

# Troubleshooting WSRN Field Operations

## Quick Guide

Factors resulting in the inability to resolve high precision positions almost always fall into one or more of four categories. These subjects are expanded later in this document. The recommended steps in troubleshooting should be undertaken in the following order. This might sound like a cliché, but you'd be surprised how often simply powering down all devices, and powering them back up, fixes things. Assuming you've already tried that, here's some tips based on our users' experiences.

Factor	What to Look For	Tests and Checks
<b>Local Conditions</b>	Do you have sufficient sky view?	Move to a nearby area with a clear sky and compare. If the open site works, but the original site does not, it could be sky view, obstructions, RF (radio frequency) interference, and/or multipath.
	Are there potential sources of multipath? (See Figure 3).	Move to a nearby area with a clear sky and compare. If the open site works, but your original site does not, then it could be multipath
	Are there potential sources of RF interference?	Move to a nearby area with a clear sky and compare. If the open site works, but your original site does not, then it could be RF.

<b>Communications</b>	Does your internet source have data connectivity?	Navigate to a test website in a browser on the tablet/data collector.
	Is your modem built-in to the rover or tablet, or are you using a portable modem or phone hotspot?	Test to see if other devices can connect to the same Wi-Fi and/or Bluetooth source.
	Are you getting error messages in your rover software?	Difficulty logging-in and/or inability to download the source table can be an indication of poor/spotty comms.
	Wi-Fi/Bluetooth connections work, but no apparent data connectivity	Try a different cell carrier
	Cell and connections check out, but no solution	Try an alternate NTRIP caster and check the "Settings" section below.

<b>Settings</b>	Are you selecting a mountpoint/source corrections format that is supported by your rover?	Try an older corrections format if the newest does not work. (See Appendix)
	Are you selecting an individual base, or a network solution (e.g., VRS, MAC)?	If choosing a network solution in NTRIP (e.g., VRS or MAC, look for a checkbox or setting to enable "NMEA" output.
	Are you entering a valid and active login?	Test your login/password on the RTN website (e.g., wsrn.org), or with an NTRIP app on your phone.

	Has anyone else used the system lately that may have changed any settings?	Ask who used it last and if they successfully connected. Store configuration files that you can restore when needed or screenshot settings.
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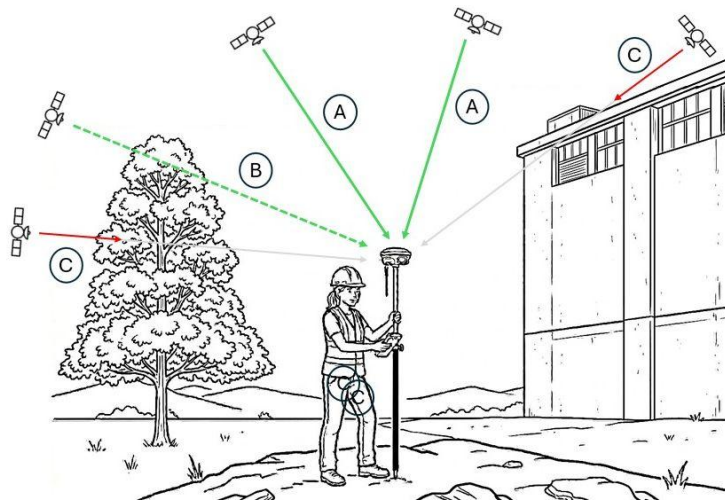
<b>Network</b>	Is there anything going on with the network?	Unlikely, but you can check the websites. There are two redundant sites. If one is showing the station map and the other is not, there may be a temporary outage: switch to a redundant caster.
	Are you still unable to connect, even after checking comms, site conditions, and settings?	Switch to a redundant caster.
	Are you entering the NTRIP caster alphanumeric URL, or numeric I.P.?	Try both URL and I.P.
	If all other steps fail...	Contact the network

# Detailed Guide

## Local Conditions

### How clear is your sky view? - Common Issue

You need to have at least five healthy satellites in view to be able to do any real-time GNSS work. If you have an older rover that supports only one constellation (e.g., GPS) then good sky view is crucial. Even with two constellations (e.g., GPS + GLONASS), you may still need at least 5 GPS, no matter how many GLONASS you can see. With multiple constellations, manufacturers have been able to process mixes of satellites, often to be able to use a minimum of 2 from each, to add up to 6 or more. Still, there are limits for sky view for even multi-constellation systems. Some lower-priced rovers may state that they support 4 or more constellations but may only be using 2 signals per constellation.



