MES COLLEGE ERUMELY

SEMINAR PRESENTATION

5TH GENERATION MOBILE TECHNOLOGY

(5G)

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WHAT IS 5G?

- 5G is the 5th generation mobile network.
- It is a new global wireless standard after 1G, 2G, 3G, and 4G networks

- deliver higher multi-Gbps peak data speeds, ultra low latency

WHAT DOES IT OFFER?

- High bandwidth
- Extraordinary data capabilities
- High connectivity
- More power & features in hand heldphones Large phone memory, more dialing speed,

COMPARISON BETWEEN 5G AND 4G

5G TECHNOLOGY

- It stands for the 5th generation mobile technology
- The maximum upload rate of 5G technology is 1.25 Gbps
- The maximum download rate of 5G technology is 2.5 Gbps
- . The latency of 5G technology is about 1 ms

4G technology

- It stands for the 4th generation mobile technology•
- The maximum upload rate of 4G technology is 500 Mbps
- The maximum download rate of 4G technology is 1 Gbps
- • The latency of 4G technology is about 50 ms

ADVANTAGES OF 5G

- Greater speed in the transmissions
- Lower latency
- Greater capacity
- A greater number of connected devices
- Huge possibilities
- Easily manageable with the previous generations
- Network slicing
- Very high bandwidth
- Huge applications

APPLICATIONS OF 5G

- High speed mobile networks
- Entertainment and multimedia
- IOT(internet of things)
- Smart home
- Smart city
- Smart farm
- Automotive.
- Emergency Communications.
- Factories of the Future.
- Health Care.

CONCLUSION

- 5G technology is going to be a new revolution in wireless systems marketing.
- 5G is the next frontier of innovation for entire mobile industry.
- 5G - a promising Generation of wireless communication that will change people’s lives
- Includes all the leading features of a wireless communication technology can have.

THANK YOU

SPREAD SPECTRUM TECHNIQUE

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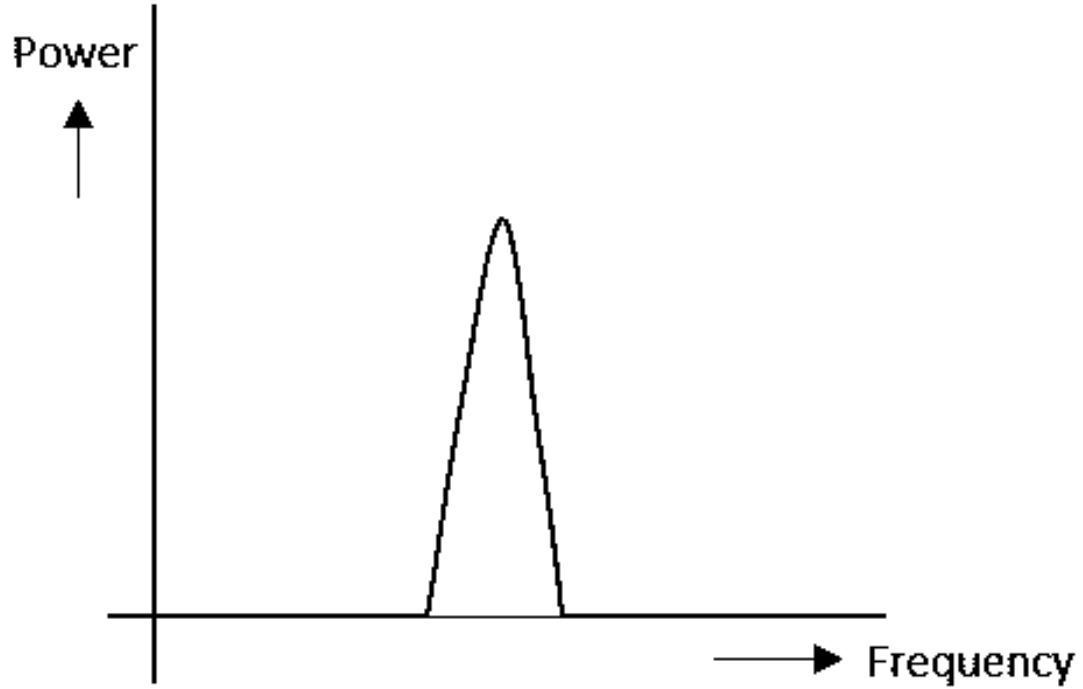
- Introduction
- Narrowband signal
- Spread spectrum signal
- Need of spread spectrum
- Different spreading techniques
- Advantages of spread spectrum
- Applications of spread spectrum
- Conclusion

