The RTD Family of products offers a full suite of high-precision GPS sensor positioning and navigation solutions for:

- Post-processing
- Real-time positioning of dynamic objects
- Deformation monitoring
- Reference network management
- Network RTK
- Attitude determination

RTD Family products are based on Geodetics’ Epoch-by-Epoch™ positioning technology and:

- Are GPS hardware and platform independent
- Operate in real-time
- Operate in modern networked environments
- Are modular and scalable to meet your needs
RTD Family of Products


This revolutionary advance in high-precision GPS analysis technology provides for robust real-time integrity monitoring and enhanced early warning capabilities. For the first time, the user can determine the state of the network independently at each instant in time. This "network epoch" is the basic building block of RTD-Net and the software can easily manipulate sequences of independent network epochs to automatically monitor changes in the state of the network.

RTD-Net controls the GPS receivers, downloads data and converts to RINEX. It analyzes the data, and generates alarms, statistics, reports and more. It carries out a continuous, simultaneous adjustment of the data modeling the dynamic state of the entire network caused by ionosphere, troposphere and other factors.

- Compute instantaneous positions for all receivers in a network at each epoch.
- Carries out a continuous, simultaneous adjustment of the data modeling the network caused by ionosphere, troposphere and other factors.
- Centrally controls the GPS receivers, downloads data and converts to RINEX.
- Analyzes data, generates alarms, statistics and reports utilizing robust data collection and quality control.
- Downloads archives and manages data with a full suite of communications options.
- Distributes data (Web-based & ftp)
- Management tools - metadata input and process control; data visualization including residuals; system alarms.
- Accepts broadcast and precise GPS orbits
- IGS compatible - RINEX conversion, site log files, SP3 orbit files, etc.

RTD-Pro: Geodetics’ flagship product is designed for real-time, high-precision positioning of multiple roving objects.

RTD-Pro includes all of the capabilities of RTD-Net, and adds Server/Client connectivity to conventional RTK clients with RTCM, CMR and CMR+ messaging and provides instantaneous RTK from multiple base stations, for PDA-based wireless clients using RTD-Rover.

The RTD-Pro server delivers reference station data to conventional RTK rovers or to RTD-Rover via a wireless Internet connection using several modes:

Standard RTK mode delivers RTCM data from base receivers to RTK field users. The user can sequence between different bases to multiply determine his position. Enhanced RTK mode delivers RTCM data from the server selected closest site in the network.

Smart Client mode communicates with RTD Rover operating on a PDA, equipped with a wireless communication. Unlike conventional network RTK (Standard and Enhanced), the positioning is performed on the PDA using Geodetics Epoch-by-Epoch™ technology and not in the receiver, and is compatible with any dual-frequency GPS receiver. Epoch-by-Epoch™ processing on the PDA makes the system is ideal for a wide range of dynamic positioning applications.

- Tracks multiple moving objects within GPS networks.
- Serves conventional RTK clients with RTCM messaging.
- Provides initialization-free RTK from multiple base stations, for PDA-based “Smart” clients.
- Allows relative positioning between dynamic objects (no static base station required).
- Allows extended range through innovative single-epoch-based treatment of ionospheric and tropospheric effects, using “real” base stations.

RTD-Rover: RTD Rover is a versatile application used to position, with geodetic quality, stationary or moving GPS receivers with respect to multiple base stations, using wireless communications. RTD Rover implements Geodetics’ Precise Instantaneous Network (PIN) positioning, based on its Epoch-by-Epoch™ technology. PIN positioning is a new network-based real-time methodology, not requiring multi-epoch initialization and re-initialization inherent in conventional RTK surveying and existing network RTK methods.

In conventional terms, RTD Rover performs instantaneous network RTK at the rover site.

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**RTD-Postprocess:** Fully automated GPS post-processing software designed for post-processing of static and dynamic application data utilizing RINEX files from any type of geodetic receiver as well as files of recorded binary data from RTD supported receivers. The software runs in two modes: baseline mode and network mode. The network mode can accommodate multiple stations. The software can also accommodate moving reference stations. The software includes numerous tools including extensive statistics.

**RTD-L1:** A robust real-time integrity monitoring system providing enhanced early warning capabilities for permanent local (up to 5km) GPS networks operating single-frequency receivers. RTD-L1 has all the capabilities of RTD-Net, except for supporting L1 only GPS receivers.

