

Draft



CEL-FI GO G43 User Manual

For Models:

G43-BBBE

G43-99JE

G43-JJNE



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1. About this Guide

This User Manual supports all Nextivity **CEL-FI GO G43** hardware versions. Each hardware version supports different cellular frequency bands and/or configurations as they apply to local regulatory bodies or customers worldwide. Learn more at <https://nextivityinc.com/products/cel-fi-go-g43/>

The manual covers planning, installation, and management of the GO G43 system.

For more information about Nextivity cellular and Public Safety hardware and software products, please visit us at www.nextivityinc.com or ask your local operator or supplier.



CEL-FI GO G43

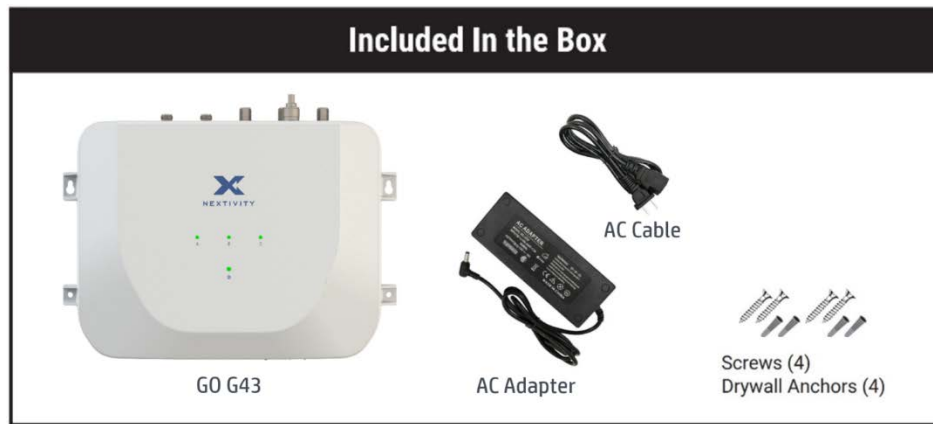
Safety Precautions

- Use **CEL-FI GO G43** indoors. It should not be used outdoors.
- This product is designed to be used with the external **AC Adapter** that shipped with the Unit. When installing the equipment, all the requirements of the **AC Adapter** manufacturer and the referenced standards must be met.
- There are no user-serviceable parts inside.

Note

Changes or modifications to this product not expressly approved by Nextivity may void your right to operate the equipment.

2. What's Included with the CEL-FI GO G43



For more information about the product, Data Sheet, and more, please refer to <https://nextivityinc.com/products/>

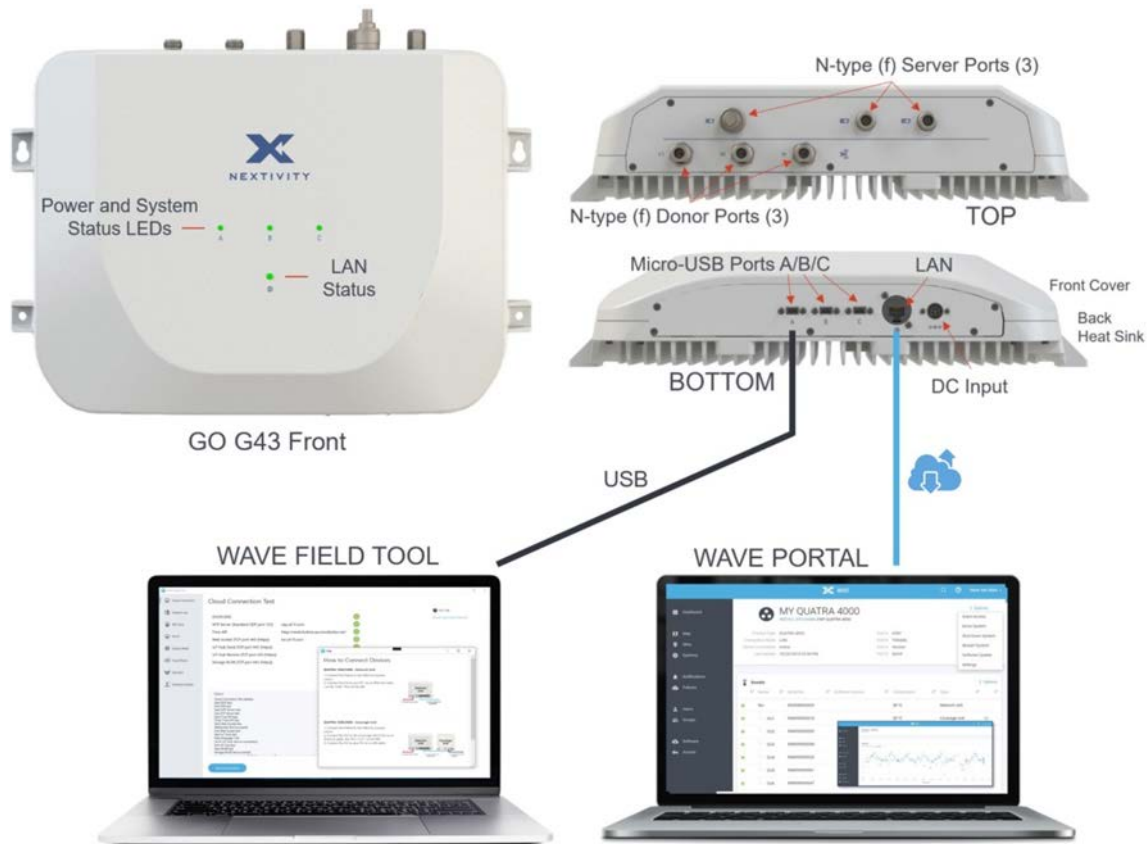


Review the latest authorized antennas at www.nextivityinc.com/antennas

3. Product Interfaces

GO G43 is a wall mountable unit that has Donor and Server Antenna output ports on the Top of the unit. The Bottom of the unit has a locking DC Input port for use with the supplied **AC Adapter**, a **LAN** port for Certified Installer **WAVE Portal** remote management, and Micro-USB ports for local management with a Window PC and **WAVE Field Tool*** software.

* At the time of publication, the WAVE Field Tool is undergoing an upgrade. Additional functionality will be released in Q1 2024. Contact support@nextivityinc.com with any questions.

