Fiber to the Edge

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ICT SUMMIT
CONFERENCIA Y EXHIBICIÓN
PUERTO RICO 2026

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Fiber to the Edge

Security & surveillance



Emergency blue phone call boxes



Badge readers



Pan-Tilt-Zoom cameras

Outdoor Wi-Fi



Low voltage remote power



Power over Ethernet (PoE) applications



Remote applications

Campus environments



Access controls

Door locks

Connectivity for Applications Continue to Expand across all Verticals

- Parking Lots / Garages
- Warehouses
- Universities
- Campgrounds
- Manufacturing / Industrial
- Local Government
- Airports
- Large Public Venue
- Transportation









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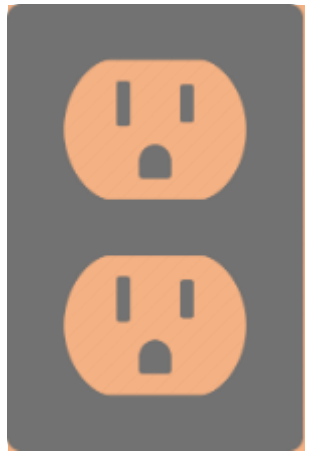
Top challenges: network complexity & costly deployments



Distance Limitations



Space Constraints



Limited Local Power

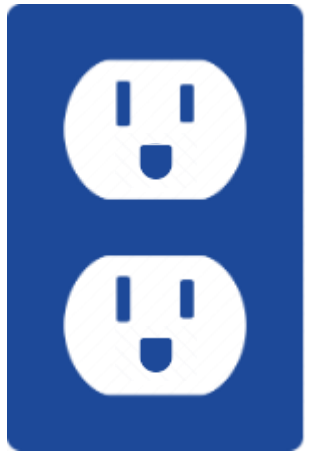
Enable remote applications with data & power to the edge



Deliver data and power beyond 2000 feet



Streamline infrastructure to reduce linear feet of cable by 70%



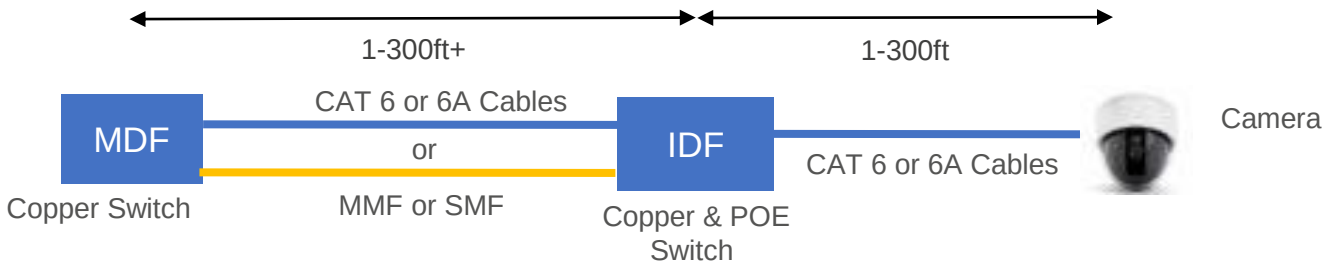
Reduce cost and complexity with remote power

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Typical Networking Architecture: Traditional Category Cabling

Traditional Copper LAN with POE



Challenges with Category Cabling Going Distances beyond 300'

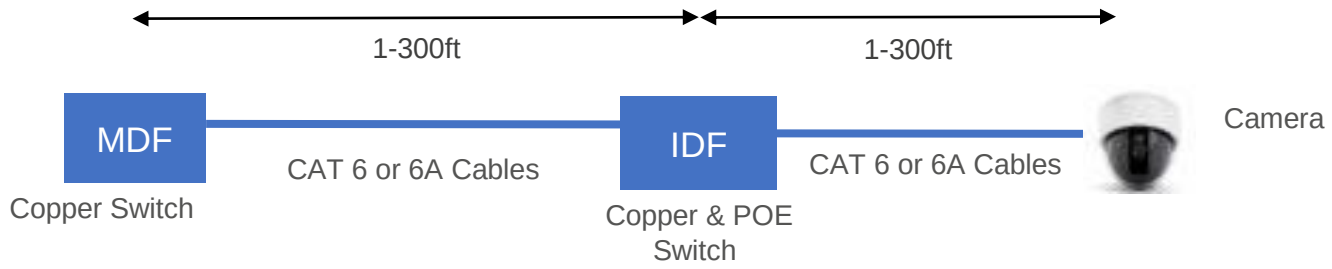
- **POE can be limited beyond 300'**
- **Bandwidth drops for some copper solutions beyond 300'**
- **Multiple Cables for multiple Applications / Devices: Larger Cable bundle size**
- **Adding IDFs / Power sources to extend cabling**
  - **May not exist where you need it = Expensive**

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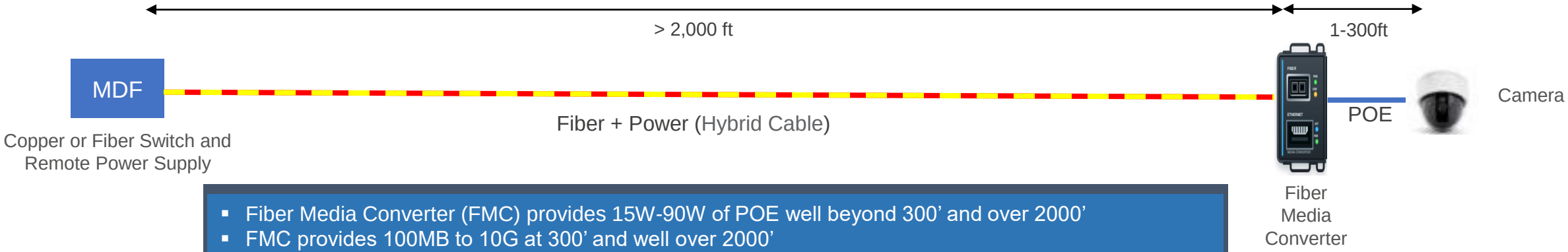
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Networking Architecture: Traditional Copper vs. Long Reach

