THE UNDER SECRETARY OF DEFENSE

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WASHINGTON, DC 20301-3010

ACQUISITION,
TECHNOLOGY
AND LOGISTICS

JUL 30 2004

MEMORANDUM FOR: SEE DISTRIBUTION

SUBJECT: Radio Frequency Identification (RFID) Policy

In my capacity as the Defense Logistics Executive (DLE), this memorandum issues the policy for implementing Radio Frequency Identification (RFID) across the Department of Defense (DoD). This policy finalizes the business rules for the use of high data capacity active RFID (Attachment 1) and finalizes the business rules for the implementation of passive RFID and the use of Electronic Product Code™ (EPC) interoperable tags and equipment (EPC Technology) within the DoD supply chain (Attachment 2). Attachment 3 prescribes the implementation approach for DoD suppliers/vendors to apply passive RFID tags. This policy memorandum applies to the Office of the Secretary of Defense (OSD); the Military Departments, the Joint Chiefs of Staff and the Joint Staff; the Combatant Commands; the Inspector General of the Department of Defense; the Defense Agencies, and the DoD Field Activities (hereafter referred to collectively as the "DoD Components"). An internal implementation strategy for DoD Components to read and apply passive RFID tags will be issued in a separate Defense Logistics Executive (DLE) decision memorandum. This policy supersedes two previous issuances of policy dated October 2, 2003 and February 20, 2004.

DoD Components will immediately resource and implement the use of high data capacity active RFID in the DoD operational environment. Attachment 1 outlines the detailed guidance on active tagging. DoD Components must ensure that all consolidated shipments moving to, from, or between overseas locations are tagged, including retrograde, and must expand the active RFID infrastructure to provide global intransit visibility. In order to take advantage of global RFID infrastructure not within DoD's control, the DoD Logistics Automatic Identification Technology Office will assess the ability to leverage any compatible active RFID commercial infrastructure that commercial entities may establish. This should not be viewed as direction to commercial carriers and port operators to establish an active RFID infrastructure.

Attachment 2 contains the detailed guidance on implementation of passive RFID capability within the DoD supply chain as well as the data constructs for the tags. DoD will use and require its suppliers to use EPC Class 0 and Class 1 tags, readers and complementary devices. DoD will migrate to the next generation tag (UHF Gen 2) and supporting technology. When the specification for UHF Gen 2 is finalized, the Department will announce a transition plan to this technology, but we expect use of EPC Class 0 and Class 1 technology for approximately two years.

Radio Frequency Identification will be a mandatory DoD requirement on solicitations issued on or after October 1, 2004 for delivery of materiel on or after January 1, 2005 in accordance with the supplier implementation plan at Attachment 3. Contracts with DoD shall require that passive RFID tags be applied to the case, pallet and item packaging for unique identification (UID) items in accordance with Attachment 3. The Defense Logistics Board (DLB) will review the internal implementation plan, benefits, compliance requirements, and requisite budget requirements annually based on an assessment of the implementation to date. This review will include an updated analysis of implementation success as well as provide guidance for expansion of RFID capabilities into additional applications and supply chain functional processes. A DLE decision memorandum will provide funding guidance for DoD Component implementation.

In order for the DoD Components to meet the requirements of this policy, we have developed a Department-wide RFID Concept of Operations (CONOPS) to outline the transformational role of RFID technology in DoD logistics and to articulate the specific uses of both active and passive RFID throughout the DoD supply chain. Components will prepare a supporting RFID implementation plan that encompasses both active and passive RFID technology in a cohesive environment to support the DoD vision. Active RFID implementation plans are already due and an update to include passive RFID implementations is due to the ADUSD (SCI) by October 29, 2004 to ensure total interoperability and standardized implementation throughout the Department.

To support the purchase of passive RFID technology and leverage the purchasing power of the Department, the Army's Program Executive Office Enterprise Information Systems (PEO EIS) continues development of a multi-vendor contract mechanism to procure EPC technology. This contract will include competitive vendors providing RFID equipment/infrastructure in accordance with current published EPC specifications (Class 0 and Class 1) and, when published, specifications for UHF Gen 2.

To institutionalize RFID as a standard way of doing business, this policy will be incorporated into the next update of the DoD Supply Chain Materiel Management Regulation (DoD 4140.1-R), the Defense Transportation Regulation (DoD 4500.9-R) and the Military Standard 129. Likewise, DoD Components will incorporate this policy into Service/Agency level publications as well as Component strategies to achieve compliance with the DoD Business Enterprise Architecture – Logistics (BEA-LOG).

The following policy also applies to take full advantage of the inherent life cycle management efficiencies of this technology: Beginning in FY 2007 and beyond – only RFID- capable AIT peripherals (e.g. optical scanners, printers used for shipping labels) will be acquired when these peripherals support RFID-capable business processes. Beginning in FY 2007 and beyond – logistics automated information systems (AISs) involved in receiving, shipping and inventory management will use RFID to perform business transactions, where appropriate, and AIS funding will hinge on compliance with this policy.

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Managers of all major logistics systems modernization programs will update appropriate program documentation to include the requirement for RFID capabilities as part of the system operational deployment in conformance with the business rules and initial timeline set forth in this policy. Managers of major acquisition programs will update programs as required to include the requirement for RFID capabilities where applicable. The DLB will review these requirements prior to FY 2007 implementation.

We will continue to partner with your staffs as well as our suppliers on this critical initiative. RFID remains part of the larger suite of AIT technologies and the Department will leverage all of these technologies, where appropriate in the supply chain, to improve our ability to support the warfighter. However, an RFID-capable DoD supply chain is a critical element of Defense Transformation and will provide a key enabler for the asset visibility support down to the last tactical mile that is needed by our warfighters. Your continued efforts are vital to our success in meeting this requirement. For further information, please refer to our website at www.dodrfid.org.

