



# Tackling Indoor 5G Coverage

Building ecosystems to deliver indoor coverage for next generation networks



## Contributing Authors:

Matthew Gauvin, Global Product Line Manager – Fiber and Power Solutions

Stephen Cass, EMEA Regional Sales Manager

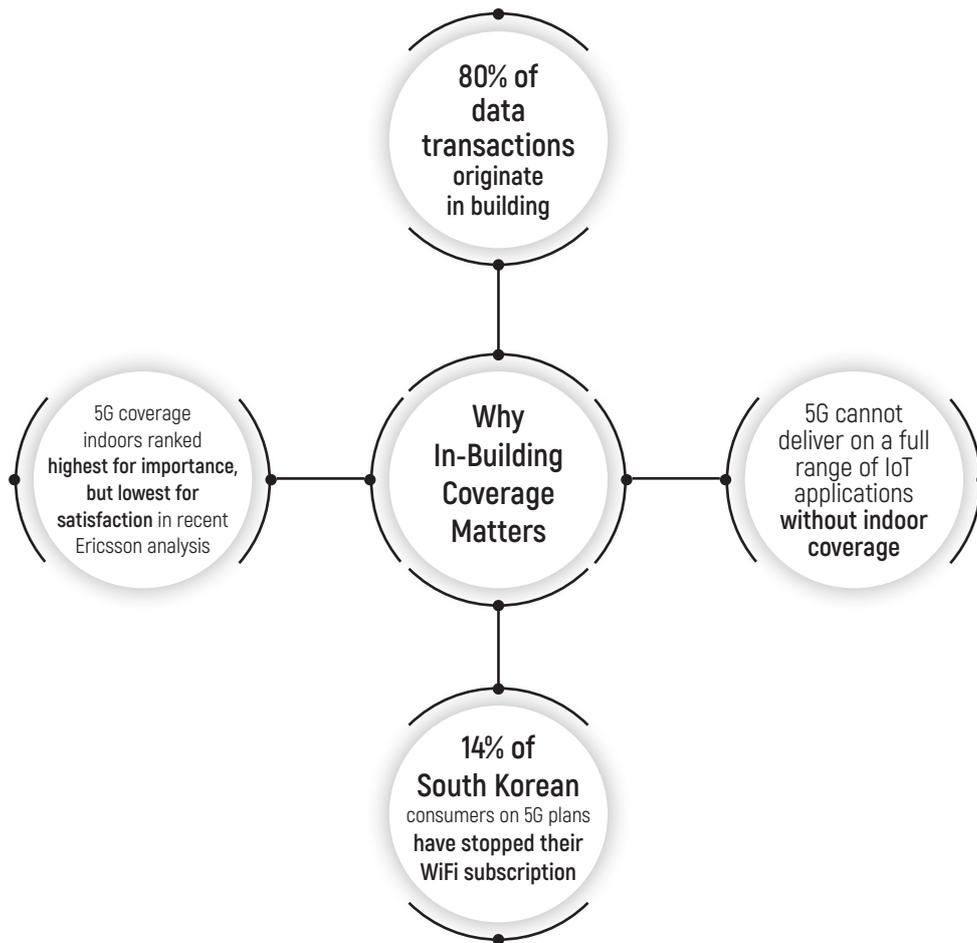


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### EXECUTIVE SUMMARY

Operators are picking up serious momentum when it comes to 5G roll outs. As of December 2021, 487 operators in 145 countries or territories had invested in 5G mobile or fixed wireless networks with 200 of these having launched some level of 5G network coverage. However, there is still a long road ahead when it comes to ensuring that 5G meets its potential and drives maximum ROI. A big stumbling block to overcome will be to ensure comprehensive coverage, in particular, in buildings.



<https://www.ericsson.com/en/reports-and-papers/consumerlab/reports/five-ways-to-a-better-5g#kf3>

The need for in building 5G is absolutely clear, it is demanded by customers, and proven in more mature markets to be a key revenue driver for operators. So, with such significant drivers to address in building coverage the big questions are: how can operators achieve this and can existing approaches to in-building coverage support 5G?