Traditional Copper LAN with POE



Long Reach Solution with Fiber Media Converter



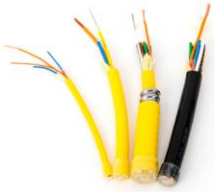
- Fiber Media Converter (FMC) provides 15W-90W of POE well beyond 300' and over 2000'
- FMC provides 100MB to 10G at 300' and well over 2000'
- 1 Composite cable can support multiple devices at the edge
- Reduces need for new IDFs, Typically requires less duct space

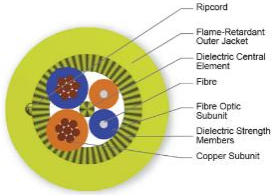
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Fiber to the Edge Long Reach: Key Components

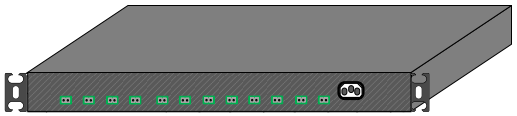
1 **Long-reach, flexible cable:**
Class 2/3 – Hybrid Cable
exceeds tradition distance limitations





2 **Low Voltage, DC Power:**
Remote Power Supply Unit(s)
centrally powers edge devices





3 **Connectivity at the edge:**
10G HPoE Fiber Media Converter
enables future flexibility



- 100MB to 10G = High Bandwidth
- 15W to 90W = High Power
- -40F to 167F = Industrial Temps

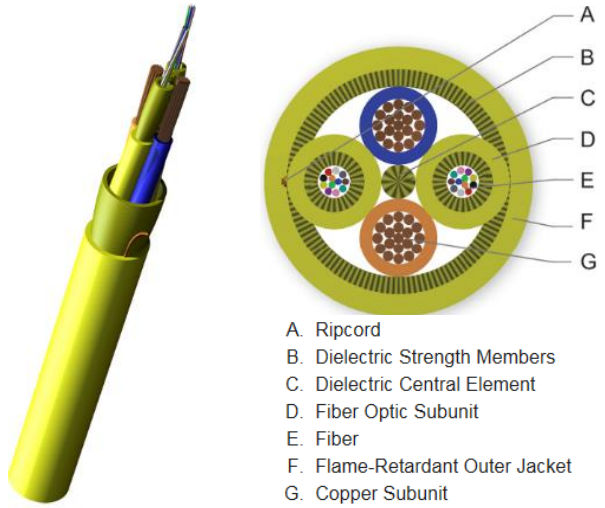
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1 Hybrid Fiber: Beyond 300 ft – Reach Up to 3000+ ft

Bandwidth over fiber and Power over copper

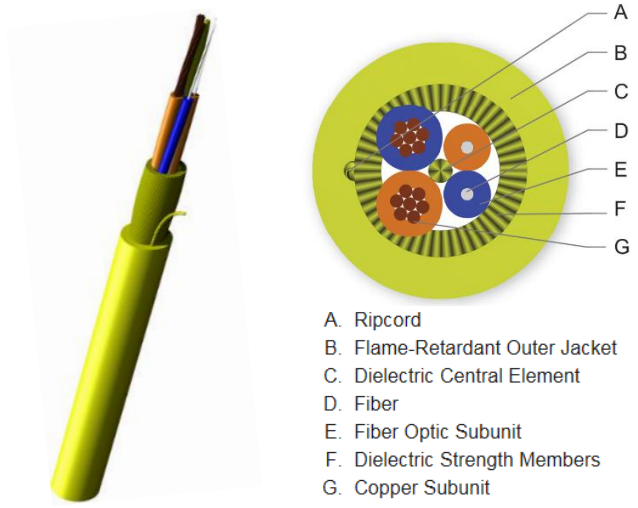
- **Bandwidth over fiber. Power over copper.**
- **Indoor/Outdoor or Plenum; Larger AWG = more distance / less voltage drop.**



A. Ripcord
B. Dielectric Strength Members
C. Dielectric Central Element
D. Fiber Optic Subunit
E. Fiber
F. Flame-Retardant Outer Jacket
G. Copper Subunit

Indoor, Loose Tube

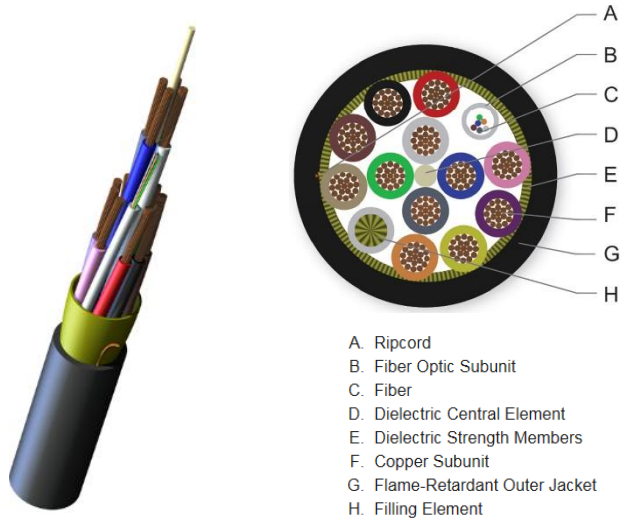
- ✓ Plenum
- ✓ Fibers: 2-24
- ✓ Gauges: 12,16
- ✓ Conductors: 2, 4, 6, 12
- ✓ Interlocking armor



