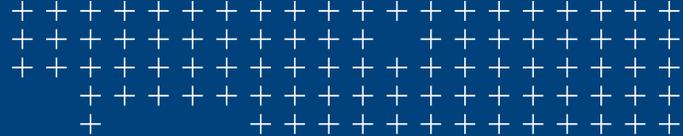# Trimble RTX
Frequently Asked Questions

Trimble

Why Trimble Correction Services are the Right Choice

Experience You Can Trust	
Corrections is all we do, and we've been at it for over 2 decades	Over 200 team members with dedicated focus on delivering best-in-class positioning solutions.
Technology	Industry-leading Trimble RTX® technology proprietary to Trimble, Trimble develops GNSS hardware, software and corrections technology as a full solution powering Trimble RTX correction services.
World class customer service	Dedicated customer care specialists fluent in multiple languages providing customer support 24/7.
Expansive network coverage	Trimble RTX coverage is available worldwide.
Maximize Productivity / Minimize Downtime	
Global network operations teambeen at it for over 2 decades	A global team of network engineers and IT professionals on 3 continents monitoring global network systems and performance around the clock.
Redundant system architecture	State-of-the-art processing centers on multiple continents, providing network redundancy to ensure consistent system uptime.
Corrections delivery options for any work environment	GNSS corrections delivered via satellite and cellular/IP.
Back-up service delivery	Trimble xFill® – satellite delivered corrections seamlessly engage if RTK radio or cellular/IP connectivity is lost. xFill allows users to stay in the field longer without interruptions.
Ease Of Use - Tools And Resources	
Subscription/Account Management	Phone and email support available at anytime.
In the field support	Sales and technical associates available to help you manage your business.

Trimble RTX
Frequently Asked Questions

About Trimble RTX Correction Services

Q A

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 2 cm.

Q A

WHAT CORRECTION SERVICES ARE AVAILABLE?

	Horizontal Accuracy (cm)	Vertical Accuracy (cm)	Initialization (mins)[1] Fast / Standard
CenterPoint® RTX			
RMS	2 cm	5 cm	< 1 / < 15
95%	2.5 cm	-	< 2 / < 20
FieldPoint RTX™			
RMS	10 cm	-	< 1 and < 15
95%	20 cm	-	
RangePoint® RTX			
RMS	30 cm	-	< 5
95%	50 cm (15 cm pass-to-pass for Agriculture)	-	
ViewPoint RTX™			
RMS	50 cm	-	< 5
95%	100 cm	-	
ViewPoint RTX for Agriculture			
95%	30 cm pass-to-pass	-	< 5
xFill® Premium			
RMS	2 cm	-	< 1 / < 15
95%	2.5 cm	-	< 2 / < 20

1 RMS/95% performance based on in field measurements. Achievable accuracy and initialization time may vary based on type and capability of receiver and antenna, user's geographic location and atmospheric activity, scintillation levels, GNSS constellation health and availability and level of multipath including obstructions such as large trees and buildings.

Q A

WHAT ARE TRIMBLE RTX CORRECTIONS USED FOR?

▶ Trimble RTX corrections can be used in agriculture, automotive, forestry, utilities, land survey, construction, mining, cadastral mapping, oil and gas and more.

About Trimble RTX Technology

Q **A**

WHAT DOES RTX MEAN?

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

Q **A**

HOW DOES TRIMBLE RTX TECHNOLOGY WORK?

▶ Trimble RTX utilize real-time satellite measurements from a global network of tracking stations, along with highly accurate atmospheric models and algorithms to generate Trimble RTX corrections. These corrections are then broadcast 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.

How Does Trimble RTX Work?

