



Frequently Asked Questions

Positioning Services
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Trimble RTX Frequently Asked Questions

About Trimble RTX Correction Services

What are Trimble RTX Correction Services?

Trimble RTX™ represents a family of GNSS correction services that provide customers with high-accuracy positioning via satellite or Internet. While stand-alone GNSS positioning without corrections provide horizontal accuracies that are typically more than 1-meter, Trimble RTX correction services can provide horizontal accuracies better than 4 cm.

What correction services are available?

There are 4 Trimble RTX correction services available:

Correction Service	Horizontal Accuracy (cm) ^{1,2}	Initialization (mins) ^{2,3}
CenterPoint® RTX	<4	<5 or <30
FieldPoint RTX™	20	<5 or <15
RangePoint® RTX	50	<5
ViewPoint RTX™	<100	<5

1 All horizontal accuracy specifications are based on in-field performance 95% of the time.

2 Dependent on receiver capabilities and user's geographic location.

3 Receiver initialization time varies based on type of receiver, GNSS constellation health, level of multipath and proximity to obstructions such as large trees and buildings.

What are Trimble RTX corrections used for?

Trimble RTX corrections can be used in agriculture, forestry, utilities, land survey, construction, mining, cadastral mapping, oil and gas, to name a few.

About Trimble RTX Technology

What is RTX?

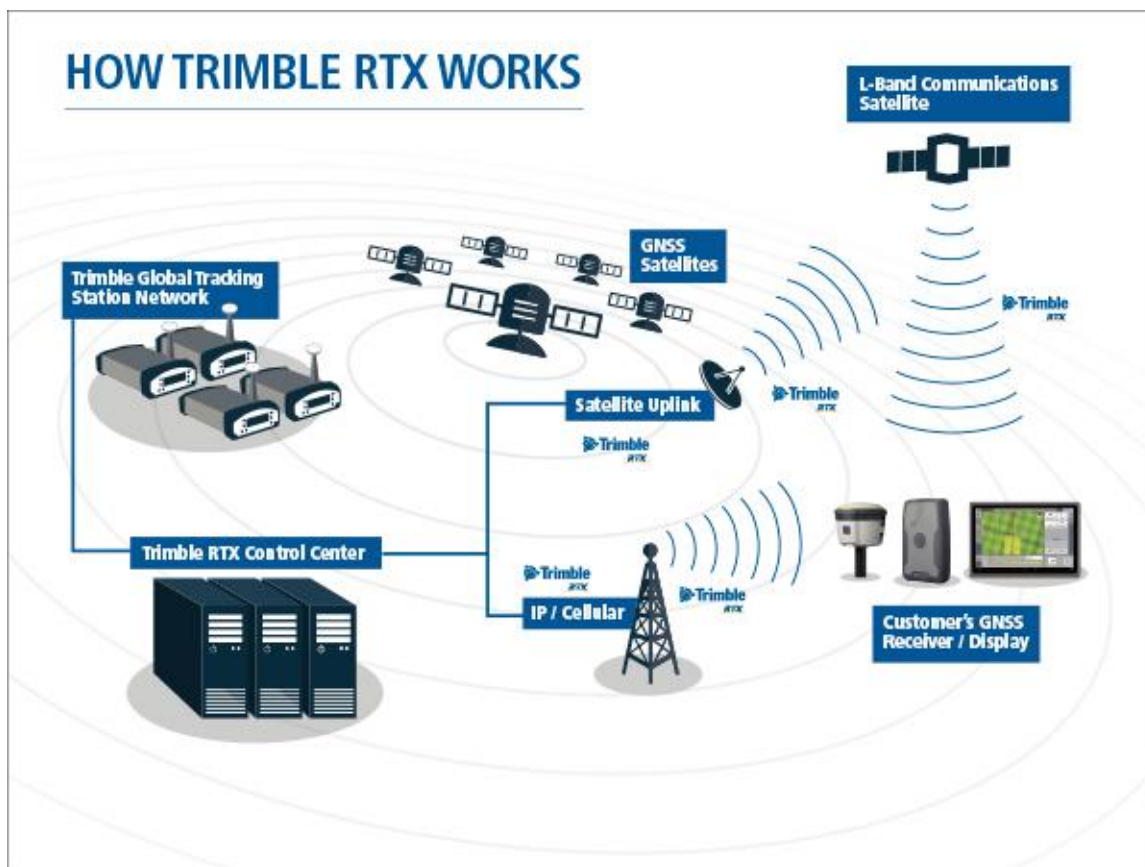
RTX stands for Real Time eXtended (RTX). It is the technology that powers Trimble RTX correction services.

www.trimble.com/positioning-services www.trimble.com

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How does Trimble RTX technology work?

