



DAS Frequently Asked Questions.



Introduction to Enterprise DAS.

Communication networks across our commercial buildings are constantly evolving.

In today's fast pace lifestyle, mobile devices have become an integral part of our lives, and we rely on them as a constant source of information - as a result, mobile phone coverage within a building is now seen as an essential service and it is expected everywhere, at any time, just as we expect utilities such as water, gas and electricity.



Why DAS?

Nearly 80% of all mobile communications is performed in an in-building environment.

A DAS solution extends a Telecommunications carrier's network throughout the building through a series of nodes connected to in-building infrastructure to ensure network coverage is not interrupted and signal strength is maintained.





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Frequently Asked Questions.

A DAS solution integrates a range of specialist technologies. The experienced Madison team are often asked a number of questions in relation to the installation of a DAS network. Below are answers to some of the most commonly asked questions.

What is DAS & what are the different types of DAS Solutions?

What is the difference between IBC and DAS?

IBC is a generic term that stands for In-Building Coverage or In-Building Cell. IBC refers to the whole in-building coverage ecosystem and can include things such as the carrier base station and any other active elements.

Whereas DAS stands for Distributed Antenna System and is a specific part of an IBC system. DAS only refers to the antenna system that distributes the carriers signal within the building.

What is Passive DAS?

Passive DAS means that the DAS itself is not driven by any active elements. It means that the DAS is not powered by any other element other than the base station which the carrier provides and plugs into the DAS. Passive refers to the fact that all elements in the system are passive as the system does not have its own power source nor generate its own power. This is the most common type of DAS system in Australia.

What is an Active DAS?

Active DAS Systems are also common in Australia. Active DAS means that there is an extra set of equipment which acts as a power booster. Active DAS systems are typically used for much larger buildings and sites. As a building gets larger, the signal strength can become weaker, therefore using an active component will give the DAS signal a boost. A DAS system with active equipment and elements is referred to as an active DAS.

What is DBS/Hybrid DAS?

A hybrid DAS is a combination of active and passive DAS systems. Part of the DAS may be powered directly by the carriers base station, and that will be the passive part of the DAS, and there may be other sections of the DAS which are located quite far from the carrier base station and therefore, that equipment requires a power boost, by using an active element or component. Using a combination of passive and active equipment and components, is referred to as a Hybrid DAS.

DBS stands for 'Distributed Base Station'. This means that base stations can be distributed around the building using remote heads which are fibre fed equipment. A DBS solution is essentially a passive DAS system except carrier base stations are distributed around the building rather than congregating in one particular room.

What are the room requirements for a DAS project?

What size room is needed?

The MCF2018 specification document states the minimum size room requirements is 32m². The specification in the MCF is a guideline, therefore, size requirements can be evaluated during the design of the project. It is important to keep in mind the size of the racks required when evaluating the size requirements, including the height, for your DAS room.

How much rack space is needed?

Each carrier requires a minimum of 4 rack spaces. Rack spaces are 600mmW x 600mmD. It is important to account for an additional 600mm for the actual rack door to swing open, which means a total depth of at least 1200mm is needed. Australia has 3 operators, therefore the DAS room should provide at least 12 racks, however, it is recommended to provide 5 racks for each operator. Generally, the DAS room should at least cater for 4 to 5 rack spaces per carrier.

How much power is needed?

Generally, DAS rooms need approximately at a minimum 4KW per operator or per carrier. Peak power is used to calculate the power requirements. There are a lot of variables when it comes to working out how much power is needed. It depends on the size of the system, as a larger DAS system will increase the power requirements, whereas a smaller room will require less. Each carrier tends to use different base station units from different vendors, which all have different power requirements and it depends on how the base stations are configured. How many technologies are put in and how many carriers run within each frequency. Air conditioning power requirements also need to be considered. It is best to seek advice from the DAS integrator.

How much air conditioning is needed?

