

# PRODUCT BULLETIN

14 MARCH 2013

## TRIMBLE R10 – TRIMBLE XFill FACT SHEET

### Trimble xFill

Powered by Trimble RTX™ technology, Trimble xFill™ is a key feature of the Trimble R10 GNSS system. It leverages a worldwide network of Trimble GNSS reference stations to deliver position information via geostationary satellites. Trimble xFill seamlessly “fills in” for RTK or VRS corrections in the event of a temporary connection outage, such as a radio black spot so users experience less downtime in the field.

### Getting the best Trimble xFill Positioning

One key benefit to xFill positioning is that while surveying with Trimble xFill, all surveyed points are relative to your local base station or VRS network. This makes the transition to Trimble xFill seamless to the user when radio or cell coverage is lost. The positions collected during Trimble xFill usage are at the precisions stated on the Trimble Access™ status bar only when the local base station or VRS network known coordinates are accurate to within 1 meter from WGS-84. If a local known coordinate system is used to establish your survey or VRS network, Trimble Access can easily perform the necessary transformations and coordinate conversions to WGS-84 within the required 1 meter accuracy needed. Trimble Access contains over 80 known coordinate systems for selection when creating a new job or the user can enter the establish parameters for a local coordinate system not included in the list. When the correct coordinate system is selected and the base coordinates carefully entered, the local base station or VRS is easily related to the WGS-84 datum to within 1 meter.

When starting your base station using the “Here” key, there is a possibility that the error in the WGS-84 position can exceed 1 meter. Trimble recommends that when the Here key is used; you have a SBAS correction source activated to augment the absolute



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position from the GNSS receiver. Typically, SBAS augmentation will produce an absolute position of < 1 meter RMS in the WGS-84 datum.

When the base position used is not within 1 meter of the WGS-84 position, the errors in the Trimble xFill positions could increase at a greater rate than specified. This could cause the xFill predicted errors (precisions on the Trimble Access screen) to invalidly indicate the level of error in your xFill positions.

## Setting up Trimble xFill to work in your part of the world

Every Trimble R10 GNSS receiver includes the capability to perform xFill positioning when radio or cell coverage is lost. The Trimble xFill option is included with each Trimble R10 (see coverage map below), ready to use from the moment you turn on your receiver.

To begin using Trimble xFill, simply turn on the Trimble xFill functionality in your RTK Survey Styles within Trimble Access (v12.x.x required) and the Trimble R10 will begin searching for the local xFill geostationary satellite as soon as a survey is started. Once the Trimble R10 has locked on to the Trimble xFill satellite (shown as “RTX” on the Satellite Plot), the system is ready to provide positioning to RTK precisions when radio or cell coverage is lost. There is no need for the user to enter the local Trimble xFill satellite parameters to begin using the system; the Trimble R10 will take care of it. Even if the Trimble R10 is moved to another part of the world, the receiver will quickly find the local geostationary satellite automatically.

The Trimble xFill functionality switch can be found in the “Rover options” screens within the RTK Survey Styles. On screen 3/3 you will see an xFill checkbox. When the box is checked, xFill functionality is enabled.

## Trimble xFill and OmniSTAR

Every Trimble R10 GNSS receiver comes equipped with OmniSTAR® positioning capabilities as well. You will find that Trimble xFill and OmniSTAR functionality are mutually exclusive in the Trimble R10 receiver. If you are using Trimble xFill in your current survey, OmniSTAR positioning is not available. You must set up two independent Survey Styles to use each positioning functionality/service separately. Also in order to use OmniSTAR positioning, you must purchase a subscription to any of the available OmniSTAR positioning services, which include OmniSTAR VBS, OmniSTAR HP, OmniSTAR XP and OmniSTAR G2. For more information on doing so, please visit <http://www.omnistar.com>.

## Trimble xFill Frequently Asked Questions (FAQ)

Below is a list of frequently asked questions about Trimble’s xFill:

### 1. What datum is used with the xFill correction service?

The Trimble xFill feature uses Trimble RTX technology, which is based on International Terrestrial Reference Frame 2008 (ITRF08). For Trimble xFill purposes, the ITRF08 datum is close enough to WGS-84 to state that your base station should be within 1 meter of WGS-84, which is the GNSS reference frame.