Michael W. Wynne
Acting

Attachments:
As stated

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Business Rules for Active RFID Technology in the DoD Supply Chain

1.1 Overview

Active Radio Frequency Identification (RFID) tags used in DoD are data rich and allow low-level RF signals to be received by the tag, and the tag can generate high-level signals back to the reader/interrogator. Active RFID tags can hold relatively large amounts of data, are continuously powered, and are normally used when a longer tag read distance is desired.

The DoD Logistics Automatic Identification Technology (LOG-AIT) Office is the DoD focal point for coordinating overarching guidance for the use of AIT within DoD. The Army Program Executive Office, Enterprise Information Systems (PEO EIS), Product Manager - Automatic Identification Technology (PM-AIT) Office is the DoD procurement activity for AIT equipment (to include RFID equipment and infrastructure) and maintains a standing contract for equipment integration, installation, and maintenance. The Defense Logistics Agency (DLA) is the procurement activity and single manager for active RFID tags. Users will coordinate RFID equipment/infrastructure procurement through the PM-AIT Office and tag procurement from DLA to ensure interoperability and compliance with this policy.

The following business rules are applicable to all DoD Components. They support asset visibility and improved logistic business processes throughout the DoD logistics enterprise. These rules specifically apply to DoD cargo shipped outside the Continental United States (OCONUS), however, organizations are encouraged to employ the use of active RFID technology for Intra-Continental United States (CONUS) shipments to support normal operations or for training.

1.2 Active RFID Business Rules

1.2.1 Sustainment/Retrograde Cargo

All consolidated sustainment or retrograde shipments (RFID Layer 4 freight containers (e.g., 20 or 40 foot sea vans, large engine containers and 463L air pallets) of DoD cargo being shipped OCONUS must have active, data-rich RFID tags written at the point of origin for all activities (including vendors) stuffing containers or building air pallets. Content level detail will be provided in accordance with current DoD RFID tag data specifications. Containers and pallets reconfigured during transit must have the

RFID LAYER 4

Equivalent to a "freight container." Excludes both vehicles and conventional packing. An article of transport equipment that is:

- ✓ 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 m3 or more. Long-term DoD AIT policy and standards support contractor.

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RFID tag data updated by the organization making the change to accurately reflect current contents.

CONTENT LEVEL DETAIL

Content level detail comprises two components: (1) Asset Level Detail (i.e. data elements that describe the asset) and (2) Content Level Detail - data elements that minimally identify each level of a complete shipment entity (a single shipment unit or a consolidated shipment).

1. Asset Level Detail. The minimum data elements required to describe the physical characteristics of a single asset, and the characteristics that identify that asset.

- ✓ National Stock Number (NSN)
- ✓ Nomenclature/Description Model Number
- ✓ Unit Price (U/P)
- ✓ Condition Code
- ✓ Serial Number / Bumper Number
- ✓ Serial Number Enterprise Identifier (if UID eligible)
- ✓ Part Number (if UID eligible, as applicable)
- ✓ Item Weight
- ✓ Item Cube
- ✓ Line Item Number (LIN)/Package Identification (PKGID)
- ✓ Ammunition Lot Number
- ✓ Department of Defense Identification Code (DODIC)
- ✓ Hazardous Cargo Descriptor Codes (to include ammo/ hazardous materiel).

2. Content Level Detail Visibility for Each Shipment Unit. The most basic transportation entity is a single box or unpacked item governed by a shipment unit identifier. The data elements are contained in the requisition document, Transportation Control and Movement Document (TCMD), commercial carrier transaction, and the Consolidated Shipment Information transaction that describes the shipment and shipment movement characteristics. Minimum data elements necessary to provide content level visibility for each shipment unit are:

- ✓ Requisition Document Number
- ✓ Required Delivery Date (RDD) or expedited shipment and handling codes
- ✓ Project Code
- ✓ Asset (item) Quantity
- ✓ Unit of Issue (U/I)
- ✓ 'From' Routing Indicator Code (RIC) (for DOD shipments)
- ✓ Inventory Control Point (ICP)
- ✓ RIC (for contractor/vendor shipments)
- ✓ Shipment Transportation Control Number (TCN) – for single shipment unit
- ✓ Intermediate TCN – for a multi-level consolidated shipment
- ✓ Conveyance (lead) TCN – for a consolidated shipment
- ✓ Commercial Carrier Shipment Tracking Identifier
- ✓ Transportation Priority
- ✓ Sender (Consignor) DODAAC/CAGE Code
- ✓ Ship Date
- ✓ Port of Embarkation (POE) Code
- ✓ Port of Debarkation (POD) Code
- ✓ Shipment Total Pieces
- ✓ Shipment Total Weight
- ✓ Shipment Total Cube
- ✓ Oversize Length/Width/Height
- ✓ Receiver (Consignee) DODAAC
- ✓ Commodity Class
- ✓ Commodity Code (air/water)
- ✓ Special Handling Code (air/water)
- ✓ Water Type Cargo Code
- ✓ Net Explosive Weight (NEW)
- ✓ Unit Identification Code (UIC)
- ✓ Unit Line Number (ULN)
- ✓ Operation/Exercise Name
- ✓ Hazardous Material (HAZMAT) Shipping Characteristics: United Nations Identification Number (UNID), Class or Division Number, Package Group, Compatibility Group.

1.2.2 Unit Movement Equipment and Cargo

All RFID Layer 4 freight containers and palletized unit move shipments being shipped OCONUS, as well as all major organizational equipment, must have active data-rich RFID tags written and applied at the point of origin for all activities (including vendors) stuffing containers or building air pallets. Content level detail will be provided in

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accordance with current DoD RFID tag data standards. Self-deploying aircraft and ships are excepted.

1.2.3 Ammunition Shipments

All RFID Layer 4 freight containers and palletized ammunition shipments being shipped OCONUS must have active data-rich RFID tags written with content level detail. Tags will be applied at the point of origin by all activities (including vendors) that stuff containers or build air pallets in accordance with current DoD RFID tag data specifications. Containers and pallets reconfigured during transit must have the RFID tag data updated to accurately reflect current contents by the organization making the change.

