

WAVEFORM

# QuadMini

Low Profile 4x4 MIMO Antenna

## PLEASE READ THIS FIRST:

We know, reading manuals isn't always fun. But we promise it's worth it.

We've helped thousands of customers improve signal to their cellular routers. We've compiled everything we've learned in this manual.

Give it a read before you start: it'll save you time and help you get the best performance out of your QuadMini.

Designed by WAVEFORM in the USA

Your QuadMini is designed, sold, and supported by Waveform and our team of Signal Specialists.

We've helped over 50,000 customers improve their signal since the company was founded in 2007.

If you have any issues at all, **please reach out.**



3411 W. Lake Center Dr.,  
Santa Ana, CA 92704



+1 (800) 761-3041



[www.waveform.com](http://www.waveform.com)  
[help@waveform.com](mailto:help@waveform.com)



## Install Manuals, Who Needs 'Em?

**Heads up:** Using MIMO antennas to improve your signal can take a bit of patience.

**We'd be surprised if you saw better data speeds immediately upon connecting your QuadMini.** Be prepared to spend an hour or two to find the best position to aim your antenna.

This manual is based on feedback from hundreds of customers like you. We've revised it dozens of times to make it as helpful as possible.

We promise **you'll be glad if you read it from start to finish before you get started**. It'll help you save time, avoid common pitfalls, and ensure your system works as well as possible.

## Who We Are

Hi! We're Waveform. We've been around since 2007, and while we've grown a bunch since then, we're still a small team. There's just a handful of us answering texts, and picking up calls.

The four of us pictured below lead support and product development. Feel free to reach out to us at any time; our emails are all just our first names @waveform.com



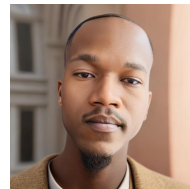
Harry (Support)



Marcus (Product)



Sina (CEO)



Conold (Support)

## Stuck? Have Questions? *Please*: Contact Us!

We're a small team, but we *really* care about helping you get the best results.

If you're having issues, please reach out. Sometimes a small tweak can make all the difference.

Even if everything goes smoothly, let us know how your system is performing! And we love getting feedback: if you think of a way we could make our antenna, accessories, the install process, or this manual better - let us know!

Call (800) 761-3041, email [help@waveform.com](mailto:help@waveform.com), or book a meeting at [waveform.com/meet](https://waveform.com/meet) to chat with a **Waveform Signal Specialist**. We're available from 6am-5pm PT, Mon to Fri.

## 00 Before You Start

Whether it be inside, outside, or on the roof, it's important that there's at least some 4G LTE or 5G signal where you're installing your QuadMini. Ideally, the cell signal should be "usable."

## What Do We Mean by "Usable"?

When using your cellular router or hotspot, **you should be able to complete a data speed test** before connecting your QuadMini. Connect to the Wi-Fi of your cellular device and visit [speedtest.net](https://www.speedtest.net) to run a quick data speed test.




MIMO antennas, like the QuadMini, will help condition your outdoor signal and get you better data speeds. **But if the signal outside your building isn't usable to begin with, an antenna might not help.** You can certainly still give the QuadMini a shot, you may not get the results you're expecting.


## Install QuadMini Outdoors If Possible

For the best performance, always **install your antenna outdoors**. The walls and roof of your house may **limit performance** and impact the speeds you see from your router.

## Compatibility

Your QuadMini supports almost every 4G LTE and low/mid-band 5G service in use in the US, Canada, and across the world. Here are the bands that it covers\*:

USA	
	B2/n2, B4, B5/n5, B12, B17, B29, B30, B46, B66/n66, n77
	B2/n2, B4, B5/n5, B13, B46, B48/n48, B66/n66, n77
	B2, B4, B5, B12, B25, B26, B41/n41, B46, B66, B71/n71, n77

CANADA	
	B2, B4, B5, B7, B12, B13, B17, B29, B46, B66/n66, B71, n78
	B2, B4, B5, B7, B12, B17, B25, n41, B66/n66, n71, n78
	B2, B4, B5, B7, B12, B13, B17, B25, B26, B29, B46, B66/n66, B71/n71, n78

**All supported 4G (LTE) Bands:** B1, B2, B3, B4, B5, B7, B8, B11, B12, B13, B14, B17, B18, B19, B20, B21, B22, B25, B26, B28, B29, B30, B32, B34, B37, B38, B39, B40, B41, B42, B43, B46, B47, B48, B50, B51, B53, B65, B66, B67, B69, B70, B71, B74, B75, B76, B85, B103, B106

**All supported 5G (NR) Bands:** n1, n2, n3, n5, n7, n8, n12, n13, n14, n18, n20, n25, n26, n28, n29, n30, n34, n38, n39, n40, n41, n46, n47, n48, n50, n51, n53, n65, n66, n67, n70, n71, n74, n75, n76, n77, n78, n79, n80, n81, n82, n83, n84, n85, n86, n89, n90, n91, n92, n93, n94, n95, n96, n97, n98, n99, n100, n101, n102, n105

*\*The bands your router actually uses may vary from this list.*

# How Much Improvement Should You Expect?

In short: It's hard to say. **Many people see an increase in data speeds of between 50% and 200%**, but some people may only see 10%. Despite all the science, wireless signals often work in strange and magical ways.