A. Ripcord
B. Flame-Retardant Outer Jacket
C. Dielectric Central Element
D. Fiber
E. Fiber Optic Subunit
F. Dielectric Strength Members
G. Copper Subunit

Indoor, Tight Buffered

- ✓ Plenum
- ✓ Fibers: 2
- ✓ Gauges: 16,
- ✓ Conductors: 2,
- ✓ Interlocking armor



A. Ripcord
B. Fiber Optic Subunit
C. Fiber
D. Dielectric Central Element
E. Dielectric Strength Members
F. Copper Subunit
G. Flame-Retardant Outer Jacket
H. Filling Element

Indoor/Outdoor, Loose Tube

- ✓ Riser
- ✓ Fibers: 2-24
- ✓ Gauges: 12,16,
- ✓ Conductors: 2, 4, 6, 12
- ✓ Interlocking armor

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1 How Far – What AWG to Use

- Calculate how far each size of AWG cable can reach based on PoE requirements.
- Determine longest Spool size for that AWG of cable
- Visualize relationship between Distance, PoE delivered, and AWG. Adjust design accordingly.

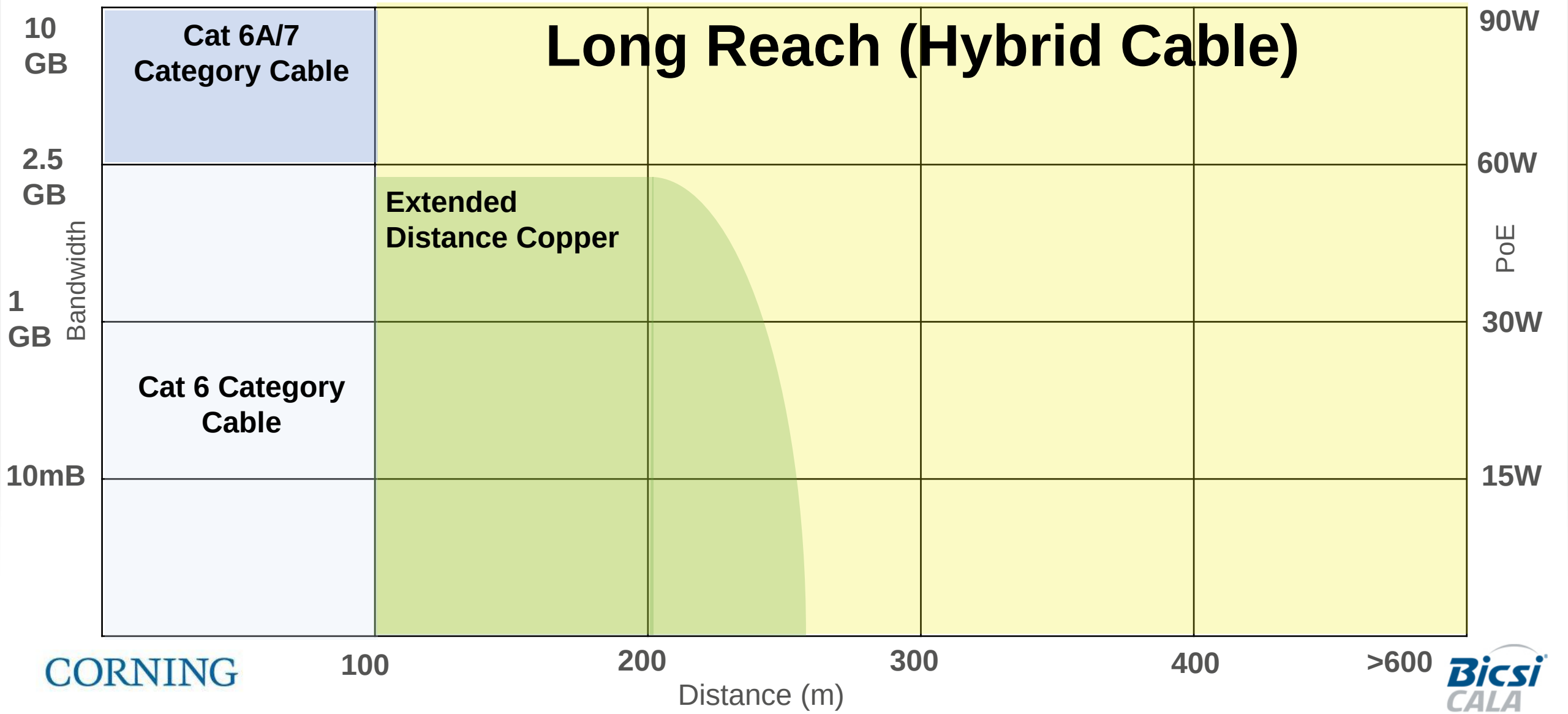
Hybrid Cable Configurator					
Max Reel	9842	9842	4839	2411	2033
PoE + FMC	**Conductor AWG**				
	20	**18**	**16**	**14**	**12**
5	3,168	5,037	8,009	12,734	20,249
10	1,584	2,518	4,004	6,367	10,124
15	1,056	1,679	2,670	4,245	6,750
20	792	1,259	2,002	3,184	5,062
25	634	1,007	1,602	2,547	4,050
30	528	839	1,335	2,122	3,375
35	453	720	1,144	1,819	2,893
40	396	630	1,001	1,592	2,531
45	352	560	890	1,415	2,250
50	317	504	801	1,273	2,025
55	288	458	728	1,158	1,841
60	264	420	667	1,061	1,687
65	244	387	616	980	1,558
70	226	360	572	910	1,446
75	211	336	534	849	1,350
80	198	315	501	796	1,266
85	143	228	362	576	916
90	**72**	114	181	288	458
	20	**18**	**16**	**14**	**12**
Distance	72	114	181	288	458
Watts	90	90	90	90	90
Green = Meets Distance Requirements for PoE Design					
Red = Does not meet distance requirment for PoE Design					
Yellow = Greater than Max Reel Size - in field splice required					

