

SPE for Building Automation

SPE Technology Day

September 22th & 23th, 2020



Single Pair Ethernet
System Alliance

Presenter



- ◆ Market Manager LAN Cabling
- ◆ Reichle & De-Massari AG
- ◆ Electrical engineer FH
- ◆ 26 years experience as Development Engineer, Project Manager and Product Manager in LAN Cabling and RJ45 connectivity
- ◆ Participation in various standardization committees (ISO/IEC SC25, Cenelec TC215, IEC SC48B, TIA TR42)

Contact: matthias.gerber@rdm.com



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Content

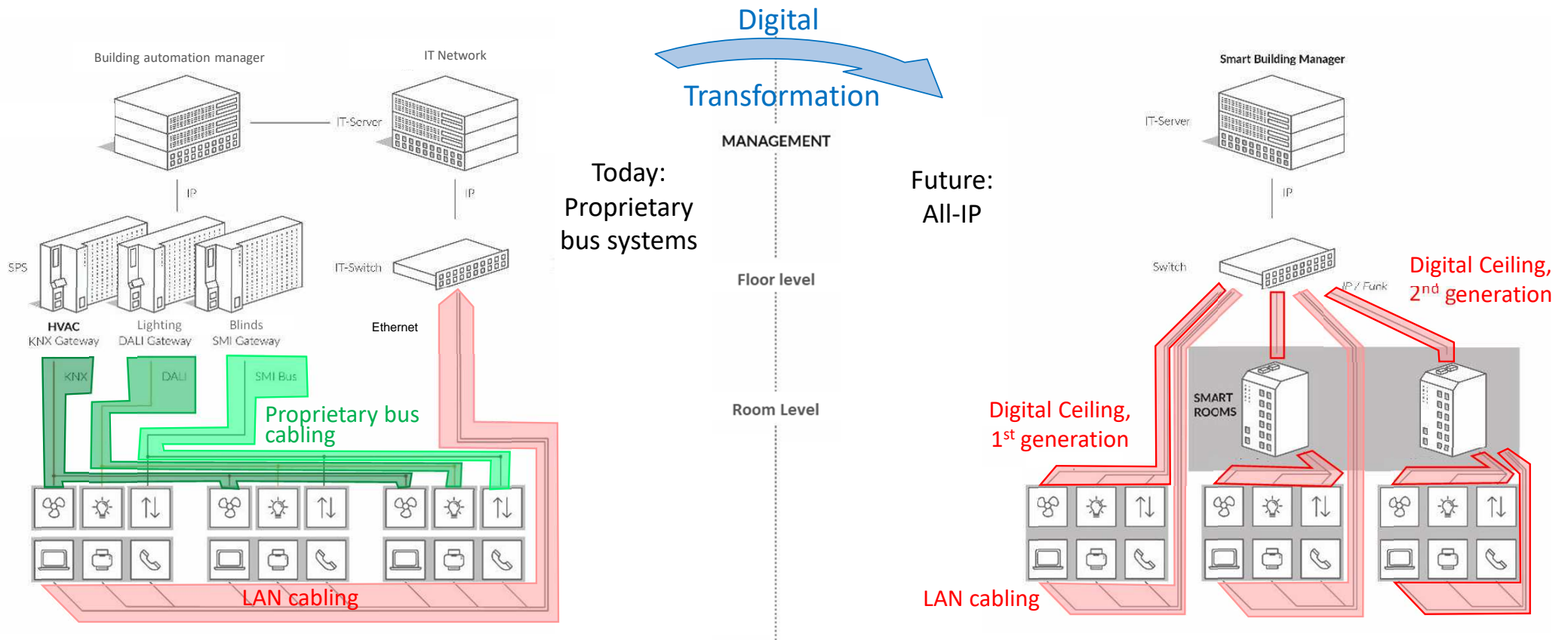


- ◆ Digital Building Transformation
- ◆ Digital Ceiling Evolution
- ◆ SPE implementation possibilities
- ◆ Connectivity market expectations
- ◆ Conclusions



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Digital Building Transformation



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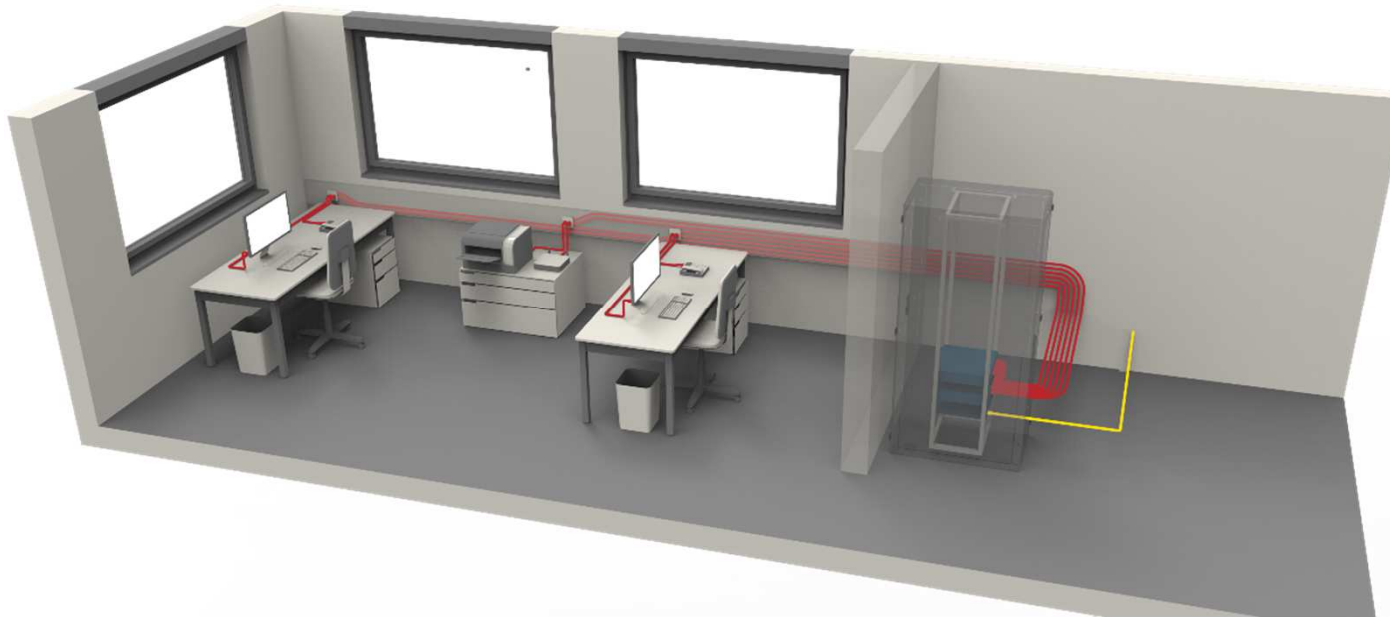
Structured Cabling Evolution 1



