

Cross Correlation of two sequences when one is shifted by each shift. Auto-correlation: Cross-correlation of a sequence with itself.

Right Shift by 2 bits

0 0 1 1 0 0

$$\begin{aligned}
 & \text{Do dot product with itself (Auto-correlation)} \\
 & (0 0 1 1 0 0) \cdot (1 1 0 0 1 0) \\
 & = (-1 -1 1 1 -1 -1) \cdot (1 1 -1 -1 1 -1) \\
 & = (-1 -1 -1 -1 -1 1) \\
 & = -4
 \end{aligned}$$

Similarly shift by 3, 4, 5 and 6 bits.

→ CDMA - 2000 parameters:

Parameter

- 1) Carrier Frequency
- 2) Spectrum allocation

- 3) Chip/Channel rate
- 4) Data modulation

- 5) Spreading

- 6) Power Control Freq-

- 7) Frame duration

- 8) Coding

- 9) Base station detect

- Turbo code:

Information bits

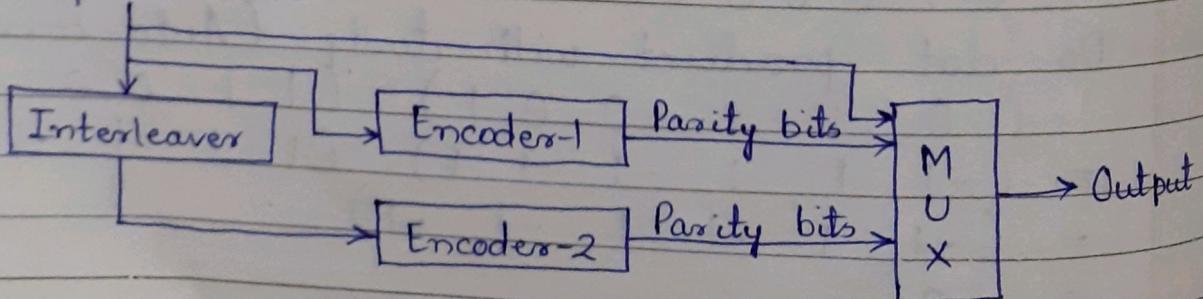


Fig.: Turbo Code Encoder

Description

3.75 MHz

1850 - 1910 MHz uplink
1930 - 1990 MHz downlink

1.228 Mega Cycles/sec (Mc/s)
Forward → QPSK (Quadrature Phase Shift Key).

Reverse → BPSK (Bipolar Phase Shift Key).

QPSK, DSSS (Orthogonal Frequency Division Multiple Access)

800 MHz

20 ms.

Turbo / Convolution / Walsh Gold.

Time shifted Pseudo Number Correlation.

