ANALOG DEVICES

AHEAD OF WHAT'S POSSIBLE™

10BASE-T1L Power Delivery

HEATH STEWART

ANALOG DEVICES

REV 01

Existing Class Power Table Extensions
Added in Pittsburgh

- (3) 20V Classes
- (2) 50V Classes
- AWG and Length specified
- R_{LOOP} Errors
  - 14AWG R_{LOOP} Too High
  - 24AWG R_{LOOP} Too Low

Class	10	11	12	13	14	15
$V_{PSE(max)}$ (V)	36	36	36	60	60	60
$V_{PSE\_OC(min)}$ (V)	20	20	20	50	50	50
$V_{PSE(min)}$ (V)	20	20	20	50	50	50
$I_{PI(max)}$(mA)	102	155	169	254	388	400
$P_{class(min)}$ (W)	2.04	3.1	3.38	12.7	19.4	20
$V_{PD(min)}$ (V)	13.98	13.96	13.92	35.01	34.87	35.6
$P_{PD(max)}$ (W)	1.43	2.16	2.35	8.89	13.53	14.24
Cable AWG	18	14	24	18	14	24
Cable Length (m)	1000	1000	300	1000	1000	300

Changes Required to Remedy R_{LOOP}
Offers Opportunity to Rethink Classes

- Classes should exist for
  - **Max Power:** Push up max power transfer to SLEV (60V max), LPS (100W output power) limits
  - **Max Economy:** Accommodate economical 24AWG runs at 300m
  - **Middle Ground:** Place at least one class in between…
- Cabling standards would prefer to specify AWG and length, propose to remove these from 802.3bu and replace with simple R_{Loop}, DC Loop Resistance

Target IR Drop	Target Avbl	T Room	T Max	tRise	Vpse	Vpse
30%	70%	25	60	35	50	50

							Std	Std	Std	Std		Std	Equivalent Cable Lengths		
AWG	Limit	Length	R/m	Rloop	tRise	Rloop @ tRise	Rloop margined	Vpse	Ipi-stable	Ppse	Pcable	Ppd	14AWG	18AWG	24AWG
14	1000	400	0.0092	7.4	35	8.4	9.25	50	1.622	81.08	24.32	56.76	400	158	39
18	1000	400	0.0233	18.6	35	21.2	25	50	0.600	30.00	9.00	21.00	1000	400	99
24	499	300	0.0938	56.3	35	64.0	65	50	0.231	11.54	3.46	8.08	1000	1000	300

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Multiple Voltage Classes are Problematic
24V vs 50-60V

- Building Automation
  - Power transmission is maximized at 60V (just under SELV)
  - Voltage-agile PSEs will be cost prohibitive eg 24V vs 50-60V
  - PSEs and PDs should interoperate out-of-the-box
  - 50V classes are best for Building Automation
  - Is there any way to steer Building Automation vendors towards “only” 50V classes?
- Industrial Automation
  - 24V applications are historically typical
  - Are 50V classes also attractive?
  - Can 50V classes accomplish same goals?
- Proposal
  - **Choice 1:** Only support 50-60V classes
  - **Choice 2:** Building Automation supports 50-60V class; Industrial Automation supports 24V classes