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CASE STUDY

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PATH Prakash Asphaltings & Toll Highways (India) Ltd.
Constructing New Ways ...

Toll Plaza Operator implements RFID-enabled HIGHWAY TOLL COLLECTION SYSTEM

Automated toll booth transit and toll collection

RFID tag functions as a prepaid toll pass, enabling automatic toll deduction at each transit

Automated access control prevents transit without payment or auto-debit

Quick and accurate identification along with alerts

INSIDE:

TECHNOLOGY

Solution:
EPC Gen2 compliant vehicle tracking solution

Tag Type:
Parka™ UHF Passive

Reader/Antenna:
Xtenna™
Xtenna Proximity™

Method:
Multiple Tracking via Integrated Reader/Antenna modules

Integration Platform:
RFID Middleware:
Xtenna™ WebToolkit
Xtenna™ Studio
Application: Essen RFID's Highway Toll Collection System
Database: MySQL

Tag Manufacturer/Supplier:
Essen RFID, with US based chip inlay

Reader/Antenna Manufacturer:
Essen RFID, with US based module

Systems Integrator:
Essen RFID

Xtenna™ Integrated RFID Antenna/Reader

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CASE STUDY

KEY REQUIREMENTS:

The company, Prakash Asphaltings and Toll Highways (India) Ltd. is a large infrastructure company in Central India, that also provides highway tolling and maintenance services. It operates a Toll Plaza on the Indore Highway, collecting a toll fee from vehicles using this highway. A high proportion of these vehicles are regular and frequent travelers on this route, such as trucks carrying goods, buses, etc. Manual toll collection causes vehicles to pile up in queues at collection points, hampering free flow of vehicles and causing delay. This results in time wasted during freight transportation and reduced turnover. The company required an automated process of toll collection at the toll plaza for vehicles frequently using this route.

Main challenges in implementation:

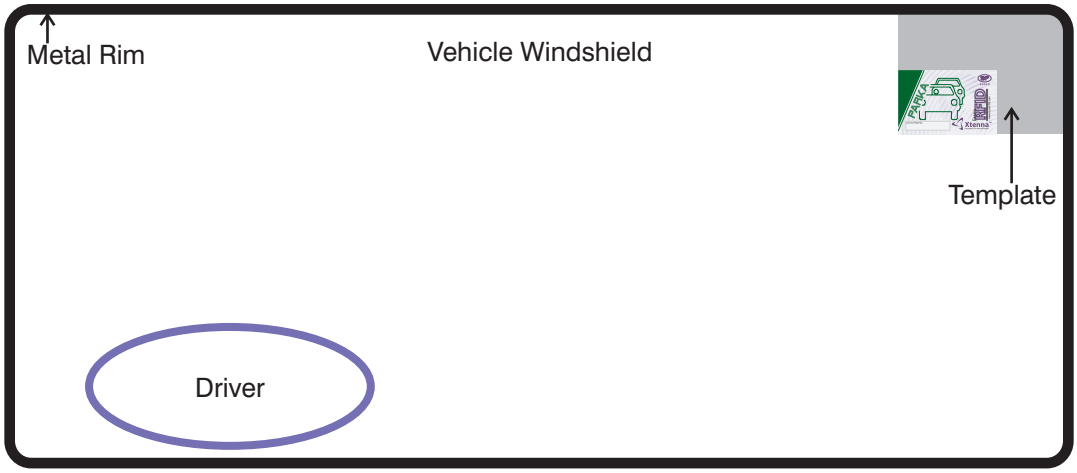
- Reducing the waiting queue line for toll payment through an automated process of toll collection from frequent/daily travelers through a toll pass.
- Allowing only those vehicles that pay toll fees to pass through.
- Preventing vehicles whose prepaid toll pass has nil balance from going through without renewal payment.

SOLUTION:

Essen RFID provided a comprehensive solution for automated toll collection at the toll plaza. Using RFID technology, the system detects RFID tags on vehicles and automatically deducts their toll fees from a prepaid toll pass.

IMPLEMENTATION:

Xtenna™ RFID Antenna-Readers are installed at the to and fro transit lanes of the toll booth. A PARKA™ Tag is issued to each vehicle and affixed to its windshield. The tags are registered using an Xtenna Proximity™ Reader. The tracking system incorporates a trigger switch that operates a boom barrier to allow vehicles to pass through. The automated Highway Toll Collection System uses MySQL for storing data and application software developed in JAVA.



