

Data Link Layer Protocol

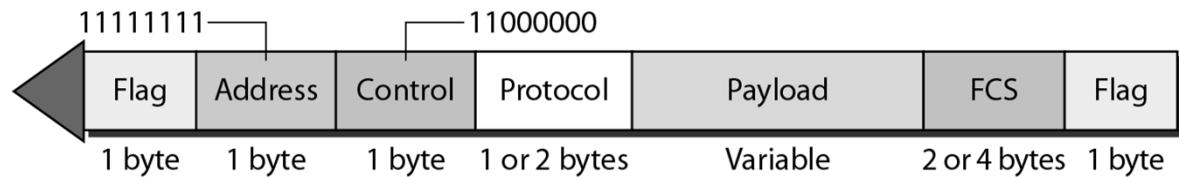
- Asynchronous Transfer Mode
- Ethernet
- Fiber Distributed Data Interface
- Frame Relay
- High-Level Data Link Control
- IEEE 802.2
- IEEE 802.11
- Point-to-Point Protocol
- Etc.

POINT-TO-POINT PROTOCOL

- Although HDLC is a general protocol that can be used for both point-to-point and multipoint configurations, one of the most common protocols for point-to-point access is the Point-to-Point Protocol (PPP). PPP is a byte-oriented protocol.
 - Framing
 - Transition Phases
 - Multiplexing
 - Multilink PPP

PPP frame format

- PPP is based on the High-Level Data Link Control (HDLC) protocol
- The difference between PPP frames and HDLC frames is that PPP frames contain protocol and Link Control Protocol (LCP) fields
- LCP
 - Described in RFCs 1548, 1570, 1661, 2153, and 2484
 - Describes PPP organization and methodology, including basic LCP extensions



