



# CONEXIO

FTTA and PTTA Solutions  
for the 5G era



# FTTA and PTTA Solutions for the 5G era

With the advance of 5G deployments, new challenges arise for site development. More frequencies and additional active systems require more fiber optic network infrastructure and additional power supply per mobile site. Innovative cabling solutions in the form of fiber and power to the antenna (FTTA + PTTA) or space and investment saving hybrid solutions (HTTA) make 5G network upgrades possible in the first place.

The roll-out of FTTA and PTTA infrastructures is as important as FTTH broadband expansion context. New, additional, and complex telecom infrastructures must be built quickly across the board. Only with them can we take advantage of the great prospects of digitization.

## How can we efficiently implement FTTA/PTTA projects?

As an internationally active telecom equipment supplier with decades of experience in fiber optics, R&M offers pragmatic solutions for efficient and cost-optimized implementation of FTTA rollouts. R&M is familiar with the daily challenges associated with the expansion of telecom infrastructure and knows what matters today and tomorrow when it comes to setting up and expanding mobile network sites during the transition from 4G to 5G.

- ✓ The first priority is simple, fast and error-free installation. Plug & Play is safe, efficient and reduces installation costs.
- ✓ Passive and active technology must fit together. The transmission systems require precisely coordinated connectivity.
- ✓ Every cell site is different. Cabling, boxes, dividers, cable head terminals - everything must be adaptable and compatible with the system manufacturers and the installation surroundings.
- ✓ With complete solutions and logistics from a single source, installation projects can be implemented efficiently. Mobile network operators can also expect expert support in integrating cell sites into access networks.

That is exactly what R&M offers. Simple, fast, cost-effective infrastructure solutions for cell sites and broadband networks that can be implemented individually at any location.

# «Easy, fast, cost-effective end-to-end 5G cell tower connections»

This is what R&M offers ...

- 1 Comprehensive portfolio of products and services.** R&M's offering for the deployment of 5G sites is based on proven FTTA, PTTA and HTTA solutions, future-proof cable assemblies and passive infrastructure with dedicated IP 68 outdoor connectivity or indoor connectivity, as well as consulting and support for every step or on the way?
- 2 Preconnected «Plug & Play» solutions.** When using CONEXIO solutions from R&M, only short jumper cables need to be renewed or added to increase the number of new connections when remote radio heads (RRH) are upgraded or replaced, or radio solutions from another manufacturer are introduced.
- 3 Reduction of installation costs.** Time required to install cell towers and Small Cells is a significant cost factor. R&M's technologies and «Plug & Play» systems make the installation in the field easier and faster. Installation time can be reduced by approx. 20-30%.
- 4 Space-saving hybrid feeders.** Multi-fiber and power cables or hybrid solutions with optimized design (e.g. reduced cross sections) from R&M help to meet today's and tomorrow's customer needs. R&M's multi-feeder cables are more rigid than individual cables and require fewer clamps. Hybrid solutions mean significantly lower leasing costs in many countries.
- 5 Increased flexibility and scalability.** R&M offers customized cabling and distribution platforms that are available worldwide. Customer or site-specific solutions save time and costs during installation.
- 6 Field-hardened, proven, robust solutions.** Outdoor-capable products with IP 68 protection are designed for extreme operating conditions and inter-operate perfectly among the solution products.
- 7 Freedom of choice without vendor lock-in.** R&M solutions are compatible with all major active system vendors products. Used in the FTTA context, these connectivity solutions work with a wide range of manufacturers' interfaces and installation methods.
- 8 Support at every step.** Local technical advice , on-time logistics and individual training are all part of R&M's support.



