

# Inseego Wavemaker™ 5G Outdoor Modem FW2010



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# 1

## Introduction and Getting Started

Overview

**Getting Started**

## Overview

The Inseego Wavemaker 5G Outdoor Modem FW2010 is the next-gen CPE solution that brings gigabit wireless 5G data speeds to urban, suburban, and rural customers alike. The FW2010 operates in 4G LTE, 5G Sub-6GHz, and 5G millimeter wave (mmW) networks, and extends mmW network coverage with high-gain, phased-array antenna elements that support bands n257, n258, n260 and n261. The FW2010 automatically connects to the best 4G or 5G cellular network available and provides up to 5Gbps data connectivity to the existing in-building network.

Your FW2010 is installed by professional technicians to assure optimal performance.

### Key Features

- High performance, high power antenna array supports up to 52dBm peak EIRP to extend the mmW network coverage up to 6 kilometers.
- High performance Ethernet port provides up to 5Gbps symmetrical data rate to the in-building network and supports Power-over-Ethernet (PoE) to the device.
- Designed to operate in extreme temperatures from -30°C to 60°C (-22 to 140°F) and has an environmental rating of IP67 for water and dust ingress.
- Advanced security features, encryption, and third-party penetration testing to ensure protection of customer data.
- Remote management with the Inseego Connect™ platform enables remote device management, diagnostics, performance monitoring, alerts, and much more.
- Inseego Mobile App, available on Apple and GooglePlay App stores, guides installers to find the best location for 5G mmWave performance, and enables consumers to manage device settings with their smartphone.

### System Requirements

Web UI operating systems supported include:

- Windows 10 and later
- MacOS 10.14 and later
- Linux® Ubuntu 18.04 LTS and later

## Getting Started

To turn on your FW2010 and connect a device:

1. Check that the PoE cable from the FW2010 is in the **PoE** port on the PoE power injector and the PoE power injector is plugged into an earthed AC outlet.



2. Insert one end of a Cat6A Ethernet cable into the **Data** port on the PoE power injector.
3. Insert the other end of the cable into the Ethernet port of the device you wish to connect.

---

**WARNING!** Use only the PoE power injector supplied with the FW2010. Unapproved power supplies could cause overheating or fires, resulting in serious bodily injury, death, or property damage. Do not defeat the safety purpose of a grounding-type plug. Use the PoE power injector only in combination with an earth-socked outlet.

---

# 2

## Admin User Interface

**Overview**

**Admin Password**

**Managing Data Usage**

**Managing Settings**

**Viewing Info About the FW2010**

**Getting Support**

# Overview

Use the FW2010 Admin Web User Interface to configure and troubleshoot your FW2010. On a computer or device connected to your FW2010, open any web browser and go to <http://192.168.1.1>.

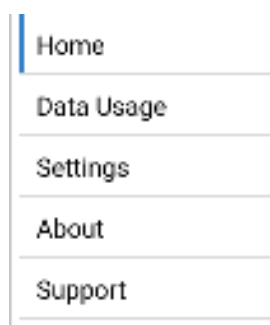
## Home Page

The Home page is the local gateway to configuring and managing your FW2010. It displays data usage and general status information.



## Side Menu

The Home page and each subscreen in the FW2010 Web User Interface includes a menu on the left, which you can use to return to the Home page or jump to other pages. The current page is indicated by a blue bar.



## Getting Help

Select the question mark (?) in the upper right-hand corner of a page to go to the Customer Support page where you can access this User Guide and other information for the FW2010.



# Admin Password

The Admin password is what you use to sign into the FW2010 Web UI. The default Admin password is **"Fast5G!"**.

You will be prompted to change the Admin password upon first login. Change the password to something easy to remember, and set up a security question that will help you securely recover your password if you forget what you changed it to.

---

**Important:** It is critical that you change the Admin password from the default to keep the device and your network secure.

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## Changing the Admin Password

To change the Admin password:


1. Click the down arrow next to **Sign Out** in the top-right corner of any Web Interface page and select **Change Password**.
2. Enter your current Admin password, then enter a new password and confirm it.
3. Select a security question from the drop-down list and type an answer to question in the **Answer** field. **NOTE:** Answers are case-sensitive.
4. Click **Save Changes**.

The next time you sign in to the FW2010 Web Interface, use the new Admin password. If you cannot remember the password, click **I forgot the Admin password**. After you correctly answer the security question you set up, the current password is displayed.

## Managing Data Usage

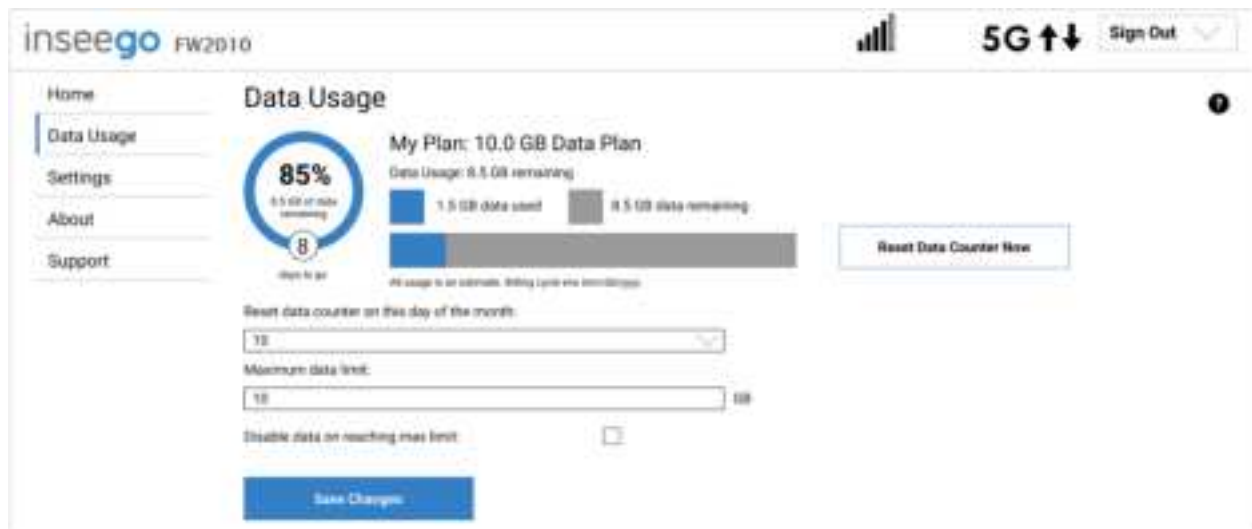
On the Web UI Home page, the Data Usage panel displays graphs of your FW2010 data usage for the current billing cycle.



To view the Data Usage page, select  from the Home page Data Usage panel or select **Data Usage** from the Web UI side menu. The Data Usage page appears.

## Data Usage Page

Use the Data Usage page to view details about your FW2010 data usage.



The data usage graph displays vary according to plan, but generally include:

- Estimated percentage of data remaining for the current billing cycle
- Number of days left in the billing cycle
- Data limit on your plan
- Estimated amount of data used in the current billing cycle
- Estimated amount of data remaining for the current billing cycle
- Date the billing cycle ends

Use the **Reset Data Counter Now** button to restart the data usage shown on this page to zero.

**Reset data counter on this day of the month:** Use the drop-down to select a day of the month for the counter displayed on this page to reset.

**Maximum data limit:** Enter a maximum data limit, if desired.

**Disable data on reaching max limit:** Check this box if you want data disabled after reaching the maximum data limit set above.

Select **Save Changes** to enact changes.

# Managing Settings

You can view and configure system settings for your FW2010. To change system settings, select **Settings** from the Web UI side menu.

The Settings page includes four tabs:

- Preferences
- Software Update
- Backup and Restore
- Advanced

## Preferences Tab

This tab allows you to change how dates, time, and numbers are displayed in the FW2010 Web UI.

**NOTE:** These preferences affect packets sent to remote servers. For example, if you select a 24 hour time format, the Web UI, and any packets reporting time somewhere else, will display time in 24 hour format.

## User Preferences

**Language:** Select a language for the Web UI.

**Date:** Select the date format to be used throughout the Web UI (mm/dd/yyyy or dd/mm/yyyy).

**Time:** Select the time format to be used throughout the Web UI (12 or 24 hour).

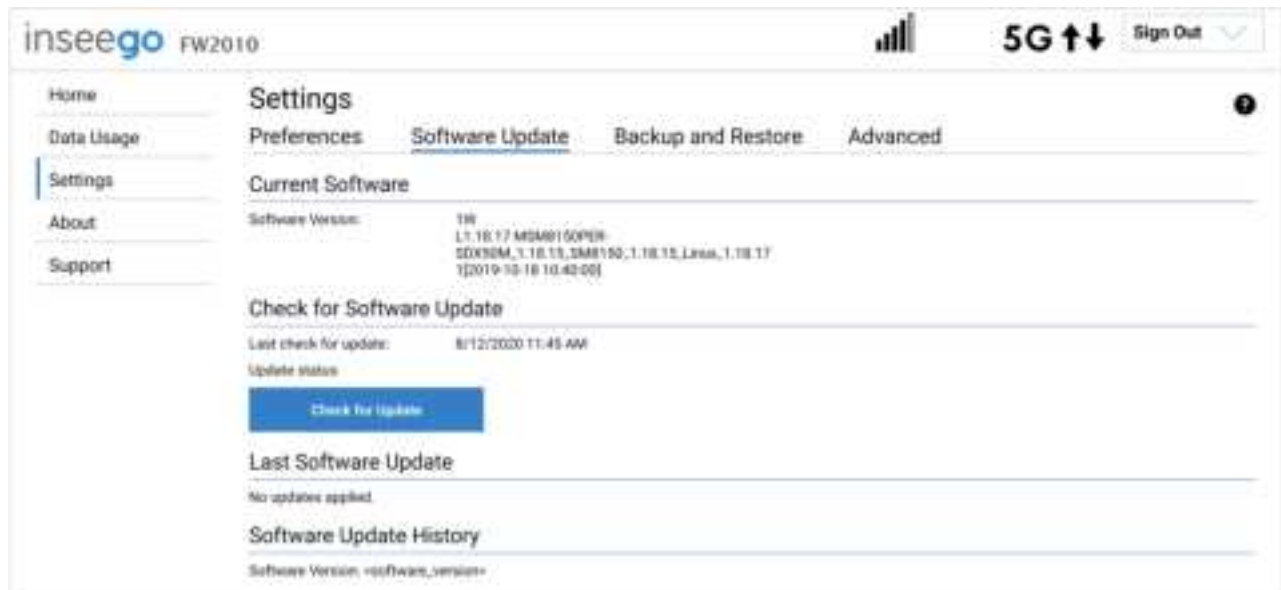
**Feet/Meters:** Select the distance format to be used for the Web UI when marking GPS altitude and accuracy (Feet or Meters).

