

Electronic Parking Lot Payment using Passive RFID and Cloud Computing.

Shilpa Batwal(Abhang)^{#1}, Dr. S. K. Yadav^{*2}

[#]Research Scholar of JJT University,
Rajasthan,India

^{*}The Institution of Electronics and Telecommunication Engineers,
New Delhi,India

Abstract- This paper focuses on an electronic payment in parking lot using radio frequency identification (RFID) technology. The proposed RFID system uses tags in the form of sticker, through which info embedded on the tags are read by RFID readers. Data information is easily exchanged between visitors and parking lot authority. In the proposed system the cloud computing is attached to the RFID architecture to handle scalable RFID system.

Keywords – RFID, cloud computing

I. INTRODUCTION

Radio Frequency Identification (RFID) is a technology that uses radio waves to transfer data from an electronic tag which is also called as RFID tag or label attached to an object through a reader for the purpose of identifying and tracking the object. Some RFID tags can be read from several meters away and beyond the line of sight of the reader. RFID can be used in many applications. A tag can be affixed to any object and used to track and manage inventory, assets, people, etc. For example, it can be affixed to cars, computer equipment, books, mobile phones, etc. The Healthcare industry has used RFID to reduce counting, looking for things and auditing items. Many financial institutions use RFID to track key assets and automate compliance.

RFID tags can be either passive, active or battery assisted passive. Passive RFID does not use a battery, while an active has an on-board battery that always broadcasts its signal. A battery assisted passive (BAP) has a small battery on board that is activated when in the presence of a RFID reader.

RFID technology is grouped under the term Automatic Identification (AutoID). AutoID Technologies are a way of controlling information and material flow. The RFID technology is a means of gathering data about a certain item without the need of touching or seeing the data carrier through the use of electromagnetic waves is required.

Comparing with the classical barcode system RFID extends the operational distance from inches to number of feet (passive RFID tags) or even hundreds of feet (active RFID tags). Their wireless transmission, processing and storage capability enable them to support the full automation of many inventory management functions in the industry [1].

The primary benefits of RFID technology over standard bar-coding are:

- Information stored on the tag can be updated on demand

- Huge data storage capacity
- Instantaneous data identification
- Data collection from multiple items (hundreds of tags per second)
- Small surface area requirement
- Longer read range; line-of-sight not required

It is believed that RFID technology will play two major roles. It will provide a means of unique object identification at low cost, which will enable it to transform supply chains and reduce their costs dramatically. Secondly, it will be used in combination with other sensing and network technologies to track objects and physical environments for purposes beyond supply-chain management, resulting in an electronic infrastructure that is intelligent and aware of its physical environment. Such an infrastructure can help increase visibility and control over physical world events that plague business decision making today. It is superior to barcode scanning in terms of speed, parallel processing and simplicity and not human intervention

APPLICATIONS OF RFID :

A. Asset tracking

RFID is useful in static or in-motion asset tracking. User can instantly determine the general location of tagged assets.

B. People Tracking:

People tracking system are used just as asset tracking system. Hospitals and jails are most general tracking required places. Hospital uses RFID tags for tracking their special patients. In emergency patient and other essential equipment can easily track. It will be mainly very useful in mental care hospitals where doctors can track each and every activity of the patient. Hospitals also use these RFID tags for locating and tracking all the activities of the newly born babies.

C. Document tracking:

This is most common problem. Availability of large amount of data and documents brings lots of problem in document management system. An RFID document-tracking system saves time and money by substantially reducing:

- Time spent searching for lost document
- The financial and legal impact associated with losing documents.

D. Government Library:

Many government libraries use barcode and electromagnetic strips to track various assets. RFID technology uses for reading these barcodes unlike the self-barcode reader RFID powered barcode reader can read multiple items simultaneously. This reduces queues and increases the number of customers using self-check, which in turn will reduce the staff necessary at the circulation desks.

