

The logo of Galgotias University, featuring a stylized 'G' composed of three curved, overlapping bands in shades of yellow, blue, and red, set against a light grey circular background.

Network Layer: Internet Protocol

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INTERNETWORKING

In this section, we discuss internetworking, connecting networks together to make an internetwork or an internet.

Topics discussed in this section:

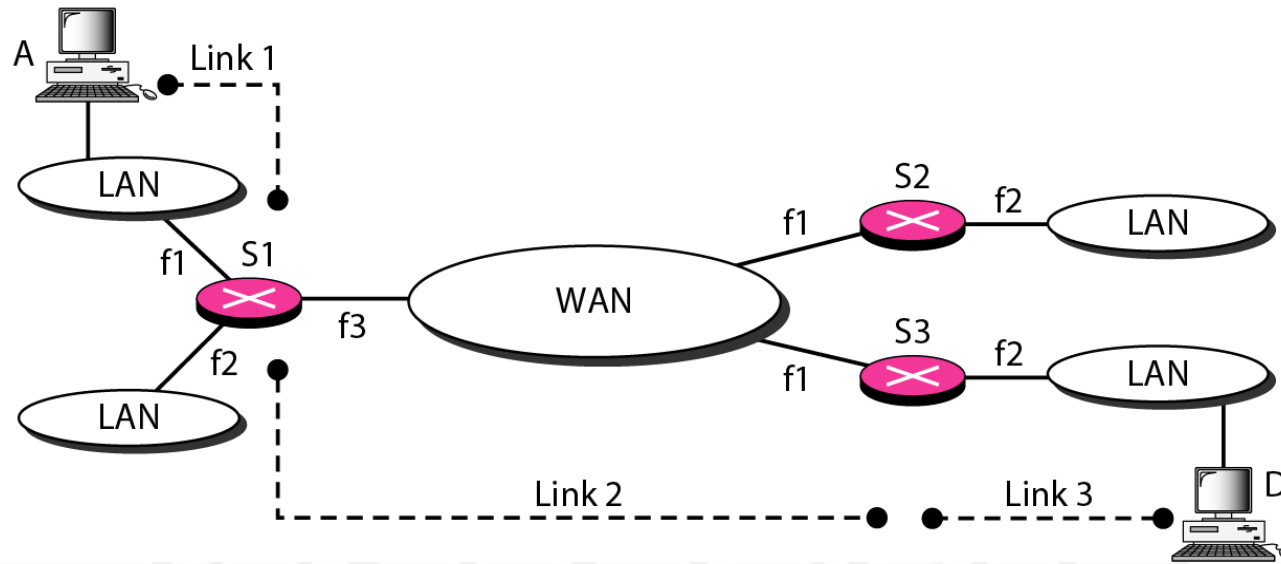
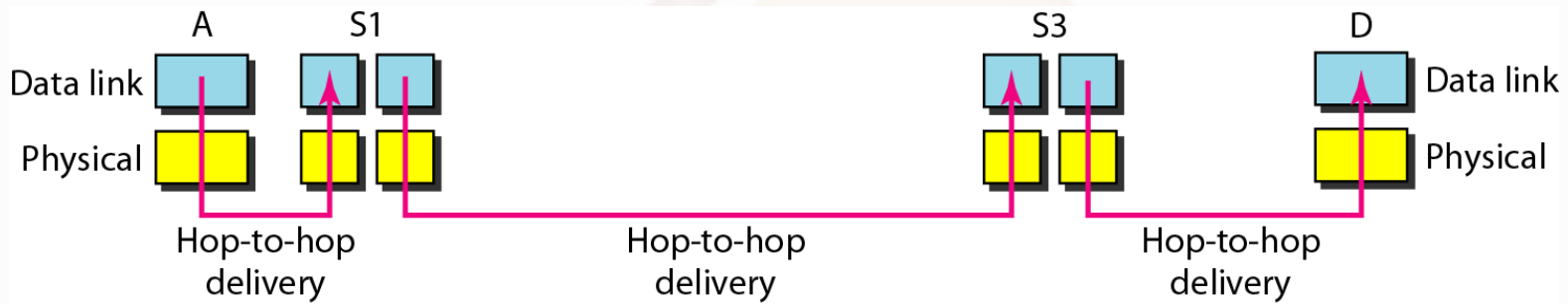
Need for Network Layer

