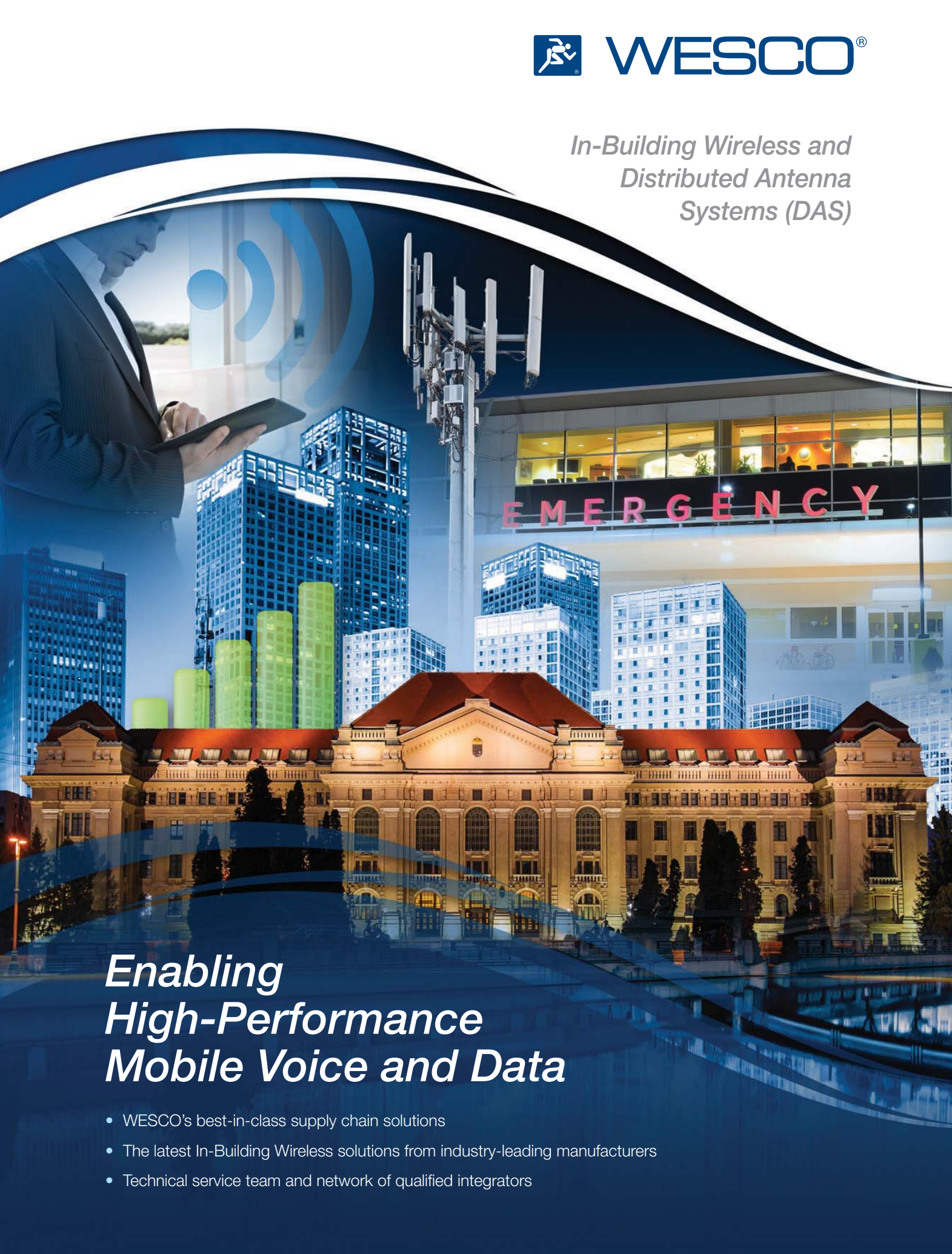


*In-Building Wireless and
Distributed Antenna
Systems (DAS)*



The background is a composite image. On the left, a man in a dark suit is shown from the chest up, looking down at a tablet device. Behind him are blue and green concentric circles representing a wireless signal. The rest of the background is a night cityscape. In the foreground, there is a large, classical-style building with a red roof and many windows, illuminated from within. Behind it are several modern skyscrapers with glowing windows. A tall antenna tower with multiple vertical elements stands in the middle ground. The word "EMERGENCY" is written in large, red, capital letters across the middle of the image, superimposed over the buildings. The overall color palette is dominated by blues, greens, and reds.