Two things are for sure: **The more spots you try the more likely you are to see a big increase in data speeds. Also, you're more likely to find better performance when installing outdoors.**

If you've gone through this manual and position your QuadMini as we suggest, but you're still not seeing much improvement, **please reach out to us for help.**

## What Tools Do You Need?

Your QuadMini includes all of the tools necessary for assembly. If you're wall mounting your antenna, you'll need a **phillips-head screwdriver** and you may need a **drill**.

For the UltraPole, **please refer to the manual included in the package or find the manual online at [waveform.com/ultrapole-manual](http://waveform.com/ultrapole-manual).**

# 01 Install Process Overview

- 1 Read this manual**, ideally from start to finish, so that you understand the whole installation process before you begin.
- 2 Find the best antenna position (Pages 6-9).** This step takes the most time, but getting it right has a huge impact on your system's performance. Even if you're installing indoors, we recommend a few tests outside. Note your findings in the table provided on page 9.
- 3 Verify performance and connect everything (Pages 10-11).** Before making any holes in your roof or walls you'll fully connect your system and run speed tests. If everything looks good, you'll finalize the cable runs and hard-wire everything.
- 4 Mount your QuadMini (Page 12-13).** You'll assemble the QuadMini with one of its mounting options at your choice of antenna location.
- 5 Tell us how your system is doing.** Nothing makes our day like hearing from customers. And if for any reason you're not seeing the results you were hoping for, we can help.

Call **(800) 761-3041**, email **[help@waveform.com](mailto:help@waveform.com)**, or book a meeting at **[waveform.com/meet](http://waveform.com/meet)**. We're available from 6am-5pm PT, Monday to Friday.

## 02 Finding the Best Antenna Position

While we include indoor mounts for the QuadMini, you'll almost always see much better results installing your QuadMini outdoors.

In this section, we'll explain the **simplest and most effective method for identifying the best location** for your QuadMini outside. Finding the best antenna position is the most critical step in this whole manual. Section 9 covers advanced tips for additional optimization.

If you can't install your antenna outdoors or you're using your QuadMini in a vehicle, read these steps, along with Section 3 for instructions on how to find the best indoor position.

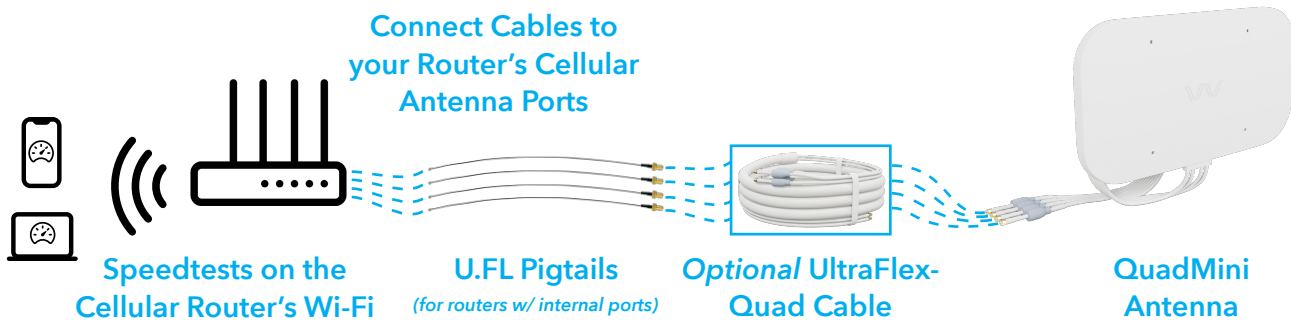
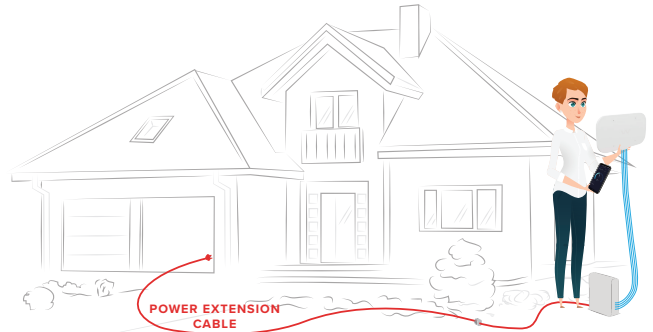
## The Goal

Your goal is to find the **best position** for the QuadMini. This position should **maximize the data speeds** from your cellular router. It can take a little patience, but spending some extra time here can have a huge impact on performance - it's worth the extra effort.