*Figure 1 – Signal Blockage. “A” indicates clean, direct signals between the satellites and rover. “B” indicates some signal attenuation while passing through light tree canopy. “C” is completely blocked.*

Step out in the open and see if you are still failing to get a fixed solution. If you still cannot fix, then it may be something other than sky view. Note that you cannot simply fix out in the open and then walk back under thick canopy. The quality of the solutions, done while under canopy, is dependent on the sky view at that location, not where you fixed. Exceptions are some newer systems that have lidar/image stabilization features that enable carrying of positions (for limited time/distance) while in sky-view challenged locations. GNSS RTK positioning accuracy is

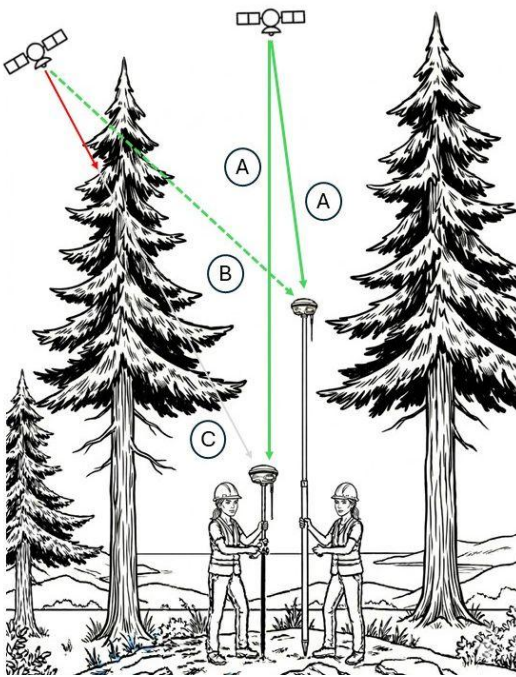
generally assumed to align with the specifications provided by GNSS manufacturers. For locations with no obstructions and clear sky visibility, these accuracy levels are easily achieved. In such conditions, the reported RTK accuracies are consistent, and a slight improvement is observed when using multi-constellation solutions.

However, even minor obstructions (e.g., 20% blockage) lead to a significant reduction in accuracy, with errors increasing by a factor of 2–3. This degradation is primarily attributed to three factors: poorer satellite geometry due to fewer tracked satellites, increased signal noise caused by multipath effects, and signal interference from vegetation. While horizontal positioning errors occur in all directions, there is a slight bias predominantly in the north-south direction. For the vertical component, the errors tend to show a degradation in precision, generally twice that of the horizontal.

As the level of satellite obstruction increases (e.g., from 19% to 52%), both vertical and horizontal errors rise rapidly—from approximately 20–30 mm at 19% obstruction to as much as 100 mm at 52% obstruction. Additionally, higher levels of obstruction reduce the receivers' ability to reliably resolve positions. With most rover software, you can choose to exclude satellites that fall below a mask angle (e.g.,  $10^\circ$ ). Satellites low to the horizon are often subject to poor signal-

to-noise. With multiple constellations, there's a lot more satellites for the rover to choose from.

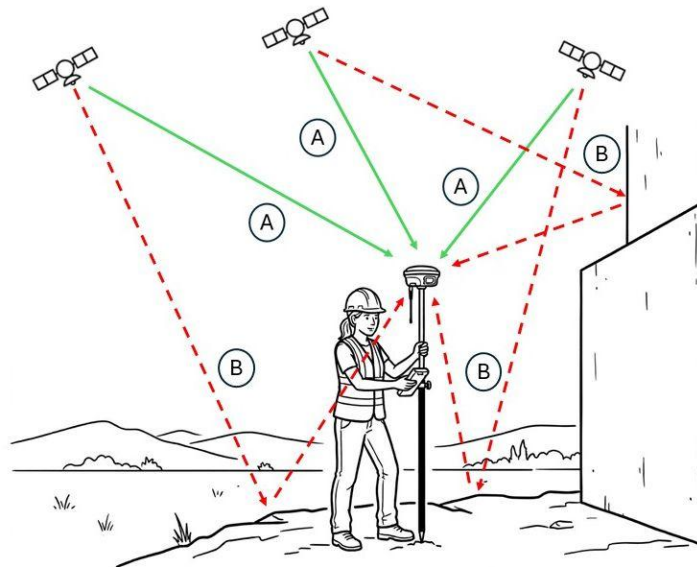
You can, in many situations, improve your sky view by simply raising up the rover/antenna, like with an extendable rod. With tilt-compensated rovers, this is much easier to do (as you are not chasing a bubble), as long as you enter the correct height into the software.



