SNS COLLEGE OF TECHNOLOGY

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ECE308- WIRELESS TECHNOLOGIES FOR IOT

III ECE / VI SEMESTER

UNIT 2 - ARCHITECTURE AND DESIGN PRINCIPLES FOR IOT
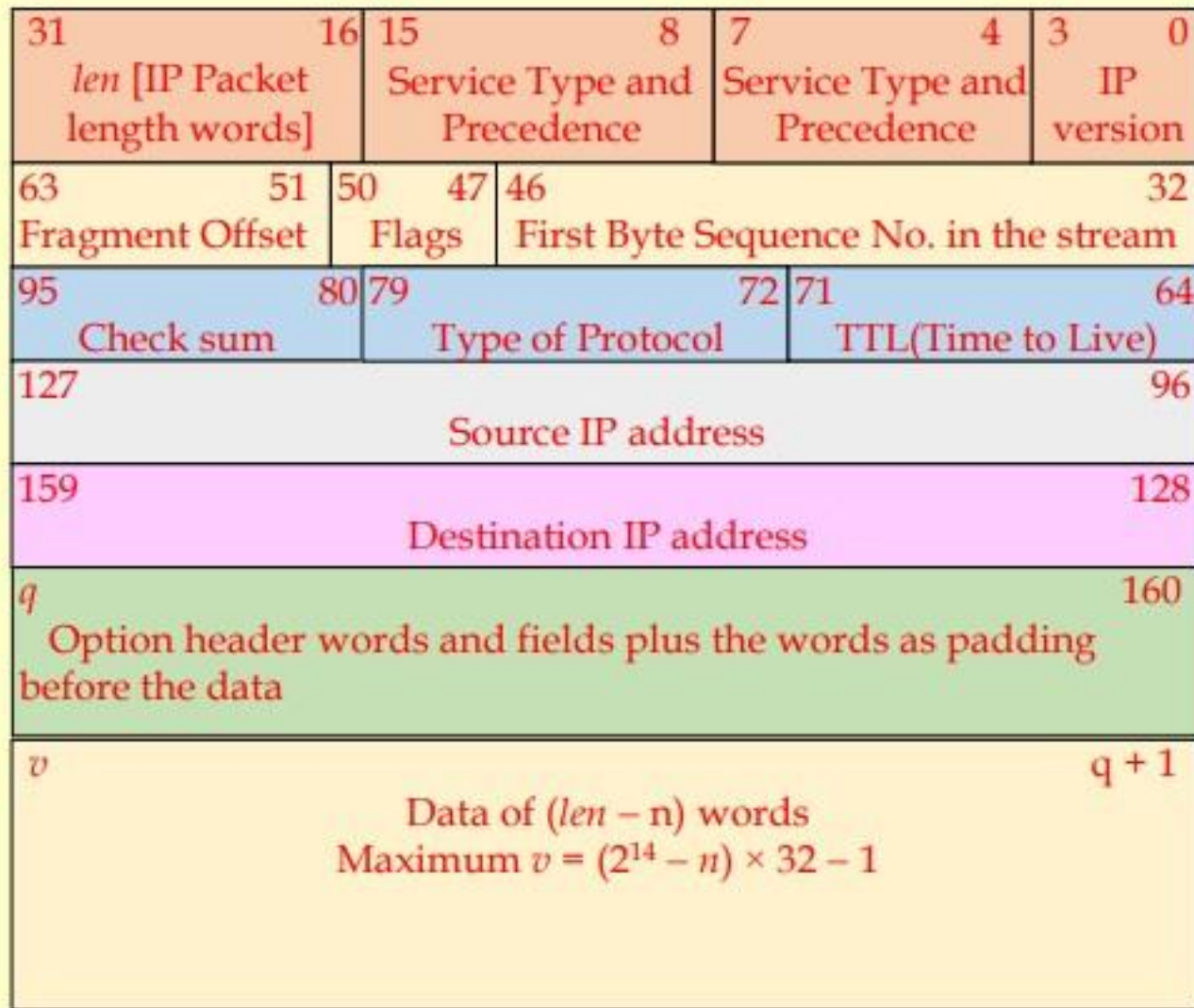
TOPIC 3 –IPv4 and IPv6 Protocols

- TCP Header plus data consist of stack from the transport layer

- From internet layer, each packet consists of 5-words basic IP header fields of 160 bits and extended header up to n words.

- 1 word = 32 bits

- n = total number of header words added at IP layer

Internet layer

- Receives and forwards data to next stage

- Uses IP version 4 (IPv4),

- Uses IP version 6 (IPv6) protocol or

- [IPv6 Routing Protocol for Low Power Lossy Networks (LLNs)] in IoT/M2M

- 6LoWPAN in IoT/M2M

31	16	15	8	7	4	3	0
len [IP Packet length words]		Service Type and Precedence		Service Type and Precedence		IP version	

63	51	50	47	46	32
Fragment Offset		Flags		First Byte Sequence No. in the stream	

95	80	79	72	71	64
Check sum		Type of Protocol		TTL(Time to Live)	

127	96	Header
Source IP address		

159	128
Destination IP address	

q 160 Extended Header

Option header words and fields plus the words as padding before the data

$q = (32 \times n - 1)$, [*n* is number of words = 5 words for header plus options plus padding words

v q + 1

Data of (*len* – n) words

Maximum $v = (2^{14} - n) \times 32 - 1$

Data Packet (stack) from or to Transport layer (Maximum Size 2^{14} words = 2^{16} B

Fig. 4.3 Data stack received or transmitted at or to transport layer, and packet consisting of IP header fields of 160 bits and extended header (*n* – 5) words (when required) plus data stack of maximum *v* words from or for the transport layer

- IP header first consists of five words
- The header extends by using option words and padding words
- Data stack to network layer has maximum V = (n + len) words where V <= (2 to the power 14 -n) words
- Packet maximum 2 to the power 14 word meaning 2 to the power 16 B

Header first word field

- b31-b16 len [IP Packet length in words]
- b15-b4 Service Type and Precedence
- b3-b0 IP version (=0100 for version 4)

Header second word fields

- b63-b51 Fragment Offset (specify which data stack

len words consist of which fragment in the data stack

of transport layer)

- b50-b47 Flags
- b46-b32 first Byte Sequence Number in the packet of the TCP stream

Header third word fields

- b95-b80 checksum (sum of header bits)

- b79-b72 type of protocol (for example, is it ICMP)

- b71-b64 time to live (number of hops try to reach to destination

Header fourth and fifth word fields

- b127-b96 32-bit source IP address

- b159-b128 32-bit destination IP address

IPv6 Protocol features

- Large addressing space and

- Route aggregation

- IPv6 addresses of 128 bits

- Vastly enlarged address space compared to IPv4

- An Pv6 address field provides a numerical label

Label in IPv6

- IPv6 addresses of 128 bits

- Vastly enlarged address space compared to IPv4

- An Pv6 address field provides a numerical label

IPv6

- Permitting the hierarchical address allocation
- Thus route aggregation across the Internet
- Thus limit the expansion of routing tables.
- Provisions additional optimization for the delivery of services using routers, subnets and interfaces,
- Manages device mobility, security, and configuration Aspects.
- Expanded and simple use of multicast addressing
- Provisions jumbo grams (big size datagram)
- Permits extensibility of options

SUMMARY

- IPv4 and IPv6 protocol basic features

- 32-bit IP4 addresses

- 32-bit IPv6 addresses

Internet layer in IPv6 receives and transmits from/to adaptation layer when using IEEE 802.15.4 WPAN devices