

Trimble RTX[®]

Correction Service

Frequently Asked Questions



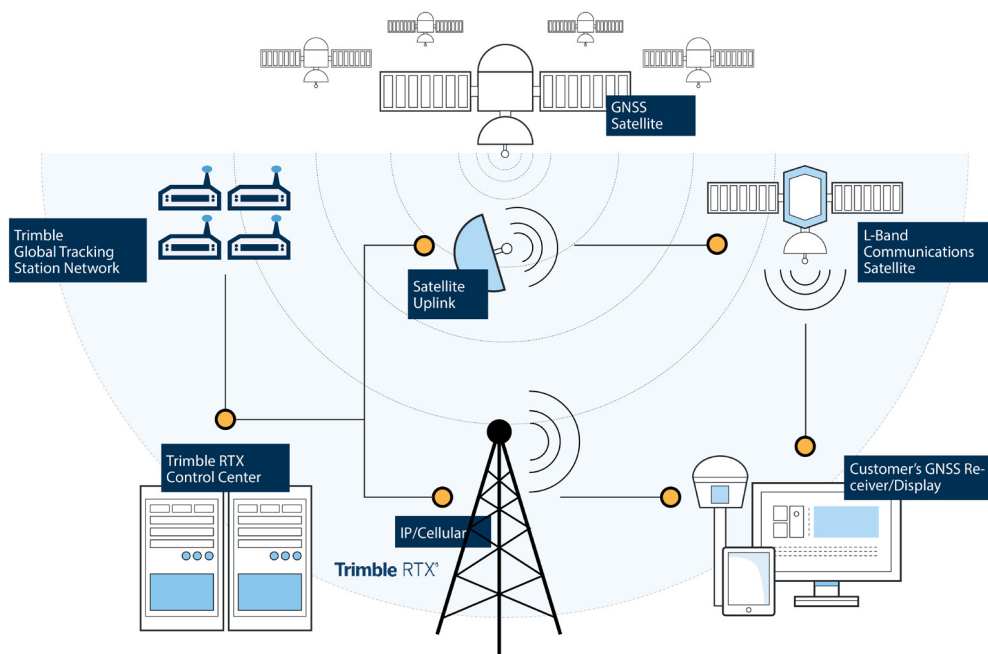
About Trimble RTX corrections

How does Trimble RTX technology work?

Trimble® RTX® correction service is a real-time Precise Point Positioning (PPP) technology that uses Trimble's global network of reference stations to accurately generate space state representation models of the ionosphere and troposphere to mitigate atmospheric biases, as well as accurate GNSS satellite ephemeris data to mitigate clock and orbit biases. The worldwide Trimble reference station network communicates with the Trimble RTX server software in the cloud. Here, global GNSS satellite data is synchronized and orbit biases are calculated; clock code and phase biases are estimated and calibrated; and per-satellite, global, and regional models are generated for the signal code and carrier phase biases of the ionosphere and troposphere. These corrections are then sent to users either via NTRIP (Internet) or by uploading the correction data to a series of geostationary satellites all around the world, where it is then broadcast in the L-Band back to users on the ground.

Trimble RTX stream protocols are proprietary to Trimble GNSS receivers and are Advanced Encryption Standard (AES) encrypted to prevent spoofing or attacks. This protocol also allows Trimble to make use of signals from all satellite systems long before they are available in open protocol messages, as well as compacting the messages to decrease latency in the correction data. Trimble RTX also uses a separate global network of integrity monitoring reference stations to verify the corrections both pre- and post-broadcast, further improving service dependability.

By effectively mitigating clock, orbit and atmospheric biases, Trimble RTX enables GNSS receivers to calculate highly accurate positions. Furthermore, Trimble RTX atmospheric models are known to provide additional resilience to solar activity, allowing productivity during periods of time that may be impossible for traditional differential solutions. Trimble GNSS receivers utilize a tightly integrated PVT (position, velocity, time) engine that is capable of combining with coupled sensors, such as inertial measurement units (IMUs), to strengthen the position solution. Modern Trimble ProPoint® receivers, built with the latest technological innovations like Trimble RTX at their core, offer users unparalleled accuracy and availability.



