

CEL-FI™

GO G41 MIMO

from WAVEFORM

BEFORE YOU START!

Scan this QR code to watch the setup videos, and...

- **Get your free Virtual Site Survey** - including a map of cell towers and where to mount your antenna.
- **Download** the Cel-Fi Wave app.
- Connect to **our team of dedicated Signal Specialists** - They are eager to help!
- View a **digital copy** of this manual.

⚠ **NOTE:** The **Cel-Fi Wave App** is used to set up your GO G41s, but **skip it's install steps** and instead follow the steps in this manual to **get the best possible performance.**



setup.wf/G41-MIMO

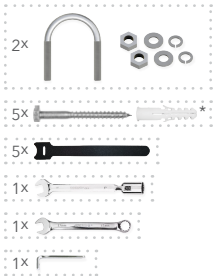
What's In The Box



2x Cel-Fi G41 Amplifiers & AC Power Supplies



DualPlus w/ FlexMount & Assembly Hardware



UltraFlex-Twin Cable (20 ft)

Indoor Antennas, Cables, and Splitters (Depends on Kit Selections)

Depending on which kit you purchased, your G41 kit will contain either 1x, 2x, 3x, or 4x **indoor MIMO dome antennas**.

You'll also have **two 30 ft RS400 coax cables for each indoor MIMO Dome antenna**.



Indoor MIMO Dome Antenna(s)



2x, 4x, 6x, or 8x RS400 Cables (30 ft)

If you picked a kit with multiple MIMO indoor antennas, you'll get two SMA-Male to N-Male Pigtails and two signal splitters, instead of two SMA-Male to N-Female Pigtails.

Only included in kit with 1x indoor antenna:



2x SMA-Male to N-Female Pigtail

Only included in kit with 2x, 3x, or 4x indoor antennas:



2x 2-Way, 3-Way, or 4-Way Signal Splitter



2x SMA-Male to N-Male Pigtail

Other Parts



UltraPole
(Manual included in box)

BOX



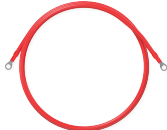
* Includes extras



2x SMA-Type Lightning Arrester



2x Weatherproofing Tape (6 in)



2x 10 AWG Grounding Cable (5 ft)

BAG

Install manuals, who needs 'em?

Signal boosters can be finicky to set up. The Cel-Fi GO G41 is no exception. The GO G41 MIMO consists of two Cel-Fi GO G41s working side-by-side and it will take a bit of work to get your GO G41 MIMO setup installed optimally.

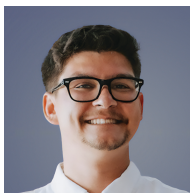
But there's a reason that most people are willing to take the time to perform an installation, even if it takes 4 to 5 hours. This is the only MIMO signal booster kit on the market, and the GO G41 is the only amplifier that provides an industry-leading 100 dB of gain. Once you get set up and running properly, you should see a **significant** improvement in signal, right away.

We've written this guide based on our own experiences and those of hundreds of customers who we've helped. **We promise you'll be glad if you read this manual through thoroughly before you get started.**

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



Ian (Support)



Marcus (Product)



Sina (CEO)



Austin (Product)

Stuck? Have Questions? Please: Contact Us!

We're a small team, but we really care about helping you get the best results. Talking to customers is what helps us improve our products. We can also help troubleshoot, and sometimes a small tweak we suggest can make all the difference.

Even if everything goes smoothly, reach out and let us know how your system is performing. We love getting feedback: let us know if there's any way we could have made the install process or this manual better.

Please, visit us at setup.wf/G41-MIMO to **connect with our team** of dedicated Signal Specialists, and access a **bunch of helpful resources!**

00 Before You Start

It's critical that you have **at least 1 bar** of **usable** signal outside or on the roof of the building you're installing your GO G41 MIMO. If you don't have 1 bar, or if you're unsure, give us a call.

What do we mean by usable?

Well, you need to be able to place a call and use data reliably. A good way to check is to turn your phone's Wi-Fi off, go outside, visit [speedtest.net](https://www.speedtest.net), and run a test. If your test is able to complete, you've got usable signal!

Cell boosters bring signal inside from outdoors. If you don't have 1 bar of *usable* signal outside your building, the GO G41 MIMO likely won't work at your location. Visit [waveform.com/returns](https://www.waveform.com/returns) to set up a return. We'd be happy to find a better solution that works for you.

Compatibility

The GO G41 MIMO consists of two Cel-Fi GO G41s working side-by-side to provide you with 2x2 MIMO service, and each Cel-Fi GO G41 is compatible with:

- ✔ **AT&T** 4G LTE on Band B2, B4, B5, & B12 | 5G (DSS, SA, and NSA) on Band n2 & n5
- ✔ **Verizon** 4G LTE on Band B2, B4, B5, & B13 | 5G (DSS, SA, and NSA) on Band n2 & n5
- ✔ **T-Mobile** 4G LTE on Band B2, B4, B5, B12, & B25 | 5G (SA and NSA) on Band n25

Worried about 5G? The GO G41 MIMO is the only consumer-grade signal booster capable of relaying 2x2 MIMO 5G SA (Standalone) and 5G NSA (Non-Standalone) signals at 100 dB of gain.

DSS (Dynamic Spectrum Sharing) is used by AT&T and Verizon to transmit 4G LTE and 5G in a single "hybrid" channel. It is enabled by default and applies to both 5G SA and 5G NSA.

The **Cel-Fi GO G41** doesn't support T-Mobile's 5G Bands n71 and n41; the FCC has not yet approved those bands for boosting in the US.

5G SA/NSA support requires firmware v14 (or newer). If "automatic software updates" is enabled, each Cel-Fi GO G41 will automatically update to the latest firmware with these features.

What do the LAN and USB-C ports do?

The LAN and USB-C ports on the side of each GO G41 are diagnostic ports, accessible only to Cel-Fi Certified System Integrators. But, no need to worry! **Access to these ports is not necessary to setup your system.** The small  light is associated with these ports.

01

This is the process that we suggest using for installing your GO G41 MIMO, each of these steps is explained in greater detail within the following pages of this manual:

- 0 Scan the QR code** to submit your virtual site survey, **download the Wave app** (which will let you control each GO G41), and get connected to our team of signal specialists.
- 1 Read this manual** – Ideally from start to finish so that you understand the whole process before you begin.
- 2 Configure the settings of each GO G41 within the Wave App (Page 8)** – Run through the initial setup in the Wave App to configure each booster. Skip the install instructions suggested in the app; we're confident that following our manual will lead to a much smoother installation experience and better performance from your GO G41 MIMO.
- 3 Find the best outdoor antenna location and direction (Pages 10-12)** – This step is the most time consuming, but it's worth the effort. Getting it right has a *huge* impact on your system's performance.
- 4 "Temporary install" and indoor antenna positioning (Pages 12-16)** – Without making any holes in your roof or walls, temporarily run the cable indoors to your GO G41, and find indoor antenna locations with enough separation from the outdoor antenna.
- 5 Verify performance and hard-wire everything (Page 17)** – Run speed tests and check your bars – if everything's looking good, it's time to finalize all your cable runs and mount antennas.
- 6 Tell us how your system is doing (Page 22)** – We really love hearing how our customer's systems are performing. Send us an email and let us know how things look.

If anything's unclear, or you're unsure about something, visit setup.wf/G41-MIMO to **connect with our team** of dedicated Signal Specialists, and access a **bunch of helpful resources!**

02 A Quick Introduction to Cellular Signal

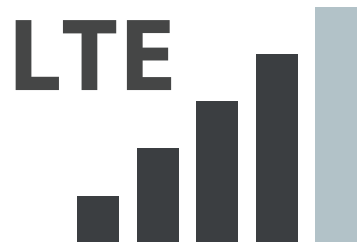
One of the most common questions we get asked is: *how do I get better data speeds?*

To understand how to get the highest data speeds we need to dig into the details a little. In this section we'll give you a quick primer on how cell signal works.

a. Signal Bars

Your phone's signal bars attempt to give you an idea of how "good" your signal is.