What is spread spectrum 🤔

- "Spread Spectrum is a technique in which the transmitted signals of specific frequencies are varied slightly to obtain greater bandwidth as compared to initial bandwidth."

Narrow band signal

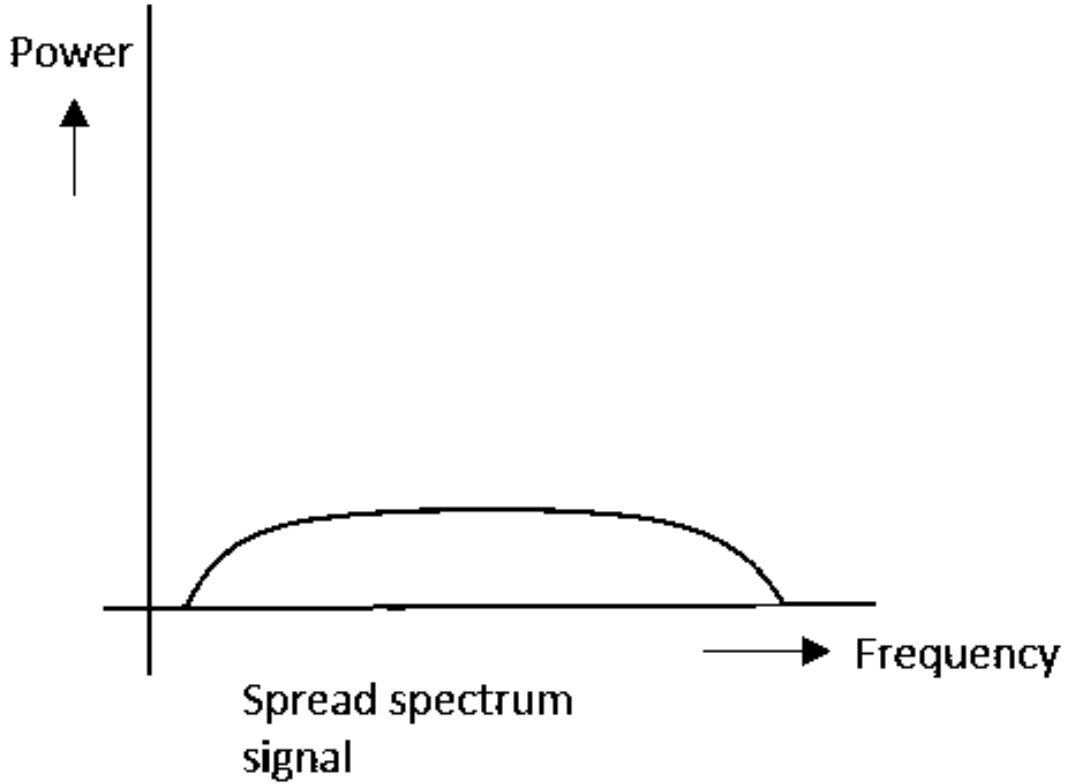


Narrow-band Signal

Features of Narrow band signals

- Band of signals occupy a narrow range of frequencies.
- Power density is high.
- Spread of energy is low and concentrated.

Spread spectrum signal



Features of spread spectrum signals

- Band of signals occupy a wide range of frequencies.
-
- Power density is very low.
-
- Energy is wide spread.

