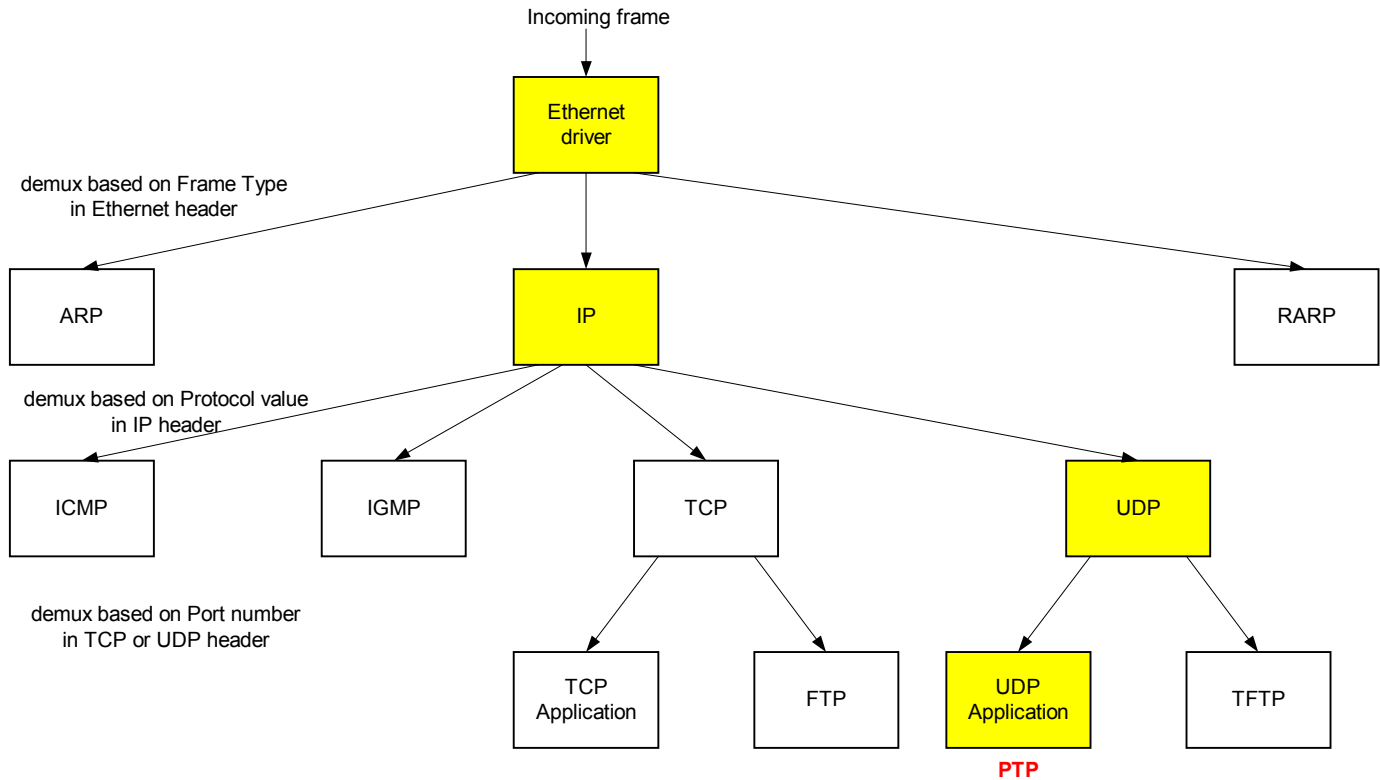


# Brief Notes on TCP/IP

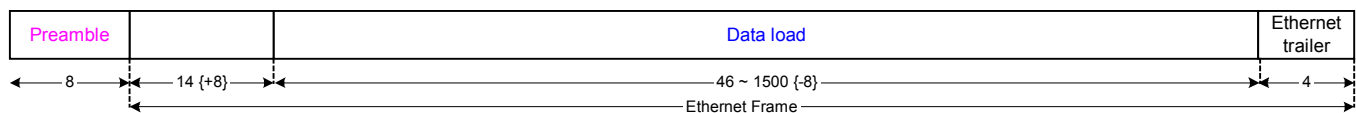
Duy-Ky Nguyen, PhD  
All Rights Reserved

2004 Jul 17

In this brief note, we will review TCP/IP encapsulation and locate IEEE-1588 PTP (Precise Time Protocol) payload.

