

## Course S-38.165 (Switching Technology) examination questions, May 5, 2004

1. What characteristics does a switching device have if it is
  - a.) a self-routing one?
  - b.) an internally non-blocking one?
  - c.) an input-buffered one?
2. The known parameters of a Clos network are  $m_1 = 4$ ,  $n_3 = 2$ ,  $r_1 = 3$  and  $r_3 = 6$ . Determine the rest of the parameters, while you minimize the number of switching blocks of the Clos network in the case when the switch is
  - a.) strict-sense non-blocking
  - b.) rearrangeably non-blocking.Sketch (draw) block diagram of the Clos network in both of the above cases.
3. The switch fabric of a telephone exchange is based on the time-slot-interchange principle.
  - a.) Draw a block diagram of the switch fabric and explain shortly performance of the fabric.
  - b.) The exchange is advertised to support up to 40 E1-interfaces. What are the minimum sizes of the memory blocks of the switch fabric and what are the required memory speeds?
4. A bi-directional optical ring of five access nodes (NASs) connects five stations and each station is connected to its network access station (NAS) with a single fiber pair.
  - a.) How many wavelength ( $\lambda$ ) channels are needed to form full point-to-point connectivity between the stations if the optical ring network is a wavelength routed network (WRN) and there is a separate fiber for both transfer directions of the ring? Draw up an example routing and channel assignments (RCA) table, which shows assigned wavelengths of all the point-to-point connections link by link.
  - b.) How many optical transceivers are needed in each NAS and what is the spectrum reuse factor?
  - c.) How many wavelengths are needed if the bi-directional optical ring network is a logically routed network (LRN)? Explain possible differences between the WRN and LRN solutions.
5. A router's routing table has the following entries:  
 $\{ \mathbf{a} = 0^*, \mathbf{b} = 1^*, \mathbf{c} = 01^*, \mathbf{d} = 11^*, \mathbf{e} = 100^*, \mathbf{f} = 110^*, \mathbf{g} = 0011^*, \mathbf{h} = 1111^* \}$ .
  - a.) Draw up a binary trie for the given prefix set illustrating the routing table data structure.
  - b.) Form a path compressed trie of the constructed binary trie (of case a.).
  - c.) What is the maximum number of look ups per routed packet in case a) and in case b) when searching for the longest prefix match?