How does your phone decide how many bars to show? Well, it measures both the *signal strength* and *signal quality*, and converts those measurements into a simple indicator.



Having either low signal strength *or* low signal quality can limit the number of bars your phone displays.

For example, you can have a strong signal, but if the signal quality is low, you won't have many bars. Or your signal quality might be perfect, but if it's very weak, you still won't see many bars.

However, the real secret is this: **signal bars aren't all that important.**

You can have full bars and very slow data speeds. Or you can have 1 bar and super high data speeds. We regularly see both!

That's why we don't recommend judging your signal by the number of bars your device is showing. Instead, **use a speed test app** to measure your data speeds indoors before and after you install your GO G41 MIMO.

You can download our favorite speed test app ("Speedtest by Ookla") by visiting this URL:
waveform.com/speedtest

Go ahead and download that speed test app now, and run a couple of speed tests indoors. You'll notice that your results will fluctuate a little between tests - that's normal.

If your phone's connected to Wi-Fi, the speed test will measure the speed of your Wi-Fi instead of your cellular connection. **Disable your phone's Wi-Fi** and run the test again.

b. Signal Quality (SINR)

Signal quality is probably **the most important measure of your cell signal**. In 4G LTE networks, signal quality is called "SINR", which stands for "Signal to Interference Plus Noise Ratio".

In general, the better the signal quality, the faster your download speeds will be. Improving this measure can have a big impact on your system's performance.

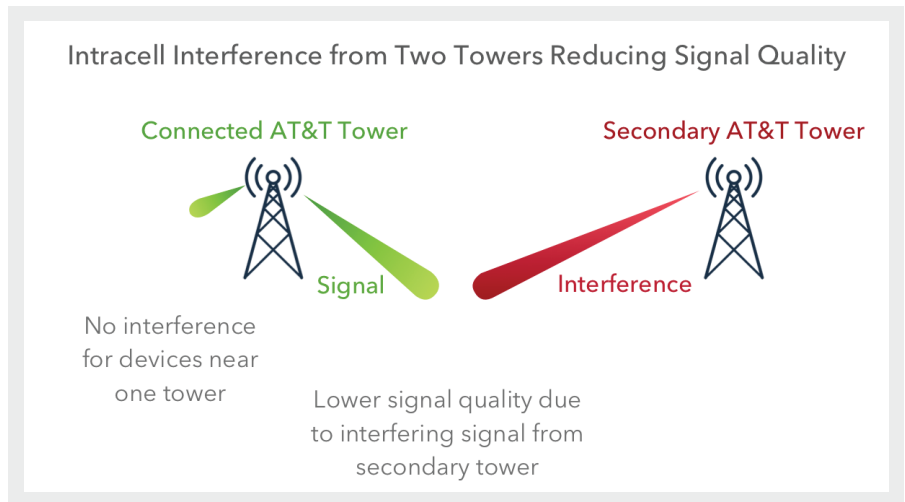
Why does signal quality drop? It's actually because **cell towers interfere with each other.**

Every cell tower transmits signal on the same set of bands.

If you're located between multiple cell towers, your phone has a hard time clearly "hearing" the cell signal from the tower you're connected to. This is called **"intracell interference"**.

A signal booster like the GO G41 won't increase your signal quality directly. However, by shielding and aiming the directional outdoor antenna that's included in your kit you can find higher quality signal, and the GO G41's will amplify that signal and rebroadcast it indoors.

We'll explain exactly how to position and aim your outdoor antenna later in this manual.

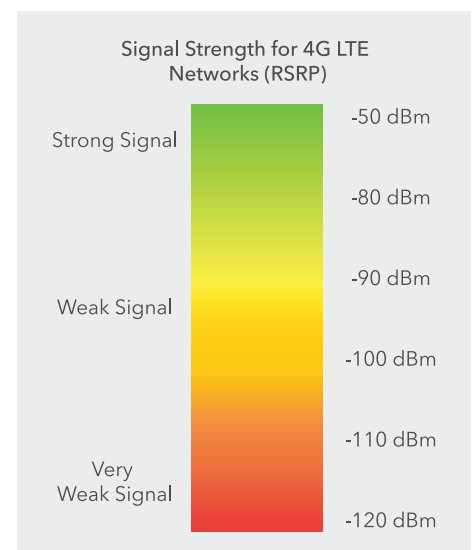


c. Signal Strength (RSRP)

The main measure of signal strength for LTE networks is called "RSRP". Signal strength is measured in dBm and is always a negative number.

Signal boosters like the GO G41 amplify your signal so you have higher signal strength. The GO G41 has 100 decibels of gain (a measure of amplification). That means that it'll cover **a larger area with stronger signal than most boosters.**

Stronger signal can help you get better data speeds and a more reliable connection. But signal quality is critical as well.



d. Bands

Your cell phone connects to towers on certain "frequency bands". These bands are licensed to each carrier by the Federal Communications Commission (FCC) in the US.

Each frequency band has a certain "bandwidth" which determines it's total data capacity. That capacity is split amongst the users who are connected to it.

In general, higher frequency bands (like 1900 MHz and 2100 MHz) travel less far and penetrate building materials less well than lower frequency bands (like 700 MHz and 850 MHz). As a result, higher frequency bands tend to be less "congested" - they have fewer users connected to them, and data speeds are often faster. This isn't *always* the case though, sometimes a lower frequency band may have better data speeds, depending on your location.

Low Frequency Bands More congested, lower data speeds Travel further, penetrate buildings	700 MHz (Bands 12, 13) 850 MHz (Band 5)
High Frequency Bands Less congested, faster data speeds Travel less far, don't penetrate buildings	1900 MHz (Band 2, 25) 2100 MHz (Band 4, 66)

Newer phones have a feature called "carrier aggregation", which means that they can connect on multiple bands simultaneously to increase data speeds.

The Cel-Fi GO G41 can boost up to 2 bands simultaneously. Depending on the signal conditions in your area, there may be just 1 cellular band available, or up to 5. After you've completed a provisional install, you can experiment with enabling specific frequency bands to see if a particular combination gets you the best speed test results.

Unfortunately, FCC regulations don't yet allow consumer signal boosters in the US to amplify band 30 (2300 MHz), band 41 (2500 MHz), or band 71 (600 MHz).

Okay, thanks for reading that!

We know that's a lot of information, but we promise it'll be helpful as you start your install. Our goal is to get you strong, amplified signal and the best possible signal quality on the bands that get you the best data speeds. Let's get started!

03 Wave App and Carrier Selection

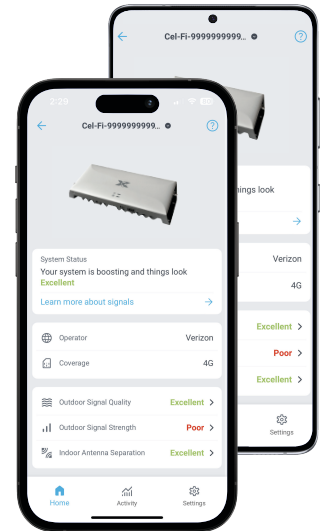
First, prior to installing any of the antennas or running any of the cables, each GO G41 needs to be set up in the Wave App.

It's important that both GO G41's share the same settings. Any time you make a changes to one GO G41, make sure to mirror them onto the other.

1 Plug each GO G41 into a power outlet to power them on, don't connect any antennas just yet.

2 Download the Wave app at waveform.com/waveapp

3 Open the app with your phone at most 4 feet from both GO G41s and **select "I don't need help"** to start pairing. Don't worry! We'll walk you through every step of the installation in this manual.



This may take a few minutes. The app will say "searching" and then allow you to select a system to connect to. **Select either of the two devices.**

4 Once connected, **rename this device** to "GO G41 A", **select your operator** (i.e. carrier), and **press continue**, leave all other options unchanged. **For AT&T customers**, choose "AT&T LTE Preferred" to ensure that each GO G41 boosts as many LTE bands as possible.

