University of Technology

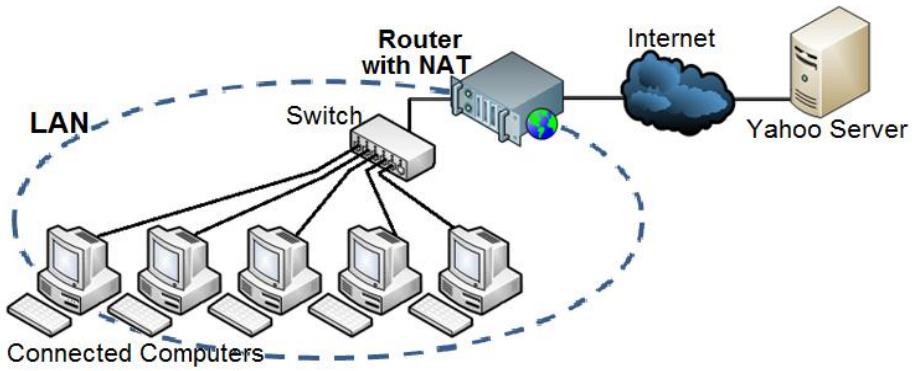
Department of Computer Sciences

Final Examination 2011-2012

Subject: ***Principles of Network Algorithms*** *Year:* ***2011- 2012***
Division: ***Network Management – 1st Class*** *Time:* ***3 Hours***
Examiner: ***Dr.Mazin S. Ali*** *Date:* ***22 / 5 /2012***

Answer 6 Questions Only

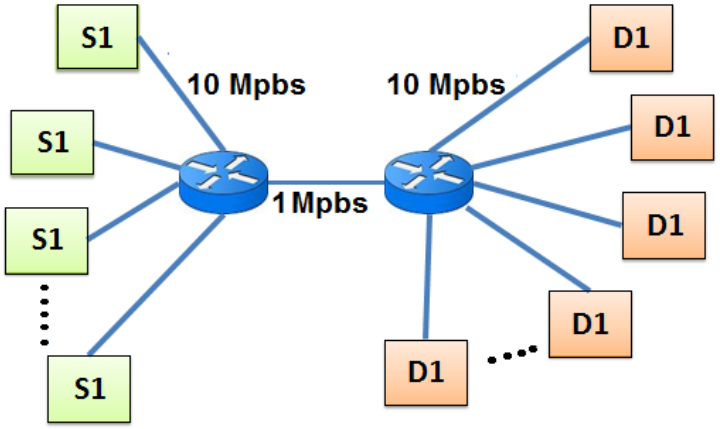
Q1: If we have the following network diagram, and if the connected computers have been assigned with 192.168.0.x as a private IPv4 Addresses:



Answer the following:

1. Address all the connected computers with IPv4 Addresses. **(4 marks)**
2. Address the network Gateway with IPv4 Address. **(1 mark)**
3. Assign suitable Public IPv4 Addresses with Dynamic NAT. **(5 marks)**

Q2: A: If we have the following network; In your opinion, is there a problem in packet traffic? Then if there is a problem, why it occurs and how can be solving it. **(5 marks)**



B: Why we use Ping tool? And how can be used under Windows OS? **(5 marks)**

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Q3: Compare between the following (Choose **5** only): **(2 marks for each one)**

1. HUB and Switch Devices.
2. TCP and UDP protocols.
3. Switch and Router Devices.
4. IP v4 and IP v6.
5. FIFO and MUCF schedule algorithms.
6. Distance-Vector (DV) and Link-State Routing (LS) Protocols.

Q4: Define the following higher-level core network protocols (Choose **5** only):
(2 marks for each one)

1. ICMP (Internet Control Message Protocol).
2. OSPF (Open Shortest Path First).
3. RTP (Realtime Transport Protocol).
4. SMTP (Simple Mail Transfer Protocol).
5. IP Protocol (Internet Layer- IP Protocol).
6. Dual-Stack Protocols Approach.

Q5: Define the following routing concepts (Choose **5** only): **(2 marks for each one)**

1. Adaptive Routing.
2. Routing Table Shadow (Local) Copy.
3. MUCF (Most Urgent Cell First) Schedule Routing Algorithm.
4. Screening Router.
5. Stable Marriage Algorithms.
6. Routing Table Lookup.

Q6: According to the following Router specifications:

- Input / Output Ports (Number of Linecards) are 8 Ports.
- Combined Input and Output Queued (CIOQ) Switches.
- Crossbar Interconnection Switching Fabric.
- Line-rate is 1Gb/s.
- 50 User maximum.
- Network Centric Bandwidth.

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- Routing Transaction's Prefixes:-

a : 0*	b : 01000*	c : 011*	d : 1*
e : 100*	f : 1100*	g : 1101*	h : 1110*

Answer the following:

a. Draw (with brief description) the high-level of Decentralize Router Architecture. **(4 marks)**
b. What is the Speed-Up of your designed Decentralize Router? **(1 mark)**
c. Construct the 1-Bit Trie Prefixes Tree. **(2 marks)**
d. Construct the Compressed 1-Bit Trie Prefixes Tree. **(3 marks)**

Q7: According to the following Router specifications:

- Input / Output Ports (Number of Linecards) are 8 Ports.
- Combined Input and Output Queued (CIOQ) Switches.
- Crossbar Interconnection Switching Fabric.
- Line-rate is 2.5Gb/s.
- 75 User maximum.
- User Centric Bandwidth.
- Routing Transaction's key:-
  "bear", "bell", "bid", "ted", "bull", "buy", "sell", "stock", and "stop".

Answer the following:

a. Draw (with brief description) the high-level of Centralize Router Architecture. **(4 marks)**
b. Calculate the Capacity of your designed Decentralize Router. **(1 mark)**
c. Construct the 1-Bit Trie Keys Tree. **(2 marks)**
d. Construct the Compressed 1-Bit Trie Keys Tree. **(3 marks)**

- Good Luck -