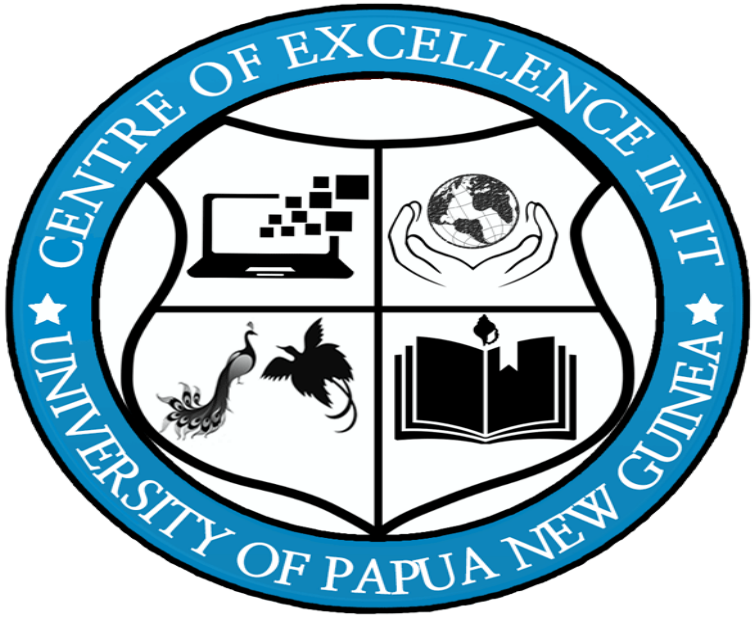
Networking Fundamentals



CENTRE OF EXCELLENCE IN IT

Chapter 2: Network Layer

Outcome:

1. You'll be able to describe the IP addressing scheme and how sub-netting works.

2. You'll be able to demonstrate how encapsulation works, and how protocols such as ARP allow different layers of the network to communicate.

3. You'll gain an understanding of the basics behind routing, routing protocols and how the internet works.

2.1 Network Layer Introduction

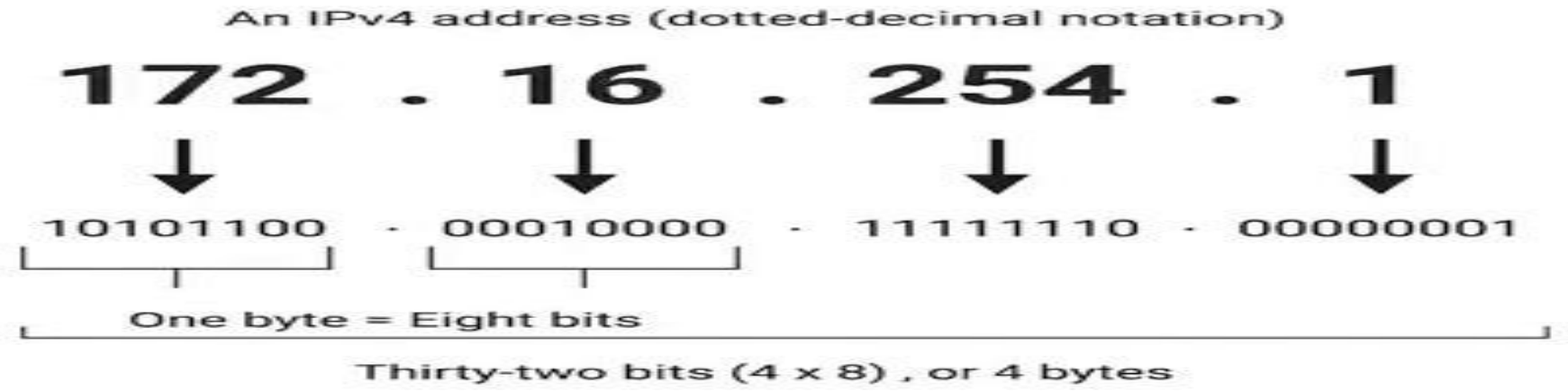
- MAC Addresses is not ideal across multiple networks across long distances.

IP addresses come into play.

