

SFP+ Compliance Boards Requirements and Construction

Ali Ghiasi

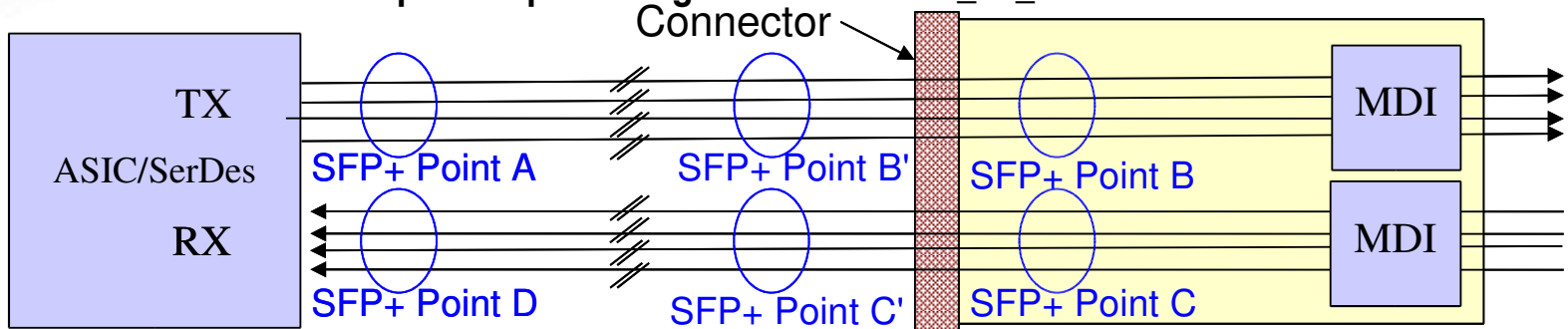
IEEE 802.3ba
Interim Meeting

Seoul 2008

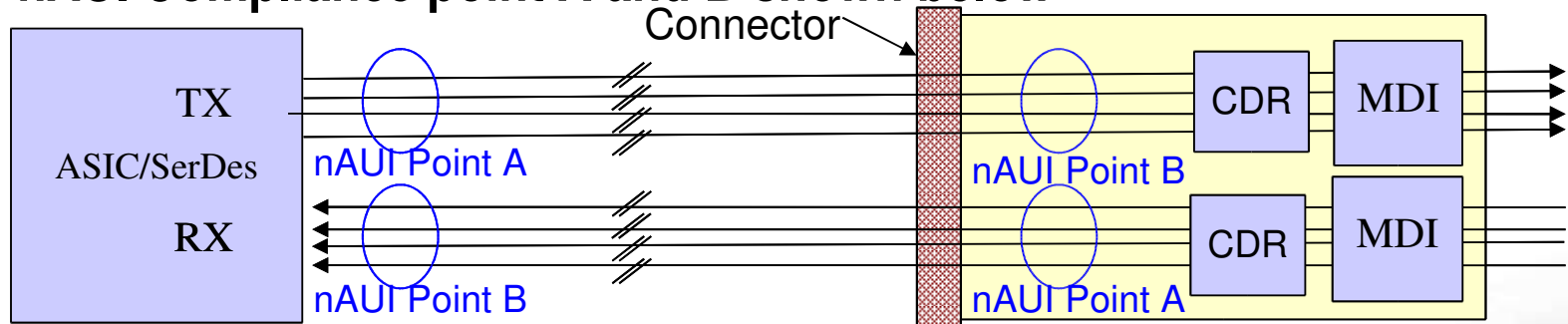
The Basic Problem

- The SFP+ compliance points A, B', B, C, C', and D with their approximate location shown below and applies to SR4/CR4/SR10/CR10 variants