If you need to boost a different carrier later on, go to "Settings" → "Operator". Changing carriers takes a few minutes - don't turn off the GO G41 or move your phone away during that process.

5 Connect to your second GO G41 by tapping the top left arrow, and selecting the other available GO G41. **Repeat step 4** to rename this device to "GO G41 B" and select your carrier.

Please note: Only **one device** (e.g. your phone or tablet) can connect to **one Cel-Fi GO G41** via Bluetooth at a time. But don't worry - every device in the building will see better cellular signal, the Wave app is only used to change settings and monitor the GO G41s.

Troubleshooting Wave App Pairing:

- » If the Wave app is unable to connect to your device, first try force-closing the app.
 - For Android, go to your phone's Settings → Apps → Wave app, then select "Force Stop".
 - For iOS, instructions for how to force-close apps can be found here: waveform.com/fcios
- » If force-closing doesn't help, restart your phone and power cycle GO G41 by unplugging it from power.

04 Understand How The GO G41 Works

The GO G41 "Searches" For Signal

Unlike other boosters, the GO G41 doesn't blindly amplify every frequency. Instead, it ***searches*** for, and then amplifies, the best signal available for your carrier.

At any given time, the GO G41 can amplify up to two frequency bands.

Once you've connected antennas to the GO G41, you can watch in the "Activity" tab of the Wave app as it scans the frequencies on different bands to find the best signal to amplify.

Anytime you power-cycle one of the GO G41s, change the band settings, or change the operator, it will restart scanning to find the best signal. The Cel-Fi GO G41 starts scanning as soon as you unplug the outdoor antenna cable. To make sure it scans all frequencies, **restart both GO G41s units anytime you disconnect and then reconnect the outdoor antenna.**

Status Lights

The small light on the GO G41 flashes to indicate its current status.



Blinking Red & Green:

The GO G41 is performing its start-up sequence.



Blinking Green:

The GO G41 is scanning for networks to boost.



Solid Green:

The GO G41 has found the best band and is now amplifying service.



Blinking or Solid Red:

The unit is in an error condition. Use the **Wave App** to check for the Error Condition Code. Call us for assistance.

Boot-up Sequence

After being plugged in, the GO G41 status light will start blinking red and green, then move on to blinking green as it starts scanning the cellular frequency bands. **Make sure the outdoor antenna is connected to the  port** before powering on so the GO G41 can find signal.

Finally, once the GO G41 has found a signal to boost, the status light will switch to solid green.

05 Positioning & Aiming the Outdoor Antenna

Finding the best location for the outdoor antenna (DualPlus), is the **most important part of the install**. In this section, we explain the simplest method for positioning and aiming. Section 12 covers some more advanced information you can use to optimize your signal further.

The Goal

Your aim is to find the best **location** and **direction** for the outdoor antenna that maximizes signal strength and in particular, signal quality, for the frequency bands available in your area.

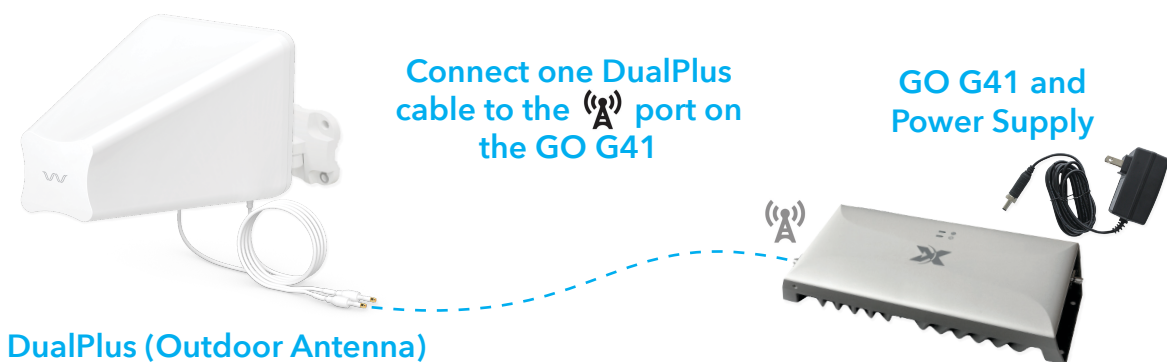
Set up one GO G41 as a Signal Meter

To keep things simple, you'll only use one GO G41 for this step. Keep the other unit turned off.

If you have a long power extension cable, we recommend taking the GO G41 & DualPlus outside with you and using one of the DualPlus's cable connections to set up the GO G41 as "signal meter".



Here are all the parts you'll be using. It doesn't matter which one of DualPlus's cable you use:



Don't have a long power extension cable? Keep the GO G41 indoors near a power socket, and place the included 20 ft UltraFlex-Twin cable in-line with the DualPlus & GO G41 to take your DualPlus outside.

The downside of this approach is that you won't easily be able to stay connected to the GO G41 via Bluetooth, so you may need a second person near the booster watching the Wave app as you test antenna positions.

Using the Antenna Position Test

The Wave app has a special "Antenna Position Test" that you can find in "Antenna Positioning" under the "Settings" tab.

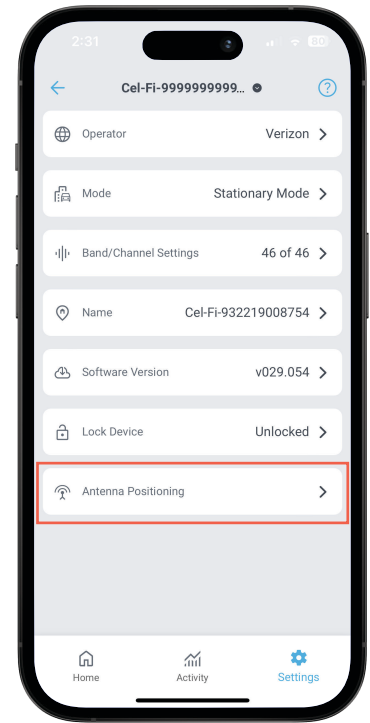
Wait for the GO G41 to display a solid green LED before connecting to it and proceeding with the antenna position tests.

With each location and direction you try, you can "Capture" results. Tests take about a minute each. Feel free to **note your test results in the table at the back of this manual.**

Ideally, you'll want to find a location with **a score that is as high as possible.** The scores are completely relative to each other so **there isn't a specific value to aim for**, just find the best score you can.

It will take some time, but it's always worth it to test as many locations as possible around your building, to optimize for the very best signal.

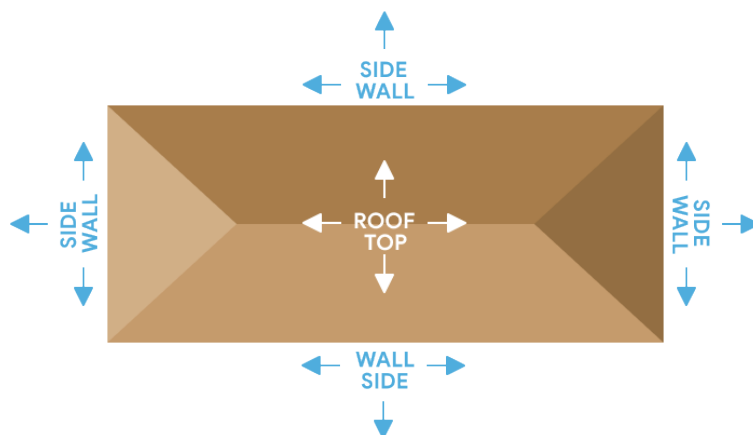
Please note: Don't be surprised if your antenna position score goes down when you connect your internal antenna(s) later on. That is totally normal!



How to Position & Aim

Finding the best outdoor antenna location and direction takes some patience, but it's absolutely worth it and will have a big impact on your system's performance.