Internet as a Datagram Network

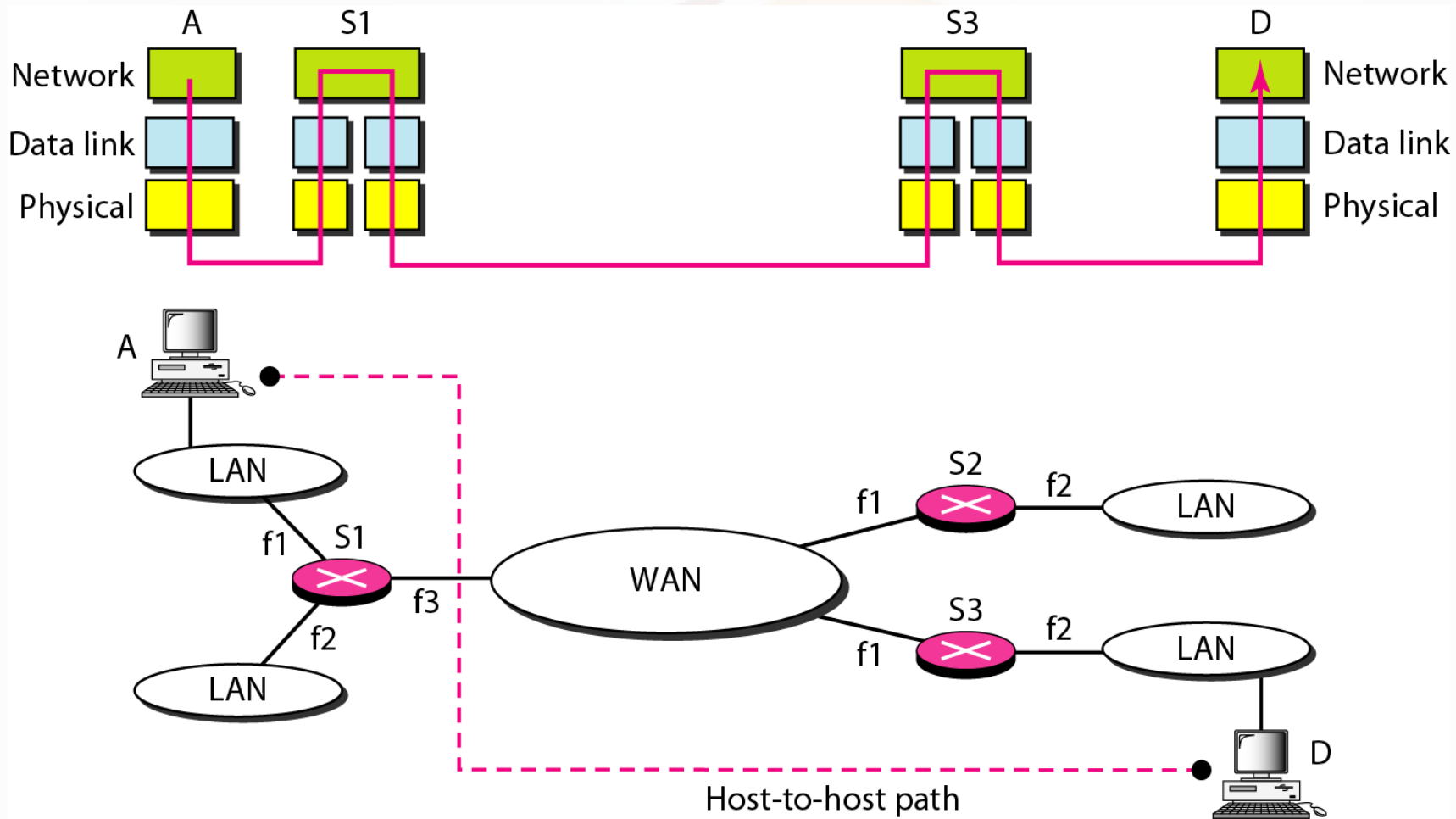
Internet as a Connectionless Network



Links between two hosts

