# P802.3bq Rx CMNR ad hoc submission

**Bryan Moffitt - CommScope**

Examination of 802.3-2012 Annex 40B Cable Clamp

- Suitability for Common-mode noise rejection testing of 40GBASE-T.
- The clamp was originally developed for unshielded cabling through a 250 MHz frequency range.

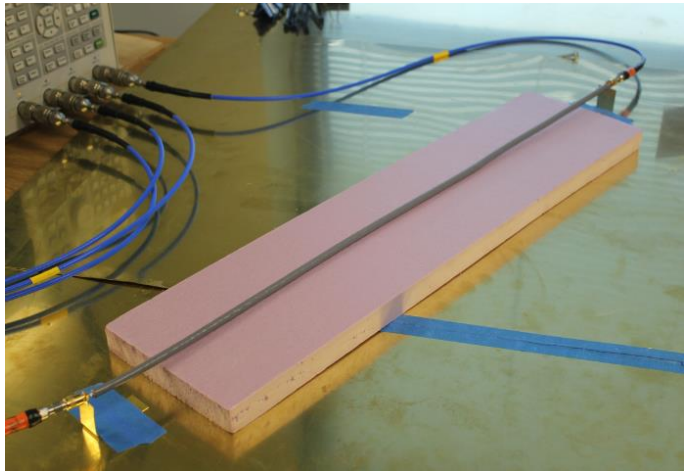
Two evaluation test setups:

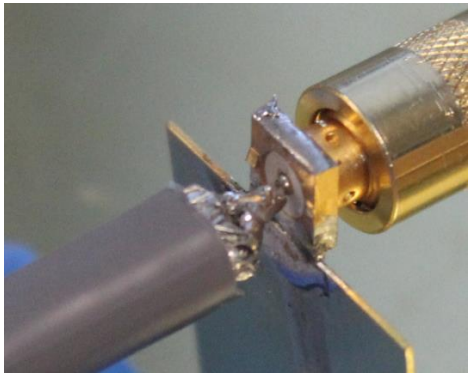
- Induction onto cable shield – Cable shield is commonly considered ground while signal properties are assessed on the enclosed pairs, but for EMC issues the shield is a conductor.

- Influence on the cable pairs – induced common and differential noise.

## Induction onto cable shield

The cable shield is treated as a 2 port transmission line

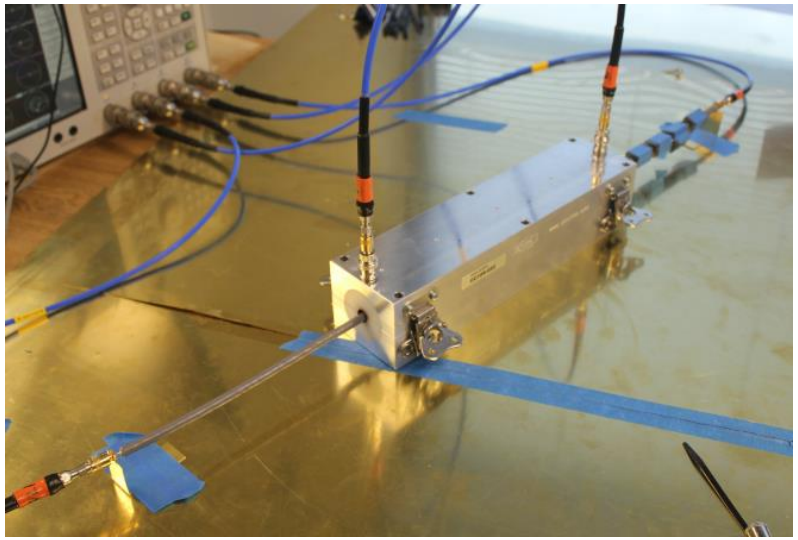


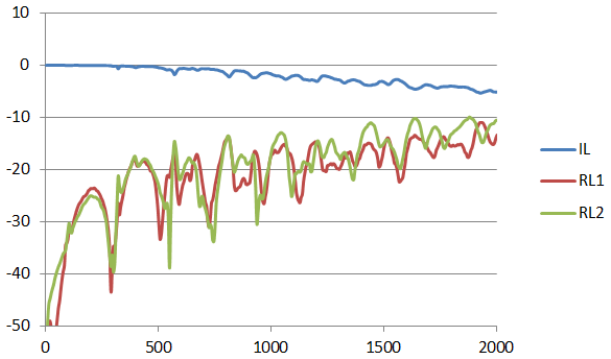


A 4 port measurement is done with it installed in the clamp test configuration.

