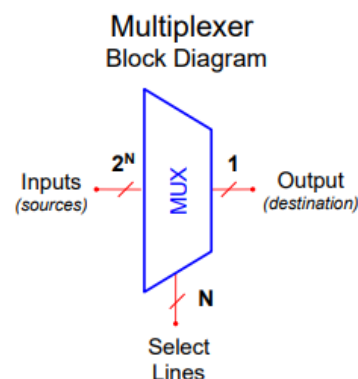


Lab # 09 Multiplexer / Demultiplexer

Multiplexers

Multiplexing is the generic term used to describe the operation of sending one or more analogue or digital signals over a common transmission line at different times or speeds and as such, the device we use to do just that is called a Multiplexer.

- A MUX is a digital switch that has multiple inputs (sources) and a single output (destination).
- The select lines determine which input is connected to the output.
- MUX Types
 - 2-to-1 (1 select line)
 - 4-to-1 (2 select lines)
 - 8-to-1 (3 select lines)
 - 16-to-1 (4 select lines)



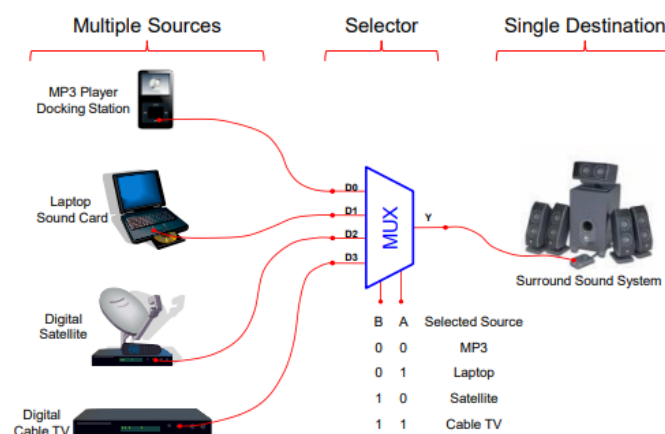
Applications of Multiplexer

Multiplexers are used in various fields where multiple data need to be transmitted using a single line. Following are some of the applications of multiplexers –

1. Communication system –

Communication system is a set of system that enable

communication like transmission system, relay and tributary station, and communication network. The efficiency of communication system can be increased considerably using multiplexer. Multiplexers allow the process of transmitting different type of data such as audio, video at the same time using a single transmission line.

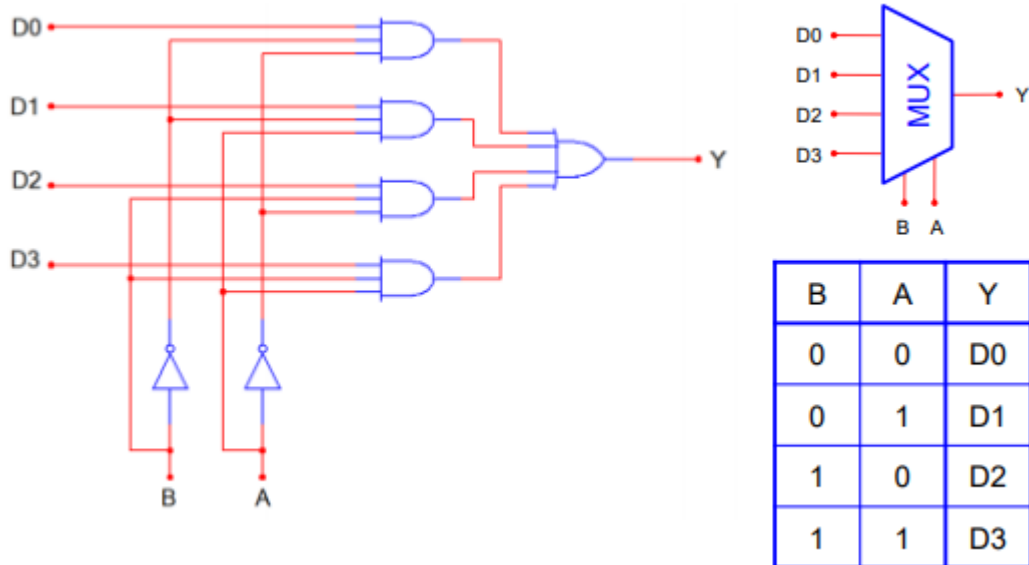


2. Telephone network – In telephone network, multiple audio signals are integrated on a single line for transmission with the help of multiplexers. In this way, multiple audio signals can be isolated and eventually, the desired audio signals reach the intended recipients.

