GT RFID Overview
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MEMORANDUM FOR: SEE DISTRIBUTION

SUBJECT: Radio Frequency Identification (RFID) Policy - UPDATE

This memorandum updates the "Radio Frequency Identification (RFID) Policy", dated October 2, 2003. This policy update provides revised business rules for the use of high data capacity active RFID (Attachment 1) and an initial set of business rules for the implementation of passive RFID and the use of the Electronic Product Code (EPC) compliant tags within the Department of Defense (DoD) supply chain (Attachment 2).

This policy and associated business rules will continue to be revised as we implement the active RFID capability and prior the passive RFID capability over the next six months.

DoD Components will continue to work to effect an immediate implementation of high data capacity active RFID currently employed in the DoD operational environment. DoD Components will implement, for January 1, 2005, implementation of a passive RFID business rules. These rules, which are in Attachment 2, include the requirement for the DoD supply chain to put passive RFID tags on the outer and pallets of material delivered to the DoD as well as on the packaging of all items requiring a Unique Identification (UID). UID Components will establish an initial capability to read passive RFID tags and test their ability by January 2005.

The Defense Logistics Agency has committed to making the strategic distribution centers (Sun Joesph, CA, and Susquehanna, PA) capable of reading passive RFID attached to shipments received from suppliers and applying passive RFID tags to shipments to DoD activities and units by that date.

A key component to implementing RFID throughout the supply chain is the publication of a Defense Materiel Acquisition Regulation (DMAR) rule governing the application of RFID to the small pallets and packaging for material purchased by the Department. To that end, I have directed the Deputy Under Secretary of Defense (Logistics and Material Readiness) (DUSD(L/MR)) to work with Defense Measurement and Improvement Policy to develop a proposed rule for publication in the Federal Register by May 2004. The rule will require passive UID tagging in the same pallet and UID item packaging level for all new solicitations issued after October 1, 2004, for delivery of material on or after January 1, 2005.
RFID Everywhere

Microsoft, IBM, Philips to back RFID
Inventory tracking technology gains speed

By Laura Pollock, IDG News Service
January 26, 2004

RFID (radio frequency identification) tagging technology continues to gain in inventory tracking use, as Monday Microsoft Corp., IBM Corp., and Koninklijke Philips Electronics NV announced projects for developing and promoting it as a cost-saving tool for retailers.
Problem: Asset Tracking

Global benefits of an integrated Smart Item network estimated to be over U.S.$240 billion annually.

Over 550 billion different items pass through the members’ supply chains every year.
## Patent Growth

Some Helpful Background on Research Resources

Some US Patents of interest (Note: a search of the US Patent Office alone will reveal over 350 patents related to RFID and its use)

<table>
<thead>
<tr>
<th>Patent Number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,713,148</td>
<td>Transponder apparatus and system</td>
</tr>
<tr>
<td>3,745,569</td>
<td>Remotely powered transponder</td>
</tr>
<tr>
<td>3,852,755</td>
<td>Remotely powered transponder having a dipole antenna array</td>
</tr>
<tr>
<td>4,001,822</td>
<td>Electronic license plate for motor vehicles</td>
</tr>
<tr>
<td>4,068,232</td>
<td>Passive encoding microwave transponder</td>
</tr>
<tr>
<td>4,096,477</td>
<td>Identification system using coded passive transponders</td>
</tr>
<tr>
<td>4,114,151</td>
<td>Passive transponder apparatus for use in an interrogator-responder system</td>
</tr>
<tr>
<td>4,123,754</td>
<td>Electronic detection and identification system</td>
</tr>
<tr>
<td>4,242,663</td>
<td>Electronic identification system</td>
</tr>
<tr>
<td>4,345,146</td>
<td>Apparatus and method for an electronic identification, actuation and recording system</td>
</tr>
<tr>
<td>4,354,099</td>
<td>Electronic identification system</td>
</tr>
<tr>
<td>4,463,353</td>
<td>Animal feeding and monitoring system</td>
</tr>
<tr>
<td>4,473,825</td>
<td>Electronic identification system with power input-output interlock and increased capabilities</td>
</tr>
<tr>
<td>4,481,428</td>
<td>Batteryless, portable, frequency divider useful as a transponder of electromagnetic radiation</td>
</tr>
<tr>
<td>4,490,718</td>
<td>Radar apparatus for detecting and/or classifying an agitated reflective target</td>
</tr>
<tr>
<td>4,494,545</td>
<td>Implant telemetry system</td>
</tr>
<tr>
<td>4,510,495</td>
<td>Remote passive identification system</td>
</tr>
<tr>
<td>4,525,713</td>
<td>Electronic tag identification system</td>
</tr>
<tr>
<td>4,546,241</td>
<td>Electronic proximity identification system</td>
</tr>
</tbody>
</table>
What is AIT?