Here are all the locations and directions we recommend testing for your outdoor antenna:

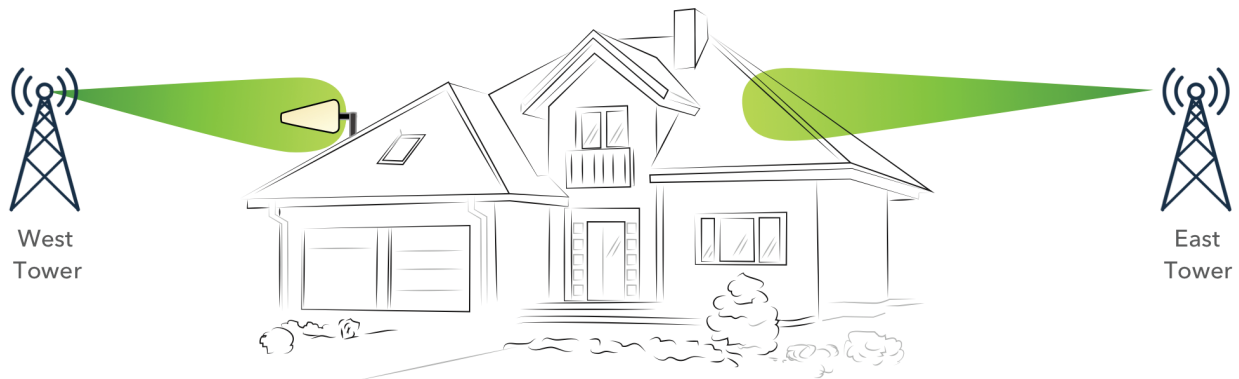


Why don't we recommend using the highest point on the roof? It's simple: while signal strength is generally better on the roof, signal quality – which is often more important for call quality and data speeds – is often better on the side of the building.

In section 2 of the manual (go back and read it if you haven't!) we explained that low signal quality happens because of "intra-cell interference".

The best way to improve signal quality is to "shield" the outdoor antenna from any other towers in the area, by putting it on the side of the building.

When the signal quality outdoors is low, the goal is to shield the outdoor antenna to reduce the signal from other nearby towers:



For some people, the top of their roof (where signal is the strongest) provides the best signal. For others, it's the side of the house. The only way to find which is best is to test.

06 Set up a Temporary Install

Once you've found the best outdoor antenna location according to the Antenna Position Test, it's time to temporarily secure the outdoor antenna, connect the second GO G41, and set up a "temporary install".

The following 4 pages explain **mounting the indoor antenna(s), antenna separation, and how to assemble your GO G41 MIMO system**. Read them before you install anything permanently.

We recommend securing the outdoor antenna temporarily, and running the UltraFlex-Twin cable indoors through a window or a door without drilling any holes.

Then, connect both of your GO G41s and in turn connect them to the indoor antenna. Once you've done that, you can test your coverage and data speeds. If everything is looking good, you can move to a permanent install. More on this in section 10.

If you're having signal issues with your temporary setup, or aren't happy with the performance, simply visit setup.wf/G41-MIMO to **connect with our team** of dedicated Signal Specialists, and access a **bunch of helpful resources!** We can often suggest an easy solution to most problems.

07 Indoor Antenna Placement

Before choosing a location for your indoor antenna(s), you'll need to understand how your indoor antenna(s) broadcast signal.

Dome Antennas

Dome antennas should be installed in the ceiling, centrally to the area you are looking to cover.

Some (but less) signal will also radiate upwards to cover the floor above. You'll need to have access to an attic or crawl space to run the cable.

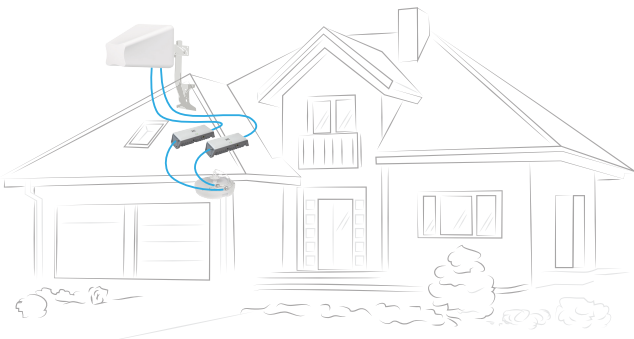


08 Antenna Separation

Antenna separation is critical to installing your indoor antennas.

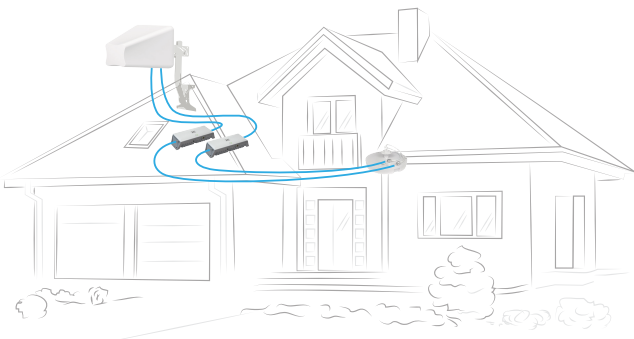
If you don't have enough separation, the Cel-Fi GO G41 boosters will throttle their gain (amplification) to avoid "oscillation". Oscillation is a type of feedback that occurs if the gain of the system is higher than the "RF separation" between the indoor and outdoor antennas.

You can improve your separation by moving your indoor antenna(s). Keep your outdoor antenna in the location with the best signal. **If you have more than one indoor antenna, the total separation is determined by whichever antenna is closest the outdoor antenna.**



Example of Poor Separation

- ❌ Not enough vertical and/or horizontal separation between outdoor and indoor antenna.
- ❌ Not enough building materials between indoor and outdoor antenna.



Example of Good Separation

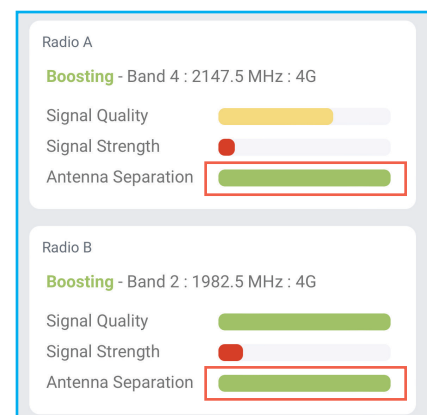
- ✅ Plenty of vertical and/or horizontal separation.
- ✅ Outdoor antenna pointing away from indoor antenna.
- ✅ Multiple layers of building materials between antennas.

How to Tell If You Have Enough Separation

The Wave app shows your status on the Home tab and a gauge on the Activity tab for antenna separation.

Ideally, you'll want "Excellent" separation with a fully green gauge for each "Boosting" band, but in small buildings that might not be possible - just do the best you can.

If you need to improve your antenna separation, refer to section 12 for more information.



09 Assembling the "Outdoor" Side of Your Kit

Once you've identified the best position for your DualPlus, 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 DualPlus at the position you've identified, but move your GO G41 boosters indoors to later perform a final round of tests to make sure everything is performing optimally.

Assembling the "Outdoor" Components

Refer to the diagram to the right as needed

- 1** Place your **DualPlus** near the best position you found in section 5.

- 2 Fasten** each lightning arrester onto a DualPlus cable.

Later on in the manual, each lightning arrestor will be connected to the UltraPole or FlexMount (if wall mounted) and to the building's ground with 10 AWG or higher grounding cables. *See section 12 for more details.*

For full setup and grounding instructions, refer to the lightning arrestor's included manual or online at waveform.com/sma-lightning-arrestor-manual

- ### 3 Fasten the UltraFlex-Twin cable onto each lightning arrester.

- 4 Fasten** the UltraFlex-Twin cable onto the outdoor antenna port of each GO G41. Note the icons next to each Cel-Fi GO G41's two SMA antenna ports:



This port should connect to the outdoor antenna.

