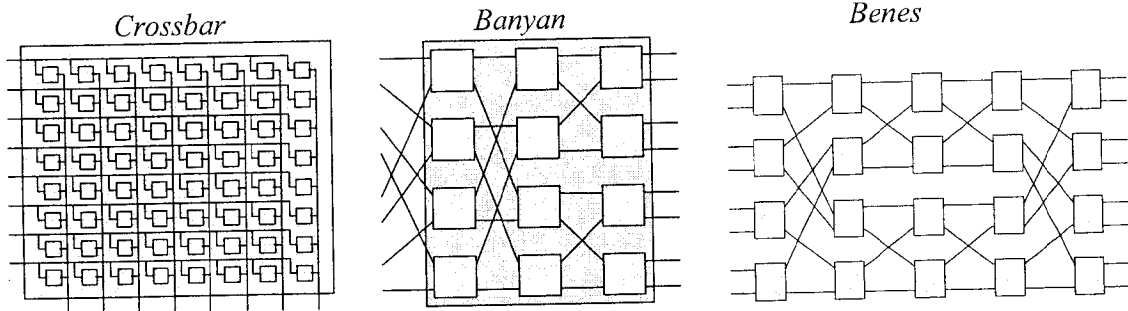


Course S-38.3165 (Switching Technology) exam questions, May 17, 2010

1. About the switch fabrics.

- a.) What is a sorting network and for what purpose is it used in case of switch fabrics?
- b.) What is meant by cost-index, fan-out and logical depth?
- c.) Give the cost-index, fan-out and logical depth of the below switch fabrics. Assume that the switch blocks of the multistage switches are constructed of crossbar structures.

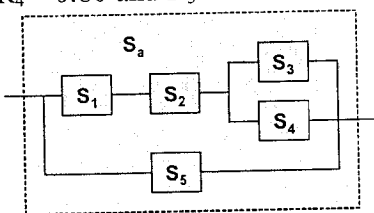


2. The known parameters of a Clos network are $m_1 = 3$, $n_3 = 2$, $r_1 = 3$, $r_3 = 4$.

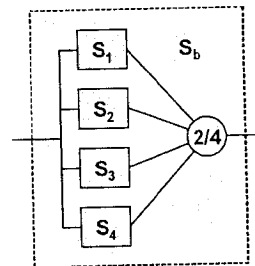
- a.) Determine the other parameters when the Clos network is strict-sense non-blocking and draw the network.
- b.) Determine the other parameters when the Clos network is rearrangeably non-blocking and draw the network.

3. Calculate reliability and failure probability of the below given telecommunication systems. Suppose that in both cases failures of the sub-systems are independent.

a.) $R_1 = 0.90$, $R_2 = 0.90$, $R_3 = 0.80$,
 $R_4 = 0.80$ and $R_5 = 0.95$



b.) $R_1 = 0.90$, $R_2 = 0.90$, $R_3 = 0.80$ and
 $R_4 = 0.80$



4. A router is equipped with Fast Ethernet line cards. Each line card includes one 100 Mbit/s incoming and outgoing interface, a routing table and the card makes routing decisions by itself.

- a.) How long can be the maximum routing delay to allow wire speed operation?
- 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 3.5 Gbit/s of which 10 % 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?
- c.) What is the maximum number of IP packets that the router is able to route in a second?

5. In the below given all-optical LLN network, connections S_1 and S_2 have been established. Both connections utilize the same wavelength λ_1 . Later connection S_3 is set up and it uses wavelength λ_2 . λ_1 and λ_2 are carried in the same waveband. After S_3 is established, NAS3 starts to receive corrupted data.

- What is the reason for this?
- How to fix the problem?
- In what conditions connections S_1 , S_2 and S_3 could be set up by using only one wavelength in the below given network? Reason your answer.

