Loop Powering Proposals

November 11, 1999 4:00PM

1) Phantom Power on Signal Pair
   Power feeding through center taps of TX & RX transformers
2) Single Pair Metalic Feed
   Power feed in one wire out the other wire of an idle pair
3) Common Mode Power Feed
   Power provided through the idle pairs with balanced current & termination.
4) True Phantom power on Idle Pairs
   Transformers used to couple power only on the idle pairs
5) Four Pair
   Combination of techniques 1 & 4
6) Two Pair Metalic Feed
   Feed and return on two pairs, each containing one feed and return.

Parameters to test against:

Xfmrs – Effect on magnetics
I/L – Insertion loss
R/L - Return Loss
# of pairs – Number of pairs required to implement the powering scheme
EMC – Effects of method on radiated EMI and susceptability
Voltage – Perceived max voltage that is supported in the method
Current – Perceived max current carrying capacity in the method
Sig Qual – Expected effects on the transmission character
Xtlk – Expected effects on cross talk with the proposed method
Disco – Possible effect of the powering mode on the discovery / identification method.
ILIM – Differential imbalance in the individual lines with respect to the transformer center tap.
1000 BT – Incompatibility with 1000BASE-T

Loop Powering Matrix

	Method 1	Method 2	Method 3	Method 4	Method 5	Method 6
Xfmrs	Yes[1]	No	No	Yes[2]	Yes[3]	No
I/L	Yes[4]	No	No	No	No	No
R/L	Yes[5]	No	No	No	No	No
# of pairs	2	3	4	4	4	4
EMC	Yes[6]	Yes[7]	Yes[8]	Yes[9]	Yes[10]	Yes[11]
Voltage	SELV	SELV	SELV	SELV	SELV/2	SELV
Current	2x	1x	2x	2x	4x	2x
Sig Qual	Yes[12]	No	No	No	Yes[13]	No
Xtlk	Yes	No	No	No	Yes	No
Disco						
ILIM	Yes	No	No	No	Yes	No
1000BT	No	Yes	Yes[14]	No	No	Yes

[1] Limited current (approximately 300mil or increase size), DC imbalance, heat rise, longitudinal balance, possible package size changes to bring out center taps
[2] See 1
[3] See 2
[4] Thermal effects cause by fluctuating load or large currents can effect Insertion Loss. This effect can be minimized with auto-transformer.
[5] Thermal effects cause by fluctuating load or large currents can effect Common Mode Return Loss. This effect can be minimized with auto-transformer, however, not as effectively as the insertion loss.
[6] Use of 2 wire common mode chokes on the media side will no longer be effective for dampening EMI in applications requiring chokes. There is a potential for coupling power supply noise onto the wire.
[7] There is a potential for coupling power supply noise onto the wire. Use of additional chokes may be required in some applications which may have been handled previously with passive termination. Since there is no necessity to pass data signals, the chokes may be of a simpler construction. Because this method uses minimum loop size, EMI would be relatively reduced.
[8] There is a potential for coupling power supply noise onto the wire. Use of additional chokes may be required in some applications which may have been handled previously with passive termination. Since there is no necessity to pass data signals, the chokes may be of a simpler construction.
[9] See 6, but since there is no necessity to pass data signals, the chokes may be of a simpler construction.
[10] See 6.
[11] See 7.
[12] Potential temperature rise of cables and imbalances in the power feed which effect the margin for baseline wander can degrade signal quality.
[13] See 12.
[14] This must become a phantom feed mode implementation, which is feasible.