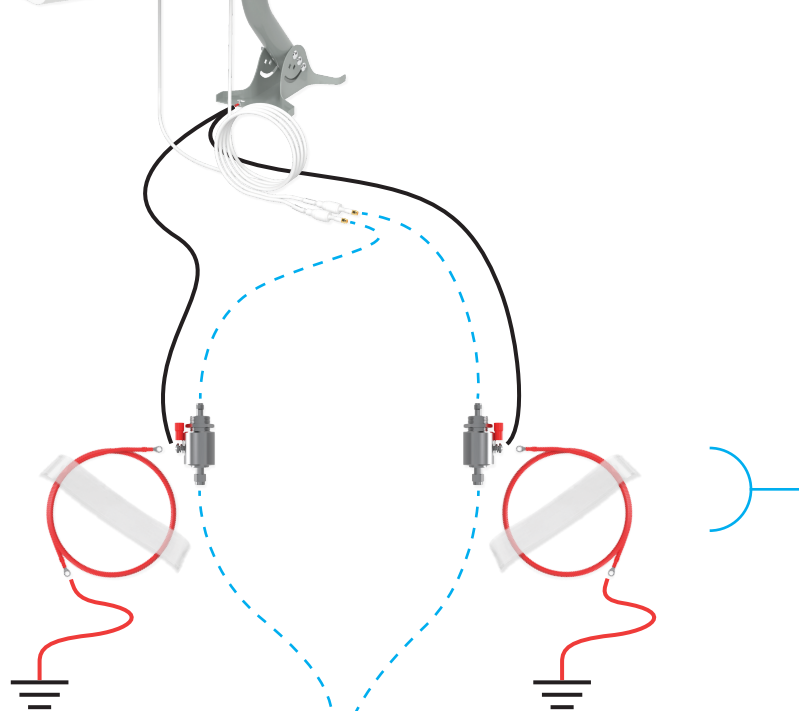


This port should connect to the indoor antenna.

Install Tips

- **Before attempting to route the cables through your building**, lay the UltraFlex-Twin cable out flat to straighten it. This will make it easier to work with.
- **A finger-tight connection is sufficient** to fasten the connectors. Tools are not required to tighten them and may cause damage.

Next up: Proceed with Step 5 on page 17 when you are ready to start installing the indoor components.

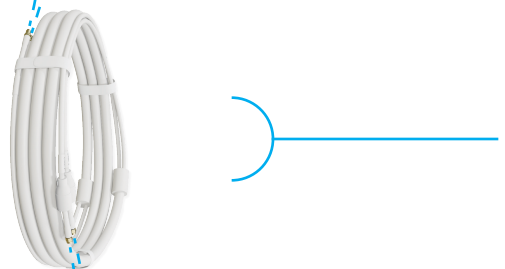


2x SMA Lightning Arrestor Kits

Each kit includes a 10 AWG grounding cable (5 ft) & weatherproofing tape (6 in).

Installed outdoors, just before the
UltraFlex-Twin cable enters the building.

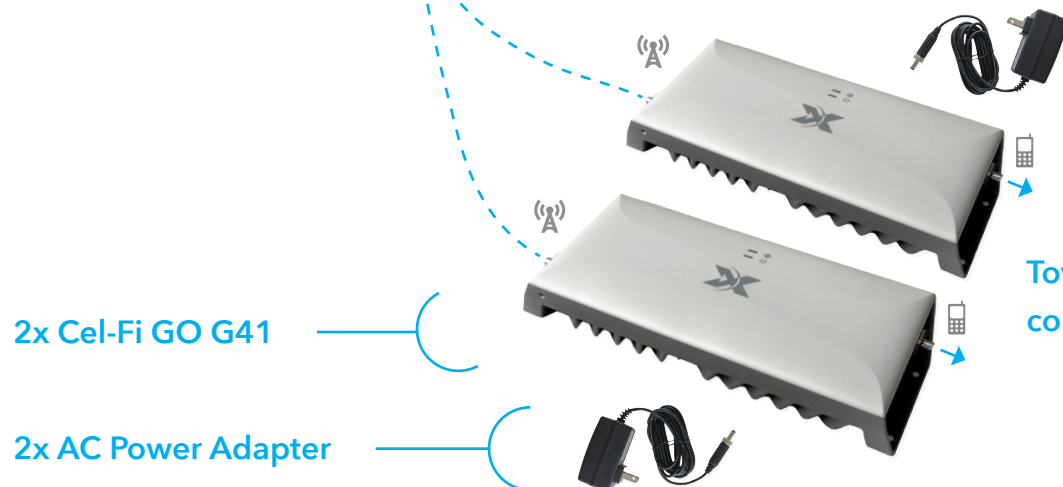
For full setup and grounding instructions, refer to the lightning arrestor's included manual or online at waveform.com/sma-lightning-arrestor-manual



UltraFlex-Twin Cable (30 ft)

Keep track of the cable paths by matching each label number.

e.g. Antenna 1 → Cable 1 → GO G41 A



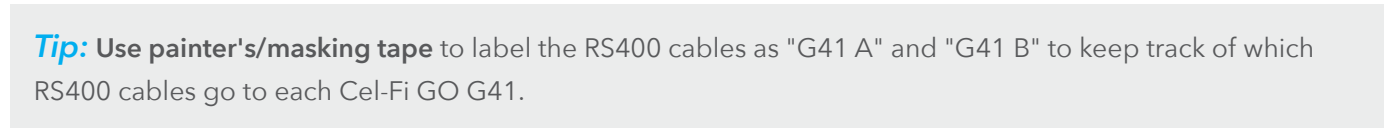
Towards the indoor components

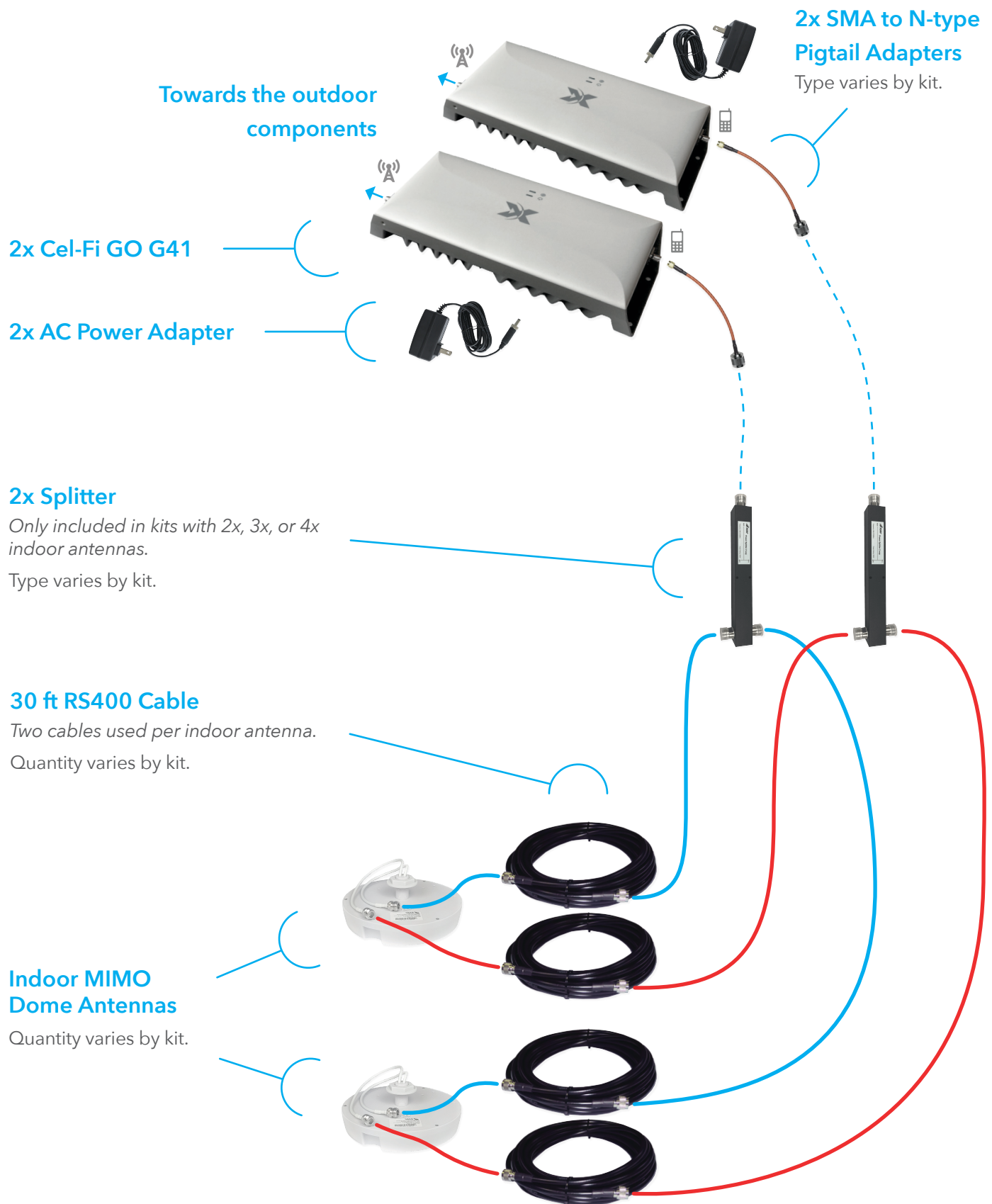
Refer to the diagram to the right as needed

