

Wireless LAN Networks : Channel Management

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Talking about Channel Management. Frequency Channel Saturation, this is a very big topic. Here we just briefly discuss three different types of frequency channel separation.

The first type is Direct-Sequence Spread Spectrum (DSSS).

As previously explained, Wireless LAN devices have transmitters and receivers tuned to specific frequency or radio wave to communicate. A common practice is for frequency to be allocated as ranges. Such ranges are then split into smaller ranges called channels. If the demand for a specific channel is too high, that channel is likely to become over-saturated. The saturation of the wireless medium degrades the quality of the communication.

Over the years, a number of techniques have been created to improve wireless communication and alleviate saturation. The techniques listed below mitigate channel saturation by using the channels in a more efficient way.

- DSSS, Direct-Sequence Spread Spectrum is a modulation technique. Spread-spectrum is designed to spread a signal over a larger frequency band, making it more resistant to interference you can see in 22 MHz. With DSSS the signal is multiplied by a “crafted noise” known as a spreading code. Because the receiver knows about the spreading code, so when it was added, it can mathematically remove it and re-construct the original signal. In effect, this creates redundancy in the transmitted signal in an effort to counter quality loss in the wireless medium. DSSS is used by 802.11b. It is also use by cordless phones operating in the 900 MHz, 2.4 GHz, 5.8 GHz bands.
- Frequency-Hopping Spread Spectrum or FHSS. FHSS also relies on spread-spectrum methods to communicate. It is similar to DSSS but transmits radio signals by rapidly switching a carrier signal among many frequency channels. With the FHSS, sender and receiver must be synchronized to “know” which channel to jump. This channel hopping process allows for a more efficient usage of the channel, decreasing channel congestion. Walkie-talkies and 900 MHz cordless phones also use FHSS, and Bluetooth uses a variation of FHSS. FHSS is also use by the original 802.11 standard.
- Orthogonal Frequency Division Multiplexing (OFDM) is another modulation method, is a subset of Frequency Division Multiplexing in which a single channel utilizes multiple sub-channels on adjacent frequencies. Sub-channels in an OFDM system are precisely orthogonal to one another, which allow the sub-channels to overlap without interfering. As a result, OFDM systems are able to maximize spectral efficiency without causing adjacent channel interference. OFDM actually transmits in parallel of the signal, that's why it maximises spectral efficiency. In effect, this makes it easier for a receiving station to “hear” the signal, and because OFDM uses sub-channels, channel usage is very efficient. OFDM is used by a number of communication systems including 802.11a/g/n/ac.



These are just some of the examples of DSSS. DSSS use spreading code, more redundant information but easier for the receiver to assemble a signal.

Frequency-Hopping Spread Spectrum is more efficient using of the channel by hopping around, avoiding channel saturation.

OFDM example use sub-channels, and it can transmit in parallel, multiple signals at the same time. So, it extend the efficiency of the channels.