Code Generation:

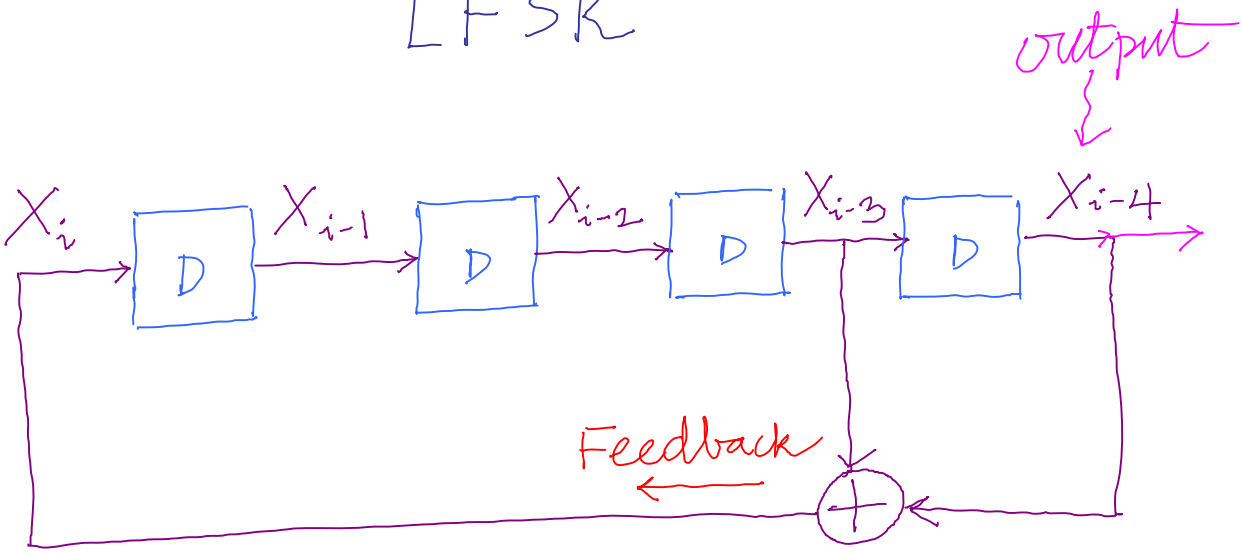
$C_1 = [1, -1, -1, 1]$

random sequence of +1, −1s

PN Sequence or Pseudo Noise Sequence.

PN sequences are generated Using Linear Feedback Shift Register (LFSR).

