Consensus proposal for AUI error requirements

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Goals

• Propose a value for the COM parameter $\text{DER}_0$ to enable progress on AUI specifications
  • With examples of measured BER

• Summarize the results presented in previous presentations
Two different views:

**2e-5 per host**
- [ran_3dj_01_2305](#) (slide 14): “Random BER of 2e-5 for AUIs within each host”

**5e-5 per host**
- [ghiasi_3dj_02_2305](#) (slide 9): “Recommend to allocate 5E-5 per host PHY”
  - The electrical adhoc can take the 5E-5 decide how to divide between C2C and C2M
  - Starting point could be by allocating pre-FEC BER of 4E-5 for C2M and 1E-5 to C2C
- [patra_3dj_01a_2305](#) (slide 13): C2C BER 1e-5, C2M BER 4e-5 (total 5e-5)
What is the real difference?

• Let’s look at the total “BER” without dividing it between C2M and C2C
• The 2e-5 proposal is for Random BER
  • Translated to DER0=2.67e−5
  • ran_3dj_01_2305: “Specifications will be in terms of FLR or similar... details TBDL”
• The 5e-5 proposal is for Measured BER with precoding
  • patra_3dj_01a_2305: “All the BER limit described in this table represent Worse case BER with DFE alpha 0.75 to represent Burst error events”
  • Due to precoding, the measured BER will be 2x the random BER
  • This proposal assumes a random BER of 5e-5/2=2.5e-5
• So the difference is 2e-5 vs 2.5e-5
What does it mean?

If we allocate all the error budget to a single AUI per host:

<table>
<thead>
<tr>
<th>Host Random BER</th>
<th>2e-5</th>
<th>2.5e-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM parameter DER₀</td>
<td>2.67e-5</td>
<td>3.33e-5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measured average BER</th>
<th>Without precoding, no error propagation (a=0)</th>
<th>2e-5</th>
<th>2.5e-5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Without precoding, medium error propagation (a=0.35)</td>
<td>3.1e-5</td>
<td>3.9e-5</td>
</tr>
<tr>
<td></td>
<td>Without precoding, maximum error propagation (a=0.75)</td>
<td>8e-5</td>
<td>1e-4</td>
</tr>
<tr>
<td></td>
<td>With precoding</td>
<td>4e-5</td>
<td>5e-5</td>
</tr>
</tbody>
</table>

If we divide the error budget between two AUIs, all numbers scale accordingly.

Due to symbol muxing, the effect of correlated errors on RS-FEC performance and FLR is small, despite the large differences in measured average BER.

For example, the last two rows have a factor of 2 in measured BER but yield almost the same performance.

Alternatives to average BER measurement should be considered.
Proposal

• Adopt DER0 value of 2.67e-5, equivalent to measured BER of 4e-5 with precoding ON, for higher-loss AUIs within a PHY
  • Division between C2C and C2M to be determined
  • Measurement method for compliance to be determined