GNSS Satellites

L-Band Communications Satellite

Trimble Global Tracking Station Network

Satellite Uplink

Trimble RTX Control Center

IP / Cellular

GNSS Receiver / Display
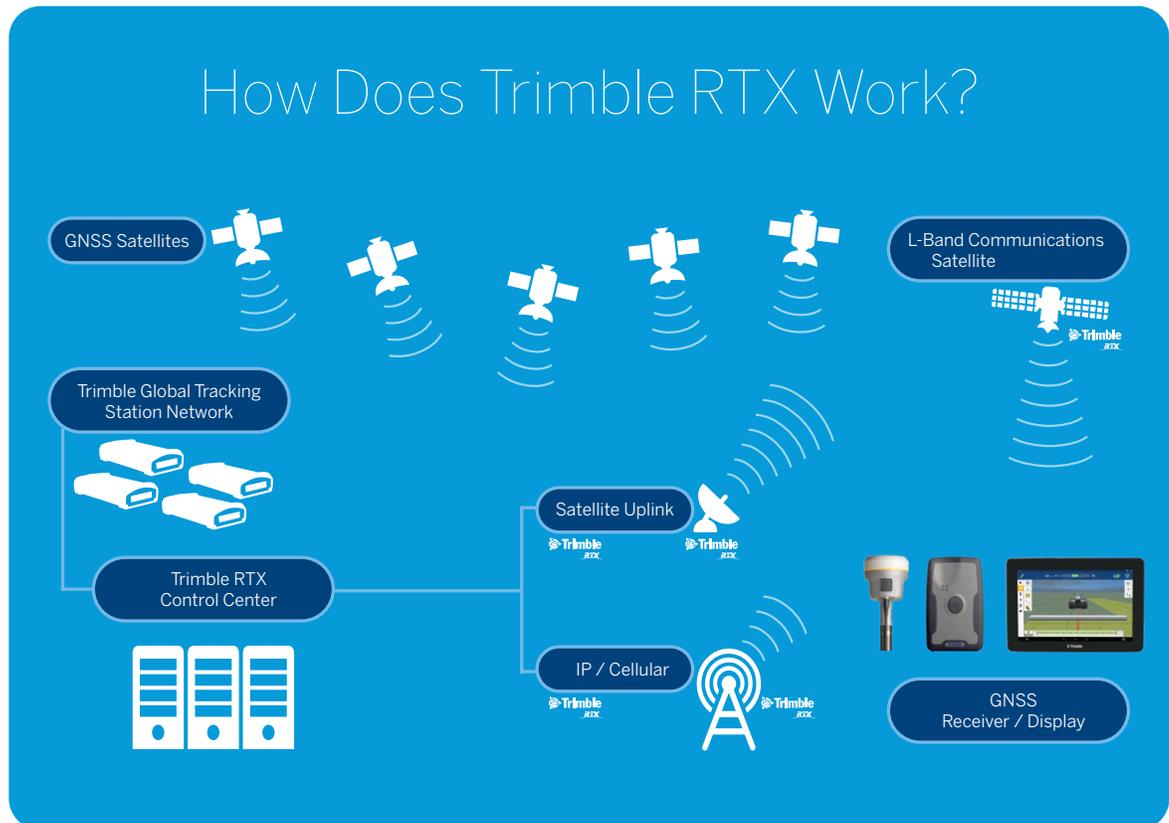
Trimble

About Trimble RTX Technology

Q A ## WHAT IS XFILL PREMIUM?

► xFill Premium is an unlimited backup solution for RTK and VRS. It can be used to bridge correction signal interruptions with high accuracy for the duration of the interruption, and to mitigate outages due to scintillation interference.

Q A ## HOW DOES XFILL PREMIUM WORK?

► xFill Premium runs seamlessly in the background calculating Trimble RTX positions and will automatically bridge positioning gaps if a user's RTK or VRS correction source is interrupted; these interruptions typically occur due to cellular signal disruption or loss of radio connectivity. The Trimble RTX corrections are delivered via satellite, allowing continued field operations during RTK/VRS signal interruptions and during most periods of scintillation interference that renders RTK inoperable. xFill Premium delivers close to CenterPoint RTX positioning accuracy for the duration of the interruption, extending Trimble's standard xFill service, which is limited to 5-20 minutes.

Q A

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.

	Horizontal Accuracy (cm)	Vertical Accuracy (cm)	Initialization (mins)[1] Fast / Standard
CenterPoint® RTX			
RMS	2 cm	5 cm	<1 / <15
95%	2.5 cm	-	<2 / <20
FieldPoint RTX™			
RMS	10 cm	-	<1 and <15
95%	20 cm	-	
RangePoint® RTX			
RMS	30 cm	-	<5
95%	50 cm (15 cm pass-to-pass for Agriculture)	-	
ViewPoint RTX™			
RMS	50 cm	-	<5
95%	100 cm	-	
ViewPoint RTX for Agriculture			
95%	30 cm pass-to-pass	-	<5
xFill® Premium			
RMS	2 cm	-	<1 / <15
95%	2.5 cm	-	<2 / <20

1 RMS/95% performance based on in field measurements. Achievable accuracy and initialization time may vary based on type and capability of receiver and antenna, user's geographic location and atmospheric activity, scintillation levels, GNSS constellation health and availability and level of multipath including 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.