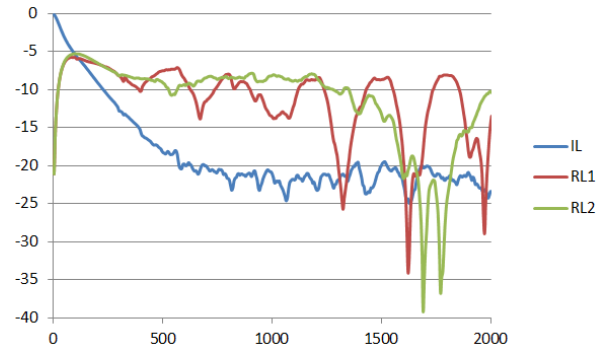
This shows the response of the shield to clamp drive.

Note that 5 chokes are used – this provides higher backscattered loss

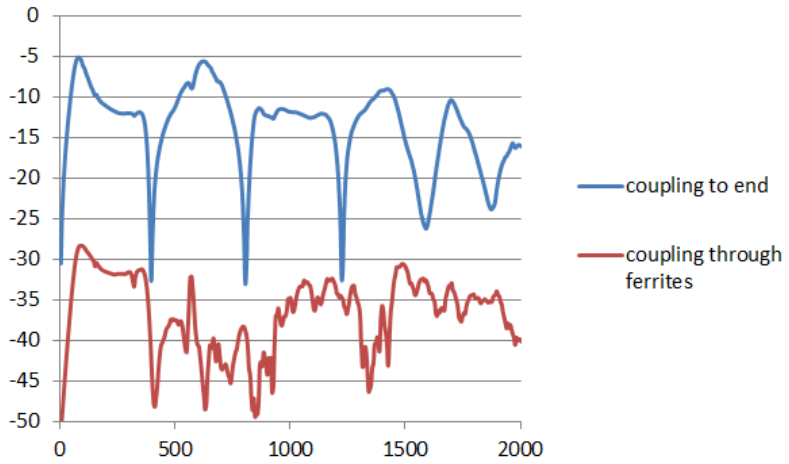





50Ω head de-embedded
180Ω referenced to show dominant mode
Cable shield result




50Ω head de-embedded
180Ω referenced
Cable shield with 3 chokes result

