

PN Sequences and Scramblers

Exercise 1: How many flip-flops would be required to generate a ML PRBS of period 16383? How many ones would the sequence have? What is the longest sequence of 0's?

$$2^n - 1 = 16383$$

$$2^n = 16384$$

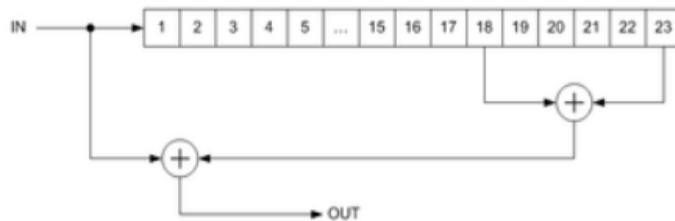
$$n = \log_2 16384 = \log_2 (16 \cdot 1k) = \log_2 (2^4 \cdot 2^{10}) = \log_2 (2^4) + \log_2 (2^{10}) = 14$$

It is important to understand that a scrambler does not provide secrecy (encryption).

Exercise 2: Why not?

- scrambling algorithms are public
- anyone can de-scramble the data.

Exercise 3: How many errors will appear in the output of a V.34 descrambler if there is one input error?



- one error when the error appears at the input
 - one error each time the error reaches one of the two inputs to the xor gate
- total: 3 errors.

Exercise 4: In the diagram above, what two signals would the receiver compare to detect errors?

