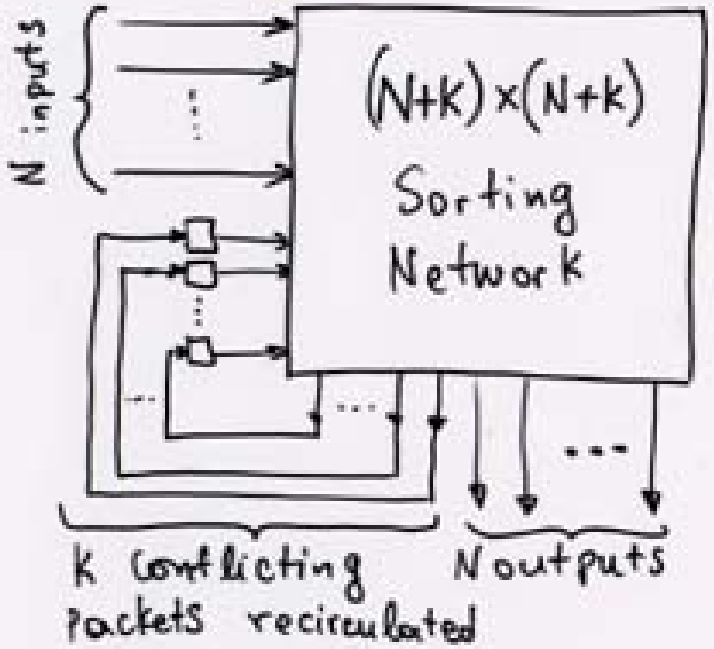
5.3 Towards Scalable Switches

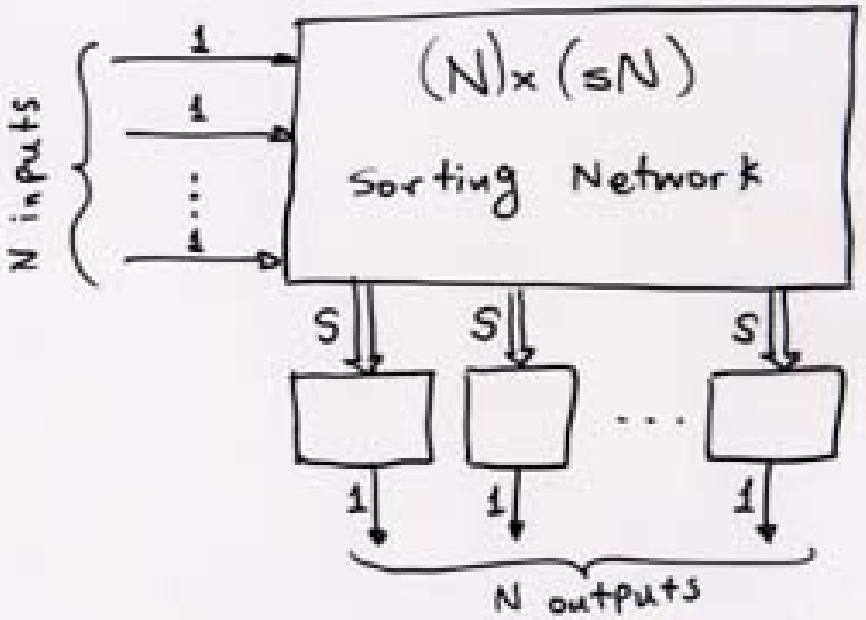
- Buffer throughput limitation $\Rightarrow$ use input queueing or CIOQ
- Input queued crossbar scalability limited primarily by:
  - quadratic cost growth rate, $O(N^2)$, of crossbar
  - scheduler complexity & efficiency, i.e. solving the output contention (congestion management) problem
- To solve the crossbar cost $\Rightarrow$ use switching fabrics
- To solve the scheduler / contention / congestion problem:
  - (sorting / self-routing networks – bad solution)
  - Switching Fabrics with Small Internal Buffers, large input VOQ's, and Internal Backpressure (Flow Control)

Central Scheduler is Impractical for large N

Solution 1: Sorting Networks w. Distributed Control (see ch.5 for details)

- all incoming packets allowed in – no central scheduling
- conflicting packets appropriately steered – distributed control





- uses communication paths as buffer memory
  ... too expensive
- Knock-Out Style
  but different Sw. Fabric
- Sorting Networks are quite large ... not too practical

Central Scheduler is Impractical for large N

Solution 2: Switching Fabrics with Internal Buffering & Backpressure