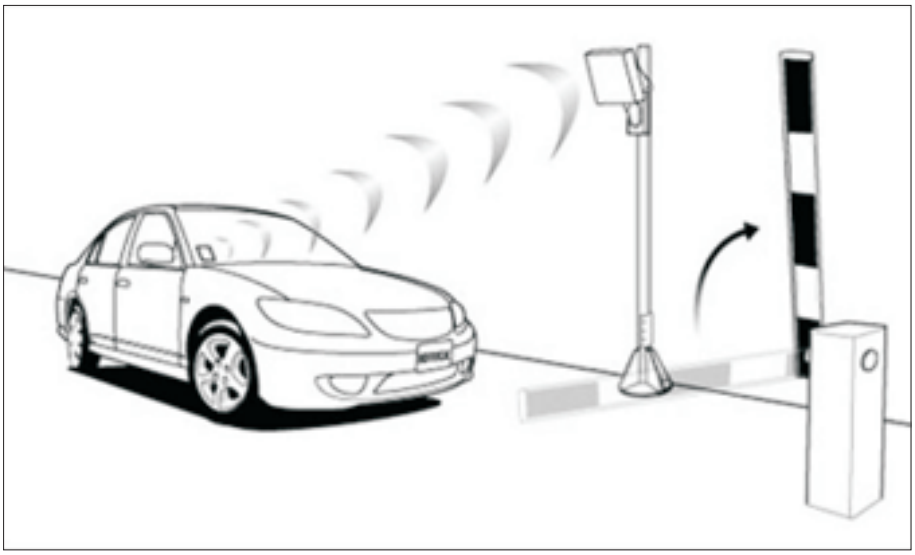
CASE STUDY

WORKING:

The system requires that a PARKA™ RFID tag is issued to those vehicles that are using the toll plaza on a frequent/daily basis.

Process Flow:

1. Before a tag is issued to a particular vehicle, all relevant owner details are obtained for the system database. Details of each vehicle, including Vehicle License Plate number, are also entered into the system database.
2. A permanent RFID tag is assigned to each vehicle. Essen RFID's PARKA™ Tag is used for this purpose. The tag is first read by the Xtenna Proximity™ Reader and is registered in the database as assigned to that particular vehicle. The tag is then affixed on the vehicle's windshield.
3. At the time of tag registration, a prepaid toll payment is charged to the vehicle owner and credited to him in the database in the form of an electronic toll pass.
4. When a vehicle during its trip, reaches the toll booth, the Xtenna™ Antenna-Reader at the booth detects the vehicle's RFID tag, reads it and verifies its unique tag ID associated with the vehicle and the owner. Once this is done, a toll fee for that particular transit is automatically deducted from the prepaid toll payment and its time logged into the database. The boom barrier is then automatically triggered to open to let the vehicle go through. The entire sequence is automated and takes place in a speedy, streamlined manner.



5. This process is repeated each time the vehicle passes through the toll collection lane at the toll plaza. The Xtenna™ Antenna-Reader detects the vehicle's tag, captures the tag ID, checks prepaid balance and deducts toll fees from the balance amount of the toll pass.

CASE STUDY

6. When the balance amount on the toll pass of a particular vehicle becomes zero and its tag ID is detected at the toll booth, the boom barrier is not opened for that vehicle and the operator is alerted that this vehicle's toll balance needs to be recharged/renewed.
7. The vehicle owner/driver then pays the requisite amount to renew his toll pass and this data is updated in the database against the vehicle's tag ID. The toll fees for the current transit are then automatically deducted from the renewed balance, the time logged in and the boom barrier opened for the vehicle.
8. If a vehicle passing the toll booth is an infrequent traveler, then it does not have an affixed RFID tag. When the Xtenna™ Antenna-Reader does not detect the tag, the boom barrier is not automatically opened. The driver of the vehicle pays the toll fee to the booth operator, who enters this transit toll fee into the system. This in turn releases the boom barrier to allow the vehicle to go through.
9. The system has report generation functions that provide details of vehicles, vehicle owners, tags, transit times, prepaid balances for each registered vehicle, daily toll collection data in the form of debits from prepaid, credits from renewals and manual collection entries of untagged vehicles.

CASE STUDY

BENEFITS:

- Automated toll process through RFID technology. The registered RFID tag also functions as a prepaid electronic toll pass.
- Accurate identification and transit for tagged vehicles at toll booth.
- Automatic deduction from prepaid toll pass during transit.
- Preventing vehicles from transiting if they have nil balance on their prepaid toll pass, along with alerts to operator.
- Reduction in manual entry work for toll collection, since all frequent travelers are issued prepaid tags.
- Enables quick transit, preventing congestion and time wastage at the booth.
- Automated report generation enables ready information of vehicle records and collection data.

LINKS:

Hardware:

Xtenna™

Xtenna Proximity™

Tags:

PARKA™

Software:

Xtenna WebToolkit™

Xtenna Studio™

Reference Example:

http://www.essenrfid.com/Mailer/accessparking-flash-demo.pdf