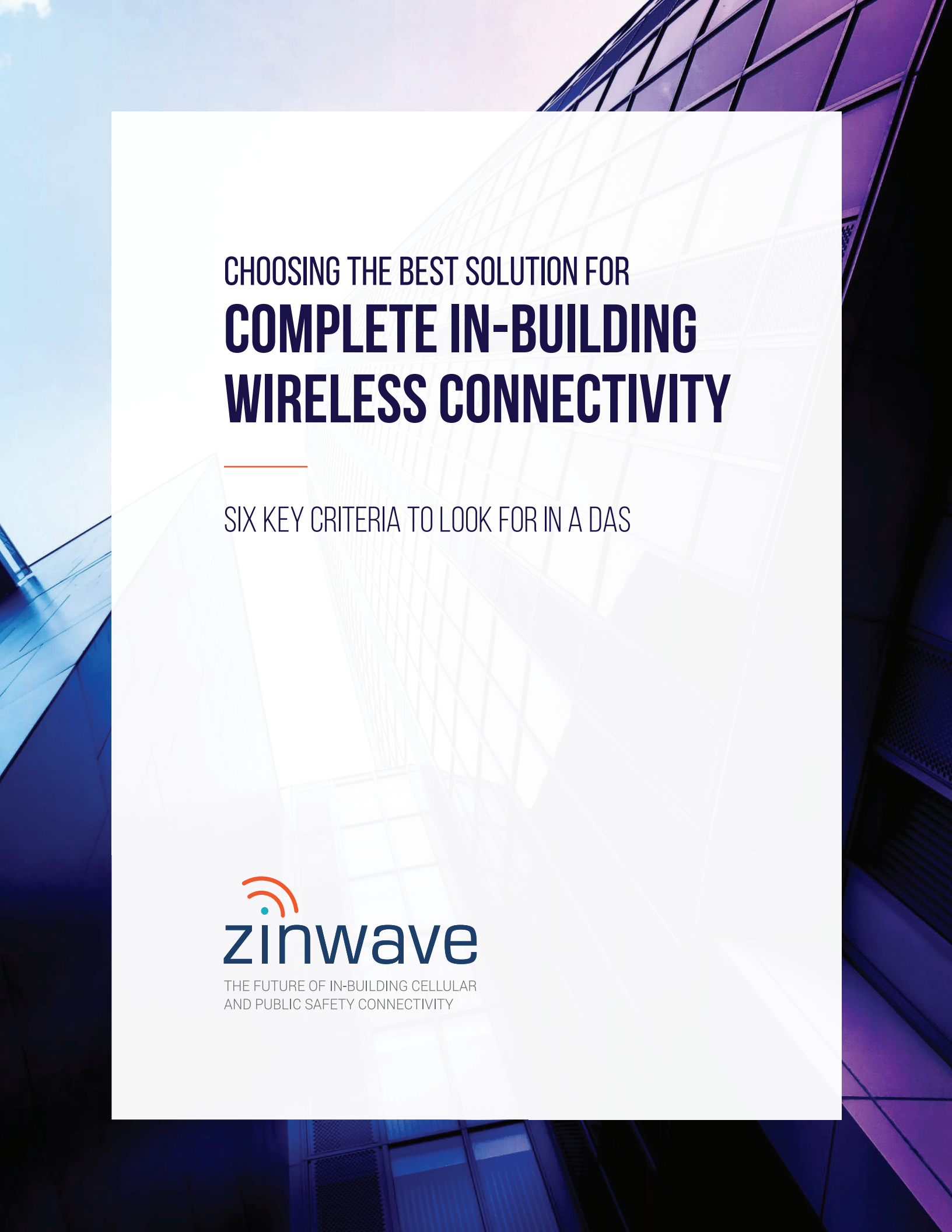

CHOOSING THE BEST SOLUTION FOR

COMPLETE IN-BUILDING WIRELESS CONNECTIVITY

SIX KEY CRITERIA TO LOOK FOR IN A DAS

zinwave

THE FUTURE OF IN-BUILDING CELLULAR
AND PUBLIC SAFETY CONNECTIVITY

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CONNECTIVITY IS ESSENTIAL

In Abraham Maslow's famous hierarchy of needs, the most essential human necessities (air, water, food and sleep) make up the fundamental human motivators in the base of the pyramid. The levels above comprise needs that are increasingly aspirational and less essential to survival. **Today, we can add another basic need to the pyramid's foundation: constant, reliable wireless connectivity.**