# A new generation of FTTA cabling is required

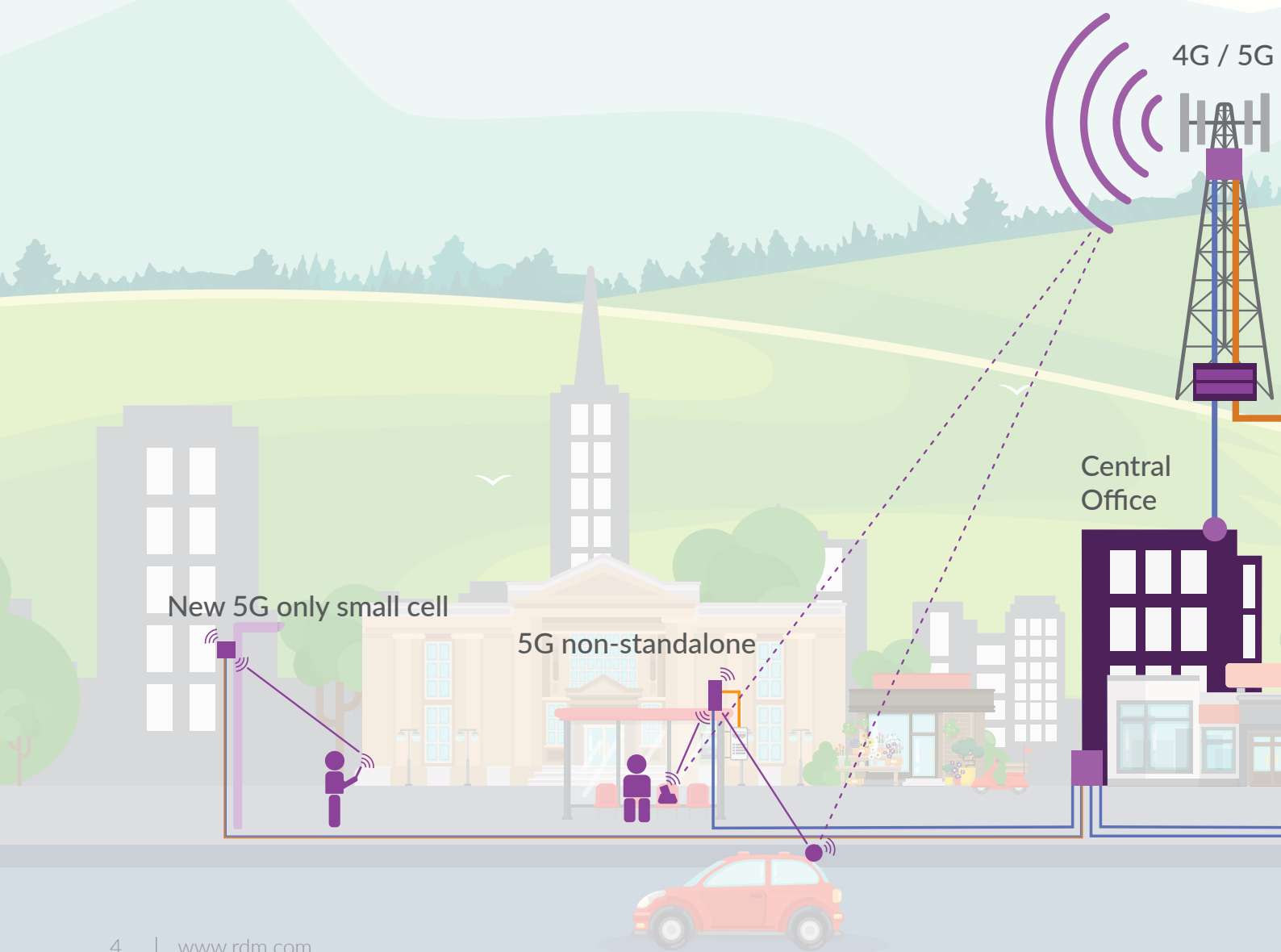
The expansion of 5G services places new demands on modular solutions with high flexibility and adaptability to individual site conditions.

This includes expansions (e.g. Massive-MiMo) at 4G sites and additional conversion to active antenna systems. For so-called «non-standalone» 5G Macro Cells, additional RRH's will be installed, and the mobile network will be gradually densified by means of supplementary Macro Cells (5G standalone).

Maximum densification will be achieved later with additional Small Cells and correspondingly more compact antenna systems, which will form an «underlying» network in urban areas. In the future, particularly time-critical 5G services will be realized with targeted, local signal coverage and shorter latency times.

On one hand, the cabling solutions must enable rationalization of processes for the individual upgrade of existing sites from 4G to 5G. On the other hand, these cabling solutions must be the most cost-effective and uniform as possible for standardized radio towers for new 5G (only) sites.

The technical requirements for the mobile networks in terms of signal density, quality, and high speed for the provision of 5G services are high. Data transmission quality, bandwidth, and speed in the 5G network will increase up to 4x 25 Gbit for typically 2 small form-factor plugs (SFP) per RRH.



