

Cables for SPE

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Draka – Prysmian Group



Single Pair Ethernet
System Alliance

Agenda

- ◆ Prysmian Group
- ◆ Industrial IoT and Building IoT
- ◆ SPE Channels and Remote Powering (PoDL)
- ◆ SPE Cable Requirements and portfolio



Prysmian Group in the world

 **+50**
COUNTRIES

 **112**
PLANTS

 **25 R&D**
CENTERS

 ABOUT **29,000**
EMPLOYEES

 OVER **11**
BILLION ANNUAL
SALES ¹

Prysmian Group

CORPORATE BRAND

Prysmian

Draka

General Cable

COMMERCIAL BRANDS

Shared



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Multimedia Solutions – a slice of our world

Datacom

Offices, data centers
applications (copper and fiber)



Multimedia Specials

Broadcasting, CATV, Industry
and RF



Mobile Networks

Links between mobile network
antennas and base stations



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Digitalization - It's clever to get smarter

All those things need information and availability

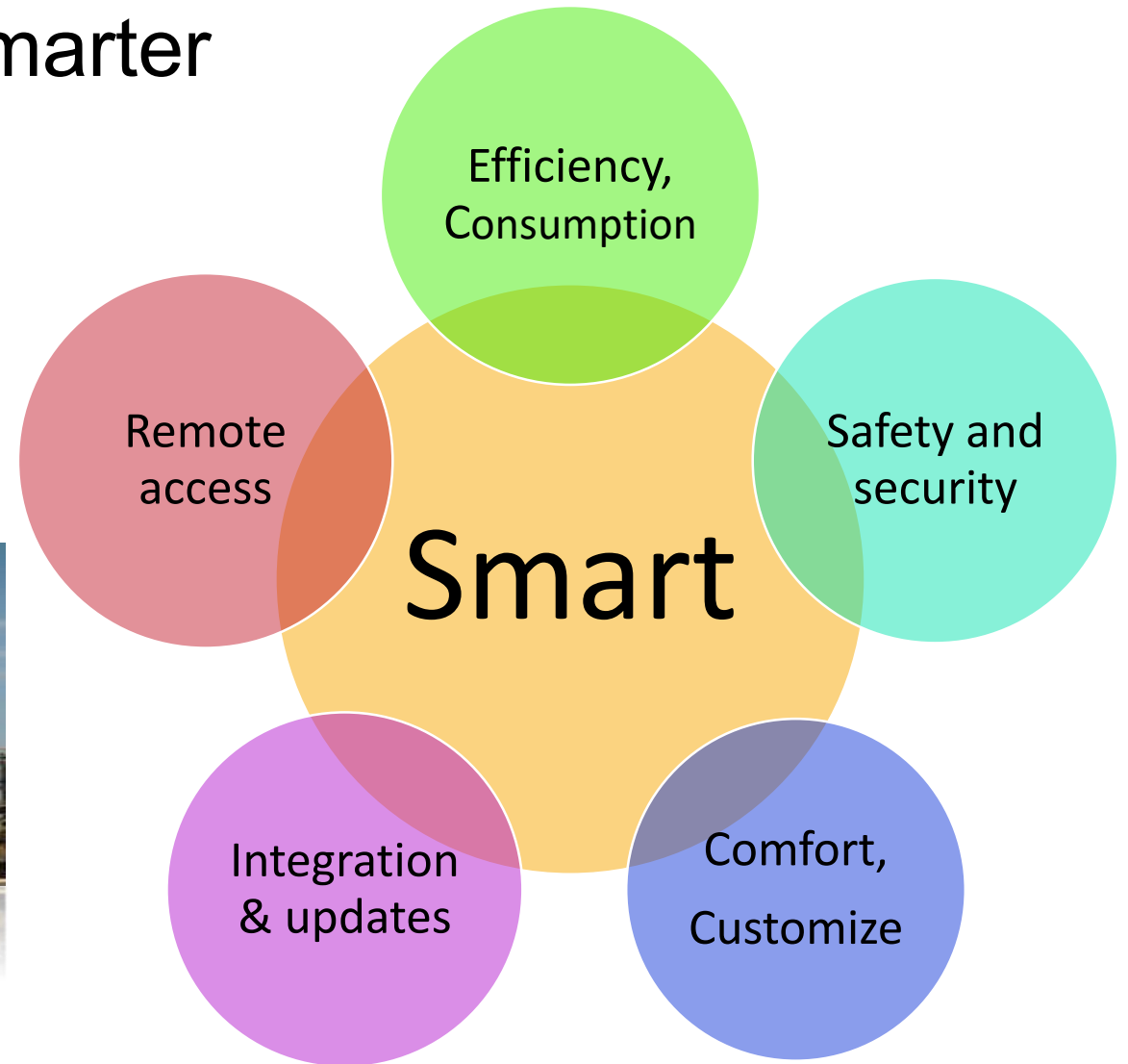
The Internet of Things will bring Smart Concepts to Digital Buildings (BIoT) and to the Industry (IIoT)



