COMMSCOPE®

Remote Power and Communications: The next wave of network devices

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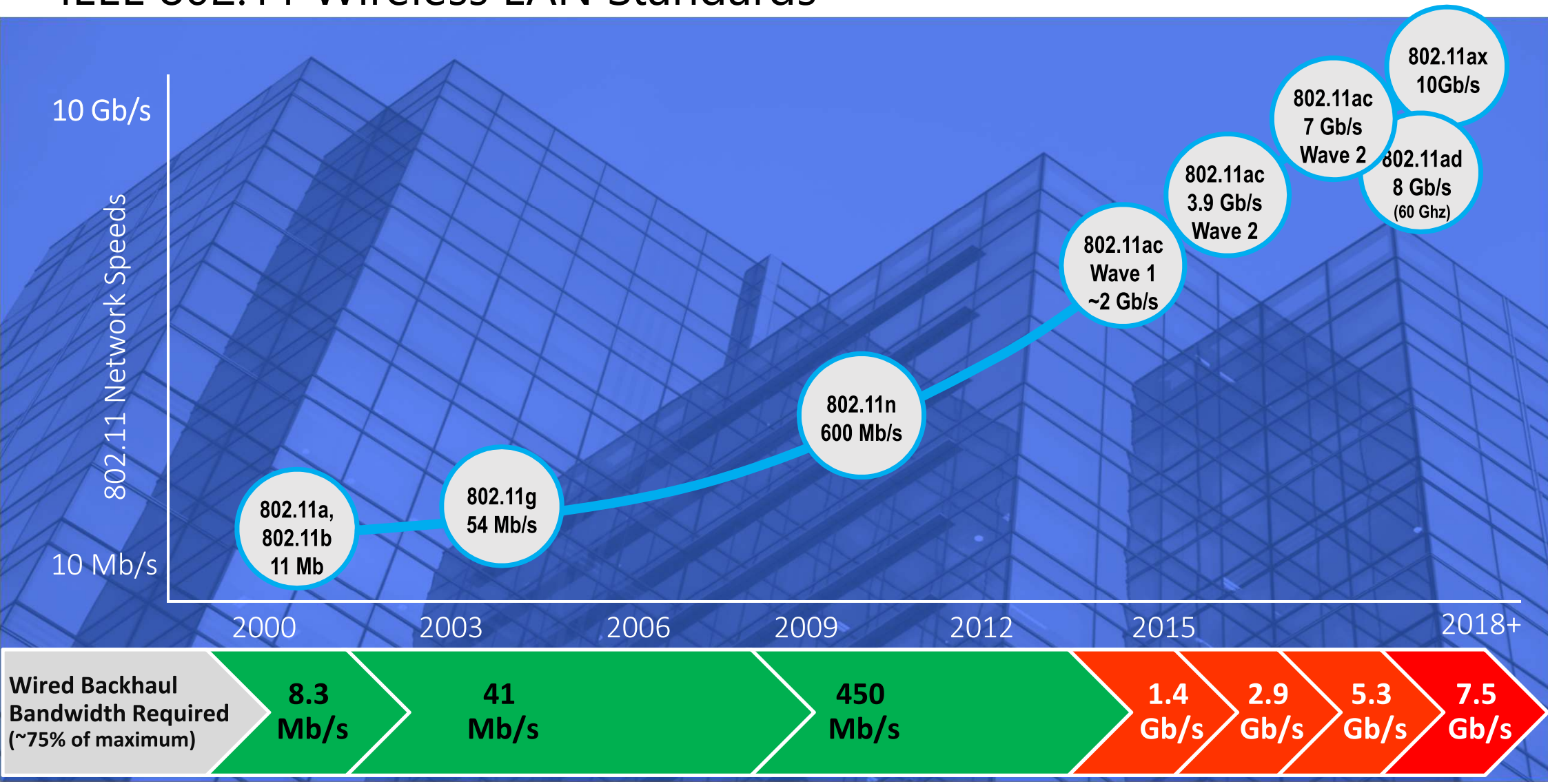
Now Meets Next

Meeting the needs of today and tomorrow

2018

IEEE 802.11 Wireless LAN Standards



IEEE Power over Ethernet (PoE)

IEEE 802.3af (type 1) was standardised in 2005

IEEE 802.3af (Type 2) was standardised in 2009

IEEE 802.3bt (Type 3 and 4) is expected in 2018

Standard	Type	Class	$V_{PSE(min)}$	$I_{wire(max)}$	$P_{PSE(max)}$	$P_{PD(max)}$	DCLR	Pair
802.3af	Type 1	Class 1	44V	175mA	4W	3.84W	40Ω	2
		Class 2	44V	175mA	7W	6.5W	40Ω	2
802.3at	Type 2	Class 3	50V	300mA	15.4W	12.95W	25Ω	2
		Class 4	50V	300mA	30W	25.5W	25Ω	2
802.3bt	Type 3	Class 5	50V	250mA	45W	40W	25Ω	4
		Class 6	50V	300mA	60W	51W	25Ω	4
	Type 4	Class 7	52V	360mA	75W	62W	25Ω	4
		Class 8	52V	430mA	90W	72W	25Ω	4

Length reduction

- Cabling channel performance and reference implementation with 90 meter PL +10 meter cords are based on 20°C operating temperature
- Higher temperature demands a shortening of the channel length
- The table assumes same temperature along the whole length of the cabling
- If needed it can be calculated for each part of the cabling according to the specific ambient temperature and bundle heating and summed up
- Lenght less than 1 meter are unsignificant (e.g. fire barriers)

Table 4 — Technology-independent channel length vs. temperature

	Total length of cords m		
	10	15	20
T_{global} °C	Channel length m		
20	100	98	95
25	98	96	93
30	97	94	91
35	95	92	89
40	93	90	87
45	90	87	85
50	86	84	82
55	83	81	79
60	80	78	76

NOTE The channel length values assume the use of cords with an attenuation premium of 50 % and an overall temperature coefficient of 0,4 % per °C up to 40 °C and 0,6 % per °C between 40 °C and 60 °C.