*Figure 3 (left) – Using an extendable rod may yield more signals received at the rover. “A” indicates clean signals. “B” indicates signal degradation (e.g. by thick tree canopy), whereas the taller rod may still receive usable signals passing through less dense upper canopy.*

### **Are There Sources of Multipath Nearby? - More of an Issue for Older Rovers**

Multipath is where signals bounce off certain types of surfaces to give false ranging from the satellites. High metal or concrete walls are common sources.



*Figure 4 – Multipath. “A” indicates direct, good signals from the satellites to the rover. “B” indicates reflected, bad signals (multipath) that are typically rejected by the rover software.*

This typically shows up as degradation in signal-to-noise ratio (SNR). You may see SNR listed for each satellite observed. For example, 1/50 would be preferred to 1/20. In many rovers, you can temporarily exclude satellites with poor SNR, though some rover positioning engines will automatically exclude these from solutions. Solutions often do not use every satellite in view.

While newer rovers, especially those that support multiple constellations, can detect and reject nearly all multipath, if you have an older system, you may experience difficulty fixing and/or experience poor results near multipath hazards. You could test away from those potential hazards to see if this is the case.

### **Radio Frequency Interference - Unlikely**

GNSS signals reside in spectrum ranges that are typically not subject to outside radio frequency interference. However, there can be situations where unintentional signals spray out from sources. For example, antennas or dishes nearby with poor wiring, or arcing from moisture. Test away from suspected sources and compare.

Working under high voltage lines may or may not affect your operations. It is difficult to determine in advance which power corridors will or will not. Test under them, and then some distance away to see if that is the case. While relatively rare, there is no mitigation for such interference. Throughout the tenure of the WSRN, there have only been a few locations verified to be an RF hazard zone. One was next to a large military facility, but it is now no longer a hazard. Another was under at end of an airport runway that has altimeter radar. In the latter case, not only was the GNSS disrupted briefly, but also cell and radio.

### **Jamming and Spoofing - Highly Unlikely**

Things like jamming, deliberate interference, and spoofing are extremely rare in our state. Deliberate jamming usually occurs only in conflict zones. Even in those instances, it is usually very localized, focused, and often brief. Other RF interference is rare, and there are no persistent areas of interference in our state that we have been able to verify. Interference, when it is present, would mostly result in a denial of service, and not a position off by a decimeter or meter.

A map of persistent interference/jamming zones is [gpsjam.org](http://gpsjam.org). Incidents of suspected GPS issues should be reported to the U.S. Coast Guard Navigation Center (NAVCEN) and will be investigated by multiple federal agencies. Spoofing is when a party deliberately overrides signals to create false positions. It is rare, difficult to do, and would result in values being miles off, and not just a few tenths of a foot. There are signal jammers like cheap "trucker jammers" that some people have used to jam their on-board GPS to block being tracked. This is very rare and highly illegal, and only a few cases have been confirmed (nationwide). Plus, the vehicle with the jammer is moving and you might not even notice the few epochs of outage as it passes by.

If you suspect RF interference, jamming or spoofing, please do the other debugging steps first as those will likely reveal where the issue is. You can contact the WSRN and they can look to see if anyone else in is experiencing anything odd in your vicinity. The WSRN has spectrum analyzers on many of the reference stations (and have not seen any persistent interference). The WSRN has spectrum analyzers at each base, and some portable devices, to investigate areas of suspected interference. Again, it is extremely rare.

# Communications

Reliable internet data connectivity is key to using NTRIP for GNSS corrections from the WSRN. This is typically via cellular data, however, there has been a rise in use of satellite internet.

Your field software might say “Invalid Credentials”, “Login Failed”, “Failure to Connect to Caster” (these error messages vary from manufacturer to manufacturer), or it fails to load a mountpoint/source list—these are often a result of poor, spotty, or high-latency cellular service in the specific location you are working in.

Do not assume that if you have cell voice and a number of displayed bars, that there is reliable data connectivity. Packet data works in its own way. Cell reception maps are not very reliable, so you may want to research ahead of time. For new areas you may soon be working in, consult cell tower maps or contact folks in those areas and inquire about cell data reception.

**Check if you have data connectivity.** Different rovers and mapping systems handle cell connectivity in various ways. Start by making sure you understand how your device is set up to connect to the internet

- You might have a modem and SIM card in your tablet/data controller or rover head that has been activated for a data account.
- Or a separate dedicated portable modem (hotspot, jetpack, etc.)
- Or you may be using your phone as a hotspot
- The tablet/data controller with the field software may have a built-in modem, and the connection is direct to the software.