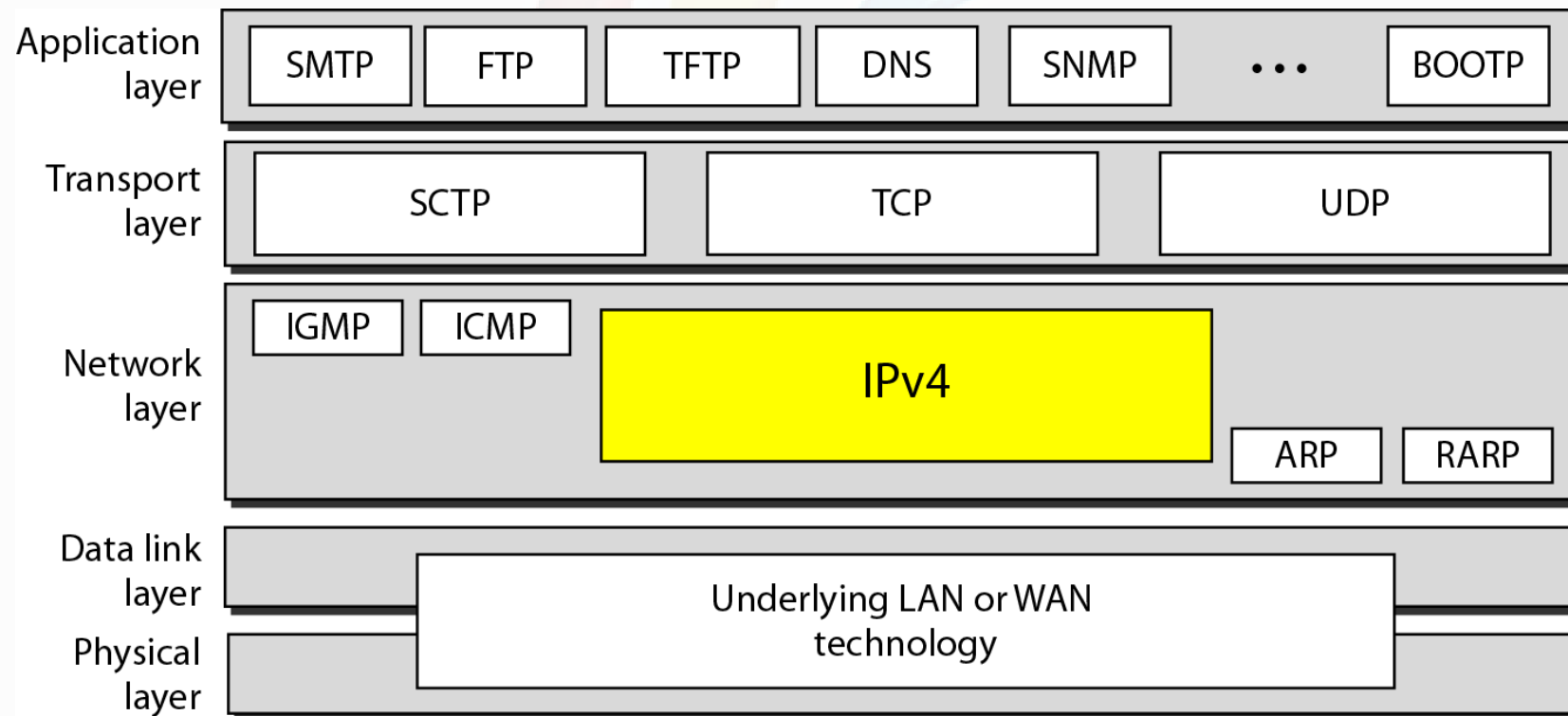


Network layer in an internetwork

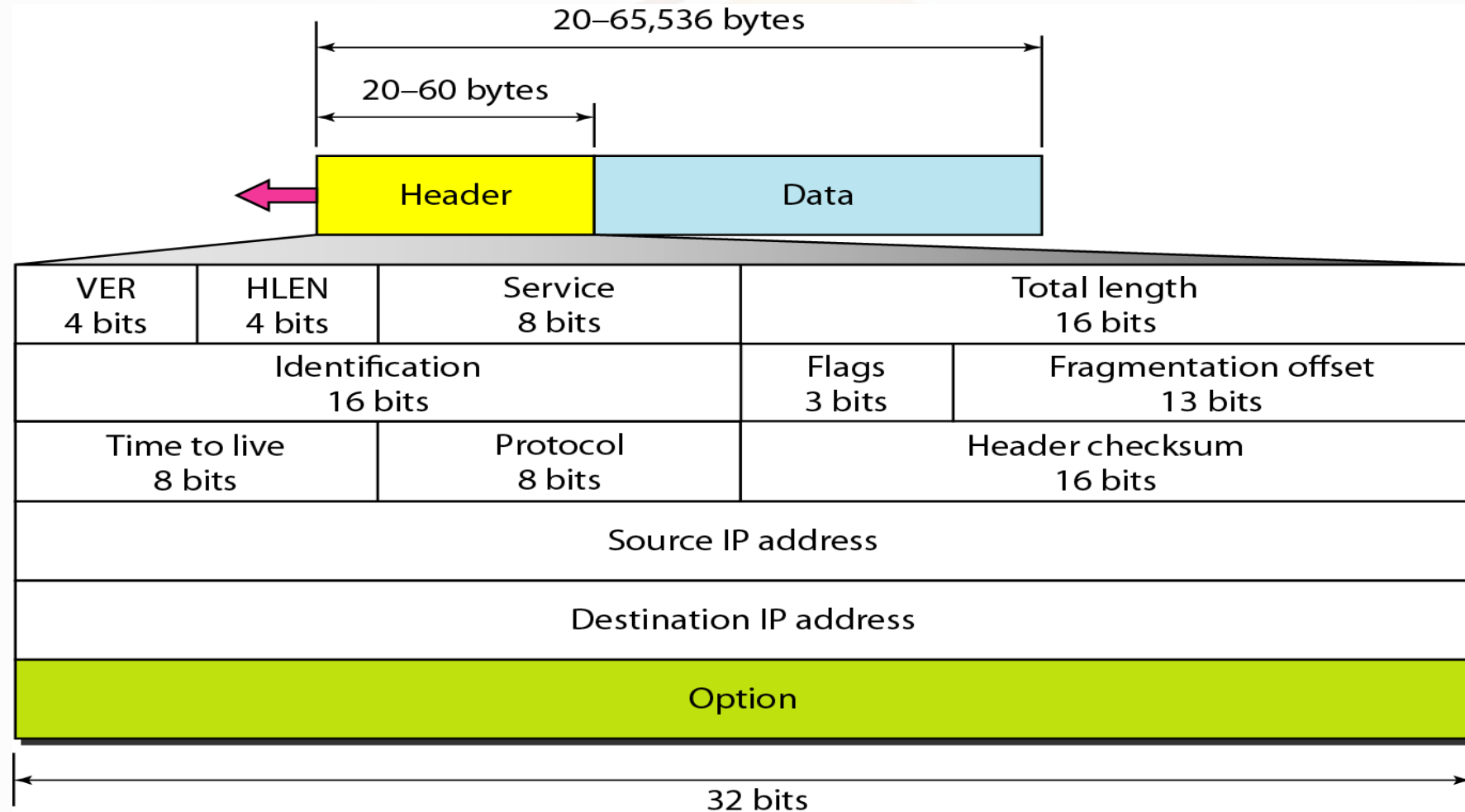


Internet Protocol version 4 (IPv4)

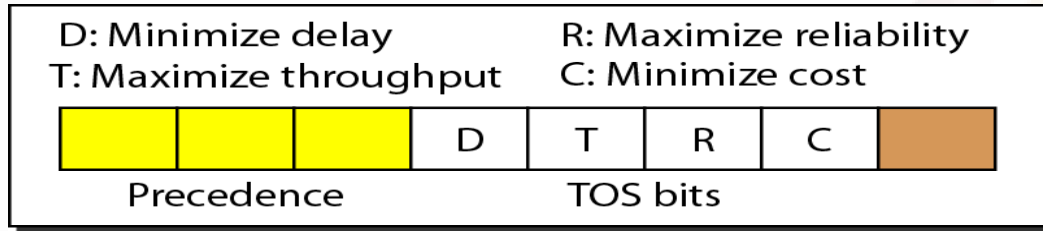
The Internet Protocol version 4 (IPv4) is the delivery mechanism used by the TCP/IP protocols