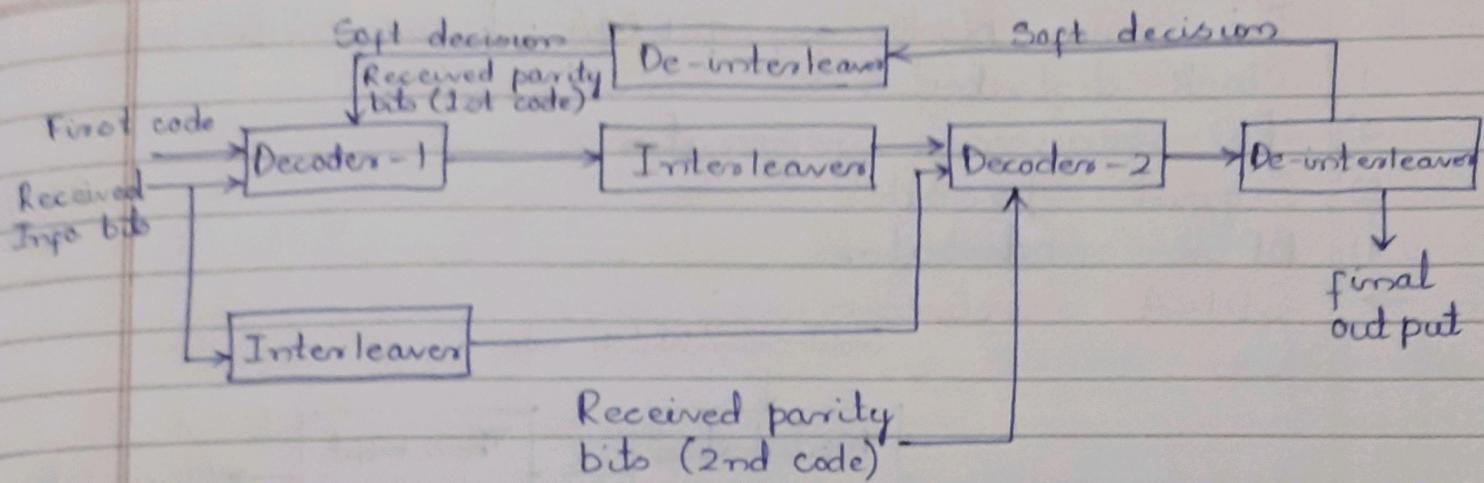


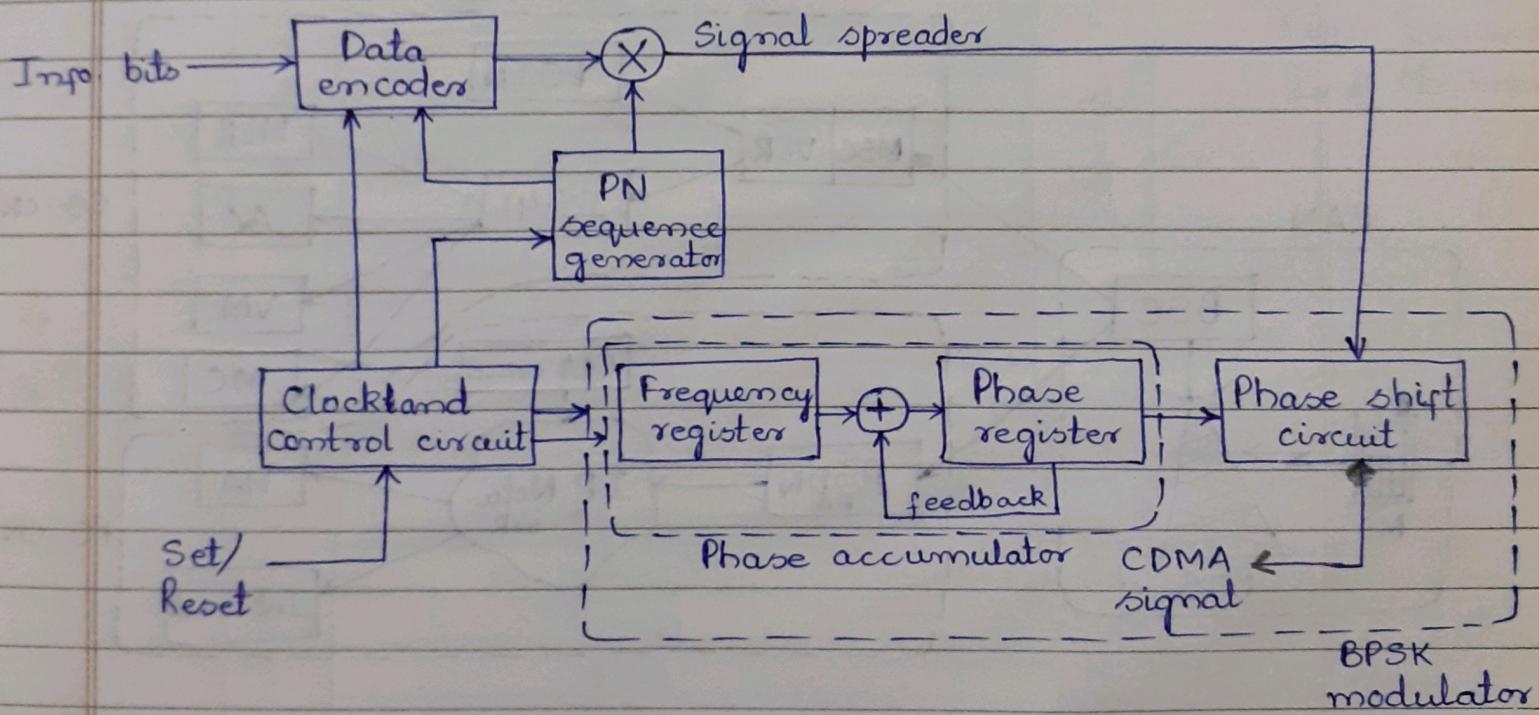
Fig.: Turbo Code Decoder

Refer examples on Turbo coders and decoder from books, etc.

- Convolution code :-

Refer to GSM for convolution code.