If the portable modem is separate, or a phone hotspot, you typically connect via Wi-Fi. Any Wi-Fi or Bluetooth connection is a potential point of failure—you need to double check those settings and connections.

*Test: try adding another device to the same access point or as a Bluetooth device*

**Check the quality of the connection.** A common way to check if you have successfully connected to cell data in the field software, is to open a browser on the table or data controller. Nearly all such devices have an OS that supports a default web browser. Open a web site that changes frequently (so you are not simply looking at a cached page). Go to

the [wsrn.org](http://wsrn.org) or [wsrn3.org](http://wsrn3.org) website and check if you can see the map. Better still, free, non-proprietary sites like [fast.com](http://fast.com) and [speedof.me](http://speedof.me) will show if you have live data stream access and how fast the upload and download speeds are. GNSS corrections are relatively small packets, and use little bandwidth, only a fraction of the streaming speed you would need for video streaming.

*Test: browse a website on your tablet/data controller*

**Wi-Fi compatibility.** If you change your cell access device and/or rover, the default Wi-Fi formats may not be set for older protocols. Check which protocols your rover/tablet/data controller and Wi-Fi access point device or hotspot app supports. You can often go into settings and pick an older or newer protocol as needed.

*Tests: Check your rover/tablet data sheet and hotspot for compatible Wi-Fi protocols.*

**Boosting Reception.** There are proximity boosters, but they are often not very effective. If you have a portable hotspot with an external cell antenna jack (SMA) you can add an external antenna, and even an in-line cell booster. Simply getting the hotspot higher up (like with a fiberglass rod) can help in cell-challenged areas. Some crews put a modem and high-gain antenna in the vehicle, park it on a hill, and use a local long-range Wi-Fi router to get signal to rovers.

*Tests: Drive up a hill or put your hotspot on the top of an extendable pole to see if that improves reception. Your work location may simply just have poor cell.*

**Satellite Comms.** While some sat phones provide data access, it can be quite expensive. Alternately, there are mini style satcomm devices that access low Earth orbit (LEO) comms constellations. Some come with built-in Wi-Fi routers, or you could connect one.

*Tests: Find someone that has such a setup, or a dealer, and try it out before committing.*

**High Latency.** Typically, not an issue, but there are cases where one cell carrier service, in a specific area, might experience higher latency than another carrier. To check if this is the issue, see if someone on the crew has a different carrier, and connect via that.

*Test: try using a modem or hotspot with a different cell carrier in the same location.*

**Inconsistency and Congestion.** You may have worked just fine at location in the past, but suddenly find it has poor cell. The carriers occasionally tweak the panels on the cell towers to optimize them for high use locations. So, your reception profile could have changed. Congestion typically only applies in heavily populated areas. You can visit the test sites listed above to check.

*Tests: try using a modem or hotspot with a different cell carrier in the same location.*

While a communication issues on the server/caster is possible, it is highly unlikely as there are redundant systems. As another troubleshooting step outlines, try the other caster (if you have verified that you have cell data connectivity).

## Settings

**Are you selecting a corrections format that your rover supports?** There are misconceptions about corrections formats. The common ones are generic, based on international standards and are non-proprietary. It's not like there is a different flavor based on the brand of RTN or base, with some kind of magic sauce, or that exclude certain brands of rovers, though there are some proprietary formats (rarely implemented). Like many RTN, the WSRN broadcasts several standard formats, mostly to continue to support older rovers. For newer rovers, built within the past 7-10 years, the WSRN provides RTCM3.4-MSM (multi-system message) supporting GPS, GLN, GAL, BDS, and QZSS. Most older rovers can use RTCM3.1 (GPS + GLN). And as there are some very old rovers that only support CMR+, the WSRN also supports that. See the WSRN "[Mountpoint Naming Guide](#)" for more information.

It is recommended that you try mountpoints with an "MSM" suffix first, to take advantage of as many constellations and signals as possible. If that does not work, fall back to an older format.

**Did you choose mountpoints for the right subnet?** The WSRN is broken into 6 "subnets" covering different parts of the state. Subnets provide consistency within regions, considering

factors like tropospheric effects. Consult the WSRN printable map (have crews keep a copy handy) to see the prefixes for each subnet. E.g., “PACWA” for the coastal subnet, “SEWA” for the southeastern subnet, etc. if you choose the wrong subnet (e.g., PACWA instead of PRSN when working say, in the Seattle area) you might still fix but will likely have poor results.

