ملخص شابتر 5

true or false

Physical and data link layers operate locally their task is limited to deliver data from one node to the next (immediate) node	T
The network layer is responsible for the source-to-destination [host to host] delivery of datagram	T
independent networks or links are connected together to create an internetwork	T
Packetizing Encapsulate the payload in an network layer packet at the source and decapsulateing the payload from the network-layer packet at destination	T
Forwarding the packet from its source to the destination – finding the best route among all possible routs connecting the networks correct/ ROUTING	F
Forwarding_ when a router receives a packet, it needs to forward the packet to another attached network\ networks	T
connection oriented services Each packet traveling in the Internet is an independent entity **Correct/ connectionless**	f
Datagram approach(connection- oriented)services There is a relation between all packets belonging to a message correct //Virtual- circuit approach	f

Virtual- circuit approach(connection- oriented) Packet arrived destination out of order **correct /Virtual- circuit approach(connection- oriented) Packet arrived destination in order**	f
•An IPv4 address is a 32-bit address that uniquely and universally مهم defines the connection of a host or route to the Internet.	T
find shortest paths from a given source node to all other nodes by developing the paths in order of increasing path length.	T
Dijkstra **routing,** the least-cost route between any two nodes is the route with minimum distance. CORRECT/ **distance vector**	F
The Optimality Principle (Sink Tree)Create a tree that **reach each node** with a minimum cost	T
Simple routing technique is flooding	T
flooding packet is sent by a source node to every one of its neighbors	T
flooding incoming packet is retransmitted on all outgoing links except for the link on which it arrived	T
Routing is a way to find the best route among all possible routs connecting the networks	T
Datagram approach مهم connectionless services Each packet traveling in the Internet is an independent entity	T

supernetting Combine several class C blocks into a large block	T
The last address in a block is normally not assigned to any device; it is used as the network address correct /first address	f

نقاط اختياري او اكمل

The network layer adds a header that includes the logical addresses

***مهم In the datagram approach, the forwarding decision is based on the destination address of the packet.**

*

Two devices in the Internet can never have the same address at the same time

* If a device operating at the network layer (e.g. router) has m connections to the Internet, it needs to have m IP address

- address space مهم is the total number of addresses used by the protocol

*In classful addressing, an IP address in class A, B, or C is divided into **netid and hostidl**

*Datagram approach connectionless services Each packet traveling in the Internet is an independent entity

- The Internet addresses are 32 bits in length; this gives us a maximum of 2^32 addresses. These addresses are referred to as IPv4 (IP version 4) addresses.

- In IPv6, the Internet uses 128-bits addresses that give much greater flexibility in address allocation

مهم*In classful addressing, a large part of the available addresses were wasted *The first address in a block is normally not assigned to any device; it is used as the network address that represents the organization

*The two common terms used are prefix and suffix. The part of the address that defines the network is called the prefix; the part that defines the host is called the suffix.

*class A address: designed for large organizations

*Class B address: designed for midsize organizations

*class C address: designed for small organizations.

Class D address: designed for multicasting.

Class E address: reserved for future use

• IPv4 is an *unreliable connectionless* protocol responsible for source-to-destination delivery مهم.
*Packets in IPv4 layer consist of two parts: a header and data (payload).

- The length of the header is 20 – 60 bytes and it contains essential information for routing and packet delivery.
  - Ipv4 is a layer 3 protocol
  - Host-to-host network layer delivery protocol for the internet.
  - ipv4 It is unreliable and connectionless protocol.•No error control. No flow control.

timestamp that specifies how long the IP packet is allowed to "live" on the network, If the TTL =0, the packet is discarded.

Type of Service (TOS) A field designed to carry information to provide quality of service features, such as prioritized delivery, for IP

To create a connection – oriented services, a three phase process is used :

1.Setup phase - request packet + acknowledgment packet

2.Data transfer phase

3.Teardown phase

Packet switching

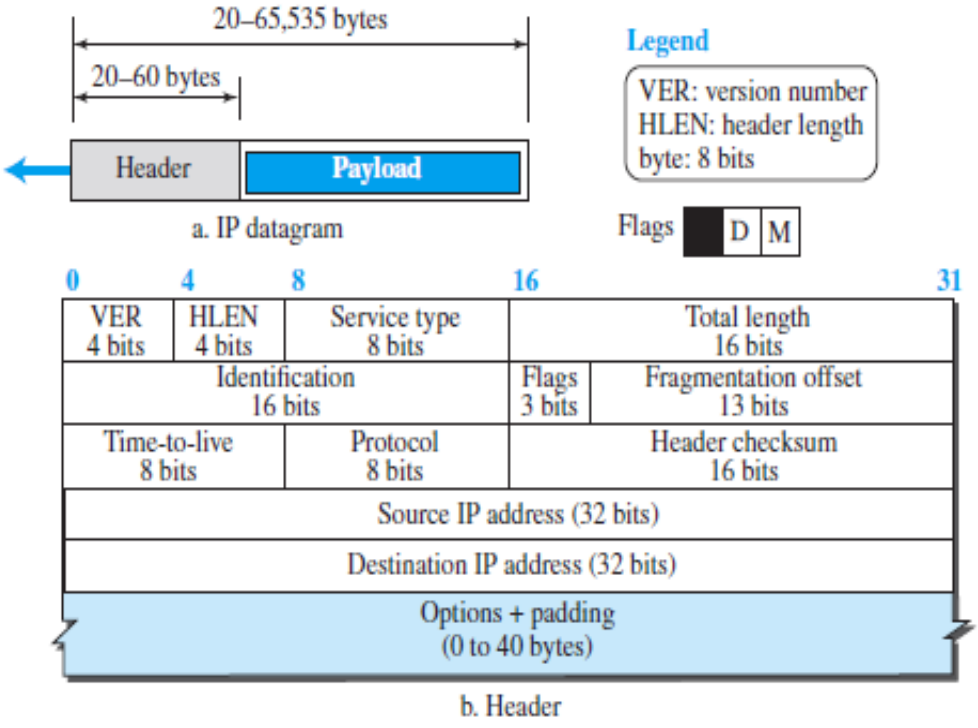
1-Datagram approach : connectionless services

2-**Virtual- circuit approach : connection- oriented services**

Two restrictions need to be applied to the allocated block

1. The number of requested addresses N needs to be a power of
3. The first address needs to be divisible by the number of addresses in the block

Figure 19.2 *IP datagram*



total length of the packet including the header.

Since the field length is 16 bits,

the total length (header + data) is 65 515 bytes. 20 to 60 bytes are used as header.

length of data = total length - header

Routing algorithm

1-**decides which output line incoming packet should be transmitted on.** 2-fills up and updates routing tables.

***Routing protocols** are used to continuously update the routing tables that are consulted for routing and forwarding.

Non-adaptive/static routing	Adaptive routing
❑Routing decisions not based on traffic, topology . instead, routes are computed in advance **Examples:** Flooding, The Optimality Principle (Sink Tree), and Shortest Path (Dijkstra's)	❑Change their decisions to reflect changes in the topology and traffic **Examples:** Distance Vector

shortest path routing	distance vector routing
developed by E. W. Dijkstra example of a nondaptive routing algorithm	developed by Bellman-Ford Routing example of adaptive routing algorithm
• Find the shortest paths from a given source node to all other nodes by	Distance vector is a distributed routing algorithm **In distance vector routing,** the least-cost route between any two

Difference Between IPv4 and IPv6:

IPV4	IPV6
IPv4 has 32-bit address length	IPv6 has 128-bit address length
In IPv4 end to end connection integrity is Unachievable	In IPv6 end to end connection integrity is Achievable
Address representation of IPv4 in decimal	Address Representation of IPv6 is in hexadecimal
In IPv4 checksumfield is available	In IPv6 checksumfield is not available
It has broadcast Message Transmission Scheme	In IPv6 multicast and any cast message transmission scheme is available

M or Flag	Fragmentation Offset	Fragment Case
0	0	No fragmentation
1	0	There is a fragmentation and this is **(First Fragment)**
1	Any value ≠ 0	There is a fragmentation and this is **(Middle Fragment)**
0	Any value ≠ 0	There is a fragmentation and this is **(Last Fragment)**

	First byte	Second byte	Third byte	Fourth byte
Class A	0			
Class B	10			
Class C	110			
Class D	1110			
Class E	1111			

a. Binary notation

	First byte	Second byte	Third byte	Fourth byte
Class A	0–127			
Class B	128–191			
Class C	192–223			
Class D	224–239			
Class E	240–255			

b. Dotted-decimal notation