THADOMAL SHAHANI TSEC ENGINEERING COLLEGE

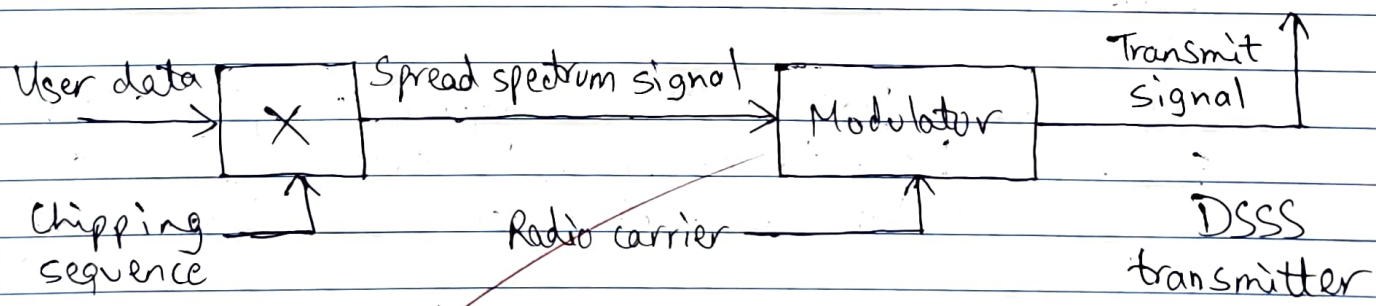
EXPERIMENT NO. 9

Aim :- Write a program to explain concept of DSSS.

Theory :-

Spread spectrum includes techniques involving spreading bandwidth needed to transmit data, reducing narrowband interference.
Direct sequence Spread Spectrum (DSSS) systems take a user bit stream and perform an (XOR) with a so-called chipping sequence.
Wireless systems use the sequence 10110111000, called as Barker's code. These Barker codes exhibit a good robustness against interference and insensitivity to multi-path propagation.

The first step in a DSSS transmitter, is the spreading of user data with chipping sequence (digital modulation).
The spread signal is then modulated with a radio carrier (radio modulation).

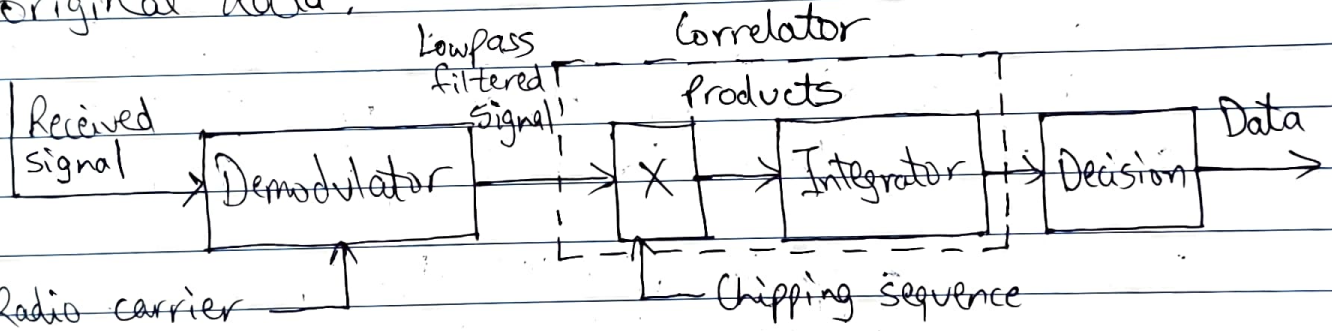


Assuming a user signal with a bandwidth of 1 Mhz, spreading it with 11-chip Barker code would result

in a signal with 11 MHz bandwidth. The radio carrier then shifts it to carrier frequency eg. 2.4Ghz. This signal is then transmitted.

DSSS Receiver :

The receiver has to perform inverse functions of two transmitter modulation steps. However, noise and multi-path propagation require additional mechanisms to reconstruct the original data.



First step in the receiver involves demodulating the received signal. This results in a signal with approximately same bandwidth as original spread spectrum signal.

The receiver has to know original chipping sequence, sequences have to be precisely synchronized since receiver calculates product of chip with incoming signal.

This comprises XOR operation. An integrator adds all these products.

Calculating products of chips and signal, adding products in an integrator is also called correlation.

Finally, in each bit period a decision unit samples sums generated by integrator and decides if this sum represents a binary 1 or a 0.

Eg. Transmission of user data 01.

Soln

User Data	0	1
XOR with Barker code	10110111000	10110111000
Spread Spectrum	10110111000	01001000111

They are concatenated to 22 digits and sent.
At receiver, perform XOR operations on received signal with same Barker's code.

Received signal	10110111000	01001000111
XOR with Barker code	10110111000	10110111000
Result	00000000000	11111111111

Now, result is given to integrator which performs sum of products. Sum of products for first part is 0 and next in 11. The decision unit maps sums less than 4 to binary 0, and sums larger than 7 to binary 1.

This constitutes the original user data i.e 01.

Conclusion :-

Thus, understood the concept of Direct Sequence Spread Spectrum (DSSS) and its significance in Mobile Computing.