Set A: Channel Performance for 400GPL PAM6- C2M and KR

Hansel D'Silva, David Stauffer and Samuel Kocsis, Amphenol

November 2026

IEEE 802.3dv 400 Gb/s/Lane Signaling Task Force

History

Revision	Date	Comment
0.5	30-Oct-2026	▪ Initial Draft.
1.0	30-Oct-2026	▪ Revised slide in mentioning CPC cable length for C2M is 0.5 m.
1.5	3-Nov-2026	▪ Revised the font size of the legend for the results. ▪ Added a slide titled ‘Port Names’. ▪ Revised slide titled ‘Modulation Options’ in removing the mention of PAM-8. ▪ Added the sentence of '425 Gbit PAM6 with existing technologies is possible with HVM around 2027-2028 while further enhancement in technology is needed for 425 Gbit PAM4' to the summary.
2.0	4-Nov-2026	▪ Added images to slide titled ‘Touchstone file Header Information’. ▪ Minor typographical edits.
2.5	5-Nov-2026	▪ Minor editorial edits.

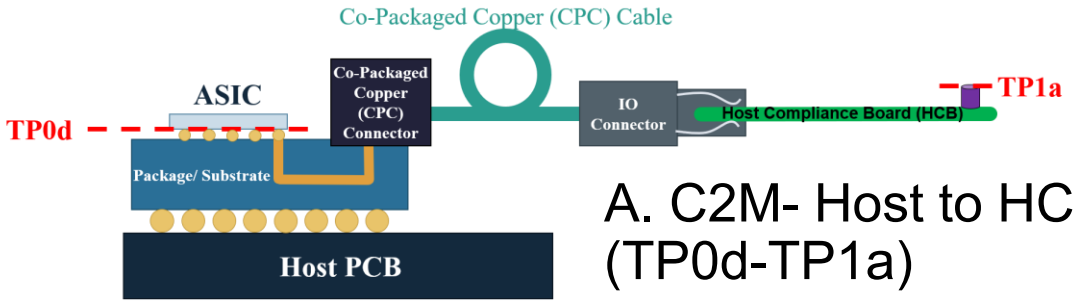
Purpose of this presentation

- The purpose of this presentation is to share channels of C2M- Host to HCB and KR- Backplane for IEEE 802.3dv- 400GPL electrical interfaces.

Summary

- Shared a THRU.s4p, FEXT_1.s4p and NEXT_1.s4p with 10MHz:10MHz:130GHz and a reference impedance of 42.5 Ohm.
- At 425 Gbit PAM6 for a loss of ~-20 dB from TP0d to TP1a, the CPC cable length is 0.5 m.
- At 425 Gbit PAM6 for a loss of ~-40 dB from TP0d to TP5d with a 1 m backplane cable, the CPC cable length is 0.25 m.
- 425 Gbit PAM6 with existing technologies is possible with HVM around 2027-2028 while further enhancement in technology is needed for 425 Gbit PAM4.