**Units:** Choose the format for decimal numbers displayed in the Web UI (using a period or comma as the decimal point).

Select your display choices from the drop-down menus and click **Save Changes** to update settings.

## Software Update Tab

Software updates are delivered to the FW2010 automatically over the mobile network. This tab displays your current software version, last system update information, software update history, and allows you to check for new software updates.



### Current Software

**Software Version:** The version of the software currently installed on your FW2010.

### Check for Software Update

**Last check for update:** The date and time the FW2010 last checked to see if an update was available.

**Update status:** This area is usually blank. If you check for an update, the results display.

**Check for Update:** Click this button to manually check for available software updates. If a new software update is available, it is automatically downloaded.

### Last Software Update

This section displays details about the last software update.

### Software Update History

This section displays details of the last updates that have been downloaded and installed to this device. If no updates have been installed, this section is not displayed.

## Backup and Restore Tab

Use this tab to back up current FW2010 settings to a file on your computer, restore (upload) a previously-saved configuration file, reset the device to factory defaults, or restart the device.

The screenshot shows the 'inseeo FW2010' web interface. At the top, there's a status bar with a signal strength indicator, '5G' with up/down arrows, and a 'Sign Out' button. A left sidebar contains links: Home, Data Usage, Settings (highlighted), About, and Support. The main content area is titled 'Settings' and has sub-tabs: Preferences, Software Update, Backup and Restore (active), and Advanced. Under 'Backup and Restore', there are three sections: 1. 'Backup Configuration' with a note about saving settings to a file, an 'Admin Password' input field, a warning about lockout, and a 'Download' button. 2. 'Restore Settings' with a note about restoring from a file, an 'Admin Password' input field, a warning, a 'No file selected' field with a 'Browse' button, and a 'Restore from' button. 3. 'Restore to Factory Defaults' with a note about resetting to defaults and a 'Restore Factory Defaults' button. At the bottom is a 'Restart Device' section with a note and a 'Restart' button.

### Backup Configuration

To back up current FW2010 settings to a file on your computer, enter your Admin password in the **Admin Password** field.

The default Admin password is **Fast5G!** and should have been changed upon first login. If you don't remember your Admin password, select **Sign In** in the top-right corner of the Home page, click **I forgot the Admin password**, and answer the displayed security question. The current Admin password will be displayed.

**NOTE:** If you enter an incorrect password five times in a row, you will be locked out of the Web UI. To unlock it, restart your FW2010 by disconnecting the PoE cable from the PoE Injector **PoE** port for 10 seconds and reconnecting it.

Click the **Download** button. The file is automatically downloaded to your Downloads folder. This configuration file contains all settings for your FW2010.

**NOTE:** The backup file cannot be edited or viewed on the downloaded system or on any other device. This file can only be restored for this model of FW2010, and settings can only be viewed or changed using the Web UI.

## Restore Settings

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**CAUTION!** Restoring settings (uploading a configuration file) changes ALL of the existing settings to match the configuration file.

---

To restore system settings from a backup settings file, enter your Admin password in the **Admin Password** field.

Click **Browse** and choose a backup settings file to restore.

**NOTE:** You can only restore a file that was created for this model of FW2010.

Click the **Restore Now** button.

## Restore to Factory Defaults

**Restore Factory Defaults:** This button resets all settings to their factory default values.

---

**CAUTION!** This resets all settings to their factory default values, including the Admin password.

---

## Restart Device

**Restart:** This button turns your FW2010 off and on again.

## Advanced Tab

The Advanced Settings pages on the FW2010 Admin website are intended for users with technical expertise in the area of telecommunication and networking.

**WARNING!** Changing the Advanced settings may be harmful to the stability, performance, and security of the FW2010.

When you select the **Advanced** tab on the Settings page, a warning message appears. If you click **Continue**, the Cellular tab of the Advanced Settings page appears.

The Advanced Settings page includes the following sub tabs:

- Cellular
- Manual DNS
- SIM
- LAN
- Inseego Connect

## Cellular Sub Tab

In most configurations, the FW2010 is used with a dynamic IP and SIM and the Access Point Name (APN) is available from the network, for example: *internet*. However, if you are on a private network, you may need to set the APN on this tab for the network to communicate with the FW2010.

The screenshot shows the Inseego FW2010 web interface. The top navigation bar includes the Inseego logo, 'FW2010', a signal strength indicator, '5G' with up/down arrows, and a 'Sign Out' button. The left sidebar contains links for Home, Data Usage, Settings (highlighted), About, and Support. The main content area is titled 'Settings' and has sub-tabs: Preferences, Software Update, Backup and Restore, and Advanced (selected). Under the 'Advanced' tab, there are further sub-tabs: Cellular (selected), Manual DNS, SIM, LAN, and Inseego Connect. The 'Cellular' sub-tab is active, showing 'Network Selection' and 'APN Settings'. In 'Network Selection', there is a toggle for 'Enable automatic network selection' (currently off) and a 'Select a Different Network' button. The 'APN Settings' section includes a caution: 'Caution: Changing the APN may cause loss of data connectivity.' It has input fields for APN, Authentication (set to 'None'), Username, and Password. There are also two toggle switches: 'Retain these settings during factory reset' (on) and 'Apply these settings to current SIM only' (on). A 'Save Changes' button is at the bottom.



## Network Selection

**Enable automatic network selection:** When the **ON/OFF** slider is **ON**, your FW2010 automatically selects the best 5G available network and you cannot use the **Select a Different Network** button below.

**Select a Different Network:** You may wish to use this option if multiple networks are available and you have a preference. **NOTE:** This option is available only if **Enable automatic network selection** is off. Click the button to scan for available networks, then choose the preferred network.

## APN Settings

**APN:** Enter the APN for your private network.

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**CAUTION!** Changing the APN may cause a loss of data connectivity.

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**Authentication:** Select the authentication method for your private network from the drop-down (PAP, CHAP, or None).

**Username:** Enter the user name for your private network.

**Password:** Enter the password for your private network.

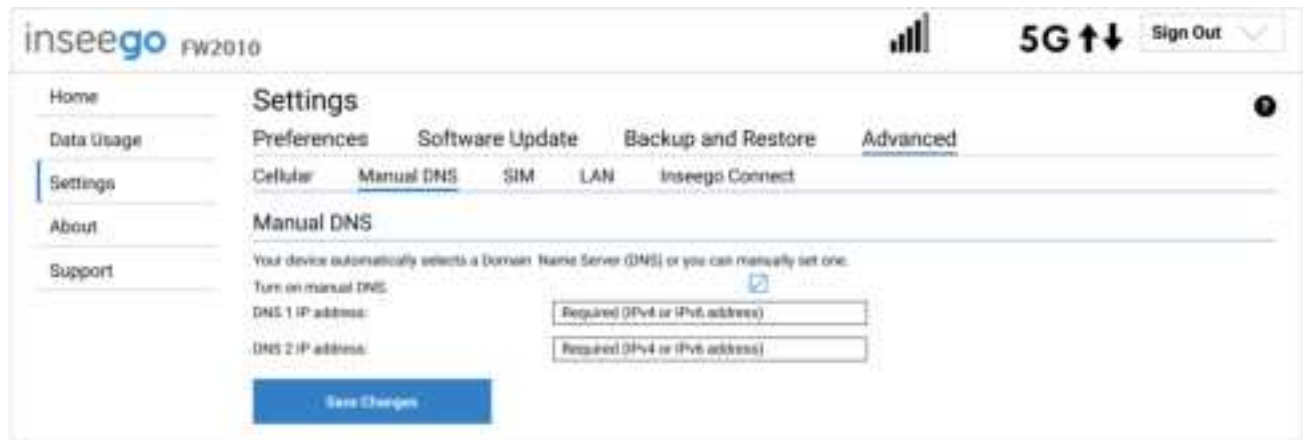
**Retain these settings during factory reset:** When the **ON/OFF** slider is **ON**, your FW2010 will keep these APN settings after a factory reset.

**Apply these settings to current SIM only:** When the **ON/OFF** slider is **ON**, your FW2010 will only apply these APN settings to the current SIM.

Click **Save Changes**. The device will reboot for changes to take effect.

## Manual DNS Sub Tab

The FW2010 automatically selects a Domain Name Server (DNS). This page allows you to manually assign up to two DNS IP addresses.