Configurator Example @ 48VDC to FMC

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1 Limitations of Copper Cables vs Long Reach FTTE



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2 Remote Power Solutions

Remote power enables hard-to-reach devices and reduces deployment cost of unplanned technology needs



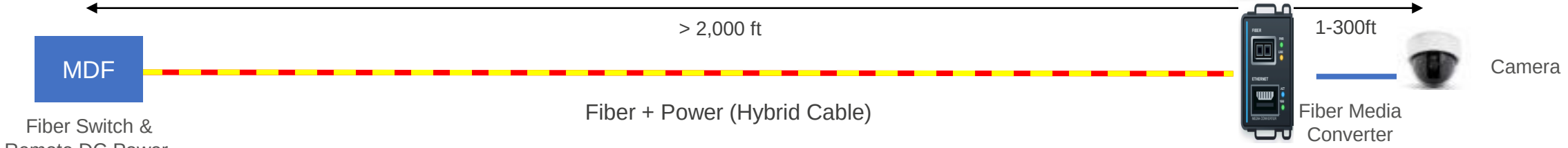


AC to DC Power Supplies and Accessories

Remote power minimizes the need for adding costly local power outlets.

Optimize network deployment:
- Deliver power to end device
- PoE, PoE+, and PoE++

Fiber to the Edge



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3 Connectivity at the Edge

10G HPoE Fiber Media Converter

Media converter converts the composite cable's **optical signal to an electrical signal** and **delivers PoE, PoE+, PoE++, or HPoE** to connected application.



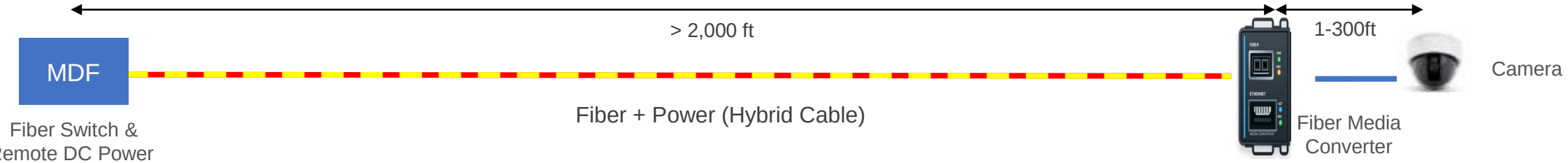
Single Port

Alternatives



Three Port

Fiber to the Edge



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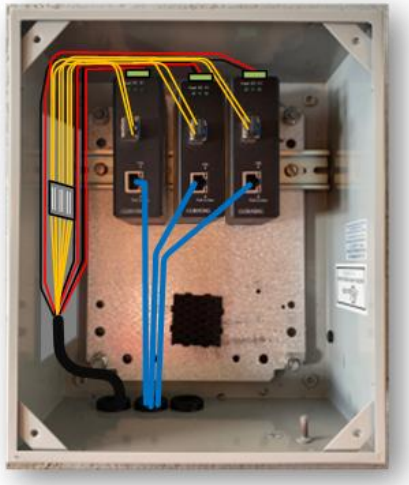
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3 Connectivity at the Edge

- **Check Bandwidth**
  (100MB up to 10GB)
- **Check Power over Ethernet Range**
  (15W PoE : 90W HPoE)
- **Check temp range**
  (-40°F to +167°F).
- **Small size**
  ~3” x 1.5” x 4.2”, 9.5oz

1 to Multiple Fiber Media Converters at 1 location

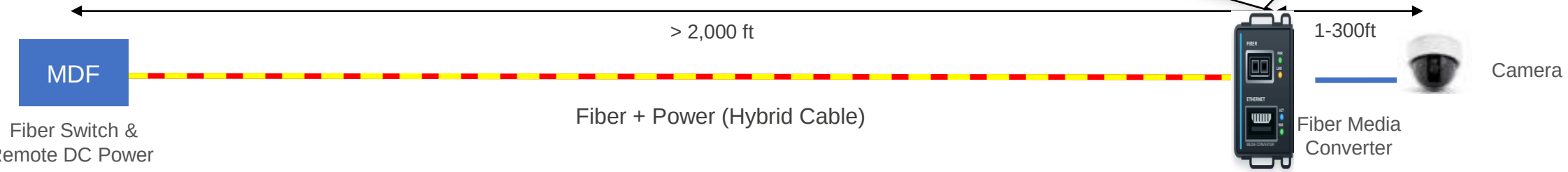
shown with 10G BiDi, DIN rail Bracket, and Mount Kit for low profile Enclosures



Are there Helpful Features

- 1/10G Auto Negotiation of Fiber Port
- Link Status Detection & Communication
- POE auto-reset devices

