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TIPP - Tagged Item Performance Protocol Adoption Simply Explained

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1 Introduction

TIPP (Tagged Item Performance Protocol), developed by GS1 in collaboration with the Industry, is a grading system for communicating UHG Class1 Gen2 RFID tagged-item **performance** between retailers, brand owners and manufacturers.

In an open retail supply chain, retailers, brand owners and manufacturers communicate tagged-item requirements. Today these requirements usually include tag sizes, materials to be tagged, barcode quality, font size, colour, type of tag (adhesive soft-tag or tamper-resistant hard-tag), application method (hang-/price-tag, sewn-in or embedded), etc.

To date, none of these negotiations have included the RFID tagged-item performance requirements, meaning the requirements by which an RFID tag can be read with a near 100% precision when the tag is applied to the item.

To facilitate the process of defining performance requirements and in light of a dramatic increase in RFID deployments in retail, the TIPP workgroup has developed a grading system, which in turn is based on a tagged-item specification format. This Format includes thresholds for the relevant performance factors: in practice this means that 2 tagged items having similar specifications will perform similarly within the same use case; hence the need for a UHF Gen2 RFID grading system.

NOTE : the Tagged-Item Grading System, as explained in this document, is, like any GS1 Standard and Solution, a **voluntary** guideline, it is not mandatory. It has been developed **by** the Industry **for** the Industry with the aim of facilitating the collaboration between Industry stakeholders, thus increasing the efficiencies and reducing the costs within the supply chain.

2 What is TIPP?

1. A set of performance grades for UHF Class 1 Gen2 (C1G2) tagged-items
2. A repeatable test procedure to validate the grade of a tagged-item
3. A test catalogue that details orientation and placement of items for testing
4. A non-normative Solution Providers Guide to explain the technical details of TIPP
5. This adoption guide

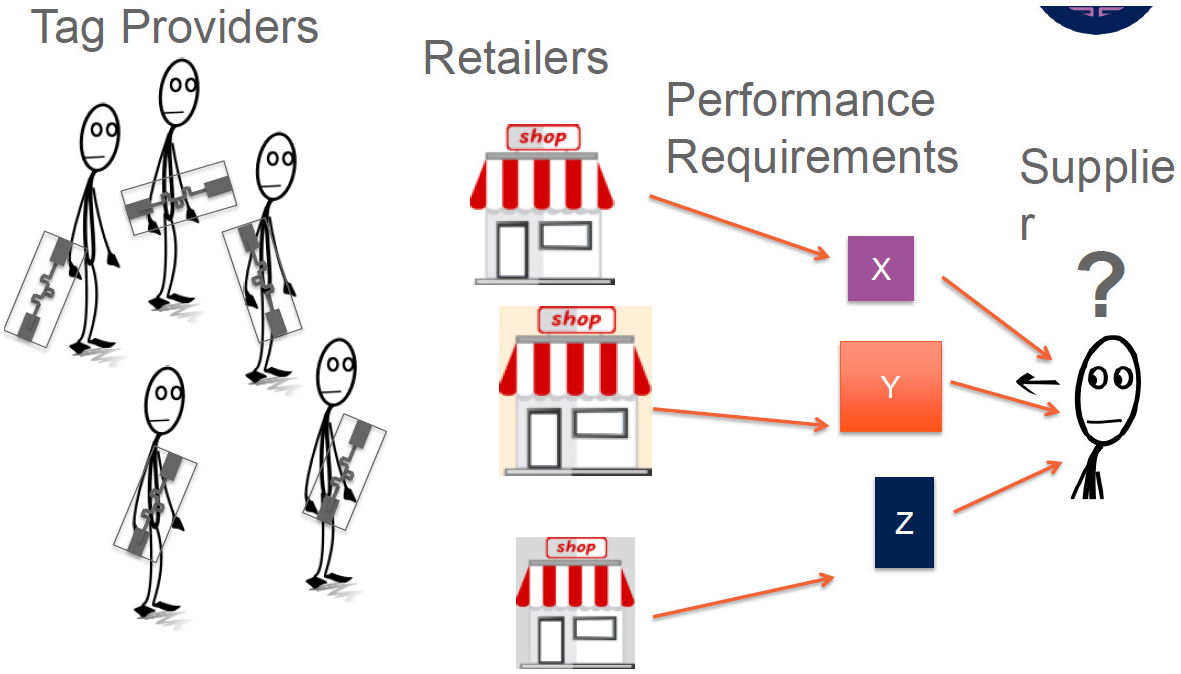
In this document we specifically focus on topic 5, providing a comprehensible, simple, non-technical guideline that will facilitate understanding of TIPP and hence the adoption of the grading system.

