DoD Combat Feeding: Overview & Global Asset Visibility Initiative

October 2003
DoD Combat Feeding

Combat Rations
Combat Feeding Systems
Field Food Service Equipment
Balancing Our Investment

Today’s Warfighter: Continuous Product Improvement

S&T Investment
- Equipment/Field Feeding
- Food Safety/Biosensors
- Novel Preservation & Stabilization
- Novel Nutrient Delivery Systems
- Revolutionary Packaging
- Modeling & Simulation
- Logistics

Transitioning Technology to the Warfighter
- Individual
- Group
- Assault
- Special Purpose

Transformation Planning
Guidance/Joint Vision
2020: Revolutionary Products and...
OEF/OIF Lessons Learned

✓ LEGACY FORCE efforts on target
✓ CR improvements revalidated
✓ JV2020 concepts validated/provided
✓ GAV needs improvement
  - 15th MEU, Camp Rhino
  - 101st AD Div, Kandahar
  - 10th Mtn Div, Ft. Drum, NY
  - DA Subsistence Analysis Team, OEF
  - 101st NCO visit to Natick
  - 101st DISCOM, Camp Eagle III, Iraq
  - OFIG Rep, Kandahar
  - Battle Lab Integration Team Rep, Kandahar
  - AMC FAST SWA, STAT, Baghdad
  - AMC LSE
  - VSA Community, SWA

“... our base has been eating MREs for 42 consecutive days and I must admit I am not tired of them yet. Thank you for making our deployment tastier.”

SrA Garrett Palmer
OEF/OIF Lessons Unlearned

- Inaccurate inventory
- Inconsistent deliveries
- Unidentified containers

- MILVANs lost
- Temperature abuse
- Menu redundancy

“...we have no idea what we have, when it will come, or the ability to control it...”
MG Stratman, DCG, CFLCC OEF

“...temperature abuse is a significant problem...rations left on the tarmac with no protection...”
COL Cornwell USCENTCOM Staff Vet June 03
# Military RFID Challenges Identified

- #1 visibility tool: clipboard and carbon paper
- #2 visibility tool: AIT
- “What’s that thing?”
- Great tag, but overpriced/oversized/overpowered
- Simple hardware/software, but lacks reliability/ease of use

- **Not well trained**
- **No tactical ownership**
- **Poor tag discipline**
The “Worst-Worst” Case Scenario

Multipacks packed with multiple RICs, from multiple nodes
“I was NOT a believer before this operation, didn’t think we could manage info, but now know that we can. TAG EVERYTHING.”

MAJ Charles Burke
Chief, Logistics Information & Supply Policy
3rd Army/ARCENT & CFLCC
Auto-ID RFID  The Path Forward