For Buildings, we need to integrate parallel systems



For factories, we need to fuse and simplify different solutions



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Automation Pyramid (ISA95)

Application Area

Control Level

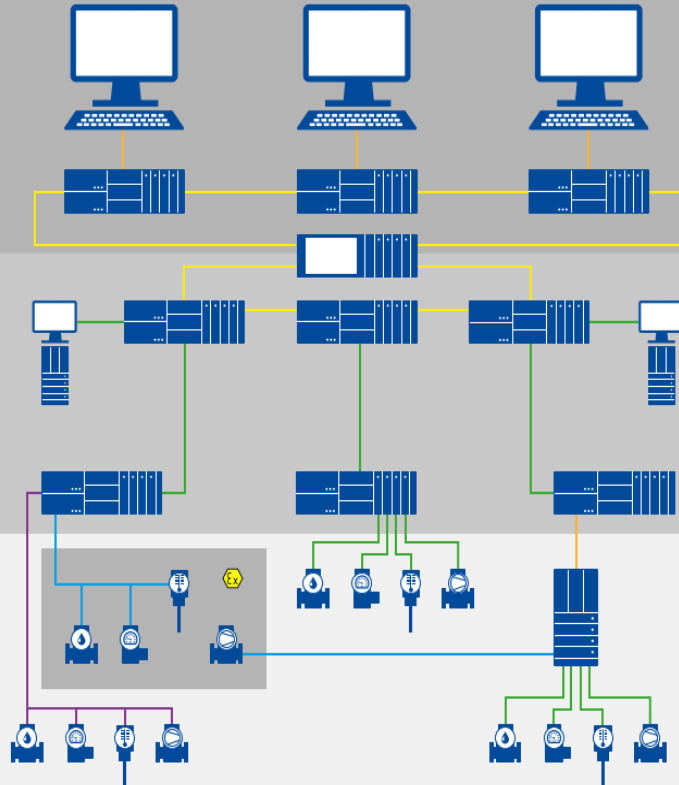
- Ethernet TCP/IP Copper Cable
- Fibre Optic Cable

Automation Level

- HSE-Industrial Ethernet Cable
- Fibre Optic Cable
- Profibus FMS/DP Cable

Field Level

- HSE-Industrial Ethernet Cable
- Profibus PA Cable
- Ex i



Draka's Cable Solution

Control Level

- Standard Ethernet (UC Cables)
- Standard Optical Fibre (UC^{100G})

Automation Level

- Industrial Ethernet
- Optical Fibre Cables
- Profibus DP

Field Level

- Industrial Ethernet
- Profibus PA Cable

Changes on Field Level has a high level of complexity: **specific and different cabling**, connectors (some times proprietary), different protocols in PLCs or modules, the need of **gateways etc.**

All the top levels of automation are using transparent "All-IP Ethernet".

