

Data Communications and Networking Fourth Edition



Chapter 6

Bandwidth Utilization: Multiplexing and Spreading

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6.1

6-1 SPREAD SPECTRUM

In spread spectrum (SS), we combine signals from different sources to fit into a larger bandwidth, but our goals are to prevent eavesdropping and jamming. To achieve these goals, spread spectrum techniques add redundancy.

Topics discussed in this section:

- Frequency Hopping Spread Spectrum (FHSS)
- Direct Sequence Spread Spectrum (DSSS)

Spread Spectrum

- A signal that occupies a bandwidth of B, is spread out to occupy a bandwidth of B_{ss}
- All signals are spread to occupy the same bandwidth B_{ss}
- Signals are spread with different codes so that they can be separated at the receivers.
- Signals can be spread in the frequency domain or in the time domain.

Figure 6.27 Spread spectrum



Figure 6.28 Frequency hopping spread spectrum (FHSS)



Figure 6.29 Frequency selection in FHSS



Figure 6.30 FHSS cycles



Figure 6.31 Bandwidth sharing



Figure 6.32 DSSS



Figure 6.33 DSSS example