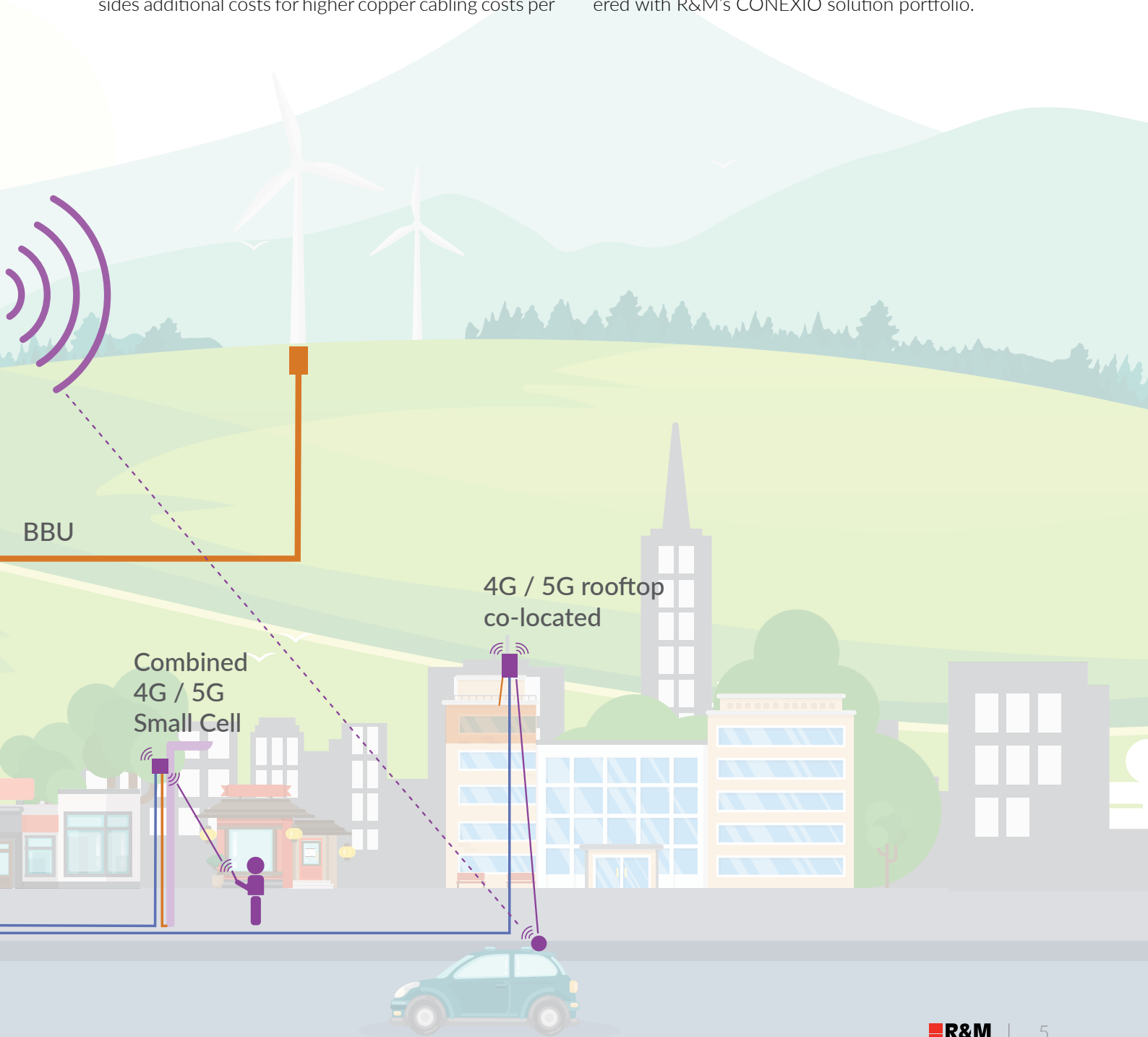
The quality, security of the connectivity and performance of the selected cable configurations for the Common Public Radio Interface (CPRI) between the Base Band Unit (BBU) and the RRH near the antenna are critical to maintain the quality of service.

This applies not only to the fiber-optic signal link between these two components (BBU and RRH), but also to the same extent to the increasingly demanding power supply for the RRHs and the active antenna systems. The significantly higher power per RRH or AAU (Active Antenna Unit) requires higher copper cross-sections or amplifier solutions (boosters) for the power supply. Besides additional costs for higher copper cabling costs per

site, additional challenges due to further densification with Small Cells, aspects such as weight, handling on site, wind load at the mast, installation times and tools; provision of higher power in battery buffering, voltage drops with long line lengths and many more come into play when selecting the site-specific cabling solution.

Each cell tower site needs specific system solutions for more power, more fiber, higher complexity and less and less space at antenna towers.

New and additional installations must fit the site conditions in a way that upgrades can be carried out time and cost-efficiently. These aspects have been considered with R&M's CONEXIO solution portfolio.





# CONEXIO - the R&M portfolio for mobile cell sites

Mobile operators, neutral hosts, tower companies, real estate owners, even residents, as well as public authorities and operators of private and local 5G all belong to the diverse stakeholder environment in the mobile network business. They bring in interests when it comes to the expansion and cabling of future-proof cell sites.

Every cell site is different. Topologies, climate zones, cellular applications, business models, standards and installation methods differ. Masts, RRH's and base stations have variable, differentiated material requirements.

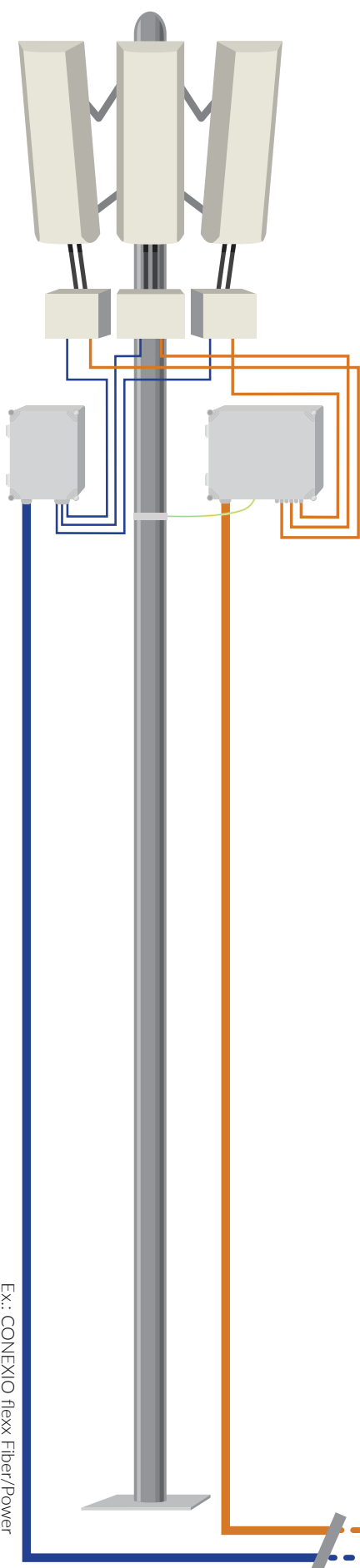
Existing 4G cell towers will be packed when the complex nationwide 5G roll-out is added. FTTA/PTTA often requires clever cable routing from access networks to cell sites.