The MCF2018 states that a minimum 12kW split system is required. Depending on the size of the project, this may or may not be enough air conditioning for the DAS room and is dependent on how many operators will be installed, and how the base units are configured. For example, a typical configuration with 4kW of total power output, requires a 12000 btu/hour capacity air-conditioning unit. It is best to seek advice from the DAS design team. They can work with the carriers to work out the exact heat load and the air conditioning requirements for each project.

Who pays for this room?

Generally, the building developer or building owner pays for the room itself, although it does not have to be a specifically built room, as an existing room can be easily converted. The room does not need to be a room dedicated to the DAS equipment, however rooms that are specifically dedicated to a DAS system, generally have the best outcomes, however the space still needs to meet minimum space requirements to run 3 operators with at least 4-5 racks each.

The air conditioning and electrical set up costs, including the DAS equipment, are also paid for by the building developer or owner and should be considered when putting together a budget for the DAS project.

What is the DAS Room Size mandated in MCF2018?

M32M²

What if the room size is smaller?

The Carrier most likely will not sign off on the detail Design put forward hence the DAS deployment will not be able to go ahead.

What is the Electrical requirement for the DAS Room?

The builder must supply a 100 Amp single phase supply with a 36 pole Distribution board.

Do I need to supply a UPS?

While it's preferred, it is not essential.

What Air Cond requirements I need to provide for the DAS room?

MCF2018 Mandates that you must provide 6+6KW on a 1+1 Hot standby configuration.

What is the MCF2018 and what does it mean for the DAS project.

What is MCF2018?

MCF stands for Mobile Carrier Forum, and is essentially, an organisation that was formed by the three main carriers in Australia, Telstra, Optus and Vodafone. These three carriers wrote this specification document and update it regularly with industry standards. Prior to 2018, the MCF was updated in 2014, and is regularly reviewed to ensure industry trends and requirements of the DAS industry are kept up to date.

The pricing is dependent on the size of the project, room requirements, equipment requirements and Connection Fee.

Is the MCF a standard and is that standard mandatory?

The MCF2018 is an industry standard document, its main role is to advise and be used as a guideline for DAS projects. The MCF2018 specification list is not necessarily strict and mandatory as there are things that can be negotiated between the DAS integrator and the carrier. While some elements of the MCF are strict and need to be adhered to, there are some elements that can be negotiated. It is best to speak with the DAS integrator. If the DAS integrator has good relationships with the carriers, they can negotiate on behalf of the building owner or developer with the lead carrier. Therefore, most items in the MCF are standard and mandatory, but there is some room for negotiation.

Who signs off on the DAS?

The lead carrier needs to sign off on the DAS system at two stages, the design stage and the project completion stage.

There are two types of carrier. The lead carrier is the main carrier that is ultimately responsible for the maintenance and upkeep of the DAS system. The sharing carrier is a secondary or third carrier that plugs into the DAS system once the project has reached completion and is not responsible for the maintenance and upkeep of the DAS. Sharing carriers need approval from the lead carrier before they can connect to the lead carrier DAS.

The lead carrier will sign off after two checkpoints, first after receiving a detailed design of the project. The carrier will either accept, reject the design or require amendments to the design. Secondly, the project completion checkpoint, once the post completion documentation such as, build design, walk test and KPI reports have been submitted, the lead carrier will examine the reports and may perform their own testing, once checked the carrier will sign off on the completion of the project and arrange for connection.

Detail Design Questions.

What is the typical timing for getting a detail design completed and handed to the lead Carrier to review and approve?

From date of receipt of PO for a detail design to be completed, it typically takes 4-6 weeks to submit to the lead Carrier

How long would a lead Carrier take to sign off on a detail design?

A lead Carrier, pending how busy they are, could take "few weeks" to review, make recommendation for small changes and send back to Madison for a final update. In-turn Madison will take 1-2 weeks to implement the recommended changes and return to the lead Carrier for their signature. The Carrier could again take "few weeks" to review and sign off on.

Are we guaranteed to get a detail design sign off?

