

A Guide to Small Cell Technology for Joint Use Professionals



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PART 1 INTRO TO SMALL CELL TECHNOLOGY

CHAPTER 1 What are Small Cell Attachments?



As small cell attachment requests increase, joint use asset owners will see more backlogs, delays, staffing challenges, and stress. In order to prepare, this guide will explore **what a small cell is**, what's driving its deployment, and what it means for joint use professionals.

WHAT ARE SMALL CELL ATTACHEMENTS?

Operating on the same radio access technology as WiFi, Bluetooth, 3G and 4G (LTE), small cell attachments are smaller in size than standard macro cell towers. They use minimal power, have shorter range, and can handle less concurrent calls or sessions.

As the demand for faster wireless increases, providers are working to build the infrastructure in support of the global data traffic increase. Ultimately, the use of small cell offers additional coverage at home or work and has the power to prevent signals from being dropped.

Since current infrastructure attachments can't fully support the demand for 5G, supplementing cell towers with small cell attachments will provide the needed technology.

WHAT SHOULD JOINT USE PROFESSIONALS KNOW ABOUT SMALL CELL?

With the recently passed legislation from the FCC, utility pole owners are required to:

- Allow access by wireless carriers
- Not limit small cell attachments to the communications space
- Perform work in a timely manner

For all joint use parties, there are several details to be aware of when preparing for more small cell attachments requests:

- Size
- Where to attach
- Distribution
- Ownership
- Placement
- Community Concerns
- Support Infrastructure
- Zoning and Design

In this section, let's dive deeper into **small cell** – particularly types of attachments, equipment, and a few other things about small cell attachments.

There are three types of small cell attachments:

- Femtocells: These are the shortest range of small cell types, covering 10 meters or less. The router-like devices are usually deployed in homes or small businesses and also accommodate coverage for a few users.
- 2 **Picocells:** These are typically installed in large, indoor areas, such as shopping malls, offices or train stations. They can support up to 100 users at one time.
- **3 Microcells:** The largest and most powerful small cell, microcells are installed on traffic lights or signs. The range is under 2 kilometers, and are used for events that require larger capacity.

Each of these types also requires the following equipment: an antenna, a service meter and shell, a disconnect switch, an outboard communications device, a weather-head from the meter shell up the pole into the power zone, and new cabinets. Additionally, here are five key things you should know about small cell attachment.

- 1 **Power Supply** While small cell devices are low-power that range from 100W to 500W, the total power consumption is supplied by a 20 Amp circuit from the electrical utility.
- 2 **Backhaul Requirements** Small cells use backhaul solutions to transport data from the field to operator's network.
- 3 Antenna Placement Usually a small cell attachment is placed on top of a utility pole. If that space is taken by an existing service provider, the new provider will have to find another location or pole.
- 4 Asset Structural Integrity Before adding a small cell attachment, engineers must assess structural integrity. They should inspect safe weight loading capacity, how much added windforce the antenna will contribute, and (for strand mounts) the weight-loading impact of internal or external cabling.
- **5 Permitting and Approvals** Since 5G architecture will be much different from 3G and 4G, joint use parties will have to ensure that they are effectively communicating with one another to streamline small cell attachment permitting.



PART 2 DISTRIBUTED ANTENNA SYSTEMS & SMALL CELL

A technology similar to small cell that was developed 20 years ago, Distributed Antenna Systems (DAS) served a similar purpose – they exist to extend wireless coverage and capacity.

Much like small cell, DAS allows cell phones and other wireless devices to work reliably in situations when the existing infrastructure is insufficient.

In addition to areas with poor coverage, DAS is also used in locations where there are large groups of people such as concert venues, sports arenas, or public plazas.