— For detail of compliance point diagrams see dudek_01_0908



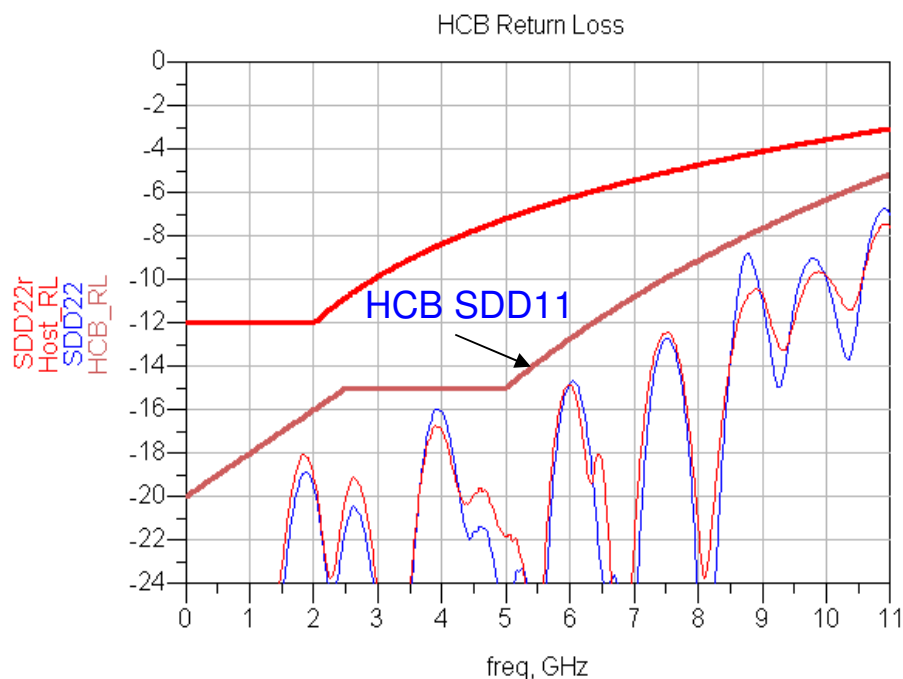
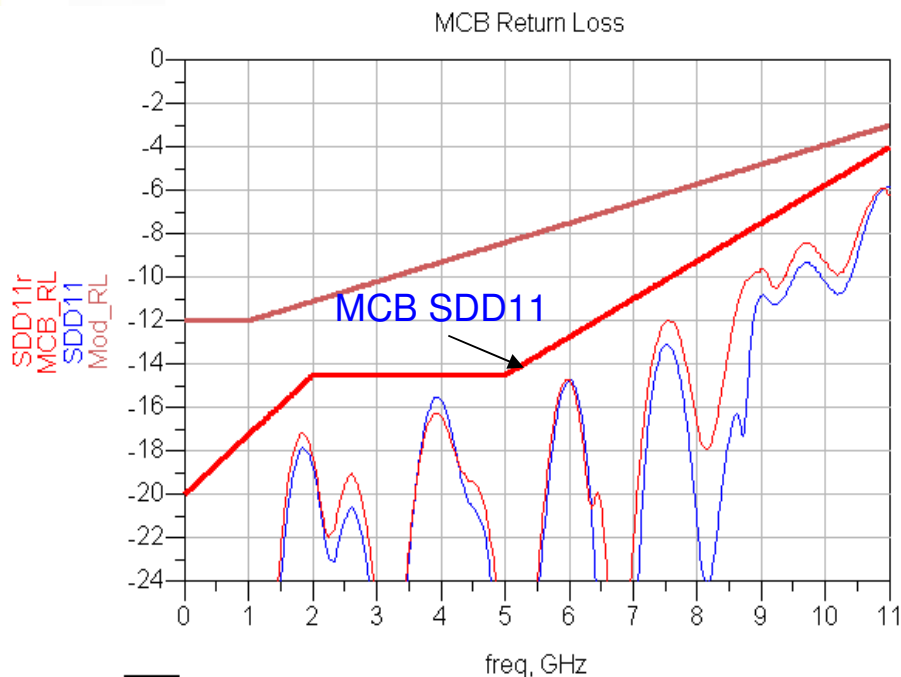
- nAUI Compliance point A and B shown below



- How do you test for these compliance points accurately and without guess work?

Compliance Board B2B Return Loss

- Broadcom MCB (Module Compliance Board) + Spirent HCB (Host Compliance Board)



```
Eqn Mod_RL=if(freq<1e9)then -12 elseif(freq>=1e9)then (-12.9 + 0.9*(freq/1e9)) else -3
```