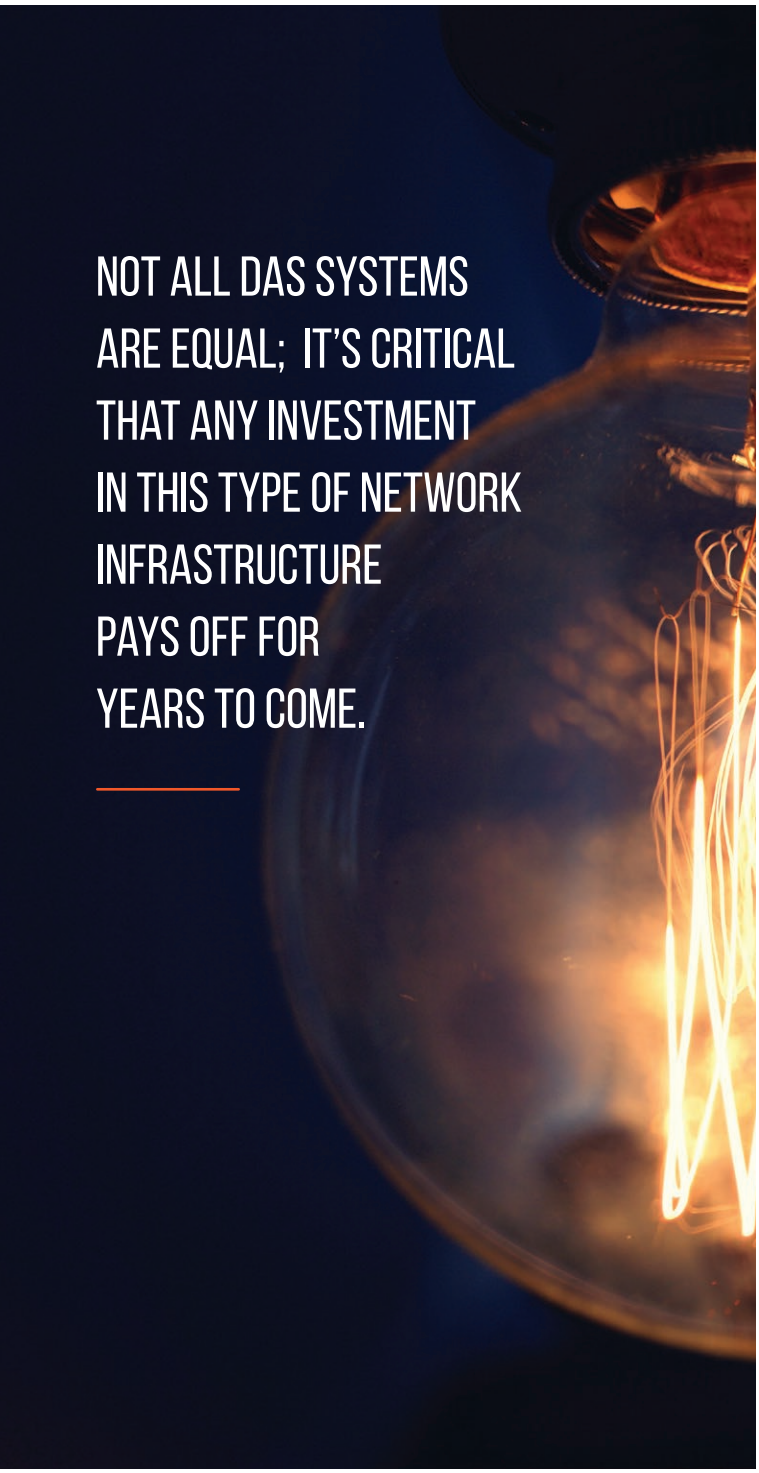
People rely on their devices, and connectivity is no longer a simple preference; it is a necessity. Mobile internet usage for the average U.S. adult has quadrupled over the past five years. Regardless of location, people expect to be able to connect to a reliable, high-speed network. However, indoor environments make a consistent connection difficult.

Cellular signals do not penetrate well into buildings. Dropped calls and interrupted data connections continue to plague the owners and occupants of office towers, medical centers, corporate campuses, airports, universities and other indoor environments.

It's a problem with far-reaching repercussions that range from lower customer satisfaction (resulting in higher churn rates) to decreased employee productivity and morale (resulting in higher turnover).

Today, 80 percent of cellular usage is generated or initiated indoors. For building owners and managers that want to ensure consistent, reliable indoor connectivity, a distributed antenna system (DAS) is the best wireless solution.