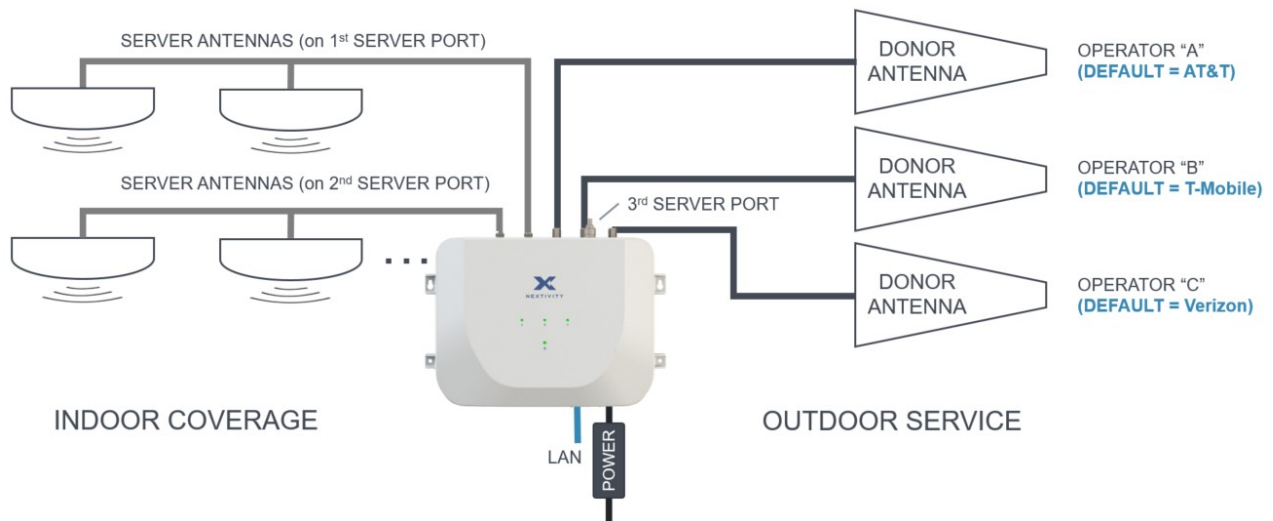


4. Typical Installation Overview

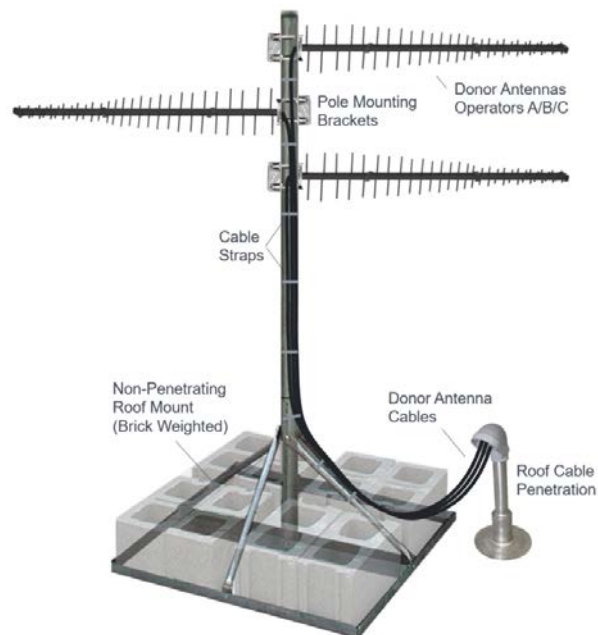
The **GO G43** is typically mounted in a Low-Voltage utility room (IDF/MDF). A coaxial cable from each of the three **GO G43** donor ports is connected to a donor antenna on the roof, or another location where there is a suitable quality donor signal for each operator. The donor ports may be pre-assigned to three operators, depending on the SKU, and they may be reassigned to the operators of your choosing using the **WAVE Portal**, or the **WAVE Field Tool** windows program from a PC that may be connected to the **GO G43** with a micro-USB cable.

The donor antennas are aimed using the **COMPASS XR** portable survey tool. Aiming and fine tuning of antenna directions may also be accomplished by observing RF performance metrics on the **WAVE Portal** or **WAVE Field Tool**.

The **GO G43** handles all signal processing and power control functions, and the boosted signals are fed from the server antenna ports to server antennas in the building using coaxial cable. More server antennas may be connected using splitters and/or couplers, which is useful for larger buildings or areas with more walls.



Donor antennas may be mounted in many ways. The most common is a pole mount, often on a non-penetrating "skid" that does not penetrate the roof or damage the roof membrane.



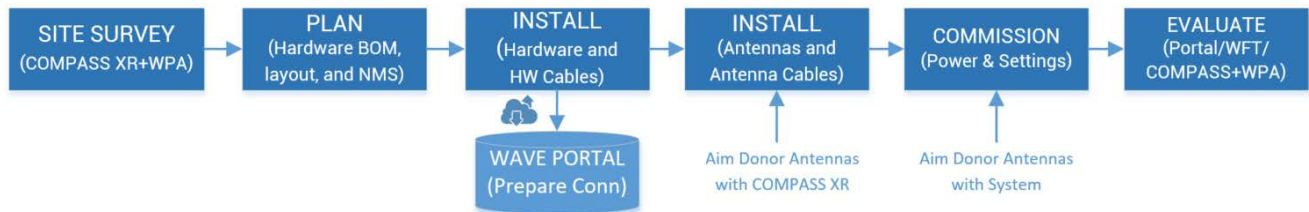
5. Installation Prerequisites

Before starting a project, do the following:

1. If you are a professional installer, make sure you have a **WAVE Portal** account. Access to the **WAVE Portal** is only granted to trained installers that have passed relevant **Nextivity University** online courses. [Request Portal Access](#).
2. In order for the **GO G43** to connect to the **WAVE Portal** in the cloud, a LAN connection must be supplied by the customer according to the firewall requirements in Appendix A. Normally a Virtual LAN is configured for the **GO G43** so it remains separate from the customer's network.
3. In the event that a LAN connection cannot be provided, the **GO G43** can still be commissioned using the **WAVE Field Tool*** software program for Microsoft Windows. Download the tool at <https://nextivityinc.com/software/wavefieldtool/>

* At the time of publication, the WAVE Field Tool is undergoing an upgrade. Additional functionality will be released in Q1 2024. Contact support@nextivityinc.com with any questions.

6. Installation



Nextivity University has additional courses and information that may be helpful.

6.1 Step 1: Site Survey

Current Service and Needs

Visit the project site and measure current service for each operator. If using a cell phone for each operator, evaluate service using signal “bars” on test phones. Wi-Fi calling must be disabled.

You can also use the Nextivity **COMPASS XR** and **WAVE Pro App**, which are specifically designed to measure all operator bands and channels at the same time. The **WAVE Portal** may be used to quickly generate professional signal reports using uploaded floor plans.



COMPASS XR



WAVE Pro App



Survey Report

Do all operators need boosting? If not, then the **GO G43** may be assigned to relay one to three operators as needed.

Do all areas in the building need boosted service? It is best to favor service antennas where service is needed most, and the customer will know the most important areas.

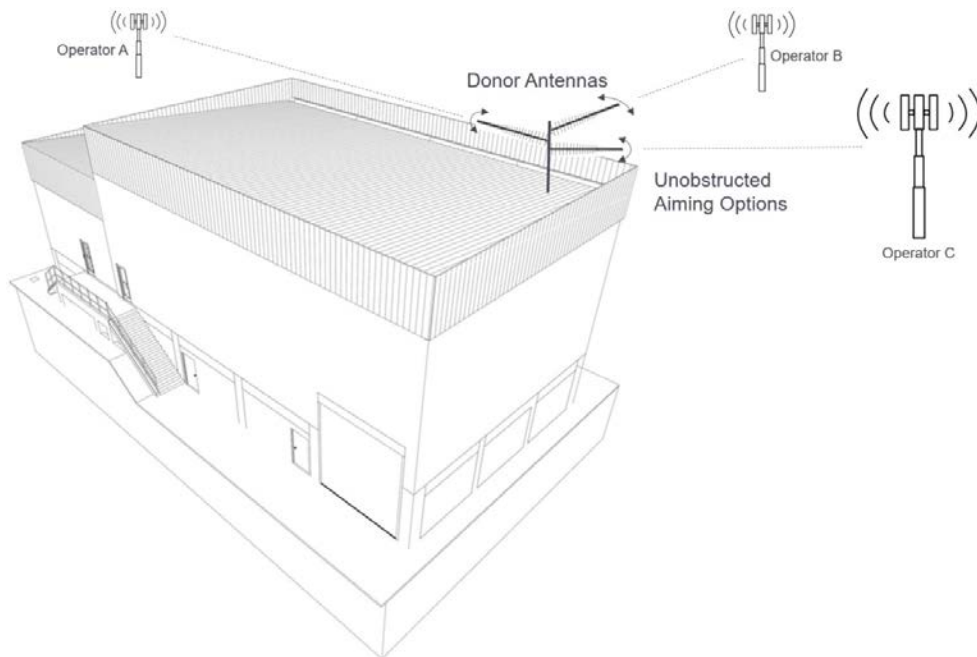
Where to Install Donor Antennas

This is the most important decision to make when planning. The Donor Antennas should be installed on the side of the building with the best service quality for each operator (typically a roof or high up on an exterior wall). This may also be a corner of the building which allows easier antenna aiming on two sides of the building. If the space to be covered is a suite or floor within a larger building, where outdoor antennas may not be possible, find the best windows or exterior rooms with the best service for each operator, and plan to install the donor antennas there (most likely outward facing panel antennas).

