SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

16EC231 – DIGITAL ELECTRONICS

II YEAR/ III SEMESTER

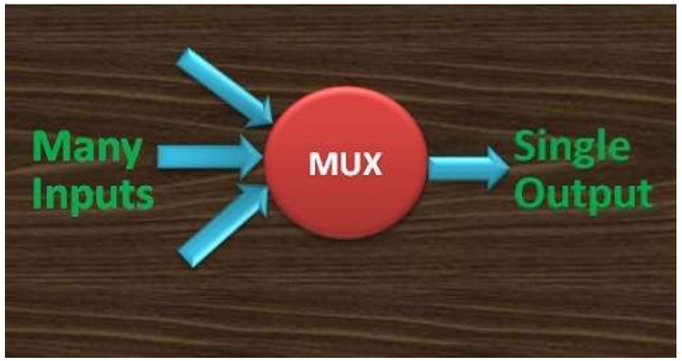
UNIT 2 – COMBINATIONAL CIRCUITS

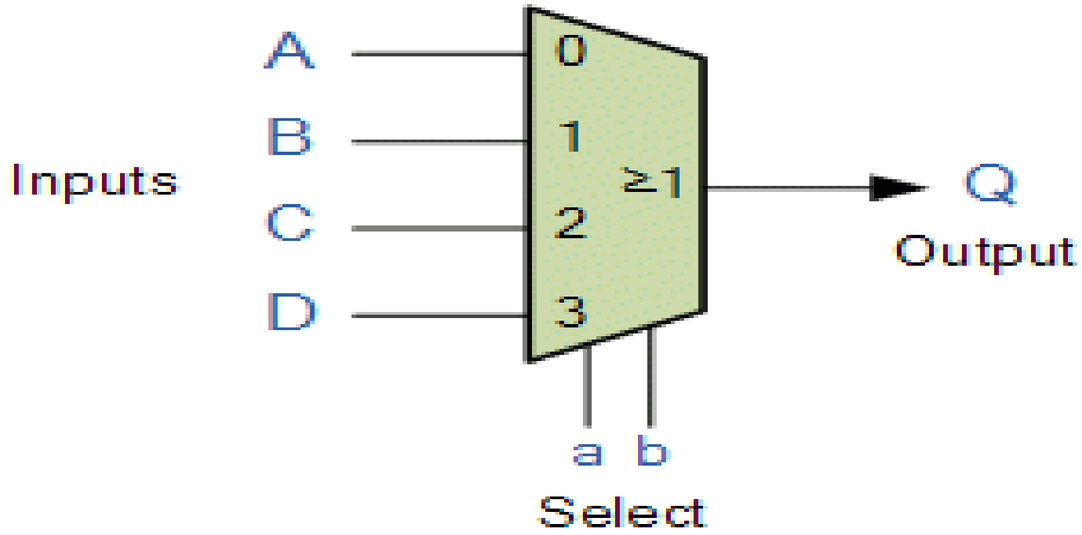
TOPIC - Multiplexer

What is a Multiplexer?

- Multiplexer is a combinational circuit that has maximum of 2n data inputs, ‘n’ selection lines and single output line.

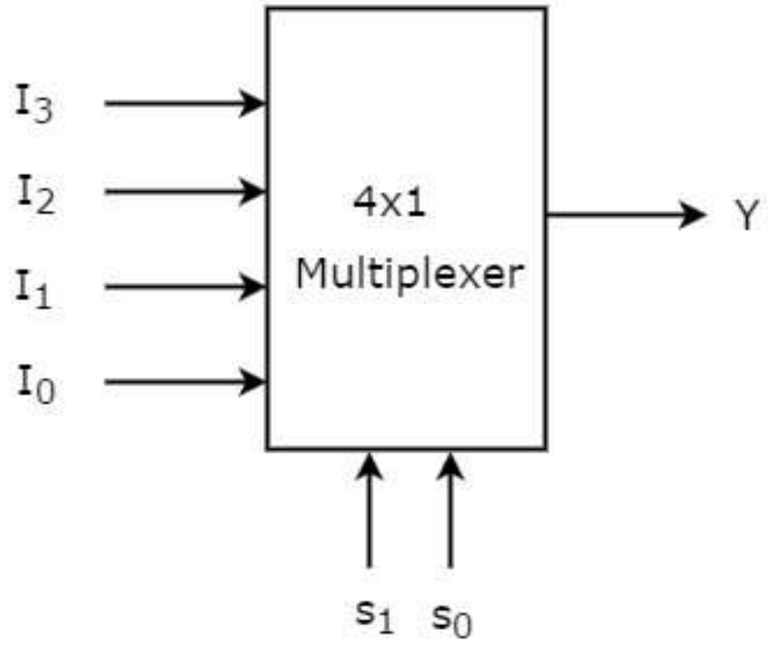
- One of these data inputs will be connected to the output based on the values of selection lines..