The screenshot shows the Inseego FW2010 web interface. At the top, there's a header with the Inseego logo, 'FW2010', a signal strength indicator, '5G' with up/down arrows, and a 'Sign Out' button. A left sidebar contains links: Home, Data Usage, Settings (highlighted), About, and Support. The main content area is titled 'Settings' and has sub-tabs: Preferences, Software Update, Backup and Restore, and Advanced (selected). Under the 'Advanced' tab, there are sub-sections: Cellular, Manual DNS (selected), SIM, LAN, and Inseego Connect. The 'Manual DNS' section contains the text: 'Your device automatically selects a Domain Name Server (DNS) or you can manually set one.' Below this is a checkbox labeled 'Turn on manual DNS' which is checked. There are two input fields: 'DNS 1 IP address:' and 'DNS 2 IP address:'. Both fields have a placeholder text 'Required (IPv4 or IPv6 address)'. At the bottom of the section is a blue button labeled 'Save Changes'.

### Manual DNS

**Turn on manual DNS:** Check this box to manually select a DNS.

**DNS 1 IP address:** Enter the IP address for the primary DNS. This address is required to use the Manual DNS feature.

**DNS 2 IP address:** Enter the IP address for the secondary (backup) DNS. This address is optional and may be left blank if desired.

Click **Save Changes**.

## SIM Sub Tab

The SIM card in your FW2010 can be locked using a PIN. If the SIM card is locked, you must enter the PIN before connecting to the mobile network. Once entered, the PIN is remembered until the next shutdown. You may also need to provide the existing PIN to change a SIM. The default PIN is available from your service provider.

Use this page to unlock your SIM or enter a SIM PIN.

The screenshot shows the 'inseeego FW2010' web interface. At the top, there's a status bar with a signal strength indicator, '5G' with up/down arrows, and a 'Sign Out' button. On the left, a sidebar menu includes 'Home', 'Data Usage', 'Settings' (highlighted), 'About', and 'Support'. The main content area is titled 'Settings' and has tabs for 'Preferences', 'Software Update', 'Backup and Restore', and 'Advanced'. Below these is a sub-menu with 'Cellular', 'Manual DNS', 'SIM' (highlighted), 'LAN', and 'Inseeego Connect'. The 'SIM Settings' section contains a note about PIN security, a toggle for 'SIM PIN lock' (currently 'Off'), 'SIM status' (currently 'Ready'), a 'Desired action' dropdown (set to 'Turn on PIN lock'), and a 'Current PIN' input field. A 'Save Changes' button is at the bottom.

### SIM Settings

**SIM PIN Lock:** Indicates whether the PIN lock feature is in use. If On, the PIN lock has been turned on, and the SIM PIN must be entered to connect to the mobile network. If Off, the PIN lock feature is not turned on and the SIM PIN is not required.

**SIM status:** The current status of the SIM card. Possible states include:

- **Ready** – No SIM PIN is needed.
- **PIN Locked** - SIM PIN must be entered before you can use the mobile network.
- **PUK Locked** - PUK (personal unblocking key) for the SIM must be entered in order to continue. The PUK can be obtained from your service provider.
- **Unlocked** - SIM PIN was needed, but has already been entered.
- **No SIM** - No SIM is detected. Check that the SIM is inserted correctly.
- **SIM Error** - SIM is detected, but is not responding as expected and cannot be used.

**Desired Action:** The actions available depend on the SIM status. Possible operations include:

- **PIN Lock** - If the SIM is currently PIN locked, you are prompted to enter the PIN.  
**NOTE:** If an incorrect PIN is entered too many times, the SIM becomes PUK locked. A counter indicates how many incorrect entries will cause PUK lock. Once PUK locked, the PUK must be obtained from your service provider.
- **PUK Lock** - If the SIM is currently PUK locked, the only operation possible is to enter the PUK.  
**NOTE:** If an incorrect PUK is entered too many times, the SIM becomes permanently unusable. You will need to obtain a new SIM. A counter indicates how many entry attempts remain.
- **Turn on SIM PIN Lock** - Sets the SIM so that entry of a PIN is required upon startup to connect to the mobile network. To perform this operation, you must enter the current PIN.
- **Turn off SIM PIN Lock** - Turns off a PIN lock that was previously turned on so that entry of a PIN is no longer required to connect to the mobile network. To perform this operation, you must enter the current PIN.

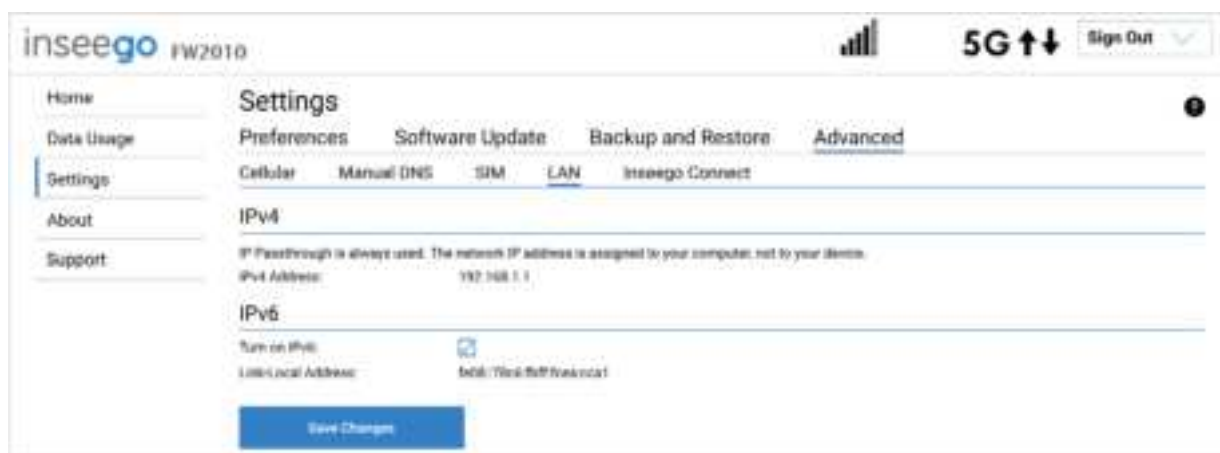
**Current PIN:** Enter the current PIN.

**NOTE:** The default SIM PIN is available from your service provider.

Click **Save Changes**.

## LAN Sub Tab

This page provides settings and information about the FW2010's local area network (LAN). The LAN consists of the device and all connected devices.



### IPv4

**IP Address:** The network IP address assigned to your computer, not your FW2010 device.

**NOTE:** IP Passthrough is always used.

### IPv6

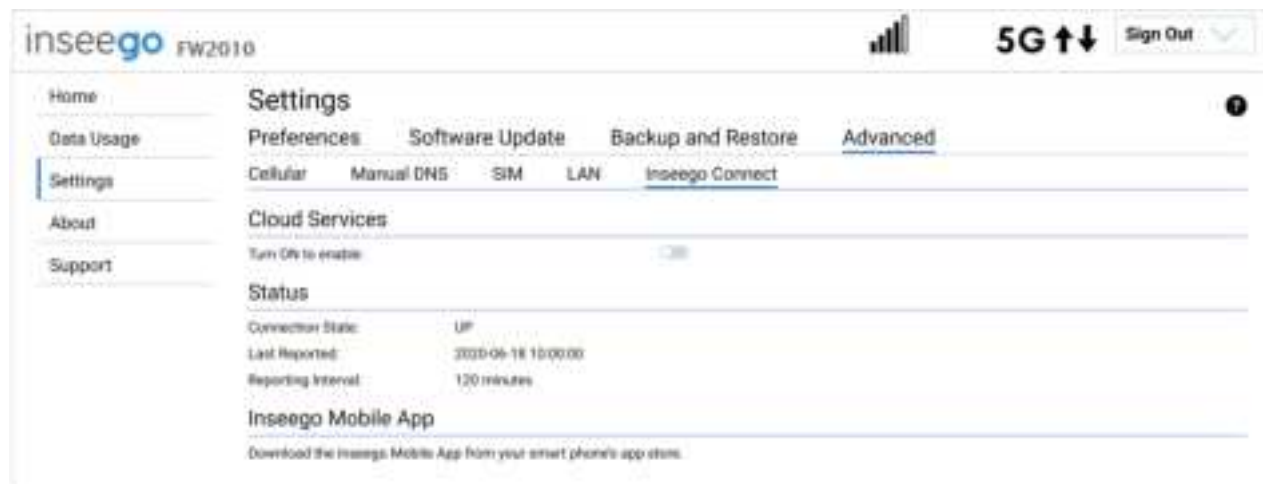
**Turn on IPv6:** Move the slider to ON if any of your connected devices support IPv6. This enables IPv6 connected devices to make IPv6 connections to the Internet.

**Link-Local Address:** The Link-Local IPv6 address if the connected device supports IPv6.

Click **Save Changes** to activate and save new settings.

## Inseego Connect Sub Tab

Use this page to enable and configure settings for connection with Inseego Connect. Inseego Connect is a cloud platform product that provides 360 degree visibility and secure accessibility into all of your Inseego devices from a single platform.



### Cloud Services

By default, the connection to Inseego Connect is **ON**. Slide the **ON/OFF** slider to **OFF** if you wish to disable the connection.

**NOTE:** After enabling Inseego Connect, restart your device to establish the initial connection with the cloud.

### Status

**Connection state:** The status of the Inseego Connect connection.

- **UP** – FW2010 is communicating with Inseego Connect servers.
- **DOWN** – FW2010 is NOT communicating with Inseego Connect servers.

