



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ECE308- WIRELESS TECHNOLOGIES FOR IOT

UNIT 2 - ARCHITECTURE AND DESIGN PRINCIPLES FOR IOT

TOPIC 5 -IP ADDRESSING IN THE IOT



32-bit IP version 4 address



- An IP address identifies every device connected to the internet. This enables computers and other internet-connected devices, such as mobile phones and Internet-of-Things (IoT) devices, to communicate over the internet and on local-area networks (LANs).
- Four decimal numbers separated by dots, for example, 198.136.56.2
for 32 bits 11000110 10001000 00111000 00000010.

31	16	15	8	7	4	3	0	
<i>len</i> [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		Source IP address				96		
159		Destination IP address				128		
<i>q</i>		160						
Option header words and fields plus the words as padding before the data								
<i>v</i>		<i>q</i>						
Data of (<i>len</i> - <i>n</i>) words Maximum $v = (2^{14} - n) \times 32 - 1$								

Header

Extended Header

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

Recall Source and destination addresses at the header in TCP protocol stack

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



4-decimal Numbers IP version 4 address



- IP addresses can be between 0.0.0.0 to 255.255.255.255, total 2³² addresses due to 32-bit address.
- Three separate fields with a decimal number each for each set of 8 bits are easier to use.



Subnet address



- Internet address visible to outside world for the routers on the Internet
- Subnet address for use within the group internally, and is invisible to outside world.
- A subnet is a sub-network consisting of number of hosts or nodes or devices or machines.



Class A, B and C Networks



- Three x.x.x specifies a network group of $2^{24} - 2$ hosts
- Two x.x specifies a network group of $(2^{16} - 2)$ hosts,
- One .x specifies a smaller group of $(2^8 - 2)$ hosts



Class A network group address



- Address n.x.x.x, where x is between 0 to 255 and n is between 1 and 126 for the addresses between 1.0.0.0 and 126.x.x.x.
- This is because the IP address 32-bit has msb bit 31 =0.



Class B Network



- •Class B network group address means address n.m.x.x, where x is between 0 to 255 and n.m is between 128.1 to 191.254 for the addresses between 128.1.0.0 and 191.254.x.x.
- This is because the IP address 32-bit has two msb bits $31-30 = 10$



Class C Network



- Class C network group address means address n.m.k.x, where x is between 0 to 255 and n.m.k is between 192.0.1 and 223.255.254 for the addresses between 192.0.1.0 and 223.255.254.x.
- This is because the IP address 32-bit has three msb bits $31-30-29 = 11$



Dynamic IP Address



- A number of computers, laptops, mobiles and devices may need connection in an organisation to an IP router
- Once a device connects to Internet, it needs to be allotted individual IP address, called dynamic IP address
- When the device connects to a router, the router and device use DHCP (Dynamic Host Control Protocol)
- DHCP actions assign an IP address at an instance to the device.



Domain Names System (DNS)



- An Application which provides the IP address for the corresponding service from the named domain service
- For example, an IP address, 198.136.56.2 (11000110 10001000 00111000 00000010) registered domain name rajkamal.org for the IP address



128-bit address IPv6 address



- A hexadecimal digit represents 4-bit, 0 hex = 0000 binary to f hex = 1111.
- 128-bit address: 32 hexadecimal digits
- Eight sets of 4 hex-digits each separate by a colon or dot in an IPv6 address.
- Example is 16-hexadecimal digits, 40a0:0acb:8a00:b372:0000:0000:0000:0000.



Thank You