IEEE P802.11
Wireless LANs
Universal DSSS and HRDS Channelization

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Abstract

A mechanism is presented to allocate and identify channels for direct sequence PHYs in any arbitrarily situated regulatory band. The mechanism includes an algorithm for channel assignment and a set of parameters that define the band to be used and other factors that may be necessary for regulatory compliance.

There are a small number of parameters that may be used to define a radio band. These parameters describe its location in the spectrum, its extent, and any guard band necessary for compliance with out of band emission limits given the transmitted spectrum of the DSSS and HRDS waveform. The parameter F_L defines the lower band edge of the allocated spectrum. Similarly, F_U defines the upper band edge. Thus, the allocated spectrum can be determined from:

$$BW_A = F_U - F_L \qquad \text{(equation 1)}$$

For compliance with out of band emissions, a guardband may be needed at either or both of the lower and upper extents of the allocated band. The guardband necessary at the lower extent of the allocated band is given by BW_{LG}. The guardband at the upper extent of the allocated band is given by BW_{UG}. Either, or both of these parameters may be zero, should a guardband not be required. With the required guardbands known, and the allocated bandwidth calculated, the useful bandwidth, BW_U, may be calculated. The useful bandwidth is the bandwidth that remains once the guardbands are taken from the upper and lower portions of the allocated spectrum. Thus the useful bandwidth is:

$$BW_U = BW_A - \left(BW_{UG} + BW_{LG}\right) \qquad \text{(equation 2)}$$

The number of channels, n_{max}, that may be allocated within the useful bandwidth is determined from the useful bandwidth, the bandwidth of the channel, BW_C, and the channel spacing, f_{space}. A half-width of the channel bandwidth is subtracted form the useful bandwidth at both the upper an lower edges of the band. The result is divided by the channel spacing. Both the bandwidth of the channel and the channel spacing are parameters used as input to this mechanism. For the DSSS and HRDS PHYs, the bandwidth of the channel is 22 MHz. Thus, the maximum number of channels that may be supported is given by:

$$n_{max} = \left\lceil \frac{(BW_U - BW_C)}{f_{space}} \right\rceil \quad \text{(equation 3)}$$

The mechanism described here allocates channels within the useful bandwidth, starting from the lower edge of that bandwidth. This may result in an asymmetric assignment of channels in the useful bandwidth, leaving any unused bandwidth at the upper edge of the useful bandwidth. The lower edge of the useful bandwidth is obtained by adding the bandwidth of the lower guardband to the lower edge of the allocated bandwidth.

$$F_{LU} = F_L + BW_{LG} \quad \text{(equation 4)}$$

Now, if n is the channel number, the center frequency of channel n, f_n, is given by

$$f_n = F_{LU} + \frac{BW_C}{2} + (n-1) \times f_{space} \quad \text{(equation 5)}$$

An example of how the parameters may be set to duplicate the channel assignment in Table 64 of ISO/IEC 8802-11: 1999(E) is shown here. All values are shown in MHz, though it is not desirable to use MHz as the unit in the standard, because of the need to represent fractions for some bands.

$$F_U = 2483.5$$
$$F_L = 2400.0$$
$$1 \le BW_{UG} \le 5.5$$
$$BW_{LG} = 1$$
$$BW_C = 22$$
$$f_{space} = 5$$

These parameters result in 11 channels, spaced at 5 MHz, beginning at 2412 MHz.

The equations used to determine the number of channels and channel centers can be implemented simply, as a general algorithm that can determine a channel allocation for any band sufficient to support at least a single channel. A mechanism for supplying the seven parameters and an identifier for the regulatory domain is all that is needed to allow an implementation to automatically create a channel allocation for a new regulatory domain and begin operation.
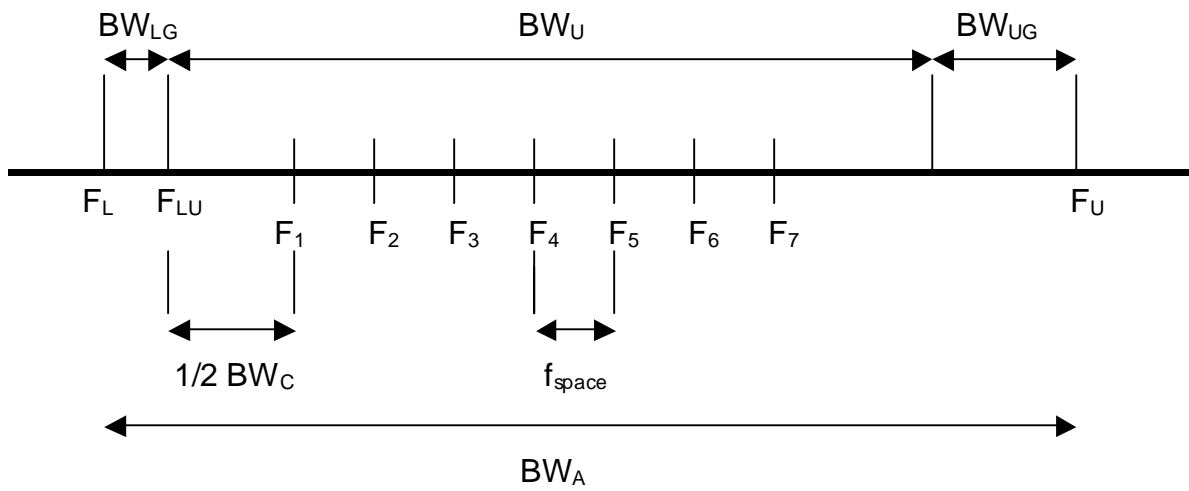
Figure 1, Parameters for Channel Allocation