1. Touchstone Files being shared

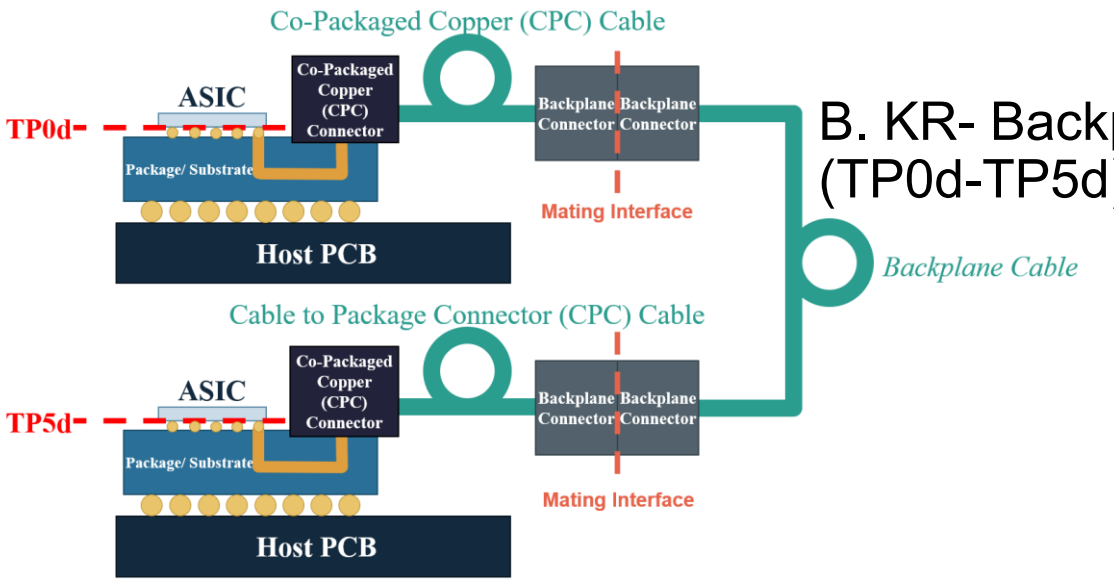


A. C2M- Host to HCB (TP0d-TP1a)

1] IO Connector with nominal wipe
- dsilva_set_a_v1_c2m_425gbit_pam6_tp0d_tp1a_nomwipe_thru.s4p
- dsilva_set_a_v1_c2m_425gbit_pam6_tp0d_tp1a_nomwipe_fext_1.s4p
- dsilva_set_a_v1_c2m_425gbit_pam6_tp0d_tp1a_nomwipe_next_1.s4p

2] IO Connector with minimum wipe
- dsilva_set_a_v1_c2m_425gbit_pam6_tp0d_tp1a_minwipe_thru.s4p
- dsilva_set_a_v1_c2m_425gbit_pam6_tp0d_tp1a_minwipe_fext_1.s4p
- dsilva_set_a_v1_c2m_425gbit_pam6_tp0d_tp1a_minwipe_next_1.s4p

3] IO Connector with maximum wipe
- dsilva_set_a_v1_c2m_425gbit_pam6_tp0d_tp1a_maxwipe_thru.s4p
- dsilva_set_a_v1_c2m_425gbit_pam6_tp0d_tp1a_maxwipe_fext_1.s4p
- dsilva_set_a_v1_c2m_425gbit_pam6_tp0d_tp1a_maxwipe_next_1.s4p



B. KR- Backplane (TP0d-TP5d)

dsilva_set_a_v1_kr_425gbit_pam6_tp0d_tp5d_thru.s4p
dsilva_set_a_v1_kr_425gbit_pam6_tp0d_tp5d_fext_1.s4p
dsilva_set_a_v1_kr_425gbit_pam6_tp0d_tp5d_next_.1s4p

- The touchstone file have port names along with S-parameter quality as per IEEE P370.
  - Start : Step : Stop= 10 MHz: 10 MHz: 130 GHz.
  - Reference impedance: 42.5 Ohm.
  - TX port: [1 3] (in case of crosstalk, aggressor).
  - RX port: [2 4] (in case of crosstalk, victim).
  - Files: 1 Thru, 1 FEXT and 1 NEXT.

2. Touchstone file Header Information

A. C2M- Host to HCB (TP0d-TP1a)

THRU
!Port1= TP0d (TX)
!Port2= TP1a (RX)
!Port3= TP0d (TX)
!Port4= TP1a (RX)

NEXT_1
!Port1= TP1a (AGG)
!Port2= TP1a (VIC)
!Port3= TP1a (AGG)
!Port4= TP1a (VIC)

FEXT_1
!Port1= TP0d (AGG)
!Port2= TP1a (VIC)
!Port3= TP0d (AGG)
!Port4= TP1a (VIC)

```
1  !
2  !Shared with IEEE 802.3dv 400 Gb/s/Lane Signaling Task Force- November 2026
3  !
4  !Port1= TP0d (TX)
5  !Port2= TP1a (RX)
6  !Port3= TP0d (TX)
7  !Port4= TP1a (RX)
8  !
9  !S-parameter Quality Metrics as per IEEE P370,
10 !   - Casuality Quality Metric (CQM)= 99.2590%
11 !   - Reciprocity Quality Metric (RQM)= 100.0000%
12 !   - Passivity Quality Metric (PQM)= 100.0000%
13 !
14 # GHz S RI R 42.5
15 0.01 0.04057989277204666 0.03831040001318881 0.9492511016686519 -0.19581147803
```