Field level normally has $L < 1\text{km}$, speed $< 1\text{M}$, Ethernet gap

DeviceNet[™]
HART

PROFI[®]
BUS

Fieldbus
Foundation

Modbus

ASI[®]
INTERFACE

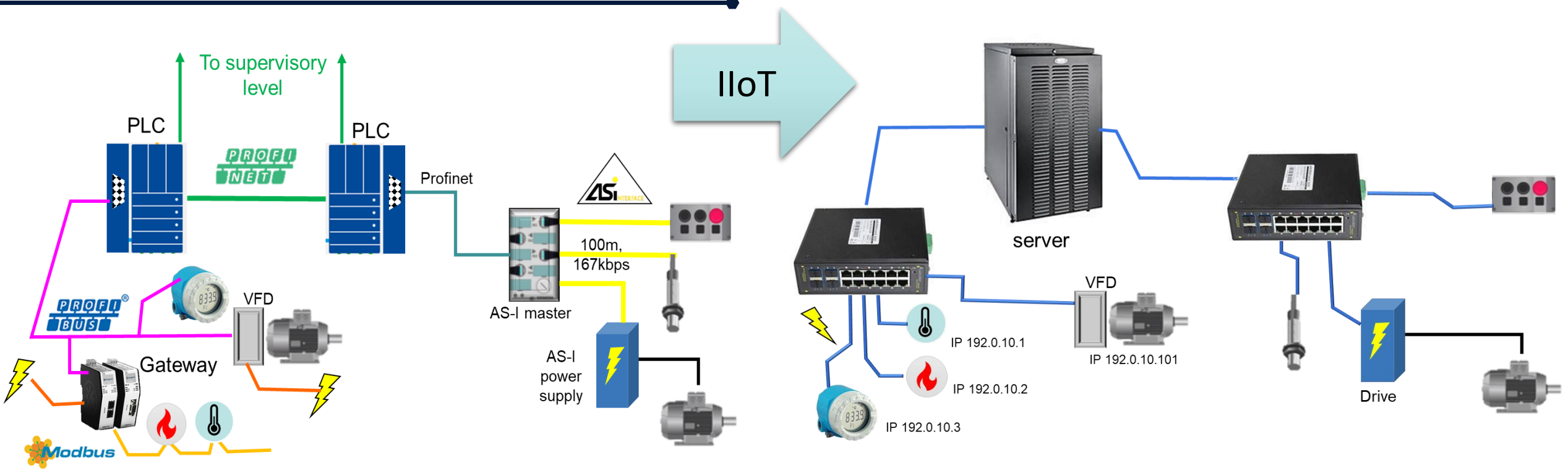
4-20mA
RS485



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Field Level ecosystem

All-IP : each device is IP accessible, transparent from bottom to top



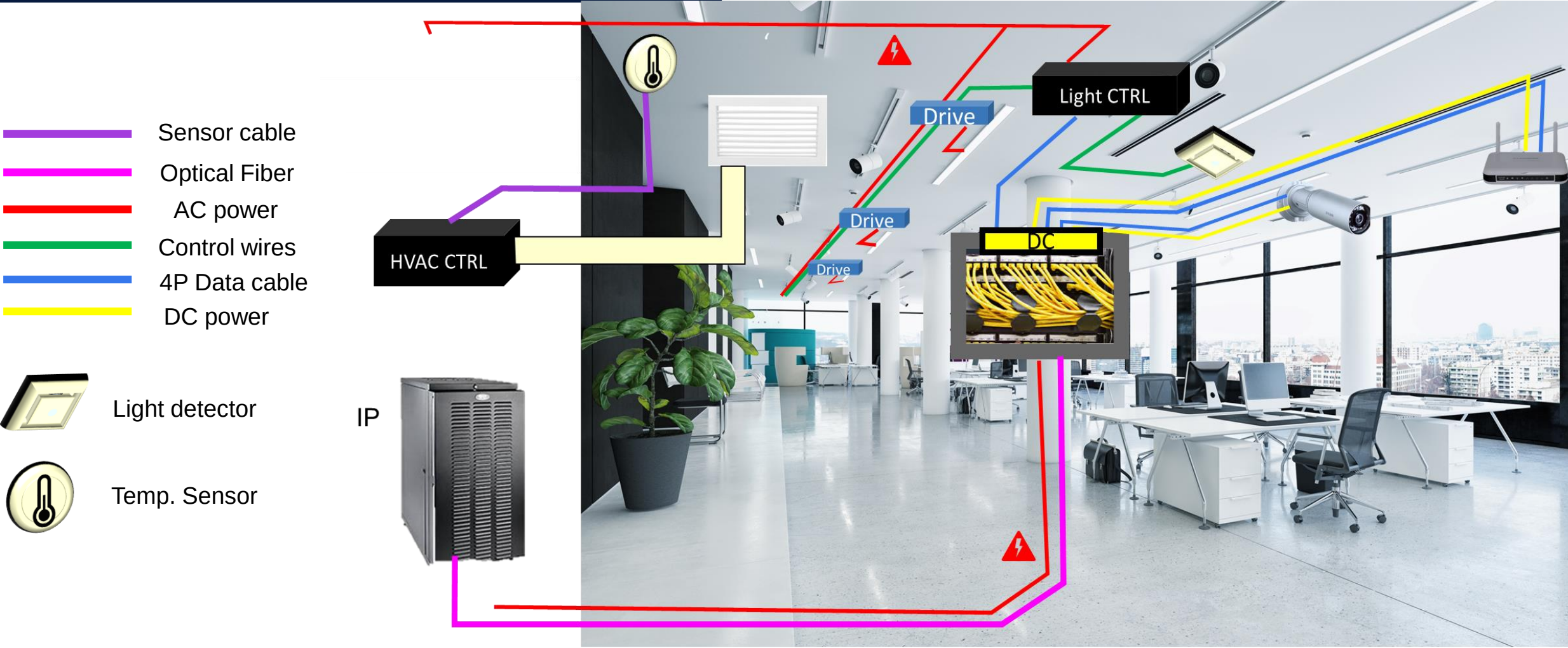
Now, how can we help Buildings to be smarter?

