

On the Prevention of Collisions in EPC Gen2 RFID Contention

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Abstract—The EPC Gen2 RFID technology relies on a random contention protocol to arbitrate the access to the radio channel. Because of the simplicity of the RFID platform, the pseudo-random number generator has some limitations that we study in detail. In particular, some of the possible outcomes of the generator are much more likely than others. As a result, the number of collisions in this technology is relatively high.

We propose to use an improved contention protocol in which an RFID tag keeps using the same backoff value as long as its contention results in a successful transmission, and computes a new backoff value after collisions. This solution has already been studied in the context of wireless local area networks. In the present letter, we adapt the solution to the RFID technology and present a performance evaluation based on simulation. The presented solution substantially improves the performance in some scenarios of interest.

Index Terms—Medium Access Control, decentralized constraint satisfaction solver, learning MAC protocol

I. INTRODUCTION

RFID technology makes it possible to wirelessly read passive tags. This has several applications in inventory management. We are interested in scenarios in which a given set of tags has to be read several times. A possible example is a pallets of products that travels from the factory to a warehouse, and from there to a shop. The goods are checked at the entry points and exit points of each location, and also when they are loaded and unloaded to and from the truck. The same pallet is read several times. There is interest on speeding up the reading of the whole pallet as it reduces the time needed for loading and unloading the trucks.

Another examples is a smart shelf in a shop that has the capability to interact with the customers. The idea is that when the customer picks a product from the self, interactive content related to that particular product is displayed on the screen. To achieve this goal, each product has a tag. A reader continuously reads all the tags in the shelf. When it detects that one of the tags is no longer on the shelf, it displays the information of that product. The goal in this scenario is to minimize the reaction time of the system to the action of the customer.

The process of reading a set of tags is governed by a random medium access protocol. It is possible that during the reading process, two tags transmit simultaneously and therefore they are not read. To cope with this possibility, the reader performs several reads to reduce the chances that some tags left unread. In this paper we note that the random reading process needs

to be carried out only once. Subsequent reads can be totally deterministic and consist of a single round.

II. RELATED WORK

[1] [2]

III. RFID MEDIUM ACCESS CONTROL

IV. ENHANCED COLLISION AVOIDANCE IN RFID

V. SIMULATION RESULTS

VI. CONCLUSION

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