Generic Cabling

Work area cabling:

- IT devices



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Structured Cabling Evolution 2



Generic Cabling

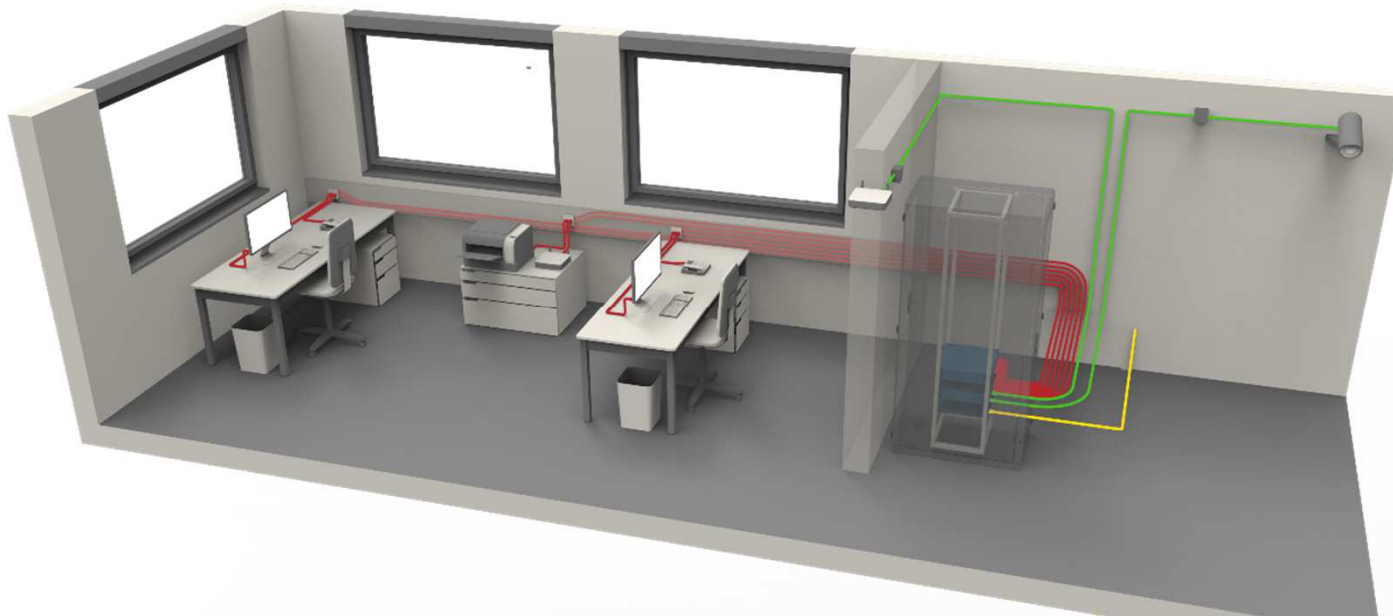
Work area cabling:

- IT devices

Power over Ethernet

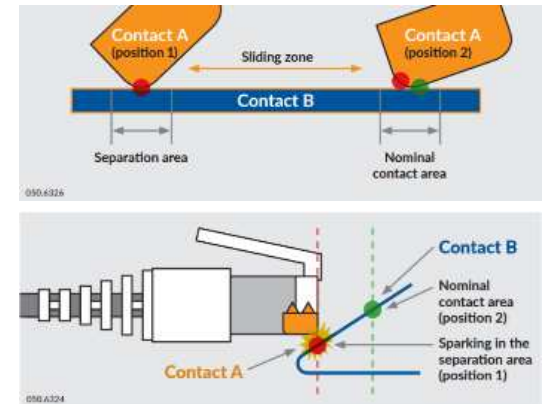
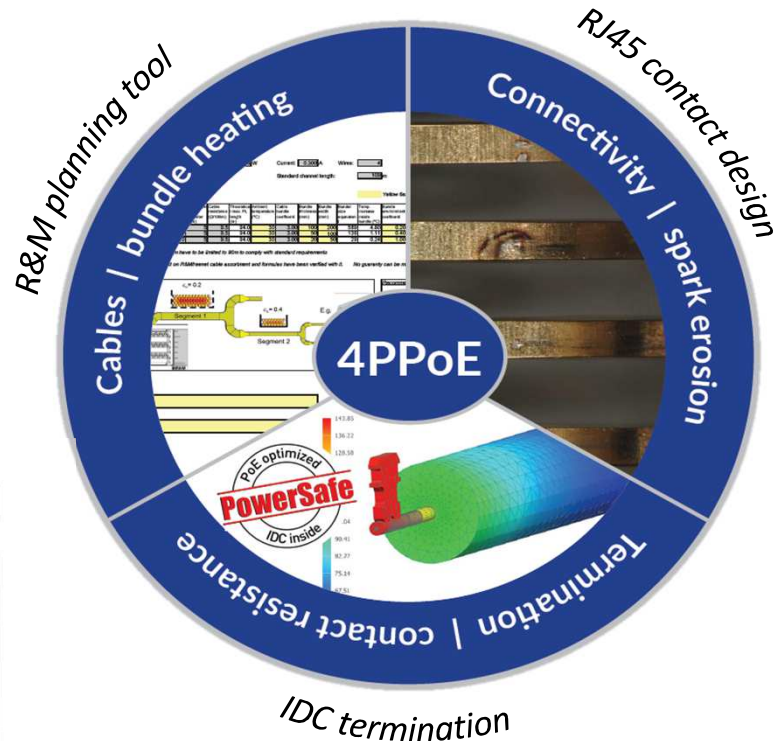
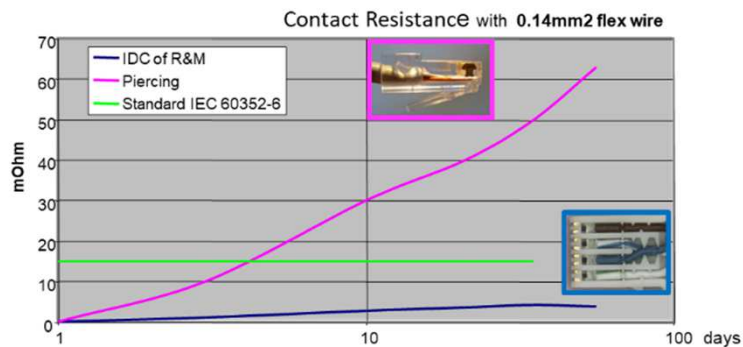
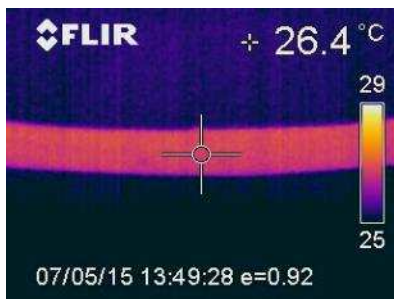
Occasional additional devices:

- WAP
- Cameras

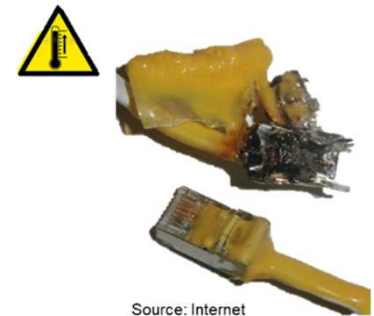


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Remote Power: Power over Ethernet Support



IEC 60512-99-1 / -2



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Structured Cabling Evolution 3



Generic Cabling

Work area cabling:

- IT devices

Power over Ethernet

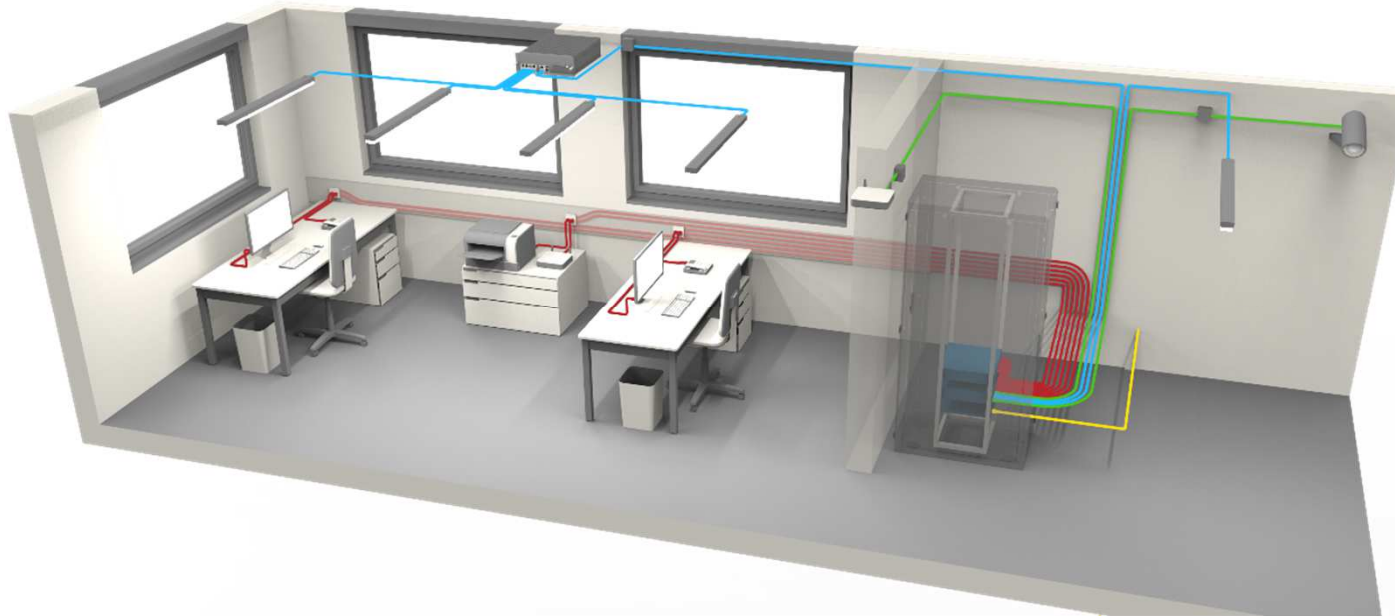
Occasional additional devices:

- WAP
- Cameras

Digital Ceiling

Wide coverage BA devices:

- LED Lighting
- Sensors

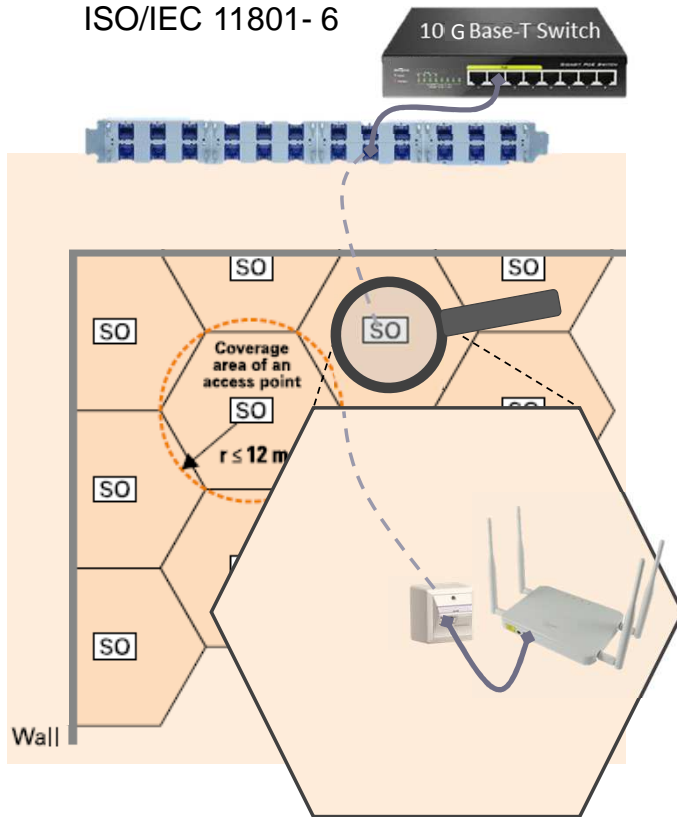


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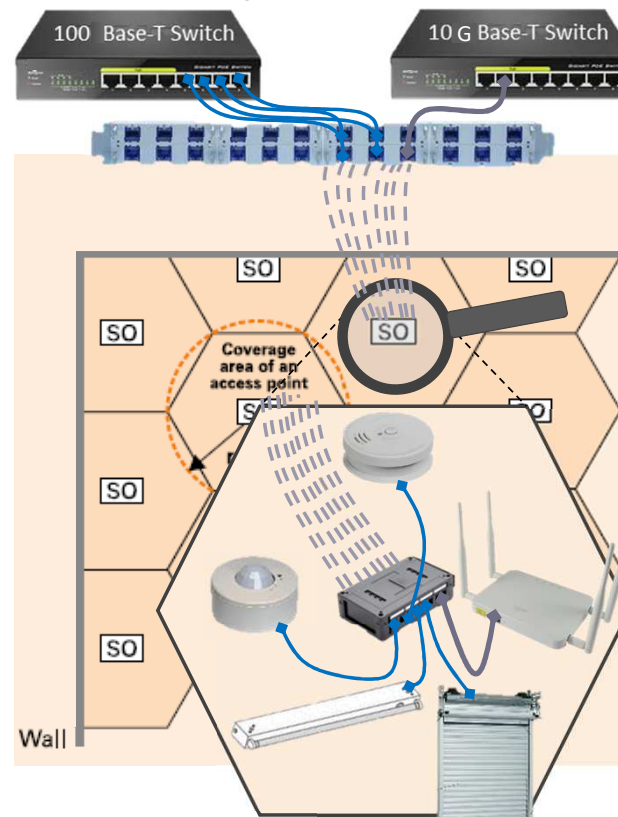
Digital Ceiling concept



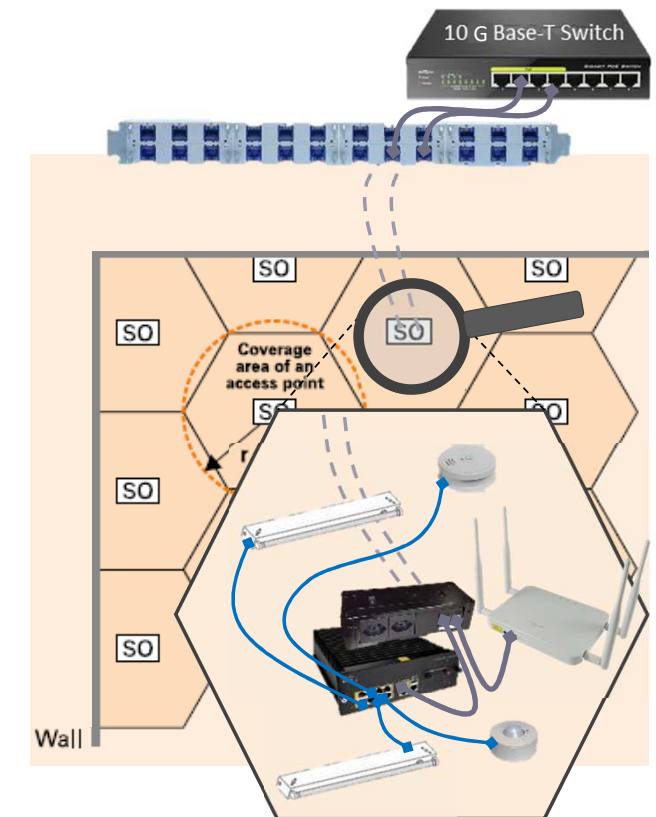
Distributed Building Services
ISO/IEC 11801-6



