

# SPINNER

## In-Building Wireless Solutions

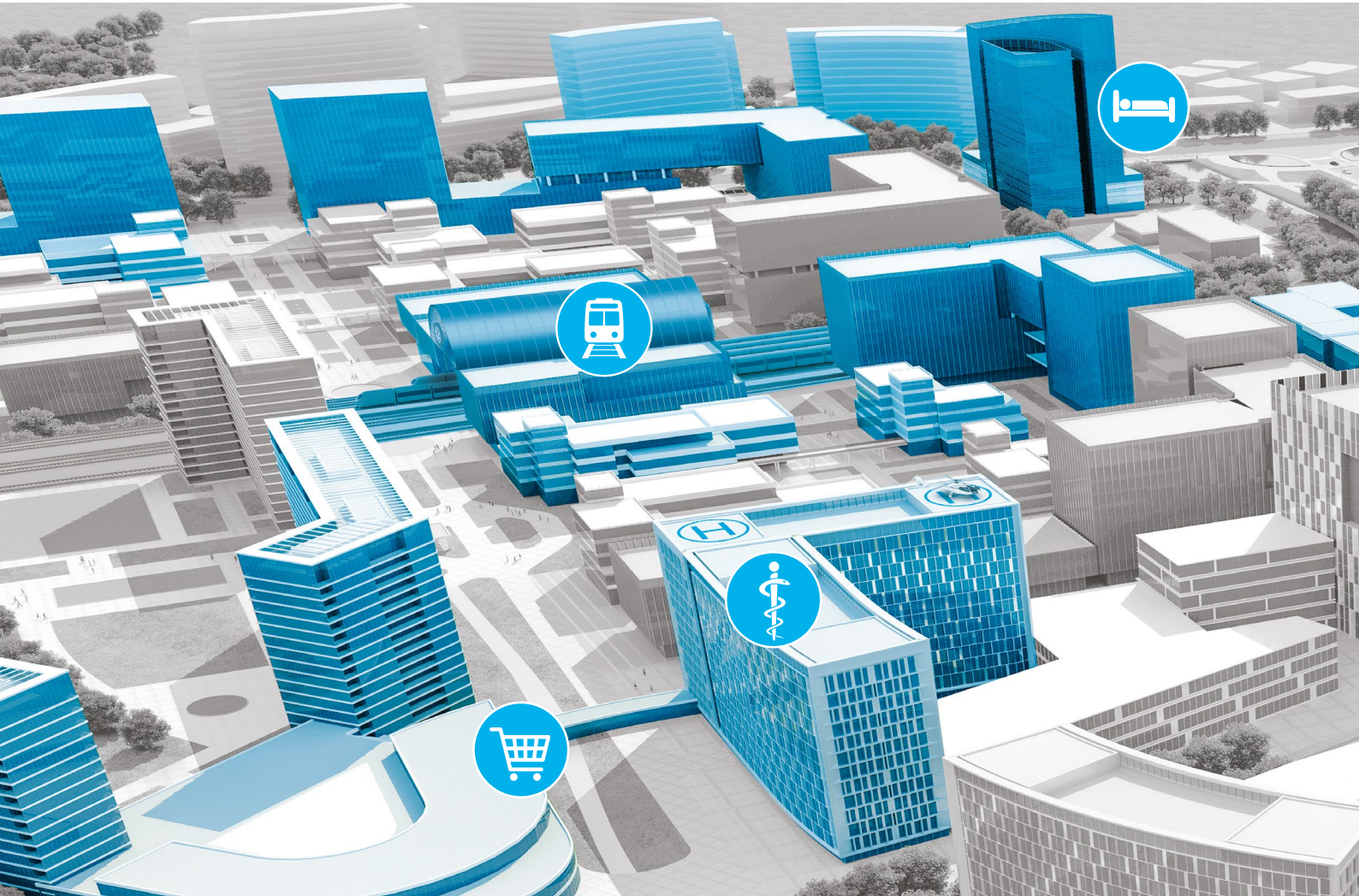


Putting the Power of  
Passive Systems to Work for You

HIGH FREQUENCY PERFORMANCE WORLDWIDE  
[www.spinner-group.com](http://www.spinner-group.com)