Fiber to the Edge

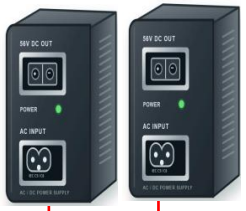


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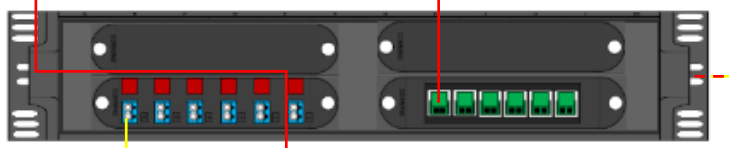
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3A Fiber Media Converter

Fiber Media Converter interoperable with existing **copper switches**



Remote Power



Hybrid Cable

Media converter &
enclosure at edge







Media converter
at headend



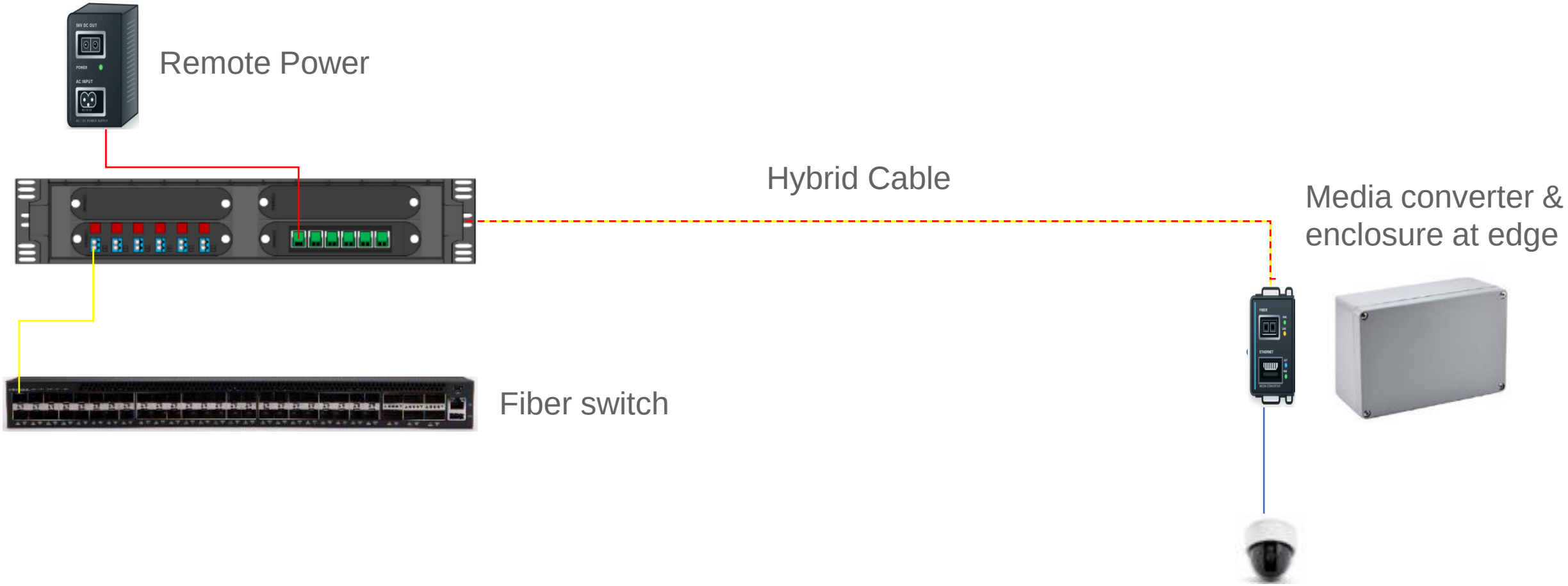
Copper switch



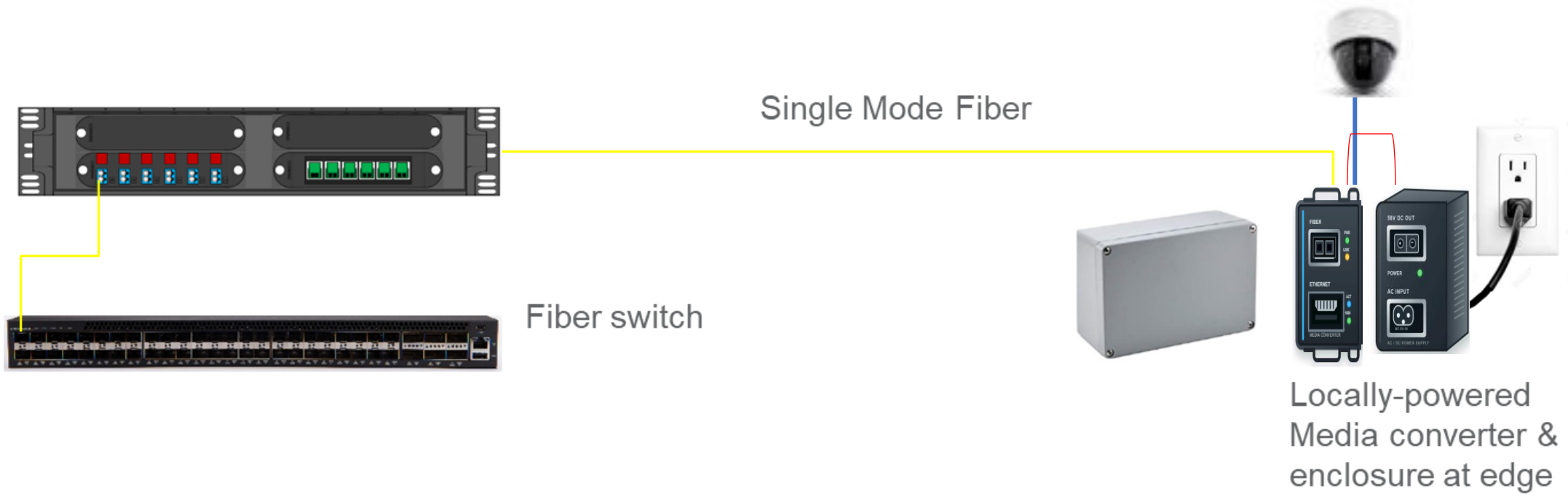
