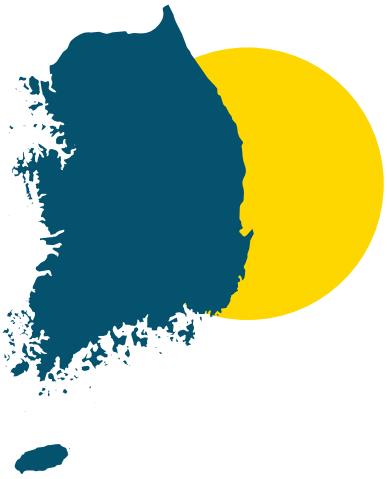
In a nutshell



With the world's 11th largest economy (in terms of GDP) and strong focus on digital innovation, South Korea offers an attractive marketplace for global businesses. Domestic demand remains strong, with nearly full employment and South Korean brands are now global leaders for many consumer electronics devices. Nonetheless, South Korea is facing the challenges of shifting demographics, with population ageing happening at the fastest rate across all OECD countries.
South Korean companies have achieved the top global market share in shipbuilding, DRAM semiconductors and TFT-LCD displays, and count themselves among the global leaders in automobiles, shipbuilding, steel, petrochemicals, textiles and consumer electronics. It holds a leading global status as a developer and manufacturer of Internet-of-Things (IoT) devices, equipment and infrastructure. Sectors such as Location Based Services (LBS) are also strong, with smartphone and internet penetration being the highest in the world. Furthermore, South Korea has ambitions of becoming the world leader for autonomous vehicles, with significant investment in autonomous technologies and the K-City autonomous vehicle testbed.

Key opportunities

Road

The automotive industry in South Korea is the sixth largest in the world for unit production, and the seventh largest by export volume. The country aims to become the world leader for autonomous driving, with Hyundai already testing Level-4 driving on public streets in early 2018. In addition, Naver, traditionally an IT-company, tested Level-3 driving in 2017, and expects to demonstrate Level-4 technology by the end of 2018. The K-City site, opened in 2017, represents the world's largest testbed for autonomous cars. Additionally, Seoul, Jeju, and Sejong are developing integrated mobility solutions, making use of Korea's ICT expertise.

LBS **IoT**

South Korea's LBS sector is one of the most advanced in the world, with the country's top global ranking for internet penetration and smartphone possession. Each smartphone sold in Korea is required to be equipped with a GNSS chipset, with several of the latest South Korean smartphone models (such as the Samsung S8 and Galaxy S9, and the LG V30) already being Galileo-compatible. LBS revenues are expected to increase by almost 25% in 2018, with the largest sectors being marketing and business transactions, and lifestyle and entertainment applications.

Rail

The European Rail Traffic Management System (ERTMS) / European Train Control System (ETCS) has been adopted in South Korea. This will allow a significant penetration of GNSS via the virtual balises set to be used in the new ERTMS / ETCS architecture. Furthermore, the South Korean government has announced plans to roll-out "smart train" systems using e.g. IoT devices to measure train vehicle health, and drones for the monitoring of train and system performance.

Maritime

Most of South Korea's large ships are equipped with a GNSS-enabled Automatic Identification System (AIS), while smaller fishery boats are all equipped with personal or car navigator systems. The Korean government is currently looking into alternative maritime navigation technology, in order to counter the threat of frequent GNSS jamming events. This includes the development of an eLoran testbed, but resilient GNSS systems such as the Galileo authenticated services could provide additional means.

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Strengths & opportunities

- Leadership in the innovative consumer electronics industry with Samsung & LG renowned global brands.
- Strong interest of South Korean government to encourage further advances in developing areas such as autonomous vehicles and smart services.
- Highest rates of smartphone possession and internet penetration in the world.
- Significant EU- Korea cooperation mechanisms, such as EU-Korea Cooperation Agreement on GNSS (2007) and EU-Korea Free Trade Agreement (2011)

Weaknesses & threats

- Sporadic jamming events of navigation signals may lower the perception of GNSS as a reliable source of information.
- Based on needs for resilience, the development of alternative systems such as eLoran may reduce future funding for GNSS-based solutions.
- Some applications involving mapping may be considered state-sensitive, which limits opportunities for foreign firms.

Korean GNSS industry

In recent years, South Korea has increased its investment in upstream GNSS infrastructure. In 2014, the decision was taken to launch an independent Korean SBAS (KASS), to be built by Thales Alenia Space based on EGNOS architecture. In addition, plans for the Korean Positioning System (KPS) were announced in 2018, which is planned to be fully operational by 2034.

In addition, South Korea has a strong position in the consumer electronics market, including for LBS. The South Korean population are typically keen early adopters of new digital technologies, and South Korean brands such as Samsung and LG are well-placed to influence global trends. Notably, South Korea has some of the highest broadband and 4G penetration rates in the world, and is already advanced in the rollout of 5G services.

There is a strong and growing demand for resilient GNSS applications motivated by concerns around safety and security. For instance, a GPS jamming incident in March 2016 reportedly affected more than 1000 aircraft and 700 maritime vessels. GPS jamming events nearby airports and at sea have increased the demand for resilient position and navigation information sources.

GNSS is also a key enabler of several mobility and transport applications, with its use predicted to grow due to increased digitalisation and the development of independent South Korean satellite navigation systems. Several South Korean government institutions view GNSS as key national stakeholders, including the Ministry of Land, Infrastructure and Transport (MOLIT), the Ministry of Oceans and Fisheries (MOF), the Ministry of Trade, Industry and Energy (MOTIE), and the Ministry of Science and ICT (MSIT). MOLIT designs and implements national GNSS policy initiatives in the areas of road and transportation, MOTIE is responsible for encouraging the GNSS downstream industry, MOF coordinates marine applications, while MSIT possesses competencies primarily in the commercialisation (R&D) and acquisition of key GNSS technologies.

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Key GNSS stakeholders

Institutions

Chipsets / Receivers

Applications / System Integrators / Solution Providers

Contribution to multi-GNSS in Asia-Pacific

System	KPS	KASS
Space Segment	7 satellites, 3 of which in GEO.	2 GEOs.
User segment	Unknown.	Unknown.
Position accuracy	Unknown.	Unknown.
Current status	First announced in 2018, details not fully clear. Planned to be fully operational by 2034.	Open service planned for operation by 2020, followed by a Safety-of-Life service in 2022.

GNSS.asia South Korea

GNSS.asia local partner:
SpaceTec Partners and IPNT (Institute of Positioning Navigation and Timing)

For more information on the on-going activities of GNSS.asia and specific queries, please contact **Korea@gnss.asia** or visit **www.gnss.asia**

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