Set B2: Channel Performance for 400GPL PAM6- KR

Hansel D'Silva, David Stauffer and Samuel Kocsis, Amphenol
Mike Peng Li and Frank Lambrecht, AMD

November 2026

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

History

Revision	Date	Comment
03	03-Nov-2026	▪ Initial Draft. ▪ Revised the slide titled ‘Summary’ and ‘Touchstone Files being shared’. ▪ Minor typographical edits.
03a	05-Nov-2026	▪ Minor editorial edits.
03b	11-Nov-2026	▪ Revised the slide titled ‘History’ in aligning with that uploaded to the IEEE 802.3dv Public Area.

Purpose of this presentation

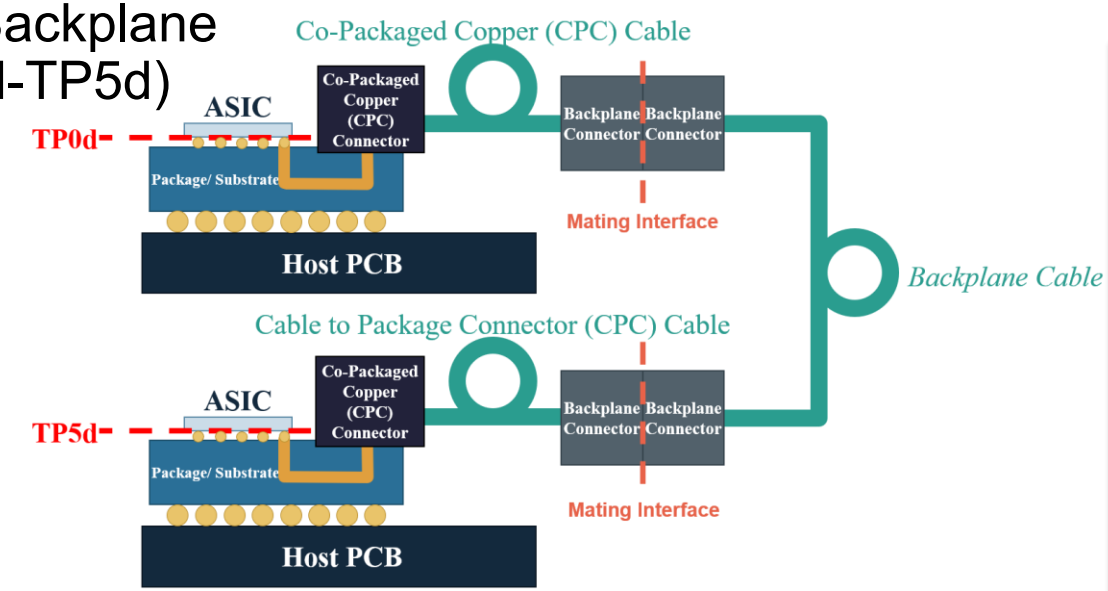
- The purpose of this presentation is to share channels of KR- TP0d to TP5d for IEEE 802.3dv- 400GPL electrical interfaces.

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 Gbps PAM6 for a loss of ~-40 dB from TP0d to TP5d with a 1 m backplane cable, the CPC cable length is 0.4 m.
- 425 Gbps PAM8 is off the consideration with PAM4 & PAM6 being dominant considerations.
- 425 Gbps PAM6 with existing technologies is possible with HVM around 2027-2028 while further enhancement in technology is needed for 425 Gbps PAM4.

1. Touchstone Files being shared

KR- Backplane (TP0d-TP5d)



dsilva_set_b2_v1_kr_425gbit_pam6_tp0d_tp5d_thru.s4p
dsilva_set_b2_v1_kr_425gbit_pam6_tp0d_tp5d_fext_1.s4p
dsilva_set_b2_v1_kr_425gbit_pam6_tp0d_tp5d_next_.1s4p