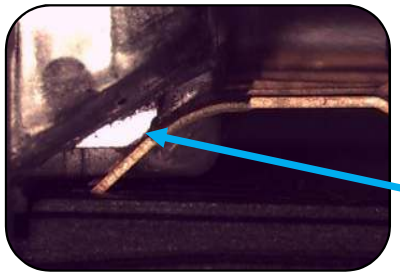
Demating under load

If connectors are disconnected under load arcing will ocour

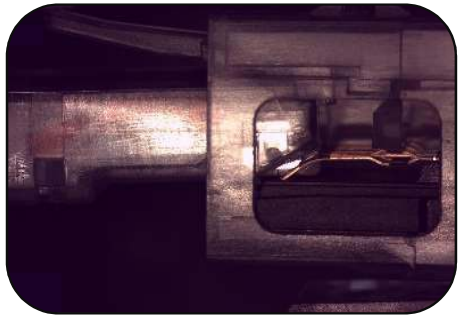
That might degrade the communication over the connecting hardware

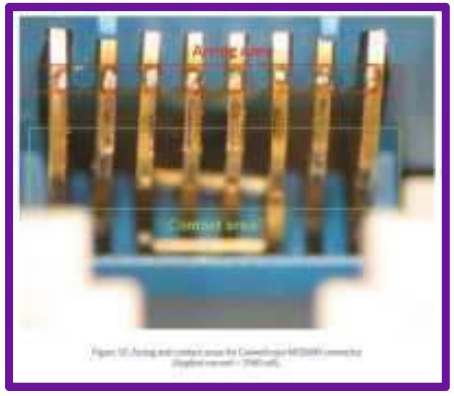
IEC 60512-99-001 is a test standard for demating under load that CommScope use

Here are a examples of our MGS600 connector and how the design ensures that the arcing area is far away from the contact area