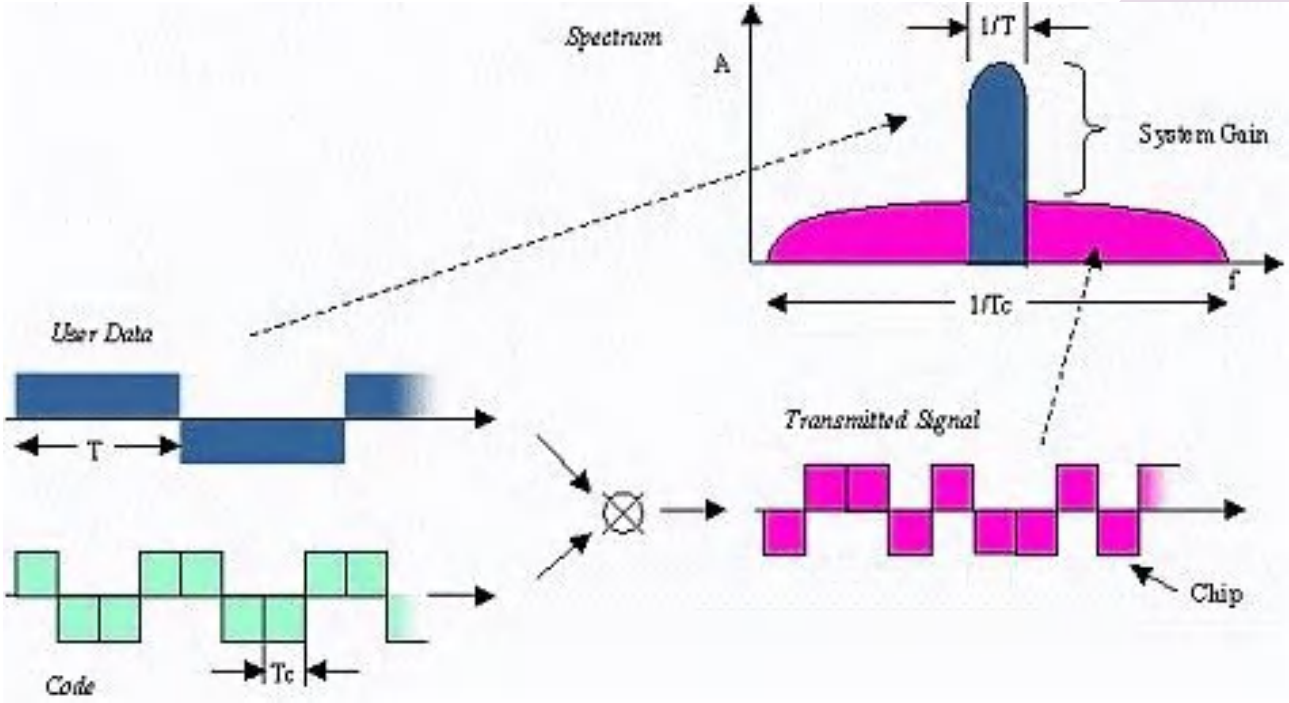
Need of spread spectrum

- establishment of secure communications,
- increasing resistance to natural interference,
- noise, and jamming,
- To prevent detection, to limit power flux density (e.g., in satellite downlinks),
- To enable multiple-access communications.

spread spectrum the transmissions signal bandwidth is much higher than the information bandwidth.
Their are numerous way to cause a carrier to spread.
2 step modulations
1)The data to be transmitted is modulated
2)carrier is modulated by the spreading code

Different spreading techniques

- Direct sequence (DS)
-
- Used to transmits Digital information
- Mix the digital information stream with a pseudo random code


Spectrum
A
1/T
System Gain
f
1/Tc
User Data
T
Transmitted Signal
Chip
Code
Tc

- DSSS - Direct Sequence Spread Spectrum
- Direct Sequence Spread Spectrum (DSSS) is a spread spectrum technique whereby the original data signal is multiplied with a pseudo random noise spreading code.
- This spreading code has a higher chip rate (this the bitrate of the code), which results in a wideband time continiuous scrambled signal.