THRU	NEXT_1	FEXT_1
!Port1= TP0d (TX)	!Port1= TP5d (AGG)	!Port1= TP0d (AGG)
!Port2= TP5d (RX)	!Port2= TP5d (VIC)	!Port2= TP5d (VIC)
!Port3= TP0d (TX)	!Port3= TP5d (AGG)	!Port3= TP0d (AGG)
!Port4= TP5d (RX)	!Port4= TP5d (VIC)	!Port4= TP5d (VIC)

```
!
!Shared with IEEE 802.3dv 400 Gb/s/Lane Signaling Task Force- November 2026
!
!Port1= TP0d (TX)
!Port2= TP5d (RX)
!Port3= TP0d (TX)
!Port4= TP5d (RX)
!
!S-parameter Quality Metrics as per IEEE P370,
!   - Casuality Quality Metric (CQM)= 99.7120%
!   - Reciprocity Quality Metric (RQM)= 100.0000%
!   - Passivity Quality Metric (PQM)= 100.0000%
!
# GHz S RI R 42.5
0.01 0.1052645425604126 0.04620705331920429 0.7696168063070217 -0.5044050556019898
```

- 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. Modulation Options

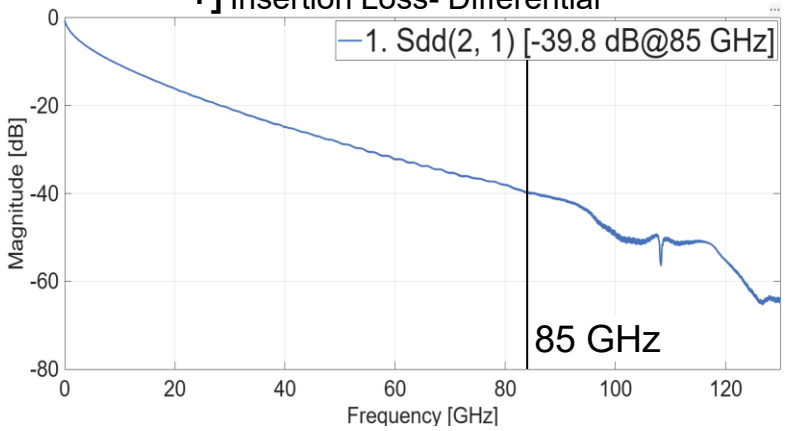
Data Rate	425 Gb/s		
Modulation (PAM-N)	~~8~~	6	4
Bits per Symbol	~~3~~	2.5	2
Signaling Rate [Gsym/s]	~~141.67~~	170.00	212.50
Nyquist Frequency [GHz]	~~70.83~~	85.00	106.25

- Only PAM4 and PAM6 are dominant candidates.
  - PAM8 is off the consideration.
- 2027-2028 product needs to be based on existing technologies.
- 2028-2029 product will be based on next generation technologies.

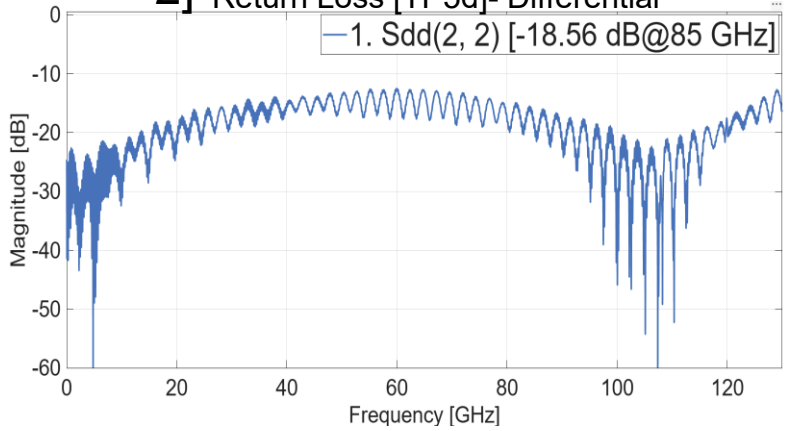
- 425 Gbps PAM8 is off the consideration.
- 425 Gbps PAM6 with existing technologies is possible with HVM around 2027-2028 while further enhancement in technology is needed for 425 Gbps PAM4.

