

BeiDou Navigation Satellite System (BDS)

The BeiDou Navigation Satellite System is an independently constructed and operated navigation satellite by China. This navigation system has been made to compete with the United States' owned Global Positioning System (GPS).

BeiDou navigation system was initiated in the 1990s, and by 2000 it was operational in China. Then, in 2012, the navigation system was made operational all over the Asia-Pacific region, and in November 2020, it was launched for global services.

What is BeiDou?

- The Chinese word BeiDou means Big Dipper or Plough constellation
- The expansion of BeiDou Navigation Satellite system globally was done in three phases: BDS-1, BDS-2, and BDS-3
- It uses a network of more than 30 satellites and can provide positional accuracies of under 10 meters
- Through this navigation system, China aims at a more ubiquitous, integrated and intelligent, comprehensive national positioning, navigation and timing (PNT) system to be established by 2035
- It is the fourth Global navigation satellite system

Features of BeiDou Navigation Satellite System

- "Independence, Openness, Compatibility and Gradualness" are the four principle which have been followed by China for the satellite navigation system
- BDS has also resulted in improved socio and economic development aspects of China, as it is widely used in transportation, agriculture, hydrological monitoring, forestry, public security and other fields
- Navigational signals of multiple frequencies is also provided by Beidou Navigation Satellite system
- Pakistan has become the first country to opt for the BeiDou Navigation Satellite System

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List of Indian Satellites	List Of Space Centres & Indian Space Agencies
Satellite Launch Vehicle Program	Militarisation Of Space

Structure & Architecture of BeiDou Navigation Satellite System

There are three main segments of the BeiDou Navigation Satellite System:

1. Space Segment:

- Over 30 satellites have already been launched to be a part of the BeiDou Navigation Satellite System Constellation. These are spread across three space segments:
 - i. Geostationary Earth Orbit (GEO)
 - ii. Inclined Geo-Synchronous Orbit (IGSO)
 - iii. Medium Earth Orbit (MEO)

2. Ground Segment:

- It comprises of ground stations, including master control stations, monitoring stations, and management facilities

3. User Segment:

- Comprises various BDS basic products, systems, and services. Also, basic products such as chips, modules and antennae, terminals, application systems and application services

BeiDou Navigation Satellite System - Key Points

The impact of creating its own navigation system, shall benefit China in multiple ways. Few of such important points have been discussed below:

- BDS will strengthen China's military power
- If the performance of the navigation system is as per China's claims, various countries and companies may opt for BDS, which may result in economic development of the country
- This has also given China an edge in terms of space program in comparison to India. This is because, [IRNSS - NAVIC](#), which is India's navigation system is functional at regional level
- China is also influencing countries which are a part of the [One Belt One Road](#) initiative to choose BDS as the navigation system in their countries which will ultimately lead to the country's economic development

Also, read [India-China Relations: UPSC Notes](#)

Applications of BeiDou Navigation System

BDS will benefit China in multiple purposes. From security, to transportation, every sector has faced a positive impact of the navigation system:

1. **Transportation** - BDS will promote a smooth, efficient, safe and green transportation system in China. Both, land and aviation sector can benefit from this navigation system
2. **Agriculture** - BDS technologies have accelerated the transformation from traditional agriculture to intelligent agriculture, which will reduce the agricultural cost
3. **Forestry** - This department uses the BeiDou Navigation satellite system to carry out forestry resource inventory, forestry management and inspection activities
4. **Fishery & National Marine Economic Safety** - A lot of Chinese economic growth is dependent on fishery and other marine activities. BDS provides easy signalling options

Apart from the ones mentioned above, BDS has also been effective in fields of security, disaster prevention, mitigation, finance, and various other sectors.

Other Global Navigation Satellites

Global Navigation Satellite System (GNSS) is a general term describing any satellite constellation that provides Positioning, Navigation, and Timing (PNT) services on a global basis

China is the fourth country to launch a global navigation satellite. Given below are the other three global navigation systems in brief:

1. USA Global Positioning System (GPS)

- It is operated by the United States Space Force
- The project was launched in 1973 in the United States

2. Russia's GLONASS

- This space-based satellite navigation system is operated as a part of a radio navigation-satellite service
- Development of GLONASS began in the Soviet Union in 1976

3. European Union's Galileo

- It was created by the European Union, through the European Space Agency
- The first Galileo test satellite was launched in 2005, and the first satellite to be part of the operational system was launched in 2011

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