SPI-4 Length and Signal Specification

Interconnect requirements
Budget – engineering – PIP/SSM
Interconnect Requirements

• SPI-4 specifies the Driver/Receiver Specifications
  – Interconnect must deliver to the receiver a signal level at the receiver mask.
  – Specifying loss is not the full answer for the bulk media.
    • 6 db for a loaded cable – 6 db for connectors and loads.
    • 12 db for point to point
SPI-4 requirements

Notes:
1) the multidrop specification is based on a 3 meter maximum length with 30 AWG wire

2) the point to point is based on a 25 meters maximum length with 30 AWG wire

3) curve shape is $K \times \sqrt{f}$

Maximum allowable (end to end) $S21$ vs log frequency
## SPI-4 Table 11

Table 11 - Attenuation requirements for SCSI cable media

<table>
<thead>
<tr>
<th>Distance between SCSI bus terminators (meters)</th>
<th>Attenuation per meter maximum (dB) at 200 MHz</th>
<th>Attenuation of length equivalent to terminator to terminator distance maximum (dB) at 200 MHz</th>
<th>Distances are consistent with these minimum size conductors when used with high quality dielectrics</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 9</td>
<td>0.63</td>
<td>6</td>
<td>0.032 4 mm² (32 AWG) solid/ 0.050 92 mm² (30 AWG) stranded</td>
<td>multiple loads allowed</td>
</tr>
<tr>
<td>0 to 12</td>
<td>0.48</td>
<td>6</td>
<td>0.050 92 mm² (30 AWG) solid/ 0.080 42 mm² (28 AWG) stranded</td>
<td>multiple loads allowed</td>
</tr>
<tr>
<td>&gt;12 to 25</td>
<td>0.48</td>
<td>12</td>
<td>0.050 92 mm² (30 AWG) solid/ 0.080 42 mm² (28 AWG) stranded</td>
<td>point to point only</td>
</tr>
</tbody>
</table>

*Note:* Both the per meter and the length equivalent to the terminator to terminator spacing requirements shall be simultaneously met
Budget for interconnect

• The frequency specified in SPI-4 may not be accurate for the signals.
  – 200 MHz points depends a lot on the dielectric characteristics
  – Length specifications without fully specifying the media limits the design engineers.
  – Leaving the requirements to PIP and SSM to model the full characteristics of the interface is a better solution.
SPI-5 issues

• Cables may have periodic structures that will have high losses at 160 MHz, but not at 200 MHz.
  – A cable that passes the 200 MHz test may not work for Fast-320, with 160 MHz signals.
  – Swept frequency or driver to Receiver mask is better, leaving the details to PIP and SSM.