

EXAM 2

1) TRUE/ FALSE

(14 POINTS)

- All NIC's have the same MAC address (for broadcasting). F V
- Token ring networks uses a MAU. T V
- Transceivers are only used with fiber and UTP. F V
- Fully-connected networks require more links than star-connected networks. T V
- 10baseT Ethernet allows for 3000-meter segments. F V
- A collision is required for exchange data over an Ethernet cable. F V
- A hub is used to enforce network hierarchy. T V

2) MULTIPLE CHOICE

(14 POINTS)

Star-connected networks

- A. require hubs. V
- B. are limited to 16 nodes.
- C. both A and B. J

A portion of an Ethernet bus is called a

- A. CSMA module.
- B. Etherpath.
- C. segment. V

Hubs are also called

- A. generators.
- B. transceivers.
- C. concentrators. V

Hubs act like

- A. repeaters. V
- B. transceivers.
- C. routers.

A bridge between networks C and D

- A. broadcasts all packets between C and D.
- B. broadcasts selected packets between C and D.
- C. broadcasts all packets from C to D, selected packets from D to C.

A router

- A. connects two different networks.
- B. ties all hubs together.
- C. is not used for Internet connections.

Routing protocols are designed to

- A. direct the flow of information between networks.
- B. interrogate network device agents to gather statistics.
- C. broadcast traffic on all segments of a network.

3) Fill in the appropriate features in the appropriate box: (12 POINTS)

10

- a) Easy to modify and add new computers.
- b) Network can slow down in heavy traffic.
- c) Failure of one computer does not affect the rest of the network.
- d) Even performance despite many users.
- e) If the centralised point fails the network fails.
- f) Cable break can affect many users.

Topology	Bus	Ring	Star
Property	b, a	a, b	a, c, e, b

14

4) IDLE RQ (STOP AND WAIT)

(14 POINTS)

A channel has a data rate of 4 Kbit/s and a propagation delay of 20 ms. For which frame size does "stop and wait" give an utilisation of at least 50% ?

5) ETHERNET LAN

(21 POINTS)

CSMA/CD limits the maximum distance between two computers attached to the same LAN segment.

- Given that the minimum packet size (control information and data) for Ethernet 10 Mbps is 500 bits and that the propagation velocity of the media is $2 \times 10^8 \text{ ms}^{-1}$, what is the maximum distance between 2 computers?
- What becomes the maximum distance if we use Fast Ethernet instead, given that the same minimum packet size as for Ethernet is used?
- Calculate the time it takes to transfer a TCP acknowledgement between 2 computers 50 meters away, using Ethernet. Assume that an Ethernet frame contains 18 bytes of control information (header and trailer), and that the TCP acknowledgement requires 20 bytes of TCP header, no TCP data and 20 bytes of IP headers.

6) LANs Performance

(25 POINTS)

Assume that a file with a million characters is transmitted from one station to another. Compute the *total transmission time* and the *effective throughput* for the following cases:

- A LAN with a bus topology with 2 stations at distance 1km from each other. Each packet is acknowledged with an 88 bit packet before the next packet is sent.
- A LAN with a ring topology with a total circumference of 2 km with two stations at distance 1 km apart. Acknowledgements are given by allowing a packet to circulate past the receiving station and back to the sending station. The ring has 100 repeaters and each repeater has a delay of one bit time.

The propagation speed on the bus (and ring) is $2 \times 10^8 \text{ m/s}$. The bit rate is 10 Mbps and the packet size is 256 bits with 80 bits of overhead in both cases.