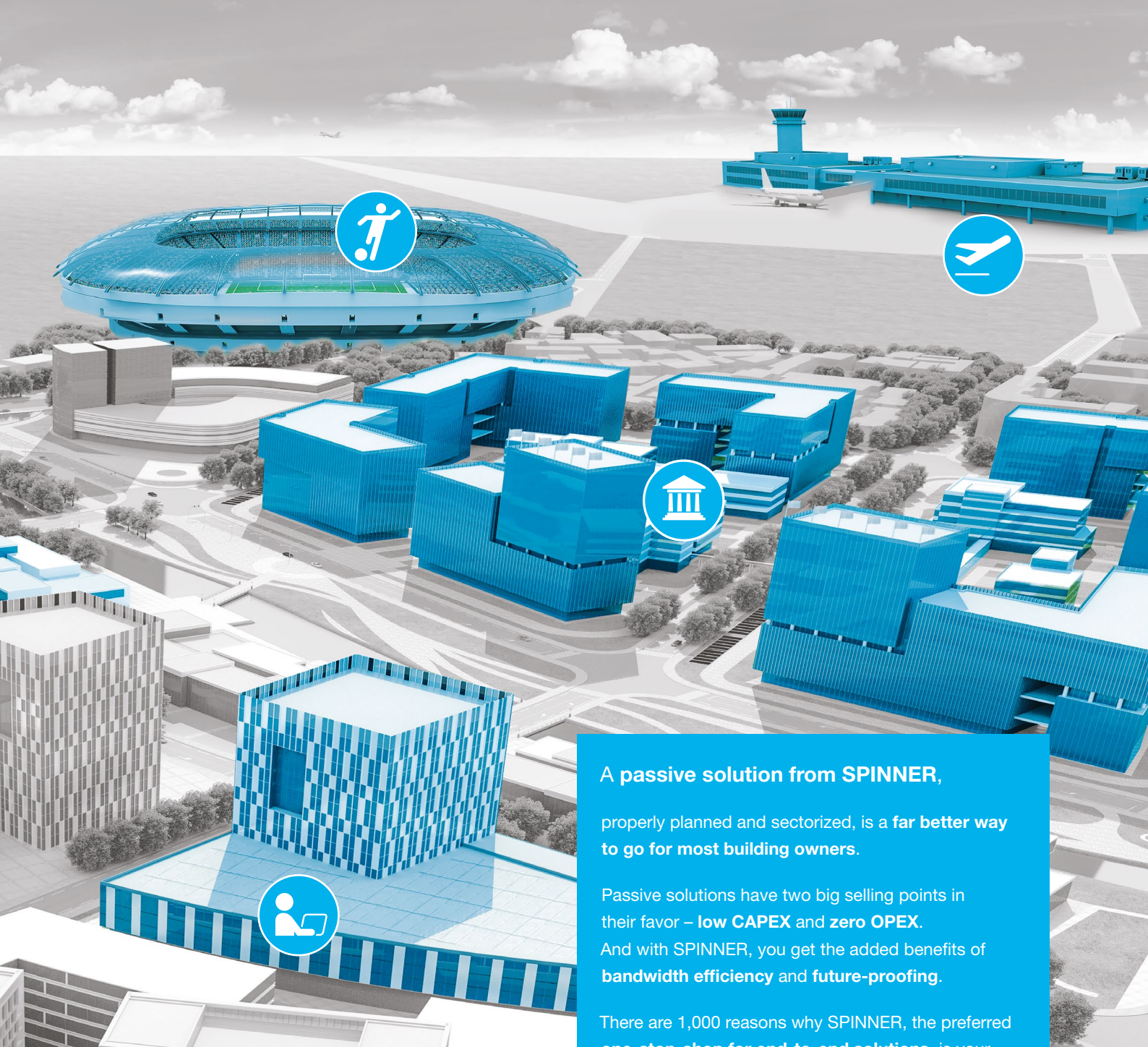
# In-Building Wireless Solutions for Most Every Venue



**Building planners, owners and operators, mobile network carriers, electrical contractors, installation companies and everyone else looking for the right in-building solution have to answer one question: Which technology provides the biggest bang for the buck?**

The big pain-point for all is the **up-front investment**. **Maintenance costs** and **technical overhead** are an issue for owners and operators' accountants, while **bandwidth utilization** and **radio interference** gives their technicians cause for concern. SPINNER has an answer to that question – passive systems put all those concerns to rest.