3 Statement of challenge (what are we trying to solve?)

In an open retail supply chain where RFID is being deployed for various reasons, parties communicate with their direct business partners about the RFID tags and inlays to be used. Retailers consult and accommodate with brand owners, brand owner with manufacturers, manufacturers with their tier 1 suppliers etc… and each of them negotiates with its solution and/or technology provider.

These consultations and adaptations usually take time and will have a negative influence on the deployment timeline. The communication can quickly turn technical as it mainly revolves around the tagging specifications. These specifications usually include tag sizes, materials to be tagged, barcode quality, font size, colour, type of tag (adhesive soft-tag or tamper-resistant hard-tag), the application method (hang-/price-tag, sewn-in or embedded), etc…

In most cases the end result will be that the supplier will have to comply with his customer's requirement and the supplier will be asked to buy his RFID tags, containing a specific named inlay with a specific named RFID tag manufacturer.



This process may be considered bearable and accessible as long as RFID adoption within retail is in its starting phase and the number of customer-supplier business relationships around RFID tag requirements is few. This being said though, in apparel, the by far dominating product category using RFID tags, most retailers made use of inlay lists in communicating tagging requirements. Creating these lists require much effort, both by the retailers and the technology vendors.

With the multiplication of RFID deployments (IDTechEx estimates that the market share of Apparel-Retail in RFID in terms of turnover between 2014 and 2024 will grow from US$ 0.4b to US$ 8b[1]) and the exponential increase in RFID business relationships, these processes will soon become very complex, if not to say a hair-rising chaos to manage, in particular for suppliers. The immediate results of this complexity will become longer deployment phases and increased costs, costs that will automatically have to be passed on to the customers, be they retailers, brand owners or the consumer.

Providing a Tagged Item Performance Protocol along with a grading system will:

- Give retailers (or store operations) ***independence*** in setting RFID performance requirements. This means that different retailers do not have to agree on the performance levels (and use-cases) that they need, or even which product categories to tag.
- Provide suppliers (or supply operations) ***flexibility*** in how they meet those requirements. This means that suppliers have the responsibility to meet the required performance but may innovate within their supply chain on the best way to do it. They will benefit from scalability and may start using the advantages of the RFID tagged goods within their own processes.
- Allow repeatable testing to ensure that a supplier's tagged items meet the performance requirement(s) of the retailer.

The basics for developing a grading system were to determine common definitions and methods for specifying and verifying the performance of RFID tagged-items for all retail use-cases. Moreover, it is intended to determine key performance indicators (KPIs) within a grade. These were the main tasks for the TIPP work group which led to the agreed grading system.

[1] IDTecEx, RFID Data and Progress, April 2015

4 A few basics

4.1 What is an RFID Performance Use Case ?

In order to express what the requirements are for a given "performance use case", we list here a few factors that will have an influence on the performance of a tagged-item:

- Product type: Cotton jeans, silk blouse, leather/metal shoe, polyester socks,…
- Fixturing / display type: hang tag, care label, etc. / folded on table, hanging on rack, folded in wall, etc.
- Reader type: handheld, portal, overhead, other,…
- "Read" activity type: cycle count, Point-of-sale, Electronic Article Surveillance,…

