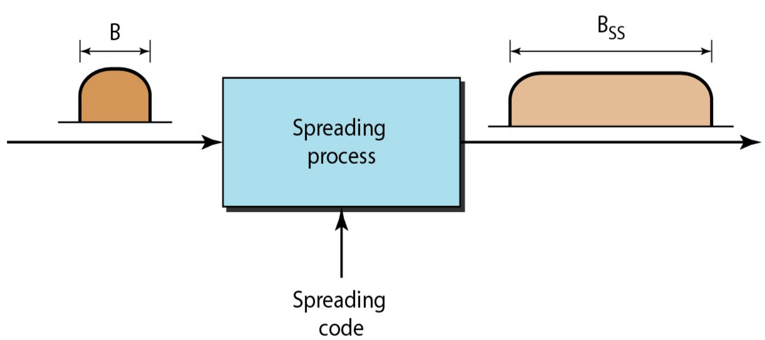
Course Name: A Level (2^{nd} Sem) Subject: DCN

Topic: Spread Spectrum Date: 19-03-20

Spread Spectrum:

- In spread spectrum, we combine signals from different sources to fit into a larger bandwidth (like multiplexing), but spread spectrum is designed to be used in wireless applications (LANs and WANs). In these types of applications, we have some concerns that outweigh bandwidth efficiency.
- In wireless applications, all stations use air (or a vacuum) as the medium for communication. Stations must be able to share this medium without interception by an eavesdropper and without being subject to jamming from a malicious intruder (for e.g. in military operations).
- To achieve these goals, spread spectrum techniques add redundancy; they spread the original spectrum needed for each station. If the required bandwidth for each station is B, spread spectrum expands it to Bss' such that Bss » B. The expanded bandwidth allows the source to wrap its message in a protective envelope for a more secure transmission.



Spread spectrum achieves its goals through **two** principles:

1. The bandwidth allocated to each station needs to be, by far, larger than what is needed. This allows redundancy.
2. The expanding of the original bandwidth B to the bandwidth Bss must be done by a process that is independent of the original signal. In other words, the spreading process occurs after the signal is created by the source.

After the signal is created by the source, the spreading process uses a spreading code and spreads the bandwidth. The figure shows the original bandwidth B and the spreaded bandwidth Bss. The spreading code is a series of numbers that look random, but are actually a pattern.

There are **two techniques** to spread the bandwidth:

1. Frequency Hopping Spread Spectrum (FHSS)
2. Direct Sequence Spread Spectrum (DSSS).

Exercises:

1. **Define Spread Spectrum. Why does spread spectrum technique add redundancy? Explain.**

2. **Discuss the principles through which spread spectrum achieves its goal.**