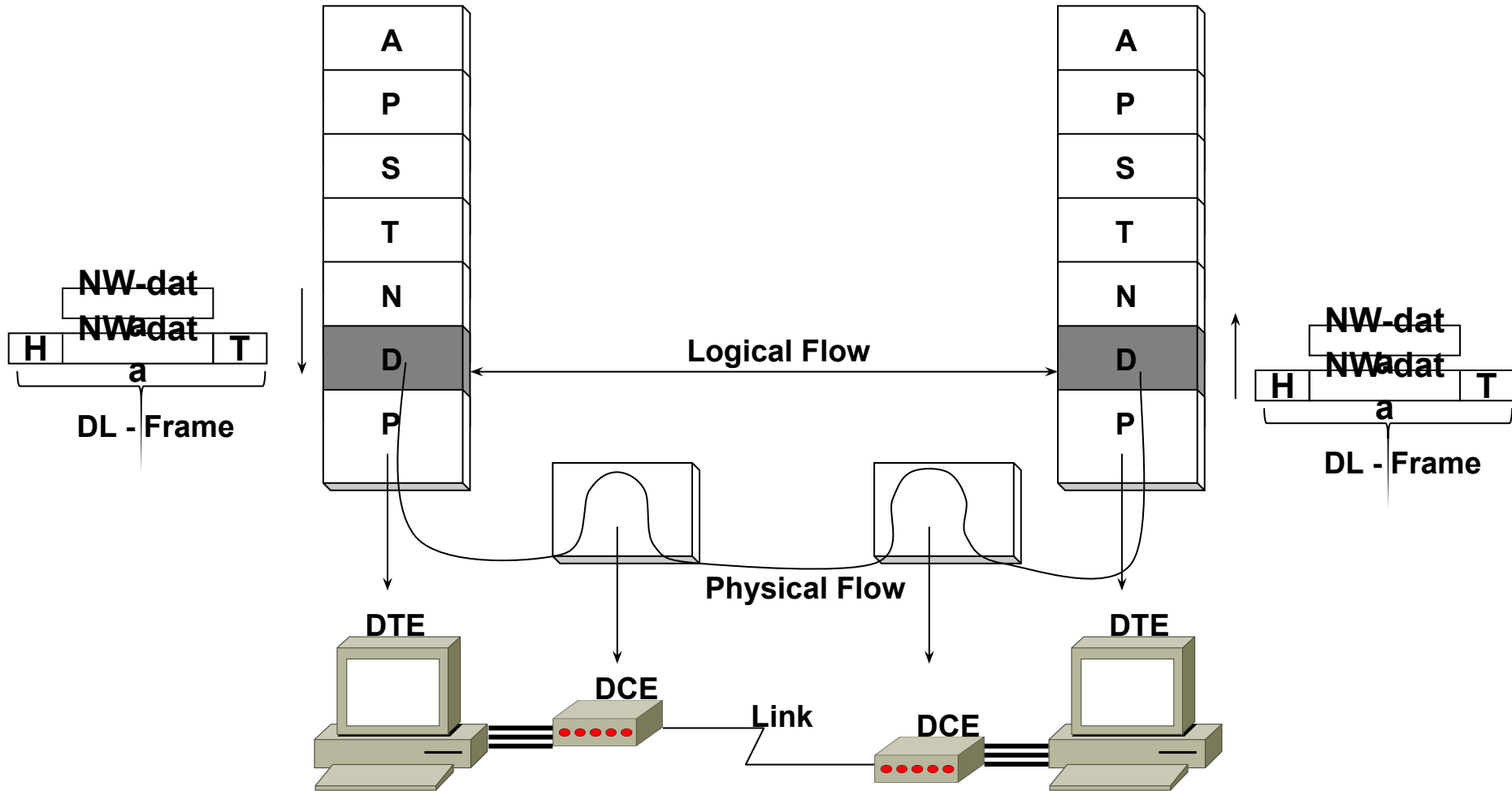