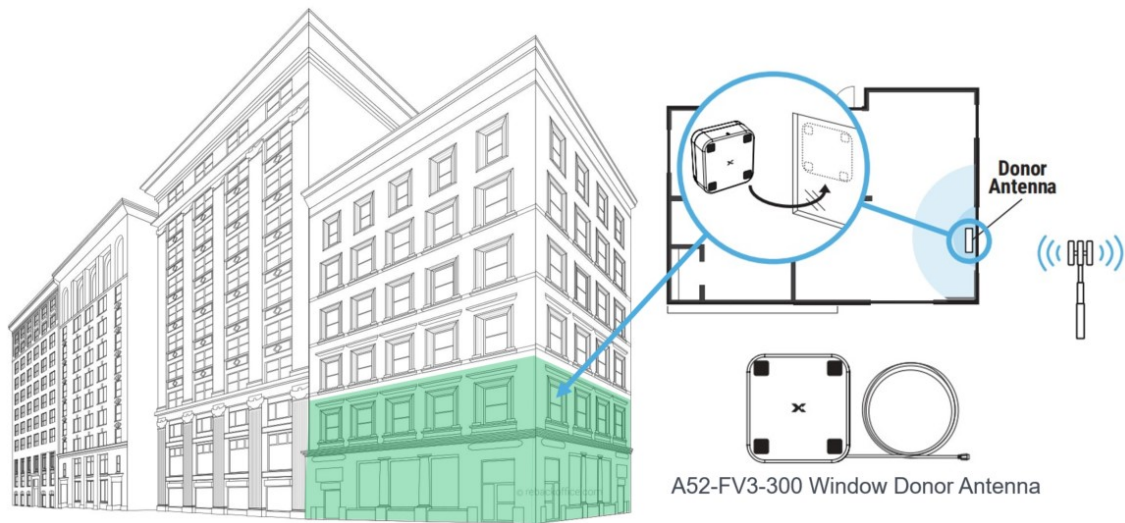
Using **COMPASS XR** or cell phones for the operators to boost, observe signal “bars” on the phones while running internet speed tests using the phone’s browser. The speed tests will be the best indication of donor signal quality.



Later when the donor antennas have been installed, they will be aimed. Make sure that the antennas will be able to swing across the horizon to candidate cell towers, without obstructions such as roof equipment or building signage.



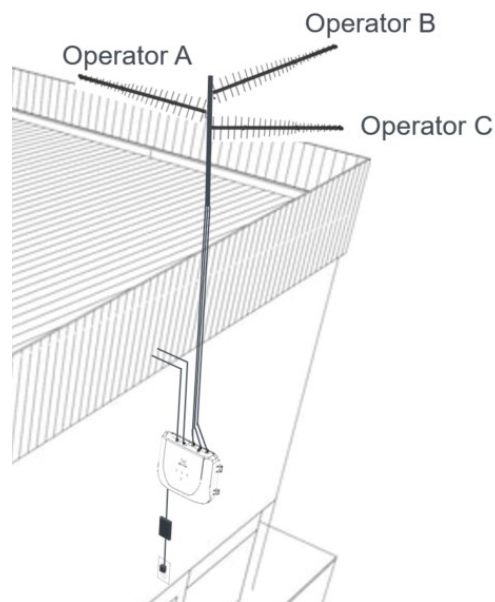
If you are a tenant in a larger building, without exterior or roof donor antenna access options, consider mounting a panel donor antenna on or near a window. Only the GO G43 with its outstanding Echo Cancellation capability will allow donor and server antennas to be installed this close together and still achieve full coverage power.



Where to Install the GO G43 and Run Cables

Also, during the Site Survey decide where the **GO G43** will be installed. This is usually on a wall in a utility or IDF/MDF IT room with either existing roof conduit cable access, or a suitable location for a roof/exterior penetration for the cables. If outdoor donor antennas are not possible, make sure that cables may be run to a suitable indoor donor antenna location.

The GO G43 mounting location will also need a suitable power outlet for the unit and have coaxial cable pathway access to the server antennas that will be installed within the building. Low-Voltage cable pathways are a good choice, away from power cables.



6.2 Step 2: Plan the System

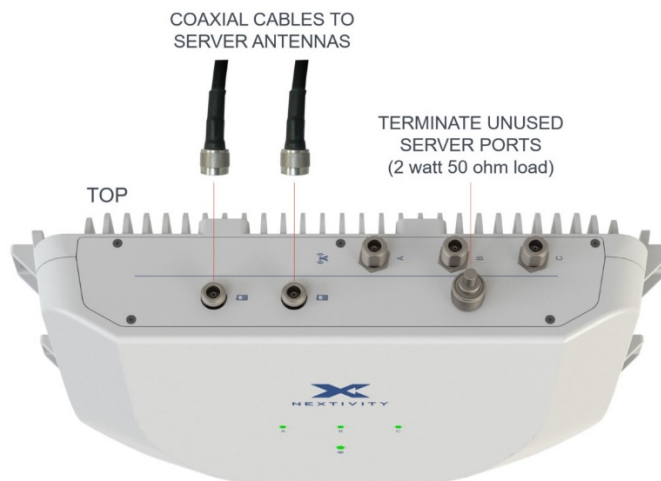
In the previous step you determined where the **GO G43**, donor antennas, and cabling will go. You will now want to select your antennas from the approved list of Nextivity antennas.



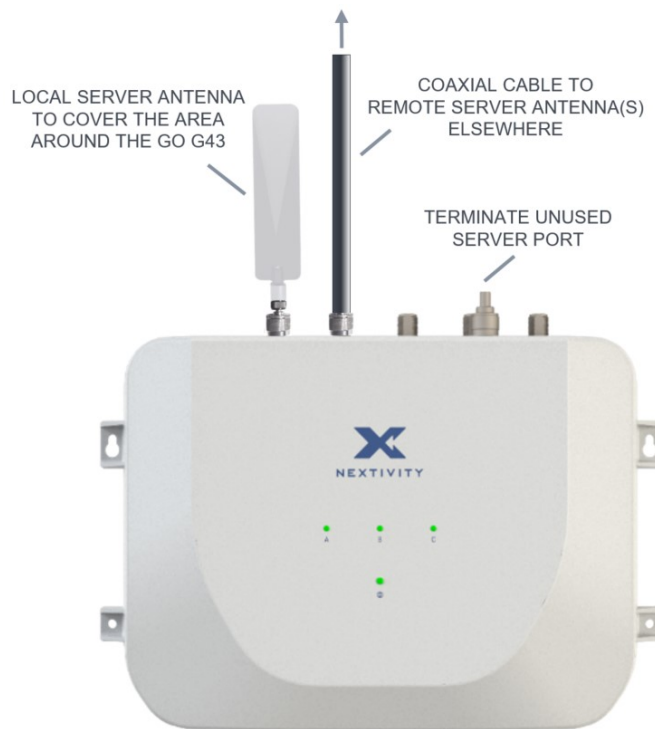
<http://www.nextivityinc.com/antennas>

The **GO G43** has three server antenna ports. For a smaller project, usage of a single server port should be enough. For larger projects, you may use two or all three server ports for more coverage power. Plan to connect each server port you intend to use to at least one server antenna, using $\frac{1}{2}$ inch coaxial cable as needed. Thinner cables are more lossy and will reduce your coverage power.

Any unused Server Antenna ports should be terminated with a minimum 2-watt N-type (m) 50-ohm load.



Another example is to connect an antenna directly to a server antenna port on or near the GO G43 itself, to cover the immediate area around the unit. Then use coaxial cable to connect server antennas further away into the building.