SPINNER has its roots in Germany, and German engineering is revered the world over. While the occasional detractor may gripe about a tendency towards over-engineering, we have found the opposite to be true when it comes to **in-building communication solutions**. Some of our offshore competitors want to move a pricy mountain of technology to fix a molehill of a problem. Not SPINNER. We deliver solutions that are **sized to fit and grow as you**. Less may well mean more for you and your building.



## In Praise of Passive Systems

If you are in the market for an in-building solution, you may have read case studies in praise of active technologies. They can indeed deliver great performance – if you happen to own or have been contracted to install communications equipment in very large complexes. An active solution deployed in the wrong venue and for the wrong reasons will saddle you with a pricey and inflexible solution.

Known for their premium quality, SPINNER's standard off-the-shelf components and systems meet every need for the vast majority of projects. However, if you have something more demanding in mind, we will be happy to deliver a custom solution.

### A passive solution from SPINNER,

properly planned and sectorized, is a **far better way to go for most building owners.**

Passive solutions have two big selling points in their favor – **low CAPEX** and **zero OPEX**. And with SPINNER, you get the added benefits of **bandwidth efficiency** and **future-proofing**.

There are 1,000 reasons why SPINNER, the preferred **one-stop-shop for end-to-end solutions**, is your go-to choice for passive solutions – the stellar references we earned in as many projects.

If you wish to learn more about the tech that made these projects so successful, read on.



# Keeping the CAPEX Blues at Bay and the ROI Rolling



Comparing the price/performance ratios of active and passive in-building solutions is an interesting exercise, especially for your accountants.

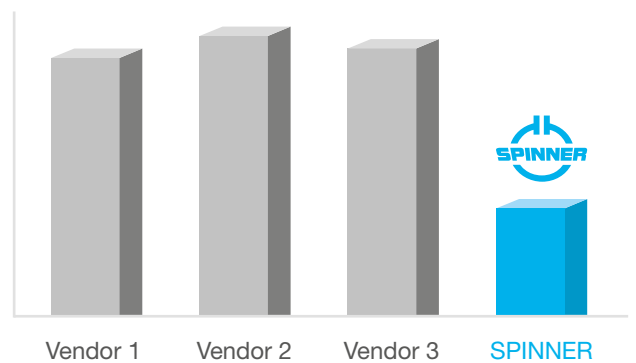
Active solutions usually cost twice as much as a comparable passive option.

In our experience, it is not unusual for a passive system to be far more affordable with as much as

