How To Set Up a VRS™ or Single Base Connection With a Trimble® GPS receiver using a Cingular (AT&T®) Cell Phone

September 3, 2013

A VRS, Virtual Reference Station, is one option for providing real-time differential correction to a GNSS receiver. VRS corrections are available from a variety of public and commercial services. VRS networks and subscription services provide dual-frequency (L1/L2) real-time differential GPS (DGPS) and in many cases DGNSS (GPS and GLONASS) corrections to improve accuracy as data is collected. A VRS service uses data from several (permanent) reference stations to compute corrections that are generally more accurate than corrections from a single reference station. These corrections are then broadcast over the Internet.

A VRS or Single Base solution may be free or have a fee imposed, depending on the managerial policies of that particular system. Continuous use of this option depends on being able to maintain a good cell phone signal.

In preparation for using a VRS or Single Base solution, you need to obtain the right equipment. Any member of the Trimble GeoExplorer® family, ProXT/XH/XRT, Pro 6T/H or Juno 5 series will work fine providing you are using TerraSync™ Professional, GPScorrect™ Extension for ESRI® ArcPad® or Trimble Positions Software Suite. This requires a Windows® Mobile Device or PC platform.

You will also need a cellular phone that has the ability to connect to the Internet. We recommend that you purchase a "data plan" with that phone. This will typically provide you with unlimited data streaming. Please visit your local cellular distributor for pricing. You can connect to the Internet without an unlimited data plan, but that could result in very large cellular phone bills, as your connection time would be billed as "voice" time.

Note– Delivery speed of the VRS or Single Base corrections are not as critical as maintaining strong signal connection with a cell tower.

Although you could connect the cell phone to the GPS unit with a cable, we recommend that you use Bluetooth®. This will provide a wireless connection between the two devices making this system easier and less physically restrictive to use in the field. The Bluetooth signal should maintain connectivity with the GPS receiver or PDA and your cell phone, for up to 10 meters (32.82 feet). Make sure the cell phone you purchase has Bluetooth built in.

For the purposes of this document, we will assume that you are using one of the members of Trimble's GeoExplorer family and a Cingular cell phone with Bluetooth and Internet connectivity. If you have different equipment, these instructions could be slightly different for your system. Using the Single Base or VRS solution will generally result in excellent horizontal accuracy that will likely eliminate the need to post-process GPS data.

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<u>**Step-by-step instructions**</u>

Section One

Note: If you are using a cell modem card in the handheld, skip to Section Three.

This first series of steps will create a COM Port through which your cell phone can communicate with your handheld receiver.
1. Turn on your cell phone.
2. Go to a menu that allows access to the Bluetooth radio, probably "Settings".
3. Turn Bluetooth on and escape back to the main screen.
4. Turn on your Geo and tap Start>Settings.
5. Tap the Bluetooth icon.
6. Put a checkmark in the box labeled "Turn on Bluetooth." (You do not have to make it "discoverable.")
7. Tap the Devices tab at the top of the screen.
8. Tap "Add new device".
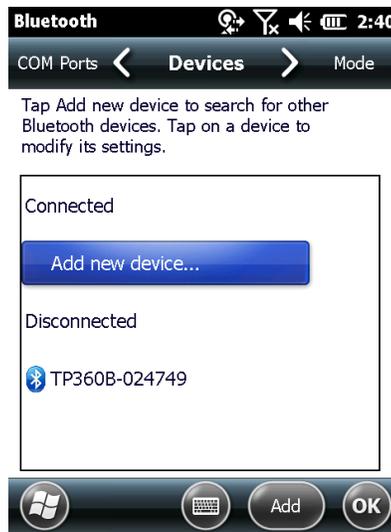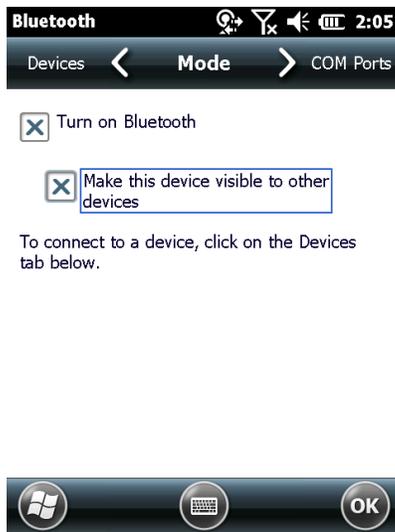
9. The GeoXH will automatically begin searching for all Bluetooth devices in the vicinity.
10. When your cell phone is found by the software, tap the name listed in the window.
11. Tap "Next" at the bottom of the screen.
12. You can change the Display Name if you want. Put a check mark next "Dialup Networking" and tap Save.