DoD/Academia/Commercial Industry

- MIT Auto-ID Center (MIT, UCC, P&G, Gillette)
- EPCglobal and Auto-ID Labs – Nov 03
- Initiatives: global standards, interoperability & affordability
<table>
<thead>
<tr>
<th>Board of Overseers</th>
<th>Technology Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proctor &amp; Gamble*</td>
<td>AC Nielsen</td>
</tr>
<tr>
<td>Gillette*</td>
<td>Accenture</td>
</tr>
<tr>
<td>UCC *</td>
<td>ADT/Sensormatic</td>
</tr>
<tr>
<td>Abbot Lab</td>
<td>Alien Technology</td>
</tr>
<tr>
<td>Ahold, IS</td>
<td>Arbitron</td>
</tr>
<tr>
<td>Best Buy</td>
<td>Applied Wireless ID</td>
</tr>
<tr>
<td>Cannon Inc</td>
<td>Avery Dennison</td>
</tr>
<tr>
<td>Carrefour</td>
<td>British Telecom</td>
</tr>
<tr>
<td>CHEP</td>
<td>Cap Gemini Ernst &amp; Yng</td>
</tr>
<tr>
<td>Coca-Cola</td>
<td>Cash's</td>
</tr>
<tr>
<td>CVS</td>
<td>Catalina Marketing</td>
</tr>
<tr>
<td>Dai Nippon Printing</td>
<td>Checkpoint Systems</td>
</tr>
<tr>
<td>Department of</td>
<td>ConnecTerra</td>
</tr>
<tr>
<td>Defense</td>
<td>Ember Corporation</td>
</tr>
<tr>
<td>EAN International</td>
<td>Embrace</td>
</tr>
<tr>
<td>Eastman Kodak</td>
<td>Flexchip AG</td>
</tr>
<tr>
<td>Georgia Pacific</td>
<td>Flint Ink</td>
</tr>
<tr>
<td>Home Depot</td>
<td>GEA Consulting</td>
</tr>
<tr>
<td>International Paper</td>
<td>GlobeRanger</td>
</tr>
<tr>
<td>Johnson &amp; Johnson</td>
<td>IBM</td>
</tr>
<tr>
<td>Kellog’s</td>
<td>ID Tech Ex</td>
</tr>
<tr>
<td>Kimberly Clark</td>
<td>Unpinj, Inc</td>
</tr>
<tr>
<td>Kraft</td>
<td>Information Resources</td>
</tr>
<tr>
<td>Lowe’s</td>
<td>Intel</td>
</tr>
<tr>
<td>Mead Wetvaco</td>
<td>Intermec</td>
</tr>
<tr>
<td>Metro</td>
<td>Invensys Controls</td>
</tr>
<tr>
<td>Mitsui &amp; Co. Ltd.</td>
<td>Ishida</td>
</tr>
<tr>
<td>Nestle</td>
<td>KSW Microtec AG</td>
</tr>
<tr>
<td>Pepsi</td>
<td>KSF</td>
</tr>
<tr>
<td>Pfizer</td>
<td>Manhattan Assts.</td>
</tr>
<tr>
<td>Philip Morris</td>
<td>Matrics</td>
</tr>
<tr>
<td>Sara Lee</td>
<td>Morningside Tech</td>
</tr>
<tr>
<td>Smurfit Stone</td>
<td>NCR</td>
</tr>
<tr>
<td>Target</td>
<td>Nippon T&amp;T</td>
</tr>
<tr>
<td>Tesco</td>
<td>NTT Comware</td>
</tr>
<tr>
<td>Stores</td>
<td>OatSystems</td>
</tr>
<tr>
<td>Toppan Printing</td>
<td>Philips Semi</td>
</tr>
<tr>
<td>Unilever UPS</td>
<td>PSC, Inc.</td>
</tr>
<tr>
<td>US Postal Service</td>
<td>Provia Software</td>
</tr>
<tr>
<td>Visy Industries</td>
<td>Rafsec</td>
</tr>
<tr>
<td>Wal-Mart</td>
<td>RF Saw</td>
</tr>
<tr>
<td>Wegmans Foods</td>
<td>SAMSYS</td>
</tr>
<tr>
<td>Westvaco</td>
<td>SAVI</td>
</tr>
<tr>
<td>YFY Group</td>
<td>Sensitech</td>
</tr>
<tr>
<td></td>
<td>Siemens</td>
</tr>
<tr>
<td></td>
<td>ST Microelectronics</td>
</tr>
<tr>
<td></td>
<td>Sensormatic</td>
</tr>
<tr>
<td></td>
<td>Siemens</td>
</tr>
<tr>
<td></td>
<td>Sun Microsystems</td>
</tr>
<tr>
<td></td>
<td>Symbol Tech</td>
</tr>
<tr>
<td></td>
<td>TAGSYS</td>
</tr>
<tr>
<td></td>
<td>ThingMagic</td>
</tr>
<tr>
<td></td>
<td>TIBCO Software</td>
</tr>
<tr>
<td></td>
<td>Toppan Forms</td>
</tr>
<tr>
<td></td>
<td>Toray Intl</td>
</tr>
<tr>
<td></td>
<td>UNISYS</td>
</tr>
<tr>
<td></td>
<td>Vizional Tech</td>
</tr>
<tr>
<td></td>
<td>Verisign</td>
</tr>
<tr>
<td></td>
<td>Vizional Tech</td>
</tr>
<tr>
<td></td>
<td>Zebra Tech</td>
</tr>
</tbody>
</table>