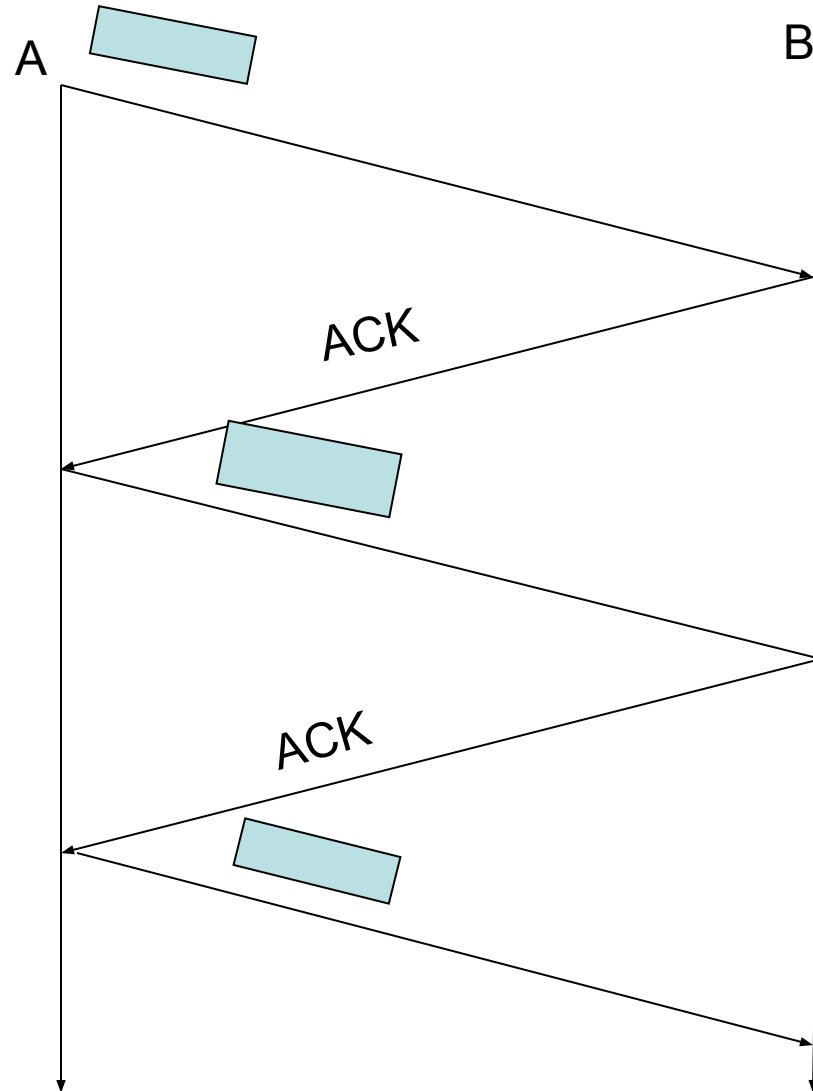