1.2.4 Prepositioned Materiel and Supplies

All RFID Layer 4 freight containers and palletized prepositioned stocks or War Reserve Materiel as well as all major organizational equipment, must have active data-rich RFID tags written with content level detail and applied at the point of origin by all activities (including vendors). Execution for current afloat assets will be completed during normal maintenance cycle, reconstitution/reset, or sooner as required.

1.2.5 RFID Infrastructure

USTRANSCOM will ensure that designated strategic CONUS and OCONUS aerial ports and seaports (including commercial ports) supporting Operation Plans (OPLANs) and military operations have RFID equipment (interrogators, write stations, tags, brackets) with read and/or write capability to meet Combatant Commander requirements for asset visibility. Military and commercial ports will be instrumented with fixed or mobile RFID capability based on volume of activity and duration of the requirement at the port.

Military Departments and Combat Support Agencies will ensure sufficient RFID infrastructure and equipment (interrogators, write stations, tags, and brackets) are appropriately positioned to support Combatant Commander requirements for asset visibility. As above, military and commercial ports will be instrumented with fixed or mobile RFID capability based on volume of activity and duration of the requirement at the port.

To ensure that users take maximum advantage of inherent efficiencies provided by this technology, RFID capability will be operational at logistic nodes and integrated into existing and future logistics automated information systems. RFID recorded events will become automatic transactions of record. Geographical Combatant Commanders may direct Service Components/Combat Support Agencies to acquire, operate, and maintain additional theater supporting RFID infrastructure to meet changing theater operations.

As a general rule, an organization responsible for port or logistics node operation is also responsible for installing, operating, and maintaining appropriate RFID capability. Additionally, when responsibility for operating a specific port or node changes (e.g., aerial port operations change from strategic to operational), the losing activity is responsible for coordinating with the gaining activity to ensure RFID capability continues without interruption.

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1.3 RFID Funding

The cost of implementing and operating RFID technology is considered a normal cost of transportation and logistics and as such should be funded through routine Operations and Maintenance or Working Capital Fund processes. It is the responsibility of the activity at which containers, consolidated shipments, unit move items, or air pallets are built or reconfigured to procure and operate sufficient quantities of RFID equipment to support the operations. Working Capital Fund activities providing this support will use the most current DoD guidance in determining whether operating cost authority or capital investment program authority will be used to procure the required RFID equipment. If the originating activity of the Layer 4 container/consolidated air pallet is a vendor location, it is the responsibility of the procuring Service/Agency to arrange for the vendor to apply active tags, either by obtaining sufficient RFID equipment to provide the vendor to meet the requirement, or requiring the vendor as a term of the contract to obtain necessary equipment to meet the DoD requirement. Additionally, Combatant Commanders are responsible for coordinating with their Service Components to ensure adequate enroute RFID infrastructure is acquired and operating at key logistics nodes.

1.4 RFID Tag Return

The DLA automated wholesale management system will provide tags through existing supply channels. The DoD Item Manager for the active RFID tags (NSN 6350-01-495-3040) is the Defense Supply Center Philadelphia, Inventory Control Point, Routing Identifier Code S9I. Only new Condition Code A tags will be sold to customers.

All returned tags that are serviceable after refurbishment will be received into wholesale inventory as Condition Code B and will be available as free issue from the DLA Defense Distribution Center (DDC) when they are placed on a pallet or container by DDC. This will spread the savings across the DoD Community of active tag users. When DDC requisitions tags, Condition Code B tags will be issued first. If there are no Condition Code B tags available for issue to the DDC, the DDC will pay the standard price for Condition Code A tags. Activities are encouraged to use the Defense Logistics Management Supplement Materiel Returns Program (MRP) to return tags no longer required and receive reimbursement for packaging, crating, handling, and transportation (PCH&T) costs. Excess tags sent back without MRP transactions will not result in PCH&T reimbursement to the customer. The PCH&T reimbursement incentive for tags received with MRP transactions will result in reduced costs and savings to DoD from reusing the Condition Code B tags. The Military Services, other requisitioners, and users may opt to establish their own retail operation for used tags and incur the cost of refurbishment themselves.

1.5 RFID Tag Formats

The DoD LOG-AIT Office is responsible for coordinating, establishing, and maintaining RFID tag formats at the data element level. RFID tagging procedures require active data-rich RFID tags be written with content level detail in accordance with approved formats - *RF-Tag Data Format Specification, Version 2.0*, the current version. RFID tag data files will be forwarded to the regional in-transit visibility (ITV) server(s) in accordance with established DoD data timeliness guidelines published in the current versions of the DoD

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4500.9-R, Defense Transportation Regulation and Joint Publication 4-01.4, Joint Tactics, Techniques, and Procedures for Joint Theater Distribution. RF Tag data is further transmitted to the Global Transportation Network (GTN) and other global asset visibility systems as appropriate. This tag data flow will be analyzed in the future as part of the DPO architecture. RF tag formats will be identified in the current version of DoD 4500.9-R, Defense Transportation Regulation, and the format requirements will be published in MIL STD 129, DoD Standard Practice for Military Marking for Shipment and Storage. It is the intent of the Department to incorporate all RFID tag formats and usage standards into a DoD RFID manual.

1.6 RFID ITV Server Management

The PM-AIT Office will manage the RFID ITV servers. All DoD Component operated RFID interrogators will forward their data to the ITV servers maintained by PM-AIT. This will enable the PM-AIT Office to program for funding and provide a centralized management structure for the regional ITV servers, including the ITV server on the Secret Internet Protocol Router Network (SIPRNET). PM-AIT is responsible for ensuring that ITV system performance and information assurance requirements are in accordance with DODD 8500.1, *Information Assurance (IA),* and DODI 8500.2, *Information Assurance (IA) Implementation.* The Non-classified Internet Protocol Router Network (NIPRNET)-based ITV servers must be interoperable with GTN, GTN 21, Joint Total Asset Visibility, and Integrated Data Environment, and other DoD logistics systems as determined by the PM-AIT Office and the user representative(s). The SIPRNET-based ITV server must interoperate with the Global Combat Support System, Global Command and Control System, and other classified systems as determined by PM-AIT and the User Representative(s). PM-AIT is responsible for maintaining the accreditation and net worthiness certification of all ITV servers.