**Are your settings correct for single-base or network solutions?** See the appendix and Figures 5 & 6 (in the Appendix) for an explanation of what is meant by “single-base” and “network” corrections. For single-base (corrections from a specific station), your rover sends an NTRIP request, and the corrections start flowing. Network RTK requires an additional step: your rover needs to send its autonomous position along with the request, to the network so that it knows which multiple stations to include in a custom solution. One common issue with network RTK is that some users test the rover while in the office or vehicle: it can’t see the sky and cannot send its autonomous position to initiate the solution.

Settings, especially how they are labelled, vary significantly between manufacturers, but generally there should be a check box for “VRS”, “Send NMEA” or other option to send NMEA (position) output.

Many users set up multiple connection shortcuts, or styles in their rover software for single-base and network corrections. Some may limit the mountpoints listed depending on what style you pick. With as many mountpoints as the network needs to provide (i.e., to support all the formats and stations) this can be many hundreds, and some rover software may not put them in alphabetical order.

Some rover software has an option for “auto-pick” (of single base sources), with the intention of choosing the nearest base. As this option is implemented inconsistently, it is not recommended. Instead, it is recommended that you use a network solution (that would be minimally impacted if an individual base is not available at the time), and if you prefer single-base, look at the map.

**Are you entering valid login credentials?** RTN, like the WSRN typically never disable anyone’s login without contacting the user directly. The exception is “test” accounts, that would automatically expire after an agreed upon period (e.g., 90 days). While it is possible for a login to become corrupted, it is extremely rare. There are several ways you can test your login if you suspect this.

- *Test by logging into either of the network website(s): [www.wsrn.org](http://www.wsrn.org) or [www.wsrn3.org](http://www.wsrn3.org)*
- *Use a free NTRIP client app on your phone, like Lefebure (Android), or NTRIP Checker (iOS). But make sure to disconnect after the test so you do not use up your data plan.*

Note: that when you log into the website, it will ask for 'Organization'. That is not your company or org name, it is instead the type of account. E.g., schools is 'EDU', partners is 'PARTNERS', and subscribers is 'SUBS', etc.. Your organization would have been provided in the credentials email you received when your account was initially set up. The website(s) are where you can find static files for post-processing, automated post-processing, etc.

**Do your results appear to be about 4' off in horizontal?** GPS works by default in relation to the WGS84 ellipsoid, but the (current) geodetic reference framework of U.S. works in relation to the GRS80 ellipsoid (e.g., NAD83). The ellipsoids are identical, except that they are offset by about 2 m at the earth's center. This translates, on the ground, in Washington State, to about 4' in horizontal and 1' in ellipsoid height. The transformation (Molodensky) is applied on the fly, but, depending on settings, you may be either not transforming, or double transforming. Settings for the geodetic systems vary between manufacturers, but as the WSRN is already based on GRS80 (NAD83), you would not want to transform. Some manufacturers have a "No Transformation" option. You need to check with your vendor for the correct settings.

**Do your results appear to be off between 50' - 75' vertically?** You may not be applying a geoid difference model in your rover software. Consult your manual or with your vendor about how to download a current geoid model and apply it in your field software.

**A Note About Projections:** The GNSS rover does not provide "state plane coordinates", UTM or other projected coordinates. GNSS only yields geographic/cartesian plus ellipsoid height values, and your field software performs transformations to state plane, applies geoids to ellipsoid values for orthometric heights, etc. Consult your manual or with your vendor for questions about projections.

## Network

Issues with the network are quite rare, as the WSRN operates dual, redundant systems. They are identical, provide the same corrections, and your login credentials work for both. In the unlikely chance that one of the systems is down, the other should be fine. Scheduled maintenance is typically done only monthly, after hours and on weekends. The key for the user is knowing how to switch between casters if needed. This is further detailed in the Appendix.

**Is there something going on with the network?** Unlikely, you can quickly check the live status maps at: [www.wsrn.org/Map/SensorMap.aspx](http://www.wsrn.org/Map/SensorMap.aspx) and [www.wsrn3.org/Map/SensorMap.aspx](http://www.wsrn3.org/Map/SensorMap.aspx). If the maps show live stations in your area, then the caster mountpoints should also be working. If one map is blank (e.g. during maintenance), then switch to the other map and corresponding caster (see Appendix).

**Are you still unable to connect, even after checking comms, site conditions, and settings?** Switch to the other caster as a first check (see Appendix).