In conclusion, the development and expansion of fiber optic and power infrastructures for 5G and mobile communications require site- and operator-specific system solutions.

They can be ideally implemented with a universal FTTA/PTTA/HTTA modular system.

It is called CONEXIO and comes from R&M.





Ex.: CONEXIO flexx Fiber/Power

The CONEXIO portfolio includes compact, harsh environment, easy-to-install infrastructure components for cabling and connectivity between BBU and RRH:

**CONEXIO flexx** – Box Solutions

**CONEXIO easy** – Cable Head Terminal Solutions

**CONEXIO lite** – Divider Solutions

**CONEXIO discrete** – Direct RRH cabling

**Accessories** – Jumper cables, 19" panels and mounting material

All CONEXIO solutions (excluding discrete) are available as FTTH, PTTA and HTTA variants. R&M offers the right cable types for all applications and building technology requirements.

### Usable everywhere

CONEXIO is designed to cover all the possibilities of fiber- and copper-based site connectivity. Including cost-effective, spontaneous installation on houses, facades, or existing cell tower masts. In this way, market players are equipped to meet current and future requirements of the wireless, distributed antenna system (DAS) and mobile communications business. They can densify or expand cells, backhaul and fronthaul infrastructures at any time.

### Complete support

R&M configures CONEXIO solutions according to site-specific needs. All cabling systems are prefabricated, assembled, and fully commissioned at the factory - and are maintenance-free. Ready to deploy, these cabling systems are delivered in appropriate packaging to the central warehouse or installation site. This allows rollouts to be planned precisely, installation times to be shortened, project costs to be optimized and quality standards to be guaranteed.

### Thought ahead

CONEXIO is compatible with R&M solutions for FTTH and public networks. This means that every cell site can be seamlessly and cost-effectively connected to access and core networks.



### CONEXIO *flexx* – Box



- Fiber optic (FO), power (PO), hybrid (HY) for 6 RRH and FO for 12 RRH
- Different box sizes depending on configuration
- Feeder cable lengths from 10 m to 200 m
- Flexible mounting, easy maintenance
- Connections are accessible
- Use of standard LCd connectors and cables
- Interchangeable jumper cable between box and RRH
- Optional installation protection: circuit breaker and/or overvoltage/lightning protection close to the antenna

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### CONEXIO *easy* – Cable Head Terminal



- FO, PO, HY for 6 RRH and FO for 12 RRH
- Compact design, high functionality, short installation time
- Feeder cable lengths from 10 m to 200 m
- Plug & Play supports easy replacement and future upgrades of RRH. Further configurations possible (x RRH)
- Optional: Pluggable MPO multi-fiber cable for FO connection from BBU to terminal



### CONEXIO *lite* – Divider



- FO, PO, HY for 6 RRH and 12 RRH
- Feeder cable lengths from 10 m to 200 m
- Compact, lightweight, customizable
- Easy to be deployed, short installation time
- Adapter plate for cable breakout fixation and individual arrangement of FO/PO cables
- Optional: further configurations (x RRH)