For kits with 2x, 3x, or 4x indoor antennas, fasten a SMA-Male to N-Male Pigtail Pigtail Adapter onto the  port of each GO G41 booster.

For kits with 1x indoor antenna, fasten the two 30 ft RS400 cables directly onto the indoor antenna.

For kits with 2x, 3x, or 4x indoor antennas, for each splitter, fasten each 30 ft RS400 cable onto a different indoor antenna, **as shown in the diagram below:**





Tip: Make sure that the two cable paths for each indoor antenna connect to a different Cel-Fi GO G41. If both cables paths for an indoor antenna connect to same the Cel-Fi GO G41, it will not broadcast a MIMO cell signal.

Test & Install Permanently

Now that everything is connected and set up as a temporary install, it's time to verify performance!

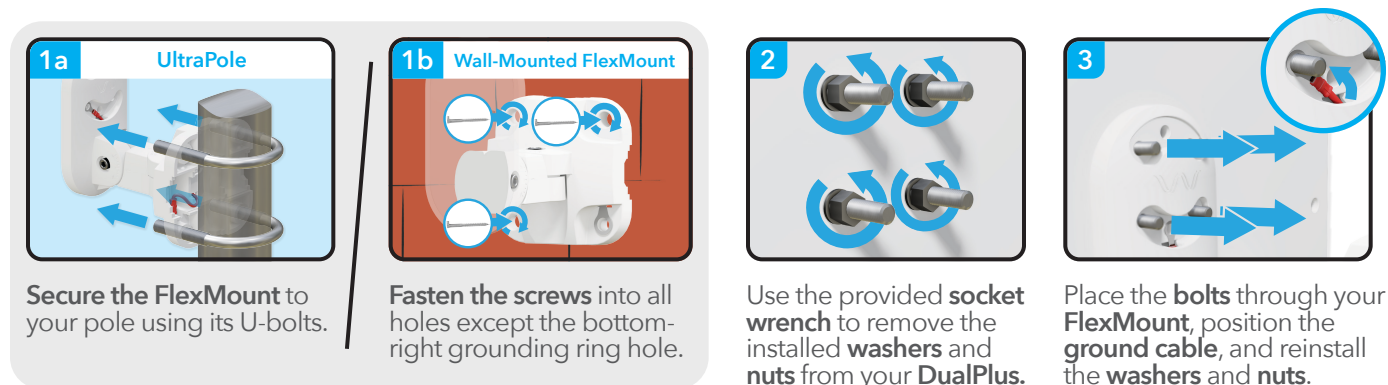
If you're using a phone and mainly care about call quality, place a call and walk around your home to see how it performs. If data speeds matter more, run a test using the Speedtest app you downloaded from [waveform.com/speedtest](https://www.waveform.com/speedtest). For either test, make sure Wi-Fi is turned off on your phone. Alternatively, **if you're using a hotspot**, connect to it and run a test using the Speedtest app.

If everything looks good and you're happy with the results, it's time to start drilling holes and securing the antennas for a permanent install.

If you're not happy with the results, don't panic! Visit setup.wf/G41-MIMO to **connect with our team of dedicated Signal Specialists**, and access a bunch of helpful resources! We can often suggest an easy solution to help you optimize your setup.

Mounting your DualPlus with FlexMount

Your DualPlus, equipped with its FlexMount, should be **installed against a pole or directly onto the exterior of your building** at the location & direction determined in section 5.



For complete FlexMount & UltraPole instructions, refer to their **included manual** or visit waveform.com/flexmount-manual & waveform.com/ultrapole-manual, then **resume this manual** to complete your installation.

Install Tips

- Mount DualPlus with its cables facing downward **to ensure proper weatherproofing.**
- **Create a small “drip-loop” in your cable** before it enters your building to help keep water from running inside.
- **If you're wall-mounting your FlexMount,** position your FlexMount against the wall and mark the locations of its holes with a pencil or marker before drilling any holes.

05 Protecting Your System

There are a couple of final steps before your installation is complete.

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.

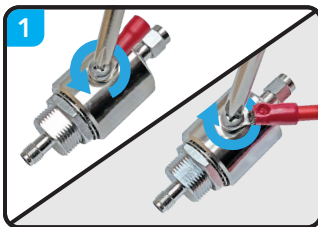
Weatherproofing Your Outdoor Connections

Your DualPlus and UltraFlex-Twin cables include weatherproofing boots, and the lightning arrestor includes weatherproofing tape, to help waterproof each outdoor cable connection.

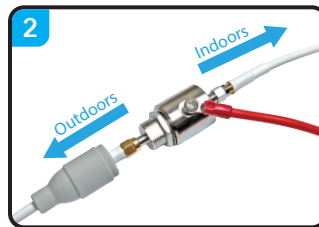
Once your connectors are tight, **slide the DualPlus's cable boots** over its connection to each lightning arrestor, then **wrap weatherproofing tape** around the UltraFlex-Twin's connection to each lightning arrestor and **slide its cable boots** over its connection to each GO G41. Sliding these boots takes a bit of strength so don't be scared to put some elbow-grease into it!



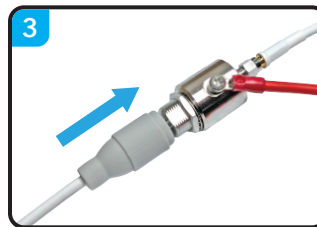
The general steps for setting up, connecting, and weatherproofing the lightning arrestors are **described below**, but for full setup and grounding instructions, refer to the lightning arrestor's included manual or online at waveform.com/sma-lightning-arrestor-manual



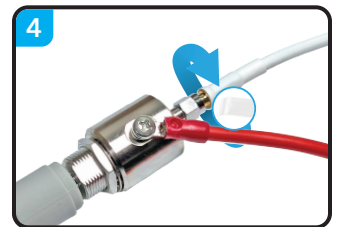
Unfasten the bolt to **remove the spare cable crimp**, then refasten the bolt to **secure the ground wire**.



Fasten the DualPlus cables (outdoor side) & UltraFlex-Twin cables (indoor side) onto each lightning arrestor.



Slide each DualPlus cable boot over its connection.



Follow the guidelines listed below to **wrap the silicone tape** around the UltraFlex-Twin cable connection.

How to Wrap Silicone Tape

1. Fully remove its plastic backing then **stretch the tape** until you've doubled its length – this activates its self-fusing properties.
2. Stretch the tape as you **overlap each wrap** by about 5.0 mm (0.2 in).
Tip: Hold the corner of the tape to keep it from slipping.
3. Once fully wrapped, **tightly squeeze the tape for 30 seconds** to give it time to fuse.

Other Important Info:

When installing the lightning arrestor outside, it should be installed as close as possible to the cable's point of entry for the building, **but not near combustible materials**.

Grounding Your System

Since outdoor equipment is a prime target for lightning strikes, the **National Electric Code (NEC) requires grounding** with 10 AWG or lower-gauge (thicker) grounding cables.