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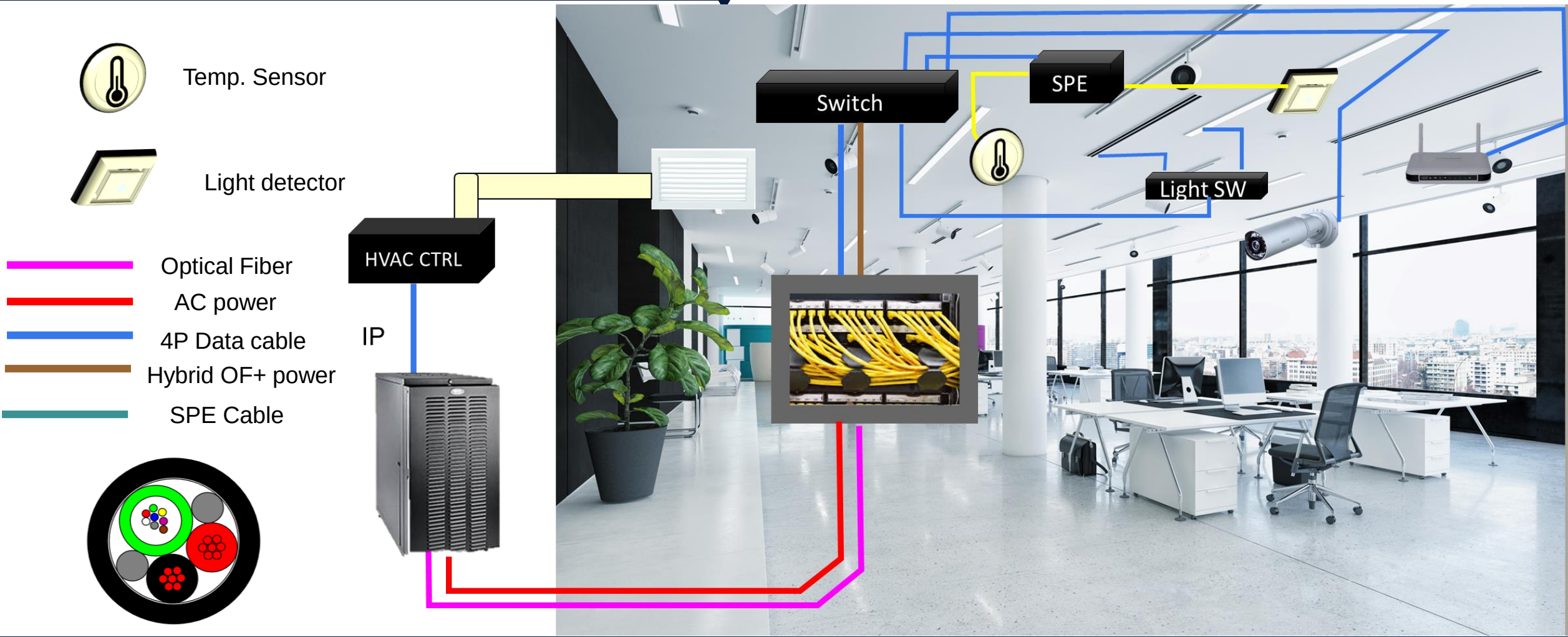


Building systems



Building IoT (BIoTT)

Digital Ceiling



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So what kind of cable do we need for SPE PHY?

It depends on which **application** you want to run

10 Mbps

100 Mbps

1000 Mbps

It depends on the **distance** you want to reach with this speed

15m

40m

100m

250m

400m

1000m

And **where** is the place you will install it

IIoT - Factory floor

BlIoT – Digital Building

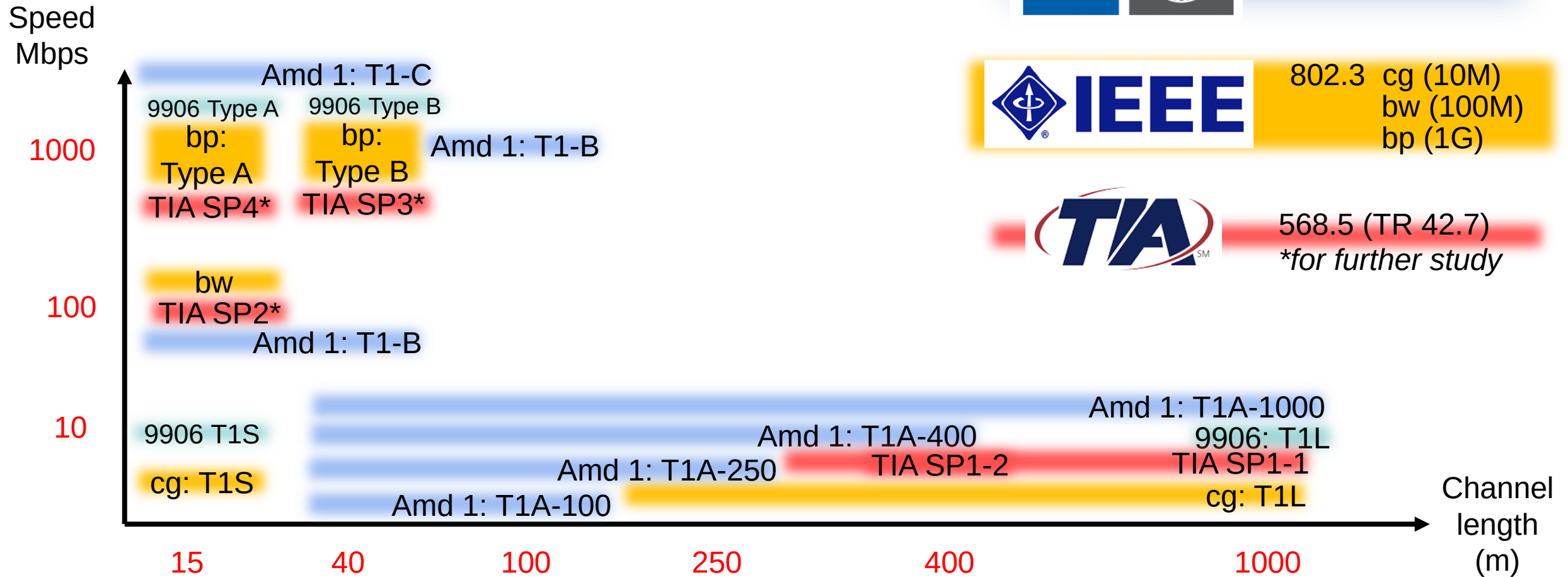
Heavy Duty

Channel to allow the application



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The channels are in the standards