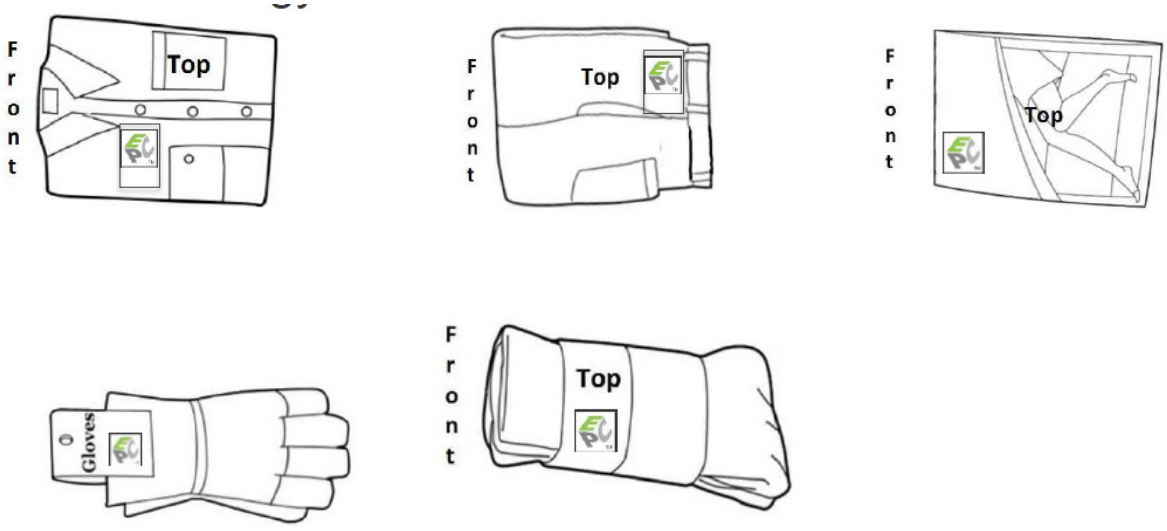
Example: the required TIPP grade is depending on the item layout in the store and the read scenario: a handheld scanner requires less read range, and thus a lower performing TIPP grade than a fixed overhead ceiling reader.

By establishing a performance specification for the combination of all these subcomponents, TIPP has developed a simple specification **while still allowing independent measurement and validation of the specification by both retailer and supplier**.

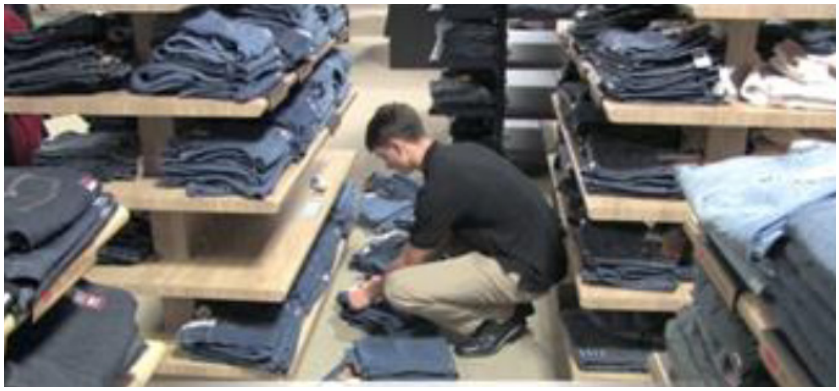
4.2 What is a tagged item?

RFID tags are attached to the product to create an RFID tagged-item?

The performance protocol is all about the tagged-item: it is **not** about the RFID tag, the inlay, the label, the chip, the antenna or any other RFID component. In short, the object of this protocol is not the performance of RFID in itself, but the read performance of the RFID tag that is attached to the (commerce) item.



4.3 How can items be displayed?



vs.

4.4 Who are the stakeholders and their respective roles?

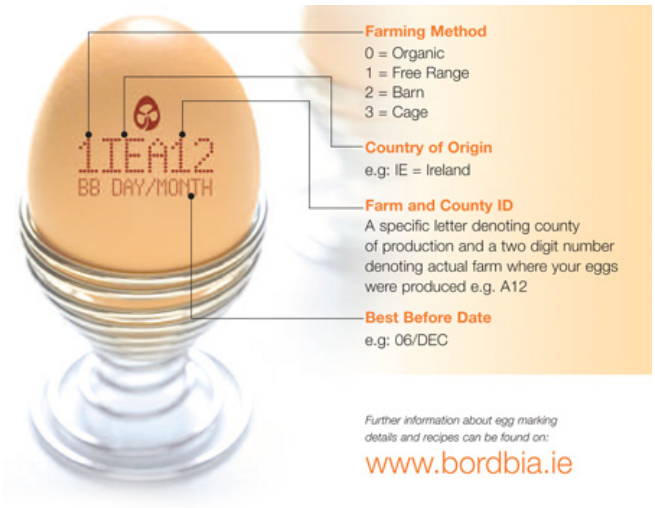
Stakeholder	Role
Retailer	Identifies TIPP grades that meet use-case requirements. Implements inbound verification
Supplier	Ensures tagged items meet retailers' grade requirements. A supplier can be a brand owner or a manufacturer
System Integrator	Qualifies a solution based on TIPP grades. Assists the Industry in developing new grades
Tagging Solution Providers	Offer services to assist suppliers to comply with TIPP requirements.
Technology Providers	Deliver TIPP-aware products and contributes to TIPP understanding and education
Testing Labs	Provide data about tagged item performance on representative product types

