



S-38.120 Telecommunication Switching Technology, Exercise 6
Ilvesmäki/Brax, Friday 26.4.2002, 9-11am, Lecture Hall S4

You may participate to this exercise only if you have **not** gathered the required 12 points from the first five exercise rounds. All other answers are disregarded.

The answers are to be returned before the exercise begins (see the above date and time) either to the exercise assistant (in person or via email to lynx@tct.hut.fi or, preferably, to a box underneath the lab's noticeboard on G-wing 2nd floor. Since we aim to publish the results immediately after the exercise **all late answers will be disregarded**. Please, adhere to the deadline.

Task 1 (moderate)

Show that when two national networks are synchronized by using Primary Reference Clocks (one clock in each network with Free Run Accuracy of 10^{-11}) a slip occurs approximately once in 72 days.

Task 2 (moderate)

Draw a strict-sense non-blocking symmetrical STS (space-time-space) -switch and determine its input stage, middle stage and output stage dimensions. Use 2Mbit PCM -systems to form a 120 subscriber switch. (Hint: Use whole 2Mbit lines and assume that all timeslots are for subscribers. Remember that you need two timeslots for one two-way call. Construct a three stage symmetrical switch and refer to Clos-network conditions for strict-sense non-blocking systems.)

Task 3 (easy)

Explain the principles of time and space switching from the PCM-system point of view. What do the switches actually do to a timeslot? Draw simple illustrations of both methods of switching.

Task 4 (easy-moderate)

- Let's look at the Power Supply -system in the figure below. We assume it to be in working condition when any 2 of the three systems are operational ($m=3, k=2$). The reliability of a single component is marked with p_a, p_b or p_c respectively. Using combinatorial calculations derive the probability of functioning for the power supply system.
- Assuming that $p_a=p_b=p_c$ use the binomial distribution and Bernoulli equation to derive the probability of functioning for the power supply -system.