Are you entering the NTRIP caster as an alphanumeric URL, or numeric I.P.? Some newer equipment prefers that you enter a URL in NTRIP for the caster. This varies from manufacturer to manufacturer, even between models of the same brand. Also, custom NTRIP clients may name fields differently. Some might call it a “caster address”, others “source”, etc. You should try the I.P., and if that does not work, the corresponding URL. I.e., 156.74.250.108 = [www.wsrn3.org](http://www.wsrn3.org), and 156.74.250.121 = [www.wsrn.org](http://www.wsrn.org).

If all else fails... If you've done all of the quick field checks in the sections above, and you are still having difficulties, please contact the network (see support info in the Appendix).

# Appendix

## Redundant Casters

The WSRN operates parallel, redundant systems; two of everything. Two websites and two NTRIP casters. This is so that while we perform maintenance on a server the other is still operating.

Caster	Caster I.P. Address	Caster URL and Website
108	156.74.250.108	<a href="http://www.wsrn3.org">www.wsrn3.org</a>
121	156.74.250.121	<a href="http://www.wsrn.org">www.wsrn.org</a>

*It is important that users know how to switch casters if needed.*

If you do not want to leave your crews waiting in the field, please instruct them on how to make the key NTRIP setting change to switch casters. And/or set up shortcuts/styles in the rover software so they can switch quickly as needed.

Maintenance is typically done only once a month at night, early morning, or late evening on weekends. You can always switch to the other caster if needed, as the network only does maintenance on one system at a time.

## Live Web Status Maps

<http://www.wsrn.org/Map/SensorMap.aspx>

<http://www.wsrn3.org/Map/SensorMap.aspx>

## Ionospheric Activity Status

[The NOAA Space Weather 3-day Forecast](#)

[WSRN I-95 Live Ionospheric Status](#)

Read details about how iono/solar activities may affect GNSS field work in the [WSRN FAQ](#).

## Mountpoint Naming Convention

There are many hundreds of mountpoints that you will see, in what manufacturers might call a “source list” or “mountpoint list”. This is to accommodate multiple formats to support new and older rovers.

The state is divided into 6 “subnets” to manage network quality, considering local conditions. See the [printable network map](#). Note the prefixes for each subnet (e.g. SEWA, PACWA, NWWA, etc.)

Style	Prefix	Style Indicator	Suffix
Single Base	4-Character Station Code (e.g., BDRY, VCWA, CHEL...)	Not applicable	<ul style="list-style-type: none"> <li>• No suffix = CMR+</li> <li>• “3” = RTCM3.1</li> <li>• “_MSM” = RTCM3.4-MSM</li> </ul>
Network	Subnet – see map (e.g., EWA, SEWA, SWWA, NWWA, PACWA, PRSN)	“VRS”	<ul style="list-style-type: none"> <li>• “CMR” = CMR+</li> <li>• “RTCM3” = RTCM3.1</li> <li>• “_MSM” = RTCM3.4-MSM</li> </ul>

## Mountpoint Examples

- CHEL = Station CHEL, CMR+, single-base
- CHEL3 = Station CHEL, RTCM3.1, single-base
- CHEL\_MSM = Station CHEL, RTCM3.4-MSM, single base
- NWWAVRSCMR = NW subnet, CMR+, network solution
- NWWAVRSRTCM3 = NW subnet, RTCM3.1, network solution
- NWWAVRS\_MSM = NW subnet, RTCM3.4-MSM, network solution

## Standard Correction Formats Supported

- CMR+            Non-proprietary version of CMR that supports GPS+GLONASS. Should only be used if it is the only format the rover supports.
- RTCM3.1        Non-proprietary version of RTCM that supports GPS+GLONASS. For many rovers that were built more than 7 years ago.
- RTCM3.4-MSM    Non-proprietary version of RTCM that supports GPS+GLN+GAL+BDS with “multi-system-messages” (MSM)

## Standard Styles Supported

- Single-Base    Corrections from a specific, chosen station
- VRS            Network Solution

Note that your rover may have an “auto-base” or “auto-pick” option. Those options vary a lot from one manufacturer to another, so you may see inconsistencies in how it chooses a nearest station, or it may switch in mid-session. The network does not provide a server-side auto-pick option for the same reasons. We recommend consulting the map and selecting the base if you prefer single-base.

