JUNIPER® SYSTEMS

geode™

GNS3 Receiver

USER MANUAL

Geode GNS3 Receiver User Manual

Part Number: 30725-06

Trademarks

Disclaimer

Cautions

⚠ CAUTION: This symbol indicates that failure to follow directions could result in serious injury, damage to equipment, or loss of information.

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Contents

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GNS3 Receiver

CHAPTER 1

1 Introduction

The Juniper Systems Geode GNS3 GNSS Receiver is a precision GNSS receiver. With the Geode, you can collect real-time, centimeter, decimeter, sub-foot, or sub-meter, GNSS data. It works with a wide range of iPhone®, iPad®, Android®, and Windows® devices to fit your needs. Take the Geode with you mounted on a pole, in a pack, or held in your hand to collect real-time GNSS data in harsh environments—including heavy tree canopy and mountainous areas—using almost any handheld device.

Like other Juniper Systems products, the Geode is built ultra-rugged. Rated IP68, it is dustproof as well as waterproof to a depth of 1.4 meters (4.5 ft) for 30 minutes or longer. It can survive multiple drops from 1.2 meters (4 ft) to concrete. It is designed to withstand harsh environments and provide a consistently reli-

able performance. While stand-alone single-frequency GPS receivers are accurate to only two to five meters or more, the Geode uses NTRIP/RTK, SBAS, Atlas®, or GALHAS corrections and combines complex smoothing algorithms and full-wave carrier phase tracking to deliver precision GNSS accuracy depending on the configuration.

Note: GNSS accuracy is subject to observation conditions, multipath environment, number of satellites in view, satellite geometry, and ionospheric activity.

The Geode GNS3 is available in two hardware configurations with multiple activations and subscriptions to meet a variety of needs.

1.1 Geode, Geode GNS2, and Geode GNS3

Features that are specific to the Geode GNS3 are identified throughout this manual. For information about the Geode and Geode GNS2, see the Geode Owner's Manual.

Juniper Systems offers two GNS3 models: GNS3M and GNS3S.

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GNS3 Receiver

CHAPTER 2

2 Geode Features

The Geode is a real-time, precision GNSS receiver. This means the Geode, depending on the corrections used, has sub-meter to centimeter accuracy. This is the cutting edge of geospatial technology. Historically, this level of precision and accuracy was only available via post-processing software or expensive survey-grade equipment.

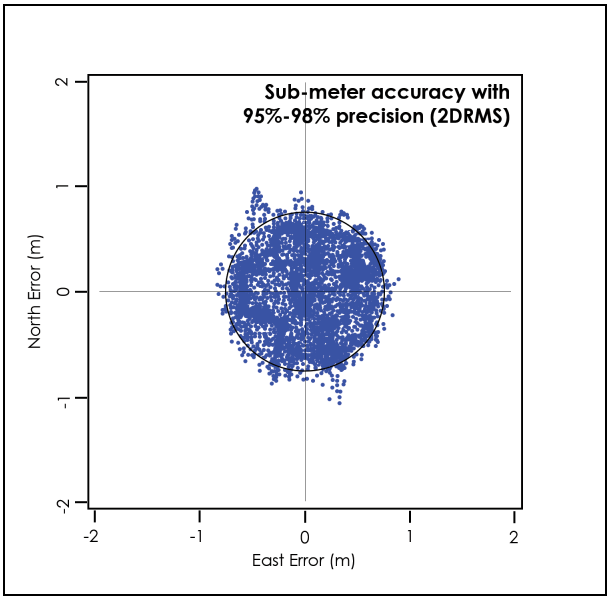
2.1 Accuracy and Precision

It is important to note that in the context of GPS accuracy and precision are related but not the same thing.

Accuracy refers to the radius of the circle of unknown around a true point. The smaller the radius, the higher the accuracy. The exact range of the Geode's accuracy depends on the corrections used. This means the Geode can plot a position to within a sub-meter (or better) radius of the true point.

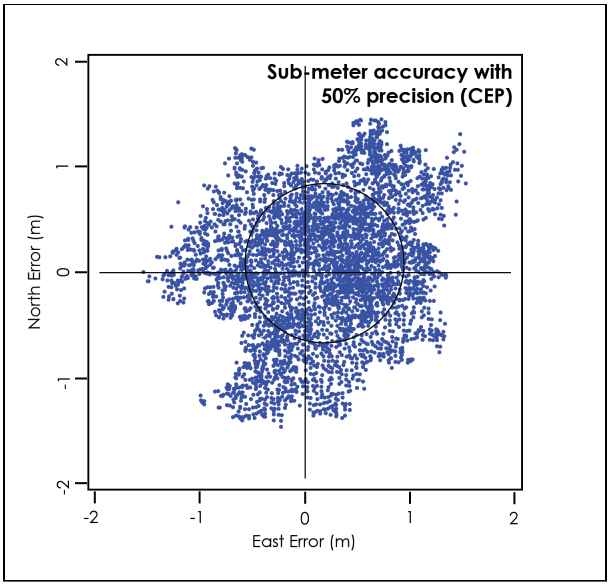
Precision refers to repeatability or how frequently a receiver can plot a point inside the circle of accuracy and whether that circle is centered over the true point.

Over time, any stationary GPS receiver will plot multiple positions for a given point. This happens because of errors caused by variables in the satellites, the surrounding physical environment, and the ionosphere. Modern geospatial technology has made huge progress in correcting for those errors, but a receiver's real-time accuracy is dependent on its ability to process those corrections. The points plotted by the stationary receiver eventually form a scatter plot. Precision is the percentage of points on the scatter plot that fall within the circle of accuracy.



For the Geode in ideal conditions, 95–98% of the points on a scatter plot will fall within a sub-meter radius of the true point.

GPS manufacturers report their accuracy in different ways. They use different statistical descriptions of probability. A GPS receiver may be sub-meter. That is, it may be able to plot points within a meter radius of the true point. However, those points may only fall within that meter radius, 50–60% of the time. The accuracy for those receivers is sub-meter, but the precision is only 50–60%.



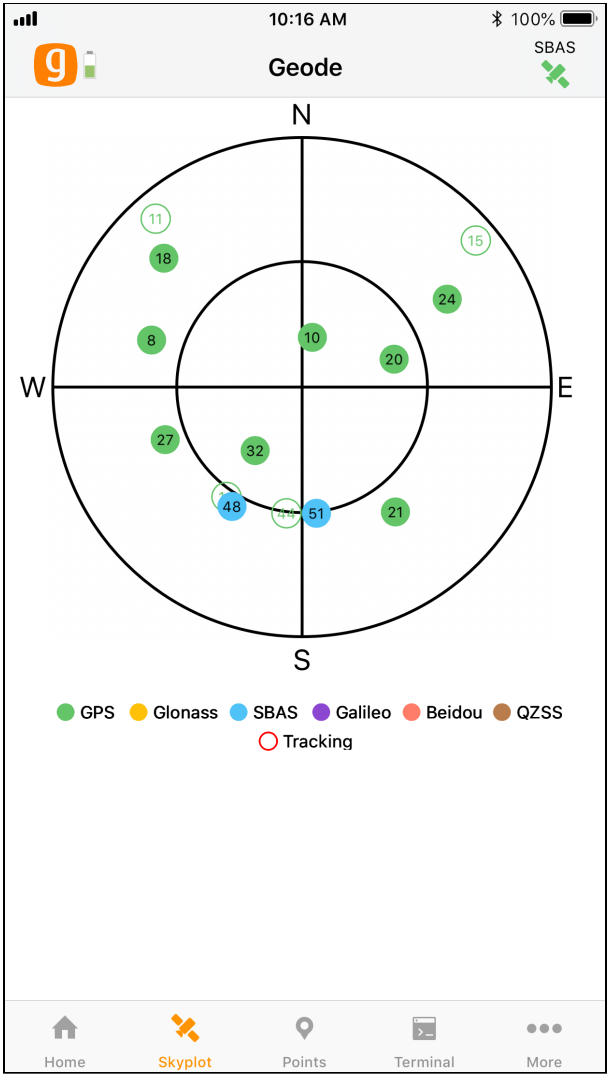
These claims largely depend on the statistical method used to calculate accuracy. One manufacturer might use circular error probable (CEP), a calculation that qualifies the data as sub-meter only 50% of the time. Another could use root mean square (RMS), denoting the data is only truly sub-meter around 65% of the time. The third manufacturer could use twice the distance root mean square (2DRMS), a measure that indicates the data as sub-meter accurate around 95–98% of the time.

2.2 GPS vs. GNSS

A GPS receiver's reliability refers to the consistency with which it is able to secure enough satellite signals to produce accurate, precise positioning. This becomes a challenge when the receiver's immediate surroundings interfere with its line-of-sight to the satellites. For example, tall trees and buildings are common challenges to GPS receivers' reliability.

The Global Positioning System (GPS) is the United States government's navigation satellite constellation. As of June 2021, the GPS constellation consists of 31 operational satellites. You can view six or more GPS satellites from virtually any point on

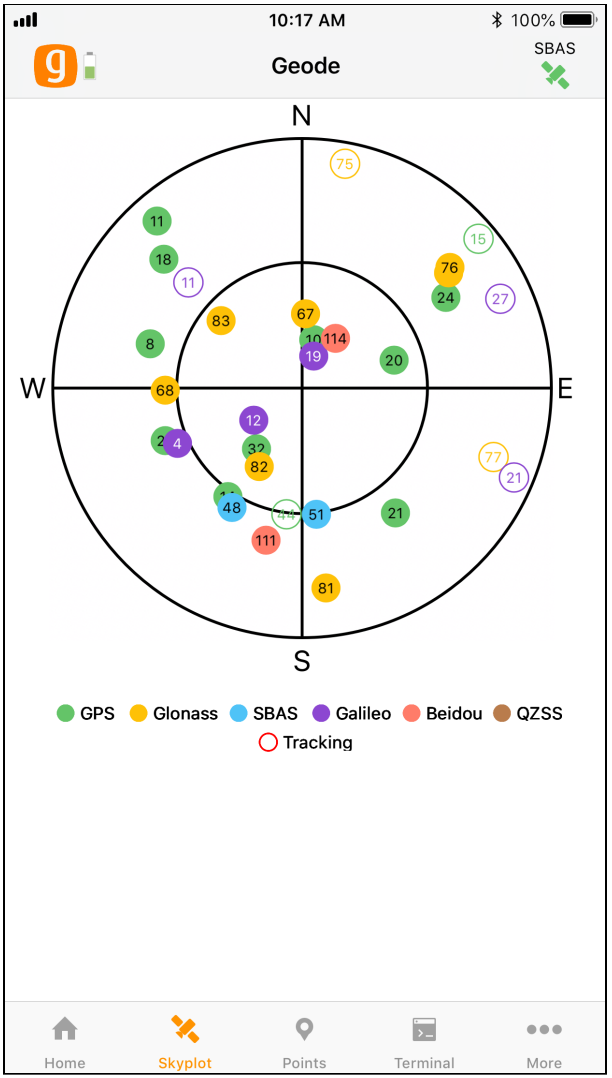
the planet. The US government has stated that it is committed to maintaining the availability of at least 27 GPS satellites 95% of the time.



The standard configuration for the Geode is that of a GPS receiver. This means that it receives positioning data from the US government's GPS constellation of satellites. To calculate an ac-

curate position, the Geode (or any GPS receiver) needs a direct line of sight with at least four satellites. Without that fourth satellite, the receiver has to estimate altitude which can affect horizontal accuracy by hundreds of meters. This is not likely to be a problem if you are collecting data in an open, flat landscape. However, if you are collecting data in the mountains, under heavy canopy, or in a city scape, physical obstructions may make it difficult to view four satellites in the GPS constellation simultaneously.

This is why the Geode also comes with GNSS. GNSS stands for Global Navigation Satellite System, and it encompasses all global satellite constellations from various countries and unions. Specifically, the Geode can receive positioning data from the following satellite constellations: GPS (US), GLONASS (Russia), GALILEO (European Union), BeiDou (China).



With the multi-GNSS configuration, the number of satellites available at any given moment is multiplied. This greatly increases the likelihood that your Geode will be able to get a fix on multiple satellites simultaneously, even under thick canopy or in the middle of a densely populated city block. With more satellites

available to the Geode, total data sets in challenging environments are consistently higher quality.

The multi-GNSS configuration of the GNS3 makes the Geode's ability to deliver precision GNSS more reliable under what used to be considered "less-than-ideal" circumstances.

Note: GNSS accuracy is subject to observation conditions, multipath environment, number of satellites in view, satellite geometry, and ionospheric activity.

2.3 GNSS Correction Services

GNSS data (including GPS) will unavoidably have errors in it. Sources of GNSS error include:

- Deviations in GNSS satellite orbits
- Inaccurate clocks on the GNSS satellites
- Ionospheric activity that changes daily and hourly
- Interference of satellite signals that creates noise in the multipath environment

When a manufacturer touts a receiver's accuracy, it is usually referencing the receiver's accuracy under ideal conditions. These ideal conditions minimize sources of error. They include flat, open landscapes with clear skies and no buildings or trees interfering with the receiver's direct line-of-sight to at least four, perfectly positioned satellites. But even these ideal conditions require corrections because the ionosphere is constantly changing and users have no control over satellite orbits or timing.

The Geode is built to be a rugged, go-anywhere GNSS receiver. It is built to perform in all environments, no matter how challenging. This extends even to its receiver capabilities. As with all receivers, it will be more accurate under ideal conditions, but it also has the ability to access and integrate data from various correction and satellite augmentation services, so it provides real-time high accuracy positions in rugged, less-than-ideal environments.

2.3.1 SBAS Differential Correction

The Geode receives Satellite Based Augmentation System (SBAS) data. SBAS includes regional networks of ground and satellite technologies that work together to boost the accuracy and dependability of GNSS/GPS data. SBAS uses stationary land-based GNSS/GPS monitors to calculate GNSS position errors caused by ionospheric disturbances. This error causes delays in timing, which result in position errors.

To calculate GNSS position errors, GNSS data from satellites are compared against the precisely documented locations of each land-based station. Any discrepancy is determined to be an error. These errors are sent to the master control station, which create a real-time regional model for correcting ionospheric errors. This correction model, also known as an ionospheric map, is sent to geostationary satellites and broadcast throughout the region. These SBAS corrections—called deviation corrections—allow GNSS/GPS receivers to more accurately and reliably determine their position.

GNSS is normally accurate to about five meters, but when using SBAS, a user can achieve an accuracy of two meters or better. The Geode combines SBAS corrections with complex smoothing algorithms and full-wave carrier phase tracking to deliver an accuracy better than 60 cm 2DRMS. In other words, 95–98% of the positions recorded by the Geode will be within 60 cm of the true point.

2.3.2 NTRIP and RTK

NTRIP stands for Network Transport of RTCM via Internet Protocol. It delivers the corrections used for Real-Time Kinematic (RTK) Positioning. Where available, RTK and CORS networks stream data corrections over the internet, allowing the Geode to calculate an RTK Fix/Float position solution with differential GNSS accuracy.

NTRIP makes it possible to create networks of localized base stations that increase both availability and precision of RTK corrections. Since distance from a base station strongly affects positioning precision and accuracy, NTRIP-enabled RTK networks are able to calculate the user's closest base station or use algorithms and modeling to create a virtual base station very close to the user's receiver. The Geode accesses NTRIP-enabled RTK services via the cellular data or internet capabilities of the device it is connected to. These services require a subscription and a stable internet connection. The Geode uses the data provided by the NTRIP-enabled RTK network to achieve a precise RTK Fix/Float solution.

2.3.3 Atlas Correction Service

The Atlas Correction Service is a worldwide L-band satellite based correction that covers almost all of the land 75° north and south of the equator.

The Geode GNS3M includes an option to subscribe monthly or annually to Atlas to receive extra corrections. The three options provided are Atlas Basic, H30, and H10.

- **Atlas Basic**—As good as 50 cm accuracy (similar to SBAS) with 95% precision
- **H30**—As good as 30 cm accuracy with 95% precision
- **H10**—As good as 10 cm accuracy with 95% precision

This correction service varies depending on tree cover and does not work under a heavy tree canopy.

When using Atlas corrections, the satellites can take time to converge depending on the subscription you have.

- **Atlas Basic**—Typically 5 minutes or less
- **H30**—Typically 15–30 minutes or less
- **H10**—Typically 30 minutes or less

To check the level of subscription of your unit, go to **Receiver Configurations** > **Manage Subscriptions**.

When Atlas is enabled, the satellite icon color in the top right corner of Geode connect will indicate the signal quality.

- **Blue**—Bit Error Rate (BER) between 0 and 20; Excellent signal
- **Green**—BER between 21 and 150; Good signal
- **Orange**—BER between 151 and 250; Marginal signal
- **Red**—BER above 250 to 500; Poor/Unusable signal

These colors can also be seen when using SBAS if the RD1 NMEA sentence is enabled.

2.3.4 Galileo High Accuracy Service (GALHAS)

The Galileo High Accuracy Service (GALHAS) is available on GNS3H models when multi-frequency is enabled. GALHAS is a type of precise point positioning (PPP) correction service that applies orbit, clock, and signal biases to both code and phase portions of the GNSS signals to achieve high-accuracy solutions. In 2025 GALHAS currently provides precise corrections for orbit and clock related errors broadcast through the Galileo Open Service and GPS. The corrections are transmitted in the Galileo E6 signal. In the future the corrections will also include phase biases.

The GALHAS implementation is occurring in phases 0–2. Phase 0 was completed in 2022. Phase 1 was completed on 24 January 2023 with some limitations (such as phase bias corrections) due to the current infrastructure. Phase 2 is underway and includes improved infrastructure, design, and additional data. When completely implemented, GALHAS will have two different service levels. (The current (2025) implementation is a relaxed version of Service Level 1, i.e. without the phase bias corrections.)

GALHAS Characteristics		
	Service Level 1 (SL1)	**Service Level 2 (SL2)**
Service Area/Coverage	Global coverage	Regional coverage for the European Coverage Area (ECA)
Types of Corrections	Orbit, clock, biases (code and phase)	Orbit, clock, biases (code and phase) Atmospheric corrections
Delivery Channels	HAS Signal-In-Space (SIS) HAS Internet Data Distribution Interface (IDD)	
Accuracy target (95%)	20 cm horizontal 40 cm vertical	
Availability target	99%	
Convergence time target	300 seconds	100 seconds
Format	Open format similar to Compact-CSSR	
Dissemination	Galileo E6B using 448 bits per satellite per second/terrestrial (internet)	
Constellations	Galileo and GPS	
Corrected Frequencies	Galileo E1/E5a/E5b/E6/E5 AltBOC GPS L1/L5/L2C	

2.4 Update Interval Rate

The standard Geode configuration comes with an update interval rate of 1 Hz. This means the Geode updates its position and outputs that data to the connected device once per second.

An optional upgrade for update intervals up to 10 Hz or 20 Hz (10 or 20 updates per second) is available. These upgrades also allow for update adjustments of 2 Hz, 5 Hz, and 10 Hz. Higher update rates are important for projects in which you are collecting data at faster speeds.

Note: At higher data rates, we recommend turning off messages not required for your application, such as GNS, RRE, and VTG messages.

For more information about how to upgrade the update interval rate, see:

- iPad and iPhone: 5.5.4 Upgrade Geode
- Android: 7.5.4 Upgrade Geode
- Windows: 9.5.4 Upgrade Geode

2.5 Operating Systems

The Geode GNSS Receiver is able to communicate with a wide range of computing devices such as laptops, tablets, and smart phones. These devices may also run a variety of operating systems, including iPhone, iPad, Android, and Windows 10/11.

2.6 Geode Connect

Geode Connect is a simple utility app designed to make the Geode easy to use. Geode Connect provides you with the ability to easily establish a Bluetooth wireless, USB, or serial connection with their handheld device, report position information of the Geode, and customize the most commonly used configuration settings. Although Geode Connect has limited data-capture features, it is not intended to replace your mapping, navigational, or data-collection app. Juniper Systems offers a full mapping software application called Uinta that can be used with the Geode. Juniper Systems also partners with several software developers who offer mapping applications that can be used with the Geode.

Geode Connect is free for download from the Juniper Systems website and various app stores. For more information about

downloading and using Geode Connect with your specific operating system, refer to:

- Set Up Geode Connect for iPad and iPhone
- Set Up Geode Connect for Android
- Set Up Geode Connect for Windows PC

2.7 Third-Party Applications

The Geode streams NMEA 0183, RTCM, and Crescent Raw Binary data protocols, which makes it compatible with most mapping, navigational, and data-collection software. It will usually work seamlessly with the app that you are already using. It will simply improve the precision, accuracy, and reliability of your data. For a list of professional GPS and GNSS data-collection apps, visit the Juniper Systems blog at blog.junipersys.com and search for *data-collection software*.

Note: When using the Geode with Android devices, some mapping and data-collection apps do not readily indicate which receiver they are connected to, the highly accurate and reliable Geode GNSS Receiver or the device's own internal, consumer-grade GPS receiver. For information about identifying and solving this problem, see Connect Device.

2.8 Juniper Rugged™

Like other Juniper Systems products, the Geode is built ultra-rugged—waterproof, dustproof, and drop proof. It is designed to withstand harsh environments. It features IP68-rated protection, meets or exceeds MIL-STD 810G (drop, vibration, temperature, ingress protection), and operates in extreme temperatures, providing reliable performance wherever you need to collect data.

2.9 Bluetooth® Wireless Technology

The Geode is equipped with a Class 1 Long Range Bluetooth wireless transmitter. It has a range of approximately 100 meters or 328 feet. However, the device you are pairing with the Geode may or may not have the same range. It may be a good idea to test this range before relying on it heavily. For instructions on

pairing your Geode with your handheld device or laptop, see Getting Started.

2.10 Antennas

Juniper Systems offers two GNS3 models, the GNS3M and the GNS3S.

- **GNS3M**—Includes a multi-frequency antenna (L1, L2, L5) and an option to subscribe to receive Atlas corrections.
- **GNS3S**—Includes a single frequency antenna (L1). This configuration cannot be updated to a GNS3M multi-frequency.

For applications involving dense canopy or other skyline interference, the Geode includes an external antenna port allowing you to place an external antenna in an area with better sky visibility. Consult Juniper Systems Technical Support before using the Geode with an external antenna.

2.11 LED Status Indicators

There are four LED Status Indicators on the face of the Geode.

Amber LED: Blinks when a 3D GPS fix is made (four or more satellites) and turns solid when a DGPS fix is made (a correction source is being applied to the solution).

Blue LED: Solid when the Geode unit is connected via Bluetooth wireless technology in Geode Connect.

Red LED: 1) Blinks slowly when battery is charging. 2) Solid when battery is fully charged. 3) Blinks rapidly when battery cannot accept a charge (for example, from a laptop computer that doesn't have enough power to charge the Geode or other faulty power supply).

Green LED: 1) Solid when the power is turned on. 2) Blinks when the battery needs to be charged.

2.12 Power Supply and Battery

The Geode uses a 15 W, 100–240 V AC universal USB power supply with wall charger for charging the internal battery. Power adapters for the US, UK, EU, and AU/NZ are available from Juniper Systems.

The following USB cables work for charging the battery:

- **USB-C to USB-C**—Recommended for use as a primary charging cable. Use this when the device is powered on and charging at the same time. This cable can also be used for data transfer.
- **USB-A to USB-C**—Legacy cable used for charging when the receiver is powered off.

The Geode has an internal, non-removable battery that can provide 10+ hours (up to 16 hours for the GNS3S) of use. The battery may require as much as six hours to charge before the first use. Subsequent charges should take four hours or less, depending on the remaining power.

When not in daily use, charge the Geode periodically to 50% power. Do not allow the battery to become completely depleted as it may not recover.

If you do not plan to use the Geode for more than a month, charge/discharge the battery to about 50% (the optimal charge level for storage).

To charge the Geode in the field, use the included USB cable and a vehicle USB adapter to plug the Geode into a vehicle's 12 V power port. For best results, use an adapter that is rated at least 10 W/2.1 A.

Charging the Geode by connecting it to a battery-powered PC or handheld device is not recommended. Most of these devices do not have enough power to charge the Geode. If the Geode detects it is connected to a battery with insufficient power, it will not charge. The red light will flash rapidly indicating that the Geode is not charging. If you connect the Geode to a device via USB for data transfer, the red light may still flash rapidly to let you know that the battery isn't charging. This does not affect the data transfer.

⚠CAUTION: The Geode needs to be charged periodically. If the battery drains completely, it may not recover, and your Geode will need to be sent to Juniper Systems for a battery replacement.

2.13 Connector Ports

The Geode comes standard with a USB-C port for charging the receiver and for connecting it to a PC or handheld device. It also comes with an external antenna port. This port will supply the external antenna with 3.3 V at up to 45 mA of power. Consult Juniper Systems Technical Support before using the Geode with an external antenna.

The Geode includes a Serial RS-232C 9-pin port. This allows the Geode to be mounted to a piece of equipment while maintaining a constant connection for data and power. Use a straight-through 9-pin cable to communicate with your Geode. For a list of functions for each pin, refer to Appendix A: Serial Port Configuration.

2.14 Carrying Options

The Geode can be carried in a number of different ways. It can easily be carried in-hand, in a pack, or mounted on a pole, depending on what your individual needs are.

For a complete list of carrying options, visit the Geode page on the Juniper Systems website or go to the blog at blog.junipersys.com and search for *Geode*.

2.14.1 Camera Tripod Mount

The Geode can be attached to a camera tripod using the 1/4 in.–20 mounting hole in the case. The screw must be less than 7 mm (0.3 in.) long to avoid damaging the case. Also included with the Geode is a 5/8 in.–11 adapter that fits into a camera tripod hole. This will allow the Geode to be mounted to a standard 2 m survey pole.

2.14.2 Mounting Plate

The Geode can be mounted diagonally on a standard AMPS-style mounting plate. Many other attachments support the AMPS diagonal style mounting interface. Use attachment screws size M4 (less than 4.5 mm (0.17 in.)).

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GNS3 Receiver

CHAPTER 3

3 Getting Started

The Geode GNSS Receiver is ready to use right out of the box. Simply charge the battery and pair the Geode with a Bluetooth® wireless technology-enabled handheld device. The Geode may be used with most mapping apps that use industry standard NMEA 0183 protocol.

Anatomy of the Geode

1 LED Status Indicators

2 Power Switch

3 MCX Antenna Connector

4 USB-C

5 M4 Amps Port (1 of 2)

6 RS-232C Serial Port

7 GNS3 Label

8 1/4"–20 Attachment Port

3.1 Perform Initial Tasks

When you receive your Geode, perform the tasks outlined in this section before first use.

3.1.1 Review Documentation

This user manual and other documents are available on the Juniper Systems website at http://www.junipersys.com/products/geode. View, download, and print documents as desired.

3.1.2 Charge the Battery

The Geode has an internal, non-removable battery that can provide more than 10 hours of use. When your Geode arrives, the battery will carry a charge. However, a complete charge is recommended before relying on the Geode for a full day of work.

To charge the battery,

1. Insert the USB-C charging cable into the USB-C port on the Geode.
2. Connect the cable to the wall charger.

   For wall charger specifications, see Power Supply and Battery.
3. If necessary, attach the appropriate plug adapter for your country onto the AC wall charger.
4. Plug the charger into a wall socket.
5. Charge the battery pack at room temperature (68°F or 20°C) for 4–6 hours (for the first charge). While the battery pack is charging, the red LED blinks. When it is fully charged and external power is applied, the red LED is solid. The LED will turn off when the external power is removed.

3.2 Turn on the Geode

To turn on the Geode, press and release the power key . The green LED activity indicator turns on.

3.2.1 Reset the Geode

You can perform a soft or receiver reset for the Geode using the power key by following the instructions below.

Soft Reset

A soft reset will set the Geode back to the default settings.

To perform a soft reset,

1. Press and hold the power key for 5 seconds.
2. When the LED activity indicator flashes slowly, release the power key.

The Geode will perform a soft reset and turn off when the reset is complete.

Receiver Reset

A receiver reset will set the Geode back to the factory settings.

To perform a receiver reset,

1. Press and hold the power key for 15 seconds.
2. When the LED activity indicator flashes quickly, release the power key.

The Geode will perform a receiver reset and then turn off when the reset is complete.

3.3 Connect the Geode to a Mobile Device

The best way to connect your mobile device to the Geode receiver is via Juniper Systems' Geode Connect app for Apple iOS, Android, or Windows.

For more information about downloading and using Geode Connect with your specific operating system, refer to:

- Set Up Geode Connect for iPad and iPhone
- Set Up Geode Connect for Android
- Set Up Geode Connect for Windows PC

Geode Connect is intended to serve as a connection and configuration utility for the Geode receiver. Although it has some data

capture and mapping demonstration features, it is not intended to replace your mapping, navigational, or data-collection app.

Depending on what other mapping or data-collection software you are using, Geode Connect may be required. For example, you may need Geode Connect to serve as an NTRIP/RTK client for another app, or you may need it to act as the mock location provider on your Android device. For more information, see Enable Mock Locations.

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GNS3 Receiver

CHAPTER 4

4 Set Up Geode Connect for iPad and iPhone

As a configuration and communication utility for the Geode GNS3 GNSS Receiver, Geode Connect provides you with the ability to establish communications with the Geode; change receiver settings; and view position, altitude, estimated horizontal error, differential status/fix information, speed, heading, satellites in fix, correction signal, and PDOP.

This chapter gives an overview of the features included in Geode Connect for iPad and iPhone. It gives details about specific settings that can optimize the Geode's precision, accuracy, and reliability, depending on the situation and environment. It also gives specific instructions about the nuances of using the Geode with iPad, iPhone, and third-party apps.

4.1 Download and Install

Geode Connect is available for download in the App Store and on the Juniper Systems website.

4.1.1 The App Store

Search for Geode Connect in the App Store. Install according to the device instructions.

4.2 Connect with the Geode

To pair your Geode with an iPhone or iPad via Bluetooth, you can use Geode Connect to connect your devices directly or connect through the OS of your device before connecting it in the Geode Connect app.

4.2.1 Connect through Geode Connect

To connect through Geode Connect,

1. Power on the Geode and open Geode Connect on your device.
2. Tap **OK** to pair your device with the Geode.
   If the Geode has not been connected to this device before you may need to search for nearby devices.

3. On the Geode Connect Device screen, tap **Discover Nearby Devices**.

4. Tap **OK**.
5. In the Select An Accessory dialog box, select the serial number of your Geode.

   Note: The serial number can be found on the bottom of the Geode.

   When the Geode is paired with your iOS device, a green "Pairing Successful" banner appears.
6. On the Connect Device screen, select your Geode.

When your Geode is selected, the Home screen displays.

4.2.2 Connect through OS

To connect through OS,

1. Power on the Geode.
2. Go to the Settings app on your iPhone.
3. Go to **Bluetooth** > **Other Devices**.
4. Select the Geode you wish to pair with. It will be listed with its serial number, which can be found on the bottom panel of the Geode.
5. Allow the iPhone to complete the pairing process.
6. Open Geode Connect.
7. Select **Connect Device**.
8. Tap on the Geode you want to connect with.

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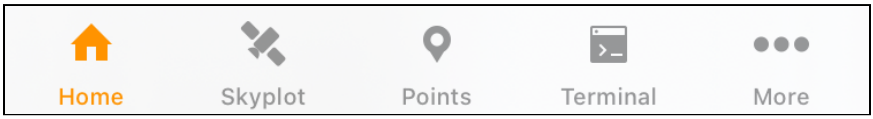
GNS3 Receiver

CHAPTER 5

5 Learn Geode Connect for iPad and iPhone

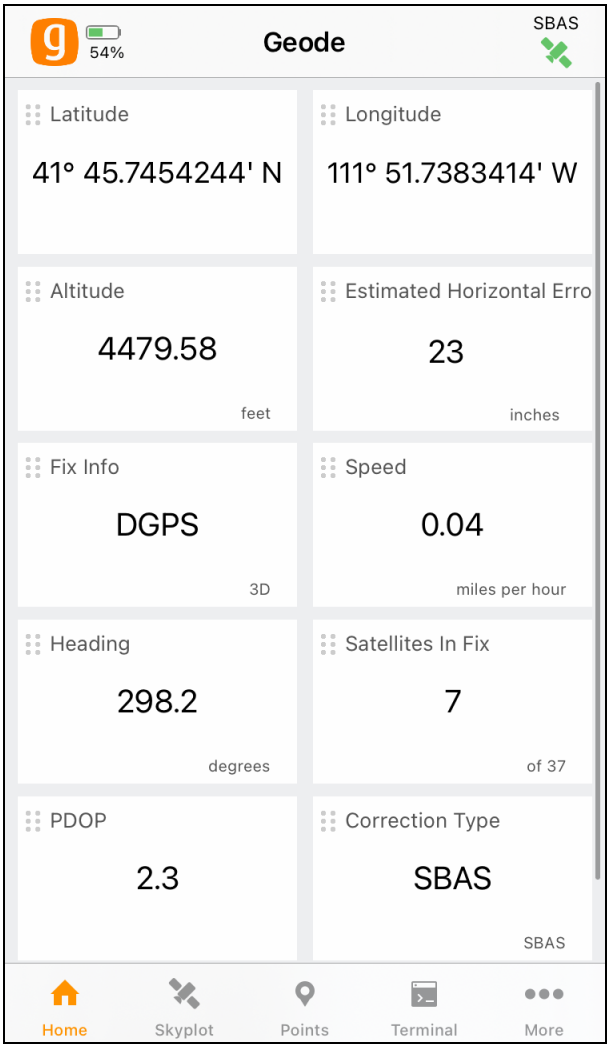
Geode Connect is a utility app that allows you to customize and fine-tune the Geode to your specific project or application. Each screen in Geode Connect serves one of three primary functions: configuration of the Geode, validation of Geode accuracy, or changing Geode Connect settings. Though it does have some limited data-capture features, these are included only for demonstration purposes. Geode Connect is not intended to replace your data-collection app.

5.1 Home



The Home screen for Geode Connect serves as a dashboard for the Geode receiver. On this screen, you can view connection status, correction mode, and positioning data. It displays latitude, longitude, altitude, estimated horizontal error, fix info (GPS, DGPS, RTK, and so on), speed, heading, number of satellites in fix, PDOP, and correction signal.

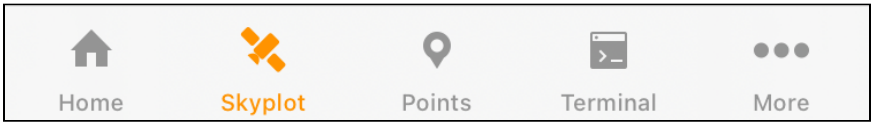
You can drag and drop each box to reorganize the screen to your preference.



From the toolbar on the bottom of the screen, you can access the Skyplot, Points, Terminal, and Settings screens. Tap **More** in the bottom right corner to configure the connected receiver. Tap the orange Geode icon in the top left corner to disconnect or change your receiver. The satellite icon in the top right corner tells you which correction service you are using, and it turns green when you are connected. If the RD1 NMEA sentence is en-

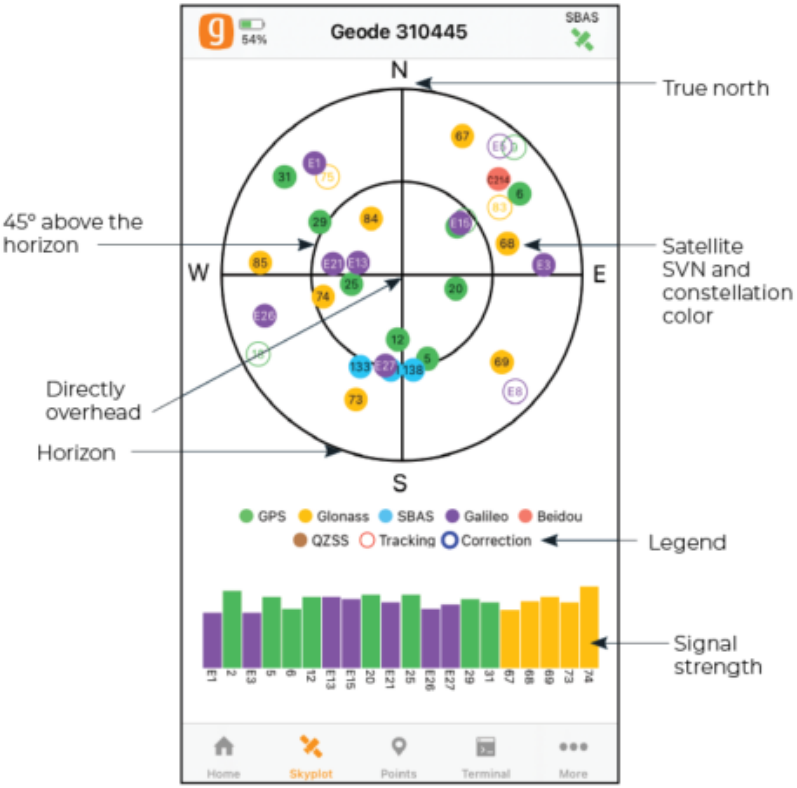
abled, the satellite icon color changes relative to the signal quality. For more information, see Atlas Correction Service.

5.2 Skyplot



The Skyplot screen shows which satellites are being used in the positioning solution and where they are in the sky. It also shows satellites that are being tracked by the Geode.

On the Skyplot screen, each satellite is identified by a space vehicle number (SVN) and color for its constellation. The location of each satellite on the
Skyplot indicates where its location in the sky relative to true north. The outside ring is 0° elevation (horizon). The inside ring is 45° elevation—halfway above the horizon from the Geode's present location. The intersection of the two lines indicates directly overhead.

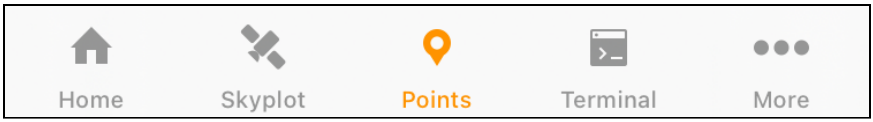


Satellite symbols outlined in red indicate that the satellites are being tracked, but they are not yet a part of the positioning solution. Satellite symbols outlined in blue indicate that a correction is being applied to the signal.

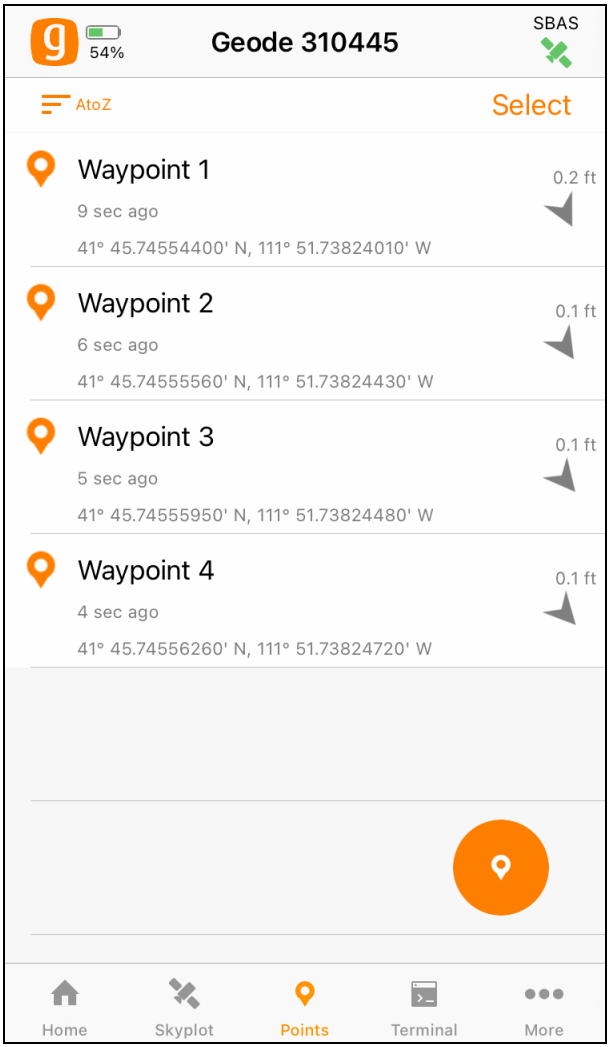
Multi-GNSS Geode models support the Galileo, BeiDou, GPS, QZSS, SBAS, and GLONASS constellations.

The Skyplot screen is meant to be used as a guide. It shows the relative visibility of satellites in the sky, but it is not an absolute reference for satellites used in the positioning solution.

5.3 Points



The Points screen allows you to capture points and export captured data as CSV, KML, or KMZ files. This feature allows you to validate the accuracy of the Geode without requiring the use of a third-party app.



5.3.1 Capture Waypoints

To capture a waypoint,

1. With the Geode in the position you would like to capture, tap the waypoint icon .

   A waypoint with your location will be added to your list.

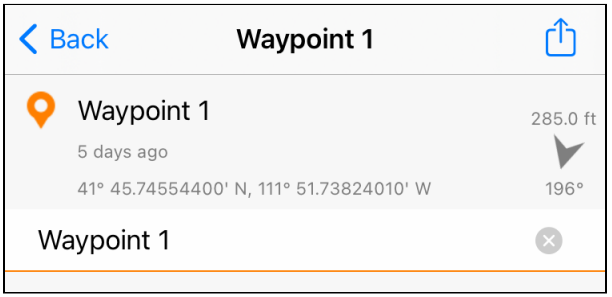
2. Type a description or name for the waypoint (optional).
3. Tap **OK**.

5.3.2 Organize and Edit Waypoints

Organize waypoints by tapping in the upper left corner beneath the Geode symbol. The app will cycle through the following organizational methods: oldest, newest, A to Z, Z to A, and proximity.

To edit the name of a waypoint,

1. Tap on the waypoint you want to rename.
2. Tap on the waypoint name beneath the coordinates.
3. Type the new name.



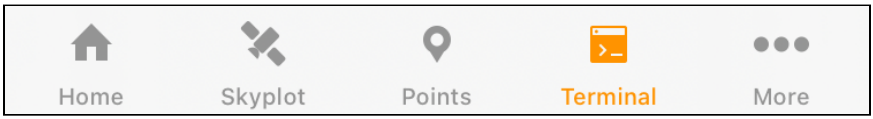
5.3.3 Export or Delete Waypoints

To export or delete waypoints,

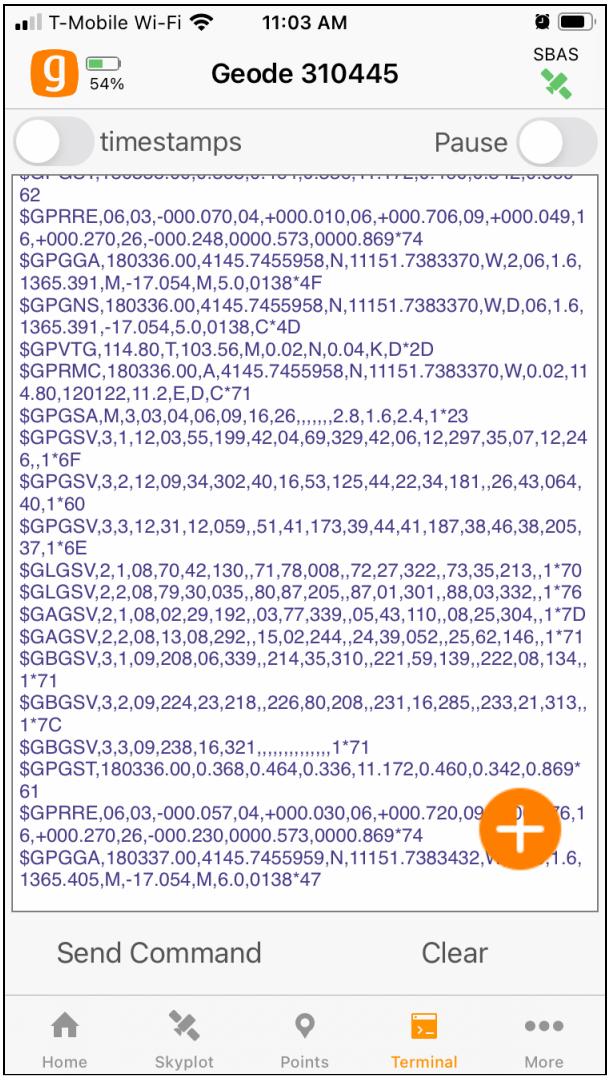
1. Tap **Select** (in the upper right corner).

2. Select the waypoints you want to share or delete.
3. To delete the selected waypoints, tap the trash icon and confirm deletion.
4. To export the selected waypoints, tap the share icon.
5. Name the export file.
6. Select the file format (CSV, KML, or KMZ).
7. Tap **Export**.
8. Export or share according to the instructions for your iPad or iPhone.

5.4 Terminal



The Terminal screen displays the NMEA sentences the Geode is receiving. It provides the options to include time stamps (top left) or to pause the data (top right).



At the bottom of the Terminal page, you can send commands to the Geode. This gives you flexibility to configure the Geode and customize data output.

1. Tap **Send Command.**
2. Tap **Show/Hide logging** to show or hide the NMEA strings in the terminal.

3. Tap **Send custom** to enter a custom command.
4. Tap **JSHOW** to show the current receiver configurations.
5. Tap **Clear** to clear the terminal screen.

   For a comprehensive list of commands and messages that can be used to configure the Geode, please refer to technical documentation provided by Hemisphere GNSS.