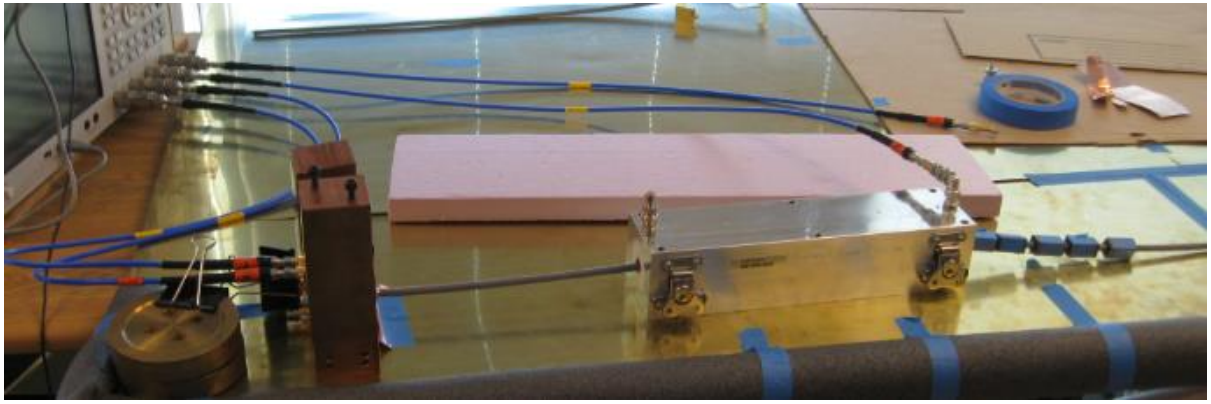



50Ω referenced, no head de-embedding
Clamp driving shield

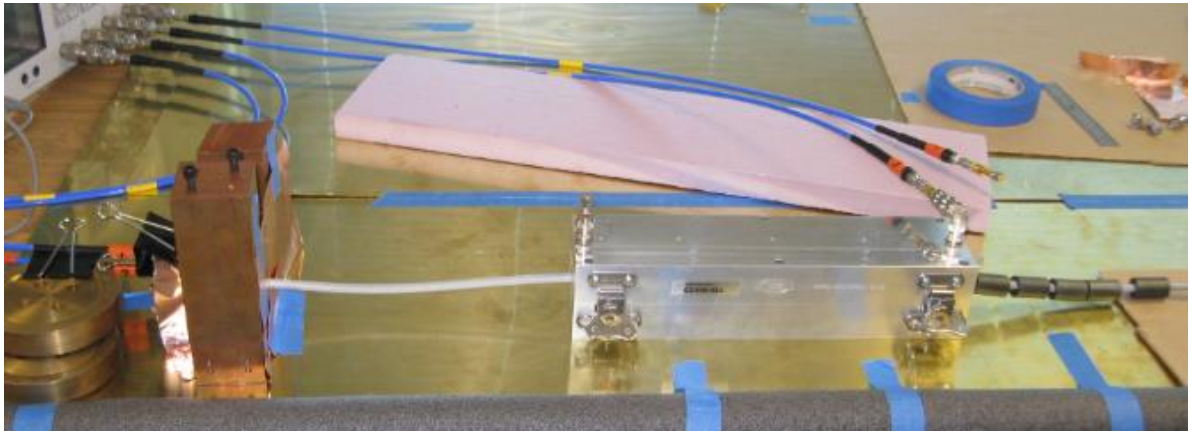
The 5 chokes provide a significant block to backscattering

**Influence on the cable pairs**

25 meter Cat 8 cable in clamp position

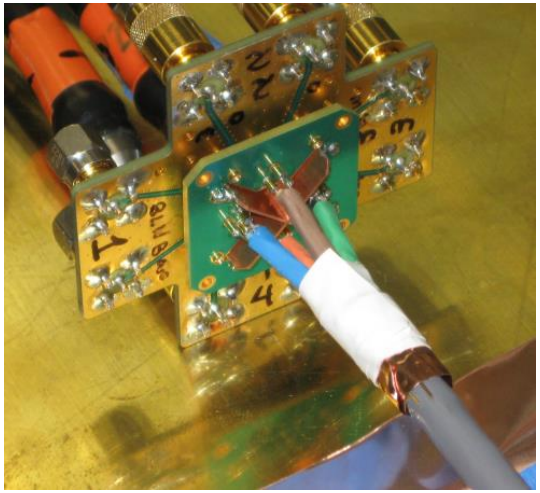


25 meter Cat 6A unshielded cable in clamp position (for comparison)

