Network Layer

Services → allow end devices to exchange data

Protocols: IPv4, IPv6

Basic Operations

(1) Addressing
(2) Encapsulation
(3) Routing
(4) De-encapsulation

- Encapsulates transport layer segment
- Uses IPv4 or IPv6 packets
- Examined by Layer 3 devices
- Addressing does not change from source to destination

Characteristics: (1) Connectionless
(2) Best Effort
(3) Media Independent

Maximum Transmission Unit (MTU): control information sent by the data link layer

Fragmentation: Layer 3 splits the IPv4 packets into smaller units (only in IPv4)

↓

causes latency

IPv4 Packet

Header purposes: (1) ensures that the packet sent to correct direction
(2) contain info for layer 3 processing in various fields
(3) info is used by all layer 3 devices that handle the packet

Host Forwarding Decision

(1) Packets are always created at the source
(2) Each one creates their own routing table
(3) Destination : Itself - 127.0.0.1 (IPv4) / ::1 (IPv6)
Local Hosts
Remote Hosts

* Remote traffic is forwarded directly to the default gateway of the LAN

Default Gateway

DGW : Router / Layer-3 switch

Features : (1) Must have an IP address in the same range as the rest of the LAN
(2) Accept data from the LAN
(3) Capable of forwarding traffic off of the LAN
(4) Route to other networks

Introduction to Routing

Three types of routes in a routing table : (1) Directly Connected
(2) Remote [Manual / Dynamic]
(3) Default Route

Static Routing: (1) Must be configured manually
(2) Must be adjusted manually
(3) Good for small non-redundant nets

Dynamic Routing : (1) Discover remote networks
(2) Maintain up-to-date info
(3) Choose the best path to the

destination