What does “RTX” mean?

RTX stands for **Real Time eXtended** technology that powers Trimble RTX correction services and provides you with real-time precise point positions.

What is the difference between Trimble “RTX” and “RTK”?

Real-Time Kinematic (RTK) solutions encompass both Real-Time Networks (RTN) and Base/Rover workflows. These are differential solutions that depend on simultaneous observations of GNSS pseudoranges to calculate a rover position relative to the base station, which has a known coordinate to which the observed location is compared.

Trimble RTX solutions provide an absolute position, utilizing real-time precise point positioning (PPP). This type of positioning is similar to a position achieved with static single-point positioning when combined with post-processing, but it is achieved in real time and allows for kinematic (moving) observations.

What is “initialization” or “convergence”?

Initialization refers to the initial procedure when a GNSS session is initiated. During this process, the unit searches for satellites, locks onto them and begins to calculate its position. When the position of the receiver reaches the accuracy specification, then it is considered to be fully initialized. Once initialized, the receiver will maintain that level of accuracy unless initialization is lost through extended corrections or GNSS signal disruptions. With PPP, a similar term “convergence” is used to describe the initialization process in which carrier phase ambiguities converge to constant values and a position solution reaches an optimal, precise value.

How long does initialization or convergence take?

Trimble RTX correction services have different convergence times ranging **from under one minute to under three minutes for Trimble ProPoint receivers**, and around a minute to fifteen minutes for non-ProPoint Trimble receivers, based on the location of use. These values apply to multi-frequency receivers with multi-constellation support only. In particular areas of the world, including Europe and North America, Trimble maintains dense reference station networks that provide both regional ionospheric and tropospheric models to mitigate atmospheric biases. In these areas, convergence times are the fastest. In other parts of the world, less dense reference station networks are utilized to generate global ionospheric models. In these areas, convergence takes longer.

Refer to the datasheet for your GNSS receiver in the specifications table to verify performance for your particular model, and refer to the Trimble RTX [coverage maps](#) for the most up-to-date information on convergence times.

Can I start working before the receiver is fully converged?

While it is technically possible, it is not advisable. **Be sure to allow time for your receiver to get fully converged before making observations.** Even in areas with regional atmospheric models, you may not get a full payload of correction parameters until nearly a minute has passed, but the GNSS receiver may be able to resolve enough ambiguities to indicate a precise position—continue to observe your position until at least a minute has passed before storing data. This applies to utilizing Trimble RTX correction service via satellite or internet delivery.

Does the receiver need to remain stationary while converging?

No, you may move the receiver while waiting for it to converge. Convergence will be improved in open sky areas that are free from multipath, obstructions, and electromagnetic interference. Allow time for convergence prior to storing observations.

How long do I need to wait for convergence if I temporarily lose the Trimble RTX correction stream or tracking of the GNSS satellites?

The GNSS receiver will rapidly re-converge to specified accuracies after the loss of GNSS signals and/or the Trimble RTX correction stream.

Which GNSS constellations do Trimble RTX corrections support?

Trimble RTX correction services utilize GPS, GLONASS, Galileo, BeiDou, and QZSS for the global reference station network, and offer corrections and integrity monitoring for these constellations as well.

How reliable are Trimble RTX services?

The Trimble RTX services have exceptional up-time because they use a worldwide network of reference stations and have redundancy in the entire infrastructure system used to calculate and deliver the correction services. All reference stations, cloud-based Trimble RTX Server software, satellite and internet uplinks are monitored 24 hours a day, 7 days a week, 365 days a year by Trimble's global team of network engineers and IT specialists to ensure reliability in worldwide positioning and broadcasting. In addition, Trimble RTX is recognized with industry standards for integrity and process reliability, such as ASIL and ISO certifications.

Are there any factors that can cause errors or outages of Trimble RTX correction services?

