Circuit switching concepts

- A network built around a single circuit-switching node consists of a collection of stations attached to a central switching unit.
- The central switch establishes a dedicated path between any two devices that wish to communicate.
- The dotted lines inside the switch symbolize the connections that are currently active.

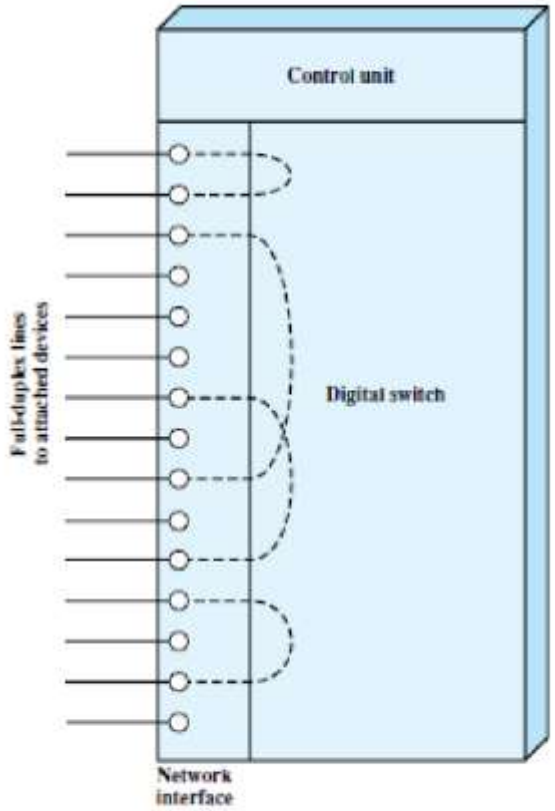

Figure 10.4 Elements of a Circuit-Switch Node

- The dotted lines inside the switch symbolize the connections that are currently active.

Circuit switching concepts

- Heart of a modern system -> digital switch.
- Function of the digital switch -> provide a transparent signal path between any pair of attached devices.
- The path is transparent in that it appears to the attached pair of devices that there is a direct connection between them.
- Typically, the connection must allow full-duplex transmission.

Circuit switching concepts

Network Interface

- Network interface element represents the functions and hardware needed to connect digital devices, such as data processing devices and digital telephones, to the network.
- Analog telephones can also be attached if the network interface contains the logic for converting to digital signals.
- Trunks to other digital switches carry TDM signals and provide the links for constructing multiple-node networks.

Circuit switching concepts

Control unit

- performs three general tasks.

1) it establishes connections.

- This is generally done on demand, that is, at the request of an attached device.
- To establish the connection, the control unit must handle and acknowledge the request, determine if the intended destination is free, and construct a path through the switch.

2) the control unit must maintain the connection.

- Because the digital switch uses time division principles, this may require ongoing manipulation of the switching elements.
- However, the bits of the communication are transferred transparently

3) the control unit must tear down the connection, either in response to a request from one of the parties or for its own reasons.

Blocking or nonblocking

- Blocking occurs when the network is unable to connect two stations because all possible paths between them are already in use.
- a nonblocking network permits all stations to be connected (in pairs) at once and grants all possible connection requests as long as the called party is free.

switching techniques internal to a single circuit-switching node

Space Division Switching:

- signal paths are physically separate from one another (divided in space).
- Each connection requires the establishment of a physical path through the switch that is dedicated solely to the transfer of signals between the two endpoints.
- The basic building block of the switch is a metallic crosspoint or semiconductor gate that can be enabled and disabled by a control unit.