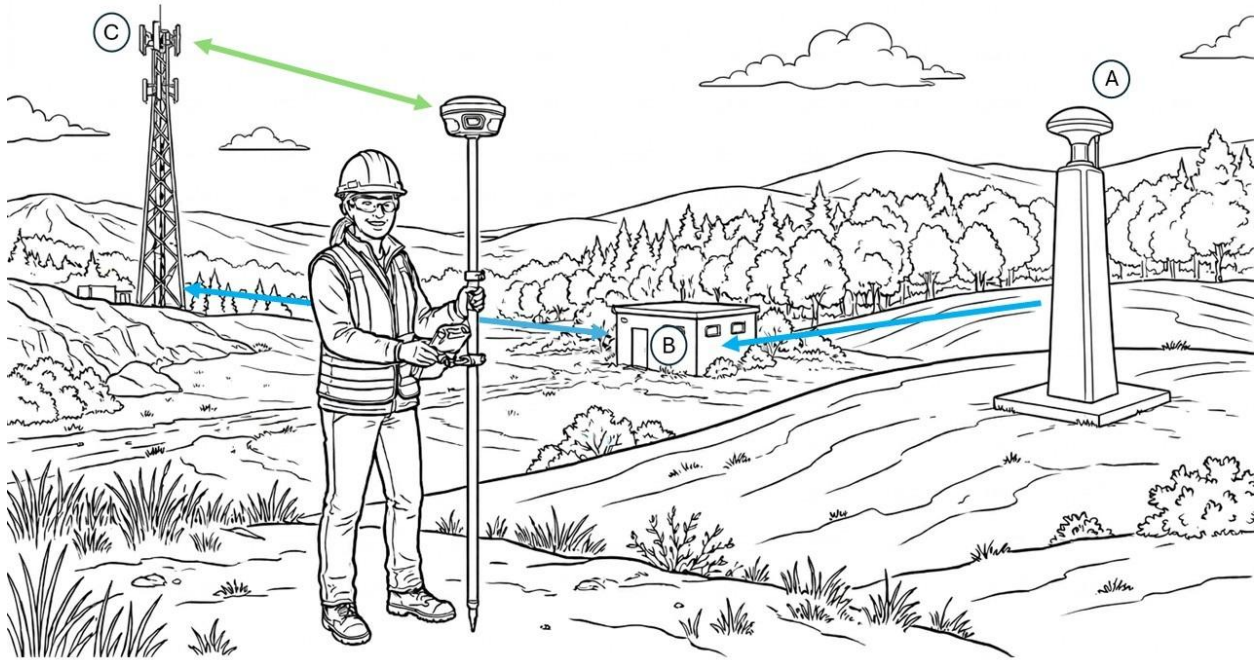
Note that past network style solutions were offered (e.g. MAC and FKP). Users found no significant advantages, and sometimes disadvantages, so the VRS style is the standard network style offered.

## **Network and Single-Base Corrections**

What is the difference between “network” (e.g. VRS”) and “single-base” corrections? These are two options for the user; whether they wish to use a multi-station custom corrections solution or use individual corrections from a chosen, single base.

Single-base is where you choose an individual base and corrections format from the mountpoint list. Single-base corrections degrade as the distance from the base increases but is generally good for 10-20km (depending on solar activity). However, if you are only a few km from the base, and the solar activity is low, you may, in some cases, find a subtle gain in performance

over a network solution. Few RTN users choose single-base, unless they have a specific application, or if their rover does not support network corrections.



*Figure 5. Single-base corrections. Observations at the base “A” are sent to the RTN Operations Center “B”, then streamed to the user via cellular (or satellite) communications.*

Network Corrections are created, from groups of stations surrounding the user’s location. It is a custom correction, based on the user’s location. The rover sends its rough location to the RTN Operations Center, where a cluster of stations are chosen, and corrections are computed and streamed to the user via cellular (or satellite comms).

To initiate a custom request, the rover must send an NMEA position; there is often a check box or setting in the rover software (labelled “VRS” or “NMEA output”). Be sure not to test this while indoors, or in the truck; it needs clear sky to gain an autonomous position.

The corrections computations are based on the vicinity of the rover, sometimes called “virtual”. However, the nearest physical base is noted in the corrections messages as “Physical Base station” (PBS) or “physical reference station” (PRS). Most rover software enables exports of vectors between the PBS / PRS and the rover.

