Investigations of the thermal impact of remote powering over generic cabling

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Presented to the
4-pair PoE Study Group in
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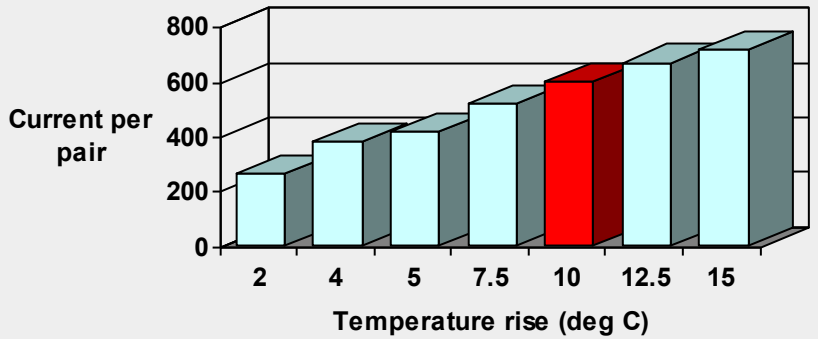
ISO/IEC TR 29125

ANSI/TIA-TSB-184	Guidelines for Supporting Power Delivery Over Balanced Twisted-Pair Cabling
ISO/IEC TR 29125	Information technology - Telecommunications cabling guidelines for remote powering of terminal equipment

Based on information from TIA (TIA-TSB-184) and ISO/IEC (TR 29125)

100 Category 5/5e cables in a bundle
Open air ventilation
All pairs powered



IEEE 802.3at Type 2: 300 mA per conductor/600 mA per pair

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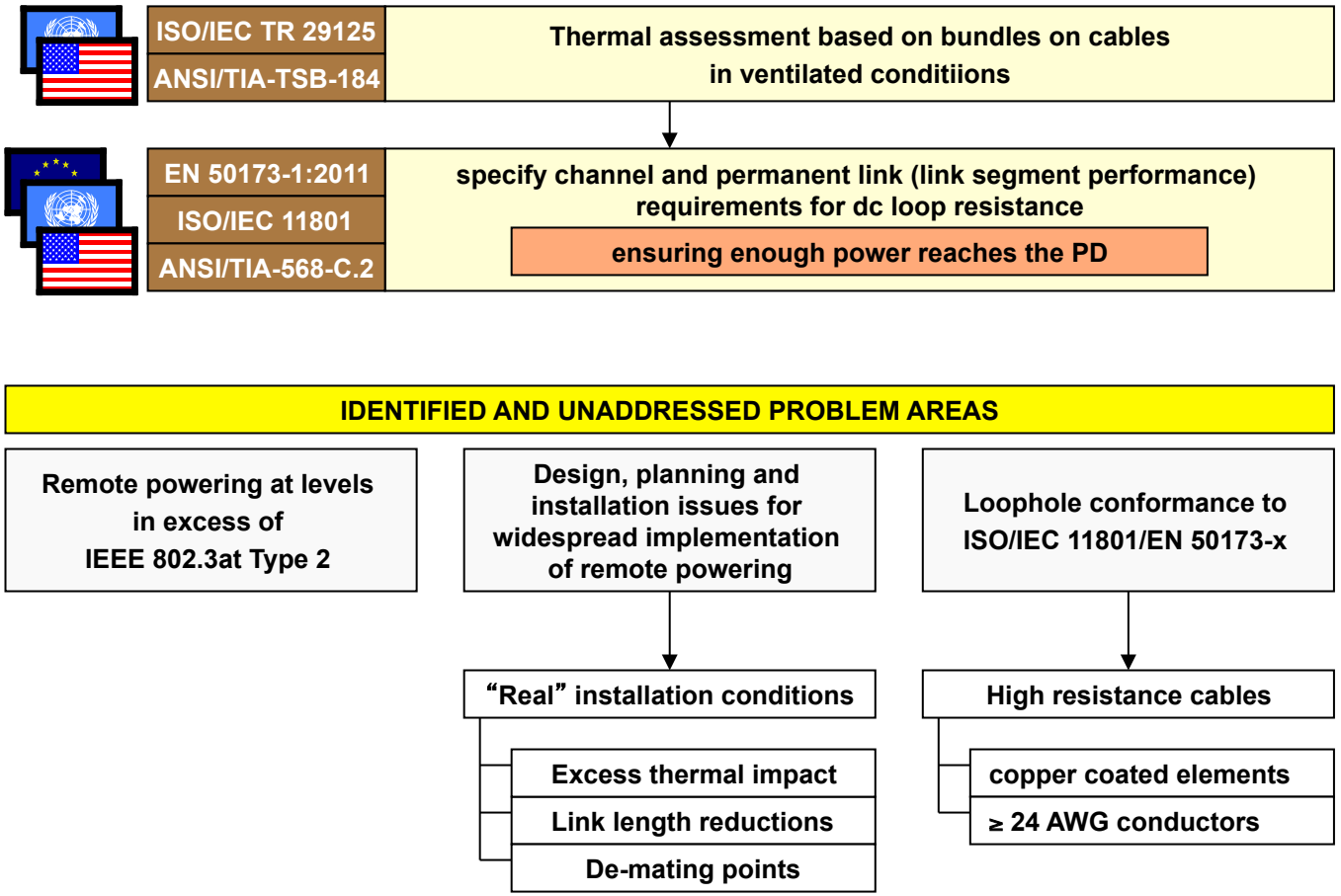
Further Investigation