1.7 Wireless Encryption Requirements

Per the DoD Wireless Policy (DODD 8100.2), encryption requirements do not apply to the detection segment of a personal electronic device (PED) e.g., the laser used in optical storage media; between a barcode and a scanner head; or Radio Frequency (RF) energy between RF identification tags, both active and passive, and the reader/interrogator.

1.8 Frequency Spectrum Management

PM-AIT office will continue to assist DoD Components in frequency management issues related to active RFID tags and equipment purchased under the DoD RFID contracts by PM-AIT.

RFID tags that meet the technical specifications of 47 CFR 15 of the FCC's Rules and Regulations for Non-Licensed Devices, i.e. Part 15, must accept and may not cause electromagnetic interference to any other federal or civil RF device. 47 CFR 15 only applies to use of these devices within CONUS and other US Possessions. DoD components will forward requests for frequency allocation approval via command channels to the cognizant military frequency management office to ensure that RFID tags comply with US national and OCONUS host-nation spectrum management policies. RFID tags and infrastructure may require electromagnetic compatibility analysis to

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quantify the mutual effects of RFID devices within all intended operational environments, e.g. Hazards of Electromagnetic Radiation to Ordnance (HERO) and Hazards of Electromagnetic Radiation to Fuel (HERF).

(References: International Telecommunications Union (ITU) Radio Regulations (Article 5); National Telecommunications and Information Administration (NTIA) Manual of Regulations and Procedures for Federal Radio Frequency Management; DoD Directive 3222.3, Department of Defense Electromagnetic Compatibility Program, 20 Aug 1990; DoD Directive 4650.1, Policy for Management and Use of the Electromagnetic Spectrum, 8 Jun 04).

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Business Rules for Passive RFID Technology in the DoD Supply Chain

2.1 Overview

Passive Radio Frequency Identification (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, while the RF signal strength returned from the tag is constrained to low levels by the limited energy. This low signal strength equates to a shorter range for passive tags than for active tags. The DoD approved frequency range for passive RFID implementation is UHF 860-960 MHz.

The DoD Logistics Automatic Identification Technology (LOG-AIT) Office is the DoD focal point for coordinating overarching guidance for the use of AIT within DoD. The Program Executive Office, Enterprise Information Systems (PEO EIS), Product Manager - Automatic Identification Technology (PM-AIT) Office is the DoD procurement activity for AIT equipment (to include RFID equipment and infrastructure) and will establish a standing contract for equipment installation and maintenance. Beginning in FY 2007, only RFID capable AIT peripherals (e.g. optical scanners and printers used for shipping labels) will be acquired when those peripherals support RFID-capable business processes. Beginning in FY 2007, logistics automated information systems (AISs) involved in receiving, shipping, and inventory management will use RFID to perform business transactions, where appropriate. AIS funding will hinge on compliance with this policy. The Defense Logistics Board (DLB) will review these requirements prior to FY 2007 implementation.

2.2 Passive RFID Business Rules

The following prescribes the business rules for the application of passive RFID technology at the case, pallet, and item packaging (unit pack) for Unique Identification (UID) items on shipments to and within DoD. These rules are in addition to the UID requirement for data element identification of DoD tangible assets using 2D data matrix symbology marking on the item itself. To facilitate the use of RFID events as transactions of record, the DoD has embraced the use of Electronic Product Code™ (EPC) tag data constructs, as well as DoD tag data constructs, in a supporting DoD data environment. As the available EPC technology matures, the intent is to expand the use of passive RFID applications to encompass individual item tagging.

2.3 Definitions:

The following definitions apply to passive RFID technology and tags in support of the DoD requirement to mark/tag materiel shipments to DoD activities in accordance with this policy (Figure 1 depicts the definitions graphically):

EPC Technology: Passive RFID technology (readers, tags, etc.) that is built to the most current published EPCglobal Class 0 and Class 1 specifications and that meets interoperability test requirements as prescribed by EPCglobal™. EPC

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Technology will include Ultra High Frequency Generation 2 (UHF Gen 2) when this specification is approved and published by EPCglobal™.

Unit Pack: A MIL-STD-129 defined unit pack, specifically, the first tie, wrap, or container applied to a single item, or to a group of items, of a single stock number, preserved or unpreserved, which constitutes a complete or identifiable package.

Case (either an exterior container within a palletized unit load or an individual shipping container):

- **Exterior Container:** A MIL-STD-129 defined container, bundle, or assembly that is sufficient by reason of material, design, and construction to protect unit packs and intermediate containers and their contents during shipment and storage. It can be a unit pack or a container with a combination of unit packs or intermediate containers. An exterior container may or may not be used as a shipping container.
- **Shipping Container:** A MIL-STD-129 defined exterior container which meets carrier regulations and is of sufficient strength, by reason of material, design, and construction, to be shipped safely without further packing (e.g., wooden boxes or crates, fiber and metal drums, and corrugated and solid fiberboard boxes).

Pallet (palletized unit load): A MIL-STD-129 defined quantity of items, packed or unpacked, arranged on a pallet in a specified manner and secured, strapped, or fastened on the pallet so that the whole palletized load is handled as a single unit. A palletized or skidded load is not considered to be a shipping container.

