

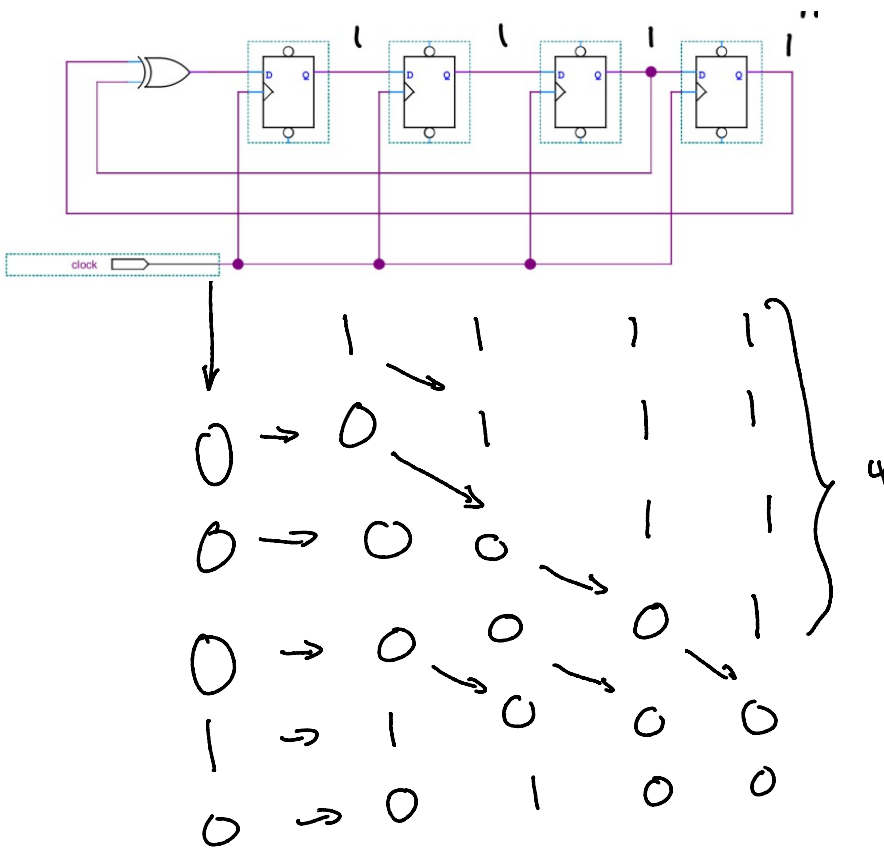
PN Sequences and Scramblers

Exercise 1: How many bits are there in an m-sequence for $m = 6$?
How many are 1's? How many are 0's?

$$\text{period} = 2^m - 1 = 2^6 - 1 = 64 - 1 = 63.$$

$\begin{matrix} 32 & 1\text{'s} \\ 31 & 0\text{'s} \end{matrix}$

Exercise 2: If the initial value of each flip-flop is 1, what are the values of the next 4 bits output by the right-most flip-flop?



Exercise 3: How many flip-flops would be required to generate a ML PRBS of period 8191? How many ones would the sequence have? What is the longest sequence of 0's?

m for 8191 ?

$$2^m - 1 = 8191$$

$$2^m = 8192$$

$$m = \log_2 8192 = 8 \times 1024 = 2^3 \cdot 2^{10} = 2^{13}$$

$$\frac{8192}{2} \text{ 1's} = 4096 \text{ ones.}$$

for $m=13$

we will have one run of 12 zeros.

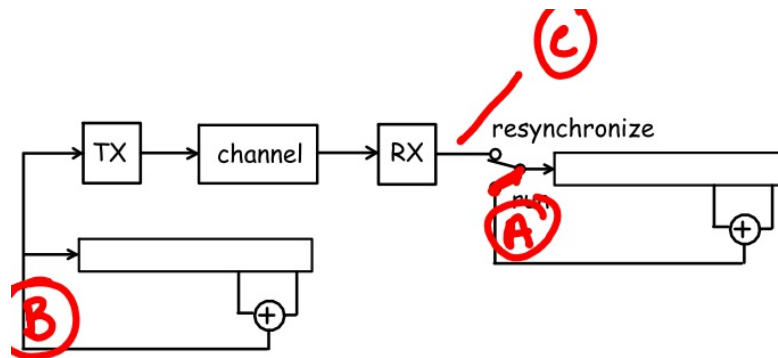
Exercise 4: Why not?

de scrambling operation is known to everyone (part of specification)

Exercise 5: How many errors will appear in the output of a V.34 de-scrambler if there is one input error?

3 errors - 1 due to channel error
2 due to differences in de scrambling sequence

Exercise 6: In the diagram above, what two signals would the receiver compare to detect errors?



compare (C) & (A)
to count errors