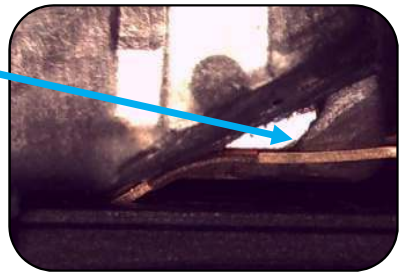


Initial Mated Contact Point





Final Mated Contact Point

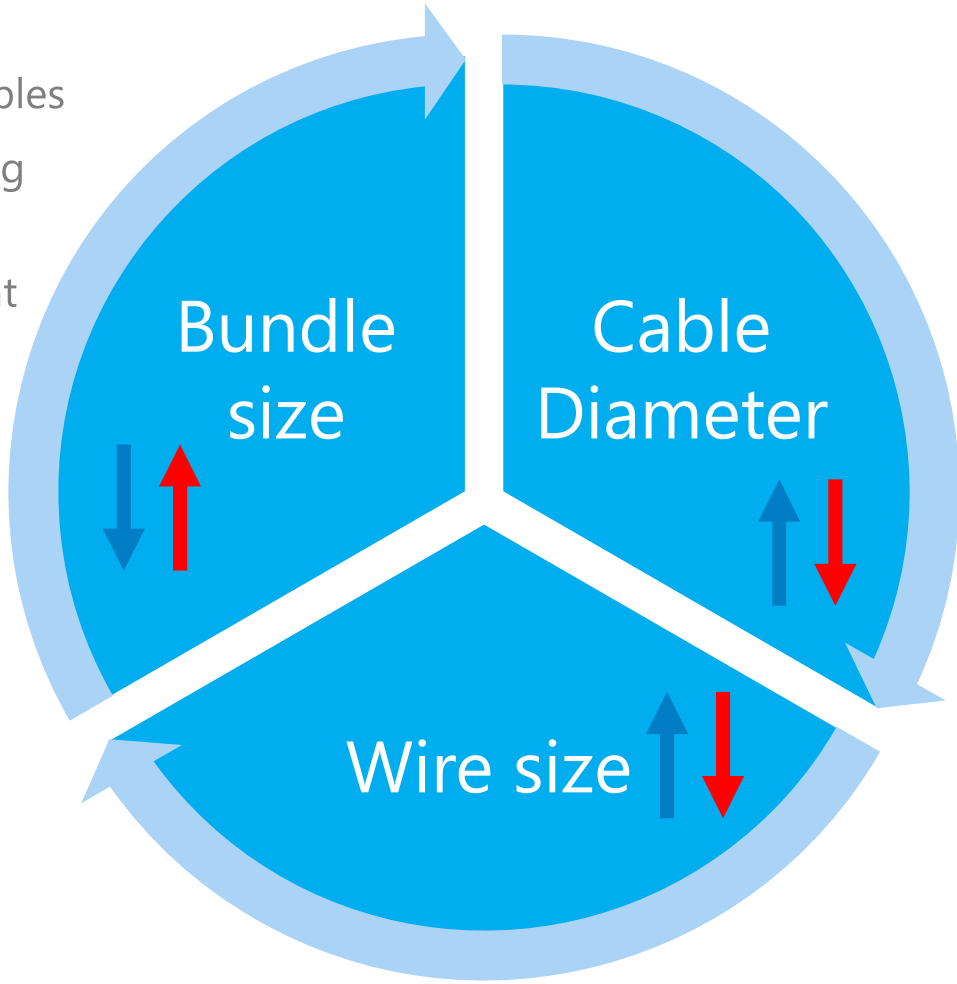


Remote Power heating basics

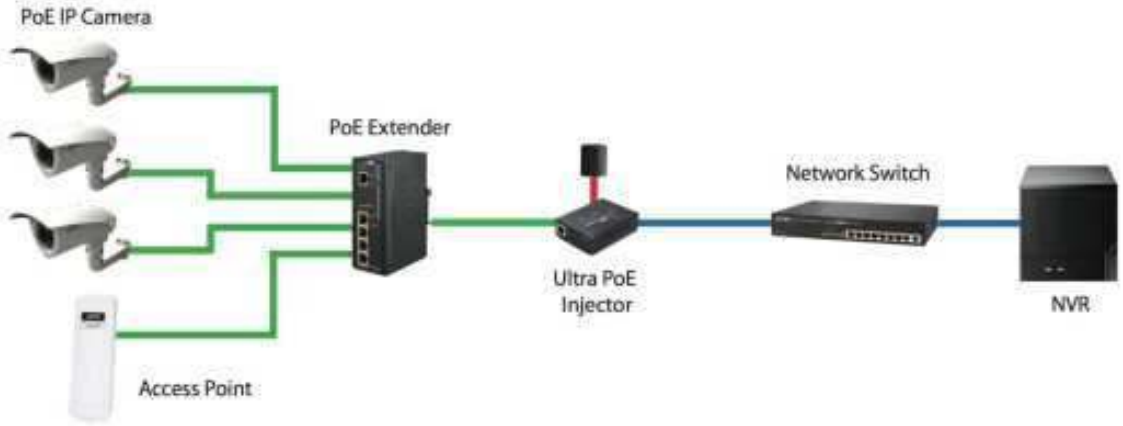
- **Ambient temperature** = temperature sorrounding the cables
- **Heating** = the heating caused by the applications including power delivery
- **Operating temperature** = the combination of the ambient temperature and the heating
- **Data cables are normally specifyed up to 60°C**

Major factors for heating:

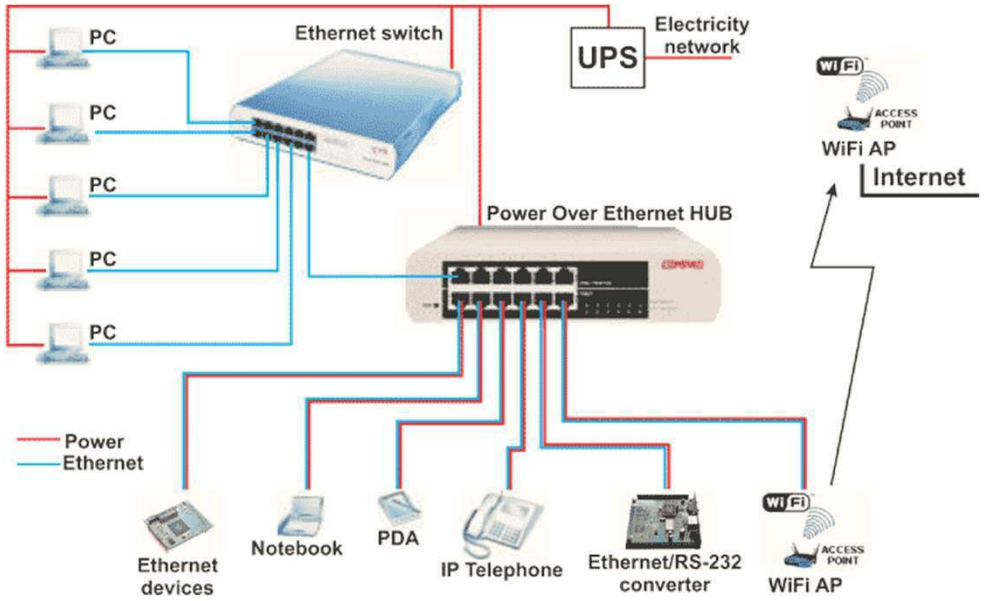
- Wire size
- Cable diameter
- Bundle size
- Installation conditions
- Ambient temperature



WiFi


PoE IP Camera
PoE Extender
Network Switch
Ultra PoE
Injector
NVR
Access Point


aruba


PC
PC
PC
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PC
Ethernet switch
UPS
Electricity
network
WiFi AP
Internet
Power Over Ethernet HUB
Power
Ethernet
Ethernet
devices
Notebook
PDA
IP Telephone
Ethernet/RS-232
converter
WiFi AP

High Powered Cameras are now available

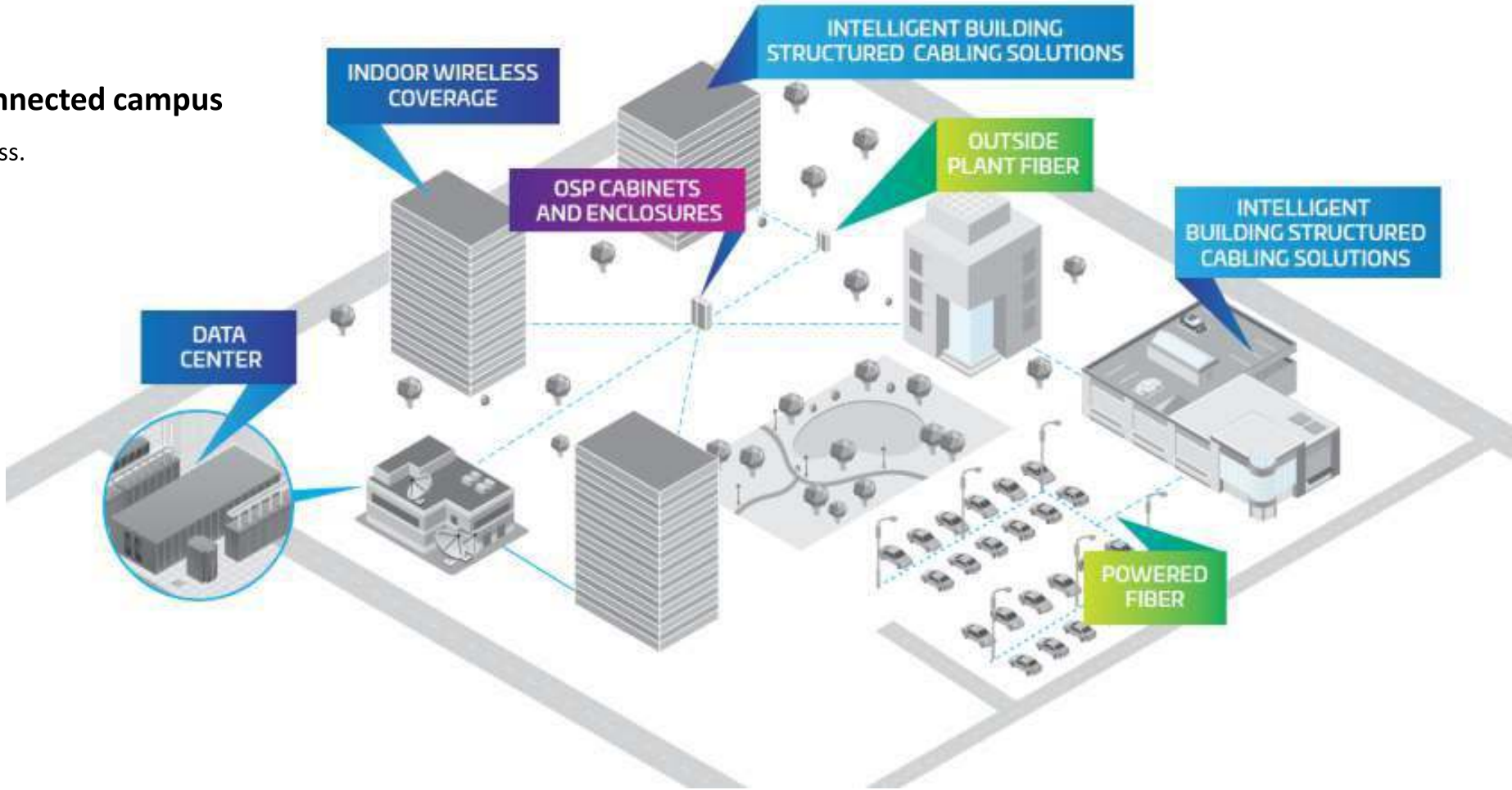
Axis Communications Q6128-E 4K Outdoor PTZ Network Camera with 3.9-46.8mm Varifocal Lens