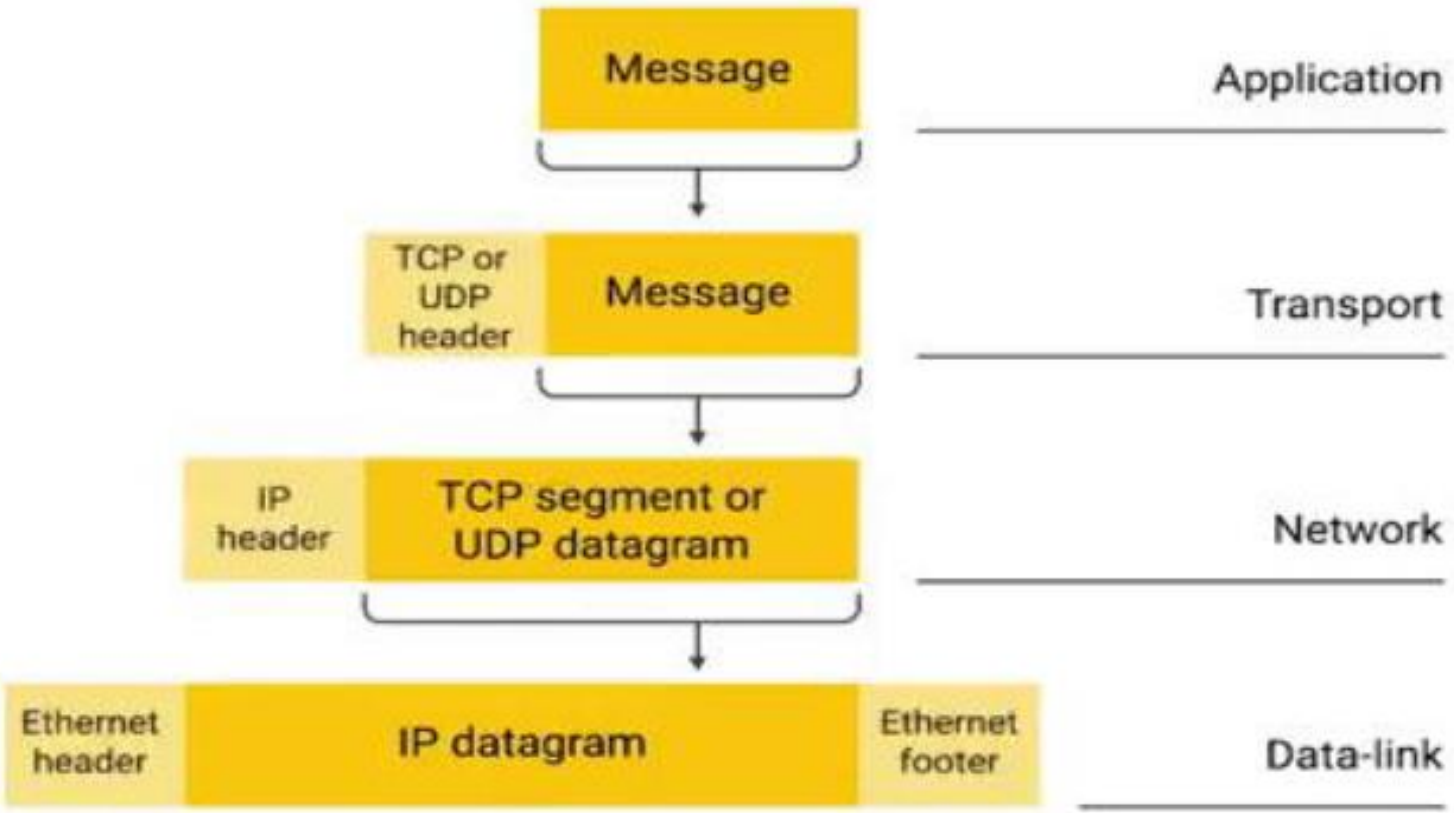
#	Layer Name	Protocol	Protocol Data Unit	Addressing
5	Application	HTTP, SMTP, etc..	Messages	n/a
4	Transport	TCP/UDP	Segment	Port #'s
3	Network	IP	Datagram	IP address
2	Data Link	Ethernet, Wi-Fi	Frames	MAC Address
1	Physical	10 Base T, 802.11	Bits	n/a

2.2 IP Addresses

- IP addresses are 32-bit long numbers made up of 4 octets.
- Single octet, can represent all decimal numbers from 0 to 255.
- Valid IP Address > 172.16.254.1
- Invalid IP Address > 123.456.789.100



2.3 IP Datagrams and Encapsulation



2.4 IP Address Classes

The address class system is a way of defining how the global IP address is split up. There are three primary types of address classes: Class A, Class B, and Class C.

- Class A addresses are those where the first octet is used for the network ID, and the last three are used for the host ID.
- Class B addresses are where the first two octets are used for the network ID, and the second two, are used for the host ID.
- Class C addresses, are those where the first three octets are used for the network ID, and only the final octet is used for the host ID

2.4 IP Address Classes

IP address classes

Class	Range	Max Hosts
A	0-126	16 Million
B	128-191	64,000
C	192-224	254
D	224-239	N/A
E	240-255	N/A

2.5 Sub-netting

- Sub-netting is the process of taking a large network and splitting it up into many individual smaller subnetworks or subnets..
- Subnet Mask – Just like an IP address, they are 32-bit numbers that are normally written as four octets in decimal.
- Subnet IDs are calculated via what's known as a subnet mask.