Prysmian Group

Mobile Solutions
Supporting the global growth of 4G and 5G

Prysmian   **General Cable**   **Draka**

Linking communities to the new digital world

The world is in the midst of a data explosion.

Living and working digitally is the new normal. And for network operators, this means managing a near-exponential increase in bandwidth. Modern day networks must provide robust physical infrastructure, trusted IT security and long-term reliability in order to meet global rising demand.

At Prysmian, we've been refining our technical expertise for more than 140 years. It's why we're the market leader and telecommunications industry's trusted partner of choice.

Our global presence and expert regional knowledge, mean we're uniquely placed to support the needs of every customer: from manufacturing high-performance and cost-effective data cables within tight lead times, to offering specialised network solutions which enable high-speed connectivity in the core network, within data centres, or at the edge. And of course, our proprietary optical fibre technology sets us apart from our competitors.

All our products and services are tailored to help customers and partners become more innovative and competitive, and deliver the connected buildings, advanced IoT networks and smart factories of tomorrow.

Contents

Overview

5G is spreading. Rapidly. And usage is predicted to rise exponentially in the coming years.

In North America, forecasted 5G adoption rates are set to sharply increase, from 20% in 2021 to 90% in 2027.

Equally, in Northeast Asia, Western Europe and the Gulf Cooperation Council, 5G adoption rates will also grow: to 72%, 83% and 80% respectively.

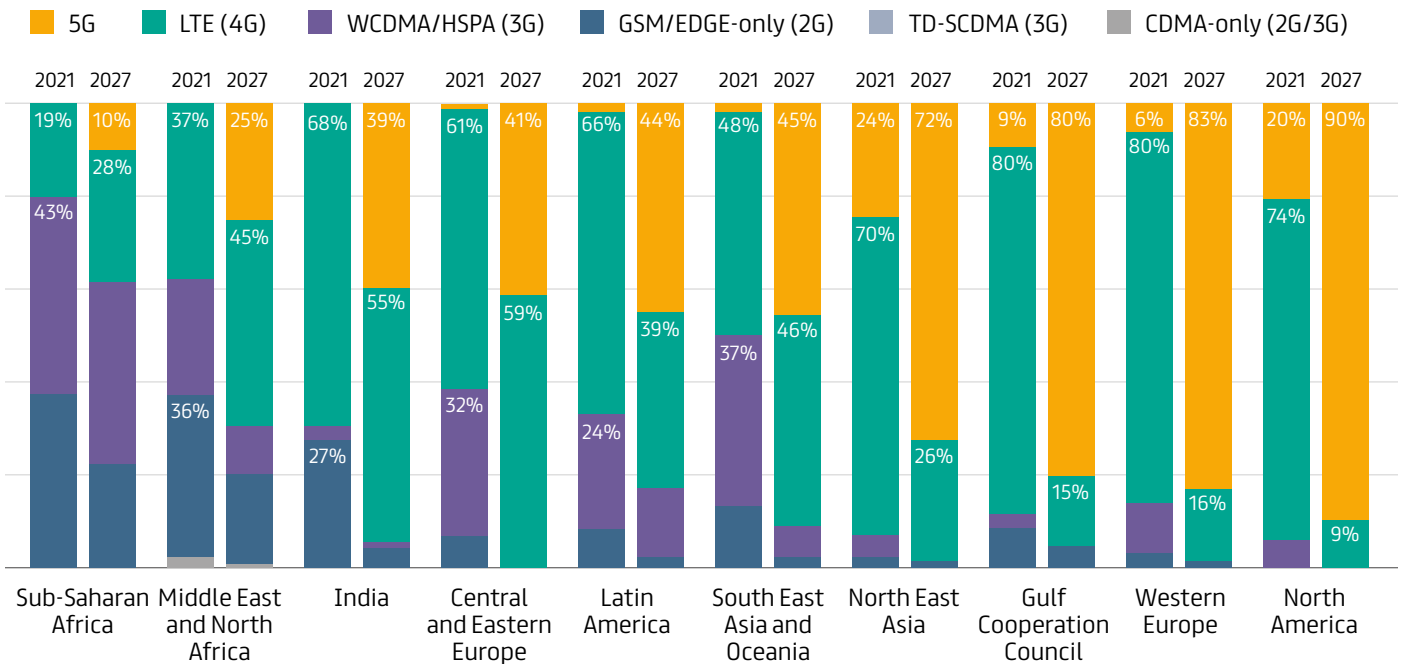**Making 5G the fastest adopted mobile technology ever.**

Legend: 5G | LTE (4G) | WCDMA/HSPA (3G) | GSM/EDGE-only (2G) | TD-SCDMA (3G) | CDMA-only (2G/3G)

Region	Year	5G	LTE (4G)	WCDMA/HSPA (3G)	GSM/EDGE-only (2G)
Sub-Saharan Africa	2021		19%	43%	
Sub-Saharan Africa	2027	10%	28%		
Middle East and North Africa	2021		37%	36%	
Middle East and North Africa	2027	25%	45%		
India	2021		68%		27%
India	2027	39%	55%		
Central and Eastern Europe	2021		61%	32%	
Central and Eastern Europe	2027	41%	59%		
Latin America	2021		66%		24%
Latin America	2027	44%	39%		
South East Asia and Oceania	2021		48%	37%	
South East Asia and Oceania	2027	45%	46%		
North East Asia	2021	24%	70%		
North East Asia	2027	72%	26%		
Gulf Cooperation Council	2021	9%	80%		
Gulf Cooperation Council	2027	80%	15%		
Western Europe	2021	6%	80%		
Western Europe	2027	83%	16%		
North America	2021	20%	74%		
North America	2027	90%	9%		

Figure 1: Current and forecasted global mobile subscription penetration rates by region and technology (%)
Statistics from: Ericsson Mobility Report, 2021.

(Note that only North America will likely eliminate 3G entirely, leveraging only 4G and 5G by 2026.)

In other parts of the world 4G will still play a huge role, remaining the main broadband mobile technology.

There will be a few challenges to the Radio Access Network (RAN) as a result of supporting this fast-paced growth in both 5G and 4G, namely:

- **Network densification at both macro and micro level**
  New sites will be added to support the high throughput demand of 5G applications at both sub-6 GHz and MM wave.

- **Site densification increase**
  More radios will be installed on existing sites, increasing the demand for faster backhauling and power requirements.

- **More complex radio configurations**
  Radios will require more power because of carrier aggregation and high order Multiple Input, Multiple Output (MIMO).

As a result, in order to reduce tower space and save installation costs, radio sites will dramatically change their use of multi-core power, fibre and hybrid cables, and breakout enclosures.

> **To serve this purpose, we've put together a detailed catalogue, helping customers to explore our comprehensive range of products and services, specifically engineered to help create more efficient radio sites of the future.**

▮ 5G	▮ LTE (4G)	▮ WCDMA/HSPA (3G)
▮ GSM/EDGE-only (2G)	▮ TD-SCDMA (3G)	▮ CDMA-only (2G/3G)

An introduction to Fibre-to-the-Antenna (FTTA)

The increasing demand for bandwidth and the evolution of mobile networks have pushed Mobile Network Operators (MNOs) and network vendors to solve architectural challenges that improve performance, reduce installation time and simplify site complexity.

Fibre-to-the-Antenna (FTTA) was introduced to reduce the structural bottlenecks of traditional coaxial-based systems, by disaggregating the remote radio head unit (RRH), and the baseband unit (BBU) interconnected by means of a fibre. Furthermore, the RRH is powered by a dedicated DC power line (see Figure 2).
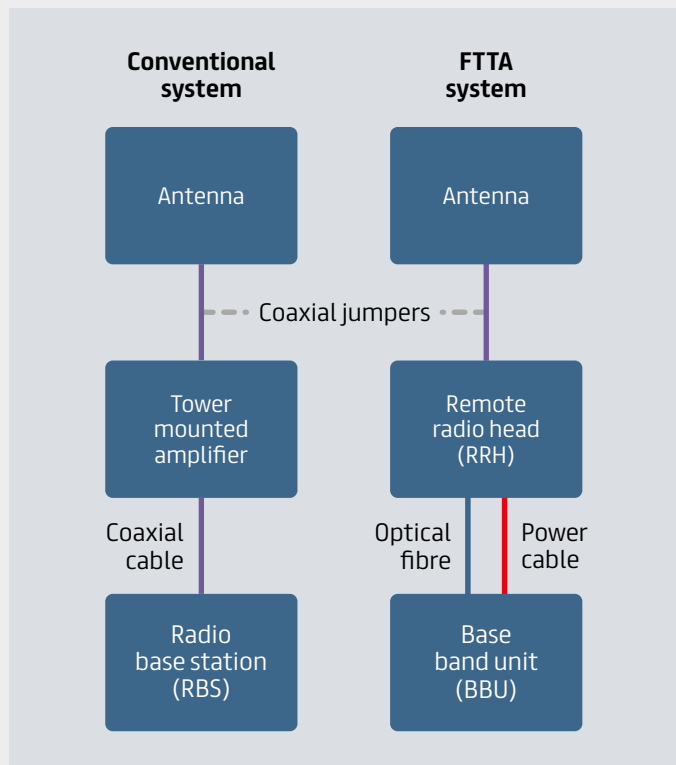

Figure 2: Conventional system design vs FTTA system

An RRH closer to the antenna is more beneficial than conventional coaxial-based systems.

- **Reduced signal loss**
  The higher frequencies introduced with 4G would produce unsustainable losses on the coaxial cables. But with the utilisation of fibre and the digitalisation of the signal between BBU and RRH, losses are eliminated. Any RF losses now only occur on the RF jumper, between the RRH and the antenna.

- **Less space required and ease of deployment**
  Fibre can feed many RRHs by means of a tiny cable (in comparison to the coaxial counterpart), saving tower space, reducing carried weight, and making installation easier.

- **Decrease of electrical power requirements**
  The repositioning of the power amplifiers from the base station to the RRH allows the use of 48V DC.

- **Moving from D-RAN to C-RAN**
  The RRH and BBU can be spaced apart – up to a few tens of kilometers – by centralising the BBU in a single point; eliminating local battery backup and leveraging on economy of scale for easier conditioning and power supply.

As a global leader in providing cabling solutions, Prysmian Group has a wide range of off-the-shelf and custom-made cables and connectivity solutions for FTTA applications.

Anatomy of FTTA architecture

Coaxial RF jumper

RRH   RRH

Jumper cables

FTTA box

FTTA breakout /enclosure

Riser cable
- Power cable
- Fibre cable
- Hybrid cable

BBU

Distribution rack
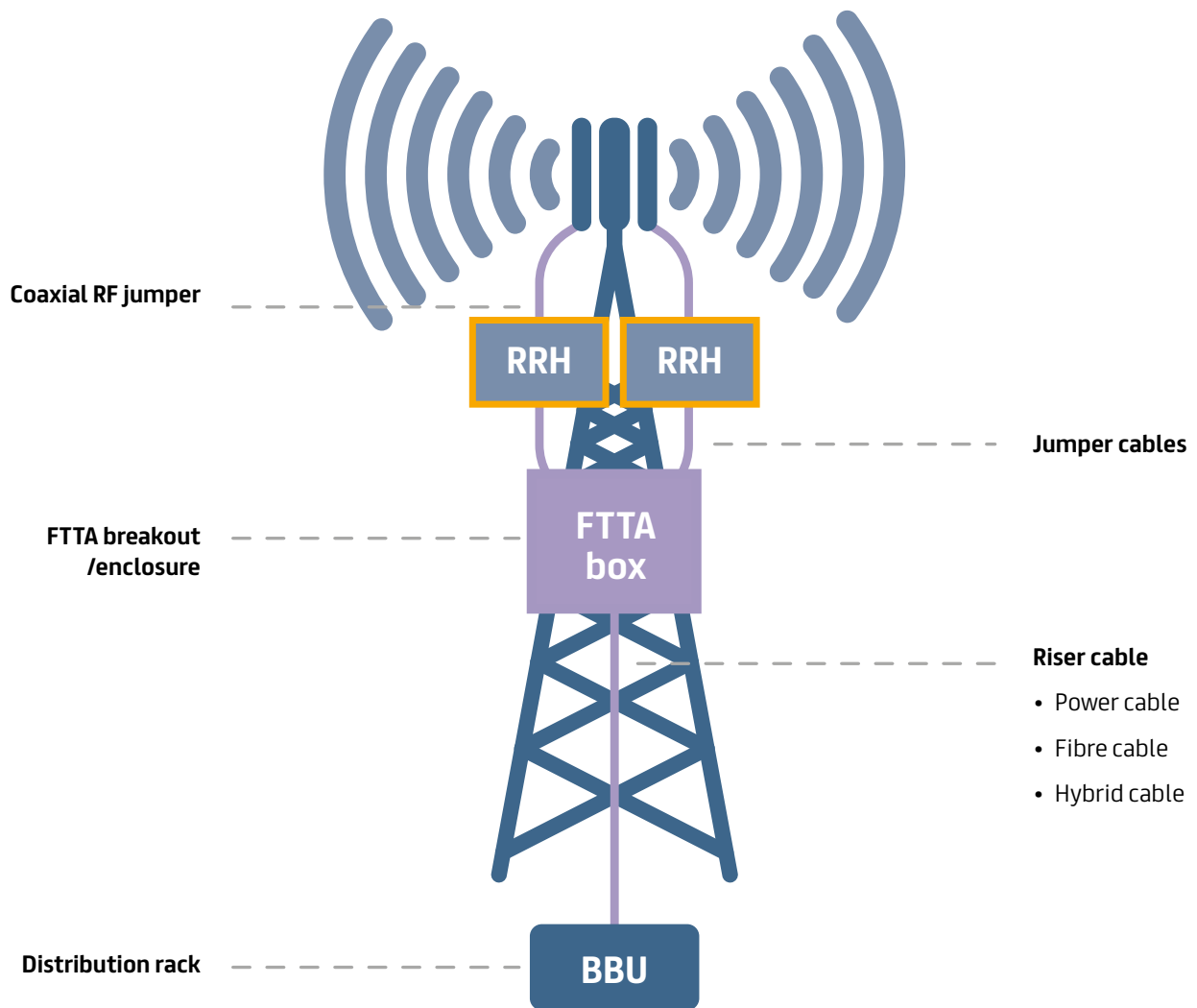
The main components of an FTTA system

- **Antenna:** A passive piece of equipment that transmits and receives radio waves through the air.

- **Coaxial RF jumper:** Guides the analogue RF signal from the RRH to the antenna, and vice versa.

- **Remote radio head unit:** The component responsible for processing, converting, filtering, and amplifying the signal from/to the BBU.

- **Jumper cables:** Also called drop cables, they connect the FTTA enclosure with the RRH.

- **FTTA enclosure:** Or 'distribution box'. It splits the incoming riser cable into power/fibre to each individual RRH.

- **Riser cable:** Contains power and/or fibre from the BBU up to the distribution box.

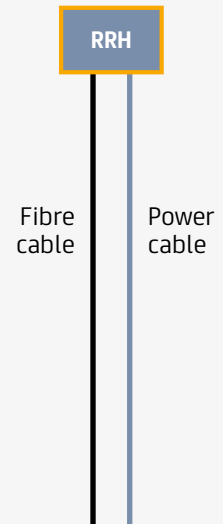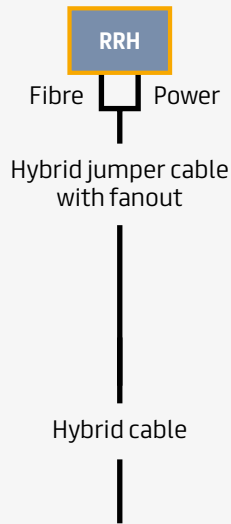- **Baseband unit:** The device that processes baseband signals.

Multiple radio

Prysmian's enclosure solutions offer greater flexibility and independence from vendors.
The derivation point is closer to the RRH, allowing easier radio upgrading or replacement.

	Full Hybrid	Combined	Discrete	
			Power only	**Fibre only**

Full Hybrid
RRH #1 — Hybrid jumper — RRH #N — Hybrid jumper → Hybrid enclosure → Hybrid cable

Combined
RRH #1 — Fibre jumper / Power jumper — RRH #N — Fibre jumper / Power jumper → Hybrid enclosure → Hybrid cable

Discrete – Power only
RRH #1 — Power jumper — RRH #N — Power jumper → Power-only enclosure → Power cable

Discrete – Fibre only
RRH #1 — Fibre jumper — RRH #N — Fibre jumper → Fibre-only enclosure → Fibre cable

	Full Hybrid	Combined	Discrete
Speed of deployment	✔✔✔✔✔	✔✔✔✔✔	✔✔✔✔✔
Scalability	✔✔✔✔✔	✔✔✔✔✔	✔✔✔✔✔
Vendor independence	✔✔✔✔✔	✔✔✔✔✔	✔✔✔✔✔
Spatial occupancy	✔✔✔✔✔	✔✔✔✔✔	✔✔✔✔✔

This direct link solution brings high speed of deployment.

Fibre + power	Single hybrid	Single discrete

RRH #1 RRH #N

Power jumper
Fibre jumper
Fibre jumper
Power jumper

Hybrid enclosure

Power cable
Fibre cable

RRH

Fibre Power

Hybrid jumper cable with fanout

Hybrid cable

RRH

Fibre cable
Power cable
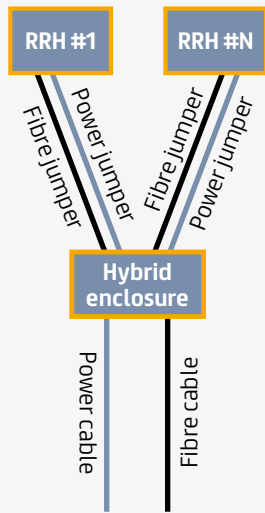
FTTA Breakout – Multiple RRHs

F-Series

HYBRID   **FIBRE ONLY**   **POWER ONLY**   **COMBINED**

The F-Series Box is a wall/pole-mounted FTTA enclosure designed for external use, with a fibre patch panel and/or a DIN rail for power terminals.

The F-Series Box can handle fibre-only, power-only or hybrid cables and can be preconfigured to customer specifications with a range of different inputs and outputs.

Features

- Multiple configurations available
- Quick and easy access
- Ruggedised outdoor design

Technical details

Dimensions	345 × 272 × 105 mm
Max riser cable entry diameter	28 mm
Max number of RRHs	6 hybrid/power, 12 fibre only
Default copper wire cross-section	10 mm^2
Water resistance	IP66
UV protection	High
Operating temperature	-40 °C to +75 °C

FE-Series

The FE-Series enclosure extends the F-Series capacity, enabling the connection of more RRHs.

