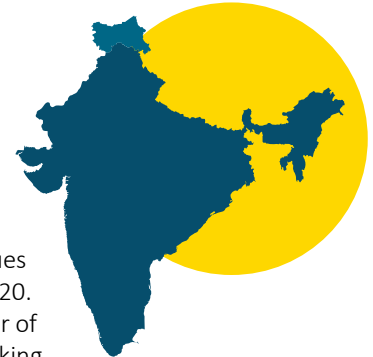


In a nutshell

India emerged as the fastest growing major economy in the world in 2018. It is also expected to become one of the top three global economies within the next 10 to 15 years. The Indian market continues to grow, stimulated by government initiatives such as Digital India, Make In India and Start-up India, and increasing openness to foreign investment. India's GDP rose by 7.2% in the last quarter of 2017 and continues to rise. Additionally, India's labour force is expected to touch 160-170 million by 2020. India has capitalised on a large, highly-educated population to become a major exporter of IT-enabled services and software developments. Significant societal trends are also taking place, taking increasing advantage of digital technologies to support economic growth and societal wellbeing. India has invested in a national SBAS system (GAGAN), and in 2018 launched the final satellite of the Indian Regional Navigation Satellite System (IRNSS or NavIC). These are hoped to drive the further use of GNSS applications in India.



Key opportunities



Timing & Synchronisation

It has been predicted that the Internet-of-Things (IoT) market in India will rise to US \$9 billion by 2020. The highest adoption of IoT is expected to be in industries such as utilities, manufacturing, automotive & commercial telematics, transportation and logistics. The Indian Government has pledged to invest US \$15 billion for 100 smart cities from 2017 to 2022. This will also act as a key enabler for IoT adoption, with up to 21 billion IoT devices predicted in India by 2020.



Road

India has become the fourth largest automobile market in the world in 2017, with sales surpassing 4 million vehicles. Intelligent Transportation Systems (ITS) are being developed, however the sector is still in its infancy. Opportunities can also be found in telematics, particularly for transport, logistics tracking and fleet management. Due to a massive growth in online consumer services, the logistics industry is experiencing rapid growth. The majority of taxi services in metro areas already use GNSS-enabled tracking technologies.



Rail

The Indian railway system remains the backbone of transport in India. Indian Railways employs the largest workforce in the world to run the system, which is currently undergoing sizeable modernisation. Investments are being made into the use of satellite imagery, GNSS and other geospatial information sources to monitor, maintain and manage rail assets across the country. While GPS is currently in use for most of these applications, it is expected that further multi-GNSS systems may be adopted in the near future.



LBS

Smartphone penetration rates are rising in India, such that the Indian market already has more consumers than the Europe market. Such developments have also lead to a higher percentage of Indian-developed devices, such as the "all-Indian" Bharat 5 Plus smartphone from Micromax. The use of GNSS-enabled Location-Based Services (LBS) is rising in parallel. For instance, the Indian Government mandated the use of GPS in all smartphones from January 2018, and is supporting further LBS development via the Digital India Initiative.



E-governance

The Indian Government has paid significant attention to the use of GNSS technologies for various development schemes as part of e-Governance. These include the management of civic amenities via the tracking of public assets, the modernisation of national land records, and emergency service fleet management.

Strengths & opportunities

- Emerging and open market, with a high number of startups and opportunities for significant modernisation of infrastructure.
- Clear focus of Indian government on modernisation via programmes such as Make in India, Digital India, Smart Cities Mission, Start-up India and the National Mission for Clean Ganga.
- Growing smartphone usage, with a market already larger than Europe.
- Significant developments in the automotive industry, with a rising consumer base and demand for improved logistics and fleet management.

Weaknesses & threats

- Lack of uptake of GNSS in many industries, and the strong market position of GPS in those sectors which already use GNSS.
- Significant reliance on government programmes to drive innovation and modernisation.
- Slower development of industry sectors such as precision agriculture and smart mobility / Intelligent Transport Systems (ITS).
- Lack of concrete policy frameworks for GNSS exploitation.

Indian GNSS industry

- The Government of India has shown a keen interest in utilising the latest digital technologies in all flagship programmes such as Make In India, Digital India, Smart Cities Mission, Start-up India, and the National Mission for Clean Ganga. This has filtered through to satellite-based navigation technologies, resulting in investments into the national satellite navigation systems GAGAN and IRNSS/NavIC.
- GNSS has already made inroads into various sectors, including public infrastructure and private business. Currently the major sectors incorporating GNSS technology are agriculture, telecommunications, oil and gas, public safety, environmental management, forestry, infrastructure and logistics.
- Due to the push towards Smart Cities and “safe” city initiatives, there exists significant opportunities for GNSS-enabled services in India. Location Based Services (LBS) and Internet-of-Things (IoT) are expected to be significant drivers of change in Indian society.
- Based on a large number of start-ups, and the rapid pace of development induced by government initiatives, a fresh and developing industry could lead to a rise in local GNSS technology manufacturers and services.

Key GNSS stakeholders

Institutions



Chipsets / Receivers



Applications / System Integrators / Solution Providers



Contribution to multi-GNSS in Asia-Pacific

System

IRNSS / NavIC

GAGAN

System	IRNSS / NavIC	GAGAN
Space Segment	7 GEO + GSO satellites	3 GEO satellites
User segment	L5-band (1176.45 MHz) and S-band 2492.028 (MHz)	Signals in L1 and L5 bands, augmentation to GPS.
Position accuracy	< 10m over mainland India	Horizontal: 1.5m; Vertical: 2.5 m
Current status	Final satellite was launched in April 2018, with full operations expected before end of 2018.	Operational and certified for use in 2013.



GNSS.asia local partner:
IIRA Consultancies Pvt Ltd



For more information on the ongoing activities of GNSS.asia and specific queries, please contact india@gnss.asia or visit www.gnss.asia