HDLC & PPP frame format

HDLC



Cisco HDLC



PPP

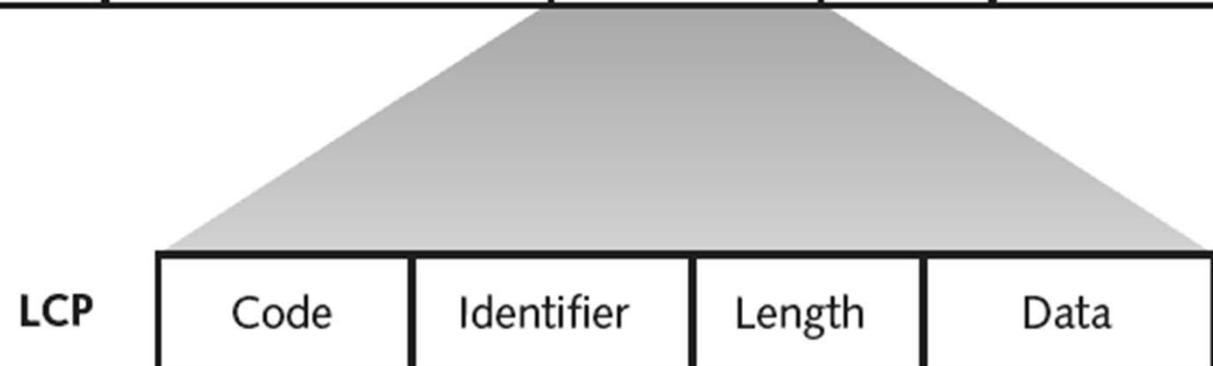
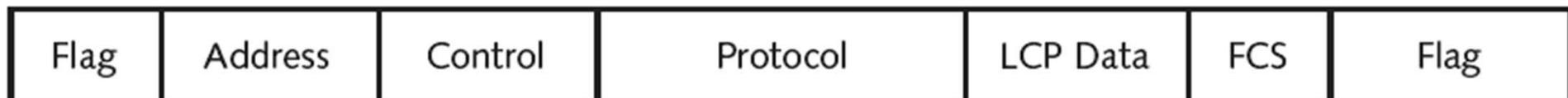
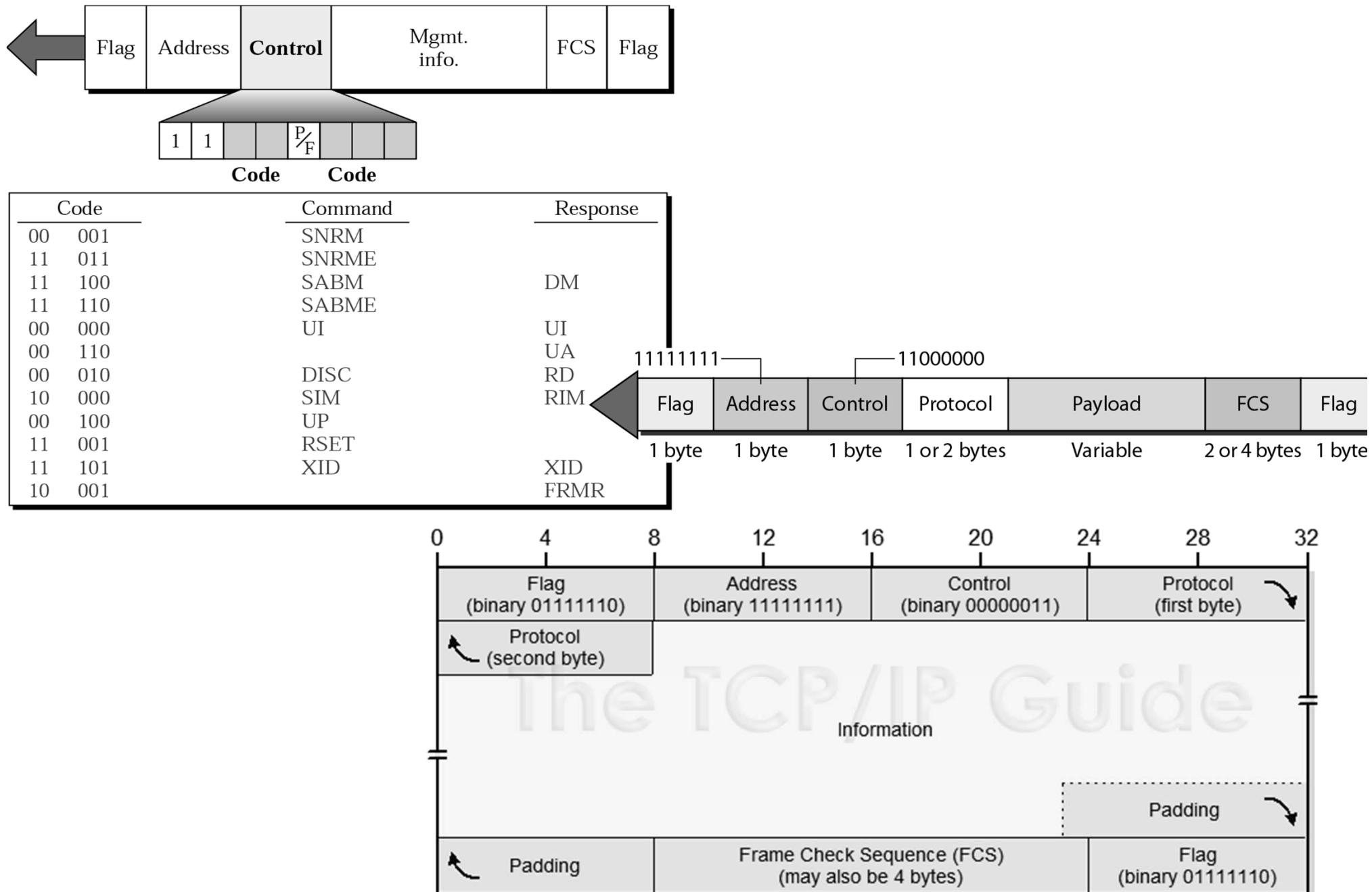
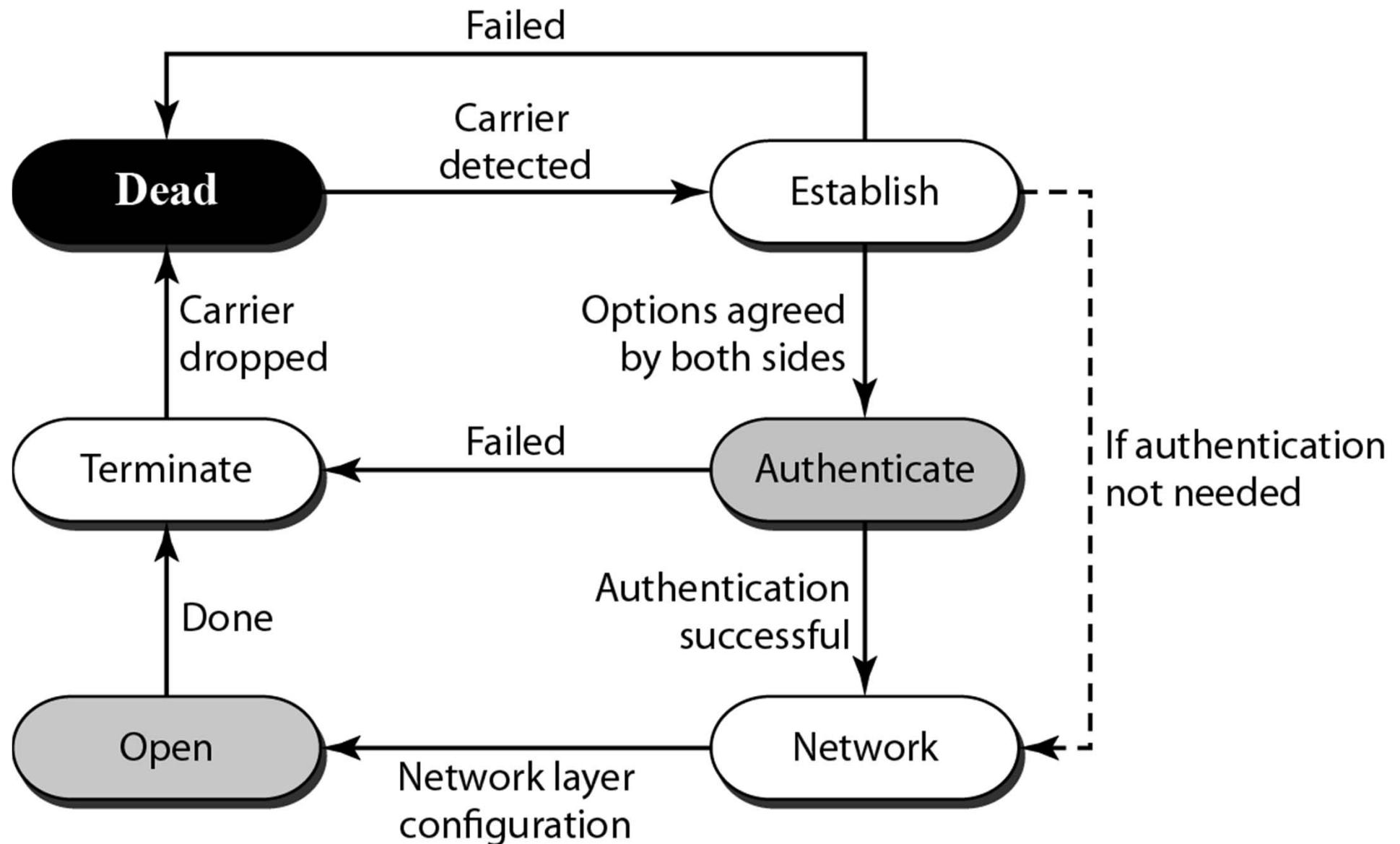