- Axis High PoE midspan 1-port: 100-240 V AC, max 74 W
- Camera consumption: typical 14 W, max 51 W
- Axis PoE+ midspan 1-port: 100-240 V AC, max 37 W
- IEEE 802.3at Type 2 Class 4
- Camera consumption: typical 14 W, max 25 W

Connectivity

CommScope-connected campus

Fibre. Copper. Wireless.



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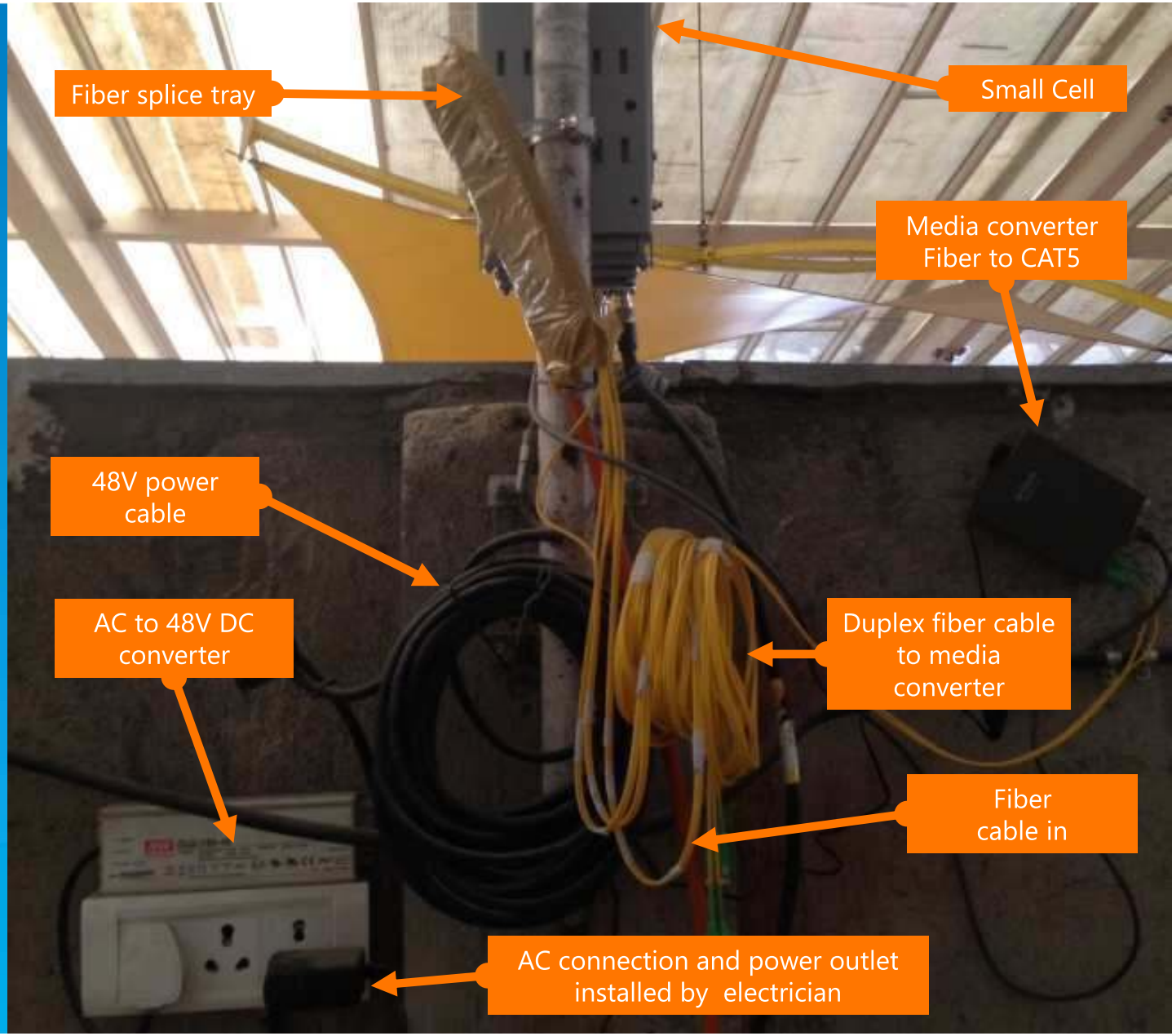
Fundamental Problem

POWER OVER ETHERNET (PoE, PoE+)

Has distance, data rate and power limitations

Custom engineering designs are expensive, and not robust



GOAL

A hybrid copper/fiber system that installs like a “long extension cord”

SYSTEM ELEMENTS

- Hybrid cable
- PoE Extender interface
- Power supply (PSU)

Simultaneously Power and Communicate with Network Access Devices

CommScope's Powered Fiber Cable System

Complete “rack to device” solution for both powering and communicating with devices such as small cells, Wi-Fi hotspots, HD cameras, and variety of devices requiring optical communications and DC power in one system.