### WHAT IS DAS VS DRS?

Traditionally the challenge of in-building coverage has been addressed with DAS solutions. DAS has been the sweetheart of indoor connectivity, managing connectivity challenges by installing relatively small repeater antennas throughout a building connected to a single central controller. To date this has worked very successfully for both mobile and public safety connectivity in buildings.



DAS	DRS
Cost effective solution for 4G	More complex than DAS but with greater functionality
Well established & trusted approach to indoor coverage	Higher cost but better suited to 5G coverage

DRS on the other hand, has to date been more at home in high-capacity venues; stadiums, conference centers, train stations and not been a viable option for indoor wireless – the complexity and cost have not been deemed necessary especially as there would be redundancy in the system. DRS works with a similar principle to DAS, but the distributed modules include both an antenna and radiohead. The benefit is a streamlined architecture that is able to support a number of advanced features from MIMO to flexible capacity scaling. This, combined with better performance in 5G frequencies when compared to DAS, makes it a very logical choice to deploy 5G in buildings.

### WHICH IS BEST?

At RFS we would advocate a layered approach to inbuilding coverage. The DAS systems in place are not made redundant by the advent of 5G; far from it. 4G and 5G will coexist and therefore it makes sense to keep in place existing 3G/4G DAS system. However, a DRS solution can be added to address 5G needs giving a complete architecture that addresses all the needs of building users and flexible enough to adapt for the future of connectivity.

### HOW DOES THE RFS TECHNOLOGY WORK?

In January 2022, we expanded our HYBRIFLEX portfolio to add three additional solutions. Each targets the specific challenges and requirements in active distributed antenna system (DAS), distributed radio system (DRS) and small cells deployments to enable the delivery of indoor and cross campus 5G connectivity.

The HYBRIFLEX® portfolio is a mix of fiber only and hybrid cables. The hybrid solutions mean a single network can be used to support traditional Ethernet services as well as high-bandwidth and mission-critical wireless services from 50 MHz to 6 GHz. The fully converged network provides wireless coverage for applications that use PMR, UHF,

### Tackling triple play challenges

Triple play services deliver data, voice and video traffic across a network. Although this expectation is nothing new, existing solutions are typically designed to deliver connectivity in ‘bursts’ for data services, not the continuous stream that is needed for voice and video. The result is that many networks are being clogged with re-transmits due to poor connectivity. The RFS solution addresses this by allowing an architecture that is designed to deal with modern connectivity needs, using single mode fiber and Angled Physical Contact (APC) to ensure no re-transmits.



TETRA, wireless LAN, Wi-Fi, Z-Wave IoT, RFID and 5G technologies, among others. With the RFS hybrid solution, any remote devices can now be connected to one cable that provides access to high-bandwidth optical fibers and a single, uninterrupted power supply.

This has been used in RFS DAS solutions for decades, however, the new suite of solutions allows this to serve DRS systems that are designed specifically to cope with the challenges of 5G indoors.

The versatility of the HYBRIFLEX cable means it can be deployed in many configurations, including as part of the layered DAS/DRS approach that offers customers the best of both worlds when it comes to indoor coverage. For the DRS solutions, they can be offered with both integrated or separate radios and antennas depending on customer needs. This ensures optimum wireless coverage that is enabled by the directionality and MIMO capabilities of RFS solutions.

We can assist a customer with determining which approach will work best for their needs with consultancy services ranging from system design to construction, installation, and integration, ensuring the system is designed and implemented in line with the end-users' requirements.

### IN PRACTICE

We have seen how the technology works, now we can look at exactly how the HYBRIFLEX solutions will be installed to address a range of connectivity needs in different environments.

### CASE STUDY 1



#### PLUG-AND-PLAY CONNECTIVITY SOLUTION

**Application:** Inside a Data Center

##### The Challenge

Delivering high volumes of data reliably at extremely high-speeds to ensure uninterrupted transfer between the data centers and the end user.

##### *How HYBRIFLEX can help?*

In the average tier 1-2 data center, 24k miles of network cable is used. Although storage is a key part of the offering from a data center, fundamentally the transport of that data has a much more immediate impact on the customer. Therefore, ensuring that the network within a data center is running smoothly and capable of delivering consistently is vital.