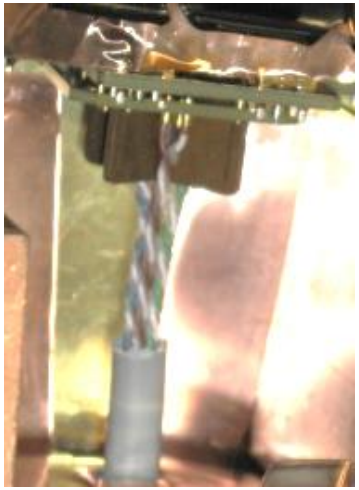


No connectors are tested- just the cable pickup

Cat 8

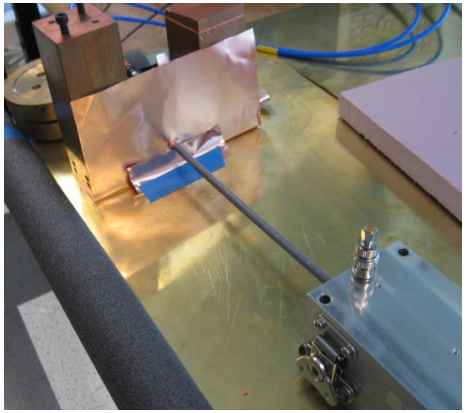


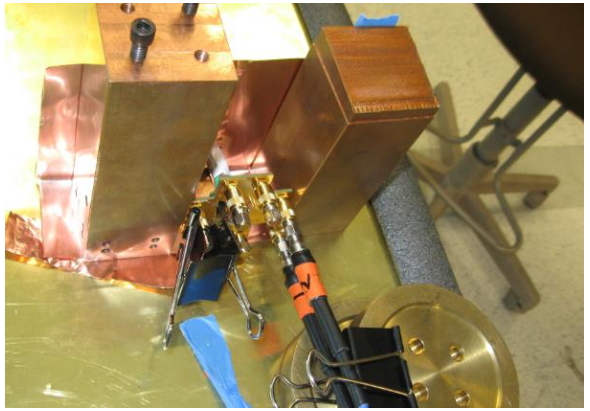
Cat6A

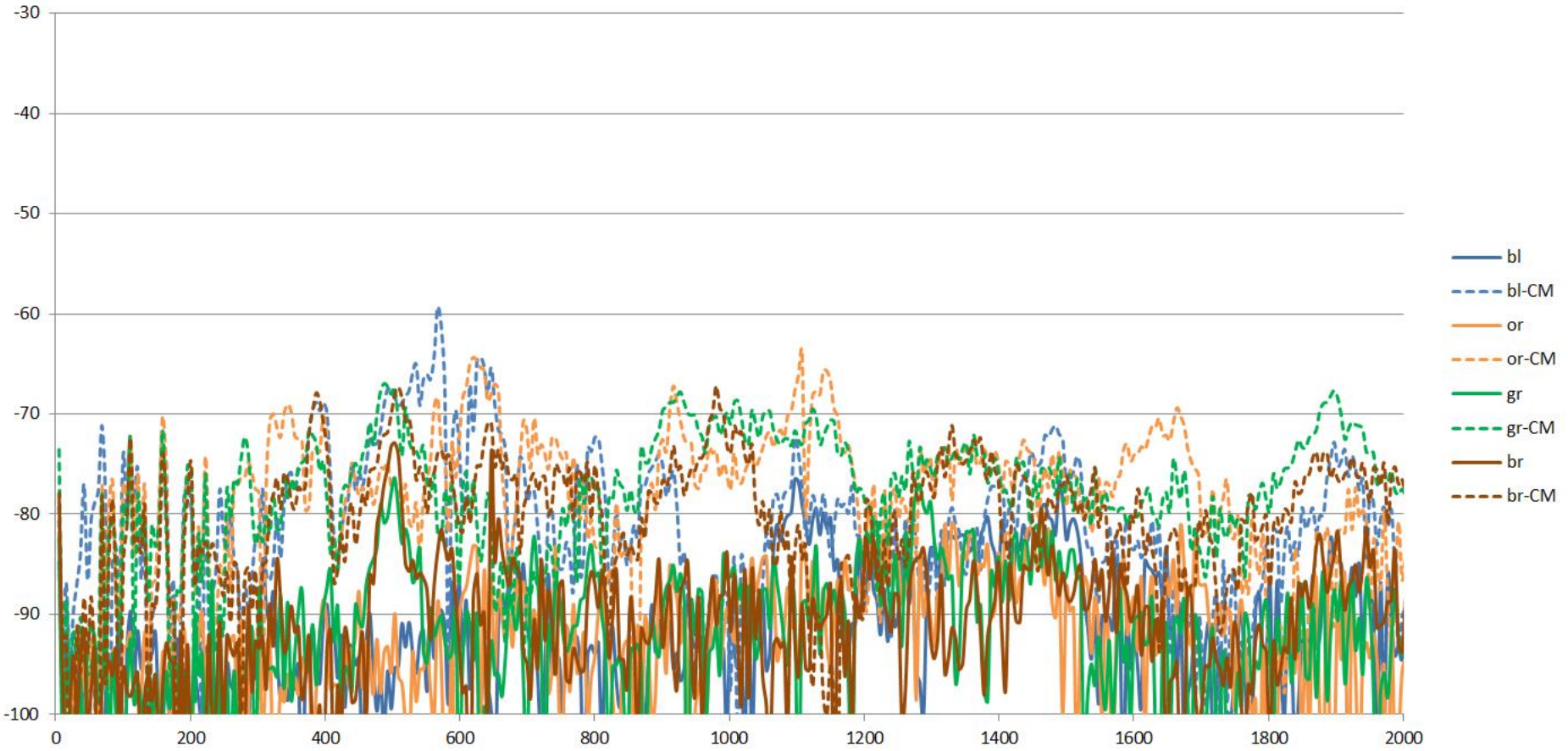


The cable is directly terminated on an 8 port test head – 2 ports sense pair pickup from the clamp while the other pairs are 50 Ω terminated per conductor

