

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 (λ) 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:
{ **a** = 0*, **b** = 1*, **c** = 01*, **d** = 11*, **e** = 100*, **f** = 110*, **g** = 0011*, **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?