Performance and Operation

Q&A

HOW LONG DOES INITIALIZATION OR CONVERGENCE TAKE?

▶ Trimble RTX correction services have different initialization times ranging from 1-20 minutes based on the correction service type. Refer to the performance specifications table above for details.

Q&A

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.

Q&A

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.

Q&A

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.

Q&A

WHAT IS CENTERPOINT RTX FAST?

▶ CenterPoint RTX Fast is a regionally available service that significantly reduces the convergence time for Trimble RTX services, down to as little as 1 minute for 2 cm horizontal accuracy.
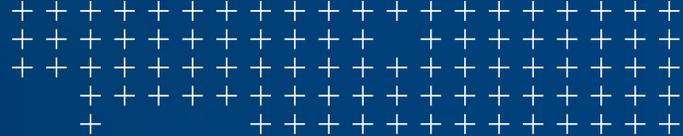
Q A WHAT IS CENTERPOINT RTX QUICKSTART
(OR CENTERPOINT RTX FAST RESTART)?

▶ 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. When using Trimble RTX Fast, this feature is not applicable, as the solution can fully initialize in less than 2 minutes.

Q A WHY DO CENTERPOINT RTX, FIELDPOINT RTX AND XFILL
PREMIUM HAVE MULTIPLE INITIALIZATION TIMES LISTED?

▶ An initialization time of < 1 minute for CenterPoint RTX, FieldPoint RTX and xFill Premium correction services is available on most receivers when used in the fast regions in central North America and throughout Europe, while all other regions (non-fast regions) have an initialization time of < 15 minutes for the same services. Both RangePoint RTX and ViewPoint RTX initialization times are typically less than 5 minutes worldwide.

Q A WHICH GNSS CONSTELLATIONS DO
TRIMBLE RTX CORRECTIONS SUPPORT?

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

Q A IN WHICH COORDINATE REFERENCE FRAME ARE
TRIMBLE RTX POSITIONS CALCULATED AND STORED?

▶ Trimble RTX coordinates are computed in ITRF2014 current epoch; these coordinates will be transformed to a fixed epoch dependent on the receiver and field software. For example, Trimble Access will transform the coordinates of an R10 using RTX to ITRF2014 Epoch 2005.0. xFill Premium applies an offset to the Trimble RTX positions resulting in positions that match the RTK/VRS coordinate reference frame that is being used.

NOTE: You can use the Trimble CenterPoint RTX Post Processing service to determine an ITRF2014 epoch 2005.00 position for your base station and control points. Trimble CenterPoint RTX Post Processing service is available at www.TrimbleRTX.com.

Performance and Operation

WHAT ARE ITRF AND ITRF2014?

▶ 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. ITRF2014) 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 ITRF2014 current epoch, autonomous GPS positions are provided in the current realization of WGS84. This discrepancy in time will usually result in 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. A local RTK base station may be required for the highest accuracy requirements, such as field leveling in agriculture. While RTK works on the basis of cancelling GNSS error sources between the local base and rover, Trimble RTX models these errors on a global scale. As such, Trimble RTX is available worldwide, broadcast via satellite or cellular delivery, and allows users to work without the constraints of a local RTK base station(s) or VRS network.

Q A

HOW ARE TRIMBLE RTX CORRECTION SERVICES DIFFERENT FROM SBAS SYSTEMS (E.G. WAAS, EGNOS, ETC.)?

▶ SBAS systems typically use only one GNSS constellation, such as GPS. Trimble RTX technology is compatible with multiple GNSS constellations, including GPS, GLONASS, Galileo, BeiDou and QZSS. Trimble RTX technology provides more accurate, consistent and reliable 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.

Q A

HOW ARE TRIMBLE RTX CORRECTION SERVICES DIFFERENT FROM OTHER GNSS CORRECTION METHODS IN TERMS OF ACCURACY, COST, CONVENIENCE, ETC.?

▶ Refer to the table below for a summary of different GNSS correction methods.