Trimble RTX leverages real-time satellite and atmospheric data from a global network of tracking stations, along with highly accurate models and algorithms to generate Trimble RTX corrections. These corrections are then broadcasted to the receiver via a set of geostationary satellites or over the Internet, which the receiver uses to improve the accuracy of its GNSS positions.



Performance and Operation

What performance can I expect from Trimble RTX correction services?

The performance specifications for Trimble RTX correction services are listed below, dependent on receiver type and region of operation.

Correction Service	Horizontal Accuracy (cm) ^{1,2}	Initialization (mins) ^{2,3}
CenterPoint® RTX	4	<5 or <30
FieldPoint RTX™	20	<5 or <15
RangePoint® RTX	50	<5
ViewPoint RTX™	100	<5

1 All horizontal accuracy specifications are based on in-field performance 95% of the time.

2 Dependent on receiver capabilities and user's geographic location.

3 Receiver initialization time varies based on type of receiver, GNSS constellation health, level of multipath and proximity to obstructions such as large trees and buildings.

What is initialization?

Initialization (also known as convergence) is the process of calculating your position to a desired accuracy level. When a receiver's position reaches full accuracy, then it is considered to be fully initialized.

How long does initialization or convergence take?

Trimble RTX correction services have different initialization times (see below) based on the correction service type.

<u>Correction Service</u>	<u>Initialization time (minutes)^{1,2}</u>
CenterPoint RTX	<5 or <30
FieldPoint RTX	<5 or <15
RangePoint RTX	<5
ViewPoint RTX	<5

1 Dependent on receiver capabilities and user's geographic location

2 Receiver initialization time varies based on type of receiver, GNSS constellation health, level of multipath, and proximity to obstructions such as large trees and buildings.

Can I start working before the receiver is fully initialized?

Yes, you may begin operating the receiver before it has fully initialized, however, to work with the correction service's full accuracy, it is recommended that your receiver has been fully initialized. Most Trimble RTX capable receivers will allow you to set a "convergence threshold", which determines what accuracy level must be reached before you can begin working.

Does the receiver need to remain stationary while initializing?

No, you may move the receiver while waiting for it to initialize. The initialization time will be similar whether the receiver is static or not.

How long will I need to wait for initialization if I temporarily lose the Trimble RTX correction stream or GNSS satellites?

The GNSS receiver will rapidly re-initialize to specified accuracies after the loss of GNSS signals and/or the Trimble RTX correction stream. The Trimble RTX correction stream may be lost for up to 200 seconds, while GNSS signals may be lost for up to four minutes before the receiver requires full re-initialization.

What is CenterPoint RTX QuickStart (or CenterPoint RTX Fast Restart)?

CenterPoint RTX QuickStart and CenterPoint RTX Fast Restart are features that allow rapid re-initialization of CenterPoint RTX on a precisely known point. By starting the receiver on a known point, or in the same location that it was in when it was turned off last, CenterPoint RTX can fully initialize in less than 5 minutes.

Why do CenterPoint RTX and FieldPoint RTX have both <5 minutes and <30 minutes initialization times?

An initialization time of <5 minutes for both CenterPoint RTX and FieldPoint RTX correction services is available on some receivers when used in parts of the United States and much of western and central Europe. Worldwide we offer an initialization time of <30 minutes for CenterPoint RTX and <15 minutes for FieldPoint RTX. Both RangePoint and ViewPoint initialization times are typically less than 5 minutes worldwide.

Which GNSS constellations do Trimble RTX corrections support?

Trimble RTX correction services support GPS, GLONASS, QZSS and BeiDou.

In which coordinate reference frame are Trimble RTX positions calculated and stored?

Trimble RTX coordinates are computed in ITRF2008 current epoch; these coordinates will be transformed to a fixed epoch of ITRF2008 epoch 2005.00 dependent on the receiver and field software.

Note: You can use the Trimble CenterPoint RTX Post Processing service to determine an ITRF2008 epoch 2005.00 position for your base station and control points. Trimble CenterPoint RTX Post Processing service is available at www.TrimbleRTX.com.

What are ITRF and ITRF2008?

The International Terrestrial Reference Frame (ITRF) is a terrestrial reference frame established and maintained by the International Earth Rotation and Reference Systems Service (IERS). ITRF is the realization of an ideal reference frame, the International Celestial Reference System (ICRS), which is also maintained by IERS; this realization is based on estimates of position and velocity of terrestrial stations observed by VLBI, LLR, GPS, SLR, and DORIS. Due to the motion of the Earth's crust, the terrestrial positions of points on Earth are constantly changing. A position at a specific instance in time will have both a reference frame (e.g. ITRF2008) and an epoch (e.g. epoch 2005.00); the epoch is the time the realization refers to.

What is the difference between ITRF and WGS84?

Both ITRF and WGS84 are global datums; WGS84 is used by GPS, and is based on a specific realization being updated periodically. Since 1997, WGS84 has been maintained to within 10 cm of the then current ITRF realization. While Trimble RTX positions are computed in ITRF2008 current epoch, autonomous GPS positions are provided in the current realization of WGS84. This discrepancy in time will usually result a small difference between the coordinates of a position in ITRF and the coordinates of the same position in WGS84.

Is CenterPoint RTX the same as RTK?

No. RTK requires the use of either a temporary or permanent base station (can be in the form of VRS corrections), and performance is dependent on, and directly impacted by distance from the base station. Trimble RTX is available nearly worldwide, via satellite or cellular delivery and offers a more versatile solution for use in even the most remote locations.

How are Trimble RTX correction services different from SBAS systems (i.e. WAAS, EGNOS..)?

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

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

There are several environmental factors that can degrade accuracy or cause outages in GNSS systems when using any sort of correction:

- **Solar activity:** GNSS signals can be impacted by solar activity as they pass through the Earth's ionosphere.
- **Obstructions:** Any objects that prevent a receiver from receiving information from GNSS satellites or the Trimble RTX correction stream can impact accuracy or cause outages. Tall trees, buildings, overpasses, and steep terrain are common obstructions that impact GNSS users.

Will Trimble RTX corrections work indoors?

No. Unless there is a clear line of sight between the GNSS receiver and positioning satellites, Trimble RTX positioning will not work very well, or at all. Trimble only recommends Trimble RTX usage outside, with an unobstructed view of the sky.

How reliable are Trimble RTX services?

Trimble RTX services use a worldwide network of base stations, with redundancy in infrastructure for calculating and delivering correction services. All base stations, correction solutions, and delivery mechanisms are monitored by a global team of network engineers and IT specialists to ensure reliability in worldwide positioning and broadcasting.

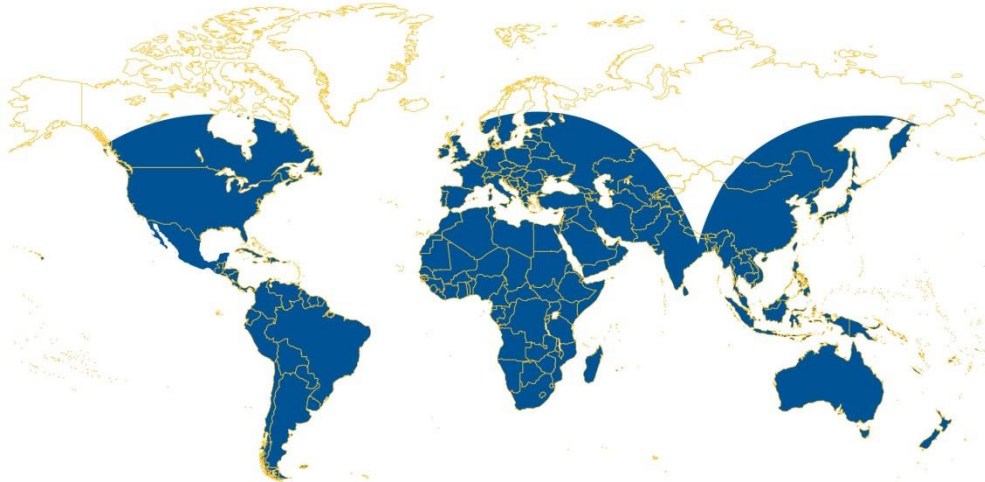
Delivery and Availability

How are Trimble RTX correction services delivered to the receiver?

