



# **Oregon Real-Time GNSS Network**

**How to Get Started**

**April 2026**

### **Oregon Real-Time GNSS Network (ORGN)**

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# Introduction

The Oregon Real-Time Global Navigation Satellite System (GNSS) Network or ORGN, is a cooperative network operated by the Oregon Department of Transportation's Geometronics Unit. The ORGN includes partnerships with schools, cities, counties, private companies and Earthscope Consortium.

The purpose of the ORGN is to provide a reliable and accurate GNSS network to increase the productivity and profitability of GNSS use in Oregon, and the goal of the ODOT Geometronics Unit is to provide user support so that ORGN users can easily use the ORGN products and services.

Land surveyors can increase their productivity and profits by using real-time correctors from the ORGN. They can also use ORGN RINEX data files for post-processing their GNSS data.

Presently, there are over 3000 active rover accounts registered with the ORGN. Users include ODOT, other government, private surveyors, academia, vendor, precision agriculture and GNSS-guided machine control users.

GNSS reference stations in the ORGN are planned, located and installed with maximum care taken to ensure antenna stability and minimal signal interference. Antenna positions of the reference stations are constantly monitored for movement and disturbance.

The coordinates of the Oregon Real-time GNSS Network, derived by aligning the ORGN to the National Spatial Reference System maintained by the National Geodetic Survey (NGS), are referenced to the NAD 83 (2011) Epoch 2010.00 (MYCS3) datum/adjustment as of March 1, 2026. This is the same datum/adjustment used for results output by the NGS Online Positioning User Service (OPUS). The coordinates for ORGN reference stations are determined by a least squares adjustment using the NGS OPUS-Projects software. Please refer to the ORGN [Network Coordinates](#) web page for more information on ORGN site coordinate generation.

The real-time correctors provided by the ORGN are generated by Leica GNSS Spider network software operating on servers at the Oregon Department of Transportation; however, the ORGN supports all brands of rovers and can use all brands of reference station receivers. The real-time correctors from the ORGN are sent out in the non-proprietary RTCM 3.x format. The RTCM formats are agreed upon by GNSS manufacturers as a common format for transmitting GNSS correctors, so any brand of rover of recent build can receive correctors in these RTCM formats and thus be used to access real-time correctors from the ORGN.

Please visit the [ORGN](#) website for more information about the Oregon Real-time GNSS Network, including network status, products and services, support information, and contacts.

# What you need to use ORGN Real-Time Correctors

To use real-time GNSS Correctors from the ORGN, you will need:

## 1. A GNSS receiver

Note: Any brand of GNSS rover of recent manufacture will be able to receive real-time correctors from the ORGN. The ORGN transmits GNSS correctors in the non-proprietary RTCM 3.x format.

Any recently manufactured single or dual frequency GNSS rover can receive correctors from the ORGN. Your rover should be able to receive GNSS correctors in the non-proprietary RTCM 3.x format used by the ORGN to transmit GNSS correctors. The rover should also be capable of connecting to the internet (via a cell modem internal or external or a cell phone with a data plan broadcasting Bluetooth or WiFi).

## 2. An ORGN Rover Account

- a. You can apply for a rover account by submitting the on-line [request form](#).
- b. After you submit the on-line rover account request, ODOT will send you a User ID and Password along with a document which further explains ORGN products and rover configuration.
- c. Currently, ORGN Rover accounts are provided from ODOT with no charge to the user; however, ODOT reserves the right to charge a minimal fee for rover accounts in the future to recover maintenance and operating costs for the ORGN.

## 3. Connection to the Internet

Note: ORGN correctors are provided over the internet on IP 167.131.109.57 or URL [orgn.odot.state.or.us](http://orgn.odot.state.or.us) on several ports. Any internet connection will work. Some suggestions:

- a. Cell modem: internal or external
  - You will need a data service contract.
  - Select your provider based on the best data cellular coverage for your project.
  - It is recommended that your cellular contract provides unlimited data service rather than charging per byte of data transmitted.
  - Both GSM and CDMA cell phone services work with the ORGN.
- b. WiFi hotspot
  - Many GNSS receivers are capable of receiving Wi-Fi
  - Multiple GNSS units can use the same Wi-Fi device

## Data Cellular Data Service

Note: There are two general formats of cell phone service: GSM and CDMA, and all cell service providers use one of these two formats. Fortunately, both GSM and CDMA cell phone services are compatible with the Oregon Real-Time GNSS Network.

Disclaimer: The following information does not constitute endorsement by ODOT of any particular type of cell phone service or any cell phone provider.

