GNSS Torchbearers

In just six short years the torch will be lit, signaling the start of the 2012 Summer Olympic Games in London. Until that time, the area known as the Thames Gateway will be transformed through one of the most ambitious construction projects ever undertaken in the U.K. To meet the increased demand for highly accurate positioning data, Ordnance Survey, the national mapping agency of Great Britain, has begun adding RTK network capacity with reference station densification and the addition of broad-spectrum GNSS capabilities.

A computer-generated illustration of the Aquatics Centre for the London 2012 Olympic Games. Photo Courtesy of London 2012.

Similar stories are being told around the world. Cities, regions and even entire countries are building or upgrading GNSS infrastructure networks as a means to stimulate growth in their respective areas. Network operators today are increasingly investing in the broad-spectrum GNSS capacity of modernized GPS and GLONASS. These state-of-the-art solutions are able to access all available positioning signals—GPS (L1, L2, L2C and planned L5 frequencies) and GLONASS (L1 and L2).

The common denominator is Trimble VRS technology. The Trimble VRS solution has become the world's standard for network correction, with more than 100 networks in operation providing reliable network corrections every day. Demonstrating field productivity increases of up to 51 percent with some networks, the improved precision and tracking associated with these networks have operators around the world choosing Trimble GNSS network solutions. Here's a look at a few of the networks throughout the world that are leading the way with broad-spectrum GNSS capabilities.

GNSS moves across Europe

Olympian efforts

Sweeping change is planned for the 64-km (40-mi) area known as the Thames Gateway and Olympic Park in and around London, England. In preparation for 2012, upgrades to Ordnance Survey's ubiquitous OS Net™ have already begun. For the majority of the first phase of the modernization project, Ordnance Survey is implementing Trimble NetR5™ GNSS receivers with Trimble Zephyr Geodetic™ 2 antennas, which access both modernized GPS and GLONASS frequencies.

The new receivers and related software upgrades will provide greater versatility to the OS Net infrastructure, further increasing signal acquisition in

Des Rasch, OLS, owner of Rasch & Chambers Ltd. in Dunnville, Ontario, Canada determines a geodetic elevation point using the Can-Net GNSS Reference Station Network.

Trimble Zephyr Geodetic 2 antenna on top of South Carolina's York County Courthouse.

Trimble Zephyr Geodetic antenna in the swisstopo AGNES network.

Trimble R8 GNSS rover checking NGS control point with the AZGPS GNSS network in Phoenix, Arizona.

densely developed areas and greater accuracy for projects demanding high-precision mapping. "All our activities are focused on providing the definitive geographic context for the places we all live and work in," said Neil Ackroyd, Ordnance Survey Director of Data Collection & Management. "Businesses, organizations and individuals depend on our authoritative and reliable location data every day."

Swiss efficiency

With 31 reference stations covering the entire 41,000 km² (15,830 mi²) country, the Swiss Federal Office of Topography (swisstopo) operates the "Automated GPS Network Switzerland" (AGNES) and offers the Swiss Positioning Service (swipos), which provides RTK GPS and DGPS corrections as a commercial service. In August 2006, swisstopo decided to update the network by upgrading to combined GPS/GLONASS receivers. As a result of greater satellite availability, AGNES II is able to optimize positioning performance, particularly in critical areas with limited sky view and zones with extreme topographic features. Currently, 31 Trimble NetR5 GNSS receivers and Zephyr Geodetic 2 antennas are being added to the network; the new antennas will allow AGNES II to take advantage of future planned constellations and frequencies.

Visionary Slovakia

EUPOS member Slovakia was the first country in the world with its own nationwide modernized network. Completed in January 2007, the SKPOS network includes 21 Trimble reference stations and antennas, as well as Trimble network software. The approximately 50,000 km² (19,305 mi²) surface area of Slovakia is completely covered by the SKPOS network. The network operator, GKU Bratislava *(Geodetick a kartografick ústav Bratislava)*, states that measurement accuracies in the centimeter range are possible nationwide. In addition to internal users, GKU Bratislava intends to offer real-time and post-processing services for commercial use as well. The network has already achieved a high acceptance level among internal users.