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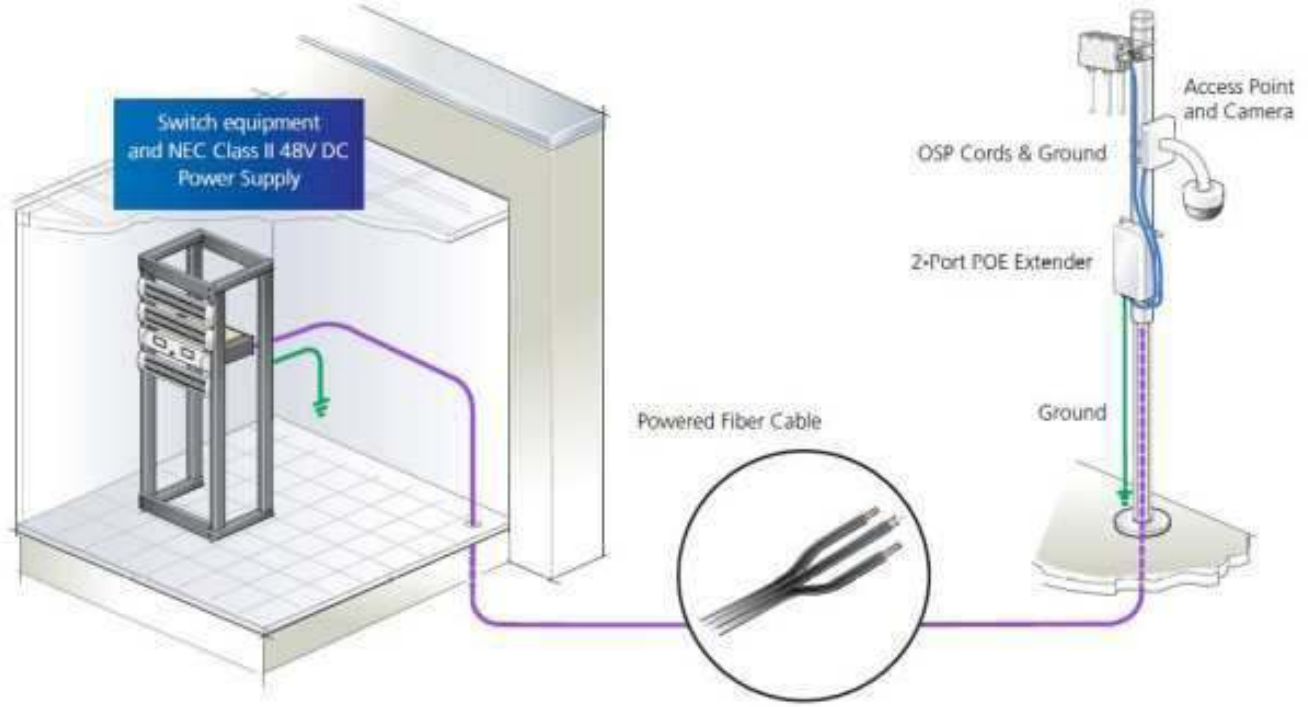
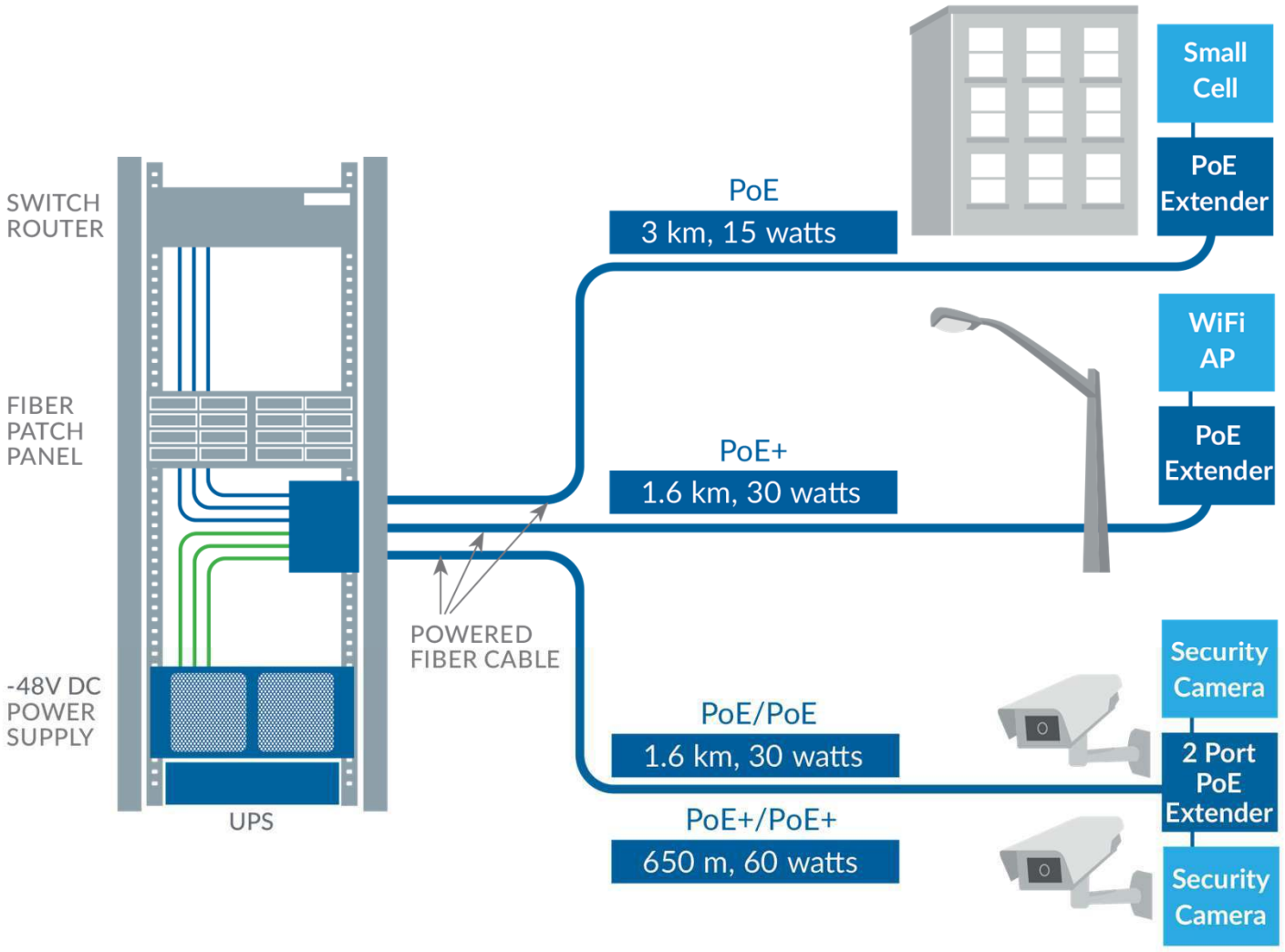
Typical Outdoor installation

