

Continuing discussion on interfaces necessary for NPO architecture in IEEE802.3dv

Guangcan Mi, Xiang He
Huawei

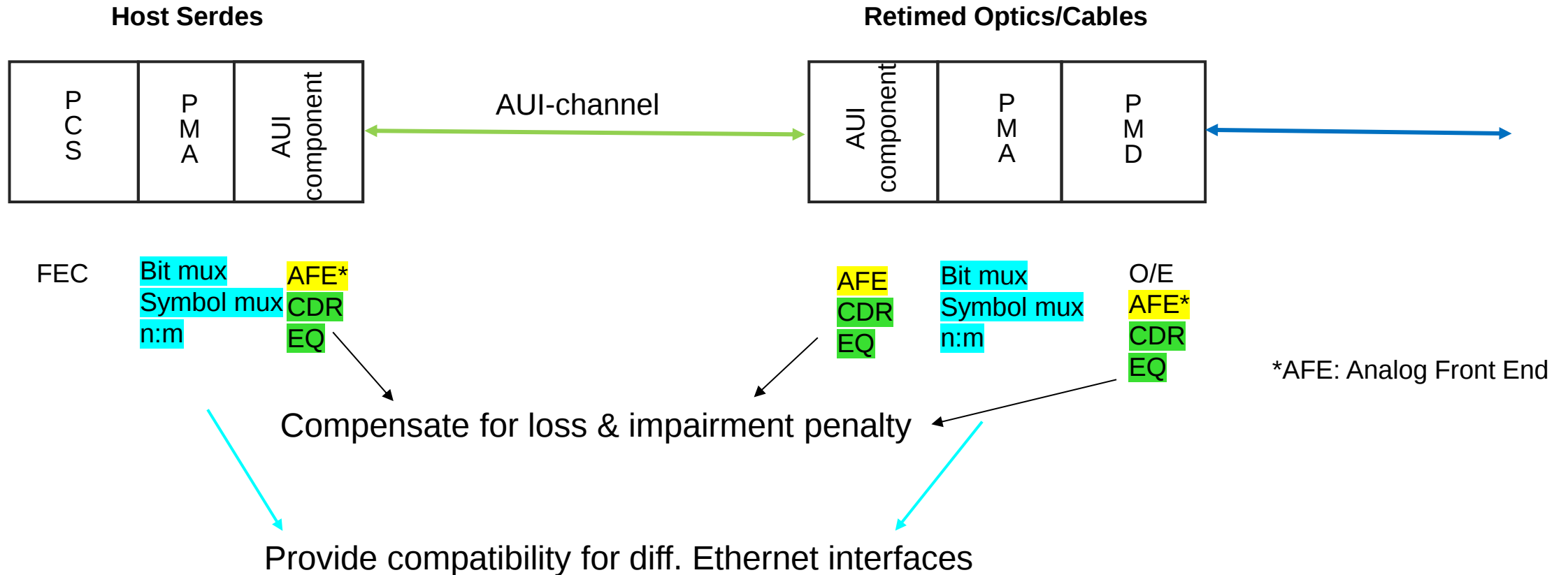
Contributor

Yumeng Yang, Huawei
David Dahan, Huawei

Recap-why we want to discuss interface for NPO

- **Signaling rate @ 400Gbps is further limiting the achievable reach of copper, while pushing optics further into application domain needing**
 - High density connection
 - Low power
 - Very large volume
- **The industry has been exploring various implementations to reduce power consumption**
 - Pluggable optics, without retimer or half of the retimer.
 - Near packaged optics, without retimer
 - Co-packaged optics directly interface O/E with SERDES I/O
- **These implementations share common features:**
 - removing some of the multiple instances of retimer in the end-to-end link
 - Resulting in a new type of interface that IEEE802.3 doesn't provide yet
- **NPO is the popular topic in 2026, with industry showcasing/advocating.**
 - That being said, the interface is not bound to any specific implementation. Other feasible implementations could use the same interface.

