

AN INTRODUCTION TO FASTag: A GAME CHANGER IN AUTOMATIC TOLL COLLECTION SYSTEMS IN INDIA.

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Abstract: This paper outlines the challenges encountered by conventional toll collection systems in India and brings out the need for having an automated toll collection system such as FASTag, a program rolled out by National Highways Authority of India (NHAI) for Electronic Toll Collection on National Highways.

Key words: Toll Collection System, RFID, FASTag, Traffic Management, Toll plaza.

1. INTRODUCTION:

India is a country with the second largest road network in the world. Out of the total stretch of 5.4 million km of road network, almost 97,991 km is covered by national highways. The National Highways Authority of India (NHAI), a nodal agency of the Ministry of Road Transport and Highways is responsible for the maintenance and the expansion of the highways.

Travelling on these state/national highways also known as toll roads require a tax to be paid called the Toll Tax. The government spends the taxes collected by means of toll roads usage on the maintenance of these roads so that the drivers and the riders can travel comfortably.

The challenges associated with the conventional tolling process are as follows:

- Limited number of toll booths leading to slow toll collection process
- Slow toll collection process at the toll booths results in a minimum of 10 minutes average waiting time per vehicle
- Fuel wastage due to long waiting time at the toll plaza
- Air pollution
- Verbal arguments and physical fights among impatient travellers and the toll attendants.
- Toll plaza accidents which happen due to the sudden lane changing by drivers for faster clearance.
- Wastage of time at booths has a negative impact on transport sector as well as the whole economy. A 2016 study by IIM, Calcutta said the country suffers losses of nearly Rs 40,000 crore per year due to delays in transportation. The study also highlighted that, the delays led to consumption of fuel worth Rs 90,000 crore.

These limitations in the conventional toll collection systems called for an immediate revamp in the Indian toll collection machinery. Thus, a step in this direction was taken by National Highways Authority of India (NHAI), a nodal agency of the Ministry of Road Transport and Highways by introducing “FASTag” which employs Radio Frequency Identification (RFID) technology and provides for seamless movement of FASTag affixed vehicles at toll plazas.

Such type of highway tag brands are in operation in many developed countries of the west and are known by different names like Eazee Pass, SunPass in the US, e-Pass in Australia, Salik in Dubai etc.

1.1 FASTag:

FASTag is a simple reloadable tag which allows for automatic deduction of toll charges without having to stop at the toll plazas for making the payments. This tag is affixed on the vehicle's windscreen and works on the Radio-frequency Identification (RFID) technology. Initially set up as a pilot project on the stretch of the Golden

Quadrilateral between Ahmedabad and Mumbai in 2014, the system was implemented on the Delhi-Mumbai arm of the Quadrilateral on 4 November 2014 (Joshi, 2017).

At present, FASTag is operational at 240+ toll plazas across National Highways.

The customer must visit any of the Point of Sale (POS) locations at Toll Plazas / Issuer Agency to get his FASTag account created by paying a onetime fee of ₹ 200.

FASTag account is procured by making a payment through cheque or online through Credit Card/ Debit Card/ NEFT/ RTGS or through Net Banking. FASTag account can be recharged upto Rs. 1,00,000.00 (Rupees One Lac only).

Users can drive their vehicles through the FASTag lanes at the toll plazas after recharging their FASTag accounts and the toll amount will be automatically deducted from their accounts.

The government has now made it mandatory for all the vehicles manufactured or sold after December 1, 2017 to have a FASTag.

1.2 WORKING:

Affixed on the wind shield of the vehicle is a unique RFID tag that allows for making toll payments directly from the bank or prepaid account linked to it.



Figure1. FASTag affixed to the Car's wind shield

Issuer Agency will electronically deduct the applicable toll fee from the customer's account linked to the FASTag. This deduction will be done post the toll transaction. The customer needs to adequately fund the account which is linked to FASTag. This recharge process may be termed as top-up.

The customer receives an SMS with requisite details to his registered mobile number as soon as the toll transaction takes place.

Customer will receive an SMS alert in your registered phone number each time an amount is deducted from your FASTag account. Fee payable on each toll plaza is available on www.nhtis.org in addition to being displayed at the concerned toll plazas.

Periodic statement of account may also be obtained on website of the Issuer Agency after registration by the customer.

1.3 RFID TECHNOLOGY:

RFID technology enables a device to capture the digital data encoded in RFID tags or smart labels using the radio waves.

RFID is classified under a broad technology called Automatic Identification and Data Capture (AIDC). It uses radio waves to automatically identify people or objects, collect data about them and enter the collected data directly into the computer systems with little or no human intervention.

RFID Systems comprises of three components:

- i. An RFID tag or a Smart Label
- ii. An RFID reader
- iii. An Antenna

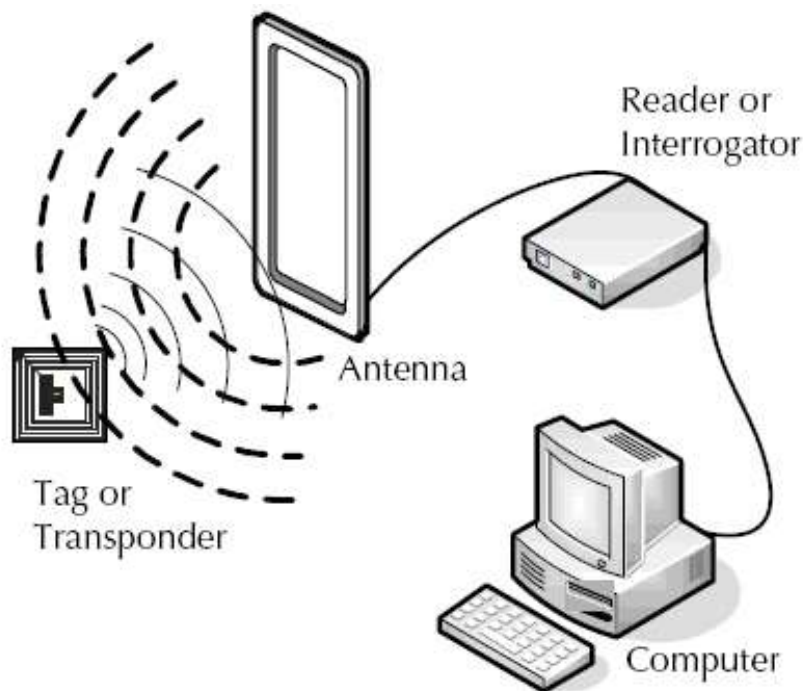


Figure 2: RFID System.

RFID tags consist of an integrated circuit and an antenna, which are used to transmit data to the RFID reader (also called an interrogator). The RFID reader then converts the radio waves to a more usable form of data. Information collected from the tags is then transferred through a communication interface to a host computer system, where the data can be stored in a database and analysed at a later time (Satyasrikanth P, 2016).

By using RFID technology at every toll plaza, congestion and the long queues of traffic can be avoided which will automatically result in time saving as well as one will not need to do the payments manually. Also an Electronic Toll Collection System is able to determine if a car is registered in a toll payment program, and it alerts enforcers of toll payment violations, and debits the participating account.

2. BENEFITS OF ADOPTING FASTag:

FASTag has brought about several socio-economic and environmental benefits to its participants. The following table lists the benefits to the road users, the toll operators and the Government.

Table 1. Benefits of adopting FASTag

BENEFITS OF ADOPTING FASTag:		
To the Road Users	To the Toll Operators	To the Government
Convenience of cashless payment	Improved lane utilisation	Improves transparency of toll transactions
Non-stop motion & reduced commute time	Lower operating costs Reduced effort in management at toll plaza	Savings on fuel, reduction of emissions from idling and repeated stops at Toll Plazas
Cashback* of 5% for FY – 2018-19 Applicable for trips made at NHAI plazas only	Better audit control through centralized user accounts	Reduced air pollution
Online Portal for customers SMS alerts for low balance and toll transactions etc.	Reduced use of paper and reduced toll payment hassles	Reduced use of paper

3. CHALLENGES FACED BY FASTAG:

- **FASTag charge is high for multi-axle vehicles** – Multi-axle vehicle owners are hesitant to opt for FASTag as the toll charges for such vehicles are quite high. A truck requires more than Rs. 2,000 for 10 trips while a car can make 10 trips at a much lower value. This gives people the ideas for deploying car tags in trucks.
- **FASTag may not be approved** – When there is no amount in the account, no credit is given to the users. Then the user has to pay in cash. Moreover, at times, the RFID scanner goes through technical issues, leaving a FASTag user in a fix to pay the toll amount in cash.
- **FASTag can be stolen or lost** – Since the FASTag comes in a tag form, it can easily be stolen or lost. In such a situation, the user must request the agency to block the FASTag account instantly and process re-issuance.
- **FASTag can be wrongly charged** – At times, due to technical glitches, a FASTag user may be wrongly charged. In such a situation, the user is left with the only option to report the matter as soon as he/she comes to know about it and ask for a reimbursement.
- **FASTag may face malfunction or damage** – A user must report about the same and ask for a replacement.

- **FASTag faces the issue of discipline at all most every toll plaza** – Vehicles without the FASTags enter the designated lane while the ones with FASTags wait for their turn, behind these vehicles.
- **Same lane for electronic toll collection (ETC) and very important person (VIP)** – There should be a dedicated ETC lane at every toll plaza. Not having a dedicated ETC lane means the purpose of FASTag fails as it causes a delay in the journey of FASTag users.
- **National Highways Authority of India (NHAI) does not involve itself in FASTag payments**, it has not provided any software for the same instead, it has authorised several banks to handle them. Since, each bank is using its own software it has given rise to lot of payment related issues which needs an immediate rectification.
- **FASTag project needs proper monitoring** to ensure refunds are made on account of billing errors.
- There is **no wholesale package** providing discounts or free trips for commercial operators who have multiple vehicles crossing toll plazas hundreds of times.
- The **government must ensure easy availability of FASTags** through various channels and **also educate the people** on using the dedicated FASTag lanes since the concept is new, it is in a nascent stage in India.

4. COMPARATIVE STUDY: Manual Toll Collection System vs Automated Electronic System

Table 2. Comparison between manual toll collection system and FASTag

Criteria	Manual Toll Collection System	Automated Electronic System (FASTag)
Time Consumption	More	Less
Traffic Congestion	More	Less
Payment Mode	Cash/Debit card/Credit Card	Debit card/Credit Card/NetBanking/Online Recharge
Air Pollution	More	Less
Use of Paper	More	Less
Incentives	No incentives	A cashback of 10% on all Toll payments using FASTag
Highway Management	Good	Better

5. CONCLUSION AND FUTURE WORK:

Although RFID based FASTag is seen as an advantageous mode of toll collection system in India offering numerous socio-economic and environmental benefits to both – the user and the collector, until its drawbacks or the challenges are not uprooted to the base, the module shall continue to face serious crunch and may not work as intended. By designing appropriate solutions to address the challenges faced by FASTag it can be made a technologically superior mode of toll collection eventually proving itself to be a game changer in automatic toll collection system, in the years to come. Also, plans are afoot by the Petroleum Ministry and private Oil Marketing Companies that FASTags could be utilised by consumers for buying petrol at petrol pumps and even for parking facilities.

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