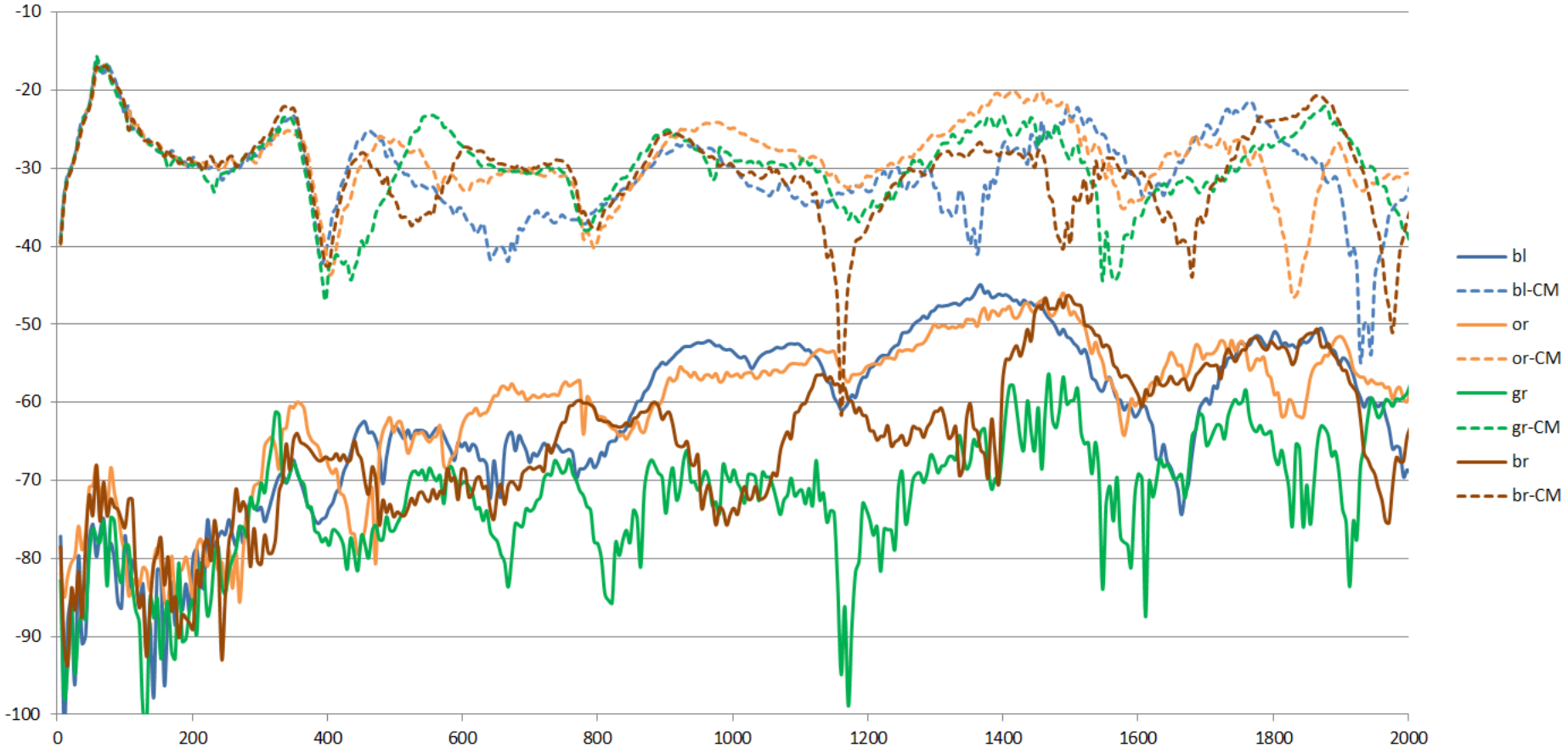
The test head is shielded with a ground barrier – the Cat 8 shield is grounded at the barrier, but the unshielded Cat 6A is routed through








The Cat 8 result shows very low injection and very little difference between common mode and differential mode




The Cat 6A result shows consistent and high level of common mode injection up through 300 MHz, with large margin to differential

Preliminary conclusion is that the 40.6.1.3.3 Cable Clamp test is not suitable for injecting common mode into shielded cabling pairs

It may be useful for assessing the quality of the shield termination and connection at the PHY

40.6.1.3.3 seems to already acknowledge this by reference to 40.7.1 c)

*The use of shielding is outside the scope of this standard*