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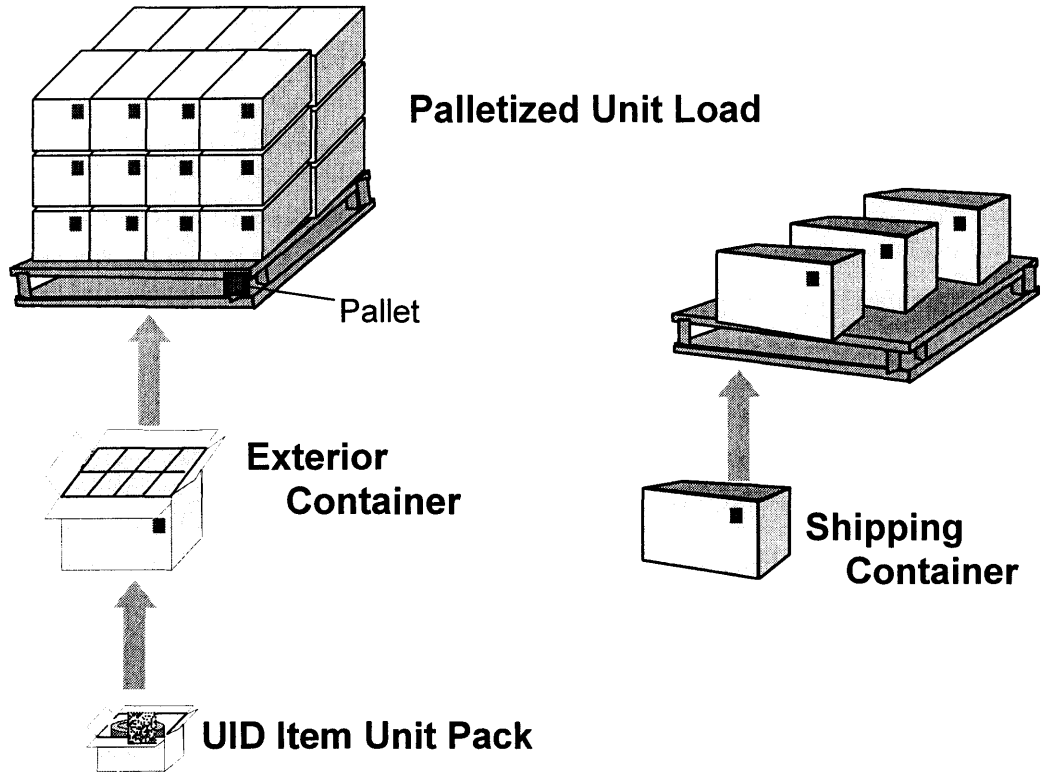
Figure 1



2.4 Case, Palletized Unit Load, UID Item Packaging Tagging/ Marking

DoD sites where materiel is associated into cases or pallets will tag the materiel and supplies at that site with an appropriate passive RFID tag prior to further trans-shipment to follow-on consignees. The Defense Logistics Agency has committed to enabling the strategic distribution centers at Defense Distribution San Joaquin, CA (DDJC) and Defense Distribution Susquehanna, PA (DDSP) with passive RFID capability by January 1, 2005.

Per the schedule outlined in Attachment 3 of this memo, case, pallet, and item packaging (unit pack) for Unique Identification (UID) items will be tagged at the point of origin (including vendors) with passive RFID tags, except for the bulk commodities listed in Section 2.4.1. If the unit pack for UID items is also the case, only one RFID tag will be attached to the container.

2.4.1 Bulk commodities not included

The following bulk commodities are defined as those that are shipped in rail tank cars, tanker trucks, trailers, other bulk wheeled conveyances, or pipelines.

- Sand
- Gravel

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- Bulk liquids (water, chemicals, or petroleum products)
- Ready-mix concrete or similar construction materials
- Coal or combustibles such as firewood
- Agricultural products – seeds, grains, animal feeds, and the like.

2.4.2 Contract/Solicitation Requirements

Per the schedule outlined in Attachment 3 of this memo, new solicitations for materiel issued after October 1, 2004, for delivery after January 1, 2005, will contain a requirement for passive RFID tagging at the case (exterior container within a palletized unit load or shipping container), pallet (palletized unit load), and the UID item packaging level of shipment in accordance with the appropriate interim/final Defense Federal Acquisition Regulation Supplement (DFARS) Rule/Clause or MIL-STD-129 as appropriate.

2.5 Passive UHF RFID Tag Specifications

The DoD approved frequency range for the tags is 860-960 MHz with a minimum read range of three meters. Until the EPC UHF Gen 2 tag specification is published and quantities of UHF Gen 2 items are available for widespread use, the DoD will accept the following EPC tags:

- Class 0 64-bit read-only
- Class 1 64-bit read-write
- Class 1 96-bit read-write

The above listed tags will be utilized for initial shipments from suppliers in compliance with appropriate contractual requirements to tag items shipped to DoD receiving points commencing January 1, 2005.

When the UHF Gen 2 EPC technology is approved and has completed any required compliance and/or interoperability testing, the DoD will establish firm tag acceptance expiration dates (sunset dates) for EPC Version 1 (class 0 and 1) tags and will accept only UHF Gen 2 EPC tags thereafter. The DoD goal is to migrate to use of an open standard UHF Gen 2 EPC tag, Class 1 or higher, that will support DoD end-to-end supply chain integration.

Anticipated Passive EPC Version 1 Tag sunset dates for suppliers shipping to DoD:

- Class 0 – 64 bit: At a minimum, 2 years from the publication of the specification for UHF Gen 2 – subject to the availability and product maturity of this technology, i.e., UHF Gen 2.
- Class 1 – 64 bit: At a minimum, 6 months from the general commercial availability and product maturity of Class 1 96 bit tags.
- Class 1 – 96 bit: At a minimum, 2 years from the publication of the specification for UHF Gen 2 – subject to the availability and product maturity of this technology, i.e., UHF Gen 2.

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As outlined below, suppliers to DoD must encode an approved tag using either a DoD tag data construct or an EPC tag data construct. Suppliers that choose to employ the DoD tag construct will use the Commercial and Government Entity (CAGE) code previously assigned to them and encode the tags per the rules that follow. Suppliers that are EPCglobal subscribers and possess a unique EPC manager number may choose to use the EPC tag data construct to encode tags per the rules that follow. Suppliers must ensure that each tag identification is unique.

