BACKGROUND ON THE USE OF RFID IN THE DOD SUPPLY CHAIN

Attachment 1 – Background and requirement for RFID in the DOD Supply Chain

General Overview

RFID systems carry data in suitable transponders, generally known as tags, and retrieve data, by machine-readable means, at a suitable time and place to satisfy particular application needs. Tags have a discrete memory capacity that varies from a small license plate to thousands of records. Data within a tag may provide any level of identification for an item during manufacture, in-transit, in-storage, or in-use. With additional data, the tag may support applications that need item-specific information. For example, shipment consignee or destination ports can be readily accessed upon reading the tag. In addition to tags, an RFID system requires a means for reading or "interrogating" the tags to obtain the stored data and then some means of communicating this tag data to a DoD logistics information system.

Why RFID is essential to the DoD Supply Chain

The use of RFID in the DoD supply chain has the potential to provide real benefits in inventory management, asset visibility, and interoperability in an end-to-end integrated environment. RFID encapsulates the data accuracy advantages inherent in all types of automatic identification technology (AIT). Additionally, RFID is a totally non-intrusive methodology for data capture (requires no human intervention), is non-line of sight technology, and is a technology that may possess both read and write options within the same equipment item.

RFID addresses a key challenge that has been noted at every node within the DoD supply chain – lack of visibility of item data. As an integral aspect of the overarching suite of AIT capabilities, RFID will become a key technology enabler for the DoD logistics business transformation and will support long-term integration of the Unique Identification (UID) into the DoD end-to-end supply chain. RFID (both active and passive) is required by DoD to:

- Provide near-real time in-transit visibility for all classes of supplies and materiel
- Provide "in the box" content level detail for all classes of supplies and materiel
- Provide quality, non-intrusive identification and data collection that enables enhanced inventory management
- Provide enhanced item level visibility

RFID Policy Scope and Definition

RFID policy and the corresponding RFID tagging/labeling of DoD materiel are applicable to all items except bulk commodities (i.e., bulk liquids, sand, gravel etc.).

The types of RFID used within DoD will be driven primarily by the supported functional logistics business process with the goal of an integrated capability across all business processes and throughout all echelons of the DoD supply chain. Interoperability with our commercial business partners/suppliers will support the goal of streamlining the DoD supply chain.

RFID in the context of DoD usage falls into three broad categories based primarily on the technology currently in existence – active RFID, passive RFID, and semi-passive RFID. Active RFID uses an internal power source (battery) within the tag to continuously power the tag and its RF communication circuitry. Passive RFID relies on RF energy transferred from the reader/interrogator to the tag to power the tag. Semi passive RFID uses an internal power source to monitor environmental conditions, but requires RF energy transferred from the reader/interrogator similar to passive tags to power a tag response.

Active RFID allows extremely low-level RF signals to be received by the tag (since the reader/interrogator does not power the tag), and the tag (powered by its internal source) can generate high-level signals back to the reader/interrogator. Active RFID tags are continuously powered, whether in the reader/interrogator field or not, and are normally used when a longer tag read distance is desired.

Passive RFID tags reflect energy from the reader/interrogator or receive and temporarily store a small amount of energy from the reader/interrogator signal in order to generate the tag response. Passive RFID requires strong RF signals from the reader/interrogator, and the RF signal strength returned from the tag is constrained to very low levels by the limited energy. Passive RFID tags are best used when the tag and interrogator will be close to one another.

Semi-passive RFID tags use a process to generate a tag response similar to that of passive tags. Semi-passive tags differ from passive in that semi passive tags possess an internal power source (battery) for the tag's circuitry which allows the tag to complete other functions such as monitoring of environmental conditions (temperature, shock) and which may extend the tag signal range.

History of RFID in DoD

Both active and passive RFID technologies have been used in commercial business applications spanning the late 1980s through today. RFID has been used in systems, such as toll road applications (EZ-Pass), and used extensively for retail theft prevention (EAS-electronic article surveillance).

Within DoD, active RFID has been the technology application for in-transit visibility (ITV) applications on major end items and consolidated cargo moving via the Defense Transportation System (DTS). The current DoD environment for use of active RFID encompasses all Services, Agencies, and Combatant and Supporting Commands to provide the ITV necessary for the proper exercise of statutory Directive Authority for Logistics.

Use of passive RFID technologies in DoD has been limited to smaller pilots or proof of principle applications with no extensive development or use within the DoD to date.

RFID in the DoD Supply Chain

Emerging RFID technologies and capabilities encompass both active and passive technologies that enable an end-to-end system with the technology tailored to each specific portion of the supply chain. These technologies will leverage the work of the Auto-ID Center in the development of the Electronic Product Code (EPC) which is an inherent element of future RFID tagging/labeling in the commercial retail arena. DoD will embrace the use of commercial documentation standards (ISO standards) which will facilitate our partnership with industry and expedite efficiencies that will benefit both enterprises.

DoD RFID application requirements will be determined by answering the fundamental questions relating to RFID in the context of the specific supply chain function. These questions are:

- How Far – What must be the distance of the RFID tag read range?
- How Many – What is an acceptable or desired quantity of RFID tags to be read in the field of view of the reader/interrogator trying to collect and communicate data to a supporting Automated Information System (AIS)?
- How Fast – How fast is the RFID tag moving (conveyor belt, forklift, truck/motor vehicle, rail car, container crane, etc.) and how long will the RFID tag remain in the field of view of the reader/interrogator trying to collect and communicate data to a supporting AIS?
- How Much – What is the amount of data required to be stored on an RFID tag and then transmitted to a supporting AIS?