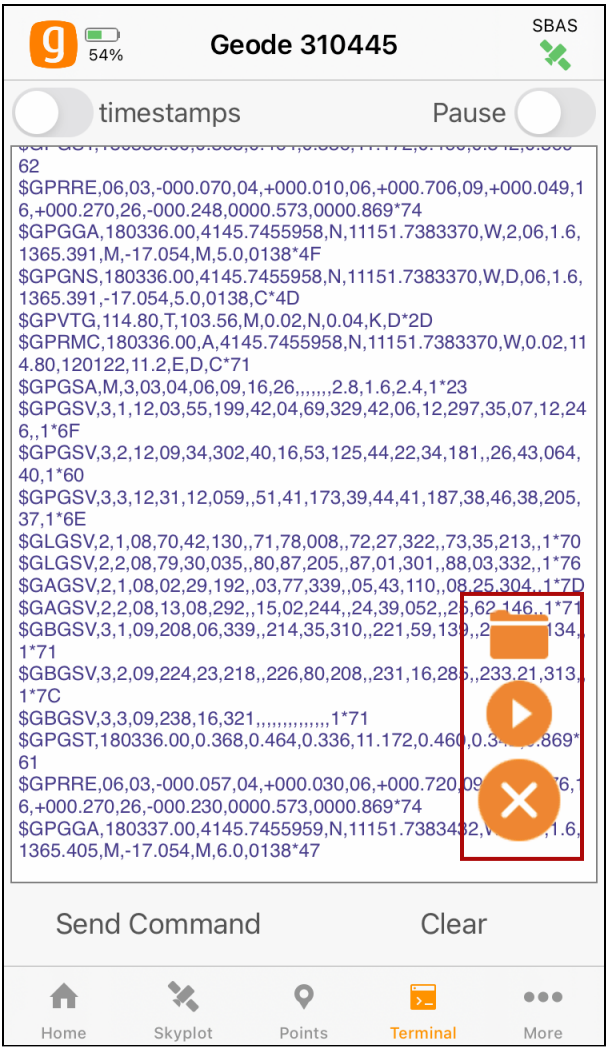
6. Go to https://hemispheregnss.com/ > **Resources & Support** > **Technical Documentation**.
7. Under General, tap **Technical Reference Guide**. (It may include a version number.)

⚠ CAUTION: Use at your own risk. It is possible to cause communication or other errors in the Geode that may require technical assistance to repair.

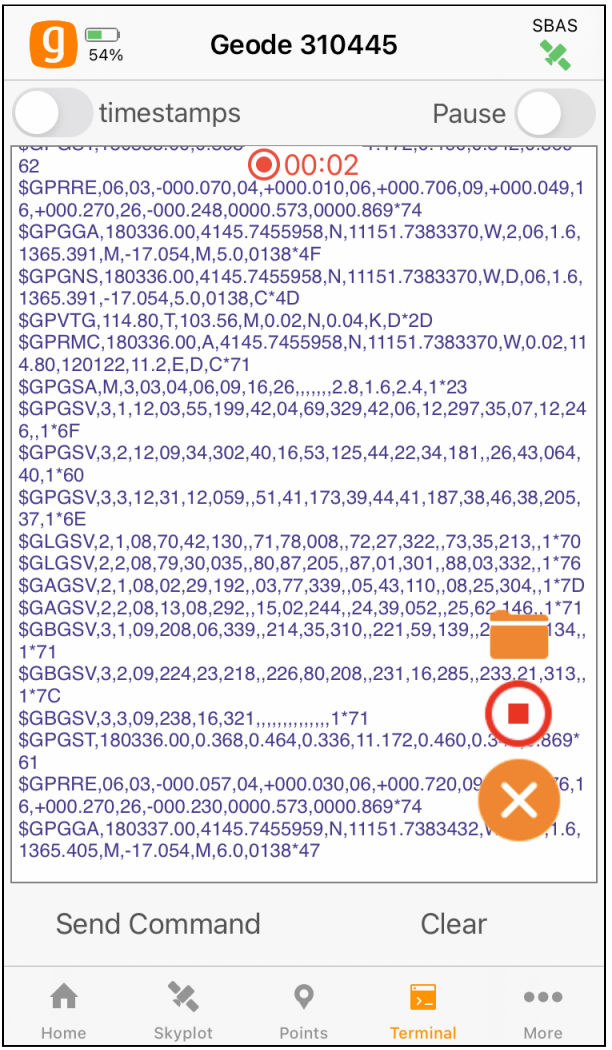
5.4.1 Capture, Save, or Share NMEA Sentences

To record the NMEA sentences the Geode is receiving,

1. Tap the plus icon in the lower right corner to display the menu.



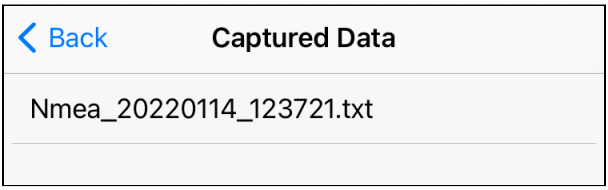
2. Tap the play icon to begin recording your data.



To stop recording,

1. Tap the red recording icon. The string of NMEA sentences will be saved.
2. Tap the folder icon to view the saved recordings. From this screen you can organize, share, or delete the NMEA

recordings.

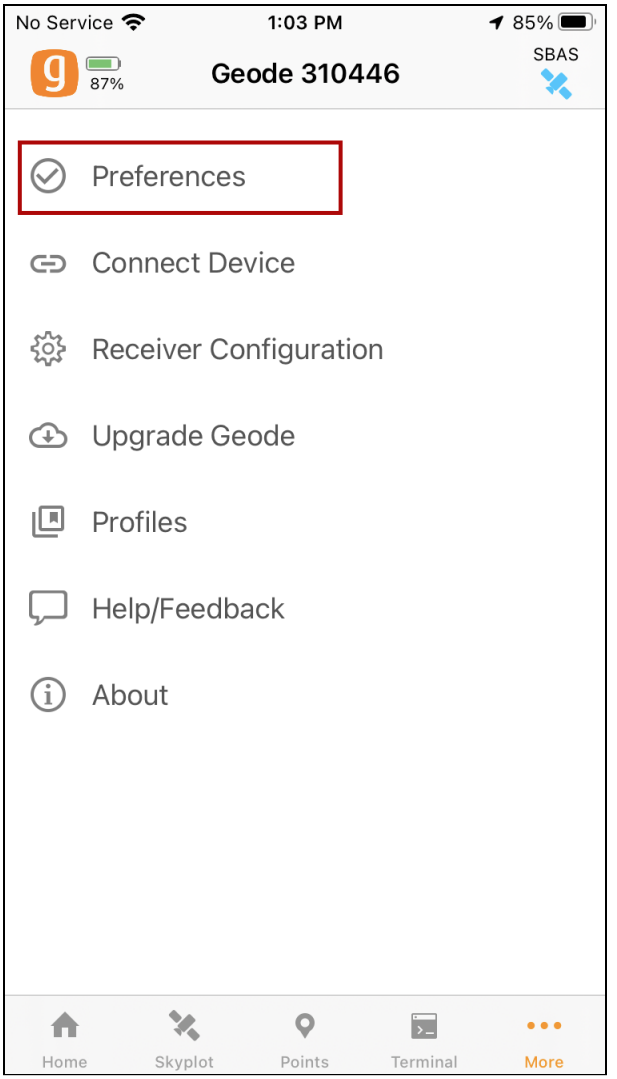


5.5 Settings

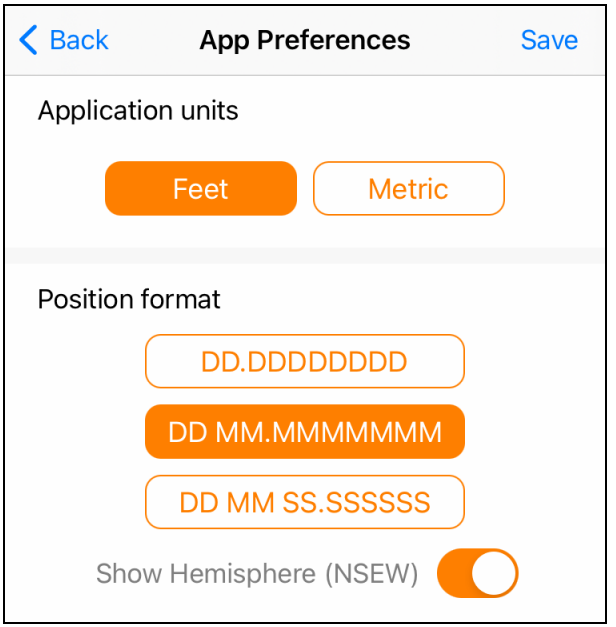
The Settings screen provides options for the configuration of the Geode receiver and Geode Connect settings. The following sections describe each of these options.

5.5.1 Preferences

The Preferences screen allows you to customize your preferences for how information is displayed in Geode Connect.



You can specify application units (feet or metric), position format, and whether the app will show the hemisphere.

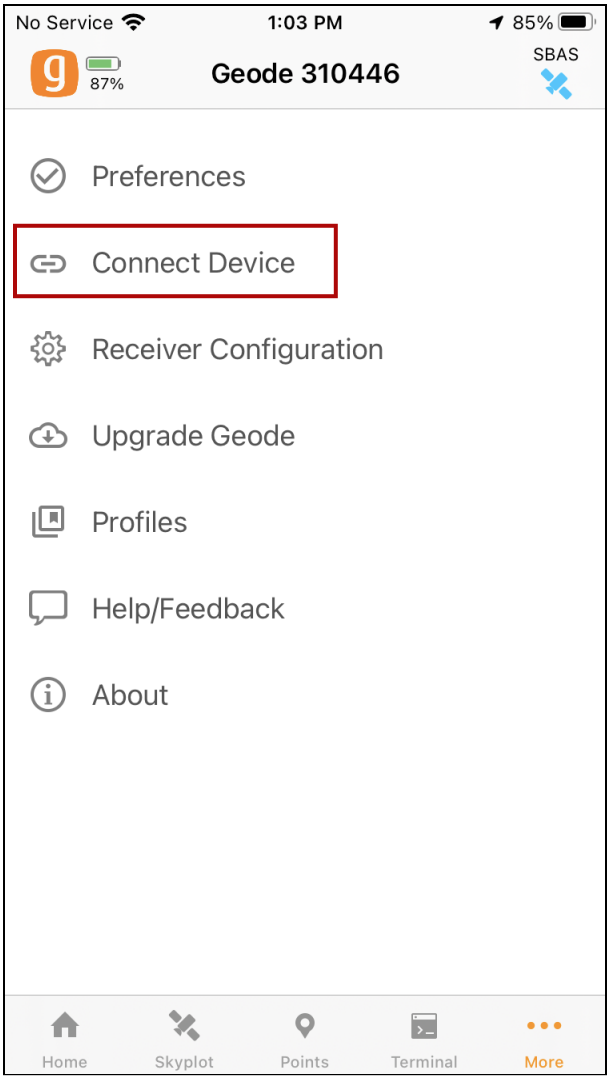


To save your changes, tap **Save** before you leave the screen.

5.5.2 Connect Device

The Connect Device screen allows you to connect your iPad or iPhone to the Geode.

For more information, see Connect with the Geode.

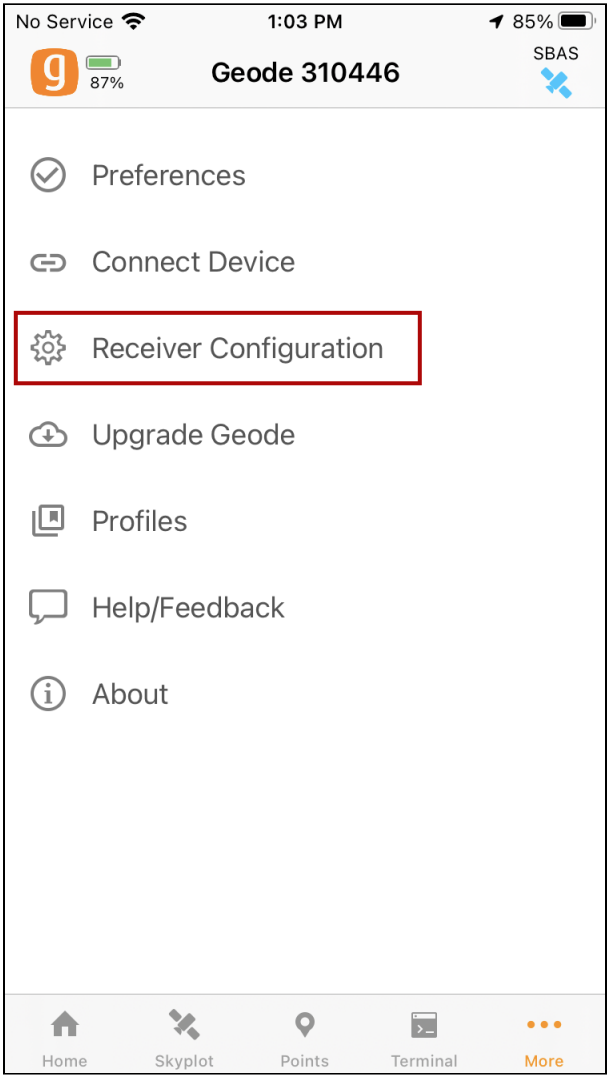


5.5.3 Receiver Configuration

Note: The Receiver Configuration options are only available if you are actively connected to a Geode receiver. Changes saved on these screens are changes made to the Geode receiver,

and these changes apply to all navigation and data collection apps using the Geode receiver.

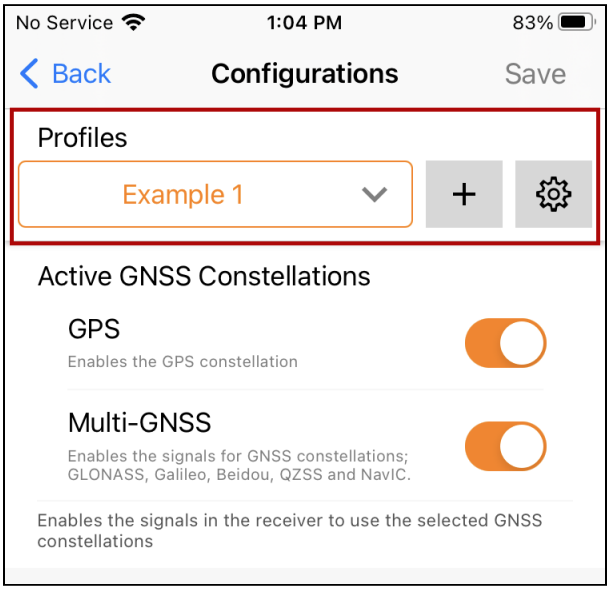
From this screen, set up the Geode to meet the needs of your project or application.



Detailed descriptions of the options display below each setting.

*Note: Changes must be saved before leaving the screen. To save changes, tap **Save** in the upper right corner.*

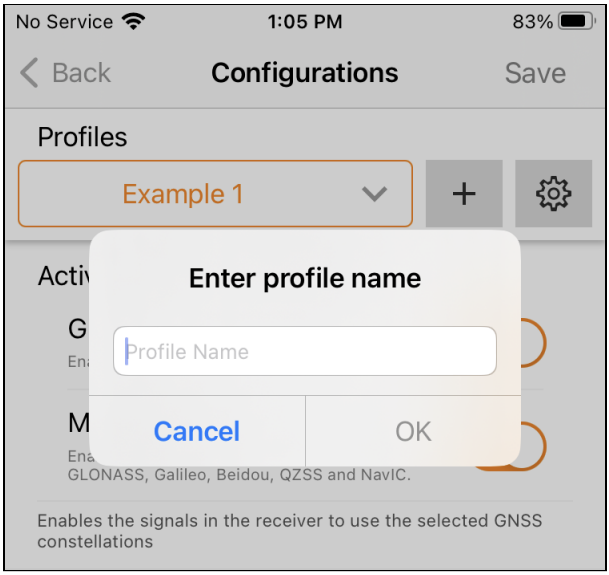
Profiles



Add a Profile

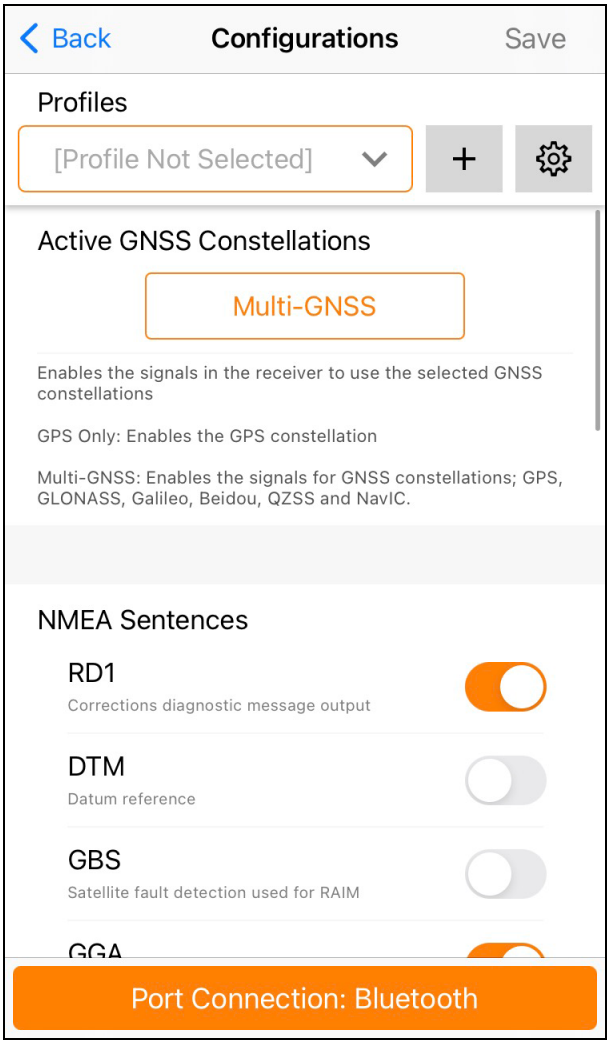
To add a profile,

1. Tap **Add Profile** .
2. Enter the profile name and tap **OK**.



3. Select the appropriate settings for active GNSS constellations, NMEA sentences, and update rate. Expand an area to view additional advanced settings, to manage subscriptions, and to configure NTRIP/RTK.
4. Tap **Save**.

The new profile will be created based on the current receiver settings. Any changes you make to the receiver settings will be applied to the current profile.



Edit a Profile

To edit a profile,

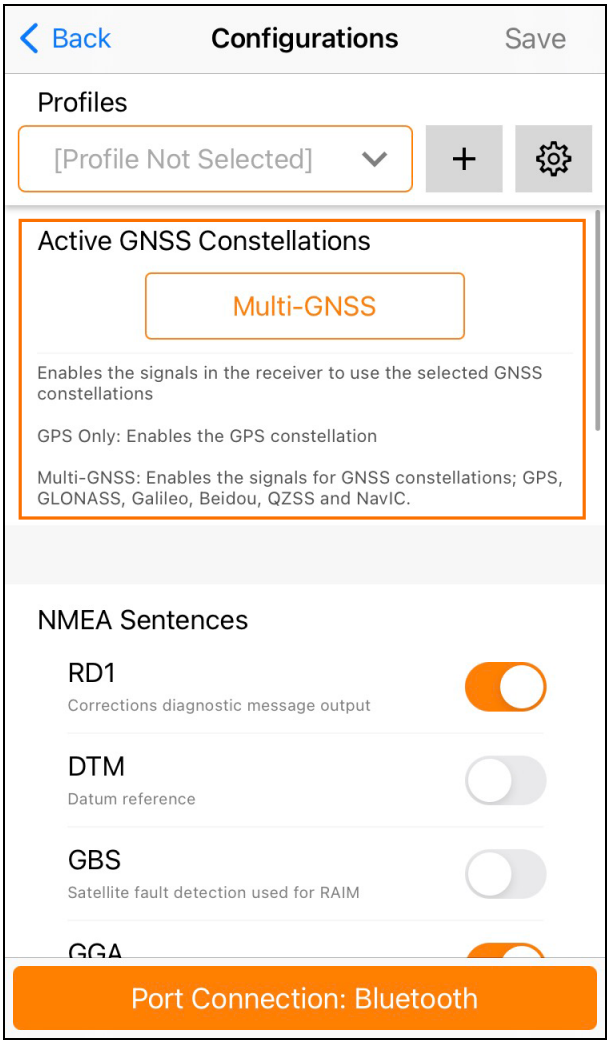
1. Under Profiles, ensure the profile you want to edit is displayed.
2. Make the desired changes to the settings, and tap **Save**.

Manage Profiles

To manage the profiles, tap the gear icon  to open the Profiles screen. See also

Active GNSS Constellations

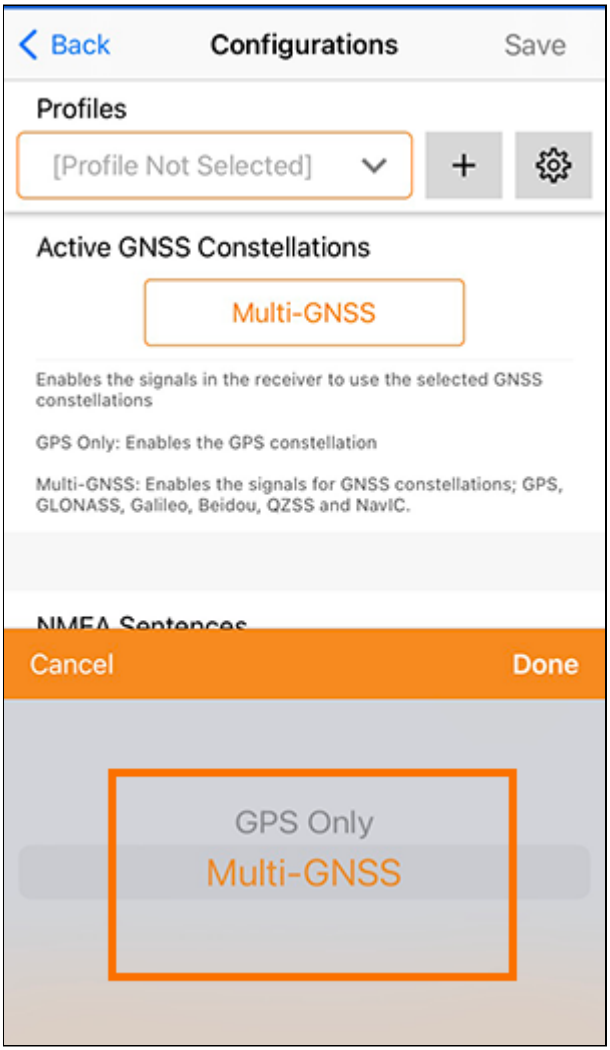
You can choose which GNSS constellations to use in your solution: Multi-GNSS or GPS.



To choose which GNSS constellations to use,

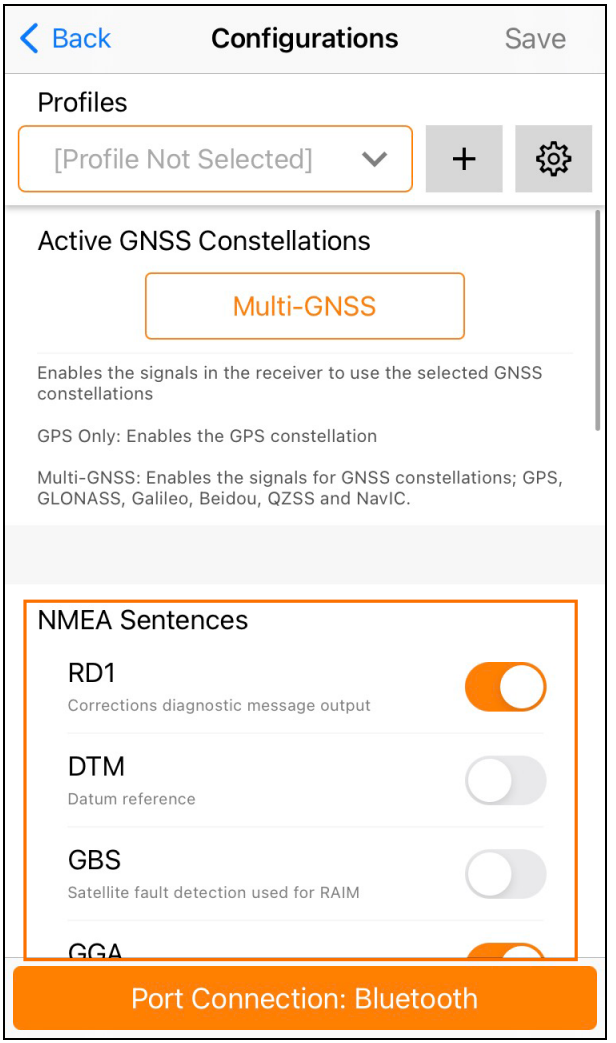
1. Tap the currently active constellations (Multi-GNSS or GPS Only).
2. Tap the constellation you want to use (Multi-GNSS or GPS Only)

3. Tap **Done**.



NMEA Sentences

You can choose which NMEA sentences you want the Geode to receive. In most instances, the default NMEA sentences are sufficient for your project or application.



Note: iPhone and iPad require the GGA and RMC messages to be enabled in order to provide a position to the operating system for other apps to use.

The following list explains the available NMEA sentences:

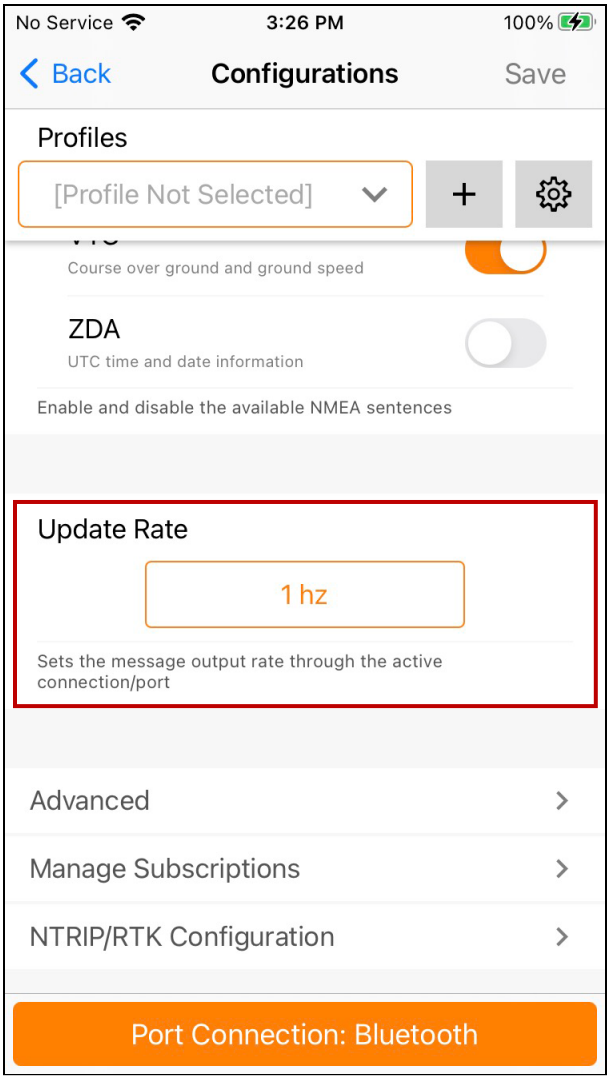
- **RD1**—Correction diagnostic message output
- **DTM**—Datum reference

- **GBS**—Satellite fault detection used for RAIM
- **GGA**—Detailed GPS position information
- **GLL**—Latitude and longitude data
- **GNS**—Fix data for a single or combined satellite navigation system
- **GRS**—GNSS range residuals
- **GSA**—GPS DOP and active satellite information
- **GST**—GNSS pseudorange error statistics
- **GSV**—GNSS satellites in view
- **RMC**—Recommended minimum specific GNSS data
- **RRE**—Range residual message.
- **VTG**—Course over ground and ground speed.
- **ZDA**—UTC time and date information

Update Rate

The update rate sets the message output rate through the active port. You can specify your preferences for the update rate. To upgrade the update rate, use the Upgrade Geode menu option.

Note: At higher data rates, we recommend turning off messages not required for your application, such as GNS, RRE, and VTG messages.



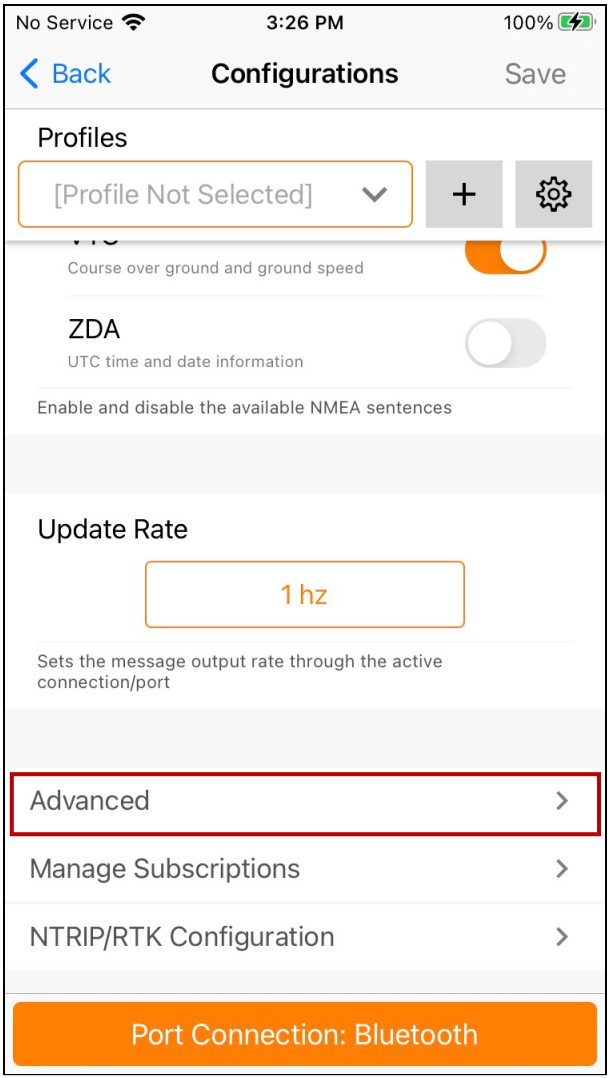
Advanced

The Advanced screen allows you to configure the following advanced settings for the Geode.

- NMEA Precision
- Mask Angle

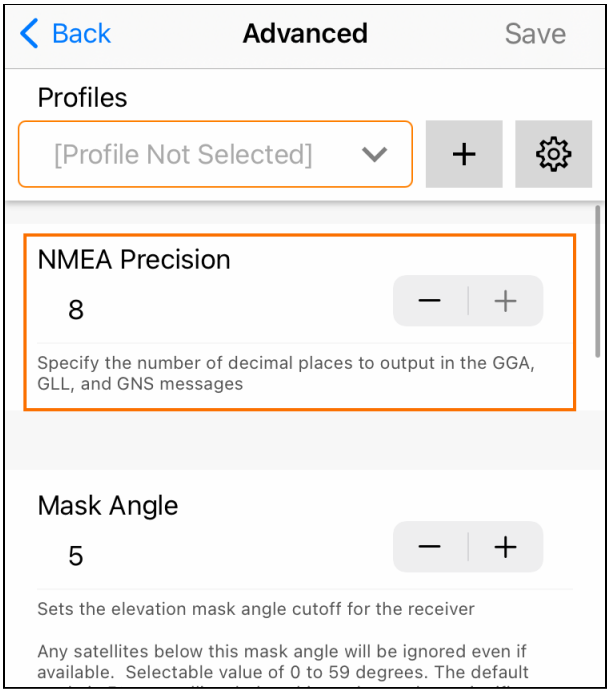
- Correction Source
- SBAS
- Receiver Mode
- Battery Status Sentence
- Receiver Reset

Changes saved in the Advanced screens are made to the Geode receiver, not Geode Connect. Changes will appear in other navigational and data collection apps.



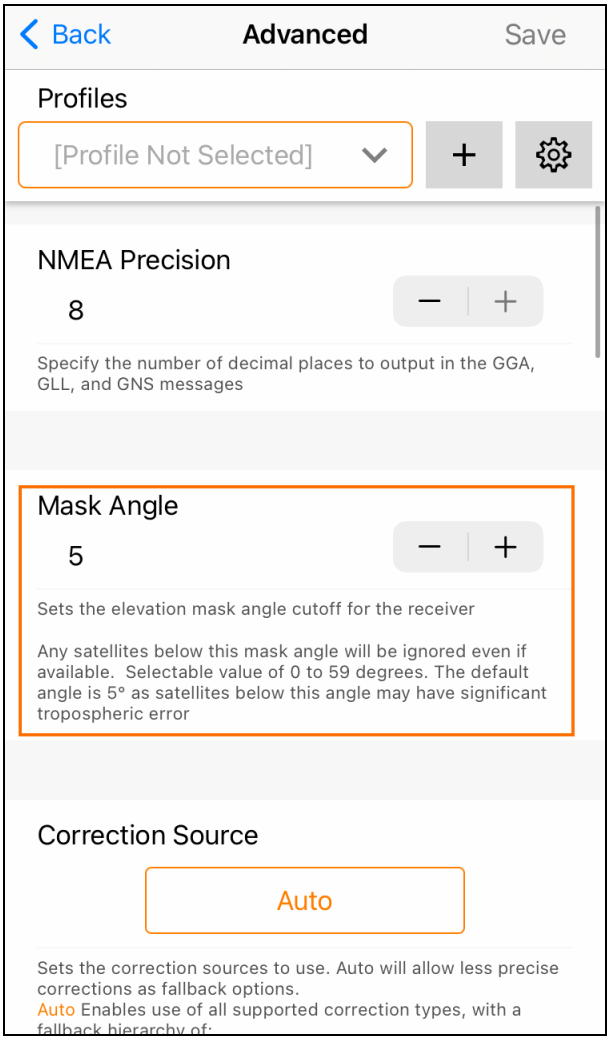
NMEA Precision

This specifies the number of decimal places to output in the GGA, GLL, and GNS messages.



Mask Angle

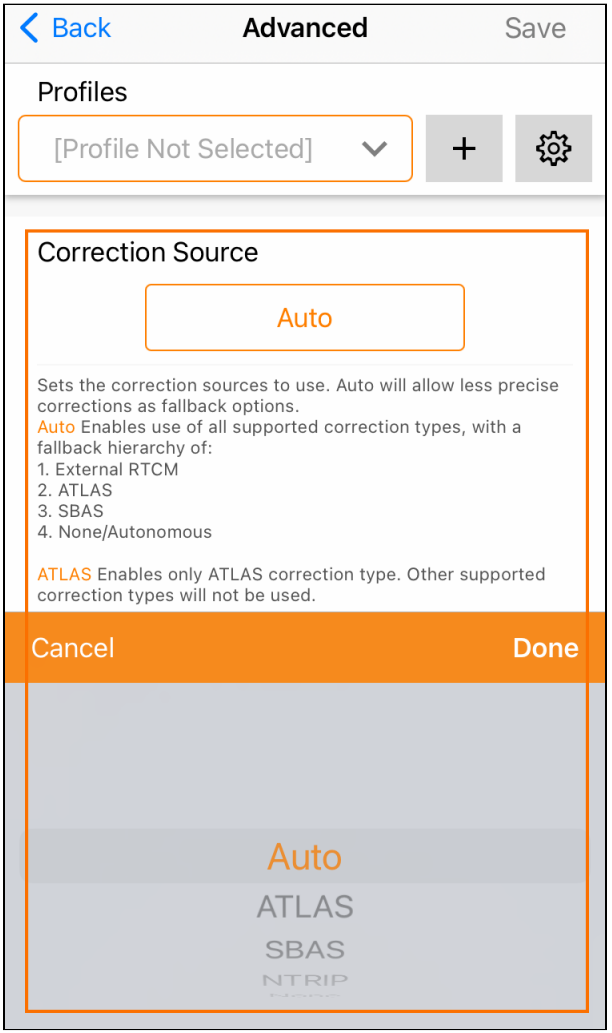
This specifies the elevation mask angle cutoff for the receiver. Any satellites below this angle will be ignored, even if they are available.



Correction Source

This specifies whether the Geode should automatically choose to apply the most accurate correction source available or use only a specific correction source. The Geode's default correction source is *auto*, which means automatically search and use the best available correction service. .
Note: If the most accurate correction source changes while data

is being collected, there may be significant differences between positions corrected by different methods. Because different correction sources use different reference datum, an automatic change to a different correction source may look like an error in a data set.

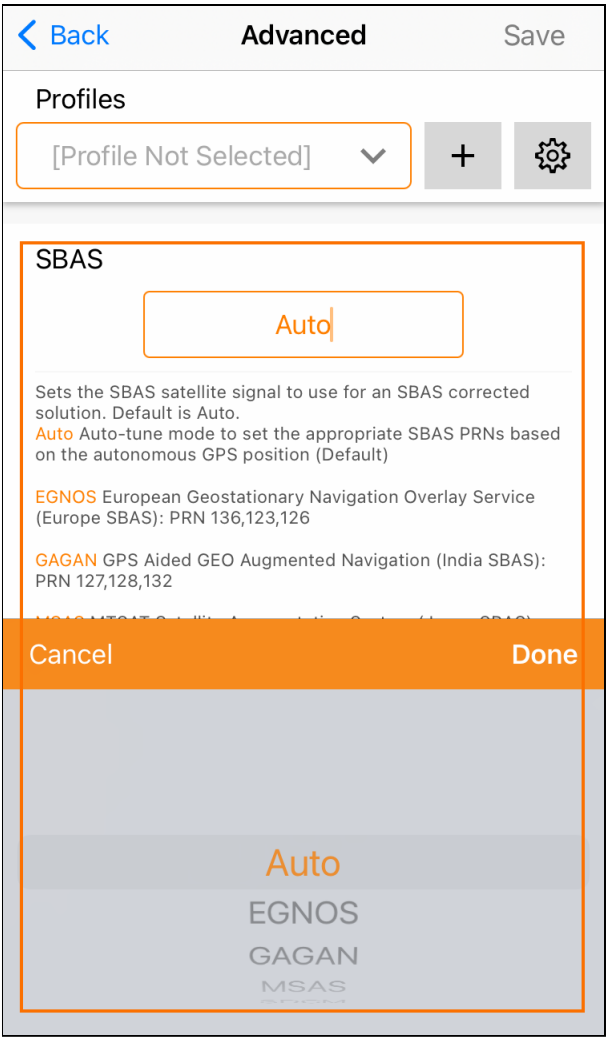


You may want to specify the correction source applied by the Geode. You can set the Geode to use any of the corrections sources listed in the table below.

Correction Source Options		
Setting	**Action**	**If signal is lost/unavailable**
Auto	Geode chooses the correction source based on the current level of accuracy	Geode will try the next option in the following order: ▪ NTRIP/RTK ▪ Atlas ▪ GALHAS ▪ SBAS ▪ None/Autonomous
NTRIP/ RTK	Geode uses corrections only from NTRIP/RTK.	Geode will not apply any correction.
Atlas	Geode uses corrections only from Atlas.	Geode will not apply any correction.
SBAS	Use corrections only from SBAS.	Geode will not apply any correction.
None	Geode does not use any corrections.	Geode will not apply any correction.

SBAS

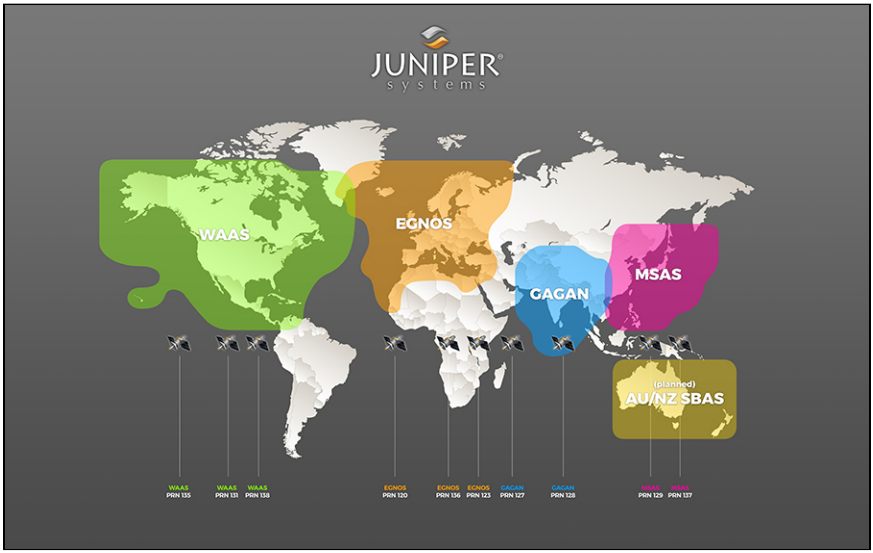
This specifies which SBAS satellites the Geode should use for GPS correction. Usually, selecting Auto is sufficient because the various SBAS services cover different geographical areas. However, there are some areas where these services overlap (see map below).



For example, if you are collecting corrected GPS positions in the Northeastern United States, the Geode may be receiving SBAS corrections from WAAS or EGNOS. If the receiver is set to Auto, it may even jump back and forth between the two.

The two services use different reference datum or models. Switching between them can cause significant error between different points of data.

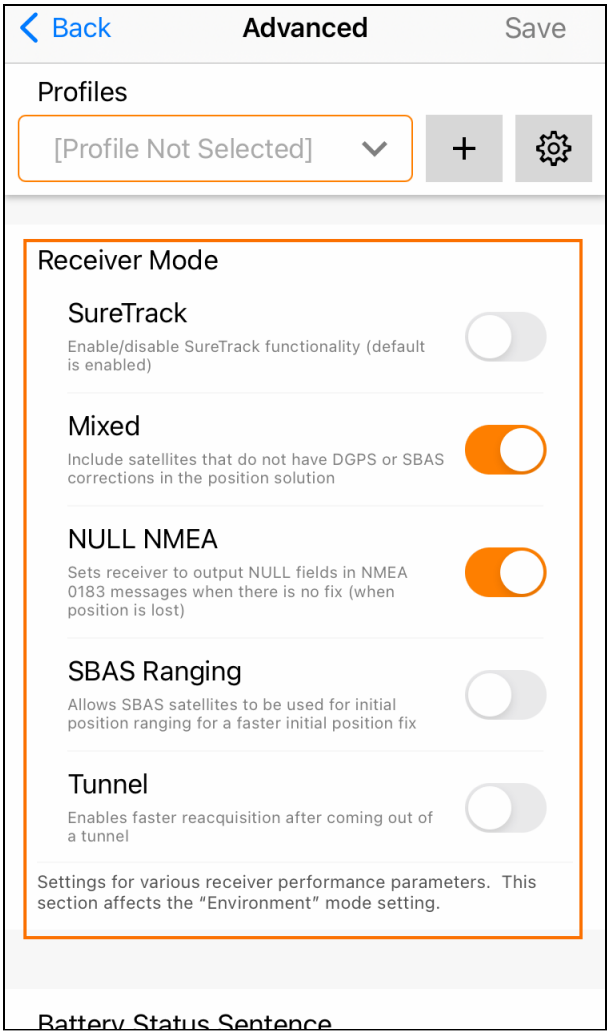
In areas of overlap, the best practice is to select a specific SBAS service the Geode should accept corrections data from.



- **Auto**—Sets the appropriate SBAS PRNs based on the autonomous GPS position.
- **EGNOS**—European Geostationary Navigation Overlay Service (Europe SBAS) PRN 120, 124, 126
- **GAGAN**—GPS Aided GEO Augmented Navigation (India SBAS) PRN 127
- **MSAS**—MTSAT Satellite Augmentation System (Japan SBAS) PRN 129, 137
- **SDCM**—System for Differential Correction and Monitoring (Russia SBAS) PRN 125, 141, 140
- **SouthPAN**—Southern Positioning Augmentation Network (Australia and New Zealand SBAS) PRN 122
- **WAAS**—Wide Area Augmentation System (North America SBAS) PRN 133, 135, 138
- **None**—SBAS corrections disabled.

Receiver Mode

These options affect how the Geode collects and processes positioning information and how it outputs certain types of data.



Receiver Mode Options

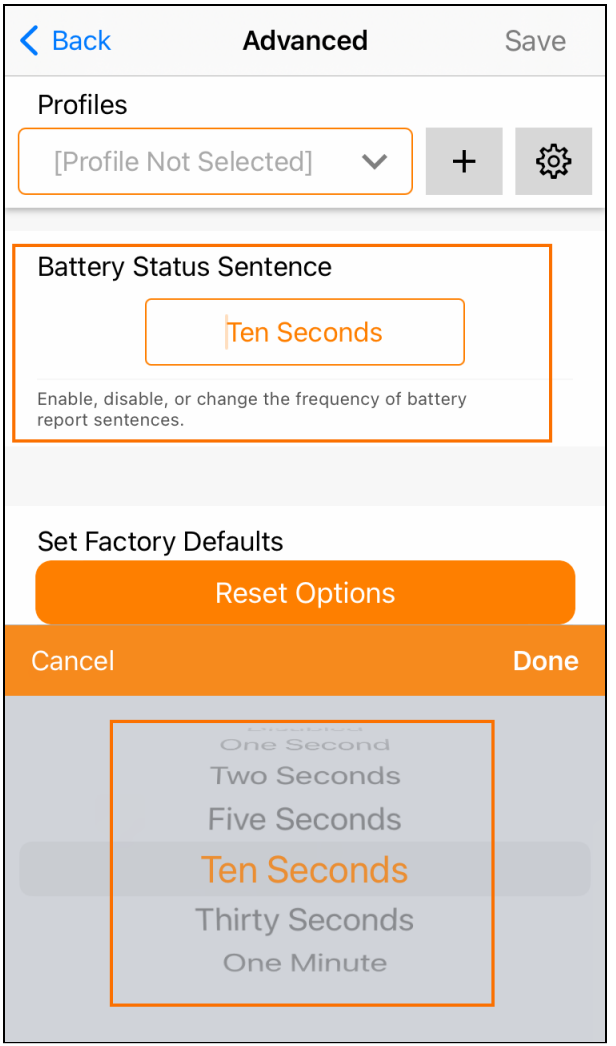
Option	Description	Recommendation	Additional Explanation
SureTrack	Legacy feature. Only seen with GNS 1 and 2 in an older version of Geode Connect.		
Mixed	The default option. The receiver uses all GNSS satellite signals available to calculate the position solution. This includes non-GPS satellites, which do not have DGPS or SBAS corrections. Certain NTRIP/RTK services do provide corrections for non-GPS satellites.	The best choice for most situations. Particularly good if there is a lot of interference.	
NULL NMEA	The recevier sends a NULL NMEA message when it cannot get a fix.	Turn off if the app you are using shows your position as (0°, 0°), a location in the Atlantic Ocean west of Africa.	This option is available because different navigational apps interpret NULL messages differently. Some apps interpret a NULL message to mean that the Geode's position is (0°, 0°), which is west of Africa in the Atlantic Ocean.