11801-1 Amd 1
11801 - 9906



802.3 cg (10M)
bw (100M)
bp (1G)



568.5 (TR 42.7)
**for further study*



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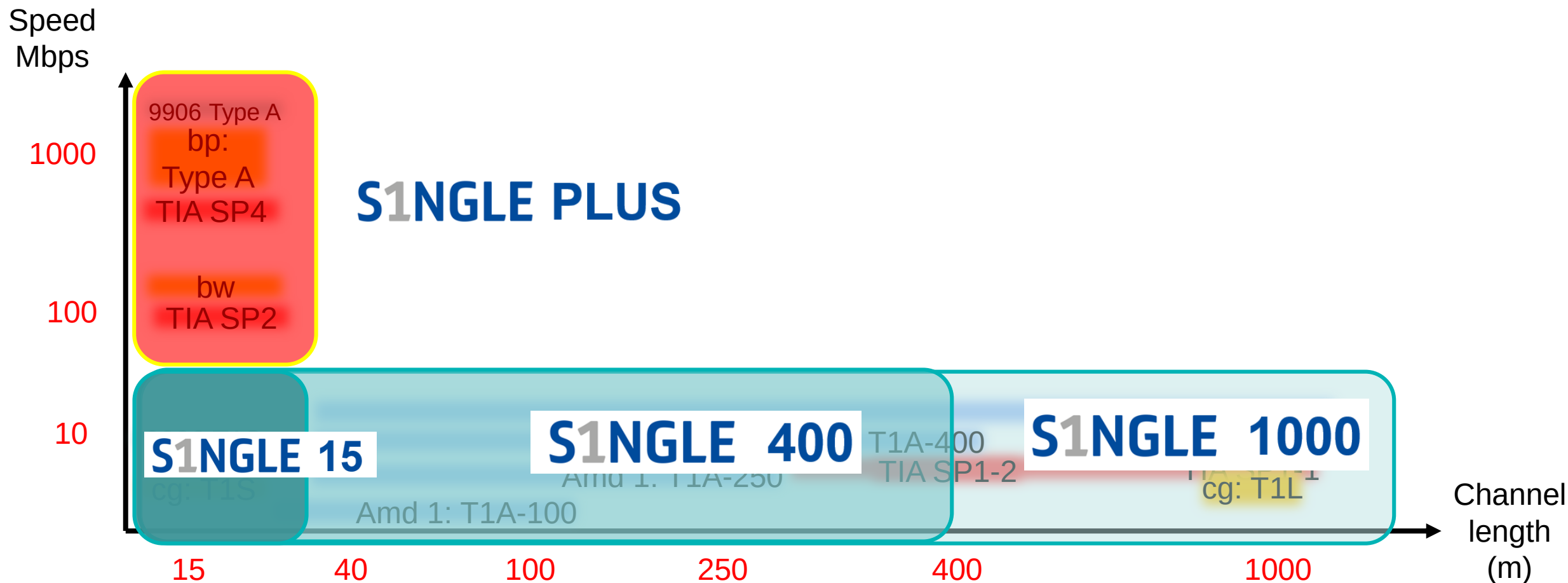
For the right channel, the proper components

Channel	Channel Length	Bandwidth	Cable standard	Segment	Draka
T1-A 100	100m	20MHz	IEC 61156-13	Permanent link	S1NGLE
T1-A 250	250m		IEC 61156-14	Patchcord (IL derated)	
T1-A 400	400m		TIA 568.5 (TR 42.7)	Complete spec	
T1-A 1000	1000m				
T1-B	100m	600MHz	IEC 61156-11	Permanent link	S1NGLE PLUS
			IEC 61156-12	Patchcord (IL derated)	
T1-C		1200MHz			



Draka portfolio for SPE

Draka **S1NGLE**



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Design criteria for SPE Cables

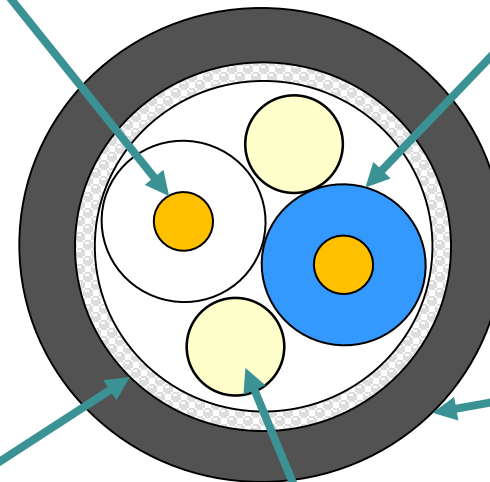


100% IACS copper
fixed installation :
 AWG18/1 (1.0mm)
 AWG23/1 (0.58mm)
 AWG22/7 (7x0.26mm)
work area :
 AWG 26/7 (7x0.165mm)

