



# Small cell design—Does it fit?

Small cells are an increasingly important part of smart city infrastructure. As 5G rollouts continue and cell densification intensifies, small cells are critical for connecting mobile users to the faster, better wireless service they want. At the same time, they enable myriad smart city connected devices and services, including signage, security video surveillance, electric vehicle charging, lighting and sensors of all kinds. With deployment of 5G and IoT applications, the possibilities are endless—and the challenges to properly deploying small cells in densely populated urban environments become even more complex.

Perhaps one of the most important questions to ask when deploying new equipment in an existing or new small cell site is: “Does it fit?” The question may seem obvious on the surface but is far more complex because it must be answered on three critical levels:

- Physically
- Thermally
- Structurally

#### SECURITY TECHNOLOGY

- 1 HD video surveillance
- 2 Gunshot detection
- 3 Emergency call station
- 4 Security lighting

#### NETWORK TECHNOLOGY

- 5 Wireless broadband
- 6 5G readiness
- 7 Wi-Fi hotspot
- 8 Fiber broadband

#### LIGHTING TECHNOLOGY

- 9 Adaptive lighting
- 10 Emergency lighting
- 11 LED lighting
- 12 Controlled lighting

#### POWER TECHNOLOGY

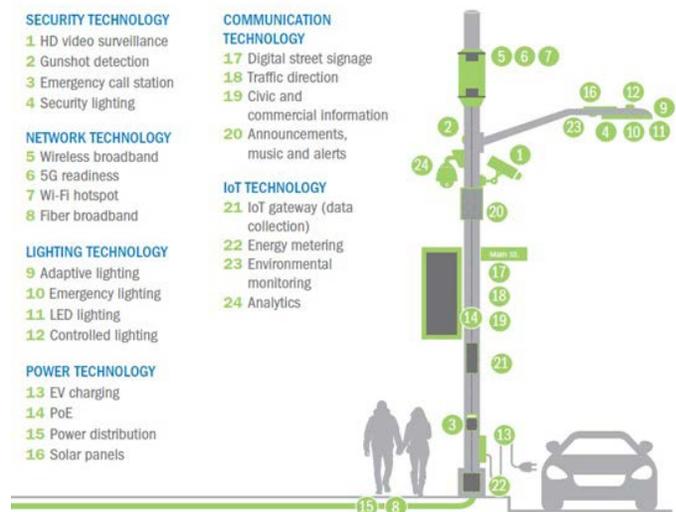
- 13 EV charging
- 14 PoE
- 15 Power distribution
- 16 Solar panels

#### COMMUNICATION TECHNOLOGY

- 17 Digital street signage
- 18 Traffic direction
- 19 Civic and commercial information
- 20 Announcements, music and alerts

#### IoT TECHNOLOGY

- 21 IoT gateway (data collection)
- 22 Energy metering
- 23 Environmental monitoring
- 24 Analytics



## Does It Fit Physically?

The question of physical fit must take into consideration not only the size of the network equipment (such as radios, antennas, and sensors) but also required power components and room for proper cable routing. Once the network engineer determines the equipment needed at the small cell site, the next challenge becomes zoning. Every municipality or homeowners' association (HOA) has its own requirements for aesthetics and concealment that must then be met. In many cases, these requirements may differ neighborhood to neighborhood. The small cell site designer must work within these requirements to identify products that will fit and conceal the equipment. Most small cell designs fall under one of five main concealment categories:

- **Top of the pole**, with the site sharing space with the antennas
- **Middle of the pole** enables all equipment to be contained in an easy-to-access but hard-to-spot enclosure
- **Base of the pole** and integrated pole deployments can be configured with or without lighting to match existing streetlight aesthetics
- **Wall mounts and wooden pole mounts** provide additional deployment flexibility on existing structures
- **Strand mounts** enable compact small cells to connect to power and backhaul almost anywhere