**Last reported:** The time when FW2010 last sent a packet to Inseego Connect servers.

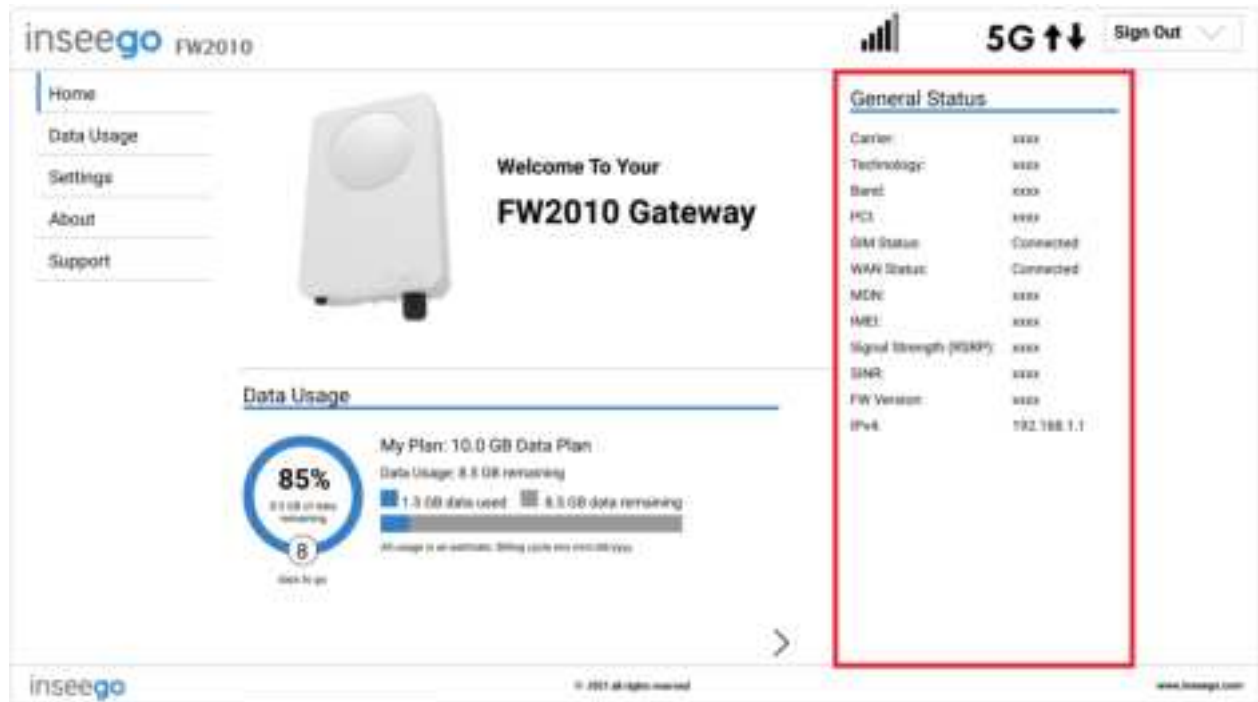
**Reporting interval:** This is the interval at which your FW2010 will send packets into the Inseego Connect server. **NOTE:** A shorter interval means more data usage.

### Inseego Mobile App

You can download the Inseego Mobile App from your device's app store.

## Viewing Info About the FW2010

On the Web UI Home page, the General Status panel shows general Internet connection and system information.



**Carrier:** The name of the Mobile Network Operator.

**Technology:** Indicates the current cellular data connection, for example, 5G Sub6.

**Band:** The cellular network band in use for the current connection.

**PCI:** The Physical Cell ID that indicates the cellular tower/node to which the device is connected.

**SIM Status:** The current status of the SIM card.

**WAN Status:** The current status of the WAN connection.

**MDN:** The phone number of your FW2010.

**IMEI:** The International Mobile Equipment Identity (IMEI) for your FW2010. This is a 15 digit code used to uniquely identify an individual device. The IMEI does not change when the SIM is changed.

**Signal Strength (RSRP):** The strength of the cellular signal, measured in dBm. Higher absolute values indicate a stronger signal, for example: -80 dBm is a stronger signal than -90 dBm.

**SINR:** Signal to Interference plus Noise Ratio. An LTE-specific measure of signal quality, taking interference and noise into account. SINR is a positive value, and higher numbers are better.

**FW Version:** The version of the firmware (software) currently installed on your FW2010.

**IPv4:** The network IP address assigned to your computer, not your FW2010 device.

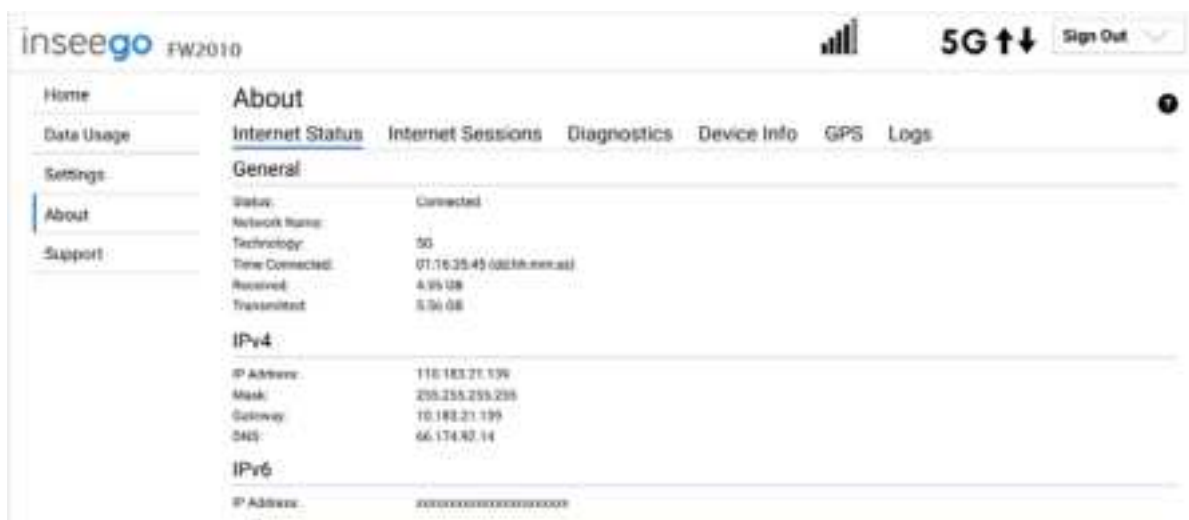
To view more information about your FW2010 and its use, select **About** from the Web UI side menu.

The About page includes the following tabs:

- Internet Status
- Internet Sessions
- Diagnostics
- Device Info
- GPS
- Logs

## Internet Status Tab

Use the Internet Status tab to view general Internet connection and system information.



### General

**Status:** The current status of the FW2010 Internet connection.

**Network Name:** The name of the network for the current Internet session established.

**Technology:** Indicates the current cellular data connection, for example, 5G.

**Time Connected:** The amount of time that has elapsed since the connection for the current Internet session was established.

**Received:** The amount of data received for the current Internet session. This counter starts at zero when the connection is established.

**Transmitted:** The amount of data transmitted for the current Internet session. This counter starts at zero when the connection is established.

### IPv4



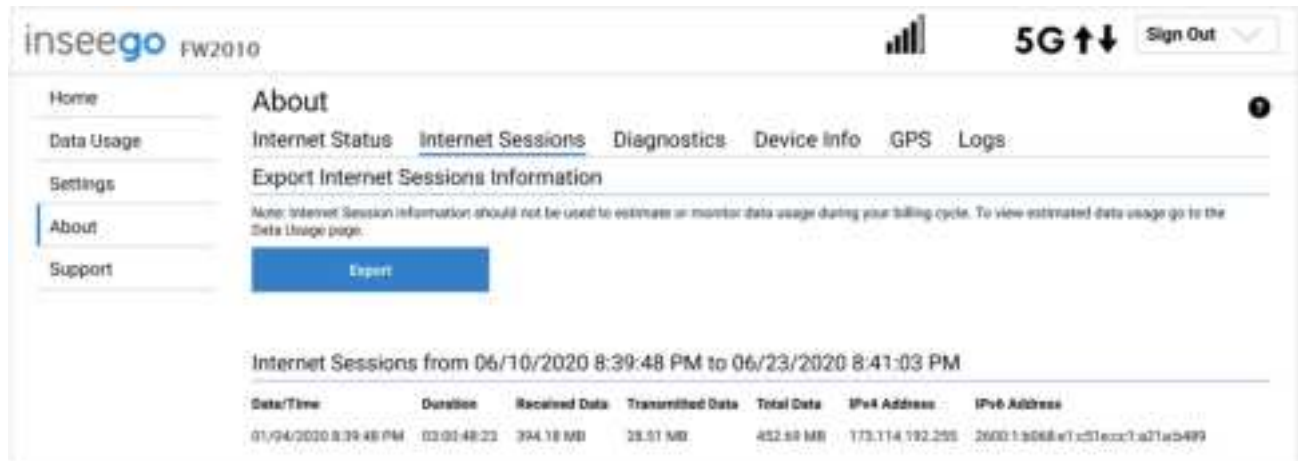
- **IP Address:** The Internet IP address assigned to the FW2010.
- **Mask:** The network mask associated with the IPv4 address.
- **Gateway:** The gateway IP address associated with the IPv4 address.
- **DNS:** The Domain Name Server currently used by the FW2010.

## IPv6

- **IP Address:** The global IPv6 address for the FW2010 (blank if IPv6 is turned off or is not supported by the current network connection or operator).

## Internet Sessions Tab

Use the Internet Sessions tab to export and view Internet session data.



### Export Internet Sessions Information

Click the **Export** button to display Internet session data.

### Internet Sessions

**NOTE:** Internet Sessions are presented in date order.

**Date/Time:** The date and time the Internet session began.

**Duration:** The total amount of time for the Internet session.

**Received Data:** The amount of data received for the Internet session. This counter starts at zero when the connection is established.