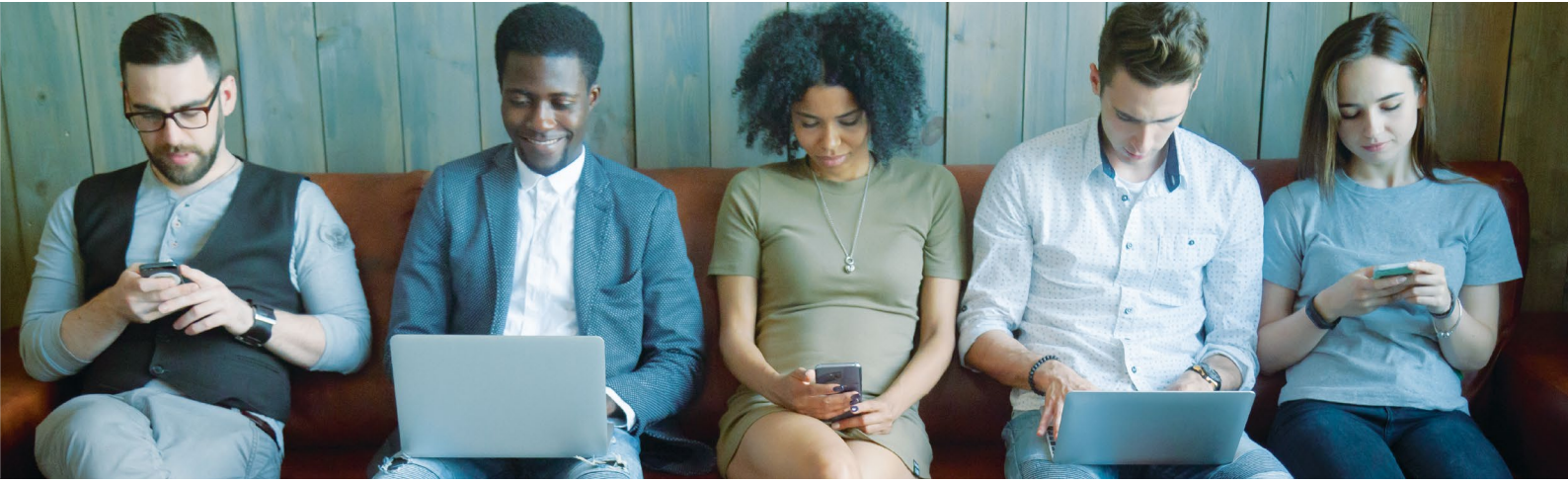
# 60% lower CAPEX

Normally, you would expect a far lower price like this to come at the cost of far lower performance. Surprisingly, this is not the case. A **good passive solution**, well designed and executed with the best technology, **can compete with active solutions' performance and beat them easily in a price comparison.**

Experience teaches that passive systems can even be made to **cover vast venues and handle high-volume traffic.** And our all-passive multiband combining systems also deliver excellent service in smaller venues such as office buildings.



## Near Zero OPEX



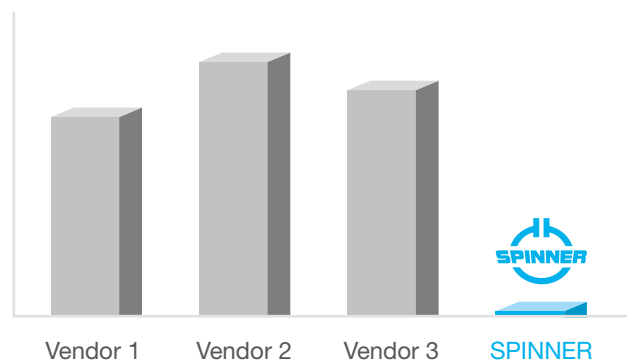
**None to speak of** – that is the answer to questions about the **operating expenses for passive solutions**. Our combining systems require **neither electricity nor air conditioning**. They **do not wear**. Operating, monitoring and maintenance costs for the system are **zero**. There is **no system updating or servicing**, so unexpected and unwanted side effects are not a concern, as are the follow-up costs of finessing your way around discontinued products.

There is but one operating expense point for passive solutions – the cost of floor space. It is minimal for our combining systems, which come in rack-mount and standalone versions.

**The only OPEX for a SPINNER solution is the cost of its remarkably small footprint in the building.**

**Compared to an active system, the savings add up to**

# 99% lower OPEX



We could go on and on about passive systems' OPEX advantage, but we'll let a satisfied customer speak for us: **"Building proprietors want a straightforward solution that will do the job for 15 to 20 years without the need for any changes or upgrades. A long service life is expected, and ideally it should require no maintenance. This can only be achieved with a passive system. Once it is in place, the only costs incurred are for the space occupied by system components, which are minimal in any case,"**

said Mr. Hervieu, Associate Director at LD Expertise, about our solution in the ultra-advanced #cloud.paris office building in Paris, France.