1. **GSM (Global System for Mobile communications)**
  - a. Fixed or Dynamic IP address
  - b. Uses a SIM card which allows users to switch information from phone to phone by simply moving their SIM card from one phone to the other.
  - c. GSM Providers
    - AT&T
    - T-Mobile
2. **CDMA (Code-Division Multiple Access)**
  - a. Fixed or Dynamic IP address
  - b. CDMA Providers
    - Verizon
    - US cellular

Although GSM and CDMA provide similar basic features and services to end-users (such as voice calling, text messaging, and data services) they operate very differently at many technical levels. This makes GSM phones completely incompatible with CDMA cellular networks, and vice versa; however, both GSM and CDMA are compatible with the Oregon Real-Time GNSS Network (ORGN).

## Data Cellular Coverage

Cellular data coverage at the location you are going to be surveying is by far the most important consideration in choosing a cellular provider.

Cellular providers provide maps of their data cellular coverage on their websites.

Make sure you look at the data coverage maps and not the voice coverage maps when you visit a cellular provider's website. It is generally true for all cell providers that their voice cellular coverage encompasses a larger area than their data cellular coverage. You need to know what the data cellular coverage is for your project areas.

The coverage map below is an example of a data cellular coverage map shown on a provider's website.

Warning: The coverage maps shown on cellular providers' websites are typically optimistic and should not be relied upon as showing actual data coverage. It is recommended that you test the data cellular coverage at your job site before you begin your job. Reportedly, some land

surveyors maintain data cellular contracts with several providers to ensure cellular coverage in a wide range of job locations

## Configuring your Rover for Utilizing the ORGN Correctors

Configure your rover with the following information. Your GNSS vendor should be able to show you which screens on your rover to enter the required information. As ODOT develops configuration "cook books" or receives "cook books" from vendors, we will post those on the ORGN website under [Support Documents](#).

1. **NTRIP Username** (assigned to you when you sign up for an ORGN rover account)  
(NTRIP=Network Transport of RTCM data via Internet Protocol)
2. **NTRIP Password** (assigned to you when you sign up for an ORGN rover account)
3. **IP address for the ORGN Proxy Server** (serves up the GNSS correctors to users):

167.131.109.57

or

ORGN.ODOT.STATE.OR.US if your unit permits alpha input.

4. **TCP/IP Port Number on our ORGN Proxy Server**
  - a. Port 9879: Single base correctors both GPS-only and GNSS correctors
  - b. Port 9881: GPS only Network correctors MAX and i-MAX, and Nearest\_Single Base.
  - c. Port 9882: GNSS Network correctors MAX and i-MAX, and also Nearest\_Single Base
5. **Mount Point:** choose mount point from the Source Table depending on which corrector you want to use.

NTRIP Mount List/Source Table:

A full list of all products provided by the ORGN, [All Products List](#).

When you connect to our ORGN proxy server with your rover, an NTRIP "mount list" or "source table" will be displayed on your rover. The mount list/source table is a menu of available real-time correctors to select from:

- a. **MAX: (Master Auxiliary)** A corrector based on one master and several auxiliary reference stations of the ORGN. The MAX corrector is sent out via RTCM 3.0. (If you have an RTCM 3.0-capable rover, you should pick MAX for your network-based corrector.) The MAX corrector contains additional network messages, allowed in RTCM 3.0, that capable rovers use to make calculations on the rover to determine the best network corrector.

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- b. i-MAX: (individualized Master Auxiliary) This is also a corrector based on several reference stations, sent out via RTCM 3.x. The IMAX corrector also allows the use of MSM 4 which provides correctors from multiple constellations (GPS, Glonass & Galileo).
  - c. Nearest\_single: A single base line corrector from the ORGN reference station that is closest to your rover.
  - d. Single Base: A single base line corrector from an ORGN base station selected by you
6. **RTCM version to 3.x**
7. **Reference Station Sensor:** Unknown

This is not your rover receiver type. It is the sensor type of the ORGN GNSS Network, and we have several makes and models of reference receivers in the network. Set to: Unknown.

8. **Reference Station Antenna:** Null Antenna

This is not your rover antenna type. It is the antenna type of the ORGN GNSS Network, and we have several makes and models of antennas in the network. Set to: Null Antenna or something similar.

9. **Send User ID:** No (This is different from the NTRIP Username above.)
10. **Send GGA:** Yes, or automatic.

GGA is data in NMEA format that is sent from your rover to our ORGN proxy server. The GGA message informs our Spider GNSS network software of your rover location. Spider needs to know your rover location to calculate the best ORGN reference stations to use in calculating the real-time GNSS correctors sent to you.