## 1. Prepare Your Test Setup

Is your cellular router battery-powered? Or, do you have a power extension cord?

If so, **connect your QuadMini directly to your cellular router** (as shown below), and restart your router.



**Can't take your router outdoors?** No problem. Keep your router powered indoors and add the UltraFlex-Quad cable into the setup to bring the QuadMini outside.

*If you're leaving your router indoors, your speed tests may be limited by the router's Wi-Fi range rather than its cellular connection. Ask someone to stay near the router so they can run speed tests as you try different positions with the QuadMini outside.*

**Not sure which ports to connect to?** Some cellular routers have both Wi-Fi and cellular antenna ports. Make sure to attach your QuadMini to your router’s cellular ports, not Wi-Fi. Some devices only have internal antenna ports. **Refer to your router’s manual, our device-specific guides at [waveform.com/hotspot-guides](http://waveform.com/hotspot-guides), or reach out to us for help if you’re unsure.**

## 2. Get Ready to Perform Speed Tests

Since the goal is improved data speeds for your cellular router, it makes sense to **judge the best position for your antenna by measuring your data speeds**. We recommend using Speedtest by Ookla for this. Visit [waveform.com/speedtest](http://waveform.com/speedtest) to get there easily.

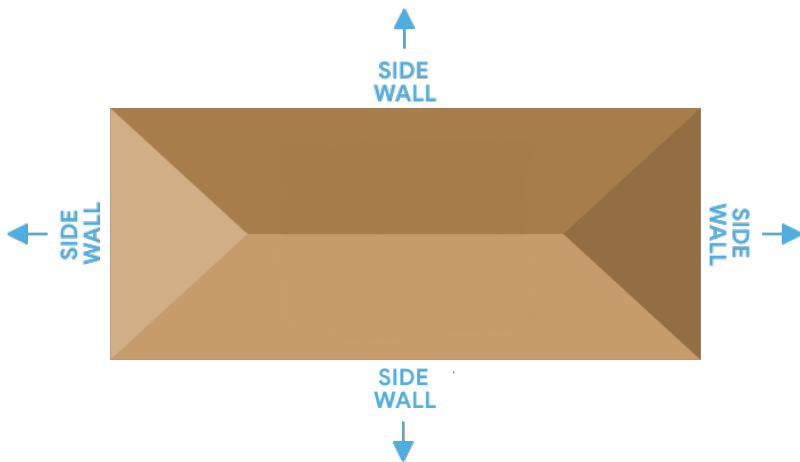
Once your test setup is ready and your testing phone or laptop is connected to your cellular router, **you’ll have everything you need to start testing** at different positions outside.

Go ahead and **run a couple of speed tests to get a baseline**. You’ll notice your results fluctuate a between tests – that’s completely normal.

## 3. Take Outdoor Measurements

**With each new location, restart your cellular router by disconnecting and reconnecting the power. This forces the device to connect to the best bands available at that location.**

We recommend **running 2-3 speed tests at each of the following outdoor positions** with your QuadMini, and writing each of your results in the table on page 9.



**Don’t just go to the highest point of the roof!** While signal is generally stronger the higher you go, there’s also often more interference. We’ve found it’s often better to mount the QuadMini on the side of the building where antennas are better shielded from interference.

If you’re running into issues, we’d love to help. Call **(800) 761-3041**, email **[help@waveform.com](mailto:help@waveform.com)**, or book a meeting at [waveform.com/meet](http://waveform.com/meet) to **chat with a Waveform Signal Specialist**. We’re available from 6am-5pm PT, Monday to Friday.

## 03

**Installing your QuadMini indoor, or in a vehicle?** Make sure you've read the steps in the previous pages. Before continuing, **we strongly recommend installing the QuadMini outside.** Buildings and vehicles have a big impact on cell signals, and can limit your performance.

