Passive Copper Objective for 400GbE

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Outline

- **Proposed objective**
- **400G copper applications**
- **Five criteria:**
  - Compatibility
  - Distinct Identity
  - Broad Market Potential
  - Technical Feasibility
  - Economic Feasibility

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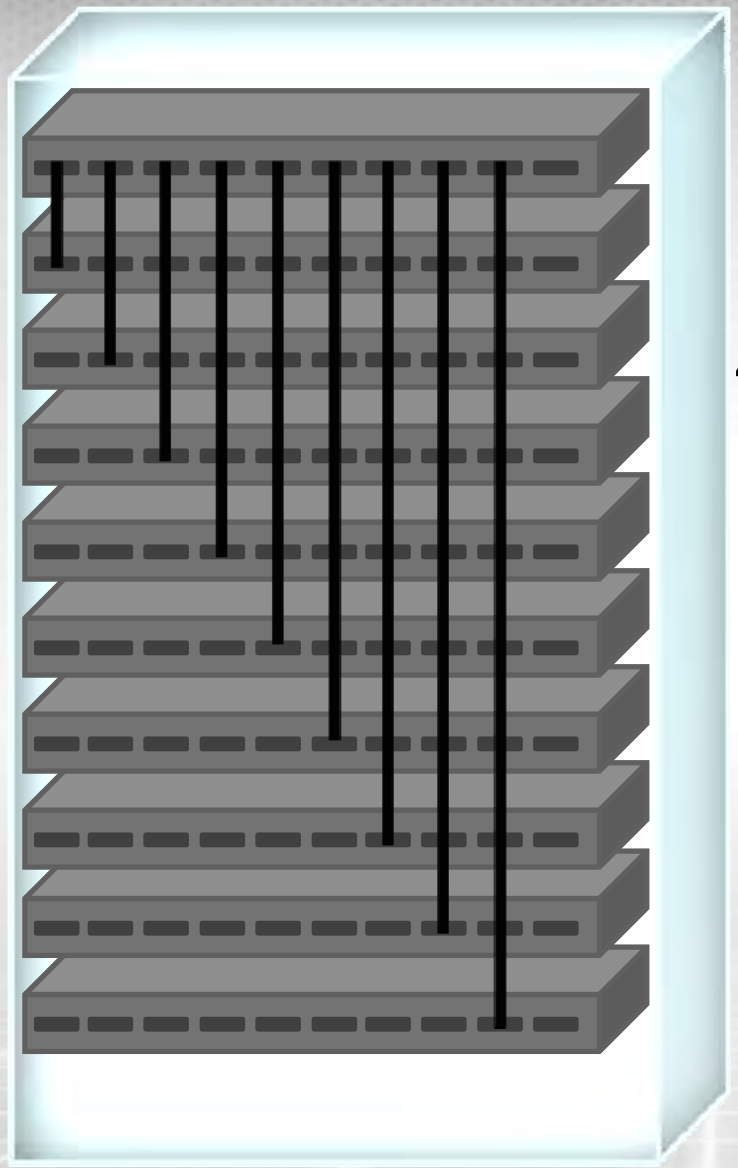
Proposed Objectives

- Define a 400 Gb/s PHY for operation over links consistent with copper twin-axial cables with a with a total channel insertion loss of <= 35 dB at 12.9 GHz.

CR16 copper module

- CDAUI16 electrical I/F for retimed cables
- CR16 electrical I/F for passive copper cables