Enabling High-Performance Mobile Voice and Data

- WESCO's best-in-class supply chain solutions
- The latest In-Building Wireless solutions from industry-leading manufacturers
- Technical service team and network of qualified integrators

Your One Source for Data Communications, Security and Electrical Solutions



WESCO is a full-service, global supply chain company providing you with leading products, services and solutions to meet your MRO, OEM and capital project requirements. As Your One Source for Data Communications, Security and Electrical Solutions, we get what you need.



WESCO
DISTRIBUTION®

Supporting the Demand for Mobile Voice and Data Indoors

The ways we are weaving mobile technology into our daily activities, personal and professional, are seemingly endless. We've become dependent on wireless connectivity. This dependency has created the expectation that, regardless of location, you will be able to make a call, check email, stream video and operate a host of mobile applications. Not long ago, this expectation would have been unrealistic. So what has changed? In a word, *everything*.

Have you ever...

- ...responded to an email in the grocery store?
- ...viewed an online advertisement while at the mall?
- ...streamed videos in a client presentation?
- ...made a cell phone call in a high-rise building?

If you answered yes to any of these, you likely used an In-Building Wireless System, or needed one.

Benefits of an In-Building Wireless System

- **Customer and tenant satisfaction**

Meet your occupants' expectations for coverage everywhere

- **Capacity for future demand**

Support the increase in connected devices and applications

- **Compliance with building safety ordinances**

Support emergency service radio transmissions and E911/First Responder Requirements



Expanding Beyond the Limitations of the Macro Network

The macro network is the overall wireless connectivity made available by cell phone/mobile data service providers. It is designed to serve outdoor, ground-level communications with an average population density.

Carriers have done a phenomenal job providing coverage and upgrading networks to support higher-speed technologies. However, there is a limit to what these highly engineered macro networks can accomplish indoors, in densely populated venues and anywhere increased coverage and capability is required.

Cellular service outdoors is supported by towers that aim downward. At approximately the 15th floor of a high-rise, you begin to lose signal. The macro network sufficiently penetrates most small buildings and residential construction. However, introduce metal roofing, concrete, cinder block and energy-efficient window glass, and your signal is gone. To provide the communication services your occupants expect, you need an In-Building Wireless System.

Outdoor



20% Users
80% Coverage

Indoor



80% Users
20% Coverage

Does Your Property Require a Campus or In-Building Wireless System?

- High-rise buildings
- Service required below street level
- Energy-efficient glass
- New construction, where it may be mandated by state and federal codes
- Densely populated indoor or outdoor venues
- Mass notification needs, such as SMS texting on campuses or flight notification in airports

Market Drivers for In-Building Wireless

- Proliferation of wireless devices
- Demand for 100% coverage of cellular voice and data
- Energy-efficient construction materials
- Building and new construction safety ordinances

Active DAS



Active DAS

Active DAS uses active electronics at the end points. They distribute signal through managed hubs, remote access units and standard Category and fiber optic cabling. Fiber optic links can carry the signal up to 6km from the expansion hub to the main hub across singlemode fiber. Active systems are highly configurable for supporting converged wireless services and include options for connecting via existing UTP infrastructure and Passive Optical LAN.