# Data Link control Layer 2

# Потоки данных по соединениям физического и канального уровней

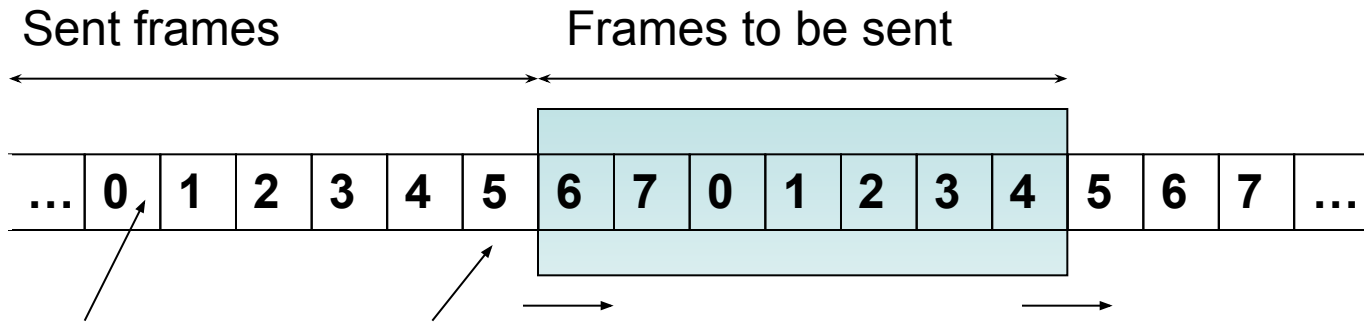


# Flow control – Stop-and-Wait

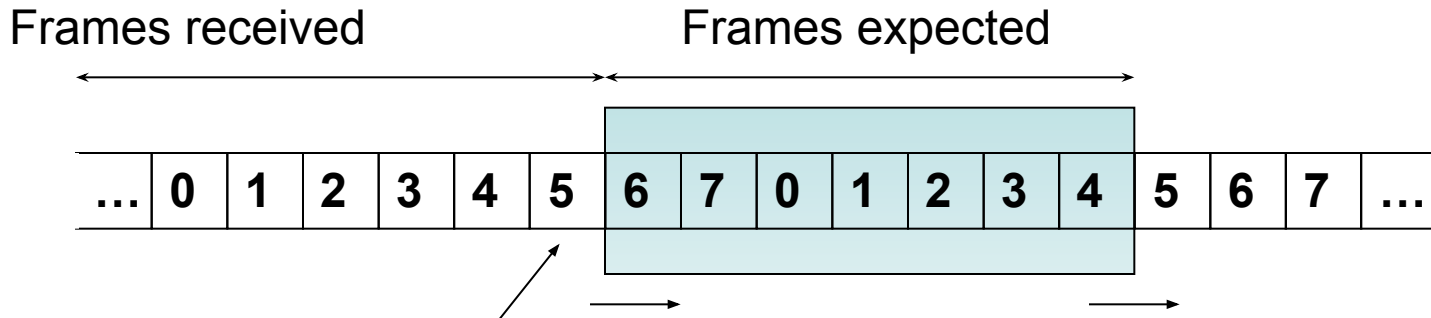


Низкая  
эффективность  
использования  
канала –  
особенно, если  
канал длинный, а  
скорость  
передачи -  
высокая

# Flow control –sliding window



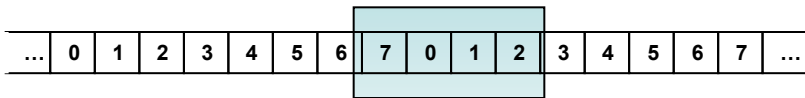
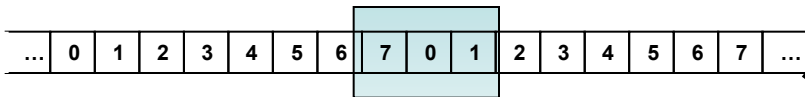
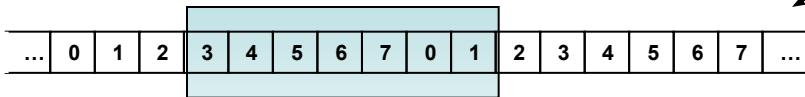
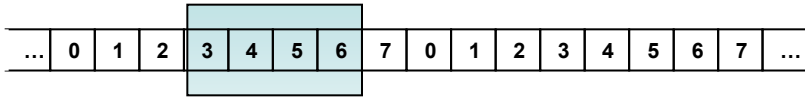
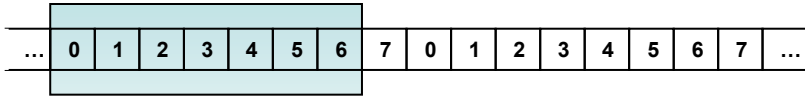
From sender perspective