SBAS Ranging	The receiver treats SBAS satellites as GPS satellites to speed up the initial position fix.	Use to speed up the initial position fix. Turn off for improved accuracy.	SBAS satellites operate in a time system distinct from that of the GPS satellites, so a position solution that includes SBAS satellites may be less accurate than a GPS-only or GNSS-only solution.
Tunnel	Faster reacquisition of the fix after coming out of a tunnel.	Use it as needed.	

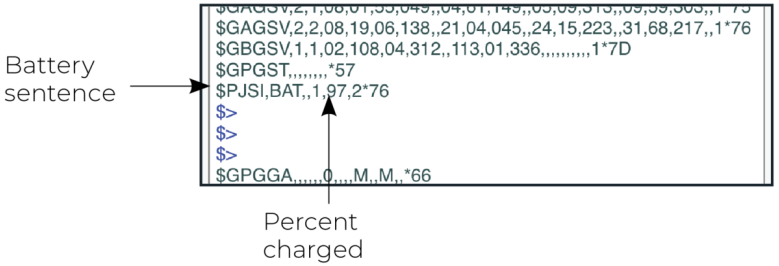
Battery Status Sentence

This gives the option to choose how frequently the Geode sends a battery status message. The message is used by Geode Connect and other applications to display the battery capacity status. The default setting is 10 seconds.

The message is sent out from the Geode as a custom message along with the NMEA sentences. The message is visible in the terminal screen, as are all other NMEA messages and commands.



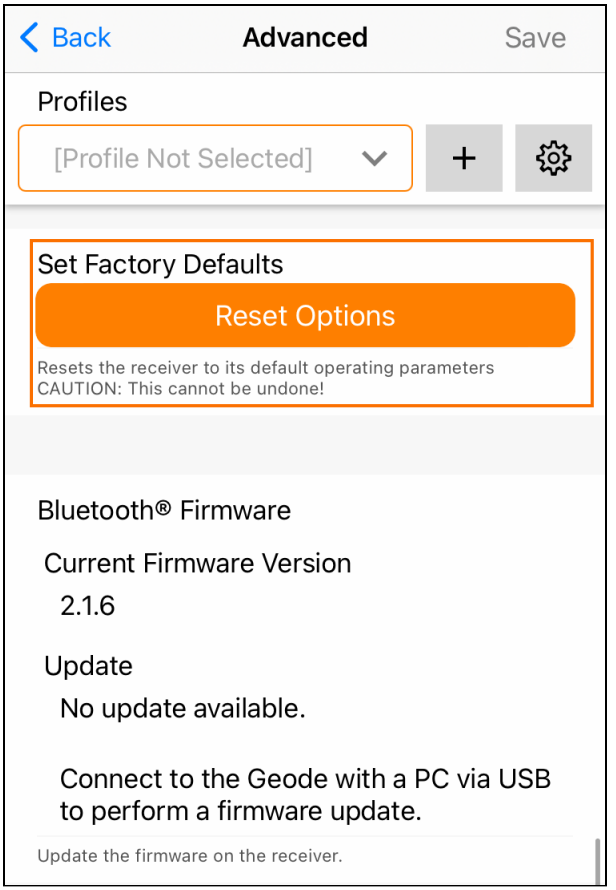
In Geode Connect, the battery status sentence looks like this:



This sentence may not be recognized by some navigation or data-collection apps. If it causes problems in an app, disable it.

Receiver Reset

Reset Options allows you to reset your Geode with a soft reset or to the factory defaults.



⚠ CAUTION: Resetting the receiver cannot be undone.

The two choices for resetting your Geode are

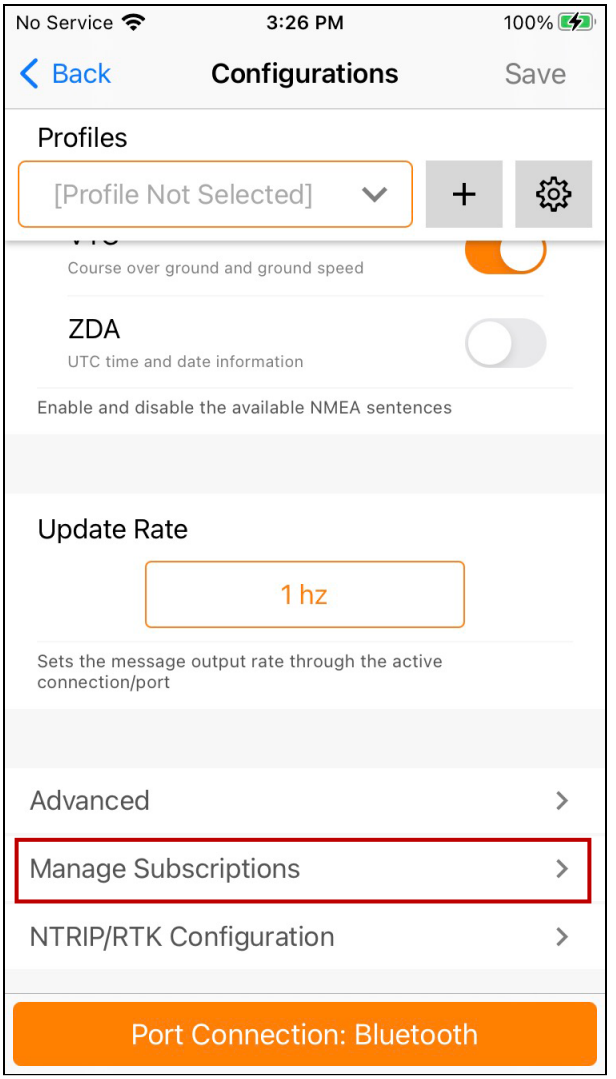
- A soft reset returns the Geode to default settings.
- Set factory defaults returns the Geode to the default settings and also clears the real-time clock at startup, the backed up ephemeris and almanac, and reboots the receiver.

Following a factory reset, the time to first fix will increase by 4–6 minutes because the Geode will re-download the data when it connects with a positioning satellite.

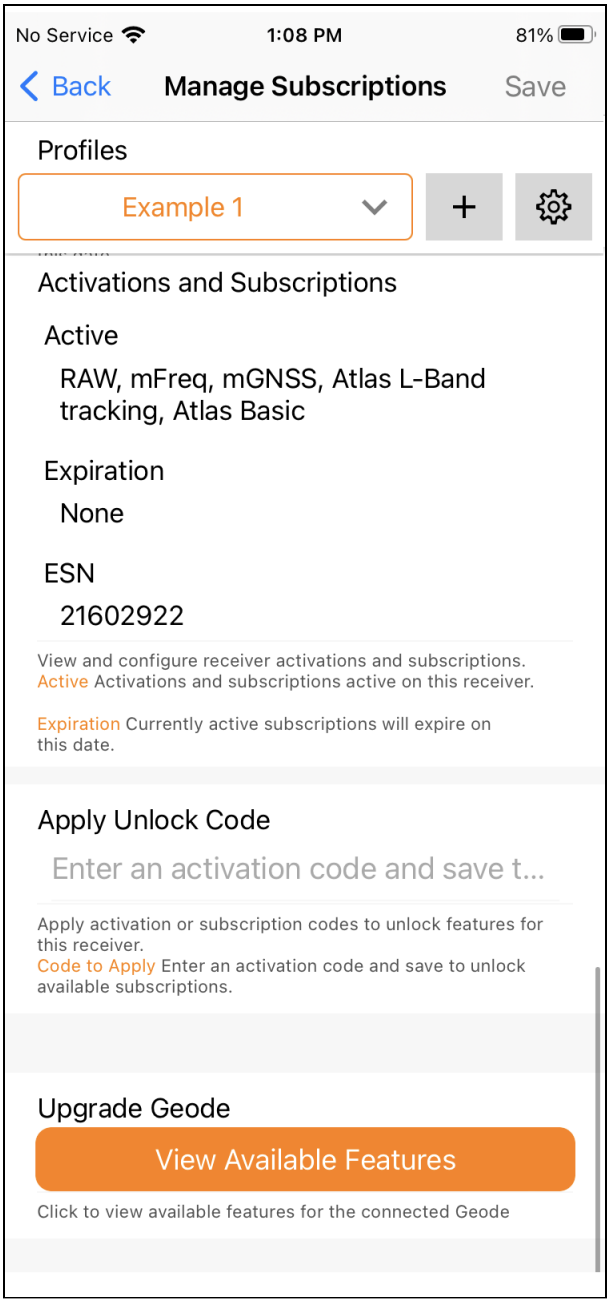
The two almanac messages from the GPS satellites alternate every 12.5 minutes. After setting to factory defaults, the best practice is to turn on the Geode and wait 25 minutes to ensure a complete Almanac has been stored.

Manage Subscriptions

GNS3M devices offer a subscription to Atlas. This screen allows you to view the details of your current subscription, apply unlock codes, and view the subscriptions that are available for activation.



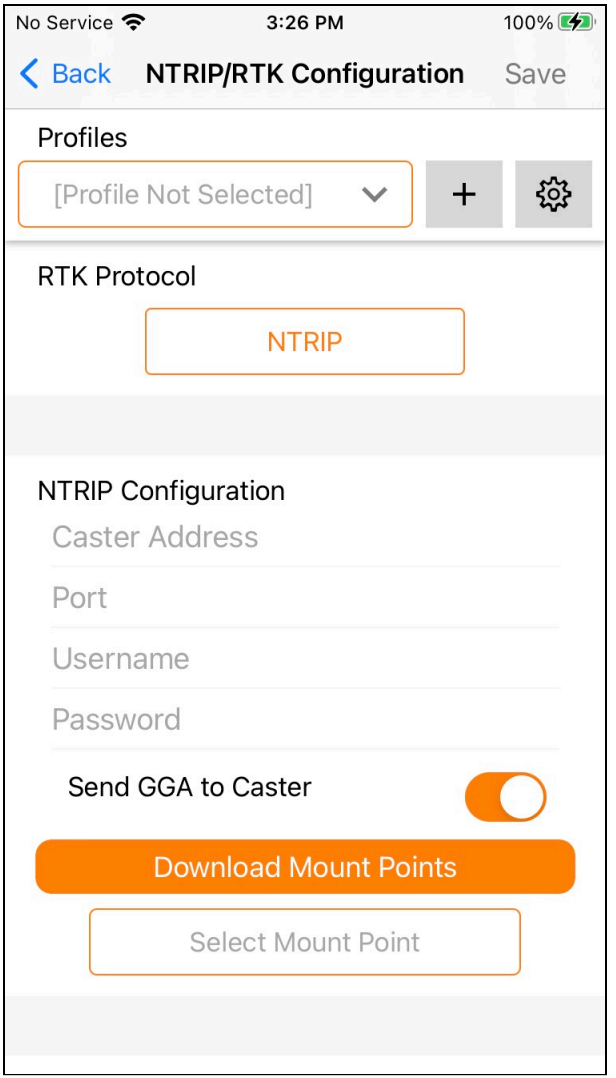
Tap **View Available Features** to apply upgrades to the Geode. For more information, see Upgrade Geode.


No Service
1:08 PM
81%
Back
Manage Subscriptions
Save
Profiles
Example 1
Activations and Subscriptions
Active
RAW, mFreq, mGNSS, Atlas L-Band tracking, Atlas Basic
Expiration
None
ESN
21602922
View and configure receiver activations and subscriptions.
Active Activations and subscriptions active on this receiver.
Expiration Currently active subscriptions will expire on this date.
Apply Unlock Code
Enter an activation code and save t...
Apply activation or subscription codes to unlock features for this receiver.
Code to Apply Enter an activation code and save to unlock available subscriptions.
Upgrade Geode
View Available Features
Click to view available features for the connected Geode

Configure NTRIP/RTK

Use this screen to enter the information supplied by your NTRIP/RTK service provider, including the caster IP address, port, username, and password.

Note: The picture below shows NTRIP selected as the RTK protocol. If the information from your service provider is only an IP address and port and does not include a username, password, and mount point, then choose Direct IP as your RTK protocol.



Note: NTRIP/RTK settings are stored in the Geode Connect app, not in the Geode receiver.

NTRIP is a useful protocol for precise correction of real-time positioning solutions. (See NTRIP and RTK.)

The Geode is able to calculate an RTK Fix/Float position with sub-meter to centimeter-level accuracy. NTRIP services do require an internet or cell data connection (via your mobile device) and usually involve either a free or paid subscription to the service.

If you have a subscription to an NTRIP/RTK service, Geode Connect will allow you to configure the Geode to use that service.

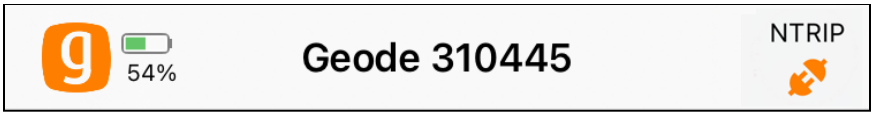
Note: Save changes before leaving the screen.

To establish an NTRIP/RTK connection,

1. Ensure the handheld device you are using to host Geode Connect has a data connection.
2. Enter the identifying information supplied by your NTRIP/RTK service provider.
3. Verify “Send GGA to Caster” is checked. This tells the Geode to send its position to the caster so that the caster can locate the mount points closest to the Geode’s position.
4. Tap **Download Mount Points**.
5. Tap the drop-down menu in the Mount Points section. This will open a list of mount points in the network close to the Geode’s position.
6. Choose the appropriate mount point.
7. Tap **Start NTRIP/RTK**.

When NTRIP/RTK is connected and working, the word NTRIP and a closed green plug will appear on the right side of the Home page. Tap this icon to return to the NTRIP/RTK configuration screen at any time.

If NTRIP appears on the home page with an open orange plug, the Geode is still trying to establish a connection to the NTRIP service. The connection might take a while. If the Geode has trouble connecting, try selecting a different mount point.



To turn off NTRIP/RTK, tap the NTRIP icon in the upper right corner to go to the NTRIP Configuration screen. Select **Stop NTRIP**.

Third-Party Apps and NTRIP/RTK

When using the Geode with your device, some third-party mapping and data-collection apps may need some help connecting to an NTRIP/RTK service.

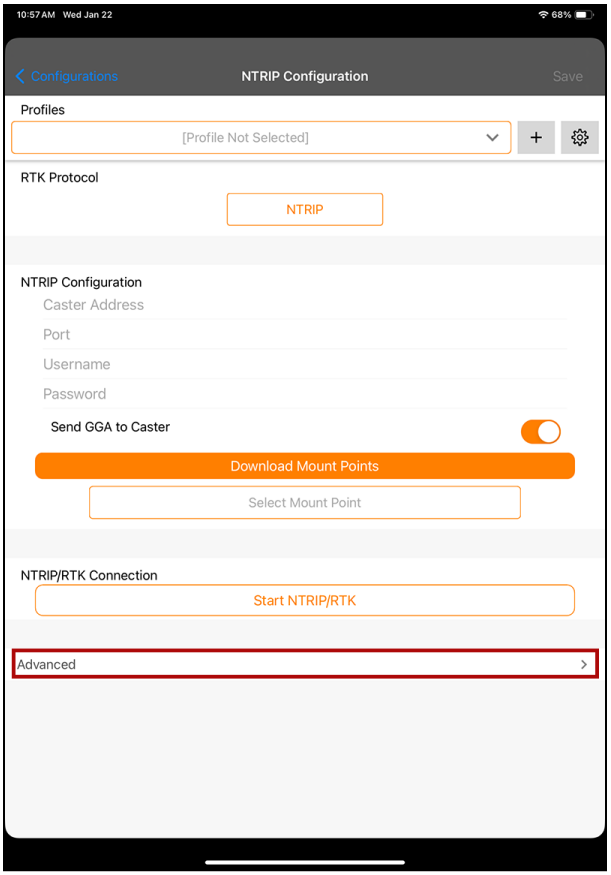
If the third-party app has built-in NTRIP/RTK capabilities, do not use Geode Connect. Simply connect to the Geode and configure NTRIP/RTK in the third-party app.

If the third-party app does not have built-in NTRIP/RTK capabilities, you can use Geode Connect to supply that service directly to the app. You will need to connect the Geode to both apps: Geode Connect and the third-party app.

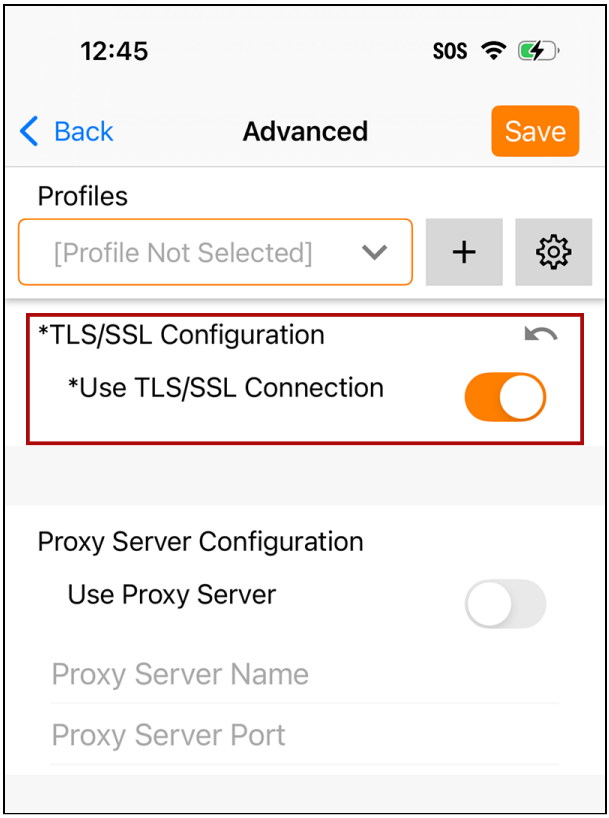
Once the Geode is connected to both apps, configure NTRIP services in Geode Connect. Leave Geode Connect open while using the third-party app.

Configure NTRIP/RTK Advanced Options

The NTRIP/RTK Configurations Advanced screen allows you to give more direction about how Geode Connect will communicate with your RTK server.



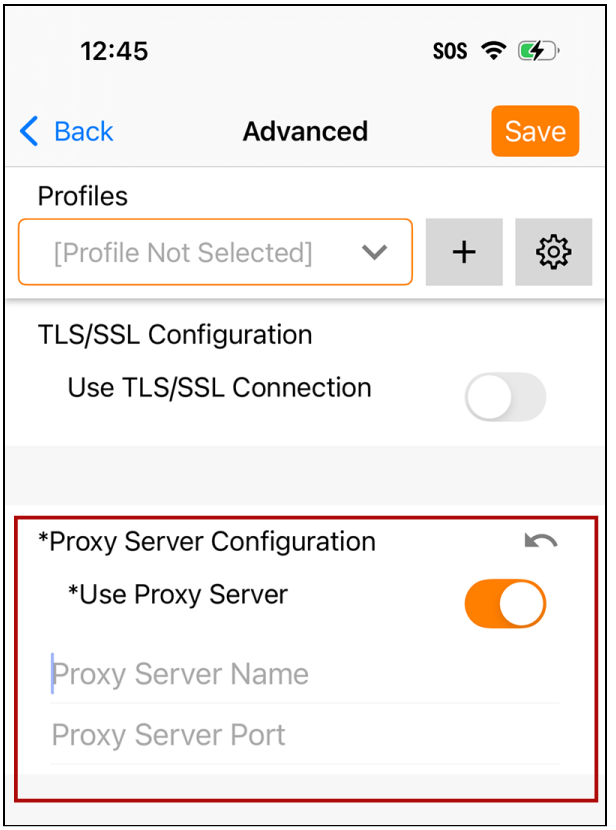
Use TLS/SSL. From NTRIP/RTK Configurations Advanced screen you can indicate that you would like to use a TLS/SSL connection to your NTRIP service provider. Your NTRIP service provider will let you know if you need to use this option.



To connect with TLS/SSL,

1. Select **Use TLS/SSL Connection**.
2. Tap **Save**.

Use Proxy Server. From NTRIP/RTK Configurations Advanced screen you can direct Geode Connect to use a proxy server. You may need to use a proxy server if a network firewall blocks the port that your NTRIP service is using.

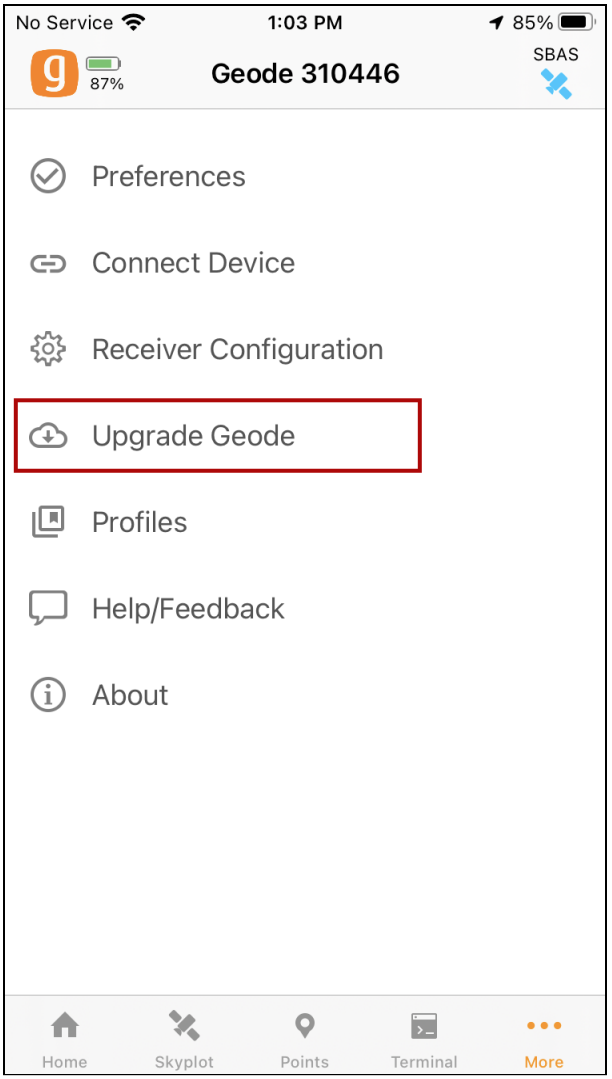


To use a proxy server,

1. Select **Use Proxy Server**.
2. Enter the proxy server information.
3. Tap **Save**.

5.5.4 Upgrade Geode

On the Upgrade Geode screen, you can request a quote for upgrades, activate your upgrades, or extend a subscription.



You can apply upgrades via activations or subscriptions.

- **Activations** include a one-time upgrade to apply a new feature to the product. The available activations include increased output rates, multi-frequency, and Atlas basic L-band corrections.

- **Subscriptions** include time-based purchases of an H10 or H30 Atlas L-band correction service.

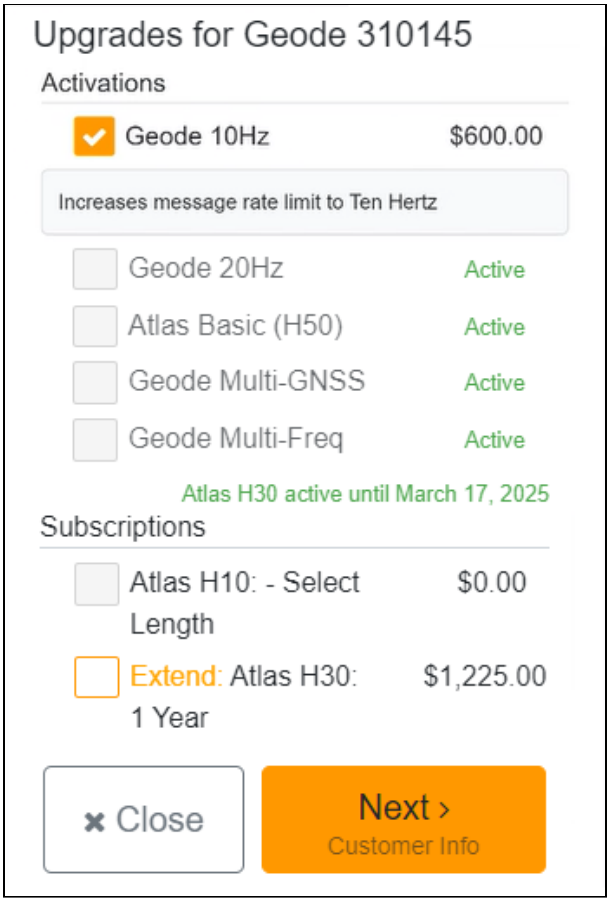
This screen can also be accessed from under **Receiver Configurations** > **Manage Subscriptions**.

Request a Quote

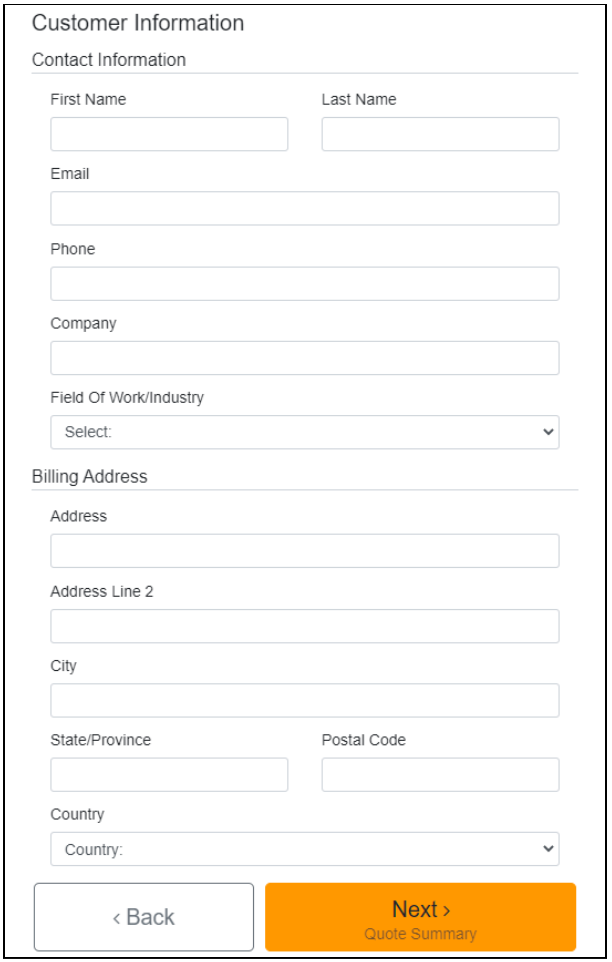
To request an activation or subscription quote,

1. Select the check box next to one or more activation or subscription.
2. Select **Next**.

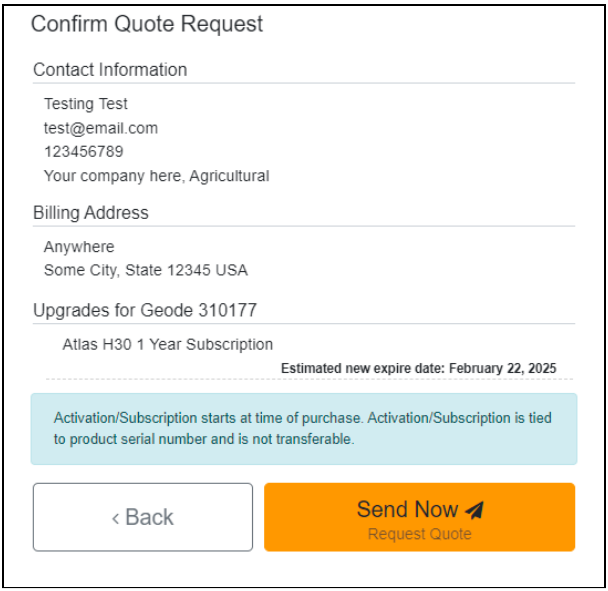
   Note: If you have a single-frequency Geode, the only activations available are 10 Hz and 20 Hz.



3. Enter your contact information.
4. Tap **Next**.

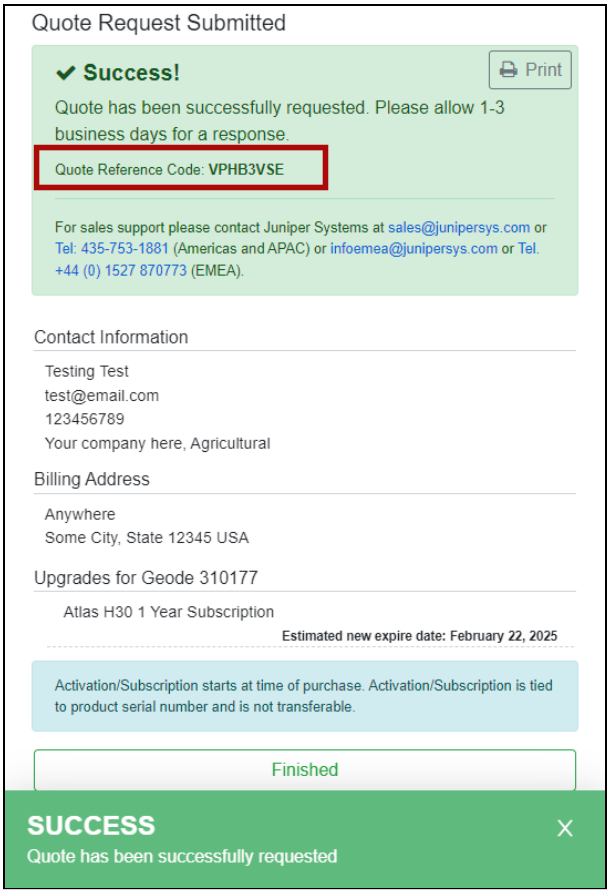

Customer Information
Contact Information
First Name
Last Name
Email
Phone
Company
Field Of Work/Industry
Select:
Billing Address
Address
Address Line 2
City
State/Province
Postal Code
Country
Country:
‹ Back
Next ›
Quote Summary

5. On the Quote Summary screen, verify your information is correct and then select **Send Now**.



An email requesting your quote will be sent to Juniper Systems and a representative will contact you.

When the request email is sent, you will receive a Quote Reference Code. This code can be used to reference your request if you encounter any problems and need to contact Juniper Systems.

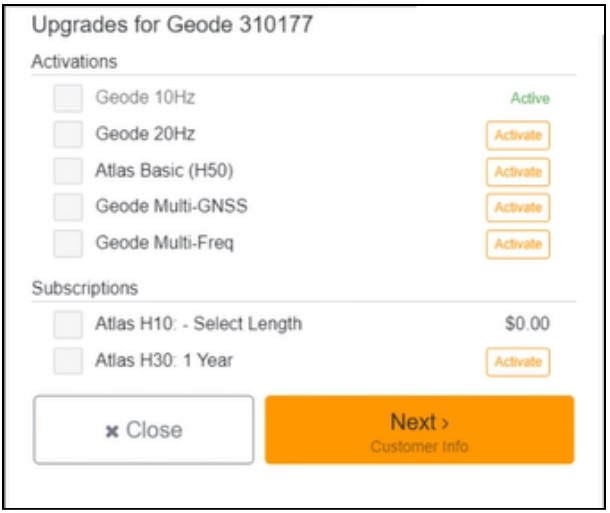


Activate Upgrade

If you have already purchased an activation or subscription you will need to activate it in Geode Connect.

1. Verify your device is connected to the GNS3 and the internet.

2. In the activations list, tap the yellow activate option next to the upgrade you would like to activate.

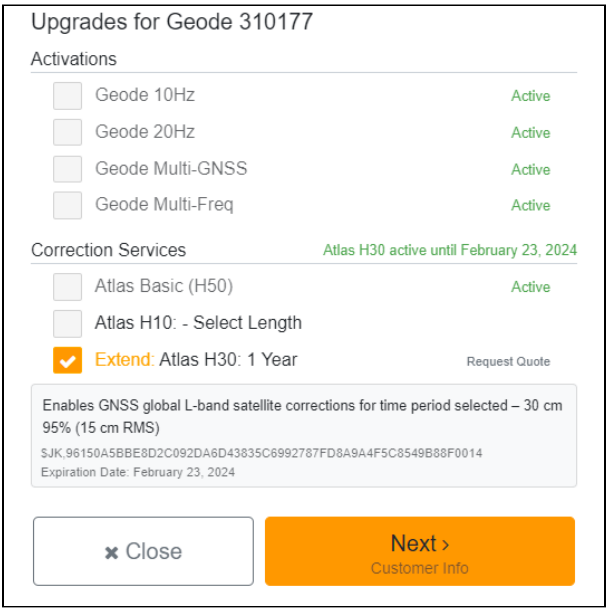


Extend a Subscription

To extend your current subscription,

1. Select the check box next to your subscription. It will be marked with a yellow “Extend.”

2. Select **Next**.

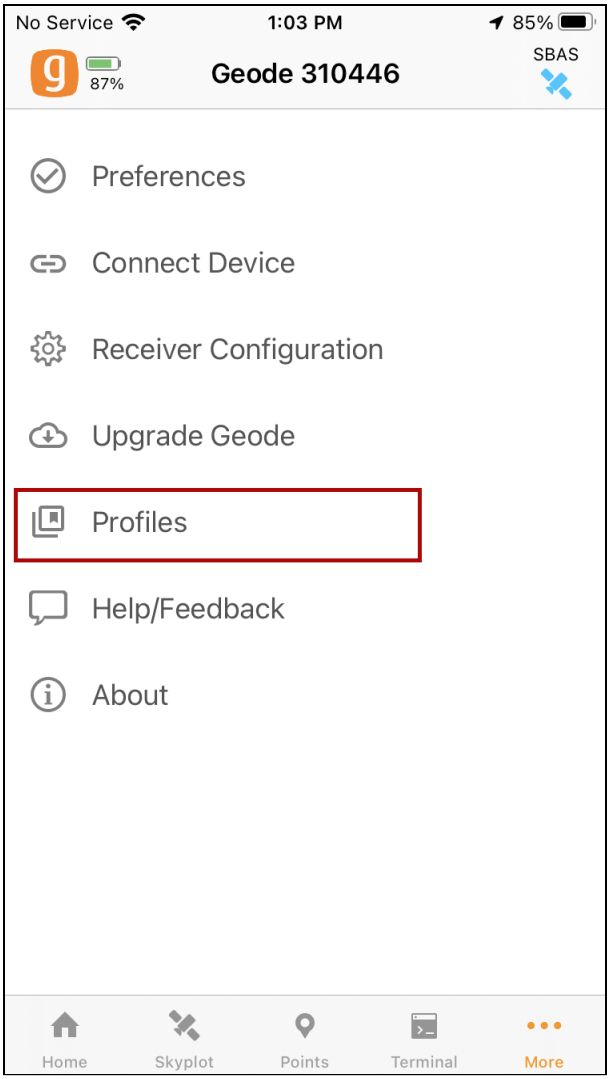


3. Request a quote for the subscription by following the process listed in the **Request a Quote** section above.

If you purchased the subscription previously, you can activate the subscription for your GNS3 on this screen as well.

5.5.5 Profiles

A profile is an easy way to save and apply the configuration settings that fit a specific project or application. Open the Profiles screen to manage the configuration profiles for your GNS3 receiver.


No Service
1:03 PM
85%
87%
Geode 310446
SBAS
Preferences
Connect Device
Receiver Configuration
Upgrade Geode
Profiles
Help/Feedback
About
Home
Skyplot
Points
Terminal
More

Profiles Screen

For instructions on adding or editing a profile, see Profiles in 5.5.3 Receiver Configuration.

Delete a Profile

To delete a profile,

1. Tap the delete icon  next to the profile you want to delete
2. Tap **Delete** to confirm the profile deletion.

Export a Profile

You can export a profile as a .JSON file and use it on other GNS3 receivers.

To export a profile,

1. Tap the export profile icon  next to the profile you want to export.
2. Select the desired file location.

Import a Profile

You can import a profile saved as a .JSON file.

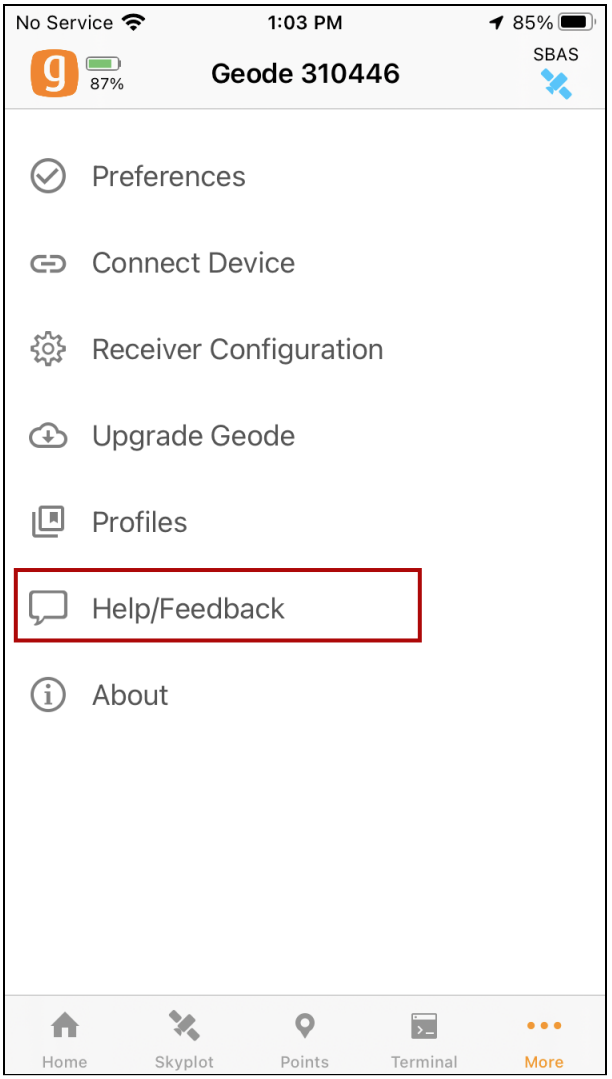
To import a profile,

1. Tap **Import Profile**  .
2. Locate the profile you want to import.

The imported profile is automatically applied to the active connection port.

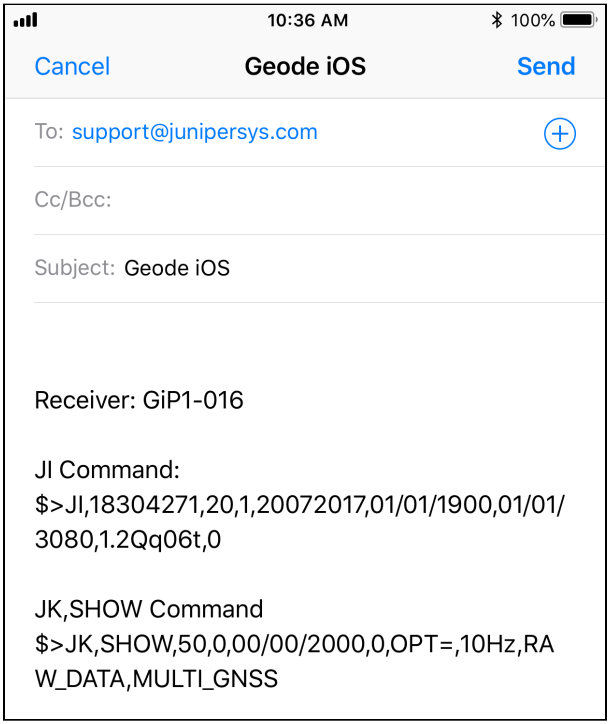
5.5.6 Request Help and Send Feedback

On the Settings screen, tap **Help/Feedback**.



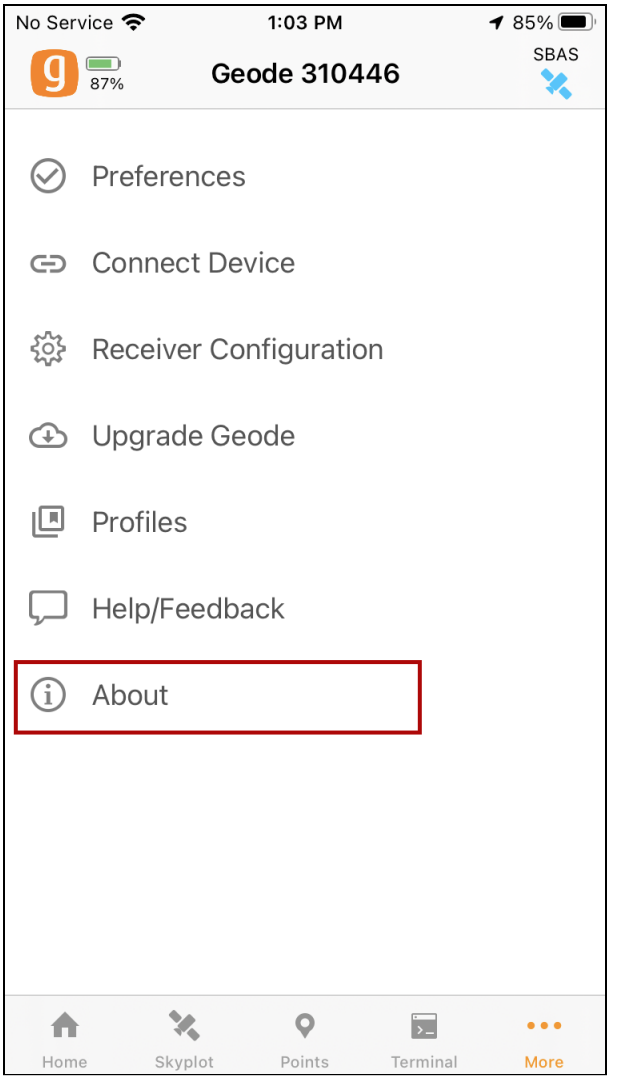
This feature links directly with the email account configured on your device and opens an email addressed to Juniper Systems Support. The email includes detailed configuration commands from the Geode. This allows Juniper Systems Support to diagnose and solve the problem more efficiently. This info is also used when purchasing a feature upgrade for the Geode.

You can enter additional information into the email to provide a further explanation about your issue.



5.5.7 About

The About screen shows the Geode Connect version currently in use.


No Service
1:03 PM
85%
87%
Geode 310446
SBAS
Preferences
Connect Device
Receiver Configuration
Upgrade Geode
Profiles
Help/Feedback
About
Home
Skyplot
Points
Terminal
More

geode™

GNS3 Receiver

CHAPTER 6

6 Set Up Geode Connect for Android

As a configuration and communication utility for the Geode GNS3 GNSS Receiver, Geode Connect provides you with the ability to establish communications with the Geode; change receiver settings; and view position, altitude, estimated horizontal error, differential status/fix information, speed, heading, satellites in fix, correction signal, and PDOP.

This chapter gives an overview of the features included in Geode Connect for Android. It gives details about specific settings that can optimize the Geode's precision, accuracy, and reliability, depending on the situation and environment. It also gives specific instructions about the nuances of using the Geode with the Android operating system and third-party apps.

6.1 Download and Install

Geode Connect is available for download on Google Play and the Juniper Systems website.

6.1.1 Google Play

Search for Geode Connect on Google Play. Install according to device instructions.

6.1.2 Juniper Systems Website

If your device cannot access Google Play, the app is also available on the Juniper Systems website.

1. Go to www.junipersys.com/support/geode/downloads.
2. Select Geode Connect for Android.
3. Download the APK file and follow the instructions on your device to install the app.

6.2 Connect with the Geode

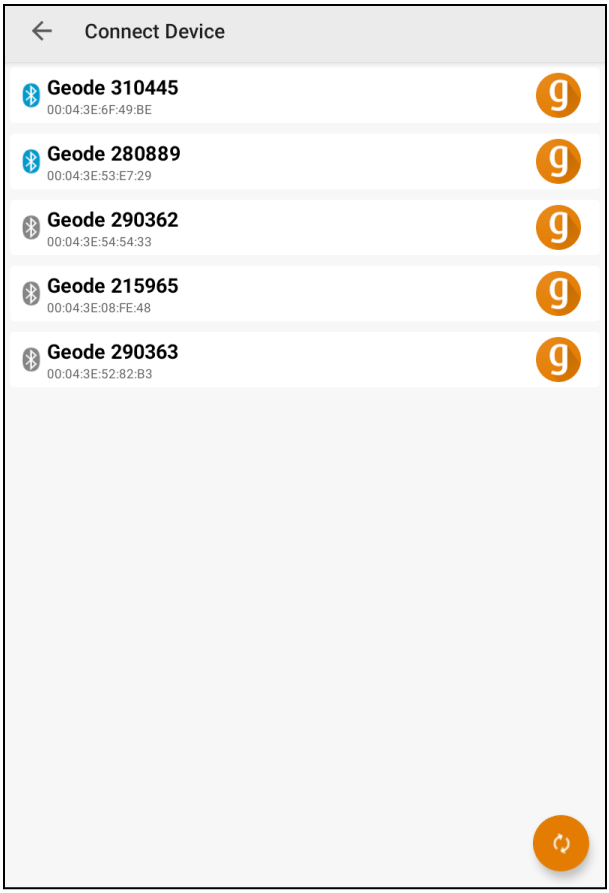
Android devices can use Bluetooth to pair with the Geode directly in Geode Connect:

1. Power on the Geode.
2. Make sure Bluetooth wireless is enabled on your Android device.

For devices using Android 12 and below, make sure that Location is enabled.

3. Open Geode Connect.
4. Tap the Geode icon with a slash through it in the top left corner. Tapping this icon will allow you to connect, disconnect, or change your device.

If the Android device was paired to the Geode previously, it will connect automatically.



The app will display a list of local Bluetooth wireless devices. Identify your Geode via the serial number printed on its bottom panel.

5. Tap the name of the Geode you wish to pair with.

   Note: If your Geode doesn't show up in the list of devices, check to make sure it is turned on and not paired with another device. Then tap the refresh icon at the bottom of the list of devices .