Passive Hybrid and Active DAS for Campus and In-Building Wireless

Passive Hybrid DAS



Passive Hybrid DAS

The Passive Hybrid DAS uses a combination of antennas, coaxial cable, splitters and fiber optic cable. The term “hybrid” is an evolution from a predecessor, the Passive DAS, which used coaxial cable in both the horizontal and vertical space. Passive Hybrid systems use coaxial cable in the horizontal and fiber optic in the vertical risers. The purely passive solution has fallen out of favor due to the amount of signal loss that occurs over multiple runs of 50 ohm coaxial cable.

Implementing an In-Building

>>> Needs Assessment and Site Survey

>>> Design and Proposal

>>> Build

>>> Test

Implementing an In-Building Wireless solution requires a systematic approach.

There are numerous technologies, configurations, regulations and carrier requirements to consider. WESCO will help you navigate this process to ensure a successful outcome that meets your budget and performance expectations.

Step 1 **Requirements: Needs Assessment and Site Survey**

The physical environment, construction, occupancy and reason for your interest in the solution are essential to the design. In the Site Survey, your integrator will measure existing coverage from the macro network, identify suitable equipment locations and inspect cabling pathways. They will identify signal obstructions such as firewalls, shielding and fortified construction. Such obstacles are common in hospitals, police stations and government buildings and can be accounted for in the design. Whether you're installing a DAS to satisfy mission-critical requirements or to complement other wireless systems, your WESCO Technical Solutions Engineer, along with recommended integrator partners, will identify your requirements and design a solution to meet your needs.

Step 2 **Design and Proposal**

Based on the analysis of your Needs Assessment and Site Survey, WESCO will review with the systems integrator design options for the system layout. The plan will include locations for antennas, equipment, cable runs and a model of the predicted coverage. WESCO can coordinate communications between the systems integrator, facilities owner and service providers to keep your project on schedule. Once the design is approved by the carrier(s), we coordinate a proposal that includes project scope, pricing and project timeline.

Step 3 **Build**

WESCO supports the build-out of your system, providing the material, project staging, and reporting to keep your project on time and all stakeholders aware of progress. Your integrator will begin with installing the cabling and connectivity infrastructure, testing at regular intervals to ensure proper terminations.

Wireless System

and Commission >>> Documentation and Warranty

Step 4

Test and Commission

Once the infrastructure and active equipment are in place and coverage is confirmed, it is time to run the final system test. The system integrator, working with the carriers, will install the necessary equipment to connect to their networks and conduct a systems test. Upon passing system inspection, the Retransmission Agreement will be executed, and your system will be connected to the carriers' network(s).

Step 5

Documentation and Warranty

Your certified integrator will provide your warranties and system performance report, in addition to services related to the manufacturer warranty. WESCO can assist you in reviewing the final commissioning and system performance report upon completion of the project. Many integrators offer service level agreements, monitoring options and annual inspections to ensure your system continues to operate at peak performance. Keep in mind that future changes may require inspection and adjustment to accommodate building additions or the construction of other obstacles such as shielded, brick, concrete or cinder block walls.

In-Building Wireless/ DAS Product Solutions

Passive Hybrid DAS

- Coaxial Splitters
- Low-Power Systems
- RF Enhancers

Active DAS

- Head-End Units
- Remote Access Units
- Interconnect Units
- Radio Interface Modules

Antennas

- Indoor/Outdoor
- Directional/Omnidirectional

Cabling & Connectivity

- Fiber Optic
- Coaxial
- Category Twisted Pair
- Composite Fiber/Copper for DAS and PoE
- RF Cable

Wireless/DAS Enclosures

- Indoor/Outdoor
- Wall or Ceiling Mount

In-Building Wireless and DAS **FAQs**



Q: *What is the difference between In-Building Wireless and DAS?*

A: In-Building Wireless (IBW) is the umbrella term that covers all solutions for supporting wireless signal indoors. IBW includes Distributed Antenna Systems (DAS), as well as Repeater Systems, Microcells and Distributed Radios (Small Cell).

Q: *How do I choose between the various types of IBW?*

A: This depends on many factors, beginning with your building's size, construction, occupancy and the carrier network in your area. For a large enterprise building, you will often be directed toward a DAS because Repeaters, Micro Cells and Small Cell are often not appropriate for in-building applications.

