**2. What are DSSS and FHSS? How do they work?**

**DSSS – Direct Sequence Spread Spectrum**

**Definition:**  
DSSS is a spread spectrum technique where the original data signal is combined with a high-rate chipping code to spread it over a wider frequency band.

**Working:**  
In DSSS, each bit of data is multiplied by a unique pattern of faster bits (called chips). This process spreads the signal across a broader frequency range. At the receiver end, the same chipping sequence is used to decode and retrieve the original signal. Even if some bits get affected by noise, the overall data can still be recovered because of the spreading.

* It uses more bandwidth but improves reliability.
* Because the signal is spread out, it becomes less prone to interference and appears as noise to unintended receivers.
* It’s mainly used in 802.11b Wi-Fi.

**FHSS – Frequency Hopping Spread Spectrum**

**Definition:**  
FHSS is another spread spectrum technique where the signal rapidly hops between different frequencies in a predefined sequence.

**Working:**  
Instead of staying on one frequency, FHSS transmits data over multiple smaller frequency channels, hopping from one to another based on a synchronized pattern. The receiver follows the same pattern to collect the full signal. If there's interference on one frequency, it only affects a small part of the transmission.

* It doesn't use wide bandwidth at once, but spreads the signal over time by hopping.
* It’s great for avoiding interference and makes the signal harder to jam or intercept.
* Mostly used in Bluetooth and early Wi-Fi versions.