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Increasing Power/Current

Example

8 Port 95W per Port Power over Ethernet Mega Midspan

- Full Power 95W per port
- Gigabit Compatible
- SNMP v2c Management Standard
- 12.5K Detection
- Diagnostic LEDs
- Full Protection OVP, OCP, OTP
- Compliant IEEE802.3at detection, disconnect, and voltage control

Download Datasheet

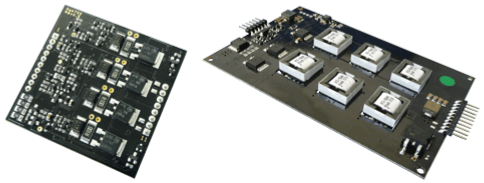
Example

Silvertel **Telephony & Power Solution Modules**

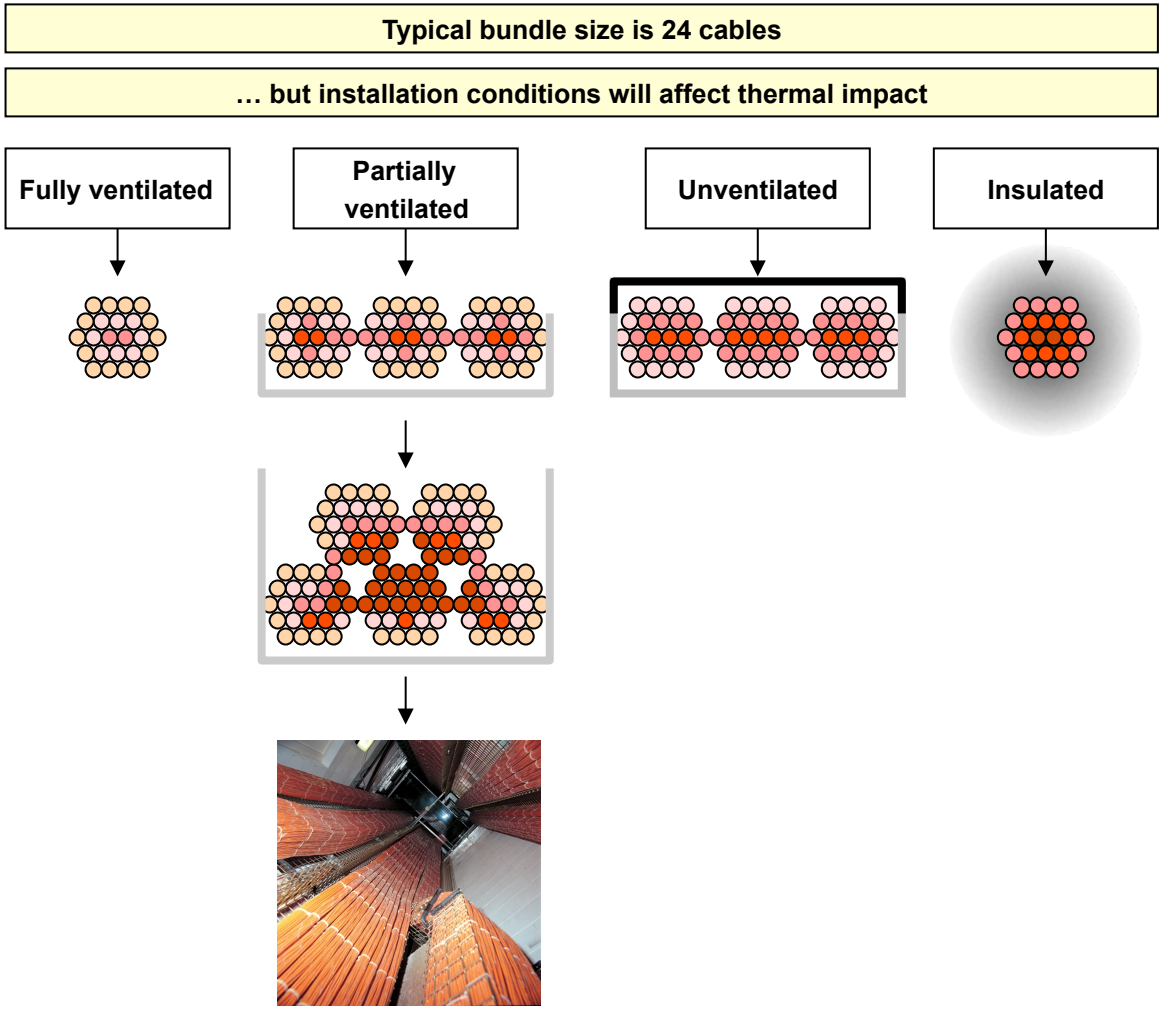
Home | Company Info | Products | News | Worldwide Sales

200W Power over Ethernet (PoE) Modules for the Powered Device (PD) and Power Sourcing Equipment (PSE)

Silvertel has announced the launch of the Ag5700 and Ag6700. PoE modules providing output power from 60W up to 200W.



Installation Conditions



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Channel Specification

EN 50173-1:2011	Information technology - Generic cabling systems: General requirements
ISO/IEC 11801	Information technology - Generic cabling systems: General requirements

DC loop resistance (maximum)	
Class C	40 Ω
Classes ≥ D	25 Ω

No length dependence

UNINTENDED CONSEQUENCES
The use of smaller copper conductors (higher Ω/m) on shorter channels
The use of non-copper conductors (higher Ω/m) on shorter channels

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CLC TR 50174-99-1

CLC TR 50174-99-1	Information technology - Cabling installation: Remote powering

Work began: 2012	Publication: 2015 probable

OBJECTIVES	
1	Definition of a “test configuration” to assess thermal impact of remote powering
2	Testing of different installation conditions and currents
3	Development of a modelling tool to enable predictions of thermal impact
4	The production of requirements/recommendations for cabling installation, planning and operation

OPENING POSITION
None of the CENELEC experts were aware of any problem caused by cable heating where current levels are in accordance with IEEE 802.3at and therefore did not anticipate any need for additional installation or operational instructions for cabling in support of IEEE 802.3at.