# It's All About Bandwidth

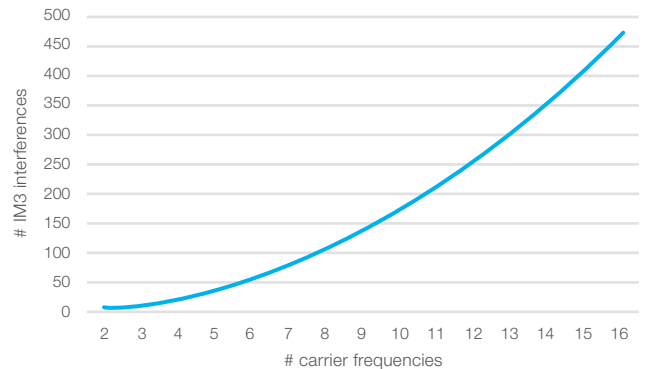
**Conventional wisdom says you can't have both, a low price and high performance. Not true – you don't have to settle for a trade-off between the two with a SPINNER passive system. Our solutions make the most of available bandwidth by minimizing passive intermodulation (PIM) and reflection, while maximizing isolation.**

Multiple frequencies sharing the same transmission medium can cause passive intermodulation. The more frequencies that are mixed, the higher the probability that these mixed signals will occupy the useful signal bands (see chart on the right).

A mismatched product lacking the proper impedance causes reflections. This reflected signal adversely impacts the transmitted signal. Isolating filters separate the good signals from the bad.

All three factors affect the signal to interference plus noise ratio (SINR), a measure of a useful signal's quality that is degraded by a noise signal. Noise signals are always present. The lower the SINR, the poorer the system's transmission rate. The graph on the right illustrates how PIM, reflection (VSWR) and isolation affect the SINR. It, in turn, affects the transmission rate, bandwidth utilization, your total cost of ownership and user satisfaction, as the chart on the next page shows.

The overall performance of a system depends on its weakest component. The slightest malfunction at any point in the network can have a significant impact on all other components, no matter how high the quality, and can significantly impair overall performance.