The ONLY party that can approve a submitted detail design is the lead carrier. Also, the lead carrier can't be forced into signing a detail design. While highly unusual, the lead carrier retains the right to refuse to sign off and connect to a proposed DAS solution. Note the Carriers OWN the frequency spectrum proposed to be used hence they always have the last say on the decision making.

Upgrading DAS to 5G.

Is there a 5G DAS and how do I upgrade?

Currently, in the latest MCF2018 specifications, there is no requirement for a 5G DAS system. All carriers are currently deploying the 5G network across the country and its starting to make its way into the In-Building environment. Usually macro and roof top sites will have 5G installed first. Once that is completed, the carriers will start considering 5G in an indoor environment.

When upgrading a DAS system to 5G, there are a few things to understand first. Firstly, under the current MCF2018 specifications, many of the DAS systems in Australia can only operate from the 700-2700MHz spectrum. 5G operates on a number of frequencies, essentially, 5G can operate on any frequency, however, the most popular frequencies are currently in the 3.5-3.6GHz Band (C-Band) or the higher frequency Millimetre Wave Band. A current DAS system from 700-2700MHz does not support these frequencies, therefore, if the carrier only offers 5G on those higher frequencies, DAS systems operating on the lower frequencies will not be able to support 5G. However, if carriers intend to refarm some of the current frequencies for 5G in the future, for example frequencies used for 3G or 4G, then existing DAS systems operating on a 4G network will be capable of supporting 5G.

If carriers make large investments in the 3.5-3.6GHz band, there is passive equipment such as, DAS antennas, cabling and splitters that do already support up to that frequency. It is likely the next revision of the MCF2018 specifications may require the operational frequency range of a DAS system to be higher and cater up to 3.6GHz.

If carriers do choose to refarm existing bands, no additional work is required, as the DAS system will be able to support these frequencies and it is each carrier's responsibility to maintain the base station equipment to support 5G. However, if upgrading the DAS system to support the higher frequencies, a new system would need to be built. This is because existing passive infrastructure cannot support a frequency as high as 3.5-3.6GHz.

How much does it cost?

Pricing include many variables, and it is difficult to tell how much it would cost to replace all the passive components of an existing DAS, which would be required if upgrading DAS to support higher frequencies. However, it is likely that carriers will refarm some frequencies in the 700-2700MHz band so that existing DAS systems can support 5G. Which means if DAS has already been implemented in the building, they will not be made redundant and can continue to be used for years to come, and therefore, may not cost building owners anything to upgrade their DAS system.

Carrier Interconnection.

When do we need to engage with the Lead Carrier for the Carrier interconnection lease agreement

ASAP. In order for the Lead Carrier to consider our detail design and sign off on it, they must have engaged with the building owner to agree on a interconnection lease agreement.

What are the typical Carrier Interconnection costs?

Discussions in relation to any interconnection costs are strictly between the Lead Carrier and the building owner. There is an NDA signed off by both parties in relation to any commercial discussions taken place. It is however understood, costs for EACH Carrier vary from 0\$- \$300k pending on the project. .

Can you advise who are the key contacts within each Carrier for us to discuss our interconnection requirements?

The best way to identify the individuals representing each Carrier is to visit AMTA MCF forum site. The link to access these contacts is:

<https://amta.org.au/in-building-coverage-information-for-property-owners-managers/>

Telstra:

Joanne Lyng
National In-Building Coverage Manager
Enterprise Business and Government | Wireless Access | Network Engineering
Email: joanne.lyng@team.telstra.com

Optus:

Elie Abouhanna
Associate Director IBC Solutions | Networks
Email: Elie.Abouhanna@optus.com.au

Vodafone Hutchison Australia:

Kellie Gerardis
Project Manager – Central Projects Delivery
Email: Kellie.Gerardis@vodafone.com.au

Remote Areas.

If the solution proposed is Active what space requirements I need to provide?

For a fully Active solution, the remotes can be wall mounted. You need to allow at least space for approximately 2m (L) x 1.5m (W) x 300mm (D).

