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News: NavIC Satellite NVS – 01

- Recently, NVS – 01 was successfully launched using the GSLV F-12 rocket and was successfully placed into the Geosynchronous Transfer Orbit.

NavIC Satellite NVS – 01

- NavIC Satellite NVS – 01 is the first of the second-generation satellites of ISRO's NVS (Navigational Satellite) series of payloads.
- It weighs 2,232 kg, making it the heaviest in the constellation.
- The NVS-01 carried navigation payloads L1, L5 and S bands.
- Its purpose is to provide continuity for the NavIC (Navigation in Indian Constellation) services, which is an Indian Regional Navigation Satellite System (similar to GPS) that offers accurate and real-time navigation within India and up to a 1,500 km region around the country.
- In the First generation, there are seven satellites in the Indian Regional Navigation Satellite System (IRNSS) constellation, operationally named NavIC, weighing much less — around 1,425 kg — at liftoff.

Atomic Clock

- The satellite will have a Rubidium atomic clock onboard, a significant technology developed by India.
- Some of the existing satellites in the navigation constellation lost their ability to provide accurate location data due to failed atomic clocks. Satellite-based positioning systems rely on precise time measurements from atomic clocks to determine object locations. When the clocks fail, the satellites cannot provide accurate location information anymore.

L1 signals for better use in wearable devices

- It will send signals in a third frequency, L1, besides the L5 and S frequency signals that the existing satellites provide, increasing interoperability with other satellite-based navigation systems.
- The L1 frequency is among the most commonly used in the Global Positioning System (GPS), and will increase the use of the regional navigation system in wearable devices and personal trackers that use low-power, single-frequency chips.

Longer Mission Life

- It will have a longer mission life of more than 12 years. The existing satellites have a mission life of 10 years.

Indian Regional Navigation Satellite System / Navigation with Indian Constellation (NavIC)

- IRNSS is an autonomous regional satellite navigation system that provides accurate real-time positioning and timing services.
- It covers India and a region extending 1,500 km around it, with plans for further extension.
- The constellation consists of 7 active satellites with 3 located in Geostationary Orbit and 4 in geosynchronous orbit.
- Recently, International Maritime Organisation (IMO) has recognised the Navigation with Indian Constellation (NavIC) or desi GPS as a component of the World-Wide Radio Navigation System (WWRNS), making India the fourth country in the world to have its independent regional navigation satellite system get this recognition. The other three countries that have their navigation systems recognised by the IMO are the US, Russia and China.
- The IMO has accepted IRNSS as an alternative navigation module in Indian waters. It was in use only on a pilot basis earlier but now all merchant vessels are authorised to use it, even small fishing vessels.
- The navigation system can now replace GPS in the Indian Ocean waters upto 1500 km from the Indian boundary.

- With the recognition as a component of the WWRNS, the **Indian navigation system is similarly placed as Global Positioning System (GPS - USA), most commonly used by marine shipping vessels across the world or the Russian Global Navigation Satellite System (GLONASS).**
- The development will enable the utilisation of NavIC in the fields of maritime navigation, surveying and geodesy (science of accurately measuring Earth's geometric shape, its orientation in space and its gravity field).
- Recently, **Qualcomm Technologies has unveiled mobile chipsets supporting IRNSS-NavIC.** The release of chipsets will help accelerate the adoption of NavIC by smartphone Original Equipment Manufacturers.

Geosynchronous Orbit

- About **35,786 kilometers above the Earth's surface, satellites are in geostationary orbit.**
- From the center of the Earth, this is approximately 42,164 kilometers. This distance puts it in the high Earth orbit category. At any inclination, a geosynchronous orbit synchronizes with the rotation of the Earth. More specifically, the time it takes for the Earth to rotate on its axis is 23 hours, 56

minutes and 4.09 seconds, which is the same as a satellite in a geosynchronous orbit.

Geostationary Orbits

- Geostationary orbits fall **in the same category as geosynchronous orbits, but it's parked over the equator.** This one special quality makes it unique from geosynchronous orbits.