GSLV-F18/NVS-03 Mission

Strengthening India's Indigenous Navigation Capabilities

PIB Analysis

- ISRO successfully launched the GSLV-F18/NVS-03 mission on 30 October 2026 from Satish Dhawan Space Centre, Sriharikota.
- The mission placed NVS-03 into Geosynchronous Transfer Orbit (GTO), strengthening India's indigenous navigation system, NavIC.

Key Highlights of the Mission

- **20th GSLV Flight**: The mission marked the 20th flight of India's Geosynchronous Satellite Launch Vehicle.
- **Third-Generation Satellite**: NVS-03 is the third satellite in the second-generation NavIC series (NVS-01 to NVS-05).
- **Orbital Placement**: The satellite entered GTO and is being manoeuvred towards its designated orbital slot at 111.75° East.
- **Satellite Weight**: NVS-03 weighs approximately 2,250 kg.
- **Enhanced Signals**: It carries navigation payloads in L1, L5 and S frequency bands, improving compatibility and navigation capabilities.
- **Indigenous Technology**: It carries an indigenously developed atomic clock alongside procured clocks for precise timing.
- **Wider Applications**: It strengthens Positioning, Navigation and Timing (PNT) services for transportation, aviation, maritime operations and disaster management.



What is a Satellite Navigation System?

- A satellite navigation system uses a network of satellites to provide positioning, navigation and timing information.
- Receivers use signals from multiple satellites to determine their location, speed and direction.
- **Applications**: Route navigation, aircraft tracking, precision agriculture, disaster management and telecommunications.
- **Examples**: GPS (USA), GLONASS (Russia), Galileo (European Union), BeiDou (China) and NavIC (India).

What is Geosynchronous Satellite Launch Vehicle (GSLV)?

- GSLV is a three-stage launch vehicle developed by ISRO to place satellites into Geosynchronous Transfer Orbit and Low Earth Orbit.
- Cryogenic Upper Stage: Its indigenous upper stage uses liquid hydrogen as fuel and liquid oxygen as oxidiser.
- Self-Reliance: Indigenous cryogenic technology replaced Russian-supplied stages, strengthening India's advanced launch capabilities.
- GSLV-F18: It is approximately 50 metres tall, weighs 420 tonnes at lift-off and carried the 2,250 kg NVS-03 satellite.

NavIC

- **NavIC**, formerly called Indian Regional Navigation Satellite System (**IRNSS**), is India's indigenous regional satellite navigation system developed by ISRO.
- It provides Positioning, Navigation and Timing (PNT) services through satellites and ground stations.
- **Coverage**: It covers India's landmass and approximately 1,500 km beyond its geopolitical boundary.
- **Original Constellation**: It consists of seven satellites—three in geostationary orbit and four in inclined geosynchronous orbit.
- **Frequency Bands**: The next-generation NVS satellites introduce L1 alongside the existing L5 and S bands.

What are the Two Types of NavIC Services?

- **Standard Positioning Service (SPS):** An open navigation service available to civilian users and interoperable with other global navigation systems.
- **Restricted Service (RS):** An encrypted navigation service exclusively available to authorised strategic users.

What is the Progress of the Next-Generation NVS Series?

The five-satellite NVS series aims to improve NavIC's coverage, reliability and continuity.

Satellite	Key Details
NVS-01	Launched on 29 May 2023 through GSLV-F12; carries L1, L5 and S payloads and an indigenous Rubidium atomic clock.

NVS-02	Launched on 29 January 2025 through GSLV-F15; orbit-raising failed due to oxidiser valve malfunction.
NVS-03	Launched on 30 October 2026 through GSLV-F18; carries L1, L5 and S payloads.
NVS-04 and NVS-05	Upcoming satellites intended to strengthen NavIC capabilities.

NavIC Strengthening India's Space Sovereignty

- **Strategic Independence**: Reduces dependence on foreign navigation systems for critical national applications.
- **National Security**: Strengthens indigenous navigation support for strategic and defence operations.
- **Technological Self-Reliance**: Promotes domestic development of satellites, atomic clocks and advanced launch technologies.
- **Economic Applications**: Supports transportation, agriculture, aviation, maritime activities and disaster management.
- **Atmanirbhar Bharat**: Strengthens India's capacity to independently design and operate strategic space infrastructure.

Conclusion

- The NVS-03 mission marks an important milestone in strengthening India's indigenous satellite navigation capabilities.
- Expanding NavIC will enhance strategic autonomy, technological self-reliance and India's position in the global space sector.

Reference

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