The Nordic Networks

Public providers are not alone in recognizing the advantages of GNSS. In Denmark, Trimble dealer GEOTEAM operates GPSnet.dk, providing combined

GPS and GLONASS corrections over approximately 43,000 km² (16,602 mi²) of Danish heartland, and also a large portion of the inshore waters. The newly upgraded system includes 27 Trimble GNSS receivers and antennas. Søren Ellegaard, GEOTEAM general manager reports, "Customers using Trimble R8 GNSS rovers report up to a 50 percent increase in productivity working in cities compared to using a standard GPS rover solution."

In Finland, Trimble dealer Geotrim has operated GPSNet.fi since 2001. Covering more than 338,000 km² (130.502 mi²), the network has been updated with Trimble NetR5 GNSS receivers and Trimble Zephyr Geodetic 2 antennas. With a total of 86 stations, GPSNet.fi is used by the Finnish Land Registry as well as numerous municipal planning departments and private survey companies.

GNSS growth in the Americas

With more than 25 Trimble VRS networks operating in North America, recent investment in GNSS network expansion and modernization underscores the confidence these operators have in the immediate value of broad-spectrum satellite positioning.

Western pioneers

Covering the Phoenix metropolitan area in Arizona, AZGPS currently has nine Trimble NetR5 receivers with Zephyr Geodetic 2 antennas. For users, the conversion increased satellite availability with very little effort. "The GNSS capability improved our work by giving us more satellites and better coverage, enabling us to get difficult shots," says AZGPS subscriber Greg Thompson, RLS, survey manager at Wilson & Company in Phoenix. From 10 users at launch, AZGPS now has 86 regular subscribers, and a dozen or so users who subscribe by the day for peak periods.

Statewide in South Carolina

The state of South Carolina is currently building a combined GPS and GLONASS network that will soon cover the state. Using Trimble reference stations and antennas as well as Trimble software (Trimble GPSNet and RTKNet), the network is scheduled to be statewide with 45 stations by the end of 2007. "With such a dynamic network, we're expecting the highest accuracy and most consistent results," said Dr. Lew Lapine, PLS, Chief of the South Carolina Geodetic Survey, Office of Research and Statistics. The network is funded through the South Carolina Department of Transportation (SCDOT) and the South Carolina Budget and Control Board.

Canadian expansions

Initially launched in 2004, the Can-Net GNSS Reference Station Network has expanded across Canada to include 54 Trimble GNSS reference stations. Set up by Cansel Survey Equipment Inc., the Can-Net GNSS Reference Station Network provides GNSS data for real time and post-processed applications. Currently, Trimble VRS network corrections are available in the Toronto area (15 stations); Ottawa area (5 stations); Edmonton area (5 stations); Montreal area (6 stations); and Vancouver area (7 stations).

Rapid growth in Asia

In addition to a plethora of networks in China, advanced GNSS networks are being implemented in Korea, Singapore, Malaysia and other Asian countries. Since 1999, 10 RTK networks have been established throughout China using Trimble VRS technology. Located in Shanghai, Wuhan, DongGuan, Tianjin, Shenzhen, Sichuan (Chengdu), Suzhou, Qingdao, Beijing and Guangdong, the multi-purpose networks provide a geospatial infrastructure in each area. In addition, the city of Nanning in the Guangxi has installed the nation's first RTK network with broad-spectrum GNSS capabilities. With five Trimble NetR5 GNSS receivers, the network was installed in the first part of 2007.

Is the future here?

Innovation continues and will continue, bringing new advancements in productivity and efficiency to a wide range of applications. Multi-constellation Trimble VRS networks broaden access to increased positioning precision and field productivity. As global GNSS networks continue to proliferate, the availability of precise network corrections nears that of a global utility. GNSS infrastructure networks are opening up new horizons for high-accuracy positioning professionals around the world.