While the technology for DAS and small cell is very similar, there are <u>several key differences</u> as well. Here are 7 ways they differ:

- 1 **Supply** DAS uses one central power supply for multiple nodes, while small cell requires power for each individual node.
- 2 **Cell Organization** DAS uses many nodes simultaneously while small cell functions as a network of individual cells.
- 3 Frequency Support DAS supports multiple frequencies (2G, 3G, 4G/LTE, 5G, VHF bands), while small cell supports a single frequency.
- **4 Multiple Service Provider Support** DAS can be shared by multiple carriers, while small cell is primarily single-carrier.
- 5 Scalability A single DAS can serve up to 1,800 users and provide coverage for several miles; small cell technology supports a couple dozen subscribers and delivers coverage to a smaller area.
- 6 Backhaul Each small cell requires its own backhaul connection to the network source, but an entire DAS network only needs a single backhaul connection.
- 7 **Deployment** Generally, deployment of small cell is much faster than DAS, making it more beneficial.

While small cell and DAS serve different purposes, they can be viewed as complementary technologies. Together, the two technologies can deliver lower cost of ownership and easier deployment.



In this section, we explore how <u>small cell attachments</u> are different, the equipment involved, and the data asset owners need.

HOW SMALL CELL ATTACHMENTS ARE DIFFERENT

Small cell attachments differ from traditional attachments in that there is more engineering involved due to the amount of equipment needed. This is one of the reasons that utilities and pole owners can have no more than one small cell attachment per pole.

EQUIPMENT INVOLVED WITH SMALL CELL AND DAS ATTACHMENTS

So, what equipment is involved for small cell and DAS attachments?

First, there are two main methods for attaching small cell or DAS. One is a cantenna, which is a can or tube that houses a small cell antenna, power source, strand equipment in conduit, and any other related equipment. The second method is a strand-mount, where the small cell equipment is attached directly to the wire between two poles.

A small cell or DAS attachment typically involves:

- An antenna (mounted at the top of the pole or on the strand)
- A power source and fiber
- A disconnect unit
- Head-end (For DAS only—this panel is an interface from the antenna system to the service carrier, and is bolted onto the pole at its base)

ASSET OWNERS NEED GOOD DATA

For companies to determine whether a utility pole is a good fit for a small cell attachment, they need to know accurate and updated data:

- Who owns the asset
- Asset type
- Asset height
- Location
- Material
- Number of existing attachments
- Power availability

With an increase in requests from wireless carriers, having this data available will help asset owners stay a step ahead of everyone else.



PART 3 HOW SMALL CELL IS CHANGING 5G WIRELESS

While asset owners and joint use professionals may face challenges with small cell, the new technology offers benefits such as ultra-fast connections, stronger signals, and exciting new technology and services.

We've outlined five key ways that **small cell wireless is changing connectivity** below.

- **1 5G Preparation** 5G will meet the heavy use of video and consumer demands faster than ever before.
- 2 Staying Connected One major goal of small cell is simple – to provide consistent coverage. Small cell wireless will mend existing gaps in coverage.
- 3 Expansions of Internet of Things (IoT) Small cell will also increase the number of IoT devices, which may include wearable tech and healthmonitoring devices.
- 4 Filling in Coverage Gaps In areas with a large group of people, small cell can fill in the coverage gaps. Examples of these areas are stadiums, airports, hospitals, government buildings and more.
- 5 Safety Enhancements Finally, due to these changes with small cell, safety will increase as well. Cell service is vital to victims or bystanders so they can call 911.



As small cell attachments allow for 5G wireless access, there are a few guidelines **joint use parties must consider for installation.**

- **Climbing accessibility:** Wood poles must be possible to climb and any new equipment should be installed on the same side as existing equipment.
- **Minimum clearances:** The standard clearance can vary but typically it is 40 inches between the lowest power attachment and the uppermost communications attachment. For antennas placed at the top of a pole, they require 5 feet of clearance above the uppermost power conductor.
- **Backhaul solutions:** Backhaul is a transport process which includes several elements. Carriers may use dark fiber (unused fiber already in the ground), lit circuits (fiber in use), cable TV, or a wireless solution to transport voice and data from the base station back to its core.
- Attachment guidelines: The pole owner specifies how equipment must be attached and positioned onto an existing pole.