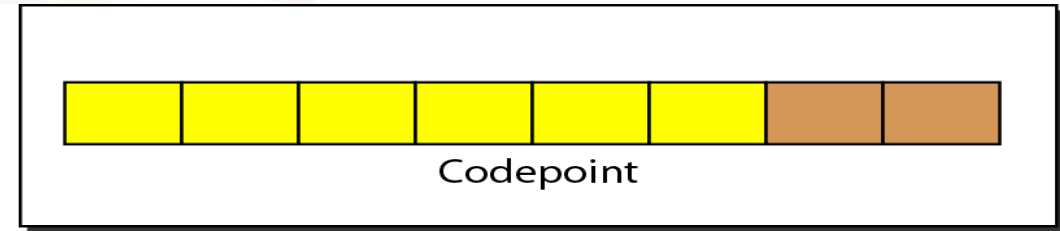
IPv4 datagram format



Service type or differentiated services



Service type



Differentiated services

The precedence subfield was part of version 4, but never used.

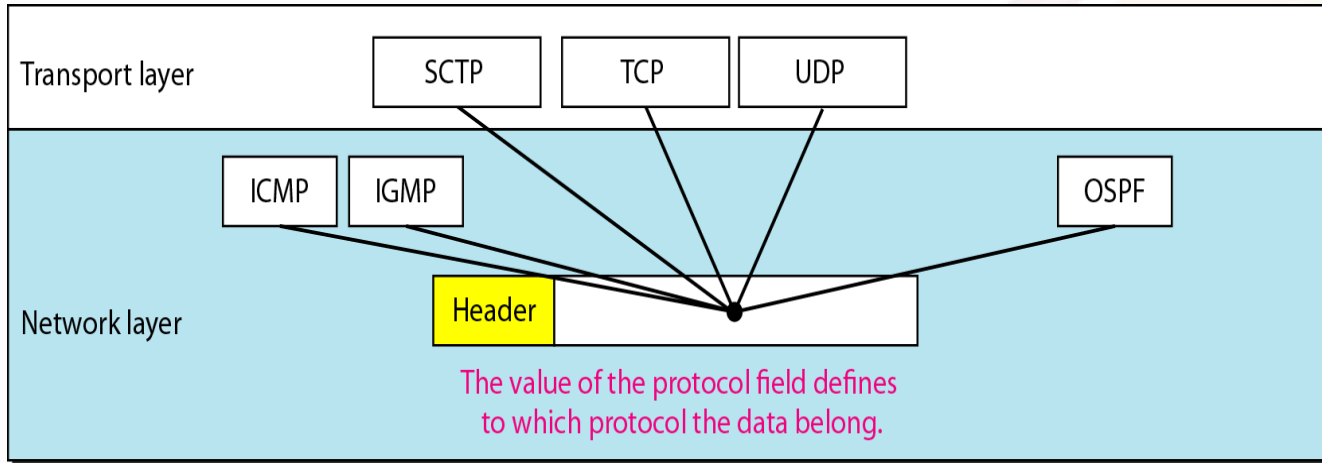
<i>TOS Bits</i>	<i>Description</i>
0000	Normal (default)
0001	Minimize cost
0010	Maximize reliability
0100	Maximize throughput
1000	Minimize delay

Default types of service

<i>Protocol</i>	<i>TOS Bits</i>	<i>Description</i>
ICMP	0000	Normal
BOOTP	0000	Normal
NNTP	0001	Minimize cost
IGP	0010	Maximize reliability
SNMP	0010	Maximize reliability
TELNET	1000	Minimize delay
FTP (data)	0100	Maximize throughput
FTP (control)	1000	Minimize delay
TFTP	1000	Minimize delay
SMTP (command)	1000	Minimize delay
SMTP (data)	0100	Maximize throughput
DNS (UDP query)	1000	Minimize delay
DNS (TCP query)	0000	Normal
DNS (zone)	0100	Maximize throughput

