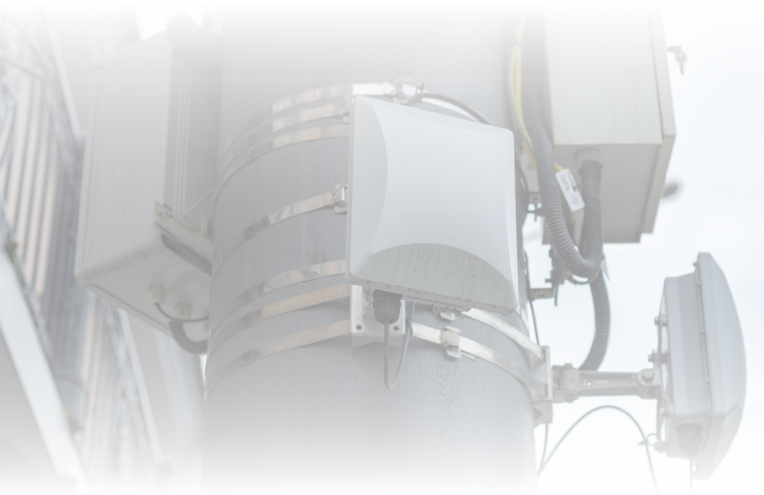


5G mmWave Small Cell Concealment Options Streamline Deployment, Installation and Maintenance

5G mmWave network deployment will depend to a large extent on small cell sites located on street poles to meet coverage requirements in urban areas. Several options exist to combine and conceal the 4G/5G electronics, power and connectivity on new or existing lighting poles to create a small cell site. Through scalable manufacturing, testing and fast turnaround times, these options can reduce time-to-deployment and simplify installation and maintenance

The 5G backbone in dense urban environments

To make 5G wireless services a reality, small cell sites using mmWave radios will be widely installed in order to provide sufficient coverage. Their higher frequencies exhibit increased propagation loss that limits inter-site distances (ISD) to roughly a tenth of a mile. So, 5G small cell sites must be lower to the ground and in closer proximity to one another than previous wireless generations.



Street lighting poles are obvious platforms for 5G small cell sites.

As a result, in dense, high-volume urban areas, 5G small cell sites will become prevalent across busy city streets, historic sites and neighborhoods, co-existing with

lighting poles and other forms of street furniture. To avoid cluttering up these urban areas, carriers, tower companies and municipalities are recognizing that street lighting poles are obvious platforms for 5G small cell sites. However, 5G mmWave small cell site solutions should balance the needs and concerns of both service providers and municipalities.

Lighting poles can form a complete small cell site

As 5G mmWave services proliferate, small cell poles are expected to become a common element in the urban landscape. They need to fit in seamlessly with the rest of the architecture, public spaces and pedestrian right of ways. Because each city has its own history, challenges, ordinances and aspirations, small cell poles will need to be easily adapted to different designs yet be based on a standard product for streamlined customization and manufacturing.

Crucially, these poles must combine and conceal all the elements needed for a complete 5G small cell site. The small cell poles from Raycap, for example, can integrate AC- or DC-powered 5G and 4G radios, AC disconnect functions with surge protection for safety and long life, as well as fiber management and connectivity enclosures.

Most small cell poles mount the 4G/5G antennas or radios at the top of the pole to optimize performance and make concealment easier. The overriding characteristic of pole toppers should be flexibility in configuration, so the radios can be positioned optimally (and eventually upgraded) depending on the needs of that particular site. Importantly, the pole manufacturer must be able to provide a concealment material that does not interfere with the 5G mmWave signals.



Small cell poles, like these at one of Raycap's three manufacturing facilities, contain and conceal complete small cell sites.

To meet required coverage patterns, multi-tenant siting and future upgrades, the pole topper should have a uniform form factor that can host different brands of 5G mmWave radios, as well as be backwards compatible with lower frequency bands. With unique mounting options, the form factor can support different orientations of the radios, radios on different levels, on top of one another or back-to-back.

Enclosures on existing poles and buildings provide flexible deployment

When a new, fully concealed small cell pole is not an option, carriers and municipalities can use a small cell enclosure and topper solution to mount the 5G small cell on an existing pole. Carriers and cities can balance performance needs with aesthetic standards through the use of custom-made mounts, shrouds and enclosures to conceal or partially conceal equipment on existing metal or wooden poles.