RFID applications span the length of the DoD supply chain to include:

- Receipt – Includes automatic update of inventory and valuation.
- Storage/ Issue – Includes inventory management.
- Transportation – Includes movement and consolidation for trans-shipment.
- Maintenance – Includes movement tracking and assembly/disassembly.
- Disposal – Includes hazardous material tracking.

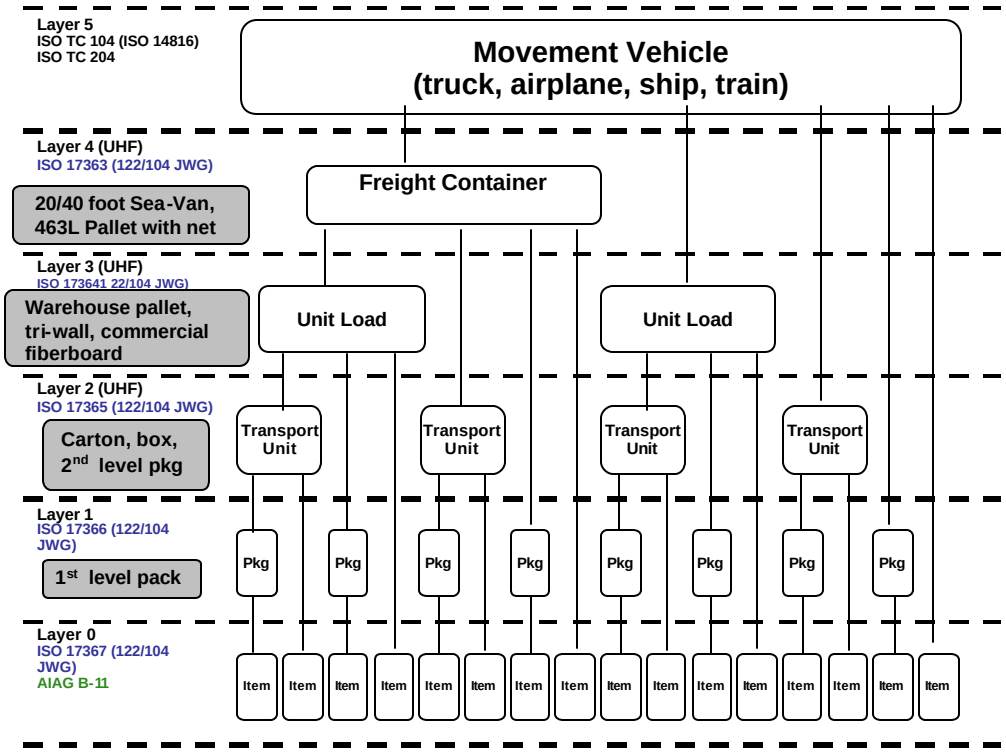
RFID Standards

The DoD will adhere to the appropriate ISO standards for RFID by types as follows:

- Technology – standards that apply to the specific technology; parameters and technical specifications by frequency.
- Data Content – standards that apply to the makeup and use of the data – Syntax and Semantics.
- Conformance – standards that apply to the media produced – quality and test specifications.
- Application – standards that apply to the various applications – freight containers, returnable containers, tire and wheel identification, supply chain applications.

In keeping with the development and adherence to international standards for RFID, the following are notional application levels for RFID tagging. The diagram depicts these same levels in graphical view along with the applicable standard.

Layers of Logistics Units and Applicable Standards (RFID)



- Layer 5 – Movement Vehicle (truck, aircraft, ship, train)

- Layer 4 – Freight container (20 or 40 foot SeaVans, 463L Pallets with net,): An article of transport equipment:
    - Of a permanent character and accordingly strong enough to be suitable for repeated use.
    - Specially designed to facilitate the carriage of goods by one or more modes of transport, without intermediate reloading.
    - Fitted with devices permitting its ready handling, particularly its transfer from one mode of transport to another.
    - So designed as to be easy to fill and empty.
    - Having an internal volume of 1 m^3 or more.
    - The term "freight container" includes neither vehicles nor conventional packing.

- Layer 3 – Unit Load (Warehouse pallet, tri-wall packaging, commercial fiberboard packaging): One or more transport units or other items held together by means such as pallet, slip sheet, strapping, interlocking, glue, shrink wrap, or net wrap, making them suitable for transport, stacking, and storage as a unit. In distribution, an item or assembly of items assembled or restrained for handling and transportation as a single entity.

- Layer 2 – Transport Unit (cartons, boxes – second level packaging): Packaging designed to contain one or more articles or packages or bulk material for the purposes of transport, storage, handling and/or distribution.

- Layer 1 – Package (first level packaging – the "bubble pack"): The first tie, wrap or container of a single item or quantity thereof that constitutes a complete identifiable pack. A product package may be an item packaged singularly, multiple quantities of the same item packaged together or a group of parts packaged together.

- Layer 0 – Product item (individual item): A first level or higher assembly that is sold in a complete end-usable configuration.