NEXTIVITY
Smarter by Design

# CEL-FI COMPASS XR User Manual

For Models:

J11-900-100

PowerfulSignal
Stronger Signal Solutions

# Contents

# 1. Overview

The COMPASS XR and WAVE PRO App work together to improve cellular and public safety coverage installations. A convenient tool in a lightweight and portable package, it can be used globally to deploy and verify multiple technologies, including 5G New Radio networks in sub-6 GHz spectrum, LTE, CBRS, and LMR public safety coverage. For customers with the Cel-Fi Antenna Mount, the Antenna Pointing feature will find the best direction to aim donor antennas. Coverage reports for cellular and public safety frequencies can be run on-site to determine coverage needs and help optimize Cel-Fi systems.

# 2. Specifications

- Band Support:
  - 5G-NR SA & NSA*: n1/n2/n3/n5/n7/n8/n12/n20/n25/n28/n38/n40/n41/n48/n66/n71/n77/n78/n79
  - LTE FDD: B1/B2/B3/B4/B5/B7/B8/B12/B13/B14/B18/B19/B20/B25/B26/B28/B29/B30/B32/B66/B71
  - LTE TDD: B34/B38/B39/B40/B41/B42/B43/B48
  - UMTS**: B1/B2/B4/B5/B6/B8/B19
  - LMR: 758-775 / 851-861 MHz
  - CBRS: 3550-3700 MHz
- Rugged rubberized exoskeleton
- SMA connectors
- Replaceable rechargeable batteries
- USB-C charger
- Internal global 5G/LTE modem and LMR scanner
- FCC certified
- CE certified
- Connects to smartphone via Bluetooth LE

** 5G NSA (Non-StandAlone) scans are best-effort and may not contain all relevant measurements. 5G NSA support is carrier-dependent, generally based on SSB and the availability and content of SIB1 data within the 5G band.*

*** UMTS support to be enabled in a future software release.*

# 3. CEL-FI COMPASS XR Hardware

### Power

Use the Power On/Off button located on the front of the Cel-Fi COMPASS XR to power on the device. The “Power” LED will turn green if the device is on. During startup, the “Status” LED will flash green. Once the Cel-Fi COMPASS XR is ready to use, this LED will turn solid green.

If the power adaptor is not attached and the battery is dead, no lights will display. Use the power charger that came with your device to recharge the battery. It can take up to 4 hours to charge fully if the batteries have been depleted.

