31 Agosto 2007

Appello di Commutazione e Switching architectures

Rules for the exam. It is not allowed to use notes, books or calculators. When needed, approximate the counts.

Regole d'esame. Non è possibile consultare appunti, libri o calcolatrici. Approssimare i calcoli quando possibile.

Lasciare indicati i calcoli se non si riescono ad approssimare. Evidenziare le soluzioni alle domande numerate.

Time available: 70 minutes - Durata della prova: 70 minuti.

PROBLEM A Design an $80 \times 80$ rearrangeable, non-blocking switching fabric, using two possible architectures, the first built with recursive factorization of a Clos network with factor $\sqrt{N}$ and the second with factor 2.

1. Design the two final architectures.
2. Compute the complexity in terms of crosspoints for both architectures.
3. Discuss the advantages and disadvantages of each of them.

PROBLEM B Consider a $3 \times 3$ input queued switch, with ports running at 10 Gbps. The following rates should be guaranteed:

$$R = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix} \text{ Gbps}$$

where $R_{ij}$ is the rate from input $i$ to output $j$. Show how to guarantee these rates and describe all the algorithms involved.

PROBLEM C Describe the packet-mode scheduling approach in input queued switches and discuss its performance in terms of throughput and delays, motivating the answer.