5 Grading systems

Grades simplify communication and enhance understanding. It all comes down to agree on a specific set of grades so that all involved understand what is meant and act accordingly. Without the requirement of any previous technical background, each user of the grading system should be in a position to understand which type (grade) of product (s)he needs in which type of situation.

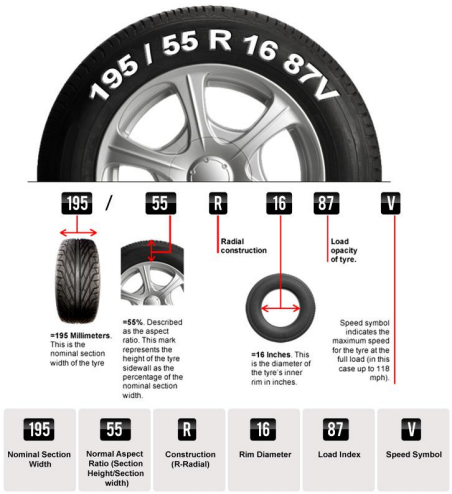
5.1 A few examples in other sectors

In Fresh Food

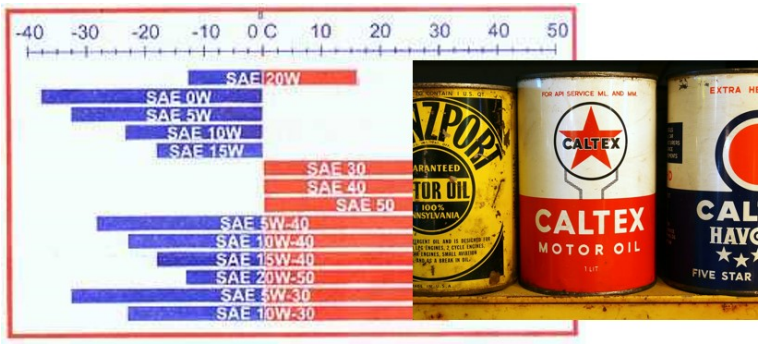


For Electricity Efficiency

In the Automotive Industry (tyres)



In the Automotive Industry (engine oil)



5.2 Grading precedent in retail

A grading system with respect to GS1 standards is nothing new to retail. Today if a barcode cannot be properly decoded or is scanned with a delay it's more than just time at the cash register or the warehouse that is lost. Every time a human has to manually enter data into a system there is potential for error as well as delay. To minimise faulty reads, delays and errors at the check-out or

the warehouse, GS1 offers a Barcode Scanning and Verification Service through its member organisations, that determines a GS1 Barcode's distinct levels with respect to quality and conformance to GS1 specifications and summarizes this in a simple grading system.

5.3 TIPP Grading system

5.3.1 Basics

TIPP Grades
S05B
S15B
S20B
M05B
M10B
M15B
S15D
M20D

The principle of the TIPP grading system is simple:

- The grading system consists of grade names which are built up as follows :
  - <Letter><Number><Letter>-<region>, which stand for
  - <Test><Performance><Class>-<region>
- Within the same test scenario and class, higher numbers indicate higher performance
- Grades from different classes or test scenarios cannot be ranked
  - "S" stands for single item, "M" stands for multiple items
  - The numbers (05, 10, 15, 20, etc…) specify item factor performance levels
  - Letters "B","D", and "V" specify the family to which the grade belongs.
  - An optional 4th component specifies the frequency restriction for the grade.