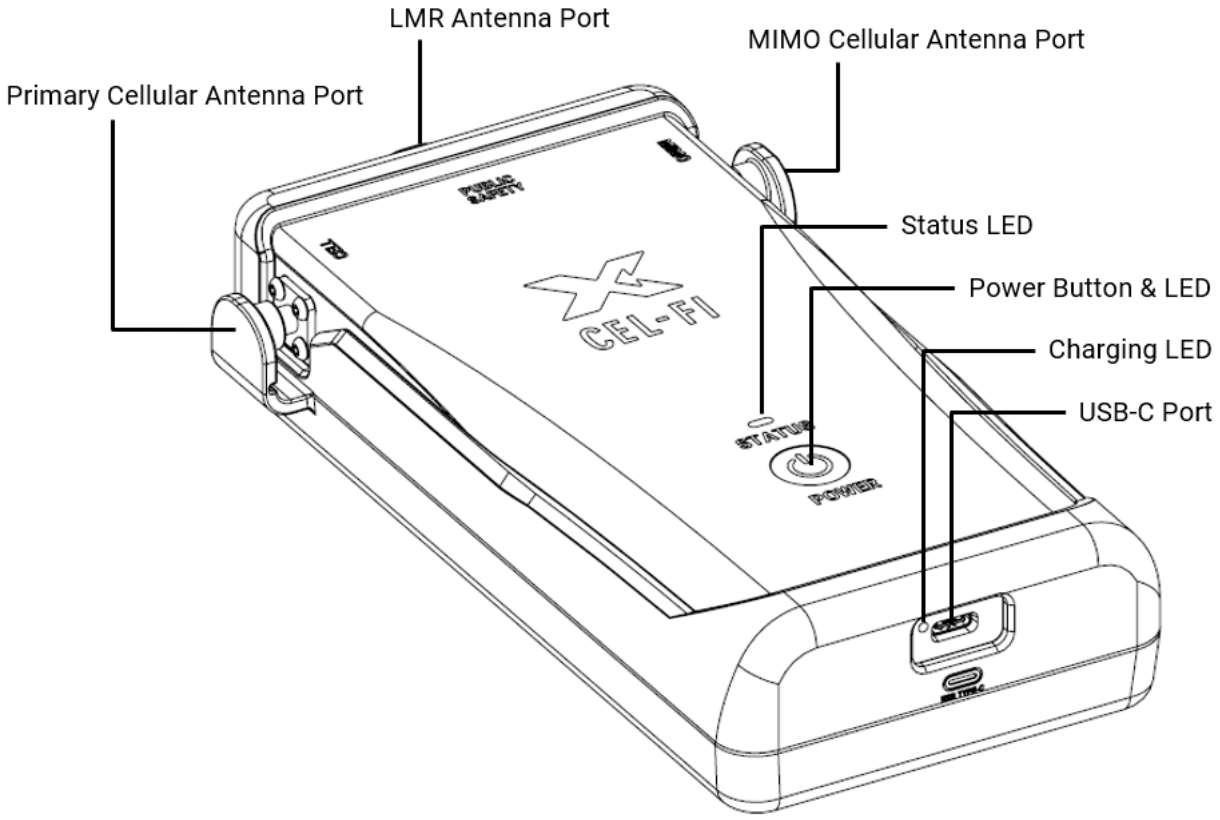
### LEDs

There are 3 LEDs on the COMPASS XR. These lights indicate the following device conditions:

2. Power (within power button)
   - Solid green: device is powered on
   - Off: device is powered off
3. Status (above power button)
   - Solid green: device is ready
   - Blinking green: device is busy processing
   - Solid red: device experienced an error
   - Blinking red: the battery is low
4. Charging (next to USB-C port)
   - Solid green: device is charging
   - Blinking green: charging error (e.g. overheated and will resume once temperature drops)
   - Off (while power cable is connected): charging is complete

### Ports

- The COMPASS XR has three SMA connectors, which can be used to connect the included wideband antennas when conducting site surveys, or to other antennas using the included pigtail cable and assorted RF adapters.
- A USB-C port is used to charge the COMPASS XR. Use the provided AC adapter and the plug connector appropriate to the mains/power outlet in your region.




## 4. Preparing for First Use & Included Accessories

Batteries must be installed in the COMPASS XR before its first use. Two rechargeable 3500 mAh, 3.7V protected 18650 standard cells are included with the product. Follow these steps to install the batteries:

1. Remove the COMPASS XR from the Hard Case and its Carrying Case.
2. Remove the protective rubberized exoskeleton by retracting the caps from each of the three SMA connectors, peeling back the sides to dislodge the four snugging nubs that secure the exoskeleton to the device, and peeling back the top of the shell to fully remove it from the COMPASS XR.
3. Use a Philips screwdriver to remove the three screws from the battery door on the back of the device.
4. Install the two provided 18650 batteries in the orientation marked on the battery housing. Ensure the batteries are fully seated.
   - NOTICE: Use only protected 18650 button top cells, as provided with the COMPASS XR.
5. Replace the battery door and screws. Replace the exoskeleton, pushing the snuggling nubs unto the sides of the device.

It is recommended to charge the COMPASS XR for 8 hours before its first use.

### Included Accessories

- Hard Case
  - Rugged IP67-rated carry-on-sized transportation case
  - Die-cut foam secures all included equipment
  - Store COMPASS XR in its Carrying Case or separately
  - Extra space for additional cables and connectors
- Carrying Case
  - Designed for extended use in a variety of carry configurations
  - One-shoulder sling or two-shoulder backpack, straps included
  - Integrated belt clip
  - Internal pouch for spare antennas
- Three (3) 5GNR/UHF 410–5925MHz Antennas (Nextivity model: A21-ML3-600)
- SMA Female to N-type Male (2-meter length)
- RF Adaptors
  - N-type Female to N-type Female
  - N-type Female to QMA Female
  - N-type Female to 4.3-10 Female
- Batteries: Two (2) rechargeable 3500 mAh, 3.7V protected 18650 cells
- Battery Charger: 5V, 3.2A USB-C charger with 1m cable & global plug adapters
- Calibration Certificate (LMR 700/800)