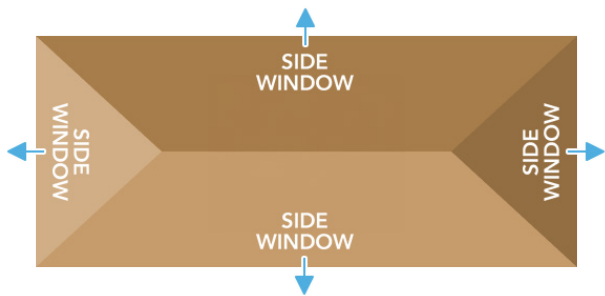
If you need any accessories to reach outside or you're unsure where to install, please reach out! Call **(800) 761-3041**, email **help@waveform.com**, or book a meeting at [waveform.com/meet](https://waveform.com/meet) to **chat with a Waveform Signal Specialist**. We're available from 6am-5pm PT, Mon-Fri.

In this section we'll outline the **tips & tricks for indoor and vehicle installations.**

## Taking Measurements

### A For Indoor Installs

Run speed tests indoors with the QuadMini positioned at **every window on each floor and side of the building.**



**Don't just go to windows on the highest floor!** While signals are generally stronger higher up, they often have more interference.

**Avoid windows with low-E glass**, as they can obstruct cell signals. If you're unsure whether a window is low-E, please reach out to us!

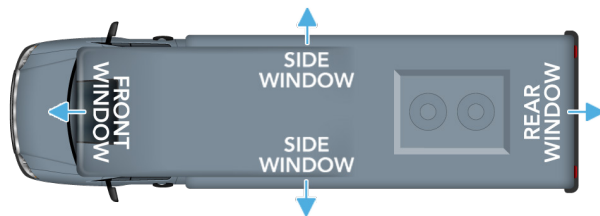
At each new location, **restart your cellular router** to ensure it connects to the best available bands.

Once you've found the best position with the fastest data speeds, proceed to section 6 to get ready for your final installation.

## B For Vehicle Installs

Your options for installing your QuadMini are a lot more limited in vehicles, and the best signal will be on different sides of the vehicle as you drive around.

However, you can **run speed tests** in different locations when parked for a small improvement.



Just like in a building, you'll see **better performance by installing your QuadMini outdoors.**

For example, using the pole mount bracket to mount to the ladder on the back of an RV can often be a good choice.



## 04 Your Measurements

Use this table to make notes of your data speed measurements while you're positioning your QuadMini at the various positions described in the previous sections.

Important: each time you move to a new location, power cycle your cellular router so that it connects to the very best bands available.

[illegible]

## 05 Connecting Your System

Once you've identified the best position for your QuadMini, it's time to hook everything up.

**Don't drill any holes in your walls yet!** Start with a temporary install and test performance first.

Keep your QuadMini at the position you've identified, but move your router indoors and perform a final round of tests to make sure everything is performing optimally.

If you purchased your QuadMini as a complete kit, follow the steps below to assemble and install your kit. If you only purchased the antenna, your assembly may look a little different.

## Getting the Complete Kit Set Up

Refer to the diagram to the right as needed.

- 1 Place your **QuadMini** near the best position you found in section 2 or 3.
- 2 Connect your **QuadMini** to your **UltraFlex-Quad cable** and run the cable into your building.

*If you don't want to drill holes into your walls or roof to route your cables, **install your Coax Window Entry cable** in a window, and **connect it to your QuadMini and/or UltraFlex-Quad cables.***