5.3.2 What's in a TIPP grade?

A TIPP grade contains the relevant performance factors for a RFID tagged-item operating in a retail environment. Specifically:

- **Orientation** : The position of the interrogator antenna relative to the tagged-item
- **Sensitivity** : the minimum power required for the tagged-item to respond to an RFID interrogator
- **Backscatter Power** : the effective power level of the tagged-items response

5.3.3 Benefits of a grading system:

- TIPP grades are :
  - Verifiable
  - Independent of product category or use case
- Retailers are able to :
  - Set performance levels independently
  - Select category and use case independently
  - Continually monitor tagged-item performance

Example: due to the way items are presented in the store, e.g. folded on a table at a stack of 6 items, a specific item may need a "higher" grade at retailer A than at retailer B, as retailer B might present it in a different way.

- Suppliers are able to :
  - Combine requirements from multiple retailers
  - Continually verify tagged-item performance

Example: if for a specific product, retailer A requires a "higher" grade than retailer B, then the supplier may choose to use the "higher" grade for all instances of that specific product. This will prevent the supplier to work with 2 different processes (applying tags of 2 different grades) and it will help him to achieve economies of scale, preferring 1 brand and type of tag rather than 2 different tag providers. One purchase of 200.000 tags with provider X and another purchase of 250.000 tags with tag provider Y will generally be more expensive than a single purchase of 450.000 tags with provider X, Y or Z.

5.3.4 What is TIPP NOT?

TIPP is **not** a certification programme, i.e. it can and should not be used for the certification of EPC/RFID tags, as tag performance depends on various factors. Grades depend on use cases and do not objectively reflect an EPC/RFID tag's quality. TIPP is **not** a use case requirement, i.e. EPC/RFID uses cases are in general independent of TIPP.

TIPP is **not** a replacement for GS1 tagging guidelines, i.e. TIPP does not tell the user where to best position an EPC/RFID tags on the garment and/or how to encode the tag itself.

TIPP is **not** a quality guideline or acceptance criteria, see above.

TIPP is **not** a performance requirement for tags, inlays or labels

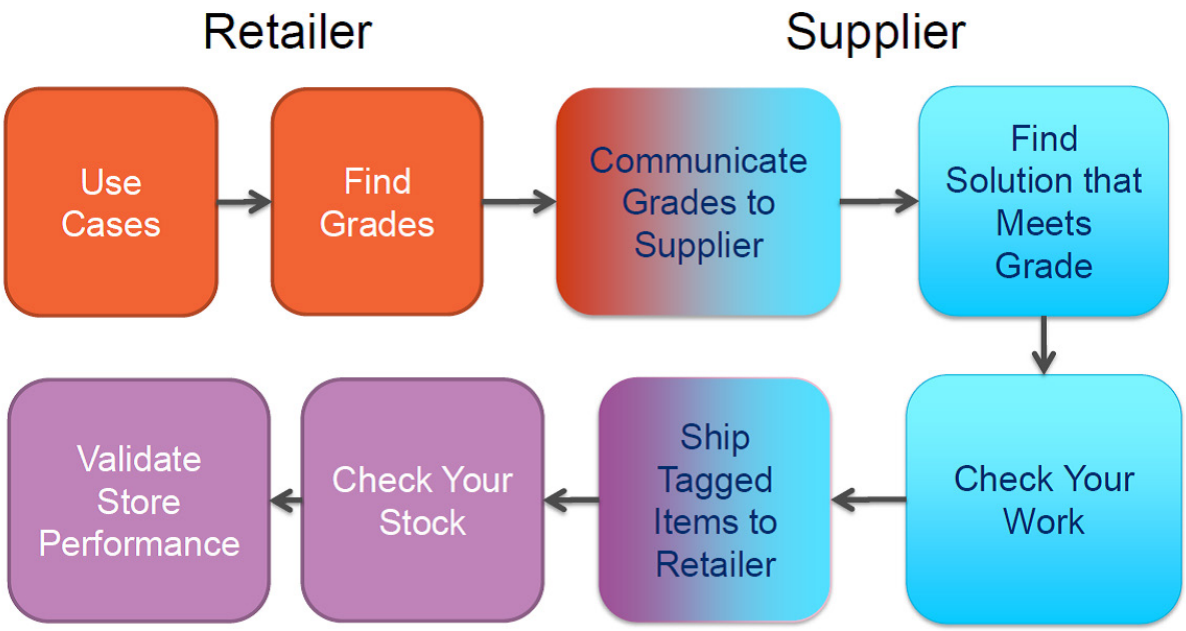
TIPP is **not** a placement or folding requirement for retail display, i.e. TIPP accounts for the most common placement and folding scenarios, but does not require that products need to be presented in that way.