You have just created a COM Port through which your cell phone can communicate with your GeoExplorer.


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Section Two

This next step will allow you to use that connection through which you can connect your cell phone to the Internet.

1. On your GeoXH tap Start>Settings>Connections>Connections
2. Tap "Add a new modem connection".
3. Give your connection a name. I simply called mine "VRS".
4. Under "Select a modem," select Bluetooth.
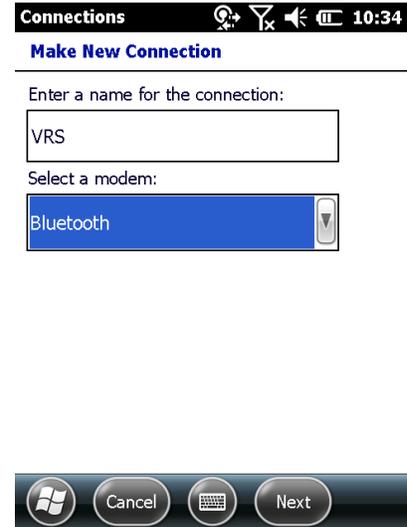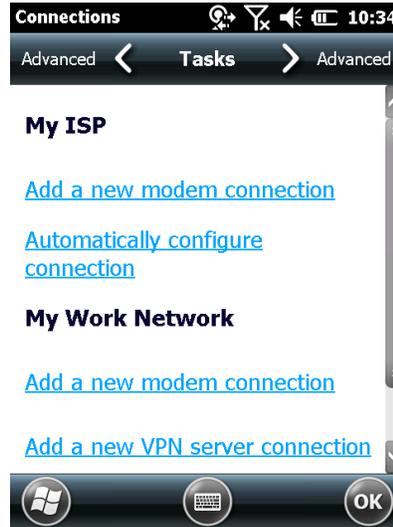
5. Tap "Next" at the bottom of the screen.
6. Select the name of your phone, then tap Next at the bottom of the screen.
7. You must now type in the number that your GeoXH will dial to connect with your cell phone. For Cingular phones, that number is *99# (Contact your cellular service provider for this number if you are using another service).
8. Tap Next.
9. Unless the phone provider confirmed that you must enter user name, password, and domain settings to access the Internet, tap **Finish** without entering any information in this screen. The phone provider may also require some connection setting to be changed and those can be found under the Advanced… button. Once you have configured your setting tap OK.

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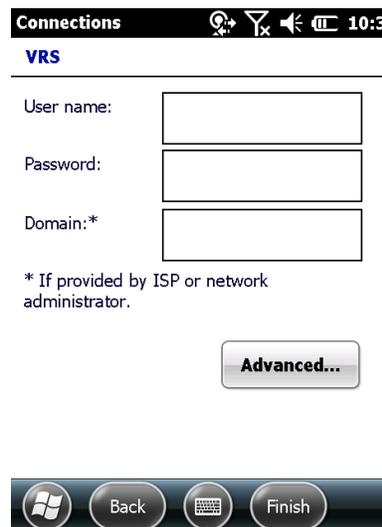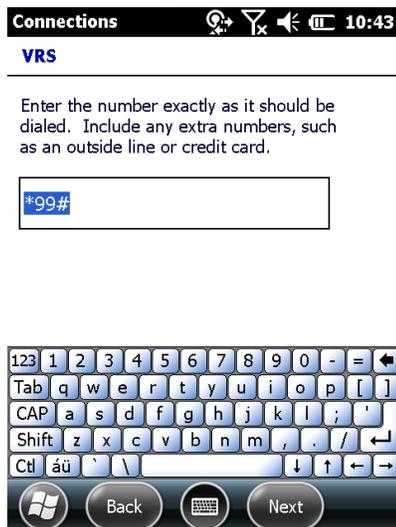
10. Tap Finish at the bottom of the screen.
11. On your GeoXH tap Start>Settings>Connections>Connections.
12. Click "Manage existing connection".
13. You will also see a radio button in the left margin of the number to be dialed. If you wish to try the connection you've just setup, you can touch and hold on the connection displayed in the list. When the menu pops up, select "Connect."
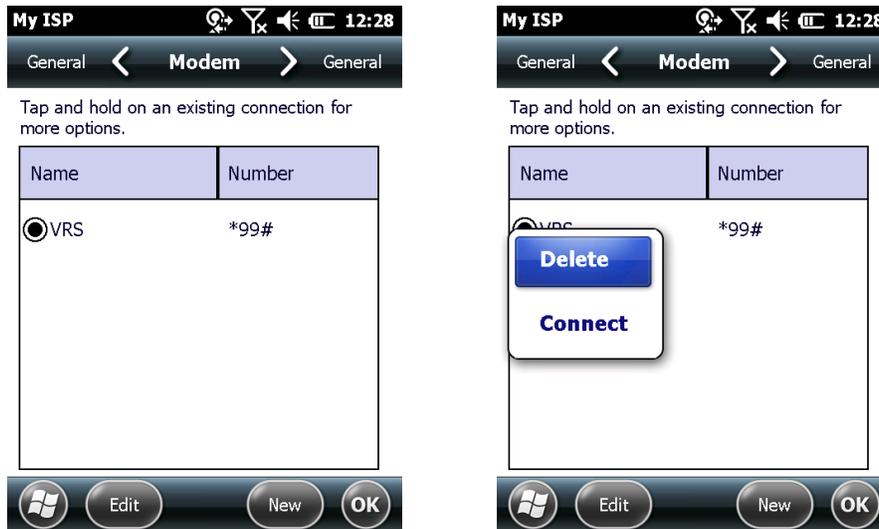
You are connected when you see two opposing arrows in the status bar at the top of the screen. You should observe the screen on your cell phone. Initially, you may have to provide permission for this connection to complete. For future use, you can select that you will "Always allow" these devices to connect. Once connected, you can proceed to launch your data collection software on the Geo.