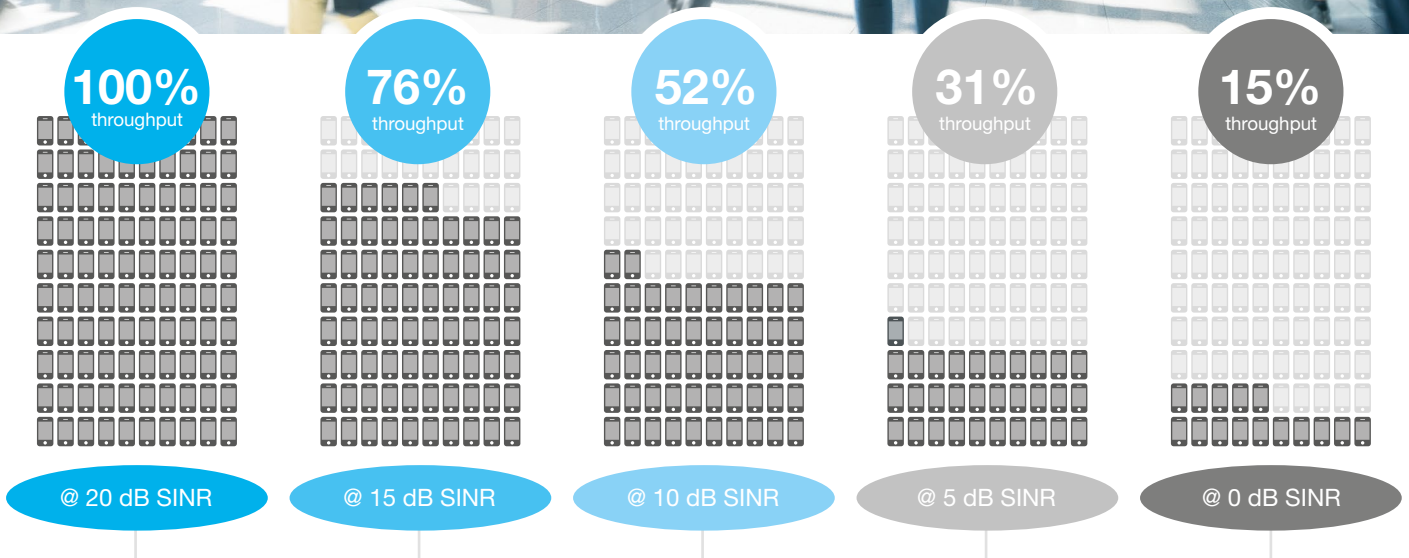


#cloud.paris office building  
France

This kind of powerful performance lets you make the most of available bandwidth. But don't take our word for it; we'll let the #cloud.paris office building's Mr. Hervieu speak for us: **"We are relying on a SPINNER Multiband Combining System to ensure mobile communications throughout #cloud.paris. The overall performance is outstanding and technically first-rate. It gives us access to the maximum available bandwidth and ensures fault-free operation."**



# Bandwidth & User Satisfaction – It’s Both or None



**Good network performance lowers TCO and improves customer satisfaction**

The higher the quality of a combining system, the higher the transmission rate. **SPINNER combining solutions deliver this premium quality – they achieve the highest transmission rates on the market.**



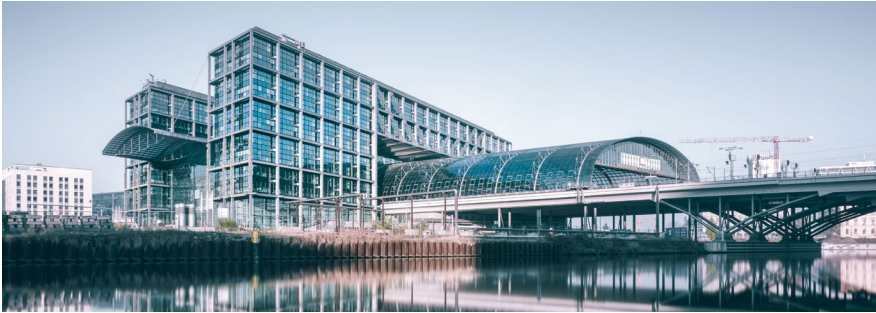
**Village Mall**  
Rio de Janeiro

Perhaps you would like a second opinion. Then let us refer you Gerson Monteiro, in-building systems engineer at Oi. Commenting on our system in Rio de Janeiro’s Village Mall, he said, **“We’ve been impressed by the excellent quality of SPINNER’s MNCS system. Low insertion loss and PIM as well as high isolation are critical for in-building systems and SPINNER’s system has convinced us by delivering the best technical performance. We also saw the flexibility of MNCS as an advantage since we did not know in the beginning which radio technologies and operators would be going to join the system. The modularity of the MNCS system with its expansion possibilities is unique.”**



# The Right Solution for Every Venue

No matter how many operators you have to integrate or how big the complex happens to be, we can help you find the right solution.



## Combining

SPINNER in-building solutions range from simple multiband combiners to custom solutions tailored to the venue.

### Scalable solutions



#### Multiband Combiners

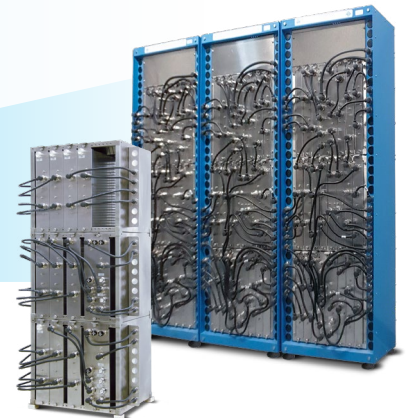
Ranging from diplexers to hexaplexers and all points in between, our ultra-reliable **multiband combiners handle a wide variety of all commercially used bands.**



#### Multiband Combining Systems

These standard off-the-shelf systems run the gamut from a 2:1 solution with two inputs and one output to the high-end 20:4 solution with 20 inputs and four outputs for up to four operators with five bands each.

SPINNER couplers feature **unique isolation** designed to separate operators' bands and make the most of available bandwidth.



