IEEE802.3 4P Study Group
Channel Pair to Pair Resistance Unbalance

November 2013
Dallas TX

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Terminology

- P2P = Pair to Pair.
- Runb=Pair Resistance Unbalance
  - This is the 2% cable 3% channel data.
- P2PRunb = Pair to Pair Resistance Unbalance (system level including PSE and PD output and input resistance and transformers).
  - Proposed 5% for cable. See:

http://www.ieee802.org/3/4PPOE/public/nov13/darshan_01_1113.pdf

- P2PCRunb = Pair to Pair Channel Resistance Unbalance (includes only 4 connector channel model components)
  - Presented in this work.

Objectives

- To set the numbers for the Channel Pair to Pair Resistance Unbalance based on work done at the references slides.

P2P **Channel R**esistance Unbalance[1] Model

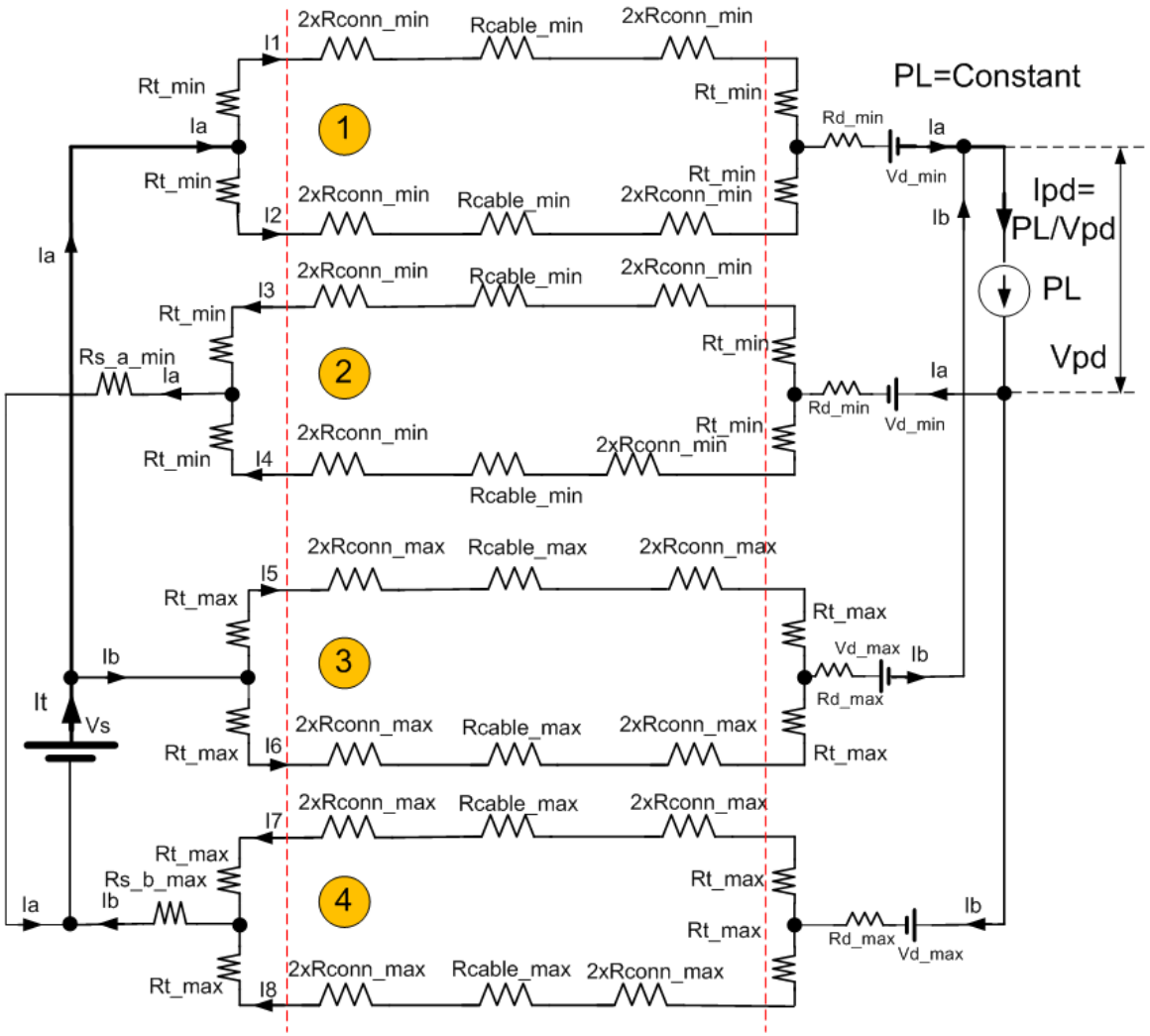


Figure 1

Min/Max data base used.

	Max resistivity	Min resistivity
Cable resistivity	117mOhm/m *	66mOhm/m*
Transformer winding resistance	120mOhm min, 130mOhm max	120mOhm min, 130mOhm max
Contact resistance	30mOhm min, 60mOhm max	30mOhm min, 60mOhm max
Diode bridge	0.3V+0.4Ohm*Id min; 0.4V+0.5Ohm*id max	0.3V+0.4Ohm*Id min; 0.4V+0.5Ohm*id max
PSE output resistance	0.25+0.1 Ohm min 0.25+0.2 Ohm max	0.1+0.05 Ohm min 0.1+0.1 Ohm max

-*Cable pair to pair resistance max imbalance is set to 5%.