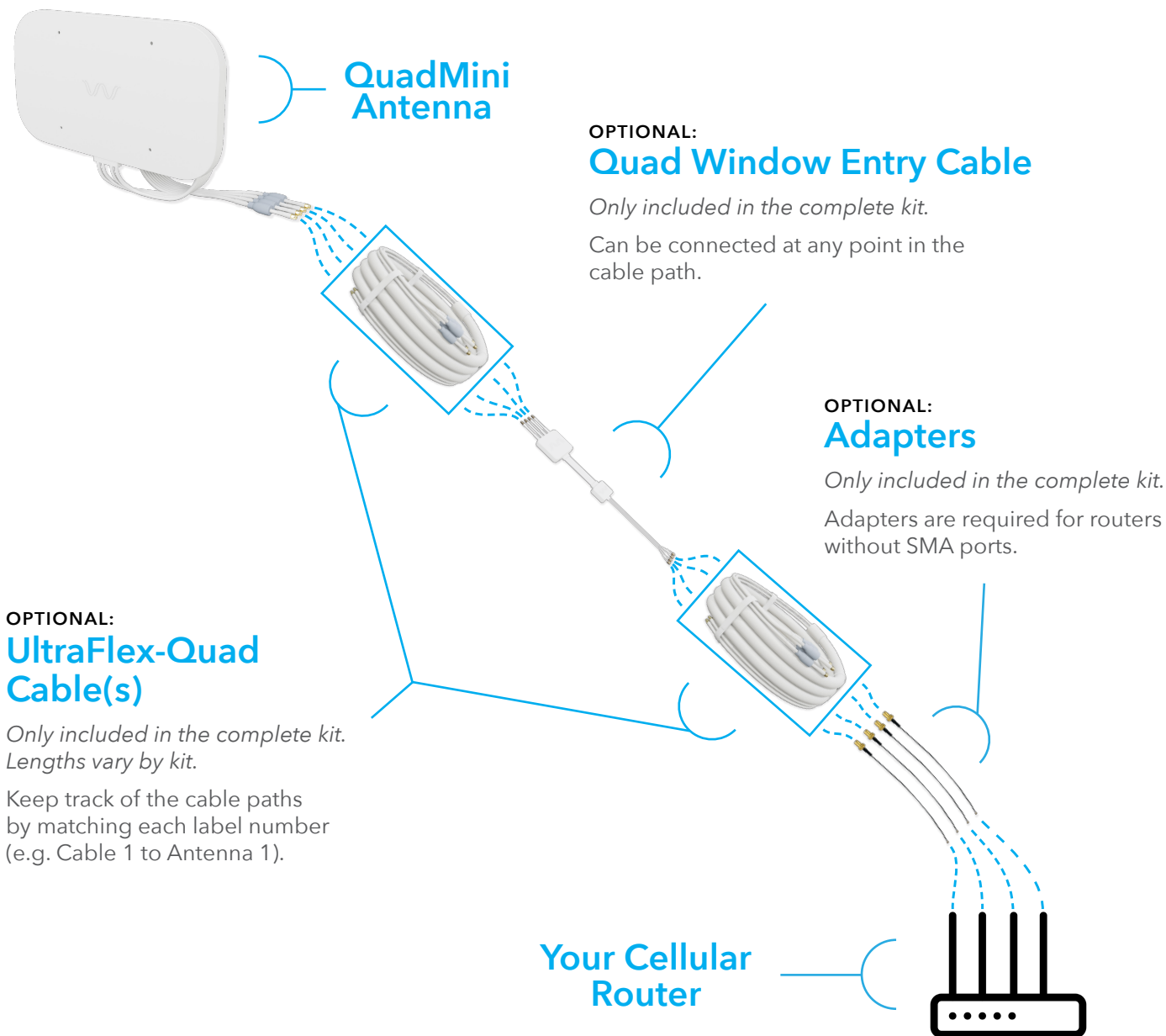
- ### 3 **Connect your cables** to your router's cellular antenna ports and hand-tighten.

If your cellular router only has internal U.FL ports, install the included U.FL pigtail adapters, and connect them to your UltraFlex-Quad cable.

- 4 Restart your cellular router**, wait for it to reconnect, then perform 1-2 speed tests to verify that you are happy with your system's performance.

## Install Tips

- **Before attempting to route the cables through your building**, lay the UltraFlex-Quad cable out flat to straighten it. This will make it easier to work with.
- **A finger-tight connection is sufficient** to secure the connectors. Tools are not required to tighten them and may cause damage.
- **Unsure how your cables connect to your router?** Refer to your router's manual, our device-specific guides at [waveform.com/hotspot-guides](https://www.waveform.com/hotspot-guides), or reach out to us for assistance.



## How to Install the Quad Window Entry Cable

Your Quad Window Entry Cable can be connected at any point in your system as needed. Follow the manual included or find it online at [waveform.com/window-entry-manual](http://waveform.com/window-entry-manual)

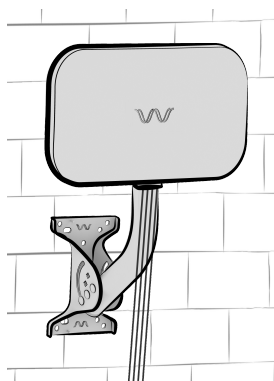
- 1** Loosely position the window entry cable in your window frame, with its larger case outside.
- 2** Check that your window fully closes. If not, please reach out to us for assistance.
- 3** Connect its indoor connectors to your router or UltraFlex cable.
- 4** Connect its outdoor connectors to your QuadMini or UltraFlex cable.

## 06 Mounting Your QuadMini

Now that you have all the components in your system connected and **you've verified that you are happy with your data speeds**, it's time to mount your QuadMini!

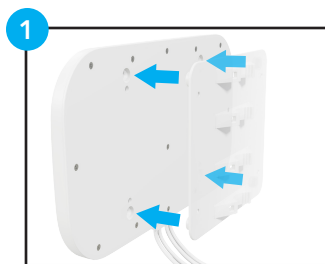
## If you're mounting your QuadMini outdoors...