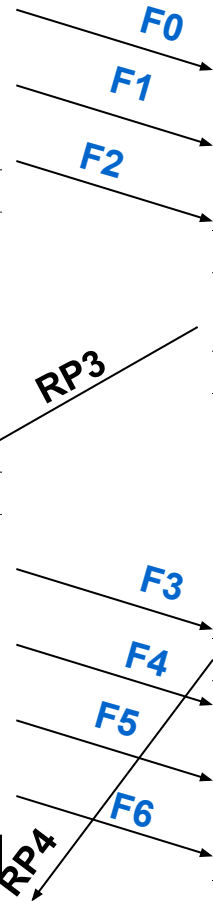
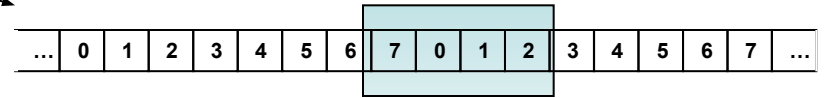
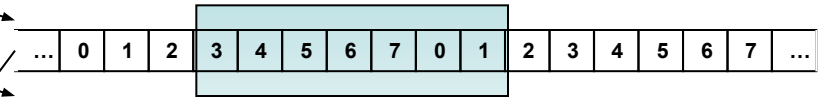
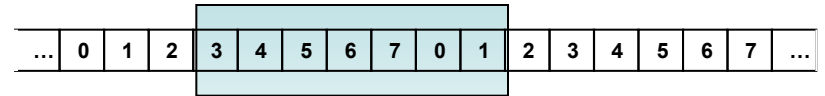
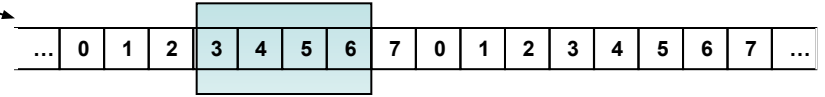
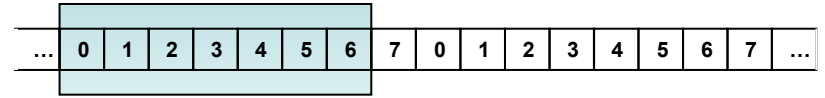
From receiver perspective

# Example of a sliding-window protocol

Source System A



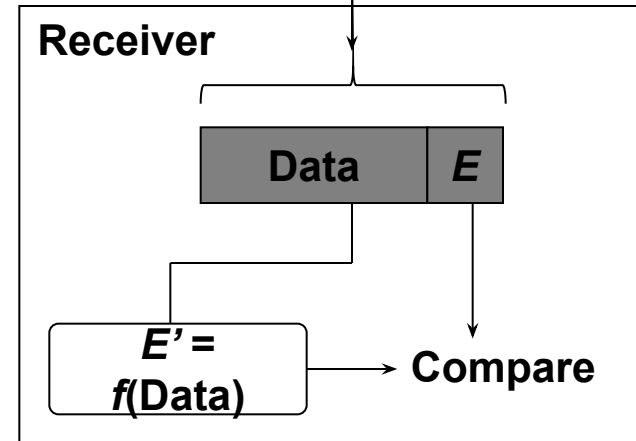
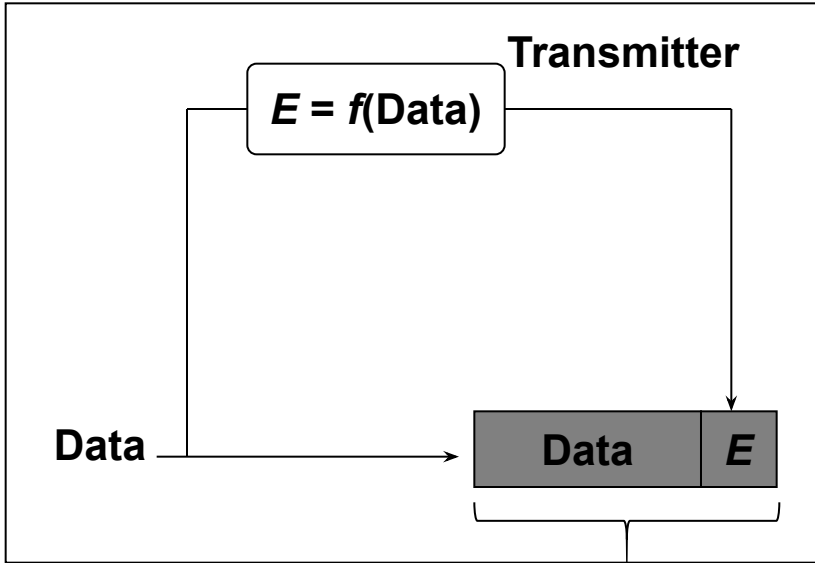
Destination System B



