

Texas Cooperative Network “Best Practices”

As members of the Texas Cooperative Network you are all aware of the significant advantages of operating within a Trimble VRS network. The ability to work anywhere within the network and achieve RTK accuracies, without the capital outlay and manpower needed to set up and maintain an RTK base station provides you the surveyor a significant increase in productivity and cost savings.

The purpose of this document is to provide some general guidelines and “best practices” for operating within the network.

Coordinates of the Texas Cooperative Network

To establish final coordinates for the network 24 hour data sets were logged. A minimum of three days and up to ten days of data were collected. The raw data was then post-processed in Trimble Geomatics Office against local RRP stations to establish the final base station coordinates. Only independent baselines were used to establish final coordinates. Mission planning was used to select optimal data sets for post-processing. All files were also submitted to OPUS for processing and the solutions were checked for consistency against the Trimble Geomatics Office solutions.

Final coordinates were established in (Ref Frame: NAD83 CORS96 EPOCH:2002.0000)

General Guidelines

Operating in the Texas Cooperative network allows the user to operate as though there was a reference station, a “virtual” reference station, right next to the rover. This eliminates or significantly reduces the PPM error inherent in traditional single base RTK solutions. This also allows users to operate anywhere within the polygon of the network while still achieving RTK precisions.

This ease of operation for a network Rover can sometimes lull users into a false sense of security, and provide less than desirable results. Users must keep in mind that VRS solution is still an RTK solution, which is still susceptible to all the anomalies that can affect the end results. Multipath, obstructions, satellite geometry and atmospheric conditions can all degrade the solution. Typical RTK accuracies are +/- 1cm (.033’) horizontal by +/- 2cm (.066’) vertical RMS, under nominal conditions, and can be significantly worse under marginal conditions.

Also, data packet loss due to poor cellular reception can seriously affect the stability of the RTK solution, as the Rover expects an update once per second. If packet loss is severe enough the solution at the Rover starts to deteriorate to the point of losing initialization. This can be noticed by monitoring the status line on the data collector, and is evidenced by the horizontal and vertical precisions and the rms values varying significantly from update to update. Multipath, obstructions, and other anomalies will produce similar performance issues. Users should continuously monitor the Rover status indicators to ensure you are achieving optimal results. The status indicators are not absolute values, but are a relative estimate of the precision of the solution and are indicative of the stability and repeatability of the solution. The general rule of thumb is the lower and more consistent the values are from update to update, the more reliable the solution.

Best Practices, DO's and DON'Ts

Use mission planning to anticipate times of poor satellite geometry. Poor geometry and weak satellite constellations will affect the RTK accuracies. Using mission planning will allow you to plan ahead and avoid crew down-time.

Constantly monitor the status indicators on the data collector. Low precision and rms values typically indicate consistent packet updates and will help ensure you are getting the best possible results.

Use good survey practices. Users should do periodic check shots to ensure repeatability.

Calibrate to your local control. Due to differences in the coordinate reference frame of the network and local control it is recommended that users calibrate to their local control system. A site calibration will provide users the best fit to their control and the ability to see in real time how well their RTK results fit. Consult the Trimble Survey Controller manual for calibration procedures.

Maintain your equipment. Keep your Trimble GPS firmware and software agreements current. Firmware and Software upgrades provide added functionality, performance, and corrections to your GPS RTK Rover. Also your Rover rods and tribrachs need to be calibrated regularly.

Do not assume results are absolute. Remember, the solution is based on the Rover calculating a Real-Time Kinematic solution from the corrections provided and the common satellites being tracked by the network stations on a second by second basis. Any anomalies such as multipath, poor satellite geometry and severe packet loss can significantly degrade your results.