WHAT IS **A DAS?**



A DAS enables indoor cellular connectivity by bringing outdoor signals into the building and distributing those signals among strategically placed access points. The system ensures a strong signal throughout the building while minimizing the threat of interference. Because the signal used to support a DAS is separate from signals generated from outdoor cellular towers, the added capacity is dedicated to the building – unlike repeaters, which siphon capacity away from outdoor towers.

Considering a DAS utilizes an operator-approved and -supported cellular signal which is delivered into the building, users receive guaranteed quality of service, as opposed to the unreliable performance of Wi-Fi. Additionally, calls transition seamlessly from the outside network to the inside network as users move in and out of the building, something Wi-Fi does not guarantee.

DAS solutions are ideal in large environments that are densely populated, such as public venues, hospitals and large office buildings, for example. They are well-suited for all building sizes, but are optimal for buildings that are 150,000 square feet or larger.

However, not all DAS systems are equal, and it's critical that any investment in this type of network infrastructure pays off for years to come.

THERE ARE SIX KEY CRITERIA TO EVALUATE WHEN CHOOSING THE OPTIMAL DAS SOLUTION.

CRITERIA 1

A DAS SHOULD **GROW WITH YOU**

The ideal DAS solution is capable of supporting all of the most commonly used cellular, public safety and private LTE frequencies (like OnGo) upon the initial installation. This allows a business to utilize as few or as many frequencies as needed from the outset, and it allows additional frequencies or wireless operators to be added in the future with simple software updates instead of additional hardware upgrades.

The ability to incorporate these updates means the DAS system can support spectrum changes when wireless carriers expand their networks or as the Federal Communications Commission (FCC) opens additional spectrum. This is a "one-and-done" approach to hardware installation, which allows the original hardware layer to support all carriers and all frequency bands available today and in the future.

Some DAS solutions require multiple hardware installations to accommodate more frequencies. Not only does this have an immediate impact on business –because multiple installations might be required simply to have access to all currently available frequencies – but also in the future, when a business's needs change or when new spectrum becomes available.

This is critical because the state of wireless spectrum can change in the blink of an eye. For example, T-Mobile surprised the wireless industry in 2017 with its $8 billion purchase of 600MHz spectrum from the FCC. Buildings with an optimal DAS technology had the ability to easily upgrade their DAS with a software update to accommodate the newly introduced frequency.

WHAT SHOULD YOU BE ASKING?

Is the DAS solution flexibile enough to simultaneously support all cellular and public safety frequencies without adding more hardware?

IF THE ANSWER IS NO:

The business will be required to add more hardware to accommodate future technology needs. This is costly and disruptive, and may involve adding even more hardware, as well as adding cabling throughout the building. Furthermore, new layers added onto existing hardware may cause degradation in the existing system's performance.

DAS systems should not be ripped and replaced as new spectrum is released; the DAS platform is either ready for the future or it is not. Simple, inexpensive software upgrades should equip it for new spectrum in the future.

CRITERIA 2

A DAS SHOULD USE ALL-FIBER INFRASTRUCTURE AND BE SIMPLE TO INSTALL

Determining the type of cabling used for a DAS is crucial. As networks and capacity needs grow, all aspects of a broadband network are important. The more broadband support needed, the more traffic and capacity a network will need to carry.

Based on performance, fiber is the preferred cabling versus CAT6 or coaxial because it can carry higher traffic loads. It has the most bandwidth available, and it is simple, non-intrusive and costs less to install, test and maintain.

CAT6 has limited bandwidth and a 100-meter cable length allowance, which is not enough to span a large campus or very large building. Coaxial cabling also suffers high losses over distances, and is difficult, intrusive and expensive to install, test, and maintain. Depending on how the system is engineered, antenna points can be hard to access with coaxial cabling.

Fiber cabling is inexpensive compared to the alternatives, and is much easier to maintain. Because fiber is flexible, it can be routed around tight corners and other spaces where CAT6 or coaxial cable can't go. The added flexibility also speeds up the installation process and makes it less intrusive. The less time installers need to solve for cable routing, the less time workers are displaced. Furthermore, fiber-based DAS solutions can often take advantage of the preexisting fiber infrastructure within a building to further simplify the installation process.

WHAT SHOULD YOU BE ASKING?

Is the DAS system fiber-based in order to provide an optimal connection?

IF THE ANSWER IS NO:

A business will not be prepared for growth in data traffic because alternative cabling supports less traffic than fiber. Moreover, future technologies like 5G, OnGo and high-frequency bands in unlicensed spectrum are crippled without an all-fiber system due to signal losses experienced with CAT6 and coaxial cabling.