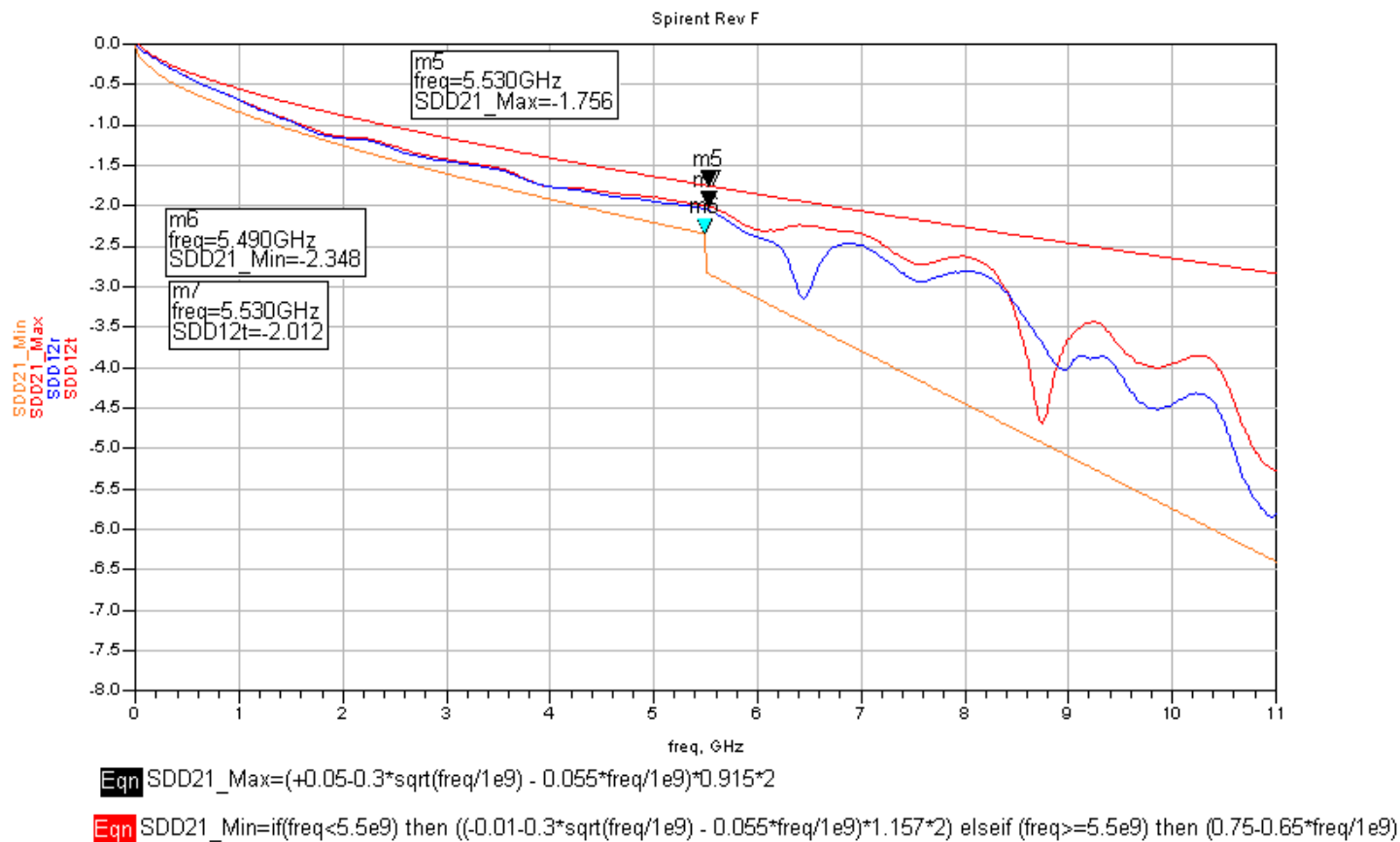
```
Eqn MCB_RL=if(freq<2e9) then (-20+5.5/2*(freq/1e9)) elseif (freq<5e9) then -14.5 else (-23.25 + 10.5*(freq/1e9)/6) endif
```

```
Eqn HCB_RL=if(freq<2.5e9) then (-20+5/2.5*(freq/1e9)) elseif (freq<5e9) then -15 else (-13.8 + 28.85*log10(freq/5.5e9)) endif
```

```
Eqn Host_RL=if(freq<2e9)then -12 elseif(freq>=2e9 AND freq<11e9) then (-6.68 + 12.1*log10(freq/5.5e9)) else -3
```

