

Course S-38.3165 (Switching Technology) exam questions, March 5, 2007

1. Answer the following questions concerning transport systems and switching.
 - a.) Why are the switches used in transport networks - what are the benefits of switching?
 - b.) What is meant by frame alignment, why is it needed and what methods are used in synchronous transport networks for frame alignment?
2. Switch fabric concepts.
 - a.) How are logical depth and fan-out related to switch fabrics?
 - b.) What property of a switch fabric is described by cost-index?
 - c.) What sort of a switch fabric has full accessibility?
3. An ATM switch is equipped with 16 line cards and each of them implements one STM-4 input and output interface.
 - a.) Determine the minimum required throughput (bits/s) of the switch fabric if plain ATM cells are carried through the fabric?
 - b.) Determine the minimum required throughput (bits/s) of the switch fabric if the ATM cells are carried through the fabric in frames that include a 53-octet payload and 3-octet control field?
 - c.) Assume that each input interface makes the routing decisions of the ATM cells locally, i.e. each input interface implements a Routing Information Table (RIT). What should be the routing capacity (cells/s) of an STM-4 interface to avoid overflows of the input buffers?
4. The known parameters of a Clos-network are $m_1 = 4$, $n_3 = 2$, $r_1 = 2$ and $r_3 = 4$.
 - a.) Determine the other parameters and sketch the Clos network when it is strict-sense non-blocking.
 - b.) Determine the other parameters and sketch the Clos network when it is rearrangeably non-blocking.
5. Design an optical 8x8 switch by using
 - a.) optical "broadcast star" 2x2 switch components
 - b.) optical wavelength selective 2x2 switch components.

In both cases, sketch the detailed structure of the switch (including required components and connections between them) and add to the sketch the needed wavelengths (at the inputs and outputs).