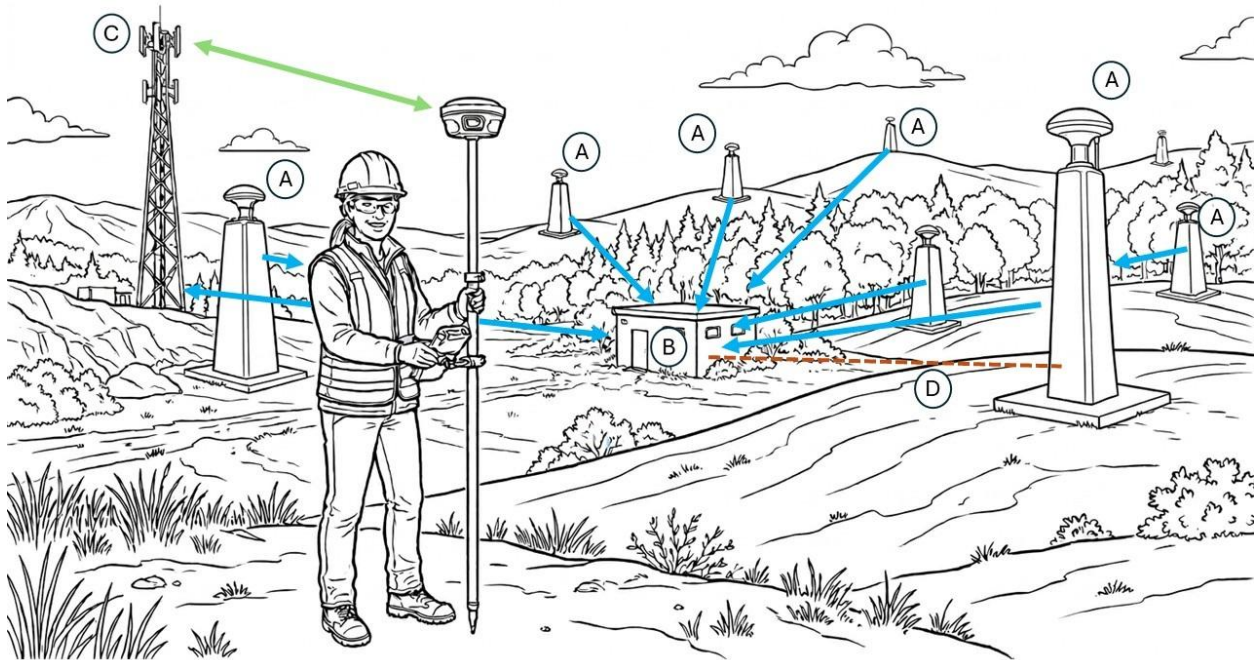


Figure 6. Network corrections. Observations at all bases “A” are sent to the RTN Operations Center “B”. A custom correction from bases surrounding the rover are computed, then streamed to the user via cellular (or satellite) communications. The physical base /reference station (PBS / PRS) message “D” is added to the corrections stream based on the position of the nearest healthy base.

Network is the most common correction style used. Users find network corrections advantageous for the following reasons:

- They only need to choose one mountpoint for an entire subnet
- Even if an individual base is down, a network solution will still be computed.
- There is no significant degradation-over-distance, even during elevated solar activity.

### **Support**

Per user agreements. Live phone support is 9:00am – 3:00pm, Monday to Friday. Responses may be delayed outside of those hours. If you have support questions that are not time crucial, the best way to reach our whole team is via email: [info@wsrn.org](mailto:info@wsrn.org)

If you are in the field and need immediate assistance, texting is the best option:

206-423-4765 or 206-514-0237

Or you can leave a voicemail at:

206-684-5630 or 206-514-0237

If your crew is having trouble in the field, have them contact us directly. Troubleshooting is difficult without being able to speak to the person in the field directly.

Logins and passwords. The network does not change or disable any passwords without contacting the users well in advance. The exception is “test” accounts that expire after 90 days automatically.

*Keep a copy of your credentials handy and give them to your crews.*

Hardware and Software. The network does not support your hardware and software. The best resource is the vendor that sold the gear to you. The network support team will try to be as helpful as possible, but there are so many hardware and software combinations out there, they could not possibly be versed in all of them. And the support team is prohibited from doing the vendors work for them.

A Note About Projections: The GNSS rover does not provide “state plane coordinates”, UTM or other projected coordinates. GNSS only yields geographic/cartesian plus ellipsoid height values, and your field software performs transformations to state plane, applies geoids to ellipsoid values for orthometric heights, etc. Consult your manual or with your vendor for questions about projections.

Where users have shared tips and solutions, or there are generic elements, the team is happy to help. In some cases, users and vendors have sent cheat sheets, and those can be found on the [Miscellaneous Downloads](#) site.

The best resource for help with your field hardware and software is the vendors who sold you the gear, and/or manufacturers’ support pages.