

Experiment no.:**Date of Performance:****Title: Study of DSSS transmitter & receiver using suitable setup/kit.**

Objectives: 1) To study generation of Direct sequence spread spectrum
2) To understand spectrum of DSSS

Equipment's: 1) Experimental Kit
2) Power supply
3) DSO 20MHz
4) spectrum analyser
5) connecting cables

Theory:**DSSS Generation:**

Direct-Sequence Spread Spectrum (DSSS) is a modulation technique used in telecommunications to reduce interference in signals during transmission. It is a spread spectrum technique which means that the frequency of the signal generated with a particular bandwidth is deliberately increased (spreading) resulting in a signal with a wider bandwidth. Transmitting signals with a spread bandwidth have less unintentional/intentional interference and loss/corruption of data. The bandwidth of the original signal before spreading of frequency (DSSS) occurs is called the information bandwidth. At the receiver end, the signal undergoes despreading or removal of DSSS modulation and the information bandwidth is restored.

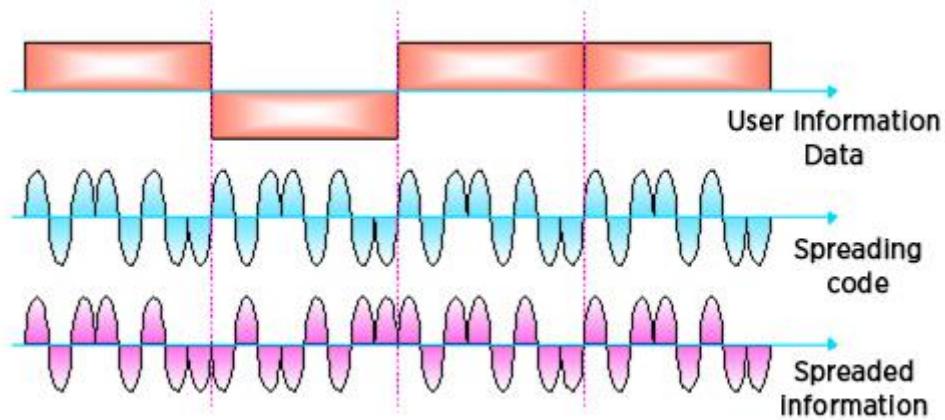


Fig.1 DSSS waveforms

For DSSS transmissions, the data signal is multiplied with a pseudorandom spreading sequence that has a much higher bit rate than the original data rate. The resulting transmitted signal resembles bandlimited white noise, like an audio recording of "static". The spreading sequence is known at the receiver end and the original data is reconstructed by multiplying the same spreading sequence with the transmitted noise-like signal. This process is known as despreading.

While a transmitted DSSS signal occupies a much wider bandwidth than a simple modulation of the original signal would require, its frequency spectrum can be somewhat restricted for spectrum economy by a conventional analog bandpass filter to give a roughly bell-shaped envelope centered on the carrier frequency. If an undesired transmitter transmits on the same channel but with a different spreading sequence (or no sequence at all), the despreading process reduces the power of that signal. This effect is the basis for the code-division multiple access (CDMA) property of DSSS, which allows multiple transmitters to share the same channel. DS-CDMA (Direct-Sequence Code Division Multiple Access) is a multiple access scheme based on DSSS which works by spreading the signals from/to different users with different codes. It is the most widely used type of CDMA.