### CONEXIO *discrete* – Direct RRH wiring

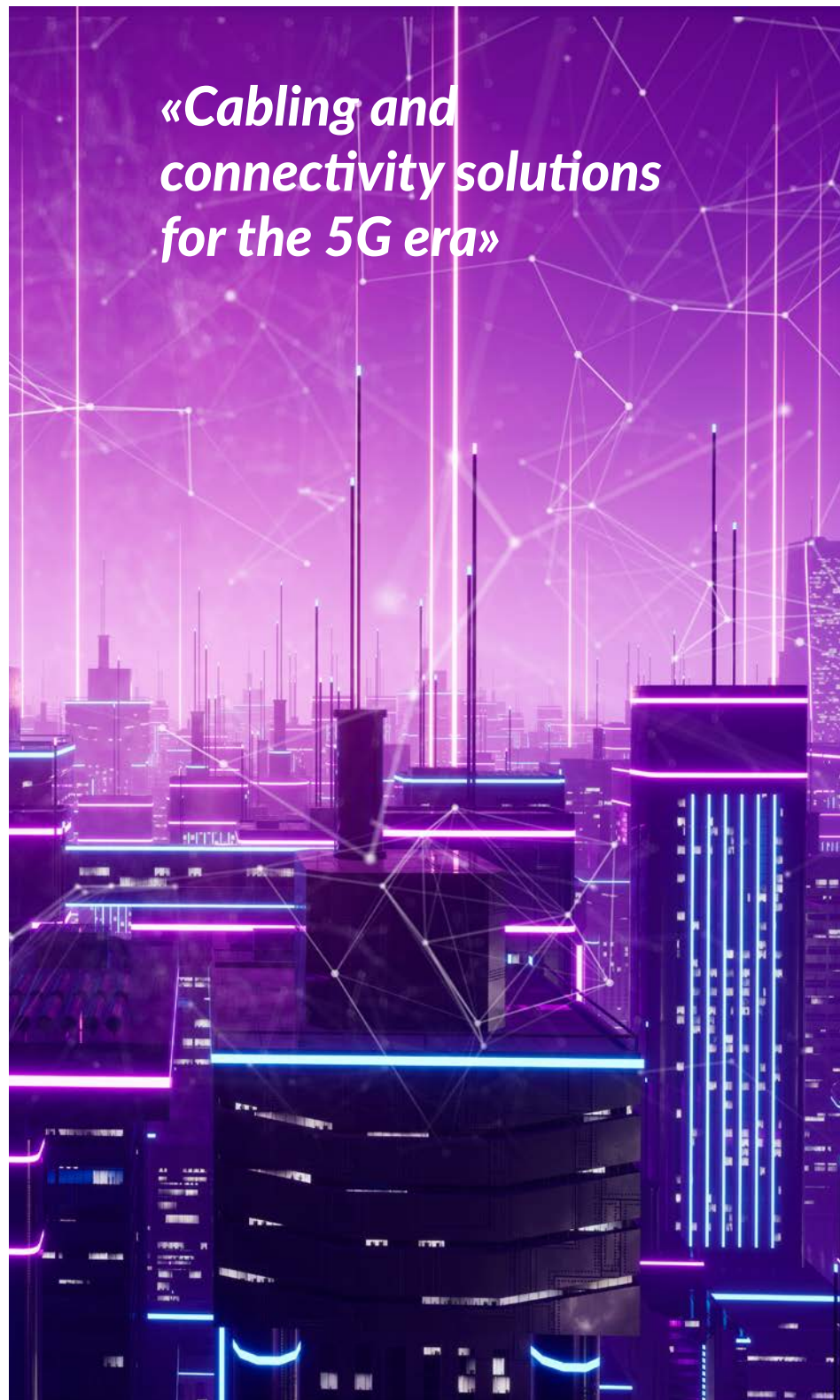


- FO (2 fibers) and PO (2+1 conductors, DC) for single RRH's
- Classic installation
- Lightweight cables, easy storage
- More space and cable clamp required on the mast
- Longer installation times
- Easy retrofit of RRH

### CONEXIO *jump* – Jumper cables



- FO (2 fibers) and PO (2+1 conductors, DC) per RRH
- Jumper lengths from 2 m to 10 m
- R&M Connectivity HEC-BR
- Market standard OEM connectivity
- Plug & Play - ready for immediate installation



# CONEXIO *flexx*

CONEXIO *flexx* supports all FTTA/PTTA/HTTA applications in the field of outdoor cabling on masts, on radio towers or roofs of skyscrapers.

CONEXIO *flexx* is available as a multifunctional fiber optic, copper, and hybrid box. It forms the interface between the system elements BBU and RRH or between feeder and jumper cable.

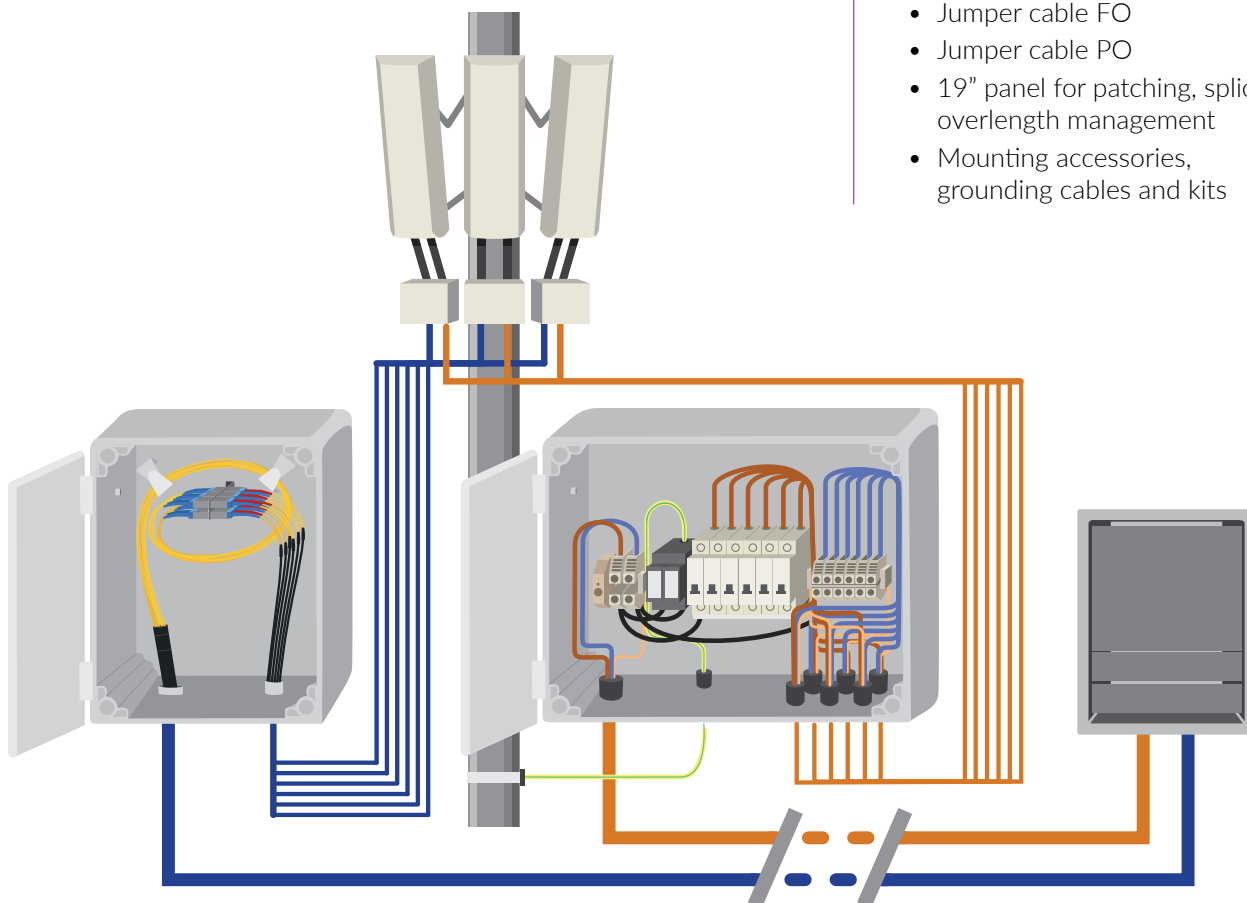
In both power and hybrid variants, CONEXIO *flexx* offers space for installation of circuit breakers. Modules for overvoltage protection (lightning protection near the antenna) also fit inside. Circuits can be individually de-energized within the box. This facilitates commissioning and the replacement of radio heads.

