



# **SNS COLLEGE OF TECHNOLOGY**

**Coimbatore-35**

**An Autonomous Institution**

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Grade

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Chennai



## **DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING**

### **19ECE308- WIRELESS TECHNOLOGIES FOR IOT**

III ECE / VI SEMESTER

UNIT 2 – for IoT/M2M devices. UNITII ARCHITECTURE AND DESIGN

PRINCIPLES FOR IOT

### **TOPIC 3 -IPv4 and IPv6 Protocols**



# IPv4 Protocol headers and data stack



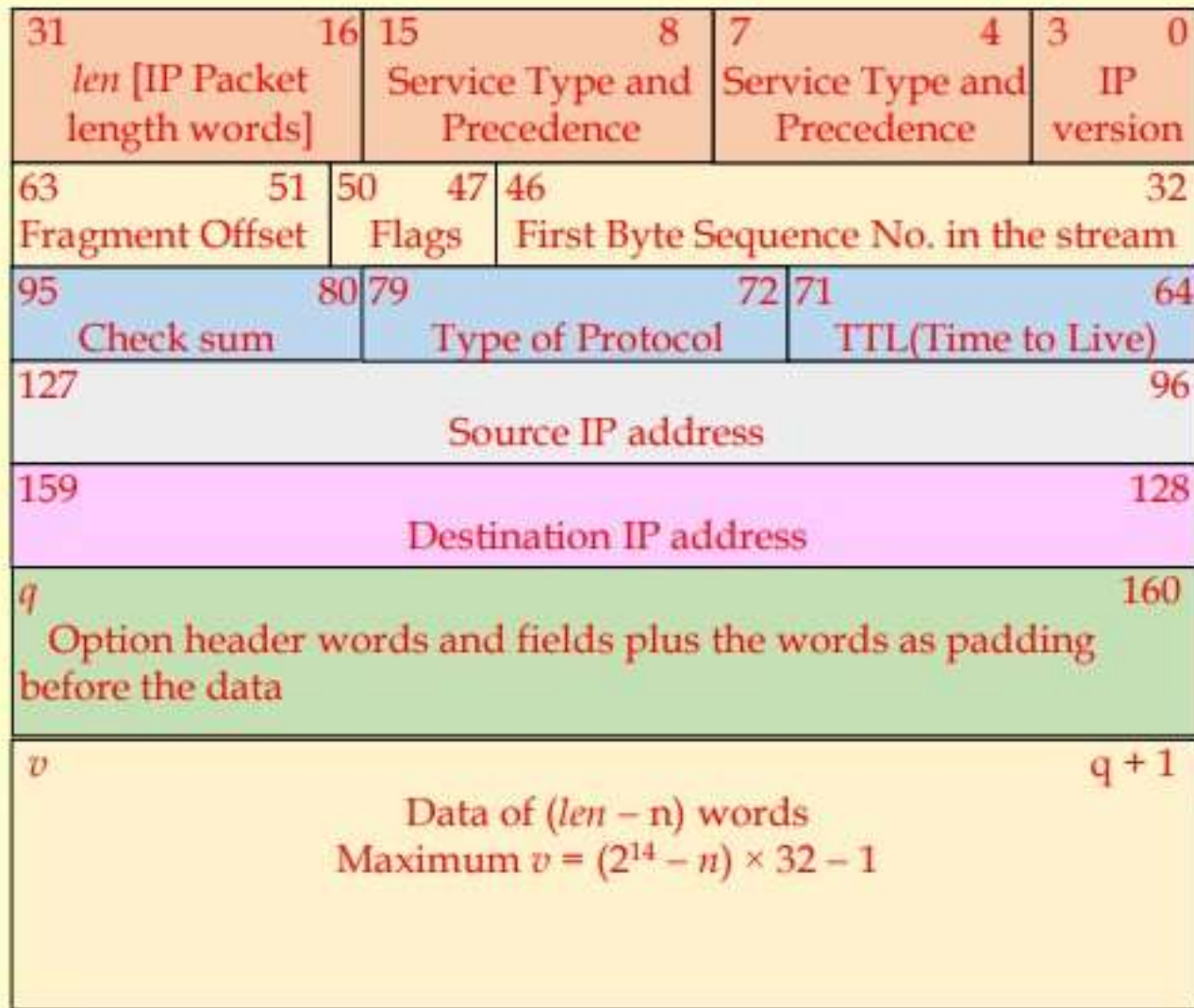
- TCP Header plus data consist of stack from the transport layer
- From internet layer, each packet consists of 5-words basic IP header fields of 160 bits and extended header up to n words.
- 1 word = 32 bits
- n = total number of header words added at IP layer



# 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



Header

Extended Header

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

**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



# IPv4 Header and Data Stack (Packet Size) to next stage



- IP header first consists of five words
- The header extends by using option words and padding words
- Data stack to network layer has maximum  $V = (n + \text{len})$  words where  $V \leq (2 \text{ to the power } 14 - n)$  words
- Packet maximum  $2 \text{ to the power } 14$  word meaning  $2 \text{ to the power } 16$  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 IPv6 address field provides a numerical label



# Label in IPv6



- • IPv6 addresses of 128 bits
- • Vastly enlarged address space compared to IPv4
- • An IPv6 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