Figure 11-2 HDLC and PPP packet structure

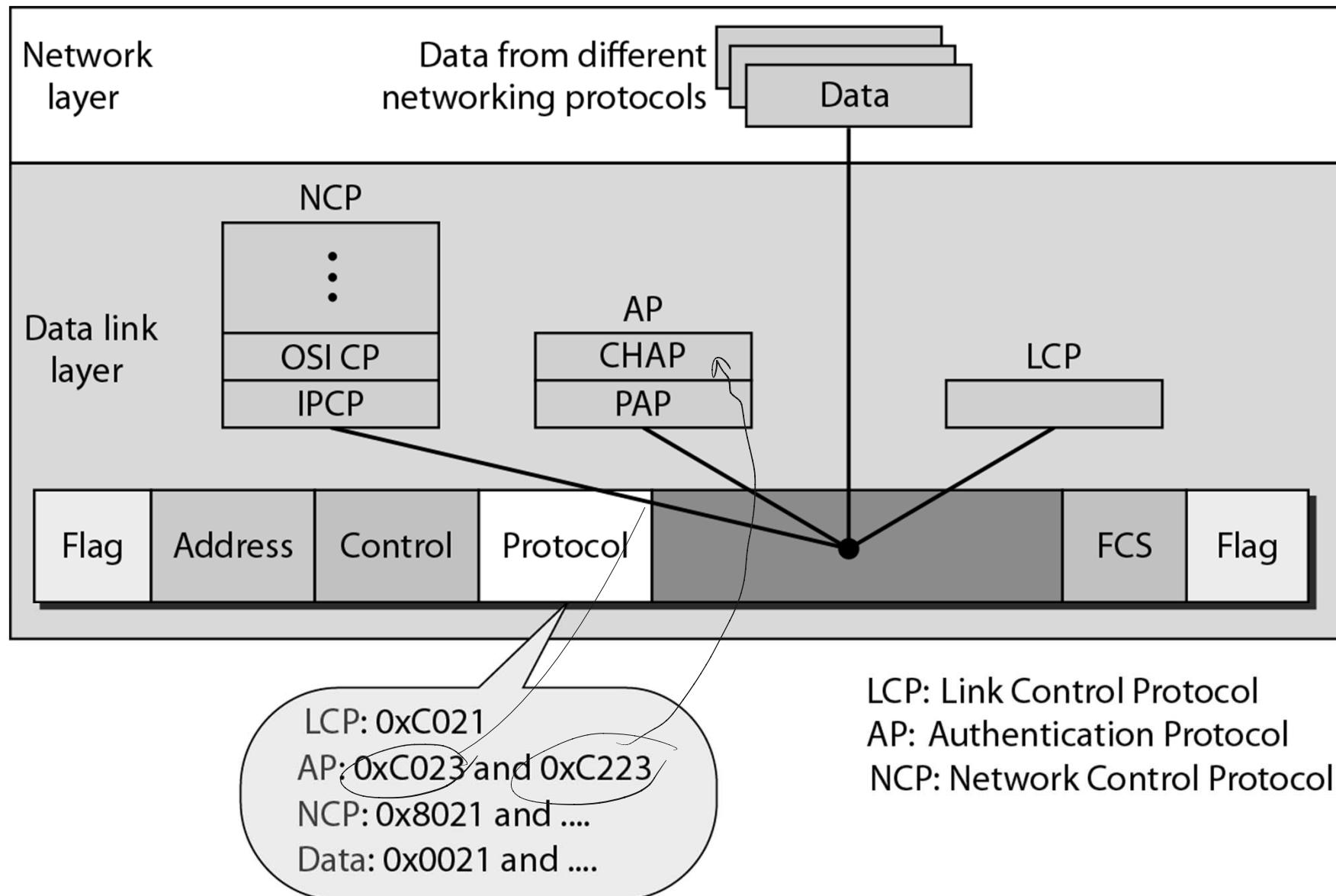
HDLC & PPP frame format



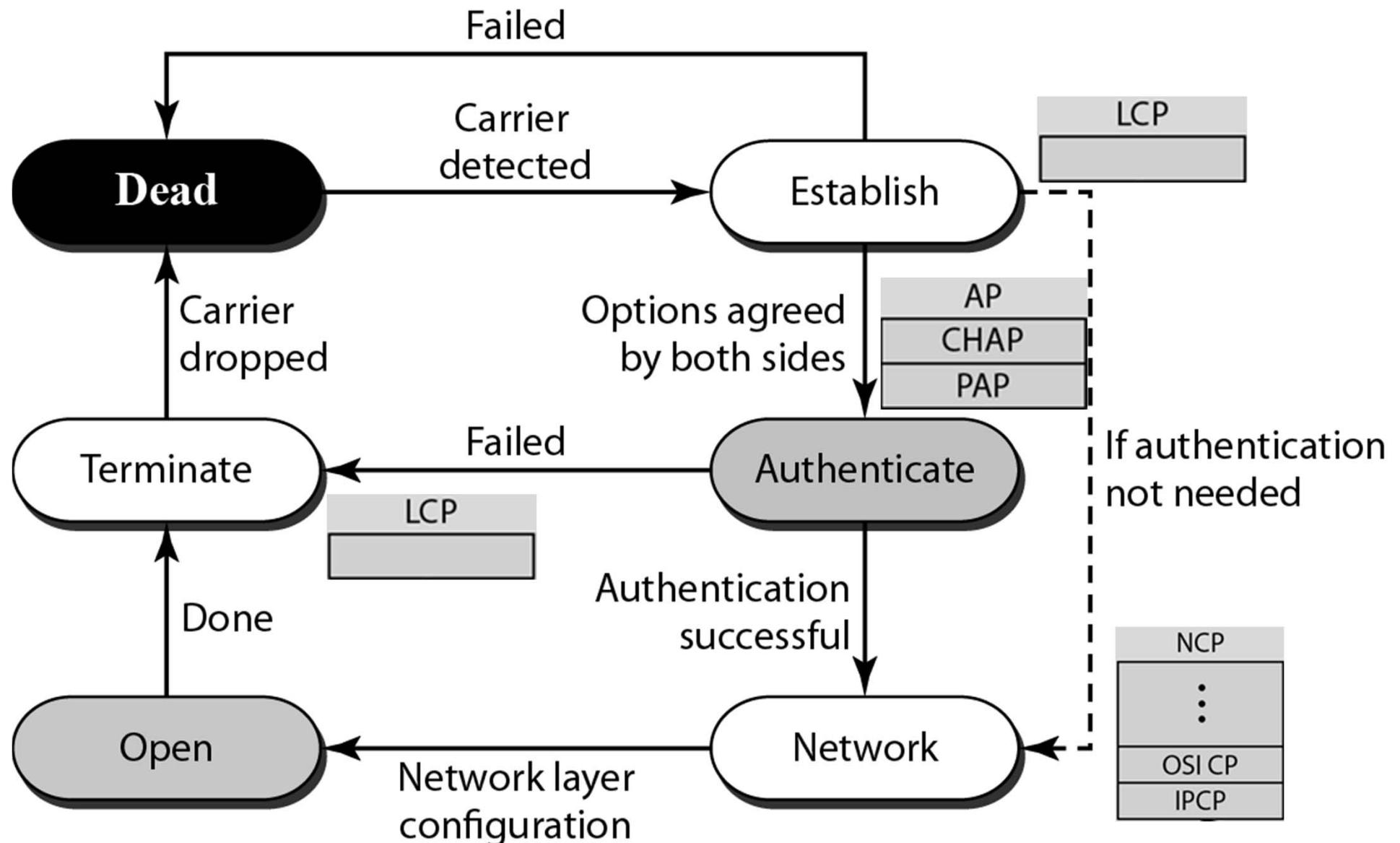
Transition phases



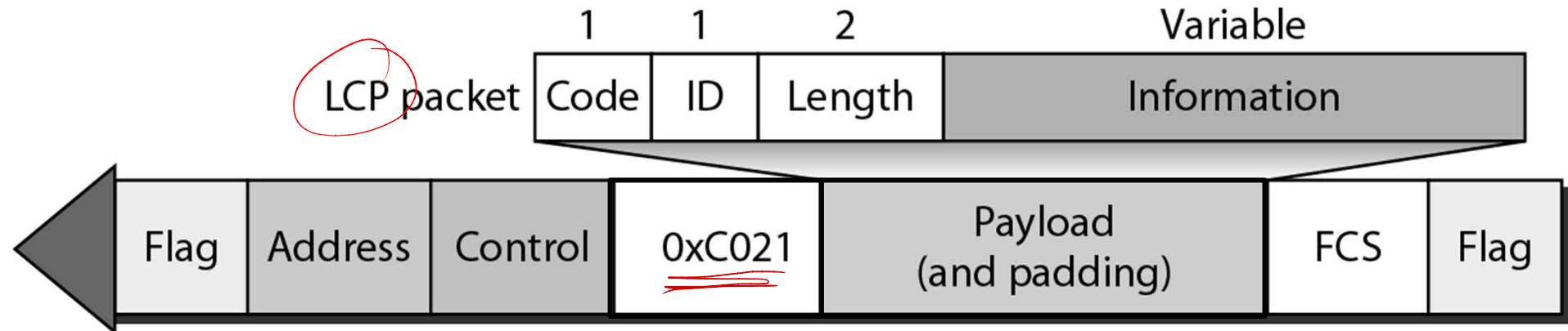
Multiplexing in PPP



Transition phases



LCP packet encapsulated in a frame



- **Responsible**
 - Establishing
 - Maintaining
 - Configuring
 - Terminating links.

LCP packets

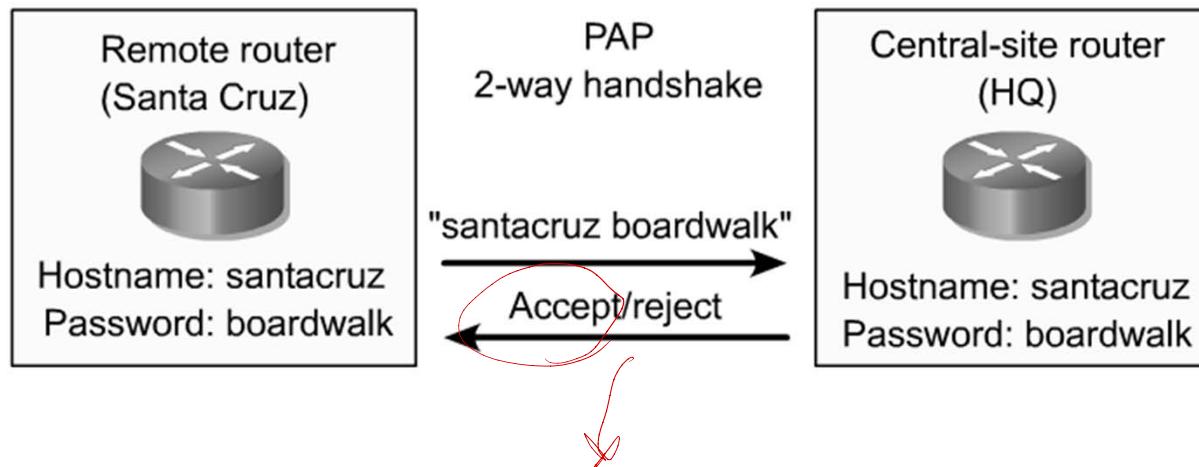
Code	Packet Type	Description
0x01	Configure-request	Contains the list of proposed options and their values
0x02	Configure-ack	Accepts all options proposed
0x03	Configure-nak	Announces that some options are not acceptable
