Closed-loop TX equalization tuning for CAUI-4 C2C

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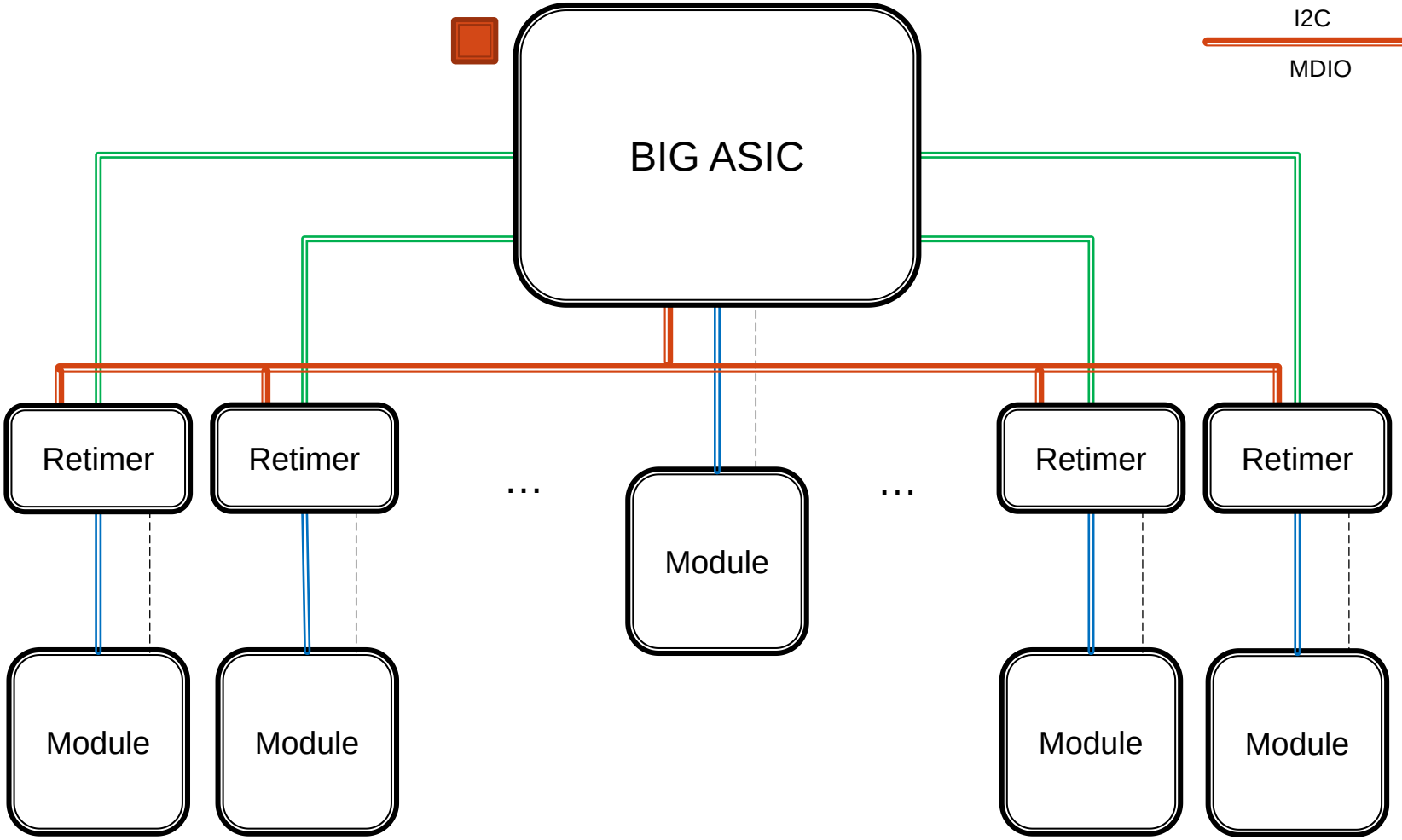
A multi-PHY system with MDIO control



How this can be used

- The equalization settings for each transmitter (up to 8 per retimer) are stored in main non-volatile memory.
- During system initialization, the MDIO host (SME) programs the configuration registers in each device (MMD).
- This can work. But…

Problems

- Many settings to tune – finding the optimum for each design can be a burden during system design and integration.
- Variability between devices and boards can prevent using one fixed set of settings for a whole product line
  - Or make the setting sub-optimal for some instances
- It would be nice if the system could configure itself.
  - As in clause 72 and similar PMDs
  - But there is no backchannel in CAUI-4…

Proposal: Backchannel using MDIO

- The SME can inform each port about its partner's equalization setting (5 bit value).
  - This information is already known to the SME.
  - Requires 5 more bits.
- An MMD can initiate a request for another setting using a read-only register.
- The SME can:
  - Read a request
  - Program the requested setting to the other MMD
  - Acknowledge by writing the partner setting to the requester.
- This back-channel is fully controlled by the SME. Tuning can happen once at system integration, or every time the system is powered on, or even during operation.
- MMDs can use any algorithm to choose the requested setting.
- Completely optional – even if MDIO is used.

Details

- Registers
  - No new registers required, only allocation of existing bits in registers 1.184 to 1.187
  - I can provide detailed text in the next meeting
- State diagrams
  - No specified behavior.
  - I can provide diagrams for a possible use case in the next meeting.
  - Should we add anything to 83D at all?

Questions, comments