What are the electrical requirements that I need to provide for these remote units?

You need to provide 240v AC for EACH Active remotes. Ideally the Carrier would like to have these on backed up power, but it is not mandatory.

A DBS solution is proposed to be deployed. What are the space requirements at the remote end to deploy the Carrier equipment?

A DBS solution is when we deploy a PASSIVE solution and the Carrier deploy their Remote Radio Units (RRUs) at the remote end to feed all antennas. Each location where the RRUs are deployed, a Carrier needs a minimum of 2X600x600mm 45 high RU space. So, you need to allow at least 6x600x600mm 45 high RU space for all 3 Carriers at EACH remote location. Note the number of remote areas for a solution can't be known until a proper detail design is done and a RF link budget is set.

Do I need to provide AC again for these location (6+6KW on a 1+1 Hot standby configuration)?

Generally, not required for remote area unless the room > 45 degrees.

What do Telstra and Optus use for their active equipment?

The Carriers use an approved "grey" kit for sites that are not "Government Sensitive". Telstra's grey kit is Mavenir (CrossFire equipment with Mavenir software) while Optus's is currently testing the Mavenir to use also. For Government sensitive sites they BOTH use CommScope equipment. .

"Grey Kit" Vs CommScope what is more expensive at this stage, and which one has a is larger form factor?

CommScope has a slightly smaller form factor BUT is more expensive to purchase.

What are the Alternative Solutions to DAS.

The builder simply can't afford a DAS solution for this site. Is there anything else we can use to cover our minimum requirements in offering mobile coverage for this site?

The short answer is YES... pending on your specific site size and requirements. DAS is a Carrier approved "Carrier Enterprise grade" solution. It needs to accommodate ALL Carriers and NEEDS to meet the current MCF20XX specification. This solution is what we always recommend being deployed however we also understand that budget constraints and site conditions (when building a site but still need mobiles coverage for safety requirements) play a big part in decision making hence we also can offer couple of solutions for our client's consideration.

- CEL-FI- QUATRA
- CEL-FI- GO

What is a CEL-FI-QUATRA solution and what are the advantages/disadvantages when compared to a typical DAS solution you offer?

One thing we need to make extremely clear is that a CEL-FI-QUATRA OR CEL0FI-GO are NOT alternatives to a DAS solution. There are NO KPI's to meet or offer the same level of signal quality. They are a repeater solution meaning their input signal is only as good as what they pick up from the nearest Macro site. They are however a means of offering coverage within an area (for whatever reason) that would not be serviced by a DAS solution.

PRO's of Quatra

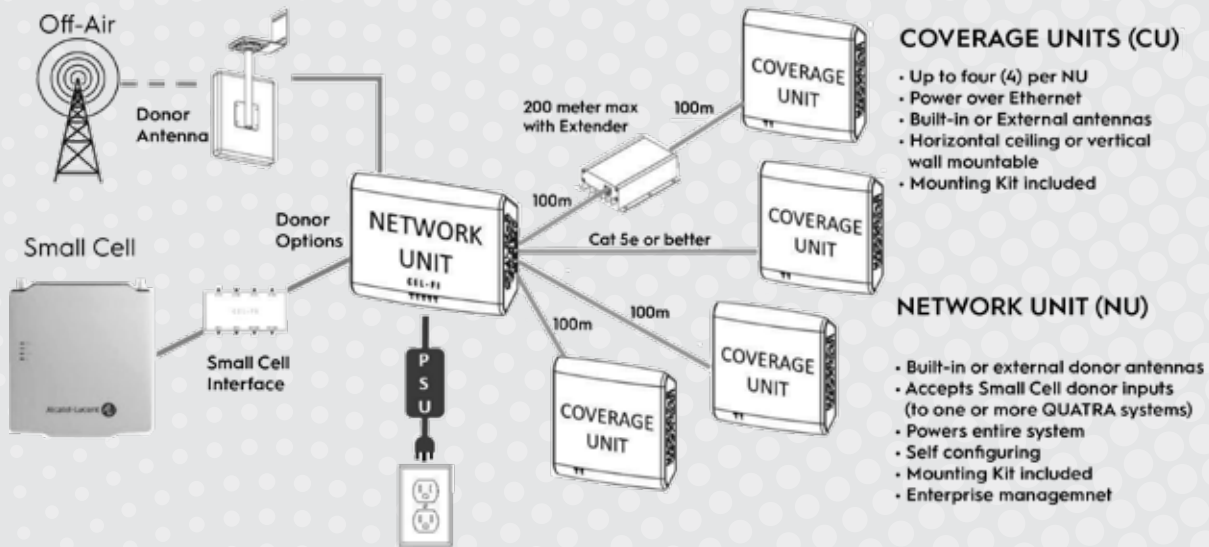
- Fast deployment (1mths vs 1yr)
- Site owner owns the DAS and can monitor it
- Easily expandable and adaptor to renovation and refurbishment
- No detail design required (just a simple design to show the Carriers our proposed solution)

