

POSITION REPORT

GNSS Market Research and Analysis

GNSS Precise Positioning Market Report 2008-2012

ABSTRACT

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World-wide Precision Positioning Markets 2008-2012

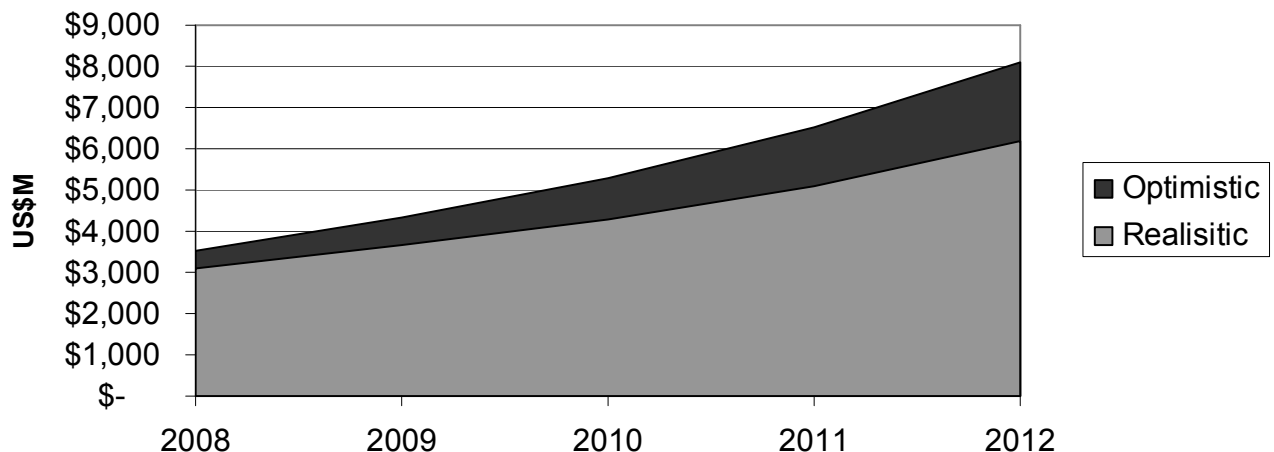
The United States Global Positioning System (GPS) is being joined by additional satellite systems from Russia, EU, China, Japan and India to create a new era of Global Navigation Satellite Systems (GNSS) and an enhanced world-wide position, navigation and timing (PNT) utility.

Precise Positioning GNSS equipment capable of accuracies of less than 10cm are used in a steadily growing number of applications including land, marine and aerial surveying, structural monitoring of dams, bridges and buildings, earthquake/tsunami warning systems, atmospheric and meteorological research, space craft navigation and machine control systems for cargo handling, agricultural and earth moving equipment.

Suppliers of precision GNSS goods and services are a mix of established GPS companies such as Trimble Navigation (USA), new entrants such as Septentrio B.V. (EU) and large multi-nationals such as John Deere.

The global value of precision GNSS products and services is approximately US\$3 Billion in 2008 and predicted to grow to a value of between US\$6-8 Billion by 2012, a CAGR of 19-23%.

Precision GNSS Value Chain Growth 2008-12



The period 2008-2012 will embrace a number of important milestones in the evolution of precision GNSS from a niche technology for scientists and surveyors to an essential productivity tool in globally important industrial sectors such as mining, agriculture and construction.

These milestones include the value of precision GNSS systems used for industrial applications such as machine control in agriculture and civil engineering exceeding that of precision GNSS for traditional uses such as surveying and science for the first time. During 2008-12, Machine Control applications for precision GNSS are forecast to grow at a CAGR of 23-28% whereas the growth in Non-machine Control applications is forecast at 16-21% CAGR.

The growth in the number of precision GNSS users (estimated at more than 300,000 globally in 2008) is encouraging government and the private sector to invest in precision GNSS infrastructure. This infrastructure uses GNSS reference stations and wireless communications to deliver a data service to multiple users removing the need for individual users to operate their own GNSS reference station. The growth of infrastructure and its associated data services will be a significant feature of the precision GNSS landscape in 2008-2012. Indeed, precision GNSS data services are forecast to be the fastest growing component of the value chain with a CAGR of 33-38%.