Finally, it's crucial that carriers work closely with local municipalities and utility companies throughout the small cell attachment process. Since every city has its own process, it can make installation challenging.



PART 4 IMPACT OF DAS ON JOINT USE ASSETS

While we touched on the impact of Distributed Antenna Systems earlier, it's essential to consider its role with joint use assets.

More than 30 years ago, DAS was the original small cell used to provide coverage in rural or remote areas.

DAS is typically installed in areas such as highrise office buildings, airports, stadiums, or college campuses. Rather than build a new tower, a network of connected DAS nodes are installed and linked to a central communications hub.

Typically used on existing infrastructure, DAS is often installed on utility poles, alongside other attachments. By the 2018, around sixteen million DAS nodes were deployed – which leads to a major concern of overcrowding on poles. While DAS and small cell technology are similar in many ways, one major difference is that DAS is carrier-neutral and can handle many frequencies; small cell is a single carrier and single frequency. In addition, small cell covers a smaller area, while DAS can handle a much larger area.

WHAT DOES THE FUTURE HOLD FOR DAS?

The growth of DAS is projected at 13 percent from now until 2021 as a result of increasing mobile data traffic and a growing need for ongoing connectivity.



CHAPTER 8 How to Streamline Joint Use Processes: Preparing for Small Cell Deployment

With the increased demand for connectivity will come more small cell attachment requests – which many joint use professionals are already experiencing.

While many are managing these requests with spreadsheets, this will not continue to be efficient or effective when dealing with large amounts of data. In order to be most effective with these requests, a **joint use platform is recommended.**

There are a few ways joint use professionals can streamline their processes, which we'll explore in this section.



1. Consolidate Joint Use Asset Data in an Accessible Format

With the substantial data needed for joint use, it can be challenging to avoid mistakes and miscommunication when it's being managed in a spreadsheet. Joint use data required for successful deployments and maintenance includes:

- Pole information
- Vault information
- Attachment permitting documents
- Small cell & DAS location, size, and type
- Fiber information
- Streetlight location and size
- Tower location and size
- Pole transfer information
- Pole and vault inspection records
- Billing and invoicing records
- New and renewing contract information

A few benefits of managing this data in a joint use platform:

- A complete history of any infrastructure asset available including applicable dates, age of asset, type, and GPS location
- A powerful search and filter function
- Mapping functionality
- Dashboard overview of real-time insights



2. Securely Share Data

Rather than sending emails back and forth for each request, using a secure system allows you to select data to share with a few defined users. This is also beneficial as far as sharing certain information with an internal staff or group and sharing other information with external stakeholders.

3. Integrate Asset Data with Other Internal Groups

This option allows joint use professionals to set up rules to automatically transmit asset data to enterprise applications, such as GIS, WMS, and FIS to ensure engineering, operations, and finance are operating smoothly.

4. Create Workflows

Finally, the ability to create workflows allows users through standard, daily procedures and ensures consistent data quality. Workflows are customized to each company's individual needs and processes.



PART 5 SMALL CELL FOR JOINT USE DEPARTMENTS

So far, we've discussed how and why small cell technology is expanding, plus the need for joint use departments to properly manage attachment requests. Now, we'll explore how power utilities are managing this explosion of small cell.

Looking at the large amount of small cells being deployed - an estimated 552,000 will be deployed by 2020. Small cell permit requests are coming from multiple places as well – whether that's wireless carriers or contractors, making the amount of requests even more overwhelming.