**RTD-Data:** A suite of communication solutions that controls the GPS receivers, stream data in real-time, downloads data and converts to RINEX. RTD-Data has all the capabilities of RTD-Net, except for the positioning algorithms.

**RTD-Guest:** A unique "Inverse RTK" solution. Using RTD-Guest, a rover can obtain full network adjusted RTK solutions (point-to-multipoint) at each epoch, with no additional rover hardware or software required. Utilizing the RTD-Guest server, the rover sends RTK corrections to the server and the server provides the solution. The solution provided by the RTD-Guest server offers significant advantages: the server makes use of all base stations in the reference receiver network it controls to provide a reliable network adjusted solution. The solution also benefits from RTD-Guest's Epoch-by-Epoch™ capability to provide a solution each and every epoch, so the problems of initialization and re-initialization are eliminated.

**RTD-Vector:** Attitude determination module utilizing two or three GPS receivers. This product can be used to solve for attitude (e.g. yaw, pitch, roll) in real-time.
RTD Technical Specifications

Applications
Static networks, precise instantaneous network (PIN) positioning, deformation (seismic/volcano/landslide) monitoring, structural (bridge/dam/building) monitoring, aircraft approach & landing, precision agriculture, machine control, vehicle tracking, harbor navigation, robotics, GPS/INS integration, intelligent transportation, sports, fleet and product tracking, location based content services.

Operational Modes
Streaming: Continuous in real-time mode, using serial connection, dial-up modem, cellular phone, frame relay, radio modem, TCP/IP, wireless Internet. Precise (IGS) ultra-rapid orbits obtainable by FTP.
Dial-Up/Polling: One or more modem(s) or TCP/IP connections for fast simultaneous data download.
RTK: Standard and Enhanced Clients - Supports conventional in-receiver RTK using RTCM V2.2. Allows for deformation of base network.
RTD-Rover: Initialization-free, wide-area precise instantaneous network ("PIN") positioning from multiple base stations, including ionosphere correction. Troposphere is estimated Epoch-by-Epoch™.
Guest Server: Instantaneous inverse RTK.
Position Server: Epoch-by-Epoch™ positions streamed to external applications.
Vector: Autonomous attitude and heading.

Network Setup
User Interface: Intuitive, guides the user through the setup process. Includes full on-line help.
Backup: Multiple network configurations can be defined and saved.
Site Info: Comprehensive names, coordinates as Cartesian or geodetic, position constraints, GPS receiver and antenna type.

Data
Site Logging: No PC required at the GPS sensor location.
Archive: Raw and RINEX data formats. Stored in user-selectable directory structure.
Replication: Automatic network or FTP transfer of data for archival, network or Internet FTP and Web access.
Utilities: RINEX file manipulation, site coordinates tool
Data Base: Site coordinates database (Microsoft MDB).

Analysis
Algorithm: Proprietary Rapid Network Analysis (RNA) module with the Epoch-by-Epoch™ positioning algorithms.
Solution: Independent position computation at each epoch in baseline or network modes.
Precision: Single-epoch precision*:
\[ \pm [10-20 \text{ mm} + 0.2 \text{ mm/km}] \] horizontal
3-5 times less precise in vertical (1 std deviation). Single-epochs can be averaged for improved static precision.
Range: Station spacing (nearest neighbor): up to 20-50 km* with dual-frequency receivers unconstrained; up to 250 km with constrained coordinates (only static networks), up to 5 km with L1 receivers.
Rate: Extremely efficient Epoch-by-Epoch™ algorithms support up to 50 Hz data rates.
Troposphere: Zenith path delay determined at each site for monitoring atmospheric water vapor content and short-term weather forecasting.

Network Analysis Output
Archive: GNS solution files for replay including Epoch-by-Epoch™ solutions. SINEX solution files for network adjustment.
Logs: Status and solution statistics.

RTK and DGPS Real Time Transmission
Formats: CMR; CMR+, RTCM V2.2; NMEA
Local: Available by connecting a radio and/or cellular phone to each GPS sensor.

PC Requirements (Each PC supports up to 30 GPS sites)
Processor: At least Pentium 450MHz with 128 MB RAM
Hard Drive: 500Mbyte, spare capacity recommended
Peripherals: CD-ROM drive, available serial and parallel or USB ports, 800x600 resolution video card.

*Accuracy and station spacing are dependent upon GPS satellite system performance, ionospheric conditions, and other factors.