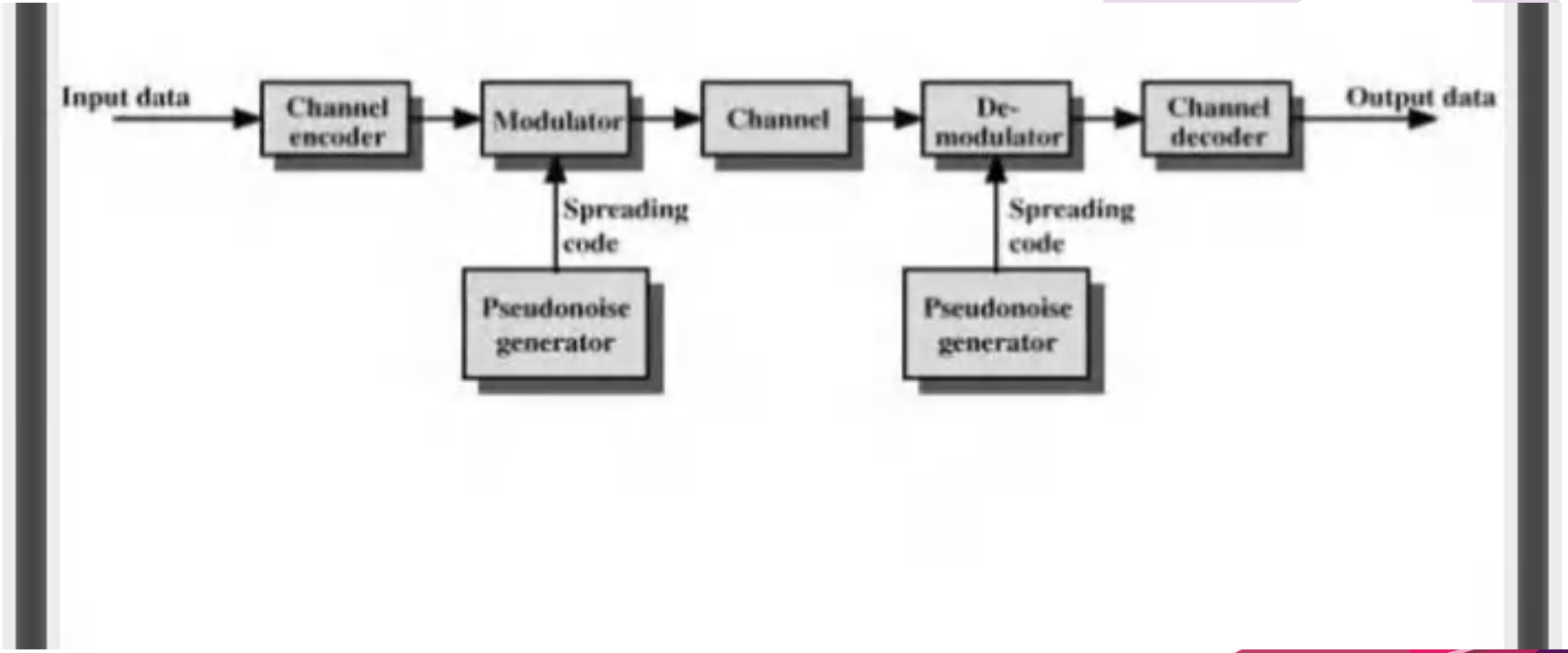
- DSSS significantly improves protection against interfering (or jamming) signals
-
- narrowband and makes the signal less noticeable.
- It also provides security of transmission if the code is not known to the public.
- These reasons make DSSS very popular by the military.
-
- In fact, DSSS was first used in the 1940s by

- DSSS can also be used as a multiple access technique
-
- whereby several different pseudo random spreading codes are being used simultaneously.
-
- This multiple access technique is better known as Direct Sequence CDMA.