• A system comprising
  • Small low-cost transceivers (tags)
  • Readers
  • Network to connect readers and databases

Tags on inventory

Tags on trucks for border control

eCommerce
Automatic Identification Technology
Not Just RFID

Includes:

- Optical Memory Cards ≅ tech. for audio CD
  - Write-once/read many times (WORM)
  - High data capacity
  - Security / counterfeit resistance
- Contact Memory Buttons (CMB)
  - Memory chip encased in hermetically sealed metal can
  - Data transfer requires contact
Automatic Identification Technology
*Not Just RFID*

Includes:

- **Biometrics**
  - “automated methods of identifying or authenticating the identity of a living person based on a physical or behavioral characteristic “
  - Characteristics include fingerprints, voice recognition, hand geometry, retina, iris, signature, vein, face
DOD would be like Wal-Mart . . .

. . . if Wal-Mart's 3000+ stores moved

. . . if a Wal-Mart stockout meant that everyone inside the store could die.

. . . if associates had to wear a different kind of vest

. . . if Christmas was a random event every 5 years
Original Project

Water / Moisture Intrusion

H-46 Gear Box
H-3 Tail Rotor Gearbox
Corrosion Inside TF-34 Engine (S-3)
H-46 Transmission

Misidentified / Mislabeled Inventory

Lost Engine Visibility

Overdue status report

• 28 RFI Engines as of 1/16/02 (over 40 days)
• 171 Non-RFI Engines as of 1/16/02 (over 60 days)
Scenario

Hello, my name is…
I have been opened in route…
I am located here…
I am emitting a chemical…
GTRI- SOLUTION
Integrated Sensor RFID with location (ISRFID™)

- **RFID Tag**
  - Sensors – can be expanded to include chemical sensors
    - Temperature, Humidity, Pressure
    - Chemical & Biological
    - Integrity
  - Microprocessor – allows for programming of information
  - Transceiver – (915 MHZ)
  - I2C Bus – allows for additional features to be added such as intrusion detection without a redesign
  - Low Power Sensor Network (LPSN) software – allows for longer battery life with extended communication range
  - Battery
Networked RFID Tags

Location Monitoring

Application Software

RFID Reader/Manager

30 ft  30 ft  30 ft

CANISTER CANISTER CANISTER

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CMB Project
Completed Pilot Project
V-22 DT/OT Active RFID

Container Storage Area – Horseshoe – MALS26
V-22 DT/OT Active RFID - RMS

Installation inside of Horseshoe
Web-based Asset Management System

Welcome to the NAVICP Georgia Tech Integrated Sensor Radio Frequency Identification (SRFID) Project Development Site.
The objective is to develop intelligent and proactive assets - Condition Based Logistics (CBL).
Web-Based Asset Management
V-22 DT/OT Active RFID DATA

Humidity (Sun vs. Shade)

Date / Time

% Relative Humidity

0 5 10 15 20 25

3/23/04 12:00 3/24/04 12:00 3/25/04 12:00 3/26/04 12:00 3/27/04 12:00 3/28/04 12:00 3/29/04 12:00 3/30/04 12:00 3/31/04 12:00 4/1/04 12:00

AM AM AM AM AM AM AM AM AM AM
Considerations

• Usage Parameters
  • [e.g. How far, How fast, How many, How much, Applied to what and the contents of the container]

• Tag and Label Issues
  • Placement, orientation, design

• Safety and Regulation

• Frequency

• Security

• Privacy
Considerations, Con’t

• Backups
• Sensor / Transducers
  • Interface
  • Tag isolation
• Data Rates
• Protocol
  • Data fields
  • Communication – who talks first
• Power source
• Anti-collision
Lesson’s Learned

• Site survey is critical
  • Determine frequency interferences in area
  • Test plan is mandatory

• Power is major hurdle

• Computer connectivity is not always guaranteed – NMCI requirements

• AIS is important

• Standards should be reviewed

• Interoperability, scalability, and modularity are critical to the design requirements

• Reconfiguration of facility could be a problem
Future

- Application
- Nanotechnology
- Power sources
- Packaging → embedded
- Performance Based Logistics
Future Capabilities

- **Key Needs:**
  - Cellular Integration and Service
    - Lower infrastructure cost
  - GPS Integration
    - Asset location
  - Satellite Tracking
    - Global asset visibility
  - Anti-Tamper / Asset Security
    - Light sensor
  - Software Integration
    - NALCOMIS, SALTS, FACTS, GTN