The optimal DAS uses fiber cabling throughout the system, and in many situations, can utilize the existing fiber infrastructure of a building. This will ensure optimal performance now and in the future, as well as keeping costs lower and minimizing installation time.

CRITERIA 3

A DAS SHOULD **SAVE SPACE**

DAS is frequently installed inside an existing building that may be decades or centuries old. Space is often at a premium inside older buildings, which often don't have telco rooms because there was no need for them until relatively recently.

Smaller equipment and fewer hardware components take up less space, allowing a business to maximize the space it has. This reduces the risk that DAS equipment will be forced into inadequate spaces or placed elsewhere, compromising aesthetics.

WHAT SHOULD YOU BE ASKING?

Does the system minimize the complexity and number of components to accomplish the required result?

IF THE ANSWER IS NO:

Additional physical space (rack and wall space) required in telco rooms can increase planning and implementation costs and add to operational costs.

In newer buildings, a system that requires more hardware (now and in the future) occupies valuable space that could be used for other purposes or even rented out. Often, these rooms need to have updated HVAC systems to support heat dissipation from the bulky DAS equipment. Therefore, the optimal solution will have fewer, more energy-efficient components, taking up less space.

CRITERIA 4

A DAS SHOULD **PROVIDE THE LOWEST TOTAL COST OF OWNERSHIP**

The need for the lowest total cost of ownership (TCO) is straightforward. However, there are several factors to consider when determining TCO.

Some DAS solutions are inexpensive to install, but the ancillary hardware required for current and future upgrades makes them more expensive over the life of the system. In addition to cabling, the system may require equipment that wasn't accounted for in the initial hardware estimate, whether it's for building-specific hardware or supplemental antennas due to the building configuration.

Furthermore, if a system starts with only a few frequencies today, but needs more in the future to accommodate new technology, more hardware will be needed. To be prepared, businesses may need to reserve significant funds for disruptive upgrades every couple of years.

The operational cost to run the system must also be considered, as low-power systems are more efficient and thus less expensive to run than high-power systems. Higher-power units are often larger and sometimes require upgrades to cooling systems. When more space is required, the monthly operational cost also increases.

Determining TCO isn't just about capital outlay; it's critical to figure out how much a system will cost over one, five, ten, or even fifteen years, and how that fits into current and future IT budgets.

WHAT SHOULD YOU BE ASKING?

Is there a low total cost to deploy the system, based on current coverage needs as well as those that may arise in the future?

Are maintenance and operating costs over time relatively low?

IF ANY OF THE ANSWERS ARE NO:

A system that costs more over time isn't a wise investment. Every aspect of a DAS must be considered when determining TCO, and that includes all current hardware as well as future hardware upgrades, maintenance and operational costs. Upgrade costs are difficult to estimate on day one, adding uncertainty to the overall system cost.

Low TCO is ideal because it streamlines IT budgets and allows businesses to invest that money into other areas. Plus, it delivers peace of mind when considering that future upgrades and maintenance costs will be minimized.

New technologies that take advantage of radio frequencies, like Internet of Things (IoT) devices and OnGo networks, should not need costly infrastructure either, which means they create significant savings over the life of the system and increase the system's overall value.

CRITERIA 5

A DAS SHOULD **SUPPORT PUBLIC SAFETY FREQUENCIES**

VHF, UHF and FirstNet are all frequency bands utilized by public safety officials and first responders. While there is no unified standard for public safety support, varying regulations at the state and local levels are already being implemented. For example, some systems use 150MHz and 450MHz frequencies (which penetrate most buildings well), while others use 800MHz frequencies (which do not).

A DAS might support VHF, UHF or 800MHz today, but when FirstNet – the first standardized nationwide emergency responder network – arrives, it will have to transition to 700MHz frequency bands. It is likely that all of these frequency bands will be in use until the complete FirstNet transition occurs, which may take several years.

Many DAS systems aren't able to support public safety frequencies without adding hardware layers, creating a combined or converged system (as opposed to a single commercial system). Other systems don't have the capabilities to support VHF or UHF, regardless of how much hardware is added to the original installation.

WHAT SHOULD YOU BE ASKING?

Is the DAS solution able to support public safety frequencies/technologies, and is it FirstNet-ready today?

Can it be deployed over the same hardware layer as all other commonly used public safety and cellular frequencies, or are additional layers or components required?