CON's of Quatra

- NOT a true DAS solution,
- NOT MCF2018 approved
- Only suitable for up to -70 ant
- Need good donor signal
- No dedicate capacity
- Only selected bands

What is a CEL-FI-QUATRA solution architecture?

Here is a typical CEL-FI-QUATRA solution showing all the elements within the system



GRN, What is it?

What does GRN stand for and does Madison offer GRN solutions?

GRN stands for "Government Radio Network". It is a system for the Emergency services voice communications. Yes, Madison offer a full turn-key GRN solution to the market.

What is GRN used for?

The radio network is used by government agencies for:

- Emergency services voice communications
- Special events
- Exercises
- Training

What is the process to get a GRN network onsite? What are the steps and what does the builder/developer/Owner has to do?

A GRN solution follows a totally different path to a DAS solution onsite. The 1st step in the process is to check if the developer/builder/Owner has received a design brief from the Telco Authority. If not, they need to submit a request into the Telco Authority to identify the correct solution which will also identify the volume of antennas to be used onsite. ONLY the Telco Authority has approval to determine the GRN solution for a site. They and only they will advise the builder/developer/Owner of that solution can be deployed onsite. The overall process is as follows:

1. Builder/developer/Owner to send a request into the Telco Authority at telcoclientservices@customerservice.nsw.gov.au
2. Telco Authority will respond with 5-6 Q's (bldg. size, # of floors, etc)
3. Builder/developer/Owner responds to Telco Authority's feedback
4. Telco Authority will prepare Design Brief based on responses to Q's

Once there is a Design Brief, Madison Technologies can determine a solution for the site and put a proposal to the Builder/Development/Owner to review and approve.

Who Pays for the DAS Solution and Why?

What are the pricing elements?

For greenfield projects where DAS is installed in new buildings, the DAS system is included in the electrical and communications package, and the telecommunications carriers ie. Telstra, Optus and Vodafone, do expect the builders to pay for the DAS.

The reason for this is mobile coverage is seen as an essential service, so people expect to have coverage regardless of location.

As mobile coverage is treated as an essential service, like other utility services. For example, utility such as water and electricity services will organise the connection, but do not pay for the plumbing or wiring of a building. It is up to the building developers or building owners to pay for the equipment needed so the connection can be made. Once the building is ready to be connected, carriers will then make the connection to the network which will then provide signal coverage within the building.

The pricing is dependent on the size of the project, room requirements, equipment requirements and Connection Fee.

Who pays for the carrier equipment?

As the equipment and base stations reside on site, the carriers would like to have the building owners or developers pay for the equipment. The equipment only provides signal to the building and not anywhere outside the building, the carrier is only providing a service and therefore, from the carrier's perspective it does not make sense for the carrier to pay for the cost of the equipment.

However, occasionally part of the base station equipment cost is included in the Connection Fee carriers charge for the connection. This fee is negotiated between the carrier and the building owner or developer.