**Transmitted Data:** The amount of data transmitted for the Internet session. This counter starts at zero when the connection is established.

**Total Data:** The total amount of data for the Internet session. This is the sum of Received Data and Transmitted Data.

**IPv4 Address:** The IP address for the session.

**IPv6 Address:** The global IPv6 address for the session (blank if IPv6 is turned off or is not supported by the current network connection or carrier).

## Diagnostics Tab

This tab displays detailed information used solely for troubleshooting or technical support.



### Modem

**Mobile Number (MDN):** The phone number of your FW2010.

**IMEI:** The International Mobile Equipment Identity (IMEI) for your FW2010. This is a 15 digit code used to uniquely identify an individual mobile station. The IMEI does not change when the SIM is changed.

**IMSI:** The International Mobile Subscriber Identity (IMSI) for your FW2010. This is a unique number, usually fifteen digits, that identifies a Global System for Mobile Communications (GSM) subscriber.

**FW Version:** The version of the firmware (software) currently installed on your FW2010.

### Network

**Status:** The status of the network.

**Technology:** Indicates the current cellular data connection, for example, 5G Sub6.

**Band:** The band in use for the current connection.

**Network Operator:** The name of the Mobile Network Operator (MNO).

**Signal Strength (RSRP):** The strength of the cellular signal, measured in dBm. Higher absolute values indicate a stronger signal, for example: -80 dBm is a stronger signal than -90 dBm.

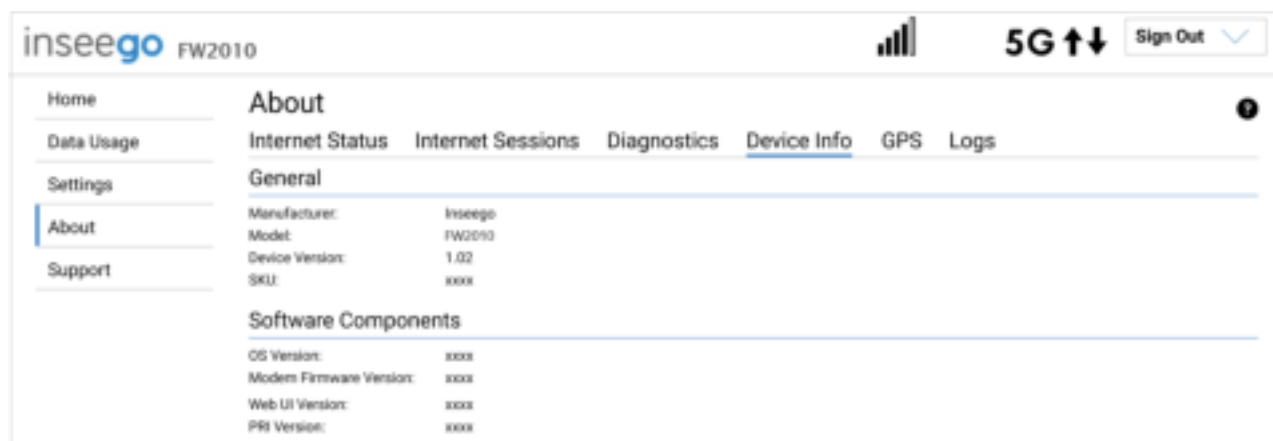
**SINR:** Signal to Interference plus Noise Ratio. An LTE-specific measure of signal quality, taking interference and noise into account. SINR is a positive value, and higher numbers are better.

**Roaming:** Indicates whether roaming is on.

**Cell ID (ECGI):** E-UTRAN Cell Global Identifier. This is a 15-digit code used to identify cells globally.

## Device Info Tab

Use this tab to view details about your internal WAN connection.



### General

**Manufacturer:** Inseego.

**Model:** FW2010.

**Device Version:** The version of firmware (software) currently installed.

**SKU:** The SKU for your FW2010.

### Software Components

**OS Version:** The version number for the Operating System and its components.

**Modem Firmware Version:** The version of firmware (software) currently installed for the modem component.

**Web UI Version:** The version number for the FW2010 Web UI.

**PRI Version:** The configuration version currently applied to the FW2010.

## GPS Tab

The FW2010 incorporates a GPS receiver. The GPS receiver can determine your device's current location. Use this tab to view current location information.



### Current Location

**Latitude:** Latitude for the last location fix.

**Longitude:** Longitude for the last location fix.

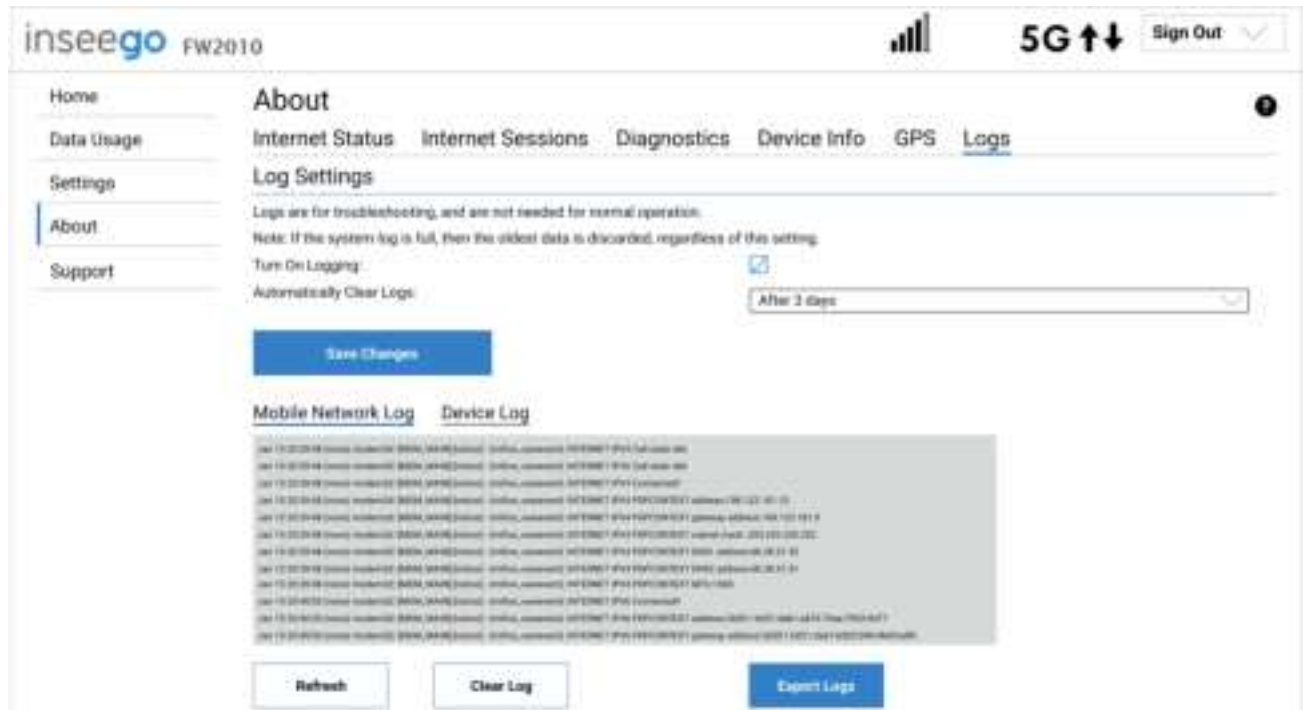
**Altitude:** Altitude for the last location fix.

**Accuracy:** A measure of the accuracy of the horizontal position obtained by the GPS receiver.

**NOTE:** You can change the format of measurement (Feet or Meters) in **Settings > Preferences > User Preferences**.

## Logs Tab

Use this tab to view log information for troubleshooting.



## Log Settings

**Turn On Logging:** Check this box to turn on logs as needed.

**Automatically Clear Logs:** Use the drop-down list to select when logs are cleared. **NOTE:** If the log is full, the oldest data is deleted regardless of this setting.

Click **Save Changes** to enact changes.

If logs are turned on, the following are visible:

Click on **Mobile Network Log** for log data of connections to the mobile network.

Click on **Device Log** for log data of events other than mobile data connections that occurred on this device.

**Refresh:** Updates the displayed log data.

**Clear Log:** Deletes all existing log data. This makes new data easier to read.

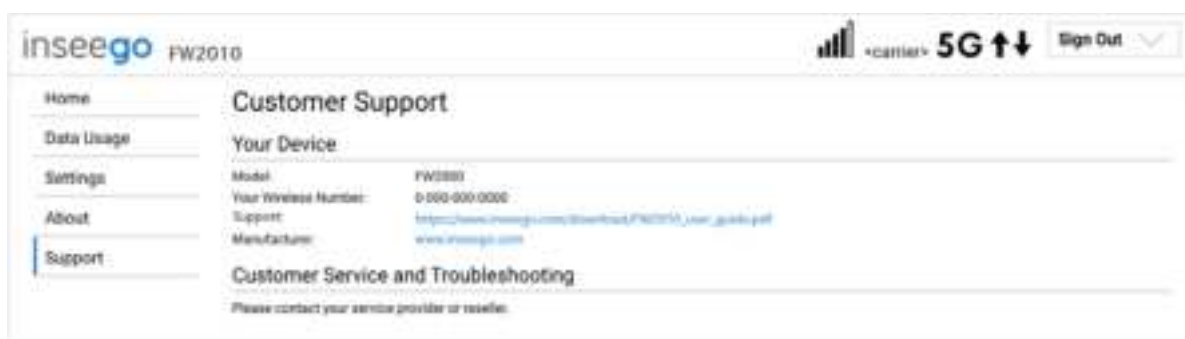
**Export Logs:** Allows you to export log data.

