PRINCE OF SONGKLA UNIVERSITY

FACULTY OF ENGINEERING

Midterm Examination: Semester 1 **Academic Year:** 2002-2003

Date: September 24, 2002 **Time:** 13:30 - 16:30

Subject Number: 240-574 **Room:** A401

Subject Title: Special Topics Information Network Engineering I
(Internet and its Protocols)

Exam Duration: 3 hours

This paper has 4 pages (including this page).

Authorised Materials:

- Anything the student can carry.

Instructions to Students:

- *Answer questions in English.* Good English is **not** required.
- Attempt all eight (8) questions
- Write answers in an answer book
- Start the answer to each question on a new page.
- **Clearly Number** the answers. It is **not** required that questions be answered in order.
- Anything illegible is incorrect.
- Show all calculations, not just the final result.
- Answer briefly where possible, essays are not required.
- The marks allocated for each question are shown next to that question. There are 30 marks total for this examination.

Question 1. *(2 marks)*

What is the purpose of a Domain Name System (DNS) NOTIFY packet? What does the receiver of such a packet learn from receiving it?

Question 2. *(5 marks)*

Assume that a node with an active TCP connection has received and acknowledged up to sequence number 5000 (the value in the *ack* field of the last acknowledgement transmitted was 5000). That packet also announced a window size of 1000. The node has no unacknowledged data in its buffers, all data up to this point arrived in order, and has been acknowledged and passed to the application. The TCP buffers are currently empty.

Indicate what the node will transmit (if anything) if the next packet it receives were to be one of those listed below, and what the node will do with the data in the arriving packet.

You should indicate the values that will be in the acknowledgement and window size fields in each case where an ack packet is transmitted.

Note that in each case, only the one packet indicated arrives, these are not a sequence of arriving packets. Rather, 5 different possibilities for the next packet to arrive.

Assume that the node always responds immediately. It does not delay acknowledgements to see if the application has data to transmit, nor does it even wait until the data has been delivered to the application. The response packet is always constructed and transmitted as soon as the incoming packet is received.

A) A packet with 200 TCP data bytes and sequence number 4800.

B) A packet with 200 TCP data bytes and sequence number 4900.

C) A packet with 200 TCP data bytes and sequence number 5000.

D) A packet with 200 TCP data bytes and sequence number 5100.

E) A packet with 200 TCP data bytes and sequence number 7000.

Question 3. *(2 marks)*

What should a SMTP (e-mail) server do, if it receives the following three byte sequence over the TCP connection from the client:

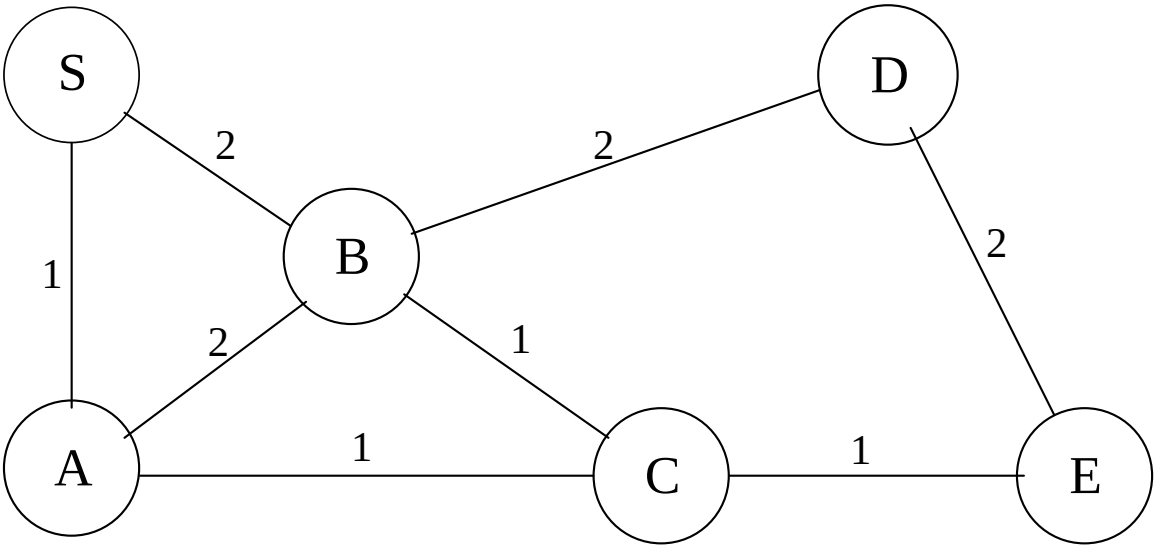
0xFF 0xFB 0x01 (or 255 251 1) (or *IAC DO ECHO*)

Question 4. *(3 marks)*

T/TCP and SCTP were both designed to overcome limitations in TCP. List 3 of those limitations (limitations that can be avoided by the use of one of T/TCP or SCTP).

Question 5. *(10 marks)*

Examine the network in the diagram



Select an Interior Routing Protocol, and show the calculations that occur at node **S**, as it computes the next hop (and path is appropriate) to each of the possible destinations (A, B, C, D, and E).

The numbers next to each of the links show the cost (metric) associated with using that link.

Show the calculations used to determine the next hop in each case — simply showing the correct first hop for each destination, or even the correct path to each destination, is not adequate.

Question 6. *(2 marks)*

Why does a mobile IP node need both a **Care Of Address** and a **Home Address**?

Question 7. *(4 marks)*

Give an example of a protocol mechanism (in any protocol you have studied) which exists to avoid a scaling problem. Describe the problem that would occur without the mechanism you describe, and how the protocol mechanism avoids the problem.

Question 8. *(2 marks)*

What information is used by a router when deciding whether, and if so where, it should forward a packet with a multicast destination address?