DBS for Building Automation (Generation 1)

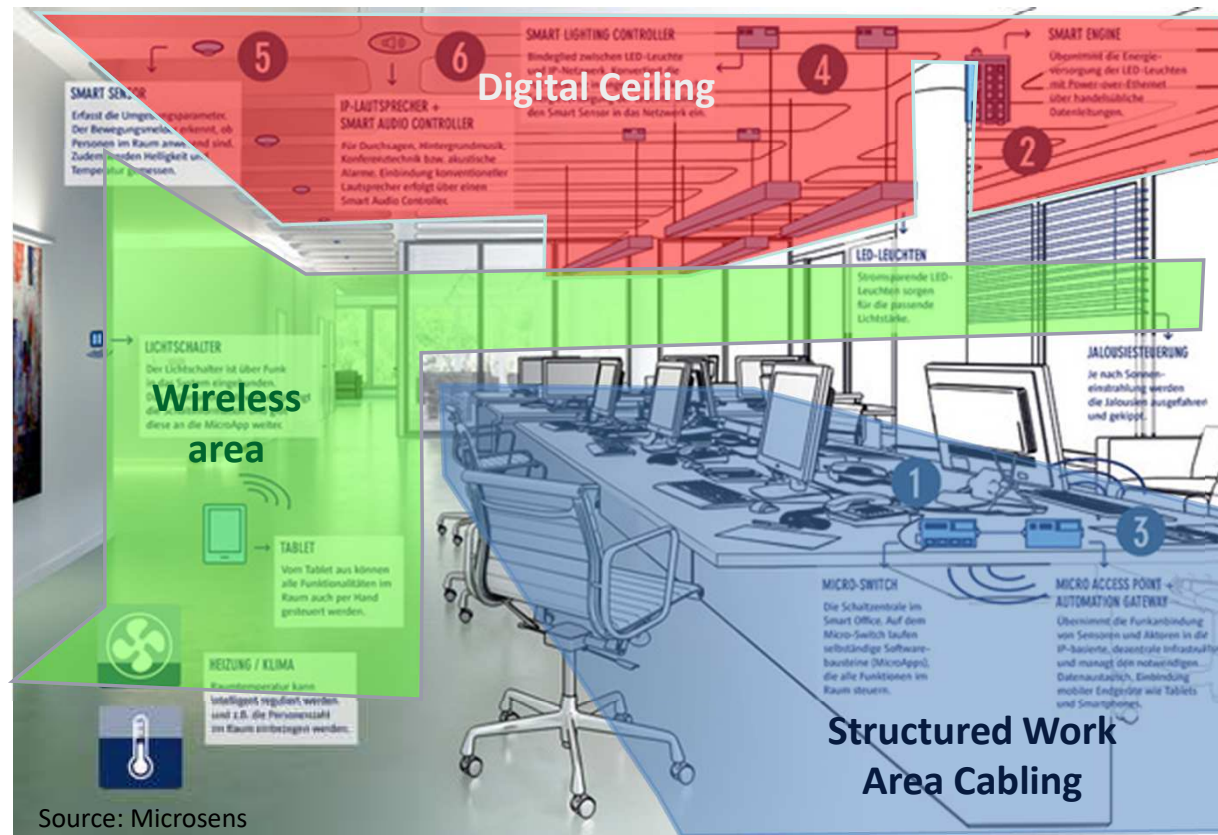


DBS for Building Automation (Generation 2)



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Digital Room Concept



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Advantages of the «All-IP» Digital Building



	Normal Building	LED Lighting	Intelligent Building
Lighting	100%	10%	6%
Climate control	100%	100%	50% – 60%
Operational expenses	100%	95%	60%
Building efficiency	100%	100%	133%

Source: Phillips, Cisco; Microsens; R&M

- ◆ Decentralized system with star topology improves reliability with reduced number of interfaces
- ◆ Converged cabling systems improves scalability
- ◆ Built in IP safety and authentication features improve access security
- ◆ Cost reductions by highly competitive components and reduced setup and maintenance costs
- ◆ New applications and technical features by combination of available data of different devices



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Structured Cabling Evolution 4



Digital Building

Generic Cabling

Work area cabling:

- IT devices

Power over Ethernet

Occasional additional devices:

- WAP
- Cameras

Digital Ceiling

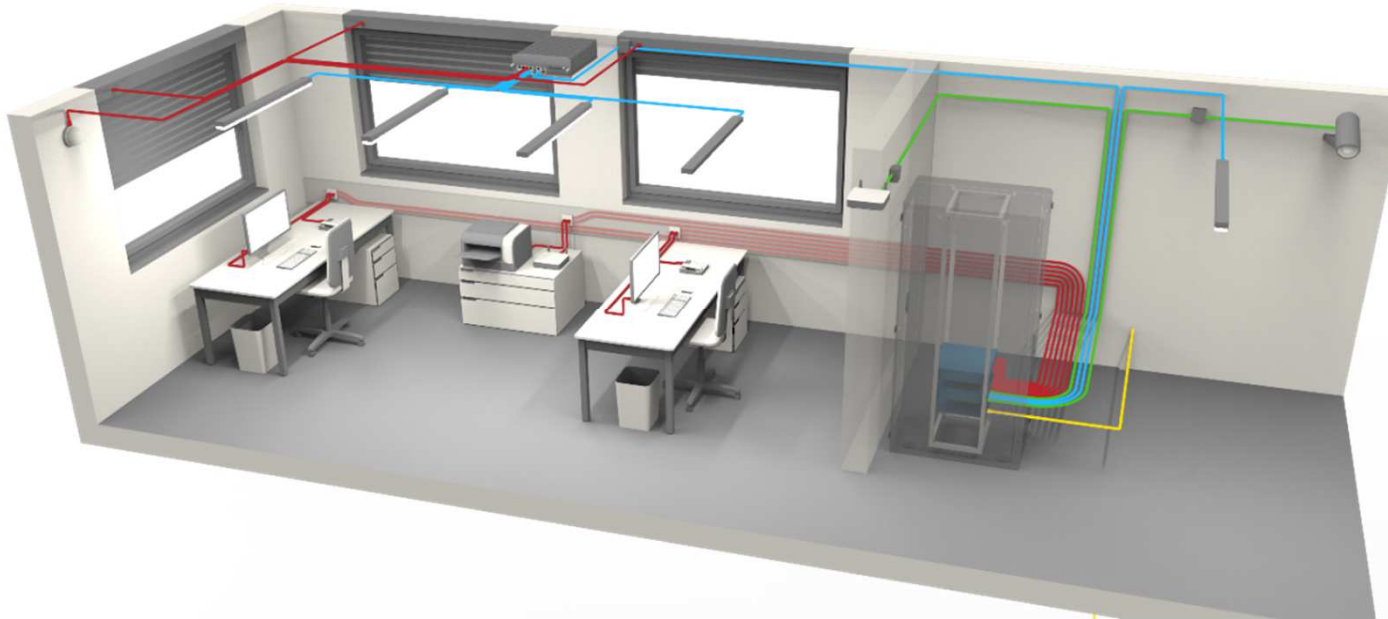
Wide coverage BA devices:

- LED Lighting
- Sensors

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Ubiquitous BA integration:

- All-IP devices
- IoT



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SPE Developments at IEEE



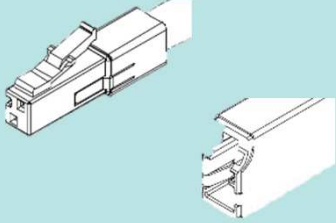
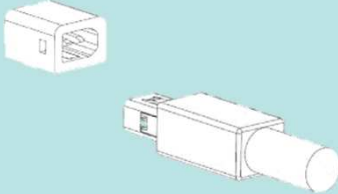
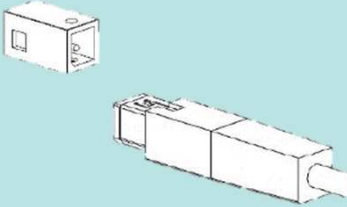
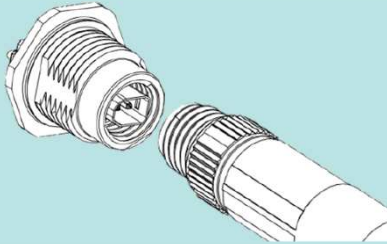
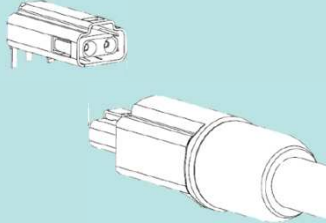
Project	Designation	Speed	Reach	Application
802.3bw	100Base-T1	100Mbps	15m UTP	- Published
802.3bp	1000Base-T1	1000Mbps	15m UTP 40m STP	- Available (Automotive) - Published
802.3bu	PoDL (Power over Data Line)			Classes 13/14/15: 8W/20W/52W
802.3cg	10Base-T1L 10Base-T1S	10Mbps	1 km x(S)TP 15m UTP 25m UTP	PP, full-duplex PP, full-duplex Multidrop (up to 8), Half-duplex
802.3ch	NGBase-T1	2.5 – 10Gbps	15m STP	- Draft for Automotive



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IEC Standardized SPE connectors