Could be replaced by a 2 port extender on the pole or up to 100Mt away

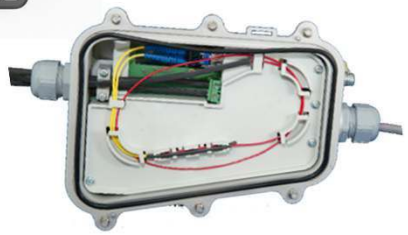


Alternative Solution



UP TO 12 OPTICAL FIBERS
SMF OR MMF

AVAILABLE IN 12 AWG or 16 AWG (3.31mm^2 and 1,31mm^2)



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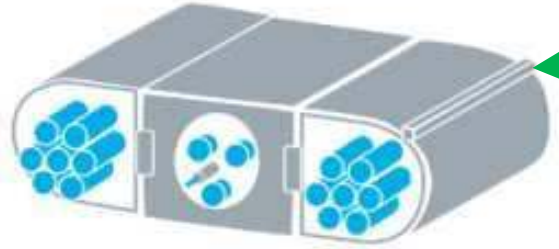
Powered Fiber Cable

Designed for rapid deployment

- Designed for "easy peel" access – the cable can be accessed much faster than traditional hybrid cables
- No special tools needed – one ordinary wire strip tool accesses both the optical fiber and conductor elements
- Utilizes globally existing, proven and inexpensive FTTH style flat cable hardware
- Very flexible due to stranded conductors
- Outdoor and Riser/LZSH indoor/outdoor rated versions

UP TO 12 OPTICAL FIBERS
SMF OR MMF

AVAILABLE IN 12 AWG or 16 AWG (3.31mm^2 and 1,31mm^2)



CONTAINS A RIDGE THAT ALLOWS FOR PHYSICAL POLARITY IDENTIFICATION

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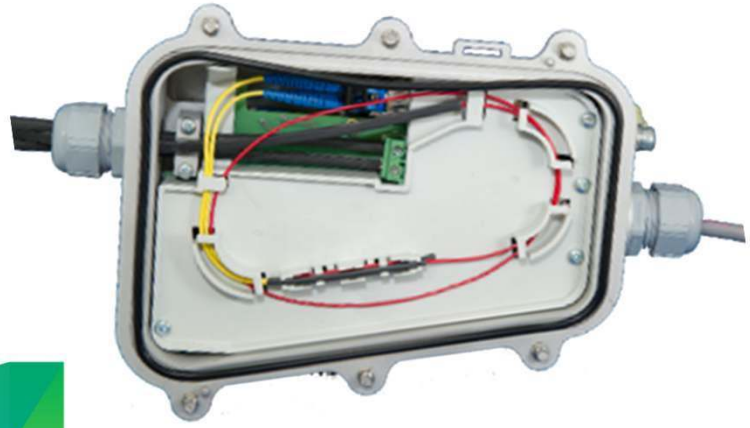
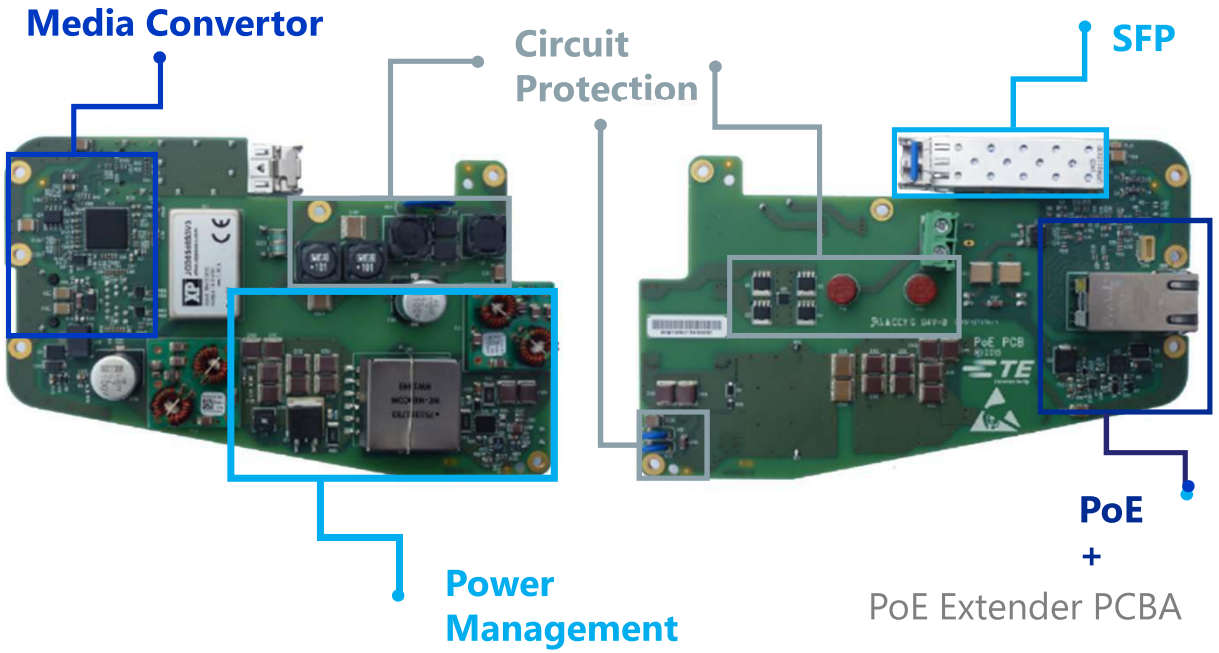
PoE Extender

