NavIC Applications in e-Governance

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Location and Time tagging at Aadhaar Enrolment Centres

- Aadhaar numbers are used for unique identification of Indian citizens.
- Malpractices and forgery while generating these unique identification numbers are observed.
- Location and Time tagging of Aadhaar Enrolment centres ensures legitimate generation within the national boundaries.
- Low-power, small-size Receiver modules with outdoor to indoor connectivity.

- Installation of about 100000 devices is planned
NavIC for High Accuracy Applications

- NavIC based RTK for surveying of reflectors for remote sensing satellite data calibration.
- **NavIC L5+S based CORS Receiver** for CORS Network and NRTK.
- Instantaneous Fixed solution at longer baseline.
- NavIC L5 is incorporated in CORS Receivers of national and state surveying agencies.
NavIC for High Accuracy Applications

RTK Fix solution using NavIC L5-S + GPS L1

- Fixed $\mu_{2D} = 0.568$ cm, $\sigma_{2D} = 0.511$ cm, 2D RMS = 0.615 cm
- Fixed $\mu_{3D} = 1.29$ cm, $\sigma_{3D} = 1.14$ cm, 3D RMS = 1.5 cm
High Accuracy Positioning for Safety-of-life Applications using GAGAN/NavIC

- Combination of Differential NavIC/GNSS and GAGAN based solution to achieve required accuracy with integrity for applications in Railway’s Automatic Train Protection (ATP) system (KAVACH program).
- A combined approach with seamless switching between Differential NavIC/GNSS and GAGAN based on their availability during operation can ensure the required accuracy with integrity.
- An integration with IMU and odometer sensors shall be done and a hybrid solution will be provided which shall be more robust and reliable in challenging environment.
- Deriving integrity parameters for railways having diverse ground based scenarios.
High Accuracy Positioning for Safety-of-life Applications using GAGAN/NavIC

Start

Receiver Power up

Standalone/DR with no integrity

Decimeter-level positioning with integrity

Meter-level positioning with GAGAN-based integrity

Standalone mode

DGNSS corrections available

GAGAN messages available

DGNSS Positioning with integrity

GAGAN based positioning with integrity

GNSS based solution (priority: DGNSS, GAGAN & Standalone)

Dead Reckoning solution

IMU/Odometer

Initialization & update

Solution available

Output solution and integrity status

Stop

Satellites ≥ 4 available

Y

N

Y

N

Y

N

Y

N

Y

N
Precise and Stable Time from NavIC System

- NTP server with NavIC Time reference for Computer Network Synchronization
- Disseminate NavIC time on Internet
- Time server to Center for Railway Information System (CRIS)
- Remote Sensing satellite data time-stamping
- Precise and stable time dissemination to public
Radio Sonde devices used in weather monitoring (atmospheric profiling) uses satellite based navigation receivers.

These devices are battery operated, light weight and one-time usable and are flown on balloons.

GNSS receivers are used in Radio Sonde devices for getting position, velocity and time information.

High power UHF signal transmitted pose interference to on-board GNSS receiver

Smaller size, lower weight, low power and lower cost

About 10000 units requirement per annum