6. Follow the prompts to finish pairing the Geode with your device.

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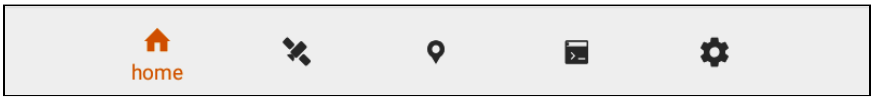
GNS3 Receiver

CHAPTER 7

7 Learn Geode Connect for Android

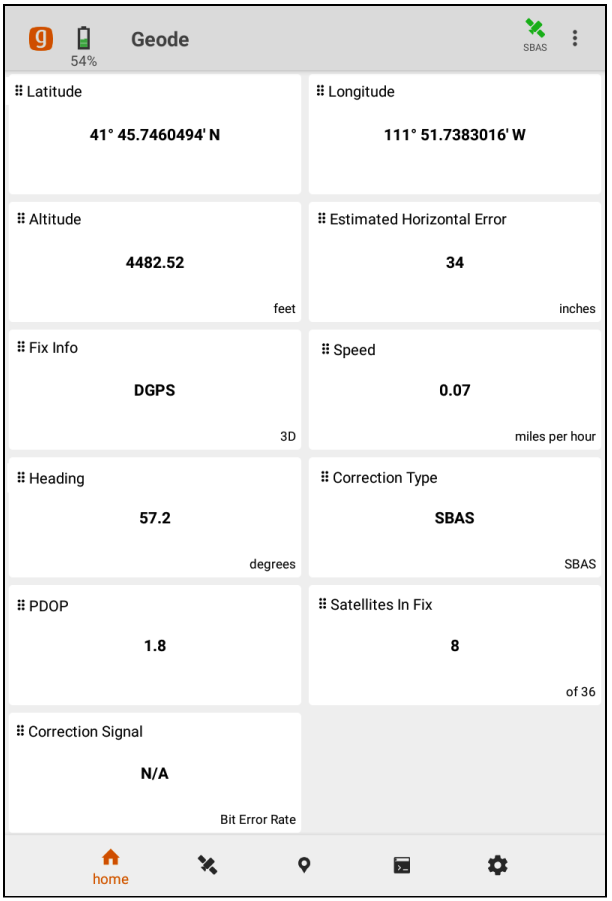
Geode Connect is a utility app that allows you to customize and fine-tune the Geode to your specific project or application. Each screen in Geode Connect serves one of three primary functions: configuration of the Geode, validation of Geode accuracy, or changing Geode Connect settings. Though it does have some limited data-capture features, these are included only for demonstration purposes. Geode Connect is not intended to replace your data-collection app.

7.1 Home



The Home screen for Geode Connect serves as a dashboard for the Geode receiver. On this screen, you can view connection status, correction mode, and positioning data. It displays latitude, longitude, altitude, estimated horizontal error, fix info (GPS, DGPS, RTK, and so on), speed, heading, number of satellites in fix, PDOP, and correction signal.

You can drag and drop each box to reorganize the screen to your preference.

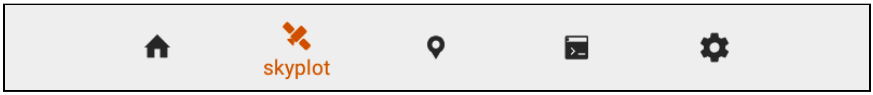


From the toolbar at the bottom of the screen, you can access the Skyplot, Location, Terminal, and Settings screens. Open the menu to view preferences and open additional screens. For more information on these options, see Settings.

Tap the orange Geode icon in the top left corner to disconnect or change your GNSS receiver.

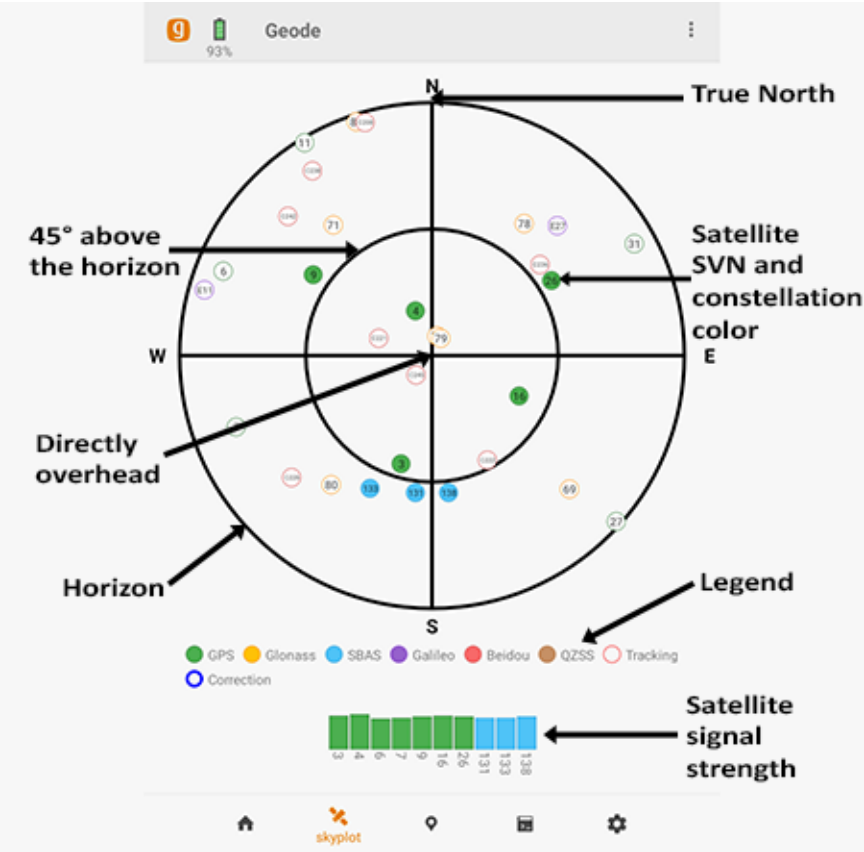
Next to the icon is the battery charge indicator, the name of the Geode to which you are connected, and the active correction type (SBAS, NTRIP/RTK, or Atlas). The satellite icon in the top right corner will tell you which correction service you are using, and it will turn green when you are connected. If you have enabled the RD1 NMEA sentence, the satellite icon color changes relative to the signal quality. For more information, see Atlas Correction Service.

7.2 Skyplot



The Skyplot screen shows which satellites are being used in the positioning solution and where they are in the sky. It also shows satellites that are being tracked by the Geode.

On the Skyplot screen, each satellite is identified by a space vehicle number (SVN) and color for its constellation. The location of each satellite on the
Skyplot indicates where its location in the sky relative to true north. The outside ring is 0° elevation (horizon). The inside ring is 45° elevation—halfway above the horizon from the Geode's present location. The intersection of the two lines indicates directly overhead.



Satellite symbols outlined in red indicate that the satellites are being tracked, but they are not yet a part of the positioning solution. Satellite symbols outlined in blue indicate that a correction is being applied to the signal.

Multi-GNSS Geode models support the Galileo, BeiDou, GPS, QZSS, SBAS, and GLONASS constellations.

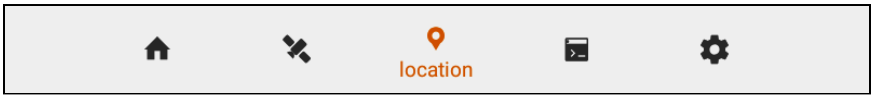
The Skyplot screen is meant to be used as a guide. It shows the relative visibility of satellites in the sky, but it is not an absolute reference for satellites used in the positioning solution.

If the Skyplot screen is not displaying data,

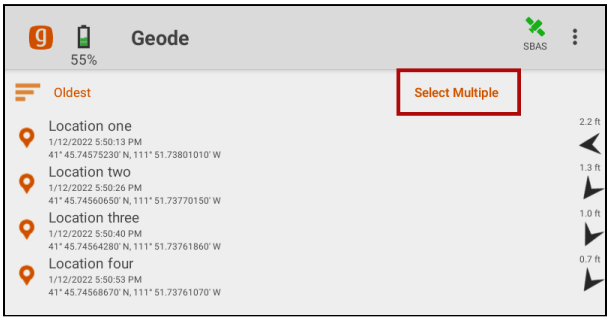
1. Go to the Settings screen by tapping the gear icon in the navigation bar.
2. Select **Receiver Configuration**.

3. Under Active GNSS Constellations, select **Multi-GNSS**.
4. Under NMEA Sentences, select **GSV**.
5. Tap the save icon .

7.3 Location



The Location screen includes the waypoint capture screen, which allows you to demonstrate point capture and share captured data as CSV, KML, or KMZ files. This feature allows you to validate the accuracy of the Geode without requiring the use of a third-party app.



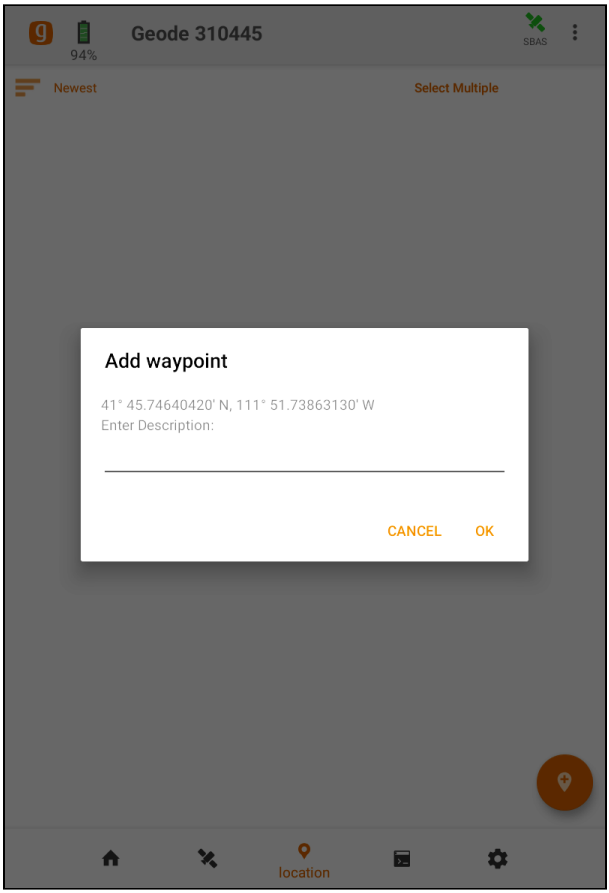
7.3.1 Capture Waypoints

Geode Connect for Android only records waypoints if the following NMEA sentences are activated: GSA, RRE, and GGA. (See NMEA Sentences for instructions on how to enable NMEA sentences.)

To capture a waypoint,

1. With the Geode in the position you would like to capture, tap the waypoint icon .

A waypoint with your location will be added to your list.

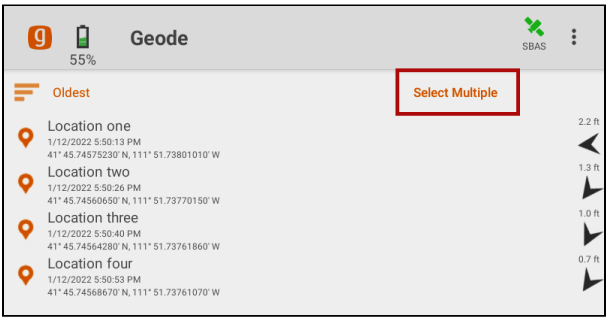


2. Type a description or name for the waypoint (optional).
3. Tap **OK**.

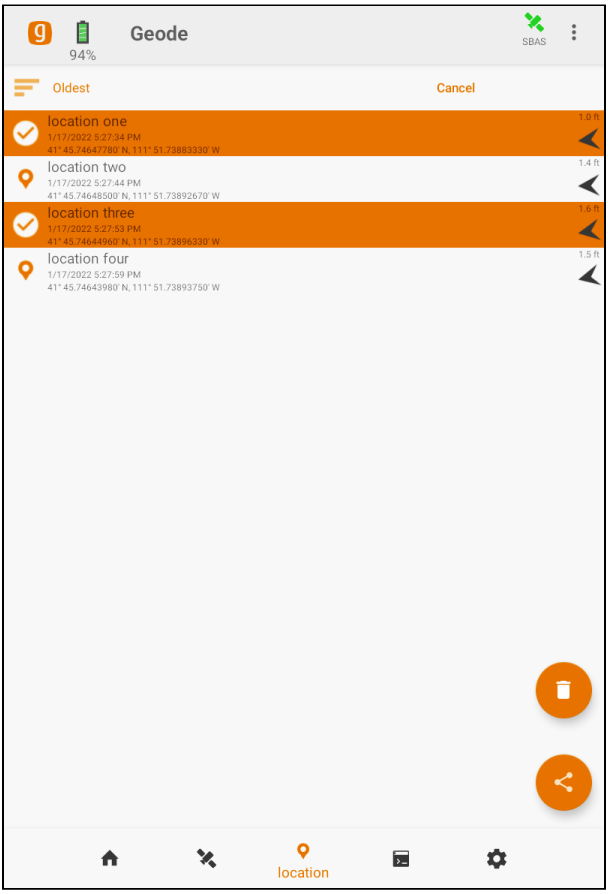
7.3.2 Delete Waypoints

To delete waypoints,

1. In the upper right corner, tap **Select Multiple**.



2. Select the waypoint(s) you want to delete.

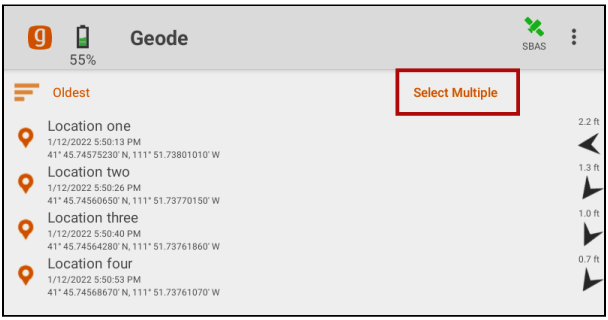


3. Tap the trash icon .
4. Tap **Delete**.

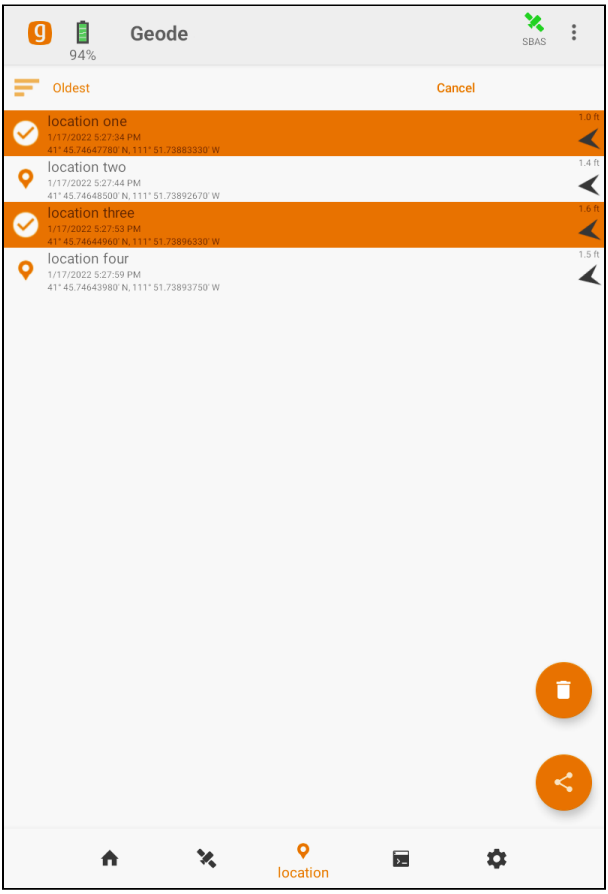
7.3.3 Share Waypoints

To share waypoints,

1. In the upper right corner, tap **Select Multiple**.

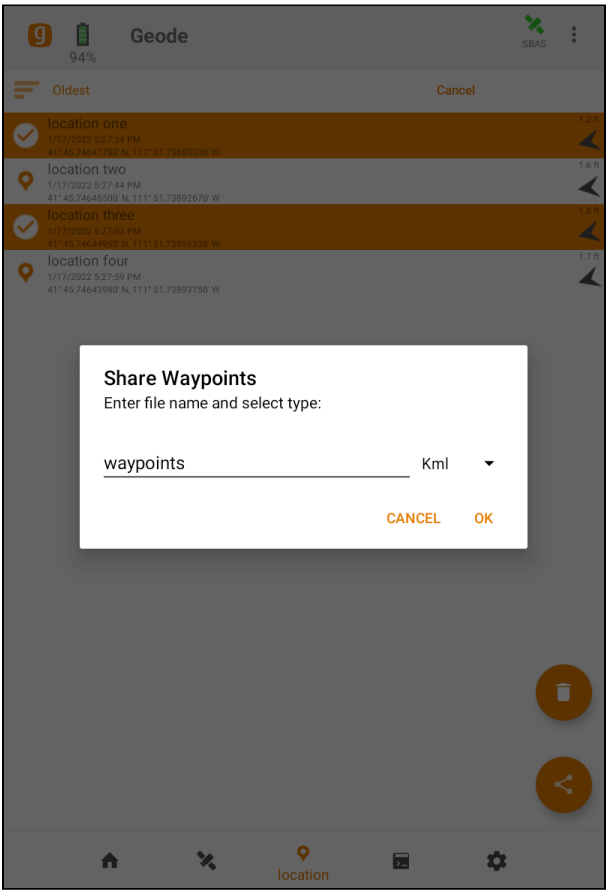


2. Select the Waypoint(s) you want to share.



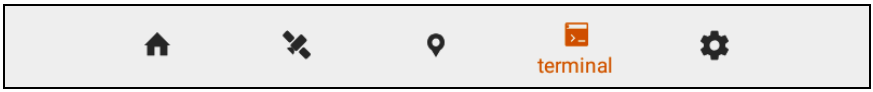
3. Tap the share icon .
4. Name the waypoint file.

5. Choose the file type: CSV, KML, or KMZ.



6. Tap **OK**. Geode Connect will package the waypoints in the file type chosen and prompt you to use your device to share the file.
7. Choose the app you would like to use to share the file.
8. Follow the instructions on your device to finish the file share.

7.4 Terminal



The Terminal screen displays the NMEA sentences the Geode is receiving. It provides the options to show timestamps (top center), pause the stream (top right), or capture and save the data (bottom right).

This screen also gives you flexibility to configure the Geode and customize data output.

Tap the plus icon + to reveal the following options:

- To capture data received by the Geode, tap the play icon Tap it again to stop logging data.
- To view saved data logging files, tap the folder icon .

  Tap the three vertical dots to the left of a log file to delete or share it.

- To send a command to the Geode, tap the command icon . The dialog box will offer Show/Hide Log as the default command.

For a comprehensive list of commands and messages that can be used to configure the Geode, please refer to technical documentation provided by Hemisphere GNSS.

1. Go to https://hemispheregnss.com/ > **Resources & Support** > **Technical Documentation**.
2. Select the Technical Reference Manual (it may include a version number).

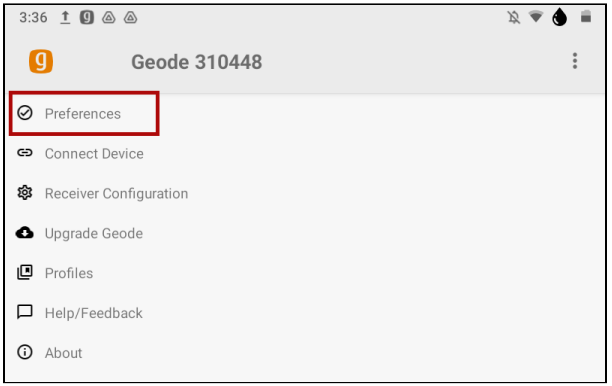
⚠CAUTION: Use at your own risk. It is possible to cause communication or other errors in the Geode that may require technical assistance to repair.

7.5 Settings

The Settings screen provides options for the configuration of the Geode receiver and Geode Connect settings. The following sections describe each of these options.

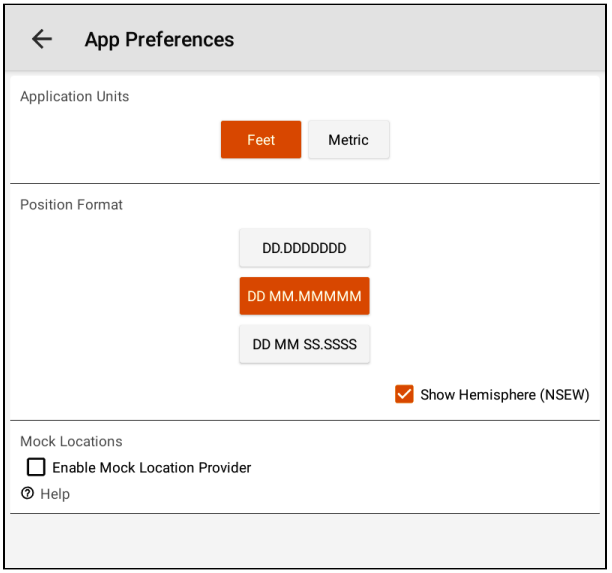
7.5.1 Preferences

The Preferences screen allows you to customize your preferences for how information is displayed in Geode Connect.



Under Preferences, you can change the application units, posi-

tion format, specify whether the app will show the hemisphere, or enable mock locations.



Note: Changes must be saved in order for them to remain from screen to screen. If the save icon in the lower right corner of the screen is orange, this means there has been a change that needs to be saved. Tap the save icon to save changes .

Enable Mock Locations

When using the Geode with Android devices, some third-party mapping and data-collection apps connect directly with the Geode through the Bluetooth wireless port. Some apps depend on the Android operating system to provide positioning data.

If you are using the Geode, it is because your project demands precision GNSS. However, if your app is depending on the operating system of your device, it may be collecting data via the consumer-grade receiver in your phone or tablet—not the Geode.

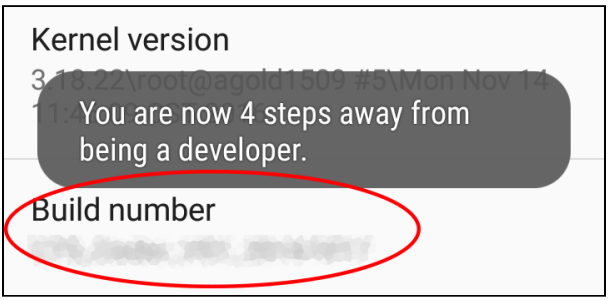
The best way to figure out where your app is getting its positioning data is to take a moment to examine the app. If the app allows you to directly choose an external receiver, you can select

the Geode and trust the app will rely on the Geode. If the app provides no option for choosing an external receiver, it is most likely relying on the Android operating system for its data. You will need to activate Geode Connect as a mock location provider in order for the app to collect data via the Geode. To do this, you will need to enable developer options in the Android OS, configure Geode Connect as a mock location provider, and test the mock location provider.

Enable Developer Options in the Android OS

Changing the mock location provider is a developer option. All developer options in Android are disabled and hidden by default. The first thing you have to do is tell Android that you are a developer:

1. From the Android home page, go to **Settings** > **About phone** (or **About Tablet**).
2. Tap Build Number seven (yes, seven) times. This will unlock the Developer options.



Note: Build Number may not look like you can tap on it. Tap on it anyway. After three taps, Android will prompt you to continue becoming a developer.

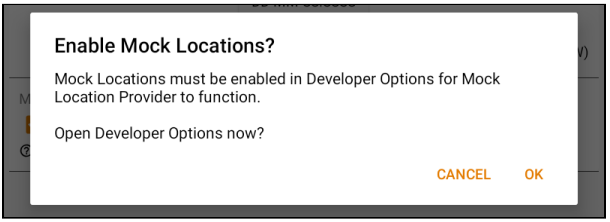
Once you are a developer, close the Android settings and open Geode Connect.

Configure Geode Connect as a Mock Location Provider

For the data received by the Geode to replace the data being received by the device's GNSS receiver, you will need to set up Geode Connect as a mock location provider.

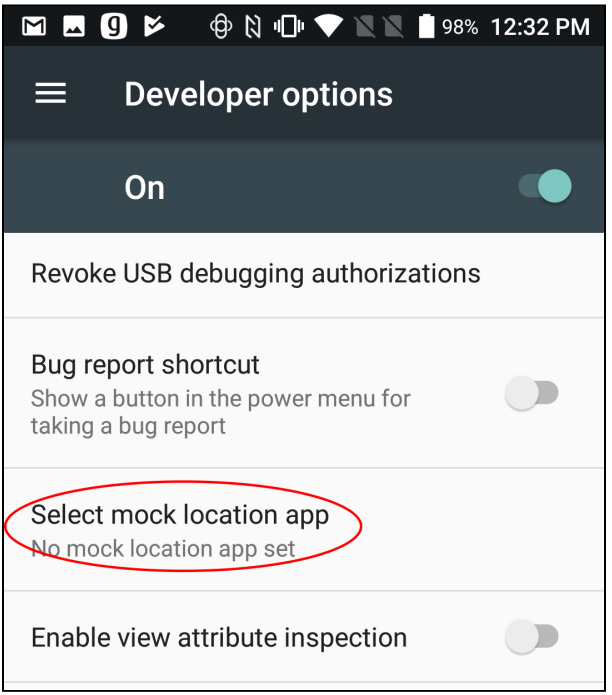
To set up the mock location,

1. In Geode Connect, go to **Menu** > **Preferences**.
2. Select the box for **Enable Mock Location Provider**.
3. Geode Connect will prompt you to open Developer Options.
4. Tap **OK**.



5. Geode Connect will open Developer Options so that you can set the mock location provider.
6. Tap **Select mock location app**. (In older versions of Android, the option is **Allow mock locations**, and it does not

ask you for a specific app.)



7. Tap **Geode Connect** in the list of possible apps.
8. Tap the Android back button to return to Geode Connect.

Test Mock Location Provider

After configuring Geode Connect as your mock location provider, test to make sure your app is now getting its data from the Geode.

Both of the following tests require that the Geode is on and has had time to build its initial almanac, usually 25 minutes after it has been turned on for the first time outside.

One-Person Test:

1. Connect the Geode to your Android device via Bluetooth wireless technology in Geode Connect.
2. Verify that Geode Connect has been set as the mock location provider.

3. Leave Geode Connect open.
4. Place the Geode in one stationary position. Do not move it.
5. Open your mapping or data-collection app.
6. Holding your phone or tablet, walk five to ten paces out and then walk in a circle around the Geode.

If the position in the data-collection app does not change significantly (remember, the Geode is just sitting there), the app is drawing its data from the Geode. You can continue to use the app and the Geode without any worries.

If the position moves in a circle, the app is drawing its data from your Android device's internal GPS receiver. Make sure all mock location provider settings have been properly configured.

Two-Person Test:

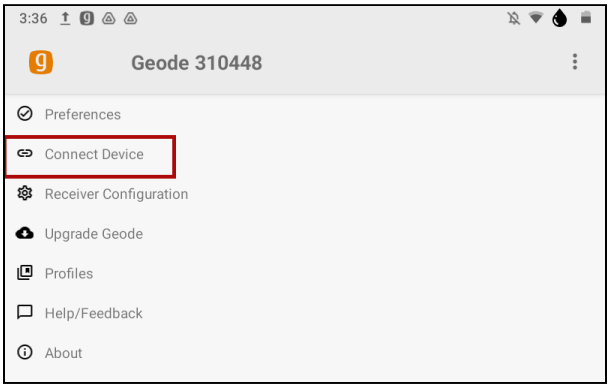
1. One person holds the Geode, and the other person holds the Android device.
2. Connect the Geode to your Android device via Bluetooth wireless technology in Geode Connect.
3. Verify that Geode Connect has been set as the mock location provider.
4. Leave Geode Connect open.
5. Open your mapping or data-collection app.
6. The person holding the Android device remains stationary.
7. The person holding the Geode walks five to ten paces out and then walks in a circle around the person holding the Android device.

If the position moves in a circle, the app is drawing its data from the Geode and the mock location provider is functioning as it should.

If the position does not change, the app is drawing its data from your Android device's internal GPS receiver. Make sure all mock location provider settings have been properly configured.

7.5.2 Connect Device

The Connect Device screen allows you to connect your Android device to the Geode.

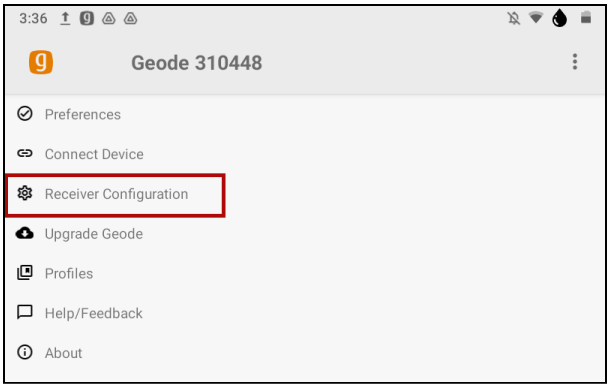


For more information, see Connect with the Geode.

7.5.3 Receiver Configuration

Note: The Receiver Configuration options are only available if you are actively connected to a Geode receiver. Changes saved on these screens are changes made to the Geode receiver, and these changes apply to all navigation and data collection apps using the Geode receiver.

From this screen, set up the Geode to meet the needs of your project or application.



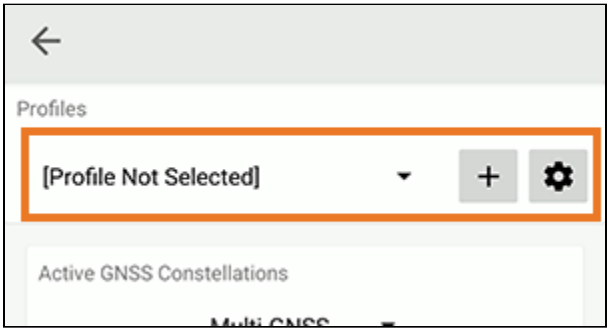
Tap **Help** to view detailed descriptions of the settings.

Profiles

A profile is a set of predefined GNS3 receiver settings that meets the needs of a specific project or application. You can have multiple profiles to fit different use cases.

Under Profiles, view the active profile. If no profile is selected, “Profile Not Selected” displays. To change the active profile, tap

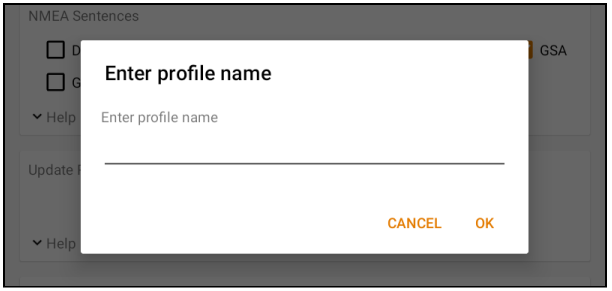
the drop-down arrow and select from the list of available profiles.



Add a Profile

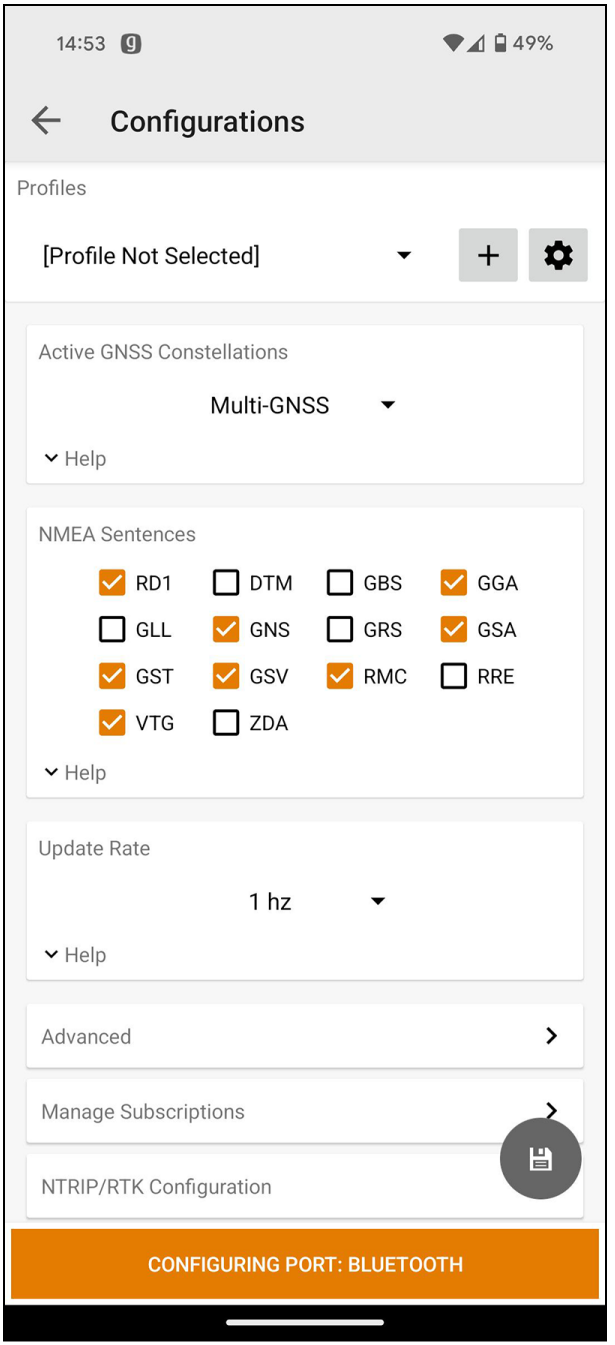
To add a profile,

1. Under Profiles, tap the new icon +.
2. Enter the profile name and tap **OK**.



3. Select the appropriate settings for active GNSS constellations, NMEA sentences, and update rate. Expand an area to view additional advanced settings, to manage subscriptions, and to configure NTRIP/RTK.
4. Tap **Save**.

The new profile will be created based on the current receiver settings. Any changes you make to the receiver settings will be applied to the current profile.


14:53
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Configurations
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[Profile Not Selected]
Active GNSS Constellations
Multi-GNSS
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NMEA Sentences
RD1
DTM
GBS
GGA
GLL
GNS
GRS
GSA
GST
GSV
RMC
RRE
VTG
ZDA
Help
Update Rate
1 hz
Help
Advanced
Manage Subscriptions
NTRIP/RTK Configuration
CONFIGURING PORT: BLUETOOTH

Edit a Profile

To edit a profile,

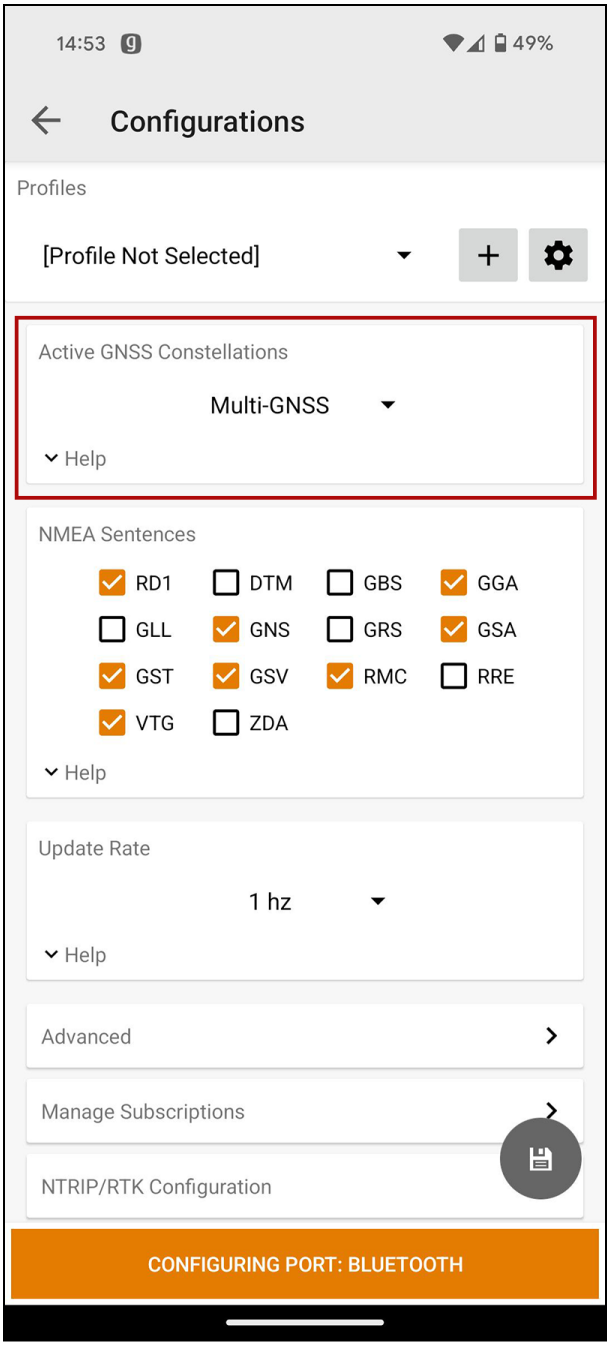
1. Under Profiles, ensure the profile you want to edit is displayed.
2. Make the desired changes to the settings, and tap **Save**.

Manage Profiles

To manage the profiles, tap the gear icon to open the Profiles screen.

Active GNSS Constellations

You can choose which GNSS constellations to use in your solution: Multi-GNSS or GPS.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[Profile Not Selected]
Active GNSS Constellations
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NMEA Sentences
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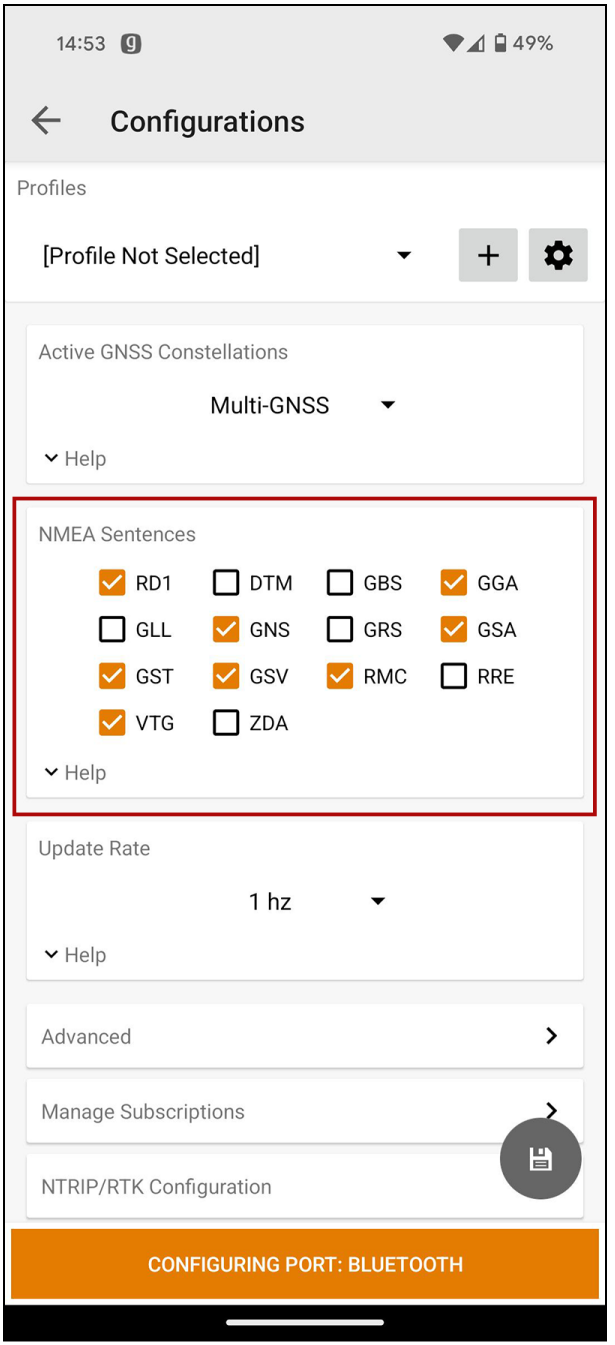
GNS
GRS
GSA
GST
GSV
RMC
RRE
VTG
ZDA
Help
Update Rate
1 hz
Help
Advanced
Manage Subscriptions
NTRIP/RTK Configuration
CONFIGURING PORT: BLUETOOTH

NMEA Sentences

You can choose which NMEA sentences you want the Geode to receive. In most instances, the default NMEA sentences are sufficient for your project or application.

Note: Changes must be saved in order for them to remain from screen to screen. If the save icon in the lower right corner of the screen is orange, this means there has been a change that needs to be saved. Tap the save icon  *to save changes .*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GSA
GST
GSV
RMC
RRE
VTG
ZDA
Help
Update Rate
1 hz
Help
Advanced
Manage Subscriptions
NTRIP/RTK Configuration
CONFIGURING PORT: BLUETOOTH

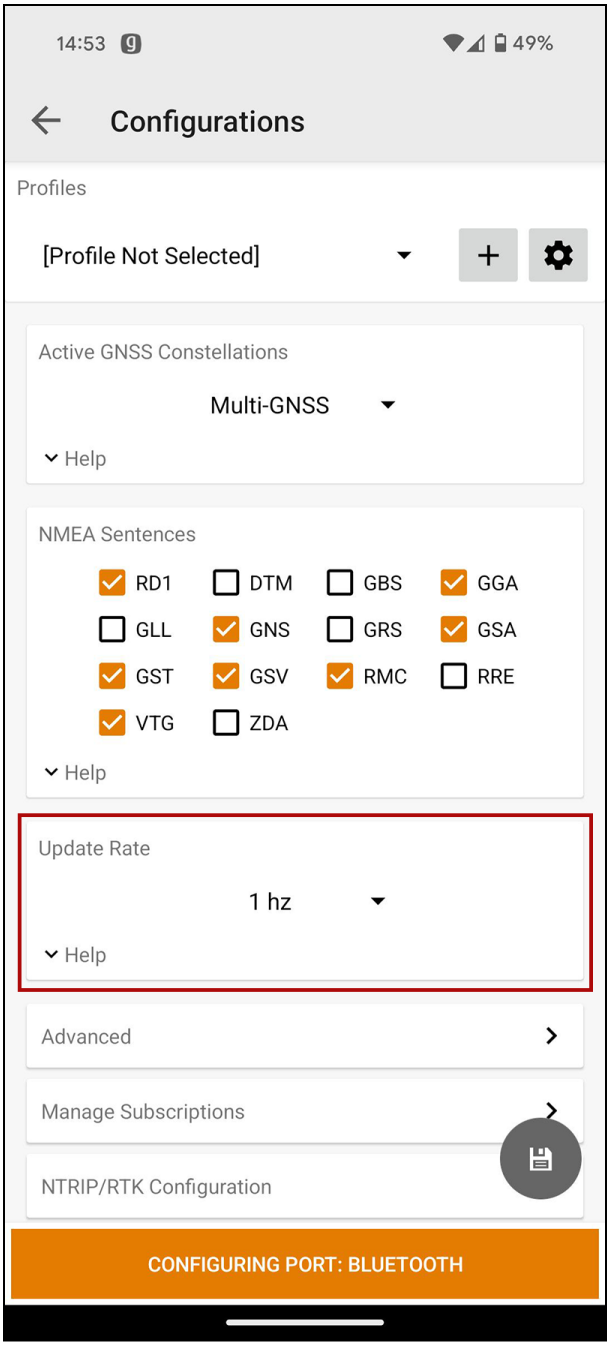
The following list explains the available NMEA sentences:

- **RD1**—Correction diagnostic message output
- **DTM**—Datum reference
- **GBS**—Satellite fault detection used for RAIM
- **GGA**—Detailed GPS position information
- **GLL**—Latitude and longitude data
- **GNS**—Fix data for a single or combined satellite navigation system
- **GRS**—GNSS range residuals
- **GSA**—GPS DOP and active satellite information
- **GST**—GNSS pseudorange error statistics
- **GSV**—GNSS satellites in view
- **RMC**—Recommended minimum specific GNSS data
- **RRE**—Range residual message.
- **VTG**—Course over ground and ground speed.
- **ZDA**—UTC time and date information

Update Rate

The update rate sets the message output rate through the active port. You can specify your preferences for the update rate. To upgrade the update rate, use the Upgrade Geode menu option.

Note: At higher data rates, we recommend turning off messages not required for your application, such as GNS, RRE, and VTG messages.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Multi-GNSS
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NMEA Sentences
RD1
DTM
GBS
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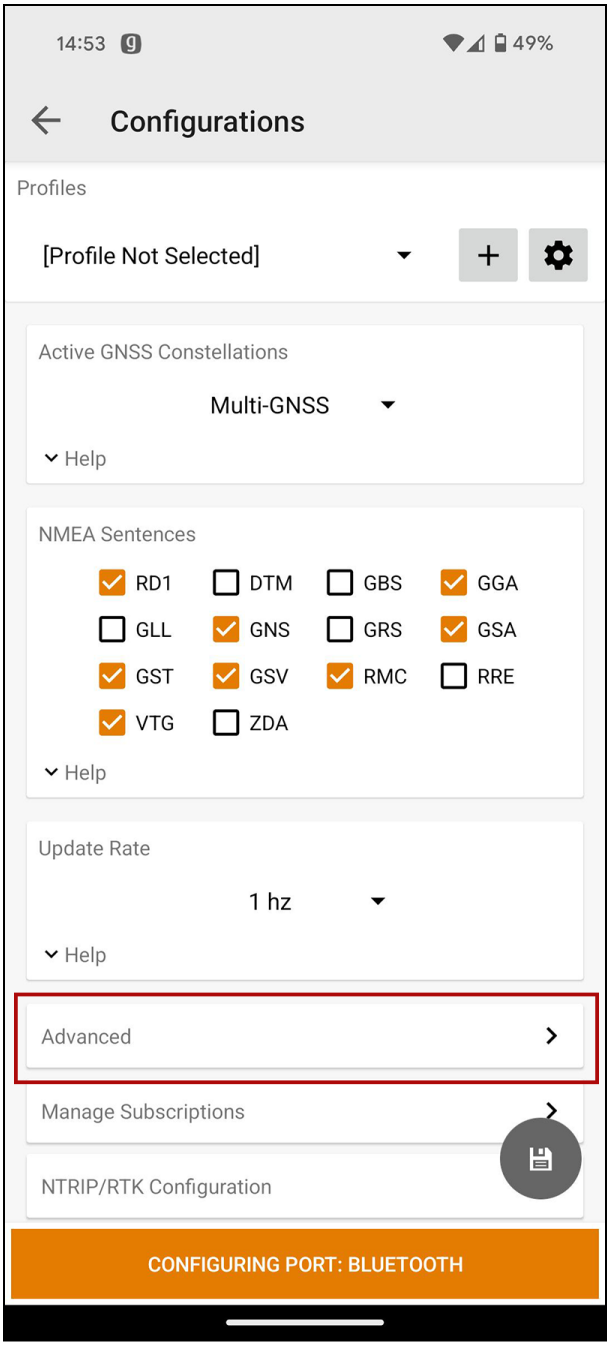
GNS
GRS
GSA
GST
GSV
RMC
RRE
VTG
ZDA
Help
Update Rate
1 hz
Help
Advanced
Manage Subscriptions
NTRIP/RTK Configuration
CONFIGURING PORT: BLUETOOTH

Advanced

The Advanced screen allows you to configure the following advanced settings for the Geode.