*Proctor & Gamble*, *Gillette*, and *UCC* are also Board of Overseers.
Auto ID Technology

Electronic Product Code (EPC)

21.203D2A9.16E8B8.719BAE03C

- Version 8 bits
- Manufacturer 28 bits (> 268 Million)
- Product 24 bits (> 16 million)
- Serial Number 36 bits (> 68 billion)

- Savant Computer
  - Distr. architecture
  - Data mgt
  - Task mgt

- ONS Server
  - Directs EPC to item info
  - Quick retrieval

- PML Server
  - Item info
  - Maintained by DoD/vendors

DoD Current/Future Systems
class 0/1 - passive
write once read many (WORM), mfg (0)/ customer (1) programmable, beam powered by reader, 1-10 m

class 2 - passive
class 1 + increased functionality, e.g. more memory, R/W, sensor capability (point in time) - 1-10 m

class 3 - semi-passive
class 2 + read/write, battery powered, enables I/O, modularity, sensor profile/manifest capability, 30-100 m

class 4 - active
class 3 + broadcasting capabilities, “sensor network”

class 5 - reader spec
Version 2.0 specs for all classes (13.56 MHz, 915 MHz, 2.45 GHz) in progress
Tags Combat Feeding Tech Demo

**Passive**
Class 1 EPC NanoBlock™ I-tag

**Semi-Passive**
Battery assisted Passive (future Class 3) EPC tag
Tag/Sensor Evolution

**Sensors:**
- Temperature
- Changing Magnetic Fields
- Acoustical Noise

**Communication Modes:**
- Active RF / Backscatter
- IR

**Future Class 2 EPC**
- NanoBlock™ Tenali™ IC & NanoBlock™ temperature sensor

**Future Class 3 Type EPC**
- NanoBlock™ sensor tag

**MAS sensor**
- CNSE/NDSU

**+ ASIC technology**

**+ battery & adv. sensor technology**

**Printed Circuit Board**
- Temp
- Tenali™ ASIC
- Pressure
Journey to DoD EPC Adoption

FY01
- Combat Feeding/MIT meeting
- DLA
- MIT Board of Overseers
- Senate/House Soldier Modernization Day

FY02
- DMEA Program Review
- QMC&S Regimental Week
- more ....
- DDC/DDJC
- DLA J-3
- Army G-4
- PEO Ships
- PD USD AT&L
- DUSD L&MR SCI
- USD ATL
- Cong Staffers
- CG, AMC
- more ....

"...the Combat Feeding Directorate is “way out ahead of everyone else in DoD...” (relative to RFID)

The Honorable Michael Wynne
DoD RFID Policy

“DoD will be an early adopter of innovative RFID Technology that leverages the Electronic Product Code (EPC) and compatible RFID tags” 2 Oct 2003

- ...to be implemented immediately
- ...passive tags on case/pallet (selected suppliers) Jan 05
- ...business rules based on results of initial RFID projects
- ...final policy July 04
- ...supports USD ATL UID policy
- ...implementation - DoD RFID Integrated Product Team (IPT), DUSD LMR SCI (Mr. Estevez) supported by DoD Logistics AIT

www.dodait.com
22-23 Oct 2003
Combat Feeding Tech Demo

**Scope**
- Commodity: MREs and UGRs
- Passive RFID tags (case & pallet)
- Semi-passive (pallet & container)
- Track depot & supply point issues/receipts
- Shelf life quality model
- Supply chain visibility to Class 1 Theater Mgr
- Tech demo (DDJC, 2Q04)