11. **Use NTRIP:** Yes

Once you are connected to the ORGN, the ORGN proxy server will validate your username and password and start transmitting the chosen real-time correctors to your rover. Most rovers will have icons which tell you when you are connected to the ORGN, when you are receiving correctors from the ORGN, and whether you have a position fix with resolved ambiguities.

## ORGN Products for Post-Processing GNSS Data

If you want to post-process your GNSS field data, RINEX data from the ORGN reference stations is available at no charge from the [ORGN website](#).

Data Storage: One hour RINEX (Receiver INdependent EXchange format) files, collected at a 1 second epoch rate and stored for 30 days on [file server](#). Since the ORGN is a partner network links to RINEX data from partners is provided on the [All Stations List](#). Archived RINEX files older than 30 days can be obtained by contacting ORGN Support.

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If an ORGN partner is already providing RINEX files on-line for their CORS site, ODOT will not duplicate those RINEX files on the ORGN website; however, we will provide a link to the partner's RINEX data from the ORGN web page.

The nominal epoch rate for ORGN RINEX files is 1 second; however, users may request RINEX files with a faster epoch rate on a project-by-project basis, for example, an aerial photography project using airborne GNSS control may require a faster data rate. If you have such a need, please contact ORGN Support in advance of your project.

FAQ's: Tips for Using the ORGN Effectively

**1. What are the advantages of using a fixed permanent GNSS reference station of the ORGN over setting up my own temporary GNSS base station?**

- a. By using a fixed permanent reference station of the ORGN you can eliminate:
- The cost of a second receiver to be used as a base receiver
  - The cost of paying a surveyor to baby sit an expensive temporary base set up.
  - The possibility of measuring the base HI incorrectly or recording HI incorrectly.
  - Inaccurate centering of the base antenna over the control station mark.
  - Using the wrong control station.
  - Using the wrong coordinates for the control station.
  - Battery failure at the base station.

**2. What are the advantages of a network multi-station real time corrector from the ORGN over a single-base RT corrector?**

If you use a single base RTK corrector, you should stay within about 10 Km of your base station to avoid distant dependent tropospheric, ionospheric, and ephemeris errors. By using a network corrector, meaning a corrector based on several reference stations, you can eliminate these distant dependent errors and survey anywhere within the closed polygon formed by the network. The exception to this is areas along the coast where correctors are given (up to 20km) outside of the polygons. The ORGN MAX and i-MAX correctors are both network multi-station correctors.

**3. Can I use any brand of GNSS rover to connect to the ORGN and receive RT correctors?**

Yes, any recently manufactured GNSS rover from any manufacturer can be equipped and configured to receive RT correctors from the ORGN. The ORGN correctors are sent out via non-proprietary RTCM 3.x format, which all brands of rovers should be capable of receiving.

**4. Do I need to perform a site calibration when using the ORGN?**

We highly recommend you perform a site calibration to fit existing local surveys or passive geodetic control such as the Oregon High Accuracy Reference Network (HARN). The ORGN broadcasts correctors in the NAD83 (2011) (Epoch 2010.00) datum/adjustment, so if your

previous projects have been done on other datums or adjustments, you will not fit the existing values unless you perform a site calibration.

## User Support Provided by the ORGN

Our goal is to provide ORGN users complete information to use the ORGN easily and effectively. We cannot be proficient in every make and model of GNSS rover, so we will encourage the users to rely on their GNSS vendor to help with specific rover configuration; however, we will post support documents for various brands of rovers to our website as we develop them.

Sources of User Support from the ORGN:

1. **Our website:** [Oregon Real-Time GNSS Network: State of Oregon](#)
  - a. explanation of products and services
  - b. status of network
  - c. alerts and advisories
  - d. on-line rover account applications
  - e. Contact Us (phone #s & emails of Geodetic group)
  - f. support documents
    - cookbooks for configuring various rover brands
  - g. contact information for further support
2. **We send direct E-mail and text with alerts and advisories to rover account holders.**
3. **Direct contacts at ODOT Geometronics:**
  - a. ORGN Management Questions:
    - Michael Nichols 971-304-4164, [Michael.Nichols@odot.oregon.gov](mailto:Michael.Nichols@odot.oregon.gov)
  - b. ORGN Technical Questions:
    - Randy Oberg, 503-881-2889, [Randy.D.Oberg@odot.oregon.gov](mailto:Randy.D.Oberg@odot.oregon.gov)
  - c. ORGN Technical & Rover Account Support:
    - Eric Zimmerman, 503-779-5069, [Eric.P.Zimmerman@odot.oregon.gov](mailto:Eric.P.Zimmerman@odot.oregon.gov)
  - d. General Support [ORGN@odot.oregon.gov](mailto:ORGN@odot.oregon.gov)