2008-2012 will also begin a transformation in the way that precision GNSS is delivered to users. Dual frequency (L1/L2) codeless and semi-codeless techniques have been the hallmark of precision GPS since the 1980's. The advent of new satellite systems including Glonass (Russia) and Galileo (EU), GPS modernization and the introduction of new frequencies including L2C and L5, are expected to contribute to the development of novel techniques enabling precise positioning with less complexity and at a lower cost.

The steady shift in user demographics, continued evolution of space based systems and precise positioning techniques combined with the growth of dedicated precision GNSS infrastructure and associated services are a recipe for a dynamic and rapidly changing business environment.

Consolidation and integration of the supply chain for precision GNSS goods and services seen over the last decade is expected to continue. This has particular significance for both the precision GNSS OEM receiver suppliers and third party resellers both of whom are expected to contribute less to the overall value chain by 2012.

Position Report – GNSS Precise Positioning Markets 2008-12 includes details on the projected US\$ 6-8 Billion value chain; starting with precision GNSS infrastructure, continuing through the market for GNSS receivers, finished GNSS goods and concluding with GNSS augmentation and distribution services.

Markets covered include surveying, engineering, agriculture, mining, deformation monitoring, GIS, marine and aviation for both machine control and non-machine control applications for the time period 2008 through 2012.

At the core of the 150+ page report are five year growth and financial projections for the high precision GNSS markets surveyed as well as analysis of the competitive landscape.

The structure of the report includes an assessment of the value of the precision GNSS value chain, the value chain components and key applications of precision GNSS in industrial and enterprise markets, it includes:

- The Global Precision GNSS Value Chain;
- The OEM market for precision GNSS receivers;
- The market for Precision GNSS Infrastructure including aviation infrastructure, marine DGPS infrastructure, Geodetic, CORS and real-time infrastructure;
- The market for government and private Precision GNSS Augmentation Services including vendor services such as Trimble NOW;
- The market for Machine based applications including civil engineering, agriculture, mining and container handling;
- The market for Land, Marine and Aerospace applications including survey, GIS data collection and deformation monitoring.
- The value of distribution services within the value chain.

The data analysis and forecasts cover the period 2008-2012 for three major geographic regions:

- North and South America including the USA, Canada and Brazil.
- Europe, Middle East and Africa, including the EU, CIS and South Africa.
- Asia and Oceania, including China, India, Japan, South East Asia and Australia.

Each topic contains an overview of important market drivers and how they affect the adoption rate of precision GNSS goods and services. Analysis and forecasts include conservative, realistic and optimistic scenarios and include details of any assumptions made during the modeling process.

Background and status of the entire spectrum of GNSS (Global Navigation Satellite Systems) includes GPS, GPS modernization, GLONASS and GLONASS modernization, SBAS (Satellite-Based Augmentation Systems), Galileo and Compass/Beidou, QZSS and IRNSS as well as technology/market trends and potential disruptions.

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1.0 Introduction

1.1 Report Background

For the purpose of this report, GNSS precise positioning is defined as 1-10cm horizontal accuracy. This precision is achieved by processing signals transmitted by navigation satellites. Currently, there are two GNSS in operation. One is widely known as GPS and is operated by the United States Department of Defense. It is currently fully operational and has been since 1993. As of July 2008, there are 32 healthy GPS satellites broadcasting signals on L1 (1575.42Mhz) and L2 (1227.60Mhz). The other operational GNSS is named GLONASS and is operated by the Russian Space Forces (military). Not enough GLONASS satellites exist for GLONASS to be used as a stand-alone system, but GLONASS satellite signals are very useful in augmenting GPS. As of July 2008, there are 12 healthy GLONASS satellites broadcasting on L1 (1602Mhz – 1616Mhz) and L2 (1246Mhz – 1260Mhz).

Today, GNSS precise positioning is used almost exclusively in military applications and professional market segments such as construction, agriculture, surveying, engineering, geographic information systems (GIS). Across several of the listed industries, precise positioning GNSS receivers are used to control machinery such as bull dozers, excavators, sprayers and combines. Precise positioning applications are relatively high value and often require complex systems engineering.