4x1 Multiplexer

- 4x1 Multiplexer has four data inputs I3, I2, I1 & I0, two selection lines s1 & s0 and one output Y.



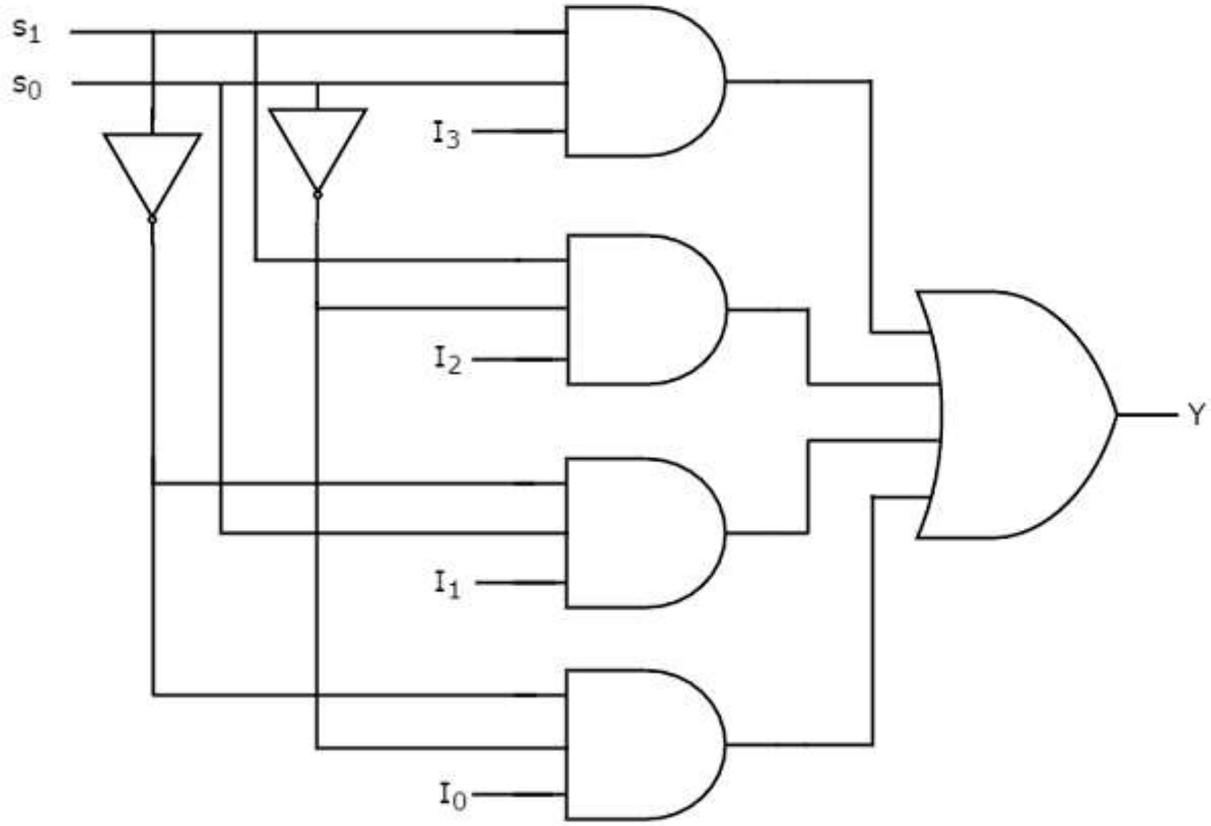
4x1 Multiplexer

- One of these 4 inputs will be connected to the output based on the combination of inputs present at these two selection lines.

