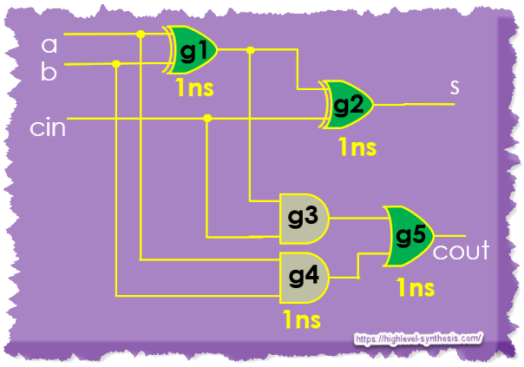
Different paths and their propagation delay in the following full-adder are



P1: $a \rightarrow g1 \rightarrow g2 \rightarrow s$ ..... $2ns$

P2: $b \rightarrow g1 \rightarrow g2 \rightarrow s$ ..... $2ns$

P3: $cin \rightarrow g2 \rightarrow s$ ..... $1ns$

P4: $a \rightarrow g4 \rightarrow g5 \rightarrow cout$ ..... $2ns$

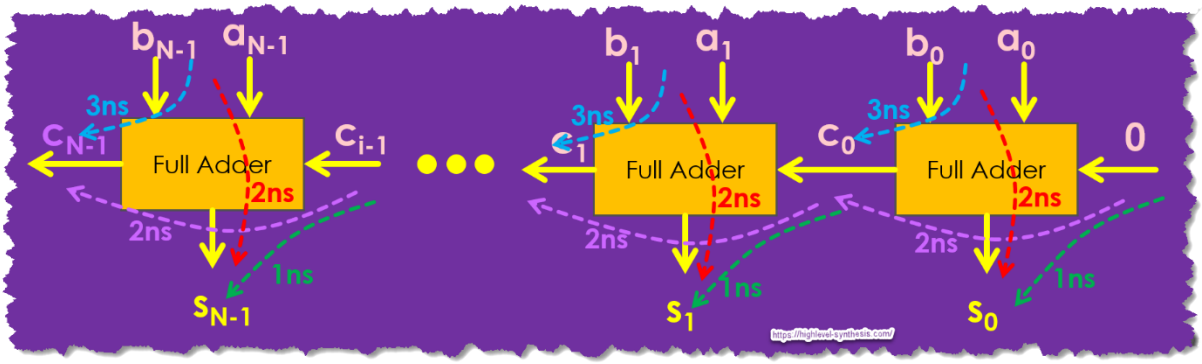
P5: $b \rightarrow g4 \rightarrow g5 \rightarrow cout$ ..... $2ns$

P6: $a \rightarrow g1 \rightarrow g3 \rightarrow g5 \rightarrow cout$ ..... $3ns$

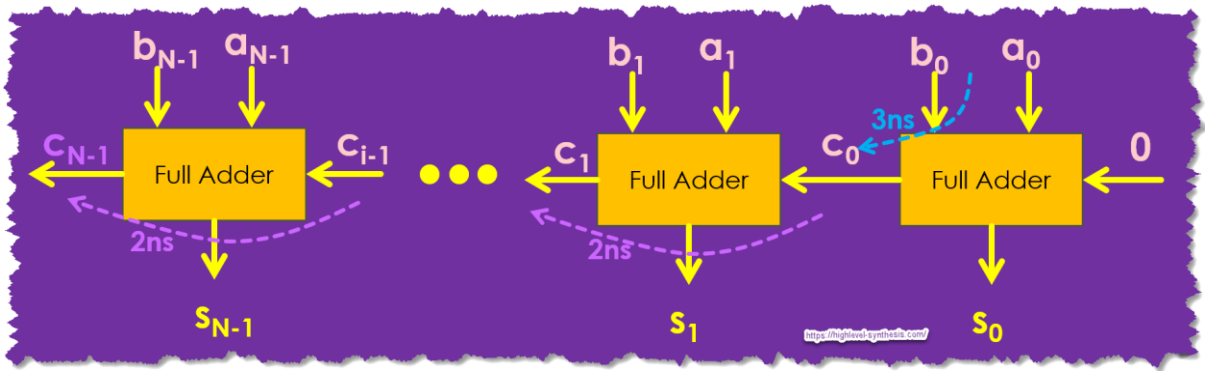
P7: $b \rightarrow g1 \rightarrow g3 \rightarrow g5 \rightarrow cout$ ..... $3ns$

P8: $cin \rightarrow g3 \rightarrow g5 \rightarrow cout$ ..... $2ns$

The following figure shows different datapaths in an N-bit binary adder that uses the above full adder.



This figure shows the critical path, considering the different path delays.



Ans this figure shows the propagation delay of the whole adder, which is $2(N-1)+3\ ns$.