

TRACKING PACKAGES AND CONTAINERS USING RFID

Inês Marques⁽¹⁾, António Serrador⁽¹⁾, Rogério Campos Rebelo⁽²⁾

⁽¹⁾ISEL-Instituto Superior de Engenharia de Lisboa

⁽²⁾CTT

a47669@alunos.isel.pt, antonio.serrador@isel.pt, rogerio.c.rebelo@cttexpresso.pt

Keywords: Tracking, Packages, RFID, Post Offices, MQTT

Summary: This paper proposes a tracking system using standard RFID technology to track items (e.g. packages, letters) along with their respective aggregator units (e.g. containers, boxes, trucks) at various stages, throughout sorting, warehousing, and package delivery. Currently, the technology used to track packages, in most post offices, is barcode, where the tracking of the packages is done in an optic portal or manually, one by one. With the increasing number of shipments nowadays, this technology is not sustainable in terms of efficiency, therefore it is essential to find a solution that automates the distribution and tracking of packages to make the process faster and easier. An approach to solve this problem we propose an architecture and implementation using RFID technology to improve the tracking process, in the post office company, since it allows for simultaneous reading and reduces reading errors or failures. This system aims to facilitate real-time monitoring and verification of the packages within each traffic aggregator unit, allowing for seamless tracking of individual packages since they enter the distribution centre, grouped inside containers, up to when they leave the centre in the distribution trucks. By offering detailed data on the location and status of each package, this system assures improved efficiency and accuracy in package management and delivery workflow. As part of this project, an application/server was developed to manage communication between the RFID reader and the monitoring server via an MQTT broker. This server facilitates real-time data transmission and processing, ensuring that tag information is accurately captured and stored remotely. A database is also proposed and developed to store and manage the received RFID data. Moreover, the position and orientation of antennas are analysed to determine the configuration that achieves the highest reading quality and to identify RFID tags flow/directions. Different types of tags are tested to determine the most suitable options for this solution, since this system has different aggregator units, different tags can be used for each one. For example, less expensive tags are required for low-value packages since they are impossible to reuse, given their high quantity. For high-value contents, high-performance tags may be used.