Frequency Hopping (FH)

- Frequency Hopping Spread Spectrum (FHSS) is a method of transmitting radio signals by rapidly switching a carrier among many frequency channels, using a pseudorandom sequence known to both transmitter and receiver.
- The data signal is modulated with a narrowband carrier signal that "hops" in a random but predictable sequence from frequency to frequency as a function of time over a wide band of frequencies

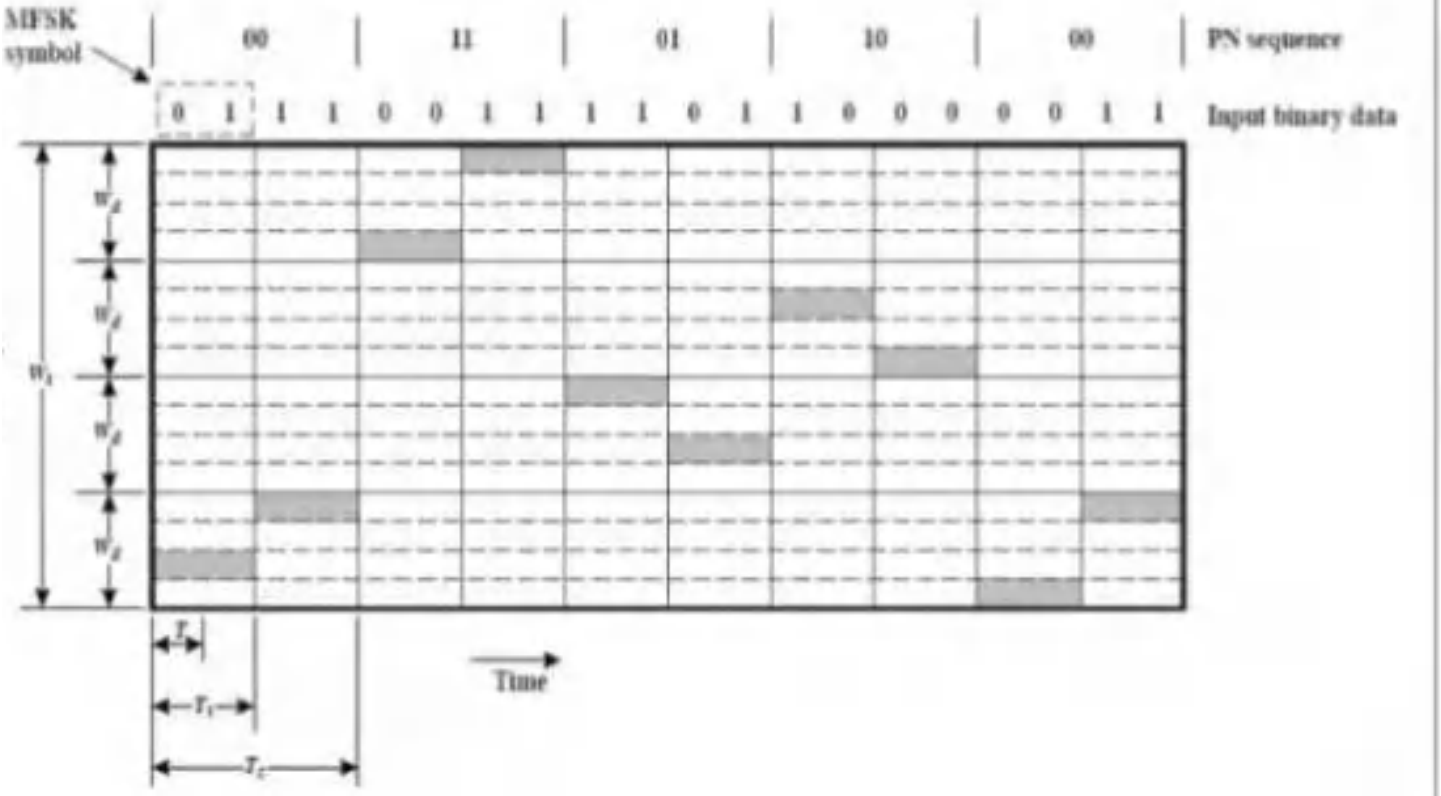
Block diagram of FHSS



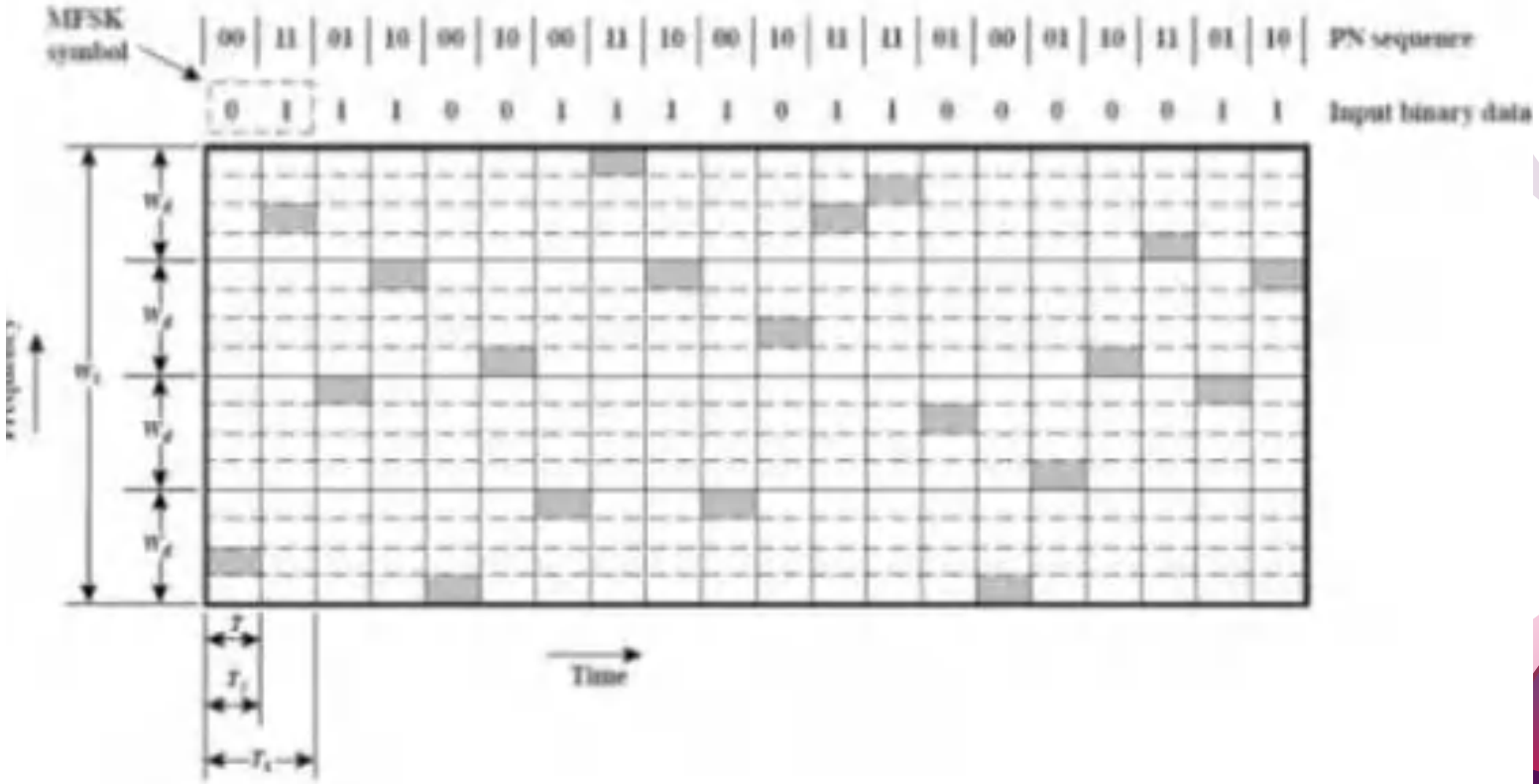
Types of FHSS

- THERE ARE TWO TYPES OF FREQUENCY HOPPING:
- 1. SLOW FREQUENCY HOPPING SPREAD SPECTRUM
- 2. FAST FREQUENCY HOPPING SPREAD SPECTRUM