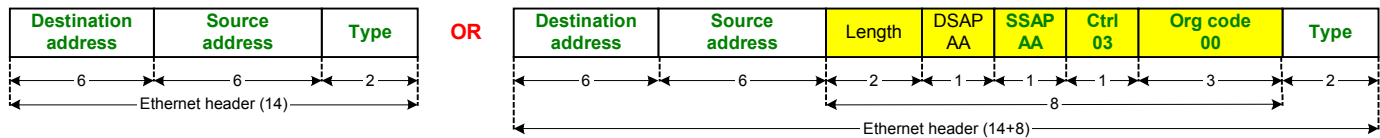


## Ethernet frame

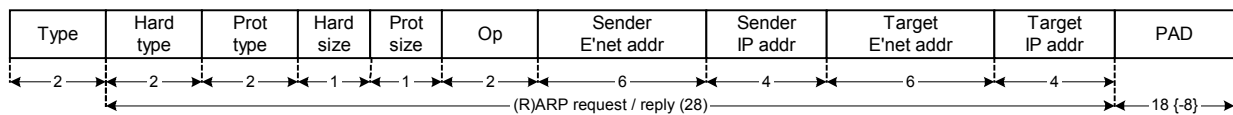


Preamble : 55 .. 55 d5 (7 of 55)

## Ethernet header

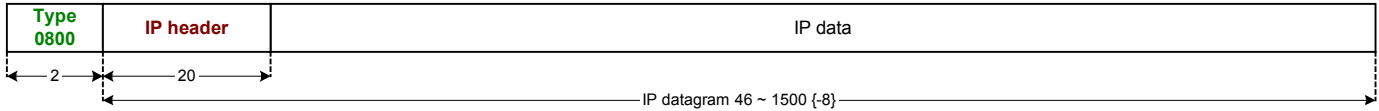


## Data load



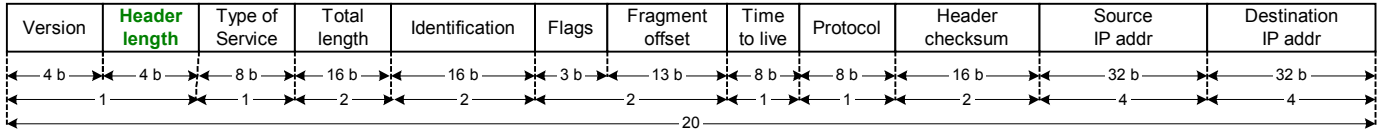
Type = 0806 (ARP) 8035 (RARP)

OR



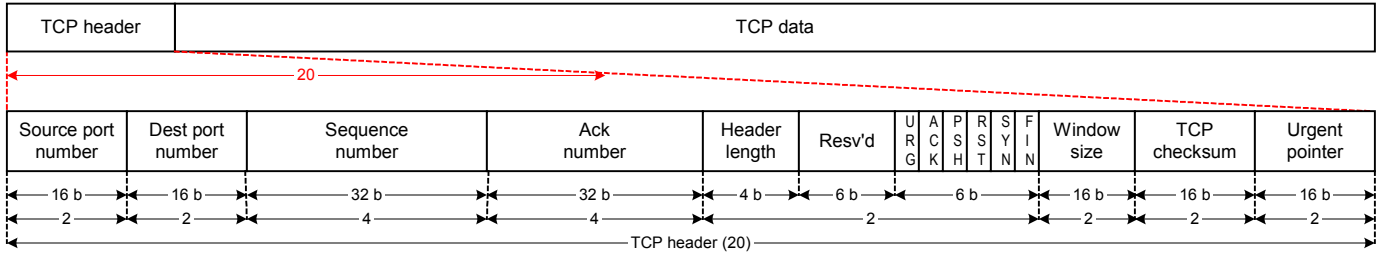
IP data = ICMP message, IGMP message, TCP segment, UDP datagram

