White Paper

RFID Tag Buyer's Guide

6/2017

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1 Introduction

There is plenty of information related to the tag selection and sourcing. The more information that can be given to the tag supplier, the easier it is for them to propose a suitable tag. The better questions you ask, the better answers you get and the easier it is to make an educated decision.

Following list is intended to serve as a memory aid: what generic issues should be considered and discussed with the supplier, and what additional project specific requirements there are to consider. All these listed issues are not applicable for every project, so please remember to focus on the questions specifically essential for the success of *your* project.

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2 Issues to Consider When Buying RAIN RFID Tags

Tag Type and Data

Functionality and Data

- Should the tag work according to EPC protocol, should it be NFC or some proprietary protocol?
- What data does the tag need to carry: Only EPC or is user memory needed as well? If you simply list the data to be stored in the tag, your supplier can calculate the required amount of memory.
- Are there any reasons to specify a particular IC type or vendor? If you list the reasons, you will better see if they make sense.
- Is the tag used for identification or would there also be additional functionality such as sensors, electronic article surveillance (EAS) use?

Format

- Hard tag, hang tag, woven, label or some kind of specialty tag? White or clear label?
- On-metal tag, embedded or conventional label?
- On which material (or what kind of item) the tag will be used, type of material and thickness?
    - The di-electricity of the base material changes the tuning of the tag. This can have huge effects on read range.
- How the tag could or should be attached?
- What kind of dimensions the tag can have? In general, the smaller the tag, the shorter the read range.
- Note: Describing the item where the tag will be attached may be the easiest way to describe the format requirements. If the tag format is "special", the details could be left for the tag manufacturer.

Durability Requirements

- How long life time should the tag have, and how it will be handled – used once in-house, moved in supply chain, used in store, used in warehouse, attached permanently, reused, etc.
- Would the tags be exposed to weather or any extreme conditions, or used inside "office conditions" only?
- Is there anything special in the use case and in the use environment (e.g. heat, cold, dirt, water)? If yes, describe the details.

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Performance Requirements

Describe the read range requirement in some of the following formats:

- TIPP grade for the tagged item in the retail industry. You can ask your solutions provider or GS1 expert to assist in specifying the grade.
- AS5678 grades in the aerospace industry
- Read range in meters or feet? And what kind of reader you plan to use (handheld, fixed, …, reader power and sensitivity)?
- Tag sensitivity and backscatter signal strength parameters? If you have your own tag test system, the test system vendor can assist you in determining these parameters.

What kind of performance tolerances are acceptable?

Describe the tag to reader orientation

- If a TIPP grade is utilized, this information is embedded in the grade
- Are the tags always read from one angle, or can the tag be on any angle towards the reader?
- For example, common dipole antenna designs have an orientation angle where the tag is almost unreadable. On the other hand, at best angles the read ranges are high.

Are the tags used in one country / one region or globally?

- Different geographical areas have different frequency bands in use. A tag can be optimized for a specific area, or designed for global use. If the tagged assets move across continents, then it's safest to require global functionality 860-930 MHz, which covers the ETSI, FCC and other regional frequencies.

Are the tagged assets identified separately, or in larger populations?

- Especially if the tagged items are thin (less than 3cm thick) and the RAIN labels end up in close proximity to each other, describe the arrangement.
- Tag performance is strongly effected by nearby tags. The magnitude of these proximity effects depend on the tag design. A good tag on its own may not be the best choice for stacks of small items where tags are close to each other in large quantities.

Delivery Format and Finishing

Delivery Format

- What should be the physical appearance of an individual tag? Hard tag, paper label, clear label, hangtag,…
- What should be the delivery format? Roll, sheet, individual tags on bag, tags on tray, etc. Consider also the type of tag.

Printing

- What visual marking or identifiers are required on the tags? Should there be a unique identifier, such as a serial number on the tag, and what is the source of that data?

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- If the tags are finalized in your own process, be prepared to discuss the equipment requirements especially before buying any additional printers. Your label supplier may be able to supply also finishing equipment.