Selection Lines		Output
S_1	S_0	Y
0	0	I_0
0	1	I_1
1	0	I_2
1	1	I_3

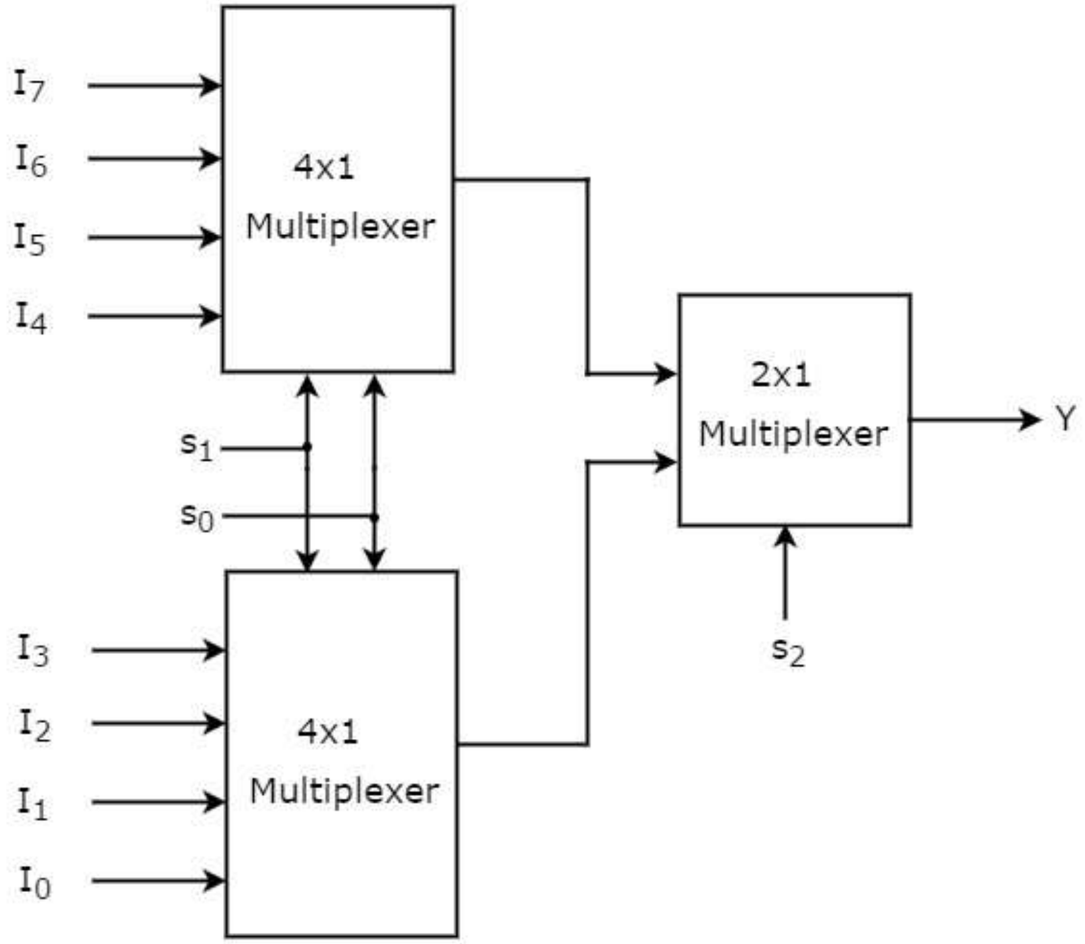
4x1 Multiplexer

➢We can implement this Boolean function using Inverters, AND gates & OR gate.



8x1 Multiplexer

- We require two 4x1 Multiplexers in first stage in order to get the 8 data inputs.