Ethernet Core Switches with 400G ports



400G copper for
intra rack core switch
interconnect

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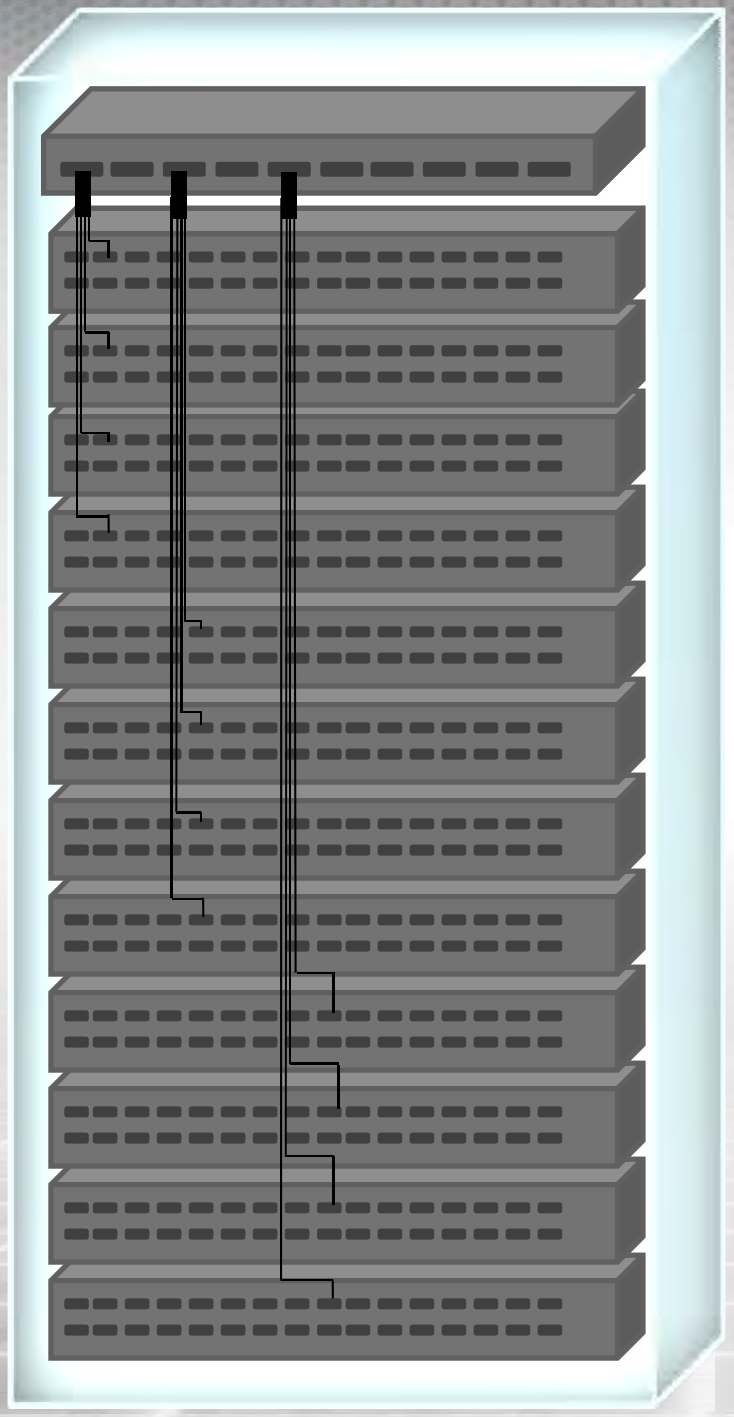

400G to 4x100G breakout option

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Compatibility

Compatible with 802.3 MAC

Compatible with proposed 400G PCS

Compatible with 100G PCS

Compatible with FEC

Compatible with 802.3bj interfaces

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Distinct Identity

- There is no standard that supports Ethernet on passive copper media at operating speeds of 400 Gb/s.
- The standard will define one PHY for twinaxial copper cables.

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Broad Market Potential

- Ethernet has become widely deployed over twinaxial copper cables for both intra-rack and inter-rack connections.
- Internet, cloud, and higher performance computing applications, along with advances in processors, server virtualization and converged networking, are driving the need for higher bandwidth inter and intra rack connections. Providing cost effective 400 Gb/s intra rack solutions are required to maintain pace with new demands.
- Cabled backplanes are an emerging market segment where extended length or performance are required beyond ‘traditional’ backplane design

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Technical Feasibility

- **Systems with an aggregate bandwidth of 400 Gb/s have been demonstrated and deployed in operational networks.**
- **Component vendors have presented data on the feasibility of the necessary components for this project.**
- **The reliability of Ethernet components and systems can be projected in the target environments with a high degree of confidence based on the following form factors:**
  - 4xQSFP form factor
    - 4x CAUI4 electrical I/F
  - CDFP MSA form factor
    - Supports 16x25G electrical interface
      - CDAUI16

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Economic Feasibility

- Prior experience in the development of twinaxial physical layer specifications for Ethernet indicates that the specifications developed by this project will entail a reasonable cost for the resulting performance
- 400 Gb/s twinaxial copper links will make it possible to achieve the desired density, power and cost targets for computer systems and network equipment.
- In consideration of installation costs, the project is expected to use proven and familiar media, including twinaxial copper cabling technology.
- Network design, installation and maintenance costs are minimized by preserving network architecture, management, and software.

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