10Gb/s Electrical Interface Proposal for 40GbE and 100GbE

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• Introduction
• Benefits of XAUI to 10GbE
• Purpose of Defining Electrical Interface in 40/100GbE
• XFI Interface Proposal
• Conclusion
The 40/100 GbE standard will benefit from standardizing a 10G serial electrical interface
- Similar to the benefits XAUI brought to 802.3ae

XFI is a 10G serial interface which can be leveraged to provide this function
• Provided the industry with a starting point
  – low cost, common interface for discrete / pluggable components commonly used in 10G Ethernet Systems
  – Prevented significant segmentation which would have delayed deployment & resulted in higher cost
  – Provided a standard based mechanism to communicate 10Gb/s over multiple lanes

• XAUI is still used as an interface to ASICs, SERDES, Repeaters, modules!
- XLAUI/CAUI based on simple SerDes interface “XFI” ensure low cost, common interface for discrete / pluggable components commonly used in 40G / 100G Ethernet Systems
  - ASIC, SERDES, Repeaters, Modules….

- Previously in ghiasi_01_0108, a unified PMD interfaced was proposed but received significant resistance as this implementation would burden all PMDs with Gearbox.
- Use of robust simple SerDes interface meets 40G/100G technical requirements and schedule objectives.
  - XLAUI/CAUI allow the standard to move forward by eliminating interdependencies of different PMD type.
  - Since XLAUI/CAUI are optional layers unified PMD interface can still be implemented for specific applications on in future.
• XFI Interface can be leveraged to satisfy 40G/100G requirements
  – 10G Serial Interface which can be used to communicate 40G or 100G by using n lanes where n = 4 or 10
  – Flexible enough to allow for numerous system architectures

• Greater than 50 networking companies with products associated with XFI

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Interface</td>
<td>supports retimed, limiting, and linear for 40G/100G</td>
</tr>
<tr>
<td>Robust Interface</td>
<td>currently used to communicate 10GbE data, can be leveraged to satisfy 40G/100G objectives</td>
</tr>
<tr>
<td>Schedule</td>
<td>Leverage SFF Committee work</td>
</tr>
</tbody>
</table>
Common Interface – Retimed, Linear, Limiting

Retimed:
- ASIC SERDES
- CDR + LD
- TOSA
- CDR + LA
- ROS A

Limiting:
- ASIC SERDES
- CDR
- LD
- TOSA
- LA
- ROS A

Linear:
- ASIC SERDES
- CDR
- LD
- TOSA
- CDR + EDC
- ROS A

Optical Module

n x XFI
Common Interface – 40G, 100G

40G

ASIC SERDES

4 x XFI

TOSA

ROS A

100G (Gen I)

ASIC SERDES

10 x XFI

TOSA

ROS A

100G (Gen II)

ASIC SERDES

10 x XFI

4 x 25G

Optical Module
Robust Interface

Table 47-2—Driver template intervals

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Near-end value</th>
<th>Far-end value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1</td>
<td>0.175</td>
<td>0.275</td>
<td>UI</td>
</tr>
<tr>
<td>X2</td>
<td>0.390</td>
<td>0.400</td>
<td>UI</td>
</tr>
<tr>
<td>A1</td>
<td>400</td>
<td>100</td>
<td>mV</td>
</tr>
<tr>
<td>A2</td>
<td>800</td>
<td>800</td>
<td>mV</td>
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</table>

Table 47-2—Driver template intervals

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Near-end value</th>
<th>Far-end value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1</td>
<td>0.170</td>
<td>0.305</td>
<td>UI</td>
</tr>
<tr>
<td>X2</td>
<td>0.420</td>
<td>NA</td>
<td>UI</td>
</tr>
<tr>
<td>A1</td>
<td>170</td>
<td>60</td>
<td>mV</td>
</tr>
<tr>
<td>A2</td>
<td>425</td>
<td>410</td>
<td>mV</td>
</tr>
</tbody>
</table>

XAUI

XFI
Conclusion

- The 40/100 GbE standard will benefit from standardizing extender layer XLAUI/CAUI based on nx10G serial electrical interface
  - Similar to the benefits XAUI brought to 802.3ae

- XFI is the robust 10G simple SerDes interface which can be leveraged.
  - A. Ghiasi the editor of the XFP MSA has agreed to provide the frame source file for XFI section to the 802.3ba editor.