### 2. My local datum differs from WGS-84 by several meters; will it still work with xFill?

If your local datum is available in the list of coordinate systems within Trimble Access or you can enter the known parameters of your local datum and coordinate system into your current job, Trimble Access can transform your local system into WGS-84.

### 3. Does the known coordinate have to be in the WGS-84 datum?

The coordinate can be in any local known datum that can be transformed into WGS-84. If the datum parameters are known and available to Trimble Access, the Access software will perform all necessary transformations.

**4. What should I do if I am using a VRS Network?**

Trimble suggests that you contact your VRS Network administrator and verify that the network control points are relative to WGS-84 to within 1 meter. VRS Networks are typically setup within a known reference frame which is easily transformed to WGS-84 coordinates at its control points.

**5. If I am using the “Here” key to start my survey, what SBAS service will give me the best augmented position?**

Trimble receivers will produce an absolute position using WAAS or EGNOS services well within the required 1 meter accuracy. Since QZSS and GAGAN are not fully functional, it is not recommended that you use these services.

**6. What about using an OmniSTAR corrected position at the base station?**

All OmniSTAR services provide corrected positions within the required 1 meter relative to WGS-84. NOTE: OmniSTAR positions are based on ITRF08, which for xFill purposes, is equal to WGS-84 to within 1 meter.

**7. Once I lose radio or cell coverage, how long will Trimble xFill continue to function?**

Once radio or cell coverage is lost, the Trimble R10 receiver will continue to “coast” in RTK mode for 10 seconds. If coverage is not regained before the 10 seconds of coasting is complete, the xFill service will begin providing positions and continue xFill positioning for 5 minutes. If radio or cell coverage is regained at any point during xFill positioning, the system will seamlessly transition back into RTK. After the radio or cell is gained and you transition back to RTK, the xFill “clock” is reset and you will have up to 5 minutes for xFill positioning the next time you lose coverage.

**8. What happens if I lose the Trimble xFill (RTX) satellite while I am in Trimble xFill?**

If you are in Trimble xFill and move to a location where the xFill satellite signal is blocked (for example: moving behind a large tree), the Trimble xFill positioning will begin to “coast” for 20 seconds, allowing you to position during the xFill satellite outage. Once the xFill satellite is regained, the Trimble R10 receiver will continue in Trimble xFill mode until radio or cell phone coverage is regained.

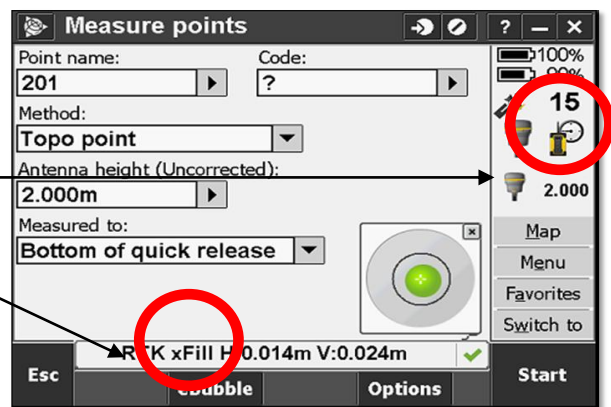
NOTE: Since the xFill (RTX) satellite is geostationary over the equator, the satellite will be in the southern sky in the northern hemisphere and in the northern sky in the southern hemisphere, approximately 30 degrees above the horizon in mid-latitudes.

**9. How do I know I am in xFill positioning mode?**

When the Trimble R10 receiver transitions to Trimble xFill positioning mode:

- the radio icon on the Access screen changes to the xFill icon
- the Access status line changes from “RTK” to “RTK xFill”.

The icon and “RTK xFill” will remain on the Access screen until radio or cell phone coverage is regain or your reach the 5 minute limit of xFill, whichever comes first.