Note: Before you proceed to the last set of instructions, you must have already contacted the manager of the Single Base or VRS Real Time Network you want to work with and obtained an IP address for the Internet Server, the Port number, a username and password to identify yourself on the network, and a list of stations that are broadcasting the appropriate protocol.

Section Three

This section explains how to use TerraSync or your Trimble extension to ArcPad to establish a connection with a VRS or Single Base.

Note: If you are using Trimble Positions for ArcGIS Mobile, real-time setup is done in the Field Configurations section of the Trimble Positions Desktop Add-in, not in the field.

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1. Open your data collection software.
2. Tap Status, then Setup, then Real Time Settings.
3. In the first pull down menu, Choice 1, select External Source, then tap the wrench tool to the right of that field.

4. The first pull down is Type. Select either Single Base or VRS.
5. Under Connection Method, select Internet.
6. Type in the IP Address and the Port number you have been given by your provider.
7. Tap the wrench to the right of Source.
8. Because your cell phone has established a connection with your Geo, you will see a list of possible base stations to choose from (this may take a few seconds).
9. Select either a Single Base or VRS. Be sure to choose a base station that is broadcasting a protocol that can be used by your receiver.
10. Enter your User Name and Password.
11. Select Auto for Connection Control.
12. Select Any for Station ID.
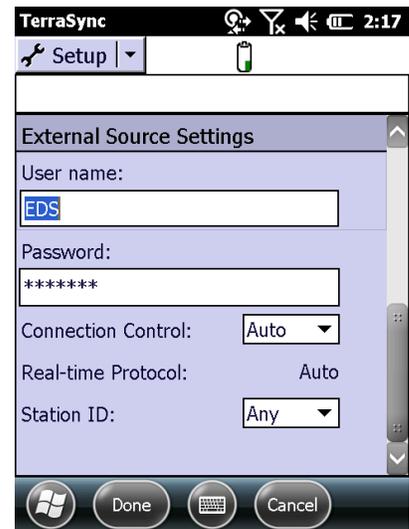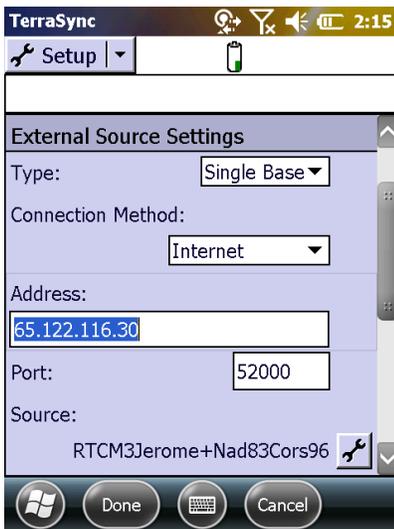
13. Tap Done, and then Done again. You are now back at the main Setup menu. Go to the Status menu and wait until the radio icon stops flashing. You will see a number to the right of the satellite icon representing your CEA (Current Estimated Accuracy). Be sure to wait until your CEA reaches an acceptable accuracy level before beginning your data collection.

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