The HYBRIFLEX plug-and-play connectivity solution features high-density Multiport Terminal (MPT) Multi-Fiber Push On (MPO) connectors that minimize the time and effort required to install and terminate large amounts of fiber in buildings. The solution is ideal for buildings, like data centers that have extremely high bandwidth requirements, and a reliable answer to the question of how to manage the challenges of data transportation.

### CASE STUDY 2



#### CONVENTIONAL INDOOR/OUTDOOR CONNECTIVITY SOLUTION

**Application:** Inside a university campus

##### The Challenge

With more classes remaining online following two years of lockdown, it is clear that the hybrid model of in-person and online learning is here to stay. With that shift, it becomes more essential than ever before to have the connectivity infrastructure across a university campus needed to support this.

##### How HYBRIFLEX can help?

To deliver the connectivity needs prompted by a change in learning and teaching styles, there needs to be a network system in place that is easy to manage for IT teams and reliable enough to meet the needs of all on campus.

The HYBRIFLEX conventional indoor/outdoor connectivity solution combines the simplicity of the plug-and-play solution with a much larger footprint that can cover both indoor and outdoor environments. It extends reliable, high-bandwidth connectivity and RoF application delivery within and between buildings on campuses of any size and complexity. The solution is ideal for deployments where high-density and mission-critical connectivity are not required and can layer over existing connectivity infrastructure to ensure minimal disruption.

### CASE STUDY 3



#### MISSION-CRITICAL CONNECTIVITY SOLUTION

**Application:** Inside a manufacturing facility that needs security

##### The Challenge

When it comes to security, mission critical connectivity is essential. Reliability is always important for connectivity, however when safety and security are involved it is vital that there is contingency to ensure connectivity is constant and able to support connectivity to CCTV and IoT security devices, for example.

##### How HYBRIFLEX can help?

In this environment, speed alone is not enough to adequately address the needs of the customer. Rather than the plug-and-play HYBRIFLEX, it therefore makes sense to use our Mission Critical solution.

This offers a single hybrid cable and a single, uninterruptable power supply to deliver traditional Ethernet services as well as mission-critical wireless services. The solution provides the high reliability and power supply security needed to support mission-critical wireless applications, in this instance CCTV cameras and remote IoT devices that form part of the security system.



### **FUTURE READY SYSTEMS FOR INDOOR CONNECTIVITY**

Alongside the need to meet customer demands to have access to connectivity everywhere, there are a number of big motivating factors to deliver indoor coverage for 5G networks. From revenue opportunities for operators, to elevating the service that universities are able to offer when it comes to online learning, there is a huge incentive from a variety of stakeholders to ensure reliable indoor coverage.

At RFS we work closely to understand the needs of our customers, the challenges they face and the opportunities for their industry. We then work to develop solutions that are designed with their specific challenges in mind. This gives us one of the most comprehensive portfolios on the market that is customer centric and can support a variety of approaches to in-building coverage, meeting a range of requirements.

Alongside the array of solutions themselves RFS offers a full suite of professional services which means we can assist customers with every step of the 5G journey from planning services, to installation and commissioning. Delivering 5G in-buildings will ultimately be a huge factor in the success of the network generation. However, it is far from a one size fits all problem, and so ensuring a range of solutions, each tackling specific challenges in a different way will be key to ensuring no matter the industry or starting point, our customers can capitalize on all 5G has to offer.



## ABOUT RFS

Radio Frequency Systems (RFS) delivers the end-to-end RF solutions and expert services needed to evolve wireless and broadcast networks today and tomorrow. Our cables, connectors, antenna systems and RF conditioning products are based on more than 120 years of experience delivering cutting-edge RF solutions and industry firsts. As a result, our solutions are recognized globally for their innovation, superior performance and unmatched quality.

As an ISO-compliant company with global operations, we bring our customers world-class engineering and manufacturing skills backed with comprehensive local support services. Our customers know they can rely on our expertise and commitment to excellence from initial design to final delivery and beyond — whether they're looking to support 5G, deploy small cells, empower smart cities or improve indoor coverage in the most challenging locations.

For more information, visit [www.rfsworld.com](http://www.rfsworld.com)

Follow us on Twitter: [www.twitter.com/RFSworld](https://www.twitter.com/RFSworld)

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