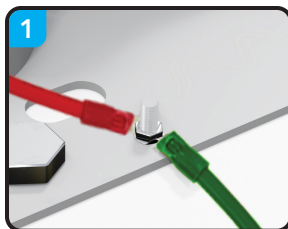
Your GO G41 MIMO kit includes two lightning arrestor kits, each with a 5 ft length of 10 AWG grounding cable, though **additional grounding cable will likely be required**. Grounding cable is available at most hardware stores, and we recommend using at least 10 AWG wire. Note that **wire gauge numbers increase as the wire gets thinner**: 6 AWG and 8 AWG are acceptable, while 12 AWG and 14 AWG are too thin.

Install the lightning arrestors outdoors, ideally just before the UltraFlex-Twin cable enters the building, and **ground both the lightning arrestors and the mounting hardware** (UltraPole or FlexMount) to a proper electrical ground.

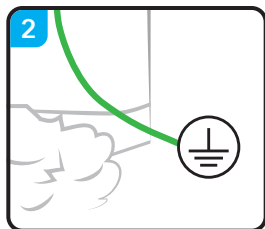
If your home already has a grounded satellite dish or HDTV antenna, you can typically bond the lightning arrestors and mounting hardware to that existing grounding cable. Alternatively, **you can ground your system directly to a grounding rod.** Most homes already have one; if not, grounding rods are readily available at hardware stores.

The general steps for grounding your UltraPole or FlexMount are described below, but for complete grounding instructions, refer to their **included manual** or visit [waveform.com/flexmount-manual](https://www.waveform.com/flexmount-manual) & [waveform.com/ultrapole-manual](https://www.waveform.com/ultrapole-manual).

A UltraPole

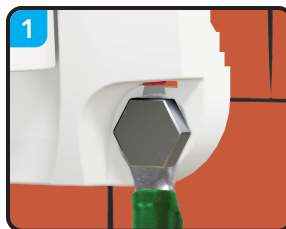


Secure the lightning arrestor's ground wire and a **10 AWG (or thicker)** ground wire to UltraPole's grounding bolt with a nut.

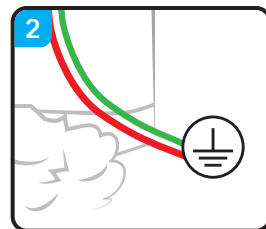


Connect that second **ground wire** to a suitable **electrical ground**.

B Wall-Mounted FlexMount



Fasten the remaining screw to attach a **10 AWG (or thicker) ground wire** to the **integrated FlexMount ground wire**.



Connect that **ground wire** and the **lightning arrester's 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)

12 Optional: Test Band Combinations

In many areas, the GO G41 will only find a single band to boost. For either GO G41, you can see this under the Activity tab: one of the it's radios will say *Boosting* and the other will remain *Scanning*. If that's the case, there's only a single band available for the GO G41s to amplify.

However, in some areas, your GO G41s may find two bands. If that's the case, you may be able to optimize your data speeds by manually testing different bands. Just **make sure both GO G41s are actively amplifying the exact same bands**, or else you won't get a MIMO signal.

Here are the steps we recommend:

1. Discover all available bands

There may actually be more than two bands available outdoors. The GO G41s will attempt to boost the best two available, but sometimes data speeds may be better on other bands. For both GO G41s, if you manually disable the first two bands that they selected, you can force the GO G41s to scan and show you what other bands are available.

2. Test each band individually, then together

When your phone detects multiple bands, it will attempt to "carrier aggregate" and connect on multiple bands simultaneously. Unfortunately, carrier aggregation isn't perfect – sometimes it works well, but in other cases, it can actually decrease your data speeds.

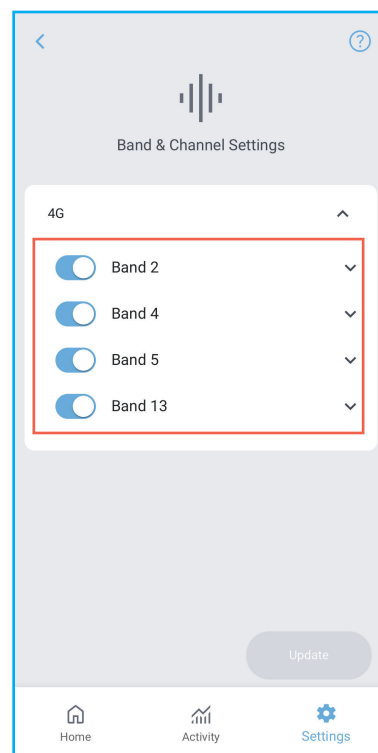
To get the best data speeds, disable all but one band to set both GO G41s to the same band, then run a speed test. Repeat this process for each band and combination of bands. **Refer back to section 2d for more guidance on different bands. Make notes of your test results in the table at the back of this manual.**

How to disable and enable bands

You can disable and enable bands under the "Booster Settings" dropdown in the "Settings" tab of the Wave app.

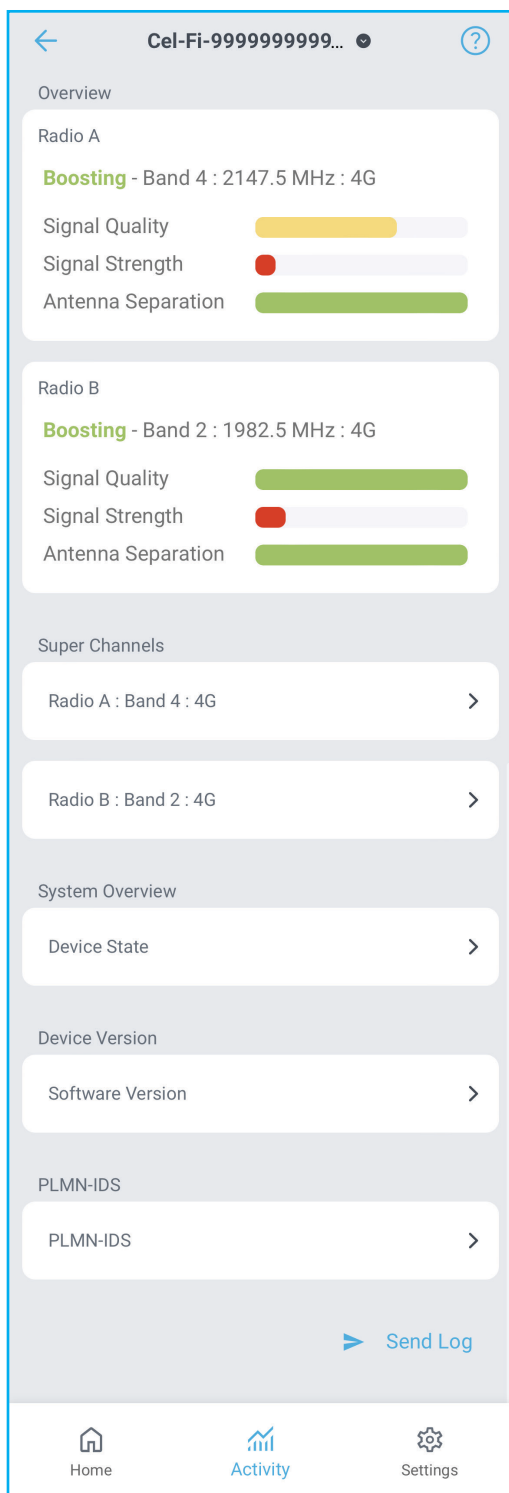
Each time you enable or disable a band, **the GO G41's will rescan to find signal**. It can take a few moments for a GO G41 to find and start boosting signal. Always set both GO G41's to the same bands.

After the GO G41's start amplifying a new band, **toggle on airplane mode on your phone for a few moments, then turn it off again**. This will force your phone to connect to the newly boosted band.



13 The "Activity" Tab

One of the best features of the GO G41 is that it actively listens and decodes the cellular signals before amplifying. You can find out more about the system's status at any given moment in the "Activity" tab.



The most important information is summarized at the top of the screen, under the "Overview" section. The information here is divided into two "radios" – each GO G41's two radios are what allow it to amplify up to two bands simultaneously.

