Course S-38.3165 (Switching Technology) exam questions, May 9, 2007

1. Circuit and packet switching are the two basic switching concepts in transport networks.
   a.) What are the essential differences between the circuit and packet switching?
   b.) Why is packet switching replacing circuit switching?

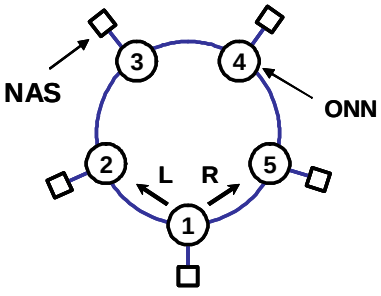
2. Explain the following switch fabric related concepts:
   a.) logical depth
   b.) scalability
   c.) ST (time-space) switch.

3. A bit stream that is transmitted on a transport link is 8B10B block coded at the transmit interface.
   a.) What is the bit rate on the transport link if the bit rate before the block codec is 1.0 Gbit/s?
   b.) How large is the redundancy of the 8B10B block code and what is gained by the redundancy?
   c.) Why is data coded before transmission onto the transport link?

4. A number of Fast Ethernet (100 Mbit/s) line cards are installed into a router. Each line card implements a routing table and makes routing decisions by itself.
   a.) Assume that each line card implements one Fast Ethernet interface. How long can the maximum routing delay be to allow wire speed operation? What is the maximum number of IP packet that the line card is able to route in a second?
   b.) Data packets are switched between the interfaces through the switching bus that connects the line cards. The switching speed of this "single bus" type of a switch fabric is 3.3 Gbit/s of which 5 % is spend for the router's internal communication. How many 100 Mbit/s Ethernet line cards can be installed into the router not causing the switching bus to become a performance bottleneck?

5. Five optical Network Access Stations (NAS) have been connected together with a bi-directional optical fibre as shown in the figure below. Assume that the NASs are connected to Optical Network Nodes (ONN) with
   a.) one fibre pair
   b.) two fibre pairs

   and the optical network provides full logical connectivity between the NASs. Determine in both cases the required number of wavelengths and transceivers as well as the spectrum reuse factor. Give also (in the form of the below table) an example how the wavelengths should be allocated in the network, i.e. routing and channel assignment (RCA) example.



Destination

Source	1	2	3	4	5
1					
2					
3					
4					
5					