Bare Copper

Insulation

High Density Polyethylene
 -40/+80°C
 100Ω impedance / capacitance
 Right control = less reflection



Jacket

For **IloT**: PVC or PUR, for good mechanical and oil resistance
 For **BloT**: LSHF-FR, with good fire protection

Shield

Aluminum/PET foil +
 tinned copper wire braid
 Provides EMI protection
 We check it with coupling
 attenuation test

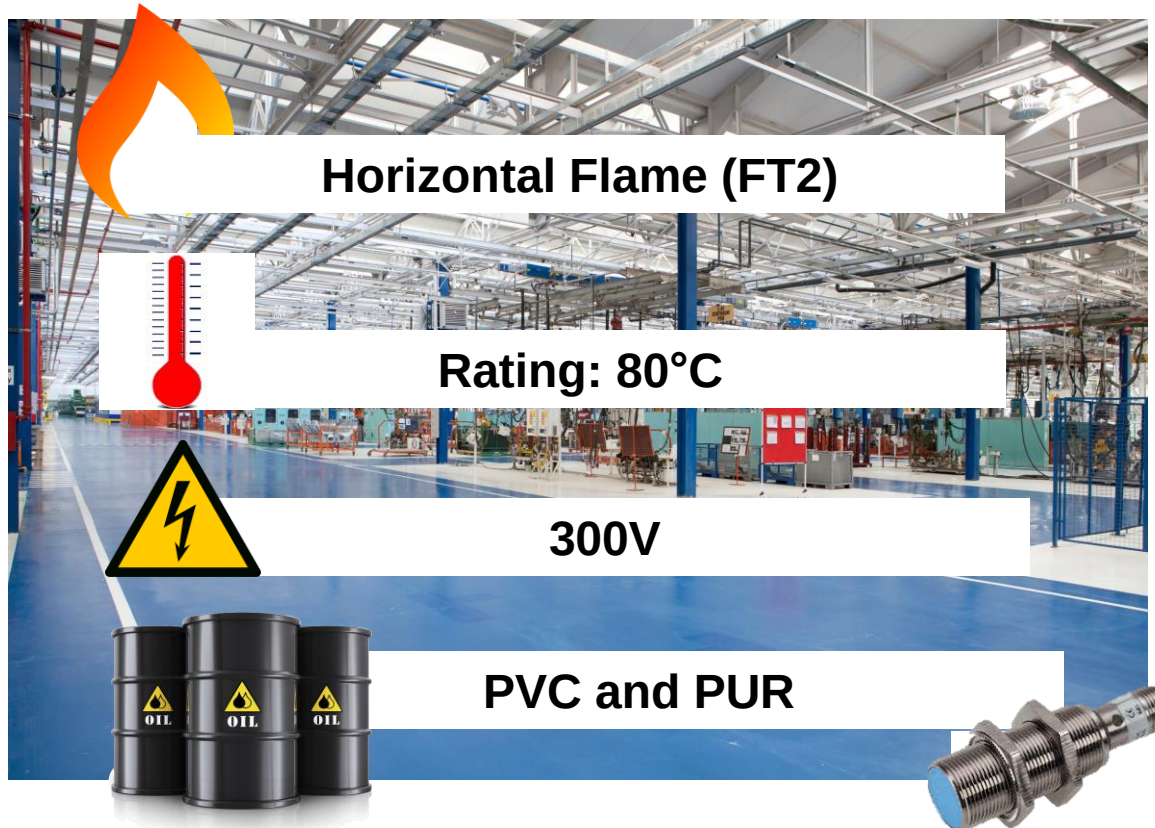
The cable might use round
 fillers to keep good geometry
 and robustness



And what about the environment?