Tag Data Content and Encoding

- Is there some particular reason not to follow the EPC RFID tag data standard by GS1?
- What data should be written on the tags: No data or carrying supplier's default data; encoded with data provided by you, serialized or not, and who generates and provides the data?
- If the tags are coded in your own process: Ask what type of equipment is recommended for encoding, and could encoding be implemented as a part of your existing processes?

Delivery Terms

- What is the supplier's minimum order quantity (MOQ) and delivery capacity? Discuss the planned order quantities and total volumes in short and medium term. Check if the supplier is capable and willing to scale up when quantities grow.
- What is the lead time?
- Be prepared to adjust your purchasing to match production processes.

Quality Control

- Has the supplier already implemented some audited quality system?
- Is the production test coverage 100%, sample based or something else?
- Is the supplier testing just for functionality (tag can be read or not) or performance?
- Are test logs such as Tagsurance log-files delivered? Ask for a sample log file.
- How are defective tags handled: removed, replaced with good ones, coded differently or marked somehow?

Change Management

- How does the supplier manage design changes? For example: if a new IC type is available, how are the new tags approved for production and delivered instead of the previous model.

Available Services from Supplier

- What kind of additional services are available? Printing, encoding, stocking finalized tags or unfinished tags, etc.
- Is the supplier capable of offering more comprehensive tagging solutions? In essence such tagging solutions would provide you with finished tags applied on your assets with minimal burden to your in-house processes.

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Price

You surely want a good price without compromising any of the above listed other requirements. If the tag price is your only decision factor, you are probably not the end user of the tag, or essential information simply has not reached you yet. In that case it might be a good idea to double confirm the tagging requirements with the RAIN RFID project manager.

It is also good to understand the difference of price of tag and the overall cost of tagging. Cost of tagging includes several factors such as the tag itself, encoding process, finishing process, attachment process, and the management effort of all these processes. It may be difficult to accurately derive the overall cost of tagging, unless you are able to outsource the whole effort to a tagging solutions provider.

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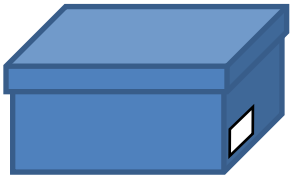
3 Example Request for Quotation – RAIN RFID Tags

Dear supplier,

Please provide a quotation for RAIN RFID labels as follows:

Use of the RFID labels

We will use the RFID labels in shoe boxes. The RFID labels will be used in tracking through the logistics chain; and in retail stores for inventory counting and loss prevention. Tunnel readers, different gate readers and different handheld readers are used to read the tags in our own facilities and at our customer. The tag will be placed at the end of the shoebox, to lower left corner, about 1 cm from the corner (see image below).



We estimate annual quantity to be 20 million tags. We may purchase the labels from one or more suppliers.

Functionality

- The labels should support EPC RFID coding. We will encode the tags during our manufacturing process. A unique TID is needed and information for TID to EPC serialization is needed.
- User memory is not needed.

Format

- The label should be white paper label (printable) with adhesive on other side.
- Label dimensions 35 mm x 55 mm +/- 5 mm.
- Delivery on a roll, please define the amount of labels on roll and roll dimensions.

Performance

- The tagged item should be according to TIPP grade S15B, when shoe boxes are stacked 2 boxes wide and 2 boxes high. Please provide the test results. Sample shoe boxes are available upon request (shall be returned to us).

Quality

- Performance variation should be within +/- 3 dB, worst labels should meet the performance requirement.
- Labels that don't meet the requirement can be delivered, but should be clearly marked, and should not be invoiced. Maximum of 5% of tags on roll can be non-performing.
- A log file including tag TID and performance information of each tag should be included to deliveries.

In addition to pricing, please provide information of minimum delivery quantity and lead time.

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Please provide also any additional information that you believe to be useful for our application.

Our planned next step – sample roll purchase and test

After reviewing the received quotations, we will purchase sample rolls from suppliers selected for second evaluation round. A test log file should be included to this sample delivery. We will encode, print, and test the tags on roll as a part of our supplier selection process. Please provide also price for the sample roll, or inform us if the larger quantity price is valid for sample roll.

We are happy to answer any questions.