Passive UHF RFID Tag Specifications

Class	User Memory Size (bits)	Origin	Encoding	Tag Data Constructs
0	64	Supplier	EPC	Serialized Global Trade Item Number (SGTIN) Global Returnable Asset Identifier (GRAI) Global Individual Asset Identifier (GIAI) Serialized Shipment Container Code (SSCC)
0	64	Supplier	DoD	DoD Tag Construct
1	64	Supplier	EPC	Serialized Global Trade Item Number (SGTIN) Global Returnable Asset Identifier (GRAI) Global Individual Asset Identifier (GIAI) Serialized Shipment Container Code (SSCC)
1	64	Supplier	DoD	DoD Tag Construct
1	96	Supplier	EPC	Serialized Global Trade Item Number (SGTIN) Global Returnable Asset Identifier (GRAI) Global Individual Asset Identifier (GIAI) Serialized Shipment Container Code (SSCC)
1	96	Supplier	DoD	DoD Tag Construct
1	96	DoD	DoD	DoD Tag Construct

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2.5.1 Passive UHF RFID Tag Data Structure Requirements – SUPPLIERS SHIPPING TO DoD – EPCglobal Subscribers using an EPCglobal tag data construct

Tag Requirement	EPC Data Construct	When Used
UID Unit Pack	SGTIN	On item packaging for items meeting the DoD criteria for assignment of UID where a serial number is used to augment a GTIN which is used for the unique identification of trade items worldwide within the UCC.EAN System.
	GRAI	On item packaging for items meeting the DoD criteria for assignment of UID (reusable package or transport equipment of specific or certain value).
	GIAI	On item packaging for items meeting the DoD criteria for assignment of UID (used to uniquely identify an entity that is part of the fixed inventory of a company – GIAI can be used to identify any fixed asset of an organization).
Case, Pallet	SGTIN	Items shipped as either pure case, or pallet (see above)
	SSCC	Items shipped as either pure or mixed case, pallet, (SSCC can be used by all parties in the supply chain as a reference number to the relevant information held in computer database or file).

Layout for 64 Bit EPCglobal Data Constructs

Tag Type	Header	Filter Value	Company Prefix	Item Reference	Serial Number
SGTIN	2	3	14	20	25
Tag Type	**Header**	**Filter Value**	**Company Prefix**	**Asset Type**	**Serial Number**
GRAI	8	3	14	20	19
Tag Type	**Header**	**Filter Value**	**Company Prefix**	**Individual Asset Reference**	
GIAI	8	3	14	39	
Tag Type	**Header**	**Filter Value**	**Company Prefix**	**Serial Reference**	
SSCC	8	3	14	39	

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Layout for 96 Bit EPCglobal Data Constructs

Tag Type	Header	Filter Value	Partition	Company Prefix	Item Reference	Serial Number
SGTIN	8	3	3	20-40	24-4	38
Tag Type	**Header**	**Filter Value**	**Partition**	**Company Prefix**	**Asset Type**	**Serial Number**
GRAI	8	3	3	20-40	24-4	38
Tag Type	**Header**	**Filter Value**	**Partition**	**Company Prefix**	**Individual Asset Reference**	
GIAI	8	3	3	20-40	62-42	
Tag Type	**Header**	**Filter Value**	**Partition**	**Company Prefix**	**Serial Reference**	**Unallocated**
SSCC	8	3	3	20-40	37-17	25

2.5.2 Passive UHF RFID Tag Data Structure Requirements – SUPPLIERS SHIPPING TO DoD – non-EPCglobal Subscribers using the DoD tag data construct

Class 0 – 64 bit tags and Class 1 – 64 bit tags

Tag Requirement	Data Construct	When Used
UID Unit Pack	DoD Construct	On item packaging for items meeting the DoD criteria for assignment of UID
Case, Pallet	DoD Construct	Items shipped as either pure or mixed case, pallet

DoD 64-bit data construct – 64 bits total user memory on tag

Header	Filter	CAGE Code	Serial Number
8 bits	2 bits	30 bits	24 bits

Fields:

- **Header** – specifies that the tag data is encoded as a DoD 64-bit tag construct, (use "CE" encoded in binary as 1100 1110).
- **Filter** – identifies a pallet, case, or UID item associated with tag, represented in binary number format using the following values:
  - 00 = pallet

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- 01 = case
- 10 = UID item
- 11 = reserved for future use

- **CAGE** – identifies the supplier and ensures uniqueness of serial number across all suppliers - represented in ASCII format. (see User's Guide for details of encoding this field).
- **Serial Number** – uniquely identifies up to 2^{24} = 16,777,216 tagged items, represented in binary number format.

Sample binary encoding of the fields of a 64 bit Class 1 tag on a case shipped from DoD supplier

Header (DoD construct)	1100 1110
Filter (Case)	01
CAGE (1D381)	11 0001 00 0100 11 0011 11 1000 11 0001
Serial Number (16,522,293)	1111 1100 0001 1100 0011 0101

Complete content string of the above encoded sample tag is as follows:

110011100111000100010011 001111100011000111111100000111000010101

Class 1 – 96 bit tags

Tag Requirement	Data Construct	When Used
UID Unit Pack	DoD Construct	On item packaging for items meeting the DoD criteria for assignment of UID
Case, Pallet	DoD Construct	Items shipped as either pure or mixed case, pallet

DoD 96-Bit Data Construct – 96 bits total user memory on tag

Header	Filter	DODAAC/CAGE	Serial Number
8 bits	4 bits	48 bits	36 bits

Fields:

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- **Header** – specifies that the tag data is encoded as a DoD 96-bit tag construct, use "CF" encoded in binary as 1100 1111
- **Filter** – identifies a pallet, case, or UID item associated with tag, represented in binary number format using the following values:
  - 0000 = pallet
  - 0001 = case
  - 0010 = UID item
  - all other combinations = reserved for future use.
- **DODAAC/CAGE** – identifies the supplier and ensures uniqueness of serial number across all suppliers - represented in ASCII format. (see User's Guide for details of encoding this field).
- **Serial Number** – uniquely identifies up to 2^{36} = 68,719,476,736 tagged items, represented in binary number format.

