

TSN: Lecture 10

Switching Network

Topics Covered

- Switched network
- Circuit-Switching
- Space-Division Switch
- Multistage switch
- MULTIPLE Switching paths
- Time-Division Switch

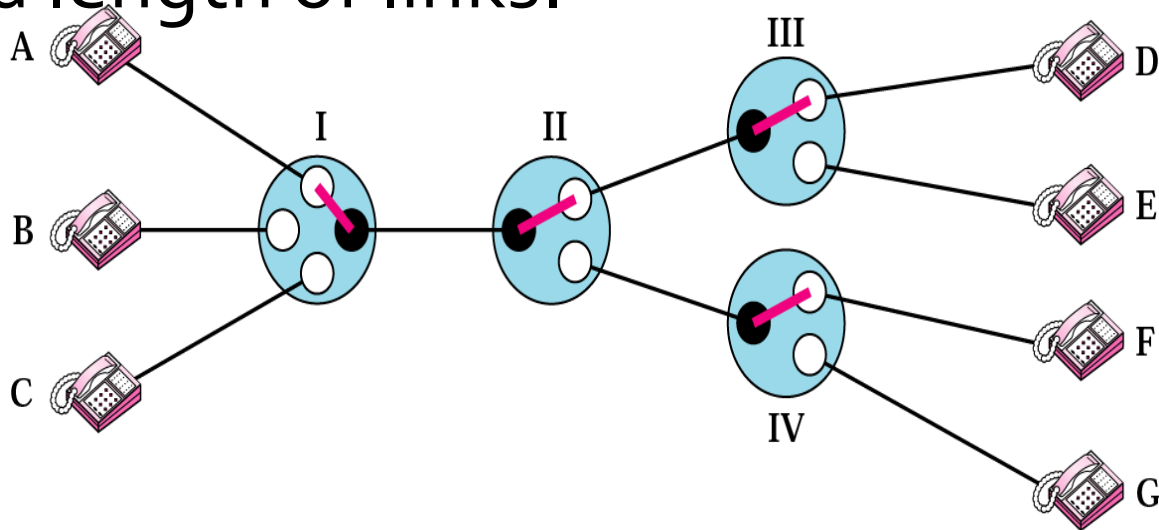


Switched network

- A switched network consists of a series of inter-linked nodes, called switches.
- Switches are hardware and/or software devices capable of creating temporary connections between two or more devices linked to the switch but not to each other.
- Methods of switching
 - Circuit switching, packet switching, and message switching

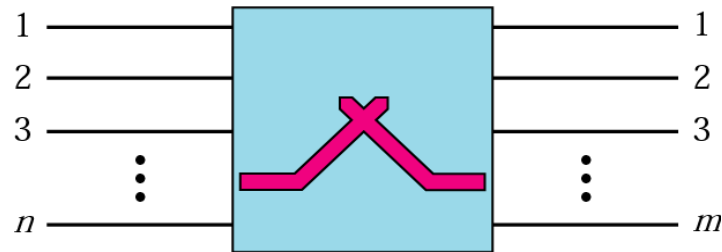
Circuit-Switching

- Circuit switching creates a direct physical connection between two devices such as phones or computers.
- We can use switches to reduce the number and length of links.