Technical details

Dimensions	345 × 272 × 135 mm
Max riser cable entry diameter	40 mm
Max number of RRHs	9 hybrid/power, 18 fibre
Default copper wire cross-section	10 mm^2
Water resistance	IP68
UV protection	High
Operating temperature	-40 °C to +75°C

T-Series

HYBRID

The T-Series FTTA Hybrid Junction Box is an aerial enclosure designed to take a single incoming pre-terminated hybrid cable and redistribute fibre and copper to four hybrid RRH jumper cables.

The box is preconfigured and ready to be connected. It also comes with a pole-mounting kit or wall-mounting bracket, for easy and secure mounting.

Features

- 'Plug and play' hybrid design
- Pre-configured internal circuit
- Patented, compact, and lightweight closure

Technical details

Dimensions	377 × 165 × 140 mm
Max riser cable entry diameter	28 mm
Max number of RRHs	4
Default copper wire cross-section	10 mm^2
Water resistance	IP66
UV protection	High
Operating temperature	-40 ^{o}C to +75 ^{o}C
Type of fibre connectors	MPO/MTP
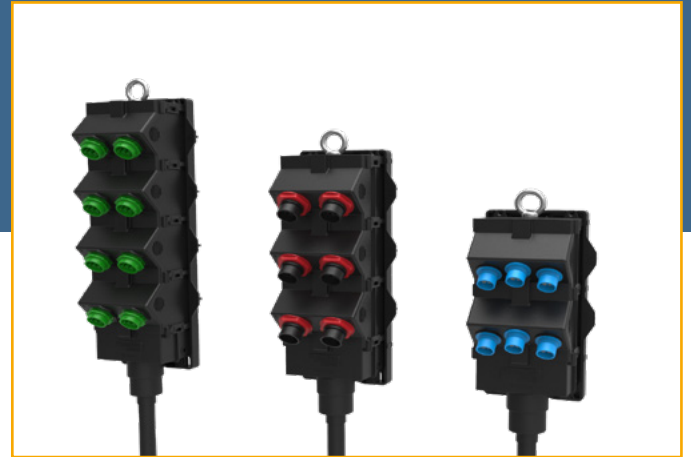
M-Series

HYBRID **FIBRE ONLY** **POWER ONLY** **COMBINED**

The M-Series FTTA Junction Box is an aerial enclosure designed to take a single incoming cable and redistribute the fibres and/or power to multiple RRH non-proprietary jumper cable connectors. Its modular design means the number and type of output connectors used can vary. The box is preconfigured to customer specifications, ready for fibre-only, power-only or hybrid configurations.

The M-Series also comes with a pole-mounting kit or wall-mounting bracket which allow easy and secure mounting to a mast, pole, or wall. The box design and installation method save valuable time when compared with solutions that provide cables separate to the box, thus requiring manual routing.

Features

- Non-proprietary and off-the-shelf jumper connectors
- Modular patented design
- Riser cable pre-connectorised and pre-mapped into the outside connectors
- Multiple configurations possible at a reduced cost
- Preconfigured and ready for external connections

Technical details

Dimensions	400 × 150 × 80 mm – 4 modules
Max riser cable entry diameter	28 mm
Max number of RRHs	15 fibre only, 10 power/hybrid
Default copper wire cross-section	10 mm^2
Water resistance	IP68
UV protection	High
Operating temperature	-40 ^{o}C to +75 ^{o}C
Output connectors	Any off-the-shelf non-proprietary connector

CasaLink Block Terminal (CBT)

FIBRE ONLY

The CasaLink Block Terminal (CBT) is a pre-connectorised fibre-only closure, designed for external use.

The closure comes in three sizes: 4,8 and 12 output ports. It is supplied with a pre-installed and pre-terminated cable of customer required length. (The closure is supplied sealed so the internal workings cannot be altered.)

Features

• Riser drop pre-connectorised onto the output fibre adapters

• Compact and minimal fibre-specific design

• Quick and easy access

Technical details

Dimensions	**12f** – 176 × 178 × 129 mm
	8f – 176 × 134 × 129 mm
	4f – 176 × 134 × 92 mm
Max riser cable entry diameter	6 mm
Max number of RRHs	12
Water resistance	IP68
UV protection	High
Operating temperature	-40 ºC to +75 ºC
Type of output connectors	Dual LC with Prysmian connector

C-Series Hybrid FTTA Breakout Unit

HYBRID **FIBRE ONLY** **POWER ONLY**

The C-Series unit is an FTTA special custom-made breakout for the Australian market, with specific bird-proof conduits.

It can receive a single incoming cable that is then redistributed to up to three output tails. The breakout unit is preconfigured to customer specifications, ready for fibre-only, power-only or hybrid external connections.

