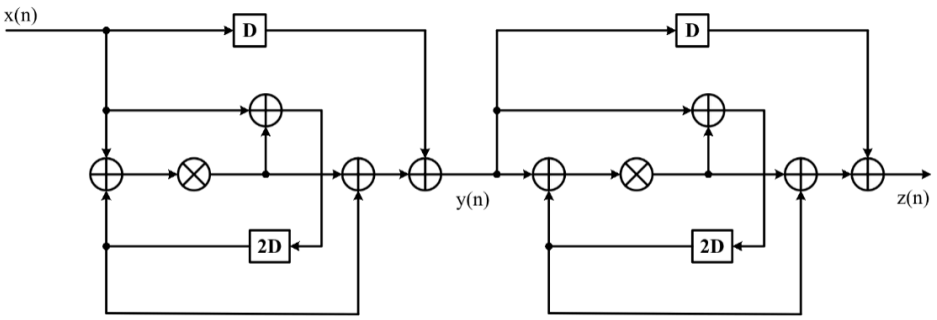
1 Question

4.1 Consider the wave digital filter shown. Assume that each multiply operation requires 20 nsec and each add operation requires 8 nesc .

a) Calculate the iteration bound of this filter by inspection

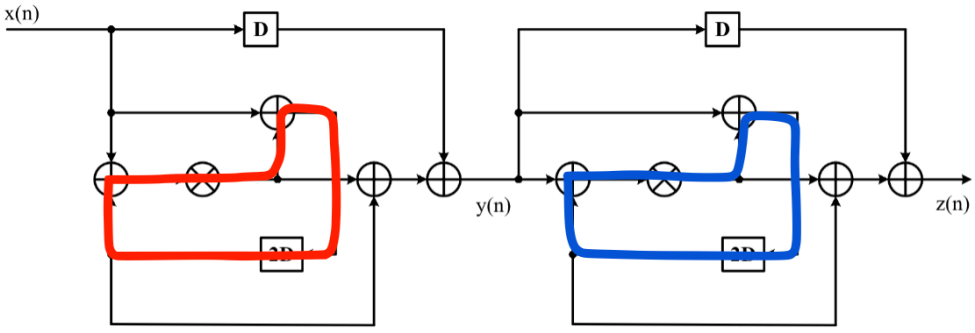
b) What is the critical path?

c) Manually pipeline and/or retime this filter to achieve a critical path equal to the iteration period bound.



2 Answer

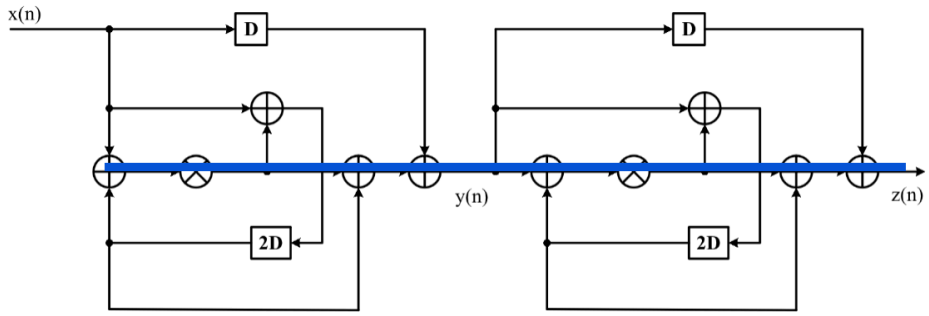
(a) By inspection, there're 2 loops in the graph,



So, the boundary iteration is:

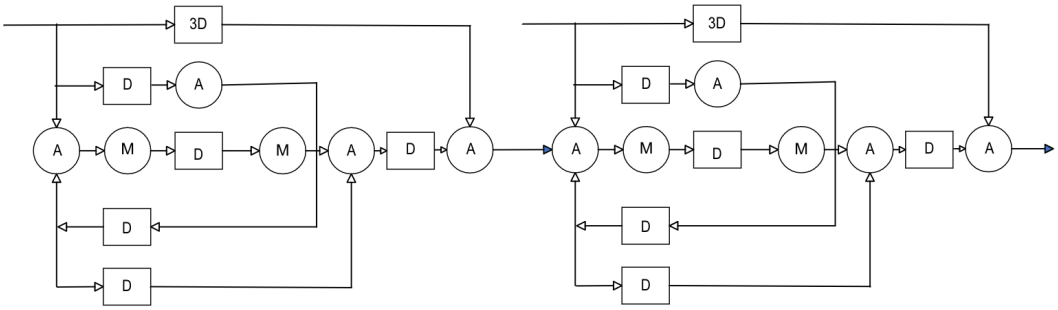
$$L^{(\infty)} = MAX\{\frac{8+8+20}{2}, \frac{8+8+20}{2}\} = 18$$

(b) The critical path is:



so the path delay is $8 + 20 + 8 + 8 + 8 + 20 + 8 + 8 = 88nsec$

(c)divide the multiplier into 2 sub parts, each one has a delay of 10nsec.



Then we use pipeline and retime to achieve a CP equals to BI.