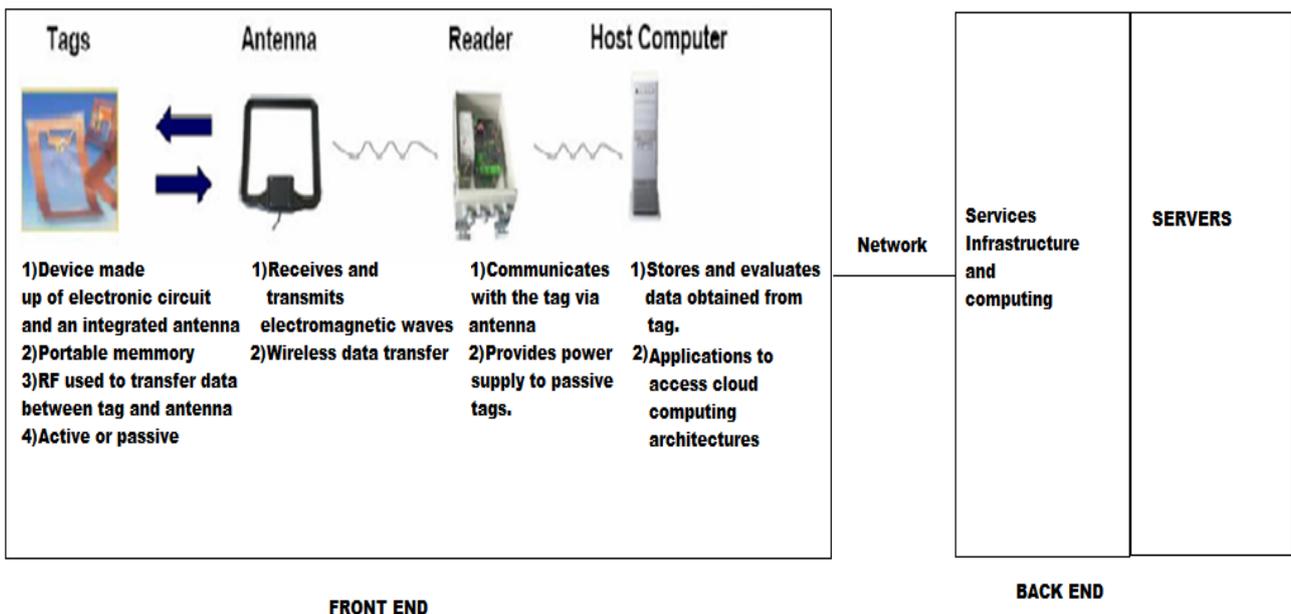
E. Manufacturing & Aerospace:

RFID technology provides an easy way to manage a huge and laborious manufacturing process. It offers all the benefits of small production parts to batch, processes and manufacturing. This type of process helps in better analysis, reduce and eliminate bottlenecks, reduced time in locating parts and products and production process based sensors can be installed to alert any anomalies. Aerospace industry and Department of Defense have a lot to gain from RFID integration into their production and process lines. Boeing and airbus, according to the direction of US Federal Aviation Administration, make Mandatory to put an appropriate tracking mechanism to track the aircraft parts. The cloud computing term refers to computational resources('computing') made accessible as scalable on demand services over a network('the cloud')[3].The concept of cloud computing may be well understood by using one example. In academic institution instead of purchasing various software or software licences to give tools to faculties for their respective subjects ,cloud computing can be used.In this case server room executive need to load only one application .It permits faculties to login into a web based service which hosts all the programs which fulfill the needs of faculty related to his/her subject.The cloud computing provides following services: software-as-a-service, platform-as-a-service and infrastructure-as-a-service.First software-as-a-service is also known as application-as-a-service. It includes the

process of any application being delivered over the platform of the web to an end user. Here many users can share one application and one computer.Platform-as-a-service is a complete platform including application development, interface development,database development,storage and testing. Infrastructure-as-a-service makes computational resources like disk space ,storage and servers available as on-demand service. Instead of using physical machines,IaaS customers get access to virtual servers on which their own software can be deployed. With the help of cloud computing big amount of capital expenditures for the deployment of infrastructure can be avoided.