0x04	Configure-reject	Announces that some options are not recognized
0x05	Terminate-request	Request to shut down the line
0x06	Terminate-ack	Accept the shutdown request
0x07	Code-reject	Announces an unknown code
0x08	Protocol-reject	Announces an unknown protocol
0x09	Echo-request	A type of hello message to check if the other end is alive
0x0A	Echo-reply	The response to the echo-request message
0x0B	Discard-request	A request to discard the packet

Common options

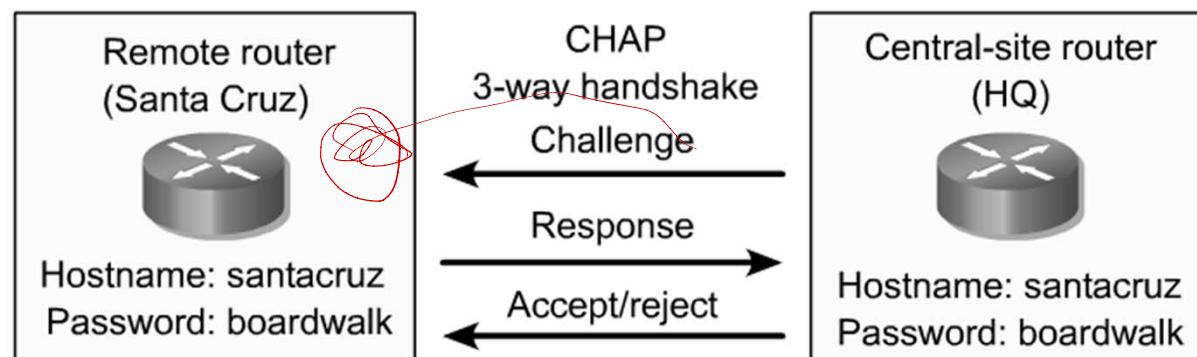
Option	Default
Maximum receive unit (payload field size)	1500
Authentication protocol	None
Protocol field compression	Off
Address and control field compression	Off