The Connection Fee is there for the same reason you would pay a connection fee to connect your water or electricity. The connection has associated costs such as, requiring a technician onsite, carrier equipment and other network related costs. Typically, the invoice from the carrier will not be itemised, so knowing exactly what the Connection Fee covers, can be confusing. Generally, this fee varies depending on carrier and project size and will include the costs of the carrier equipment.

Why do prices vary between DAS suppliers?

Why does the pricing vary?

Pricing varies depending on supplier, as there are many variables. The builder or electrical contractor may provide drawings of the DAS system project plan to different suppliers and request quotes. Each supplier may come back with a different solution for the project.

How have the drawings been interpreted?

There are many ways for the drawings and project information to be interpreted, and there is no specific way to set up an IBC/DAS design as long as the project is compliant. Some suppliers may quote 60 antennas, while others can create the same level of coverage with 50. There is nothing wrong with having more or less antennas, as long as it meets the coverage objectives.

Knowledge of the carrier requirements?

Each carrier will have their own DAS requirements, although the MCF2018 specifications is an overarching document, each carrier does have their own specific requirements when it comes to DAS. If there is a lead carrier who is involved with the early stages of the DAS project, they may have additional requirements that need to be implemented early in the project. This causes variables between carriers and pricing.

Is there a detailed design?

It is important that builders and electrical contractors provide detailed drawings for their RFQ's for their DAS project. Design teams require Reflected Ceiling Plans (RCP's), General Arrangement Plans, cabling paths, as it is important to know where cables can be run, the location of the risers, size of the room and the location of the DAS room. If the project begins without knowing exactly where the DAS room will be located, it is still vital to understand the locations of the cable trays, therefore containment drawings are also necessary. It is better to provide as much information as possible when preparing an RFQ pack for the DAS suppliers, this will ensure quality designs and the best possible solution for the DAS project.

The DAS project is complete, now what?

What happens when the DAS is built?

There are a number of things to consider once the DAS has been built. Ideally, a lead carrier has already been organised, but if not, there is still plenty of time to organise one. The DAS integrator can help with organising a lead carrier. The lead carrier will require a MCF2018 or a lead carrier design to sign off on. Once the DAS is close to completion the DAS integrator should help the building owner or developer to notify the lead carrier. Notifying the lead carrier before the completion of the project is important as the lead carrier requires sufficient lead time to prepare their end of the connection, which includes organising the base stations and transmission work to be able to plug into the DAS.

As the building owner, what do I need to do and how do we hand over to the carrier?

Once the DAS system has been built, the lead carrier will require a handover pack. While some carriers require different things, generally they include the lead carrier compliant DAS design, updated as-built drawings, the design in the industry standard IBWave format, Walk Test report and CAD files. This is so if the lead carrier makes any changes or upgrades in the future, they have the drawings and files on hand and can design the upgrades themselves.

A Walk Test report can be difficult to obtain if the lead carrier has not plugged into the system yet. However, the DAS integrator can use a CW generator to generate an RF signal that can be measure for the Walk Test. This report can then be submitted with the handover pack to show the lead carrier that the DAS meets MCF coverage requirements. Once the handover pack has been submitted, a Connection Fee will be negotiated between the building owner or developer and the lead carrier. The DAS integrator can assist with negotiations.

When does the carrier plug in?

Occasionally the lead carrier will make comments or amendments they require. For example, there may be an area that they believe has insufficient coverage, and therefore needs modification. If the lead carrier is satisfied with the handover pack, they will install their base station and transmission equipment allowing the DAS system to now connect to their network and the DAS will start providing In-Building coverage.

The Connection Fee is a fee similar to what would be paid to have the electricity or water connected to a building. The cost varies a lot from project to project and is negotiated between the lead carrier and the building owner or developer, the DAS integrator may be able to assist with the negotiation process.

Who maintains the DAS?