- NMEA Precision
- Mask Angle
- Correction Source
- SBAS
- Receiver Mode
- Battery Status Sentence
- Receiver Reset

Changes saved in the Advanced screens are made to the Geode receiver, not Geode Connect. Changes will appear in other navigational and data collection apps.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[Profile Not Selected]
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Multi-GNSS
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NMEA Sentences
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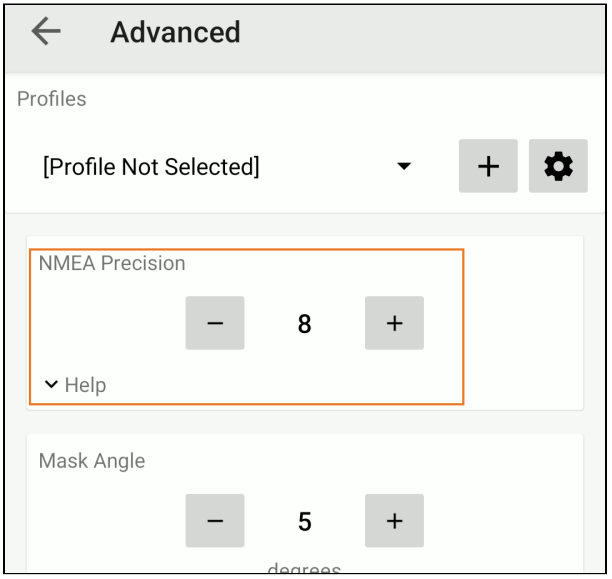
DTM
GBS
GGA
GLL
GNS
GRS
GSA
GST
GSV
RMC
RRE
VTG
ZDA
Help
Update Rate
1 hz
Help
Advanced
Manage Subscriptions
NTRIP/RTK Configuration
CONFIGURING PORT: BLUETOOTH

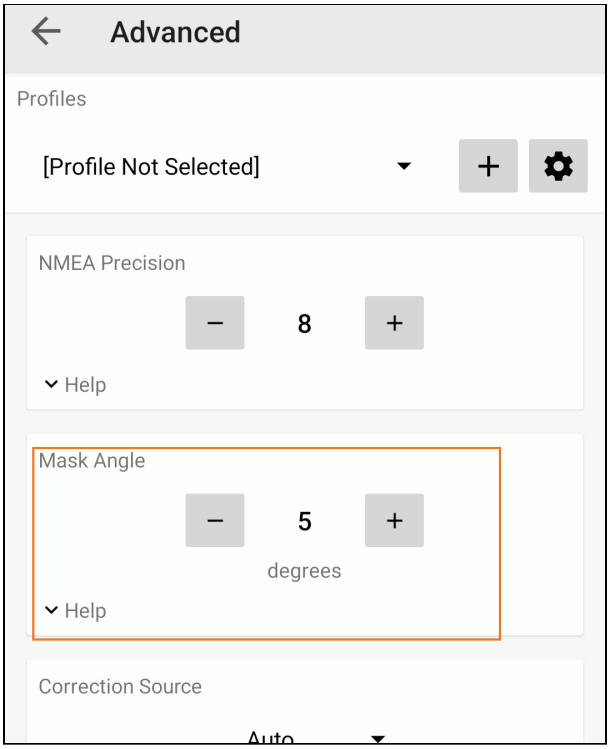
NMEA Precision

This specifies the number of decimal places to output in the GGA, GLL, and GNS messages.



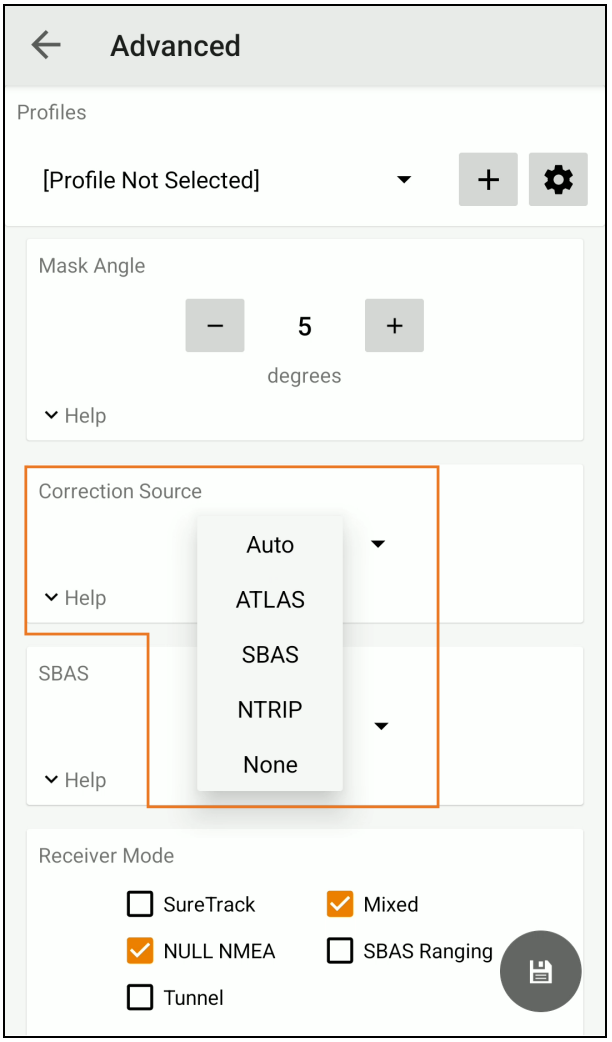
Mask Angle

This specifies the elevation mask angle cutoff for the receiver. Any satellites below this angle will be ignored, even if they are available.



Correction Source

This specifies whether the Geode should automatically choose to apply the most accurate correction source available or use only a specific correction source. The Geode's default correction source is *auto*, which means automatically search and use the best available correction service. .
Note: If the most accurate correction source changes while data is being collected, there may be significant differences between positions corrected by different methods. Because different correction sources use different reference datum, an automatic change to a different correction source may look like an error in a data set.



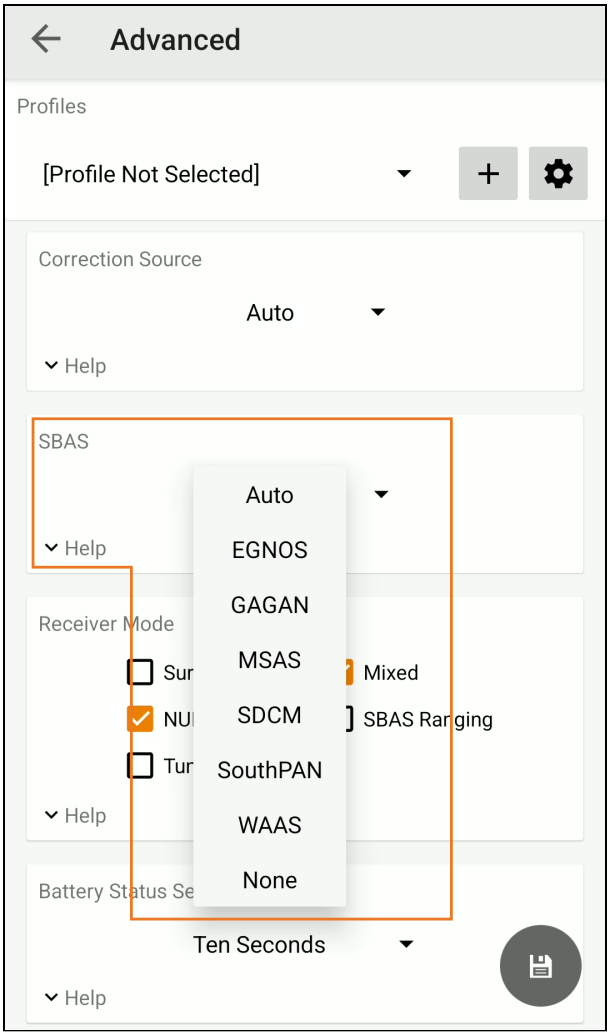
You may want to specify the correction source applied by the Geode. You can set the Geode to use any of the corrections sources listed in the table below.

Correction Source Options		
Setting	**Action**	**If signal is lost/unavailable**

Auto	Geode chooses the correction source based on the current level of accuracy	Geode will try the next option in the following order: ▪ NTRIP/RTK ▪ Atlas ▪ GALHAS ▪ SBAS ▪ None/Autonomous
NTRIP/ RTK	Geode uses corrections only from NTRIP/RTK.	Geode will not apply any correction.
Atlas	Geode uses corrections only from Atlas.	Geode will not apply any correction.
SBAS	Use corrections only from SBAS.	Geode will not apply any correction.
None	Geode does not use any corrections.	Geode will not apply any correction.

SBAS

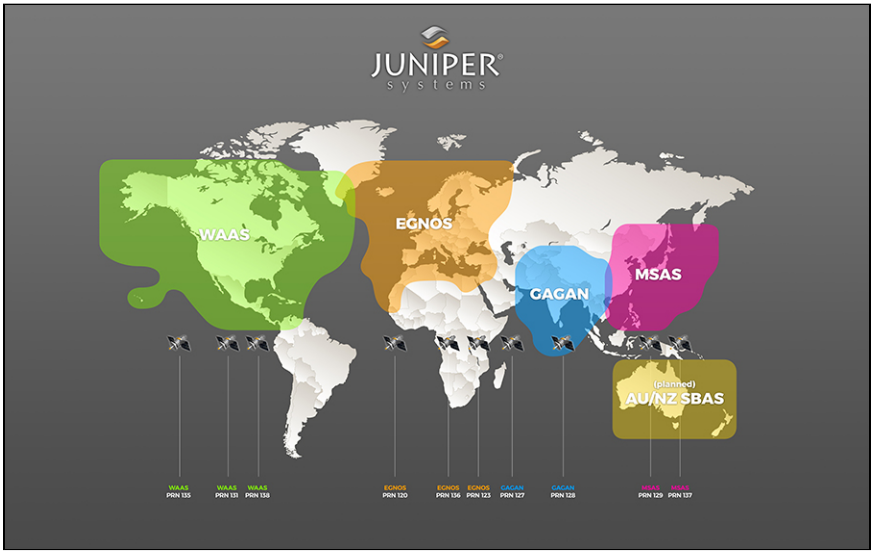
This specifies which SBAS satellites the Geode should use for GPS correction. Usually, selecting Auto is sufficient because the various SBAS services cover different geographical areas. However, there are some areas where these services overlap (see map below).



For example, if you are collecting corrected GPS positions in the Northeastern United States, the Geode may be receiving SBAS corrections from WAAS or EGNOS. If the receiver is set to Auto, it may even jump back and forth between the two.

The two services use different reference datum or models. Switching between them can cause significant error between different points of data.

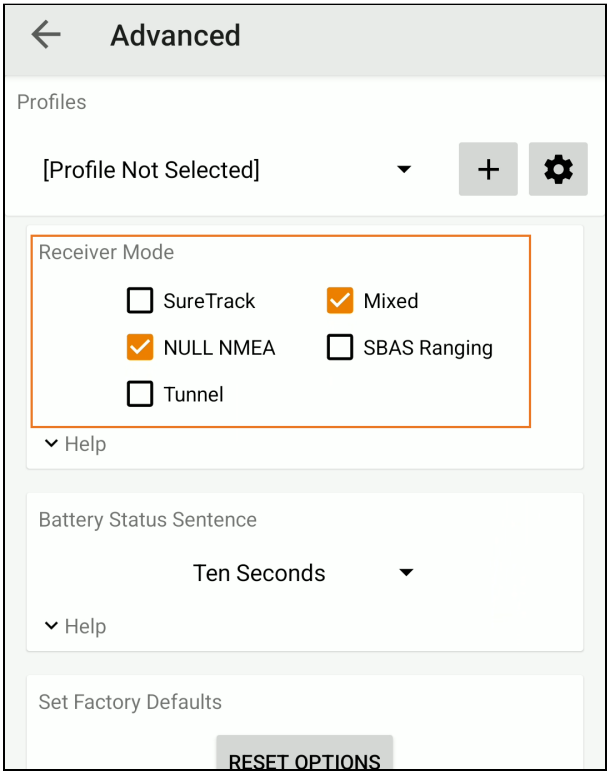
In areas of overlap, the best practice is to select a specific SBAS service the Geode should accept corrections data from.



- **Auto**—Sets the appropriate SBAS PRNs based on the autonomous GPS position.
- **EGNOS**—European Geostationary Navigation Overlay Service (Europe SBAS) PRN 120, 124, 126
- **GAGAN**—GPS Aided GEO Augmented Navigation (India SBAS) PRN 127
- **MSAS**—MTSAT Satellite Augmentation System (Japan SBAS) PRN 129, 137
- **SDCM**—System for Differential Correction and Monitoring (Russia SBAS) PRN 125, 141, 140
- **SouthPAN**—Southern Positioning Augmentation Network (Australia and New Zealand SBAS) PRN 122
- **WAAS**—Wide Area Augmentation System (North America SBAS) PRN 133, 135, 138
- **None**—SBAS corrections disabled.

Receiver Mode

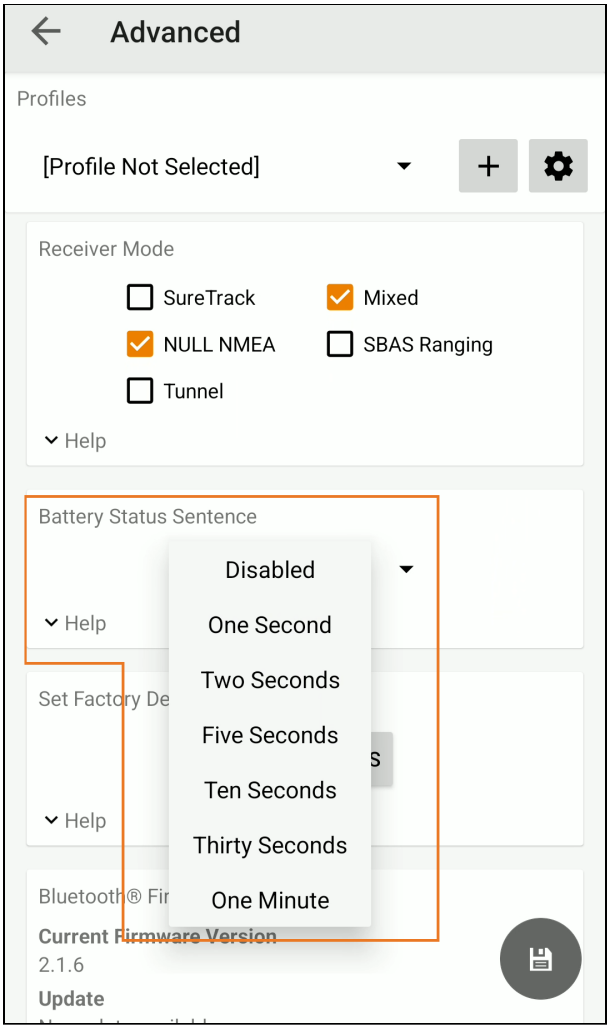
These options affect how the Geode collects and processes positioning information and how it outputs certain types of data.



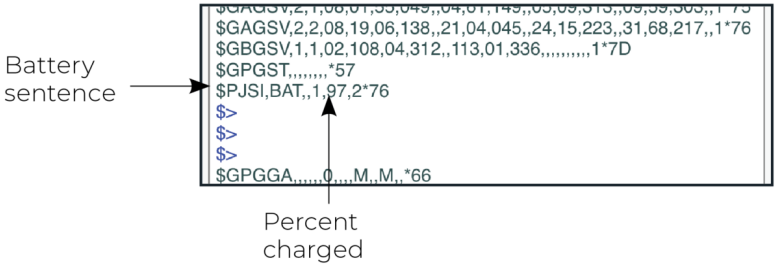
Receiver Mode Options			
Option	**Description**	**Recommendation**	**Additional Explanation**
SureTrack	Legacy feature. Only seen with GNS 1 and 2 in an older version of Geode Connect.		
Mixed	The default option. The receiver uses all GNSS satellite signals available to calcu-	The best choice for most situations. Particularly good if	

	late the position solution. This includes non-GPS satellites, which do not have DGPS or SBAS corrections. Certain NTRIP/RTK services do provide corrections for non-GPS satellites.	there is a lot of interference.	
NULL NMEA	The recevier sends a NULL NMEA message when it cannot get a fix.	Turn off if the app you are using shows your position as (0°, 0°), a location in the Atlantic Ocean west of Africa.	This option is available because different navigational apps interpret NULL messages differently. Some apps interpret a NULL message to mean that the Geode's position is (0°, 0°), which is west of Africa in the Atlantic Ocean.
SBAS Ranging	The receiver treats SBAS satellites as GPS satellites to speed up the initial position fix.	Use to speed up the initial position fix. Turn off for improved accuracy.	SBAS satellites operate in a time system distinct from that of the GPS satellites, so a position solution that includes SBAS satellites may be less accu-

			rate than a GPS-only or GNSS-only solution.
Tunnel	Faster reacquisition of the fix after coming out of a tunnel.	Use it as needed.	



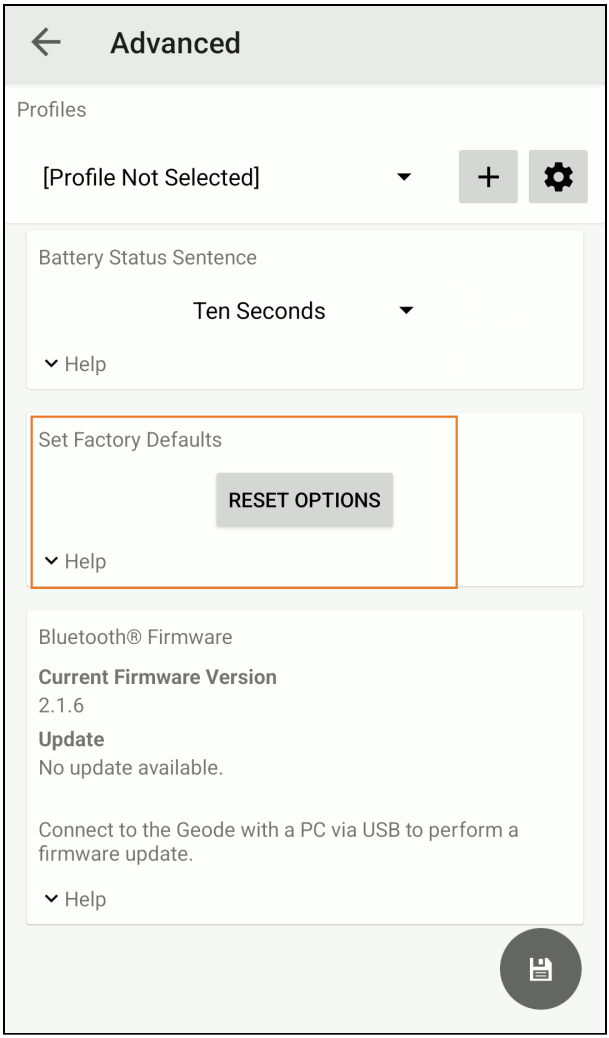
In Geode Connect, the battery status sentence looks like this:



This sentence may not be recognized by some navigation or data-collection apps. If it causes problems in an app, disable it.

Receiver Reset

Reset Options allows you to reset your Geode with a soft reset or to the factory defaults.



⚠ CAUTION: Resetting the receiver cannot be undone.

The two choices for resetting your Geode are

- A soft reset returns the Geode to default settings.
- Set factory defaults returns the Geode to the default settings and also clears the real-time clock at startup, the

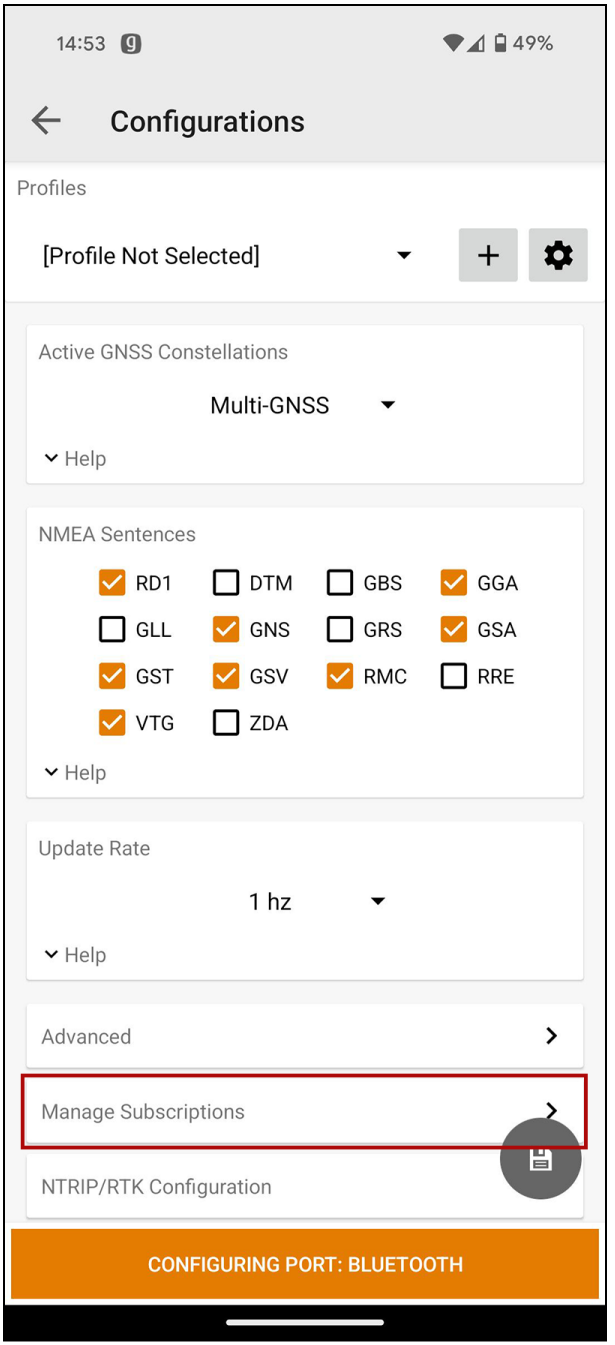
backed up ephemeris and almanac, and reboots the receiver.

Following a factory reset, the time to first fix will increase by 4–6 minutes because the Geode will re-download the data when it connects with a positioning satellite.

The two almanac messages from the GPS satellites alternate every 12.5 minutes. After setting to factory defaults, the best practice is to turn on the Geode and wait 25 minutes to ensure a complete Almanac has been stored.

Manage Subscriptions

GNS3M devices offer a subscription to Atlas. This screen allows you to view the details of your current subscription, apply unlock codes, and view the subscriptions that are available for activation.


14:53
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Configurations
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NMEA Sentences
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GGA
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GNS
GRS
GSA
GST
GSV
RMC
RRE
VTG
ZDA
Help
Update Rate
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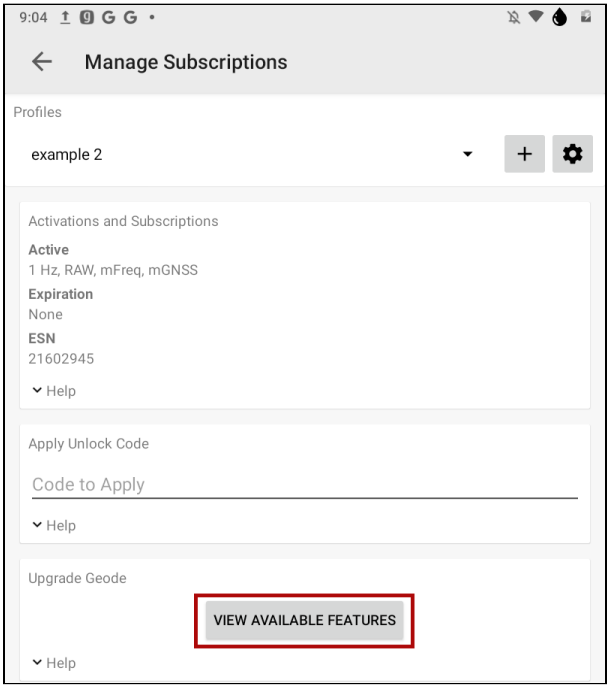
Advanced
Manage Subscriptions
NTRIP/RTK Configuration
CONFIGURING PORT: BLUETOOTH

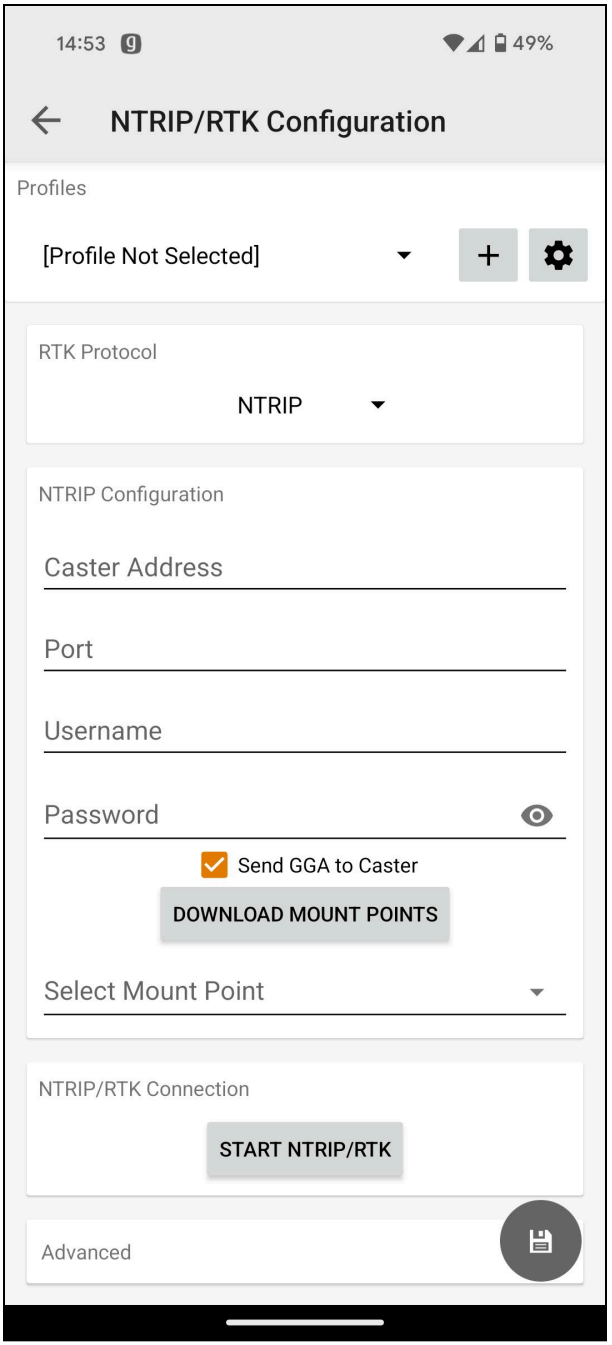
Tap **View Available Features** to apply upgrades to the Geode. For more information, see Upgrade Geode.



Configure NTRIP/RTK

Use this screen to enter the information supplied by your NTRIP/RTK service provider, including the caster IP address, port, username, and password.

Note: The picture below shows NTRIP selected as the RTK protocol. If the information from your service provider is only an IP address and port and does not include a username, password, and mount point, then choose Direct IP as your RTK protocol.


14:53
49%
NTRIP/RTK Configuration
Profiles
[Profile Not Selected]
RTK Protocol
NTRIP
NTRIP Configuration
Caster Address
Port
Username
Password
Send GGA to Caster
DOWNLOAD MOUNT POINTS
Select Mount Point
NTRIP/RTK Connection
START NTRIP/RTK
Advanced

Note: NTRIP/RTK settings are stored in the Geode Connect app, not in the Geode receiver.

NTRIP is a useful protocol for precise correction of real-time positioning solutions. (See NTRIP and RTK.)

The Geode is able to calculate an RTK Fix/Float position with sub-meter to centimeter-level accuracy. NTRIP services do require an internet or cell data connection (via your mobile device) and usually involve either a free or paid subscription to the service.

If you have a subscription to an NTRIP/RTK service, Geode Connect will allow you to configure the Geode to use that service.

Note: Save changes before leaving the screen.

To establish an NTRIP/RTK connection,

1. Ensure the handheld device you are using to host Geode Connect has a data connection.
2. Enter the identifying information supplied by your NTRIP/RTK service provider.
3. Verify “Send GGA to Caster” is checked. This tells the Geode to send its position to the caster so that the caster can locate the mount points closest to the Geode’s position.
4. Tap **Download Mount Points**.
5. Tap the drop-down menu in the Mount Points section. This will open a list of mount points in the network close to the Geode’s position.
6. Choose the appropriate mount point.
7. Tap **Start NTRIP/RTK**.

When NTRIP/RTK is connected and working, the word NTRIP and a closed green plug will appear on the right side of the Home page. Tap this icon to return to the NTRIP/RTK configuration screen at any time.

If NTRIP appears on the home page with an open orange plug, the Geode is still trying to establish a connection to the NTRIP service. The connection might take a while. If the Geode has trouble connecting, try selecting a different mount point.

To turn off NTRIP/RTK, tap the NTRIP icon in the upper right corner to go to the NTRIP Configuration screen. Select **Stop NTRIP**.

Third-Party Apps and NTRIP/RTK

When using the Geode with your device, some third-party mapping and data-collection apps may need some help connecting to an NTRIP/RTK service.

If the third-party app has built-in NTRIP/RTK capabilities, do not use Geode Connect. Simply connect to the Geode and configure NTRIP/RTK in the third-party app.

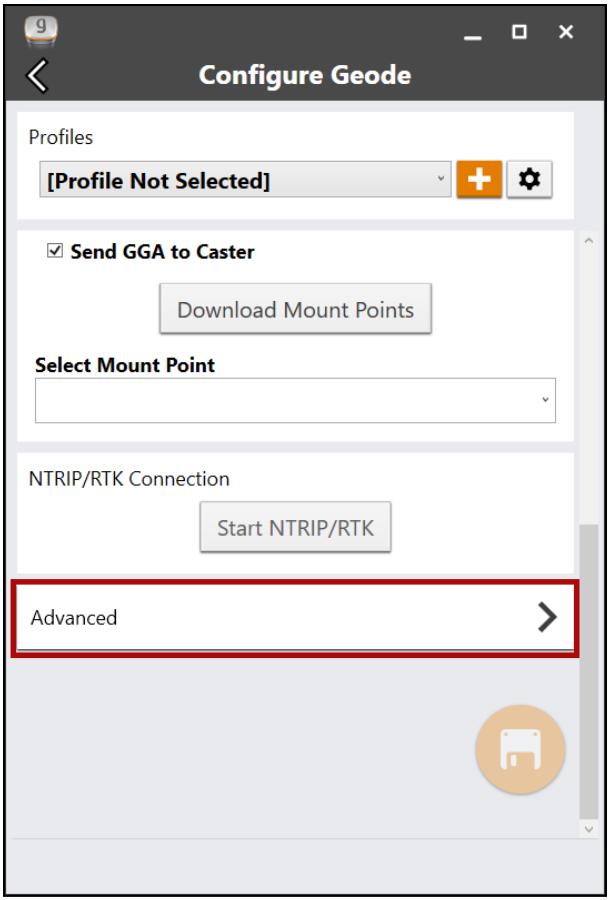
If the third-party app does not have built-in NTRIP/RTK capabilities, you can use Geode Connect to supply that service directly to the app. You will need to connect the Geode to both apps: Geode Connect and the third-party app.

This is accomplished via Mock Locations, which can be configured in Geode Connect.

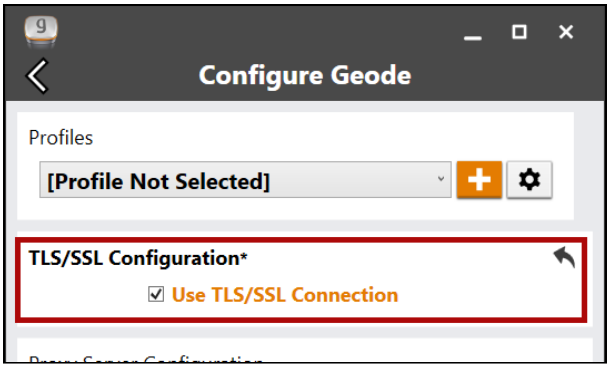
Once the Geode is connected to both apps, Configure_NTRIP services in Geode Connect. Leave Geode Connect open while using the third-party app.

Configure NTRIP/RTK Advanced Options

The NTRIP/RTK Configurations Advanced screen allows you to give more direction about how Geode Connect will communicate with your RTK server.



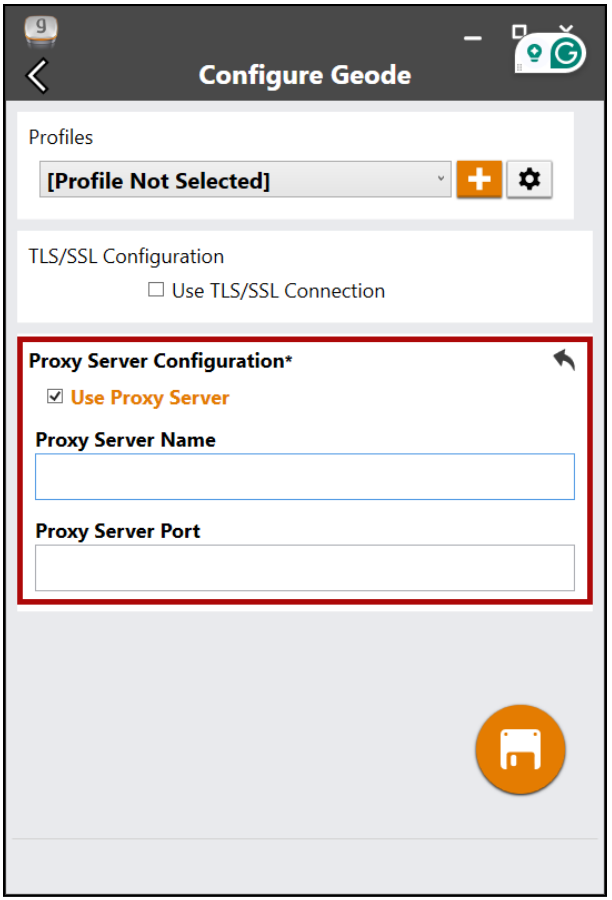
Use TLS/SSL. From NTRIP/RTK Configurations Advanced screen you can indicate that you would like to use a TLS/SSL connection to your NTRIP service provider. Your NTRIP service provider will let you know if you need to use this option.



To connect with TLS/SSL,

1. Select **Use TLS/SSL Connection**.
2. Tap **Save**.

Use Proxy Server. From NTRIP/RTK Configurations Advanced screen you can direct Geode Connect to use a proxy server. You may need to use a proxy server if a network firewall blocks the port that your NTRIP service is using.



To use a proxy server,

1. Select **Use Proxy Server**.
2. Enter the proxy server information.
3. Tap **Save**.

Port Connection

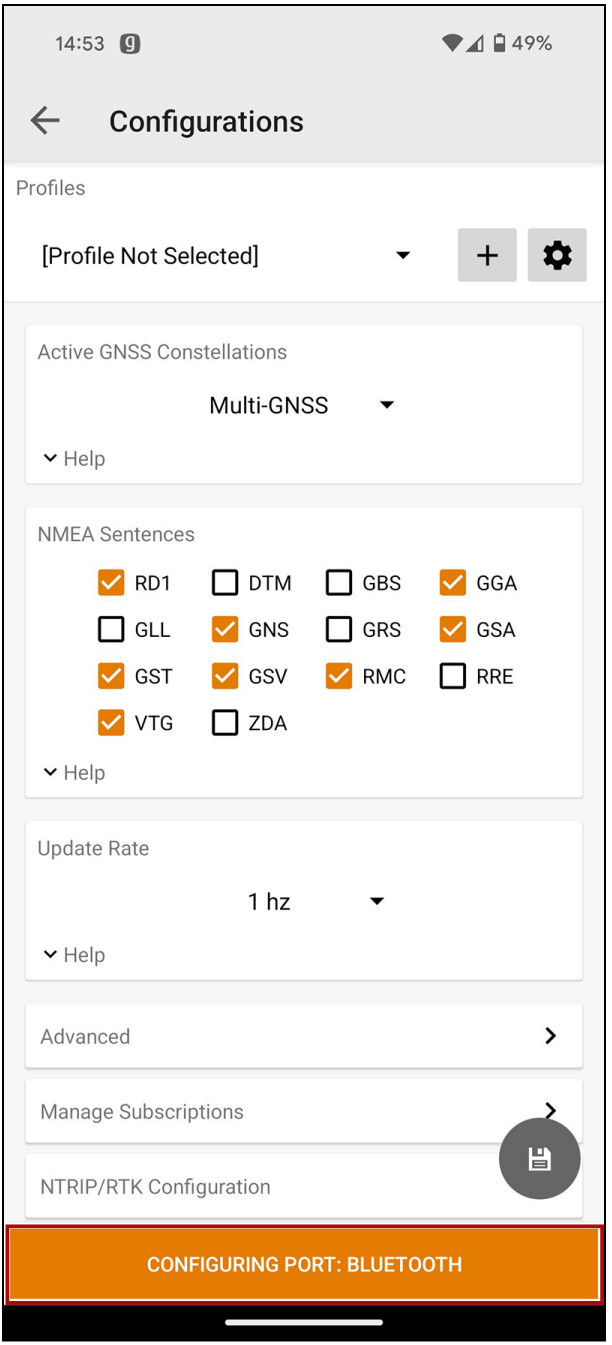
The Geode remembers the settings assigned to each configuration port, and the settings will be used when you physically connect with that port. This allows you to quickly switch between use cases.

Sample use cases for the same Geode:

- **Use Case 1**—Mounted on a pole for data collection on foot in heavy tree canopy. Geode settings optimized for a Bluetooth wireless connection, slow travel, and GNSS constellations (more potential satellites in view through the trees).
- **Use Case 2**—Mounted in the cab of a truck for carefully locating previously marked research sites. Geode settings optimized for a USB connection, slower travel, and NTRIP/RTK correction.
- **Use Case 3**—Mounted on a fast moving four wheeler on rolling hills with open sky.
  Geode settings optimized for an RS-232C connection, quick travel, and an unobstructed open sky.

To define the settings for a configuration port,

1. Tap **Configuring Port** at the bottom of the screen.


14:53
49%
Configurations
Profiles
[Profile Not Selected]
Active GNSS Constellations
Multi-GNSS
Help
NMEA Sentences
RD1
DTM
GBS
GGA
GLL
GNS
GRS
GSA
GST
GSV
RMC
RRE
VTG
ZDA
Help
Update Rate
1 hz
Help
Advanced
Manage Subscriptions
NTRIP/RTK Configuration
CONFIGURING PORT: BLUETOOTH

2. Tap the drop-down arrow and select the port you want to configure. Then, tap **Save**.
3. Select a receiver profile and/or modify the settings as desired.
4. Tap the save icon  .

Geode Connect automatically applies these settings each time you connect with that configuration port.

Port Connection

The Geode remembers the settings assigned to each configuration port, and the settings will be used when you physically connect with that port. This allows you to quickly switch between use cases.

Sample use cases for the same Geode:

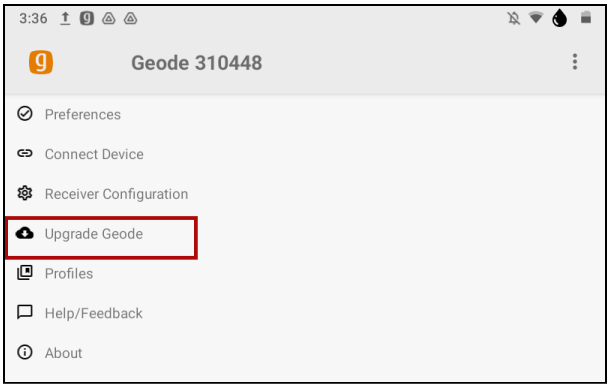
- **Use Case 1**—Mounted on a pole for data collection on foot in heavy tree canopy. Geode settings optimized for a Bluetooth wireless connection, slow travel, and GNSS constellations (more potential satellites in view through the trees).
- **Use Case 2**—Mounted in the cab of a truck for carefully locating previously marked research sites. Geode settings optimized for a USB connection, slower travel, and NTRIP/RTK correction.
- **Use Case 3**—Mounted on a fast moving four wheeler on rolling hills with open sky.
  Geode settings optimized for an RS-232C connection, quick travel, and an unobstructed open sky.

To define the settings for a configuration port,

1. Tap **Port Connection** at the bottom of the screen.
2. Select the port that you would like to configure.
3. Select the configuration settings and/or apply the appropriate profile. Then, tap **Save**.
   Geode Connect automatically applies these settings each time you connect with that configuration port.

7.5.4 Upgrade Geode

On the Upgrade Geode screen, you can request a quote for upgrades, activate your upgrades, or extend a subscription.



You can apply upgrades via activations or subscriptions.

- **Activations** include a one-time upgrade to apply a new feature to the product. The available activations include increased output rates, multi-frequency, and Atlas basic L-band corrections.
- **Subscriptions** include time-based purchases of an H10 or H30 Atlas L-band correction service.

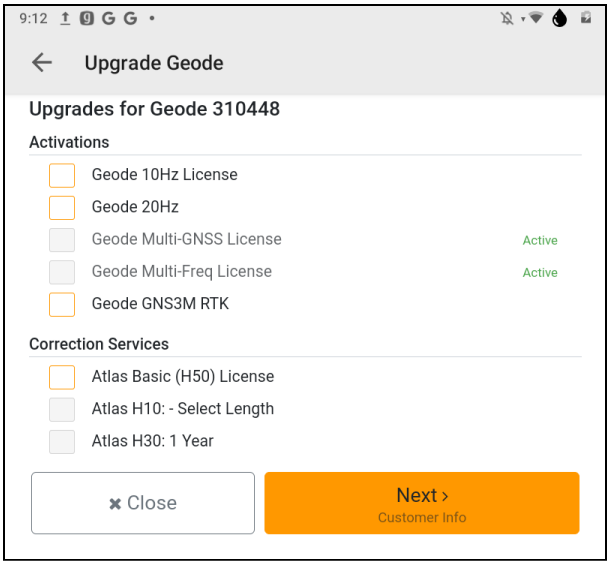
This screen can also be accessed from under **Receiver Configurations** > **Manage Subscriptions**.

Request a Quote

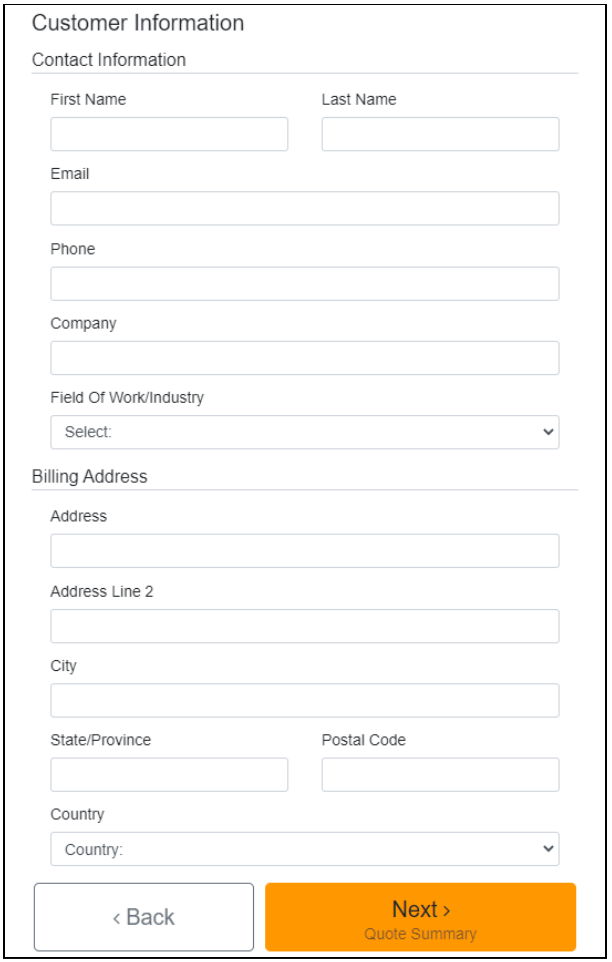
To request an activation or subscription quote,

1. Select the check box next to one or more activation or subscription.
2. Select **Next**.

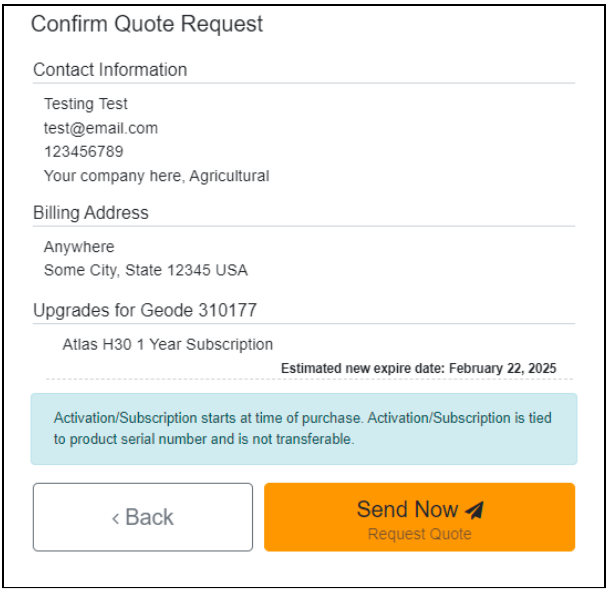
   Note: If you have a single-frequency Geode, the only activations available are 10 Hz and 20 Hz.