Trimble RTX correction services are delivered by satellite or Internet (e.g. through a cellular data connection) via a subscription service.

Where are Trimble RTX corrections available?

Trimble RTX corrections are available worldwide. Trimble RTX corrections delivered via Internet are available worldwide where an internet connection is possible. Satellite delivery is available throughout most of the world; the satellite coverage area is shown by the area shaded in blue on the map below.



Can I use Trimble RTX correction services over water?

No, Trimble RTX correction services are only available for land use.

What receivers are compatible with Trimble RTX correction services?

Trimble RTX correction services are available for the following list of receivers:

CenterPoint RTX

- AG-372*
- CFX-750*
- FmX*
- TMX-2050*
- AFS-372*
- FM-750*
- FM-1000*
- PLM 372*
- XCN-2050*
- R10*
- R2*
- R9s*
- NetR9 Geospatial*
- Geo7x*
- ProXRT (Land Administration)
- SPS855*
- SPS985* & SPS985L*
- SPS585*
- BX982
- ProMark 700
- SP80*
- SP60*

FieldPoint RTX

- Geo7x*
- R2*

RangePoint RTX

- AG-372
- CFX-750
- FmX
- TMX-2050
- AFS-372
- FM-750
- FM-1000
- PLM 372
- XCN-2050
- Geo7x
- R2
- ProMark 700
- MobileMapper 300

ViewPoint RTX

- Geo7x
- R1
- R2
- Leap
- MMX-070

*<5 minute initialization is also supported where available.

Subscriptions

What types of Trimble RTX subscriptions are available?

Trimble offers a variety of subscriptions to suit customer needs. For information on the subscriptions available in your region, please contact your local Trimble distribution partner or visit our online store at

<https://tpsstore.trimble.com>

How are Trimble RTX correction services activated?

Trimble RTX correction services are activated via a subscription. These subscriptions can be activated either Over-The-Air (OTA) or through a manual passcode entry.

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

I missed the over-the-air activation: what can I do?

You can manage your subscriptions via the Positioning Services online store at: <https://tpsstore.trimble.com>. If you received a passcode, you may manually enter the passcode into the receiver. You may also contact your local Trimble reseller or Positioning Services 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 Trimble automatically renew my subscription?

No. When your subscription ends, you will not be automatically charged for a renewal. To continue using your subscription, you'll need to renew it by going to <https://tpsstore.trimble.com> or contacting Trimble Positioning Services Customer Care.

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 <https://tpsstore.trimble.com>.

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 Trimble Positioning Services Customer Care and a member of our team will be able to advise you.

Purchasing and Support

Are there Trimble RTX demo subscriptions available?

Yes. A free 3-day demo subscription is available for all compatible receivers. This can be activated on <https://tpsdemo.trimble.com>.

How can customers purchase CenterPoint RTX services?

Subscriptions can be ordered and managed directly via the Positioning Services online store at: <https://tpsstore.trimble.com>. Customers can also place orders through a local Trimble reseller or by contacting Trimble Positioning Services Customer Care, via phone, fax or email. Contact information for your region can be found at the following link: <http://www.trimble.com/positioning-services/contact-us.aspx>

How much will Trimble RTX services cost for my device?

Pricing is available on the Positioning Services online store at: <https://tpsstore.trimble.com>. Please contact your local Trimble distribution partner or Positioning Services Customer Care for any further details.

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

Complimentary customer support is available around the clock from Trimble Positioning Services with regional offices worldwide. For more information and contact details, refer to <http://www.trimble.com/positioning-services/contact-us.aspx>.