FTTA/PTTA & 5G Site Solutions

Raycap

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Introduction

Excellence in FTTA/PTTA Connectivity Solutions

Raycap has led the way in the development of advanced connectivity solutions for the FTTA/PTTA wireless network infrastructure.

In order to support any site scenario, Raycap offers complete FTTA/PTTA wireless site solutions to wireless operators, including:

- Fiber-optic, power, and hybrid (FTTA/PTTA) cables
- FTTA, PTTA and hybrid distribution enclosures
- FTTA, PTTA and hybrid boxless solutions
- Site installation accessories
- Fiber-optic accessories
- Active solutions
- Lightning and overvoltage protection solutions that can be integrated with the cable infrastructure and provide various levels of protection, depending upon specific site requirements

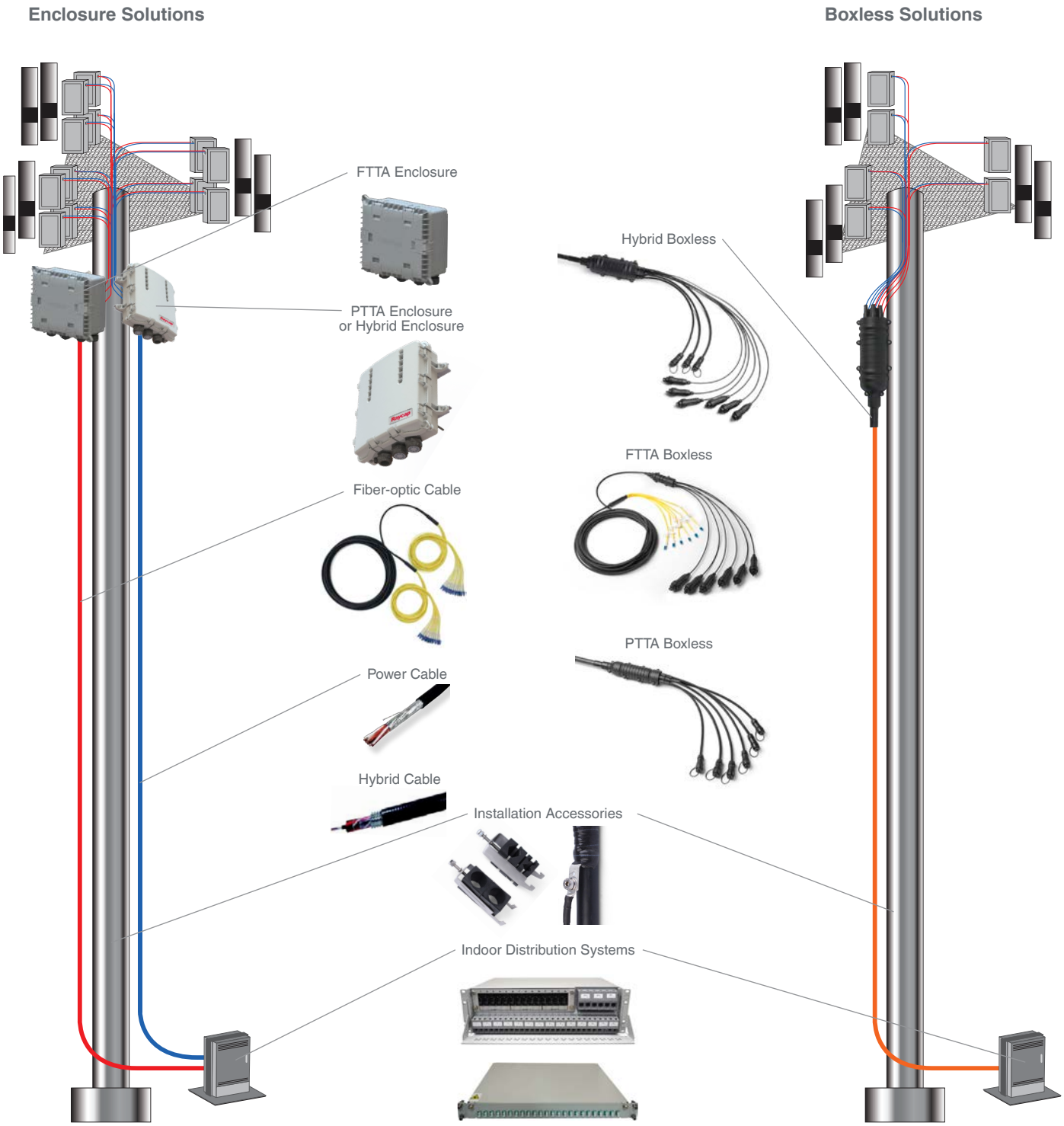
Overall, Raycap's connectivity and lightning protection solutions for FTTA/PTTA wireless networks have been installed at more than 300,000 wireless sites worldwide.

Manufacturing & Logistics Capabilities

Raycap has created a global manufacturing and logistics organization that surpasses the requirements of its customers. Its facilities are located in Germany, Romania, Slovenia, Greece and the United States. The company has a well-developed ISO quality system and disaster recovery strategies that focus on uninterrupted global supply. Not only can Raycap handle large production roll-outs, but it specializes in custom manufacturing for the wireless industry.

Overview of FTTA/PTTA Site Architectures

Complete portfolio of cable, connectivity and distribution solutions, Overvoltage Protection (OVP) as well as site accessories to support remote radio head architectures.



Raycap

Enclosures

Fiber-Optic Distribution Enclosures

Raycap's FTTA solutions are designed for installation indoor or outdoor, are cable and connector vendor independent, and support a variety of RRH deployments with cable management and distribution at the site top or bottom.

RTF-2951/12

RTF-3606/24

RTF-4754/36

RTF-3606/48

Common Features

- Tower or rooftop solution
- Bend radius protection
- Flexible design accommodates future site upgrades
- Fully customizable cable ports/connectors
- Various mounting options available
- Non-halogenated, non-flame propagating enclosure
- Lightweight aerodynamic design

Note: Contact Raycap for further variations as per your requirements.

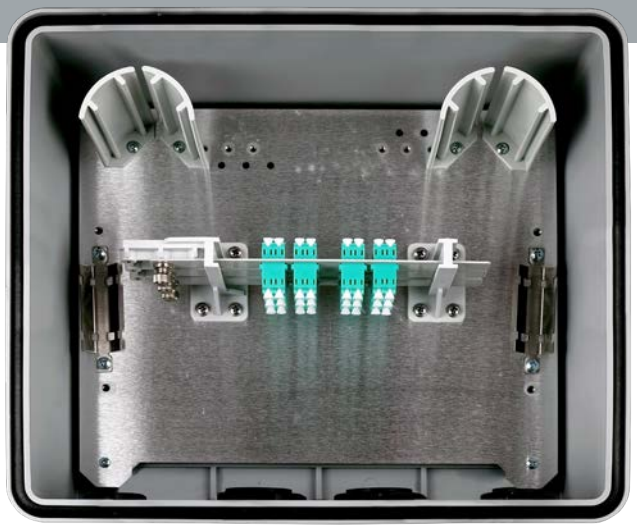
RTF-2951/12
Indoor and Outdoor FTTA Enclosures

Enclosure Features:

- Simplified cable management and distribution for up to 6 fiber-optic pairs (SM or MM)
- Sliding patch panel for easier access
- Dimensions (LxWxD): 289mm x 256mm x 108mm
- MPO termination upon request

Option without sliding patch panel upon request

RTF-3606/24
Indoor and Outdoor FTTA Enclosures

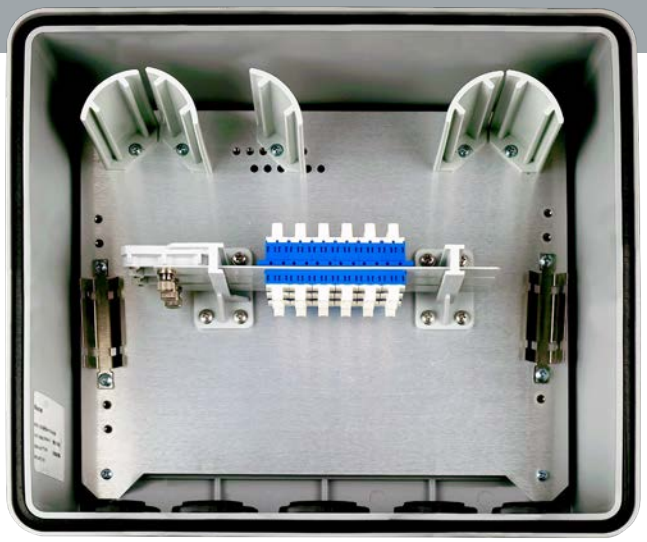


Enclosure Features:

- Simplified cable management and distribution for up to 12 fiber-optic pairs (SM or MM)
- Sliding patch panel for easier access
- Dimensions (LxWxD): 342mm x 365mm x 134mm
- MPO termination upon request

Option without sliding patch panel upon request

RTF-4754/36
Indoor and Outdoor FTTA Enclosures

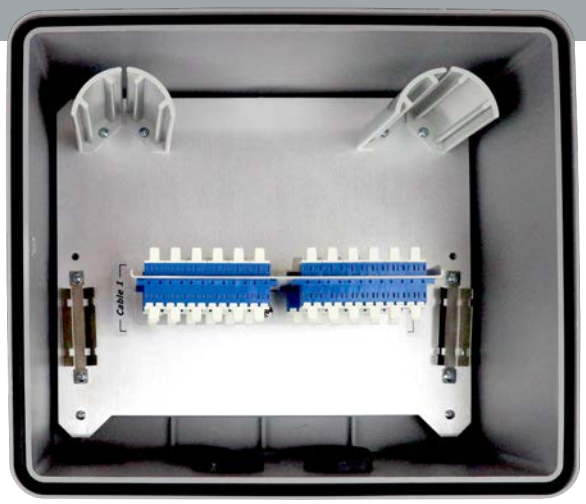


Enclosure Features:

- Simplified cable management and distribution for up to 18 fiber-optic pairs (SM or MM)
- Sliding patch panel for easier access
- Dimensions (LxWxD): 342mm x 365mm x 134mm
- MPO termination upon request

Option without sliding patch panel upon request

RTF-3606/48
Indoor and Outdoor FTTA Enclosures



Enclosure Features:

- Simplified cable management and distribution for up to 24 fiber-optic pairs
- Dimensions (LxWxD): 342mm x 365mm x 134mm
- MPO termination upon request

Power Distribution Enclosures

Raycap's PTTA solutions are designed for installation indoor or outdoor, are cable and connector vendor independent, and support a variety of RRH deployments with cable management, distribution and lightning / surge protection at the site top or bottom.

RTP-6608/1-3/0

RTP-6609/1-6/1-3/3MCBs

RTP-6609/3

RTP-8706-2

RTP-7700/6/0/0

Common Features

- Tower or rooftop solution
- Power cable management and distribution
- Fully customizable cable ports/connectors
- Various mounting options available
- Lightweight aerodynamic design
- Non-halogenated, non-flame propagating design

Note: PTTA enclosures can be ordered with various lightning and overvoltage protection (OVP) options. See protection options on page 51.

Note: Contact Raycap for further variations as per your requirements.