Authentication Protocol

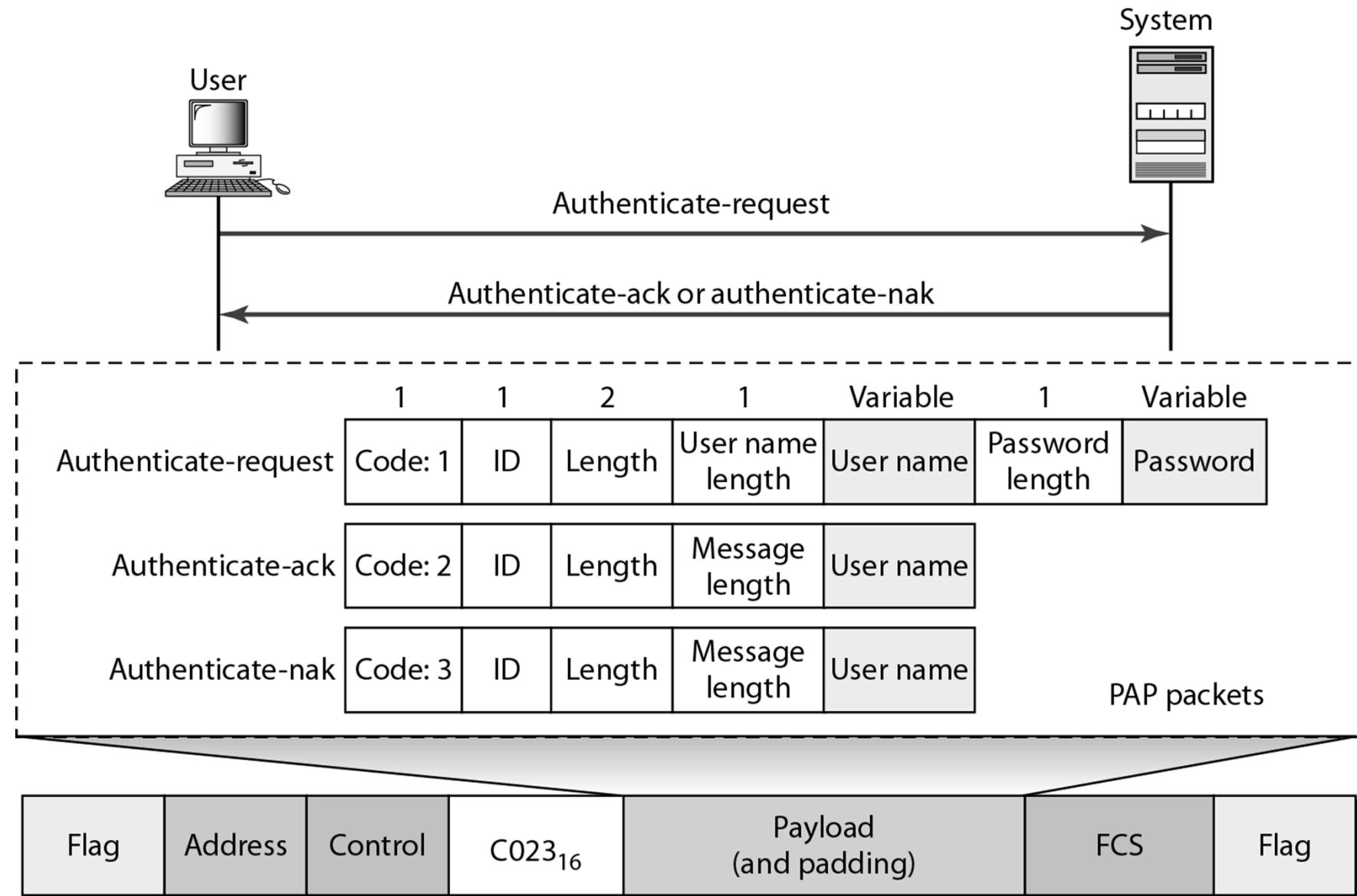
- PAP: Password Authentication Protocol



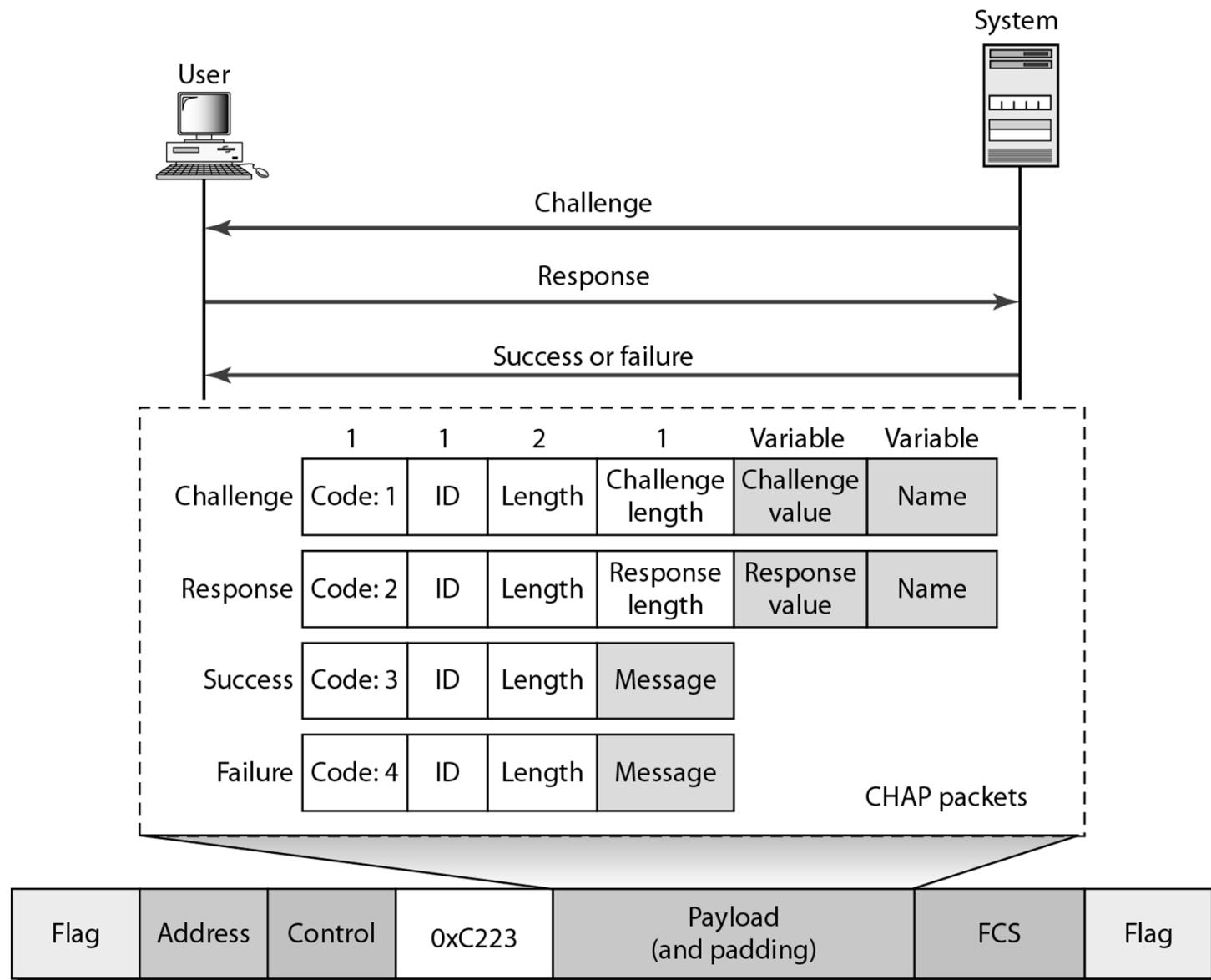
- CHAP: Challenge-Handshake Authentication Protocol



