Throughput Comparisons for Various Preamble Modes

Kent Rollins
Harris Semiconductor
Throughput Comparisons

- High Speed extension provides three options for preamble and header
  - Compatible “Long” preamble and header
  - Short Preamble and Header with 5.5 or 11 Mbps data packets
  - FH Compatible Mode with FH preamble and header and DS short preamble and header with 5.5 or 11 Mbps data packets
Frame Duration Comparison

<table>
<thead>
<tr>
<th>Service</th>
<th>Service</th>
<th>CRC 16 bits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLCP Header</td>
<td>48 bits</td>
<td>16 bits</td>
</tr>
</tbody>
</table>

MPDU 690 bytes

144 + 48 = 192

PLCP Header

SYNC+ 72 bits

<table>
<thead>
<tr>
<th>Service</th>
<th>Service</th>
<th>Length 16 bits</th>
<th>CRC 16 bits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLCP Header</td>
<td>48 bits</td>
<td>16 bits</td>
<td></td>
</tr>
</tbody>
</table>

MPDU 690 bytes

9 + 779.0 = 788

698
Simple Throughput Comparison

MPDU 690 bytes

960 Bytes in 1148 microsec → 6.7 Mbps effective throughput

Sync/SFD 48 bits

960 Bytes in 880 → 8.7 Mbps effective throughput

PLCP 48 bits

Ack

Sync/SFD 48 bits

48 bits

144 bits

48 bits

144

698

10.00

144

48 bits

10.00

48 bits

9

698

880.0

144
Throughput Comparison

- Short Preamble
- Long Preamble
- 2 Mbps

Bytes/Packet vs. Mbps
RTS CTS Effect on Throughput

• Long preamble has the advantage of utilizing the RTS/CTS mechanism to reduce collisions due to hidden nodes

• The extra transaction on each packet reduces the overall throughput
Effective Throughput with RTS/CTS

- Effective Data Rate Long Preamble Mbps
- Effective Data Rate Short Preamble Mbps
- Effective Data Rate 2 Mbps Mbps

Data Length (Bytes) vs. Mbps

- 64, 128, 256, 384, 512, 640, 768, 896, 1024, 1152, 1280, 1408, 1536, 1600
Comparison with Loading

• Simulates the effect of back-off’s on the throughput with short and long preamble
• Effect of preamble length is less with increasing load
Comparison of Throughput with Loading

![Graph showing comparison of throughput with loading](image-url)
Throughput with FH Compatibility Mode

- FH compatible mode is defined in the standard
- Utilizes the FH preamble and header with the DS Short Preamble and high speed data packet
- Effective throughput is between that realized for the long and short preamble DS modes
Comparison: Long Preamble and FH Compatible Mode

- FH Pre. 96 bits
- Sync 72 b’s
- MPDU 690 bytes

- FH Header 32 bits
- PLCP 48 bits
- Ack 72 bits

- 960 Bytes in 1148 microsec
- 6.7 Mbps effective throughput

- 7.6 Mbps effective throughput

- 144 bits
- 144 bits
- 144 bits
Comparison of FH Interoperable Mode

Bytes per Packet vs. Mbps

- Short Preamble
- FH Effective Rate
- Long Preamble

Legend: