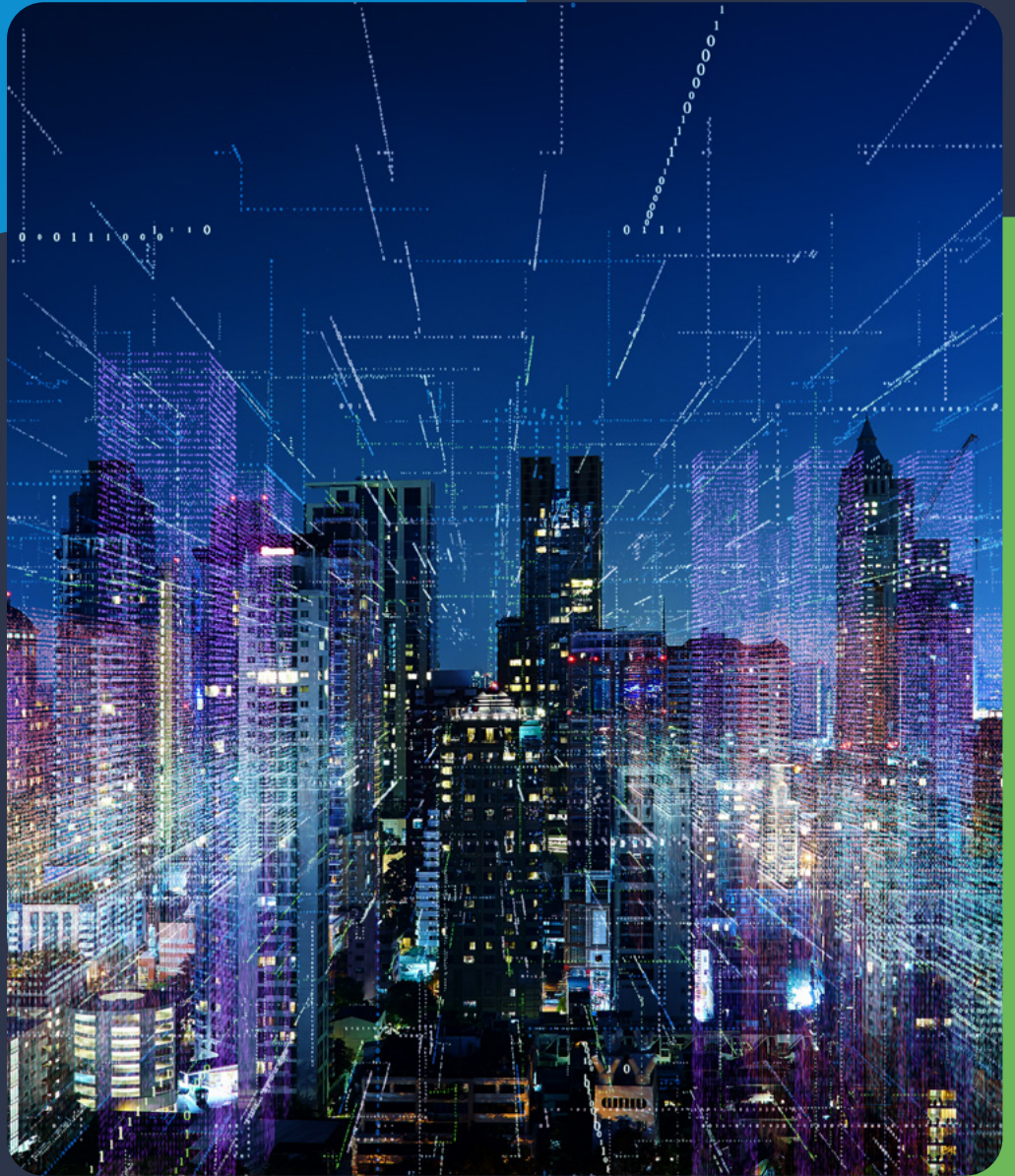


# CONNECTING THE FUTURE

Next-generation network  
solutions for the 5G era



# CONNECT TO LEAD

As the worldwide leader in energy and telecom cable solutions, Prysmian believes in the effective, efficient and sustainable supply of energy and information as a primary driver in the development of communities. With this in mind, we provide major global organisations in multiple industries with best-in-class products and services, based on state-of-the-art technology.

The challenge and opportunity before us require us to harness the power of human ingenuity to drive new forms of energy and information, to each and every corner of the earth.

At Prysmian we want to lead the energy transition and digital transformation and we are evolving our brand to reflect this ambition.

Through our knowledge, innovation and reach, we connect people and businesses with the energy and information they need.

Pushing the boundaries of electrification and digitalisation, our cables are powering the circular economy, focusing on what matters most, wherever you are.

We drive new energy and intelligence everywhere.

Together, we can lead the shift to a more sustainable way of living, that we and our planet so clearly need.

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Together, we can navigate the way forward.

# ACROSS THE GLOBE, OUR ONLINE OBSESSION IS GROWING

We want faster, smoother, easier connectivity – wherever we are, whenever we need it. Our devices are more mobile, their operating systems more capable, and their interfaces more user-friendly than ever before. And it's all driving the amount of time we spend online, skywards.

With the turn of the new decade, there are no signs of this trend slowing down. In fact, by the end of 2025, it's expected that up to 65% of the world's population will connect to the 5G network\*: a statistic which would solidify 5G's status as the most rapidly adopted mobile technology in our history. With this rise in connectivity, our data consumption will likewise soar astronomically.

But with already congested infrastructure in most western countries, how can we continue to support the growth of connectivity? How can we relieve the pressure on a burdened system, while minimising upgrade costs for mobile network operators? And how do we ensure the system remains stable, interoperable and secure?

As one of the world's key players in the innovation, improvement and deployment of the 5th generation mobile network, Prysmian has long been building the world's connected future.

Through research and development, a commitment to innovation and our dedication to securing next-generation communications for everyone, we're already working with partners across the globe to ensure they're ready for the 5G wave.

From our facilities around the world, we're creating the bespoke and market-ready solutions which will enable the future of a seamlessly integrated 5G network.

**So, no matter the challenge, we can help you shape the network of tomorrow.**

\*Ericsson Mobility Report, November 2019

# THE GROWTH OF MOBILE DATA TRAFFIC

The Ericsson Mobility Report published in Q4 2019 predicts that mobile data traffic is expected to grow to 160 exabytes (EB) per month by 2025 – up from the 40 EB we use today. Almost 50% of that volume will be served by 5G. Largely, this increased consumption will be driven by services such as video streaming, alongside emerging immersive media formats like HD and Ultra-HD video, 360-degree film, Augmented and Virtual Reality.

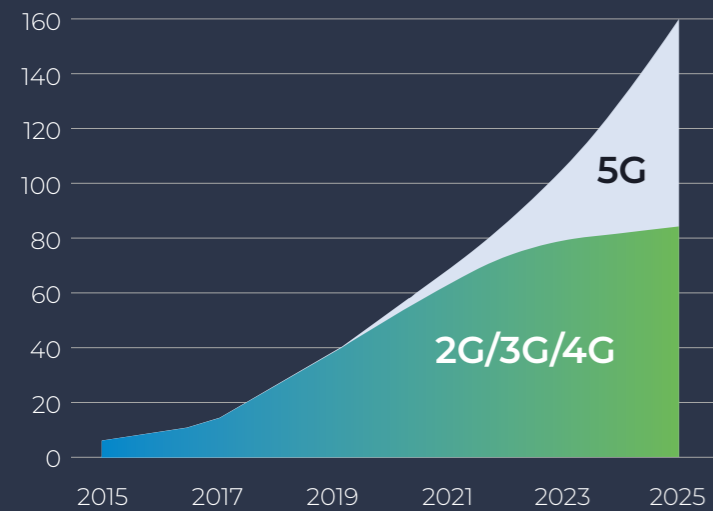
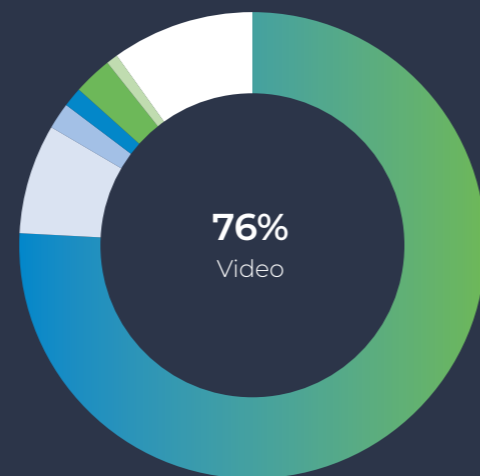


Figure 1: Global mobile data traffic (EB per month)



2025  
160 EB per month

- Video
- Social networking
- Web browsing
- Audio
- Software download and update
- P2P file sharing
- Other segments

So, what is necessary to meet 5G enhanced mobile broadband demands as we move forward? The answer lies in increasing area traffic capacity to 10 Mb/s, boosting peak data rate to 20 Gb/s, and enabling a user experience data rate of 100 Mb/s. These values are 100, 20 and 10 times greater respectively than LTE-Advanced networks can currently support.

Such network innovation can only be achieved through combined gains in cell densification, increased bandwidth and improved spectral efficiency.

Source: <https://www.ericsson.com/en/mobility-report>

# MACRO AND SMALL CELL CHALLENGES

## MACRO NETWORK CHALLENGES

Massive MIMO (M-MIMO) is a technique that simultaneously coordinates a large number of antennas to increase spectral efficiency. This will contribute to fulfilling the 5G requirements as per IMT-2020 recommendations by ITU.

M-MIMO can be deployed below 4G's current operating spectrum of 6 GHz and at mmW (from ~26 GHz-300 GHz). 3.5 GHz is currently the most popular frequency on which to deploy 5G around the world.

M-MIMO will require a high number of antennas to direct individual radio beams to different mobile users, relying on significant computation power at the radio site. A M-MIMO radio will drain three to four times more power than a 4G radio – around 1.5 kW of energy.

As a result, the wires that power the M-MIMO radios will increase in cross section, increasing the bulkiness of the cables, as well as the fibre count within them.

In its first wave of implementation, 5G radios will be installed as Non-Standalone (NSA), coexisting with LTE radios on the same or nearby towers. Towers will undergo both radio densification and power increase to maintain operations.

### The challenge of network densification

Small cells should be installed in very specific locations, as outlined by radio planning. But delivering power to new locations can be prohibitively expensive.

5G also demands high radio link reliability, so each small cell should be equipped with a battery back-up – an implementation that's likely to make CAPEX and OPEX skyrocket.

## OUR SOLUTIONS

At Prysmian, we conduct research and development in the telecom and energy sectors, to be able to create the most efficient solutions for our partners. Our carrier-grade hybrid cables and connectivity solutions deliver the support mobile infrastructure needs to remain future-fit.

**FTTA breakout boxes:** We offer both general market and bespoke solutions, to accommodate off-the-shelf connectors for network endpoint drops. This includes solutions suitable for 4G-to-5G network transition.

**FTTA drop cables:** We have a wide range of drop cable solutions, including fibre only, power only and hybrid cables, with a number of termination options (Dual LC, Quad LC and MPO). We can also provide pest-resistant cabling suitable for use in regions such as Australia and New Zealand.

**Hybrid cables:** Our portfolio of fibre and copper cables allow us to address any power or distance need your business requires for its 4G and 5G macro installations. One example is our low-inductance wire, designed to mitigate voltage drop for variable power Remote Radio Heads (RRH).

**Remote power:** We supply hybrid 400 V DC cables suitable for remote powering macro towers, including hybrid joints in both central office and macro sites.

**Blowable cables:** A new category of cables is making waves in remote powering applications. Our blowable cables can be used for traditional DC as well as innovative power transmission such as Digital Electricity™, allowing network operators to safely power radios from a distance. These cables' application goes beyond mobile, covering CCTV cameras, Wi-Fi networks and other sensors in metropolitan environments.

**Radiating coaxes:** Traditional radiating coaxial cables have a specific radiation pattern: it's higher when close to the radio transmitter, decreasing as you move toward the end of the coax. This reduces the cable's maximum usable length. Prysmian has developed a radiating coaxial cable which produces a uniform signal, significantly increasing the cables' maximum usable length – and therefore its overall usability.

**Ancillary:** Our comprehensive line of fibre cable assemblies includes pigtails, simplex and duplex patch cords, MPOs, sub rack panels and ground kits.

**Figure 2:** An illustration of where and how Prysmian Mobile products are installed in order to support 4G/5G network connectivity.

## FTTA SOLUTIONS POWERING 4G/5G CONNECTIVITY

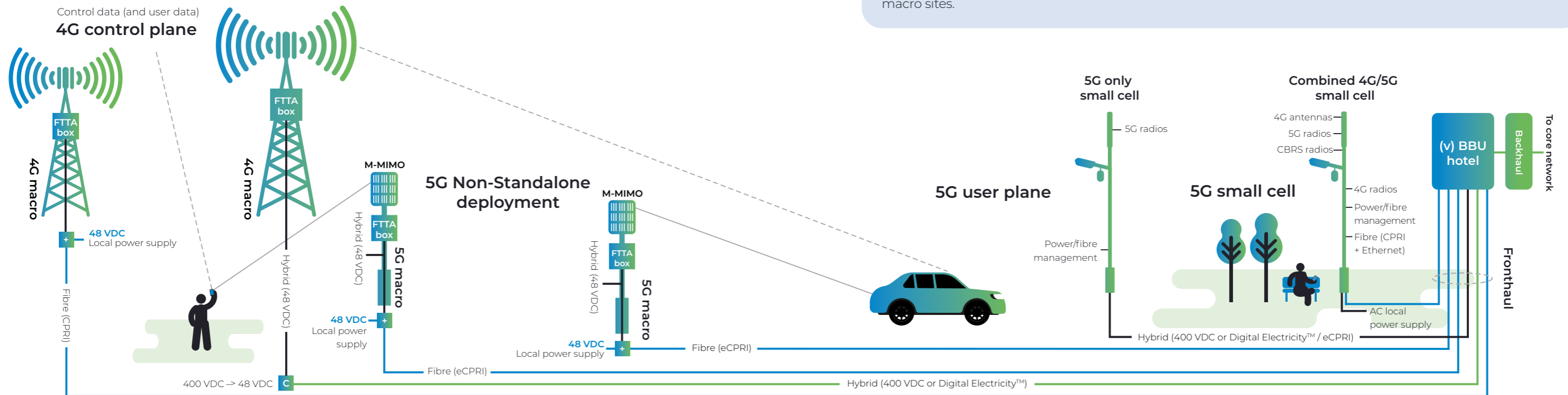


Figure 2

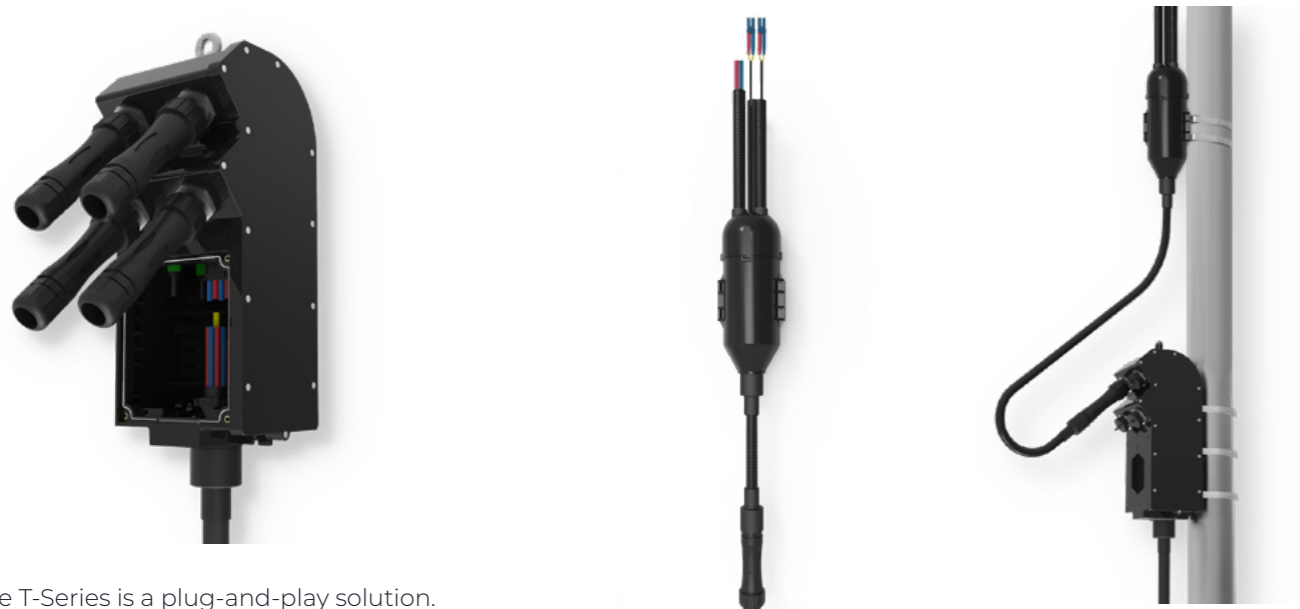
# PRODUCTS FOR MACRO CELLS: T-SERIES

The T-Series is a bespoke FTTA solution which Prysmian designed to support the evolution from 4G advanced networks to 5G radio antennas.

Featuring a hybrid feeder cable and combining four pairs of copper wires and twenty-four optical fibres, a break-out box with four MPO hybrid outputs, and relative drops, the T-Series is also designed with special cockatoo-proof conduits. This makes it suitable for use in Australia, where the birds often chew through, and interfere with, network infrastructure.



Figure 3: T-Series



The T-Series is a plug-and-play solution. The design allows for opening and rerouting even after it has been installed

Conduit pest-proof hybrid drop

In-field installation

# PRODUCTS FOR MACRO CELLS: M-SERIES

The M-Series is a flexible, quickly adjustable FTTA platform designed to meet the need for a versatile macro tower installation. It's suitable for a wide variety of applications, with various feeders, supported media types and non proprietary connector outputs available.

Each output port can support a mix of fibre and power connectivity – for example dual LC, MPO and two or three power pins.

The riser module can host cables of up to 4.3 cm in diameter. The M-Series is shipped with its feeder cable already cut to length and pre-assembled according to your order, making installation quicker with no room for error.

As the radio access network (RAN) undergoes profound transformation, vendors are pushed to use interoperable equipment. This includes using Commercial Off-the-Shelf (COTS) solutions to run network functions, allowing mobile network operators a wider choice of network vendors and avoiding lock-in with one vendor. Likewise, any interconnecting infrastructure will also need to remain interoperable to prevent compatibility issues from impacting FTTA deployments.

Figure 4: M-Series



Fibre only

Power only

Hybrid

Hybrid drops

# PRODUCTS FOR MACRO CELLS: FTTA HYBRID

A combination of fibre and copper within a single cable is possible, thanks to Prysmian BendBright<sup>XS</sup> technology. BendBright<sup>XS</sup> features microbend resistance when in contact with rigid supports like copper, nearly eliminating signal attenuation. These hybrid cables are suitable for applications such as the feeder at a cell site, delivering both power and data to remote radio heads (RRHs).

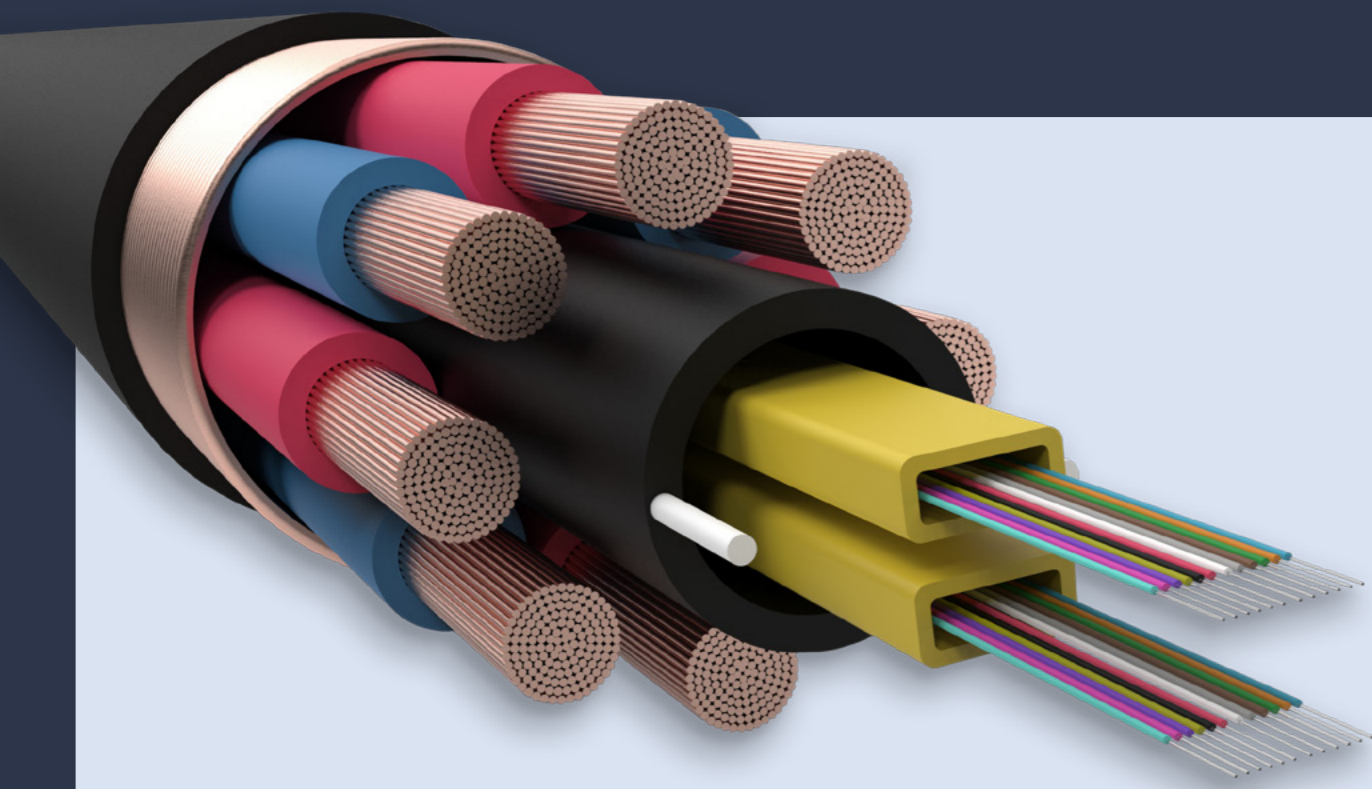


Figure 5: FTTH 48 VDC hybrid cable 8 × 10 mm<sup>2</sup> cores and 24 SM fibres

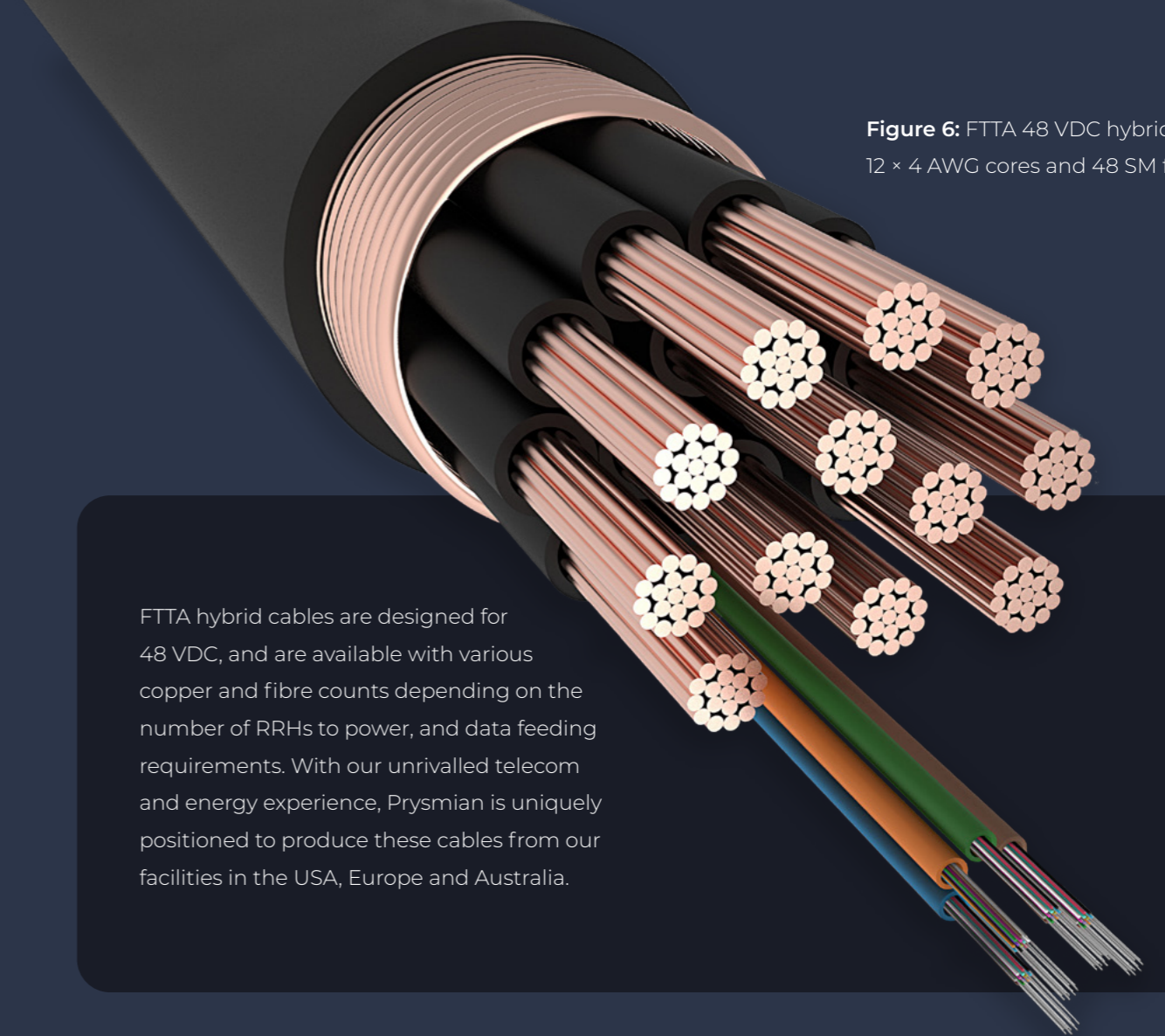


Figure 6: FTTA 48 VDC hybrid cable  
12 × 4 AWG cores and 48 SM fibres

FTTA hybrid cables are designed for 48 VDC, and are available with various copper and fibre counts depending on the number of RRHs to power, and data feeding requirements. With our unrivalled telecom and energy experience, Prysmian is uniquely positioned to produce these cables from our facilities in the USA, Europe and Australia.



Figure 7: Plants capable of making FTTH hybrid cables

# PRODUCTS FOR NETWORK DENSIFICATION: BLOWABLE HYBRID

With small cells requiring installation in very specific locations in order to transmit as required, one solution is to carry both power and connectivity through a single cable. As a result, MNOs would become independent from power utilities, and be free to concentrate battery backup to a single point.