Once the DAS system is running, the lead carrier takes care of any upgrades or maintenance to the system and the building owner or developer is no longer responsible or liable for any costs with the exception of damage to the system. If a building tenant or building owner caused damage to the DAS system, they would be liable to the cost of rectification. Any standard wear and tear, maintenance or upgrade costs is the responsibility of the lead carrier. The lead carrier will likely install an authority metre so they can monitor energy consumption as all cost in powering the system is now a responsibility of the lead carrier. Any Sharing carriers will also install their own metre and pay for their own electricity usage.

The Future of DAS.

What does the future of the DAS Industry look like?

Currently, there is the MCF2018 standard. The current specifications only talk about 4G networks. However, as 5G has been around for some time now and is gradually making its way into the In-Building industry, the carriers represented by the MCF will have to update the MCF document to incorporate technologies such as 5G and perhaps beyond.

The current type of Distributed Antenna System, using coaxial cable, which runs into small dome shaped antennas that are deployed around the building will still exist in the future in the In-Building industry. This is because the current system is flexible, and carriers are able to refarm their frequencies for 5G. This means that many of the older DAS systems using pure passive systems will still function as 5G becomes universal. The typical passive DAS systems and dome antennas will still be around for years to come.

The next thing to happen in the DAS industry, is the new age generation of systems which run on fibre and to some extent, higher grade Ethernet cable. These fibre based systems, which are called low powered active systems, will have a lot more intelligence at the edge. These systems will replace the small dome antennas with small boxes that are similar to Wi-Fi boxes. These small units will have computing capabilities, which will allow them to not only deliver 5G, higher throughput and lower latency via 5G but also have additional functionality such as, Bluetooth capabilities, gigabit Ethernet passthrough and a whole host of additional exciting features that can be implemented by using a more intelligent unit.

However, currently there is no standard on these type of systems which is why they have not yet been implemented by carriers. These units are also more expensive to incorporate into a DAS project and DAS Integrators typically want to keep costs as low as possible for the building owner or developer. Soon, these systems will become more common, as the small low powered active systems are the future of In-Building coverage. While it will likely take a while for these systems to be implemented, they will at some point hit a critical mass point and will become a standard adopted by the major carriers.

Looking further into the future, these lowered power active systems will become more common and their functionality will continue to improve, which will offset some of the cost. For example, If a small lowered power unit can track assets, that is a benefit to the building owner, which will in turn, help him manage his building.

There are pros and cons to this technology, cons being the price of the units and pros being the additional features and capabilities they can perform.

Another trend likely to be seen in the future of the DAS industry is smaller sizing in equipment and the requirements needed for the DAS room. Currently, a typical DAS room requires a minimum of 32m² and needs to host at least 4-5 racks per carrier. When a carrier plugs into a DAS system, they need to deploy racks for their base stations equipment, transmission equipment and back up battery packs, which take up a lot of space. Once all three carriers have plugged in, there will be at least 12 racks of equipment just for a typical passive system, whereas other system types would require even more space. This dedicated room comes at quite the cost to the building owner or developer, not only do they have a room that they cannot charge rent on, they have decreased the square meters of useable space in the building. However, the DAS industry is shifting to a more virtualised system, which means that all the core functionality is done elsewhere and the building has remote units that are driving the DAS system. Instead of having a dedicated DAS room, it is possible to have only a few small units on the wall driving the DAS system, saving the building owner or developer on space and cost of electricity and air conditioning.

Further to the future, the software based capabilities the DAS industry will start to see, will run on top of these new active systems. For example, Huawei has a product called 'Lampsite', and it has functionality to run, what they refer to as a 'Service Anchor'. Which allows a third party software developer to run its own applications over the 'Lampsite' and use all of the 'Lampsites' location functionality, which opens up the IBC and DAS to a whole array of third party functions that have not yet been explored by the DAS industry. Other vendors will also likely develop similar software and features. Software driven capabilities will be an exciting new capability for DAS systems although, still a few years away.



Connect with us.

Contact us at one of our
locations for help or more
information.

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