- Flexible and multifunctional use
- Up to 12 RRH connectable
- Short installation time, service friendly, accessible
- Rugged housing, IP 68
- Optional: Overvoltage/lightning protection



## Assortment

- FTTA box for 6 or 12 RRH with single mode fibers
- PTTA box for 6 RRH
- HTTA box for 6 RRH with single mode fibers
- Feeder cable FO, PO, HY
- Jumper cable FO
- Jumper cable PO
- 19" panel for patching, splicing, overlength management
- Mounting accessories, grounding cables and kits



# CONEXIO *easy*

The CONEXIO *easy* makes FTTA/PTTA/HTTA installations faster, safer and overall simpler.

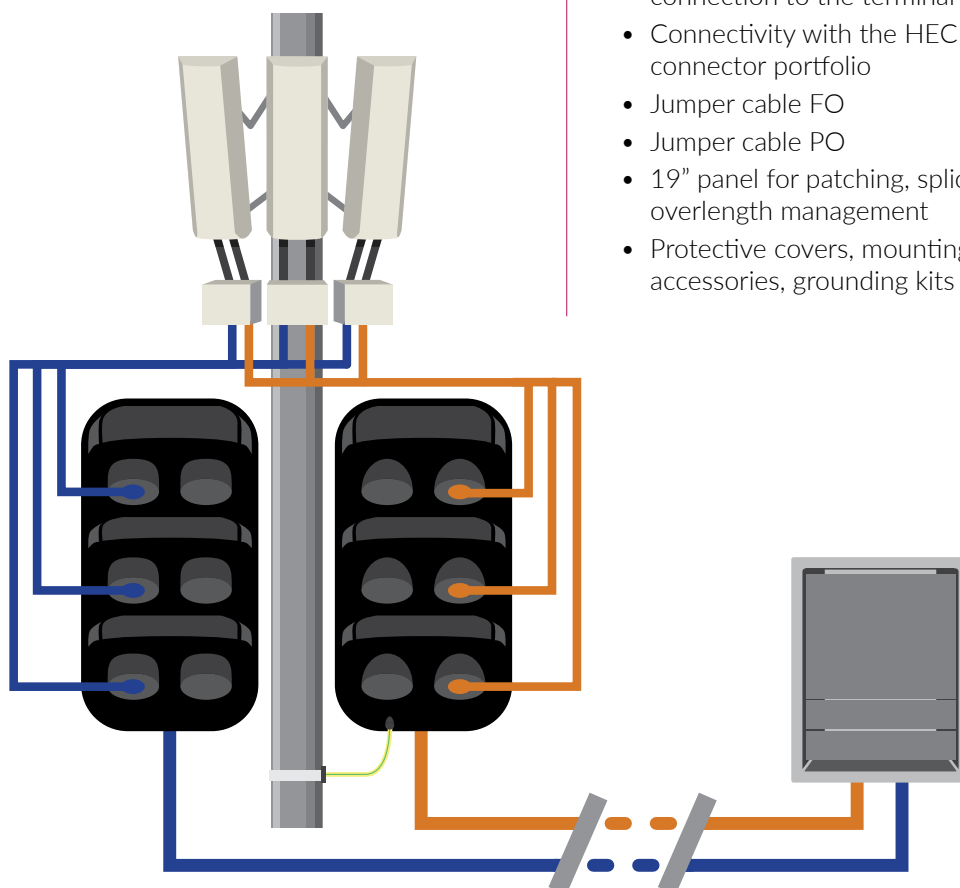
The Cable Head Terminal is available in fiber optic, copper, and hybrid versions for up to 12 radio heads.