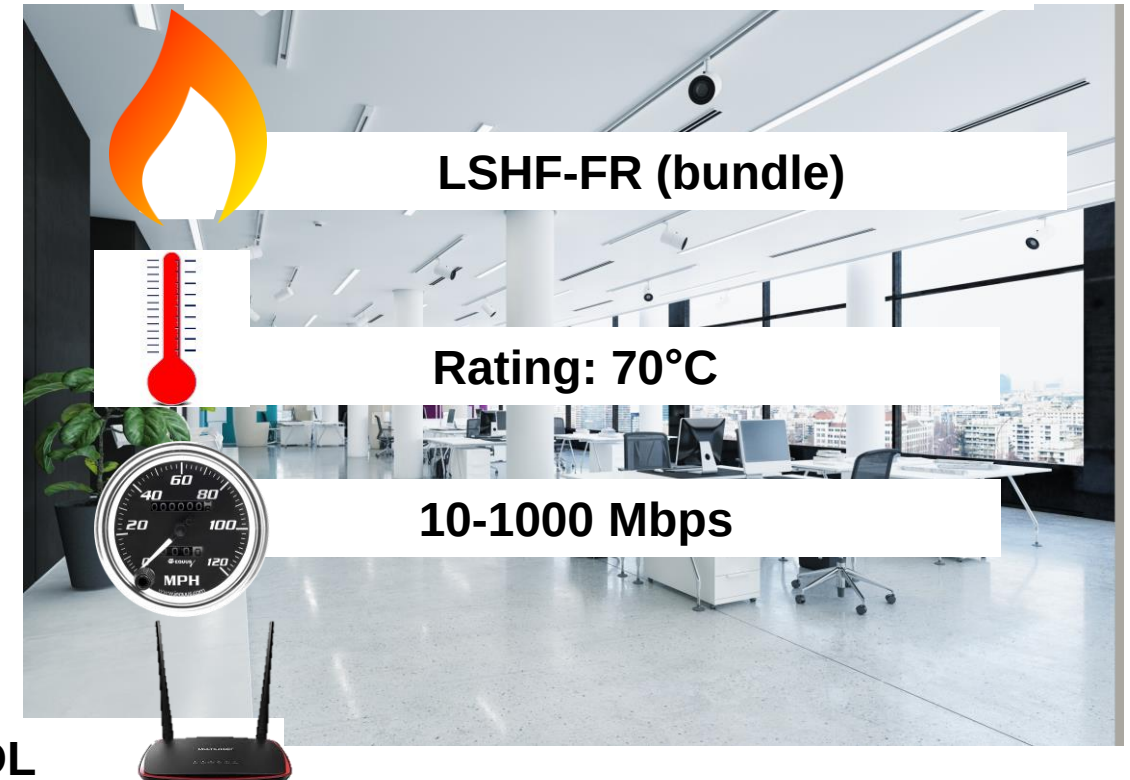
Industrial - IIoT

UL 758 (AWM)



Premises BioT

UL 444 / CPR rated



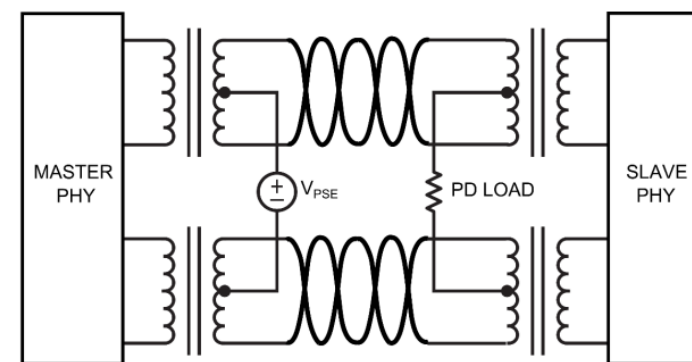
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PoE got new friend: PoDL

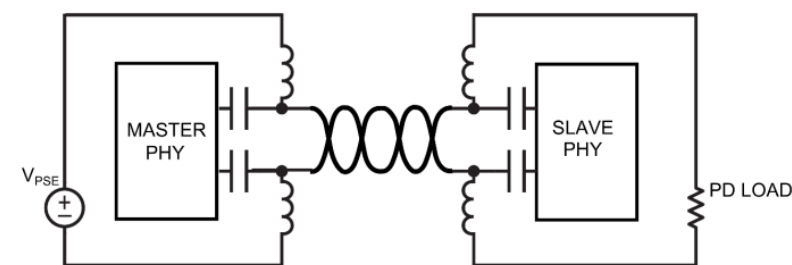
Classe	VPSE	VPD min	Power	Application	RLOOP
0	6	4,94	0,5	100M/1Gbps	6,5
1	6	4,41	1,0	100M/1Gbps	6,0
2	12	12	3,0	100M/1Gbps	9,6
3	12	10,6	5,0	100M/1Gbps	8,1
4	12	10,3	1,0	100M/1Gbps	14,4
5	12	8,86	3,0	100M/1Gbps	8,4
6	24	23,3	5,0	100M/1Gbps	12,6
7	24	21,7	10,0	100M/1Gbps	9,3
8	48	40,8	30,0	100M/1Gbps	9,8
9	48	36,7	50	100M/1Gbps	8,3
10	20	14	1,3	10Mbps	65,2
11	20	14	3,4	10Mbps	25,0
12	20	14	8,8	10Mbps	9,5
13	50	35	8,1	10Mbps	64,9
14	50	35	21,0	10Mbps	25,0
15	50	35	55,3	10Mbps	9,5

PoE is designed for 2 or 4 pairs, to deliver DC power with data.