3. Enter your contact information.
4. Tap **Next**.

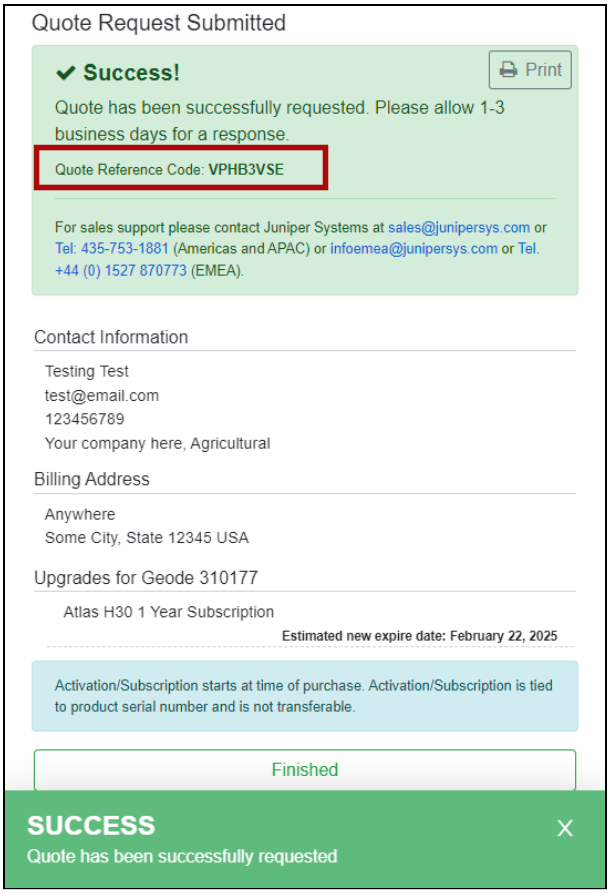

Customer Information
Contact Information
First Name
Last Name
Email
Phone
Company
Field Of Work/Industry
Select:
Billing Address
Address
Address Line 2
City
State/Province
Postal Code
Country
Country:
‹ Back
Next ›
Quote Summary

5. On the Quote Summary screen, verify your information is correct and then select **Send Now**.



An email requesting your quote will be sent to Juniper Systems and a representative will contact you.

When the request email is sent, you will receive a Quote Reference Code. This code can be used to reference your request if you encounter any problems and need to contact Juniper Systems.

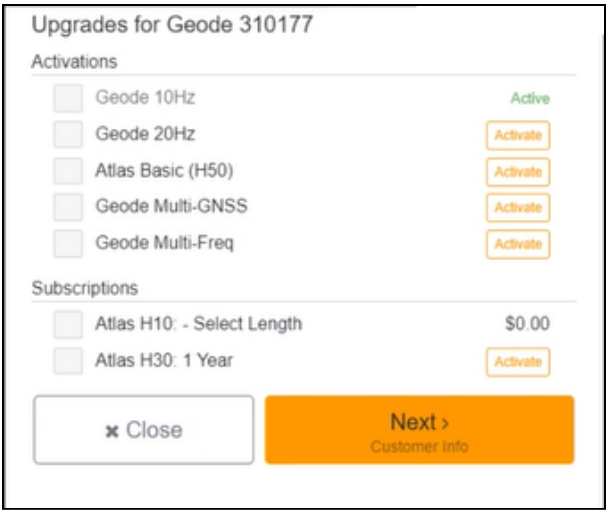


Activate Upgrade

If you have already purchased an activation or subscription you will need to activate it in Geode Connect.

1. Verify your device is connected to the GNS3 and the internet.

2. In the activations list, tap the yellow activate option next to the upgrade you would like to activate.

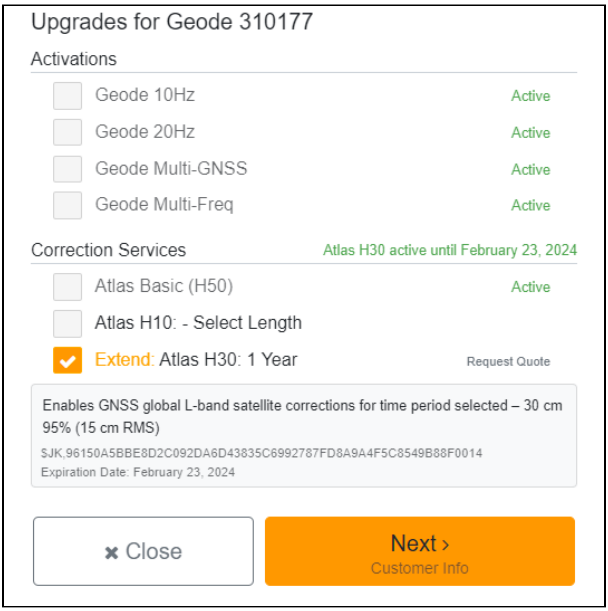


Extend a Subscription

To extend your current subscription,

1. Select the check box next to your subscription. It will be marked with a yellow “Extend.”

2. Select **Next**.

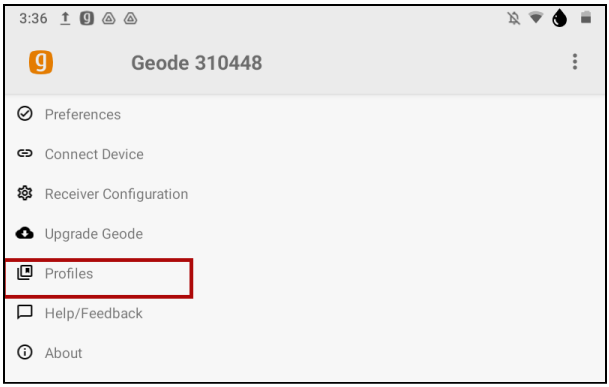


3. Request a quote for the subscription by following the process listed in the **Request a Quote** section above.

If you purchased the subscription previously, you can activate the subscription for your GNS3 on this screen as well.

7.5.5 Profiles

A profile is an easy way to save and apply the configuration settings that fit a specific project or application. Open the Profiles screen to manage the configuration profiles for your GNS3 receiver.



For instructions on adding or editing a profile, see Profiles in 7.5.3 Receiver Configuration.

Delete a Profile

To delete a profile,

1. Tap the delete icon next to the profile you want to delete
2. Tap **Delete** to confirm the profile deletion.

Export a Profile

You can export a profile as a .JSON file and use it on other GNS3 receivers.

To export a profile,

1. Tap the export profile icon next to the profile you want to export.
2. Select the desired file location.

Import a Profile

You can import a profile saved as a .JSON file.

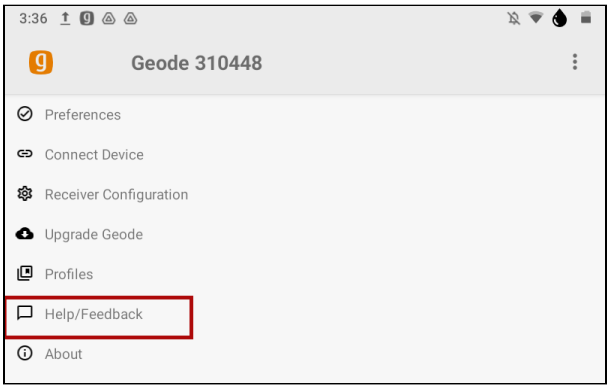
To import a profile,

1. Tap **Import Profile** .
2. Locate the profile you want to import.

The imported profile is automatically applied to the active connection port.

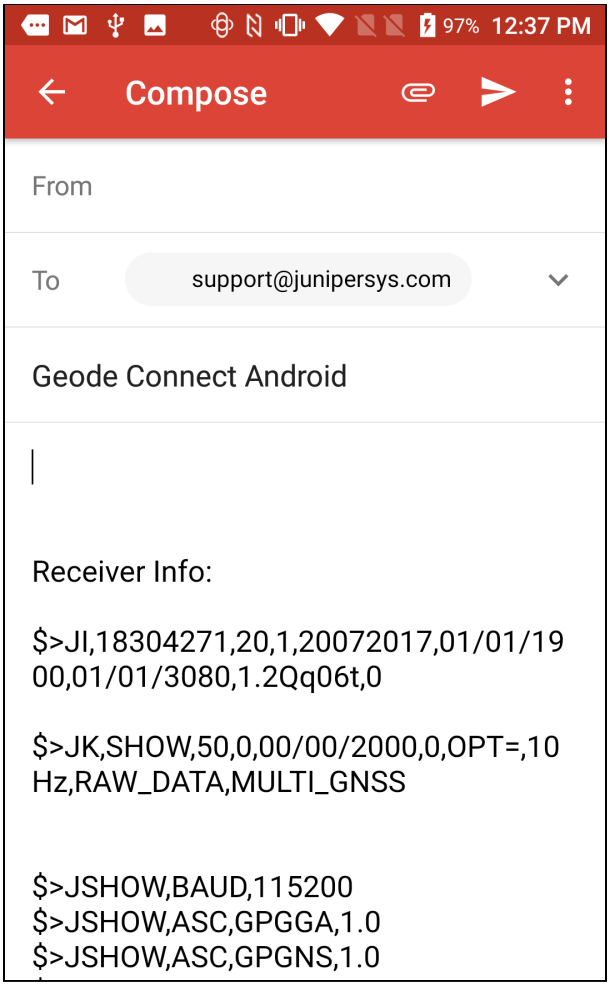
7.5.6 Request Help and Send Feedback

On the Settings screen, tap **Help/Feedback**.



This feature links directly with the email account configured on your device and opens an email addressed to Juniper Systems Support. The email includes detailed configuration commands from the Geode. This allows Juniper Systems Support to diagnose and solve the problem more efficiently. This info is also used when purchasing a feature upgrade for the Geode.

You can enter additional information into the email to provide a further explanation about your issue.



7.5.7 About

The About screen shows the Geode Connect version currently in use.


3:36
Geode 310448
Preferences
Connect Device
Receiver Configuration
Upgrade Geode
Profiles
Help/Feedback
About

geode™

GNS3 Receiver

CHAPTER 8

8 Set Up Geode Connect for Windows

As a configuration and communication utility for the Geode GNS3 GNSS Receiver, Geode Connect provides you with the ability to establish communications with the Geode; change receiver settings; and view position, altitude, estimated horizontal error, differential status/fix information, speed, heading, satellites in fix, correction signal, and PDOP.

This chapter gives an overview of the features included in Geode Connect for Windows PC. It gives details about specific settings that can optimize the Geode's precision, accuracy, and reliability, depending on the situation and environment. It also gives specific instructions about the nuances of using the Geode with the Windows operating system and third-party apps.

8.1 Download and Install

Geode Connect is available for download on the Juniper Systems webpage.

To download and install Geode Connect,

1. Go to www.junipersys.com/support/geode/downloads.
2. Select Geode Connect for Microsoft Windows PC.
3. Download the .exe file and follow the instructions on your device to install the app.

8.2 Connect with the Geode

The Geode connects with Windows PC devices via Bluetooth wireless technology, USB, and RS-232C cable.

8.2.1 Pair via Bluetooth

To pair via Bluetooth,

1. Power on the Geode.
2. Make sure Bluetooth wireless technology is enabled on your Windows device.
3. Pair the Geode to your Windows device.
4. Open Geode Connect.

5. If the device has connected to a Geode previously, tap the Geode name at the top of the screen.

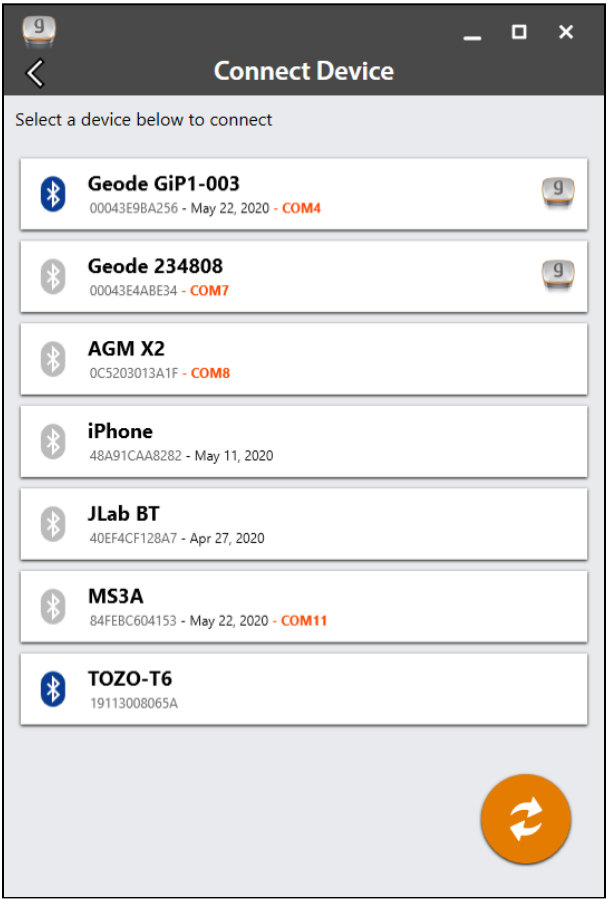
   The app will ask you what you would like to do.

   Note: If the device has not previously connected to a Geode, the app opens the Device Setup screen.

6. Tap **Change Device**. This opens the Device Setup screen.

   The app will display a list of local wireless devices. Identify your Geode via the serial number printed on its bottom panel. Select the name of the Geode you want to pair

with.



Note: If your Geode doesn't show up in the list of devices, check to make sure it is turned on and not paired with another device. Then, tap the refresh icon .

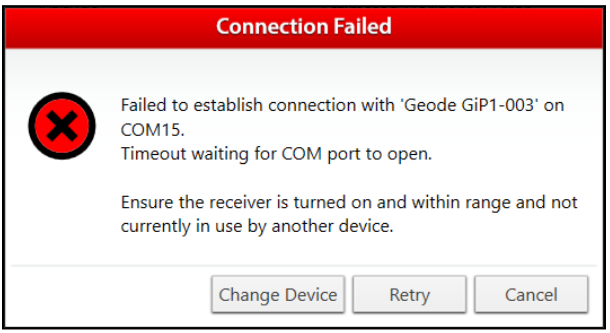
7. Follow the prompts to finish pairing the Geode with your device.
8. If prompted by your device, enter the Pair code: 0000.

The Geode should now be connected to your Windows device.

Troubleshooting a Windows PC Bluetooth Connection

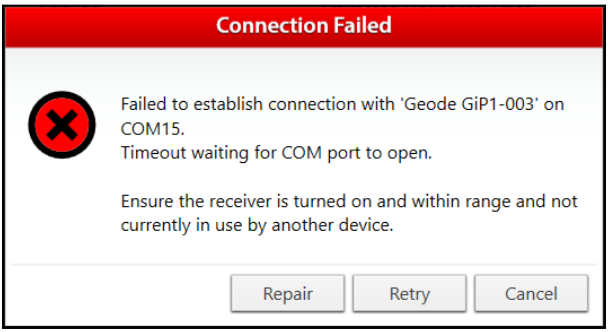
Sometimes when a Geode has been paired with a Windows PC device and then is paired with several other devices, the Geode may have trouble re-pairing with the original Windows PC device.

If this happens, the following prompt appears.



1. Select **Retry**.

   This may fix the connection. If not, Geode Connect will display the following:



2. Select **Repair**.

Geode Connect will attempt to repair the connection.

If Geode Connect is unable to repair the connection, you may need to turn the Geode off and on again and/or go to Windows

Settings and select **Forget Device** for the Geode you are trying to pair. After doing so, return to Geode Connect and begin the pair sequence for a Bluetooth connection again.

Connect via USB

The Geode can connect with a Windows PC or handheld tablet —such as the Juniper Systems Mesa tablets—using the supplied USB cable.

To connect via USB,

1. Ensure your Windows PC or tablet is in Desktop mode, not Tablet mode.
2. Power on the Geode before you plug it into your device.
3. Plug the USB cable into your device and the Geode.

   Note: This may cause the red LED Status Indicator to flash rapidly on the Geode because there is not enough power in the PC or handheld device to charge the Geode. This does not affect the data transfer between the Geode and the device.

4. Open Geode Connect.

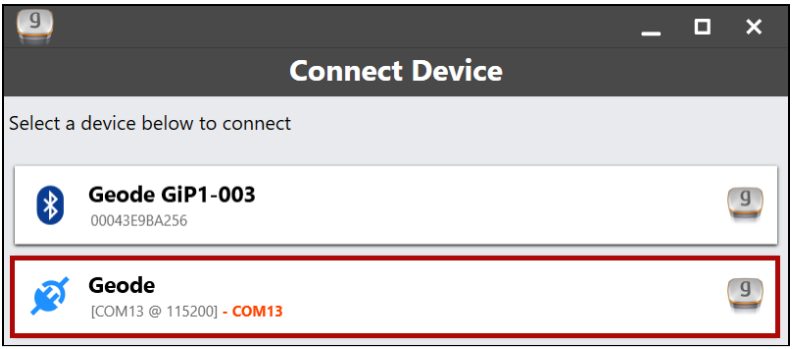
   If the device has connected to a Geode previously, tap the Geode name at the top of the screen.

   The app will ask you what you would like to do.

   Note: If the device has not previously connected to a Geode, the app will immediately open the Device Setup screen when you open the app.

5. Tap **Change Device**. This opens the Device Setup screen.

6. Geode Connect displays a list of local wireless and connected devices. It may list the same Geode twice, once as a Bluetooth wireless device and once as a physically connected device. The Geode connected via USB will have a plug icon next to it. Select this Geode.



Note: If your Geode doesn't show up in the list of devices, check to make sure it is turned on and not paired with another device. Then, tap the refresh icon .

For subsequent connections, the Geode may connect to the same device using a different COM port. This is normal.

Connect via Serial Port

The Geode has a 9-pin RS-232C serial port. This allows the Geode to be mounted to a piece of equipment while maintaining a constant connection for data and power. Use a straight-through 9-pin cable to communicate with the Geode. For a list of functions for each pin, refer to Appendix A: Serial Port Configuration.

To communicate between a PC and a Geode over a straight-through serial cable,

1. Open Geode Connect.
   If the device has connected to a Geode previously, tap the Geode name at the top of the screen.

The app will ask you what you would like to do.

Note: If the device has not previously connected to a Geode, the app will immediately open the Device Setup screen when you open the app.

2. Tap **Change Device**. This opens the Device Setup screen.
3. The app will display a list of local wireless and connected devices. It may list the same Geode twice, once as a Bluetooth wireless device and once as a physically connected device. The Geode connected via serial cable will have a plug icon next to it. Select this Geode.

Note: The name displayed for a serial connection in this list will not include the serial number of your Geode.

Note: If your Geode doesn't show up in the list of devices, check to make sure it is turned on and connected to your device. Then tap the refresh icon .

The Geode will then connect to the host device.

geode™

GNS3 Receiver

CHAPTER 9

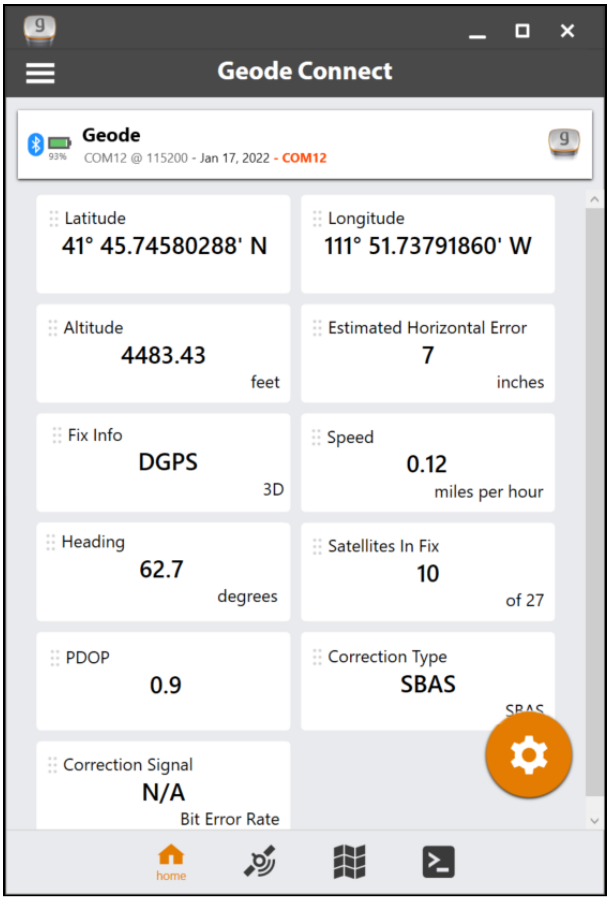
9 Learn Geode Connect for Windows

Geode Connect is a utility app that allows you to customize and fine-tune the Geode to your specific project or application. Each screen in Geode Connect serves one of three primary functions: configuration of the Geode, validation of Geode accuracy, or changing Geode Connect settings. Though it does have some limited data-capture features, these are included only for demonstration purposes. Geode Connect is not intended to replace your data-collection app.

9.1 Home

The Home screen for Geode Connect serves as a dashboard for the Geode receiver. On this screen, you can view connection status, correction mode, and positioning data. It displays latitude, longitude, altitude, estimated horizontal error, fix info (GPS, DGPS, RTK, and so on), speed, heading, number of satellites in fix, PDOP, and correction signal.

You can drag and drop each box to reorganize the screen to your preference.



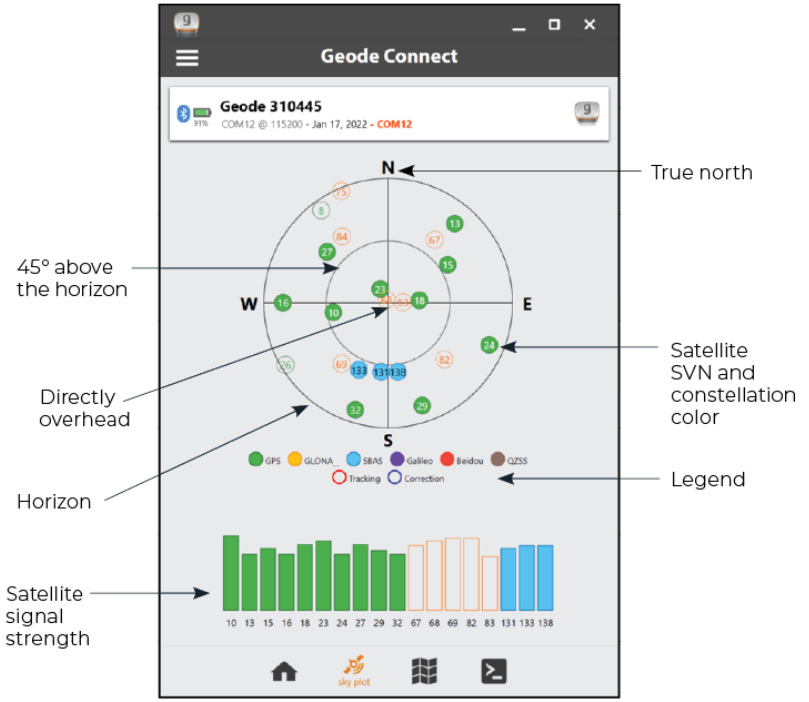
From the toolbar on the bottom of the screen, you can access the Skyplot, Map, and Terminal screens. Tap the receiver name at the top to change receivers. Open the menu to view preferences and open additional screens. The Settings menu provides options for the configuration of the Geode receiver and Geode Connect settings. For more information on these options, see Settings.

9.2 Skyplot

The Skyplot screen shows which satellites are being used in the positioning solution and where they are in the sky. It also shows satellites that are being tracked by the Geode.

On the Skyplot screen, each satellite is identified by a space vehicle number (SVN) and color for its constellation. The location of each satellite on the
Skyplot indicates where its location in the sky relative to true north. The outside ring is 0° elevation (horizon). The inside ring is 45° elevation—halfway above the horizon from the Geode's present location. The intersection of the two lines indicates directly overhead.

On the Skyplot screen, each satellite is identified by a space vehicle number (SVN) and color for its constellation. The location of each satellite on the skyplot indicates where it resides in the sky overhead relative to true north. The outside ring is 0° elevation (horizon). The inside ring is 45° elevation—halfway above the horizon from the Geode's present location. The intersection of the two lines indicates directly overhead.



Satellite symbols outlined in red indicate that the satellites are being tracked, but they are not yet a part of the positioning solution. Satellite symbols outlined in blue indicate that a correction is being applied to the signal.

Multi-GNSS Geode models support the Galileo, BeiDou, GPS, QZSS, SBAS, and GLONASS constellations.

The Skyplot screen is meant to be used as a guide. It shows the relative visibility of satellites in the sky, but it is not an absolute reference for satellites used in the positioning solution.

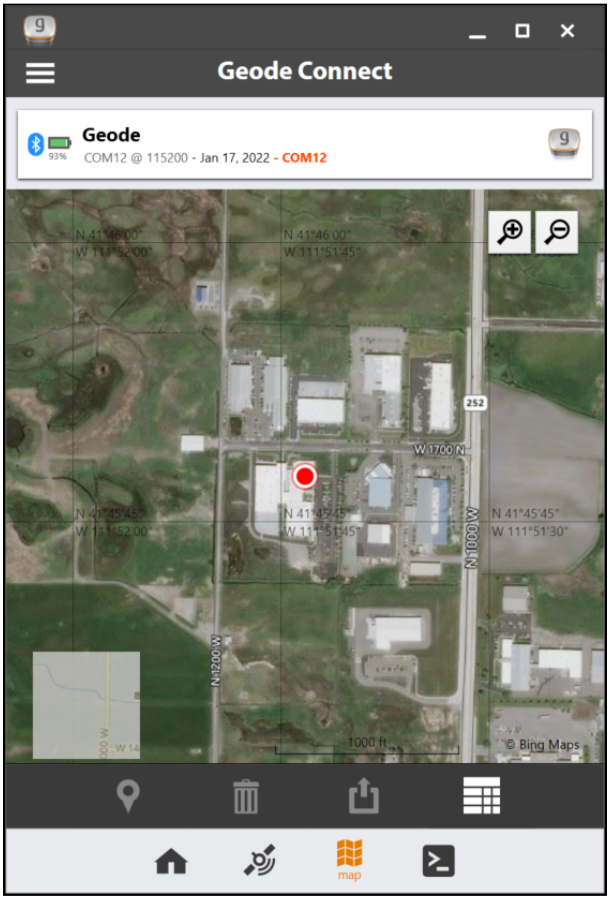
If the Skyplot screen is not displaying data,

1. Go to the Configure Geode page by tapping the menu icon in the navigation bar.
2. Tap **Receiver Configuration**.
3. Under Active GNSS Constellations, select **Multi-GNSS**.
4. Under NMEA Sentences, select **GSV**.
5. Tap the save icon .

9.3 Map

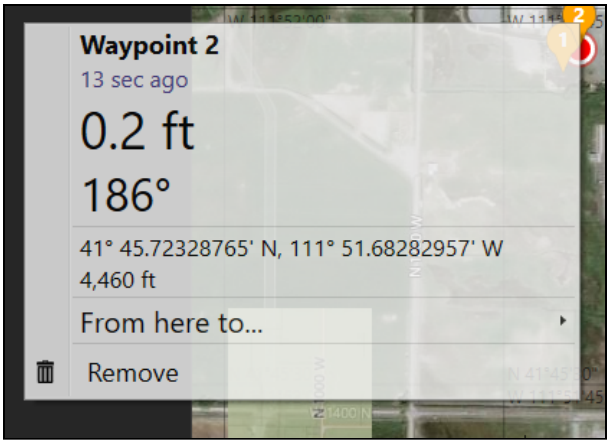
The Map screen allows you to see their position in relation to public roads and other landmarks.

On the Map screen, you can capture, compare, and navigate to waypoints.



9.3.1 Capture, View, and Compare Waypoints

To capture waypoints, place the Geode in the position you would like to capture, and tap the waypoint icon . View waypoint information by selecting a specific waypoint on the map.



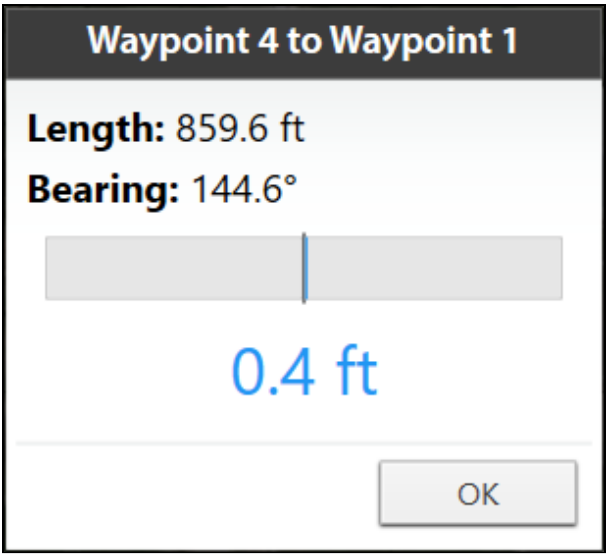
Geode Connect will show you the waypoint's distance and bearing compared to your current position. It will also display the latitude, longitude, and altitude of the waypoint.

To delete the waypoint, tap **Remove**.

To compare the waypoint to another waypoint,

1. Tap **From here to. . .**

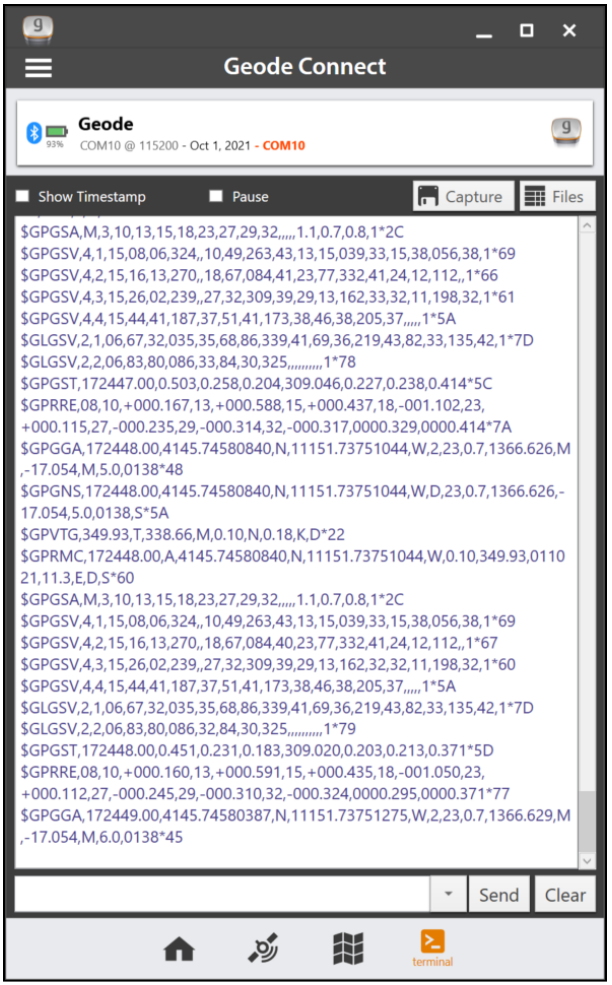
2. Select the waypoint to which you want to compare your current position.



The blue shaded area represents the cross track error between where you are now and what you need to do to get back on the direct path between the two waypoints.

9.4 Terminal

The Terminal screen displays the NMEA sentences the Geode is receiving. You can include timestamps (top left), pause (middle), capture the information (top right), or view the captured data files (top right).



At the bottom of the Terminal screen, there is a command line. This gives you flexibility to configure the Geode and customize the data output.

Tap the down arrow next to the command line to reveal the Show Log and Hide Log commands.

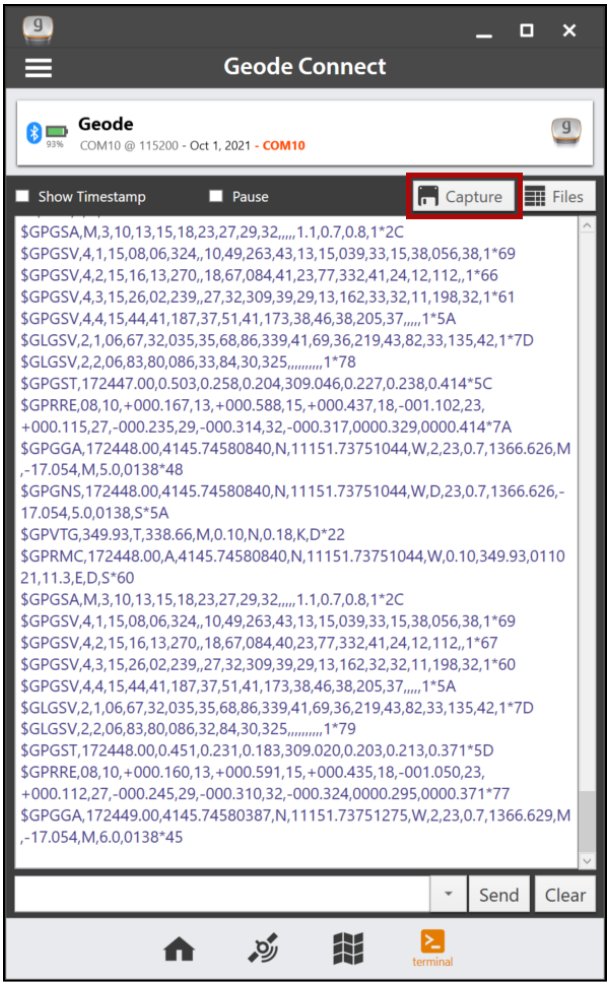
For a comprehensive list of commands and messages that can be used to configure the Geode, refer to the technical documentation provided by Hemisphere GNSS.

1. Go to https://hemispheregnss.com/ > **Resources & Support** > **Technical Documentation**.
2. Select **Technical Reference Manual** (it may include a version number).

⚠CAUTION: Use at your own risk. It is possible to cause communication or other errors in the Geode that may require technical assistance to repair.

9.4.1 Capture, Save, or Share NMEA Sentences

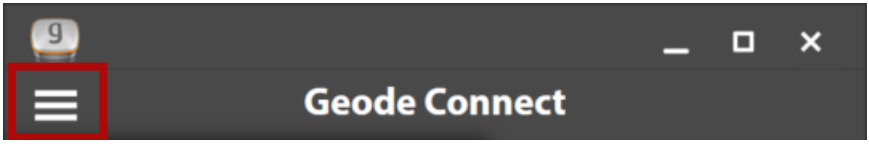
To record the NMEA sentences, tap **Capture**. Geode Connect will begin to record your data.



To stop recording, tap the timer that replaced the Capture button. The string of NMEA sentences will be saved.

Tap **Files** to view the saved recordings. From this screen you can organize, share, or delete the NMEA recordings.

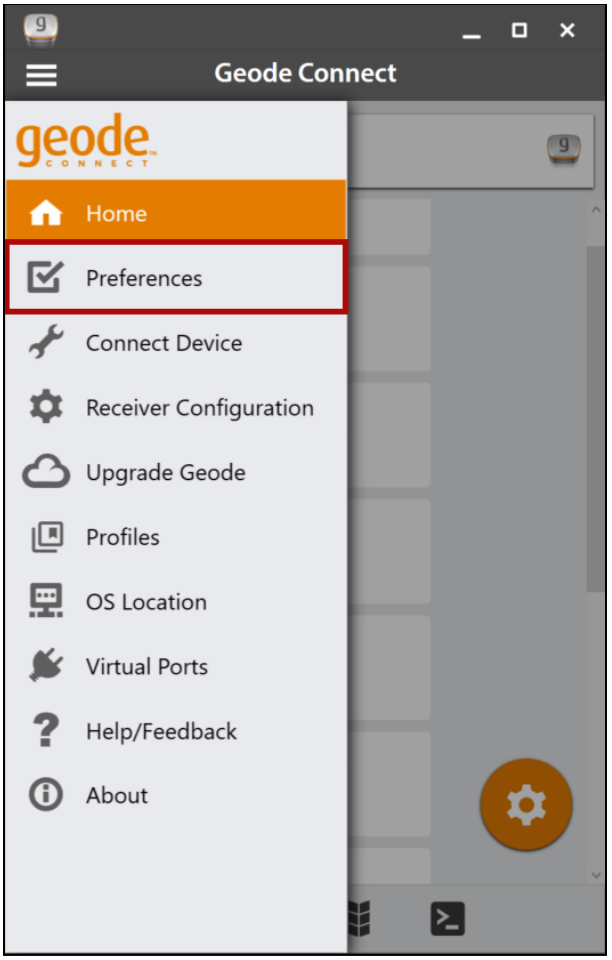
9.5 Settings



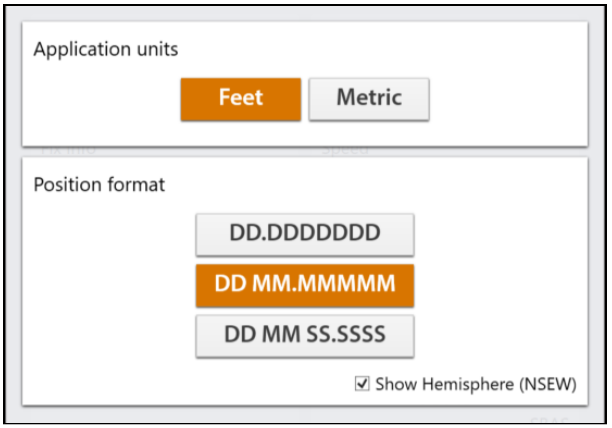
The Settings screen provides options for the configuration of the Geode receiver and Geode Connect settings. The following sections describe each of these options.

9.5.1 Preferences

The Preferences screen allows you to customize your preferences for how information is displayed in Geode Connect.



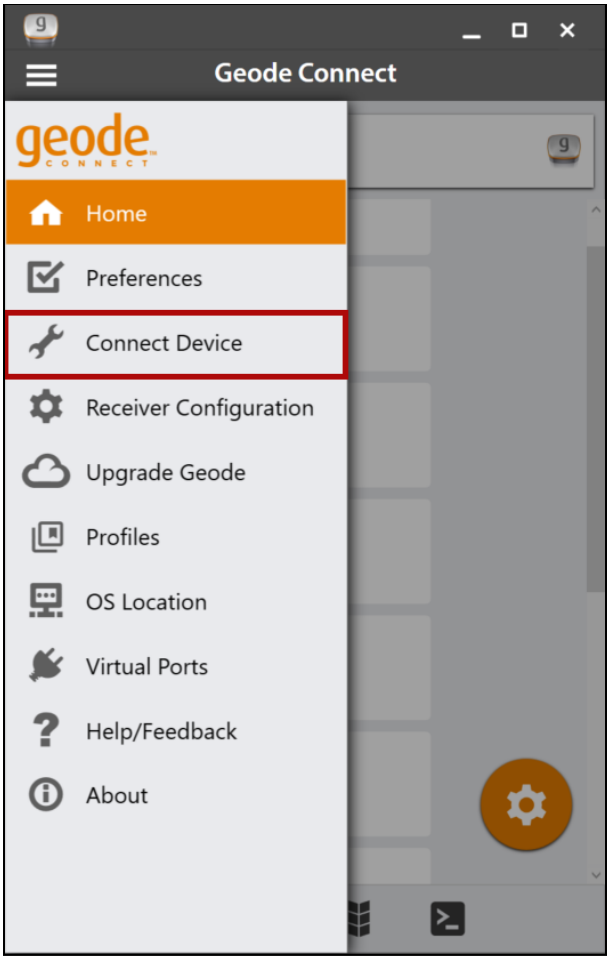
You can specify application units (feet or metric), position format, and whether or not the app will show the hemisphere.



Note: Changes must be saved in order for them to remain from screen to screen. If the save icon in the lower right corner of the screen is orange, this means there has been a change that needs to be saved. Tap the save icon to save changes .

9.5.2 Connect Device

The Connect Device screen allows you to connect your Windows device to the Geode.



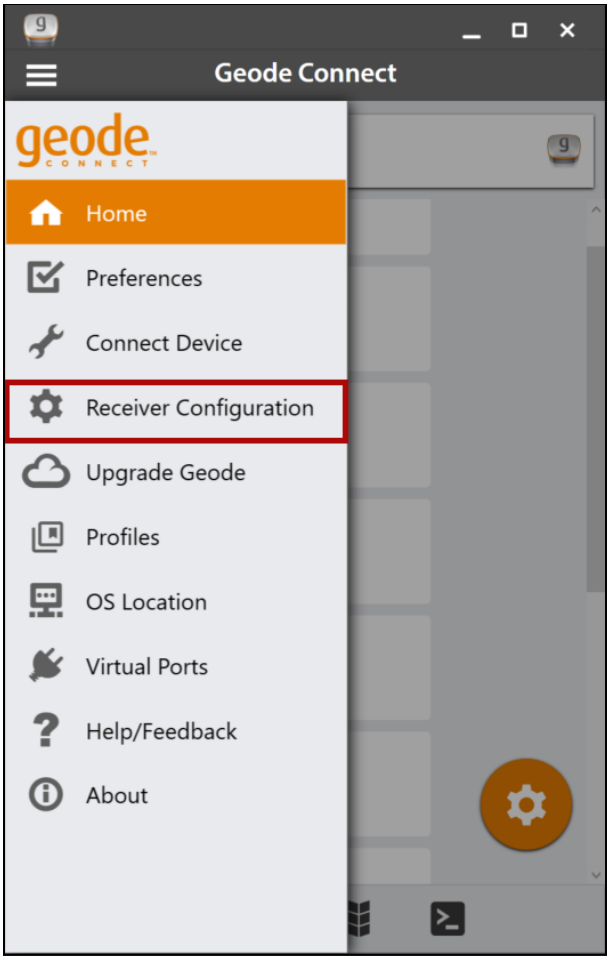
For more information, see Connect with the Geode.

9.5.3 Receiver Configuration

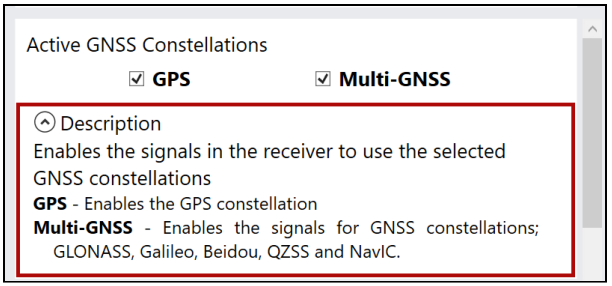
Note: The Receiver Configuration options are only available if you are actively connected to a Geode receiver. Changes saved on these screens are changes made to the Geode receiver, and these changes apply to all navigation and data collection apps using the Geode receiver.

From this screen, set up the Geode to meet the needs of your project or application.

You can also reach this screen by tapping the orange gear icon .



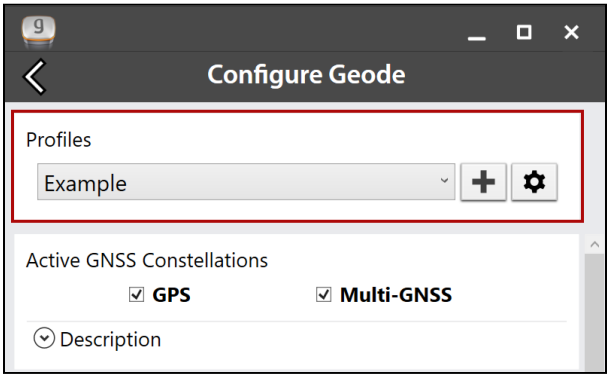
Below most settings, you can tap **Description** to view a detailed information about the setting(s).



Profiles

A profile is an easy way to save and apply the configuration settings that fit a specific project or application. Open the Profiles screen to manage the configuration profiles for your GNS3 receiver.

Under Profiles, view the active profile. If no profile is selected, “Profile Not Selected” displays. To change the active profile, tap the drop-down arrow and select from the list of available profiles.

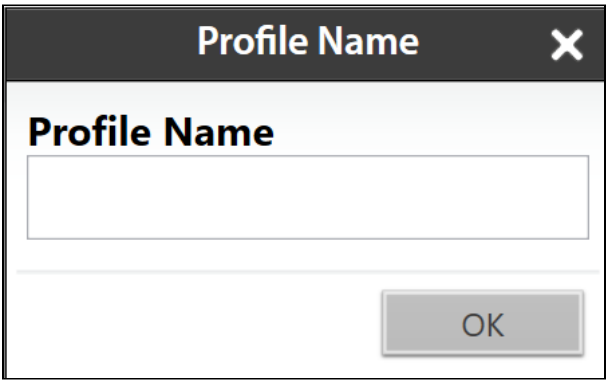


Add a Profile

To add a profile,

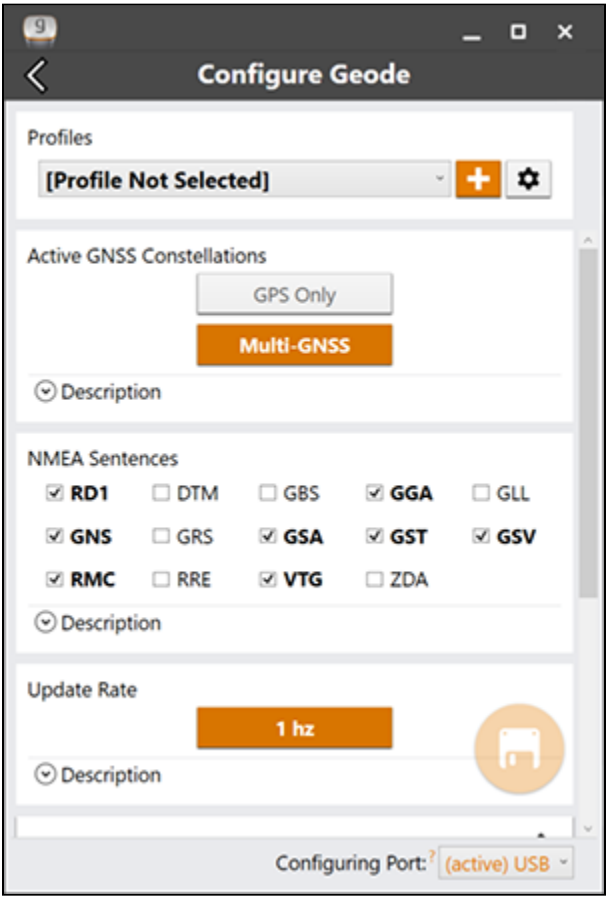
1. Tap [+].