Terminal and feeder cable form a tightly connected unit. It is leak-proof and validated for the harshest environments. R&M supplies the entire system ready for installation in site-specific lengths. Installers only must fix the base plate and terminal with feeder cable to the mast. Immediately or at a later extension date, they can plug in the jumper cables and connect the RRH.

The jumper cables are available in standard lengths of 2 m and 5 m. This simplifies stockkeeping and assembly. R&M supplies customized lengths on request.

Bayonet locking technology also makes plugging the individual cables faster, safer, and easier. Installers can operate the connectors in hard-to-reach positions with one hand. R&M HEC outdoor connectors make the FO connections and Souriau or alternative connectors are used for PO connections.

- Easy mounting, Plug & Play
- «Blind mating» with HEC-BR outdoor connectors
- Connects up to 12 RRH
- Impact and weather resistant housing, IP 68
- High wind stability



## Assortment

- FTTA terminal for 6 or 12 RRH with single mode fibers
- PTTA terminal for 6 RRH
- HTTA terminal for 6 RRH with single mode fibers
- Feeder cables FO, PO, HY - optionally with MPO plug connection to the terminal
- Connectivity with the HEC connector portfolio
- Jumper cable FO
- Jumper cable PO
- 19" panel for patching, splicing, overlength management
- Protective covers, mounting accessories, grounding kits



# CONEXIO *lite*

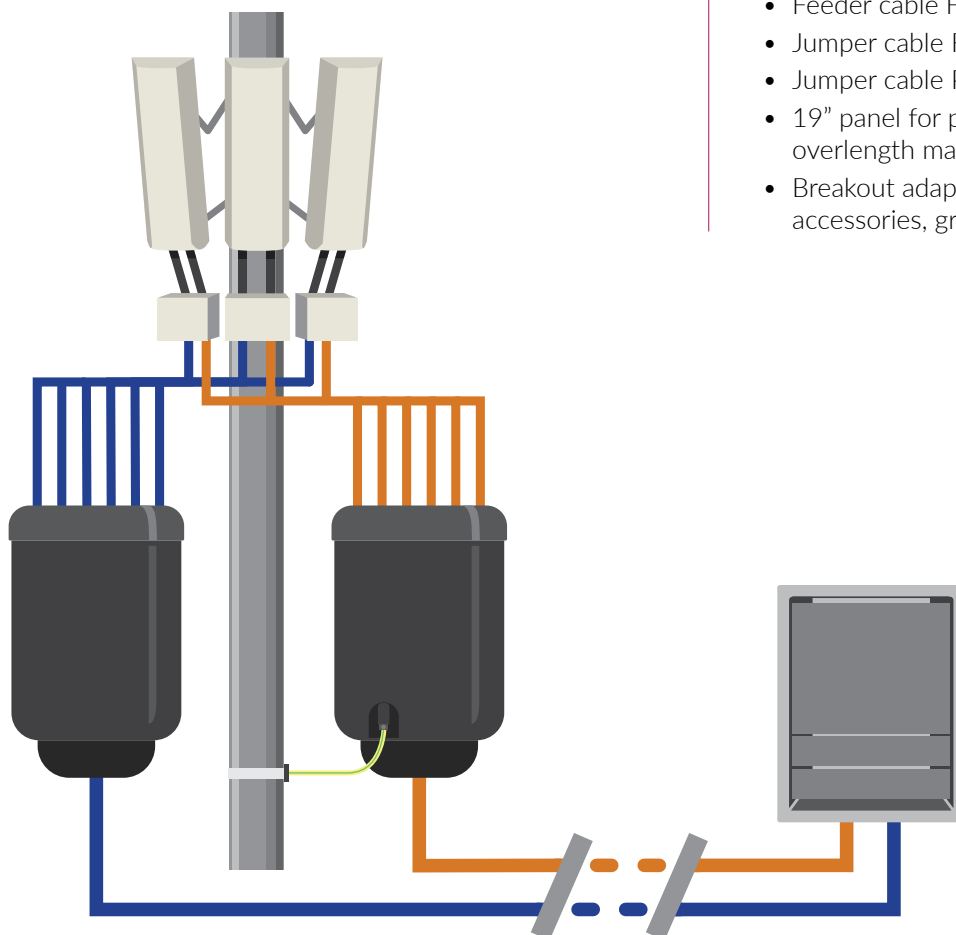
Where space is tight, there is still room for the CONEXIO *lite*. It is the divider solution of choice when antenna masts are to accommodate a high number of radio heads. It is particularly suitable in difficult weight and space conditions. When network operators upgrade or share a 4G site, this compact, lightweight, wind-stable divider often fits.

CONEXIO *lite* is available as a fiber optic, copper, and hybrid solution for up to 12 radio heads.

Feeder and breakout cables are manufactured as an assembly and thus firmly connected to the divider. The divider is leak-proof and tested for the harshest environments. R&M supplies it as a complete system in site-specific lengths.

R&M HEC-BR connectors provide the interface to the jumpers for connecting the remote radio heads. The breakout adapter plate helps to fix and manage cables and connectors securely and neatly.