PAP packets encapsulated in a PPP frame



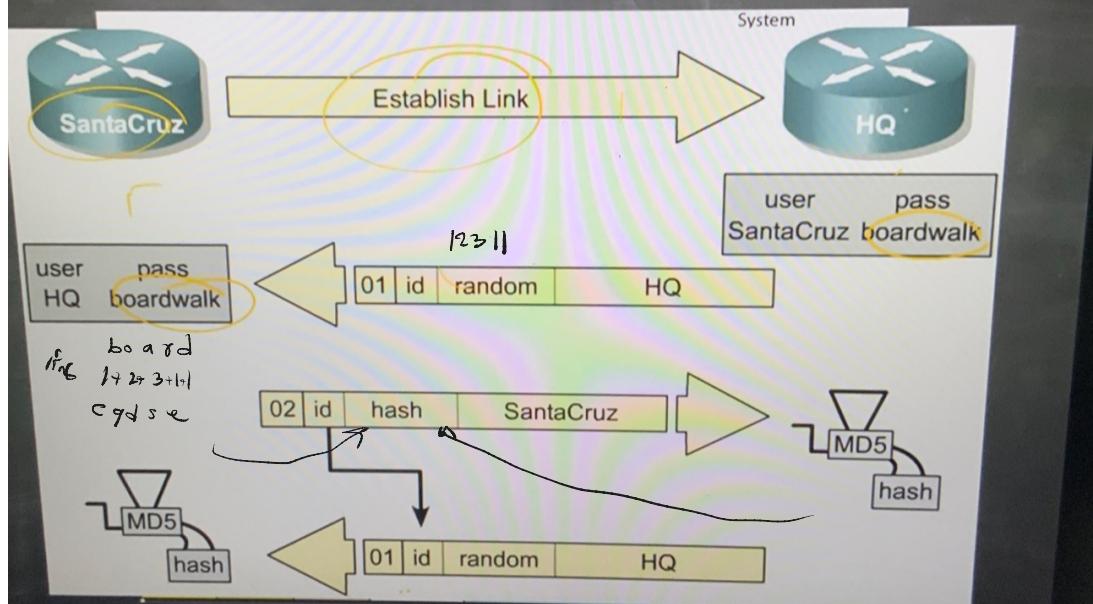
CHAP packets encapsulated in a PPP frame



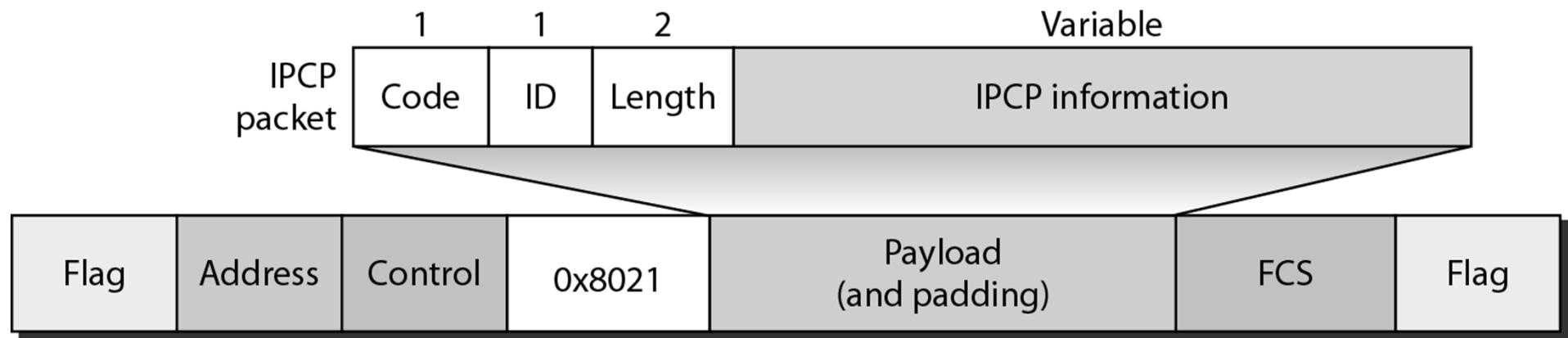
3 HDLC-PPP (2).mp4

CHAP packets encapsulated in a PPP frame

AP
CHAP
PAP

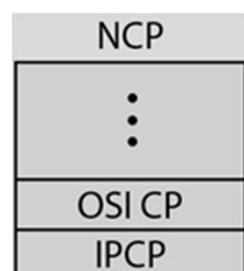


IPCP packet encapsulated in PPP frame

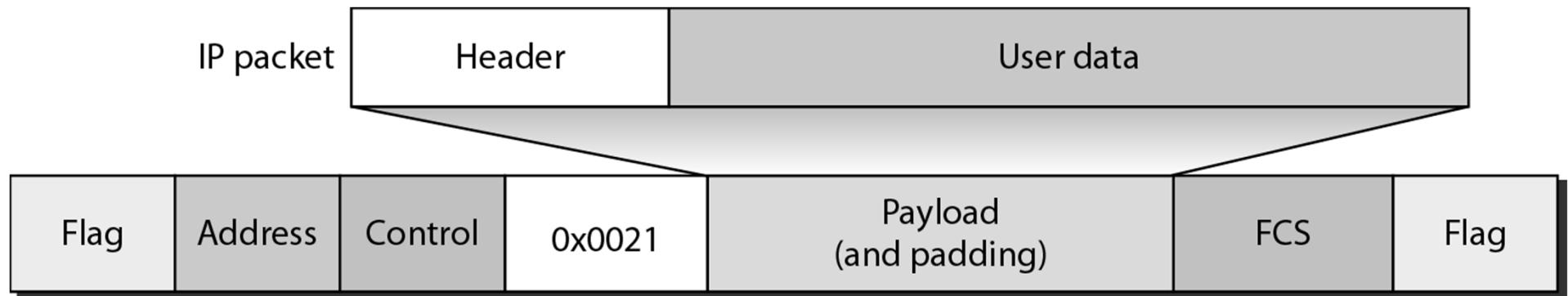


- **Code value for IPCP packets**

<i>Code</i>	<i>IPCP Packet</i>
0x01	Configure-request
0x02	Configure-ack
0x03	Configure-nak
0x04	Configure-reject
0x05	Terminate-request
0x06	Terminate-ack
0x07	Code-reject