RTP-6608/1-3/0
Indoor and Outdoor PTTA Enclosures

Enclosure Features:

- Up to 3 DC circuits (common power feed)
- Supports 4 interchangeable options of Overvoltage Protection
- Dimensions (LxWxD): 342mm x 365mm x 182mm

RTP-6609/1-6/1-3/3MCBs
Indoor and Outdoor PTTA Enclosures

Enclosure Features:

- Up to 3 DC circuits (independent power feeds with dedicated MCBs)
- Supports 4 interchangeable options of Overvoltage Protection
- Dimensions (LxWxD): 514mm x 479mm x 153mm

RTP-6609/3
Indoor and Outdoor PTTA Enclosures

Enclosure Features:

- Up to 3 DC circuits (independent power feeds)
- Supports 4 interchangeable options of Overvoltage Protection
- Dimensions (LxWxD): 342mm x 365mm x 182mm

RTP-8706
Indoor and Outdoor PTTA Enclosures

Enclosure Features:

- Up to 3 DC circuits (common power feed)
- Supports up to 3 circuit breakers
- Supports 4 interchangeable options of Overvoltage Protection
- Dimensions (LxWxD): 245mm x 289mm x 152mm

RTP-7700/6/0/0
Indoor and Outdoor PTTA Enclosures

Enclosure Features:

- Up to 6 DC circuits (independent power feeds)
- Side-access terminals
- Supports 4 interchangeable options of Overvoltage Protection
- Dimensions (LxWxD): 522mm x 479mm x 153mm

Hybrid Distribution Enclosures

Raycap's Hybrid (FTTA/PTTA) solutions are designed for installation indoor or outdoor, are cable and connector vendor independent, and support RRH deployments with cable, fiber management and power distribution at the cell site top or bottom.

RTH-6608/2/6/2MCB

RTH-7700/12/12/12MCBs

RTH-7700/12/12/0/0

RTH-8899/12/12/6MCBs

RTH-3916/12/12/12MCBs

RTH-3916/6-12/12/4MCBs

RTH-7700/6/12/6MCB

RTH-7703/6/12/6MCB

RTH-7700/6/12/0

Common Features

- Tower or rooftop solution
- Simplified power and fiber management and distribution
- Fiber-optic cable bend radius protection
- Various mounting options available
- Flexible design accommodates future site upgrades
- Non-halogenated, non-flame propagating enclosure certified for indoor and outdoor installation
- Lightweight aerodynamic design

Note: FTTA/PTTA enclosures can be ordered with various lightning and overvoltage protection (OVP) options. See protection options on page 51.

Note: Contact Raycap for further variations as per your requirements.

RTH-6608/2/6/2MCBs
Indoor and Outdoor FTTA / PTTA Enclosures

Enclosure Features:

- Power cable management for up to 2 DC circuits (common power feed, 2 MCBs)
- Supports 4 interchangeable OVP options
- Cable management for up to 6 fiber-optic pairs
- Dimensions (LxWxD): 342mm x 365mm x 182mm

RTH-3916/12/12/12MCBs
Indoor and Outdoor FTTA / PTTA Enclosures

Enclosure Features:

- Power cable management for up to 12 DC circuits (6-12 MCBs)
- Two independent power feeds from PSU
- Cable management for up to 12 fiber-optic pairs
- Supports 4 OVP options
- Dimensions (LxWxD): 518mm x 479mm x 153mm

RTH-3916/6-12/12/4MCBs
Indoor and Outdoor FTTA / PTTA Enclosures

Enclosure Features:

- Power cable management for up to 4 DC circuits (4 MCBs)
- Two independent power feeds from PSU
- Cable management for up to 12 fiber-optic pairs
- Supports 4 OVP options
- Dimensions (LxWxD): 518mm x 479mm x 153mm

RTH-8899/12/12/6MCBs
Indoor and Outdoor FTTA / PTTA Enclosures

Enclosure Features:

- Power cable management for up to 12 DC circuits (common power feed, 6-12 MCBs)
- Cable management for up to 12 fiber-optic pairs
- Supports 4 interchangeable OVP options
- Dimensions (LxWxD): 514mm x 479mm x 153mm

RTH-7700/12/12/12MCBs
Indoor and Outdoor FTTA / PTTA Enclosures

Enclosure Features:

- Power cable management for up to 12 DC circuits (12 MCBs)
- Sectorized power feed from PSU (3 independent feeds)
- Cable management for up to 12 fiber-optic pairs
- Supports 4 interchangeable OVP options
- Dimensions (LxWxD): 514mm x 479mm x 153mm

RTH-7700/12/12/0/0
Indoor and Outdoor FTTA / PTTA Enclosures

Enclosure Features:

- Power cable management for up to 12 DC circuits
- Sectorized power feed from PSU (3 independent feeds)
- Cable management for up to 12 fiber-optic pairs
- Supports 4 interchangeable OVP options
- Dimensions (LxWxD): 514mm x 479mm x 153mm

RTH-7700/6/12/6MCBs
Indoor and Outdoor FTTA / PTTA Enclosures

Enclosure Features:

- Power cable management for up to 6 DC circuits (common power feed, 6 MCBs)
- Cable management for up to 12 fiber-optic pairs
- Supports 4 interchangeable OVP options
- Dimensions (LxWxD): 514mm x 420mm x 153mm

RTH-7703/6/12/6MCB
Indoor and Outdoor FTTA / PTTA Enclosures

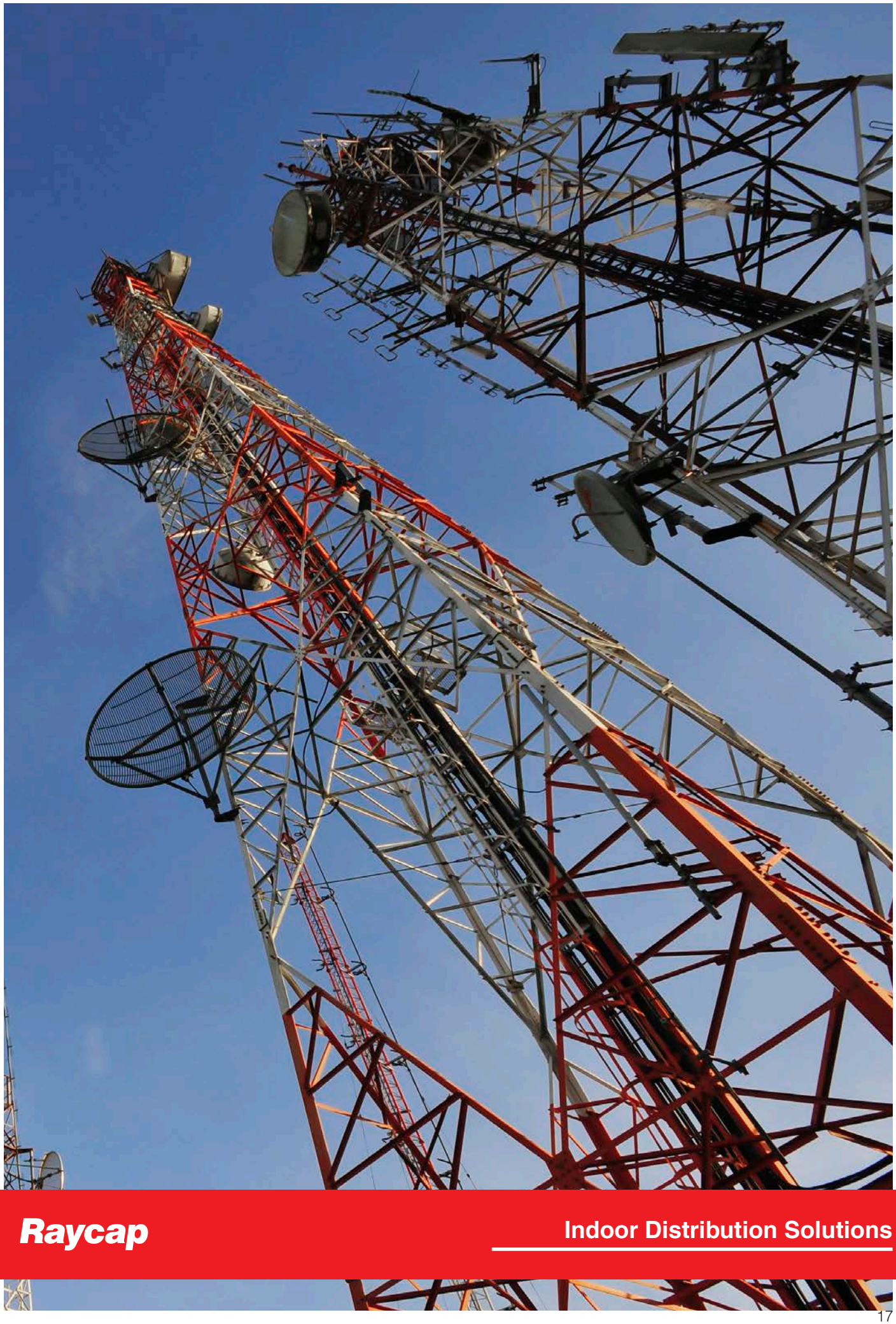
Enclosure Features:

- Power cable management for up to 6 DC circuits (6 MCBs)
- Sectorized power feed from PSU (3 independent feeds)
- Cable management for up to 12 fiber-optic pairs
- Supports 4 interchangeable OVP options
- Dimensions (LxWxD): 518mm x 479mm x 153mm

RTH-7700/6/12/0
Indoor and Outdoor FTTA / PTTA Enclosures

Enclosure Features:

- Power cable management for up to 6 DC circuits (independent power feeds)
- Cable management for up to 12 fiber-optic pairs
- Supports 4 interchangeable OVP options
- Dimensions (LxWxD): 518mm x 479mm x 153mm



Raycap

Indoor Distribution Solutions

Fiber-Optic Indoor Distribution Solutions

Indoor 19" mount or racks for fiber-optic patching / splicing / monitoring.

RTF-9563

RCPRI-1665/UMPO/12

RCPRI-1665/BMPO/12

RCPRI-1665/PP/12

RCPRI-1665

RTF-7214-ODF-HD

ROPT-CRN/Fxx

ROPT Series

RCPRI-4301/4U23/16M

RTF-8513/RTF-7976 /RTF-3526

RTF-2876

RTF-7942

RTF-3493

RCPRI-1199-CMU

**Other product configurations are available upon request.*

RTF-9563
Indoor Power and Fiber-optic Distribution Solutions

Features

- Indoor fiber patching solution for up to 48 fibers
- Slim 1HU design fits 19'' rack configurations
- Up to 4 standard entry points / cable entry from the back
- Individually labelled ports
- Multiple adaptor options available
- Bend radius protection
- Pull out design for easy access / 45° open working angle
- Mounting brackets are available for ETSI rack configurations
- RoHS, REACH SvHC and UL rated

RCPRI-1665-UMPO-12
Indoor Power and Fiber-optic Distribution Solutions

Features

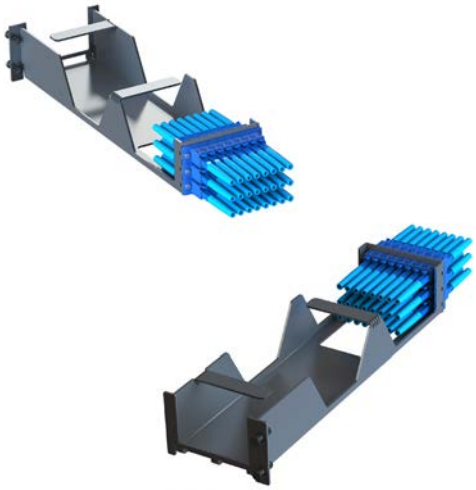
- The Raycap CPRI module is common RCPRI-1665 Subrack
- Each module monitors up tp 12 RRH via uni-directional LC couplers to the RRH, two MPO ports to the BBU, and 2 MPO ports for test
- Field-upgradable modules
- Module slides in/slides out for easy installation and removal in tight spaces
- UL 60950 Recognized Safety Standard

RCPRI-1665-BMPO-12/24
Indoor Power and Fiber-optic Distribution Solutions

Features

- The Raycap CPRI module is common RCPRI-1665 Subrack
- Each module monitors up tp 24 RRH via 24 bi-directional LC couplers to the RRH, two MPO ports to the BBU, and 2 MPO ports for test
- Field-upgradable modules
- Module slides in/slides out for easy installation and removal in tight spaces
- UL 60950 Recognized Safety Standard

RTF-1665-PP-12 Pass Through Module
Indoor Power and Fiber-optic Distribution Solutions



Features

- The Raycap CPRI module is common RCPRI-1665 Subrack
- Provides patching and distribution of fiber from the hybrid inputs at the base where splitter modules are not needed
- Each module is easily accessed and provides ultra high density in the smallest amount of rack space.