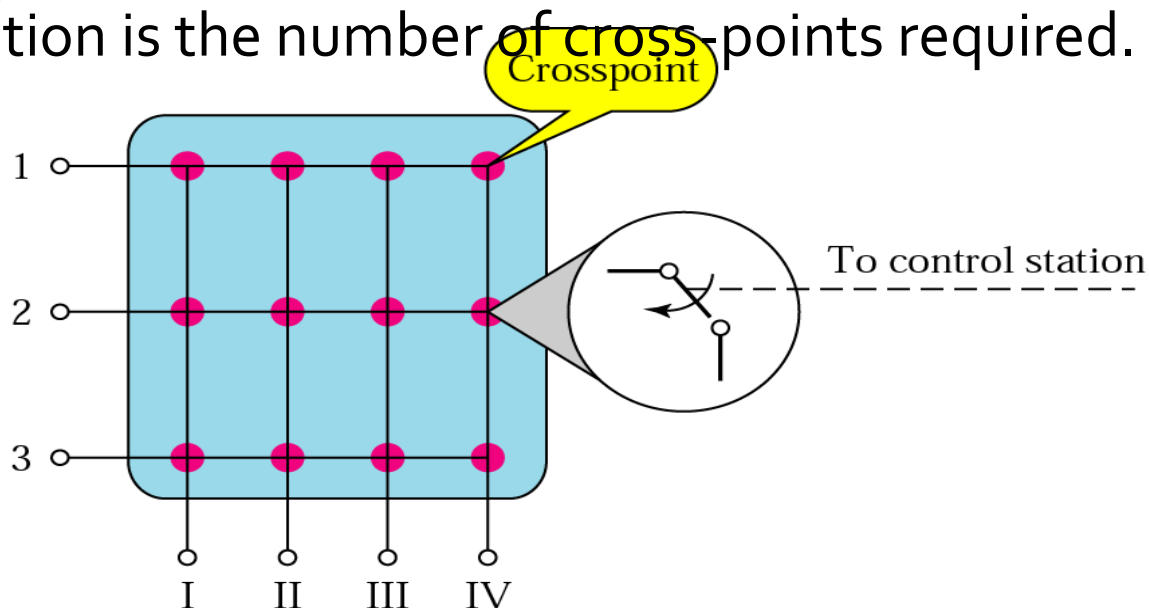
A circuit switch

- A circuit switch is a device with n inputs and m outputs that creates a temporary connection between an input link and an output link.
- The number of inputs does not have to match the number of outputs.



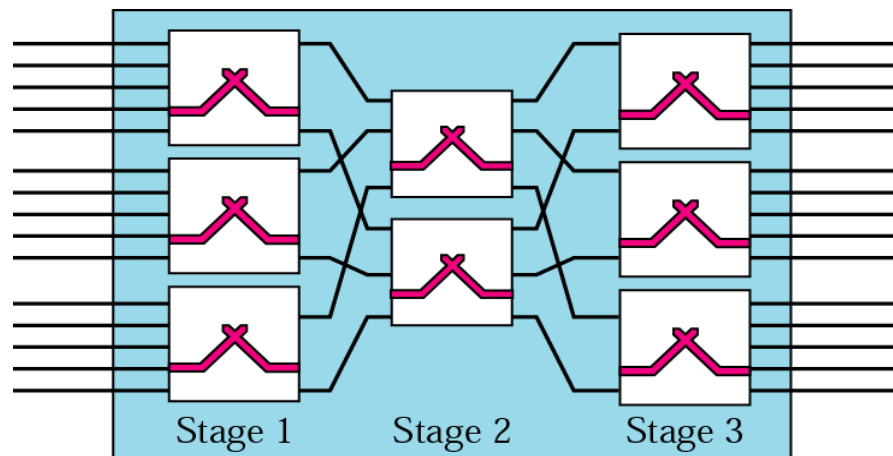
Space-Division Switch

- paths in the circuit are separated from each other spatially.
- Crossbar Switch
- Crossbar switch connects n inputs to m outputs in a grid, using electronic micro-switches (transistors) at each cross-point.
- Limitation is the number of cross-points required.



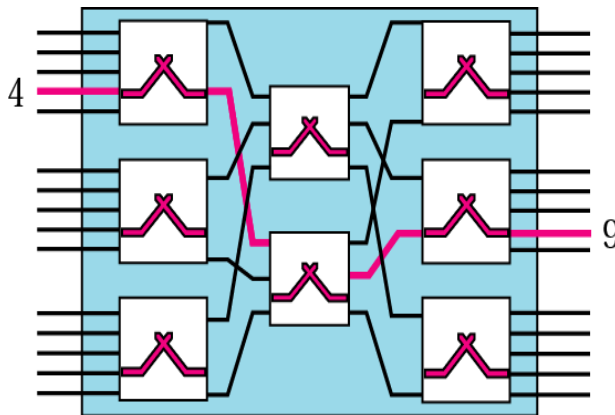
Multistage switch

- Multistage switch combines crossbar switches in several stages.
- Design of a multistage switch depends on the number of stages and the number of switches required (or desired) in each stage.
- Normally, the middle stages have fewer switches than do the first and last stages.

