

1. $G_0 = A_0 * B_0 = 2T$
2. $P_0 = A_0 \text{ xor } B_0 = 2T$
3. $G_\alpha = G_3 + G_2 * P_2 + G_1 * P_1 * P_2 + G_0 * P_1 * P_2 * P_3 = 2T + 5T + 5T = 12T$
4. $P_\alpha = P_0 * P_1 * P_2 * P_3 = 2T + 5T = 7T$
5. $C_{12} = G_\gamma + G_\beta * P_\gamma + G_\alpha * P_\beta * P_\gamma + C_{in} * P_\alpha * P_\beta * P_\gamma = 12T + 3T + 5T = 20T$
6. $C_{15} = G_{14} + G_{13} * P_{14} + G_{12} * P_{13} * P_{14} + C_{12} * P_{12} * P_{13} * P_{14} = 20T + 5T + 5T = 30T$
7. $C_{16} = G_\delta + G_\gamma * P_\delta + G_\beta * P_\gamma * P_\delta + G_\alpha * P_\beta * P_\gamma * P_\delta + C_{in} * P_\alpha * P_\beta * P_\gamma * P_\delta = 12T + 5T + 7T = 24T$
8. $S_{15} = C_{15} \text{ xor } a_{15} \text{ xor } b_{15} = C_{15} + 3T = 33T$

Note that the upper 16 bits are regular CLAs and are not HCLAs.

9. $C_{20} = G_{19} + G_{18} * P_{19} + G_{17} * P_{18} * P_{19} + G_{16} * P_{17} * P_{18} * P_{19} + C_{in} * P_{16} * P_{17} * P_{18} * P_{19} = 2T + 7T + 7T = 16T$
10. $C_{19} = G_{18} + G_{17} * P_{18} + G_{16} * P_{17} * P_{18} + C_{in} * P_{16} * P_{17} * P_{18} = 12T$ So, $S_{19} = 12T + 3T = 15T$
11. $C_{24} = G_{23} + G_{22} * P_{23} + G_{21} * P_{22} * P_{23} + G_{20} * P_{21} * P_{22} * P_{23} + C_{20} * P_{20} * P_{21} * P_{22} * P_{23} = 16T + 7T + 7T = 30T$
12. $C_{28} = G_{27} + G_{26} * P_{27} + G_{25} * P_{26} * P_{27} + G_{24} * P_{25} * P_{26} * P_{27} + C_{24} * P_{24} * P_{25} * P_{26} * P_{27} = 30T + 7T + 7T = 44T$
So, $C_{31} = G_{30} + G_{29} * P_{30} + G_{28} * P_{29} * P_{30} + C_{28} * P_{28} * P_{29} * P_{30} = 44T + 5T + 5T = 54T$
13. $C_{32} = G_{31} + G_{30} * P_{31} + G_{29} * P_{30} * P_{31} + G_{28} * P_{29} * P_{30} * P_{31} + C_{28} * P_{28} * P_{29} * P_{30} * P_{31} = 44T + 7T + 7T = 58T$
So, $C_{32} \text{ (after mux)} = 58T + 4T = 62T$
14. $S_{31} = C_{31} + 3T = 57T$ So, $S_{31} \text{ (after mux)} = 57T + 4T = 61T$

As we can observe, max delay = 62T.