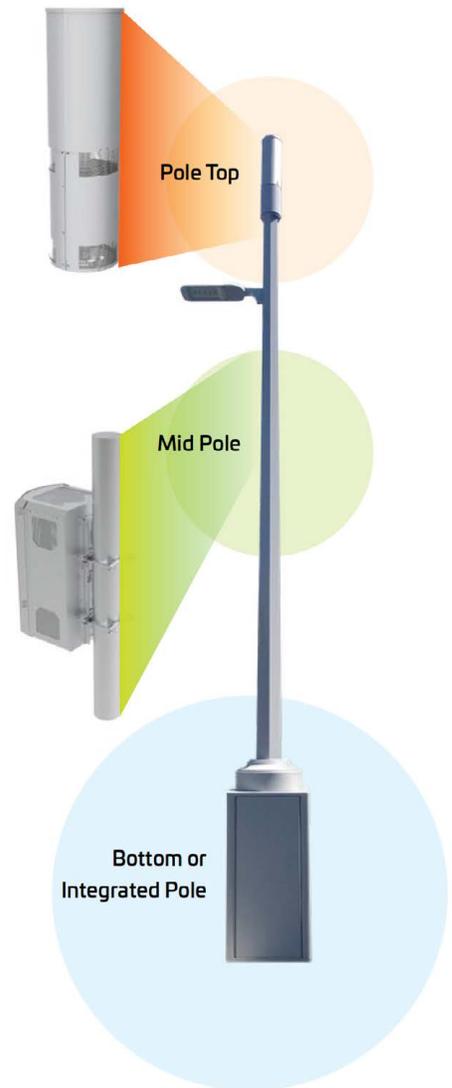
Every small cell deployment is unique to the operator's needs. Choosing the best mounting enclosure is based on the number and types of radios it will contain, as well as the site's specific zoning, permitting and aesthetic requirements. That's why CommScope offers a full portfolio of Metro Cell products for virtually any small cell application. We work with each customer to design and engineer a customized form factor that precisely meets their coverage and capacity needs, while delivering optimal thermal performance and remarkable aesthetic appeal. Our Metro Cell solutions can go virtually anywhere—in the tightest spaces and under the tightest zoning regulations.

CommScope's decades of leadership in wireless technologies help us deliver a standout solution in the Metro Cell ecosystem. We have innovated designs with improved thermal performance, fiber-optic backhaul capability and attractive aesthetics—all backed by years of extensive structural engineering experience.

## Does It Fit Thermally?

After finalizing the network equipment required and selecting concealment products that meet local zoning requirements, the next critical step is a detailed thermal analysis to ensure proper operation. The equipment within a small cell concealment enclosure generates heat that can build up. Excessive heat can affect the performance, reduce the serviceable lifetime of the equipment, or even cause equipment failure.

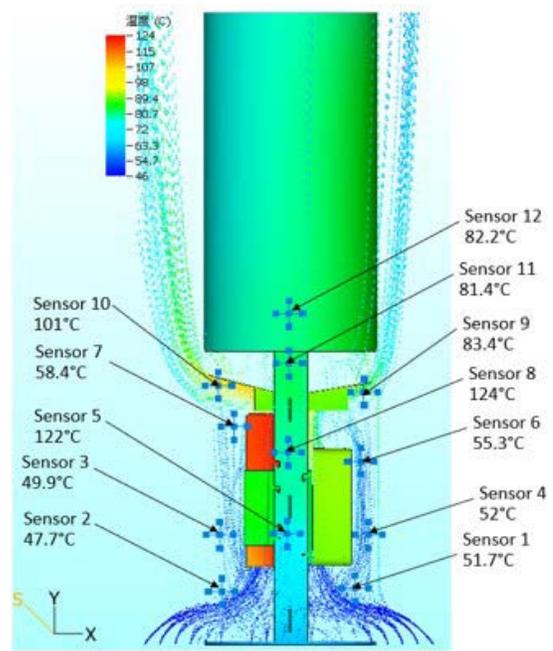
The thermal analysis must consider all heat-generating equipment (including items like power supplies), their locations relative to each other, and the airflow patterns specific to the concealment product selected. Engineers use this analysis to identify "hot spots" and can



then redesign internal bracketry to relocate equipment and improve airflow to maintain proper operating temperatures for each piece of equipment. If relocation does not resolve the thermal issue, supplemental vents and fans can be added to the enclosure design to provide more airflow and improve thermal performance.