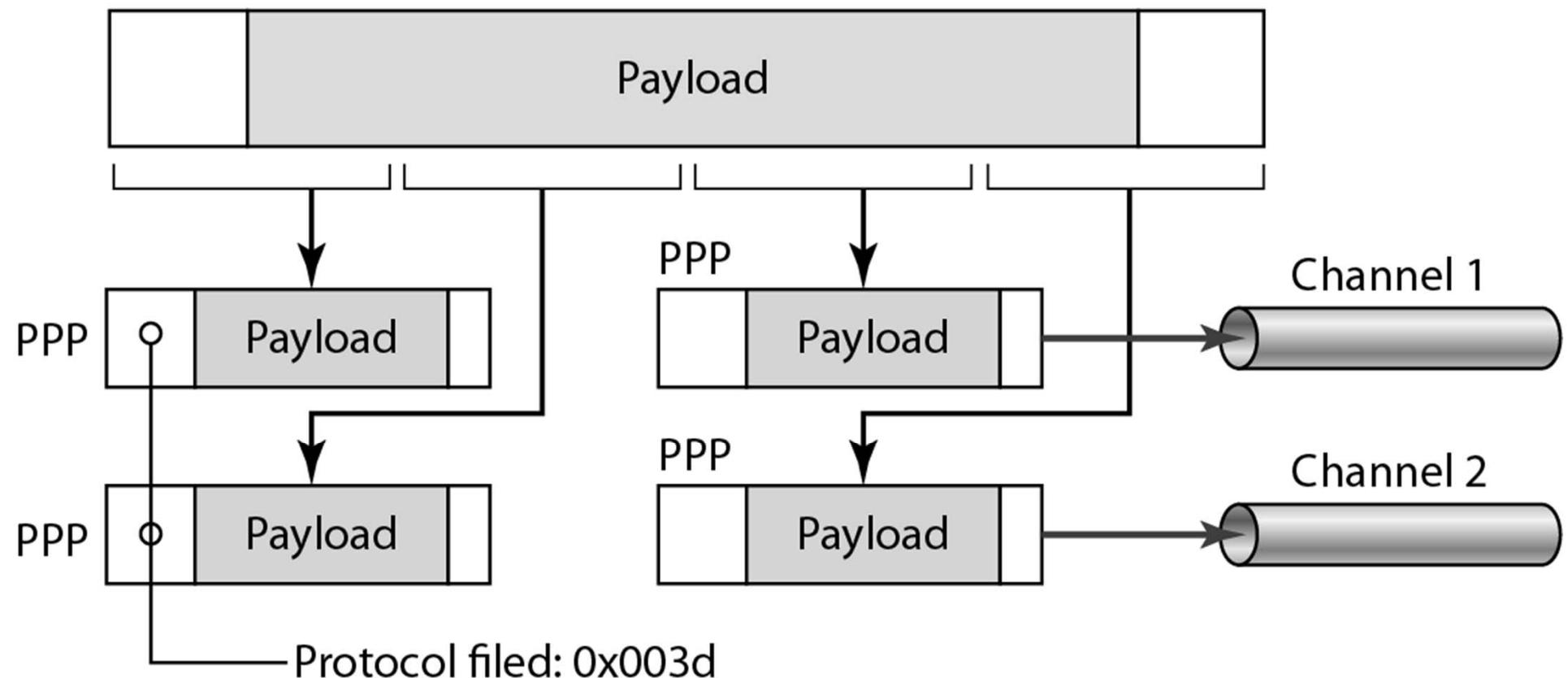
IP datagram encapsulated in a PPP frame



Code	IPCP Packet
01	Configure-request
02	Configure-ack
03	Configure-nak
04	Configure-reject
05	Terminate-request
06	Terminate-ack
07	Code-reject

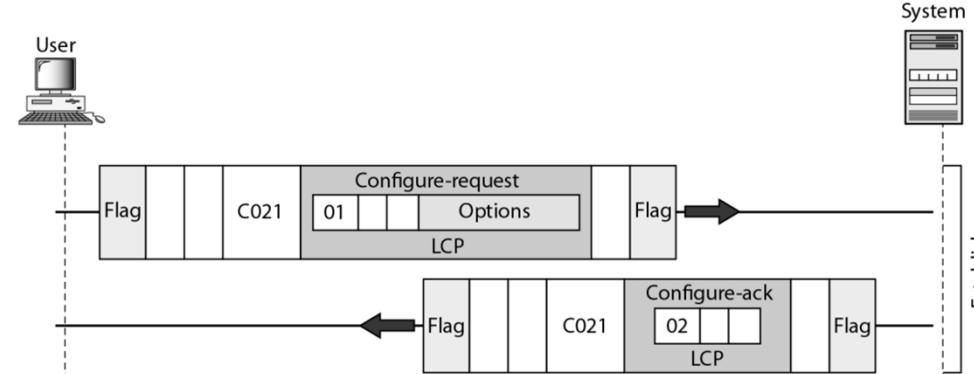
Multilink PPP

Logical PPP



LCP packets

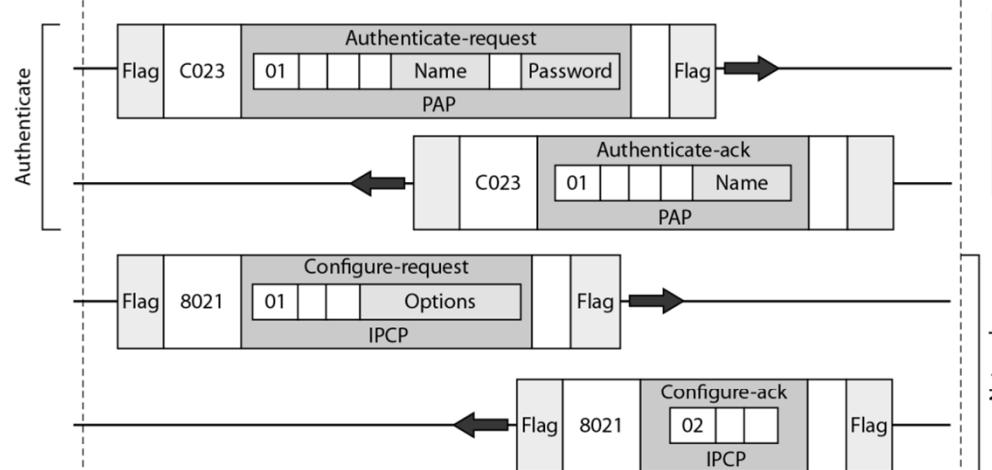
Code	Packet Type
0x01	Configure-request
0x02	Configure-ack