Your QuadMini offers **two permanent outdoor mounting options:** pole or wall mounting.

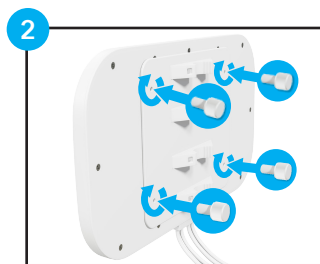


### Option 1: Pole Mount (High Performance)

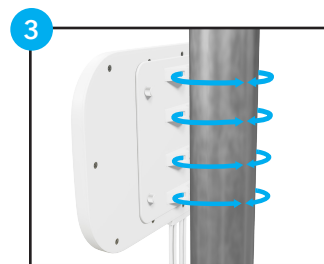
Follow the steps below to mount your QuadMini against a pole, using the included **pole bracket**:



Place your **pole bracket** into the back of the **QuadMini**.

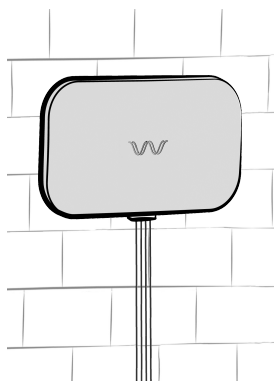


Secure the **pole bracket** with the **thumb screws**.



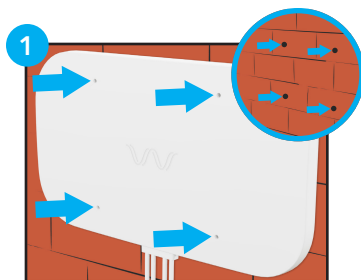
Secure the **QuadMini**  
against your pole by  
tightening the **zip ties**.

If your kit includes the **UltraPole**, refer to its included manual, or find it online at [waveform.com/ultrapole-manual](http://waveform.com/ultrapole-manual) for its assembly instructions

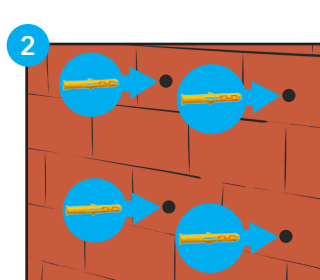


### Option 2: Wall Mount

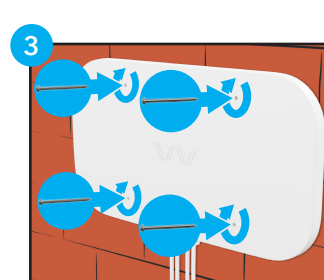
Follow the steps below to mount your QuadMini directly against the side of your building. Use the **anchors** when installing on hard surfaces like concrete or soft materials like drywall.



Hold your **QuadMini** in position and mark each hole. Then, drill pilot holes.



(Optional) Install the **anchors** into the wall of your building.

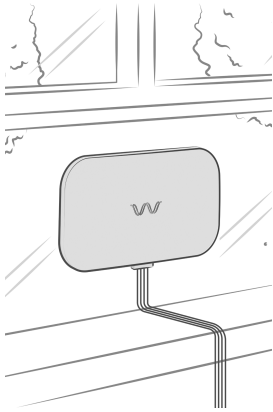


Place **QuadMini** against the wall near a window and install the **screws**.

## If you're mounting your antenna indoors...

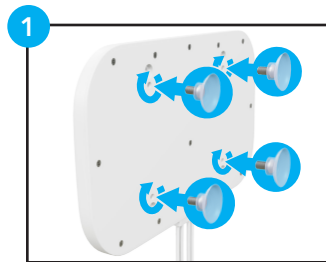
Your QuadMini offers **two indoor mounting options**: window or desktop mounting. For better performance, **we strongly recommend mounting your QuadMini outdoors** instead.

Regardless of the mounting option you choose, **remember to mount the antenna near the window you identified in section 4.**

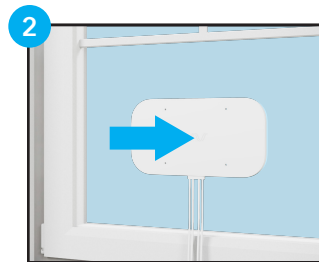


### Option 3: Window Mount

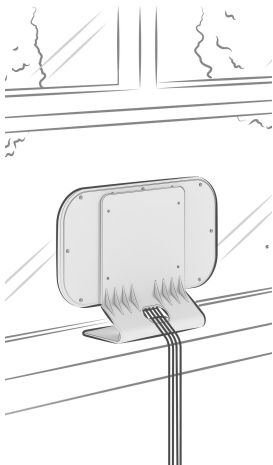
If you can't mount your QuadMini outdoors, follow the steps below to mount your QuadMini against a window using the included **suction cups**:



1. Thread each **suction cup** into the back of the QuadMini.

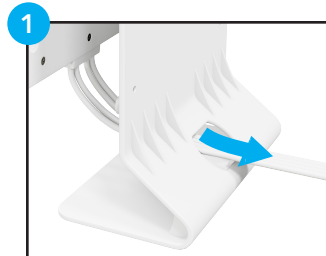


2. Press the **QuadMini** firmly against the window.

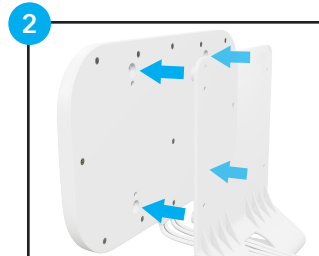


### Option 4: Desktop Mount (Limited Performance)

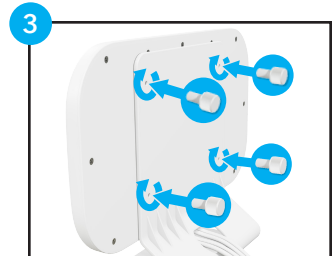
If you can't mount your QuadMini directly against your window, but have an available window sill, table, desk or other flat surface nearby, follow the steps below to position your QuadMini near your window:



1. (Optional) Feed the cables through the **desktop bracket**.



2. Align the **desktop bracket** with the back of the QuadMini.



3. Secure the **desktop bracket** into the QuadMini with the **thumb screws**.

## We're Here to Help!

We know that every use case is different and the steps for mounting your antenna may differ for your unique location. **Don't worry!** If you're running into issues, or have any questions, just reach out.

## 07 Protecting Your Outdoor System

**If you're installing your antenna outdoors**, there are a couple of final steps before your installation is complete. However, **if you've installed your antenna inside your building or vehicle**, skip ahead to the next section for advanced optimization tips.

In this section we'll describe how to weatherproof and properly ground your system. **These steps are crucial** to ensuring the longevity of your system by protecting it from the elements.

## Weatherproofing Your Outdoor Connections

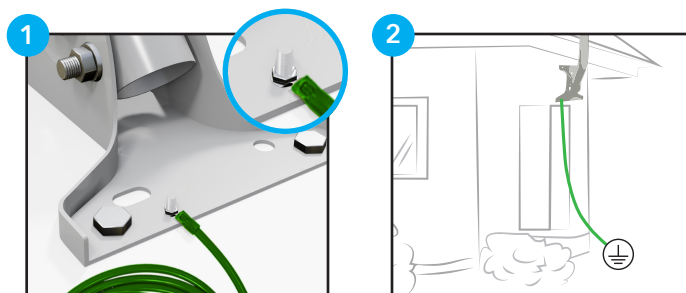
The QuadMini and UltraFlex-Quad cables come with weatherproofing boots to help waterproof each outdoor cable connection. Once your connectors are tightened, **slide the weatherproofing boots over all of the outdoor cable connections**. Sliding these boots takes a bit of strength so don't be scared to put some elbow-grease into it!



## Grounding Your Mounting Pole

If you've mounted your QuadMini against a pole, **it's important to ground your pole** to a suitable electrical ground. Mounting poles can be prime targets for lightning strikes and grounding them with a **10 AWG or lower gauge (thicker) grounding cable** (not included) is required by the National Electric Code (NEC).

**Follow the instructions within the manuals** included with your UltraPole to properly ground it for your system. The general steps are described below:



Attach a **ground wire** to your **pole**. e.g. Some mounting poles use a **grounding bolt & nut**.

Attach the **Ground Wire** to a suitable **Electrical Ground**.

## Grounding Tips

- If you're unsure about your grounding setup, **reach out to an electrical contractor**.
- **Expanded instructions** on grounding and **examples of suitable electrical grounds** can be found at [waveform.com/grounding](https://www.waveform.com/grounding)

# 08 Advanced Optimization

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By this point, you should have a really solid understanding of where to position your QuadMini and get great performance. In fact, **we're convinced that for 95% of people, the instructions provided in this manual so far are more than enough.**

If, however, you'd like to go a little deeper and get technical to optimize your system even further, here are some general guidelines.

- 1 Look up your nearby towers** on [cellmapper.net](https://cellmapper.net) by performing a "Tower search" with the "eNB-ID" that your cellular router is connecting to. An eNB-ID is a unique cell tower identifier that can often be found in your cellular router's admin interface.
- 2 If your cellular router supports bandlocking**, band lock it to every band that each nearby tower transmits, and run speed tests for each tower on each band, to find your fastest band(s) and tower.
- 3 Try enabling multiple bands** and using carrier aggregation to find the fastest band combination. Carrier aggregation is supported by most cellular routers and allows them to connect to two or more bands simultaneously. However, it doesn't always result in faster data speeds so stick to a single band if that gets you the best results.