Features

• Multiple configurations available

• 'Plug and play' system

• Ultra-compact design

• Bird-proof conduits

Technical details

Dimensions	100 × 150 mm
Max riser cable entry diameter	16 mm
Max number of RRHs	3
Water resistance	IP68
UV protection	High
Operating temperature	-40 ºC to +60 ºC
Type of output connectors	SC/LC/MPO, hybrid, power

Australian market tailor-made design

Overview of our site solutions

|	Multiple radio				
	Fully hybrid	**Combined**	**Discrete solution**		
			Power only	**Fibre only**	**Fibre + power**
F-Series	✓	✓	✓	✓	✓
M-Series	✓	✓	✓	✓	
T-Series	✓				
CBT				✓	

**A single radio direct link can be performed with our pre-connectorised direct
drop solution, available for a selection of multiple fibre, power, and hybrid cables.**

Cables for FTTA applications*

Mobile networks require increasing power and fibre count per site, especially with the switch to 5G technology. Prysmian has the experience and the know-how to provide high-quality cabling solutions that meet future demands.

* Depending on the requirements we can also provide other cable designs and features, tailored to customer needs.

Here are some design examples of fibre, power, and hybrid cables for FTTA applications.
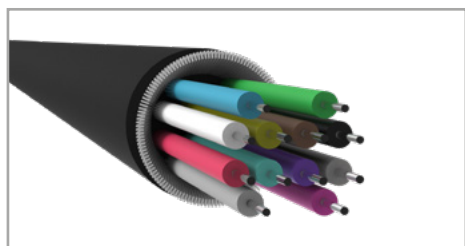
Universal Distribution Cable

Eca **CPR**

Indoor/outdoor, distribution or mini breakout cable with TB9 tight buffer, up to 24 fibres, glass yarns and FireBur® sheath.

This distribution or mini breakout cable can be used for many indoor and outdoor applications, and is specifically appropriate for FTTA, either pre-connectorised as a direct connection to the RRH or through a distribution box. This cable is longitudinally water blocked. It has glass yarn dielectric armouring for rodent resistance.

The cable features a UV stabilised, water and moisture resistant FireBur® LSOH sheathing, so it is extremely well suited for outdoor runs.

Technical details

Fibre	2–24 TB9 tightly buffered fibres 900 um (also available with loose tube)
Fibre type**	**SM fibres:** BendBrightXS G.657.A2 **MM fibres:** MaxCap-BendBright-OM4
Nominal diameter	5 to 7.5 mm
Nominal weight	32 to 63 kg/km
Tensile strength*	2400 N
Minimum bending radius	50 to 75 mm
Operation temp. range*	-40 °C to +70 °C
UV resistance	High
Water penetration*	F5C
CPR rating	Eca

* according to IEC60794 part 1-21/22
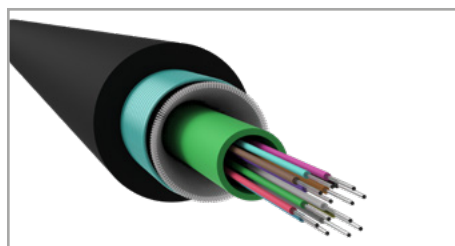
Universal Central Tube Armoured Gel-Filled Cable

B2ca **CPR**   **C**ca **CPR**   **D**ca **CPR**   **E**ca **CPR**

Indoor/outdoor, class B2ca-s1a-d1-a1, gel-filled, water-blocked central tube cable, up to 24 fibres, glass yarn, steel tape armouring and FireRes® sheath.

This cable can be used for indoor/outdoor telecom connections, and it is especially well suited for FTTA solutions, either pre-connectorised as a direct connection to the RRH or through a distribution box.

It is a CPR Class B2ca cable with very high flame-retardant performance (FireRes® sheathing). The cable with corrugated steel tape armouring is rodent proof.

Technical details

Fibre	2.8 mm diameter gel-filled loose tube with 2 –24 fibres
Fibre type**	**SM fibres:** BendBrightXS G.657.A2 **MM fibres:** MaxCap-BendBright-OM4
Armouring	0.15 mm corrugated steel tape
Nominal diameter	8.5 mm
Nominal weight	100 kg/km
Tensile strength*	3000 N
Minimum bending radius	85 mm
Operation temp. range*	-40 °C to +75 °C
UV resistance	Medium/high
Water penetration*	F5C
CPR rating	B2ca

Power Cable

Available in many designs, including pre-connectorised, varying lengths, and any connector.
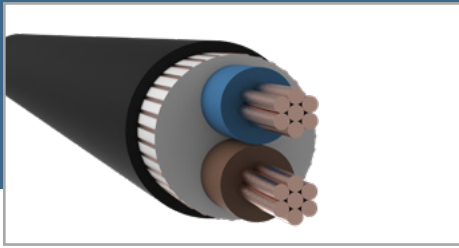
Power Cable FTTA (2, 4 or 6 Core)

B2ca CPR **Cca CPR** **Dca CPR** **Eca CPR**

This power supply and direct drop cable, suitable for outdoor or indoor installation, presents a highly flexible design with 2, 4 or 6 copper elements, and a conductor dimension up to 35 mm^2. It is well suited for FTTA applications that provide power to RRHs.