B. KR- Backplane (TP0d-TP5d)

THRU
!Port1= TP0d (TX)
!Port2= TP5d (RX)
!Port3= TP0d (TX)
!Port4= TP5d (RX)

NEXT_1
!Port1= TP5d (AGG)
!Port2= TP5d (VIC)
!Port3= TP5d (AGG)
!Port4= TP5d (VIC)

FEXT_1
!Port1= TP0d (AGG)
!Port2= TP5d (VIC)
!Port3= TP0d (AGG)
!Port4= TP5d (VIC)

```
1  !
2  !Shared with IEEE 802.3dv 400 Gb/s/Lane Signaling Task Force- November 2026
3  !
4  !Port1= TP0d (TX)
5  !Port2= TP5d (RX)
6  !Port3= TP0d (TX)
7  !Port4= TP5d (RX)
8  !
9  !S-parameter Quality Metrics as per IEEE P370,
10 !   - Casuality Quality Metric (CQM)= 99.4641%
11 !   - Reciprocity Quality Metric (RQM)= 100.0000%
12 !   - Passivity Quality Metric (PQM)= 100.0000%
13 !
14 # GHz S RI R 42.5
15 0.01 0.1195376155722571 0.02189223196970427 0.7808648057063059 -0.4297887642450505
```

- The touchstone file have port names along with S-parameter quality as per IEEE P370.

3. Modulation Options

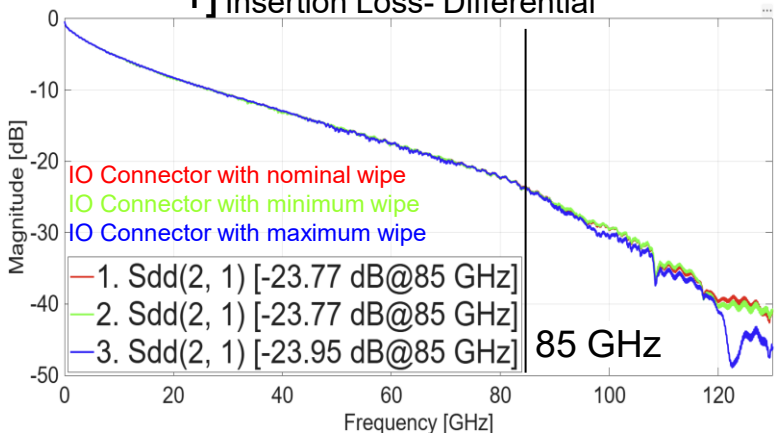
Data Rate	425 Gb/s	
Modulation (PAM-N)	6	4
Bits per Symbol	2.5	2
Signaling Rate [Gsym/s]	170.00	212.50
Nyquist Frequency [GHz]	85.00	106.25

- PAM4 and PAM6 are dominant candidates.
- 2027-2028 product needs to be based on existing technologies.
- 2028-2029 product will be based on next generation technologies.

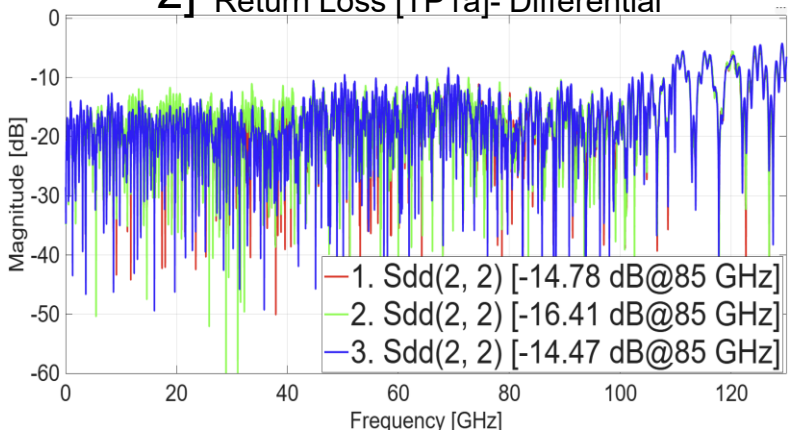
- 425 Gbit PAM6 with existing technologies is possible with HVM around 2027-2028 while further enhancement in technology is needed for 425 Gbit PAM4.