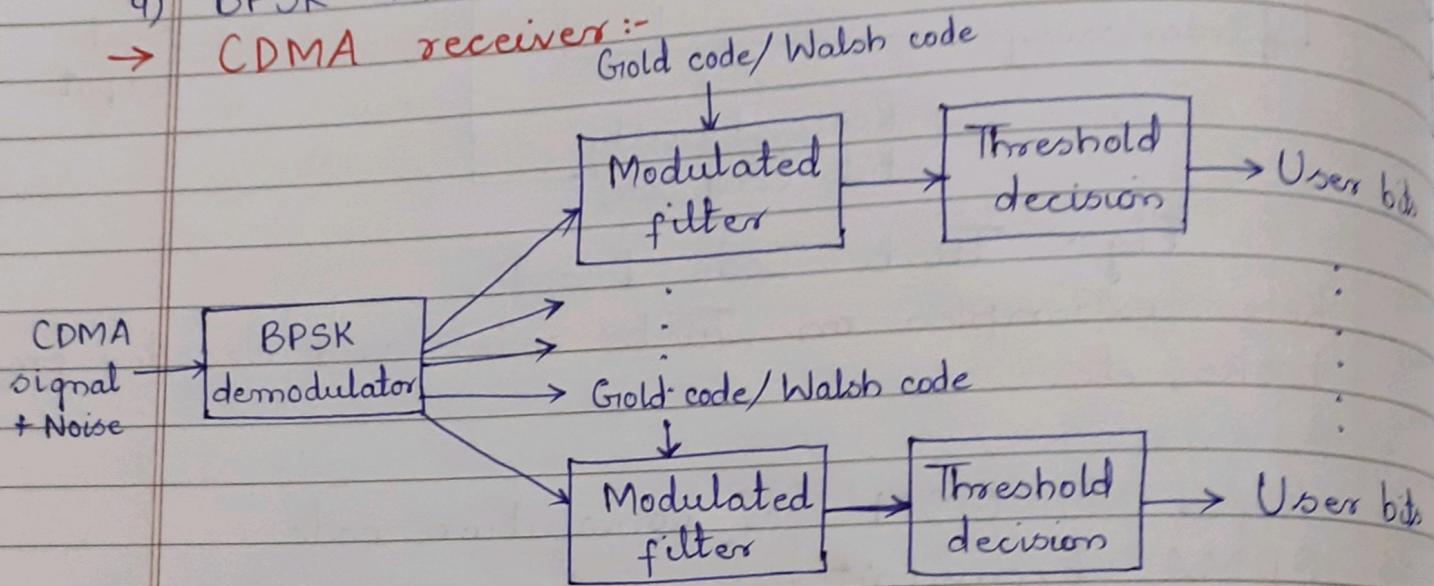
- CDMA transmitter :-



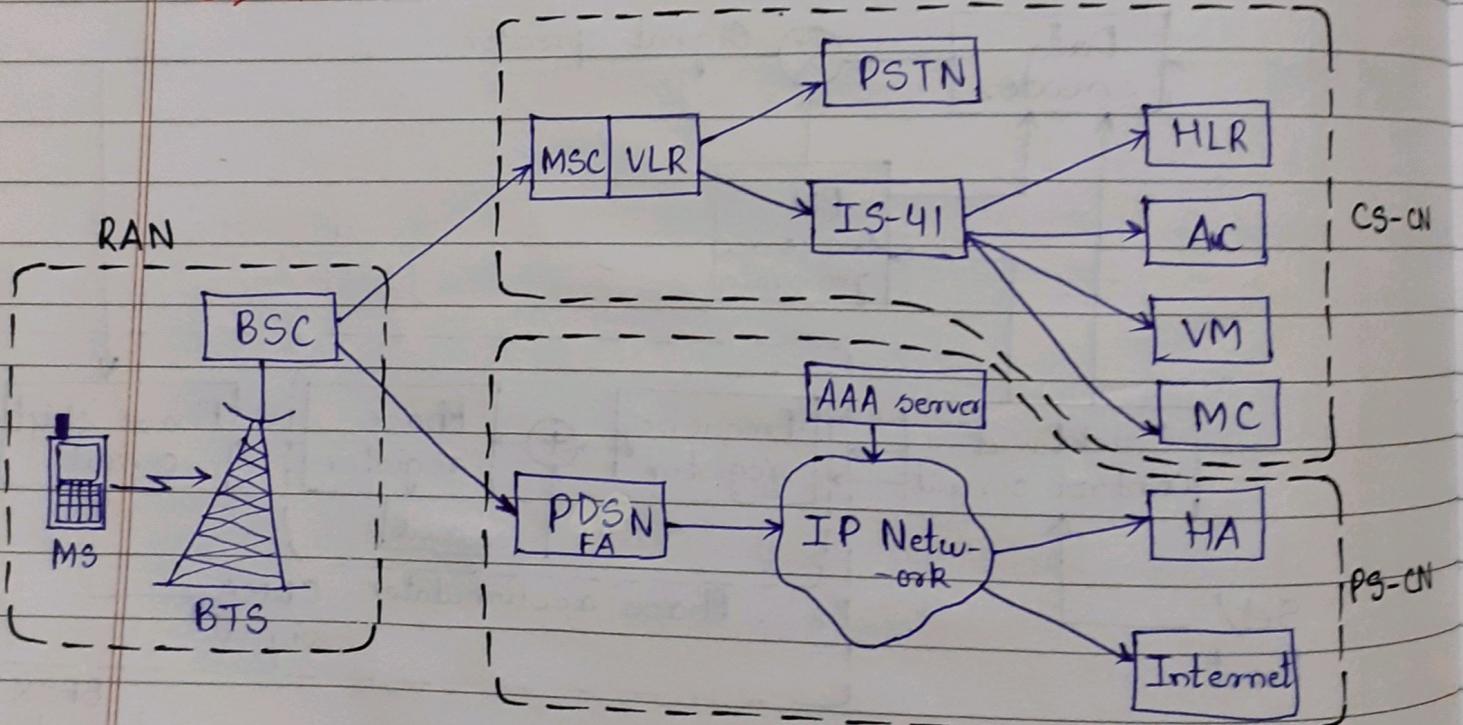
The PN (Pseudo Number) Sequence can be any of the turbo code, convolution code, Walsh code or gold code.

BPSK → Bipolar Phase Shift Keying.

- The main blocks of CDMA transmitter are
- 1) Clock distributor.
 - 2) PN sequence generator.
 - 3) Signal spreader.
 - 4) BPSK modulator.
- CDMA receiver :-



→ CDMA architecture:-



RAN (Radio Access Network).

CS-CN (Circuit Switch - Core Network)

PS-CN (Packet Switch - Core Network)

AAA (Authentication, Authorization, Accounting)

PDSN-FA (Packet Data Service Node - Foreign Agent)

IS-41 (Inter System Node - Foreign Agent)

RAN (Radio Access Network) :-

AC (Authentication Centre).

VM (Voice Mail)

MC (Message Centre).

HLR (Home Location Register).

BTS (Base Transceiver Station).