Power Management

- Automatically corrects for voltage drop over distance = zero electrical calculations
- Optical signal and power in is converted to RJ45 PoE+ compliant jack
- Automatic polarity correction



Pole / Wall Mount Brackets



Powered Optical Cable System With Integrated Power Management And Media Conversion

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2-Port PoE Extender

60W Single Port PoE Extender

- Enhances the Powered Fiber Cable System by allowing 2 PoE or PoE+ devices to be connected via one hybrid cable.
- ITU K.45 Lightening/surge protection
- IP67 sealing - Designed to terminate the Powered Fiber Cable
- NEC Class 2 and SELV compliant (no electricians needed)
- ATEX Explosion Proof certification
- Options to share the bandwidth of a single 1 Gb/s SFP or utilize two SFPs for 1 Gb/s per port operation
- Paintable sunshade for improved thermal performance and better aesthetics

30 Watt Dual Port Extender

60W Single Port PoE Extender

60W Single Port PoE Extender
With Sunshade

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Power Supply

- NEC Class II and SELV compliant = No electricians needed to deploy PFCS.
- Partnership with GE Industrial Solutions to offer this via CommScope.
- Up to 32 PF cables from 2U of rack space … so up to 64 devices powered when using 2 Port Extenders

Power Express Class 2, shown here “fully loaded” with four 8 port modules

SPS Bulk DC Rectifier, shown here “fully loaded” with 3 Rectifier modules and PSU controller

- The SPS Bulk Rectifier takes in 120VAC or 240VAC and provides 57VDC output.
- The Power Express takes in the 57VDC output from the SPS and provides up to 32 Class 2 outputs to feed the Powered Fiber Cables.
  - Each output circuit is separately controlled to ensure operation within NEC Class 2 and SELV limits.
  - Electrical protection for each circuit

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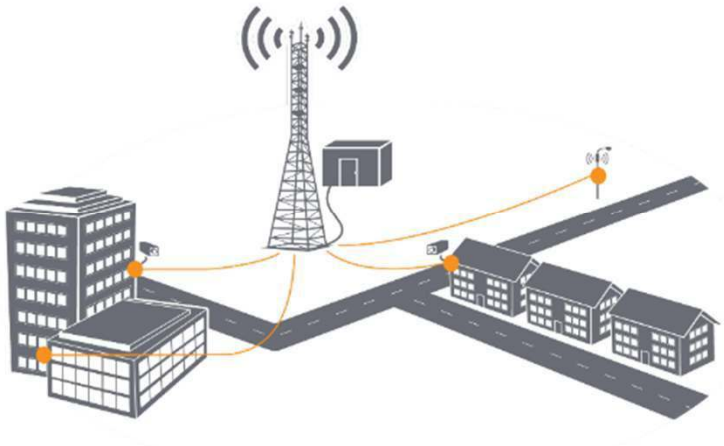
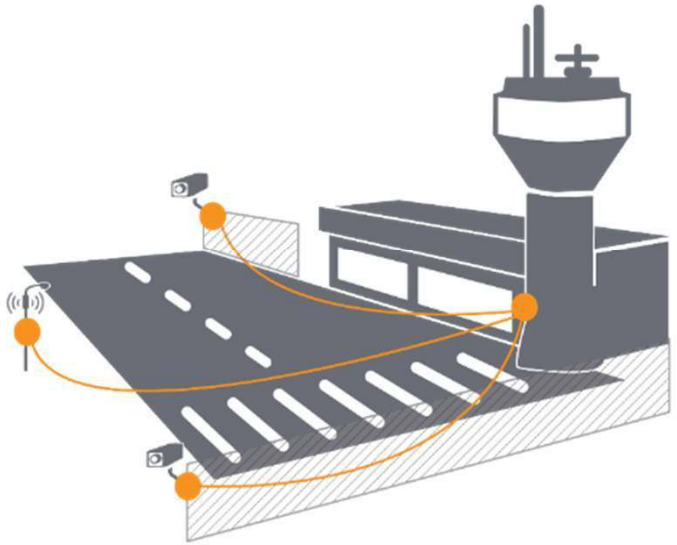
60W Single Port PoE Extender

- Some devices need greater than 30W (PoE+) power delivery such as PTZ Cameras with added heater block elements, small cells, large Wi-Fi Access points, etc.
- The 60W single Port PoE Extender combines 60W of DC power onto all 4 pairs of the copper conductors in a single RJ45 output.
- The housing is the same as the “2 Port” PoE Extender, with one RJ45 port eliminated.
- Same performance as the 2 Port Extender