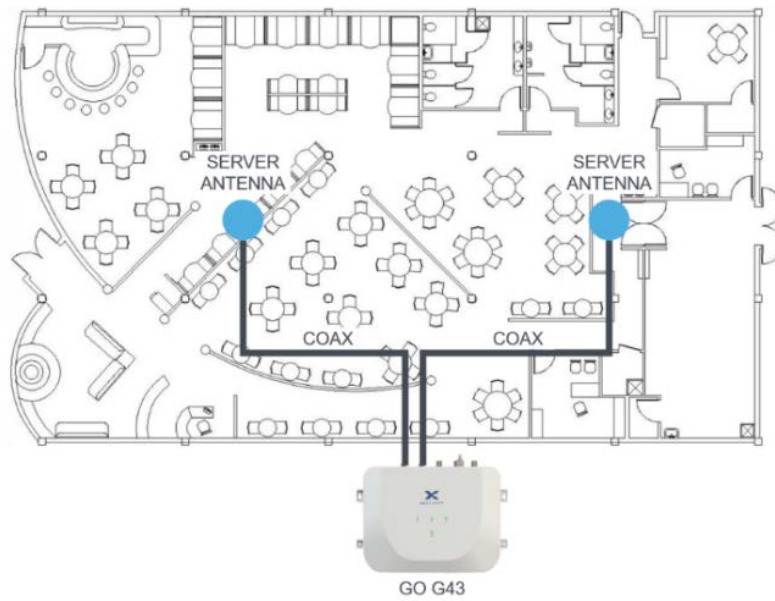
A splitter may be used to feed more antennas from each Server Antenna port on the **GO G43**. If you want to use more than two server antennas per port, a proper design with Directional Couplers is recommended. There are many online resources that explain Distributed Antenna System (DAS) design with splitters, couplers or tappers, to help you get equal power to each server antenna.

General Server Antenna Rules

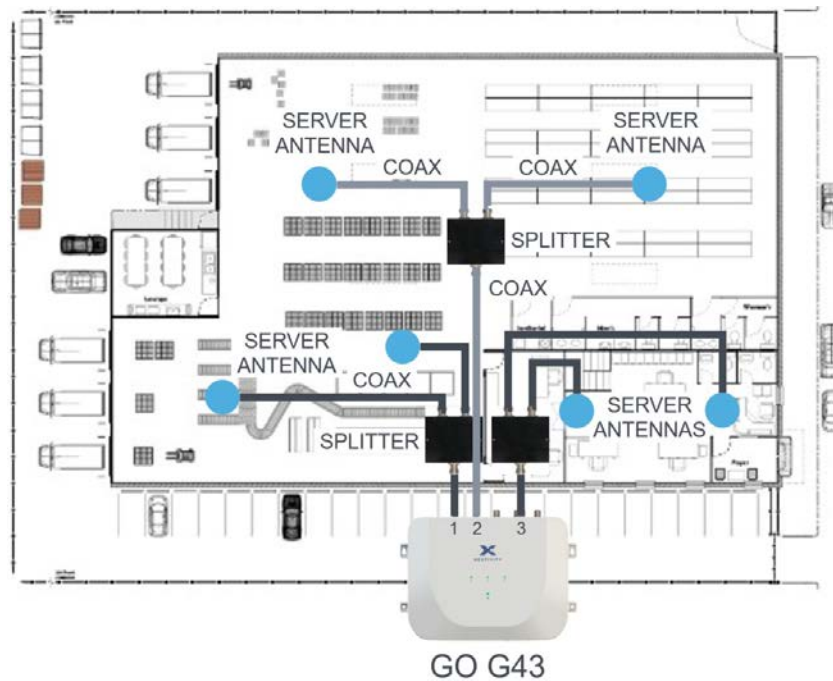
Server antennas should always be ceiling mounted in open spaces, where their signals can travel with the fewest obstructions and walls to the areas needing service. Directional panel antennas may also be used higher up on walls, to beam into open areas from the side.

If the space to be covered has more walls, plan to use more server antennas (for example, two or three antennas per server port). Cellular band splitters or couplers are used to divide the power to more antennas. You can start by spacing the server antennas evenly throughout the building, and then shift the antennas toward the areas with more walls. Open spaces will not require as many antennas because there are fewer obstructions to inhibit the signals. You can always move an antenna later if needed. Shorter coaxial cable routes are best.

EXAMPLE INDOOR SERVER ANTENNAS

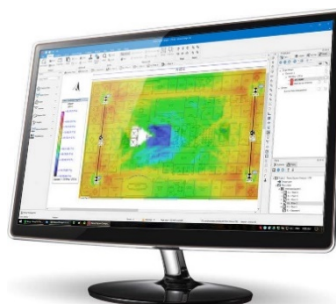


Two Server Antenna Ports, each feeding one antenna



Two Server Antennas per Server Antenna Port, Using Splitters

More sophisticated planning tools, such as iBwave planning software VEX and template files, are also available at www.nextivityinc.com



6.3 Step 3 – Plan your System Management Method

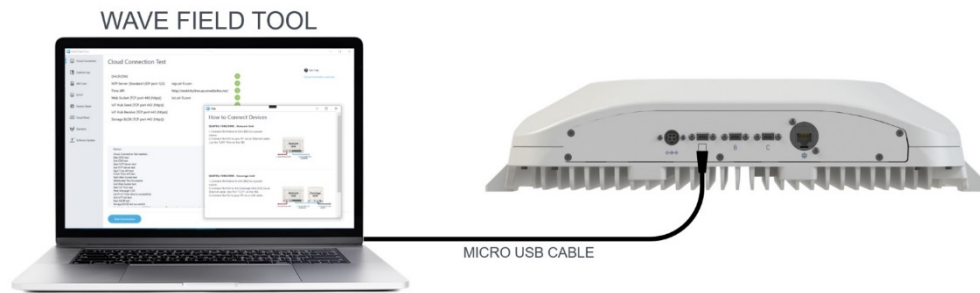
Providing a LAN connection to the system so you can manage it using the browser accessible **WAVE Portal** in the cloud, is highly recommended. The **WAVE Portal** configures the system and gives guidance for best performance using data from the actual site. It also maps your systems, notifies you of alarms, allows software enhancements, and lets you monitor and diagnose issues or alter settings without the time and expense of a site visit.

The LAN connection and firewall information is provided in Appendix A of this manual. Give this information to your customer and request that a properly configured LAN connection is ready on installation day.



If a LAN connection is not available, you may also use the **WAVE Field Tool** program. The program runs on a Windows PC that is connected to the **GO G43** using a micro-USB cable. Even if you do not use the **WAVE Field Tool*** for settings, it is still a valuable tool resetting a system or its software, testing the LAN connection, and more.

* At the time of publication, the WAVE Field Tool is undergoing an upgrade. Additional functionality will be released in Q1 2024. Contact support@nextivityinc.com with any questions.



6.4 Step 4: Install the GO G43 Unit

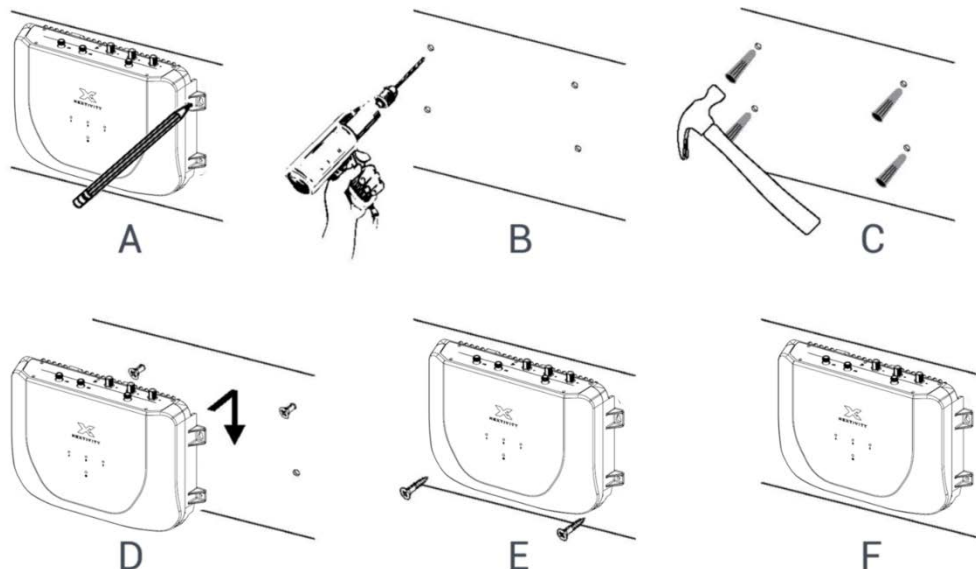
The following tools are recommended:

- Power drill/screwdriver
- Drill bit extender (3"+)
- Hammer
- Pencil, or other similar marker
- Level

Caution

Make sure the area behind any surface is free of electrical wires or other dangerous elements prior to drilling.