RCPRI-1665 Subrack
Indoor Power and Fiber-optic Distribution Solutions

Rack Unit Features

- Splitter distribution and test ports for up to 144 RRH utilizing MPO and LC connector combinations in 3 different module options
- Includes cable management and protective cover
- 2 different MTP/MTO-LC breakout patch cord offerings in different lengths

Module Features

- Modules are field-upgradable
- Module slides in/slides out for easy installation and removal in tight spaces without tools
- UL 60950 Recognized Safety Standard

RTF-7214-ODF-HD
Indoor Power and Fiber-optic Distribution Solutions

Features

- Frame system capacity up to 2592 fibers
- Compatible with all variations of standard cable systems, micro cable systems and blown fiber systems
- Customized pre-installation reduces installation cost
- The patch cable management system uses only uniform patch cable lengths
- Colored pigtails and fibers
- Cable entry from top or bottom via cable fixing plate
- Mini-flextubes guide loose tubes towards splice/patch modules
- Space saving / cost saving system

ROPT-CRN / Fxx
Indoor Power and Fiber-optic Distribution Solutions

Rack Unit Features
- Maximum capacity for 96 fiber-optic links using duplex LC connections when modules are fully-populated
- Maximum capacity is achieved in a 4U rack space with 16 modules
- Fiber connections easily accessible front and back

Module Features
- The optical splitter modules are universal
- Each module monitors 12 fibers – 6 uplink and 6 downlink between the RRH and BBU
- UL 60950 Recognized Safety Standard

ROPT Series
Indoor Power and Fiber-optic Distribution Solutions

Rack Unit Features
- Maximum capacity for 18 fiber-optic test splitters using duplex LC connections when modules are fully-populated
- Maximum capacity is achieved in a 1.5U rack space with 3 modules
- Drawer slides open for ease of input connections

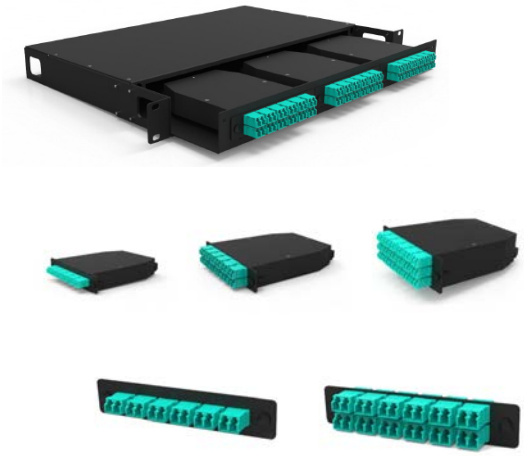
Module Features
- The optical splitter modules are universal
- Each module monitors 12 fibers – 6 uplink and 6 downlink between the RRH and BBU
- Each module incorporates 12 reflectors that enables non-invasive OTDR testing while the network operates
- UL 60950 Recognized Safety Standard

RCPRI-4301-4U23-16M
Indoor Power and Fiber-optic Distribution Solutions

Rack Unit Features
- 96 Fiber Duplex LC connections when fully populated holding up to 16 Raycap CPRI modules (RCPRI-1199-CMU)
- Unit provides cable management as well as a protective covers front and rear
- Fiber connections are inside unit, which prevents damage from accidental bumping and interference issues

Module Features
- Each module monitors 12 fibers – 6pr IN and 6pr OUT
- Reversible module can be installed with test ports either front or rear facing
- UL 60950 Recognized Safety Standard

RTF-8513 / RTF-7976 / RTF-3526
Indoor Power and Fiber-optic Distribution Solutions



Features

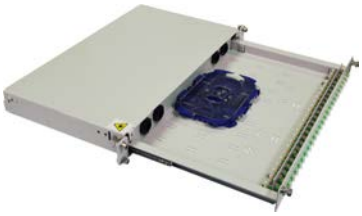
- Rack mountable
- Up to 108 fibers (LC Duplex Ports) in 1HU
- Up to 3 pluggable modules available and interchangeable in the same subrack
- Removable top for easier fiber management
- MTP/MPO connectors compliant with IEC-61754-7
- All types of MTP/MPO cables available

RTF-2876
Indoor Power and Fiber-optic Distribution Solutions

Features

- Highest port density, compact modules
- Space saving design
- Easy assembly
- Color coding provides ease of installation
- Safe and controlled bend radius
- Fully modular
- Optical components have protected access
- Additional funtions for installation and maintenance
- Labelling provided to customer specifications
- Accomodates up to 8 PLC or WDM modules
- Two compartment design for access network demarcation

RTF-7942 (Patch) / RTF-3493 (Splice-Patch)
Indoor Power and Fiber-optic Distribution Solutions



Features

- Indoor fiber patching/splicing solution for up to 24 fiber-optic pairs
- Slim 1HU design fits 19 inch rack configurations
- Up to 4 standard entry points / cable entry from rear
- Individually labelled ports
- Possibility for splice cassette (48 splices)
- Bend radius protection
- Slide out design for easy access
- Mounting brackets are available for ETSI rack configurations
- RoHS compliant

RCPRI-1199-CMU
Indoor Power and Fiber-optic Distribution Solutions

Features

- CPRI module is common for the 1RU as well as 3RU designs
- Each module monitors 12 fibers – 6pr UL and 6pr DL
- Field-upgradable modules
- Reversible module can be installed with test ports either front or rear facing
- Module slides in/slides out for easy installation and removal in tight spaces
- UL 60950 Recognized Safety Standard

Indoor Power Distribution and Lightning / Surge Protection Solutions

Indoor 19" rack mount solutions for 48 Vdc power distribution and surge protection.

RTP-1317-1

RTP-1317-2

RTP-1317-3

RTP-1317-4

RTP-1317-5

RTP-1317-6

RTP-3916/3MCBs/ 1xMPS-5924-1

RTP-3916/4MCBs/ 2xMPS-5924-1

RTP-3916/12MCBs/ 3xMPS-5924-1

RTP-3916/9MCBs/ 3xMPS-5924-1

RTP-3916/9MCBs/ 4xMPS-1980-1

RTP-3916/12MCBs/ 5xMPS-1980-1

RTP-3916/14MCBs/ 3xMPS-1980-1

RTP-3916/18MCBs/ 3xMPS-5924-1

RTP-3916/18MCBs/ 4xMPS-1980-1

Common Features

- Indoor solution
- Non-halogenated, non-flame propagating materials
- Slim, 2 & 3RU design fits 19 inch rack configurations
- Includes overvoltage protection (OVP) with Strikesorb® SPD technology high performance and maintenance free.

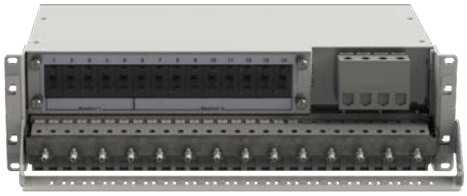
Note: Contact Raycap for further variations as per your requirements.

RTP-1317-1
DC Distribution & Surge Protection

Features

- Power distribution and protection for up to 14 DC circuits, powered by three separate input feeds
- Supports up to 14 circuit breakers
- Overvoltage Protection (OVP): Class I with I_{imp} 5kA (10/350µs)
- One OVP based on Strikesorb Surge Protective Devices (SPD) per each power section
- All output connections are front access for easy installation
- All input connections are from the front

RTP-1317-2
DC Distribution & Surge Protection



Features

- Power distribution and protection for up to 14 DC circuits powered by two separate input feeds
- Supports up to 14 circuit breakers
- Overvoltage Protection (OVP): Class I with I_{imp} 5kA (10/350µs)
- One OVP based on Strikesorb Surge Protective Devices (SPD) per each power section
- All output connections are front access for easy installation
- All input connections are from the front

RTP-1317-3
DC Distribution & Surge Protection

Features

- Power distribution and protection for up to 14 DC circuits, powered by two separate input feeds
- Supports up to 14 circuit breakers
- Overvoltage Protection (OVP): Class I with I_{imp} 5kA (10/350µs)
- One OVP based on Strikesorb Surge Protective Devices (SPD) per each power section
- All output connections are front access for easy installation
- All input connections are from the front

RTP-1317-4
DC Distribution & Surge Protection

Features

- Power distribution and protection for up to 20 DC circuits, powered by three separate input feeds
- Supports up to 20 circuit breakers
- Overvoltage Protection (OVP): Class I with I_{imp} 5kA (10/350µs)
- One OVP based on Strikesorb Surge Protective Devices (SPD) per each power section
- All output connections are front access for easy installation
- All input connections are from the front

RTP-1317-5
DC Distribution & Surge Protection

Features

- Power distribution and protection for up to 9 DC circuits, powered by a single input feed
- Supports up to 9 circuit breakers
- Overvoltage Protection (OVP): Class I with I_{imp} 5kA (10/350µs)
- One OVP based on Strikesorb Surge Protective Devices (SPD) per each power section
- All output connections are front access for easy installation
- Input connection is from the front

RTP-3917-6
DC Distribution & Surge Protection

Features

- Power distribution and protection for up to 12 DC circuits, powered by either one or two separate input feeds
- Supports up to 12 circuit breakers
- Overvoltage Protection (OVP): Class I with I_{imp} 12.5kA (10/350µs)
- One OVP based on Strikesorb Surge Protective Devices (SPD) per each power section
- All output connections are front access for easy installation
- All input connections are from the front

RTP-3916 / 3MCBs / 1xMPS-5924-1
DC Distribution & Surge Protection

Features

- Power distribution and protection for up to 3 DC circuits (single power feed)
- Overvoltage Protection (OVP): Class I with I_{imp} 5kA (10/350µs)
- OVP based on Strikesorb Surge Protective Devices (SPD)
- All output connections are front access for easy installation
- All input connections are from the back

RTP-3916 / 4MCBs / 2xMPS-5924-1
DC Distribution & Surge Protection

Features

- Power distribution and protection for up to 4 DC circuits (2 power feeds)
- Overvoltage Protection (OVP): Class I with I_{imp} 5kA (10/350µs)
- OVP based on Strikesorb Surge Protective Devices (SPD)
- All output connections are front access for easy installation
- All input connections are from the back

RTP-3916 / 9MCBs / 3xMPS-5924-1
DC Distribution & Surge Protection

Features

- Power distribution and protection for up to 9 DC circuits (2 power feeds)
- Overvoltage Protection (OVP): Class I with I_{imp} 5kA (10/350µs)
- OVP based on Strikesorb Surge Protective Devices (SPD)
- All output connections are front access for easy installation
- All input connections are from the back

