

# ECE453 – Introduction to Computer Networks

## Lecture 6 – Data Link Layer Protocol (III)

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## Example Data Link Protocols

- ◆ HDLC – High-Level Data Link Control
  - SDLC (IBM)
  - ADCCP (ANSI)
  - HDLC (ISO)
  - LAP → LAPB as part of the X.25 (CCITT)
- ◆ The Data Link Layer in the Internet
  - PPP
  - Ethernet (LAN)

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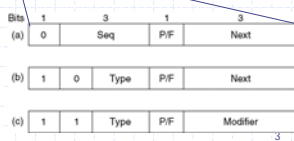
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## High-Level Data Link Control

- ◆ Bit-oriented protocol
- ◆ Frame format



- ◆ Sliding window
- ◆ 3-bit seq number



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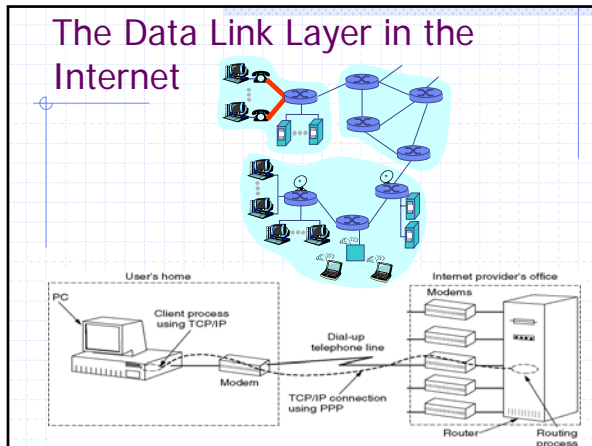
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## The Data Link Layer in the Internet




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## PPP – Point to Point Protocol

- ◆ Character-oriented
- ◆ Frame format
  - unnumbered frame
- ◆ Error detection
- ◆ Multiprotocol framing
  - LCP (link control protocol)
  - NCP (network control protocol)

What's the indication?



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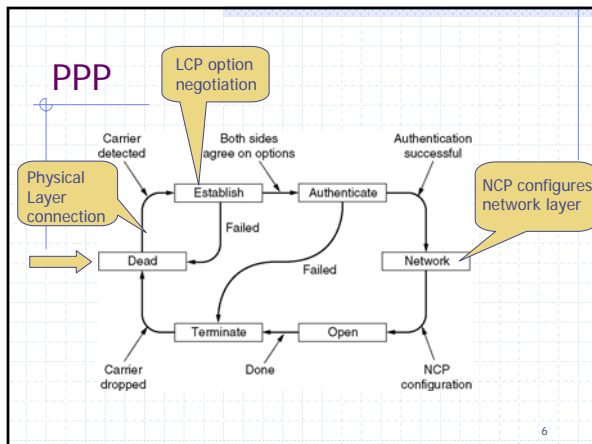
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## PPP



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## Summary

- ◆ Framing
  - Counter
  - Byte-stuffing
  - Bit-stuffing
- ◆ Error correction
  - Hamming code
- ◆ Error detection
  - CRC
- ◆ Example link layer protocols
  - HDLC
  - PPP
- ◆ Reliable data transform
  - Utopia
  - Stop-and-wait protocol
    - Simplex stop-and-wait
    - Simplex stop-and-wait in noisy channel
  - Sliding window protocols
    - Go-Back-N (GBN)
      - Sender buffer
      - Cumulative ack.
    - Selective Repeat (SR)
      - Sender and receiver buffer
      - Selective ack.

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