2.5.3 Passive UHF RFID Tag Data Structure Requirements – DoD RECEIVING POINTS SHIPPING ITEMS DOWN THE SUPPLY CHAIN TO DoD CUSTOMERS

NOTE: DoD initial implementations will use currently available tags but should transition to Class 1 96 bit tags as soon as practicable, but no later than January 1, 2005.

Class 1 – 96 bit tags

Original Tag Requirement	DoD Shipping Tag Data Construct	When Used
Case, Pallet	DoD Construct	Items shipped as either pure or mixed case, pallet

DoD 96-Bit Data Construct - 96 bits total user memory on tag

Header	Filter	DODAAC/CAGE	Serial Number
8 bits	4 bits	48 bits	36 bits

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Fields:

- **Header** – specifies that the tag data is encoded as a DoD 96-bit tag construct, use binary number 1100 1111
- **Filter** – identifies a pallet, case, or UID item associated with tag, represented in binary number format using the following values:
  - 0000 = pallet
  - 0001 = case
  - 0010 = UID item
  - all other combinations = reserved for future use
- **DODAAC/CAGE** – identifies the supplier, insures uniqueness of serial number across all suppliers, represented in ASCII format
- **Serial Number** – uniquely identifies up to 2^{36} = 68,719,476,736 tagged items, represented in binary number format

Sample binary encoding of the fields of a 96 bit Class 1 tag on a case shipped from DoD internal supply node

Header (DoD construct)	**1100 1111**
Filter (Case)	**0001**
DODAAC (ZA18D3)	**0101 1010 0100 0001 0011 0001 0011 1000 0100 0100 0011 0011**
Serial Number (12,345,678,901)	**0010 1101 1111 1101 1100 0001 1100 0011 0101**

Complete content string of the above encoded sample tag is as follows:

110011110001010110100100000100110001001110000100010000110011001011011111110111000001110000110101

NOTES:

1. Specific tag orientation and location, as well as physical mounting requirements will be addressed in MIL-STD 129.

2. Advance Ship Notices (ASNs) will be required as specified in contracts in accordance with the appropriate DFARS Rule/clause.

3. It is the intent of the Department to incorporate all RFID tag formats and usage standards into a DoD RFID manual.

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2.6 Electronic Data Interchange (EDI) Information

To effectively utilize RFID events to generate transactions of record in DoD logistics systems, RFID tag data with the associated material information must be resident in the DoD data environment so that information systems can access this data at each RFID event (i.e., tag read).

The DoD will require commercial suppliers to provide standard Ship Notice/Manifest Transaction Set (856) transactions in accordance with the Federal Implementation Convention (IC) via approved electronic transmission methods (EDI, web-based, or user defined format) for all shipments in accordance with the applicable DFARS Rule via Wide Area Workflow (WAWF). Internal DoD sites/locations and shippers will use the EDI IC 856S or 856A, as applicable.

The transaction sets enable the sender to describe the contents and configuration of a shipment in various levels of detail and provide an ordered flexibility to convey information. The Federal IC 856 and DoD IC 856S and 856A transaction sets will be modified by the appropriate DoD controlling agencies to ensure the transactions can be used to list the contents for each piece of a shipment of goods as well as additional information relating to the shipment such as: order information, product description to include the item count in the shipment piece and item UID information, physical characteristics, type of packaging to include container nesting levels within the shipment, marking to include the shipment piece number and RFID tracking number, carrier information, and configuration of goods within the transportation equipment.

The DoD will also accept the submission of web-based ASN transactions as well as User-Defined-Format (UDF) ASN files. The following required ASN transactions will facilitate this use of RFID events.

Required ASN Transactions

RFID Event Type	RFID Tag Data Construct	ASN Required	ASN Type
Shipment from Supplier	SGTIN	Yes	856/WAWF Web or UDF
	GRAI	Yes	856/WAWF Web or UDF
	GIAI	Yes	856/WAWF Web or UDF
	SSCC	Yes	856/WAWF Web or UDF
	Manufacturer Encoded Tag Serialization	Yes	856/WAWF Web or UDF
	DoD Construct	Yes	856/WAWF Web or UDF
DoD Shipper to DoD customer	Manufacturer Encoded Tag Serialization	Yes	856S or 856A via DAAS
	DoD Construct	Yes	856S or 856A via DAAS

2.7 RFID Funding

The cost of implementing and operating RFID technology is considered a normal cost of transportation and logistics and as such should be funded through routine Operations and Maintenance, Working Capital Fund, or Capital Investment processes. It is the responsibility of the DoD activity at which cases or palletized unit loads are built to procure and operate sufficient quantities of passive RFID equipment

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(interrogators/readers, write stations, tags, etc.) to support required operations. It is the responsibility of the activity at which cases or palletized unit loads are received, (i.e., activity where the "supply" receipt is processed) to procure and operate sufficient quantities of passive RFID equipment (interrogators/readers) to support receiving operations. Working Capital Fund activities providing this support will use the most current DoD guidance in determining whether operating cost authority or capital investment program authority will be used to procure the required RFID equipment.

2.8 DoD Purchase Card Transactions

Per current DoD regulations, DoD Purchase Cards may be used to acquire items on existing government contracts as well as acquire items directly from suppliers that are not on a specific government contract. If the DoD Purchase Card is used to acquire items that are on a government contract that includes a requirement for RFID tagging of material per the appropriate DFARS Rule, any items purchased via the DoD Purchase Card shall be RFID tagged in accordance with this policy. This policy does not apply to items acquired via a DoD Purchase Card that are not on a government contract. If DoD customers desire the inclusion of a passive RFID tag on shipments for these type purchases, this requirement must be specifically requested of the shipping supplier/vendor and the shipment must be accompanied by an appropriate ASN containing the shipment information associated to the appropriate RFID tag.