4. Results of C2M: Host to HCB (TP0d-TP1a)

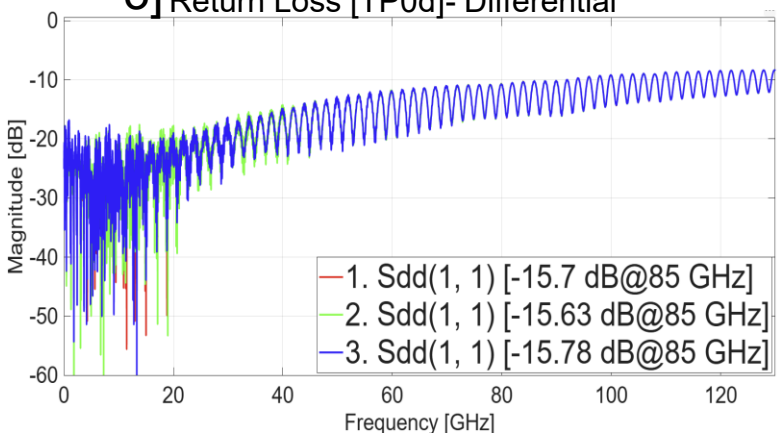
1] Insertion Loss- Differential



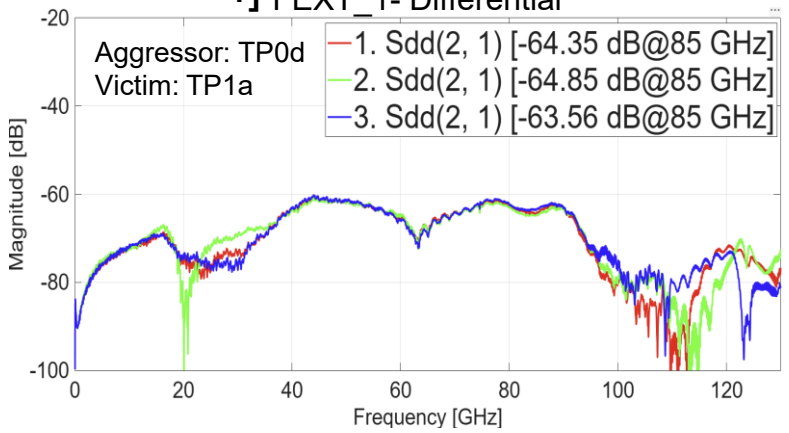
2] Return Loss [TP1a]- Differential



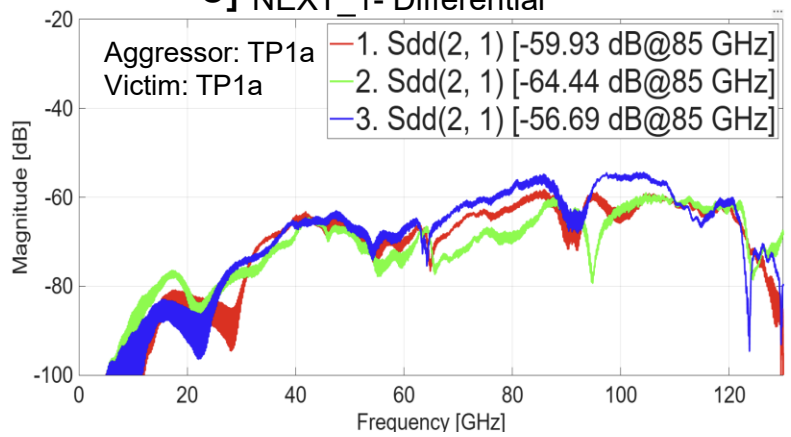
3] Return Loss [TP0d]- Differential