There are 3 modules in CDMA architecture:

- 1) RAN
- 2) CS - CN
- 3) PS - CN

— Describe all yourself —

→ Channels used in CDMA:-

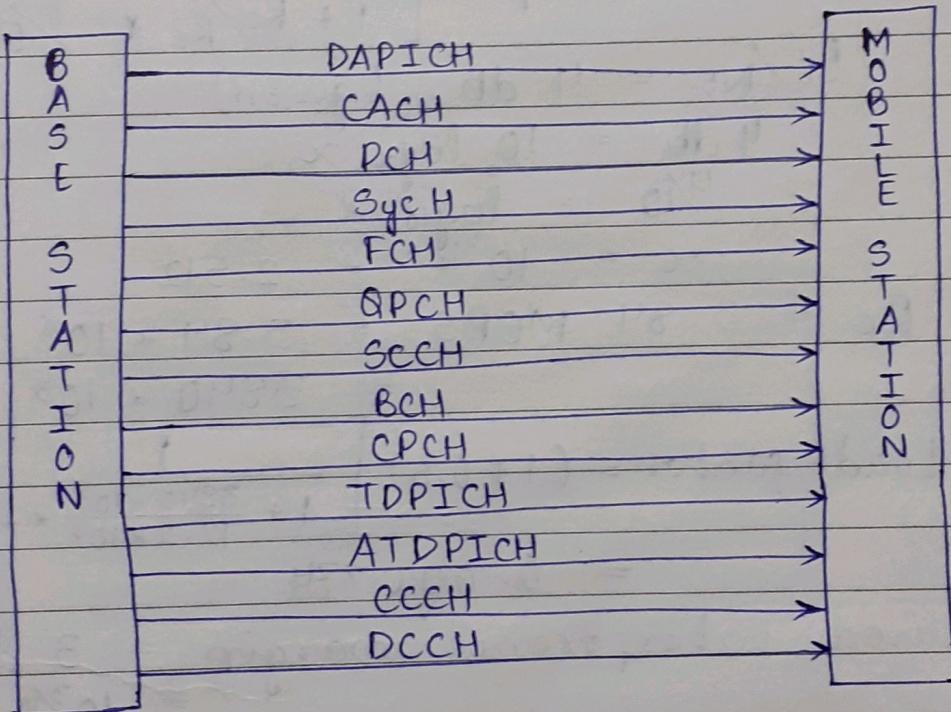


Fig:- Forward Link channels

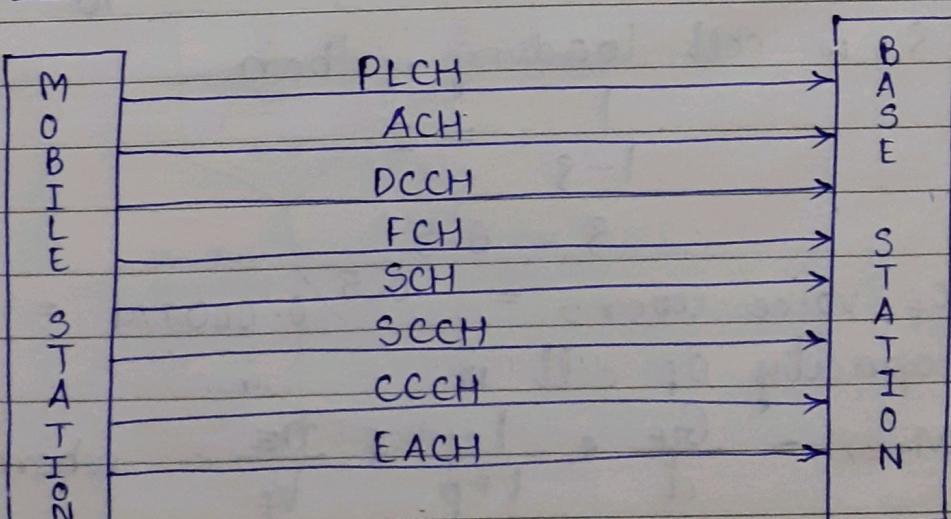


Fig:- Reverse Link channels