Up until now, there haven't been consistent standards for small cell attachments. Once the FCC'S One Touch Make Ready requirements for new attachments begins in February 2019, companies must ensure they are compliant. A few common issues surrounding small cell include:

- **1 Overlashing** This can be an obstacle for service providers that want to deploy strand-mounted small cell attachments.
- 2 Safety One concern with safety is that if a small cell attachment falls into the power space, it can create a potential safety hazard.
- 3 Pole Loading Loading may be an issue depending on where the equipment is installed - either in the middle of the pole or on the top of the pole. Loading analysis may also be completed for strand mounts.
- 4 Engineering Design This can be a time consuming process as existing processes tend to move slowly. In addition, training new staff takes time and new contractors must be trained.

5 Coordinating with Attachers and Contractors - This is another major difficulty as one large wireless carrier may use several contractors. This also means that a power company may receive several requests for a single wireless carrier.

This again highlights the need for an asset management system that can consolidate all data, which electric power providers, telecommunications companies, and broadband providers have all found useful for streamlining small cell attachments.



For telecommunications companies, one consideration that can't be overlooked is **small cell backhaul requirements.**

As a favored method for backhaul, optical fiber is ideal to meet growing demands on wireless services, which includes faster upload speeds to accommodate sensors connecting automobiles, home systems, and devices.

While fiber is the main form of backhaul, there are a few others that can be used, including copper ethernet, millimeter wave, microwave, and satellite.

However, for places where fiber is not already in place, it can be expensive to add it where it doesn't already exist, so other forms may be more attractive.

Often, communications providers will use backhaul from the small cell to an existing macro cell.

Key challenges which each include backhaul management include:



Reliability – If a provider doesn't deliver increased speeds and a consistent connection, customers will look to another provider.



Time – With new technology being deployed quickly, some providers may be at a disadvantage if they aren't keeping up.



Costs – While initial investment may be required, if the backhaul method supports cost-effective deployment, it will be a better investment for the future.





PART 6 FUTURE OF SMALL CELL FOR TELECOMS

Over the <u>next few years</u>, there will be an increase in small cell sites across the United States. This expanded 5G broadband system will ultimately support connections for improved artificial intelligence.

In addition to the overall goal of increasing connection nationwide, small cell technology will also allow carriers to offer and charge for additional services, which means more revenue. This will prove helpful for companies as they invest and hopefully see a return on that investment.

While we've talked about many challenges throughout this guide, a few other challenges for telecoms when it comes to deployment include:

- DAS attachments that serve multiple carriers require a concentrated and coordinated effort and someone to manage the project.
- Small cell is easier to deploy than DAS and an objection to any part of the DAS application holds up the entire request. Different wireless providers may have different objectives and may not need the same locations.
- Every wireless provider has different deployment times and requiring DAS may force one carrier to wait if others are not ready.
- DAS is more expensive because it is designed for requirements of an advanced user. So, if carrier A needs feature X (even if carrier B doesn't) then the system will include feature X.
- Companies deploying small cell must negotiate agreements with local municipalities, which can be a complicated and lengthy process.



As joint use professionals continue to prepare for major changes ahead with small cell technology, this is only the beginning. One important aspect of ensuring you're ready to meet the demand of requests coming up is getting started the right way.

We recommend, for both owners and attachers, centralizing all asset data. Many companies have joint use teams who are already stressed with redundant data entry. Some companies are using multiple systems to complete a single joint use process. With these exhausting practices in place, small cell attachments are making joint use departments feel stressed.

Fortunately, there are alternative solutions and processes so joint use departments don't have to continue feeling stressed while dealing with, multiple systems, and manual data entry. Our goal at Alden is to help owners and attachers save their energy, time, and budget during this complex new process.

Our joint use platform, <u>Alden One</u>[®], simplifies all interactions between joint use professionals and helps streamline the pole attachment process. Built for both pole owners and attaching companies, Alden One[®] centralizes all asset data, includes workflows for specific processes and attachments, and consolidates contact information to ensure coordination.

Alden also offers consulting services to joint use professionals who are unsure of where to begin with small cell attachment processes. We walk with our clients every step of the way through planning, workflows, and process management.



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