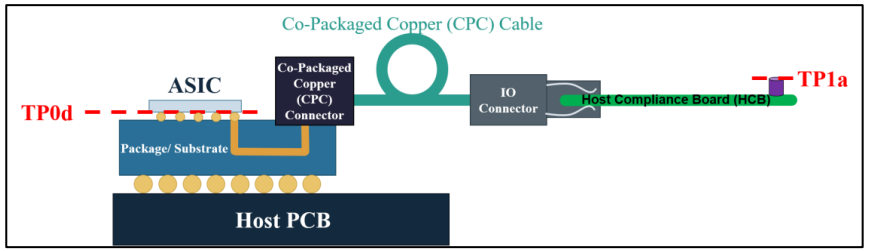


4] FEXT_1- Differential



5] NEXT_1- Differential

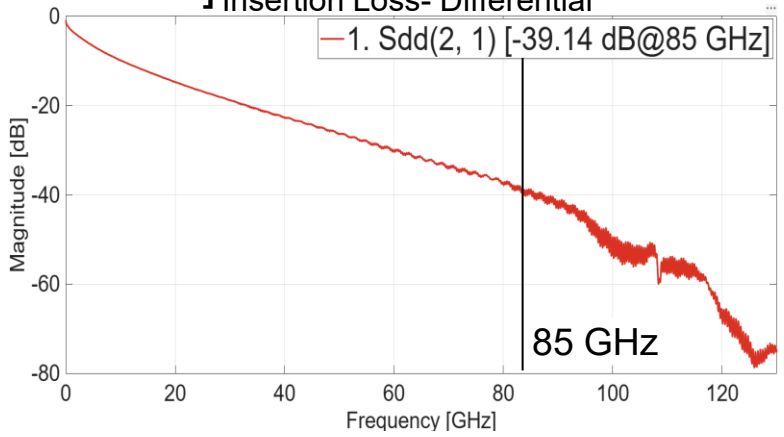




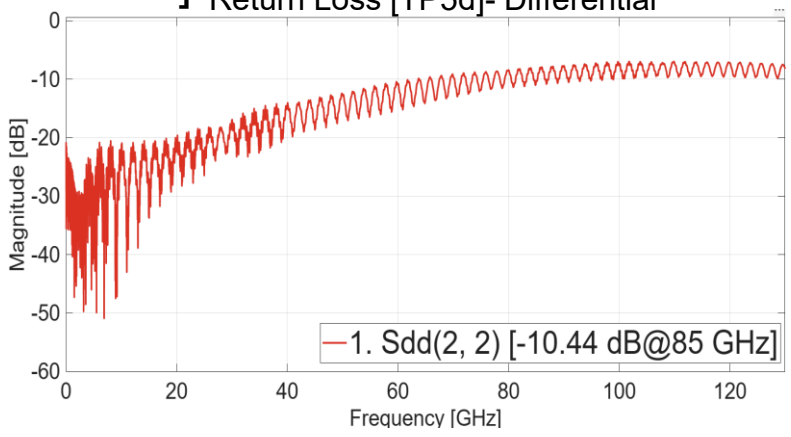
- At 425 Gbit PAM6 for a loss of ~-20 dB from TP0d to TP1a, the CPC cable length is 0.5 m.