**Demo Partners:**
DLA * DDC * DDJC * ORNL
USA Veterinary Services Agency
MIT * Navy AIT
Combat Feeding Tech Demo

DLA/DSCP
Funded Requisition

Class 1 Theater Manager

VENDOR

EPC: case/pallet

DDC

EPC: pallet/container

POE / POD

EPC: container

UNIT

EPC: case/pallet

GS

EPC: pallet/container

DS
Combat Feeding Auto-ID Tech Demo

Activities to date

- Preliminary testing (Alien, Feb 03)
- Shakedown (DDJC, March 03)
- Follow-on testing (July - Dec 03)
Preliminary Testing

Test set-up - “Area 52”

Class 1 tag placement on UGRs

Class 1 tag placement on MREs

Battery powered time/temp & manifest tags
### Shakedown Tag Manufacturers and Classes

<table>
<thead>
<tr>
<th>Pallet/Container</th>
<th>Auto-ID Compliant</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.45 GHz Battery Semi-Passive Temp &amp; Manifest</td>
<td>In-process</td>
</tr>
<tr>
<td>915 MHz Wood Tag Passive</td>
<td>No</td>
</tr>
<tr>
<td>433 MHz EchoPoint “Beacon” Tag Active</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Case</th>
<th>Auto-ID Compliant</th>
</tr>
</thead>
<tbody>
<tr>
<td>915 MHz Class 1 Passive NanoBlock™</td>
<td>Yes</td>
</tr>
<tr>
<td>915 MHz Class 0 Passive</td>
<td>not at Shakedown</td>
</tr>
<tr>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Shakedown Battery Tag

- Simulated loading/unloading
- Entrance/exit portal
- Reading loaded ISO
- Reading battery tags in transit
Shakedown Passive Tag

Class 1 tags on MREs

Reading Class 1 tags on UGRs

Other commodities (#10 cans, pouch bread, paper trays)
Follow-On Testing

- Passive Tag

- Check Tag

- Forklift

5-6 mph - 90%
3 mph - 100%

MRE - 100%
UGR - 80% & 100%

500 bytes/3-4 sec
(500 data points)
1.4 years temp data (1/day)
Shelf Life Model

- ground truth data
- activation energy
- Arrhenius constant
- temperature
- quality of food
- order of reaction

Issue
Limited Inspection
100% Inspection
Commercial Activity/Deployment

- **Industry Pilots/Business Cases:** Procter and Gamble, Gillette, Wal-Mart, Tesco, Toppan, CVS, Marks & Spencer, etc...

- **Alien** announces major order for **500 Million** EPC RFID Tags for **The Gillette Company** (Jan 2003)

- **Wal-Mart** announces...top 150 suppliers to start using EPC case level by 1 Jan 2005; all suppliers case/pallet by 2006

- **Microsoft** exploring membership in **EPCglobal™** (June 2003)

CFD Plans near term...mid term...long term

- DOD/DLA systems interconnectivity (demo expansion) in progress
- Business Case Analysis - DLA/MIT
- DoD implementation strategy sessions - OSD, EPCglobal, & Auto-ID Labs
- Totally integrated systems approach for end-to-end logistics ICW industry/academia
- FY05-08: extension of tech demo platform
  - affordable EPC compliant tags/readers
  - expand shelf life model ICW USAVSA
  - sensor integration for food quality/safety assessment
Wish List “To Do”

- CF Tech Demo: hand held reader 915 and/or 2450 MHz
- Auto-ID Spec 2.0 passive/semi passive/active tags
- More lessons learned (DoD/DLA/commercial pilots)

- Academia/industry PARTNERSHIPS:
  - VOC/DNA sensors (food quality and safety)
  - Environmental testing of tags
  - Vendor implementation

- AFFORDABLE Solutions:
  - $.01 Tag (ASIC/FSA)
  - $1.00 sensor/manifest tag

GEN Kern, 16 Oct 03, “I appreciate this great work”, we must expand to other areas”
Concept of Operations
Natick Soldier Center/DOD Combat Feeding

Meeting Today’s Challenges
Providing Tomorrow’s Solutions

Doing great things for the Warfighter everyday for the last 50 years...