For each radio, the activity tab tells you if it is "scanning", or if it has found a signal and started "boosting". When the radio is scanning, you'll notice that the frequency changes often. Once it's boosting, the frequency will no longer change.

Once a GO G41 is boosting on one of the radios, the Wave app will show a gauge for signal quality, signal strength, and antenna separation.

Signal quality and signal strength are determined by your outdoor antenna's location and direction. Antenna separation is determined by the separation between the indoor antennas from to the outdoor antenna.

The goal during installation is to get all gauges fully green. Sometimes, despite your best efforts, these gauges may remain red or yellow. That's okay, just try to fill the gauges as much as possible.

The "Send Log" button allows you send a diagnostic log from your device if our support team needs one.

Each GO G41 also gives a lot more diagnostic information under the "Super Channels" dropdowns for each boosted band.

You won't need to use this information in most cases, but we've documented some of the most important numbers below.

Radio A : Band 4 : 4G

Description	Value
Bandwidth	15 MHz
Downlink center freq.	2147.5 MHz
Uplink center freq.	1747.5 MHz
PCI	91
Donor RSSI	-72 dBm
Donor RSRP	-99 dBm
Donor RSRQ	-10 dB
Donor SINR	10 dB
Downlink TX power	13 dBm
Uplink TX power	-100 dBm
Ext. antenna in use	true
Uplink Safe Mode Gain	93 dB
Downlink System Gain	82 dB
Uplink System Gain	0 dB
Downlink Echo Gain	-2 dB
Uplink Echo Gain	-50 dB
Guard-band NB-IoT enabled	true
ENBID	48595980

Home

Activity

Settings

"Super Channel" Diagnostics Information

This section lists diagnostic information on the two bands being amplified. Select a Radio to expand the details (as shown).

The "Donor RSRP" value shows the signal strength being received from the outdoor antenna, this should be -115 dBm or better (i.e. closer to zero).

The "Donor SINR" is a measure of signal quality. Ideally, you'll want a number 3 dB or higher (i.e. more positive). The higher the SINR, the more bars, and the better your data speeds.

The "Downlink TX Power" shows the strength of the signal being rebroadcast. The higher this number, the greater the coverage area. Ideally you want 0 dBm or higher.

The Uplink and Downlink System Gain show the current uplink and downlink amplification of the system. Uplink may sometimes show 0 dB when phones aren't in use. That's normal.

The "Echo Gain" reflect how much separation you have between the outdoor antenna and the and indoor antennas. If either number is at or near 10 dB, you'd benefit from more separation.

If you're running into issues, or have any questions, we'd love to help. Visit setup.wf/G41-MIMO to connect with our team of dedicated Signal Specialists, and access a bunch of helpful resources!

14 Some Final Tips

If you unplug any of the cables on the outdoor antenna side, make sure to reset both GO G41s.

A GO G41 will start scanning as soon as you unplug the cable to its outdoor antenna. To make sure both units rescan across all available frequencies, **restart both units after you reconnect any of their outdoor cables.**

If you have extra cable, don't coil it tightly.

To minimize the negative side-effects (4 ft or wider loops are best) of coiling coaxial cables, **make sure to keep any cable loops as large as possible.**

Use the gauges shown at the top of the Activity tab.

After you've optimized the outdoor antenna location using the Antenna Position Test, use the gauges at the top of the Activity tab to **keep an eye on what the GO G41's are doing**, and potentially to further optimize your signal.

Create a "drip-loop" in the RS240 cable right before it enters the building.

When feeding the cable coming from the outdoor antenna into the building, have the cable dip below it's entry hole into the building to help ensure water doesn't flow from the cable directly into the building.

If data speeds or call quality decreases 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 and re-aiming your DualPlus or swapping to a different band combination** to get the best results.

15 Upgrading Antennas

If you have direct line of sight to the nearest tower (no obstructions, including trees) and you'd like to increase your signal quality and strength even further, you may want to consider upgrading your outdoor antenna to two **Griddys, our grid parabolic antenna**.

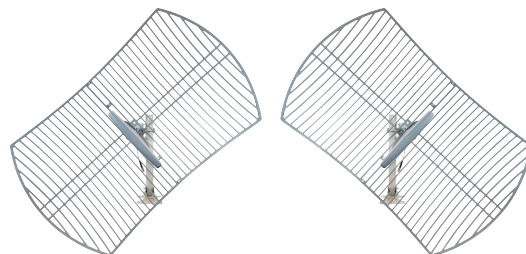
Griddy, The Grid Parabolic Antenna

- » Up to 23 dBi gain with 9-23 degree beamwidth
- » Adjustable feedhorn for frequency-specific gain improvements
- » Provides a large improvement over your current outdoor antenna, a DualPlus.
- » Find it online at waveform.com/griddy



If you choose to upgrade, you'll replace your DualPlus with two Griddys that will need to be cross-polarized to ensure a proper 2x2 MIMO connection.

To cross-polarize the two Griddys, each Griddy will need to be **pivoted 45° from vertical in opposite directions**. They'll also need to be spaced horizontally or vertically with a few inches between their grids – whichever is easiest for your installation.



Full instructions for assembling, aiming, and cross-polarizing Griddy can be found within its included manual or online at waveform.com/griddy-manual.

If you're unsure if Griddy antennas would help in your situation, please visit setup.wf/G41-MIMO to **connect with our team** of dedicated Signal Specialists.

16 Tell Us How It Works

Did your installation go great? Are you having trouble aiming your outdoor antenna? Do you think our manual could be improved? Are your data speeds not quite what you were hoping?

Please tell us: Visit setup.wf/G41-MIMO to **connect with our team** of dedicated Signal Specialists, access a **bunch of helpful resources**, and more!

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

Three ways to get money back!

Get \$80/£60/€70 by sending us a video of your install:

We'd love to feature your success! Send a 30+ sec video to videos@waveform.com showing **your installed kit** and **speed test, signal bars, or call quality results from before and after** your install. *If your GO G41 MIMO Kit is already installed*, briefly unplug it to get your "before" results. Once we review your video, we'll PayPal you those funds!

Earn 5% cash back for each friend you refer:

Love your GO G41 MIMO Kit? Refer a friend! They'll get 5% off their kit, and you'll earn 5% (via PayPal) when they purchase directly from waveform.com. Visit waveform.com/referrals to get started.

Get up to \$1000 for each U.S. business you refer:

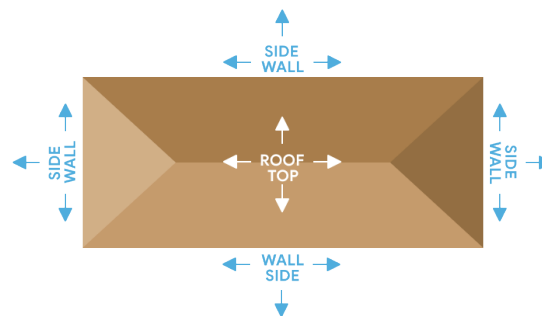
Know a business in the U.S. with poor cellular signal? Send them our way! If they deploy one of our cellular coverage solutions, you can earn via PayPal:

- **\$250** for spaces between 20,000 and 100,000 sq. ft.
- **\$1,000** for spaces over 100,000 sq. ft.

To get started, simply send an email introduction with your referral to coverage@waveform.com, and we'll handle the rest.

Your Measurements

Use the table below to make notes of your measurements while positioning and aiming the outdoor antenna of your Cel-Fi GO G41 MIMO kit.

[illegible]

Need help? We're ready and waiting.

Signal boosters aren't always easy to install. In fact, getting everything up and running can sometimes be a pain – 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 can walk you through troubleshooting and fine-tuning your installation for best results.

Simply **scan this QR code** or visit setup.wf/G41-MIMO to **connect with our team** of dedicated Signal Specialists, get your **free Virtual Site Survey**, access **installation guides**, and more!

We love solving tricky install problems.



v1.0.2

CEL-FI GO G41 MIMO | from WAVEFORM



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



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