5. Results of KR: Backplane (TP0d-TP5d)

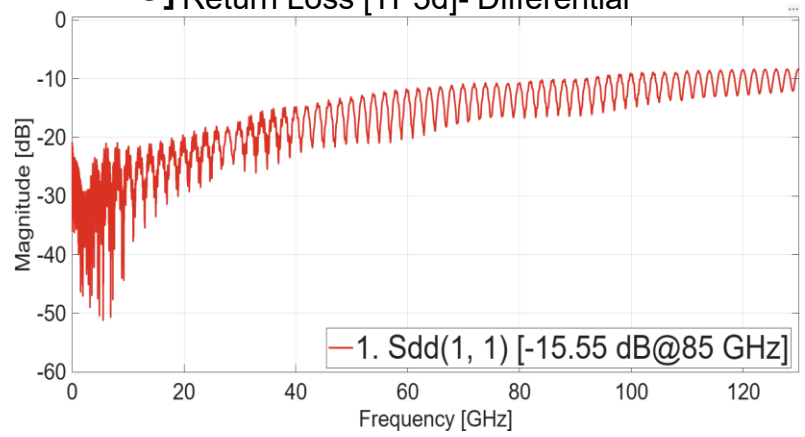
1] Insertion Loss- Differential



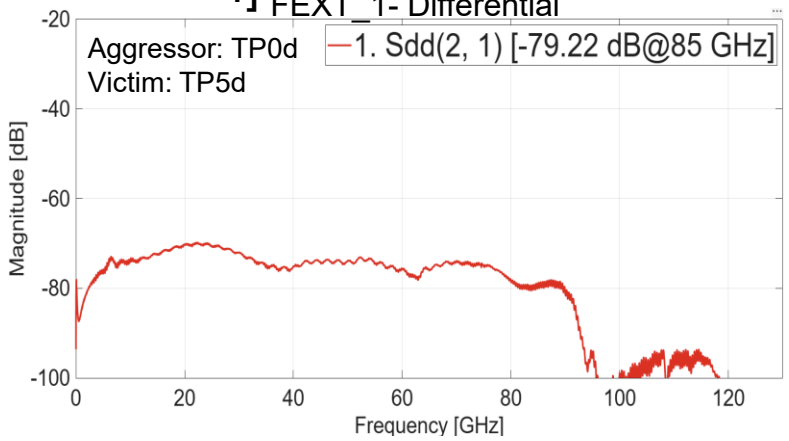
2] Return Loss [TP5d]- Differential



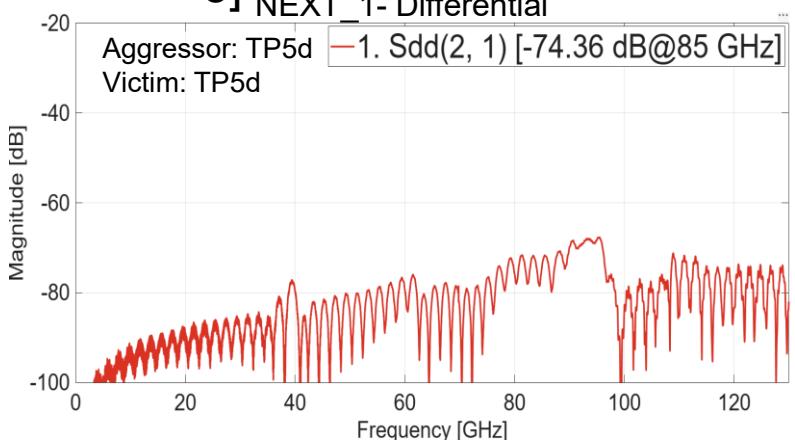
3] Return Loss [TP5d]- Differential

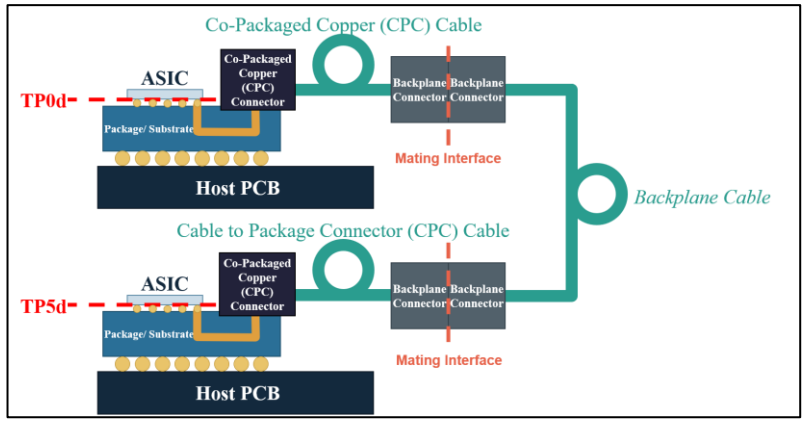


4] FEXT_1- Differential



5] NEXT_1- Differential





- At 425 Gbit PAM6 for a loss of ~-40 dB from TP0d to TP5d with a 1 m backplane cable, the CPC cable length is 0.25 m.

Thank You