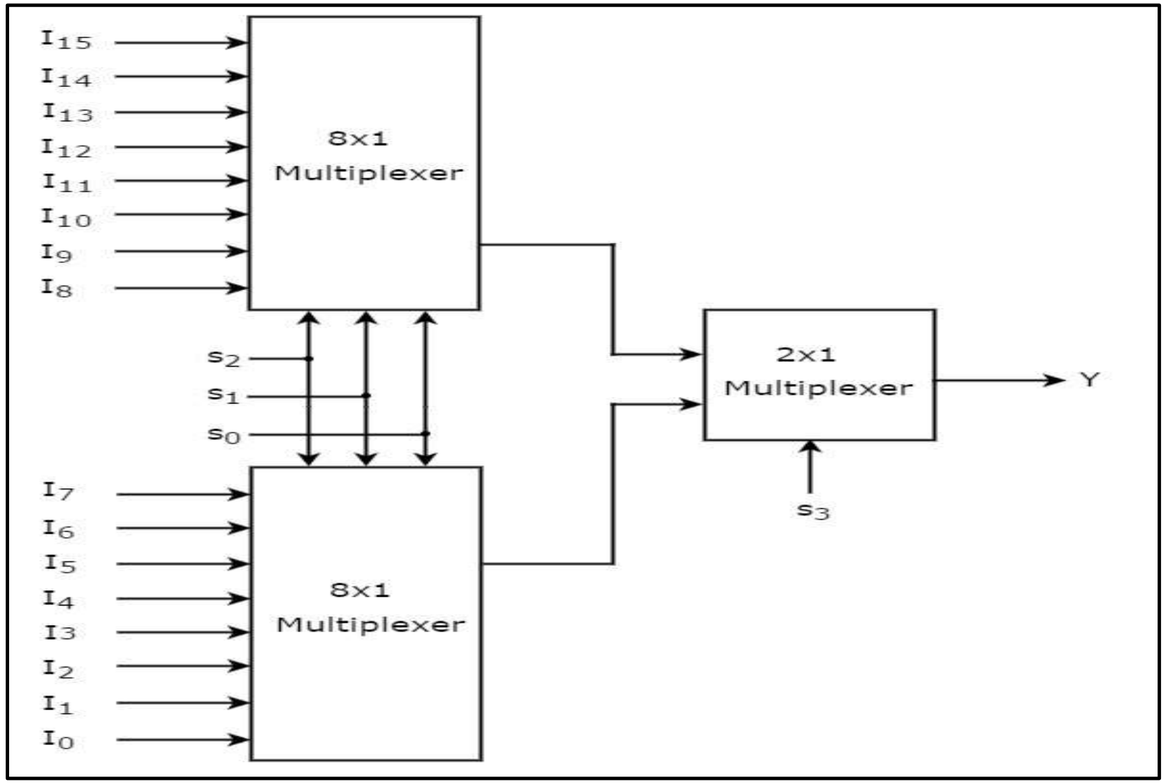
8x1 Multiplexer

- Let the 8x1 Multiplexer has eight data inputs I7 to I0, three selection lines s2, s1 & s0 and one output Y

Selection Inputs			Output
S_2	S_1	S_0	Y
0	0	0	I_0
0	0	1	I_1
0	1	0	I_2
0	1	1	I_3
1	0	0	I_4
1	0	1	I_5
1	1	0	I_6
1	1	1	I_7

16x1 Multiplexer

- We require two 8x1 Multiplexers in first stage in order to get the 16 data inputs.



16x1 Multiplexer

- 16x1 Multiplexer has sixteen data inputs I15 to I0, four selection lines s3 to s0 and one output Y.

Selection Inputs				Output
S_3	S_2	S_1	S_0	Y
0	0	0	0	I_0
0	0	0	1	I_1
0	0	1	0	I_2
0	0	1	1	I_3
0	1	0	0	I_4
0	1	0	1	I_5
0	1	1	0	I_6
0	1	1	1	I_7
1	0	0	0	I_8
1	0	0	1	I_9
1	0	1	0	I_{10}
1	0	1	1	I_{11}
1	1	0	0	I_{12}
1	1	0	1	I_{13}
1	1	1	0	I_{14}
1	1	1	1	I_{15}

Advantages

Advantages :

