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# MAGELLAN

## *DEVELOPMENTS IN GPS TECHNOLOGY ADVANCE SURVEYOR PRODUCTIVITY*

Recent advances in global positioning system technology continue to make survey work faster, easier, and more accurate. Three of the most recent and interesting developments that are significantly improving survey speed, ease-of-use, and accuracy are improved portability of GPS receivers; the growth of network RTK, now available through network transport of RTCM via Internet protocol (NTRIP); and highly reliable post-processed L1 positioning. And lowering the prices furthers access to high-accuracy GNSS positioning.

During the past several years, GPS receivers have substantially decreased in both size and weight. These decreases have resulted in improved portability and ease-of-use in the field. GPS receivers that are not as hefty and bulky as previous models enable surveyors to move more quickly and cover more ground in less time than previously was possible. Smaller size also can mean lower power consumption. This coupled with longer-lived batteries also reduces weight.

One example of a particularly significant advance in portability is the new Magellan ProMark 3, an L1 receiver for survey and mapping applications. The integrated design of the ProMark3 easily beats all the limits optical instruments have in terms of portability and range.

Portability enables a one-person crew to perform quick and reliable surveys, and, at nearly a pound, the ProMark 3 is easily hand-carried throughout the work day without added fatigue.

In one recent example, the ProMark 3 was used to do a wetlands survey, enabling a single field operator working on a 175-acre parcel to collect, in under five hours, the positions of more than 150 flags that had been set by soil

scientists to delineate the boundaries of the wetland.

Along with the excellent portability, the ProMark 3 provides outstanding shock and water resistance to ensure that even in very tough conditions, the receiver performs flawlessly. However, ProMark's portability does not compromise accuracy. The ProMark 3 delivers centimeter-level accuracy in post-processing and sub-meter accuracy in real time.

The growth of network RTK continues to extend the limits and efficiency of GPS surveying. Centimeter-level positioning in real-time based on a base station transmitting corrections to the rover is a staple of GNSS surveying, but it is generally limited to a 10- to 50-kilometer distance between reference station and rover, and the accuracy of the solution degrades as a function of the distance between the base and rover.

One solution is network RTK, which essentially extends RTK from a single-to a multi-base technique. Traditionally, network operators have broadcast the network corrections using point-to-point GSM cell phone connections. There is now a method of transmitting these corrections that takes advantage of the Internet, the networked transport of RTCM via Internet protocol (NTRIP).

NTRIP was developed specifically to stream GNSS data over the Internet. Although currently used primarily for the dissemination of GNSS correction data such as RTCM SC-104 corrections, it can also be used for distributing other types of GNSS data over the Internet.

A key advantage of NTRIP is its ability to simultaneously support the delivery of hundreds of data streams to up to a thousand users. NTRIP is designed to distribute GNSS data to both stationary and field clients, and it supports wire-

less Internet access through a variety of network including EDGE, GSM, GPRS and UMTS.

The introduction of NTRIP is expected to have dramatic effect on surveyors' work processes. It may even one day enable surveyors to give up entirely the need to set their own base stations.

Already, GPS receivers, such as the dual-frequency Magellan Z-Max.Net enable surveyors to flexibly operate on a wide number of existing RTK networks; and tomorrow's networks as well. The Magellan Z-Max.Net can be configured to offer features that include GPRS communication, NTRIP protocols, and RTCM V3.0, VRS or FKP corrections.

At the other end of the spectrum, lower-cost, single-frequency L1 GPS receivers coupled with post-processing are enabling short-range kinematic surveying to significantly benefit surveyors on many smaller projects.

My company, Magellan, continues to be the leading provider of the lower-cost single-frequency receivers. The ProMark series has long enjoyed the most significant share of the single-frequency receiver market. And now the latest in the ProMark series, the ProMark 3, enables surveyors to offer both survey and GIS mapping services to customers without a substantial investment in either equipment or training.

The ProMark 3 is built around a next-generation GNSS engine that offers two ranges of accuracy—centimeter for post-processed surveying and sub-meter for real-time mapping and navigation.

The ProMark 3 enables surveyors to locate hard-to-find points. Surveyors can use the unit's base map or an imported shape file to navigate to a known point, and then with a single keystroke, the unit can be transitioned to survey mode. Once set up over the point, the ProMark 3 prompts the users for attribute information and lets them know when sufficient data have been



collected to meet centimeter-level accuracy.

In areas where one might need to go miles to find a monument to bring a control point to a work site, it might easily take a day or more to do this conventionally with optical instruments. With the ProMark 3, a single operator is able to achieve the same result in a matter of hours. Once control is on the job site, the one-man crew can perform quick and reliable surveys.

The ProMark 3 is continuing to drive down operating time and personnel costs, thus enabling smaller survey firms to aggressively compete for jobs they might otherwise have lost to larger firms.

In these three significant areas—GPS receiver portability, network RTK, and L1 receiver advances—Magellan brought about improvements in 2006 that permit surveyors to work faster, easier and more accurately. It has every intention to continue doing so in the coming years, combining these advances to produce field receivers that continue to expand the survey and GIS work opportunities available to licensed surveyors.



## events, 2007

March 4-7: "Mission Possible," 30th Annual Conference of the Geospatial Information & Technology Association (GITA) at the Henry B. Gonzalez Convention Center in San Antonio, Texas. Keynote speaker: Howard Rheingold, author of *The Virtual Community* (early 1990s) book and executive editor of HotWired, the first commercial Webzine. [[www.gita.org/annual](http://www.gita.org/annual); 303-337-0513; e-mail: [info@gita.org](mailto:info@gita.org)]

March 9-12: *ACSM-IPLSA-MSPS 2007 Annual Conference and Technical Exhibition* at the Millenium Hotel in St. Louis, MO. [<http://www.acsm.net/conference.html>]

April 18-20: Professional Grant Proposal Writing Workshop, Georgia Institute of Technology, Atlanta, Georgia. [[www.thegrantinstitute.com](http://www.thegrantinstitute.com); [info@thegrantinstitute.com](mailto:info@thegrantinstitute.com)]

Jan-Oct: "Maps In Our Lives" exhibit at the Geography and Map Division of the Library of Congress will remain in place until October 2007. The exhibit will be moved to the Western Heritage Museum in Omaha, NE, in November 2007.

Jan-Dec: "Celebrating 200 Years of Science, Service, and Stewardship," at NOAA headquarters in Silver Spring, MD, and across the Nation. [<http://celebrating200years.noaa.gov/welcome.html>]



Jan-Dec: *ABET's 2007 Assessment Workshop Calendar* [<http://www.abet.org/workshop.shtml>]