Unfortunately, **many cellular routers don't support band locking or carrier aggregation**, and some don't list eNB-IDs or any other tower identifiers, making these steps difficult. Every cellular router is so different that we could never cover them all with just one set of instructions.

However, **we've written up guides for some of the most common devices**, you can find them online at [waveform.com/hotspot-guides](https://waveform.com/hotspot-guides). We suggest reading our guide for your router, or referring to your user manual.

## We're Here to Help!

We know, there's a lot of information out there and this can get quite technical. If you're running into issues, aren't happy with the performance of your system, or you'd just like a hand, we'd love to help!

Call **(800) 761-3041**, email [help@waveform.com](mailto:help@waveform.com), or book a meeting at [waveform.com/meet](https://waveform.com/meet) to **chat with a Waveform Signal Specialist**. We're available from 6am-5pm PT, Mon to Fri.

## 09 Need Help with Adapters?

- > **Having difficulties connecting your U.FL pigtails to internal antenna connectors?** U.FL connectors are small and can be difficult to install on the first try. We suggest that you **use a tweezer to hold the cable in place** and a **pencil eraser to push the U.FL connector down**.
- > **Does your cellular router need different adapters for its cellular antenna ports?** If so, please reach out to our team so we can help you obtain the parts you need.

## 10 Want Even Greater Performance?

If you're looking for even greater performance,  
look no further!

The QuadPro's directional high-gain antennas may be able to provide you with **superior performance over the QuadMini.**

The QuadPro also comes with our **adjustable FlexMount**, for easier aiming.



## 11 Some Final Tips

- > **Don't judge your signal by signal strength or quality alone.**  
You may find that your RSRP signal strength and SINR/RSRQ haven't improved much, but that your data speeds are meaningfully better. There's much more to an antenna than just gain, and in particular, our antennas are optimized for MIMO isolation to get you the best 5G data speeds possible.
- > **If data speeds decrease over time, consider re-optimizing your system.**  
Occasionally carriers will update their towers to broadcast different bands, light up new towers, or simply turn off existing towers altogether. If your data speeds get worse, try repositioning your QuadMini to get the best results.



## 12 Tell Us How It Works

Did your installation go well? Are you having trouble positioning your QuadMini? Do you think our manual could be improved? Are your data speeds not quite what you were hoping?

**Please tell us:** Call **(800) 761-3041**, email **[help@waveform.com](mailto:help@waveform.com)**, or book a meeting at **[waveform.com/meet](#)** to **chat with a Waveform Signal Specialist**. We're available 6am-5pm PT, Monday to Friday.

**We're a small team** who loves hearing how our products perform and helping folks get the absolute best data speeds in any given situation. **So please, reach out!**

## Two ways to get some money back!

## Send us a video of your install and get \$25

We want to feature videos of our customers who've had success with our QuadMini antenna.

Take a video that's at least 30 seconds long showing how you installed your antenna as well as the speed test results you're getting. Send it to us via email at [videos@waveform.com](mailto:videos@waveform.com) and we'll send you \$25 via PayPal!

**Get 5% back for each friend or neighbor you refer!**

Hopefully by the time you've finished installing and tuning your QuadMini, you're as excited about this product as we are.

One of our biggest challenges is spreading the word. Most people don't know that products like your QuadMini exist.

Help us get the word out: Everyone you refer gets 5% off their kit, and we'll also give you 5% of whatever they spend in cash (via Paypal).

Simply visit [waveform.com/referrals](https://waveform.com/referrals) to get started.







## Need help? We're ready and waiting.

MIMO Antennas, like the QuadMini, aren't always easy to install. But the end result is worth it.

One of the benefits of buying from Waveform is our **lifetime technical support** on every system we sell. We've installed hundreds of these devices ourselves, and can walk you through troubleshooting and fine-tuning your installation for best results.

Simply give us a call at **+1 (800) 761-3041**, email us at **help@waveform.com**, or book a meeting with our fanatical support team at [waveform.com/meet](https://www.waveform.com/meet). **We're available from 6am-5pm PT, Monday to Friday.**

We love helping solve tricky install problems.



v1.0.7



Designed by Waveform in the USA



3411 W. Lake Center Dr.,  
Santa Ana, CA 92704



+1 (800) 761-3041



[www.waveform.com](https://www.waveform.com)  
[help@waveform.com](mailto:help@waveform.com)