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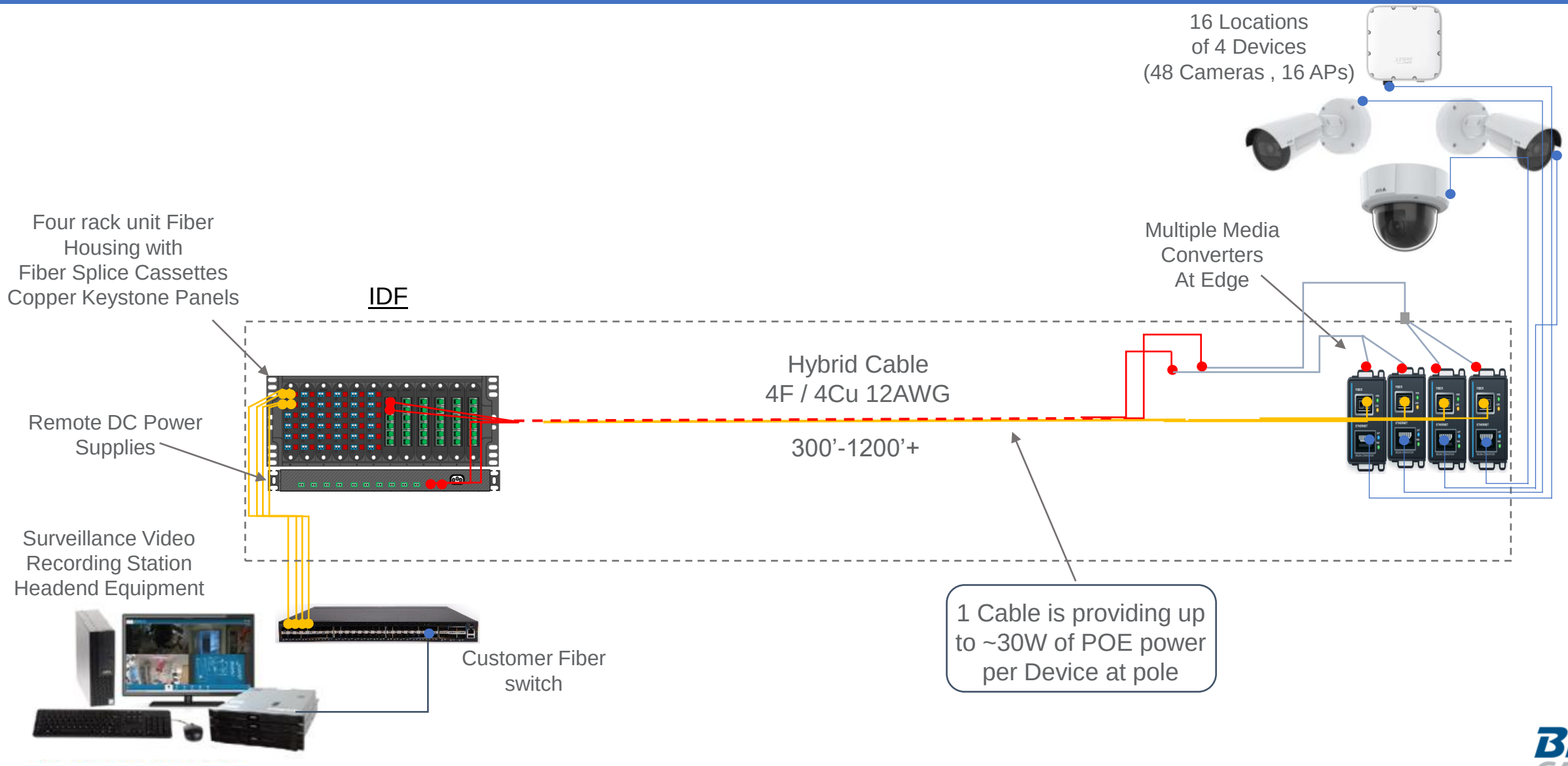
Fiber Media Converter interoperable with existing **fiber switches**



Fiber Media Converter can also be locally powered



Example : Scale UP with Multiple Fiber Media Converters at 16 Locations



Ruggedized, Pre-Terminated Fiber Connectivity Solutions for Security Applications

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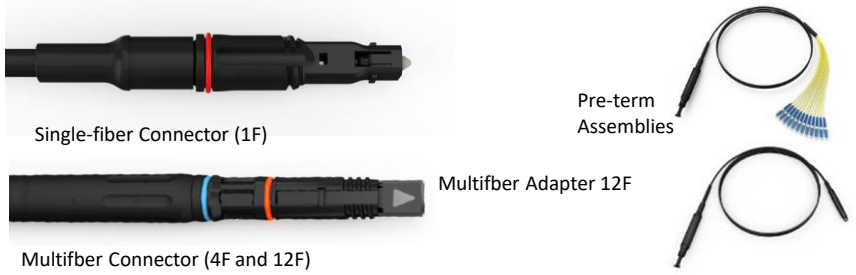
Pre-terminated Solutions: Key Components