**10. What type of precisions will I have with my Trimble xFill positions?**

When Trimble xFill starts, the xFill precisions begin at the last RTK precisions before radio or cell coverage is lost. At that point, the magnitude of your precisions numbers will begin to increase. As you continue to position with xFill, the precision will never improve throughout the five minute period. With RTK, your precisions will

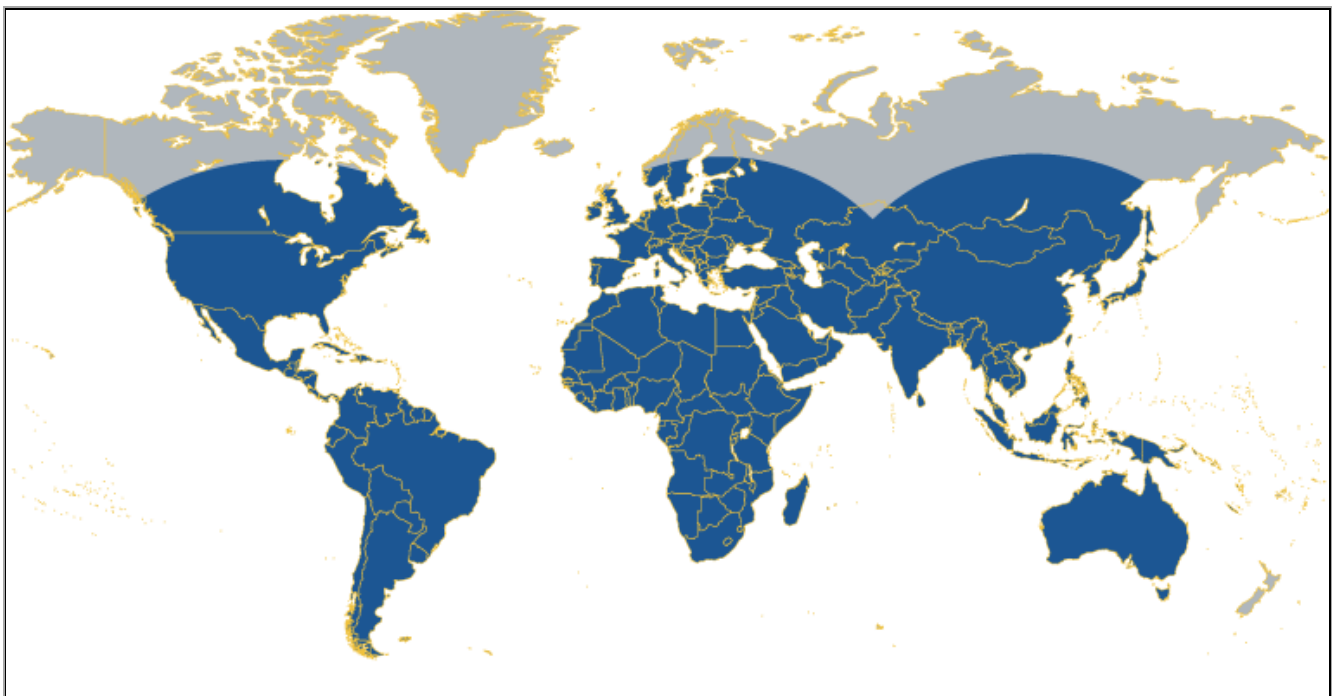
always remain at a consistent level, relative to the environment, and can, in some cases, get better when you go static. With Trimble xFill, the precisions will not improve when going static or over time. The published specifications for Trimble xFill positioning are:

Horizontal.....RTK precisions + 10 mm per minute RMS

Vertical.....RTK precisions + 20 mm per minute RMS

### **Trimble xFill Worldwide Coverage**

Because Trimble xFill relies on geostationary overhead satellites to deliver position information, coverage varies by location. In November 2012, Trimble announced that coverage is extended to the regions shown in the map below. Please contact your local Trimble sales representative for more detailed coverage information for your specific location.



### **Availability**

Trimble xFill across the expanded satellite coverage area is now available. Trimble R10 receiver firmware 4.70 is required, which is a free update for all Trimble R10 systems and is available at [www.trimble.com/survey/trimbler10.aspx](http://www.trimble.com/survey/trimbler10.aspx).

For more information, please contact your local Trimble dealer. To find a Trimble Dealer near you, go to [dealerlocator.trimble.com](http://dealerlocator.trimble.com).