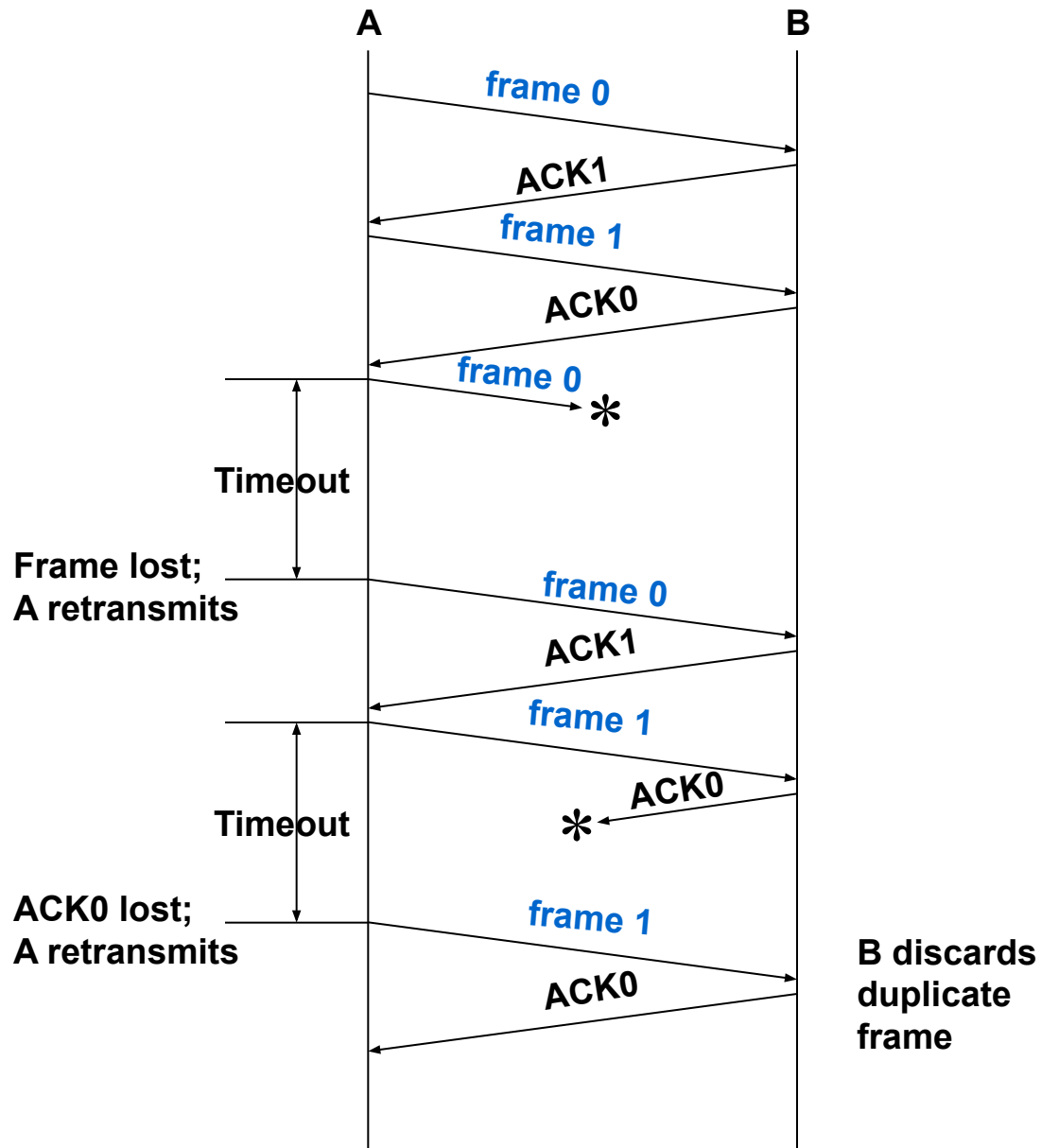
# Error Control

- FEC- Forward Error Correction (using error correcting code)
- ARQ- Automatic Repeat reQuest