II. THE PROPOSED SYSTEM

The concept is based on the existing parking system. In the existing system human interaction is required for the parking payment. This human interaction leads to the long queues.Wecan avoid theses long queues using RFID .In the proposed system there are two payment modes: Prepaid and postpaid.Here the vehicle will be given a passive tag in the form of a sticker which can be affixed on the windshield. RFID reader will be mounted at the entrance gate. When the vehicle enters at the entrance gate RFID reader checks whether the tag is barred or valid..If it is valid then vehicle will be allowed to enter inside and it's entry time will be recorded in the database. At the exit gate one more RFID reader will be mounted. Reader will calculate parking lot fees with the help of entry time and exit time. Total amount will be deducted from the user's account (for prepaid user).If the balance is low then warning email or SMS will be sent to the user and the vehicle will be allowed to leave. If user fails to pay excessive amount then the tag will be barred. In case of post-paid users, For the postpaid system, a bill will be sent to their respective homes at the end of every month. If the users fail to pay the amount, their tags will also be barred. With the help of this we can avoid human interaction which is required in parking payment. .



One of the drawbacks of RFID technology is tag collisions in RFID system. Collisions can be reduced with the help of anti-collision protocols. Reduction in collisions will result in scalable RFID systems which can be managed by attaching cloud computing to the existing RFID system. In the proposed architecture, data is collected when RFID tag comes in contact with RFID reader. The data captured by the RFID reader is sent to the host computer which stores and evaluates the data. It also consists of application to access backend of the system. The backend of the system consists of different services, infrastructure and computing facility and servers. Data which is collected from front end is filtered according to specific application, use appropriate infrastructure and stored on server.

III.CONCLUSION

In this paper with the help of proposed system we can achieve immediate payment at parking lot using RFID. When the huge amount of data is collected by RFID reader it results into scalable RFID system. To manage the scalable RFID system cloud computing can be attached to the existing RFID architecture.

REFERENCES

- [1] Tao Li Shigang Chen "Identifying the Missing Tags in a Large RFID systems" Mobi Hoc' 10, RFID September 20-24, Chicago, USA
- [2] Jeffery Napper ,Paolo Bientinesi,"Can cloud computing reach the top 500?"; UCHPC-MAW'09 ,proceedings of the combined workshops on unconventional high performance computing workshops plus memory access workshop, May 2009.
- [3] Debas Chetana, J.P.Gupta," A Cloud Computing Architecture Framework for Scalable RFID" Proceedings of International Multiconference of Engineers and computer scientists 2010 Vol IMECS 2010, March 17-19, 2010, Hong Kong..
- [4] Sam Guccino, Uros Marjanovic,"Automatic Identification/RFID course and equipment for teaching and research" Proceedings of the 2008 IAJC-IJME International Conference .
- [5] I. Bose, and S. Yan, "The Green Potential of RFID Projects: A Case-Based Analysis," *IT Professional*, vol. 13, no. 1, pp. 41-47, Jan./Feb. 2011
- [6] C.Qian, H. Ngan, Y. Liu, and L.M. Ni, "Cardinality Estimation for Large-Scale RFID Systems," *IEEE Transactions on Parallel and Distributed Systems*, 18 Jan. 2011
- [7] F. Bi, and Y. Mu, "Efficient RFID Authentication Scheme for Supply Chain Applications," *IEEE/IFIP International Conference on Embedded and Ubiquitous Computing (EUC)*, pp. 583-588, 2010
- [8] H. Pagey, and K.A. Hua, "TagPay: A Payment Atomic RFID Ownership Transfer Protocol," *IEEE 12th Conference on Commerce and Enterprise Computing (CEC)*, pp. 196-203, 2010