Hold the **GO G43** against the wall to mark, drill, and install the supplied wall anchors. The two upper mounting screw holes are keyed, allowing the screws to be pre-installed and the unit lifted into place before affixing all four mounting screws.



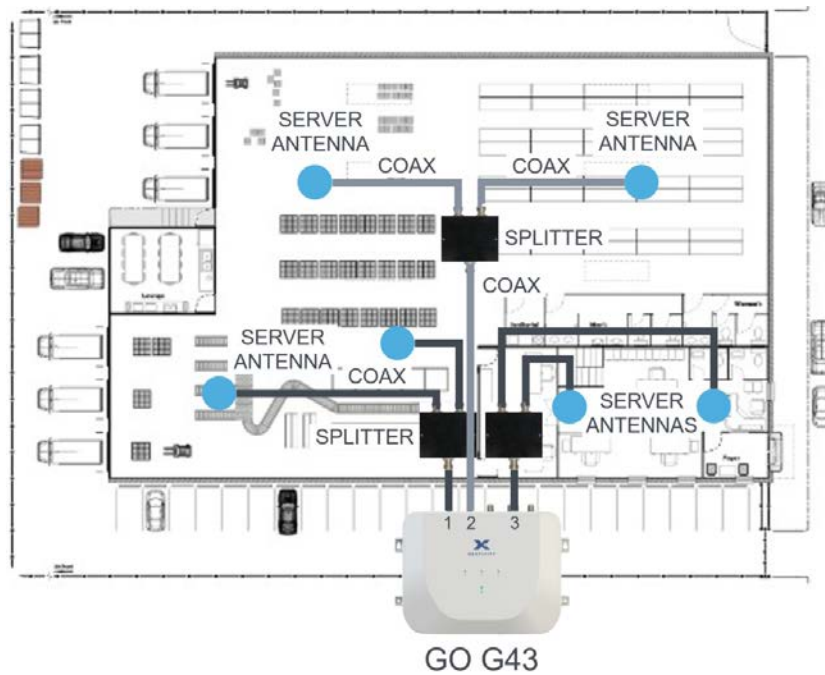
NOTE: The G43 unit may also be rack mounted if a vented rack shelf is used for proper cooling. The WAVE Portal constantly monitors unit temperature.



6.5 Step 5: Install the Server Antennas and Coax

Install the server antennas according to their mounting instructions and install the cables and or splitters/couplers that will connect them to the **GO G43** unit. Observe minimum coax bend radius and do not run coax along power cables. Shorter cables are best (less loss).

Remember that the server antennas should always be ceiling mounted in open spaces, where their signals can travel with the fewest obstructions and walls to areas needing service. The more open the space, the larger the coverage area per antenna.



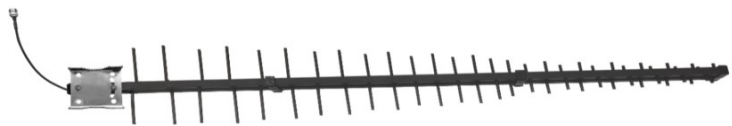
6.6 Step 6: Install the Donor Antennas and Coax

Donor antennas are the most important item that determines signal health. Take your time. Good signal in, means good signal out.

Here is a [link](#) to if you would like to watch a video about donor antenna best practices.



BETTER



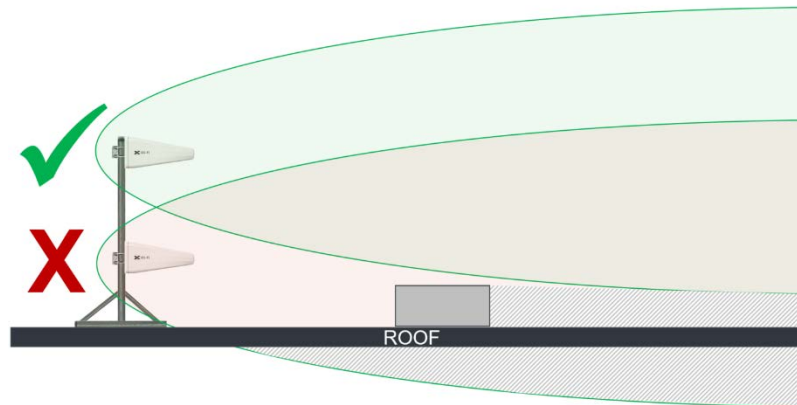
BEST

If you have a suitable antenna meter to aim the antennas, such as the **COMPASS XR**, you may aim the antennas as soon as they are installed. If not, then you will be able to aim the antennas later using information from the **WAVE Portal** or **WAVE Field Tool**.

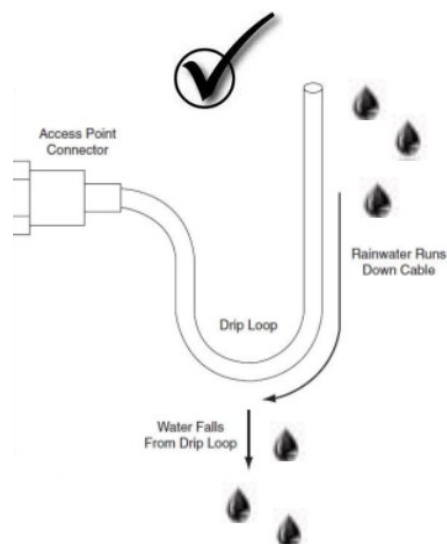
Tips for Success:

- Use a separate directional donor antenna for each operator, unless antenna aiming determines that more than one operator's best signals are coming from the same direction. Then a single antenna coaxial cable may feed both operator donor inputs on the GO G43 using a splitter.

- Mount the antennas on the side of the building with best service, with an unobstructed view that allows antenna aiming to one or more cell towers. Move an antenna to a better location if needed for a healthier signal.
- Do not mount the donor antennas near, or aim the antennas, at other antennas.
- Do not mount the antennas too close to the roof, or where their antenna patterns intersect with other objects. This is because the true antenna TX/RX pattern is a parabolic region and NOT what is directly in front of it. Antenna pattern obstructions reduce signal quality.



- Aim each antenna according to the best signal for its operator.
- It is also a good idea to install a grounded lightning arrestor on each antenna coaxial cable, following the lightning arrestor installation instructions.
- Weatherproof all outdoor cable connections with a suitable self-sealing tape or wrap.
- Always use a Drip Loop where cables enter any device or enclosure.

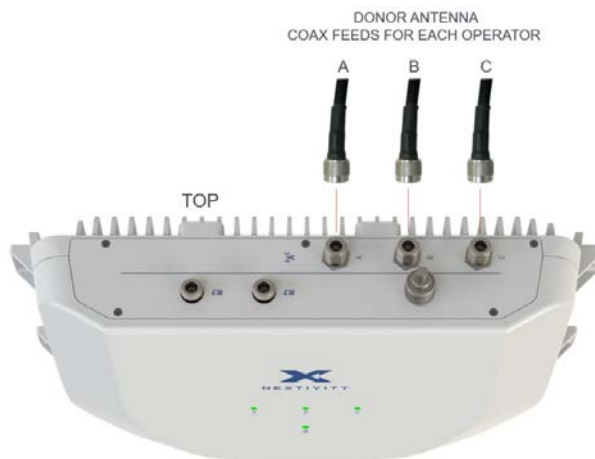


6.7 Step 7: Connect the Donor Antenna Coaxial Cables to the GO G43

The donor ports **A/B/C** on the top of the **GO G43** unit may be assigned to individual operators during the commissioning process.

Your **GO G43** model number may support the same bands on each port, or different bands. Refer to the product information for your **GO G43** model number for more information.

Once you know which operators are assigned to which ports **A/B/C**, you can connect the appropriate donor antenna coaxial cable to the corresponding port. It may be necessary to gently tighten the coax connector into the port with a wrench or pliers, so it seats properly. Do not overtighten or the port may be damaged.



