Access Algorithm

- The hidden node problem.
- The exposed node problem.

1. A listens to the carrier
   (a) If busy, wait with 1-persistence
   (b) If idle, backoff a random number of slots and go to 1, if still idle send, otherwise continue backoff.
   (c) If another station is heard while waiting, go to 1.
2. A sends a Request-to-send to B that includes the length.
3. B sends a Clear-to-send to B that echos the length.
4. A sends the data. All stations hearing refrain.
5. If correctly received B sends an acknowledgement. Otherwise, it sends nothing.

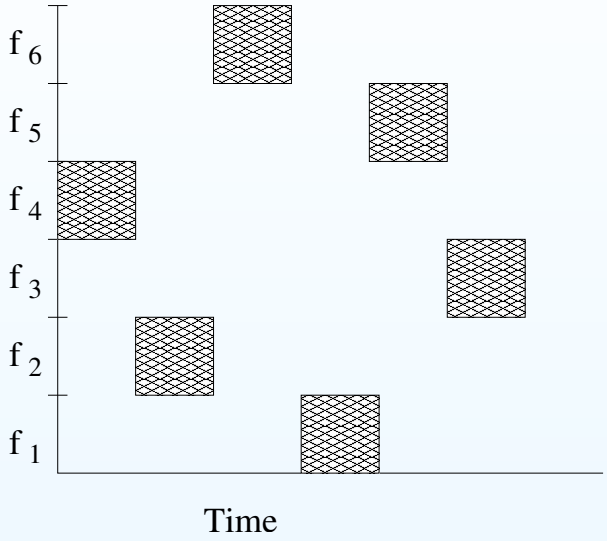
BSS Control

- AP's Beacon 10 - 100 times per second.
- Stations send Probe frames asking for information and get back Probe Response Frames.
- Roaming stations send Association Request Frames and get back Association Response Frames.
- Weakened signals result in new probing efforts.
- Authentication is required if the AP uses WEP.

Spread Spectrum

- You get an 83.4 MHz band and you want high speeds.
- Lots of users.
- A lot of other traffic in a relatively small band.
- Spread spectrum attempts to avoid difficulties by using this band cleverly.

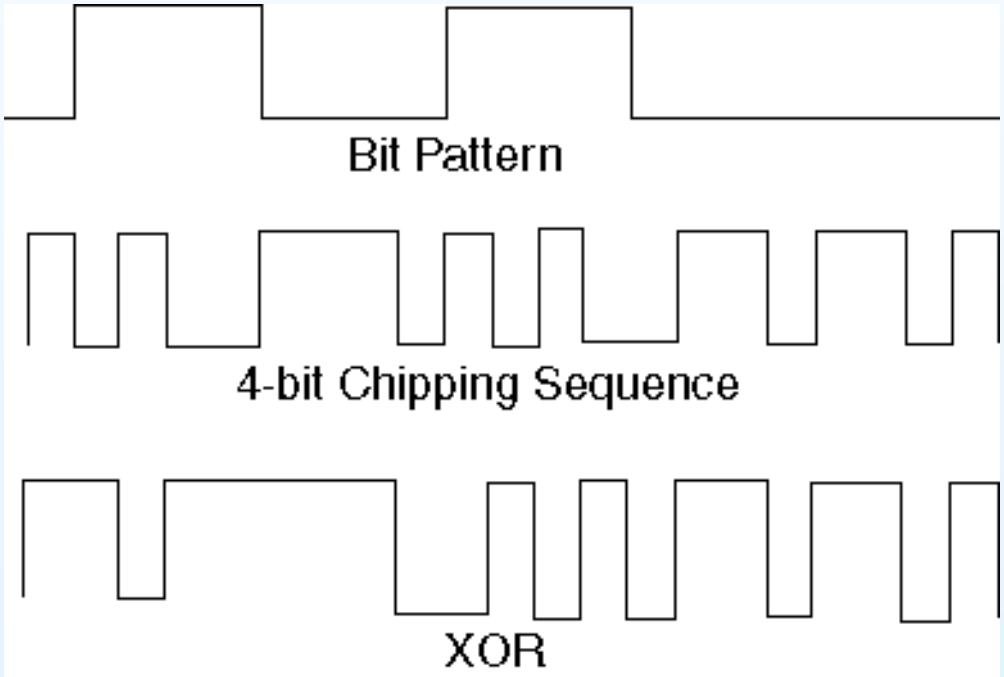
Frequency Hopping Spread Spectrum



- 79 1 MHz bands.
- The frequency used changes every 300 ms.
- Pattern is "random" but with a known seed.
- Both ends use the same pseudorandom sequence.
- Collisions with non-802.11b traffic will be temprorary.
- FHSS uses 500 k baud with either 2 or 4-bit FSK encoding.

Direct Sequence Spread Spectrum

- XOR the bit stream with a known N-bit *chipping sequence*.
- Each message bit is replaced with N bits.
- Receiver correlates a message with the chipping sequence to extract.



- 802.11b uses an 11-bit chipping sequence (11 MHz channels) at 1 and 2 Mbps (Barker Sequence is +-++-+++—).
- At 5 and 11 Mbps the 8-bit Complementary Code Keying sequence.
- Channels are 13 MHz with 5 MHz separation.
- PSK encoding is used.
- DSSS increases the required capacity but it adds information that can be used to extract the message even from a moderately corrupted message.

Performance

Similar to CSMA, but with different slot times and greater costs in the case of a collision.

- Management frame are 34 bytes, so a send requires at least one RTS, one CTS, the frame send and the ACK.
- Errors can be handled as with CSMA/CD by determining the expected number of failures.
- The cost of a failure can be the loss of the RTS or CTS or it can be the loss of the message or ACK, which results in a completely new cycle.
- Backoff cycles are difficult to deal with.