S-38.110 Telecommunication Switching Technology I, Exercise 7

Brax/Ilvesmäki, 13.4.2000

The answers are to be returned before the exercise begins either to the exercise assistant (in person or via email to lynx@tct.hut.fi) or to a box underneath the lab's noticeboard.

Task 1

Consider a reliability model for call computation where the system may be in one of the following states: The call in progress ir being established exists consistently in the spare unit, the call has been successfully disconnected in the active and spare unit, or, finally, there has occurred an inconsistency error in spare computation. Use α to note the error occurrence intensity of the spare computation and μ for call disconnection intensity.

You may assume that if an error in the state of the spare computation has occurred, it was at the beginning of the computation snd that call disconnection always also clears the state of the spare computation.

a) Draw the Markov model for the system and write and solve the STEADY-STATE probabilities for all of the states.
b) Compute the probabilities for each state if α=1 error/week and μ=5000 calls cleared/minute. Any comments on the results? What is the time spent in each of the states in one year's time?

Task 2

In the case of two national networks being synchronized by using Primary Reference Clocks, how often a slip occurs? Draw the occurrence of the slip (in days) as a function of the Free Run Accuracy and plot with error probability for one exchange from 10^{-6} to 10^{-12}.

Task 3

Using heuristic reasoning show the dimensions of a 3-stage switching fabric if it is to be non-blocking. Use symmetric switching fabric with equal number of inputs(N) and outputs(M). A switch has m or n inputs which are grouped to x or y groups. Assume that a first (and a thrid) stage switch may be connected only once to a single second stage switch. Start from the worst-case scenario where all of the inputs but one on a particular primary switch A and all of the outputs but one on a particular tertiary switch B are each connected via a different secondary switch matrix. Assume in all cases that N=M, n=m and x=y.

Task 4

Construct a rearrangeably non-blocking and symmetric Clos network for 30x30 case.