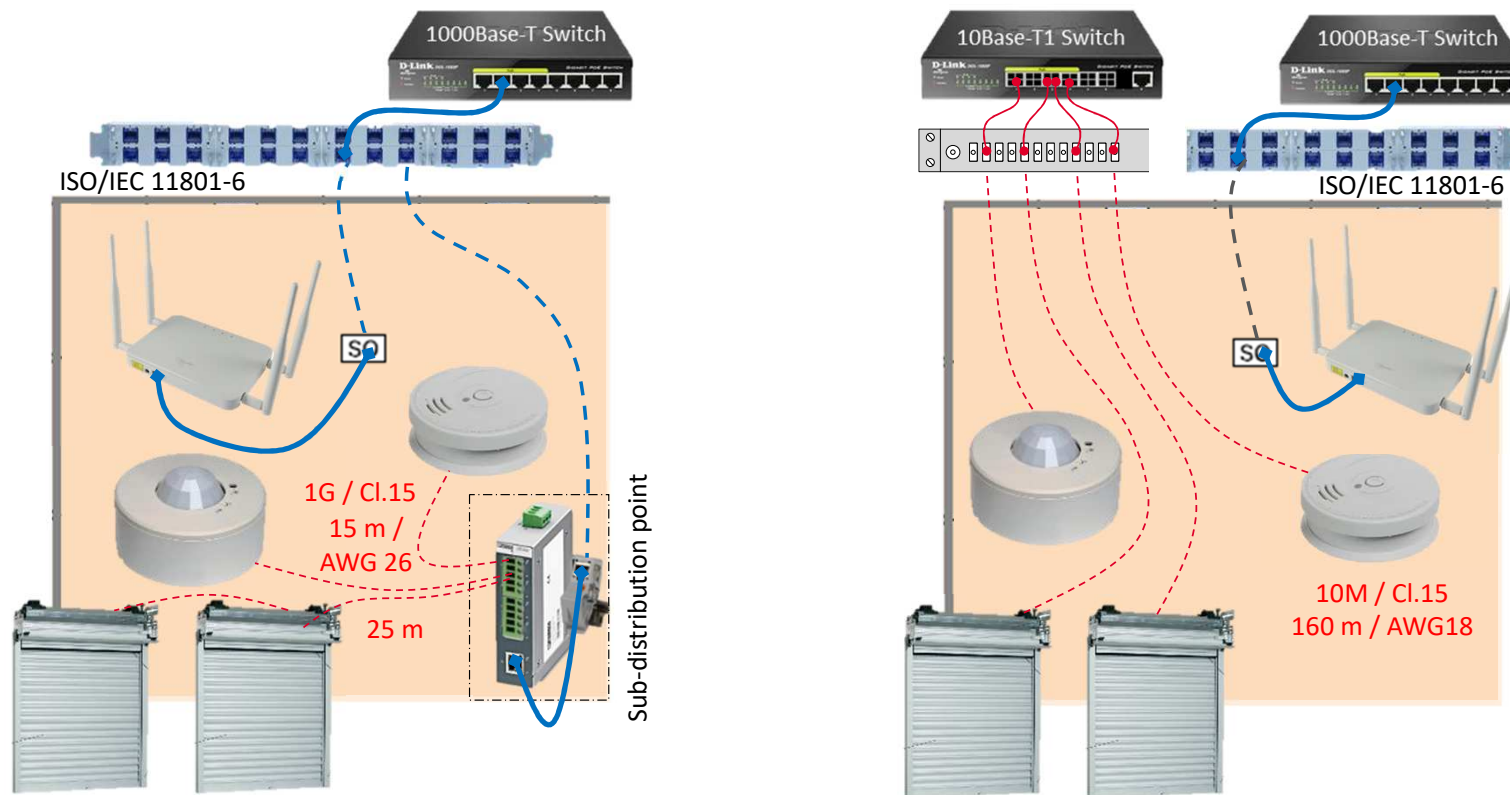


IEC 63171-1	IEC 63171-2	IEC 63171-4	IEC 63171-5	IEC 63171-6
				
<ul style="list-style-type: none"> • LC-Copper • Selected by 11801 and TIA for MICE1 • Mentioned by IEEE for MICE1 MDI • Status: Published 	<ul style="list-style-type: none"> • MSP-MICE1 • Compatible to 63171-5 • Status: FDIS 	<ul style="list-style-type: none"> • MMC3000-1P • Proprietary design by BKS • Status: CD 	<ul style="list-style-type: none"> • MSP-MICE3 • Compatible to 63171-2 • Only real M8 compatibility • Status: FDIS 	<ul style="list-style-type: none"> • Harting T1 • Selected by 11801 and TIA for MICE3 • Mentioned by IEEE for MICE 3 MDI • Status: Published
<ul style="list-style-type: none"> • Initiated by Commscope 	<ul style="list-style-type: none"> • Initiated by R&M 	<ul style="list-style-type: none"> • Initiated by BKS 	<ul style="list-style-type: none"> Initiated by Phoenix Contact 	<ul style="list-style-type: none"> Initiated by Harting
<i>Building Automation</i>	<i>Building Automation MICE 1 Industrial</i>	<i>TBD</i>	<i>MICE 3 Industrial</i>	<i>MICE 1 Industrial MICE 3 Industrial</i>



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Application specific approach for SPE: On demand



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Special case: multi-drop application

