

# Thoughts on position of AC coupling cap

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- **We need to account for the effects of the AC coupling capacitor.**
- **Allocating the effects to a different part of the system that doesn't control the implementation (as is done in 10GBASE-KR) is a poor choice. Therefore the test points should be at the BGA ball (or offset by a specified test board loss).**
- **3 possible options.**
  - A. Write specifications assuming the AC coupling is in the channel. (as is done in OIF 25G-LR)
    - Could be in connector
    - Could be in the board
    - Could be on the board
    - Recommend at the receiver
  - B. Write specifications assuming the AC coupling is in Rx
    - Could be in the package
    - Could be electronic equivalent in the die
  - C. Write separate specifications for the AC coupling
    - Not recommended due to the variability in the performance and difficulty of subdividing budgets particularly with the effects of reflections.
- **Not making a choice would require us to allocate the effects to both channel and Rx which obviously wastes budget.**

- **Some systems will want backward compatibility with 40GBASE-KR4 (with auto-negotiation)**
  - Implies that AC coupling must be OK with the 1.9V common mode voltage specified in 40GBASE-KR. Potential issue with Electronic equivalent in die.
- **Copper cable system is being defined with the AC coupling in the cable**
  - Changing this would cause cables not to be useable for 40GBASE-CR4
  - Expect to use the same Rx for this application and therefore would waste budget if AC coupling included in the Rx IC



# Advantages/Disadvantages of options A and B

- **Option A advantages**
  - More flexibility
  - Compatible with 40GBASE-KR and Copper cable
- **Option A disadvantage**
  - May have poorer performance TBD
- **Option B disadvantages**
  - Physically locating capacitors in an IC package is higher cost and on a high port count IC is likely to be physically impossible
  - Using an electronic equivalent in the IC appears attractive, but backward compatibility with 40GBASE-KR may not be feasible due to Common mode issues. Technical feasibility and performance advantage need study.

# Recommendation

- **Locate the test points at the BGA balls (or offset by a specified test board loss.)**
- **Include the effects of the AC coupling capacitor in the channel**
- **Leave the position of the AC coupling capacitor within the channel open but recommend that it is placed at the Rx end**