MCB-HCB B2B SDD21

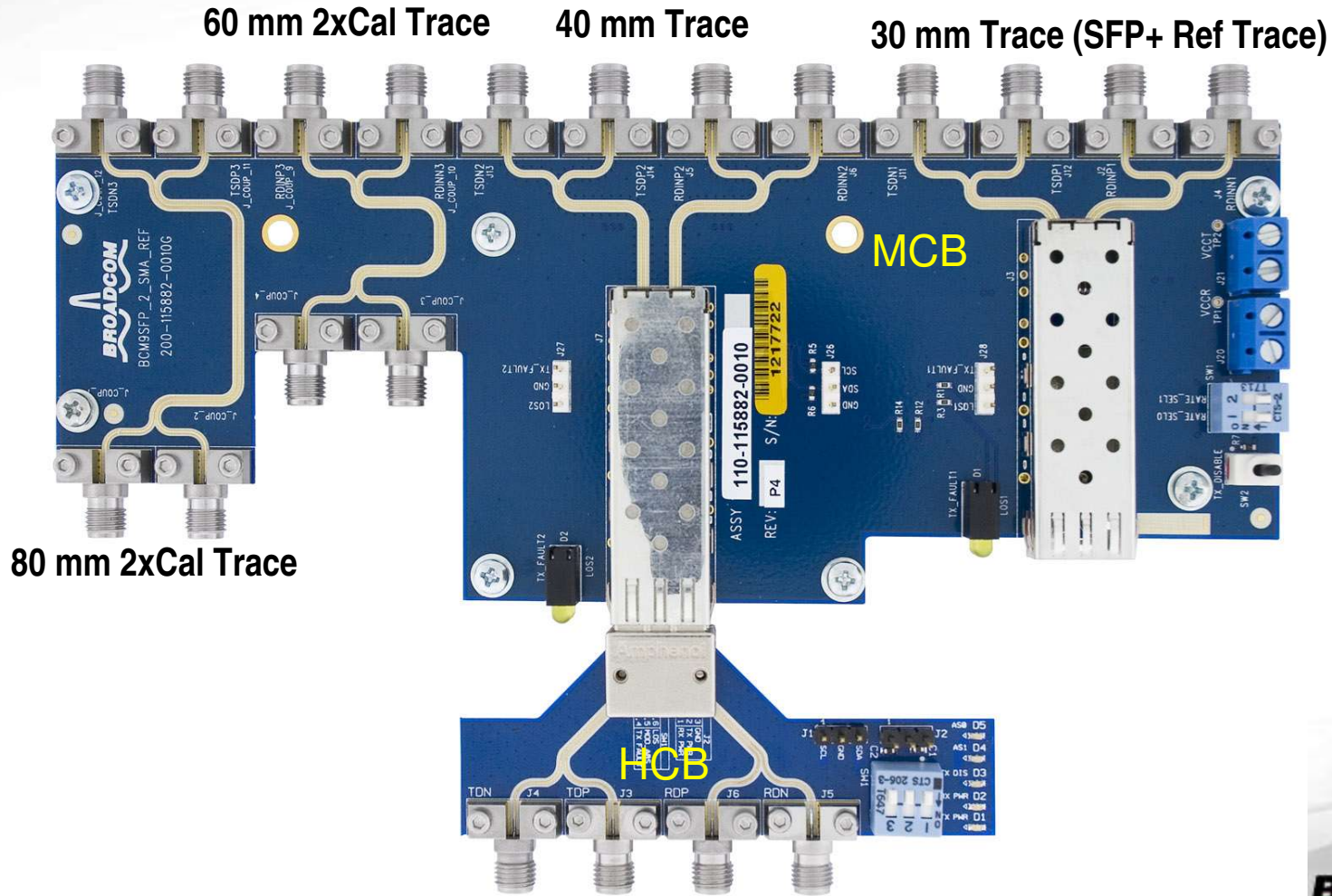
- MCB-HCB must meet specific loss and ILD as shown below:



Other Parameter Specified

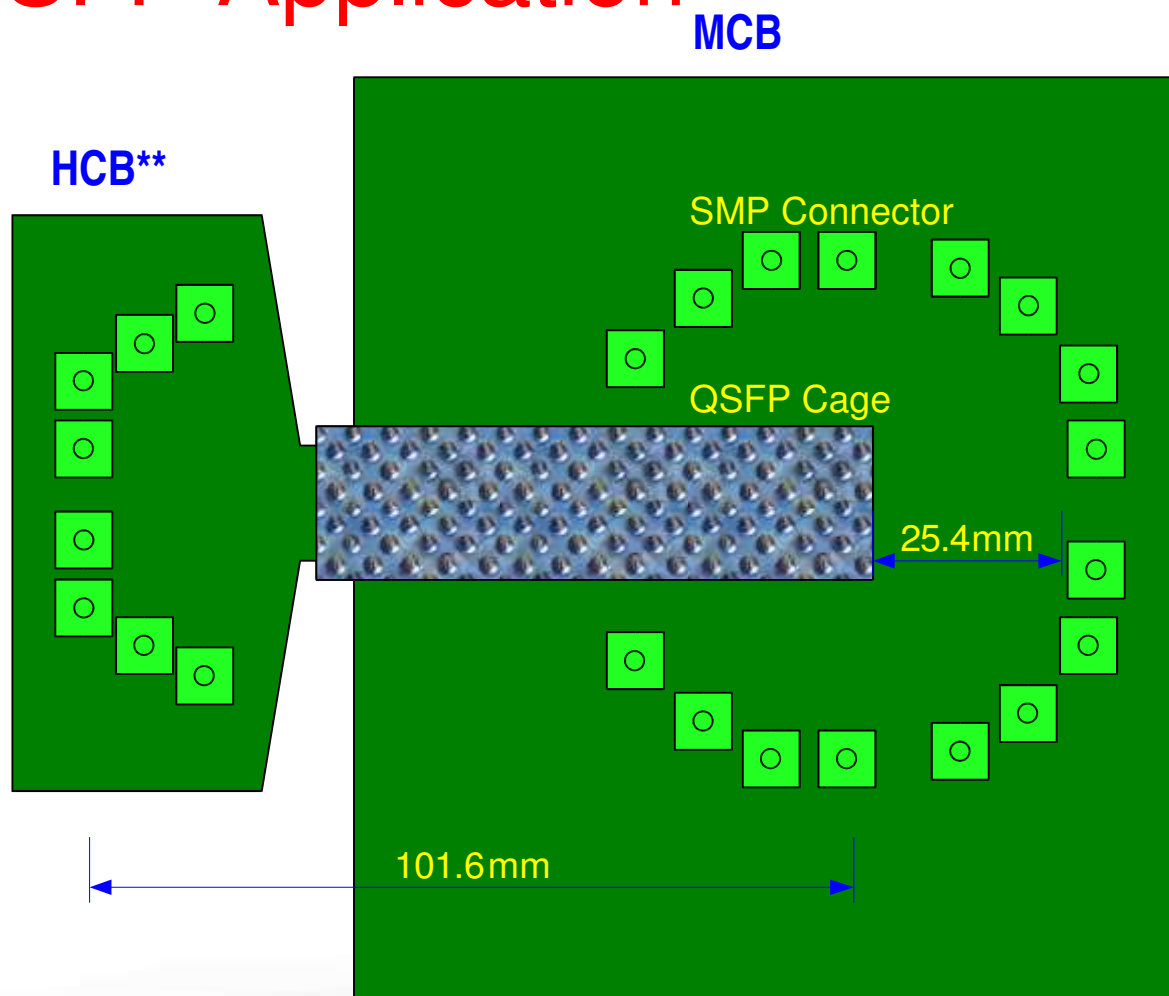
- MCB PCB loss (~0.5 dB@5.5 GHz)
- HCB PCB loss (~1.1 dB@5.5 GHz)
- Differential coupling ~7%
- SCC11/SCC22
- SCD12/SCD21
- NEXT
- Gerber for the PCB
- Broadcom worked with an RF PCB fab house to fine tune the standard RF PCB process so these board can be manufactured with all their constraints.

Picture of the Mated SFP+ HCB with MCB Boards



Possible Construction of HCB and MCB in QSFP Application

- To accommodate higher density SMP/SMPX connector 6x6 mm with 40 GHz BW*.
 - Use either Rosenberger or Huber+Suhner
- MCB PCB trace length similar to SFP+.
- HCB PCB trace length ~25% longer than SFP+.
 - Use higher grade PTFE material.



*The SMP/SMPX are in accordance with the MIL-STD348A/326 and DSCC 94007/94008.

** Additional 8 SMPs will be placed on the bottom of the board.

Summary

- **SFF-8431 precisely has already defined HCB and MCB board**
 - Latest SFF-8431 draft <ftp://ftp.seagate.com/sff/SFF-8431.PDF>
 - HCB and MCB boards Gerbers <ftp://ftp.seagate.com/sff/SFF-8434.ZIP>
- **Building HCB and MCB boards for SR4, SR10, CR4, CR10, and nAUI applications is feasible with performance similar to SFP+ HCB/MCB even with higher density.**
 - Replace K-connector with SMP/SMPX
 - Network Analyzer reference cal kit exist for SMP/SMPX
 - May use lower loss PTFE material to accommodate longer HCB trace
 - Achieving SFP+ HCB-MCB crosstalk and isolation level may be difficult!
- **Use of HCB and MCB removes guess works from the results and improves interoperability.**
- **Requesting from IEEE802.3ba to authorize Compliance Board AdHoc Group.**