Technical details

|	
Outer sheath	Halogen-free compound
Screen	Concentric copper wires
Insulation	PEX (resistant to sunlight) =XLPE
Conductor	Stranded copper (Class 2 or 5)
Conductor dimension	6-35 mm^2
Number of copper elements	2, 4 or 6
Operation temp. range	-40 °C to +80 °C
UV protection	Yes
CPR rating	Dca or B2ca
Flame retardant	IEC 60332-3

Number of cores	Conductor cross section (mm^2)	Current-carrying capacity (method e:air, c.t. +90) (A)	Cable diameter (mm)	Cable weight (kg)
2	4	49	14	300
5	6	63	16	410
2	10	86	18,5	600
2	16	115	20,5	850
2	25	149	23,5	1100
2	35	195	26	1500
4	6	50	17,5	530
4	10	70	20,5	800
4	16	92	23	1150
4	25	119	28,5	1750
6	6	44	20	730
6	10	60	23,5	1100
6	16	81	27,5	1600
6	25	104	30,5	2100

Figure 3: Cable properties. Current carrying capacities based on IEC 60364-5-52

Hybrid Cable
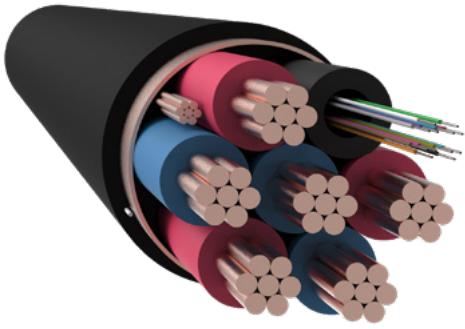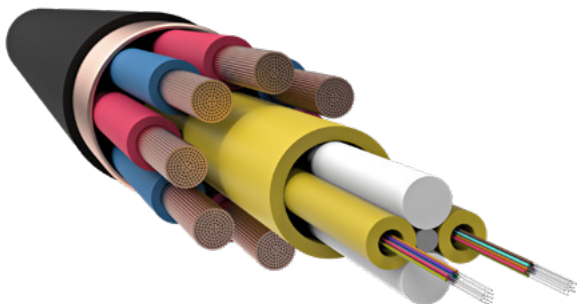
Hybrid FTTA 6-Core + 12 FO

Technical details	
Outer sheath	Halogen-free compound
Screen	Bare copper tape
Power unit	
Conductor dimension	4-10 mm^2
Number of copper elements	2-6 (Class 2)
Operating voltage	48 Vdc
Insulation	XLPE
Fibre unit	
Optical unit	PBT loose tube, filled
Number of fibres	2-12 FO
Strength element	Fibreglass yarns
Jacket	Flame retardant LSHF, black
Temperature range	-40 °C to +80 °C
UV protection	UV stabilised
CPR rating	Eca
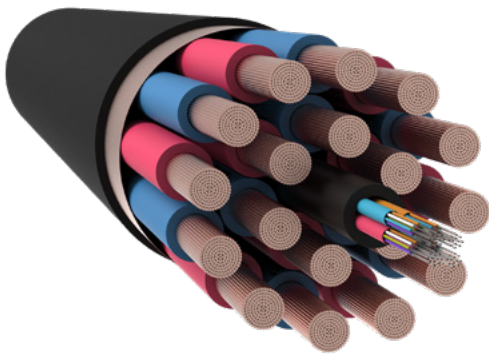
Hybrid FTTA 18-Core 10 mm^2 + 24-48 FO

| Technical details	
Outer sheath	Halogen-free compound
Screen	Bare copper tape
Power unit	
Conductor dimension	10 mm^2
Number of copper elements	18 (Class 5)
Operating voltage	48 Vdc
Insulation	XLPE
Fibre unit	
Optical unit	PBT loose tube
Number of fibres	24-48 FO
Strength element	Glass fibre reinforced plastic (GRP)
Jacket	LSZH
Operation temperature	-10 °C to +70 °C
UV protection	UV stabilised

Hybrid FTTA 8-Core 10 mm^2 + 24 FO

Technical details	
Outer sheath	Halogen-free compound
Screen	Bare copper tape
Power unit	
Conductor dimension	10 mm^2
Number of copper elements	8 (Class 5)
Operating voltage	48 Vdc
Insulation	XLPE
Fibre unit	
Optical unit	PBT loose tube
Number of fibres	24 FO
Strength element	Glass fibre reinforced plastic
Jacket	LSZH
Temperature range	-10 °C to +70 °C
UV protection	UV stabilised

