

# AUI-C2M host and module input specifications

(comments #188, #189 against D1.0)

Adee Ran, Cisco

# Motivation

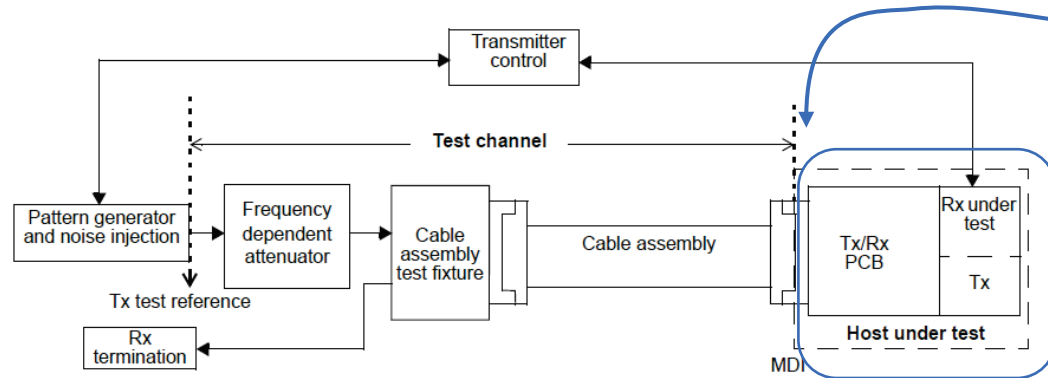
- The host and module input for 200 Gb/s per lane AUI-C2M in Annex 176E should be specified with consideration of the availability of training.
  - The receiver does not need to work with a specific transmitter waveform that it cannot change.
  - The signal can be attenuated, and equalization can be changed, if the receiver prefers it – regardless of the eye-oriented metrics (EH/VEC) that could result.
- The methodology used in CR PHYs is suitable for this purpose.
- Differences between CR and AUI-C2M (host and module) should be identified. Some parameter values need to be different.
- This contribution proposes new content for 176E.3.5 and 176E.3.6.

# Summary of “Receiver characteristics” for CR hosts (clause 179)

- Table 179–7 contains the following spec parameters defined at TP3 (host input):
  - Signaling rate range
  - Amplitude tolerance
  - Interference tolerance
  - Jitter tolerance
  - Impedance related – ERL, RLcd
- These specifications are based on those of clause 162 and previous CR PHYs
- The highlighted specifications are significantly different from existing C2M methodology. Their common properties are:
  - It is assumed that the device under test can control the input signal using training or an equivalent method.
  - The stress applied as either **additive noise** or **jitter** – but not together (testing two different properties of the receiver).
  - Additive noise stress is calibrated with a COM-based calculation based on the test channel.
- There is good evidence of correlation between meeting/violating these specs and good/bad CR performance.

# Test setup for CR hosts

Defined in clause 110 (802.3by)



NOTE—The MDI of the host under test is not included in the test channel.

Figure 110-3a—Interference tolerance test setup

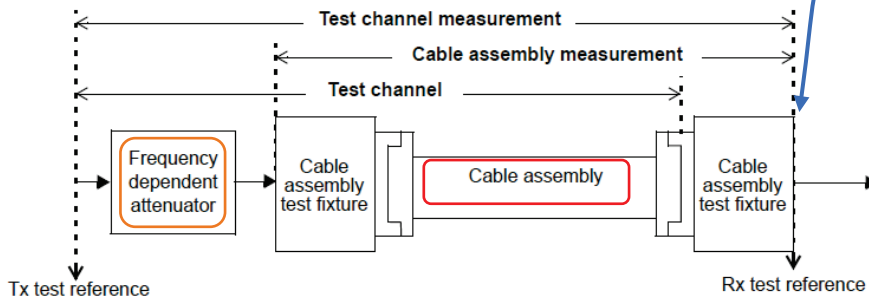


Figure 110-3b—Test channel calibration

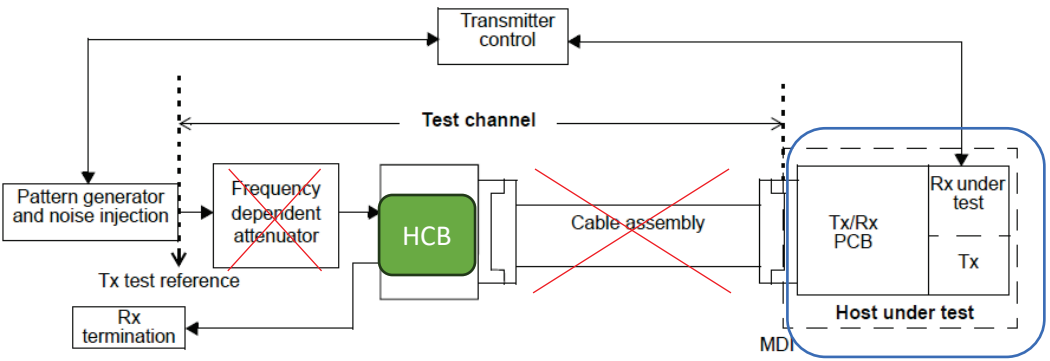
- Test interface is the MDI (host input)
- Calibration point is at the test fixture output TP3 (equivalent to TP4 in AUI-C2M)
  - Test channel is measurable
- Combination of **Cable assembly** and **Frequency dependent attenuator** emulate highest/lowest loss expected channels

