Real-Time CenterPoint® RTX

Frequently Asked Questions

1) What is Trimble Real-Time CenterPoint RTX?

CenterPoint®RTX is Trimble's global GNSS correction service that uses advanced Precise Point Position (PPP) technology and a variety of innovative techniques to provide users with real-time centimeter-level positioning accuracy anywhere on or near the earth's surface.

2) How does RTX technology work?

Trimble RTX leverages real-time satellite and atmospheric data from a global network of tracking stations to generate corrections. The corrections containing real-time precise orbit, clock, and other information such as atmospheric delays are transmitted to the rover GNSS receiver via L-Band satellites or over the Internet. The advanced software algorithms running on the rover receiver use the corrections to quickly converge to an integer carrier phase solution achieving centimeter-level positioning accuracy.

3) What is the difference between CenterPoint RTX and RTK?

Both solutions deliver centimeter-level position accuracy, but they are based on different technologies that have an impact on the way the rover payloads are built and operated for use in mapping applications.

Augmentation

- RTK works by canceling common GNSS error sources at the local base station and rover GNSS receiver when carrier phase measurements at each are differenced. However, as the base to rover distance increases the atmospheric delays at the rover and base become dissimilar and no longer cancel out, increasing positioning error. Typically, such errors become significant beyond 20 km. This limitation on baseline length requires more complex planning to use RTK especially as mapping areas increase.
- RTX does not use differential techniques but rather corrects the phase measurements directly at the rover location. This means it works on a global scale with no restrictions when it comes to project size.

Hardware Installation

- RTK requires a local base station to generate corrections and a link to pass those corrections to the rover receiver over a radio modem or via the Internet. This adds complexity to the hardware integration and requires additional cost and time to set up the infrastructure on the mapping site.
- RTX corrections are delivered directly over the air to the rover receiver via the single GNSS/L-Band antenna. This simplifies the hardware design of mapping payloads and eliminates the cost and complexity of having to set up any ground infrastructure at the mapping site.

Coordinate Datum of Computed Position

- Since RTK corrections are relative to the base station, the position generated by the rover receiver will be in the local coordinate datum of the base station position and will include any errors in the base station position itself. This can cause inaccuracies in the final deliverables especially if the exact datum of the base station is not known or accurate datum transformations are not available in real-time.
- RTX corrections are always provided in a single consistent global coordinate datum removing the risk of incorrect datum or base station position associated with RTK.

4) Which Trimble Applanix products support real-time CenterPoint RTX and what is the accuracy?

All current Trimble Applanix products support real-time CenterPoint RTX corrections. Typical absolute accuracy is within 4 cm horizontal and 8 cm vertical RMS. Accuracy may vary based on application and environment. See product data sheets for details.

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5) Are RTX corrections performance-tuned for Trimble products?

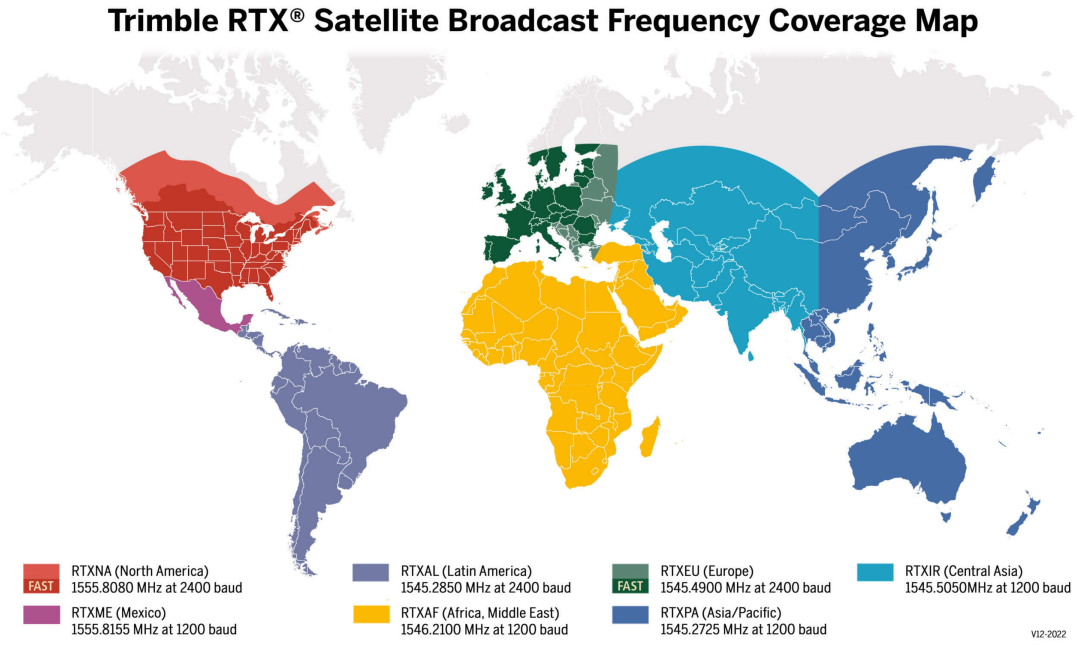
RTX is tuned to maximize performance with Trimble GNSS receivers. The Trimble Applanix GNSS-inertial products are built using Trimble Maxwell low noise GNSS tracking technology, which is the same technology used by the global network of base stations that RTX corrections are generated with. This ensures performance consistency and stability of the service.