Precise positioning GNSS receivers are manufactured by a relatively small number of companies in North America and Europe

A number of reports are available which examine the market for GPS and GNSS goods and services. Several of these reports identify professional and industrial markets for GNSS and refer to precise positioning applications. However, to date, none provide a detailed analysis of the value and structure of precise positioning markets.

1.2 Goals and Objectives

This report will satisfy the need for an objective analysis of the non-military market for precise positioning products and services. More specifically it will address:

- Trends in GNSS and associated precise positioning technologies;
- The structure and worth of the value chain including projected goods and services revenues;
- The principal vertical markets for precise positioning products and services including their drivers and characteristics;
- The revenue potential for goods and services to 2012.
- Key technology and service providers for GNSS precise positioning.

1.3 Intended Audience

This report is intended for executives, investors, entrepreneurs and other readers who have a need for an independent analysis of GNSS precise positioning markets, trends and technologies. It will also be of use to end users and government agencies who are planning to invest in precise positioning infrastructure, products or services.

1.4 Scope

This report is an analytical tool to assist people in understanding the markets and applications for GNSS precise positioning products and services. The report focuses on a wide range of high precision civilian applications along with their associated terrestrial infrastructure and data services. It does not cover military applications or discuss techniques for precise positioning using the exclusive military signals and data transmitted by GPS and GLONASS.

1.5 Methodology and Information Sources

Information for this report consists of primary and anecdotal data collected during interviews with industry executives and experts along with secondary data from professional journals, industry publications, press releases, company websites and other media and internet sources. A bibliography of secondary sources is contained in Appendix A.

The data tables and charts contained in the report are modeled from a mix of primary and secondary data sources. The data model includes a sensitivity analysis of approximately +/- 15% which corresponds to the optimistic and pessimistic scenarios. A complete version of all the data tables modeled for the report is contained in Appendix D.

Interviews, primary and secondary research were conducted during the period April-August 2008.

1.6 Authors Biographies and Credentials

Rob Lorimer is the founder and Managing Director of Position One Consulting. He has successfully completed reports into GNSS markets for a diverse range of clients including Navcom Technology (a John Deere Company), the Galileo Supervisory Authority (ProGENY Market Studies), the Queensland Government, Australia (The Global Navigation Smart State) and the Cooperative Research Centre for Spatial Information (Precise Positioning - User Needs).

From 1991-2003 he held several senior executive roles in the GNSS industry including CEO of Beeline Technology (acquired by Hemisphere GPS), Managing Director of Trimble Asia Pacific and OEM Business Unit Manager for Trimble Europe, Middle East and Africa.

His GNSS industry involvement continues today as a member of the advisory committee of the International GNSS Society (IGNSS) chair of the IGNSS special interest group Location Australia and as a regional judge for the European Satellite Navigation Competition (formally Galileo Masters competition).

The author graduated with a BSc 1st Class (Hons) from the University of Cardiff (a leading UK earth sciences institute) and undertook his post-graduate business studies at the University of Queensland, Australia. Publications include numerous papers and articles on GNSS and authorship of Global Navigation – A GPS Users Guide (1991,1994) one of the earliest books to analyse the end user applications of GPS.

Eric Gakstatter is the founder and Managing Member of Discovery Management Group LLC, a firm specializing in GNSS for high and medium precision applications since 2000.

Since March 2006, he has been a contributing editor to GPS World magazine and Editor of their bi-weekly Survey/Construction e-newsletter. He's provided news reporting and analysis on high and medium precision GNSS while also attending and occasionally presenting at several major geospatial conferences each year. He has contributed GNSS articles, interviews and/or references to other prominent publications such as BusinessWeek, GeoWorld, POB, SitePrep, Earth Observation and Geospatial Solutions.

Since 2002, he has provided timely insight and in-depth analysis consultation to the investor community in the high/medium precision GNSS sectors as well as the consumer GNSS sector.

From 1990-2000, he held several product management positions in the GNSS industry. Over the course of 10 years, he managed the development of several medium and high precision GNSS products along with associated data collection and post-processing software; integrating GNSS technology from the likes of Magnavox, Motorola, Ashtech, JRC, Magellan and Hemisphere GPS (then CSI).

Eric earned his Bachelor of Science degree from Oregon State University in 1987.

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