3. Results of KR: TP0d-TP5d

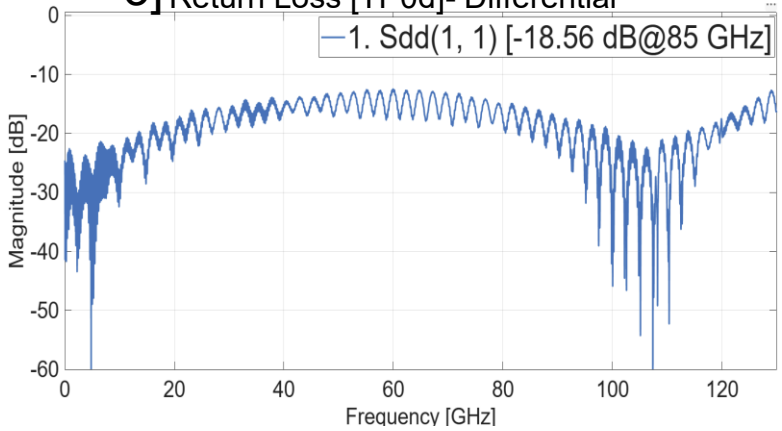
1] Insertion Loss- Differential



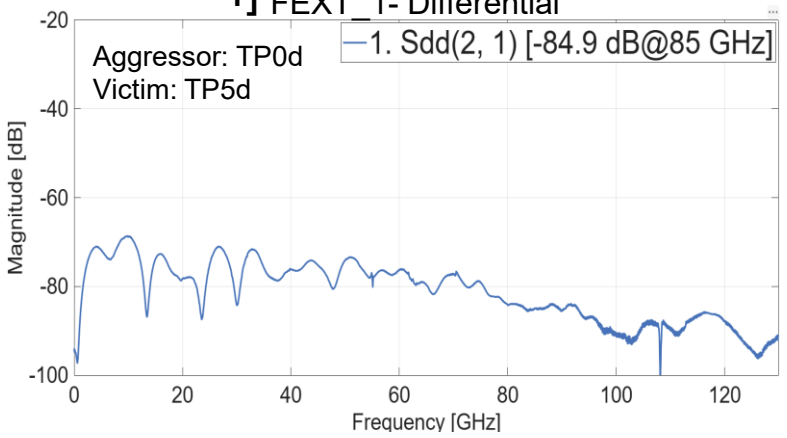
2] Return Loss [TP5d]- Differential



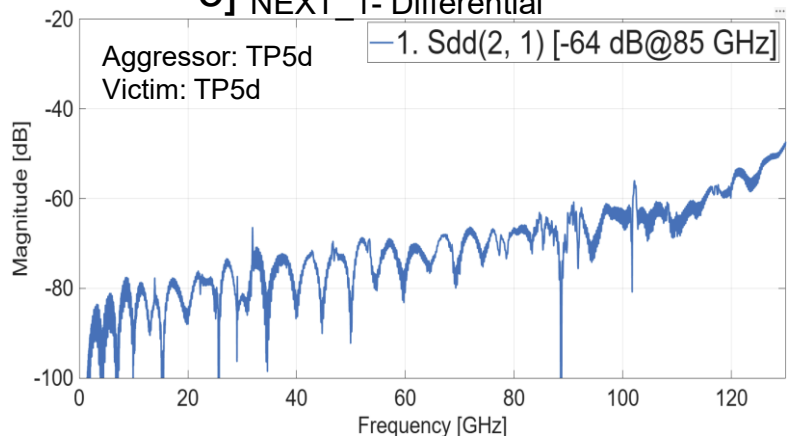
3] Return Loss [TP0d]- Differential

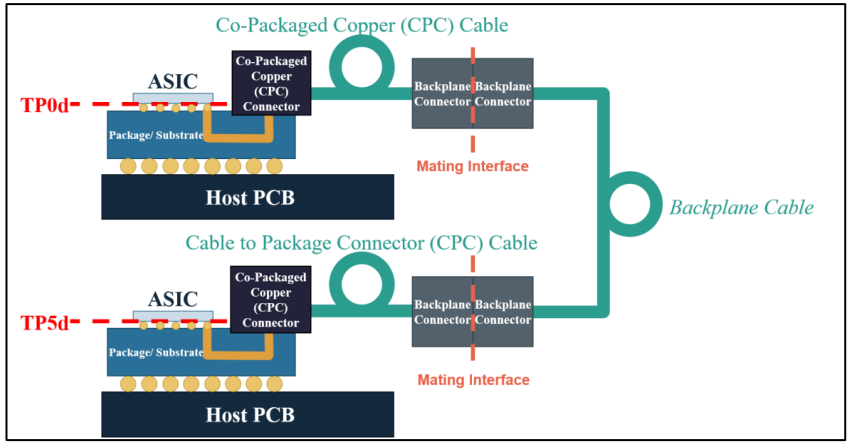


4] FEXT_1- Differential



5] NEXT_1- Differential





- At 425 Gbps PAM6 for a loss of ~-40 dB from TP0d to TP5d with a 1 m backplane cable, the CPC cable length is 0.4 m.

Thank You