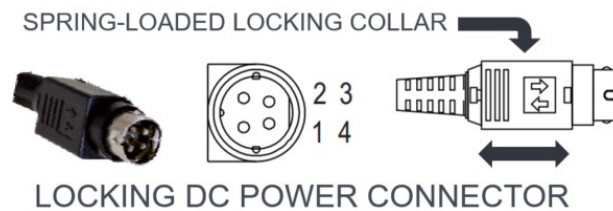
6.8 Step 8: Power ON the System

If using the **WAVE Portal** to configure the system, a properly configured LAN cable should be connected to the **GO G43 LAN** port at this time (See **Appendix A** for firewall settings).

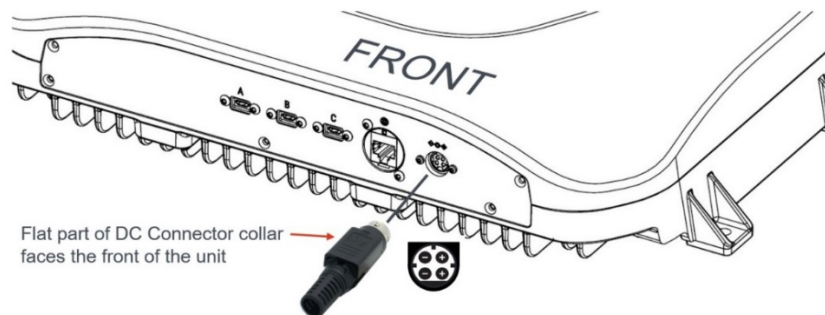
Plug the power supply DC cable into the DC power port on the **GO G43** and plug the **AC Adapter's AC Cable** into a suitable power outlet. It may be necessary to attach the **AC Adapter** to the wall using zip-ties and wall anchors, or other wall attachment method.



The DC power cable connector has a locking collar. The flat part of the connector collar faces AWAY from the wall (towards the front of the unit). Forcing the connector in backwards may damage the DC port or connector.



Gently pull the collar to connect or disconnect the cable to the **G0 G43** power port.



The **G0 G43** will power up and you should see LED activity according to the following table:

LED	INDICATION	WHAT IT MEANS
Donor A/B/C Status	LED Off	No power
	Blinking Red-Orange	Startup sequence

	Blinking Green	Wait – Setup in progress
	Solid Green	Boosting
	Blinking or Solid Red	Needs Commissioning, or there is an Error – Consult the WAVE Portal or WAVE Field Tool for help
Internet Status (icon)	OFF	No internet
	Solid Green	Internet idle
	Blinking Green	Internet activity

6.9 Step 9: Commission the System

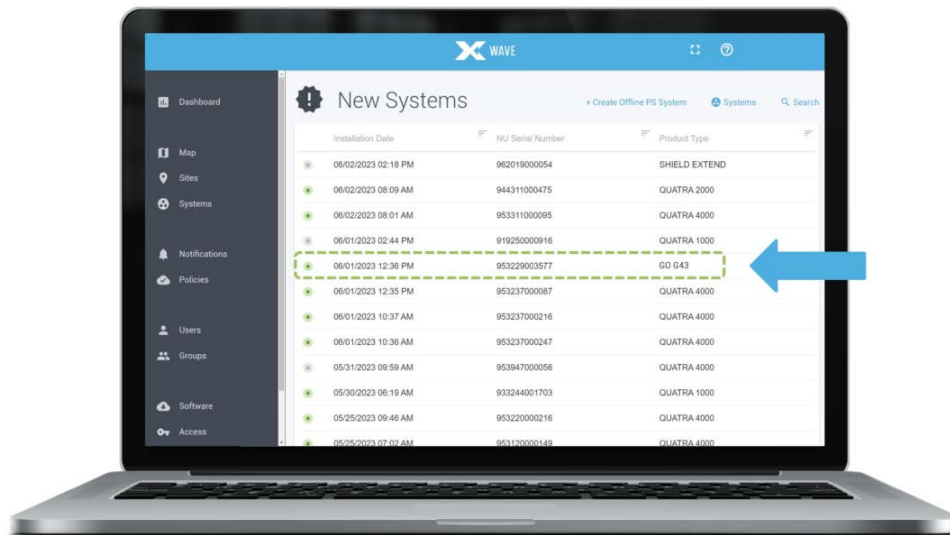
There are two ways to commission the system, using either the WAVE Portal, or the WAVE Field Tool (Note: this functionality may not be available until Q1 2024.) *Operators may be factory assigned or assigned when commissioning. The GO G43 must have operators assigned to the three donor ports A/B/C to operate, and these settings may be changed within settings.*

WAVE Portal Commissioning Method

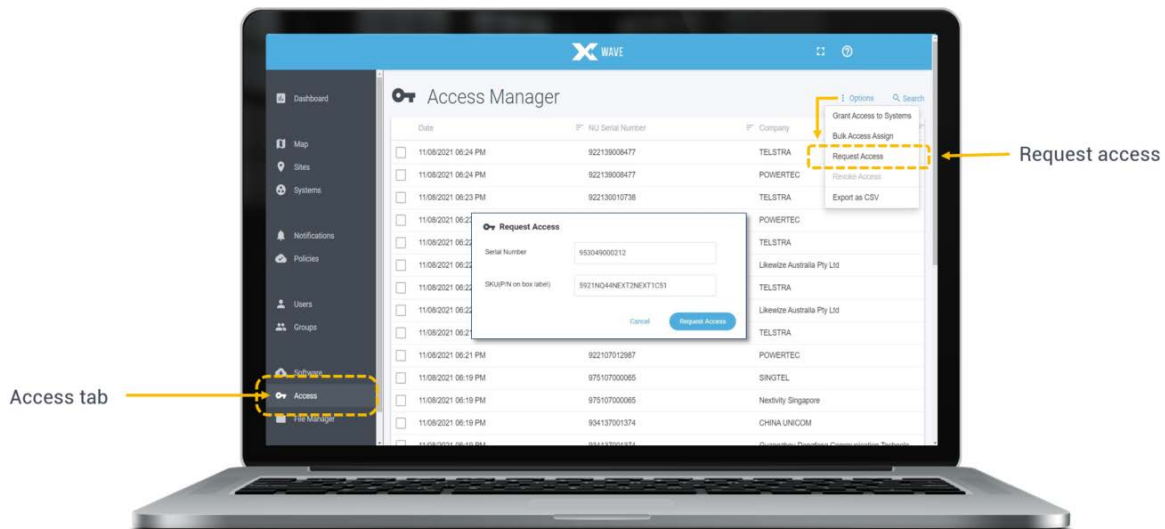
If the LAN cable is connected and there is LAN port LED activity, log into the **WAVE Portal** and look for the **GO G43** Serial Number on the **New Systems** page.

In order to use the **WAVE Portal** and related capabilities, you must be registered with the portal system.

- [Request Access to the WAVE Portal](#)
- [Log In to the WAVE Portal](#)



If you do not see the serial number listed, open the **Options** menu in the upper right corner of the **Access tab** page and select **Request Access**. Fill in the required information and your system should immediately appear on the **New Systems** page.



If you still do not see your **GO G43** serial number on the **New System** page, use the **WAVE Field Tool – Connectivity Test** to diagnose LAN connection problems.

Select the **GO G43** to continue and follow the guided steps to commission the system. Donor ports may be factory-assigned to specific operators, but you may change them when commissioning a new system or through Settings in the future.

New System Setup

Site Information

Additional Information

Site Information

Add to an existing Site

Site Name*

GO G43 My Site Name

Site Owner's First Name*

John

Site Owner's Last Name*

Smith

Site Owner's Email*

johnsmith@company.com

Site Owner's Company Name*

Company

Phone Number

800-555-1212

Address*

Business Address

Address (cont.)