## 5. Connecting to WAVE PRO

- Make sure the Cel-Fi COMPASS XR is powered on, and the “Status” light is solid green.
- Launch the Cel-Fi WAVE PRO app while standing near the Cel-Fi COMPASS XR. Bluetooth must be enabled on your phone to connect to the Cel-Fi COMPASS XR. Bluetooth Version 4.2 or higher is required and Location Services are required for older Android versions. The app will scan for available devices. If only one device is found, the app will automatically connect to it and proceed. If multiple devices are found, then a list is displayed and you can select which device to connect to. If no devices are found after one minute, then a timeout error is displayed. Tap the “Retry” button to scan again. Power cycle the Cel-Fi COMPASS XR if it is not found.
- The first time you connect to a Cel-Fi COMPASS XR, you will have the option to give it a name. You can skip this step and the serial number will be used as the default name. You can always change the name by going to the Options (hamburger) menu and selecting Settings and Device Name.

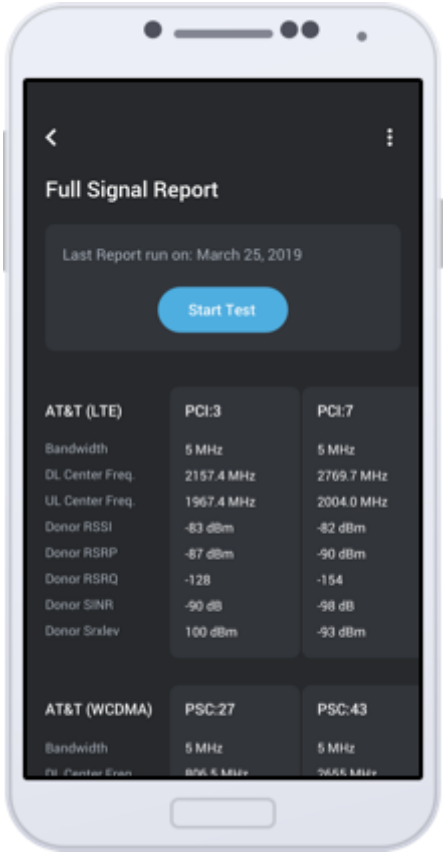

PUBLIC
SAFETY
CELL
MIMO
CEL-FI
STATUS
POWER
Select your Compass
935731000077
986214189003
922541000085
940123882101
Search Again

# 6. Optimization Features

## Signal Report

The Signal Report scans all network carriers' signal data. Simply press the "Start Test" button. The Cel-Fi COMPASS XR will gather data for several minutes. The results will be displayed below.

You can export the Signal Report by selecting the "More" icon and "Email Report." Type in your email address and the results will be sent as a text attachment.




## Grid Test

Collect site survey data for public safety or cellular coverage, or even both at the same time, using the Grid Test feature. Whether performing an initial site survey or post-install acceptance testing, the COMPASS XR works with the WAVE System to ensure a successful Cel-Fi installation.

This feature requires that the Site first be created on the WAVE Portal, and Floorplans be uploaded. Once the Site is ready, use the WAVE PRO app to download the site data to your phone, and connect to the COMPASS XR to begin your testing.

Click on the floorplan image to mark your location. The COMPASS XR will begin scanning the bands you selected for this survey, and record the signal data on the floorplan. Capture one or many measurements per grid area, depending on your needs.


### Antenna Position Test

The Antenna Pointing feature allows you to easily optimize the direction your external antenna should be pointed to. The algorithm takes into account the system gain and radio environment (including signal strength, signal quality, and pilot pollution).

This feature is designed to work with the Cel-Fi Mount, which is an indoor/outdoor mount with a proprietary 8-position dial base. This dial enables the antenna to be rotated in 45-degree increments.

Make sure the Cel-Fi COMPASS XR is connected to the external antenna using the cable included in the kit and the appropriate RF adapter (SMA to N-type, SMA to QMA, or SMA to 4.3-10), as needed. Set the antenna to a position on the Mount, then press the corresponding number on the app. The app will gather data for several minutes. Move the antenna to the next position and press the corresponding button again.

Once the app has two or more data points, it will display a table below. The results are based on each operator and the signal reported. The app will recommend the strongest band, but you may also choose which band to use. The results rank the positions and include a score out of 100.

You can test (and re-test) as many positions as you think are needed. If you tap on the “More” button and select “Testing History,” you can view a table with the date and time of the test. The results are saved until you clear them. Remember to “Clear Results” if you move to a new site.