- Compact design, lightweight construction
- Connects up to 12 RRH
- Plug & Play
- Impact and weather resistant housing, IP 68
- High wind stability



## Assortment

- FTTA divider for 6 and 12 RRH with single mode fibers
- PTTA divider for 6 RRH
- HTTA divider for 6 RRH with single mode fibers
- Feeder cable FO, PO, HY
- Jumper cable FO
- Jumper cable PO
- 19" panel for patching, splicing, overlength management
- Breakout adapter plate, mounting accessories, grounding kits

Plug & Play also applies to the connection between CONEXIO solutions and the remote radio heads. R&M has developed the CONEXIO *jump* family with fiber and power connectivity for this purpose.

It offers five connection solutions for the RRH of the leading mobile radio system manufacturers. R&M supplies them ready for installation and in standard lengths of 2 and 5 meters. On request, R&M manufactures jumpers in customer-specific lengths or with additional connection solutions.



### CONEXIO *jump* NSN

- Application: Radio head type Nokia
- Connectivity: HEC-BR with LC duplex and NSN boot
- Installation: Plug & Play



### CONEXIO *jump* FullAXS

- Application: Radio head type Ericsson (E///)
- Connectivity: HEC-BR with LC duplex and FullAXS
- Installation: Plug & Play



### CONEXIO *jump* LC duplex

- Application: Radio head type Huawei
- Connectivity: HEC-BR with LC duplex and LC duplex for pre-chamber
- Installation: Plug & Play



### CONEXIO *jump* PDLC

- Application: Radio heads type Samsung
- Connectivity: HEC-BR with LC duplex and PDLC
- Installation: Plug & Play



### CONEXIO *jump* PO

- Application: Radiohead power supply
- Connectivity: Souriau connector type or similar 2-conductor copper jumper cables
- Cross sections: 4, 6 and 10 mm<sup>2</sup>, AWG 6, 8 and 10
- Installation: Plug & Screw or Screw & Screw



## R&M HEC-BR - the outdoor connector

R&M has developed an innovative outdoor connector family: Harsh Environment Connectors (HEC).

The R&M HEC-BR - the BR stands for bayonet release - is certified for protection class IP 68. Naturally, it meets the strictest standards for telecommunications networks. With a tensile strength of up to 450 N, it offers maximum connection reliability for the fiber optic interface in this application environment.

The HEC housing decouples the LCd connector from the tensile load of the outer cable. This minimizes the influence of temperature fluctuations and associated cable shrinkage. The bayonet lock is designed to be tamper-proof and has a special locking mechanism. An integrated guide pin supports the installer, enabling him to place the HEC correctly on the adapter even with limited visibility («blind mating»). The connection locks with a turn.

- Outdoor connector for integrated LC duplex, SC simplex and MPO 12 connection technology
- Bulkhead and inline adapters
- Protection class IP 68
- Bayonet lock
- Complies with IEC-61753-1, MIL-STD-883, Telcordia GR3120
- Temperature range: -40°C to +85°C
- Tensile strength: 450 N

### R&M Cables

Depending on requirements, R&M recommends combining site-specific fiber and copper cabling in a single hybrid cable. It consolidates space requirements and installation efforts. Considering appropriate cable cross-sections, future expansions for additional RRHs can be anticipated.



# CONEXIO Accessories

The CONEXIO portfolio includes all accessories for antenna cabling, be it FTTA, PTTA or HTTA. It has been optimized for combination with all CONEXIO solutions. The range includes:



## CONEXIO patch and splice

19" panel for fiber management in the base stations, allows flexible cable and patch cord routing with space for 24 LC-Duplex adapters.

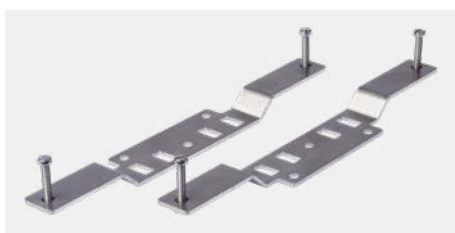
- 19" 1U rack as patch and splice panel on BBU side
- Installation material
- Patch cables
- Cable guides



## CONEXIO store

19" panel with capacity for up to 30 m of cable (Ø 7 mm). The cables can be fixed individually while maintaining the bending radii.

- 19" 1U rack for overlength management on BBU side
- Installation material



## Mounting accessories

Solutions for fast wall and pole mounting.

- Mounting kits
- Base plates
- Cable clamps
- Hose clamps



## Protective cover

The protective cover for CONEXIO easy keeps out dust, water, mist, ice and excrement. It permanently protects the connections from damage. A snap-in function ensures trouble-free handling when the cover is mounted.

# CONEXIO Accessories



## Breakout adapter plate

The breakout adapter plate for CONEXIO lite distributes, positions and secures the outdoor connectors of the divider. It simplifies the connection of the radio heads with jumper cables.

- Adapter plate for 6 and 12 RRH
- Installation on poles or walls
- Breakout fixation, arrangement, cable management (PO, FO)



## Grounding accessories

Grounding kits and grounding cables connect the installation to the antenna mast or other available service ground.

- Grounding kits for CONEXIO *flexx*, *easy* and *lite*
- Grounding cable 16 mm<sup>2</sup>, 25 mm<sup>2</sup>, green-yellow or black

## CONEXIO - More information



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