LCP: 0xC021
 AP: 0xC023 and 0xC223
 NCP: 0x8021 and
 Data: 0x0021 and

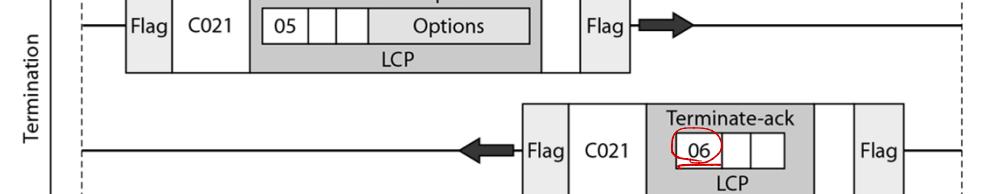
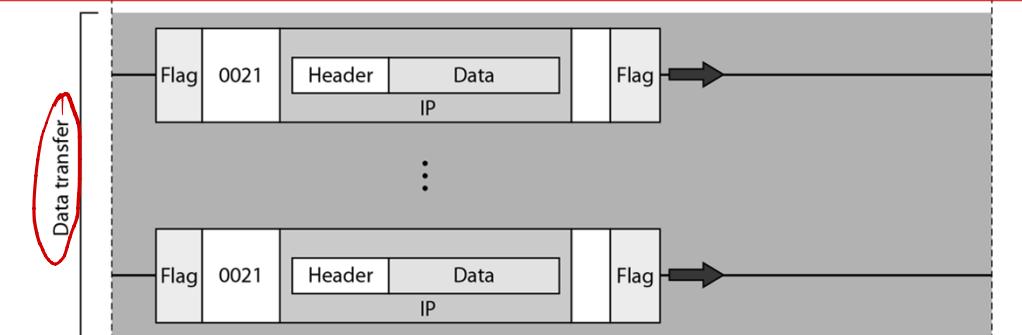
IPCP packets

Code	IPCP
0x01	Configure-request
0x02	Configure-ack



o set configuration
 post of 9 it will no longer receive
 packets

I-frame ok
 Encapsulation ok



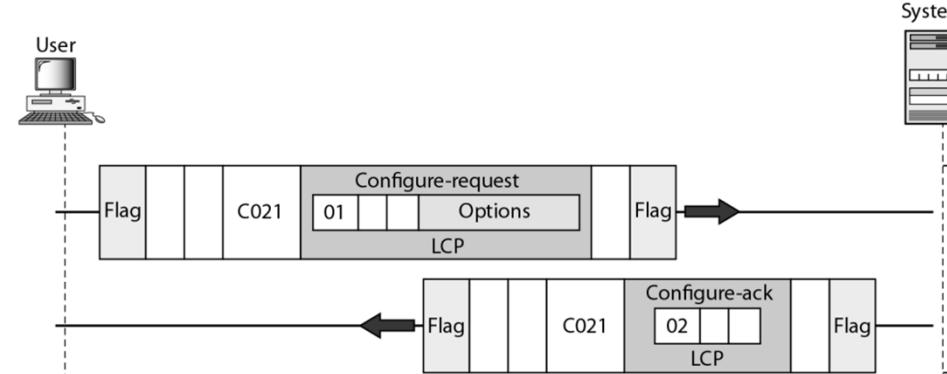
LCP packets

0x05	Terminate-request
0x06	Terminate-ack

Duration

LCP packets

Code	Packet Type
0x01	Configure-request
0x02	Configure-ack



LCP: 0xC021

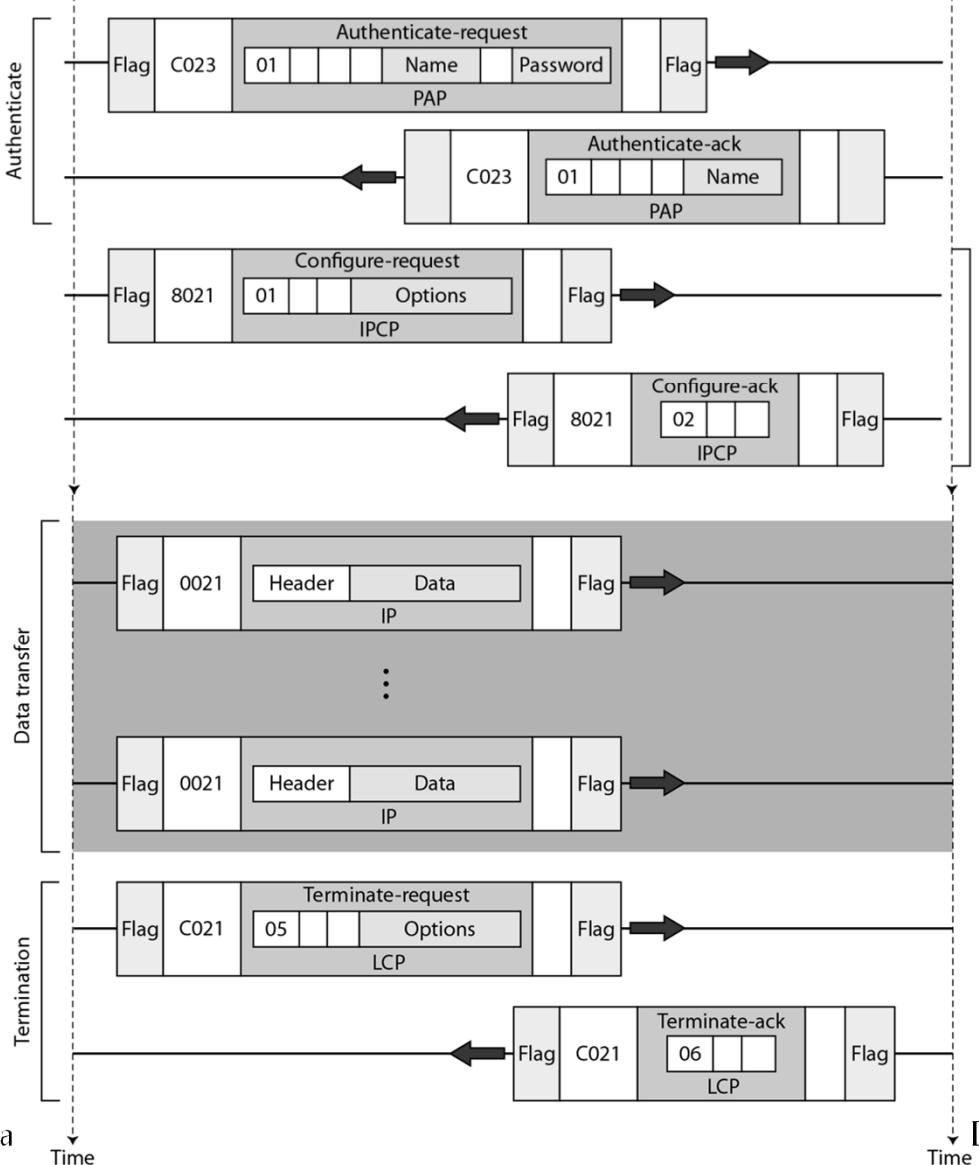
AP: 0xC023 and 0xC223

NCP: 0x8021 and

Data: 0x0021 and

IPCP packets

Code	IPC
0x01	Configure-request
0x02	Configure-ack



LCP packets

0x05	Terminate-request
0x06	Terminate-ack