CAMPUS ENVIRONMENT



CELL SITE BASE STATION



AIRPORT SURVEILLANCE

CommScope's Powered Fiber Cable System Application Examples

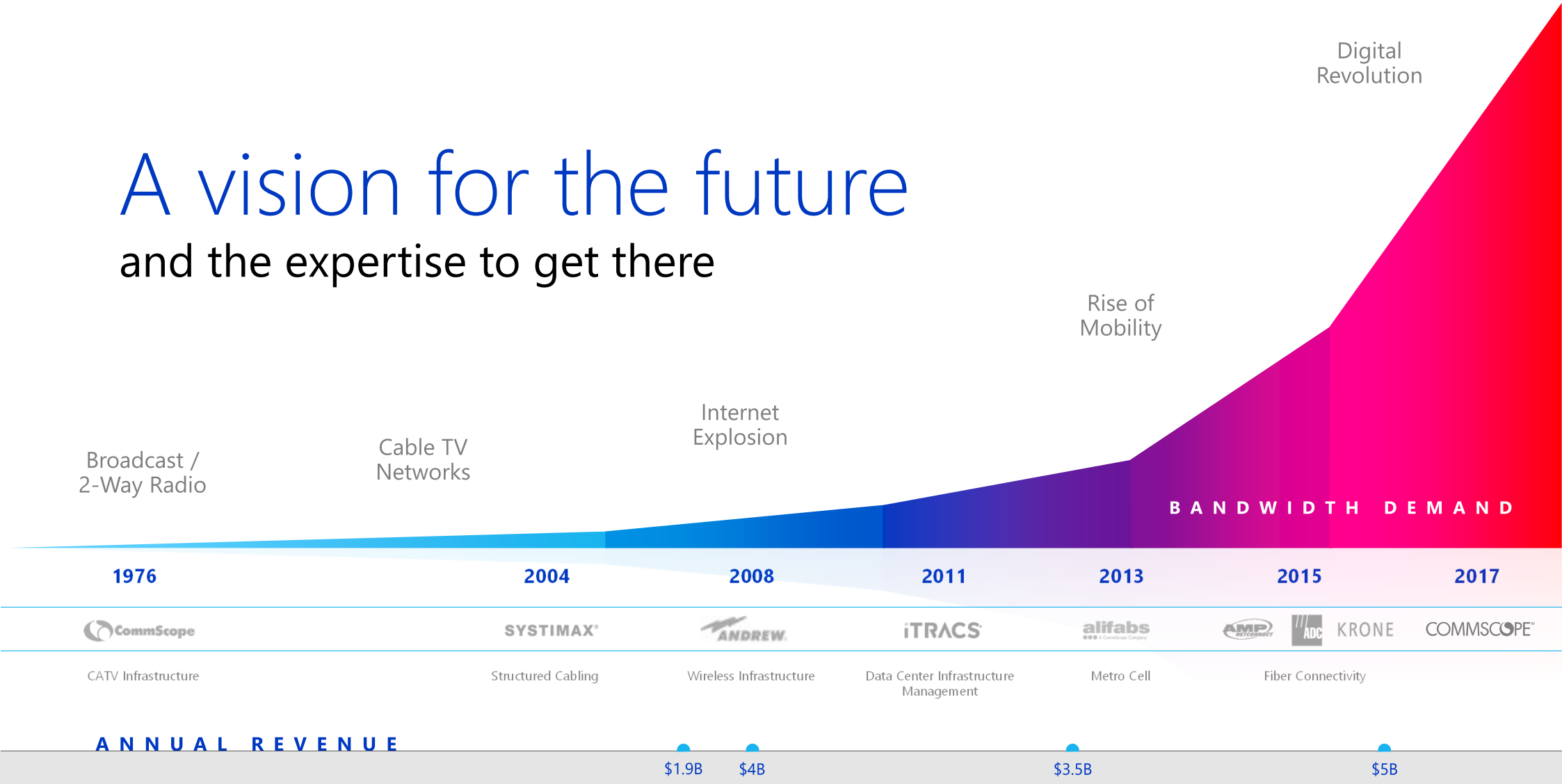
30x the Distance of PoE

- Reduce Landlord/Utility Negotiations
- Eliminate Local Power Sources
- Carrier Grade Electrical Protection
- Centrally Located UPS
- SELV and NEC Class II Compliant
- ATEX (Explosion Proof Compliance)

CommScope's Powered Fiber Cable System Benefits

A vision for the future

and the expertise to get there



COMMSCOPE

Our core markets

1st in guiding the creation of wireline, wireless, data center and commercial building networks

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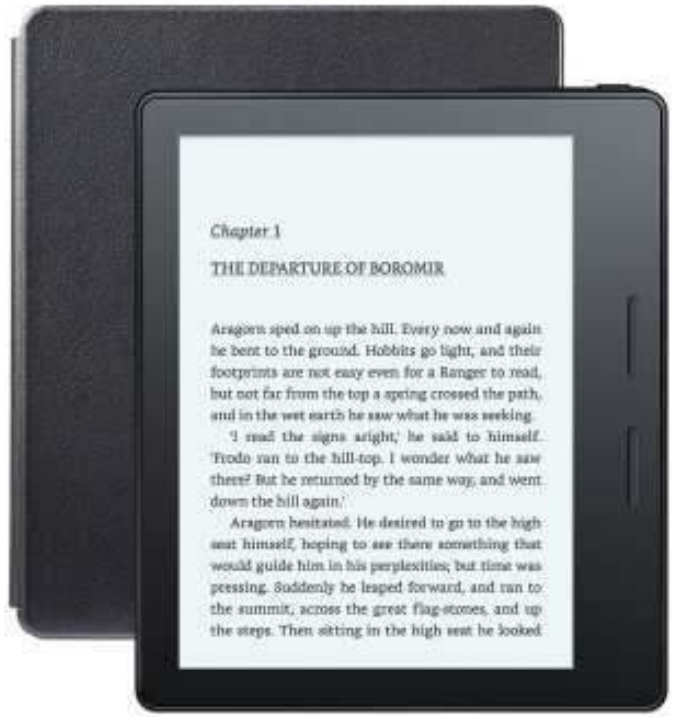
Please visit our stand no. 22 to enter the competition for a Amazon Oasis E-Reader

Or pick up a Mini Bluetooth Speaker

And also find out more about Powered Fibre solution or any other cabling infrastructure questions



Thank you!

www.commscope.com