AS
TY

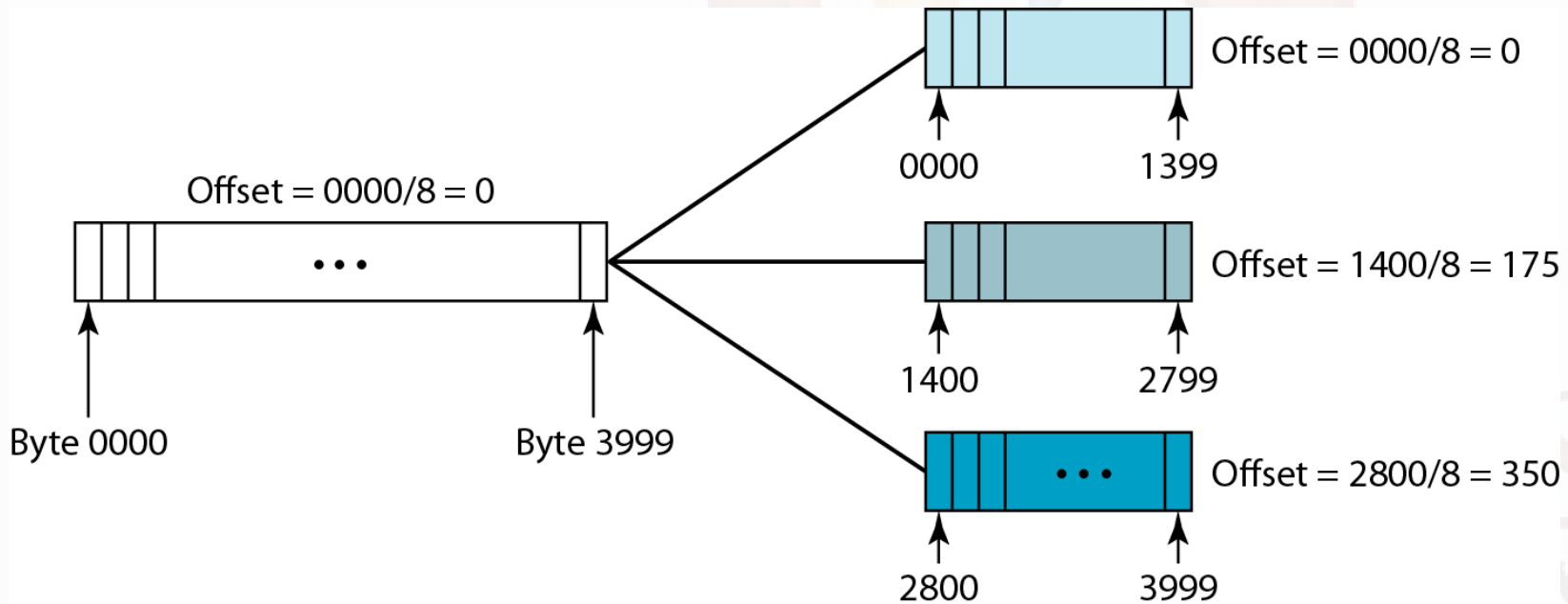
Protocol field and encapsulated data



<i>Value</i>	<i>Protocol</i>
1	ICMP
2	IGMP
6	TCP
17	UDP
89	OSPF

Protocol values

Flags used in fragmentation



Example of checksum calculation in IPv4

4	5	0	28	
1			0	0
4		17	0	
10.12.14.5				
12.6.7.9				

4, 5, and 0	→	4	5	0	0
28	→	0	0	1	C
1	→	0	0	0	1
0 and 0	→	0	0	0	0
4 and 17	→	0	4	1	1
0	→	0	0	0	0
10.12	→	0	A	0	C
14.5	→	0	E	0	5
12.6	→	0	C	0	6
7.9	→	0	7	0	9
Sum	→	7	4	4	E
Checksum	→	8	B	B	1



Thank You