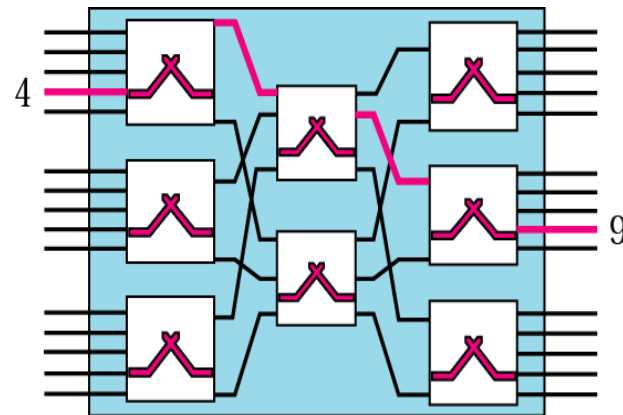


MULTIPLE Switching paths

- Multiple paths are available in multistage switches.
- Blocking refers to times when two inputs are looking for the same output. The output port is blocked.



a. First option



b. Second option

Time-Division Switch

- Time-division switching uses time-division multiplexing to achieve switching. Two methods used are:

- Time-slot interchange (TSI) changes the order of the slots based on the desired connection.

- TDM bus

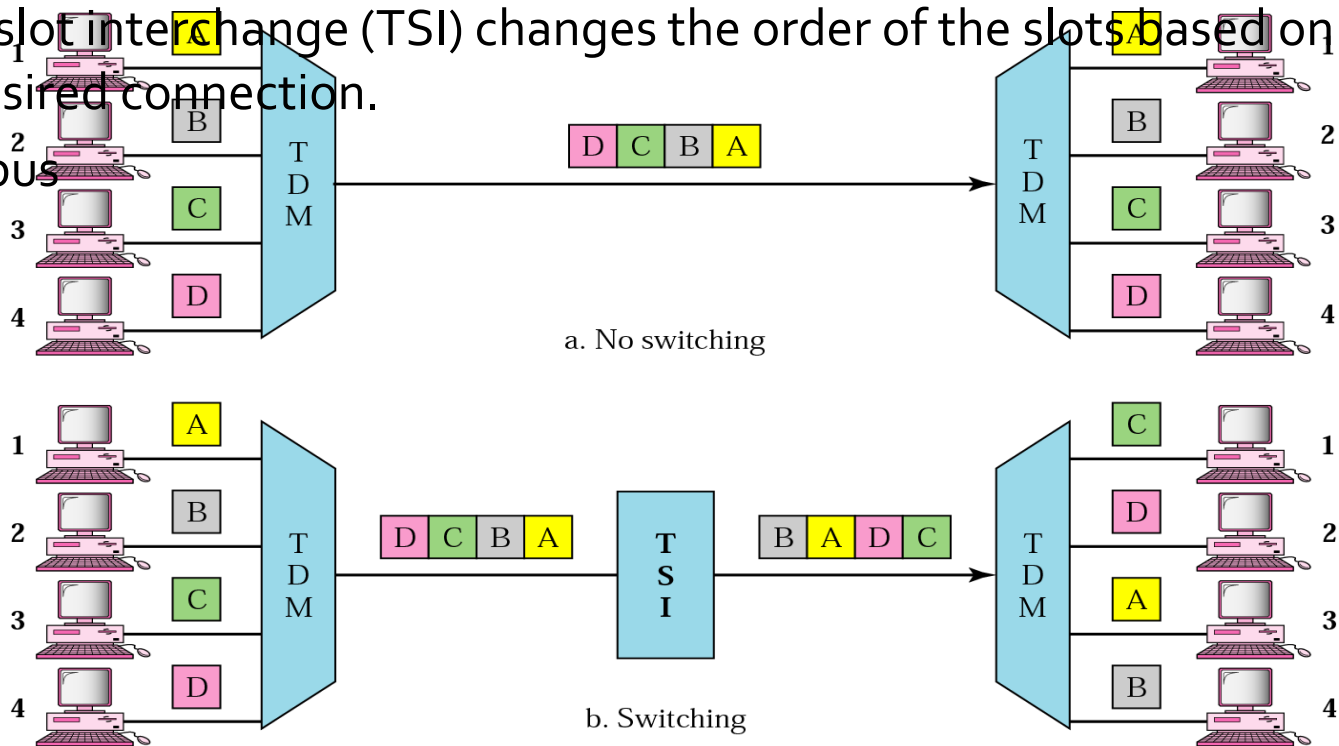


Figure 8.7 Time-division multiplexing, without and with a time-slot interchange