RTP-3916 / 9MCBs / 4xMPS-1980-1
DC Distribution & Surge Protection

Features

- Power distribution and protection for up to 9 DC circuits (3 power feeds)
- Overvoltage Protection (OVP): Class I with I_{imp} 12.5kA (10/350µs)
- OVP based on Strikesorb Surge Protective Devices (SPD)
- All output connections are front access for easy installation
- All input connections are from the back

RTP-3916 / 12MCBs / 3xMPS-5924-1
DC Distribution & Surge Protection

Features

- Power distribution and protection for up to 12 DC circuits (2 power feeds)
- Overvoltage Protection (OVP): Class I with I_{imp} 5kA (10/350µs)
- OVP based on Strikesorb Surge Protective Devices (SPD)
- All output connections are front access for easy installation
- All input connections are from the back

RTP-3916 / 14MCBs / 3xMPS-1980-1
DC Distribution & Surge Protection

Features

- Power distribution and protection for up to 14 DC circuits (2 power feeds)
- Overvoltage Protection (OVP): Class I with I_{imp} 12.5kA (10/350µs)
- OVP based on Strikesorb Surge Protective Devices (SPD)
- All output connections are front access for easy installation
- All input connections are from the back

RTP-3916 / 12MCBs / 5xMPS-1980-1
DC Distribution & Surge Protection

Features

- Power distribution and protection for up to 12 DC circuits (4 power feeds)
- Overvoltage Protection (OVP): Class I with I_{imp} 12.5kA (10/350µs)
- OVP based on Strikesorb Surge Protective Devices (SPD)
- All output connections are front access for easy installation
- All input connections are from the back

RTP-3916 / 18MCBs / 3xMPS-5924-1
DC Distribution & Surge Protection

Features

- Power distribution and protection for up to 18 DC circuits (2 power feeds)
- Overvoltage Protection (OVP): Class I with I_{imp} 5kA (10/350µs)
- OVP based on Strikesorb Surge Protective Devices (SPD)
- All output connections are front access for easy installation
- All input connections are from the back

RTP-3916 / 18MCBs / 4xMPS-1980-1
DC Distribution & Surge Protection

Features

- Power distribution and protection for up to 18 DC circuits (3 power feeds)
- Overvoltage Protection Class I with I_{imp} 12.5kA (10/350µs)
- OVP based on Strikesorb Surge Protective Devices (SPD)
- All output connections are front access for easy installation
- All input connections are from the back

Raycap

Cable Products

Fiber-Optic Cable Products

FTTA multi-core fiber cables terminated with duplex LC connectors at both sides.

OMCS-GY-8/12/24
FTTA Optical Multi Fiber Cable

FTTA multi-core fiber cables terminated with duplex LC connectors at both sides.

Features

- 4, 6 or 12 fiber-optic pairs
- SM or MM fiber optic
- Dielectric, rodent protected (glass yarns)
- Low smoke, Halogen Free (FR LSZH) outer sheath
- Connectors:
  RRH side: Duplex LC
  BBU side: Duplex LC
- 96 fiber - MPO terminated upon request

Raycap can customize with:

- Patchcords
- Indoor breakout cable
- MTP to LC fanouts

Power Cable Products

Outdoor copper cables for the DC power supply of RRH.

Multi-core Power Supply Cables (MPSC)

Features

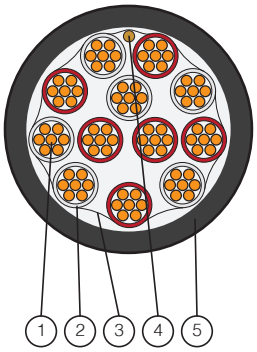
- Number of conductors: 6 or 12 conductors
- Conductor cross-section: 6mm^2 up to 25 mm^2
- Annealed bare copper stranded conductor, Class 2 or 5 per IEC 60228
- Low Smoke Zero Halogen (LSZH) jacket
- Temperature range: -40°C to +65°C

Power Supply Cables (PSC)

Features

- Number of conductors: 2 conductors
- Conductor cross-section: 4mm^2 up to 35 mm^2
- Annealed bare copper stranded conductor, class 2 or 5 per IEC 60228
- Low Smoke Zero Halogen (LSZH) jacket
- Temperature range: -40 °C to +65 °C

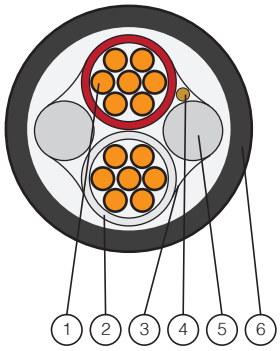
Multi-core Power Supply Cables (MPSC)



1. Stranded Anneald Copper Conductor (Class 2 or Class 5)
2. Insulation XLPE
3. Aluminum Tape
4. Copper Drain Wire
5. LSZH Outer Sheath Compound

Note: Drawing is not to scale

Power Supply Cables (PSC)



1. Stranded Anneald Copper Conductor (Class 2 or Class 5)
2. Insulation XLPE
3. Aluminum Tape
4. Copper Drain Wire
5. Filler
6. LSZH Outer Sheath Compound

Note: Drawing is not to scale

Note: Drawings present class 2 copper conductors.

CU/XLPE/ATS/LSZH 6x10 • 6x16 • 6x25
Power Supply Cables

- Conductor:
  - Type: Class 2 or 5 per IEC 60228
  - Material: Annealed copper
  - Shape: Circular, stranded
- Insulation:
  - Type: XLPE (IEC 60502-1)
  - Core Indentification: 3 x Red, 3 x White (Numbered Cores)
- Overall Screen:
  - Material: Aluminium tape & tin copper drain wire
- Outer Sheath:
  - Type: LSZH compound (UV resistant)
  - Color: Black

CU/XLPE/ATS/LSZH 12x6 • 12x10
Power Supply Cables

- Conductor:
  - Type: Class 2 per IEC 60228
  - Material: Annealed copper
  - Shape: Circular, stranded
- Insulation:
  - Type: XLPE (IEC 60502-1)
  - Core Indentification: 6 x Red, 6 x White (Numbered Cores)
- Overall Screen:
  - Material: Aluminium tape & tin copper drain wire
- Outer Sheath:
  - Type: LSZH compound (UV resistant)
  - Color: Black

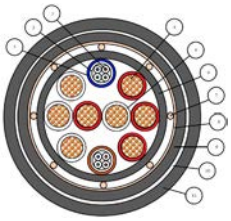
CU/XLPE/ATS/LSZH 2x10 • 2x16 • 2x25 • 2x35
Power Supply Cables

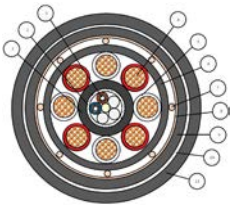
- Conductor:
  - Type: Class 2 or 5 per IEC 60228
  - Material: Annealed copper
  - Shape: Circular, stranded
- Insulation:
  - Type: XLPE (IEC 60502-1)
  - Core Indentification: Red - White
- Overall Screen:
  - Type: Aluminum tape & tin copper drain wire
- Outer Sheath:
  - Type: LSZH compound (UV resistant)
  - Color: Black

Hybrid Cable Products

Fiber-optic Cable Assembly

Hybrid Cables (48 Vdc)



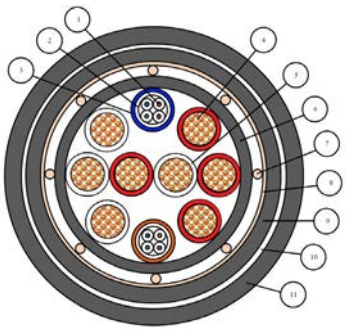


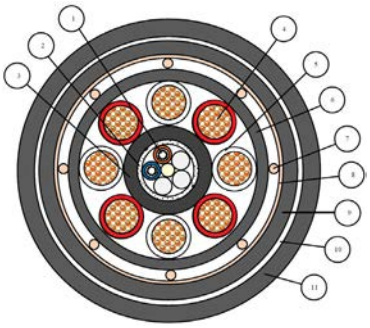
Common Features

- SM or MM fiber optic
- Dielectric, rodent protected (glass yarns)

Hybrid Cables (48 Vdc)

Fiber-optic Cable Assembly





Features

- Voltage 48 VDC
- 4 or 6 fiber-optic pairs
- 3 or 4 DC pairs
- Armouring and shielding

Fiber-Optic Jumpers

Nokia Systems

TOJ-xx-zzM-NSN-UNV

TOJ-xx-zzM-NSN-90DEG STR

Ericsson Systems

TOJ-xx-zzM-ER-CR / CRCR

TOJ-SM-xx-zzM-ER
TOJ-SM-xx-zzM-ER-ER

Huawei Systems

TOJ -xx-zzM-HUA-AR

TOJ -xx-zzM-QSFP (-LC/UPC)

Common Features

- Suitable for outdoor use
- LSZH jacket
- UV resistant

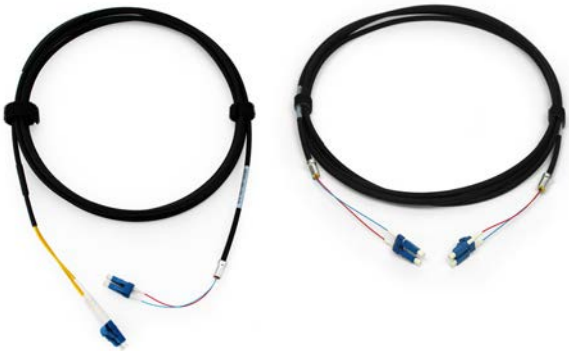
TOJ-xx-zzM-NSN-UNV
Fiber-optic Jumpers

Features
- 2 optical fibers SM or MM
- Short boot and Duplex LC connectors
- Steel tape armored furcation tubes at both ends
- Universal design, suitable for straight and 90° termination at the RRU side

TOJ-xx-zzM-NSN-90DEG STR
Fiber-optic Jumpers

Features
- 2 optical fibers SM or MM
- Angled RRU side version available
- Flexible boot connectors for easy installation

TOJ-xx-zzM-ER-CR / CRCR
Fiber-optic Jumpers



Features
- 2 optical fibers SM or MM
- Duplex LC connectors

TOJ-SM-xx-zzM-ER / TOJ-SM-xx-zzM-ER-ER
Fiber-optic Jumpers

Features

- SM optical fibers
- Connectors:
  -IP67 fiber-optic industrial duplex LC connector
  -Duplex LC connectors

TOJ-xx-zz-M-HUA/HUA-AR
Fiber-optic Jumpers

Features

- 2 optical fibers SM or MM
- Short boot and Duplex LC connectors
- Steel tape armored furcation tubes at both ends (Version HUA-AR)

TOJ -xx-zzM-QSFP (-LC/UPC)
Fiber-optic Jumpers

Features

- 8 optical fibers SM or MM
- Available in LC/UPC and QSFP version
- Compatible with QSFP radio interfaces

Power Supply Jumpers

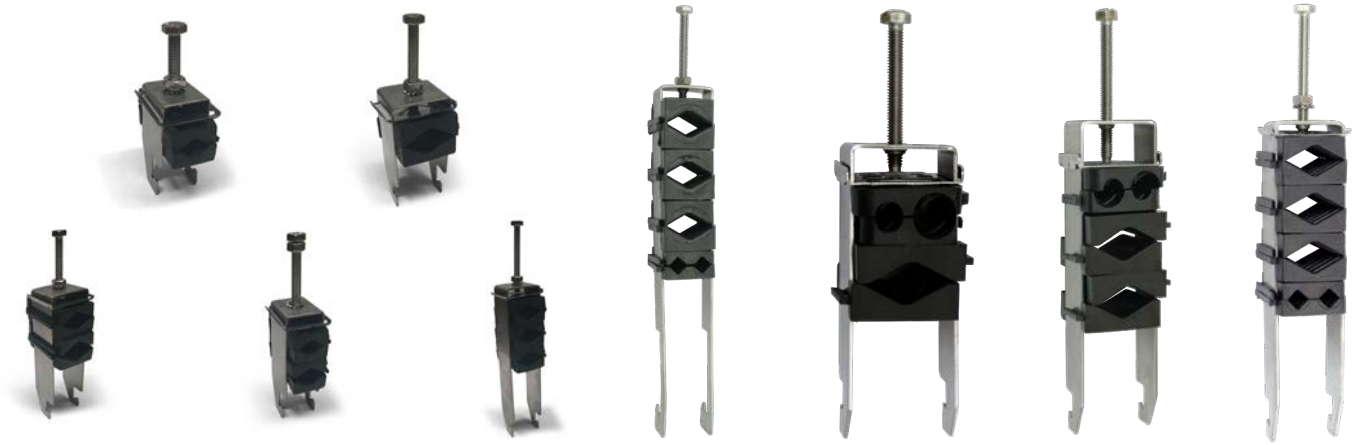
Cable with flexible copper conductors, XLPE insulated, ATS shielded and LSZH outer sheath.