Remote powering in this manner is perfect for use with centralised RAN architecture, where Base Band Units (BBUs) are located in one site, also called 'BBU hotelling'. This consolidation reduces CAPEX and OPEX significantly with the possible implementation of resource multiplexing.

Prysmian has developed a cable that can be blown into a 10 mm duct, featuring six copper cores with a cross section area of 1 mm<sup>2</sup>, and up to 36 optical fibres. This makes it possible to deliver up to 1.2 kW over 300 metres, or 300 Watts over 1200 metres. This cable can be used for both conventional DC electricity and safe-to-touch Digital Electricity™.

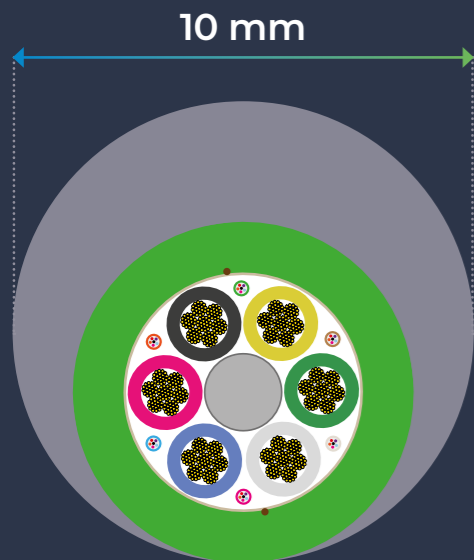


Figure 8: Blowable hybrid cable for 10 mm ducts

**Digital Electricity™, invented by VoltServer, transfers hundreds of packets of energy each second.**

If there is improper wiring, a short circuit, or if a person touches the transmission lines, the transmitter will cut out within 3 milliseconds. As a result, the system is safe-to-touch, eliminating danger to life.