Some engineered solutions, such as the cage shrouds from Raycap, can also integrate concealment materials and surge protection devices, to deliver complete solutions for custom shrouds, street furniture and electrical protection of network infrastructure equipment. Carriers and municipalities can have these enclosures customized to blend in with existing environments seamlessly.

For those areas where lighting poles do not provide adequate coverage, it is straightforward to mount and conceal 5G small cell sites on building rooftops, monuments, signs and other elements of the urban cityscape. Advanced enclosures are available to conceal entire sites and seamlessly blend in with the color or texture of existing infrastructure.

A recently installed small cell pole features an InvisiWave® radome concealment for 5G mmWave radio/antennas, and a side mounted equipment shroud.



Concealment options are critical to streamline review and deployment

With one or more small cell sites destined for virtually every block, municipalities are rightfully concerned about the aesthetic implications. Fortunately, there are now materials that can conceal 5G radios with very little or no impact on performance.

A unique 5G mmWave concealment material called InvisiWave® is now available that meets the needs of 5G bandwidth and gigabit speeds, while minimizing dB loss. It has been tested and approved for use at the mmWave frequencies commonly used for 5G networks. In addition, it is entirely backwards compatible with widely used frequencies for 4G and earlier technologies.

For maximum flexibility, the InvisiWave material is available in many configurations. It can be used in pole toppers and surrounds on pole configurations, as well as for panel products like chimneys, lanterns, cupolas and other rooftop concealments. It is fabricated with a smooth, hydrophobic surface and has the durability to stand up to environmental extremes. What's more, it can be painted to blend with existing architecture.

With InvisiWave, municipalities have the latitude to decide where and how to use concealment. This streamlines the process of defining regulations and procedures that speed up deployment of 5G networks while maintaining control over the urban aesthetic environment.

InvisiWave
has been tested

InvisiWave has been tested and approved for use at the mmWave frequencies commonly used for 5G networks.



InvisiWave®

InvisiWave pole toppers provide a complete solution for 5G radios and 4G cannister antenna on top of wooden or metal poles.



Rapid time for deployment calls for small cell poles

According to the CTIA trade group, small cell sites will skyrocket from 86,000 in 2018 to over 800,000 by 2026. As a result, high quality, scalable manufacturing will be critical to meeting this demand.

Crucially, small cell poles answer a related challenge of 5G site infrastructure: rapid time to deployment. They can be engineered as a standard product line and then quickly customized for a particular need.

800,000
small cell sites
by 2026

Furthermore, small cell poles can be manufactured, assembled and the equipment integrated and tested at a factory under controlled conditions. This means they can arrive at a site with cabling, radios, and power and fiber equipment ready to go. All that is needed for installation is to affix the pole on the foundation, then hook up the feed lines for power and fiber. This is much faster than hiring field crews to install electrical components and run cabling on site.

Multiple deployment options are available for carriers and municipalities

New solutions are emerging to help carriers, utilities and municipalities work together and move ahead with 5G policies and installations. While choices for situating small cell sites on street lighting poles will assure municipalities of favorable aesthetics and fast installation, installing C-band radios and antenna solutions on existing tower sites gives carriers the opportunity to fill in coverage using mid-cell solutions with signals that can carry over longer distances. All these options ultimately will benefit all stakeholders in streamlining and speeding up the deployment of 5G services.



Get more information on your 5G concealment options

Learn more about Raycap's solutions for 5G small cell concealment at www.raycap.com or sales@raycap.com

About Raycap

Raycap is an international manufacturer and technology leader with decades of experience providing innovative infrastructure solutions for customers in the telecom, energy, defense, transportation, and other industrial markets. Its solutions protect mission-critical applications and ensure the best possible system availability. The company's product portfolio includes lightning and surge protection technologies, structured cabling and connectivity solutions, power management systems, custom enclosures, cabinets, and wireless network concealments. Since its founding in 1987, the company has experienced continuous growth. Its engineering expertise, test laboratories, and multiple manufacturing facilities guarantee quality, reliability, and innovation. Product design, testing, and approval processes comply with all international safety standards. Raycap operates in the United States, Germany, Greece, Cyprus, Slovenia, and Romania.

For more information on Raycap products, visit www.raycap.com or www.raycap.de

Talk to Raycap about integrated small cell poles and all 5G mmWave concealment options. Contact us today at info@raycap.com

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