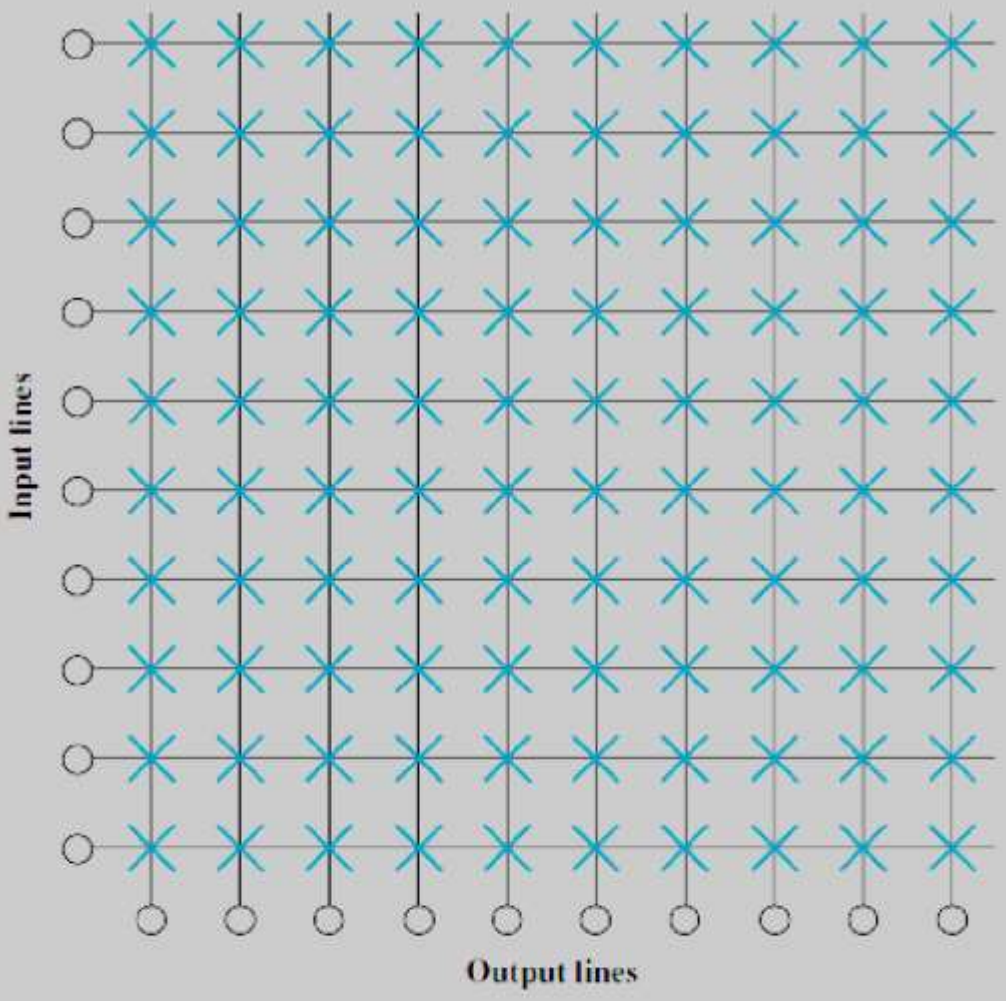

Figure 10.5 Space Division Switch

switching techniques internal to a single circuit-switching node

Space Division Switching:

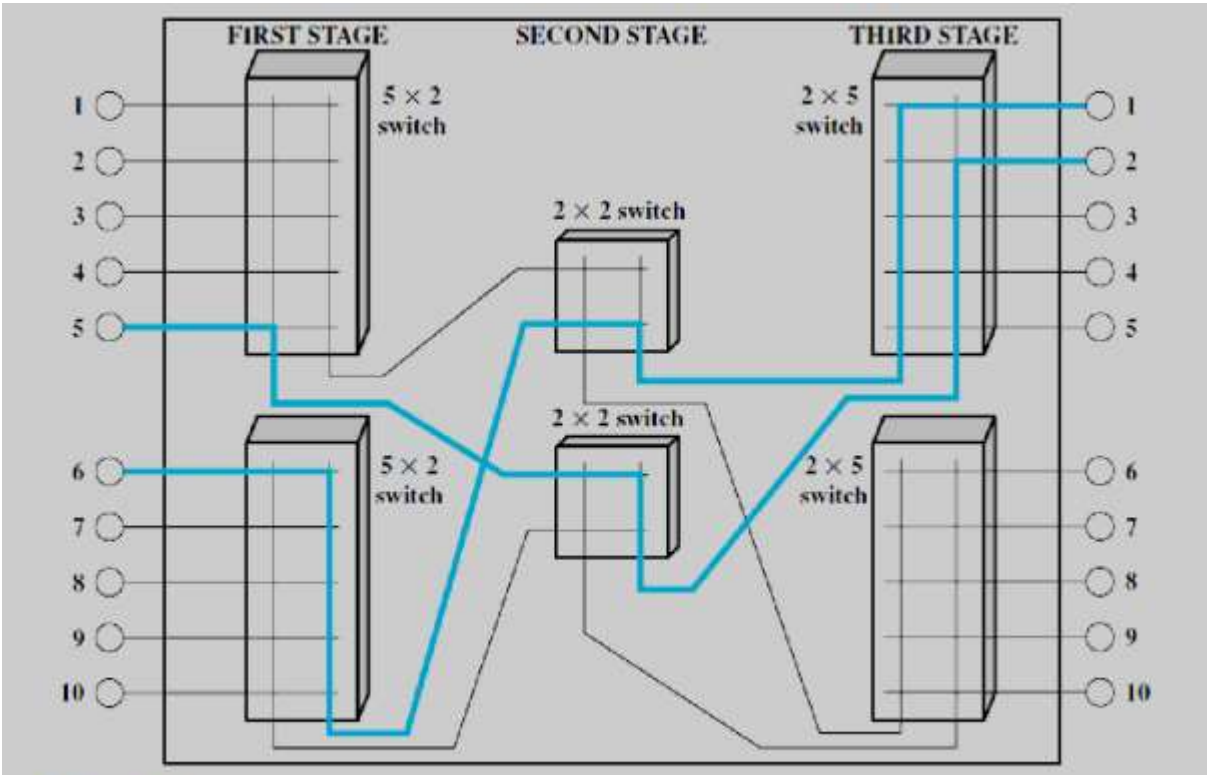

Figure 10.6 Three-Stage Space Division Switch

switching techniques internal to a single circuit-switching node

Time Division Switching:

- Virtually all modern circuit switches use digital time division techniques for establishing and maintaining “circuits.”
- Time division switching involves the partitioning of a lower-speed bit stream into pieces that share a higher-speed stream with other bit streams.
- The individual pieces, or slots, are manipulated by control logic to route data from input to output.

SOFTSWITCH ARCHITECTURE

- Softswitch is a **general-purpose computer running specialized software that turns it into a smart phone switch.**
- Softswitches cost significantly less than traditional circuit switches and can provide more functionality.
- In particular, in This opens up a number of options for transmission, including the increasingly popular voice over IP (Internet Protocol) approach.
- In any telephone network switch, the most complex element is the software that controls call processing.
- This software performs call routing and implements call-processing logic for hundreds of custom calling features.
- Typically, this software runs on a proprietary processor that is integrated with the physical circuit-switching hardware.
- Eg. Skype Call