PRYSMIAN HYBRID CABLE



Figure 9: Blowable hybrid 6 × 1 mm<sup>2</sup> cores and 36 SM fibres

# PRODUCTS FOR INDOOR COVERAGE: RADIATING COAXES

Radiating coaxial cable is a well-established technology with numerous purposes, but its traditional transmission structure reduced its maximum usable length.

Prysmian's innovative radiating slotted coaxial cable distributes a uniform signal to overcome this barrier. It can serve as an antenna for neutral hosts, used as part of complex infrastructure with multiple radio technologies coexisting on the same cable.

Plus, it's possible to manufacture a radiating coaxial cable tuned for a narrow band of transmission frequencies. This allows the signal to radiate over an increased distance, both longitudinally and radially from the cable: much further than its broadband counterpart.

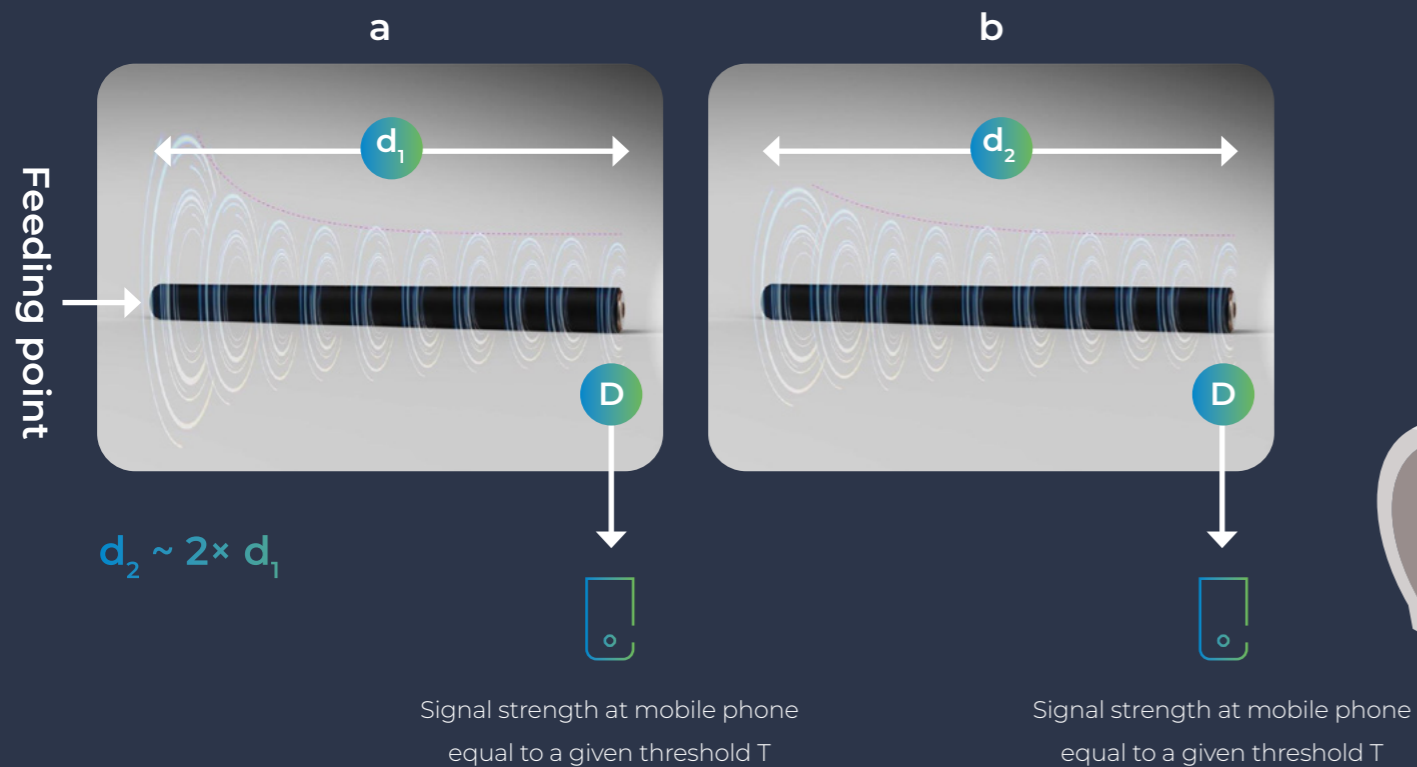


Figure 10: This illustrates the length increase of the slotted design (b) over the traditional design (a)

Figure 11: Broadband and narrowband radiating coaxial cables.

This range is ideal for long and narrow indoor places such as road tunnels, office corridors, railway infrastructures, shopping centres, garages, mines and ships.