Suite A

Town/City*

Town Name

State/Province*

State Name

Zip/Postal Code*

12345

Country*

United States of America

Cancel

Continue

New System Setup

Site Information

Additional Information

Additional Information

System Name*

Example GO G43

Policy*

Default Policy Example - 1234

Operator Assignment - Port A*

AT&T

Operator Assignment - Port B*

T-Mobile

Operator Assignment - Port C*

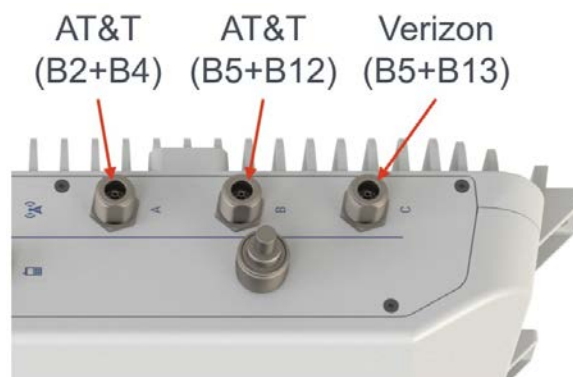
Verizon

Cancel

Add System

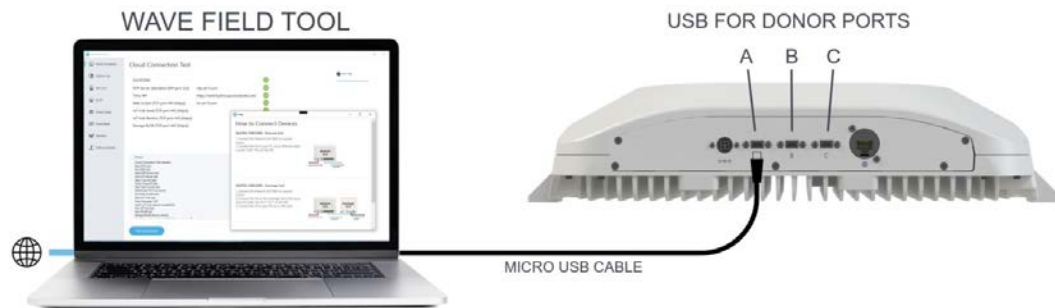
Once the GO G43 is commissioned on the portal, you will be presented with the **Systems** page.

NOTE: You may assign one or more donor ports to a single operator, as long as the donor antenna feed is split to feed all ports for that operator. If multiple ports are assigned to a single operator, do not configure overlapping channel assignments on the different ports. The portal will provide guidance. Below is an example:



Upon completion of **New Systems** page commissioning, the **GO G43** will start scanning for the best channels to relay for each operator.

If you are unable to use the **WAVE Portal** to assign operators to the donor ports, use the **WAVE Field Tool*** windows program. Connect a micro-USB cable from the PC to the ports on the underside of the **GO G43** and configure each port **A/B/C** separately.

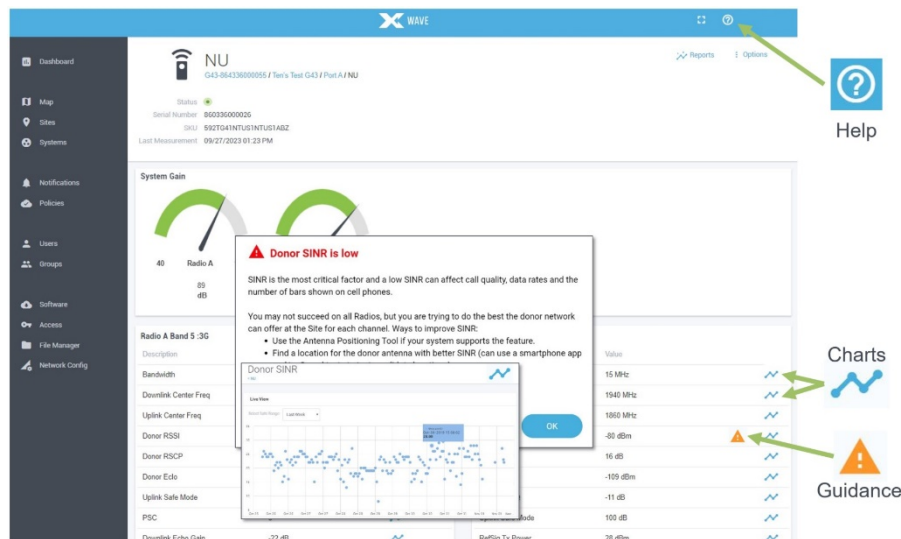


* At the time of publication, the WAVE Field Tool is undergoing an upgrade. Additional functionality will be released in Q1 2024. Contact support@nextivityinc.com with any questions.

NOTE: The computer running the **WAVE Field Tool** requires an internet connection.

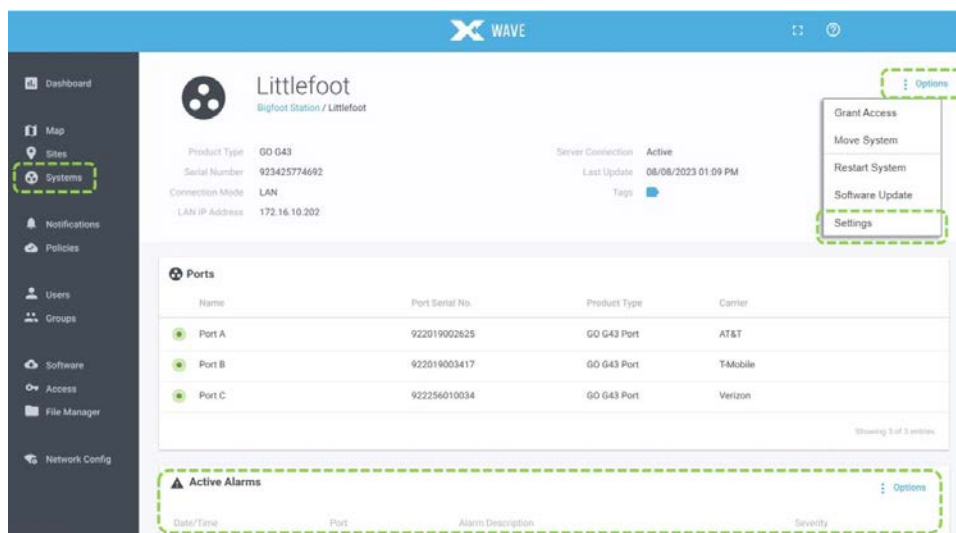
Your **GO G43** should now be providing cellular service once network scanning is complete. The system is designed to update the **WAVE Portal** with system performance metrics every hour, and then continuously if you are actively observing the system on the **WAVE Portal**. Alarms are reported immediately.

Selecting an alarm message from **Alarm History** will bring up resolution suggestions. If you select Port A, B or C, you will be presented with the **Radio Data** page for that port. This page includes KPIs, charting functions, and diagnostic alert icons that may be selected for additional guidance that is based on live system data.



To change **Settings** or other remote functions, select the **Options** menu from the upper-right corner of the **Systems** page.

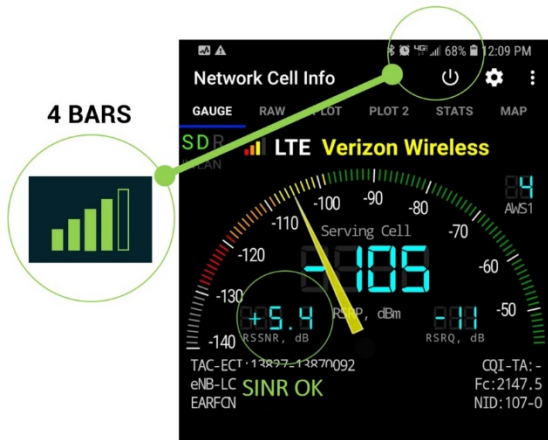
At the bottom of the page, you will see **Active Alarms**, followed by **Alarm History** over time, and **Policy** information where you can adjust alarm severities or set up email or text notifications.



