**DAILY ASSESSMENT FORMAT**

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| **FORENOON SESSION DETAILS** |
| **Image Section**           **SATELLITE NAVIGATION** A **satellite navigation** or **satnav** system is a system that uses [satellites](https://en.wikipedia.org/wiki/Satellite) to provide autonomous geo-spatial positioning. It allows small [electronic](https://en.wikipedia.org/wiki/Electronics) receivers to determine their location ([longitude](https://en.wikipedia.org/wiki/Longitude), [latitude](https://en.wikipedia.org/wiki/Latitude), and [altitude](https://en.wikipedia.org/wiki/Altitude)/[elevation](https://en.wikipedia.org/wiki/Elevation)) to high precision (within a few centimeters to metres) using [time signals](https://en.wikipedia.org/wiki/Time_signal) transmitted along a [line of sight](https://en.wikipedia.org/wiki/Line-of-sight_propagation) by [radio](https://en.wikipedia.org/wiki/Radio) from satellites. The system can be used for providing position, navigation or for tracking the position of something fitted with a receiver (satellite tracking). The signals also allow the electronic receiver to calculate the current local time to high precision, which allows time synchronisation. These uses are collectively known as Positioning, Navigation and Timing (**PNT**). Satnav systems operate independently of any telephonic or internet reception, though these technologies can enhance the usefulness of the positioning information generated.  A satellite navigation system with global coverage may be termed a **global navigation satellite system** (**GNSS**). As of June 2020, the [United States](https://en.wikipedia.org/wiki/United_States)' [Global Positioning System](https://en.wikipedia.org/wiki/Global_Positioning_System) (GPS), [Russia](https://en.wikipedia.org/wiki/Russia)'s Global Navigation Satellite System ([GLONASS](https://en.wikipedia.org/wiki/GLONASS)) and [China](https://en.wikipedia.org/wiki/China)'s [BeiDou Navigation Satellite System](https://en.wikipedia.org/wiki/BeiDou_Navigation_Satellite_System) (BDS) are fully operational GNSSs, with the [European Union](https://en.wikipedia.org/wiki/European_Union)'s [Galileo](https://en.wikipedia.org/wiki/Galileo_(satellite_navigation)) scheduled to be fully operational by 2020. Japan's [Quasi-Zenith Satellite System](https://en.wikipedia.org/wiki/Quasi-Zenith_Satellite_System) (QZSS) is a GPS [satellite-based augmentation system](https://en.wikipedia.org/wiki/GNSS_augmentation#Satellite-based_augmentation_system) to enhance GPS's accuracy, with satellite navigation independent of GPS scheduled for 2023. [India](https://en.wikipedia.org/wiki/India) has the [Indian Regional Navigation Satellite System](https://en.wikipedia.org/wiki/Indian_Regional_Navigation_Satellite_System) (IRNSS), also known as Navigation with Indian Constellation (NAVIC), an autonomous regional satellite navigation system that provides accurate real-time positioning and timing services, with plans to expand to a global version in long term.  Global coverage for each system is generally achieved by a [satellite constellation](https://en.wikipedia.org/wiki/Satellite_constellation) of 18–30 [medium Earth orbit](https://en.wikipedia.org/wiki/Medium_Earth_orbit) (MEO) satellites spread between several [orbital planes](https://en.wikipedia.org/wiki/Orbital_planes). The actual systems vary, but use [orbital inclinations](https://en.wikipedia.org/wiki/Orbital_inclination) of >50° and [orbital periods](https://en.wikipedia.org/wiki/Orbital_period) of roughly twelve hours (at an altitude of about 20,000 kilometres or 12,000 miles). **GLOBAL POSITIONING SYSTEM** The **Global Positioning System** (**GPS**), originally **NAVSTAR GPS**, is a satellite-based [radio navigation](https://en.wikipedia.org/wiki/Radionavigation-satellite_service) system owned by the [United States](https://en.wikipedia.org/wiki/United_States) government and operated by the [United States Space Force](https://en.wikipedia.org/wiki/United_States_Space_Force). It is one of the [global navigation satellite systems](https://en.wikipedia.org/wiki/Satellite_navigation) (GNSS) that provides [geolocation](https://en.wikipedia.org/wiki/Geolocation) and [time information](https://en.wikipedia.org/wiki/Time_transfer) to a [GPS receiver](https://en.wikipedia.org/wiki/GPS_receiver) anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites. Obstacles such as mountains and buildings block the relatively weak [GPS signals](https://en.wikipedia.org/wiki/GPS_signals).  The GPS does not require the user to transmit any data, and it operates independently of any telephonic or internet reception, though these technologies can enhance the usefulness of the GPS positioning information. The GPS provides critical positioning capabilities to military, civil, and commercial users around the world. The United States government created the system, maintains it, and makes it freely accessible to anyone with a [GPS receiver](https://en.wikipedia.org/wiki/GPS_navigation_device).  