### IP header

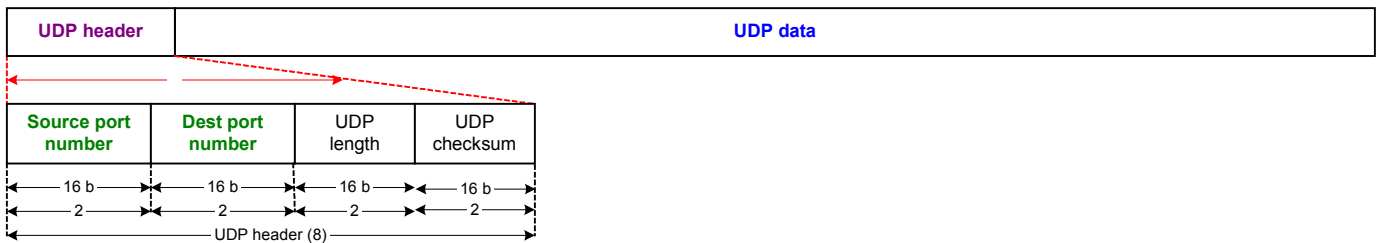


4 b = 4 bit

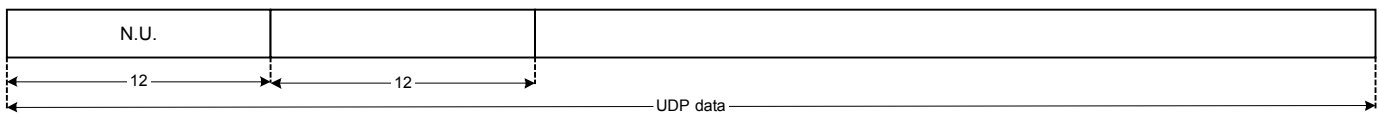
### TCP segment



### UDP datagram

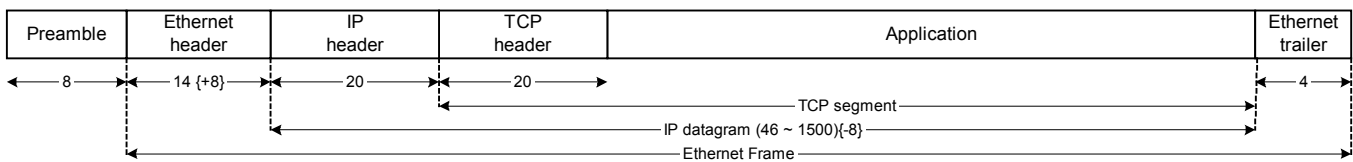


### UDP data (PTP)

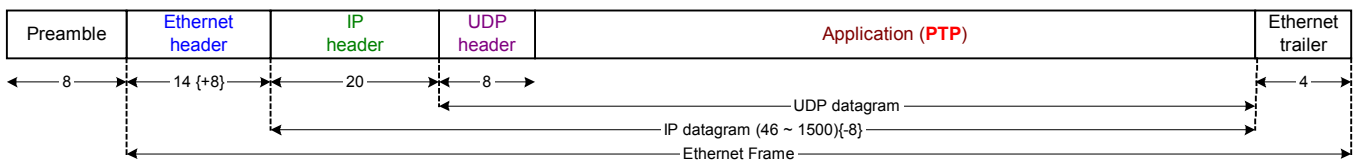


### Summary

#### TCP



#### UDP



Byte Address	Size (Byte)	Field
	8	Preamble (55 .. 55 d5)
<b>0</b>	<b>14</b>	<b>Ethernet Frame</b>
0	6	Destination Ethernet Address
6	6	Source Ethernet Address
12 [0c]	2	Length or Type <ul style="list-style-type: none"> <li><b>802.3</b> : If it's greater than or equal to 1536 (0x600) (<math>\geq 0x600</math>), it's Type, (+8) is ignored. (IP : 0x0800)</li> <li><b>802.2 LLC/SNAP</b> : Otherwise (<math>&lt; 0x600</math>), it's Length as how many bytes follow, excluding Ethernet trailer (CRC). All address from this point, including Type @ (12 + 8), must be added 8 (+8).</li> </ul>
<b>14</b>	<b>8</b>	<b>802.2 (Optional +8)</b>
<b>14</b>	<b>3</b>	<b>802.2 LLC (Logical Link Control)</b>
14	1	DSAP = 0xAA (Destination Service Access Point)
15	1	SSAP = 0xAA (Source Service Access Point)
16	1	Ctrl = 0x03
<b>17</b>	<b>5</b>	<b>802.2 SNAP (Sub-Network Access Protocol)</b>
17	3	Org code = 0
20	2	Type @ (12 + 8)
<b>14 (+8)</b>	<b>20</b>	<b>IP Header</b>
0	1/2	High-nibble 4-bit version (Start of IP) 4 for Ipv4 6 for Ipv6
	1/2	<b>IP_hdr_len</b> Low-nibble 4-bit Header length (in 32-bit word) Let B_14 = *0x14, then Size in Byte = (B_14 & 0xF) x 4 Normally : 5 for 20 bytes (IP_hdr_len = 20)
1	1	Type of Service (TOS)
2	2	Total Length of IP datagram in Bytes
4	2	Identification of each datagram sent by host, normally incremented by one.
6	2	3-bit flags 13-bit fragment offset
8	1	Time to live (TTL)
<b>9</b>	<b>1</b>	<b>Protocol used by IP for demux (UDP : 0x11)</b>
10	2	Header checksum
12	4	Source IP address
16	4	Destination IP address
<b>14 + IP_hdr_len (+8)</b>	<b>8</b>	<b>UDP Header</b>
0	2	Source port number
<b>2</b>	<b>2</b>	<b>Destination port number (PTP : 0x13F)</b>
4	2	Length of UDP header and UDP data in bytes.
6	2	UDP checksum for UDP header and UDP data
		<b>UDP Data.</b>
8	12	N.U.
	<b>12</b>	<b>PTP</b>
20	1	PTP Message Type
21	1	N.U.
22	6	PTP Source U uid
28	2	PTP Port ID
30	2	PTP Sequence ID