1

Pre-terminated Assemblies

IP68 rated, water-tight, dust proof – Single-fiber or Multifiber

Field-friendly connector mating: **PUSH, CLICK, CONNECT**



2

Outdoor Terminals – Stubbed and Stub-less

IP68 rated, Multifiber connector in, multiple Single-fiber connectors out

Go anywhere: Strands, poles, handholes, facades: **STICK-AND-CLICK**

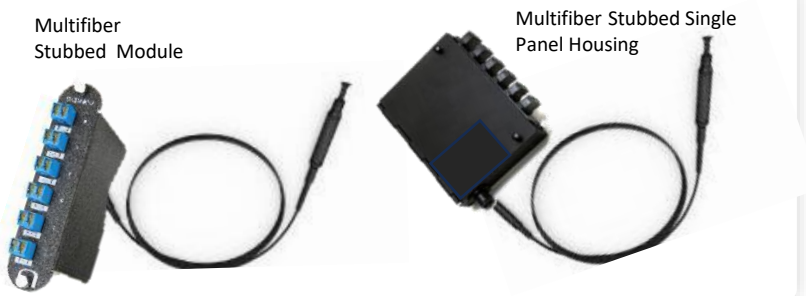


3

Integrated Hardware*

Stubbed Single Panel Housings and fiber housing Modules

Integrates Multifiber Pre-terminated technology into LAN spaces

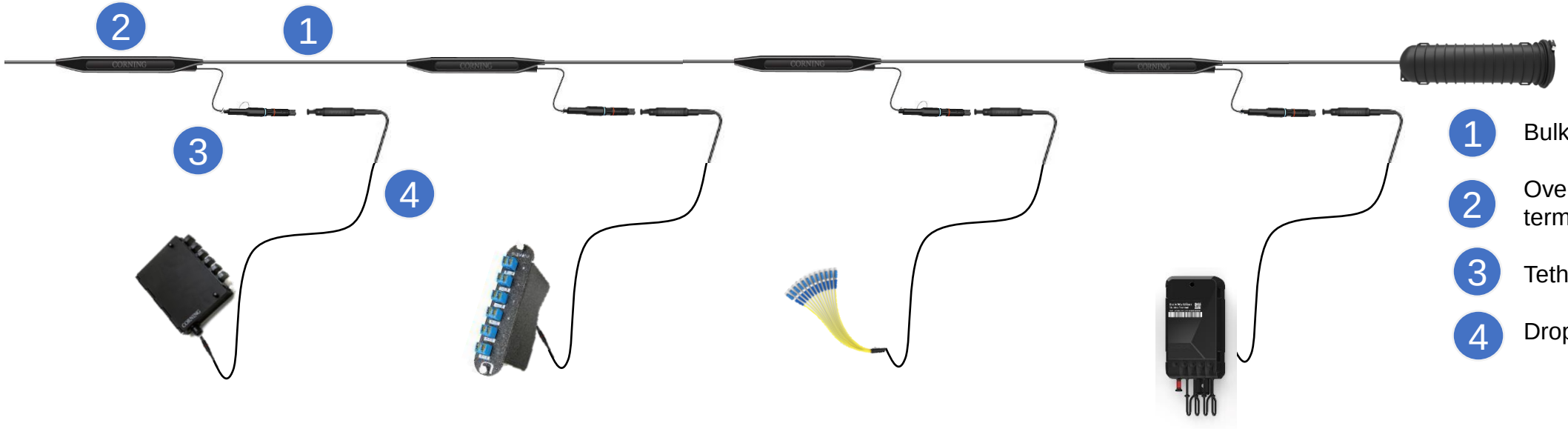


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Bulk distribution cable with pre-installed pre-terminated access

Pre-term Solutions



1. Bulk distribution cable
2. Overmolds to protect pre-terminated access points
3. Tether used to drop fibers
4. Drop Assembly

Factory installed, sealed splice points

Reduce field splicing with a predetermined loss at each waterproof tether attachment point (TAP)

Flexible pre-terminated access points

Utilize traditional field-installation techniques for aerial, below-grade, and duct applications

Various cable options & configurations

Terminals can be configured with 2,4,6,8,or 12 PreTerm connectors, Maximum of 2 tethers per attachment point allowing up to 24F

Dense fiber architecture friendly

Tethers can feed integrated Modules, Assemblies or terminals

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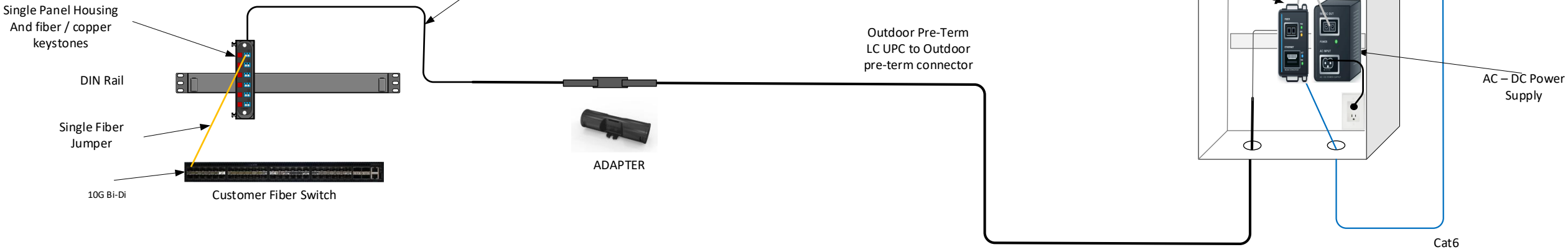
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Pre-Term Topology Examples: 1 Camera (1000’) with Local AC at Pole