## Getting Support

To view the Customer Support page, select **Support** from the Web UI side menu. The Customer Support page appears.

### Customer Support Page

Use the Customer Support page to access documentation and support information for your FW2010.



# 3

## Troubleshooting and Support

**Overview**

**Replacing your SIM Card**

**Indicator LED**

**Resetting your Device**

**Technical Support**



## Overview

This chapter provides troubleshooting and support information, including instructions on replacing a SIM card, information on the indicator LED, and how to reset your device.

## Replacing your SIM Card

A SIM card is a small rectangular plastic card that stores your phone number and important information about your wireless service. A SIM card is installed in your FW2010 during the technician installation process. These instructions are for replacing your SIM card.

The FW2010 supports only Nano SIM cards.



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**CAUTION!** Always use a factory-made SIM card supplied by the service provider. Do not bend or scratch your SIM card. Avoid exposing your SIM card to static electricity, water, or dirt.

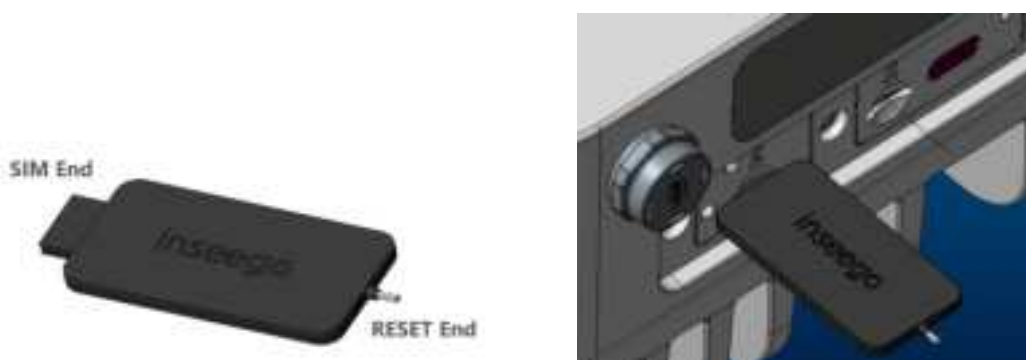
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To replace the SIM card:

1. Disconnect the PoE cable to the FW2010 from the **PoE** port on the PoE power injector.
2. Unscrew the protective shield over the SIM slots using a Phillips-head screwdriver.



1. Use the SIM end of the provided SIM tool to remove the existing SIM card.



2. If necessary, remove the new SIM card from the outer card, being careful not to touch the gold colored contacts.
3. Use the SIM end of the provided SIM tool to insert the SIM card into the SIM 1\* slot with the gold-colored contact points facing the front of the device.

**CAUTION!** Do not insert SIM card into the SIM 2 slot - it will not work.

4. Reattach the protective shield cover to a torque of 1.2Nm (0.885 ft/lb).
5. Insert the PoE cable to the FW2010 back into the **PoE** port on the PoE power injector.

**NOTE:** If there is an issue, check the indicator LED (see Indicator LED on the next page) to make sure the SIM is working correctly.

Should your SIM card be lost or damaged, contact your network operator.

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\* Only SIM 1 is enabled.

## Indicator LED

There is a multifunction LED located on the FW2010 device in the SIM compartment (visible through the protective shield). It changes colors and either blinks or glows solid to communicate current states for the device.



LED Color	Operation	Meaning
<b>Blue</b>	Solid Blinking	Strong 5G connection (3 – 5 bars) Weak 5G connection (1 – 2 bars)
<b>Green</b>	Solid Blinking	Strong 4G connection (3 – 5 bars) Weak 4G connection (1 – 2 bars)
<b>Yellow</b>	Solid	Software update is in progress
<b>Red</b>	Solid Blinking	CPE is booting up, acquiring signal No service, SIM error, or locked SIM card

## Resetting your Device

You can reset your FW2010 CPE to factory settings using the RESET button on the device or from the Mobile App, Admin Web UI, or Inseego Connect.

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**CAUTION!** Resetting returns your FW2010 to factory settings, including the Admin password.

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### Resetting with the RESET Button

The master reset button is in a small hole located in the SIM compartment on the bottom of the FW2010 device. This button returns the device to factory settings, including resetting the Admin password.

To reset the FW2010 from the RESET button:

1. Unscrew the protective shield over the SIM compartment using a Phillips-head screwdriver.



1. Place the RESET end of the provided SIM tool (or one end of an unfolded paper clip) into the master reset button hole.



2. Press for five to six seconds, then your FW2010 will restart.
3. Check the indicator LED (see Indicator LED on the previous page) to make sure the FW2010 is working correctly.
4. Reattach the protective shield cover to a torque of 1.2Nm (0.885 ft/lb).

## Resetting from the Inseego Mobile App

To reset the FW2010 from the Inseego Mobile App, select **Mobile Options**, then select **Factory Reset**.

## Resetting from the Admin Web UI

To reset the FW2010 from the Admin Web UI, select **Settings > Backup and Restore** and select **Restore Factory Defaults**.

## Resetting from Inseego Connect

To reset the FW2010 from Inseego Connect, on the Devices page, check the box next to the device and select **Factory Reset**.

## Technical Support

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**IMPORTANT:** Before contacting Support, be sure to restart both your computer and your FW2010 device.

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### Customer Service and Troubleshooting

Contact your service provider for assistance.

### More Information

Documentation for your FW2010 is available online. Go to [www.inseego.com/support-documentation](http://www.inseego.com/support-documentation). Or, from the Admin Web UI, select **Support**.

# 4

## Product Specifications and Regulatory Information

**Product Specifications**

**Regulatory Information**

**Product Certifications and Supplier's Declarations of Conformity**

**Wireless Communications**

**Limited Warranty and Liability**

**Safety Hazards**

# Product Specifications

## Device

Name:	5G High Performance Sub6 and & mmWave Outdoor CPE
Model:	FW2010-1, F2010e-1 ( FCC, ISED) FW2010-2, FW2010e-2 (CE)
Standards/Approvals/Certifications:	FCC, GCF, PTCRB CE/ISED/MIC/RCM-ACMA* Bluetooth SIG
Device Testing:	WEEE, RoHS, REACH
Dimensions:	200mm x 300mm x 90mm (7.9" x 11.8" x 3.5")
Weight:	4.0 kg (8.8 lbs)
Ports:	1 x 5Gbps Ethernet LAN Port
SIM:	2 x 4FF Nano SIM Slots <sup>†</sup>
Chipset:	Qualcomm® Snapdragon™ SDX55
LED:	Power and Status
Power:	Power over Ethernet (PoE)
Web UI OS Support:	Windows 10 and later MacOS 10.14 and later Linux® Ubuntu 18.04 LTS and later

## Environmental

Operating Temperature:	-30°C to 60°C (-22 to 140°F)
IP67 rating for water and dust ingress protection	
Internal heating element for startup and operation in cold environments	
<b>NOTE:</b> The PoE injector is an indoor device and considered support equipment. It can operate at a maximum temperature of 35°C (95°F).	

## Network Connectivity<sup>‡</sup>

5G NR mmW
5G NR Sub6
4G LTE CAT 22
4x4 MIMO mmW Bands / 800MHz Component Carrier Aggregation
4x4 MIMO Sub6 Bands / 400MHz Component Carrier Aggregation

\* Certification schedules dependent on customer launch requirements.

<sup>†</sup> Only SIM1 is enabled for this release.

<sup>‡</sup> Data plan required. Coverage subject to network availability.

## Security

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3rd Party Cybersecurity Penetration Testing Verified

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Security Hardened Web Interface

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Password Hash

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Session Timeout

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Incorrect Password Lockout

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Anti CSRF

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## Regulatory Information

### ***Federal Communications Commission Notice (FCC – United States)***

#### **FCC ID: PKRISGFW2010**

Electronic devices, including computers and wireless modems, generate RF energy incidental to their intended function and are therefore subject to FCC rules and regulations.

This equipment has been tested to, and found to be within the acceptable limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment.

This equipment generates radio frequency energy and is designed for use in accordance with the manufacturer's user manual. However, there is no guarantee that interference will not occur in any particular installation. If this equipment causes harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures.

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

This device complies with Part 15 of the Federal Communications Commission (FCC) Rules. Operation is subject to the following two conditions.

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.



**WARNING: DO NOT ATTEMPT TO SERVICE THE WIRELESS COMMUNICATION DEVICE YOURSELF. SUCH ACTION MAY VOID THE WARRANTY. THIS DEVICE IS FACTORY TUNED. NO CUSTOMER CALIBRATION OR TUNING IS REQUIRED. CONTACT INSEEGO CORP TECHNICAL SUPPORT FOR INFORMATION ABOUT SERVICING YOUR WIRELESS COMMUNICATION DEVICE.**

**FCC CAUTION:** Any changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

**MODIFICATIONS:** The FCC requires that you be notified that any changes or modifications made to this device that are not expressly approved by Inseego Corp. may void your authority to operate the equipment.

**NOTE:** The Radio Frequency (RF) emitter installed in your modem must not be located or operated in conjunction with any other antenna or transmitter, unless specifically authorized by INSEEGO CORP.

### ***Innovation, Science and Economic Development Notice (ISED – Canada)***

**IC: 3229A-FW2010**

#### **ISED RSS-Gen Notice**

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. L'appareil ne doit pas produire de brouillage.
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

### ***ISED Canada ICES-003 Compliance***

CAN ICES-3 (B)/NMB-3(B)

#### ***FCC RF Exposure Guidance Statement***

In order to comply with FCC RF Exposure requirements, this device must be installed to provide at least 150 cm separation from the human body at all times.