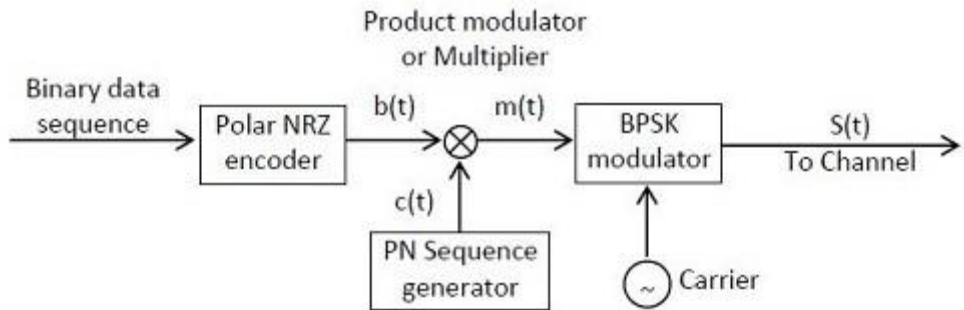
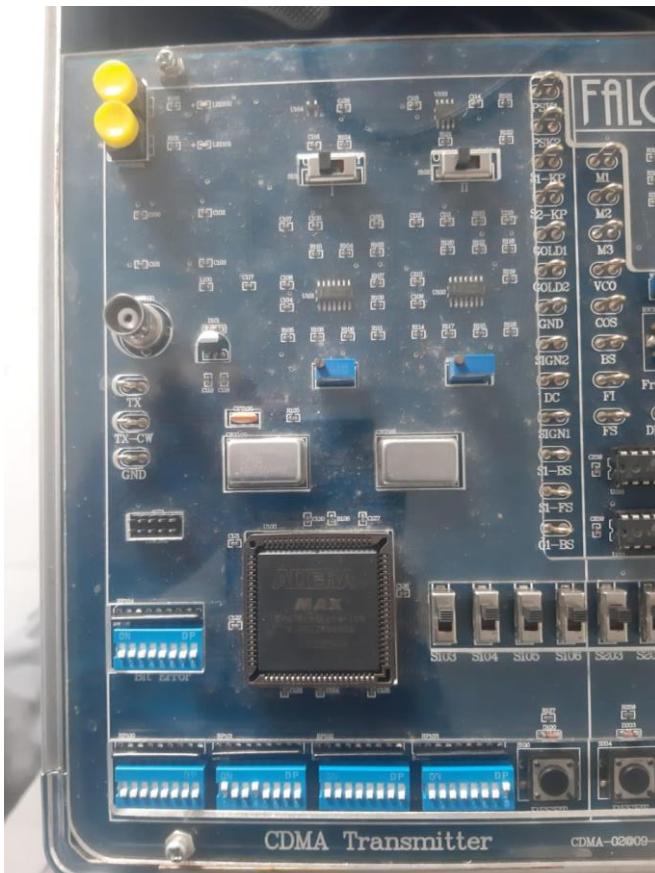


Fig.2 DSSS generation block diagram

DSSS Transmitter:



Procedure:

- 1) Equipped transmitting antenna and receiving antenna.
- 2) Plug in, turn on the AC switch in the right side of the main case. Press switch POWER100, POWER101, POWER200 and POWER201, corresponding LED LED100 LED101, LED200 and LED201 emit light, the transmitter and receiver of CDMA system start to work.
- 3) Dial all the dial-bit switches "signal code speed", "spread-spectrum code rate", "spread spectrum", "coding" of the transmitter, dial all the dial-bit switches of receiver "signal code speed", "spread-spectrum code speed rate", "track", "decode" Now the signal code speed rate of the system is 1Kbit/s, spread-spectrum code speed is 100Kbit/s.

Observations:

In this experiment, we are using Direct Series spread spectrum. Figure 3a and Figure 3b are the spectrums of PSK signal before and after spreading spectrum

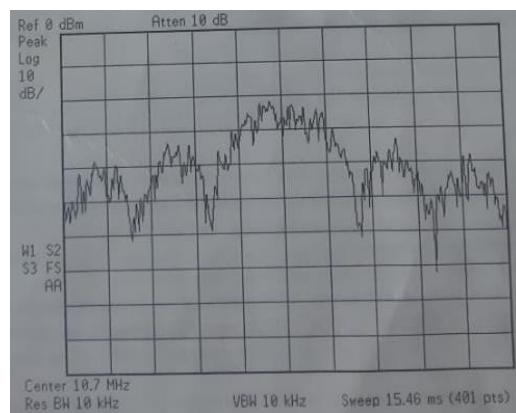
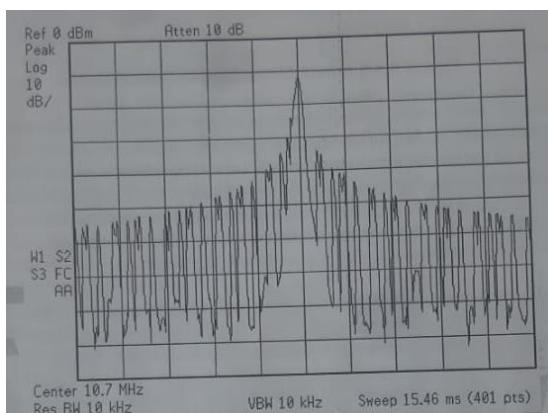


Fig.3 (a) spectrums of PSK signal before spreading (b) spectrums of PSK signal after spreading

Conclusion:

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