#### Mobile Network Combining System, or MNCS® for short

This premium solution **gets the job done when the various operators' bands are very close together.** We configure your MNCS® solutions to fit, cleanly separating the bands with filter settings adjusted to match the frequencies to be combined in your projects.

A typical MNCS® system with four operators and four bands each separates bands with around 80 dB interband isolation and around 40 dB intraband isolation.



## Distributed Antenna System (DAS)

Our top-drawer splitters, tappers and antennas distribute the combined signals. We also provide all the CPR cables and jumpers you need.



### Symmetrical and Asymmetrical Splitters (tappers)

Our symmetrical splitters distribute the signals evenly to all outputs; our asymmetrical splitters distribute the signals unevenly.

### Antennas

Antennas at the end of the distribution system transmit the signals.

### Jumpers and Cables

Our ready-made jumper cables connect components in the distribution system. We also offer cables and connectors for on-site assembly to meet the given requirements.

This is just a very small glimpse of what SPINNER, your go-to one-stop shop for end-to-end solutions, has to offer. To learn more about the entirety and details of our offer, visit [www.spinner-group.com/in-building](http://www.spinner-group.com/in-building).

## Our Mobile Network Combining System, the MNCS®

Several mobile network operators' neighboring frequencies may have to be combined for your in-building projects. Your best choice for that is our MNCS®. Featuring powerful filters for high interband and intraband isolation, low attenuation and low PIM, it is the perfect solution when the situation calls for the best possible isolation between bands. We will ship it to you custom-tuned for the given bands, configured to meet your project's requirements, and ready for use immediately upon delivery.

MNCS®'s passive technology is maintenance-free, with **no operating costs,** no upgrading and no replacing discontinued parts years down the road.

MNCS®'s components last and last. With that kind of performance, you can count these systems to operate smoothly while making the most of available bandwidths.



“The SPINNER MNCS® system has already yielded outstanding results in many of our projects. We simply submit our specifications, and SPINNER very quickly builds a tailored, perfectly calibrated system that optimally meets our requirements. The carriers are very effectively isolated from one another, and the passive intermodulation is negligible. Plus, the SPINNER MNCS® gives us flexibility for later extensions,” says Hans Rolf Lopau of Deutsche Telekom AG. “

Elbphilharmonie  
Hamburg



SPINNER MNCS® enables mobile coverage in **Gardens by the Bay** Singapore

## Peace of Mind for Many Tomorrows to Come

With new transmission technologies elbowing older tech out of the way every few years, you need your communication solutions to be future-proof. With the benefit of their flexible modular design, our MNCS® **may be easily extended on the fly** when you need to integrate more operators and new sectors later down the road.

**Adding new bands is an exercise in convenience** with SPINNER components. Our splitters and tappers can handle frequencies ranging from PMR (professional mobile radio) to 3.8 GHz (5G).

With that kind of bandwidth, these models are **ready today to cover tomorrow's demands**. If the frequency plan changes, the system will be tuned to the new requirements.

There are other ways in which passive systems are future-proof – they **reduce network complexity** and are **better protected against eavesdroppers** and **less susceptible to sabotage** than active solutions.

**Installed in venues small and large,**  
our passive systems feature in **more than 1,000** projects worldwide.



**Vodafone Campus**  
Düsseldorf

**“It was the SPINNER quality and flexibility that convinced Vodafone to use the SPINNER MNCS® system in this single operator project. If the actual demand differs from the original plans, both the rapid and efficient extension of the capacities is possible, as well as the addition of further sectors,”** **“**  
said Vodafone project manager Mr. Kirchhof.



## HIGH FREQUENCY PERFORMANCE WORLDWIDE

SPINNER designs and builds cutting-edge radio frequency systems, setting performance and longevity standards for others to follow. The company's track record of innovation dates back to 1946, and many of today's mainstream products are rooted in SPINNER inventions.

Industry leaders continue to count on SPINNER's engineering excellence to drive down their costs of service and ownership with premium-quality, off-the-shelf products and custom solutions. Headquartered in Munich, Germany, the global frontrunner in RF components remains the first choice in simple-yet-smart RF solutions.

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