Some environmental factors might degrade accuracy and convergence or cause temporary outages in GNSS systems, regardless of the correction source—these would apply to any GNSS workflow, including base/rover RTK, or using a Real-Time Network (RTN):

- **Solar activity:** GNSS signals can be impacted by solar activity and perturbed by the influence of the Sun on the Earth's atmosphere. **Utilizing Trimble RTX and its atmospheric models can provide further resiliency to solar activity, allowing productivity during periods that may be impossible for traditional differential solutions.** Read more about [Solar Cycle 25](#) and what you can do to reduce the impact of the Sun on your GNSS workflows.
- **Interference:** Any localized interference on similar or adjacent frequencies of GNSS signals (or the correction signal frequency) may disrupt the reception of those signals. Signal jamming or interference can often be detected and visualized using Trimble ProPoint GNSS receivers and viewing the spectrum analyzer page of the receiver webUI.
- **Obstructions:** Any objects that prevent a receiver from tracking GNSS satellites or the Trimble RTX geostationary satellites can impact accuracy or cause outages. Tall trees, buildings, overpasses, and steep terrain are common obstructions that impact GNSS users. Trimble RTX can be utilized via the Internet (NTRIP) to help mitigate outages when the Trimble RTX satellite is blocked by obstructions.

What is ITRF?

The International Terrestrial Reference Frame (ITRF) is a geocentric reference frame established and maintained by the International GNSS Service (IGS). Managed by the IGS Reference Frame Committee, ITRF is realized by the estimates of the coordinates and velocities of a set of IGS reference stations and satellite ranging stations around the world. ITRF is one of the most common reference frames used today, comparable to WGS84.

Which realization of ITRF is used by Trimble RTX?

Trimble RTX utilizes IGS reference stations in addition to Trimble's global reference station networks. For this reason, Trimble RTX maintains parity with the latest realization of the ITRF (currently ITRF2020) at the epoch of measurement. Trimble GNSS receivers and Trimble field data collection software can transform measurements from ITRF2020 current epoch to the datum of your choosing using the [Trimble Geodetic Library](#). Please reference your GNSS receiver or software user manual for more information.

Note that measurements taken in xFill or xFill-RTX modes utilize a calculated offset from ITRF to your local datum, and that no further transformation would be necessary.

What is the difference between ITRF and WGS84?

The main difference between ITRF and WGS84 reference frameworks is the choice of GNSS stations used in their adjustments, and the agencies responsible for their definition. The difference between WGS84 and ITRF is typically very small at each realization, generally sub-centimeter.

What are Trimble RTX corrections used for?

Trimble RTX corrections are used for high-accuracy GNSS positioning in place of, or to complement traditional RTK single-base or Real-Time Network (RTN) workflows. Surveyors and mappers use Trimble RTX corrections in many industries such as land surveying, construction surveying, mining, cadastral mapping, oil and gas, forestry, utilities, and more.

What correction services are available?

There are different types of Trimble RTX services available based on the error budget of the work being performed and the capabilities of the GNSS receiver. Reference the table below and verify performance on your GNSS receiver's data sheet to find a service that suits your application.

CenterPoint® RTX	FieldPoint RTX	ViewPoint RTX®	xFill® / xFillx
Delivers centimeter level accuracy for most precise surveying, worldwide.	Provides decimeter level accuracy ideal for mapping and asset location, worldwide.	Sub-meter accuracy ideal for L1-only receivers that require a real-time correction, worldwide.	A valuable backup solution that maintains your accuracy during RTK/VRS radio or cellular internet outages.

What Trimble Geospatial GNSS receivers support Trimble RTX?

Please check your receiver's datasheet to see which services are supported and reference the device tables below.

Model	Minimum firmware version	Supported service
EM100	5.47 or later	ViewPoint RTX
Net R9®	5.20 or later	CenterPoint RTX
R1	4.95 or later	ViewPoint RTX
R10 / R10-2 / R10-2 LT	5.20 or later	CenterPoint RTX
R12 / R12i / R12i LT	5.43 or later	CenterPoint RTX
R2	5.20 or later	CenterPoint RTX / FieldPoint RTX
R4s	3.33 or later	CenterPoint RTX
R580	5.60 or later	CenterPoint RTX / FieldPoint RTX
R750	5.52 or later	CenterPoint RTX
R780	5.52 or later	CenterPoint RTX
R9s	5.20 or later	CenterPoint RTX
TDC150	3.69 or later	FieldPoint RTX
TDC650	4.23 or later	FieldPoint RTX

What Trimble Construction GNSS receivers support Trimble RTX?