Slow FHSS


MFSK symbol
00
11
01
10
00
PN sequence
0 1 1 1 0 0 1 1 1 1 0 1 1 0 0 0 0 0 1 1
Input binary data
W_d
W_s
T_c
T_s
T_b
Time

Fast FHSS


MFSK symbol
00 11 01 10 00 10 00 11 10 00 10 11 11 01 00 01 10 11 01 10
PN sequence
0 1 1 1 0 0 1 1 1 1 0 1 1 0 0 0 0 0 1 1
Input binary data
Frequency
Time

Uses of FHSS

- Military use
- Bluetooth
- • Walkie-Talkies
- • Other radios

Military Use

- • Spread-spectrum signals are highly resistant to deliberate jamming, unless the adversary has knowledge of the spreading characteristics.
- • Military radios use cryptographic techniques to generate the channel sequence under the control of a secret Transmission Security Key (TRANSEC) that the sender and receiver share in advance.

Bluetooth

- Adaptive Frequency- hopping spread spectrum (AFH) (as used in Bluetooth)
- improves resistance to radio frequency interference by avoiding crowded frequencies in the hopping sequence.
- This sort of adaptive transmission is easier to implement with FHSS.

Walkie-Talkies

- • Some walkie-talkies that employ frequency-hopping spread spectrum technology have been developed for unlicensed use on the 900 MHz band. Several such radios are marketed under the name eXtreme Radio Service (eXRS).
-
- • Motorola has deployed a business-banded, license- free digital radio that uses FHSS technology: the DTR series, models 410, 550

Time hopping

- In a time hoped signal the carrier is ON-off keyed by the pseudo-noise (PN) sequence resulting a very low duty cycle
-
- The speed of keying determines the amount of signal spreading

Chrip

- In digital communications, chirp spread spectrum is a spread spectrum technique that uses wideband linear frequency modulated chirp pulses to encode information.
- A chirp is a sinusoidal signal whose frequency increases or decreases over time.

Hybrid systems

- Hybrid spread-spectrum (HSS) systems, which combine
- direct-sequence (DS) and frequency-hopping (FH) spread-spectrum (SS) techniques, are attractive for their strong multiple-access capabilities.
- Resistance to multipath fading and intentional/unintentional jamming, and

Advantages of spread spectrum

- Cross-talk elimination
- Better output with data integrity
- Reduced effect of multipath fading
- Better security
- Reduction in noise
- Co-existence with other systems
- Longer operative distances
- Hard to detect
- Not easy to demodulate/decode

Applications of spread spectrum

- Interference –Prevents interference at specific frequencies –E.g. other radio users, electrical systems
- Military –Prevents signal jamming –Scrambling of ‘secret’ messages
- Wireless LAN security –Prevents ‘eavesdropping’ of wireless links –Prevents ‘hacking’ into wireless LANs
- CDMA (Code Division Multiple Access) –Multiple separate channels in same medium using

Application's of Spread Spectrum

- Cellular Telephony
- Global Positioning System (GPS)
- Wireless local area network
- Secure communication in military

Conclusion

- It can be seen that the Spread Spectrum Communication has an important place in the various communication systems with various features.

- The spread spectrum communication has an advantage of multiple user in single system with multiple channels at a same time.

- It is not only used in the industrial systems but can also be implemented this communication system in the household or general use.

- Being a simple but at the same time its effectiveness, places this communication type at the most of the reliable communication system.

Thank you