Afin de se conformer aux exigences d'exposition RF FCC / ISED, cet appareil doit être installé pour fournir au moins 150 cm de séparation du corps humain en tout temps.



Inseego Corp. declares that FW2010 is in Compliance with the Radio Equipment Directive 2014/53/EU, its essential requirements and other relevant provisions of the directive.

A full copy of the EU declaration of conformity is available at the following internet address:  
<https://www.inseego.com/support/>.

The Declaration of Conformity may be also consulted at Inseego Corp., 9710 Scranton Rd., Suite 200 San Diego, USA.

### ***RF Radiation Exposure Guidance Statement***

This device must be installed to provide at least 150 cm separation from the human body at all times.

### ***Radio Frequency and Transmitted Output Power Information***

<b>Band</b>	<b>Max Power</b>	<b>Frequency</b>
BAND 1	24 dBm	1920-1980 MHz
BAND 3	24 dBm	1710-1785 MHz
BAND 7	24 dBm	2500-2570 MHz
BAND 8	24 dBm	880-915 MHz
BAND 20	24 dBm	832-862 MHz
BAND 28	24 dBm	703-748 MHz
BAND 38	24 dBm	2570-2620 MHz
BAND 40	24 dBm	2300-2400 MHz
BAND 41	24 dBm	2496-2690 MHz
BAND 42	19.5 dBm	3400-3600 MHz
BAND 43	19.5 dBm	3600-3800 MHz
FR1 n1	24 dBm	1920-1980 MHz
FR1 n3	24 dBm	1710-1785 MHz
FR1 n7	24 dBm	2500-2570 MHz
FR1 n8	24 dBm	880-915 MHz
FR1 n20	24 dBm	832-862 MHz
FR1 n28	24 dBm	703-748 MHz
FR1 n38	24 dBm	2570-2620 MHz
FR1 n40	24 dBm	2300-2400 MHz
FR1 n41	24 dBm	2496-2690 MHz
FR1 n77	24 dBm	3300-4200 MHz
FR1 n78	24 dBm	3300-3800 MHz
n257	51.6 dBm	26.5-29.5 GHz
n258	51.9dBm	24.250-27.5 GHz
Bluetooth	4 dBm	2400-2483.5 MHz

# Product Certifications and Supplier's Declarations of Conformity

Product Certifications and Supplier's Declarations of Conformity documentation may be consulted at Inseego Corp., 9710 Scranton Road Suite 200, San Diego CA 92121, USA.

<https://www.inseego.com/support/>.

## Energy Efficiency

Efficiency performance is based on the U.S. Department of Energy Federal Energy Conservation Standards for Battery Chargers.

Energy efficiency terms - the energy efficiency values are based on the following conditions:

- **PoE power injector, no-load:** Condition in which the FW2010 PoE power injector is connected to AC power, but not connected to device.
- **PoE power injector efficiency:** Average of the FW2010 PoE power injector with the measured efficiency when tested at 100 percent, 75 percent, 50 percent, and 25 percent of the power adapter's rated output current.

Mode	Power Consumption for FW2010	
	115V	230V
PoE power injector, no load	0.49W	0.56W
PoE power injector, efficiency	90.3%	90.7%

## Wireless Communications

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**IMPORTANT:** Due to the transmission and reception properties of wireless communications, data occasionally can be lost or delayed.

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This can be due to the variation in radio signal strength that results from changes in the characteristics of the radio transmission path. Although data loss is rare, the environment where you operate the modem might adversely affect communications.

Variations in radio signal strength are referred to as fading. Fading is caused by several different factors including signal reflection, the ionosphere, and interference from other radio channels.

Inseego Corp. or its partners will not be held responsible for damages of any kind resulting from the delays or errors in data transmitted or received with the FW2010 device, or failure of the FW2010 device to transmit or receive such data.

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**SURGE WARNING:** If the FW2010 endures significant interference from the environment, disconnection may occur on the cellular network or Bluetooth. This is due to a circuit-protection design feature that reboots the device to avoid potential damage. If you experience this disruption, please ensure all wireless links are re-established.

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## Limited Warranty and Liability

THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY HAVE OTHER RIGHTS THAT VARY FROM STATE TO STATE (OR BY COUNTRY OR PROVINCE). OTHER THAN AS PERMITTED BY LAW, INSEEGO CORP DOES NOT EXCLUDE, LIMIT OR SUSPEND OTHER RIGHTS YOU MAY HAVE, INCLUDING THOSE THAT MAY ARISE FROM THE A PARTICULAR SALES CONTRACT.

INSEEGO CORP warrants for the 12-month period (or 24-month period if required by statute where you purchased the Product) immediately following your receipt of the Product that the Product will be free from defects in material and workmanship under normal use. TO THE EXTENT PERMITTED BY LAW, THESE WARRANTIES ARE EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

The exclusive remedy for a claim under this warranty shall be limited to the repair or replacement, at INSEEGO CORP'S option, of defective or non-conforming materials, parts, components or the device. The foregoing warranties do not extend to (I) non conformities, defects or errors in the Products due to accident, abuse, misuse or negligent use of the Products or use in other than a normal and customary manner, environmental conditions not conforming to INSEEGO CORP'S specification, of failure to follow prescribed installation, operating and maintenance procedures, (II) defects, errors or nonconformities in the Product due to modifications, alterations, additions or changes not made in accordance with INSEEGO CORP'S specifications or authorized by INSEEGO CORP, (III) normal wear and tear, (IV) damage caused by force of nature or act of any third person, (V) shipping damage, (VI) service or repair of Product by the purchaser without prior written consent from INSEEGO CORP, (VII) products designated by INSEEGO CORP as beta site test samples, experimental, developmental, reproduction, sample, incomplete or out of specification Products, or (VIII) returned products if the original identification marks have been removed or altered. There is no warranty that information stored in the Product will be retained following any Product repair or replacement.

EXCEPT AS PROVIDED IN THIS WARRANTY AND TO THE MAXIMUM EXTENT PERMITTED BY LAW, INSEEGO CORP IS NOT RESPONSIBLE FOR DIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY BREACH OF WARRANTY OR CONDITION, OR UNDER ANY OTHER LEGAL THEORY.

THE FOREGOING LIMITATION SHALL NOT APPLY TO DEATH OR PERSONAL INJURY CLAIMS, OR ANY STATUTORY LIABILITY FOR INTENTIONAL AND GROSS NEGLIGENT ACTS AND/OR OMISSIONS. SOME STATES (COUNTRIES AND PROVINCES) DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

# Safety Hazards

Do not operate the FW2010 in an environment that might be susceptible to radio interference resulting in danger, specifically:

## **Areas where prohibited by the law**

Follow any special rules and regulations and obey all signs and notices. Always turn off the host device when instructed to do so, or when you suspect that it might cause interference or danger.

## **Where explosive atmospheres might be present**

Do not operate your device in any area where a potentially explosive atmosphere might exist. Sparks in such areas could cause an explosion or fire resulting in bodily injury or even death. Be aware and comply with all signs and instructions.

Users are advised not to operate the device while at a refueling point or service station. Users are reminded to observe restrictions on the use of radio equipment in fuel depots (fuel storage and distribution areas), chemical plants or where blasting operations are in progress.

Areas with a potentially explosive atmosphere are often but not always clearly marked. Potential locations can include gas stations, below deck on boats, chemical transfer or storage facilities, vehicles using liquefied petroleum gas (such as propane or butane), areas where the air contains chemicals or particles, such as grain, dust or metal powders, and any other area where you would normally be advised to turn off your vehicle engine.

## **Near medical and life support equipment**

Do not operate your device in any area where medical equipment, life support equipment, or near any equipment that might be susceptible to any form of radio interference. In such areas, the host communications device must be turned off. The device can transmit signals that could interfere with this equipment.

## **On an aircraft, either on the ground or airborne**

In addition to FAA requirements, many airline regulations state that you must suspend wireless operations before boarding an airplane. Please ensure that the modem is turned off prior to boarding aircraft in order to comply with these regulations. The modem can transmit signals that could interfere with various onboard systems and controls.

## **While operating a vehicle**

The driver or operator of any vehicle should not operate a wireless data device while in control of a vehicle. Doing so will detract from the driver or operator's control and operation of that vehicle. In some countries, operating such communications devices while in control of a vehicle is an offense.

## **Electrostatic Discharge (ESD)**

Electrical and electronic devices are sensitive to electrostatic discharge (ESD). Macintosh native connection software might attempt to reinitialize the device should a substantial electrostatic discharge reset the device. If the software is not operational after an ESD occurrence, then restart your computer.

