

Selecting and Installing 5G Antennas

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The selection, installation, and placement of a 5G antenna are crucial for achieving optimal performance in 5G solutions. Installing a 5G router is much different than installing a 4G router. A 4G router can usually be installed anywhere your cell phone can connect to the network. However, a 5G router must be placed in a position that provides access to the strongest signal. This is because higher speeds typically utilize higher frequencies, but the attenuation (degradation of signal strength) on these higher frequencies also increases as the frequency increases. This means that the higher frequency signals will not penetrate walls as well as signals using lower frequencies.

In many situations, achieving better performance is possible by relocating the device and running a cable directly to the router's Ethernet port. It's also significantly cheaper, because 5G antennas may require four coax cables instead of two. But there are still instances where antennas will be required.

To select and install a 5G antenna, first assess your environment for potential obstructions and interference. Then, choose an antenna type (directional or omnidirectional) based on your needs. You will also want to ensure the antenna supports the frequency bands used by your service provider. Once the above steps are completed, you are ready to install the antenna in a location that provides a clear line of sight to the nearest base station, ideally at a higher elevation and away from obstructions. Finally, you will want to test performance, signal strength, and noise levels before completing the installation.

Here is a more detailed breakdown of the steps required to select and install a high-performance 5G antenna.

1. Assessing Your Environment

Identify Potential Obstacles: Buildings, metal objects, trees, or even windows can block or weaken the 5G signal between the cell site and the router.

Check for Interference: Sources of interference, such as AC power cables, electrical devices, motors, microwaves, and air conditioners, can also impact signal quality.

Evaluate Signal Strength: Use the antennas included with the router to measure the signal strength. Decibel-Milliwatt (dBm) values typically range from -50 dBm (excellent signal) to -120 dBm (very poor signal). This measurement provides an accurate reading of your signal strength, both before and after the installation process is complete. You can also conduct a pre-installation speed test as a second point of reference for the post-installation performance.

Identify the Nearest Base Station: Use one of the many coverage analysis maps or contact each of the carriers to determine which has the best coverage for your locations.

2. Choosing the Right Antenna

Directional vs. Omnidirectional: Directional antennas focus on a specific direction, ideal for homes or buildings with a clear line of sight to the base station. Omnidirectional antennas receive signals from all directions, making them suitable for areas with multiple potential 5G sources or when the location of the nearest base station is uncertain.

Frequency Band Compatibility: Different carriers use different frequencies, so you will need to ensure the antenna supports the 5G frequency bands used by your service provider.

3. Installation

Placement: The location where you install the antenna will significantly impact the performance of the 5G solution.

- Position the antenna in a high, unobstructed location, ideally on a roof, pole, or wall.
- Try to achieve a line of sight to the base station, minimizing obstructions.

Cable Management: The longer the cable, the greater the signal degradation.

- Use high-quality, low-loss cables to minimize signal loss.
- Keep the cable as short as possible to minimize signal degradation.

Weatherproofing: If installing antennas outdoors, ensure the antenna and connectors are rugged and weatherproof.

Alignment: If using an antenna, aim it toward the nearest base station for optimal performance.

4. Connecting the Antenna

Identify Antenna Ports: Check the 5G router or modem for the antenna ports and ensure they match the connectors on your antenna.

Connect the Cables: Connect the antenna cables to the appropriate ports on the router or modem.

5. Testing and Optimization

The final step is to test the router's performance and make any necessary adjustments.

Check the Signal Strength: This can usually be done on the router or other device.

Run Speed Tests: After connecting the antenna, perform speed tests to measure the speed of your 5G connection.

Adjust antenna position: If necessary, experiment with different antenna positions to find the one that provides the best signal strength and speed.

Antenna Recommendations

The antennas listed below come with optional mounting kits and cable extensions, so you don't need to use multiple vendors for a complete solution.

Below is our recommendation for a high-performance directional antenna.



The Waveform QuadPro directional antenna is engineered for unparalleled performance and easy installation.

Broad Carrier Compatibility: Covering 600 to 6000 MHz, the high-performance QuadPro works with 5G cell service from all US carriers.

Directional, High-Performance Design: The QuadPro is highly directional, so aim it at your nearest tower to deliver blazing speed and unbeatable reliability, even at the edge of cellular coverage.

The Fastest Possible 5G Data: With an average gain of 6.8 dBi, and a peak gain up to 9.1 dBi, up to 85% efficiency, and class-leading 40 to 85 dB isolation between MIMO antenna pairs, QuadPro offers unmatched 5G performance.

Simple Setup: Use the built-in 3 ft UltraFlex cable or purchase the optional kit that includes our one-of-a-kind Window Entry Cable and modular UltraFlex-Quad extension cables.

Versatile Mounting: Use the optional FlexMount to easily attach QuadPro to any pole or wall in minutes and make use of the horizontal and vertical pivot to make aiming easy.

Below is our recommendation for a high-performance omnidirectional antenna.



The Waveform QuadMini omnidirectional antenna offers high performance in a sleek, compact design.

Broad Compatibility: Covering 600 to 6000 MHz, the QuadMini works with 5G cell service from every major US carrier.

Indoor or Outdoor: Take advantage of QuadMini's IP65 rating and integrated weatherproof connectors to place it indoors or outdoors for the best performance and ease of setup.

High Performance: With up to 5.2 dBi gain, up to 85% efficiency, and class-leading 20 to 60 dB isolation between MIMO antenna pairs, offering industry-leading 5G performance in a compact package.

Simple Setup: Use the built-in 3 ft UltraFlex cable or purchase the optional kit that includes our one-of-a-kind Window Entry Cable and modular UltraFlex-Quad extension cables.

No Aiming Required: QuadMini's omnidirectional design provides a fast and stable connection without the need for precise alignment.

Cabling Recommendations

Streamline your 5G antenna install with the Waveform UltraFlex-Quad Cable.

Specifications:

Coaxial Cable

Impedance	VSWR	Cable Type	Inner Conductor
50 Ω	≤ 1.5	LMR195-UF equivalent	Solid Copper

Loss (per 10 ft)

0.9 dB @ 600 MHz | 1.9 dB @ 2500 MHz | 2.8 dB @ 5000 MHz

Diameter [Indiv.]	Diameter [group]	Outer Jacket
4.7 mm (0.195 in)	13.4 mm (0.53 in)	Soft TPE

Connectors

SMA Male

SMA Female



The Waveform UltraFlex-Quad 4-in-1 cable offers unmatched flexibility to ensure running your cables is as easy as possible.

Four Cables in One: Using four low-loss LMR195 cables in a slim, bundled design, UltraFlex-Quad makes it easier than ever to connect your external 5G antenna to a cellular router.

Flexibility Meets Durability: Crafted from enhanced TPE, the UltraFlex-Quad Cable is not only softer and more pliable than other 4-in-1 coax cables but also exceptionally durable. Its construction ensures it can withstand the toughest conditions without compromising on flexibility, making it perfect for both intricate setups and demanding environments.

Modular and Expandable Design: With SMA-Female connectors on one end and SMA-Male on the other, UltraFlex-Quad cables offer effortless modularity. This design makes it easy to link multiple cables together, achieving the perfect length for your unique setup.

Reliable in Any Weather: The UltraFlex-Quad Cable comes equipped with integrated weatherproofing boots on the SMA-Male ends, providing robust protection against the elements. This built-in feature ensures your connections remain secure and dry, safeguarding your system's reliability, even under extreme weather conditions.

To learn more, contact MACH Networks at (866) 972-7677, extension 2, or visit <https://www.machnetworks.com>.