CU/XLPE/ATS/LSZH 2x4 • 2x6 • 2x10
Power Supply Jumpers

- Conductor:
  - Type: Class 5 per IEC 60228
  - Material: Annealed copper
  - Shape: Circular, stranded
- Insulation:
  - Type: XLPE (IEC 60502-1)
  - Core Indentification: Red - White
- Overall Screen:
  - Type: Aluminum tape & tin copper drain wire
- Outer Sheath:
  - Type: LSZH compound (UV resistant)
  - Color: Black

Installation Accessories

Cable Clamps
Cable Accessories



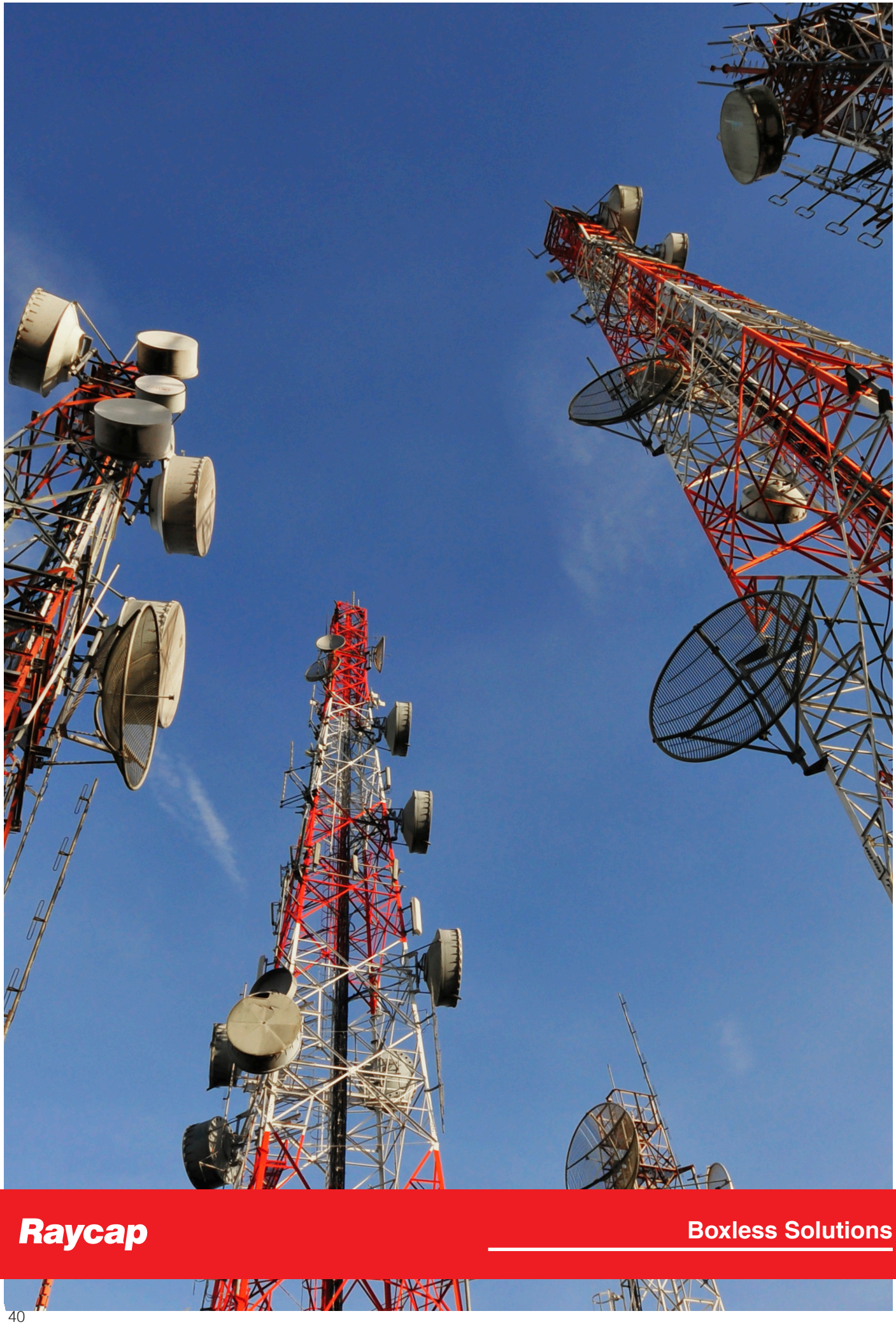
Features

- Cable clamp system for power cables
- Cable clamp system for fiber-optic cables
- Cable clamp system for power and fiber-optic cables
- Made exclusively of ASI 304 stainless steel, cables are held by sized blocks of fiberglass polyamide
- UV resistant
- Temperature range: -35°C to 110°C
- Calibrated saddles for cable safety
- Resistance to temperature changes
- Durable and easy to assemble

Grounding Kit for Power Cables
Cable Accessories

Specifications

- Tinned contact bar
- Sealing butyle
- Tin-plated copper mesh
- Protecting and sealing self-agglomerating silicon tape. Color black on reel
- 16mm^2 copper cable, black PE insulation
- Cable lug Ø10: Tinned copper



Boxless Solutions

Boxless solutions supporting FTTA, PTTA and Hybrid site scenarios.
The rugged canister enables cable breakouts for direct connectivity to the RRH, or through jumpers.

Hybrid Boxless Cable

FR LSZH Sheathed OMC-GY-SM/MM-8/ 12-LCLC-BXLS-xxxM

FR LSZH Sheathed OMC-GY-SM/MM-8/ 12-LCLC-BXLS-E-xxxM

BXLS-TOJ-xx-zzM-NSN

BXLS-TOJ-xx-zzM-HUA

PTTA Boxless Multi-core Cables

Multi-core Cables MPOCU-X-BXLS-X

Hybrid Boxless Cable (Canister)
Boxless Solutions

Hybrid boxless solution ready for installation: both fiber-optic and power cables are lengthed by separated outdoor cables

Features

- Boxless hybrid for up to 6 RRH
- Suitable for outdoor installations
- LSZH
- Connectors:
  RRH side (FO): IP68 FO Industrial Connector
  RRH side (DC): IP68 Power Industrial Connector
  BBU side: Uniboot LC
  PSU side: Blunt-cut

OMC-GY-SM/MM-8/12/24-LCLC-BXLS-xxxM
Boxless Solutions

The multi-core fiber cable is fitted with a rugged canister enabling cable breakout for direct connectivity to RRH or through jumpers.

Features

- Boxless FTTA solution for connectivity of 4, 6,or 12 RRH
- Suitable for outdoor installations
- Dielectric rodent protected
- Low Smoke, Halogen Free (FR LSZH) outer sheath
- Connectors:
  RRH side: IP68 Fiber-optic Industrial Duplex LC Connector
  BBU side: Uniboot LC
- Fiber color code compliant with TIA/EIA598-B
- IK10 canister
- UPO version available upon request

OMC-GY-SM/MM-8/12-LCLC-BXLS-E-xxxM
Boxless Solutions

The multi-core fiber cable is fitted with a rugged canister enabling cable breakout for direct connectivity to RRH or through jumpers.

Features

- Boxless FTTA solution for connectivity of up to 4 or 6 RRHs
- Suitable for outdoor installations
- Dielectric rodent protected
- Low smoke, Halogen Free (FR LSZH) outer sheath
- Connectors:
  RRH side: IP68 Fiber-optic Industrial Duplex LC Connector
  BBU side: Uniboot LC
- UPO connectors upon request
- Fiber color code compliant with TIA/EIA598-B
- IK10 canister
- Connection from bottom (protection)

BXLS-TOJ-xx-zzM-NSN
Boxless Solutions

Suitable for FTTA applications, outdoor installation. The LSZH, UV resistant cable assembly is compatible with the Nokia RRU interfaces.

Features

- 2 optical fibers SM or MM
- Suitable for outdoor use
- LSZH jacket
- UV resistant
- Connectors:
  - Boxless side: IP68 Fiber-optic Industrial Duplex LC Connector
  - RRH side: Uniboot LC Connector

BXLS-TOJ-xx-zzM-HUA
Boxless Solutions

Suitable for FTTA applications outdoor installation. Bendable uniboot connectors are used for maximum flexibility.

Features

- 2 optical fibers SM or MM
- Suitable for outdoor use
- LSZH jacket
- UV resistant
- Flexible uniboot connectors
- Connectors:
  Boxless side: IP68 Fiber-optic Industrial Duplex LC Connector
  RRH side: Bendable uniboot LC

PTTA Boxless Multi-core Cables
Boxless Solutions

PTTA boxless solution ready for installation:
The cables are lengthed by separated outdoor cables and terminated with outdoor connectors.

Features

- Boxless PTTA for 3 or 6 RRH
- Suitable for outdoor installations
- LSZH
- Conductor cross-section: 4, 6, 10 mm^2
- Connectors:
  RRH side: IP68 Industrial Power Connector
  PSU side: Blunt-cut

MPOCU-6x2x4/6/10-BXLS-E-xxxM • MPOCU-3x2x4/6/10/16-BXLS-W-xxxM MPOCU-6x2x4/6/10-BXLS-W-xxxM

The multi-core cable with copper round compacted conductors, XLPE insulation, copper wire shield, LSZH sheath, corrugated steel tape armour.

Features

- Boxless PTTA for 3 or 6 RRH
- Suitable for outdoor installations
- LSZH
- Connection from bottom (Protection)
- Conductor cross-section: 4, 6, 10 mm^2
- Connectors:
  RRH side: IP68 Industrial Power Connector
  PSU side: Blunt-cut

CWDM Solutions

CWDM products for multiplexing a number of RRU on a single optical fiber.

4CH-OADM Module
Fiber-optic Cable Assemblies

Type 1

Type 2

Fully outdoor small footprint OADM solution. Each Add Drop Unit can feed up to 2 radio equipment while providing EXP port for daisy chain or ring configurations.

