# Science & Technology · GS - III

**What is the technology being employed for electronic toll collection on highways? What are its advantages and limitations? What are the proposed changes that will make this process seamless? Would this transition carry any potential hazards?**

| EXAM YEAR | PAPER | SUBJECT |
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| MARKS | WORD LIMIT |
|---|---|
| 10 | ~150 words |

## Answer Hint

**FASTag, RFID, electronic toll collection, ANPR, GNSS, seamless tolling, privacy, cybersecurity, surveillance**

## Model Answer

### Introduction

India's electronic toll collection system primarily uses FASTag, based on Radio Frequency Identification (RFID), to enable automatic toll deduction. The government has also explored satellite-based tolling for more seamless highway payments.

### Body

**1. Technology and Advantages**

FASTag uses RFID technology to identify vehicles and automatically deduct toll charges from linked accounts. It reduces cash handling, waiting time, fuel consumption and congestion while improving toll-revenue efficiency.

**2. Limitations**

- RFID depends on functioning tags and readers.
- Tag damage, insufficient balance and technical failures can disrupt transactions.
- Toll plazas can still create bottlenecks during peak traffic.
- Manual intervention may be required for exceptions and disputes.

**3. Proposed Seamless System**

- Satellite/GNSS-based tolling can calculate road usage through vehicle location.
- Automatic number-plate recognition can complement digital identification.
- Such systems could eventually enable distance-based tolling without conventional barriers.

**4. Potential Hazards**

- Collection of location data creates privacy concerns.
- Cyberattacks could compromise financial or vehicle-related information.
- Technical errors may result in incorrect deductions.
- Exclusion of users lacking digital access can create implementation challenges.

## Conclusion

The transition from plaza-based RFID collection towards GNSS and other digital systems can make tolling more seamless, but privacy safeguards, cybersecurity, transparent grievance mechanisms and data minimisation must accompany technological modernisation.

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