Model	Minimum firmware version	Supported service
MPS566	5.52 or later	CenterPoint RTX
MPS865	3.80 or later	CenterPoint RTX
R780	5.52 or later	CenterPoint RTX
SPS585	4.84 or later	CenterPoint RTX
SPS785	3.81 or later	CenterPoint RTX
SPS855	5.20 or later	CenterPoint RTX
SPS985 / SPS985L	5.20 or later	CenterPoint RTX
SPS986	5.40 or later	CenterPoint RTX

What Spectra Geospatial GNSS receivers support Trimble RTX?

Model	Minimum firmware version	Supported service
SP20	3.69 or later	FieldPoint RTX
SP30	4.23 or later	FieldPoint RTX
SP60	3.30 or later	CenterPoint RTX / FieldPoint RTX
SP80	3.30 or later	CenterPoint RTX
SP85	3.90 or later	CenterPoint RTX
SP90m	3.80 or later	CenterPoint RTX

What is xFill?

Trimble xFill and xFillx are GNSS positioning modes that utilize Trimble RTX corrections to mitigate biases to continue providing a precise position, in your local datum, when the radio or cellular internet connection to the RTK base or Real-Time Network is lost. Trimble xFill is powered by Trimble RTX technology—the same technology that is used in our premium positioning service known as CenterPoint RTX correction service.

When using xFill or xFillx modes, your Trimble GNSS receiver calculates an offset to the geocentric coordinate system of Trimble RTX (which is currently ITRF2020 at the epoch of measurement) from your local datum. While xFill will time out after five minutes of use, the xFillx mode will allow you to continue to work indefinitely or until your correction source is restored. The xFillx mode is available to anyone who subscribes to CenterPoint RTX.

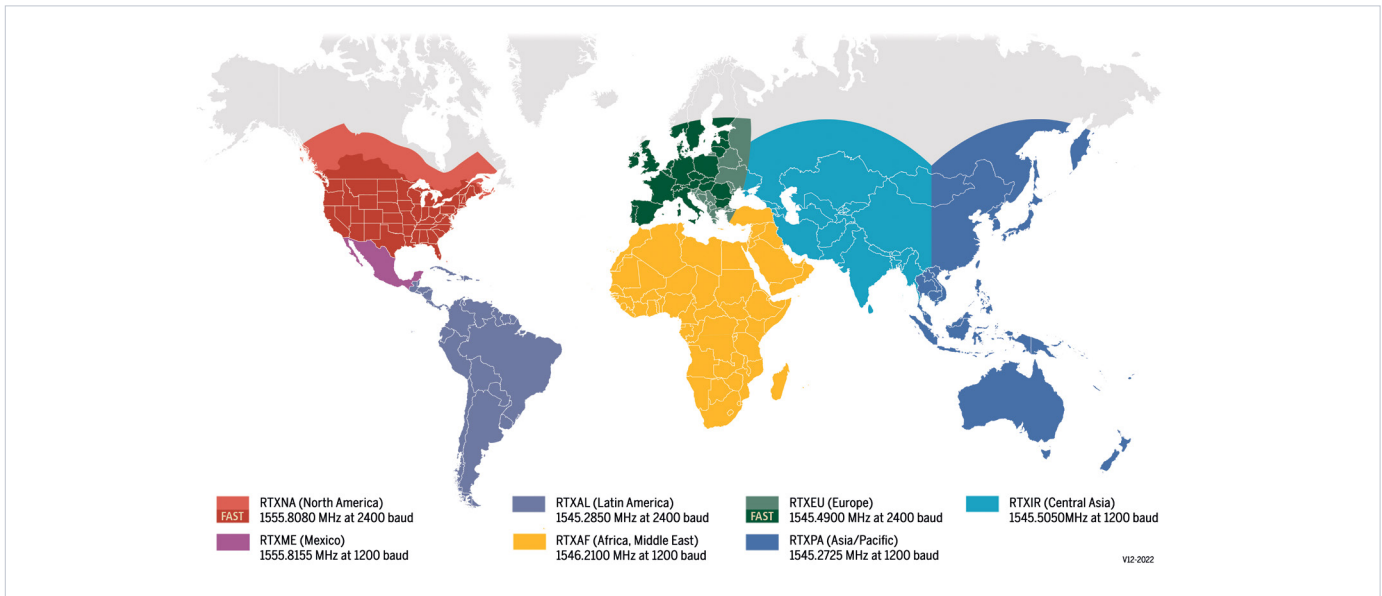
How are Trimble RTX correction services different from SBAS?

