Backwards Compatibility Considerations for 100G

Macau – 50G / NGOATH Study Group

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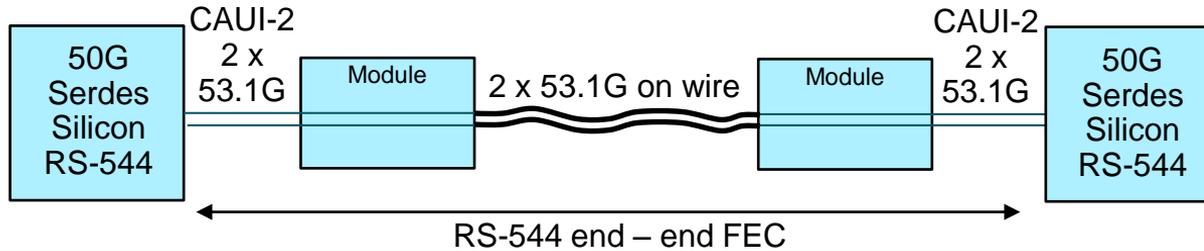
Yong Kim, Broadcom

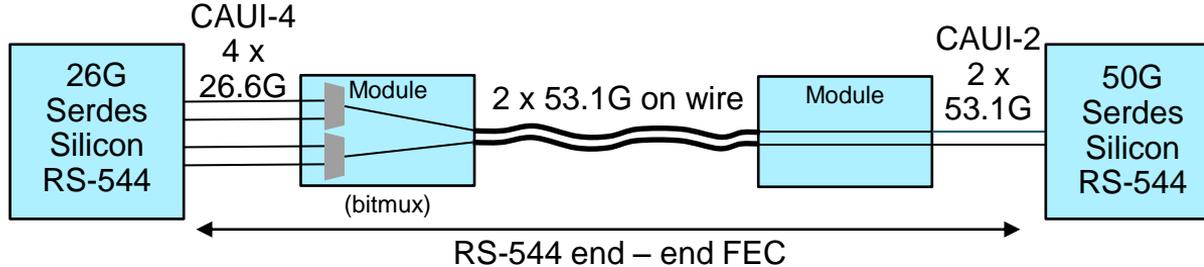Vasu Parthasarathy, Broadcom

Rob Stone, Broadcom

Supporters

Green Field Cases Being Discussed (all new silicon and hosts) – 100G PHYs

Green Field Case 1:

50G Serdes Silicon RS-544 | CAUI-2 2 x 53.1G | Module | 2 x 53.1G on wire | Module | CAUI-2 2 x 53.1G | 50G Serdes Silicon RS-544

RS-544 end – end FEC

- Optimal PMD design, leverage FEC
- Architectural Commonality with 802.3bs

Green Field Case 2:

26G Serdes Silicon RS-544 | CAUI-4 4 x 26.6G | Module (bitmux) | 2 x 53.1G on wire | Module | CAUI-2 2 x 53.1G | 50G Serdes Silicon RS-544
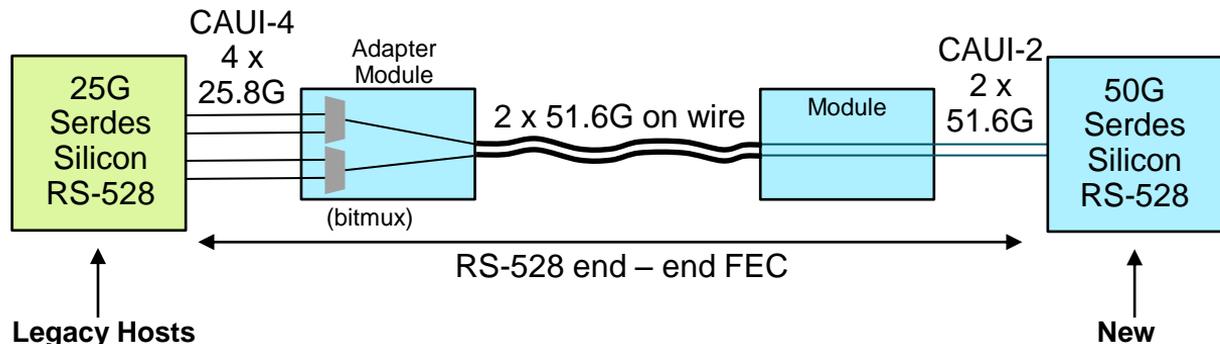
RS-544 end – end FEC

- Optimal PMD design, leverage FEC (maybe at reduced gain / burst error protection)
- Enable *new* 25G Host to communicate with 50G Host, w/ 50G based PMD