2. Enter the profile name and tap **OK**.



3. Select the appropriate settings.

Expand an area to view additional settings for correction source, SBAS, subscriptions, and NTRIP configuration.



4. Tap the save icon .

The new profile will be created based on the current receiver settings. Any changes you make to the receiver settings will be applied to the current profile.

Edit a Profile

To edit a profile,

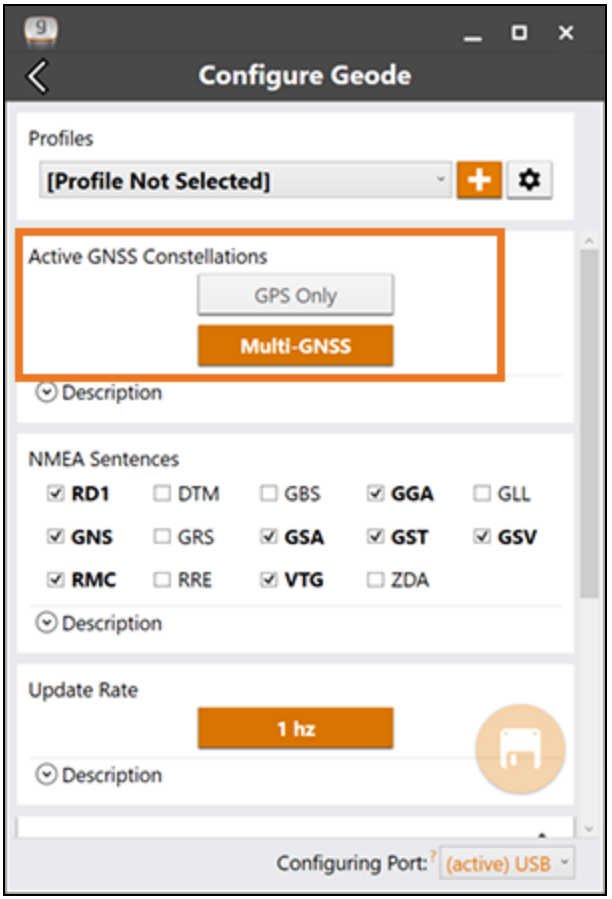
1. Under Profiles, ensure the profile you want to edit is displayed.
2. Make the desired changes to the settings, and tap the save icon  .

Manage Profiles

To manage the profiles, tap the gear icon  to open the Profiles screen.

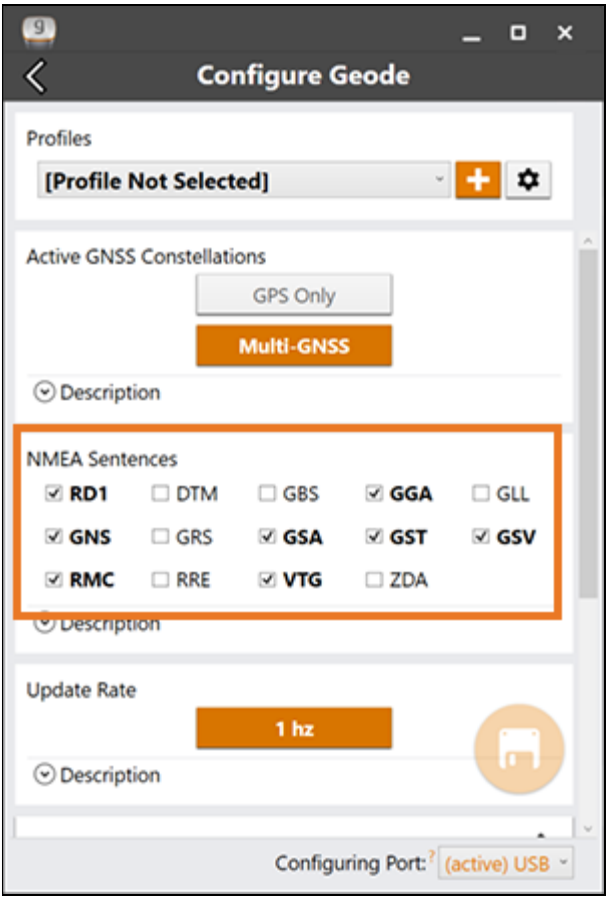
Active GNSS Constellations

You can choose which GNSS constellations to use in your solution: Multi-GNSS or GPS.



NMEA Sentences

You can choose which NMEA sentences you want the Geode to receive. In most instances, the default NMEA sentences are sufficient for your project or application.



The following list explains the available NMEA sentences:

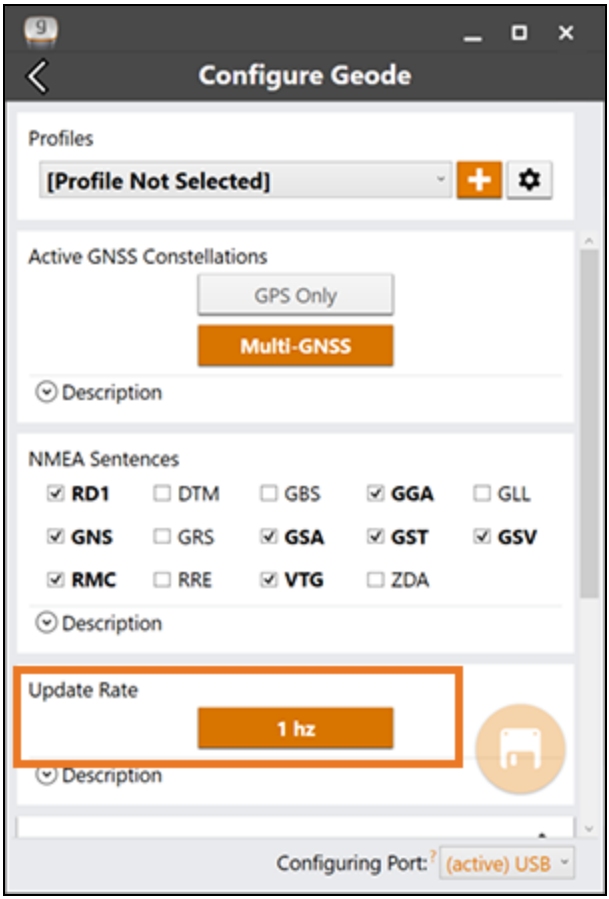
- **RD1**—Correction diagnostic message output
- **DTM**—Datum reference
- **GBS**—Satellite fault detection used for RAIM
- **GGA**—Detailed GPS position information
- **GLL**—Latitude and longitude data
- **GNS**—Fix data for a single or combined satellite navigation system
- **GRS**—GNSS range residuals
- **GSA**—GPS DOP and active satellite information

- **GST**—GNSS pseudorange error statistics
- **GSV**—GNSS satellites in view
- **RMC**—Recommended minimum specific GNSS data
- **RRE**—Range residual message.
- **VTG**—Course over ground and ground speed.
- **ZDA**—UTC time and date information

Update Rate

The update rate sets the message output rate through the active port. You can specify your preferences for the update rate. To upgrade the update rate, use the Upgrade Geode menu option.

Note: At higher data rates, we recommend turning off messages not required for your application, such as GNS, RRE, and VTG messages.



Note: Changes must be saved in order for them to remain from screen to screen. If the save icon in the lower right corner of the screen is orange, this means there has been a change that needs to be saved. Tap the save icon to save changes .

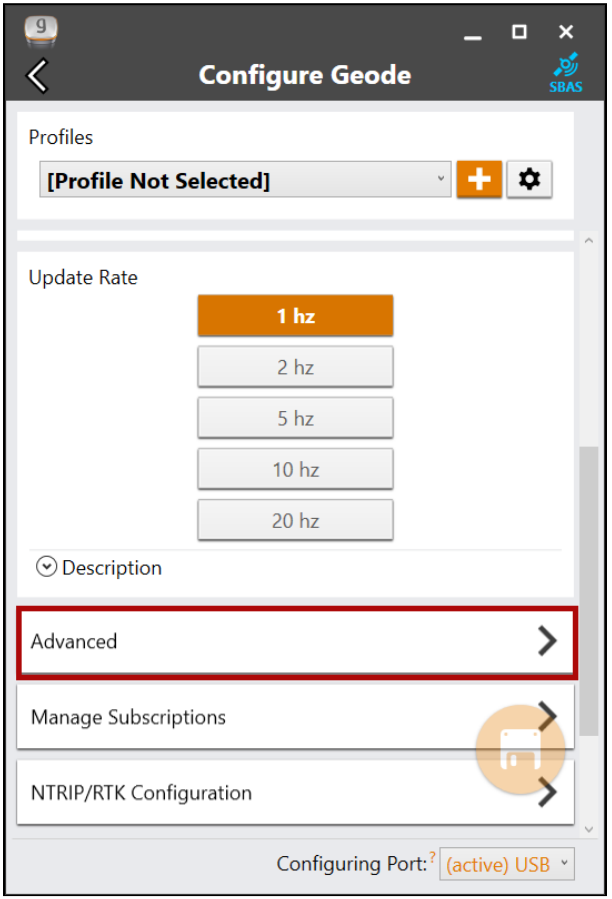
Advanced

The Advanced screen allows you to configure the following advanced settings for the Geode.

- NMEA Precision
- Mask Angle

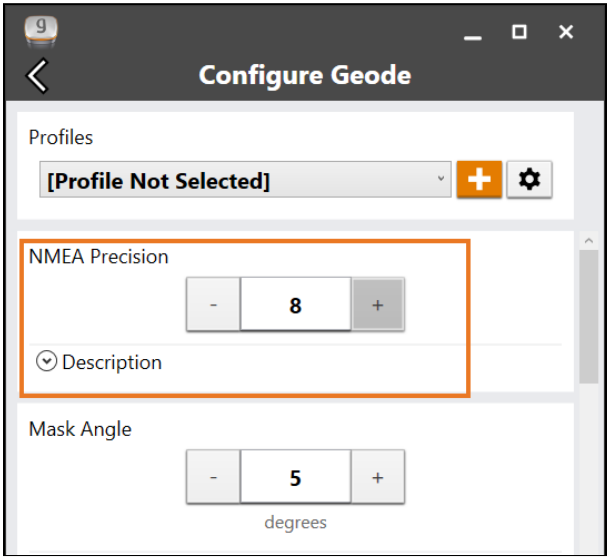
- Correction Source
- SBAS
- Receiver Mode
- Battery Status Sentence
- Receiver Reset

Changes saved in the Advanced screens are made to the Geode receiver, not Geode Connect. Changes will appear in other navigational and data collection apps.



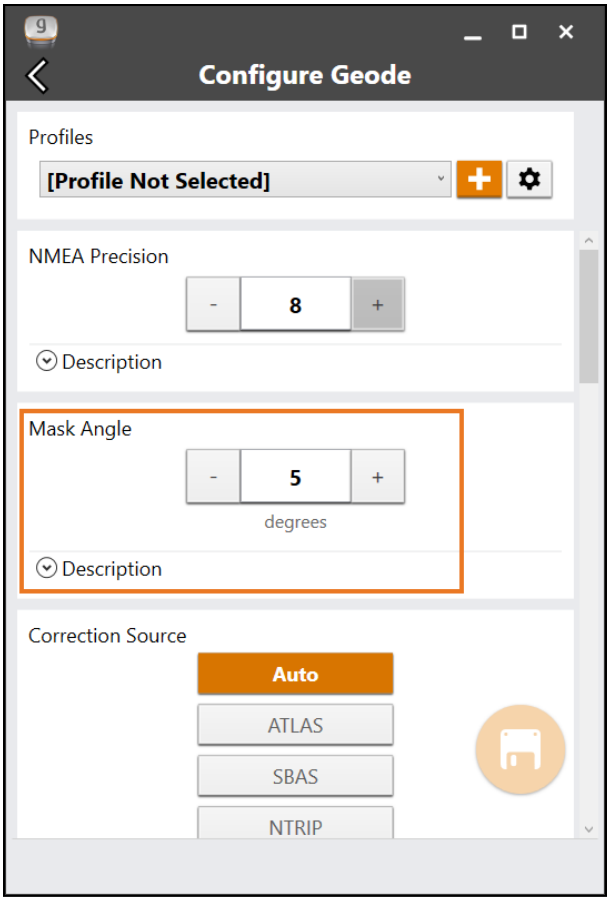
NMEA Precision

This specifies the number of decimal places to output in the GGA, GLL, and GNS messages.



Mask Angle

This specifies the elevation mask angle cutoff for the receiver. Any satellites below this angle will be ignored, even if they are available.

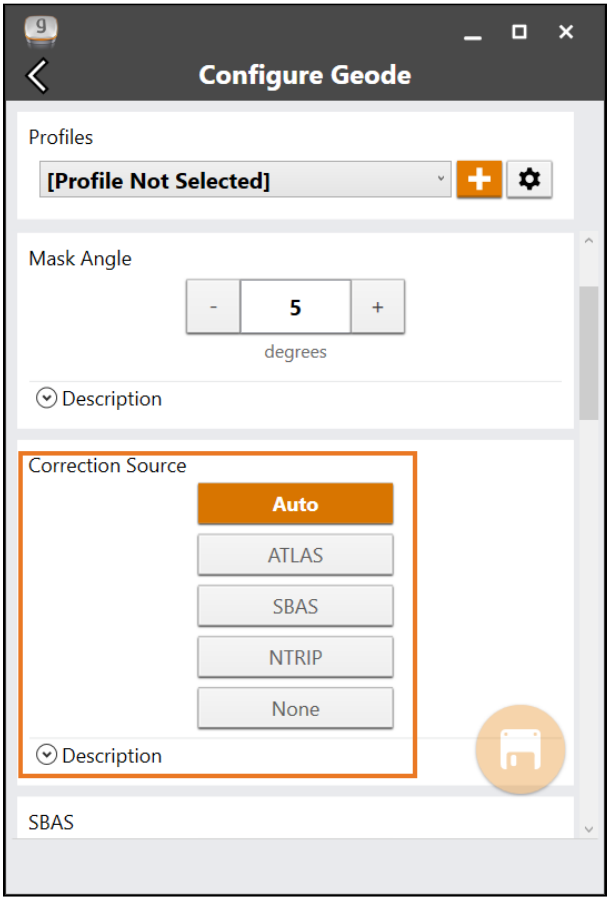


Correction Source

This specifies whether the Geode should automatically choose to apply the most accurate correction source available or use only a specific correction source. The Geode's default correction source is *auto*, which means automatically search and use the best available correction service. .

Note: If the most accurate correction source changes while data is being collected, there may be significant differences between positions corrected by different methods. Because different correction sources use different reference datum, an automatic

change to a different correction source may look like an error in a data set.



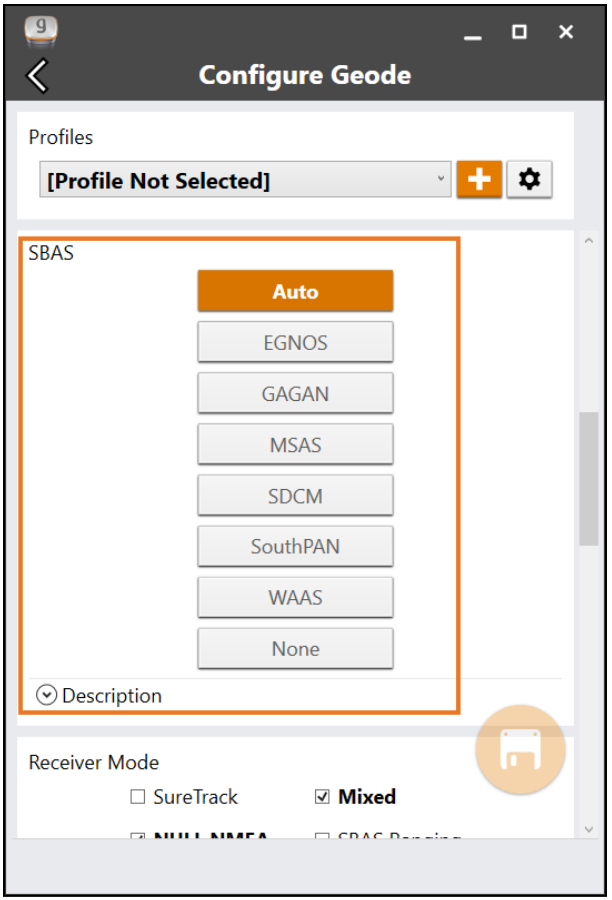
You may want to specify the correction source applied by the Geode. You can set the Geode to use any of the corrections sources listed in the table below.

Correction Source Options		
Setting	**Action**	**If signal is lost/unavailable**

Auto	Geode chooses the correction source based on the current level of accuracy	Geode will try the next option in the following order: ▪ NTRIP/RTK ▪ Atlas ▪ GALHAS ▪ SBAS ▪ None/Autonomous
NTRIP/ RTK	Geode uses corrections only from NTRIP/RTK.	Geode will not apply any correction.
Atlas	Geode uses corrections only from Atlas.	Geode will not apply any correction.
SBAS	Use corrections only from SBAS.	Geode will not apply any correction.
None	Geode does not use any corrections.	Geode will not apply any correction.

SBAS

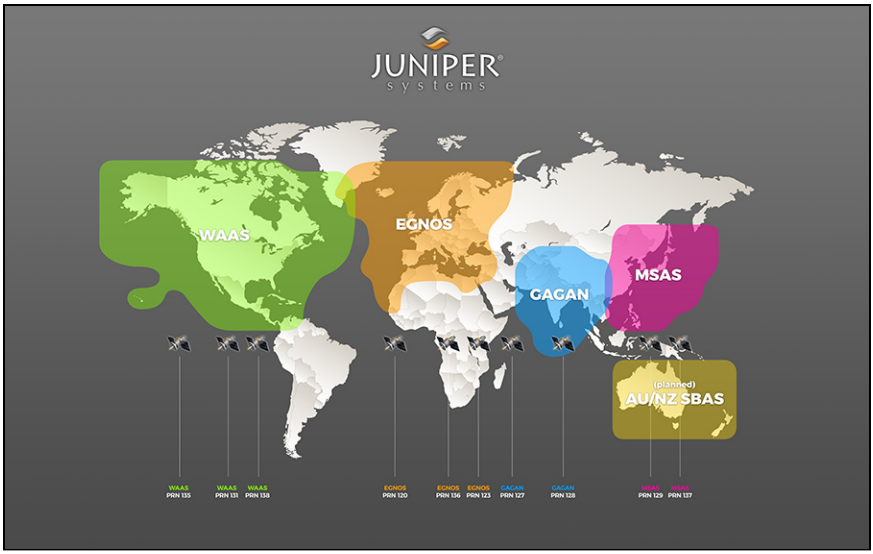
This specifies which SBAS satellites the Geode should use for GPS correction. Usually, selecting Auto is sufficient because the various SBAS services cover different geographical areas. However, there are some areas where these services overlap (see map below).



For example, if you are collecting corrected GPS positions in the Northeastern United States, the Geode may be receiving SBAS corrections from WAAS or EGNOS. If the receiver is set to Auto, it may even jump back and forth between the two.

The two services use different reference datum or models. Switching between them can cause significant error between different points of data.

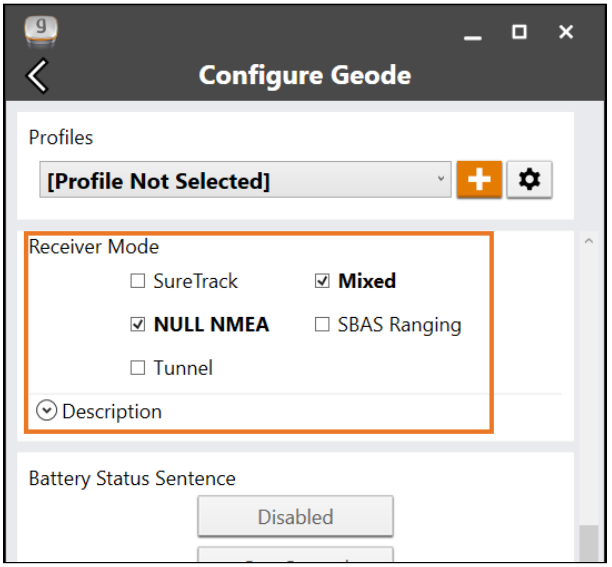
In areas of overlap, the best practice is to select a specific SBAS service the Geode should accept corrections data from.



- **Auto**—Sets the appropriate SBAS PRNs based on the autonomous GPS position.
- **EGNOS**—European Geostationary Navigation Overlay Service (Europe SBAS) PRN 120, 124, 126
- **GAGAN**—GPS Aided GEO Augmented Navigation (India SBAS) PRN 127
- **MSAS**—MTSAT Satellite Augmentation System (Japan SBAS) PRN 129, 137
- **SDCM**—System for Differential Correction and Monitoring (Russia SBAS) PRN 125, 141, 140
- **SouthPAN**—Southern Positioning Augmentation Network (Australia and New Zealand SBAS) PRN 122
- **WAAS**—Wide Area Augmentation System (North America SBAS) PRN 133, 135, 138
- **None**—SBAS corrections disabled.

Receiver Mode

These options affect how the Geode collects and processes positioning information and how it outputs certain types of data.

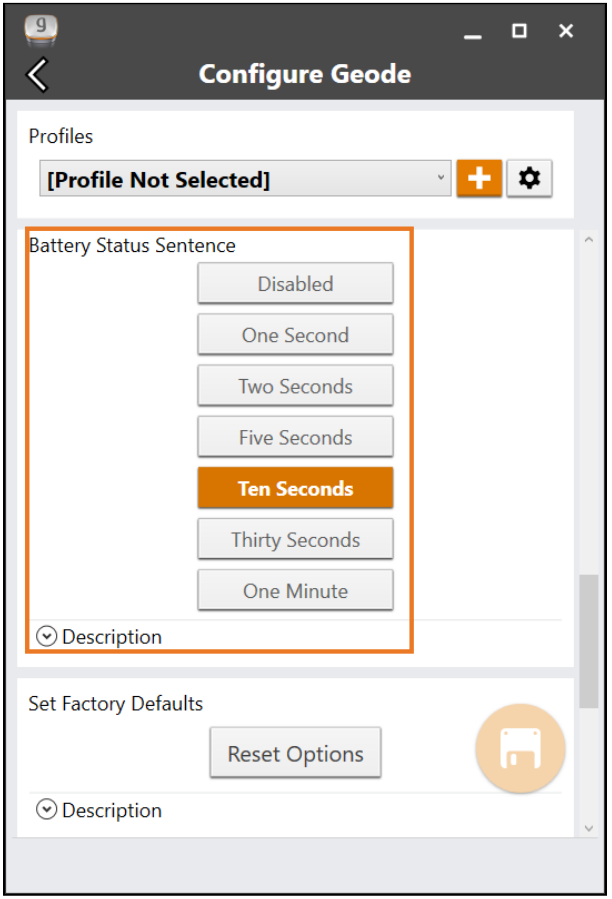


Receiver Mode Options			
Option	**Description**	**Recommendation**	**Additional Explanation**
SureTrack	Legacy feature. Only seen with GNS 1 and 2 in an older version of Geode Connect.		
Mixed	The default option. The receiver uses all GNSS satellite signals available to calculate the position solution. This includes non-GPS satellites, which do	The best choice for most situations. Particularly good if there is a lot of interference.	

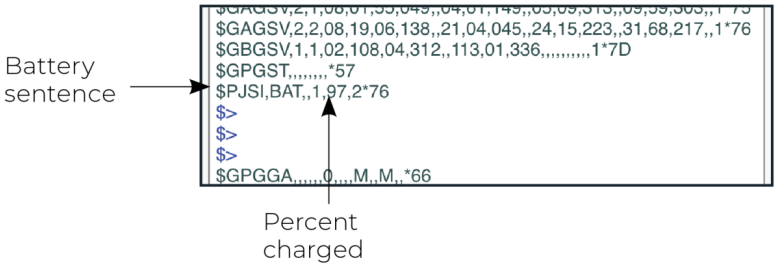
	not have DGPS or SBAS corrections. Certain NTRIP/RTK services do provide corrections for non-GPS satellites.		
NULL NMEA	The recevier sends a NULL NMEA message when it cannot get a fix.	Turn off if the app you are using shows your position as (0°, 0°), a location in the Atlantic Ocean west of Africa.	This option is available because different navigational apps interpret NULL messages differently. Some apps interpret a NULL message to mean that the Geode's position is (0°, 0°), which is west of Africa in the Atlantic Ocean.
SBAS Ranging	The receiver treats SBAS satellites as GPS satellites to speed up the initial position fix.	Use to speed up the initial position fix. Turn off for improved accuracy.	SBAS satellites operate in a time system distinct from that of the GPS satellites, so a position solution that includes SBAS satellites may be less accurate than a GPS-only or GNSS-only solution.

Tunnel	Faster reacquisition of the fix after coming out of a tunnel.	Use it as need-ed.	

Note: Changes must be saved in order for them to remain from screen to screen. If the save icon in the lower right corner of the screen is orange, this means there has been a change that needs to be saved. Tap the save icon to save changes .



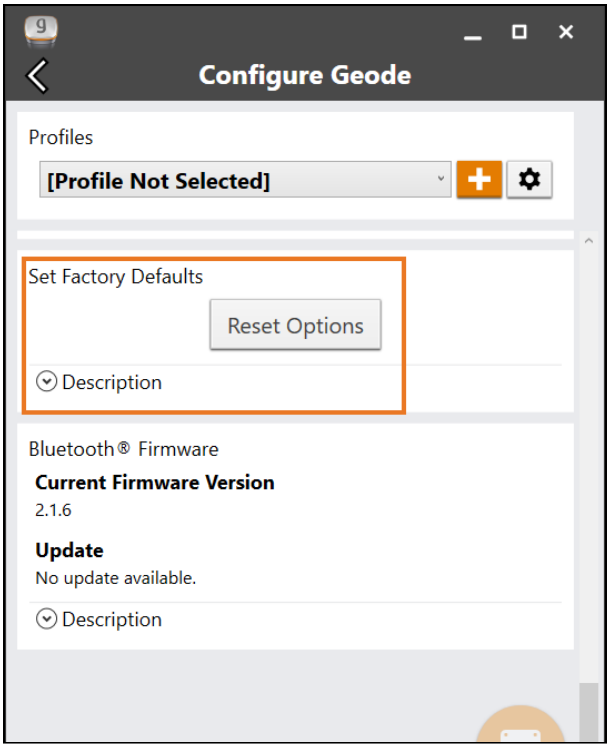
In Geode Connect, the battery status sentence looks like this:



This sentence may not be recognized by some navigation or data-collection apps. If it causes problems in an app, disable it.

Receiver Reset

Reset Options allows you to reset your Geode with a soft reset or to the factory defaults.



⚠ CAUTION: Resetting the receiver cannot be undone.

The two choices for resetting your Geode are

- A soft reset returns the Geode to default settings.
- Set factory defaults returns the Geode to the default settings and also clears the real-time clock at startup, the backed up ephemeris and almanac, and reboots the receiver.

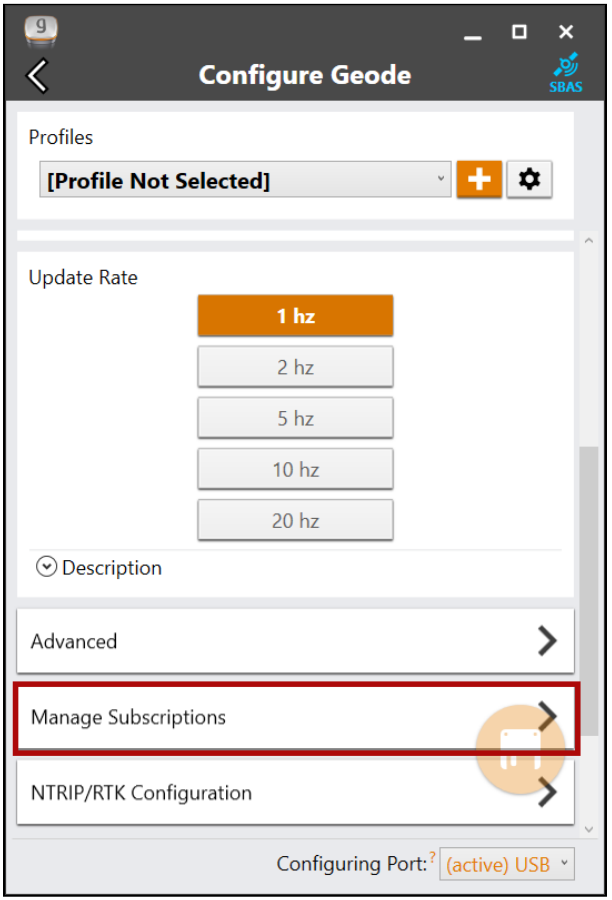
Following a factory reset, the time to first fix will increase by 4–6 minutes because the Geode will re-download the data when it connects with a positioning satellite.

The two almanac messages from the GPS satellites alternate every 12.5 minutes. After setting to factory defaults, the best

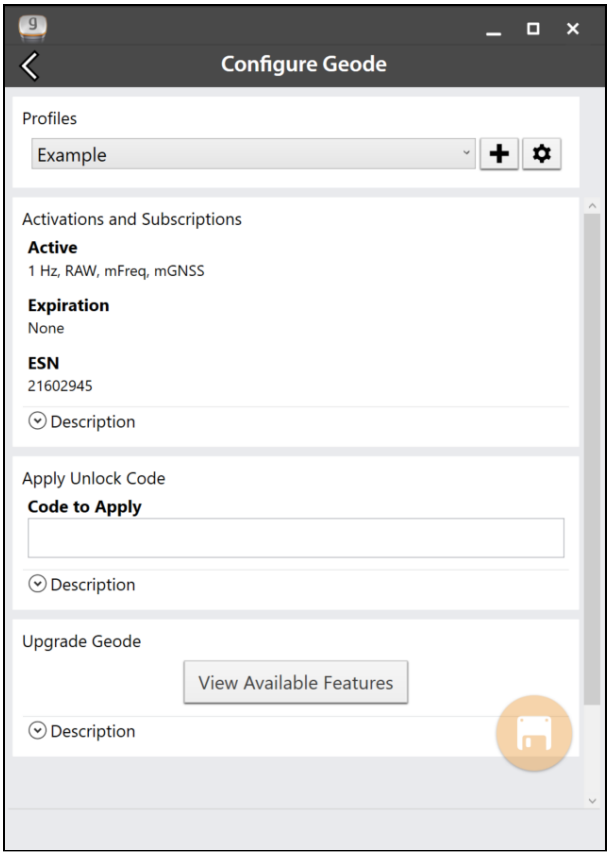
practice is to turn on the Geode and wait 25 minutes to ensure a complete Almanac has been stored.

Manage Subscriptions

GNS3M devices offer a subscription to Atlas. This screen allows you to view the details of your current subscription, apply unlock codes, and view the subscriptions that are available for activation.



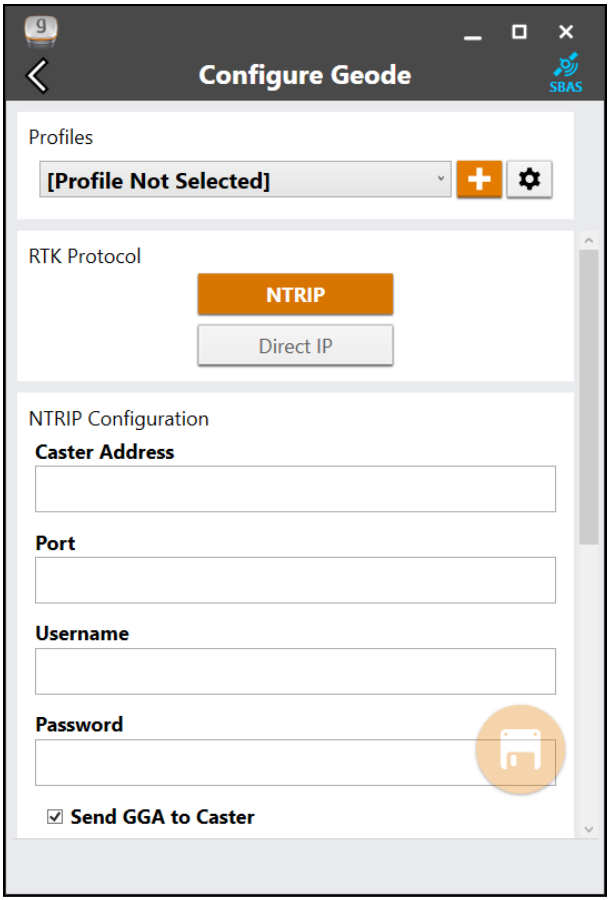
Tap **View Available Features** to apply upgrades to the Geode. For more information, see Upgrade_Geode.



Configure NTRIP/RTK

Use this screen to enter the information supplied by your NTRIP/RTK service provider, including the caster IP address, port, username, and password.

Note: The picture below shows NTRIP selected as the RTK protocol. If the information from your service provider is only an IP address and port and does not include a username, password, and mount point, then choose Direct IP as your RTK protocol.



Note: NTRIP/RTK settings are stored in the Geode Connect app, not in the Geode receiver.

NTRIP is a useful protocol for precise correction of real-time positioning solutions. (See NTRIP and RTK.)

The Geode is able to calculate an RTK Fix/Float position with sub-meter to centimeter-level accuracy. NTRIP services do require an internet or cell data connection (via your mobile device) and usually involve either a free or paid subscription to the service.

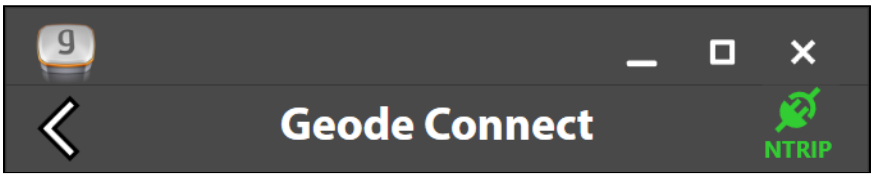
If you have a subscription to an NTRIP/RTK service, Geode Connect will allow you to configure the Geode to use that service.

Note: Save changes before leaving the screen.

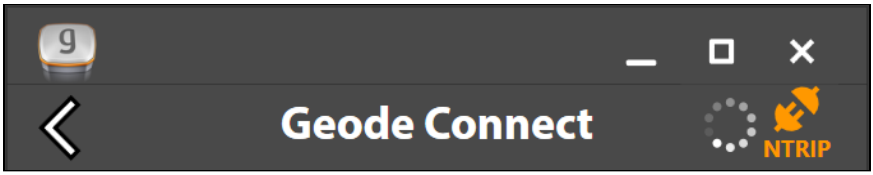
To establish an NTRIP/RTK connection,

1. Ensure the handheld device you are using to host Geode Connect has a data connection.
2. Enter the identifying information supplied by your NTRIP/RTK service provider.
3. Verify “Send GGA to Caster” is checked. This tells the Geode to send its position to the caster so that the caster can locate the mount points closest to the Geode’s position.
4. Tap **Download Mount Points**.
5. Tap the drop-down menu in the Mount Points section. This will open a list of mount points in the network close to the Geode’s position.
6. Choose the appropriate mount point.
7. Tap **Start NTRIP/RTK**.

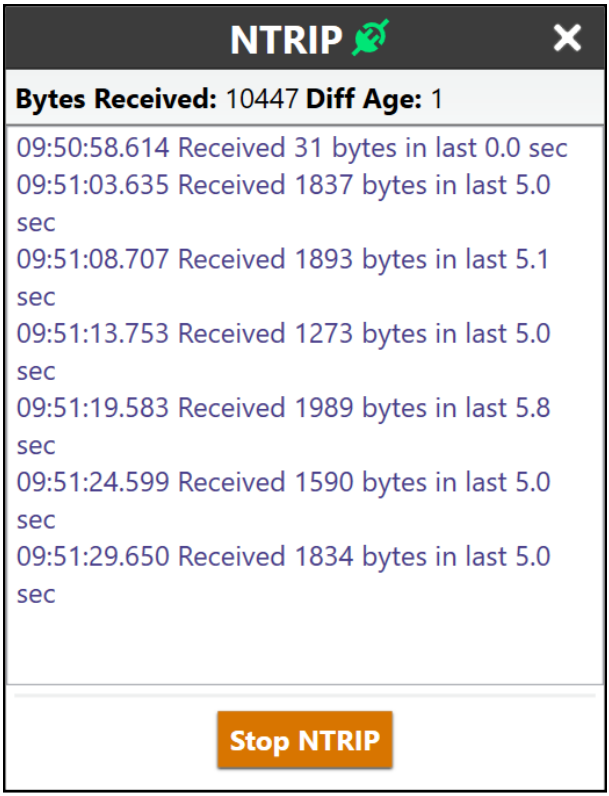
When NTRIP/RTK is connected and working, the word NTRIP and a closed green plug will appear on the right side of the Home page. Tap this icon to return to the NTRIP/RTK configuration screen at any time.



If NTRIP appears on the home page with an open orange plug, the Geode is still trying to establish a connection to the NTRIP service. The connection might take a while. If the Geode has trouble connecting, try selecting a different mount point.



Tap on the icon to open the NTRIP screen. On this screen you can see the data that is received or stop the NTRIP connection.



Third-Party Apps and NTRIP/RTK

When using the Geode with your device, some third-party mapping and data-collection apps may need some help connecting to an NTRIP/RTK service.

If the third-party app has built-in NTRIP/RTK capabilities, do not use Geode Connect. Simply connect to the Geode and configure NTRIP/RTK in the third-party app.

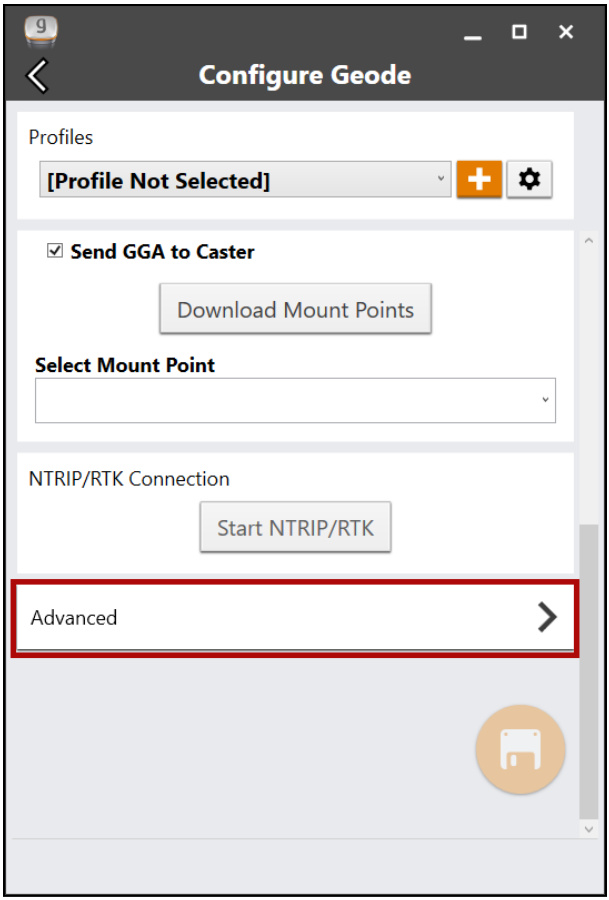
If the third-party app does not have built-in NTRIP/RTK capabilities, you can use Geode Connect to supply that service directly to the app. You will need to connect the Geode to both apps: Geode Connect and the third-party app.

This is accomplished via Virtual COM Ports, which can be configured in Geode Connect.

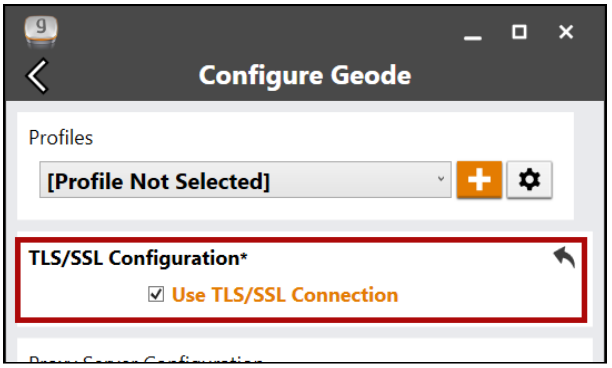
Once the Geode is connected to both apps, configure NTRIP/RTK services in Geode Connect. Leave Geode Connect open while using the third-party app.

Configure NTRIP/RTK Advanced Options

The NTRIP/RTK Configurations Advanced screen allows you to give more direction about how Geode Connect will communicate with your RTK server.



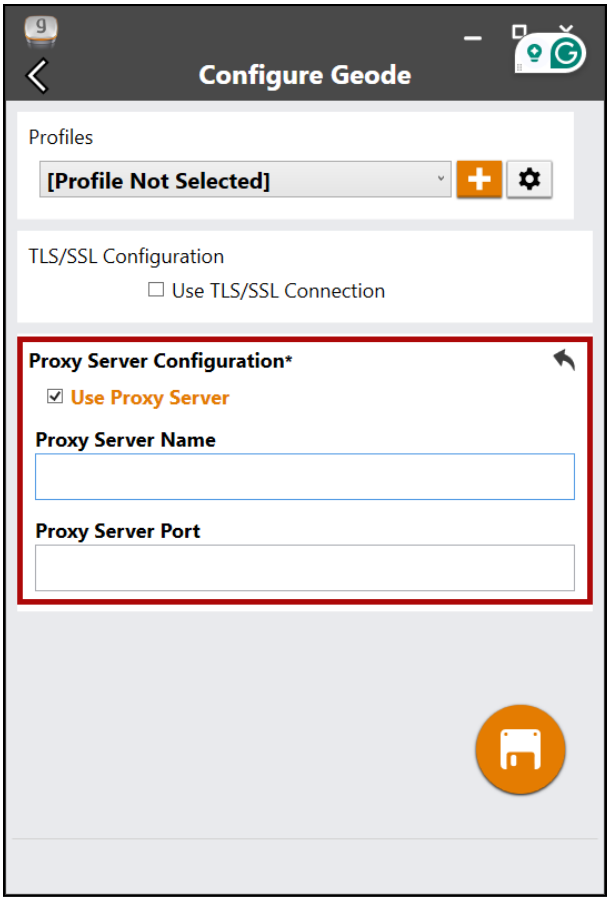
Use TLS/SSL. From NTRIP/RTK Configurations Advanced screen you can indicate that you would like to use a TLS/SSL connection to your NTRIP service provider. Your NTRIP service provider will let you know if you need to use this option.



To connect with TLS/SSL,

1. Select **Use TLS/SSL Connection**.
2. Tap **Save**.

Use Proxy Server. From NTRIP/RTK Configurations Advanced screen you can direct Geode Connect to use a proxy server. You may need to use a proxy server if a network firewall blocks the port that your NTRIP service is using.



To use a proxy server,

1. Select **Use Proxy Server**.
2. Enter the proxy server information.
3. Tap **Save**.

Port Connection

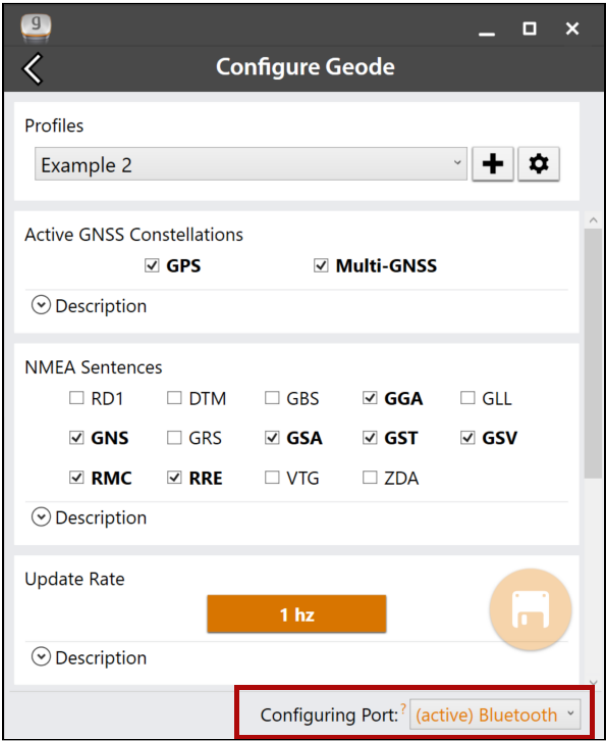
The Geode remembers the settings assigned to each configuration port, and the settings will be used when you physically connect with that port. This allows you to quickly switch between use cases.

Sample use cases for the same Geode:

- **Use Case 1**—Mounted on a pole for data collection on foot in heavy tree canopy. Geode settings optimized for a Bluetooth wireless connection, slow travel, and GNSS constellations (more potential satellites in view through the trees).
- **Use Case 2**—Mounted in the cab of a truck for carefully locating previously marked research sites. Geode settings optimized for a USB connection, slower travel, and NTRIP/RTK correction.
- **Use Case 3**—Mounted on a fast moving four wheeler on rolling hills with open sky.
  Geode settings optimized for an RS-232C connection, quick travel, and an unobstructed open sky.

