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Q4

Why is Indian Regional Navigational Satellite System (IRNSS) needed? How does it help in navigation?

UPSC Civil Services Mains 2018 · GS I · 10 marks · World's Physical Geography

Salient features of world's physical geography.

Core demand of the question

- Why is Indian Regional Navigational Satellite System (IRNSS) needed? How does it help in navigation?
- Cover strategic need, coverage, services, and how a user gets a position
- Keep the explanation within a 10-mark length

Revision summary

Foreign GPS-type systems can be limited in a crisis, so India needs a regional grid it controls.

NavIC covers India and a belt of about 1,500 km around it, including nearby seas.

Receivers use satellite time delays to fix position; SPS is civil and a restricted service is authorised.

Tropical ionosphere is handled better with more than one frequency.

Public and defence users gain backup when chips read NavIC with other GNSS.

Flow diagram

NavIC IRNSS -> India plus 1500 km

Foreign GNSS risk -> NavIC IRNSS

NavIC IRNSS -> Time range position

Time range position -> Ships phones survey defence

Conclusion

- Put NavIC in more phones, AIS sets, and aircraft boxes so the public service is not only a satellite fact.
- Keep clocks, spares in orbit, and ground stations healthy, because a navigation grid fails if time is wrong.

IRNSS is needed for sovereign, regional coverage when foreign GNSS can be limited. It helps navigation by giving Indian users a timed satellite fix for civil and restricted work from the coast to the high Himalaya.

Facts & figures

NavIC / IRNSS

Indian Regional Navigation Satellite System, India's independent regional GNSS.

Coverage belt

Primary service over India and roughly 1,500 km beyond its borders.

SPS and restricted service

Open civilian Standard Positioning Service and a restricted service for authorised users.

GEO and GSO mix

Geostationary and geosynchronous satellites that keep the Indian region in continuous view.

S-band plus L-band

Frequency design that helps fight ionospheric delay over tropical India.

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