Features
- Outdoor installations
- Compact design
- ITU-G694.2 compliant
- Low insertion loss

Applications
- CWDM Add-drop
- Small cells
- Ring networks

16-Channel Indoor/Outdoor CWDM Units
FTTA C-RAN Series

Outdoor unit

Indoor unit

The outdoor CWDM Unit can accommodate up to 2 separate 16-channel CWDM modules achieving a maximum capacity of 16 RRUs over a pair of fibers.

Indoor units can accommodate up to three 16-channel modules.

Features
- G.694.2 compliant
- High capacity
- High optical performance, LC/UPC connectors
- Expandable design
- EXP taps available upon request
- Up to 10% monitoring

Applications
- C-RAN passive fronthaul
- Indoor/Outdoor installations

CWDM Boxless Solution

Boxless Solutions

The CWDM unit fits into a rugged canister and accommodates up to 12 CWDM channels.

Features

- Small footprint
- IK10 canister
- G 694.2 compliant
- High optical performance

Applications

- Outdoor Applications
- High Density Tower Installations

Re-Use Solutions

Corrugated re-use enclosures enable using existing RF coaxial cables to power RRH.

RTR-5856/2xMPS-2540-2 • RTR-5856/2xMPS-5924-1 • RTR-5856/2xMPS-1980-1
Cable Management & DC Surge Protection

Features

- Distribution and protection for up to 4 DC circuits
- Supports up to 4 circuit breakers
- Corrugated ⅞” copper cable adapter to DC power cable
- Supports 4 interchangeable options of OVP
- Various mounting options available
- Flexible design fits various corrugated cables

RTH-2874-8DC400-36FO
Fiber Cable Management

Features

- Distribution and protection for up to 12 DC circuits
- Supports up to 12 circuit breakers
- Corrugated ⅞" or 1¼" or copper cable adapter to DC power cable
- Supports 4 interchangeable options of OVP
- Various mounting options available
- Flexible design fits various corrugated cables

Active Equipment

The optical switch connects to Raycap's Splitter Module test ports enabling the remote OTDR/CPRI/OBSAI testing and RF measurements (PIM detection).

Optical Switch

Raycap Fiber-optic Assemblies

Features

- Supports up to 12 RRUs
  (Expandable option available upon request)
- CWDM compliant
- Full port polarity compliance with Raycap Splitter Module P.N.:120-0914
- Ethernet port with definable IP address for remote connection
- User friendly GUI
- High reliability
- Low insertion loss

Applications

- D-RAN/C-RAN fiber link and RF testing
- Remote port selection for CPRI / OBSAI non-disruptive testing and RF over Fiber Measurements
- Simultaneous uplink and downlink monitoring for Layer 2 testing

PowerPlus

PowerPlus is a system that increases the PSU voltage at the base of a cellular site to overcome the voltage drop on the DC power cables that provide power to the transceivers.

PowerPlus 630 • PowerPlus 380

Power Transmission

PowerPlus System for 3 Independent DC Circuits

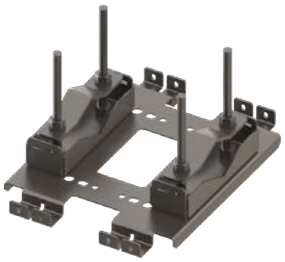
Features

- Eliminates the need to install larger cross-section conductors for long runs of DC cables
- Increased energy efficiency in case of high power RRH/AAS installation
- Prolongs battery lifetime in case of utility power outages
- Future proof concept with minimum site modifications. No need to install additional cables
- Fail-safe and risk free solution

Mounting Solutions

All products ship with standard, easy-to-install mounting brackets. Optional brackets designed to fit any installation scenario are supplied upon request.

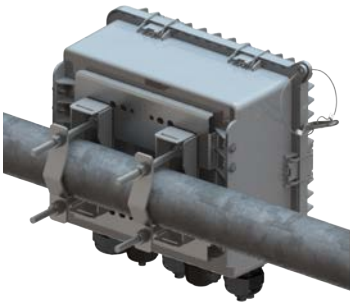
Custom designed bracket for a large radio OEM shows the Raycap connectivity and protection solution mounted directly to the radio.



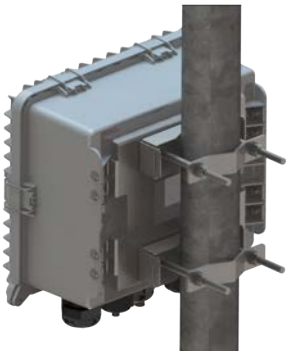
FTTA Boxless (Bracket Mounted)

Hybrid Boxless (Bracket Mounted)

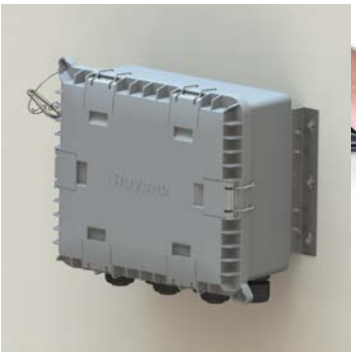
PTTA Boxless (Pole Strap Mounted)*



Horizontal Mount



Vertical Mount



Wall-Mount

Vertical or Horizontal Boxless

**Brackets available for all boxless solutions.*

Lightning & Overvoltage Protection Options

Surge Protection Strategy

Depending on local conditions and design considerations, RRH and BBU systems can require increased electrical protection, for instance in locations with higher lightning activity. Raycap's reliable lightning and Overvoltage Protection (OVP) solutions for FTTA/PTTA have been designed specifically for this application in order to guarantee the reliability of the active equipment.

Raycap offers enclosure designs where modular, pluggable, maintenance-free lightning protection based on its innovative Strikesorb Surge Protection Technology (SPD) technology can be implemented as an option at any time without requiring any re-wiring.

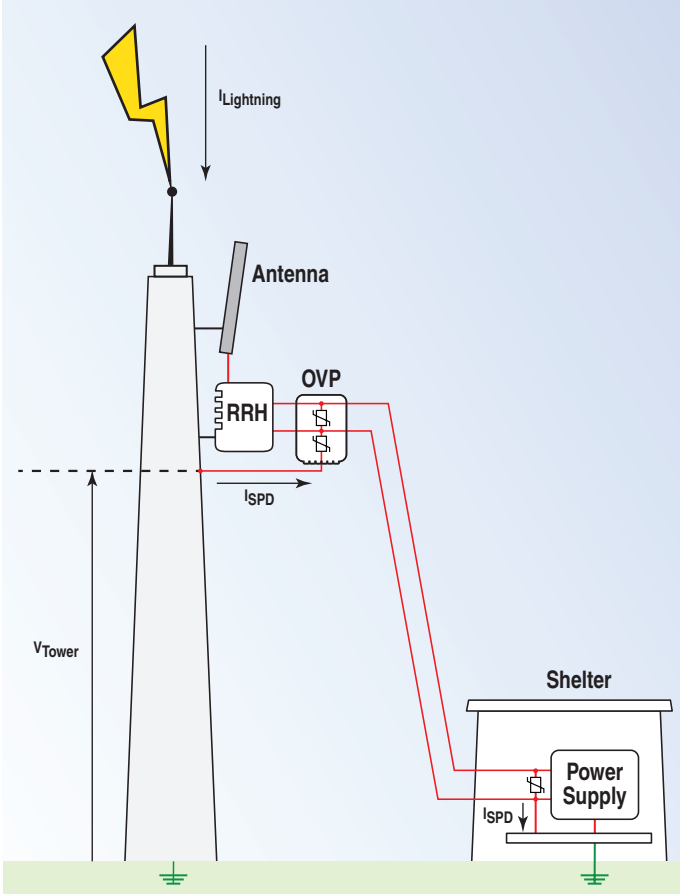
Strikesorb OVPs are available as IEC Class I or Class II surge protective ratings, and do not deploy any fuse or thermal disconnects, which are the cause of frequent failures in the field.

Strikesorb configurable OVP options for FTTA/PTTA architectures enhance flexibility and scalability in the network. Pluggable modules are available in three interchangeable options:

Surge Protective Device (SPD) per IEC 61643-11	Nominal Discharge Current [I_n] per IEC 61643-11 for Class II	Impulse Discharge Current [I_{imp}] per IEC 61643-11 for Class I
Class II	20 kA (8/20)	-
Class I	-	5 kA (10/350)
Class I	-	12.5 kA (10/350)

The need for Surge Protection

In Remote Radio Head (RRH) architectures, the remote radios are vulnerable to damage caused by lightning as lightning rods will not protect the sensitive electrical systems including RRH, Baseband Unit (BBU), and Power Supply Unit (PSU) from lightning surge damage. Because the DC power cables will act as conduits, the surge will be brought right to the equipment. Without adequate overvoltage protection, failures due to overvoltages can require costly equipment replacement and expert labour intervention. Furthermore, until equipment is repaired, operators in cur revenue loss from downtime periods.



While lightning rods direct the lightning currents down the tower and to the ground, the DC cabling that runs up and down the tower and connects the radios to the power source acts as a direct conduit, bringing the lightning current directly into the equipment.

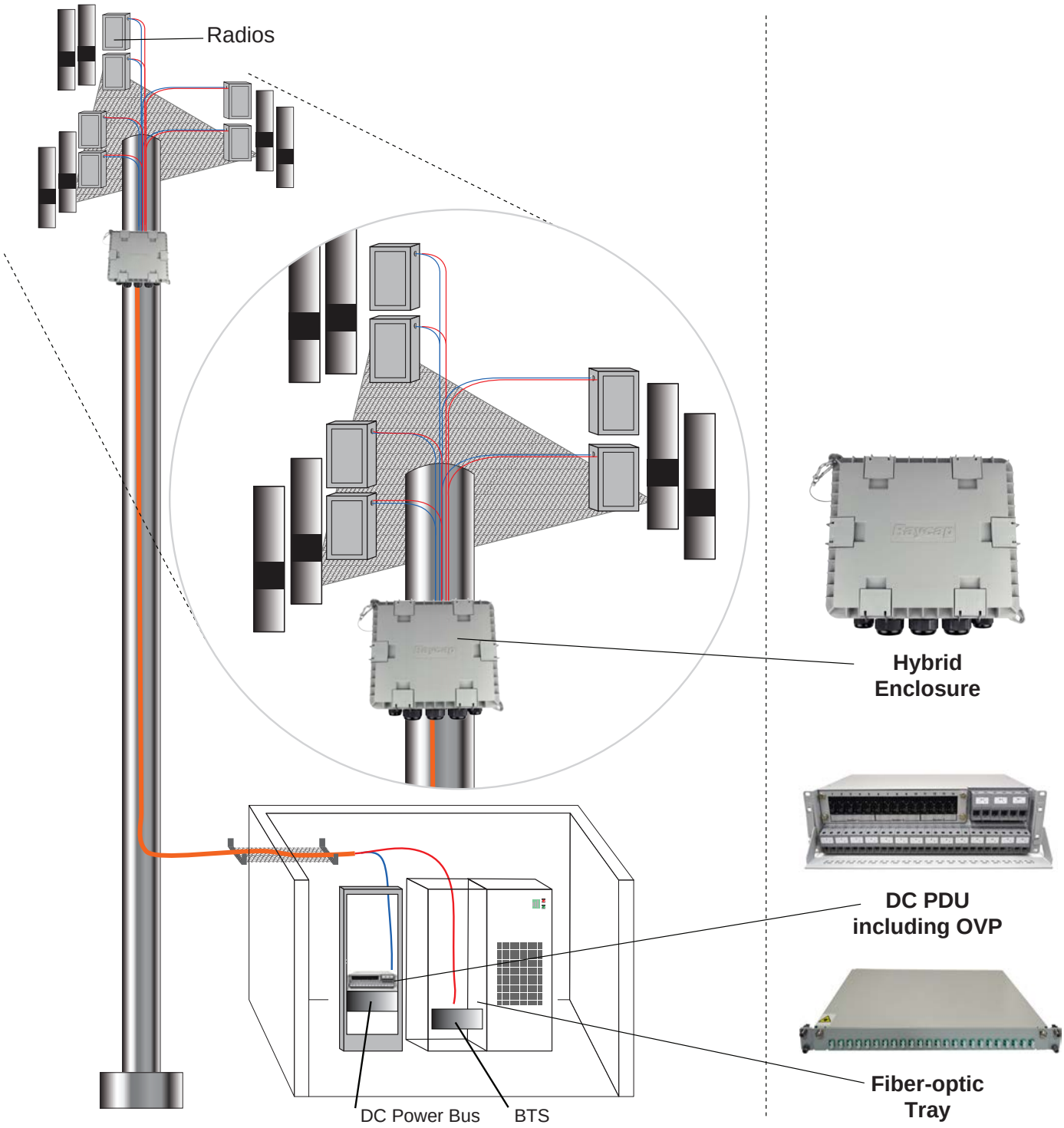
Without the proper surge protective devices installed at critical points, the remote radio head equipment is at high risk of catastrophic failure.