# For input specs, AUI-C2M is not too different from CR host

- Host input:
  - Similar interface and channel (no cable, but higher internal host loss than CR) → Similar test setup can be used (but with no **cable assembly** and **frequency dependent attenuator**)
  - With training available, the host under test can have the same algorithms as in CR
  - Error requirements are different
  - Stress calibration will be different
- Module input:
  - Different interface than a host – but **essentially the same setup (MCB replaces HCB)**
  - **“Frequency dependent attenuator”** represents a host channel
    - Two test cases can be defined, maximum-loss (with attenuator) and minimum-loss (direct connection to the MCB) – as in the CR test
    - Testing with middle cases is possible too, but should not be a compliance requirement
  - Test channel can be defined without the cable, and is similarly measurable

# Proposed test setups for C2M

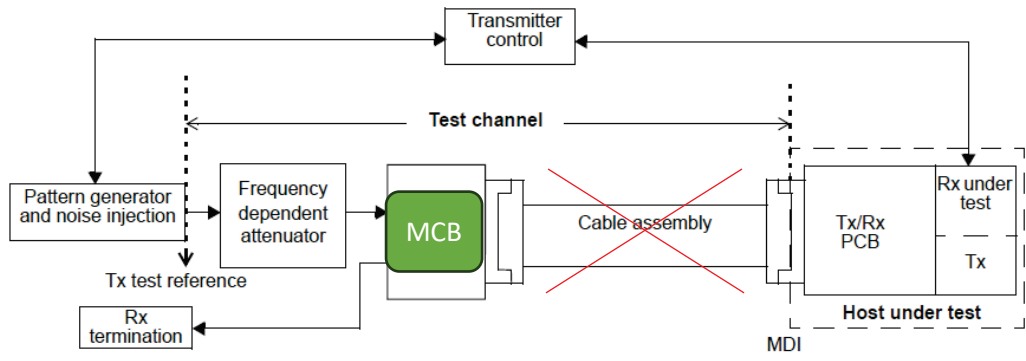
## Host input test



NOTE—The MDI of the host under test is not included in the test channel.

Figure 110-3a—Interference tolerance test setup

## Module input test



NOTE—The MDI of the host under test is not included in the test channel.

Figure 110-3a—Interference tolerance test setup

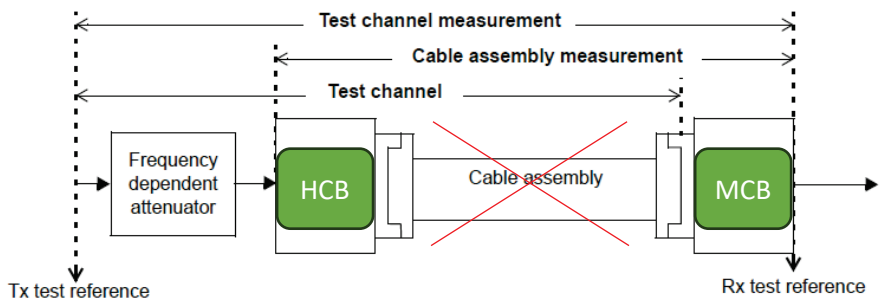


Figure 110-3b—Test channel calibration

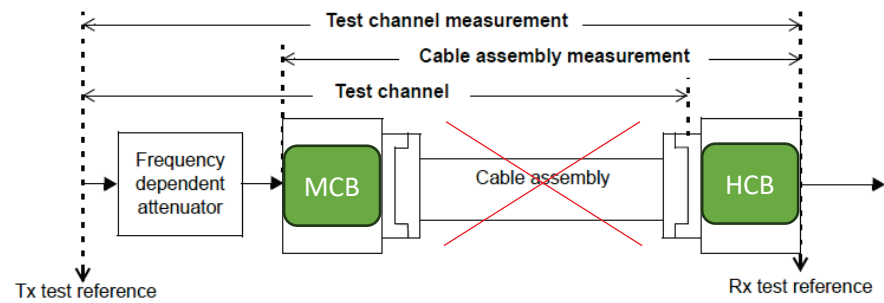


Figure 110-3b—Test channel calibration

# Proposed changes relative to CR method

- Test channel insertion loss:
  - For **host input**: one test, minimal loss (no cable, no remote host) defined by the mated HCB+MCB (MTF)
  - For **module input**:
    - Test 1 – MTF with additional frequency dependent attenuator (FDA) to get the maximum loss host channel (proposed 35 dB)
    - Test 2 – similarly but with FDA loss of (proposed 6 dB) plus the MTF, representing the minimum loss case (a small host package with board similar to the MCB)
- Test channel calibration (additive noise to achieve target COM):
  - For **module input**: same as the test channel
  - For **host input**: include FDA representing the DUT's channel, such that with addition of the MTF, you get (35 dB) – identical to module input test 1 above.
- Error requirements:
  - Point to annex 174A
  - Should be defined in same terms as CR but with different values (not covered by this presentation)

# Proposed changes to existing C2M input specs

- **Host/module stressed input tolerance** is to be replaced with the **Amplitude, interference, and jitter tolerance** of CR
- ERL and RLcd remain as they are
- Both C2M host and module have specifications for “Peak-to-peak AC common-mode voltage tolerance”
  - Specified as Low-frequency ( $V_{CM_{LF}}$ ) and Full-band ( $V_{CM_{FB}}$ )
  - Although there is no explicit tolerance test, it would be a good idea to retain these requirements, as they are implicitly assumed (due to the output specifications).
- Both also have a specification for “Differential termination mismatch”
  - This is an old specification practically for DC termination
  - Difficult to measure in practice (and often ignored)
  - It is unclear if it has additional value over ERL
  - **Proposed to be removed.**



# Proposed placement of test methodology

- The test setups for CR, host input, and module input are different enough to be described separately for each one.
- However, it would be good if test calibration and test procedure content is defined once in an annex.
  - Currently 179.9.5.3.3, 179.9.5.3.4, 179.9.5.3.5, and 179.9.5.4 and its subclauses.
  - Move the content above to a subclause in 176E or another annex.

# That's all

Questions?