# Reduction of halt time at Toll Plazas using RFID Tags

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**ABSTRACT**

*In present days, the intelligent transportation system (ITS) and simulations are used for research purposes. In this study, how much the halt time at Ban Toll Plaza located at Jammu-Udhampur Highway (NH-1A), J&K will be reduced if RFID Technology is used. This approach provides a high performance and a low cost system and ensures fully digital payment system which not only reduces the halt time at Toll payment posts but also makes the journey of vehicle riders comfortable - the main aim of Transportation Engineering. The comparison of halt times at the Toll Plaza with and without use of RFID based Toll Payment system revealed that the average halt time was considerably reduced from 43.2 seconds to 3.4 seconds.*

*Key words: RFID Technology, Toll Plaza.*

## I. INTRODUCTION

Traffic congestion, stucking at the security check posts and Toll posts roads constitutes a critical problem which is aggravated by the rise in the number of vehicles and by greater urbanization. Moreover the loss of valuable time during traffic congestion can directly affect the production, productivity, performance and the utilization of fuel. Human instinct always craves for more comfortable and short-duration travels to reach their destinations. The use of latest technology paves way to lessen the travel discomfort and try to prevent the avoidable delays in the travel. RFID technology is one such latest development which has already been a success in foreign countries and has also been made mandatory by the Government of India to have RFID tag installed on all vehicles manufactured after 2017. Present study is to compare the average halt time at **Ban Toll Plaza** located on **Jammu-Udhampur Highway (32.8377049N , 74.9356428E)** with and without use of RFID tags on vehicles.

Radio Frequency Identification (RFID) is widely used in many applications like inventory tracking, personal identification, e-money and e-shipment transactions. It is a contactless wireless device consists of tag and reader. The complexity of RFID systems differ from one application to another. RFID is very common in access control applications where access control information is usually stored in back-end database. The first RFID application was the "Identification Friend or Foe" system (IFF) and it was used by the British in the Second World War. Initially RFID tags were developed to eventually replace barcodes in supply chains. Their advantages are that

they can be read wirelessly and without line of sight, contain more information than barcodes and are more robust. RFID transponders (tags) consist of Microchip, Antenna, Case and Battery (for active tags only).

## II. EXPERIMENTAL PROCEDURE

In the investigation, the vehicle halt time at the Toll Plaza was calculated at the peak hours ( 6 A.M – 9 P.M ). The type of vehicle was not considered in the study. The halt time at the Toll Plaza if RFID based Toll payment would be fully functional at the Plaza was approximated on the basis of latest RFID tag reading time at other RFID reader equipped Toll Plazas.
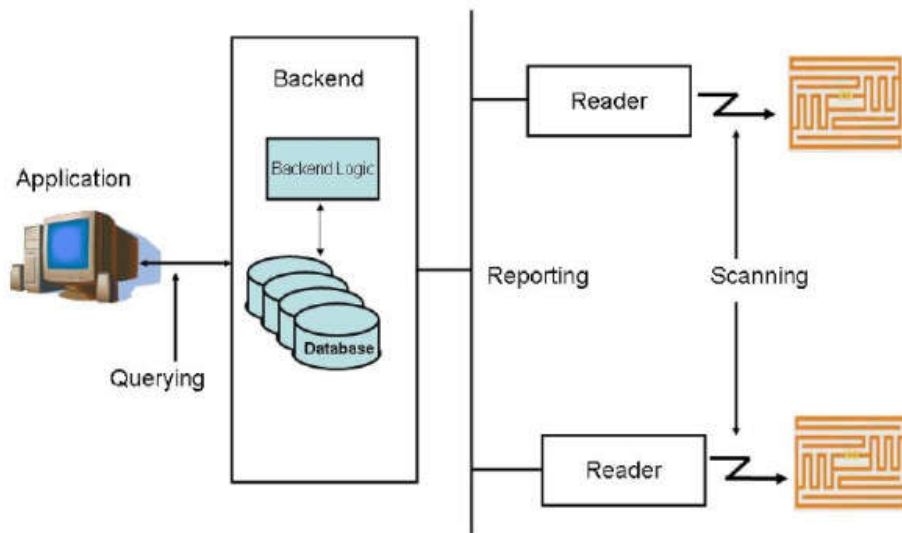
## III. FIGURES AND TABLES



Fig.1. illustration working of rfid system.



Fig.2. traffic jam at ban toll plaza during halt

Table 1: Average halt time with and without RFID Tag during peak hours at the Toll Plaza

| Time | Average halt time without RFID Tag (manual) | Average halt time with RFID Tag |
|---|---|---|
| Peak Hours ( 6:00 A.M - 9:00 P.M) | 43.2 seconds | 3.4 seconds |

## IV. CONCLUSION

From the investigations conducted on the halt time at the specified Toll Plaza, the following conclusion was drawn:

The average halt time will be considerably reduced from 43.2 seconds to 3.4 seconds, that is, approximately 92.13% reduction if RFID based Toll payment is made fully functional at the **Ban Toll Plaza**. This will ultimately result in the reduction in frequent and  long traffic jams, fuel consumption and save of precious time resource during halt period at the Toll Plaza.

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