

POSPac Post-processed CenterPoint® RTX™ (PP-RTX)

FREQUENTLY ASKED QUESTIONS

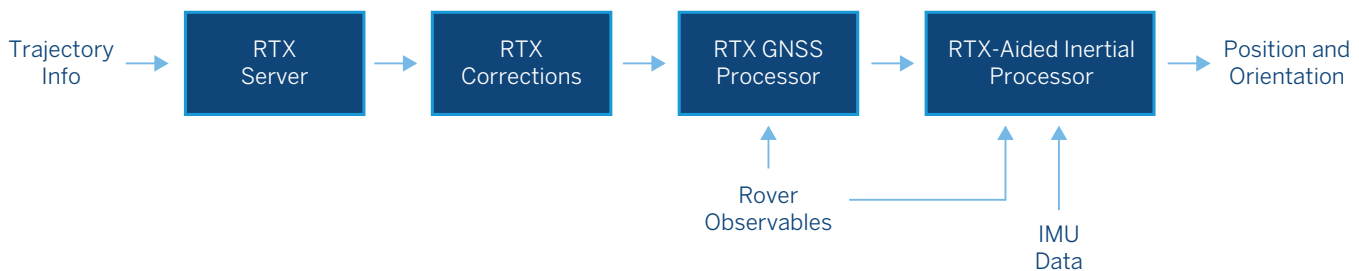
1) WHAT IS APPLANIX POSPAC POST-PROCESSED CENTERPOINT RTX (PP-RTX)?

POSPac PP-RTX is a cloud-based global GNSS correction service which utilizes Trimble's RTX technology to provide cm-level post-processed positioning accuracy without base stations. The Trimble RTX technology utilizes data from a dedicated global network of tracking stations to compute corrections to satellite orbit and clock information as well as atmospheric delay models. POSPac uses this data to post-process the GNSS-Inertial Trajectory as an alternative to SingleBase, SmartBase and MultiSingleBase augmentation processing methods.

2) HOW DOES PP-RTX WORK?

Trajectory information logged during the mission are sent to the Trimble RTX server by POSPac. This information is used to generate a set of RTX corrections unique to the mission, which are then transmitted back to POSPac. POSPac processes the corrections along with the raw GNSS and IMU data to generate an SBET with cm-level accuracy, all without the need for local base stations

- ▶ Trajectory information sent to Trimble cloud
- ▶ Localized RTX corrections returned from the cloud
- ▶ CenterPoint RTX-Aided Inertial position and orientation solution generated at 200 Hz



3) WHAT IS THE COVERAGE OF THIS SERVICE AND WHEN IS IT AVAILABLE?

The service works globally and correction data are available within minutes after data collection has been completed.



4) WHAT IS MEANT BY “CONVERGENCE TIME” AND DOES THIS MATTER FOR POSPAC PP-RTX?

Convergence time is the amount of time it takes for the RTX position accuracy to reach its final cm-level accuracy, as the residual errors left after the corrections are applied are estimated. Since the POSPac PP-RTX solution is processed in the forward and reverse directions and then combined, all convergence effects are removed. The only restriction is that the length of the trajectory itself must be longer than the convergence time to achieve full accuracy.

5) IS THERE A DIFFERENCE IN CONVERGENCE TIME FOR DIFFERENT REGIONS OF THE WORLD?

Yes, the RTX service is segmented into a standard region (global) and fast regions.

Fast region: Convergence time is 1 – 2 minutes, and datasets from 10 minutes to several hours duration can be reliably processed at 3 cm horizontal and 6 cm vertical error (RMS).

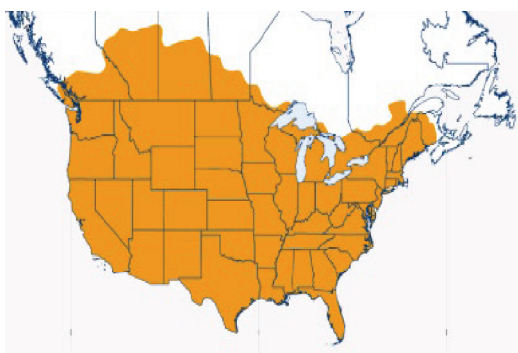
Standard region: Convergence time is 15 to 20 minutes, and datasets from 30 min to several hours duration can be reliably processed at 3 cm horizontal and 6 cm vertical error (RMS).

6) WHY IS THE CONVERGENCE TIME BETTER IN THE FAST REGION?

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

7) WHERE ARE THE FAST REGIONS?

The current fast regions are illustrated below. The fast regions are continuously being expanded.





8) WHAT APPLICATION CAN PP-RTX BE USED FOR?

MANNED AIRBORNE:

Due to the mission size, manned airborne projects can easily exceed the maximum 20 km distance from a single base station required for a precise GNSS-inertial solution. PP-RTX has no such limitation and is hence ideal for manned aerial surveys. Furthermore, since PP-RTX is a global service, it eliminates the cost and headache of setting up or procuring local base stations in different countries or remote locations. The duration of a typical manned survey mission is well above 30 minutes which means it allows to run in the fast or standard region at the precision outlined under question 5).