To define the settings for a configuration port,

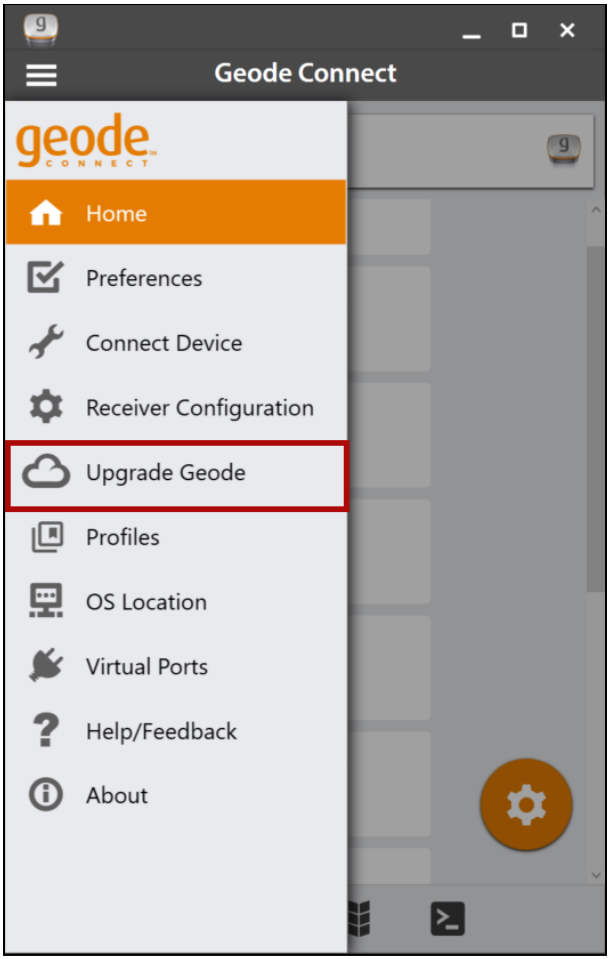
1. Select the port type in Configuring Port.



2. Select the configuration settings and/or apply the appropriate profile.
3. Tap the save icon  . Geode Connect automatically applies these settings each time you connect with that configuration port.

Geode Connect automatically applies these settings each time you connect with that configuration port.

9.5.4 Upgrade Geode



You can apply upgrades via activations or subscriptions.

- **Activations** include a one-time upgrade to apply a new feature to the product. The available activations include increased output rates, multi-frequency, and Atlas basic L-band corrections.
- **Subscriptions** include time-based purchases of an H10 or H30 Atlas L-band correction service.

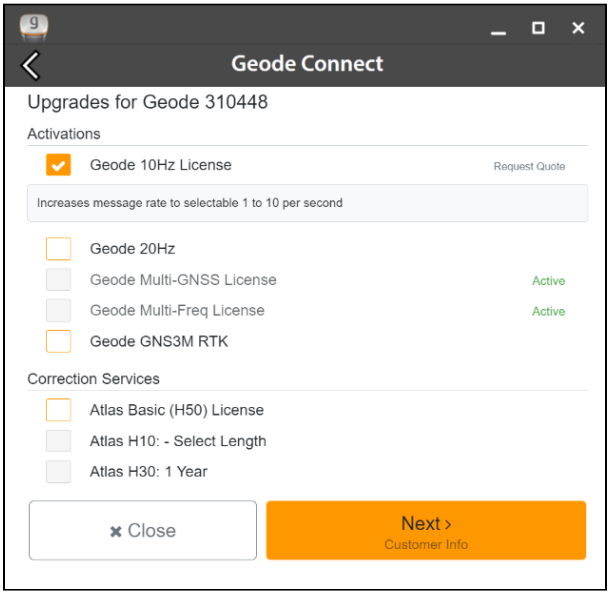
This screen can also be accessed from under **Receiver Configurations** > **Manage Subscriptions**.

Request a Quote

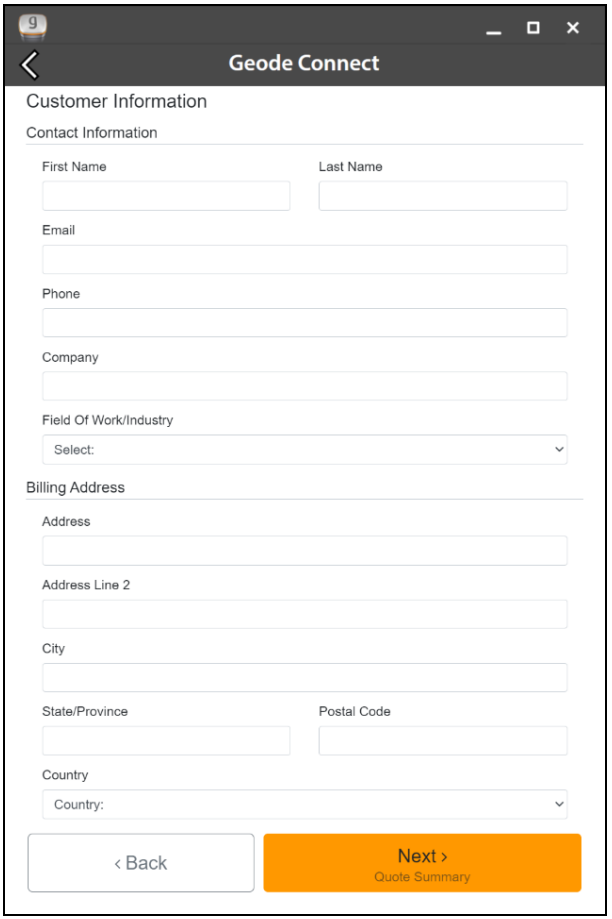
To request an activation or subscription quote,

1. Select the check box next to one or more activation or subscription.
2. Select **Next**.

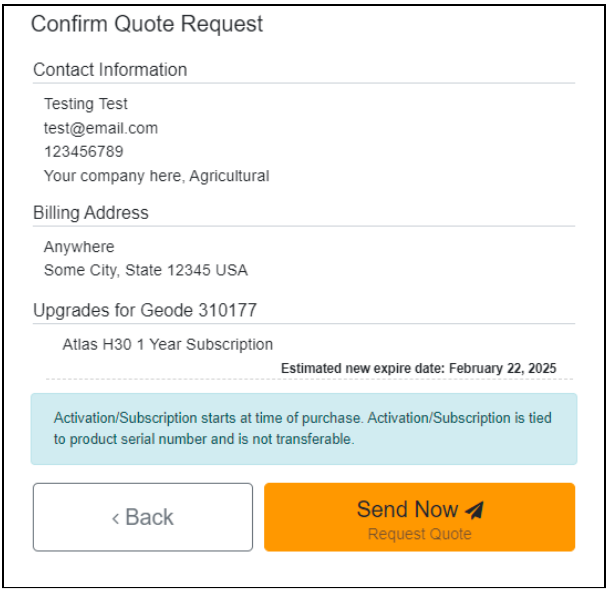
   Note: If you have a single-frequency Geode, the only activations available are 10 Hz and 20 Hz.



3. Enter your contact information.
4. Tap **Next**.

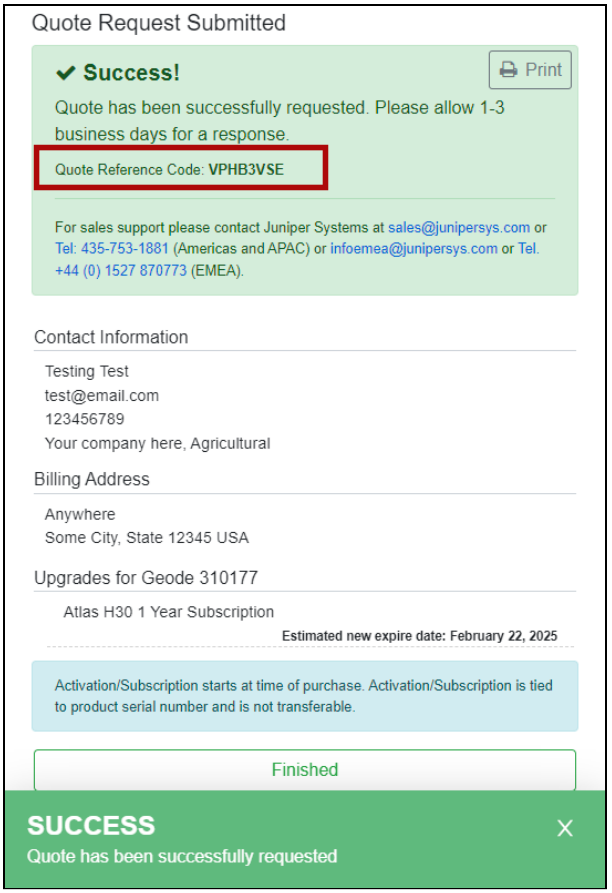

Geode Connect
Customer Information
Contact Information
First Name
Last Name
Email
Phone
Company
Field Of Work/Industry
Select:
Billing Address
Address
Address Line 2
City
State/Province
Postal Code
Country
Country:
‹ Back
Next ›
Quote Summary

5. On the Quote Summary screen, verify your information is correct and then select **Send Now**.



An email requesting your quote will be sent to Juniper Systems and a representative will contact you.

When the request email is sent, you will receive a Quote Reference Code. This code can be used to reference your request if you encounter any problems and need to contact Juniper Systems.

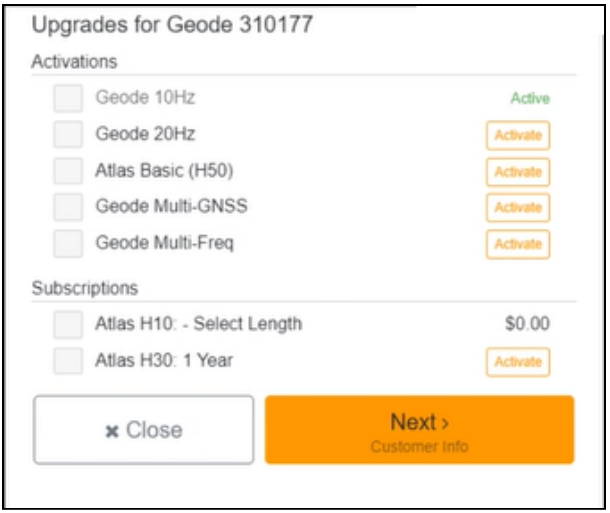


Activate Upgrade

If you have already purchased an activation or subscription you will need to activate it in Geode Connect.

1. Verify your device is connected to the GNS3 and the internet.

2. In the activations list, tap the yellow activate option next to the upgrade you would like to activate.

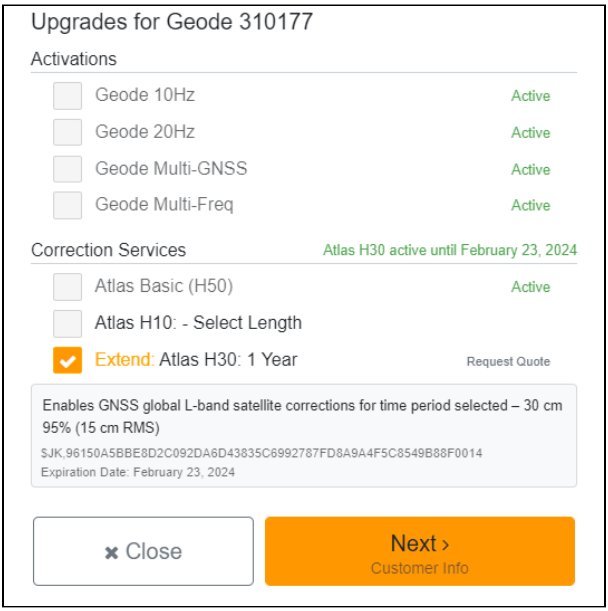


Extend a Subscription

To extend your current subscription,

1. Select the check box next to your subscription. It will be marked with a yellow “Extend.”

2. Select **Next**.

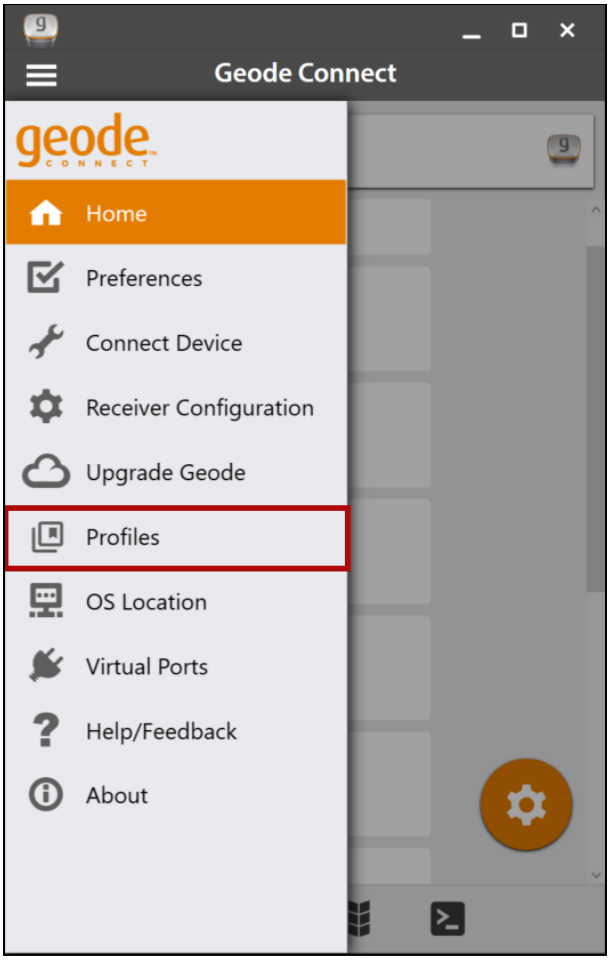


3. Request a quote for the subscription by following the process listed in the **Request a Quote** section above.

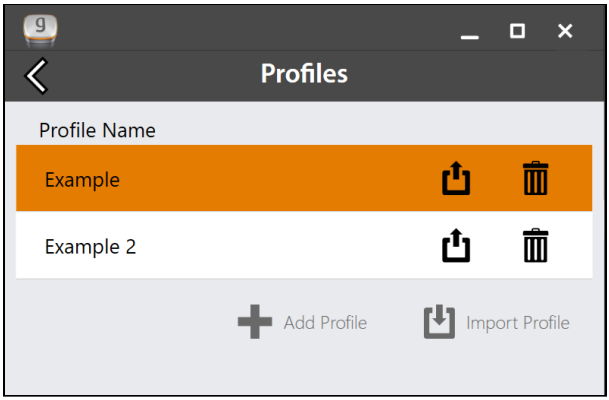
If you purchased the subscription previously, you can activate the subscription for your GNS3 on this screen as well.

9.5.5 Profiles

A profile is an easy way to save and apply the configuration settings that fit a specific project or application. Open the Profiles screen to manage the configuration profiles for your GNS3 receiver.



The active profile is shown in orange. Tap a profile to apply it.



Note: You can also change the active profile from the Receiver Configuration screen.

For instructions on adding or editing a profile, see Profiles in 9.5.3 Receiver Configuration.

Delete a Profile

To delete a profile,

1. Tap the delete icon next to the profile you want to delete
2. Tap **Delete** to confirm the profile deletion.

Export a Profile

You can export a profile as a .JSON file and use it on other GNS3 receivers.

To export a profile,

1. Tap the export profile icon next to the profile you want to export.
2. Select the desired file location.

Import a Profile

You can import a profile saved as a .JSON file.

To import a profile,

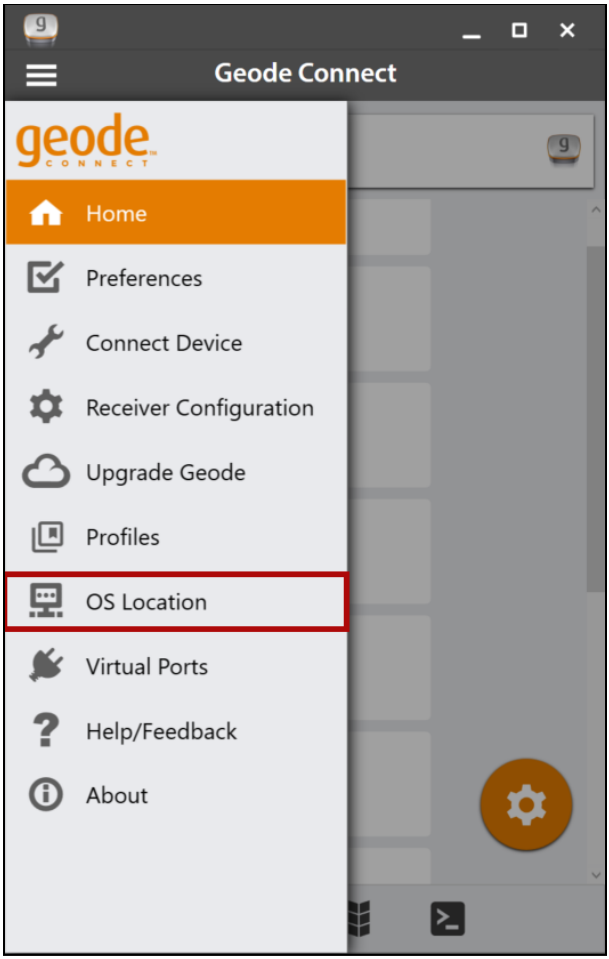
1. Tap **Import Profile**  .
2. Locate the profile you want to import.

The imported profile is automatically applied to the active connection port.

9.5.6 OS Location

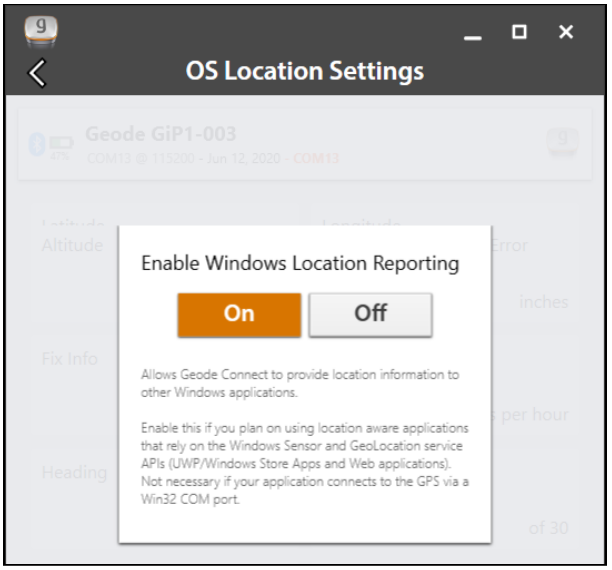
Some apps depend on the Windows operating system to provide positioning data.

If you are using the Geode, it is because your project demands precision GNSS. However, if your app is depending on the operating system, it may be collecting data via the consumer-grade receiver in your PC or tablet—not the Geode.



The best way to figure out where your app is getting its positioning data is to take a moment to examine the app. If the app allows you to directly choose an external receiver, you can select the Geode and trust that the app will rely on the Geode. If the app provides no option for choosing an external receiver, it is most likely relying on the Windows operating system for its data. You will need to enable Windows Location Reporting in Geode Connect.

Windows Location Reporting allows the Windows OS to use the Geode for its Location Services.



Select **On** to turn on Windows Location Services. Once the services are enabled, it is no longer necessary to keep Geode Connect open. If you choose to close Geode Connect, you will need to connect to the Geode via the third-party app or through Settings in Windows.

Note: The Geode sends data only from active NMEA sentences to Windows Location Services. To activate specific sentences, see NMEA Sentences.

Test Windows Location Reporting

After configuring the Geode to send location data through the Windows OS, you can test to make sure your third-party app is now getting its data from the Geode.

Both of the following tests require that the Geode is on and has had time to build its initial almanac, which usually takes about 25 minutes after it has been turned on for the first time outside.

One-Person Test

1. Connect the Geode to your Windows PC or tablet via Bluetooth in the third-party app or the OS. (Geode Connect is

not necessary once Windows Location Reporting is enabled.)

2. Place the Geode in one stationary position. Do not move it.
3. Open your third-party mapping or data-collection app.
4. Holding your PC or tablet, walk five to ten paces out and then walk in a circle around the Geode.

If the position in the third-party app does not change significantly (remember, the Geode is just sitting there), the app is drawing its data from the Geode. You can continue to use the app and the Geode without any worries.

If the position moves in a circle, the app is drawing its data from your Windows PC or tablet. Make sure Windows Location Reporting has been configured.

Two-Person Test

One person holds the Geode, and the other person holds the Windows PC or tablet.

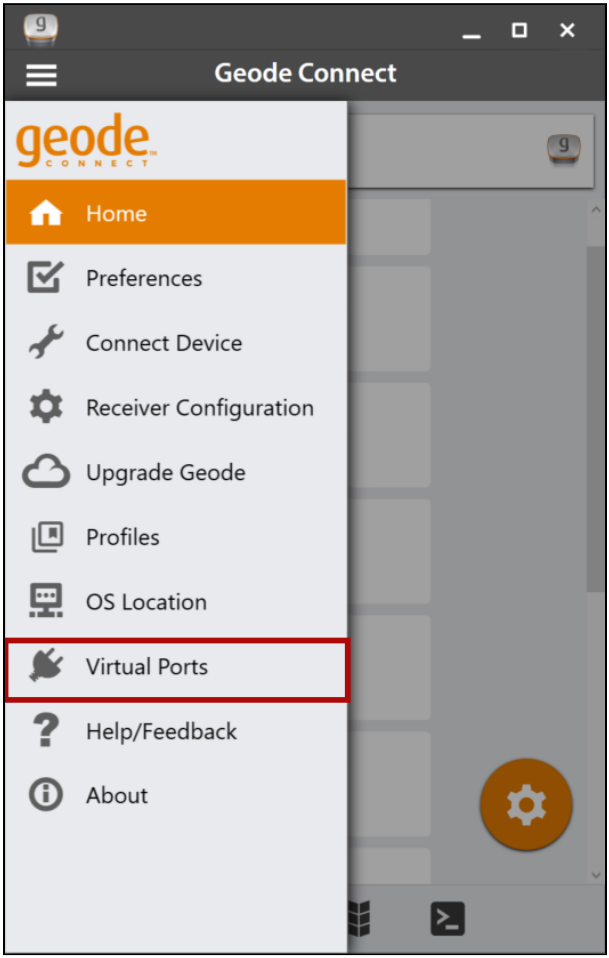
1. Connect the Geode to your Windows PC or tablet via Bluetooth in the third-party app or the OS. (Geode Connect is not necessary once Windows Location Reporting is enabled.)
2. Open your third-party mapping or data-collection app.
3. The person holding the Windows PC or tablet remains stationary.
4. The person holding the Geode walks five to ten paces out and then walks in a circle around the person holding the Windows device.

If the position moves in a circle, the app is drawing its data from the Geode. Windows Location Reporting is functioning as it should.

If the position does not change, the app is drawing its data from your Windows device's internal GPS receiver. Make sure Windows Location Reporting has been configured.

9.5.7 Virtual Ports

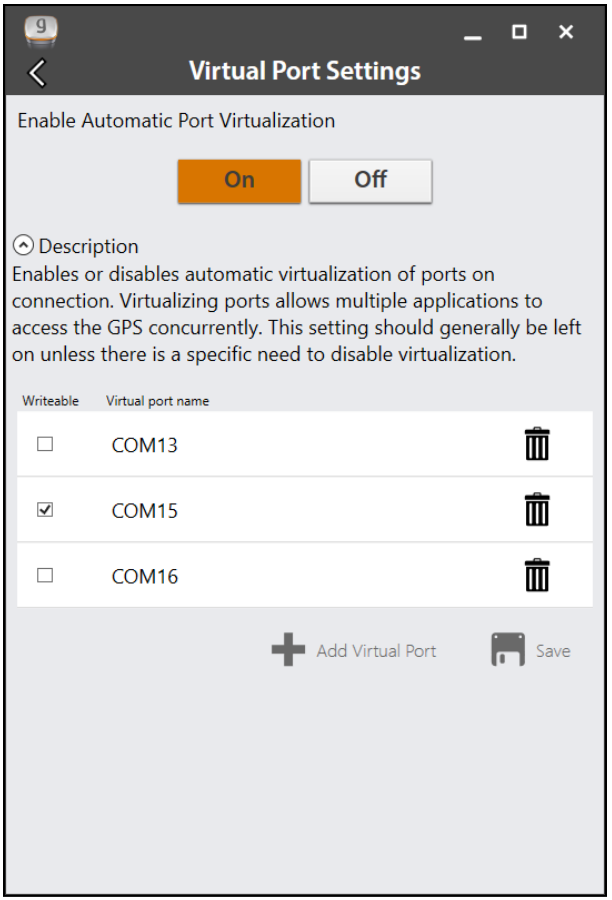
Geode Connect for Windows PC has a Virtual COM Port Driver. You can use this driver to configure virtual COM ports as writeable. Once writeable, these ports can be used for two-way communication between the Geode and third-party apps, allowing the apps to both receive and send information to the Geode.



Virtual COM ports also provide a convenient way to connect the Geode to both apps (Geode Connect and the third-party app) simultaneously.

This configuration allows the Geode to use NTRIP/RTK data from Geode Connect to correct its position and then send that corrected position to the third-party app.

Note: The first time you select Virtual Ports, Geode Connect may prompt you to install the Virtual Port Driver. Go ahead and install it.



1. Select **On**.
2. Select the COM port you would like to make writeable (so that another app can use it to send commands to the Geode).

3. Tap **Save**.

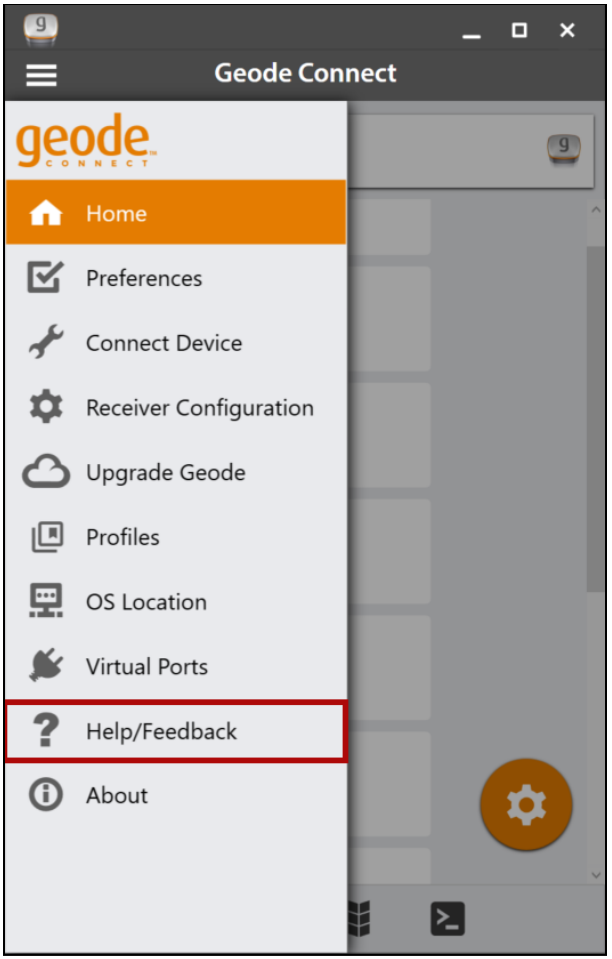
The selected port is now available for a third-party app to set up a two-way connection with the Geode.

Note: This port should not be the same as the port being used by Geode Connect. In the example above, COM15 is made available for the third-party app. Geode Connect is using COM4.

The Virtual Port Settings page can also be used to delete or deactivate virtual COM ports. Be sure to tap **Save** after each change.

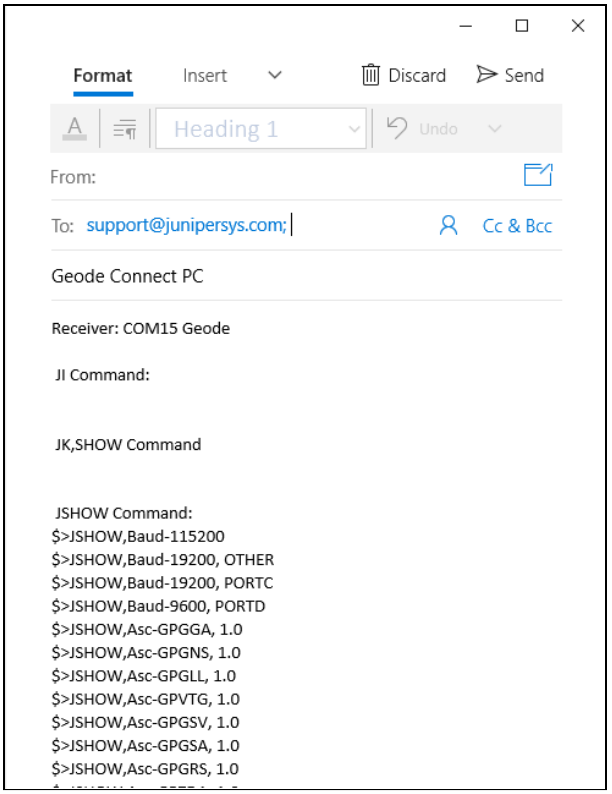
9.5.8 Request Help and Send Feedback

On the Settings screen, tap **Help/Feedback**.



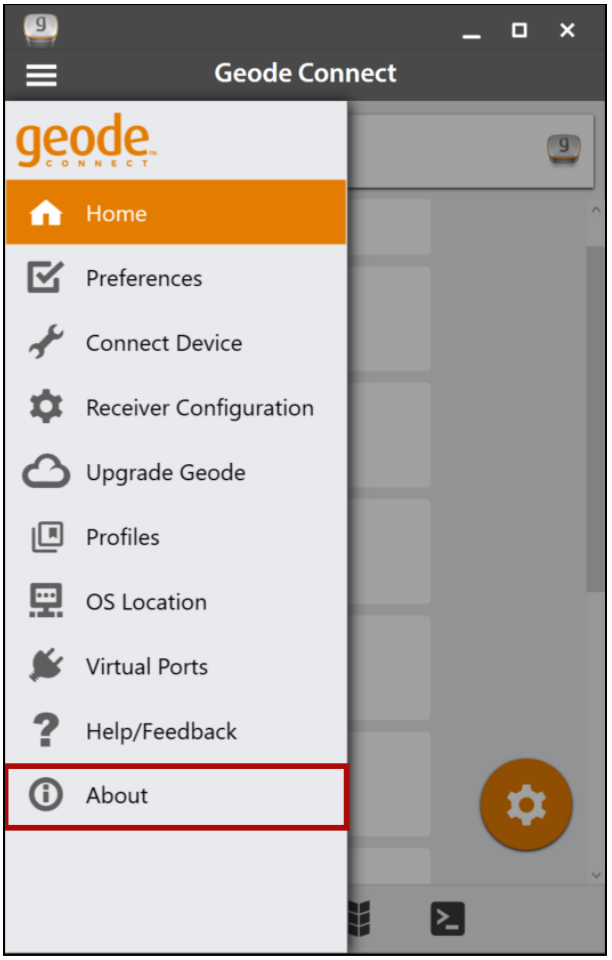
This feature links directly with the email account configured on your device and opens an email addressed to Juniper Systems Support. The email includes detailed configuration commands from the Geode. This allows Juniper Systems Support to diagnose and solve the problem more efficiently. This info is also used when purchasing a feature upgrade for the Geode.

You can enter additional information into the email to provide a further explanation about your issue.



9.5.9 About

The About screen shows the Geode Connect version currently in use.


Geode Connect
geode
CONNECT
Home
Preferences
Connect Device
Receiver Configuration
Upgrade Geode
Profiles
OS Location
Virtual Ports
Help/Feedback
About

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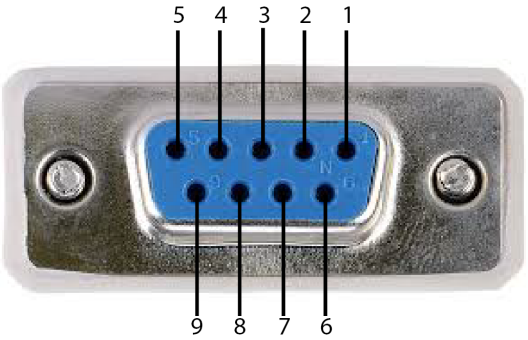
GNS3 Receiver

CHAPTER 10

10 Appendix A: Serial Port Configuration

The Geode has a 9-pin RS-232C serial port. This allows the Geode to be mounted to a piece of equipment such as a tractor or a precision planter. This type of configuration maintains a constant connection for data and power to the Geode. Use a straight-through 9-pin cable to establish communication between the Geode and your mobile device. The functions of each pin are listed below.



Serial Port Configuration		
Pin	**Signal**	**Condition**
1	PPS output	Normally low, pulsing high +/- 5.4 V, active low with falling edge synchronization
2	TXD out	+/- 5.4 V output
3	RXD in	+/- 25 V tolerant
4	Event Mkr in	Active high with rising edge synchronization (+/- 25 V tolerant)
5	GND	
6	GPS Lock out	Active high, indicates GPS fix
7		
8	Speed Pulse out	Normally low, pulsing high (+/- 25 V tolerant)
9	+12 V power input RI (ring-in) signal	Tolerance: 5-17 V DC

		Maximum: 15 W Ideal: 12 @ 1.25 A (such as, consumer vehicle battery) Possible: 5 V @ 3 A (such as, USB-C charging cable)

*Requires a USB-C cable with 5.1 K pull-down resistor on either of the CC lines.

You can remotely power on and off the Geode through pin 9 of the serial connection. Apply or remove 12 V (nominal) to cycle power on the Geode.

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CHAPTER 11

11 Appendix B: Warranty and Repair Information

11.1 Limited Product Warranty

11.1.1 Two Year Warranty

Juniper Systems, Inc. (“JS”) warrants that the Geode Receiver shall be free from defects in materials and workmanship, under normal intended use, for a period of 24 months from the date of shipment.

11.1.2 Ninety Day Warranty

JS warrants that the following items shall be free from defects in materials and workmanship, under normal intended use, for a period of ninety (90) days from the date of shipment:

- User documentation
- Accessories

11.1.3 Warranty Exclusions

This warranty shall not apply in the following conditions:

(i) The product has been set up improperly or has been improperly installed or calibrated.

(ii) The product is operated in a manner that is not in accordance with the user documentation.

(iii) The product is used for a purpose other than for which it was designed.

(iv) The product has been used in environmental conditions outside of those specified for the product.

(v) The product has been subject to any modification, alteration, or change by or on behalf of customer (except and unless modified, changed or altered by JS or under direct supervision of JS).

(vi) The defect or malfunction results from misuse or accident.

(vii) The serial number on the product has been tampered with or removed.

(viii) The product has been opened or tampered with in any way.

This warranty is exclusive, and JS will not assume and hereby expressly disclaims any further warranties, whether express or implied, including, without limitation, any warranty as to merchantability, fitness for a particular purpose, non-infringement or any warranties arising from the course of performance, dealing, or usage of trade. JS specifically makes no warranties as to the suitability of its products for any particular application. JS makes no warranties regarding the following:

- Its products will meet your requirements or will work in combination with any hardware or applications software products provided by third parties.
- The operation of its products will be uninterrupted or error-free.
- All defects in the product will be corrected.

JS shall not be responsible for software, firmware, information, or memory data contained in, stored on, or integrated with any products returned to JS for repair, whether under warranty or not.

11.1.4 Remedy

In the event a defect in materials or workmanship is discovered and reported to JS within the specified warranty period, JS will, at its option, repair the defect or replace the defective part or product. Replacement products may be new or reconditioned. JS warrants any replaced or repaired product for a period of ninety (90) days from the date of return shipment or through the end of the original warranty period, whichever is longer.

11.1.5 Limitation of Liability

To the fullest extent allowed by law, the obligation of JS shall be limited to the repair or replacement of the product. JS shall in no event be liable for special, incidental, or consequential, indirect, special or punitive damages of any kind, or for loss of revenue or profits, loss of business, loss of information or data, or other financial loss arising out of or in connection with the sale, installation, maintenance, use, performance, failure, or interruption of any product. Any responsibility and/or liability of JS shall, in connection with a warranted product, be limited in the maximum amount to the original purchase price.

11.1.6 Governing Law

This warranty is governed by the laws of Utah, U.S.A. and excludes the United Nations Convention on Contracts for the International Sale of Goods. The courts of Utah shall have exclusive personal jurisdiction in case of any disputes arising out of or in connection with this warranty.

11.1.7 Warranty Repairs

Warranty information for the Geode Receiver is located on our website at www.junipersys.com/support/my-product. You can check warranty status, and view warranty terms and conditions.

To obtain warranty repair, paid upgrade, or service on the Geode Receiver, submit a repair order on our website at www.junipersys.com/support/my-product or contact an authorized repair center within the applicable warranty period. Products returned for repair or service without proper authorization may acquire an additional handling fee and/or delay in the repair. The customer is responsible to prepay all shipping costs when sending equipment to a repair center. The repair center will return the repaired equipment by the same method it was received with costs of shipping prepaid.

Services and Materials Provided Under Warranty

- Analysis of problem by service technician
- Labor and materials required to fix defective parts
- Functional analysis performed after repair
- Repair turnaround within 10 working days of receipt unless special circumstances exist
- Shipping costs to return device to customer

JS strives to provide continued full repair services for our products for five years or more from the final production date of each product model. However, in some rare cases (depending on the repair need), it may not be possible to perform a repair due to an unforeseen discontinuation or lack of supplied parts from third-party vendors. Repair support for a product may continue beyond five years if obtaining replacement parts or tools remains

economically feasible. Our policy is that we will do what is best and most beneficial for our customers and company.

11.2 Repairs, Upgrades, and Evaluations

⚠ CAUTION: Do not attempt to repair the Geode Receiver yourself. This action voids the warranty. There are no user serviceable parts inside the Geode.

Information about repairs, upgrades, and evaluations is located on our website at www.junipersys.com/support/my-product. You can locate a repair center, submit a repair order, check repair status, view terms and conditions, get shipping instructions, and view lead times.

Before returning a unit, please get permission by submitting a repair order from our website and waiting for confirmation or by contacting a repair center directly. Be prepared to provide the following information:

- Product serial number (see label on bottom of unit)
- Your name
- Name and shipping address of company/university/agency
- Best contact method (phone, fax, email)
- Clear, highly-detailed description of the repair or upgrade
- Credit card or purchase order number and billing address (for a repair or upgrade that is not covered by the standard warranty or an extended warranty policy)

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GNS3 Receiver

CHAPTER 12

12 Appendix C: Warnings, Licensing, and Regulations

12.1 Product Warnings

Follow the warnings listed below to use the Geode and accessories safely.

12.1.1 Battery Warnings

⚠ WARNING! This device comes with a lithium-ion rechargeable battery pack. To reduce the risk of fire or burns, do not disassemble, crush, puncture, short external contacts, or expose the battery pack to fire.

The Geode unit contains no user-serviceable parts. If the unit needs service, please send it to a authorized service center.

Improper battery use may result in a fire, explosion or other hazard.

12.1.2 Wall Charger Warnings

⚠ WARNING! To reduce the risk of personal injury, electrical shock, fire or damage to the equipment:

Plug the wall charger into an electrical outlet that is easily accessible at all times.

Do not place anything on the wall charger cord or any of the other cables. Arrange them so that no one may accidentally step on or trip over them.

Do not pull on a cord or cable. When unplugging the wall charger from the electrical outlet, pull on the plug, not the cord.

Use only wall chargers intended for the Geode Receiver. Using any other external power source can damage your product and void your warranty.

12.2 Certifications and Standards

12.2.1 FCC: United States

In compliance with the FCC rules 47 CFR 15.19(a)(3), the statements that follow must appear on the device or in the user documentation.

This device complies with Part 15 of the FCC Rules. Operation of this equipment is subject to the following two conditions:

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

In compliance with the FCC rules, 47 CFR 15.105(b), the user must be notified that this equipment has been tested and found to comply with the 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 in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is 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 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/TV technician for help.

In compliance with the FCC rules, 47 CFR 15.21, the user must be notified that changes or modifications to the device that are not expressly approved by the manufacturer could void the user's authority to operate the equipment.

Only approved accessories may be used with this equipment. In general, all cables must be high quality, shielded, correctly terminated, and normally restricted to two meters in length. Wall chargers approved for this product employ special provisions to avoid radio interference and should not be altered or substituted.

When used with a 9-pin serial cable, a ferrite is required on the cable near the end of the cable that connects to the Geode.

This device must not be co-located or operating in conjunction with any other antenna or transmitter.

Contains FCC ID: X3ZBTMOD8

12.2.2 Industry Canada

In compliance with Industry Canada rules, the following statement must appear on the device or in the user documentation:

> This Class B digital apparatus complies with Canadian ICES-003.

Contains IC ID: 8828A-MOD8

12.2.3 Radio Frequency Safety

This device operates in compliance with the FCC radio frequency exposure limits for an uncontrolled environment. Users must follow instructions provided in the user documentation to satisfy compliance with FCC radio frequency exposure requirements.

12.2.4 CE Marking (European Union)

Products bearing the CE marking comply with EU Directive 2014/53/EU.

CE compliance of this device is valid only if powered with/by a CE-marked wall charger provided by the manufacturer.

12.2.5 Declaration of Conformity

The Declaration of Conformity for CE Marking is available at: http://www.junipersys.com/doc.

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GNS3 Receiver

CHAPTER 13

13 Appendix D: GNS3 Specifications

Specifications are subject to change without notice.

GNS3 RECEIVER	
FEATURE	**SPECIFICATION**

Receiver	▪ Receiver Type: GNSS multi-frequency, multi-constellation (GNS3M, when activated); single-frequency (GNS3S)
	▪ Signals:
	  ▪ GPS: L1CA, L1P, L1C, L2P, L12P, L2C, L5
	  ▪ GLONASS: G1, G2
	  ▪ Beidou: B1, B2, B3 (without L5)
	  ▪ GALILEO E1BC, E5a, E5b
	  ▪ QZSS: L1CA, L1C, L2C, L5
	  ▪ Channels: 800+
	▪ SBAS Support: 3-channel parallel tracking
	▪ L-band: Atlas worldwide 1525-1560 MHz (with subscription)
	▪ Update Rate: 1 Hz standard, up to 10 Hz or 20 Hz (optional)

Accuracy	▪ SBAS: <30 cm HRMS, <60 cm 2DRMS
	▪ Atlas (95%):
	  ▪ H10: 8 cm
	  ▪ H30: 30 cm
	  ▪ Basic: 50 cm (requires subscription)
	▪ RTK (Fixed): 2 cm
	▪ Autonomous: 1.2 meters HRMS
	▪ Cold Start: 60 sec typical (no almanac)
	▪ Reacquisition: 15 sec Atlas, all others <1 sec

Communications	▪ Bluetooth® 5.1 SPP, iAP2, EAP ▪ Bluetooth Range: Class 1 Long Range ▪ Ports: USB Type-C, Serial RS-232C DB-9 ▪ Serial Baud Rates: 4800–115200
Receiver Protocols	▪ Data I/O Protocol: NMEA 0183, Crescent Raw Binary (proprietary) ▪ Correction I/O Protocol: Hemisphere GNSS Proprietary, ROX, RTCM v2.3, RTCM v3.2, CMR, CMR+ ▪ Other: 1PPS Timing Output, Speed Pulse, Event Marker Input (optional)

Power	▪ Input Voltage: 5 V DC @ 3 A USB
	▪ Power Consumption: 1.7–2 W nominal
	▪ Overtime II Technology™ Battery: 3.6 V 6000 mAh Li-ion
	  ▪ GNS3M: 10 hours
	  ▪ GNS3S: 15+ hours
	▪ Charging time less than 4 hours

Output Power	▪ Output signals variable from 6 to -6 V DC
Input Power	▪ 0 to 5 V DC (max +/- 15 V DC)

Antenna	▪ Internal precision single/multi-GNSS with integrated ground plane
	▪ External Antenna Port:
	  ▪ GNS3M: MCX type, 50 ohm 15 V DC @ 45 mA maximum
	  ▪ GNS3S: MCX type, 50 ohm 15 V DC @ 20 mA maximum

Juniper Rugged™	▪ Operating Temp: -20° C to +60° C ▪ Storage Temp: -30° C to +60° C ▪ Meets or exceeds MIL-STD 810G (Drop, Vibration, Temperature, Ingress Protection) ▪ Enclosure Rating: IP68 (1.4 meters for 30 min)
Receiver Upgrades	▪ 10 Hz Data Rate ▪ 20 Hz Data Rate ▪ Multi-Frequency ▪ Atlas Basic ▪ Atlas H30 ▪ Atlas H10

Software	▪ Geode Connect™ software provides configuration, communications setup, and receiver settings
	▪ Available for:
	  ▪ iPhone and iPad
	  ▪ Android 7 and above
	  ▪ Windows PC (10/11)

Included Accessories	▪ Cable USB-A to USB-C ▪ Cable USB-C to USB-C ▪ 5/8 x 11 Pole Mount Adapter ▪ USB charger
Dimensions	▪ 110x110x57 mm (4.36x4.36x2.5 in) ▪ 394g (14oz) ▪ Mount: 1/4x20 camera stud and M4x5 mm AMPS Diagonal

Compatibility	▪ Geode Connect™ software provides configuration, communications setup, and receiver settings.
	▪ Windows®
	▪ Android™ 7 and above
	▪ iPad and iPhone. Full list of compatible Apple™ devices:
	  ▪ iPhone 15 Pro Max, iphone 15 Plus, iPhone 15, iPhone 14 Pro Max, iPhone 14 Pro, iPhone 14 Plus, iPhone 14, iPhone SE (3rd generation), iPhone 13 Pro Max, iPhone 13 Pro, iPhone 13, iPhone 13 mini, iPhone 12 Pro Max, iPhone 12 Pro, iPhone 12, iPhone 12 mini, iPhone 11 Pro Max, iPhone 11 Pro, iPhone 11, iPhone XS Max, iPhone XS, iPhone XR, iPhone X, iPhone 8, iPhone 8 Plus, iPhone 7, iPhone 7 Plus, iPhone SE (2nd generation), iPhone SE, iPhone 6s Plus, iPhone 6s, iPhone 6 Plus, iPhone 6
	  ▪ iPad Pro 12.9 inch (1st–6th generations), iPad Pro 11 inch (1st–4th generations), iPad Pro 10.5 inch, iPad Pro 9.7 inch, iPad (5th–10th generations) iPad Air (2nd–5th generations), iPad Mini (2nd–6th gnerations for GNS3, 5th–6th generations for GNS2)
	  ▪ iPod Touch(6th–7th generations)
	  ▪ For more information visit the product website: https://junipersys.com/products/geode.