SPE is only 1 pair, so it cannot be POE.
Now it is Power over Data Line (PoDL)



Power over Ethernet (PoE)

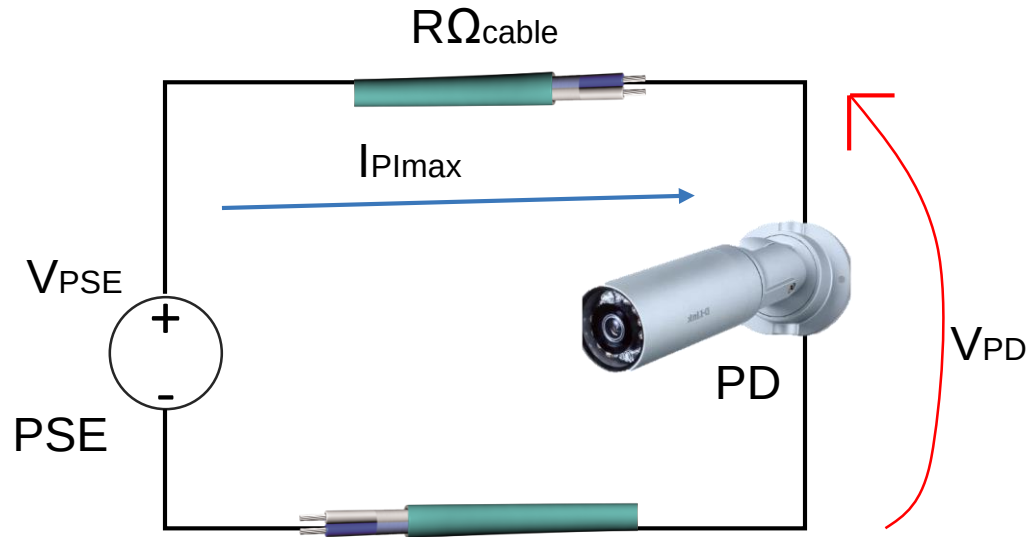


Power over Data Lines (PoDL)



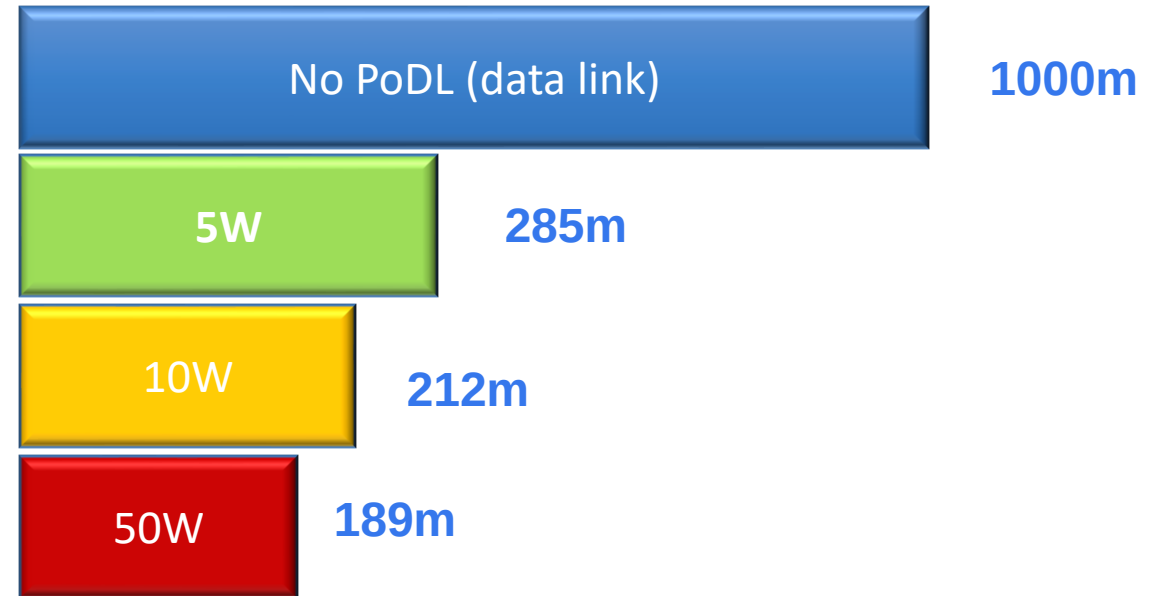
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PoDL power can affect max link length



Power transmission can heat up the conductors, increasing R_{LOOP}

Example for AWG18/1



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Now all together

Draka **S1NGLE**



Industrial

S1NGLE

Shielded 20MHz
IEC 61156-13,14

S1NGLE PLUS

Shielded 600MHz
IEC 61156-11,12

S1NGLE

Work area
Shielded 600MHz
IEC 61156-11,12

Link	AWG	Jacket	PoDL	OD
1000	18/7	PVC/PUR	10/13	7.2
400	22/7	PVC/PUR	10/13	5.8
40	22/7	PVC/PUR	6/8	5.8
40	23/1	PVC/PUR	10/13	5.1



15 26/7 PVC/PUR 9/15 3.9

Premises

backwards compatible for T1-A
channels



Link	AWG	Jacket	PoDL	OD
40	22/7	LSHF-FR	6/8	5.8
40	23/1	LSHF-FR	10/13	5.1

15 26/7 LSHF-FR 9/15 3.9



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Obrigado

Thank you

Gracias

Merci

Danke schön



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