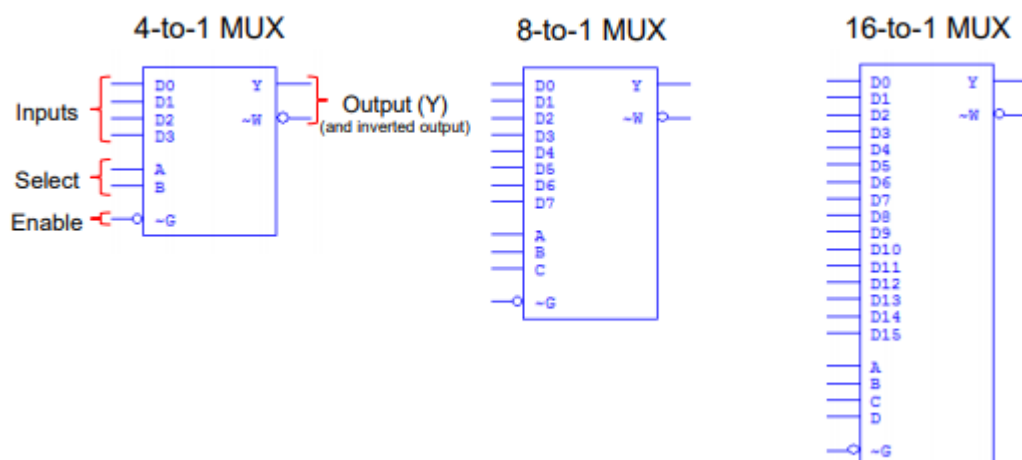
3. Computer memory - Multiplexers are used to implement huge amount of memory into the computer, at the same time reduces the number of copper lines required to connect the memory to other parts of the computer circuit.

4. Transmission from the computer system of a satellite – Multiplexer can be used for the transmission of data signals from the computer system of a satellite or spacecraft to the ground system using the GPS (Global Positioning System) satellites.

4x1 MUX:

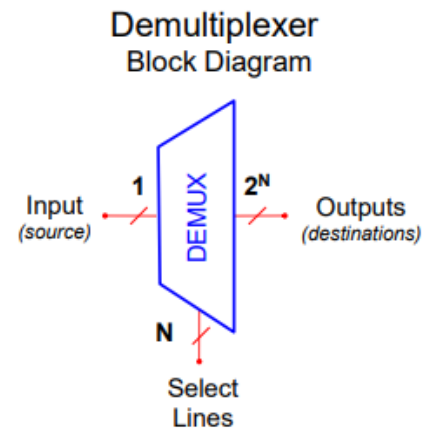


Medium Scale MUX



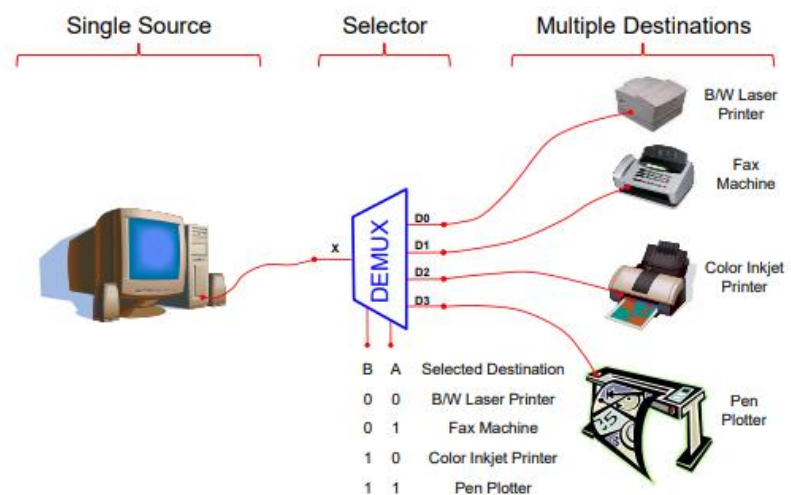
De-Multiplexer

- A DEMUX is a digital switch with a single input (source) and a multiple outputs (destinations).
- The select lines determine which output the input is connected to.
- DEMUX Types
 - 1-to-2 (1 select line)
 - 1-to-4 (2 select lines)
 - 1-to-8 (3 select lines)
 - 1-to-16 (4 select lines)



Applications of Demultiplexer

1. Demultiplexer is used to connect a single source to multiple destinations. The main application area of demultiplexer is communication system where multiplexer are used. Most of the communication system are bidirectional i.e. they function in both ways (transmitting and receiving signals). Hence, for most of the applications, the multiplexer and demultiplexer work in sync. Demultiplexer are also used for reconstruction of parallel data and ALU circuits.

