1 Planning for the ISDN-exchange performance dimensions

An ISDN-exchange has x pre-processors. On pre-processor processes 30 incoming call channels and one signalling channel. All channels are planned to carry traffic level of 0,2 erl.

How many pre-processors can you have in an ISDN-exchange if the central processor has the capacity of 200 000 BHCA and the desired load level is 50%? The pre-processor uses the LAPD/LAPB-protocol 64 kbit/s on a timeslot, channels are PCM-coded (bandwidth 64 kbit/s), a call lasts on average 30 seconds and the signalling creates 896 bits (setup + call - proc + alarm + connect + disconnect + release + release-comp and LAPD/LAPB-protocol overhead)(64+64)*7 bits = 896 bits).

2 Synchronization

Two national networks are synchronized with PRC-clocks, with Free Run Accuracy of 10^{-11}. How often does a slip occur in this system?

3 Network reliability

- Let's look at the system in Figure 1. Three devices have been connected together to improve the reliability of the system.

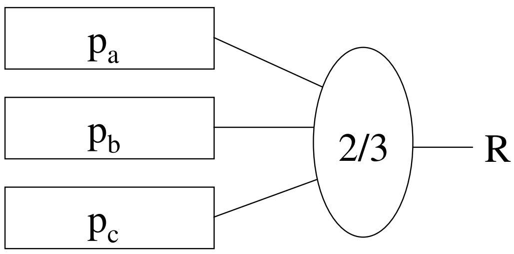

Figure 1: 2/3 -system

For the system to be functional two out of the three devices have to be functional. Define the total reliability or probability that the system is functional. Use p_a, p_b and p_c, the individual device reliability probabilities.

- Let's look at the system in Figure 2 where two devices are connected in parallel to increase the system reliability. The backup device starts functioning only after the active device has malfunctioned (=passive redundancy).

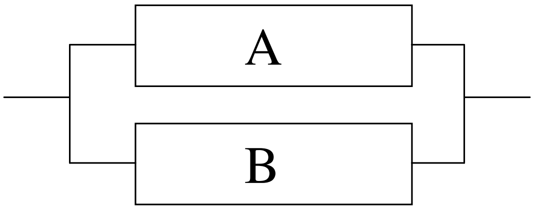

Figure 2: Backup with passive redundancy

Define the possible system states and the probabilities for these states. One device is faulted with intensity, λ, and the fault is fixed with intensity, μ.