RFID technology is spreading in versatile areas of application. In logistics the possibility of bulk reading is often considered as the key benefit of this technology. Fraunhofer IML developed principals/methods which do not only compensate writing and reading faults but also add new features/properties/qualities to bulk reading.

Shadowing effects and failures of transponders often inhibit the reading reliability which is necessary in practice. Loss of information and uncertainty of the process are following and expensive manual repair and restoring work is mandatory.

The solution is to use special algorithms to code package data while building loading units and to distribute the result to several transponders. The algorithms allow the secure recovery of information, even if single package transponders have been destroyed, removed, have not been read or even not been written.

With this method any accompanying information which is bound to a loading unit - for example a shipping note - can be distributed and can be stored on the package transponders of the unit load. Additional data storage media for storing such accompanying information are no longer necessary at the loading unit. This information forms a »virtual shipping note«.

Eliminated Faults

The use of this encoding method requires packages equipped with writeable transponders. Data of all transponders to back up are being encoded by applying this procedure and the resulting data are being added as an additional data record to the original data of each tag: Data are redundant. Each tag »knows« something about the data of the other transponders.
The redundancy level and therewith the reading safety is scalable. The adjustable redundancy level allows the complete loss of single information carriers.

**Data Privacy Protection is Assured**

Additional redundant information on the transponders can’t be decoded any more after the packages of the loading unit have been decollated. It is not possible to conclude the whole content with the data of only one transponder.

All additional data of a tag are being encoded in a manner that data of other tags serve as a key for decoding. This proceeding is the guarantee that the receiver of a package doesn’t find out something about the data of any of the other packages.

**Data and Loading Unit**

Beside the packages data in many cases there are existing other data assigned to the loading unit. These accompanying data refer to all packages of the loading unit as a whole. A possible specification is a shipping note, which can be available in print and can be connected with the loading unit.

Other Possibilities are to store these data on a server and recall them via a computer network or to apply an additional tag to the loading unit. This produces additional costs and a »single point of failure«, what should be avoided.

**Faithful Travel Companion**

On the basis of the redundant encoding and distribution of data described above additional shipping note data can be stored in this way on the transponder tags of the packages. This »virtual shipping note« can be safely read and is intrinsically tied to the packages. It will be destroyed after decomposing the loading unit. No central server, no computer network and no loading equipment with an additional transponder are required.

**Tailored Solutions**

We would like to advise you to analyze the benefits of this encoding technique for your logistic process. We deliver the required programs and support you in the system installation.

For the use of our procedures sophisticated programs are available. Integration with the logistic process and the right choice of the redundancy degree/level result from the application.

We offer further optimal encoding procedures, data compression procedures and procedures which distribute these data to the blocks of a tag in an optimal way. Herewith capabilities can be used to store more data, to increase data availability and to reduce access times. There are as many applications as you can find logistic scenarios.

We are waiting for your call/questions!

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1. At the goods issue shipping note data are being encoded and written to the packages transponders. Subsequently the loading unit is being packed.
2. Bulk reading is done at the goods receipt. Shipping note data are being reconstructed of the potentially not completely read data of the individual transponders.

**The Benefits at a Glance:**

- Secure bulk registration even in case of - loss of transponders
  - damage
  - shadowing effects
- Storage of accompanying information - no additional transponders necessary
  - flow of information synchronous to data flow
  - fault tolerant storage
- Scalable safety
- Warranty of data safety