Solution	Availability	Delivery Method	Horizontal Accuracy (RMS)	Vertical Accuracy (RMS)	Initialization Time	Additional Hardware
Autonomous	Global	N/A	3 - 5 m	6 -10 m	Instant	N/A
SBAS – WAAS, EGNOS, etc.	Continental	Satellite	1 m	2 m	Instant	N/A
Real Time Kinematic (RTK) (Single-Baseline RTK)	Local	Radio Internet	8 mm + 1.0 ppm[1] (2 cm when 12 km from the base station)	15 mm + 1.0 ppm[1] (2.7 cm when 12 km from the base station)	Instant	Radio or Modem (with data plan)
Virtual Reference Station (VRS) (Network RTK)	Regional	Internet	8 mm + 0.5 ppm[1] (2 cm or better in most networks)	15 mm + 0.5 ppm[1] (3 cm or better in most networks)	Instant	Modem (with data plan)
Trimble RTX® (No base station required)	Global Local (Fast)	Satellite Internet	2 - 50 cm (subscription level dependent)	5 cm (subscription level dependent) CenterPoint RTX only	< 1 - < 20 minutes (subscription level dependent)	N/A

1   ppm refers to parts per million, e.g. 1 ppm is equivalent to 1 mm in additional error for every 1 km in distance from the closest base station

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Performance and Operation

Q A ARE THERE ANY FACTORS THAT CAN CAUSE ERRORS OR OUTAGES OF TRIMBLE RTX CORRECTION SERVICES?

▶ There are several environmental factors that can degrade accuracy and convergence or cause outages in GNSS systems when using any correction source:

  ▶ **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. Trimble RTX delivered via IP can help mitigate outages when the Trimble RTX satellite is blocked by obstructions, but won't help with obstructions limiting GNSS satellite availability or causing a degradation in GNSS signals.

  ▶ **Interference:** Any localized interference on similar or adjacent frequencies of GNSS signals or the correction signal will disrupt the reception of those signals.

Q A 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.

Q A 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 24/7, 365 days in the year by a global team of network engineers and IT specialists to ensure reliability in worldwide positioning and broadcasting.

Delivery and Availability
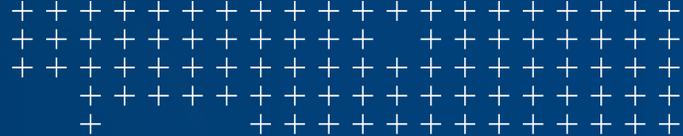
Q&A HOW ARE TRIMBLE RTX CORRECTION SERVICES DELIVERED TO THE RECEIVER?

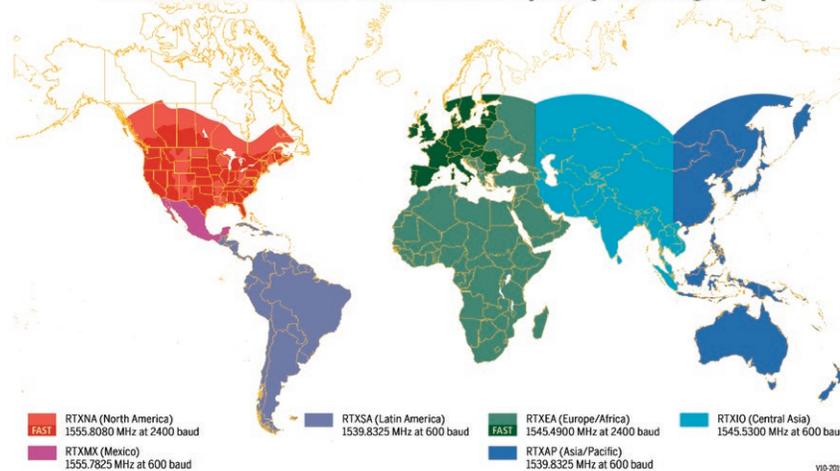► Trimble RTX correction services are delivered by satellite or Internet (e.g. through a cellular data connection). xFill Premium is only delivered by satellite. A subscription is required to use Trimble RTX correction services.

Q&A WHERE ARE TRIMBLE RTX CORRECTIONS AVAILABLE?

► Trimble RTX corrections are available worldwide via satellite and internet delivery. The satellite coverage area is shown on the map below. Trimble RTX Fast is available in most of North America and Europe. For the most up-to-date coverage maps, visit https://positioningservices.trimble.com/resources/coverage-maps.

Trimble RTX® Satellite Broadcast Frequency Coverage Map

RTXNA (North America) — FAST — 1555.8080 MHz at 2400 baud
RTXMX (Mexico) — 1555.7825 MHz at 600 baud
RTXSA (Latin America) — 1539.8325 MHz at 600 baud
RTXEA (Europe/Africa) — FAST — 1545.4900 MHz at 2400 baud
RTXAP (Asia/Pacific) — 1539.8325 MHz at 600 baud
RTXIO (Central Asia) — 1545.5300 MHz at 600 baud

V10-2019

IP/ cellular coverage anywhere an internet connection is available

Q&A CAN I USE TRIMBLE RTX CORRECTION SERVICES OVER WATER?