- **Neither of these cases addresses legacy backwards connectivity, as the host silicon is all new**
  - For GF case 2, allows re-use of existing 25G serdes IP but *__requires new PCS / FEC logic, and new 26G based module development for lower density applications – questionable business case?__*
  - Questionable whether the GF Case 2 4 x 26.6G PCS has BMP / Distinct Identity (as it does nothing to improve IO density, latency, or backwards compatibility with existing PHYs)
  - Adoption of a new PCS for 26G NRZ will make millions of 100GBASE-xR4 ports incompatible – unlikely to be embraced by the industry
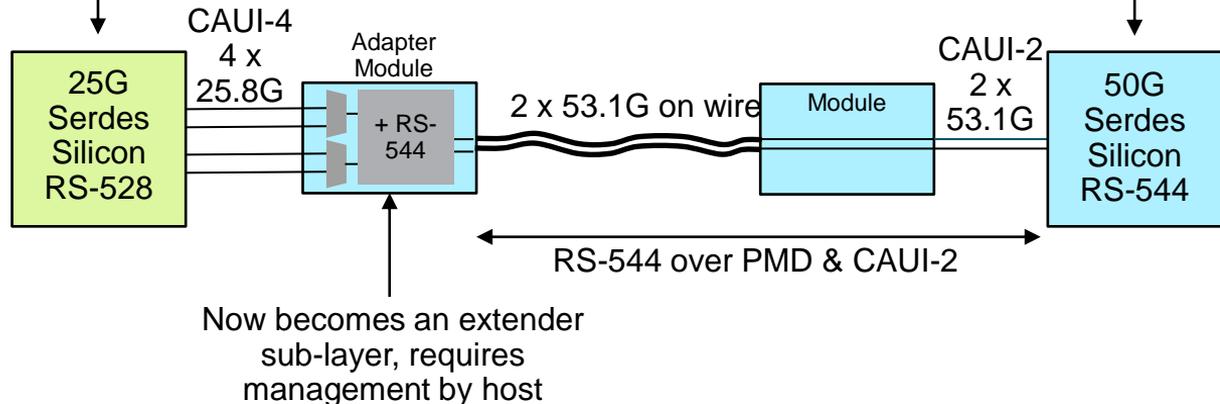
Backwards Compatibility Cases (at least one "legacy" host / silicon) – 100G

Brown Field Option A:

CAUI-4 4 x 25.8G · Adapter Module · 2 x 51.6G on wire · Module · CAUI-2 2 x 51.6G

25G Serdes Silicon RS-528 · (bitmux) · 50G Serdes Silicon RS-528

RS-528 end – end FEC

Legacy Hosts · **New Hosts (different)**

- Enables Legacy host to communicate with new 50G capable host
- Introduces an "adapter" module with 2:1 bit mux
- Impacts PMD choice due to lower performance FEC (differs from Greenfield case on previous slide)

Brown Field Option B:

CAUI-4 4 x 25.8G · Adapter Module · 2 x 53.1G on wire · Module · CAUI-2 2 x 53.1G

25G Serdes Silicon RS-528 · + RS-544 · 50G Serdes Silicon RS-544

RS-544 over PMD & CAUI-2

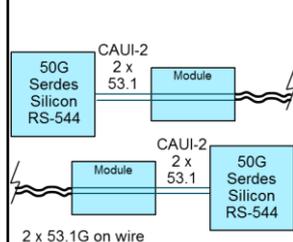Now becomes an extender sub-layer, requires management by host

- Enables Legacy host to communicate with new 50G capable host
- Introduces an "adapter" module with 2:1 bit mux and RS-544 FEC
- No limitations on PMD choice due to FEC
- Requires module and host support for FEC extender sub-layer
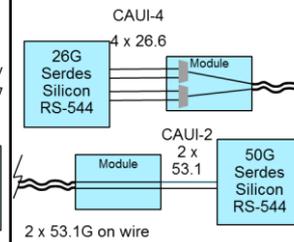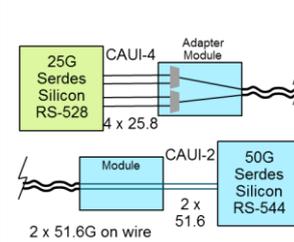
Summary
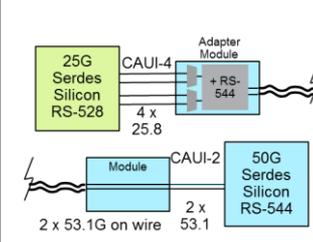
	Greenfield Case 1 (CAUI-4 hosts, RS-544 end – end)	Greenfield Case 2 (CAUI-4 Host to CAUI-2 Host RS-544 end – end)	Brownfield Option A (CAUI-4 Host, RS-528 end – end over PMD and CAUI-2 interface)	Brownfield Option B (CAUI-4 Host, RS-544 in module, over PMD and CAUI-2 interface)
compatible with existing silicon / standards*	No	No	Yes	Yes
Uses existing host management software	N/A	N/A	Yes	No, due to extender sub-layer
maximizes PMD reach / FEC leverage	Yes	No, due to interleaving	No	Yes
FEC used to protect optical PMD / 50G AUI	RS-544	RS-544	RS-528	RS-544
Maximizes new host IO density	Yes	Yes	Yes	Yes

*With appropriate adapter module if needed

Summary / Next Steps

- **There is strong interest in providing streamlined backwards compatibility between existing 100GE 4 lane ports and new 100GE 2 lane ports**
  - Will be a large number of 100G 4 lane interfaces deployed (~ 15M in 2018)
  - A streamlined way of connecting to such devices will likely be desired
- **IEEE is the right venue to do this work, in order to enable maximum adoption and minimize fragmentation**
- **However, work remains to be done before we can write an appropriate objective:**
  - Analysis of candidate PMDs which can be supported by either brownfield A, or B – and the number of module types this leads to
  - Potentially definition of extender sub-layer (to support brownfield B)
- **Propose that an appropriate objective is added by the taskforce once assessment is made of both brownfield options, associated with at least one PMD**

Thanks!