UNMANNED AIRBORNE:

Short flights (10 – 30 minutes) require the fast region coverage for best performance. Long flights (> 30 minutes) can make use of both regions without any performance loss. This is particularly useful for BVLOS applications or longer linear flights such as those associated with corridor mapping. PP-RTX is also ideal for UAV mapping applications in remote regions such as mountainous and forested areas where existing base stations are not present, and setting up a base station can be difficult.

LAND APPLICATION:

PP-RTX currently requires clean GNSS observables with minimal cycle slips and interruptions. This means for Land applications exposed to frequent GNSS disruptions (buildings, vegetation, tunnels) in urban environments, the PP-RTX service will not achieve full accuracy. For missions in rural areas with no or only a few GNSS obstacles, it may produce adequate results. Please get in touch with Applanix for more details.

MARINE APPLICATION:

The POSPac PP-RTX service can be used for all POS MV systems and applications. For offshore projects and remote coastal line surveys, it is the only cost-effective method for achieving cm-level position accuracy. Surveys in ports or missions close to the mainland, POSPac PP-RTX eliminates the cost needed to procure or set up local base stations.

9) WHAT SENSORS CAN BE USED IN CONJUNCTION WITH THE PP-RTX SERVICE?

A wide variety of sensors for direct georeferencing can be used, such as:

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

10) HOW DO I ENABLE PP-RTX IN POSPAC?

Applanix offers a 6 or 12 month subscription license for PP-RTX. The license can be purchased through the sales or support channel and activated through the Software License Utility (SLU).



11) WHAT ARE THE REQUIREMENTS TO RUN PP-RTX IN POSPAC?

- ▶ PP-RTX Subscription license (6 or 12 months)
- ▶ Internet Connection
- ▶ Minimum of 10 – 15 min rover data for the fast regions
- ▶ Minimum of 30 min rover data for the standard regions
- ▶ Clean L1/L2 data
- ▶ Calibrated antenna model

12) WHAT POSPAC VARIANTS SUPPORT PP-RTX?

All POSPac variants support PP-RTX, e.g., POSPac MMS, POSPac UAV, POSPac Cloud, POSPac Go!, etc.

13) WHAT ARE THE CORE BENEFITS OF PP-RTX?

- ▶ Worldwide coverage
- ▶ Data are available within minutes after mission completion
- ▶ Approaching RTK accuracy (see Question 3)
- ▶ Eliminate ground base set up
- ▶ Eliminate the need to download base station data from various sources
- ▶ Eliminate the need to signing up on various GNSS service providers in different countries
- ▶ Easy and robust use
- ▶ Reliable 24/7 365 days monitored service
- ▶ Improves efficiency and productivity

14) WHAT ARE THE LIMITATIONS WHEN USING PP-RTX?

While PP-RTX is a very robust technique, it is not recommended for urban land application. PP-RTX requires clean observables, which is a challenge in land application exposed to obstructions.

15) IS THIS SERVICE SUPPORTED IN REAL-TIME?

Yes, Trimble's CenterPoint™ RTX™ is also available in real-time. Please note, this is not PP-RTX. It requires a separate subscription (activated over-the-air or via a manual passcode on hardware) and the appropriate infrastructure (e.g., L-Band Antenna or Internet). The coverage is not worldwide when receiving the data through the L-Band antenna over satellite. You can check the coverage here: <https://positioningservices.trimble.com/resources/coverage-maps/>

In addition, the expected performance is less than the PP-RTX function in POSPac.

16) CAN I USE PP-RTX IN POSPAC IF I HAVE A VALID REAL-TIME CENTERPOINT RTX SUBSCRIPTION?

No, PP-RTX is a separate subscription and tied to POSPac.



17) WHICH GNSS CONSTELLATIONS ARE SUPPORTED BY PP-RTX?

PP-RTX service support GPS, GLONASS, GALILEO, BEIDOU, and QZSS (all observable that are logged by the Applanix products).

18) ARE THERE PP-RTX DEMO SUBSCRIPTIONS AVAILABLE?

Yes, please get in touch with techsupport@applanix.com to obtain a demo license for PP-RTX.

19) HOW MUCH DOES PP-RTX SUBSCRIPTION COST FOR 6 OR 12 MONTHS?

Please get in touch with your sales representative or techsupport@applanix.com for pricing.

20) WHEN DO I USE PP-RTX?

PP-RTX is best to use when:

- ▶ Mission area is large (baseline exceeds 20km)
- ▶ Mission consists of several short sub-missions distributed over wider areas
- ▶ Corridor mapping
- ▶ Coastal zone mapping
- ▶ Access restricted areas
- ▶ No CORS or VRS serviced areas
- ▶ Operating international