# 5

## Glossary

## Glossary

- **4G LTE**—Fourth Generation Long Term Evolution. LTE is a standard for wireless data communications technology and an evolution of the GSM/UMTS standards. The goal of LTE is to increase the capacity and speed of wireless data networks using new DSP (digital signal processing) techniques and modulations that were developed around the turn of the millennium. A further goal is the redesign and simplification of the network architecture to an IP-based system with significantly reduced transfer latency compared to the 3G architecture. The LTE wireless interface is incompatible with 2G and 3G networks, so that it must be operated on a separate wireless spectrum
- **5G**—Fifth Generation. The successor to 4GLTE technology, offering greater bandwidth and higher download speeds. In addition to serving cellular networks, 5G networks can be used as internet service providers, competing with other ISPs. 5G also opens up new IoT and M2M possibilities. Wireless devices must be 5G enabled to use 5G networks.
- **802.11 (a, b, g, n, ax)** — A set of WLAN Wi-Fi communication standards in the 2.4 and 5 GHz frequency bands.
- **APN** — Access Point Name. The name of a gateway between a mobile network and another computer network, often the Internet.
- **bps** — Bits per second. The rate of data flow.
- **Broadband** — High-capacity high-speed transmission channel with a wider bandwidth than conventional modem lines. Broadband channels can carry video, voice, and data simultaneously.
- **CHAP** — Challenge Handshake Authentication Protocol. Protocol used in conjunction with Point to Point Protocol (PPP) to provide security and authentication to users of remote resources. CHAP does not use username/password, but uses a challenge method for authentication. Initiator sends a logon request to the server. The server sends back a challenge to the client. The challenge is encrypted and sent back to the server. The server compares the value from the client, and if it matches, allows the session. If the compare fails, the session is denied and the request restarts.
- **DHCP** — Dynamic Host Configuration Protocol. Software found in servers and routers that automatically assigns IP addresses and other configuration data to computers, tablets, printers, and other devices connection to the IP network.
- **DHCP Server** — A server or service with a server that assigns IP addresses.
- **DMZ** — demilitarized zone. A sub-network that contains and exposes an organization's external-facing services to an untrusted network, usually a larger network such as the Internet.
- **DNS** — Domain Name System. A system for converting host names and domain names into IP addresses on the Internet or on local networks that use the TCP/IP protocol.

- **ECGI** —E-UTRAN Cell Global Identifier. A 15-digit code used to identify cells globally. It is constructed from the Mobile Country Code (MCC), Mobile Network Code (MNC), and the E-UTRAN Cell Identifier (ECI).
- **Firmware** — A computer program embedded in an electronic device. Firmware usually contains operating code for the device.
- **FTP** — File Transfer Protocol. A standard network protocol used to transfer computer files between a client and server.
- **GB** — Gigabyte. A multiple of the unit byte for digital information storage. Usage depends on context. When referring to disk capacities it usually means  $10^9$  bytes. It also applies to data transmission quantities over telecommunication circuits.
- **Gbps** — Gigabits per second. The rate of data flow.
- **Hotspot** — A Wi-Fi (802.11) access point or the area covered by an access point. Used for connecting to the Internet.
- **HTTP** —Hypertext Transfer Protocol. An application-level protocol for accessing the World Wide Web over the Internet.
- **IEEE** — Institute of Electrical and Electronics Engineers. An international technical/professional society that promotes standardization in technical disciplines.
- **IMAP** — Internet Message Access Protocol. An Internet standard protocol for accessing email from a remote server from email clients. IMAP allows access from multiple client devices.
- **IMEI** — International Mobile Equipment Identity. Used in LTE networks to identify the device. It is usually printed on the device and can often be retrieved using a USSD code.
- **IMSI** —International Mobile Subscriber Identity. A unique number, usually fifteen digits, that identifies a Global System for Mobile Communications (GSM) subscriber.
- **IoT** —Internet of things. An expansion of the internet and network connections to sensors and devices (things) allowing simple objects, such as light fixtures and locks, a higher degree of computing and analytical capabilities. IoT enables connected devices (things) to gather and share data from their environment with other devices and networks with the need for little or no human interaction.
- **IP** — Internet Protocol. The mechanism by which packets are routed between computers on a network.
- **IP type** — The type of service provided over a network.
- **IP address** —Internet Protocol address. The address of a device attached to an IP network (TCP/IP network).
- **ISP** — Internet Service Provider. Also referred to as the service carrier, an ISP provides Internet connection service (See Network Operator).



- **Kbps** — Kilobits per second. The rate of data flow.
- **LAN** — Local Area Network. A type of network that lets a group of computers, all in close proximity (such as inside an office building), communicate with one another. It does not use common carrier circuits though it can have gateways or bridges to other public or private networks.
- **M2M** — Machine to machine. Direct communication between devices. This may include wired or wireless communication.
- **MAC Address** — Media Access Control. A number that uniquely identifies each network hardware device. MAC addresses are 12-digit hexadecimal numbers. This is also known as the physical or hardware address.
- **Mbps** — Megabits per second. The rate of data flow.
- **MNO** — Mobile Network Operator. The vendor that provides your wireless access. Known by different names in different regions, some examples are: wireless provider, network provider, or cellular carrier.
- **MSID** — Mobile Station IDentifier. A number for a mobile phone that identifies that phone to the network.
- **Network Operator** — The vendor that provides your wireless access. Known by different names in different regions, some examples are: wireless provider, network provider, or cellular carrier.
- **Network Technology** — The technology on which a particular network provider's system is built; such as LTE or GSM.
- **NMEA port** — National Marine Electronics Association port. The port through which applications can access a GPS data stream.
- **NNTP** — Network News Transfer Protocol. The primary protocol used to connect to Usenet servers and transfer news articles between systems over the Internet.
- **PAP** — Password Authentication Protocol. A protocol used by Point to Point Protocol (PPP) to validate users. PAP does not encrypt data and sends the password and username to the authentication server as plain text. Most network operating system remote servers support PAP.
- **PCI** — Physical Cell ID. Each PCI corresponds to one 5G NR cell or LTE cell and consists of two parts: PSS Primary Synchronization Signal (PSS) and Secondary Synchronization Signal (SSS).
- **POP3** — Post Office Protocol 3. A protocol in which email is received and held for you by your Internet server until you download it.
- **Port** — A virtual data connection used by programs to exchange data. It is the endpoint in a logical connection. The port is specified by the port number.
- **Port Forwarding** — A process that allows remote devices to connect to a specific computer within a private LAN.

- **Port Number** — A 16-bit number used by the TCP and UDP protocols to direct traffic on a TCP/IP host. Certain port numbers are standard for common applications.
- **PRL** — Preferred Roaming List. A list that your wireless phone or device uses to determine which networks to connect with when you are roaming (Network operator specific).
- **Protocol** — A standard that enables connection, communication, and data transfer between computing endpoints.
- **Proxy** — A firewall mechanism that replaces the IP address of a host on the internal (protected) network with its own IP address for all traffic passing through it.
- **Router** — A device that directs traffic from one network to another.
- **RSRP** – Reference Signal Receive Power. An LTE-specific measure of signal strength, similar to RSSI, but RSRP measures lower than RSSI due to the method of calculation.
- **RSRQ** – Reference Signal Received Quality. A calculated value from RSRP and RSSI that provides a measure of signal and interference.
- **RSSI** — Received Signal Strength Indicator. An estimated measure of how well a device can hear a signal from an access point or router. RSSI value is pulled from the device's Wi-Fi card (hence "received" signal strength), so it is not the same as transmit power from an access point or router.
- **SIM** — Subscriber Identification Module. Found in LTE and GSM network technology, the SIM is a card containing identification information for the subscriber and their account. The SIM card can be moved to different devices.
- **SINR** — Signal to Interference plus Noise Ratio. An LTE-specific measure of signal quality, taking interference and noise into account. SINR is a positive value, and higher numbers are better.
- **SMTP** — Simple Mail Transfer Protocol. The standard protocol for sending emails across the Internet.
- **SNMP** — Simple Network Management Protocol. An Internet protocol used to manage and monitor network devices and their functions.
- **SSID** — Service Set Identifier. The name assigned to a Wi-Fi network.
- **TCP/IP** — Transmission Control Protocol/Internet Protocol. The set of communications protocols used for the Internet and other similar networks.
- **TFTP** — Trivial File Transfer Protocol. An Internet software utility for transferring files that is simpler to use than FTP, but does not provide user authentication and directory visibility supported by FTP.
- **Telnet** — A user command and underlying TCP/IP protocol that allows a user on one computer to log into another computer that is part of the same network.

- **TTY** — Text Telephones (TTY), also known as Telecommunications Device for the Deaf (TDD), are used by the deaf, hard-of-hearing, and individuals with speech impairments to communicate.
- **UDP** — User Datagram Protocol (UDP) is a communications protocol that offers a limited amount of service when messages are exchanged between computers in a network that uses the Internet Protocol (IP). UDP is an alternative to the Transmission Control Protocol (TCP) and, together with IP, is sometimes referred to as UDP/IP.
- **USB** — Universal Serial Bus. A connection type for computing device peripherals such as a printer, mobile modem, etc.
- **USB Port Types** — USB ports on computers and hubs have a rectangular Type A port, and peripheral devices have a cable with a Type A connector. Peripheral devices that do not have an attached cable typically have a Type C port on the device and a separate Type A to C cable. Type B connectors have been replaced by Type C. Mini-USB connectors have largely been superseded by Micro-USB, but are still used with some cameras, music players, etc. Micro-USB connectors are used with portable devices, such as phones and battery packs, although USB-C is being adopted by most manufacturers.
- **USSD** — Unstructured Supplementary Service Data (USSD), also known as “Quick code” or “Feature code”, is a communications protocol used to send data between a mobile device and network service provider.
- **VPN** — Virtual Private Network. A secure private network that runs over the public Internet. Commonly used to connect to an office network from elsewhere.
- **Wi-Fi** — Any system that uses the 802.11 standard developed and released in 1997 by the IEEE.
- **Wi-Fi 5** — The fifth generation of Wireless Fidelity, using 802.11ac on 5 GHz. This standard was developed and released in 2013.
- **Wi-Fi 6** — The sixth generation of Wireless Fidelity, using 802.11ax on licensed exempt bands between 1 and 6 GHz. This standard was developed in 2020.
- **Wi-Fi Client** — A wireless device that connects to the Internet via Wi-Fi
- **WPA/WPA2** — Wi-Fi Protected Access. A security protocol for wireless 802.11 networks from the Wi-Fi Alliance.
- **WPA3** — The next generation of Wi-Fi Protected Access. WPA3 simplifies security, provides more robust authentication, increased cryptographic strength, and offers additional capabilities for personal and enterprise networks. WPA3 retains interoperability with WPA2 devices.