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

Delivery and Availability

Q A

WHAT RECEIVERS ARE COMPATIBLE WITH TRIMBLE RTX CORRECTION SERVICES?

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

CenterPoint RTX

NAV-900	R10-2	SPS986	MB-TWO
AG-372	R12	SPS785	APX15 v3
CFX-750	R2	BX982	APX15 EI
FmX	R9s	SP80	APX18
TMX-2050	NetR9 Geospatial	SP60	APX20
AFS-372	Geo7x	SP90m	AVX210 v3
FM-750	Alloy	SNS	LVX POS
FM-1000	NetR9	BD982	AV V6/AP
PLM-372	Kestrel	BD935-INS	AV POST
XCN-2050	SPS855	BD940	LV V5/AP LV
AG-382	SPS985 & SPS985L	BD990	MPS865
R10	SPS585	BD992	

FieldPoint RTX

Geo7x	R2	SP60	SP20	TDC150

RangePoint RTX

NAV-900	AFS-372	Geo7x
AG-372	FM-750	R2
CFX-750	FM-1000	SP60
FmX	PLM 372	BD982
TMX-2050	XCN-2050	

ViewPoint RTX

Geo7x	PG-200	Trimble EM100
R1	SP60	NAV-500
R2	BD982	AG-200

xFill Premium

NAV-900	AG-382	R10-2
AG-372	TMX-2050	R12
AFS-372	XCN-2050	R9s
PLM 372	R10	NetR9 Geospatial

Subscriptions

Q A

WHAT TYPES OF TRIMBLE RTX SUBSCRIPTIONS ARE AVAILABLE?

▶ Trimble offers a variety of subscriptions to suit customer needs. For information on subscriptions available in your region, please contact your local Trimble reseller, Correction Services Customer Care or visit our online store at tpsstore.trimble.com

Q A

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. Some receivers also support activation through scanning a QR Code, or uploading a License File.

  ▶ **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.

  ▶ **QR Code:** The activation email will include a QR Code that can be scanned using the camera on your display. This is currently supported on the TMX-2050, SNS, and NAV-900 (Using GFX-750/XCN-1050).

  ▶ **License File:** The activation email will include a license file that can be uploaded onto the display or controller, which is then read by the software to activate the subscription. This is currently supported on the TMX-2050, SNS, NAV-900. (Using GFX-750/XCN-1050), and Geo7x.

Q A

I MISSED THE OVER-THE-AIR ACTIVATION. WHAT CAN I DO?

▶ You can manage your subscriptions via the Correction Services online store at: 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 Correction 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.

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Subscriptions

Q A

DOES TRIMBLE AUTOMATICALLY RENEW MY SUBSCRIPTION?

▶ Your subscription will automatically renew if you are enrolled in the automatic renewal. For more information, contact Correction Services Customer Care. If you are not enrolled in Automatic Renewal, you'll need to renew your subscription by going to tpsstore.trimble.com or contacting Correction Services Customer Care. More information about auto-renewal can be found in our Terms & Conditions: trimble.com/TPS_Terms/

Q A

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

Purchasing and Support

Q A 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 tpsdemo.trimble.com or by contacting Correction Services Customer Care.

Q A HOW CAN CUSTOMERS PURCHASE TRIMBLE RTX SERVICES?

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

**Q A** HOW MUCH WILL TRIMBLE RTX SERVICES COST FOR MY DEVICE?

▶ Pricing is available on the Positioning Services online store at: tpsstore.trimble.com. Please contact your local Trimble reseller or Correction Services Customer Care for any further details.

Q A WHAT KIND OF CUSTOMER SUPPORT IS AVAILABLE FOR TRIMBLE RTX CORRECTION SERVICES?

▶ With regional offices worldwide, phone and email support is available at anytime. For more information and contact details, refer to trimble.com/positioning-services/contact-us.aspx.
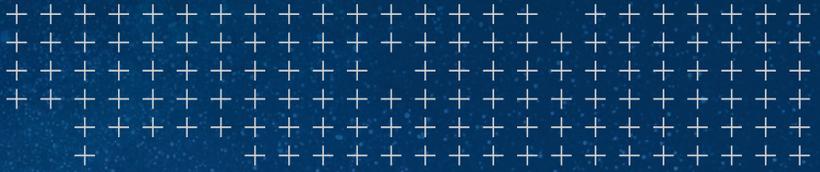
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