LFSR



Linear Feedback Shift Register

LFSR

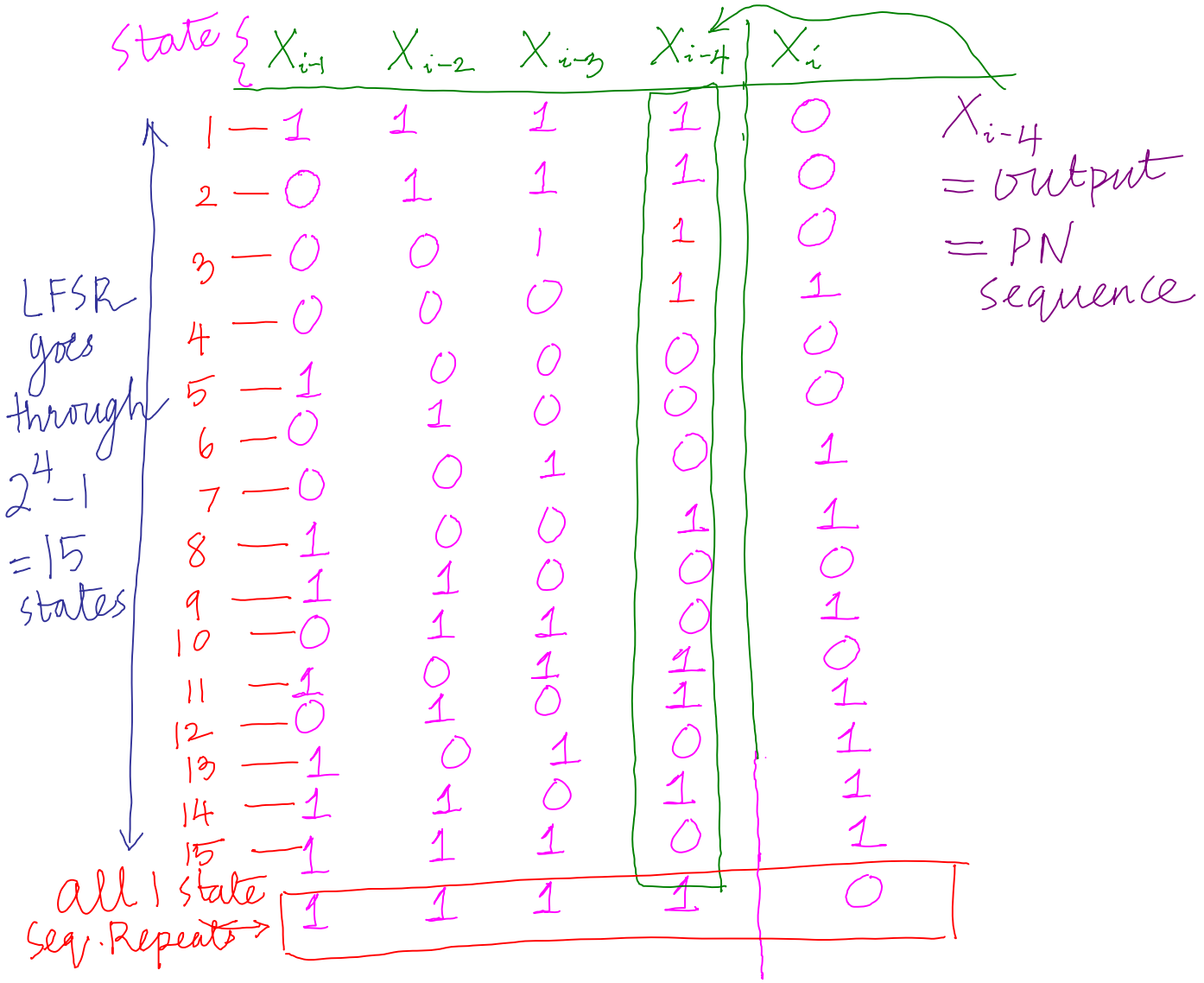
$X_i = X_{i-3} \oplus X_{i-4}$

$0 \oplus 0 = 0$

$1 \oplus 0 = 1$

$0 \oplus 1 = 1$

$1 \oplus 1 = 0$


State
X_{i-1} X_{i-2} X_{i-3} X_{i-4} X_i
1 1 1 1 1 0
2 0 1 1 1 0
3 0 0 1 1 0
4 0 0 0 1 1
5 1 0 0 0 0
6 0 1 0 0 0
7 0 0 1 0 1
8 1 0 0 1 1
9 1 1 0 0 0
10 0 1 1 0 1
11 1 0 1 1 0
12 0 1 0 1 1
13 1 0 1 0 1
14 1 1 0 1 1
15 1 1 1 0 1
all 1 state
Seq. Repeats
1 1 1 1 0
LFSR goes through 2^4-1 = 15 states
X_{i-4} = output = PN sequence

Output $= X_{i-4}$

$= 1\ 1\ 1\ 1\ 0\ 0\ 0\ 1\ 0\ 0\ 1\ 1\ 0\ 1\ 0$

Output PN sequence.

state variables = 4

$X_{i-1}\ X_{i-2}\ X_{i-3}\ X_{i-4}$

Maximum # possible states $= 16 = 2^4$

LFSR goes through 15 states

MAXIMAL LENGTH.

$= 2^4 - 1$

D = Number of Delay Registers

$= 2^D - 1$

Such an LFSR which goes through $2^D - 1$ states is termed as 'maximal length'.

PN sequence
= code of CDMA

= 1 1 1 1 0 0 0 1 0 0 1 1 0 1 0

PN sequence