6 How does it work in practice?

1. Retailer defines the use case
2. Retailer selects the appropriate grade that supports the use case.
   a. Either retailer builds a tagged-item performance specification for store use case and selects a grade that matches most closely
   b. Or retailer selects a grade level based on some degree of past experience with similar use cases and then performs store testing to validate.
3. Retailer communicates the grades to the supplier, as part of a larger RFID-tagging specification

1. Supplier measures tagging solution using the Tagged-Item Testing Methodology and verifies that its tagging solution meets the grade level specified by the retailer
2. Supplier ships the tagged items to the retailer, who then may verify themselves (or a 3rd party) that supplier's items meet the specified grade level.

3. Retailer conducts performance audit to ensure tagged items with the specific grade level meet the desired retail store performance levels.



7 To summarize:

- Grading is a widely accepted and adopted method to simplify communication and resolve technical complexity
- TIPP does not change the generic retail supply chain, it just puts accountability in the right place and improves scalability.
- Transition from inlay lists to the adoption of TIPP is necessary to secure scalability and cost efficiency.
- Selecting a grade is easier than selecting an inlay and can even be done by the retailer.
- The transition from inlay lists to TIPP grades does not require any changes in the store routines

8 Why waiting will not pay off

Aerospace industry already ratified standard AS5678A around RFID tagging with a grading system in 2007. Why? Because industry specific standards streamline business, ease communication, and save money for all the stakeholders. RFID drives enormous benefits to aerospace routines in emergency equipment maintenance, spare part management, and in tool tracking. It's been so good that they even updated the standard in 2015.

As another reference, how do retailers go about with barcoding? The power of GS1 standards, numbering systems and validation methods are rather obvious.

In apparel retail there is no question whether RFID works or not. It works. There is even no question about the ROI. RFID pays back. So why wouldn't a retailer just go ahead using RFID in their own way, and forget about TIPP? Because it is not really an option:

The highly integrated supply chains of this century require common markings, interfaces, procedures and standards among competing businesses. Proprietary may work for a while, but eventually most businesses utilize standards. It is the same with RFID (EPC Class1 Gen2), and the sooner a retailer adopts the TIPP standard for communicating tagging requirements, the faster they

will generate the benefits and gain the ability to scale to new product categories. A standard simplifies communication, takes down costs, and puts accountability in the right place.

The longer you delay the adoption of a standard, the bigger the eventual adjustment, and smaller the figure will be under the bottom line.

9 Dispelling a few myths

- "I do my own performance tests and grades."
  - Please share with the TIPP community. Using a common test and grade mechanism will save you and your supplier's time.
- "TIPP will not work in my local frequency / bandwidth."
  - TIPP specifies grades across FCC and ETSI frequency bands. Subsets of these bands are permitted for local/national supply chains.
- "TIPP will result in endless testing efforts across stores."
  - TIPP saves testing. Once a performance level/grade is determined, the does not need to be comprehensive testing of new inlays. This allows rapid adoption of new technology

10 This is how to move forward

If you are interested in implementing TIPP for your planned or running RFID project/projects, here is how to move forward:

- Retailer: Get in touch with the stakeholders within your RFID project, that could be System Integrators, RFID Tagging Solution Providers and/or Technology Providers to determine whether they are TIPP ready. If not so, point them to the technical documentations to be obtained through the GS1.org website that are listed below.
- Supplier: See whether your customers use already TIPP to specify required performance levels. If yes, contact your RFID Tagging Solution Providers to determine whether they comply with TIPP and whether they are able to deliver tags that correspond with the required performance levels / grades. If not so, point them to the technical documentations to be obtained through the GS1.org website that are listed below.
- Solution Providers: Get yourself TIPP ready and make TIPP grades an internal part of your product / tag specifications. To do so, please consider the technical documentations listed below.

Refer to the technical documents, other information sources such as the GS1 TIPP website.