Raycap advocates that connectivity solutions always provide surge protection engineered for safe use in 48 V DC power systems, and be capable of withstanding repeated lightning impulses while providing continuous protection of both the RRH and BBU equipment. Especially for the tower and rooftop applications, the Surge Protective Devices (SPD) utilized within connectivity solutions should be appropriately certified to withstand lightning currents that are very likely to occur during lightning strikes and that have the capacity to seriously damage the equipment.

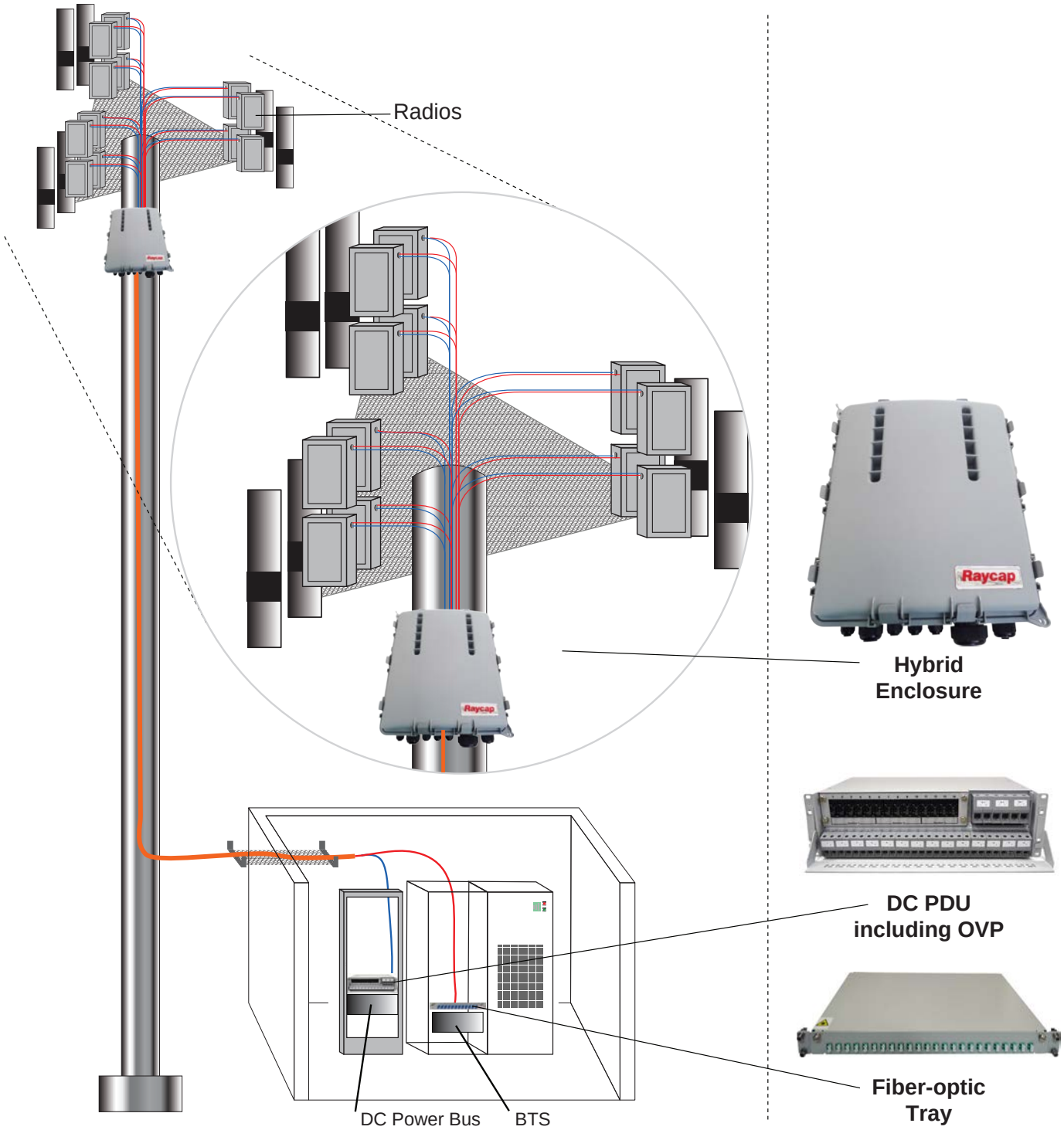
The IEC 61643-11 standard “Surge Protective Devices Connected to Low-voltage Power Distribution Systems – Requirements and Tests” defines the testing procedures a SPD needs to go through in order to be classified as a Class I or Class II device suitable for installation in locations where direct or indirect lightning currents may occur. Moreover, the SPDs employed should guarantee a protection level (UP) (as defined by the IEC 61643-11 standard) of no more than 400 V in order to be compatible with the low operating voltage of the sensitive electronics in the remote radio units. Protection solutions should be able to accommodate either Class I or Class II SPDs in a flexible, interchangeable, and future-proof manner.

Adding new bands or sectors on a site should not require time consuming rewiring in order to minimize labour; instead “pluggable” and upgradable protection solutions should be preferred. In addition, the operational safety of SPDs must be considered. Specifically, SPDs protecting equipment atop towers or buildings should not include thermal disconnects or internal fuses in order to prevent frequent failures and unnecessary maintenance. Finally, because of the DC nature of the application, some of the traditional techniques used to provide surge protection in low-voltage AC circuits (such as spark gaps) may not be appropriate for installations in low voltage DC power-fed systems of an RRH installation.

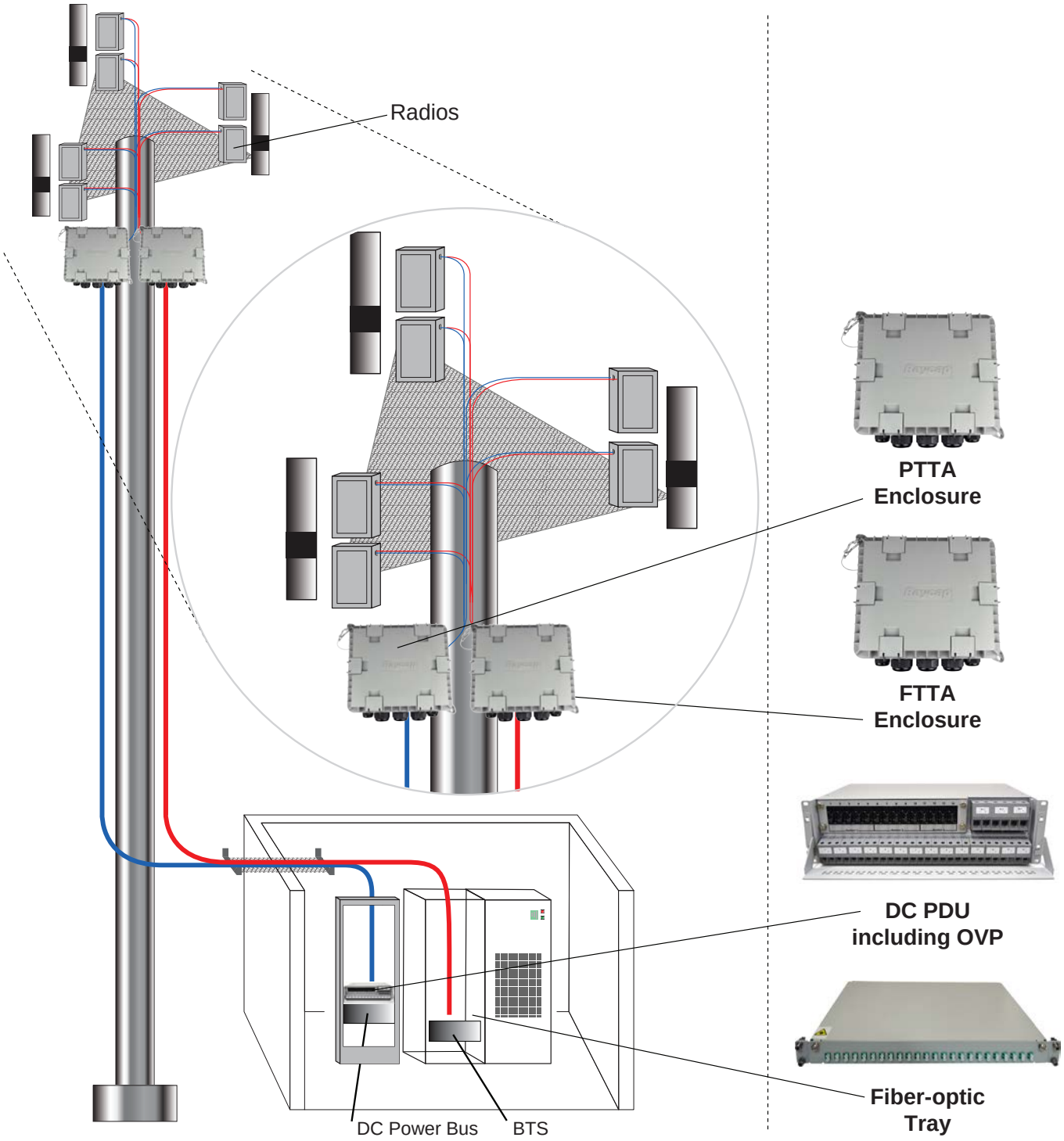
Hybrid Enclosure, up to 6 RRH
(Hybrid cable or power/fiber trunk cables can be used)