Q: *Are all Distributed Antenna Systems created equally?*

A: While an enterprise will generally be limited to a DAS solution for IBW, there are options. DAS falls into two distinct categories: Active DAS and Passive DAS. Each system offers benefits in cost and functionality. It is recommended that you consult with WESCO to determine the best initial options for your application.

Q: *Do I need a strong outdoor signal for good results?*

A: No. In fact, if your outdoor signal isn't full strength, your coverage indoors will be better than outdoors when your DAS system is connected to the cellular network.

Q: *What does "Active" DAS mean?*

A: Active DAS uses active electronics at the end points, rather than passive antennas. Active systems provide a wide variety of features and benefits. They can incorporate wireless support for Wi-Fi and connect to existing cabling infrastructure or a Passive Optical LAN. With a properly installed Active DAS, you can obtain superior system integration and extended distances of cable runs.



Q: *What does “Passive” DAS mean?*

A: Passive DAS works sort of like a sprinkler system. Antennas are distributed throughout the building to receive wireless signal. Coax brings the signal from each antenna to an Organizer on each floor that sends the signal to the Head End, and finally a roof Antenna aimed at the nearest cell tower. Passive DAS is available in two varieties, Hybrid and Standard. Standard uses coax in the vertical and horizontal. Hybrid DAS uses coax in the horizontal and fiber in the vertical. Hybrid systems are generally preferred due to the versatility and ease of installation in using fiber cable.

Q: *Which system is most affordable?*

A: While Passive components can be less expensive, cabling and operating limitations can make overall costs higher. Active equipment can be slightly more expensive, but the connectivity may use existing infrastructure or lower cost fiber, and additional system features often make it the best value. The bottom line is that the system must be suited for your premise and requirements. WESCO is an authorized, stocking distributor of industry-leading DAS equipment. We will help you identify the best possible solution.

Q: *Will my In-Building Wireless solution address state and federal ordinances?*

A: DAS can support first responder RF signal, Location-Based Services (LBS) and Public Safety regulations. The coverage your DAS provides is dependent on the type of system installed. Your integrator should be aware of all state, local and federal requirements for your facility.



More Questions on Campus and In-Building Wireless Systems or DAS?

To discuss your questions and your specific application, contact WESCO's Technical Solutions Engineers today.

Call: 877.462.7279

Create a DAS That's Right for Your Enterprise with WESCO

WESCO provides complete, customized solutions to help you implement a DAS for Campus and In-Building Wireless. Rely on the WESCO ecosystem to help you select, design and install a system that works with your:

- Physical facility layout and construction
- Applicable state and federal codes
- Carrier requirements
- Performance demands
- Budget constraints

Complete Sales Support

WESCO Technical Solutions Engineers, in combination with our network of certified integrators and industry-leading manufacturers, offer specification and design support for your networking, data communications, security and electrical needs.

Around the World or Across the Street, We Keep Your Business Running

WESCO is much more than a data communications, security and electrical distributor. We are a full-service, global supply chain company providing you with leading products, services and solutions to meet your MRO, OEM and capital project requirements.

A majority of Fortune 500 companies use WESCO as their "one-stop shop." The breadth and depth of our capabilities, geographic footprint and supply base enable us to meet your needs and provide continuity to your operations.

WESCO is the world's fastest-growing global distributor of data communications and security solutions. We have expertise in the latest technologies from all industry-leading manufacturers and can provide you with unmatched extra effort and value-added solutions.



Upgrade Your Business with Value Creation

WESCO can help your business maximize productivity while saving money. Our extensive line of WESCO Value Creation Solutions can streamline operations in a variety of areas by providing energy, project management, working capital and procurement solutions.

Providing Value Creation Solutions for:

- Communications
- eBusiness
- Energy & Sustainability
- Engineering Services
- Production Support
- Safety
- Security
- Supply Chain Optimization
- Training
- Working Capital