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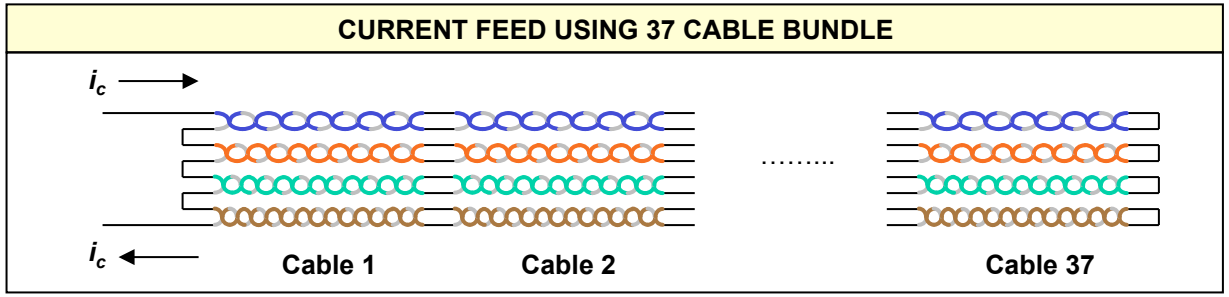
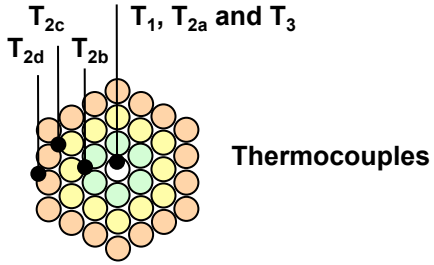
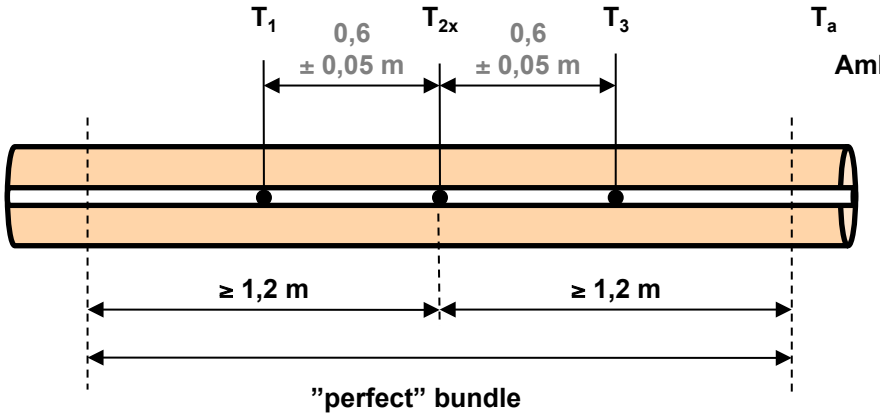
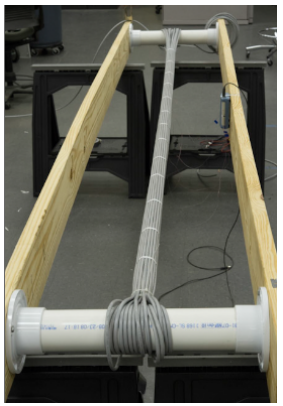
Objective 1 - Test Configuration









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Objective 2 - Initial Results

INITIAL RESULTS USING CENELEC TEST CONFIGURATION and CATEGORY 6 U/UTP CABLES

			$T_{2a} - T_{ambient}$	
				Steady state
37 cables	Fully ventilated	300 mA per conductor: all pairs powered		1.2 °C
		450 mA per conductor: all pairs powered		4.3 °C
		900 mA per conductor: all pairs powered		20 °C
37 cables	Fully insulated	300 mA per conductor: all pairs powered	5 °C	7 °C
		450 mA per conductor: all pairs powered	11 °C	17 °C
		900 mA per conductor: all pairs powered	49 °C	75 °C
			After 120 minutes	After 425 minutes
				Steady state

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Initial Conclusions

Early work, using a standardized test configuration, has looked at bundles of 37 cables in both fully ventilated and heavily insulated conditions which are considered to reflect best and worst case thermal scenarios. This work indicates that for a 4-pair current of 300 mA per conductor (600 mA per pair), the temperature increase seen at the centre of a heavily insulated cable bundle does not exceed the 10 °C previously considered by IEEE.

The above statement assumes the use of cabling channels in accordance with Class D (or above) as referenced by IEEE 802.3at.

However, it is also critical to ensure that the relevant parts of the link segment (IEEE) and channel (ISO/IEC and CLC) are specified with a dc loop resistance per unit length requirement.

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