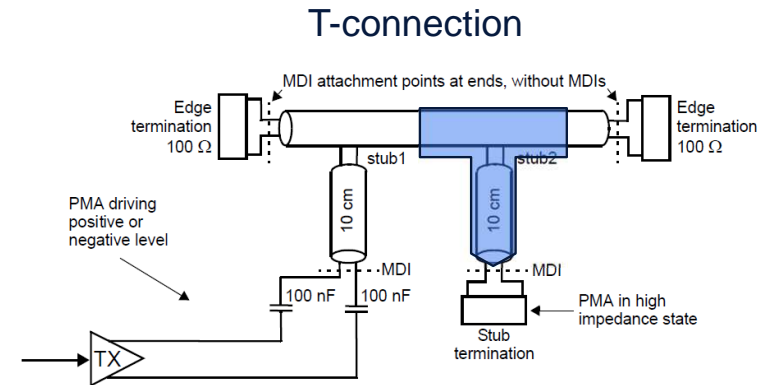
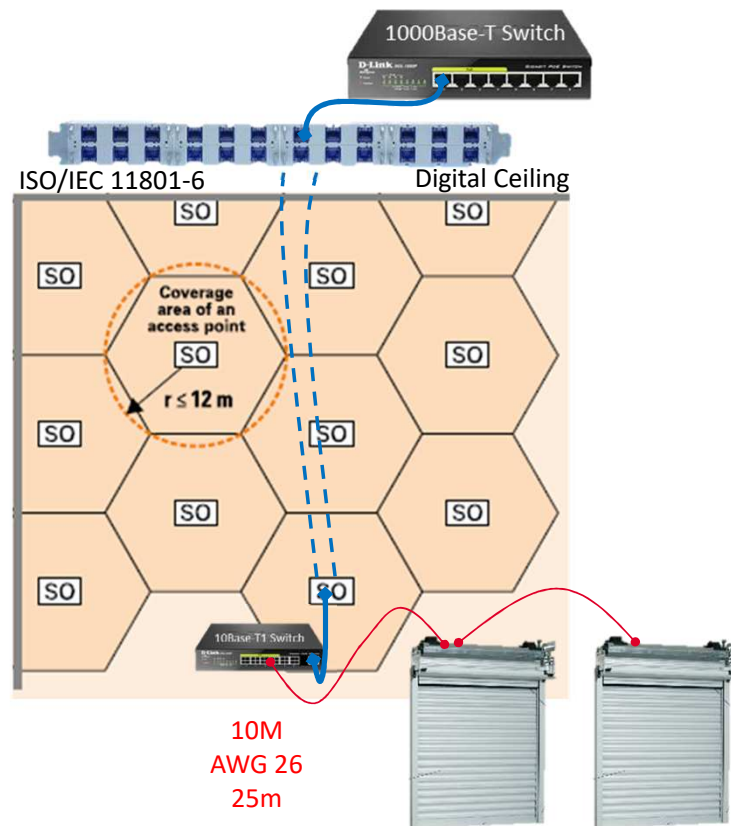
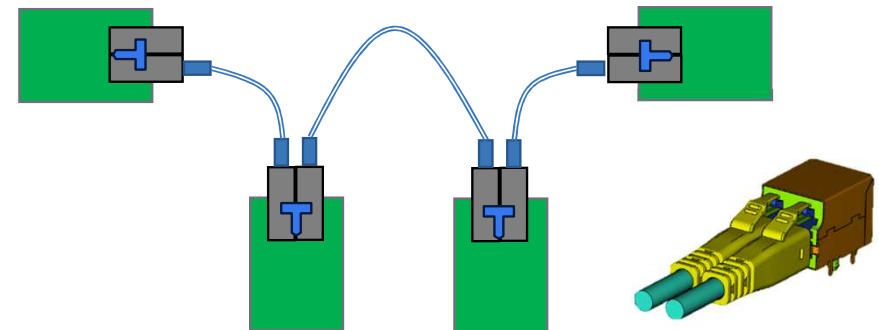


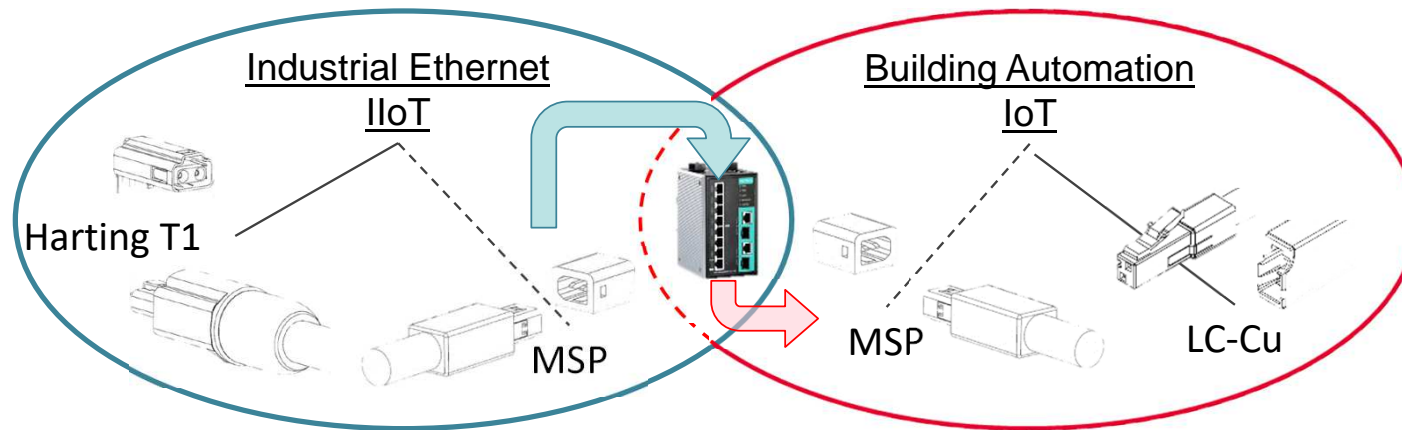
Figure 147-20—Multidrop line termination and PMA

Alternative: Daisy Chain



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Connectivity market expectation



- Much more activity for SPE in Industrial Ethernet, than for SPE in Building Automation
- Significant disadvantages of Harting T1 for MICE 3 IIoT → IEC 63171-2 / -5 connector is better alternative
- There will be industrial Ethernet Switches with SPE connectivity. Traditionally used in IoT as well.
- MSP may find its way via the Switches into the IoT environment. No TO with SPE required!



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Conclusions



- «All-IP» Building Automation make Intelligent Buildings cheaper and opens the door for new applications
- SPE will become a key technology within the «All-IP» Building Automation
- Low volume and high density to integrate huge numbers of devices are the main advantages of SPE
- SPE adds to existing cabling structures of ISO/IEC 11801-6, covering the last meters within the zone
- SPE and RJ45 based Generic Cabling will coexist and are complementing each other
- Length considerations of SPE have to take attenuation and resistance requirements (PoDL) into account (distances will be shorter than expected)
- SPE is application specific. Generic cabling structures with panels and terminal outlets will not be usual
- ISO/IEC 11801 only governs the interface at the terminal outlet
- The connectivity selection will depend and follow the available MDI of the devices. Not clear yet.



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Many thanks



Questions ?