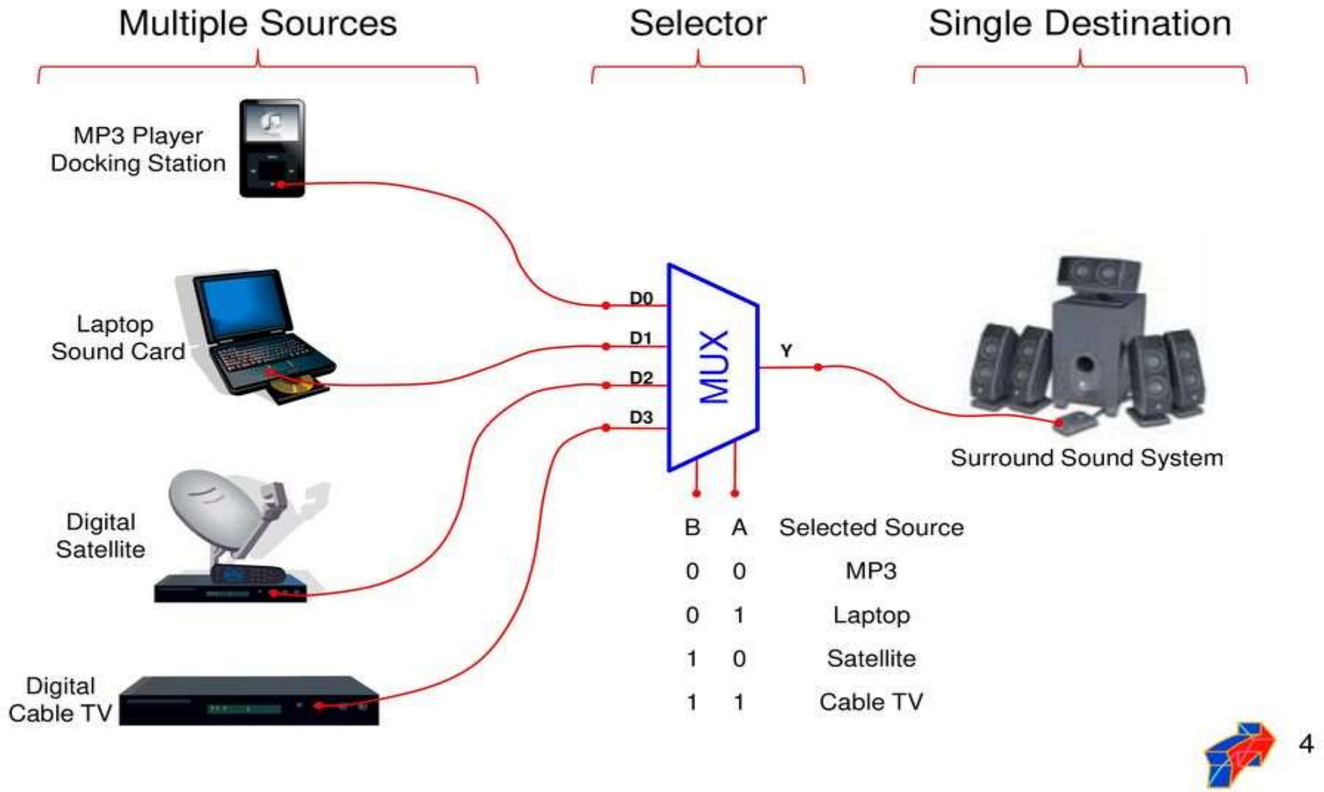
1) It reduces number of wires .
2) It reduces circuit complexity and cost .
3) We can implement many combination circuits using MUX.
4) It does not need K maps and simplification .

Disadvantages

Disadvantages:

1) Added delays in switching ports .
2) Limitations on which ports can be used simultaneously .
3) Added firmware complexity to handle switching ports .
4) Added delays in I/O signals propagating through the multiplexer .
5) Extra I/O ports required to control the multiplexer.

Typical Application of a MUX



ASSESSMENTS

1.What is Multiplexer?
2.Design 8:1 Multiplexer.
3.List the applications of multiplexer.

THANK YOU