Binary to Gray Code Convertor using CMOS

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Abstract

Any code convertor circuit would be very useful when we talk about any Digital Communication System because data security is needed while transmitting data from one end to another end. If we transmit the data without encryption anyone can temper with data in between the transmitter and receiver. In such cases, these types of Code Conversion techniques are very much useful. On the transmitter side we have data as Binary bit so we can convert such data into Gray code. So, the whole message will be changed. On the receiver side, we can perform the decryption process i.e., we can convert the Gray Code back to the original Binary Code. This way by applying such conversion to data we can make our transmission more secure.

1 Reference Circuit Details

The 4 bit Binary to Gray code convertor circuit is comprised of 3 Ex-or logic gates. Ex-or logic gate is also known as the different bit detector i.e., whenever both the inputs of Ex-or gate are not same then output will be High otherwise when both the inputs are identical the output will be Low. In binary to Gray conversion the first bit remains as it is and for the other three bits we need to Ex-or every bit with its previous bit (for example, for bit G2 we need to perform Ex-or operation between B3 and B2 bits). We can do a 4 bit Binary to Gray Code conversion using CMOS logic to implement Ex-or Gates. In this marathon I am trying to implement a whole 4 bit Binary to Gray code convert using CMOS logic. CMOS is the logic circuits which is consist of complementary arrangements of NMOS and PMOS transistors simultaneously. To implement one Ex-or Gate we need a total of 4 PMOS and 4 NMOS. Also, to design a 4 bit Binary to Gray code convertor we need total 3 Ex-or gates. Hence, to implement it using CMOS we need a total of 12 PMOS and 12 NMOS. By interconnecting all these PMOS and NMOS as per the logic gate connection circuit we can have the complete circuit of 4 bit Binary to Gray code conversion. The circuit connection will be much more complex because there will be too much interconnection between every component.

2 Reference Circuit

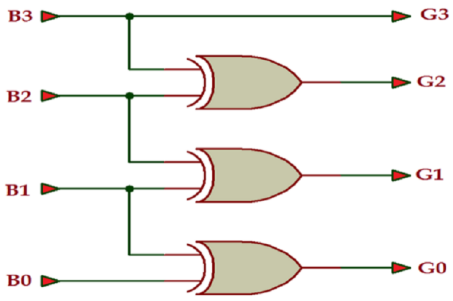

Figure 1: Reference circuit diagram.

3 Reference Circuit Waveforms

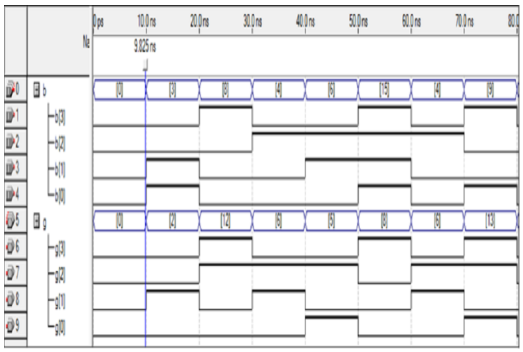

Figure 2: Reference waveform.

References

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