2.9 Wireless Encryption Requirements

Per the DoD Wireless Policy (DODD 8100.2), encryption requirements do not apply to the detection segment of a personal electronic device (PED) e.g., the laser used in optical storage media; between a barcode and a scanner head; or Radio Frequency (RF) energy between RF identification tags, both active and passive, and the reader/interrogator.

2.10 Frequency Spectrum Management

RFID tags that meet the technical specifications of 47 CFR 15 of the FCC's Rules and Regulations for Non-Licensed Devices, i.e. Part 15, must accept and may not cause electromagnetic interference to any other federal or civil RF device. 47 CFR 15 only applies to use of these devices within CONUS and other US Possessions. DoD components will forward requests for frequency allocation approval via command channels to the cognizant military frequency management office to ensure that RFID tags comply with US national and OCONUS host-nation spectrum management policies. RFID tags and infrastructure may require electromagnetic compatibility analysis to quantify the mutual effects of RFID devices within all intended operational environments, e.g. Hazards of Electromagnetic Radiation to Ordnance (HERO) and Hazards of Electromagnetic Radiation to Fuel (HERF).

(References: International Telecommunications Union (ITU) Radio Regulations (Article 5); National Telecommunications and Information Administration (NTIA) Manual of Regulations and Procedures for Federal Radio Frequency Management; DoD Directive 3222.3, Department of Defense Electromagnetic Compatibility Program, 20 Aug 1990; DoD Directive 4650.1, Policy for Management and Use of the Electromagnetic Spectrum, 8 Jun 04).

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Supplier Implementation Plan

3.1 Overview

Considering the volume of contracts and the variety of commodities managed, the Department has developed a plan for passive RFID tagging that delivers best value to the warfighting customer. This implementation plan provides a roadmap that targets critical distribution functions within the Defense Distribution Depots, depot maintenance facilities, and strategic aerial ports.

3.2 Suppliers Shipping to DoD

Per the schedule outlined in this attachment, case, pallet, and item packaging (unit pack) for Unique Identification (UID) items will be tagged at the point of origin (manufacturer/vendor) with passive RFID tags, except for the bulk commodities as defined in section 2.4.1 of attachment 2. If the unit pack is also the case, only one RFID tag will be attached to the container. Shipments of goods and materials will be phased in by procurement methods, classes/commodities, location and layers of packaging for passive RFID.

3.2.1 Commencing January 1, 2005:

All individual Cases + All Cases packaged within Palletized Unit Loads + all Palletized Unit Loads, as defined in Section 2.3, will be tagged* for the following commodities:

Packaged Operational Rations (subclass of Class I)
Clothing, Individual Equipment, Tools (Class II)
Personal Demand Items (Class VI)
Weapon System Repair Parts and Components (Class IX)

When these commodities are being shipped to the following locations:

Defense Distribution Depot, Susquehanna, PA (DDSP)
Defense Distribution Depot, San Joaquin, CA (DDJC)

3.2.2 Commencing January 1, 2006:

All individual Cases + All Cases packaged within Palletized Unit Loads + all Palletized Unit Loads, as defined in Section 2.3, will be tagged* for the above commodities in addition to the following classes/commodities to be phased in pending appropriate safety certifications.

Subsistence and Comfort Items (Class I)
Packaged Petroleum, Lubricants, Oils, Preservatives, Chemicals, Additives (Class IIIP)
Construction and Barrier Material (Class IV)
Ammunition of all types (Class V)
Major End Items (Class VII)
Pharmaceuticals and Medical Materials (Class VIII)

*Item Packaging for UID items will be tagged if the packaging is the case or exterior of a palletized unit load.

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When these commodities are shipped to the above locations in addition to the following:

USMC
Marine Corps Maintenance Depot, Albany, GA
Marine Corps Maintenance Depot, Barstow, CA

USA
Army Maintenance Depot, Anniston, AL
Army Maintenance Depot, Corpus Christi, TX
Army Maintenance Depot, Red River, TX
Army Maintenance Depot, Tobyhanna, PA

USTRANSCOM
Air Mobility Command Terminal, Charleston Air Force Base, Charleston, SC
Air Mobility Command Terminal, Dover Air Force Base, Dover, DE
Air Mobility Command Terminal, Naval Air Station Norfolk, Norfolk, VA
Air Mobility Command Terminal, Travis Air Force Base, Fairfield, CA

USAF
Air Logistics Center, Ogden, UT
Air Logistics Center, Oklahoma City, OK
Air Logistics Center, Warner Robbins, GA

USN
Naval Aviation Depot, Cherry Point, NC
Naval Aviation Depot, Jacksonville, FL
Naval Aviation Depot, North Island, San Diego, CA

DLA
Defense Distribution Depot, Albany, GA
Defense Distribution Depot, Anniston, AL
Defense Distribution Depot, Barstow, CA
Defense Distribution Depot, Cherry Point, NC
Defense Distribution Depot, Columbus, OH
Defense Distribution Depot, Corpus Christi, TX
Defense Distribution Depot, Ogden, UT
Defense Distribution Depot, Jacksonville, FL
Defense Distribution Depot, Oklahoma City, OK
Defense Distribution Depot, Norfolk, VA
Defense Distribution Depot, Puget Sound, WA
Defense Distribution Depot, Red River, TX
Defense Distribution Depot, Richmond, VA
Defense Distribution Depot, San Diego, CA
Defense Distribution Depot, Tobyhanna, PA
Defense Distribution Depot, Warner Robbins, GA

3.2.3 Commencing January 1, 2007:

All individual Cases + All Cases packaged within Palletized Unit Loads + all Palletized Unit Loads + all Unit Packs for unique identification (UID) items, as defined in Section 2.3, shipped to all locations will be tagged for all commodities*

* Class X is exempted under the Bulk Commodities definition in Section 2.4.1.

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