6) What is the correction delivery method and coverage?

Corrections can be delivered through the following methods:

- **Over the Internet via NTRIP client:** True global coverage is only limited by the availability of an internet connection.
- **Over the Air via L-Band GNSS antenna:** Corrections are delivered over a set of regional geostationary satellites transmitting corrections in the L-Band frequency range. The correction broadcast is limited by satellite coverage.

To view the most up-to-date coverage maps, please visit: positioningservices.trimble.com/coverage-maps



7) What is convergence time and is it region dependent?

The convergence time is the time required for the computed position to reach full accuracy, which is region-dependent

- **Fast Region:** 1 – 3 minutes*
- **Global Region:** 3 – 10 minutes*

* For systems using Trimble ProPoint® technology. Please contact Trimble Applanix for more information.

8) Why is the convergence time better in the Fast Regions?

Fast Regions use a denser network of reference stations to compute a regional ionospheric model for atmospheric corrections, while the global region uses a global model.

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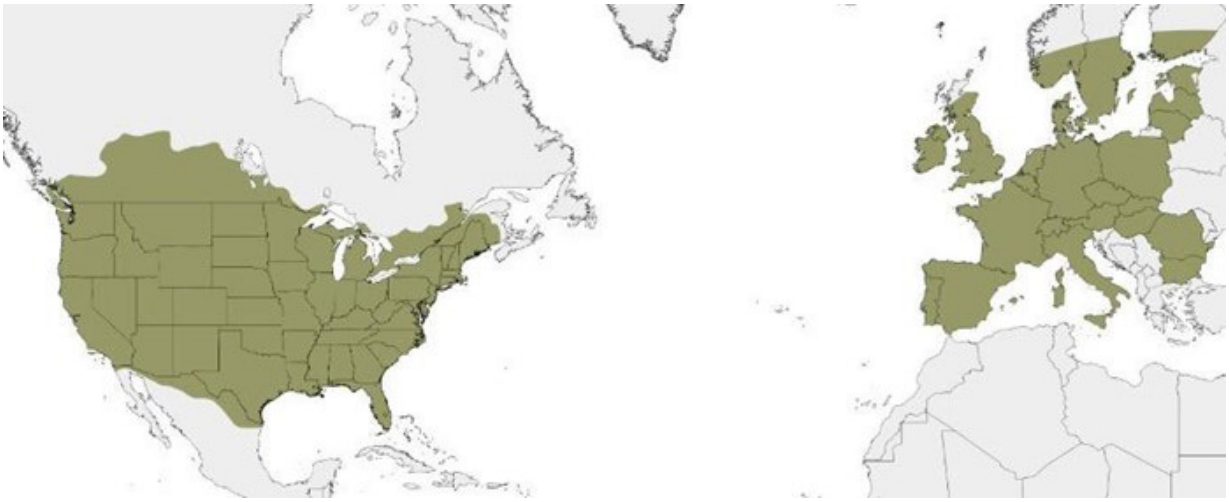
9) Where are the Fast Regions?

The current Fast Regions are shown below, and are being expanded continuously. To view the most up-to-date coverage maps, please visit: positioningservices.trimble.com/coverage-maps



10) Does the rover need to be stationary during convergence?

No, there is no requirement for the rover to be stationary. Any transition time to a mapping area with continuous unobstructed GNSS signal counts towards convergence time.

11) What happens if I lose corrections or my GNSS is jammed? Will this cause me to lose my mission?

If you lose corrections or experience significant interference that causes GNSS cycle slips in mid-operation, the system will first go to a less accurate mode and then will automatically attempt to re-converge back to full accuracy.

12) What sensors can be used in conjunction with the real time CenterPoint RTX service?

The service is intended to be used for real-time mapping applications where the fast response takes priority over the final survey grade accuracy produced by the Applanix POSPac post-processing.

Typical sensor payloads are:

- LiDAR
- Camera (RGB, NIR etc.)
- Hyperspectral Sensor
- Multibeam Sonar
- SAR

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13) How do I activate CenterPoint RTX on my system?

You can active the license using the following methods:

- The license can be ordered with Trimble Applanix products and activated at the time the system is built .
- The license can be activated by applying an authorization code in the product WEB UI.
- The license can be transmitted over the air.

14) Is it possible to get a demo subscription license?

Yes, please contact Trimble Applanix Customer Support.

15) Are there specific software/firmware requirements to run RTX?

It is recommended to keep the system under active firmware warranty, so you take advantage of firmware improvements (such as Trimble ProPoint) and possible changes and expansions of the L-Band frequencies. POS MV products running firmware version 11.2x or later are compatible with CenterPoint RTX.

TRIMBLE APPLANIX

Canada:
85 Leek Crescent, Richmond Hill,
ON Canada L4B 3B3
T+1-289-695-6000

United Kingdom:
Forester's House, Old Racecourse,
Oswestry UK SY10 7PW
T+44 1691 700500

USA:
15840 FM 529 Rd, Suite 316,
Houston, Texas, 77095
T+1.713.936.2990