FTTA Drop Cable and Distribution Rack
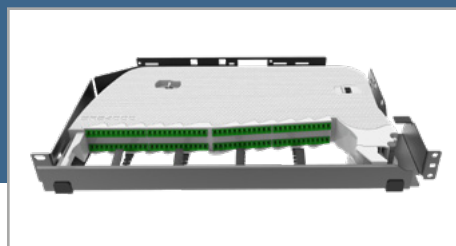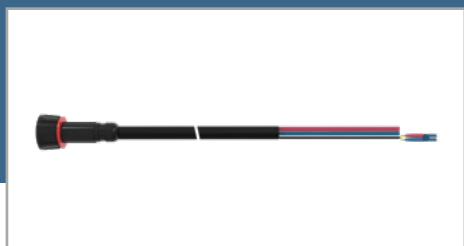
Drop Cable

The FTTA drop cable assemblies are compact and lightweight solutions, providing connections between the RRH and the distribution box. Both come in a variety of configurations, depending on customer requirements.

Features

- Ruggedised design and easy installation
- Customised length available
- Output connections can be customer/RRH specific
- Power-only, fibre-only and hybrid

Technical details

No. of fibre connections	Up to 4 LC/SC (at RRH end)
No. of power connections	Up to 3 (1 circuit + earth) optionally shielded
Fibre connection type	MPO/MTP or LC (at enclosure end) LC/SC (at RRH end)
Operating temperature	-40 °C to + 85 °C
Water immersion	IP68 at enclosure end, at the radio end depends on the radio vendor

Indoor Distribution Racks

The SRS4000 Distribution Sub-Rack is a modular product. Available in a variety of configurations for integration into 19"/ ETSI/ANSI racks, street-side cabinets or wall-mounted cabinets.

The product consists of a metal chassis available in 1U, 2U and 3U into which a choice of modules is loaded. The module types available are: Splice and Patch, Patch-Only, Splice-Only and Patchcord-Storage.

Features

- Minimum fibre bend diameter management
- Complete cable protection from entry to exit of the panel
- The sub-rack can be supplied fully configured or empty modules can be supplied for upgrading at a later date
- Easy patchcord routing, enclosing patchcords, and protection adapters via dropdown front modules

RF Jumpers and Feeders

Coaxial RF Jumper

B2ca CPR   **C**ca CPR

The perfect choice for the connection between the RRH and the antenna, providing excellent return loss value with low and stable intermodulation.

Stable electrical performance is ensured by high-quality cable and special connector head design.

Features

- Wide range of lengths available
- Connector types 7-16, N, 4.3/10, NEX10, 2.2-5, MQ4, MQ5
- Cable types: 1/2", 3/8", 1/4" (super flexible)
- Jacket options:
  – Halogen-free PE
  – CPR-rated LSOH for indoor installation
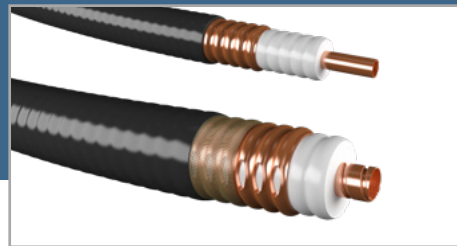
Feeder Coaxial Cable and Coaxial Antennas

B2ca CPR   **C**ca CPR   **D**ca CPR   **E**ca CPR

For a coaxial-based architecture, Prysmian Group provides high performance coaxial feeder cables to connect the radio base station (RBS) to the tower mounted amplifier.

Prysmian Group feeder cables and coaxial antennas have been designed to meet the highest quality and environmental standards.

Typical operating frequencies 100...3,800 MHz covering all main mobile communication systems including TETRA, 2G, 3G, 4G and 5G. 100% of our cables are tested at production. Full range of indoor products available with CPR versions up to B2ca-s1a.

Prysmian Group coaxial antennas include two product families: RFX and RF2X cables for broadband systems in buildings and tunnels, and RFXT cables, mainly for selected frequencies in tunnels.

Features

- Low attenuation at high frequencies
- Compatibility with standard connectors and accessories
- Two-layer jacketing for protection and flexibility

Technical details

Cable Types	RFF 1/4", 3/8", 1/2" RFA 1/4", 3/8", 1/2", 7/8", 11/4", 15/8"
Coaxial Antennas	RFX 1/2", 7/8", 11/4", 15/8" RF2X 1/2", 7/8", 11/4", 15/8" RFXT 7/8", 11/4", 15/8"
Jacket	Variety of options available
Dielectric	Cellular polyethylene
Inner conductor	Cu or CCA
Outer conductor	Corrugated copper
Characteristic impedance	50 Ω
Operating temperature	-55 °C to +85 °C
UV protection	UV stabilised

*CPR rated cables available

Prysmian Group

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