SBAS systems typically use only one GNSS constellation, such as GPS to generate corrections. Trimble RTX technology is compatible with multiple GNSS constellations, including GPS, GLONASS, Galileo, BeiDou and QZSS. Trimble RTX technology provides more accurate, consistent and repeatable positioning than WAAS or EGNOS. Trimble RTX correction services are also available worldwide; SBAS systems (such as WAAS and EGNOS) are limited to certain regions.

Where are Trimble RTX corrections available?

Please view the latest [coverage maps](#) on the [Trimble Positioning Services website](#) for the most up-to-date mapping information. Note that Trimble RTX via the Internet (NTRIP) is available worldwide.

Trimble RTX via satellite is pictured below:



Will Trimble RTX corrections work indoors?

SBAS systems typically use only one GNSS constellation, such as GPS to generate corrections. Trimble RTX technology is compatible with multiple GNSS constellations, including GPS, GLONASS, Galileo, BeiDou and QZSS. Trimble RTX technology provides more accurate, consistent and repeatable positioning than WAAS or EGNOS. Trimble RTX correction services are also available worldwide; SBAS systems (such as WAAS and EGNOS) are limited to certain regions.



Can I use Trimble RTX correction services over water?

Yes, Trimble RTX correction services are available for coastal and regional offshore use. Contact your local Trimble distributor for more information or visit our [Trimble Positioning Services Marine website](#).

Are Trimble RTX demo subscriptions available?

Free 30-day demo subscriptions are available for all compatible receivers. This can be generated at 30DayTrial.trimble.com or by contacting Trimble Positioning Services [Customer care](#).

How do you purchase Trimble RTX services?

You can purchase Trimble RTX correction services through the [online store](#), through a local Trimble distributor or by contacting Customer care by phone or email.

How are Trimble RTX corrections activated?

After purchasing your Trimble RTX subscription it can be activated either over-the-air (OTA) or by entering a passcode on your GNSS receiver.

- **Over-the-air activation:** This is an activation that is sent via satellite and/or the Internet directly to the receiver. Once this activation is received, the service will be ready to use.
- **Passcode activation:** With passcode activation, an activation passcode is emailed to you when you purchase a Trimble RTX subscription. You can then enter this passcode into your receiver to activate your subscription, which can then be used right away.

I missed over-the-air activation. What can I do?

If you received a passcode, you may enter the passcode into the receiver. Alternatively, you may resend the OTA activation yourself at resend.trimble.com. You may also contact your local Trimble distributor or Customer Care and request the activation broadcast be re-sent. Please have your account information and/or serial number on hand when contacting Customer care.

Does my subscription renew automatically?

Your Trimble subscription will automatically renew if you are enrolled in Automatic Renewal. For more information, contact Customer care. If you are not enrolled in Automatic Renewal, you'll need to renew your subscriptions by going to the online store or contacting Customer care. More information about auto-renewal can be found in our [Terms & Conditions](#).

How will I know when my current subscription will expire?

You will receive a renewal notice about 4-6 weeks before your subscription is due to expire advising you of your expiration date and the renewal process. All subscription information is also available by logging into your account on our online store. Most receivers will show the expiration date on the display or user interface. If you are unsure on how to find this, you can contact Customer care and a member of our team will be able to advise you.

How much will Trimble RTX services cost for my device?

Pricing is available on our online store. Please contact your [local Trimble distributor](#) or Customer care for any further details.

What kind of customer support is available for Trimble RTX correction services?

With regional offices worldwide, phone and email support is available anytime. For more information and contact details, refer to [contact us](#) details.