Cable resistance within pair imbalance is max 2%. See Darshan_1_1113.pdf

-All parameters are at room temperature and further study is required to address temperature variations

Results for min. resistivity model.

Length[m]	Min	Max	Idiff	P2PCRunb
1	385	659	275	26.30%
10	415	636	221	21.04%
100	500	626	126	11.19%

Simulation Conditions:

1. Pairs were not limited to 0.6A at any pair.
2. Numbers were taken at the pair with highest and lowest current.
3. See annex for details

Summary

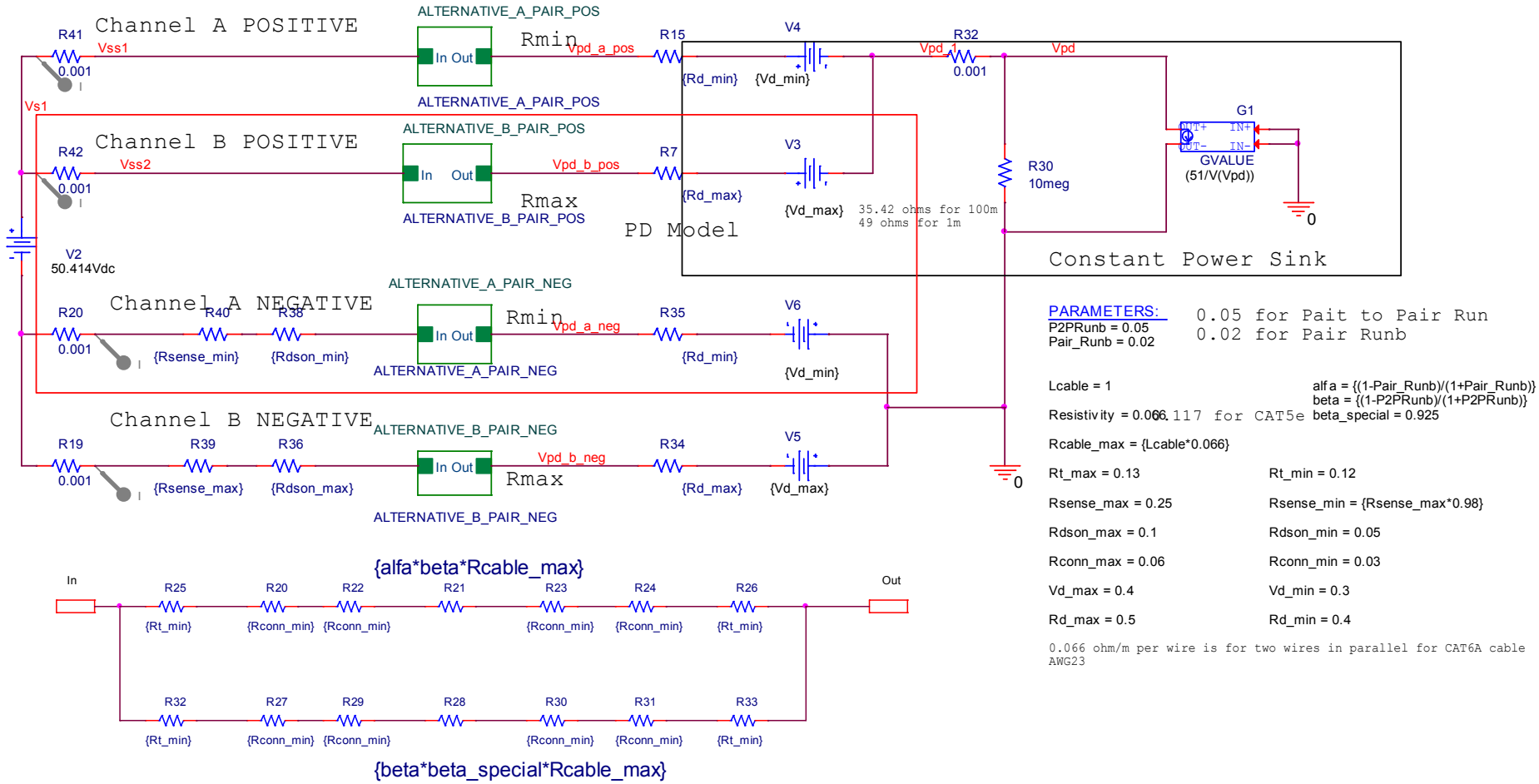
- For the data base with the low resistivity model numbers in Table 1
- P2PCRunb ≤26.3% (<30%)

References

- Sorted per latest dates
- http://www.ieee802.org/3/4PPOE/public/nov13/darshan_01_1113.pdf
- http://www.ieee802.org/3/4PPOE/public/nov13/beia_01_1113.pdf
- http://www.ieee802.org/3/4PPOE/public/jul13/beia_1_0713.pdf
- http://www.ieee802.org/3/4PPOE/public/jul13/darshan_2_0713.pdf

Thank You

System Model



- The circuit below is one of the internal blocks representing the pair content

Sim results for minimum resistivity case

Cable Length	Ia	Ia_return	Ib	Ib_return
	I(R41)	I(R20)	I(R42)	I(R19)
1m	659.412	629.521	384.797	414.688
10m	635.851	615.403	414.797	435.245
100m	625.54	611.388	499.597	513.749