# Error control principle

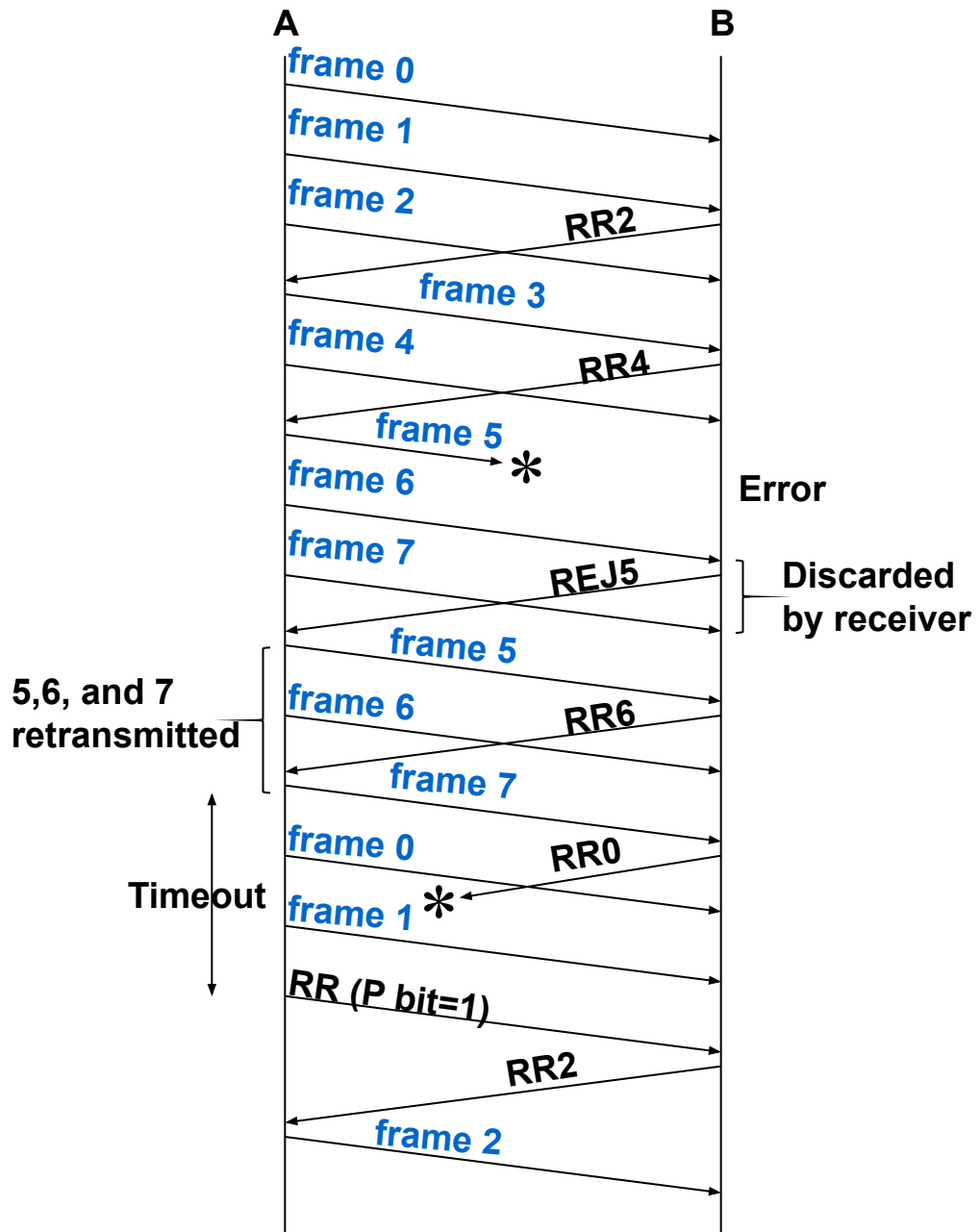


# Stop-and-wait ARQ





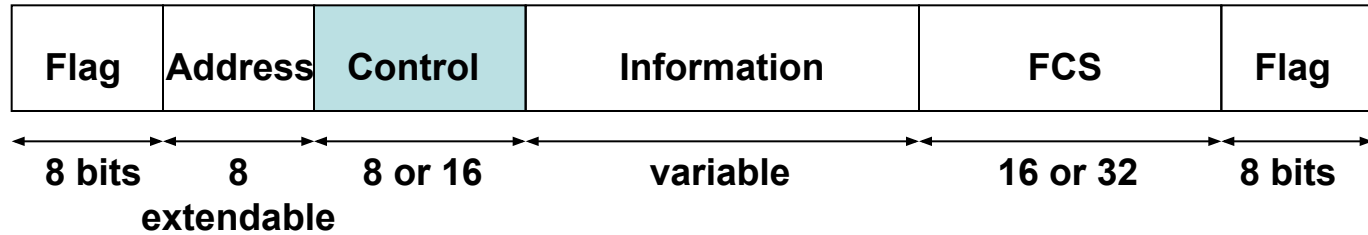
# Go-back-N ARQ



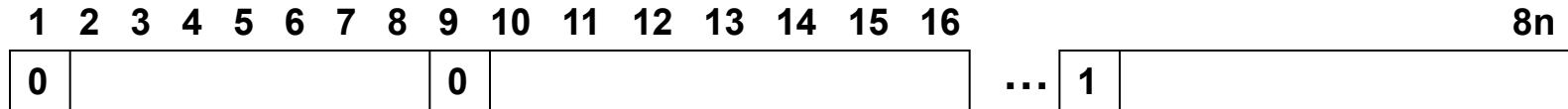
# High Level Data Link Control

## HDLC

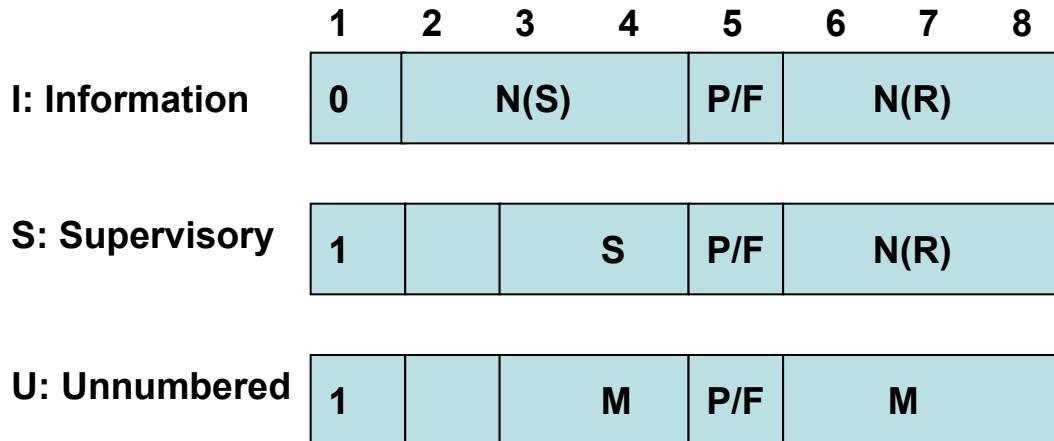
# HDLC frame structure



(a) Frame format



(b) Extended address field



## Legend

- N(S) = Send sequence number
- N(R) = Receive sequence number
- S = Supervisory Function bits
- M = Unnumbered function bits
- P/F = Poll/final bit

(c) 8-bit control field format

# HDLC (cont'd)

- Four supervisory frames

RR (N(R))- Ready to Receive- ожидается кадр с номером R, все кадры с номерами 0...R-1 успешно приняты

RNR (N(R) – Receive Not Ready – приемник приостанавливает передающую сторону, квитируя все кадры с номерами 0...R-1

REJ (N (R)) –REJection – запрос на повторную передачу кадра с номером R и всех последующих, уже переданных

SREJ (N(R) – Selective REJection- запрос на повторную передачу кадра с номером R

- Unnumbered Frames are used mostly for connection set-up

# HDLC-family

- LAPB
- LAPD
- LLC
- PPP