The GPS project was started by the [U.S. Department of Defence](https://en.wikipedia.org/wiki/United_States_Department_of_Defense) in 1973, with the first prototype spacecraft launched in 1978 and the full constellation of 24 satellites operational in 1993. Originally limited to use by the United States military, civilian use was allowed from the 1980s following an executive order from President [Ronald Reagan](https://en.wikipedia.org/wiki/Ronald_Reagan). Advances in technology and new demands on the existing system have now led to efforts to modernize the GPS and implement the next generation of [GPS Block IIIA](https://en.wikipedia.org/wiki/GPS_Block_IIIA) satellites and Next Generation Operational Control System (OCX). Announcements from Vice President [Al Gore](https://en.wikipedia.org/wiki/Al_Gore) and the [White House](https://en.wikipedia.org/wiki/Clinton_Administration) in 1998 initiated these changes. In 2000, the [U.S. Congress](https://en.wikipedia.org/wiki/United_States_Congress) authorized the modernization effort, [GPS III](https://en.wikipedia.org/wiki/GPS_Block_IIIA). During the 1990s, GPS quality was degraded by the United States government in a program called "Selective Availability"; this was discontinued in May 2000 by a law signed by President [Bill Clinton](https://en.wikipedia.org/wiki/Bill_Clinton).  The GPS service is provided by the United States government, which can selectively deny access to the system, as happened to the Indian military in 1999 during the [Kargil War](https://en.wikipedia.org/wiki/Kargil_War), or degrade the service at any time. As a result, several countries have developed or are in the process of setting up other global or regional satellite navigation systems. The Russian Global Navigation Satellite System ([GLONASS](https://en.wikipedia.org/wiki/GLONASS)) was developed contemporaneously with GPS, but suffered from incomplete coverage of the globe until the mid-2000s. GLONASS can be added to GPS devices, making more satellites available and enabling positions to be fixed more quickly and accurately, to within two meters (6.6 ft). China's [BeiDou Navigation Satellite System](https://en.wikipedia.org/wiki/BeiDou_Navigation_Satellite_System) began global services in 2018, and finished its full deployment in 2020.[[11]](https://en.wikipedia.org/wiki/Global_Positioning_System#cite_note-11) There are also the European Union [Galileo positioning system](https://en.wikipedia.org/wiki/Galileo_(satellite_navigation)), and India's [NavIC](https://en.wikipedia.org/wiki/Indian_Regional_Navigation_Satellite_System). Japan's [Quasi-Zenith Satellite System](https://en.wikipedia.org/wiki/Quasi-Zenith_Satellite_System) (QZSS) is a GNSS [satellite-based augmentation system](https://en.wikipedia.org/wiki/GNSS_augmentation#Satellite-based_augmentation_system) to enhance GNSS's accuracy in [Asia-Oceania](https://en.wikipedia.org/wiki/Asia-Pacific), with [satellite navigation](https://en.wikipedia.org/wiki/Satellite_navigation) independent of GPS scheduled for 2023.  When selective availability was lifted in 2000, GPS had about a five-meter (16 ft) accuracy. The latest stage of accuracy enhancement uses the L5 band and is now fully deployed. GPS receivers released in 2018 that use the L5 band can have much higher accuracy, pinpointing to within 30 centimeters or 11.8 inches. **INDIAN REGIONAL NAVIGATION SATELLITE SYSTEM** IRNSS is an independent regional navigation satellite system being developed by India. It is designed to provide accurate position information service to users in India as well as the region extending up to 1500 km from its boundary, which is its primary service area. An Extended Service Area lies between primary service area and area enclosed by the rectangle from Latitude 30 deg South to 50 deg North, Longitude 30 deg East to 130 deg East.  IRNSS will provide two types of services, namely, Standard Positioning Service (SPS) which is provided to all the users and Restricted Service (RS), which is an encrypted service provided only to the authorised users. The IRNSS System is expected to provide a position accuracy of better than 20 m in the primary service area.  **Some applications of IRNSS are:**   * Terrestrial, Aerial and Marine Navigation * Disaster Management * Vehicle tracking and fleet management * Integration with mobile phones * Precise Timing * Mapping and Geodetic data capture * Terrestrial navigation aid for hikers and travellers * Visual and voice navigation for drivers   The IRNSS Signal-in-Space Interface Control Document (ICD Ver. 1.1) for Standard Positioning Service (SPS) is released to the public to provide the essential information on the IRNSS signal-in-space, to facilitate research & development and aid the commercial use of the IRNSS signals for navigation-based applications. |