IF ANY OF THE ANSWERS ARE NO:

Some municipalities use VHF or UHF for public safety communications. A DAS solution that doesn't support these bands means first responders will experience communication failures inside buildings. At best, this will impact seamless communication; in a worst-case scenario, this could create dangerous situations for first responders.

A truly wideband DAS can support any cellular or public safety frequency with a single layer of equipment as well as seamlessly support future services with no additional hardware needed. This simplifies both deployment and maintenance, keeping costs down while simultaneously covering cellular and public safety frequencies.

CRITERIA 6

A DAS SHOULD BE 5G AND PRIVATE LTE READY

5G's initial assertion is that it will grant access to vast amounts of new spectrum and allow wireless networks to support use cases never supported by 4G. It is predicted to provide wider bandwidths for mobile applications, but will also present enormous challenges from an indoor propagation perspective.

Small but powerful base station antenna arrays will extend the range of signals and increase network efficiency. 5G networks will also provide for much lower latency, which is one of the main requirements for IoT critical use cases such as self-driving vehicles and personal health monitoring systems. With these qualities, 5G has the potential to almost triple the annual gain in wireless network capacity over the next decade versus the annual gain over the past 20 years –meaning DAS systems must have the ability to support it.

Other high-frequency advancements include the deployment of private LTE networks on OnGo technology, which will be a necessity in modernizing and deploying the IoT to run business-critical applications. DAS systems that can integrate OnGo networks and provide interoperability with public cellular networks will provide the best value. OnGo is a promising wireless technology for the enterprise, and DAS installations that incorporate OnGo stand to possibly replace Wi-Fi in the future.

WHAT SHOULD YOU BE ASKING?

If I invest in a DAS now, am I protected from additional costly investments to keep up with the rollout of 5G and OnGo technology in a few years?

IF THE ANSWER IS NO:

The demand for strong indoor wireless connectivity is high, and that demand will only increase as OnGo becomes standard and 5G looms on the horizon. The existing frequency bands that carriers use will aggregate, meaning DAS systems that offer access to all frequency bands will be prepared for this scenario as well as true 5G.

As true 5G emerges, outdoor frequencies will have to be moved onto other frequencies inside a building, potentially on multiple frequency bands, to be equipped for indoor propagation. In a solution with simplified architecture, users can access all of the frequency bands up to 6 GHz, the most likely to be used for indoor 5G.

It's not certain at this point where indoor 5G will fall in terms of frequency, so having an all-fiber-based solution that can support all frequencies with no additional infrastructure is ideal from a future-readiness standpoint.

CONCLUSION

THE OPTIMAL SOLUTION: **ZINWAVE**

Zinwave offers an in-building solution that can answer all the above questions with a definitive "Yes," making it the best solution in the market.

Here's why:

Zinwave supports frequencies between 150MHz-2700MHz, public safety, and 3.5-6GHz on a single hardware layer from day one

The system can support one, some or all of the cellular and public safety frequencies in use today from the moment of installation. Businesses must factor in future technology needs to choose a system that will not require costly hardware and infrastructure upgrades.

Zinwave's platform utilizes full fiber infrastructure

Fiber is the preferred cabling because it has unmatched reach, no bandwidth limitations, is easy to install, and in most modern buildings a fiber network is already established.

A Zinwave solution uses significantly less space

With only five total components, required deployment space is inherently less than any other solution.

Zinwave offers the lowest total cost of ownership

Streamlined, future-ready, and truly wideband components utilizing fiber cabling and minimized ordering, installation, and deployment time make it a best-in-class, high value, low cost solution.

Zinwave supports all public safety frequencies

Zinwave's single hardware layer supports all cellular and public safety frequencies, including VHF, UHF and FirstNet, so first responders can communicate during emergencies.

Zinwave is positioned to support 5G and OnGo

Added system infrastructure is available to support 5G as frequencies are standardized and heavily adopted. Case in point, Zinwave's industry-leading OnGo remote units have the ability to support private LTE deployments.

DOWNLOAD THE INFOGRAPHIC

ABOUT ZINWAVE

Zinwave is a Dallas-based technology company focused on providing in-building wireless solutions for cellular and public safety connectivity that are essential for business. Solutions include a five component distributed antenna system (DAS), featuring Zinwave's patented 3F advantage – fiber cabling throughout, full spectrum support on a single hardware layer, and future ready for the next generation of wireless technology. Zinwave's refined technology offers the lowest total cost of ownership, and the Cellular as a Service option enables connectivity by converting it into an operating expense. Zinwave customers come from around globe and span a wide array of industries.