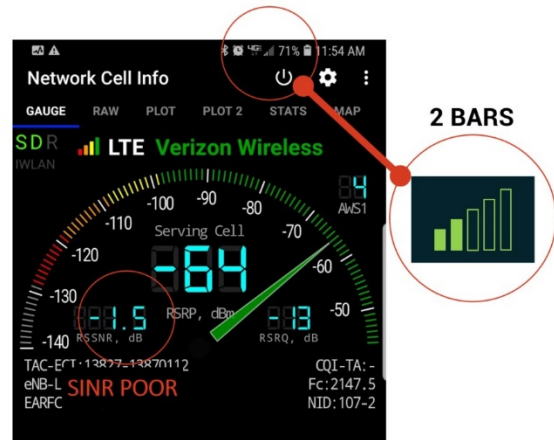
6.10 Step 10: Fine-Tune Donor Antenna Aiming

For even higher quality donor signals, observe the **SINR** (Signal to Interference plus Noise Ratio) on the **WAVE Portal** or **WAVE Field Tool** radio metrics pages. The data rates and number of signal “bars” on the customer’s phones will be a direct reflection of signal quality.

WEAK -105 dB RECEIVED SIGNAL STRENGTH
HEALTHIER +5.4 dB SINR SIGNAL QUALITY



STRONG -64 dB SIGNAL STRENGTH
POOR -1.5 dB SINR SIGNAL QUALITY



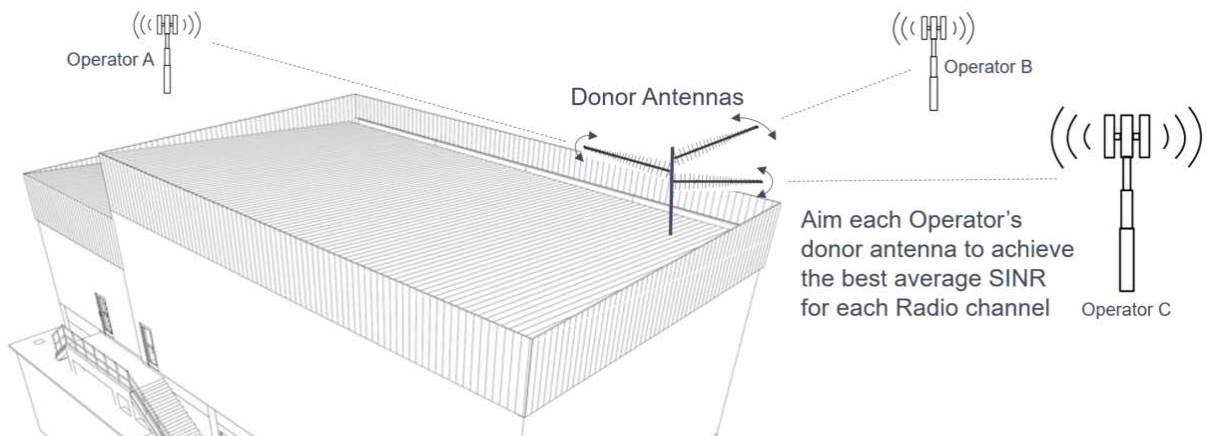
CEL-FI systems make this possible because each operator's channels are processed separately, allowing operator-specific (not frequency-specific) donor antennas.

Fine-tune one antenna at a time.

Loosen the antenna mounting bolts and gently adjust the direction that the donor antenna is aimed. **SINR** is a highly variable parameter that changes with channel traffic loading. Be patient and try to get the highest **SINR** value average that you can for the individual relayed channels. You will need to observe a number of **SINR** values over time.

When you feel that the maximum average **SINR** value has been obtained for the operator's relayed channels, tighten the antenna mounting bolts to secure it in place.

Perform this fine-tuning aiming procedure for each operator antenna, while observing the **SINR** for that operator.



Troubleshooting (Alarm Notifications)

Alarm	Description
Hardware Error	Power cycle the GO G43 and check for software updates. If the problem persists, return GO G43 for service.
Insufficient Donor Signal	Check all donor port cables and connections to the donor antennas and check the donor antenna. Relocate and re-aim the donor antenna for a better signal.
Donor Signal Too Strong	Add attenuation to the donor antenna cable for the donor port with the alarm.
Unit is Overheating	Check that the GO G43 cooling fins are not restricted or move GO G43 unit to a cooler area.
Cannot Communicate with GO or System not Online	Check the internet connection and firewall settings. Use the Connectivity Test in the WAVE Field Tool program to diagnose LAN settings.
GO Not Boosting	Use the WAVE Portal or WAVE Field Tool to resolve issues. Check donor antennas, cables, and connectors.
High Temperature	Make sure airflow over the GO G43 cooling fins is not obstructed or move the unit to a cooler place.
Low Board Voltage	Check the AC Power Supply and the AC power source.
Self-Test Failed	Unplug GO G43 power, and plug it back in. If the issue persists, use the WAVE Field Tool to reload the software.

See Nextivity Support materials in the [Nextivity Partner Portal](#) for helpful documents, videos, and the Nextivity University training materials on how to use the portal to your advantage.

7. Helpful Tools and Signal Quality

7.1 COMPASS XR and WAVE PRO App

The **COMPASS XR** is a hand-held battery-operated device specifically designed to simplify the installation of Nextivity systems. The **WAVE PRO app** connects to and controls **COMPASS XR** over Bluetooth.



Learn more at <https://training.cel-fi.com/my/#courses> and download the Site Survey Checklist at <https://cdn.allbound.com/cel-fi-ab/2022/12/27210634/Cel-Fi-QUATRA-Project-Checklist.pdf>. Both of these links require a Nextivity Identity login for the Partner Portal.

Key features include:

- Donor Antenna Aiming
- Full Cellular band scans, plus Public Safety 700/800 bands
- Building coverage Grid-Test measurements

7.2 WAVE Field Tool

The **WAVE Field Tool** runs on Windows 10 or higher, and has useful tools such as:

- LAN firewall Connectivity Test (G43 to WAVE Portal test)
- Factory reset
- Cloud Reset
- Full system software update/reload
- System settings
- System performance data
- And more...



For more information about **COMPASS XR**, the **WAVE Field Tool**, or other useful tools and resources, please contact your point of sale or Nextivity at www.nextivityinc.com

8. Specifications

For details, please refer to the [CEL-FI GO G43 Data Sheet](#)

9. Trademarks

CEL-FI, IntelliBoost, QUATRA, and Nextivity are trademarks of Nextivity, Inc.

10. Warranty & Limitation of Liability

Nextivity Inc. provides a limited warranty for its products.

For details, please refer to <https://nextivityinc.com/warranty>

In no event shall Nextivity, nor its directors, employees, agents, suppliers or End Users, be liable under contract, tort, strict liability, negligence or any other legal or equitable theory with respect to the Products or any other subject matter of this Agreement (i) for any lost profit, cost of procurement of substitute goods or services, or special, indirect, incidental, punitive, or consequential damages of any kind whatsoever or (ii) for any direct damages in excess of (in the aggregate) the fees actually received by Nextivity from End User with respect to the Products actually purchased and paid for.

Appendix A – WAVE Portal LAN Configuration Requirements

All Nextivity systems can take advantage of Nextivity's browser-based **WAVE Portal** (NMS) to perform management and reporting functions. To facilitate this, the **GO G43** may be connected to the internet through the install site LAN. Typical data payload is around 75 MB per month (system health data) or it may increase temporarily during software updates or for remote troubleshooting. Commissioning requires either a **WAVE Portal** connection, even if temporary, or use of the **WAVE Field Tool** program through a USB connection. Ping (ICMP) is not supported for the LAN connection.



The WAVE system requires the following networking access:

- 1) DHCP (standard UDP port 67)
- 2) DNS (standard UDP port 53)
- 3) ntp.cel-fi.com (standard UDP port 123, used for internal certificate validation only.)
- 4) iot.cel-fi.com (TCP port 443 (HTTPS))
- 5) NextivityIoTHubQA.azure-devices.net (TCP port 443 (HTTPS))
- 6) nextivitystorageqa.blob.core.windows.net (TCP port 443 (HTTPS))

Connections are always initiated from the device side. There is no need to configure any inbound ports on the firewall, thereby reducing exposure to external threats. To achieve both these attributes and still remain responsive to external commands, **GO G43** uses Websockets. Websockets is a lightweight IETF protocol that is built on top of HTTP and establishes persistent TCP connections between a client and server. Since the connection is initiated on client side and uses regular HTTPS, typically no special inbound firewall configuration is needed, yet commands can be delivered to the device in real-time.