Long Reach Fiber with
1000' Outdoor
PreTerm
Local AC Power at Pole
Fiber Switch

Backboard

Pole / NEMA
Local AC



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Pre-Term Topology Examples: 12 Cameras (1600’) with Local AC at Pole

Preterm Plug and Play for Security
Local AC power
Single Fiber / pole

IDF



Preterm 12F Module

Fiber Housing 1U

LC UPC Single Fiber Assembly

Customer Fiber Switch

10G Transceiver

Handhole

12F Outdoor Fiber Terminal with 12 Single Fiber drop connections





Male to Male 12F SST Drop Dielectric 100'

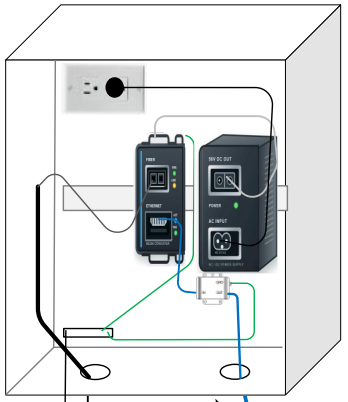


Single SMF Drop Outdoor Pre-Term to LC UPC 100' Various lengths

EDGE

60W Cam





To earth ground

x12

NEMA w/
(1)DIN Rail
(1) 18/2 Copper jumper
(1) AC/DC 56V power supply
(1) 10G Fiber Media Convert
(1) 10G SFP
(1) Surge Protection

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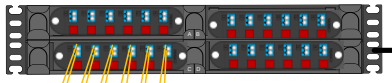
Pre-Term Topology Examples: 48 Cameras (1600’) with Local AC at Pole

PreTerm Plug and Play for Security
Local AC power
Single Fiber / pole
48 Cams

MDF



Preterm 12F Module



Fiber Housing 2U

LC UPC Single Fiber Assembly



Customer Fiber Switch

10G Transceiver

Handhole

12F Outdoor Fiber Terminal with 12 Single Fiber drop connections

x4





Male to Male 12F SST Drop Dielectric 100'

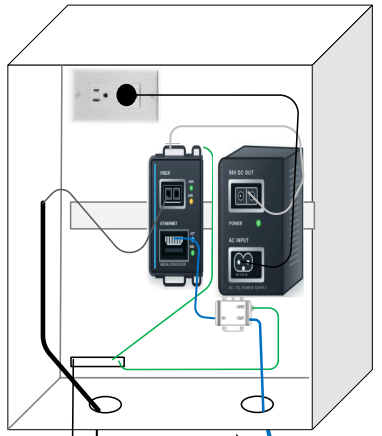


Single SMF Drop Outdoor Pre-Term to LC UPC 100' Various lengths

EDGE

60W Cam





To earth ground

x48

NEMA w/
(1)DIN Rail
(1) 18/2 Copper jumper
(1) AC/DC 56V power supply
(1) 10G Fiber Media Convert
(1) 10G SFP
(1) Surge Protection

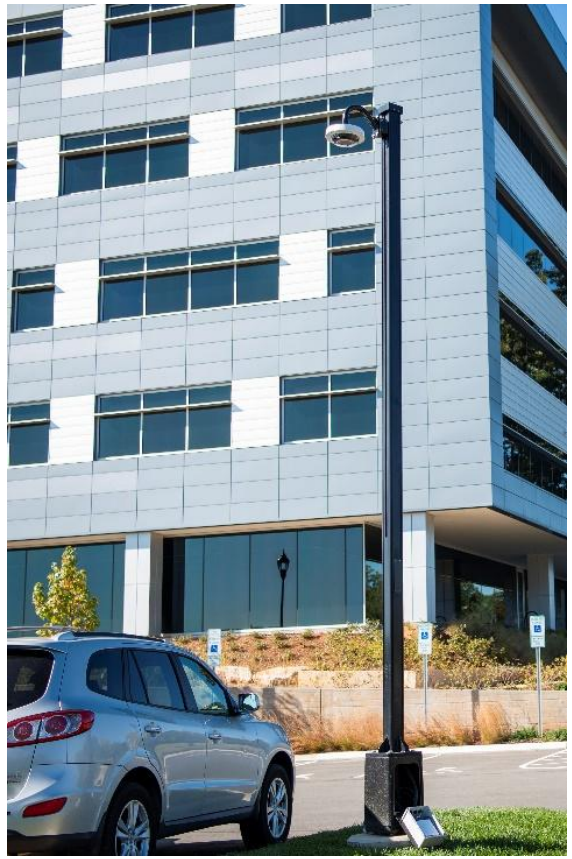
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Planning your long-reach project

Questions to Consider

- **How many devices** need connectivity?
- What are **PoE requirements** of each device?
- What is the **longest distance** from the closet to the device?
- What is the **average distance** from the closet to the device?
- Will the devices be **installed indoor, outdoor, or indoor/outdoor?**
- Can you provide a floor / site plan showing the **placement of devices?**



Long Reach Fiber to the Edge solutions

- **Bandwidth and Power Delivered at Long Distances**
- Extend connectivity over 2,000 ft
- **Space and Energy Saving**
- Fewer Cable runs, Less Conduit
- Less IDF buildout, Reduced Carbon Footprint
- **Simplicity and Ease of Use**
- Works with Existing Customer Switches
- No complex trenching or power setups in challenging locations
- Installed by LV teams
- **Future Ready**
- Virtually **unlimited** bandwidth
- Scalable architecture grows with business demand



Tomorrow's network, today

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Q & A