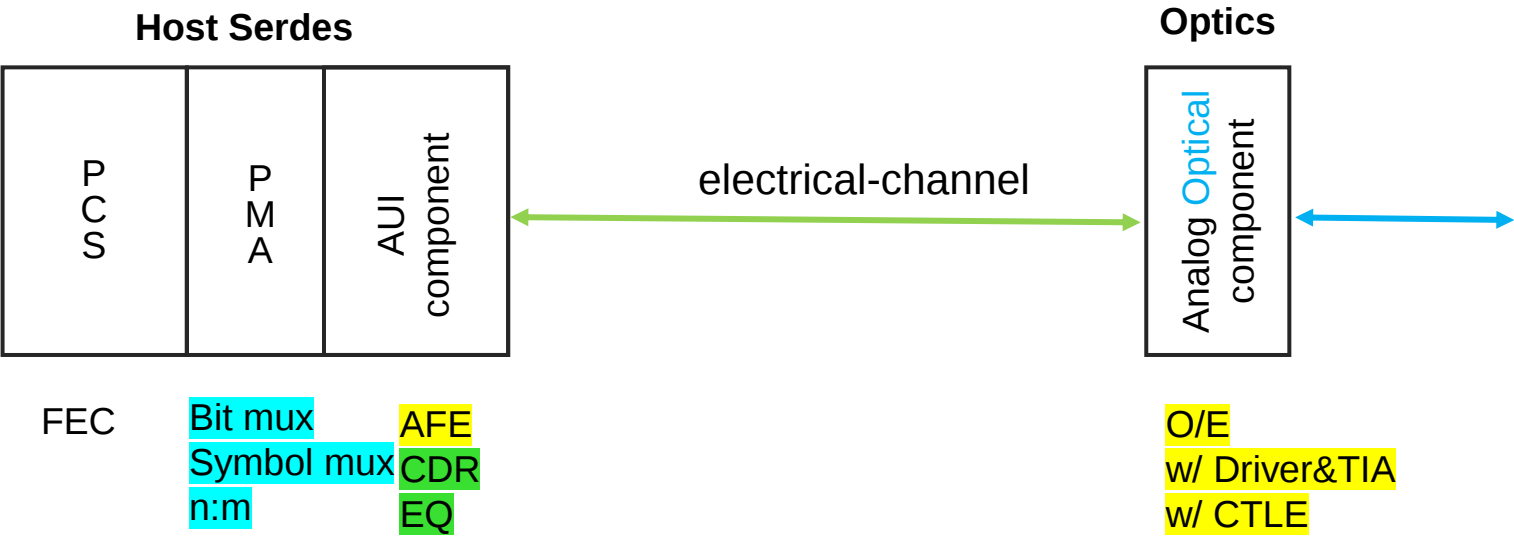
Current architecture: multiple instances of same functional components



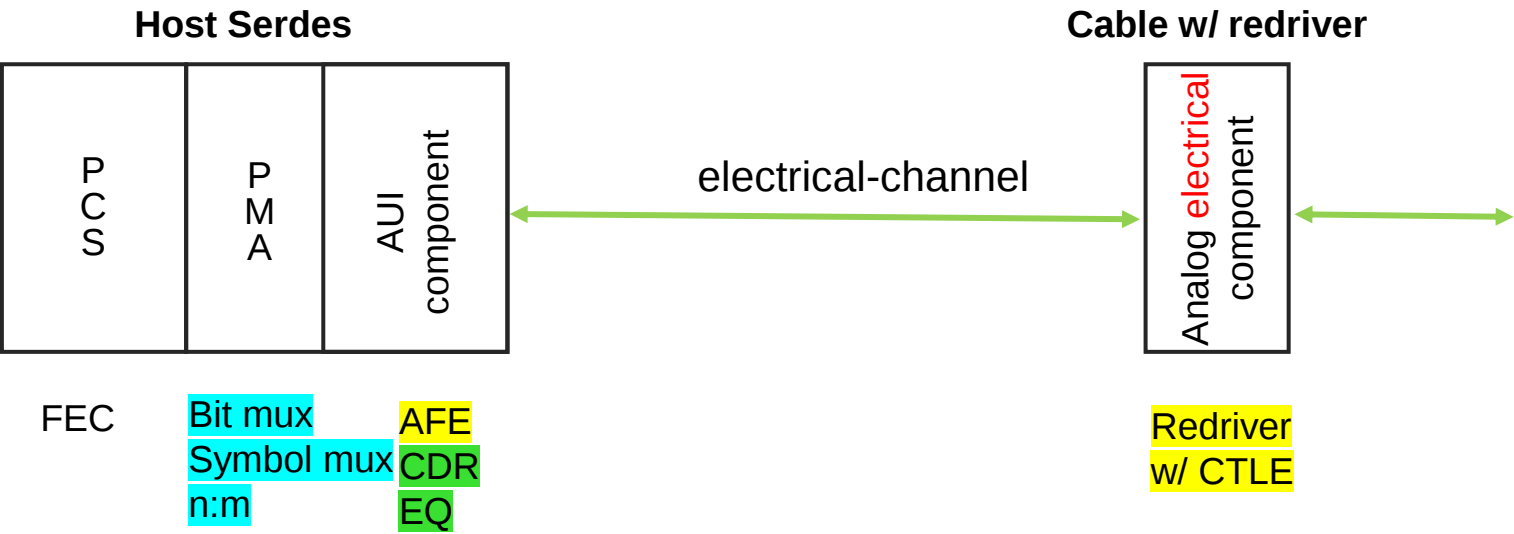
There is room for consolidation to save power in feasible applications featuring:

- electrical channel w/ sufficient low loss and impairment,
- 1:1 lane rate matching, same modulation format,
- affordable link budget

Consolidating to save power, leading to new interfaces

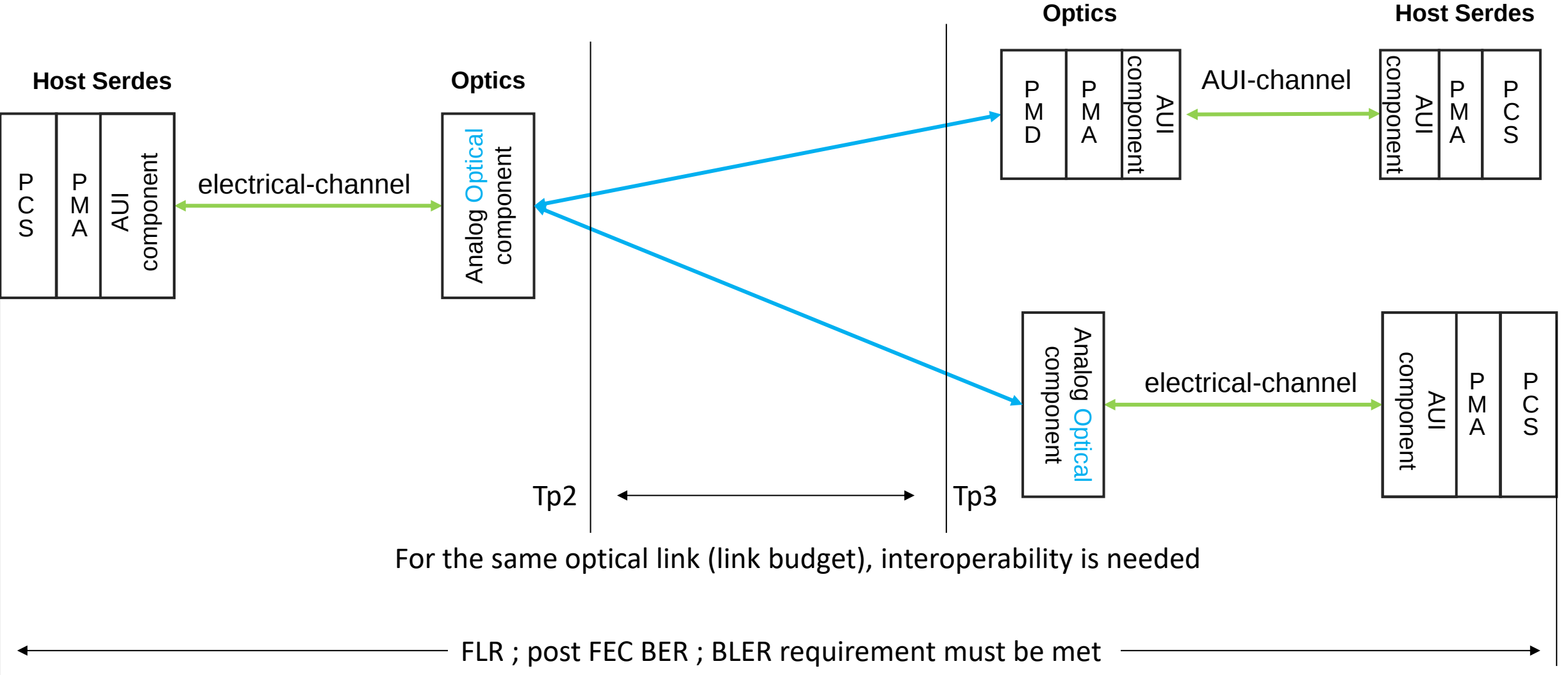


Linear Optics
NPO/CPO



Same story for
ACC

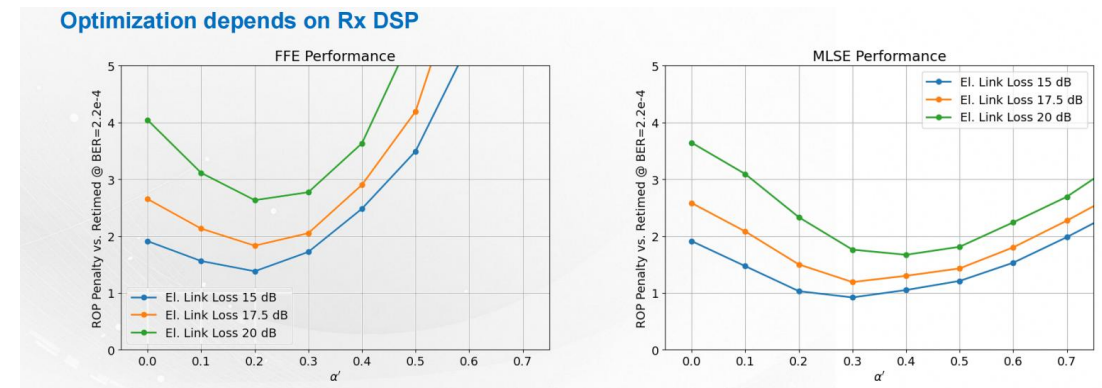
Why it is important to define the interface here in IEEE



Why it is important to define the interface here in IEEE

- In May interim meeting, [berger_400GPL_01_2605](#) showed simulation analysis on 400G-PAM4 CPO feasibility. He also showed ROP penalty relative to retimed optics, with dependency on the electrical link loss.
- This is not new to the industry who have tested water using 100G/lane LPO, 200G/lane linear NPO and 200G/lane half retimed optics.
 - Only defining an electrical channel while forcing the interfacing linear optics to comply with IEEE 802.3 Tp2 and Tp3 specification, can hardly work out.
 - Reducing loss of the electrical channel is not enough.
 - Difficulty in deployment, and further segmenting the market
- SNR degradation due to link impairment gets more significant at 400G/lane.

It is better to solve the issue from the origin:
Tp2 and Tp3 specification @ IEEE 802.3



[berger_400GPL_01_2605](#)

Propose to capture the industry need and trend

- ❑ Industry has strong interest in linear optics, particularly NPO, to reduce the power and increase the density to prepare optical interconnect for the up coming use cases.
 - ❑ NPO's strong presence in OFC2026 and ECOC2026 exhibitions, indicating the industry need/interest/trend.
 - ❑ CIOE2026 and ODX2026 has huge exhibition on NPO related products, showed particular interest in China market
- ❑ Important to build Ethernet's interoperability
 - ❑ Retimed optics and non-retimed optics interoperability is desired in application
 - ❑ Current Tp2/3 specification defined considering only retimed optics, already creating a pain point at 100G/lane and 200G/lane
- ❑ Further discussion their nomenclature is expected,
 - ❑ A new type of electrical interface?
 - ❑ A new type of optical interface?
 - ❑ A new type of optical interface with electrical channel?
 - ❑ A hybrid electrical-optical interface?
- ❑ Start working on incorporating interfaces supporting linear NPO

Thank you!