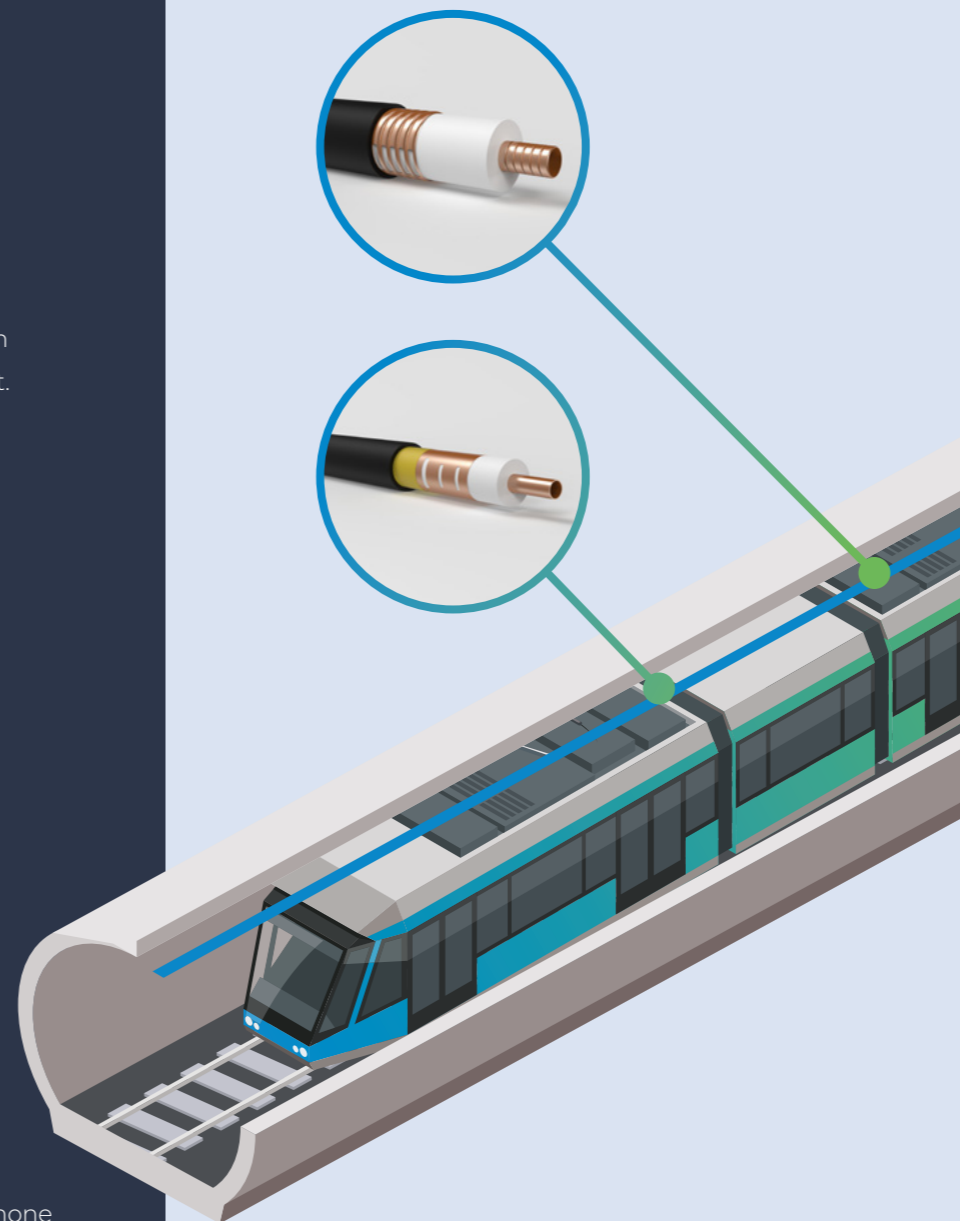


Figure 12: This illustrates the most common places (tunnels) where the radiating coaxes are installed

References: Ericsson Mobility Report (2019), [online]  
Available at: <https://www.ericsson.com/4acd7e/assets/local/mobility-report/documents/2019/emr-november-2019.pdf>

# CONCLUSION

As 5G deployment speeds closer to reality, MNOs need to ready themselves with future-fit infrastructure to support it.

To maintain low installation costs, minimise OPEX expenditure and reduce CAPEX, using high-quality products produced with a combination of expertise and experience is key.

As a world leader in the energy and telecom cable systems industry, Prysmian is supporting the global expansion of the 5G network. Over the next decade, we will continue to contribute to the realisation and full connectivity of the internet of things, in one of the most revolutionary evolutions of digital technology to date. Plus, we will continue to support our partners in improving 4G LTE and broadband capacity.

We work closely with our partners, ensuring we supply you with the exact solutions your project needs to connect people, communities and continents.

Together, we can connect today's technology with the world of tomorrow.

Contact one of our experts to get the latest updates on our product portfolio, or visit our Discovery Hub in Milan, where we can show you how our technology could work for you.

Get in touch with us at [dh@prysmian.com](mailto:dh@prysmian.com)





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