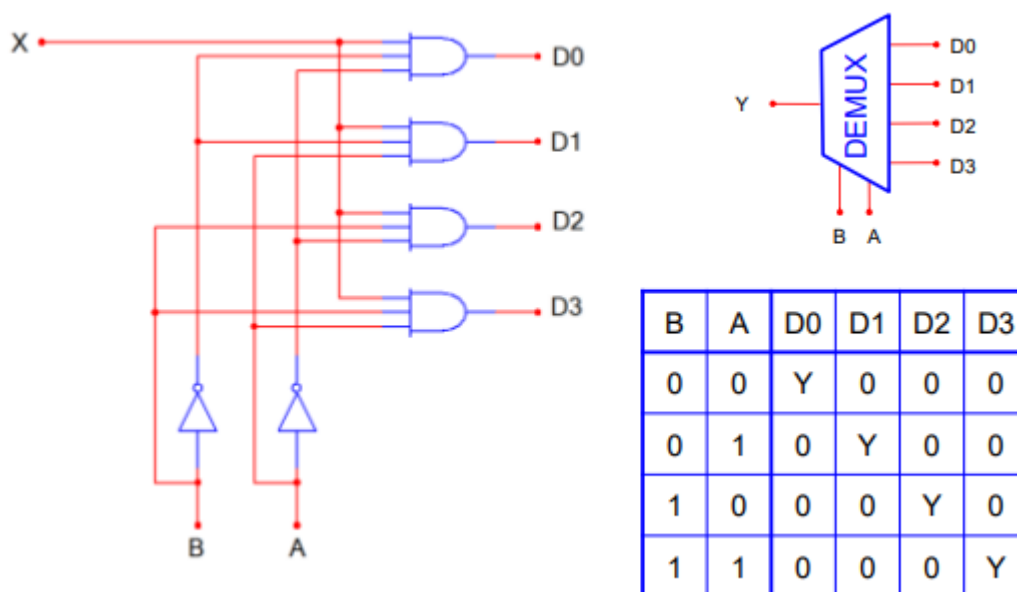


2. Communication System - Communication system use multiplexer to carry multiple data like audio, video and other form of data using a single line for transmission. This process make the transmission easier. The demultiplexer receive the output signals of the multiplexer and converts them back to the original form of the data at the receiving end. The multiplexer and demultiplexer work together to carry out the process of transmission and reception of data in communication system.

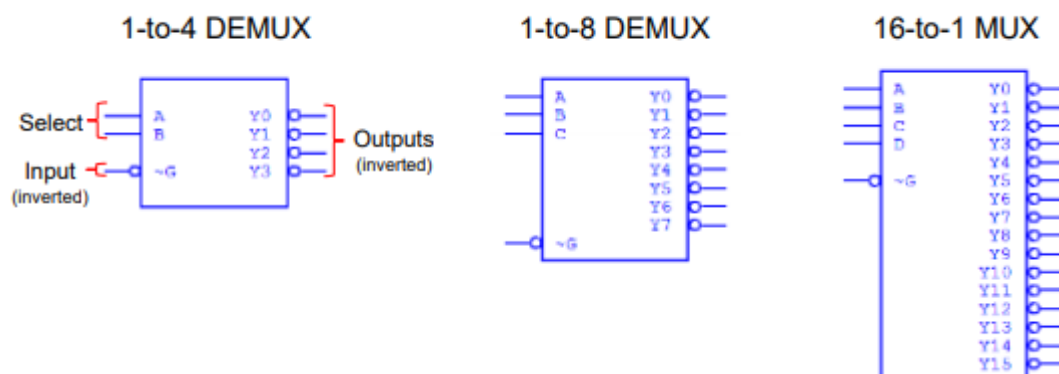
3. ALU (Arithmetic Logic Unit) – In an ALU circuit, the output of ALU can be stored in multiple registers or storage units with the help of demultiplexer. The output of ALU is fed as the data input to the demultiplexer. Each output of demultiplexer is connected to multiple register which can be stored in the registers.

4. Serial to parallel converter - A serial to parallel converter is used for reconstructing parallel data from incoming serial data stream. In this technique, serial data from the incoming serial data stream is given as data input to the demultiplexer at the regular intervals. A counter is attached to the control input of the demultiplexer. This counter directs the data signal to the output of the demultiplexer where these data signals are stored. When all data signals have been stored, the output of the demultiplexer can be retrieved and read out in parallel.

1x4 DEMUX



Medium Scale DEMUX



Next Topic

Seeing Is NOT Always Believing

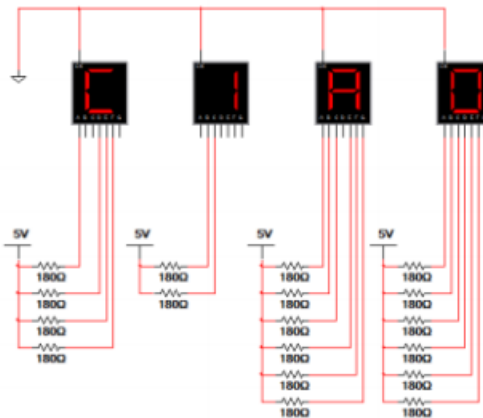
- Our lives are filled with electronic signs that display the time, temperature, or ball game score. However, what we see is not always what is really happening.
- In fact for most displays, the individual display segments are cycled through so that only one display is on at any given time.
- The cycle speed is so fast that the human eye perceives that all segments are on.



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Simple Message: All Segments On

- The circuit to the right uses four 7-segment displays to display the word CIAO. In this circuit all displays are continuously illuminated, each displaying one letter in the word.
- Though this method works, it is a VERY inefficient use of power. To illuminate the simple message CIAO in this way, 18 segments must be continuously on.
- Can you think of another way to display this message that would use less power?



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