

NavIC (Navigation with Indian Constellation)

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Why in News?

- After convincing Apple to support navigation technology NavIC in some new iPhone 15 models, the Union government may mandate manufacturers to embed the homegrown GPS alternative in all smartphones sold in India by 2025.
- According to the Ministry of Electronics and Information Technology (MeitY), all 5G phones would be required to support NavIC by January 1, 2025, and other phones by December 2025.

About NavIC (Navigation with Indian Constellation)

IRNSS: INDIA'S OWN GPS

IRNSS: NAVIC WILL BE USED TO PROVIDE ACCURATE REAL-TIME POSITIONING AND TIMING SERVICES. IT WILL PROVIDE NAVIGATION SERVICE FOR CIVILIAN AS WELL MILITARY APPLICATIONS.

IRNSS-1A, THE FIRST OF THE SEVEN SATELLITES, WAS LAUNCHED ON JULY 1, 2013

IRNSS-1G, THE LAST SATELLITE WAS LAUNCHED ON APRIL 28, 2016

7
SATELLITES

3
GEOSTATIONARY

4
GEOSYNCHRONOUS



ORBIT ALTITUDE

36,000 KM

COST

**₹1,420 CRORES
(US\$211 MILLION)**

COVERS INDIA AND UP TO **1,500 KM** BEYOND ITS BORDERS

3 EXTREMELY ACCURATE RUBIDIUM ATOMIC CLOCKS IN EACH SATELLITE

GPS RECEIVERS WILL NOT WORK; NEED SPECIAL RECEIVERS (YET TO BE DEVELOPED)



IRNSS PROVIDES STANDARD POSITIONING SERVICE
OPEN TO ALL USERS
ACCURACY BETTER THAN 20 METERS

● **4 SATELLITES IN GEOSYNCHRONOUS ORBIT** – in pairs, move in two inclined orbits – appear from ground to travel in figure '8' – assist in accurate position determination

● **3 SATELLITES IN GEOSTATIONARY ORBIT** – appear from ground to be at fixed positions in the sky

- NavIC, also known as the Indian Regional Navigation Satellite System (IRNSS), is an independent stand-alone indigenous navigation satellite system developed by the **Indian Space Research Organisation (ISRO)**.

- NAVIC was approved in 2006 (at a cost of \$174 million) and was expected to be completed by 2011, but only become operational in **2018**.
- NavIC, which consists of **7 satellites**, covering the whole of India's landmass and up to 1,500 km from its boundaries, is conceived with the **aim of removing dependence on foreign satellite systems for navigation**, particularly for "*strategic sectors*."
- Currently, NAVIC's **application** in India is limited in –
 - **Public vehicle tracking**, for providing emergency warning alerts to fishermen venturing into the deep sea where there is no terrestrial network connectivity and
 - For tracking and providing information related to natural disasters.
- **The next step India is pushing for is to include it in smartphones.** According to **India's draft satellite navigation policy 2021**, the government will work toward "expanding the coverage from regional to global."

What is the Advantage of having a Regional Navigation System?

- India is the **only country** that has a regional satellite-based navigation system.
 - **There are four global** satellite-based navigation systems – the American GPS, the Russian GLONASS, the European Galileo, and the Chinese Beidou.
 - **Japan** has a four-satellite system that can augment GPS signals over the country, **similar to India's GAGAN** (GPS Aided GEO Augmented Navigation).
- **With fully operational NavIC** (with ground stations outside India [Japan, France, and Russia] for better triangulation of signals) open signals will be accurate up to 5m and restricted signals will be more accurate (GPS ~20m).
- Unlike GPS, **NavIC uses satellites in high geo-stationary orbit** – the satellites move at a constant speed relative to Earth, so they are always looking over the same region on Earth.
- NavIC signals **come to India at a 90-degree angle**, making it easier for them to reach devices located even in congested areas, dense forests, or mountains.

Old vs New (2nd-Generation) Satellites of NavIC

- Each of the 7 satellites currently in the IRNSS constellation rode the lighter **Polar Satellite Launch Vehicle (PSLV)** – ISRO's workhorse launch rocket.
 - The last IRNSS satellite, **IRNSS-1I** was launched in 2018 to replace an older, partially defunct satellite in the constellation.
 - **IRNSS-1I was ISRO's 9th** satellite for the NavIC constellation, but is **considered to be the 8th** because the IRNSS-1H launched in 2017 was lost after the heat shield of the payload failed to open on time.
- **The 2nd-generation satellite** named as **NVS-01** (launched in May 2023), the first of ISRO's NVS series of payloads, is **heavier**.
 - The satellite will have a **Rubidium atomic clock onboard**, a significant technology developed indigenously to **determine the location of objects**.

- **Currently, only four IRNSS satellites are able to provide location services.** The other satellites can only be used for messaging services.
- The 2nd generation satellites **will send signals in a third frequency, L1** (besides the L5 and S in the existing satellites) **to increase interoperability and use in wearable devices.**
- The 2nd-generation satellites **will also have a longer mission life** of more than 12 years (existing satellites – 10 years).

News Summary Regarding the Expansion of Services under NavIC:

- Currently, only a handful of smartphones – from manufacturers such as Poco, Vivo and Xiaomi – support NavIC.
- To increase the adoption of the homegrown navigation system, the government is also considering **offering additional incentives to smartphone makers.**
 - This will be offered in the next round of the **production-linked incentive (PLI) scheme** if they use chips designed or manufactured in India which support NavIC technology.
 - **For example,** currently under the **IT hardware PLI** cashback offered to companies if they use India-designed or -manufactured chips in their systems.
- **The MeitY will make it almost mandatory** (as it is already in the automobile segment) that all the devices that use GPS include the NavIC chipsets (without excluding others like GPS).
- Earlier this week, **as Apple announced its latest iPhone lineup will support NavIC,** this will be the first time Apple has added support for NavIC to any of its iPhone models.
- **Apple's adoption of the technology could propel NavIC into mainstream acceptance.**
- ISRO's successful lunar mission (Chandrayaan 3), successful launch of its maiden solar mission (Aditya L1) and the mainstream acceptance of the NavIC technology shows **India's growing power as a space nation.**

Q.1) What is the objective of India's draft satellite navigation policy 2021?

The objective of the draft satellite navigation policy 2021 is to ensure the continuous availability of free-to-air navigation signals for civilian uses and secured navigation signals for strategic uses in the defined coverage area.

Q.2) What is the difference between the old and new (2nd-Generation) satellites of NavIC?

The new satellite named as NVS-01 is heavier and will have a Rubidium atomic clock onboard to determine the location of objects (which only 4 IRNSS satellites provide). The 2nd generation satellites will also send signals in L1 (besides the L5 and S) frequency and will have a 12 years mission life (existing 10 years).

Source: As Apple supports NavIC, Centre considers making tech mandatory, offering additional incentives

Source: <https://vajiramandravi.com/current-affairs/navic-navigation-with-indian-constellation/>

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