CommScope understands the importance of thermal performance and performs thorough analysis of all products to ensure proper operation of small cell equipment per manufacturers' operational specifications. Our small cell site concealment solutions are designed to meet both thermal and aesthetic requirements across multiple types of radios and environments.

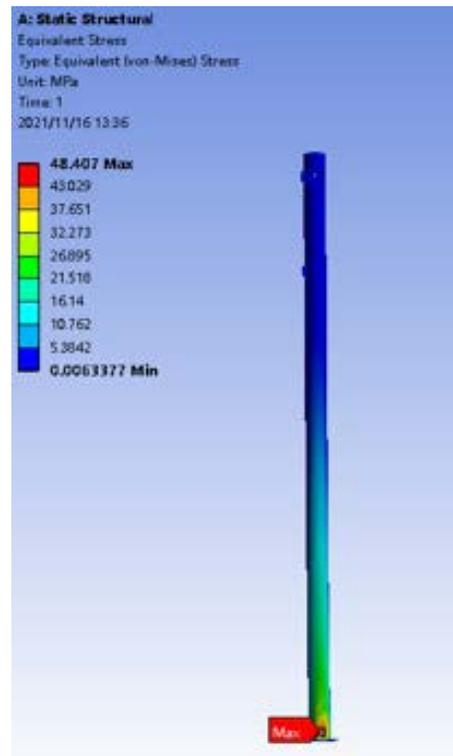
Rigorous thermal testing is just one of many steps involved in engineering our Metro Cell small cell enclosures and, ultimately, some of the best performing small cell deployments in the industry. The process also includes network planning and design, site design and construction, power coordination, fiber design, deployment, and system testing and optimization.



## Does It Fit Structurally?

The final, but equally critical, question that must be answered is that of structural integrity. For any site or even additional equipment being added to an existing site, a detailed structural analysis should be performed. This analysis should be performed by a qualified engineer to ensure the proposed design meets the structural requirements for that specific configuration. Requirements for wind load, ice load, and even seismic ratings differ from site to site, so one solution may not be suitable for every environment. Various site-specific aspects must be considered by the engineer, including size, weight, and effective projected area of all equipment, height of the structure, wind and ice loading, and even soil analysis to understand foundation requirements.

Structural integrity starts with the manufacturer. CommScope manufactures our products in the United States at our AISC-certified plant in Euless, TX, from the highest quality steel and aluminum. We perform thorough structural analysis on each and every design, overseen by licensed professional engineers (PEs) and backed up with independent PE firm reports for critical components. We are committed to providing only top-quality products that will withstand even the harshest environmental forces to help ensure proper network performance for years to come.



## About CommScope

CommScope's 40+ years of experience as an industry pioneer reflects our deep understanding of where the wireless market has been and where it's heading. We match that experience with a global presence that enables us to serve customers in over 150 countries. From structural and thermal engineering, cables, and interconnects to power systems and the entire RF and fiber path, we bring all our expertise and resources to bear on solving your toughest network challenges. All of this is reflected in CommScope's Metro Cell solutions.

For more information on CommScope's innovative line of Metro Cell solutions, please reach out to your local CommScope representative today or email us at [steel.products@commscope.com](mailto:steel.products@commscope.com).

# COMMSCOPE®

---

[commscope.com](https://www.commscope.com)

Visit our website or contact your local CommScope representative for more information.

© 2023 CommScope, Inc. All rights reserved.

CommScope and the CommScope logo are registered trademarks of CommScope and/or its affiliates in the U.S. and other countries. For additional trademark information see <https://www.commscope.com/trademarks>. All product names, trademarks and registered trademarks are property of their respective owners.

CO-117777-EN (05/23)