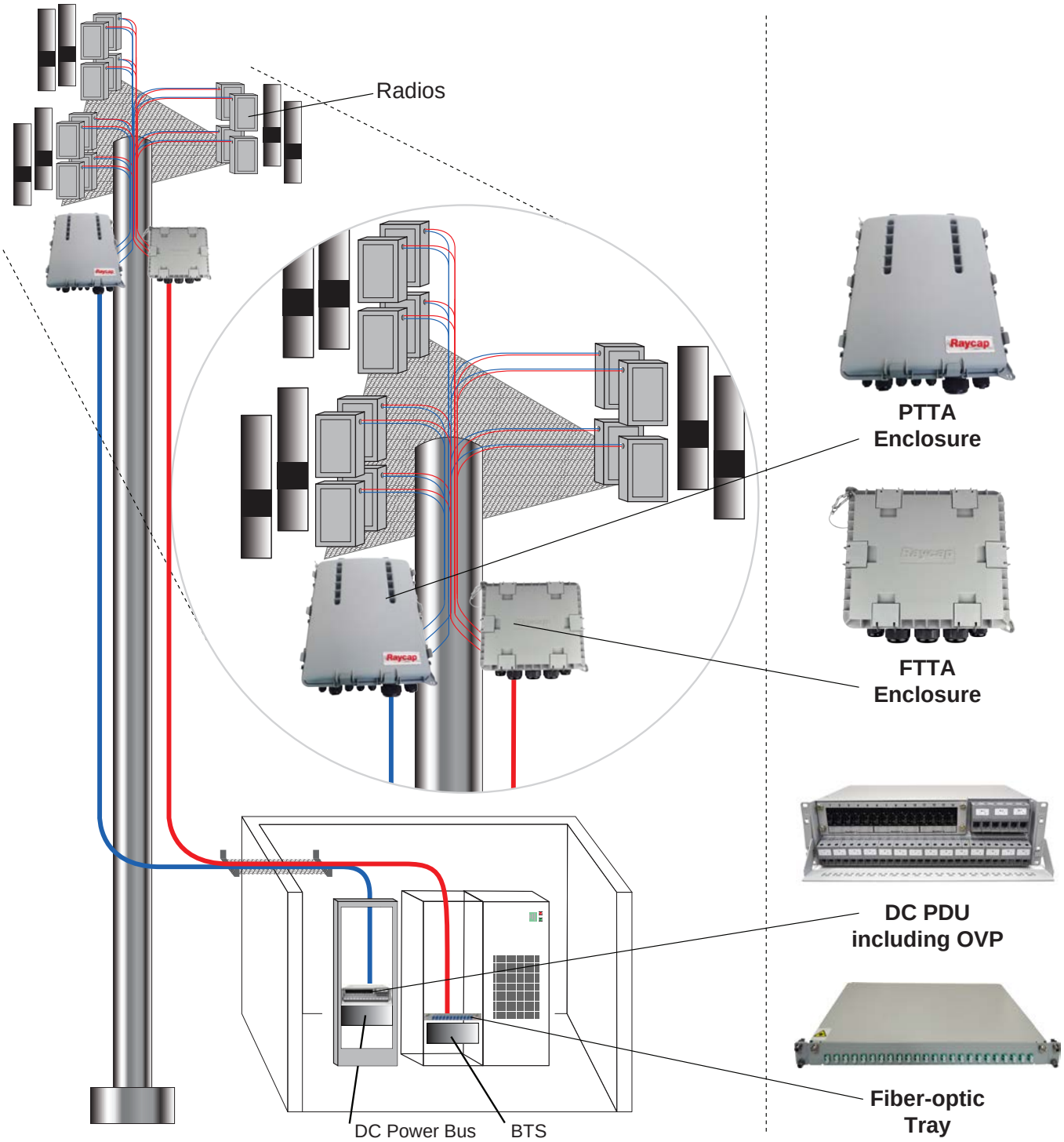
Hybrid Enclosure, up to 12 RRH
(Hybrid cable or power/fiber trunk cables can be used)



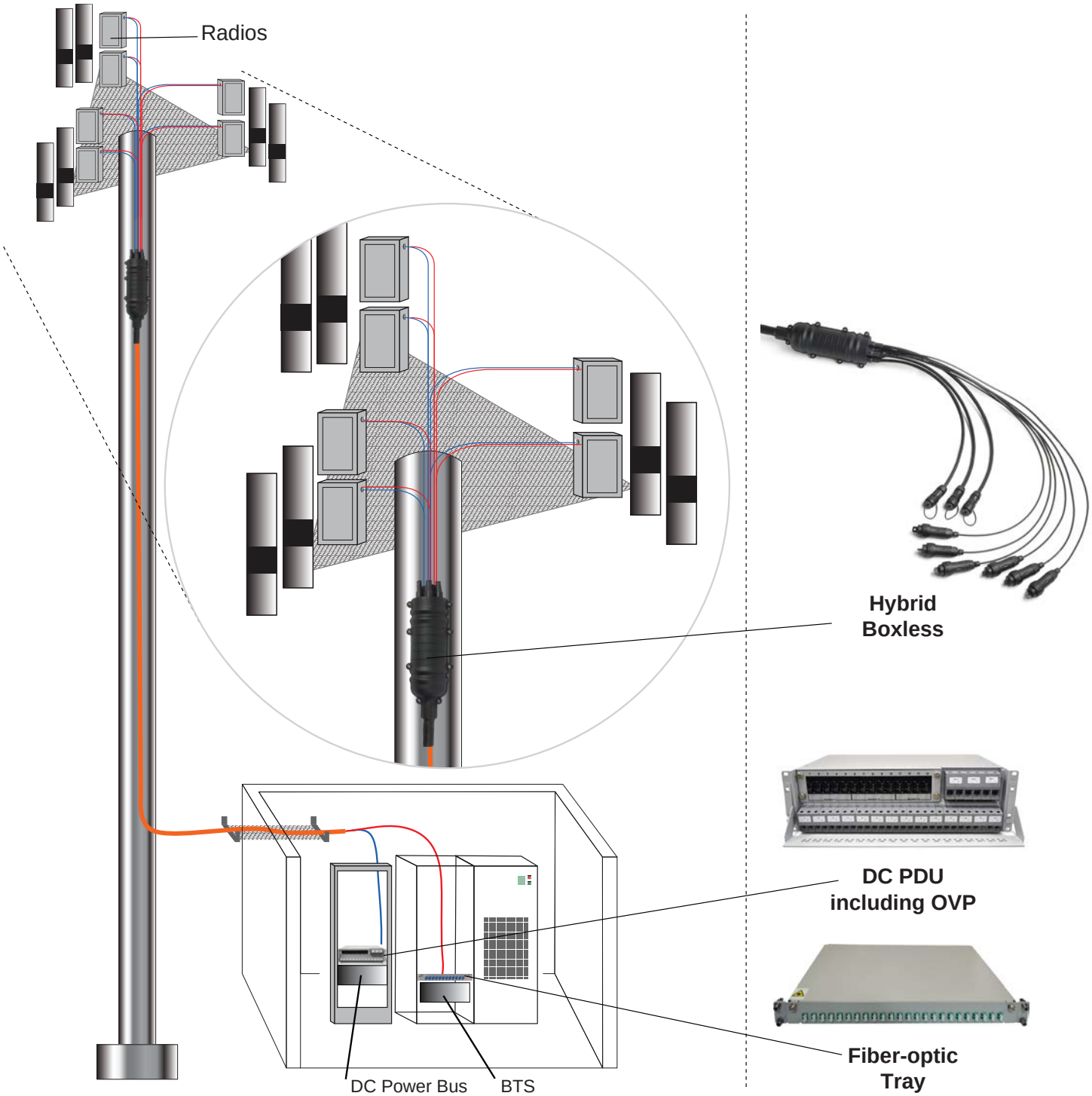
Separate FTTA & PTTA enclosures, up to 6 RRH (separate power/fiber trunk cables)



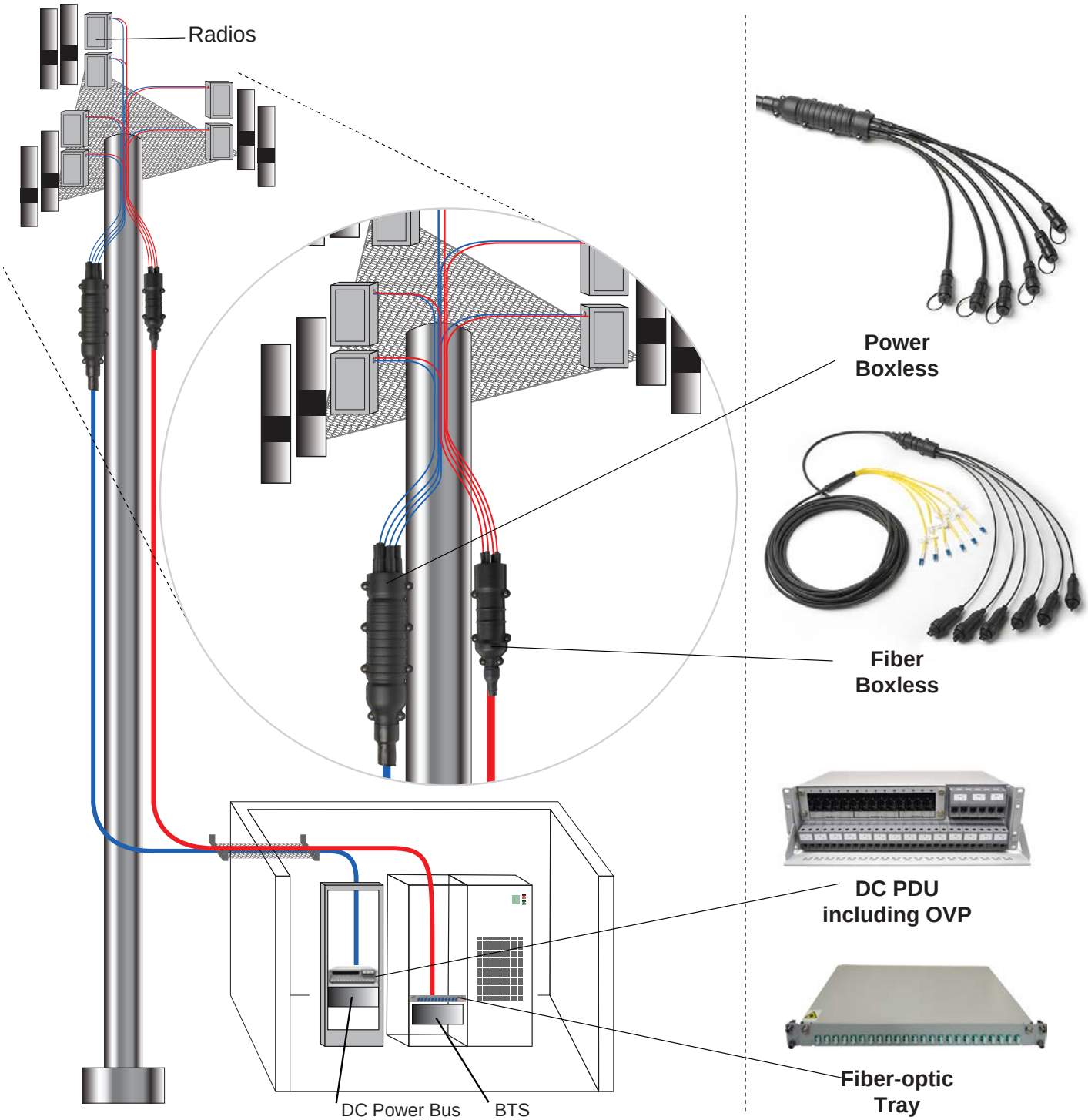
Separate FTTA & PTTA enclosures, up to 12 RRH (separate power/fiber trunk cables)



Hybrid boxless solution, up to 6 RRH (hybrid main cable)



Separate FTTA & PTTA boxless solutions, up to 6 RRH (separate power/fiber trunk cables)



Raycap Worldwide Locations

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Post Falls, ID 83854
United States of America

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North Charleston, SC 29420
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15124 Maroussi Athens
Greece

Raycap S.A. Manufacturing
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66100 Drama
Greece

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1218 Komenda
Slovenia

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2540 Nicosia
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