Georgia Institute of Technology

GT RFID Overview

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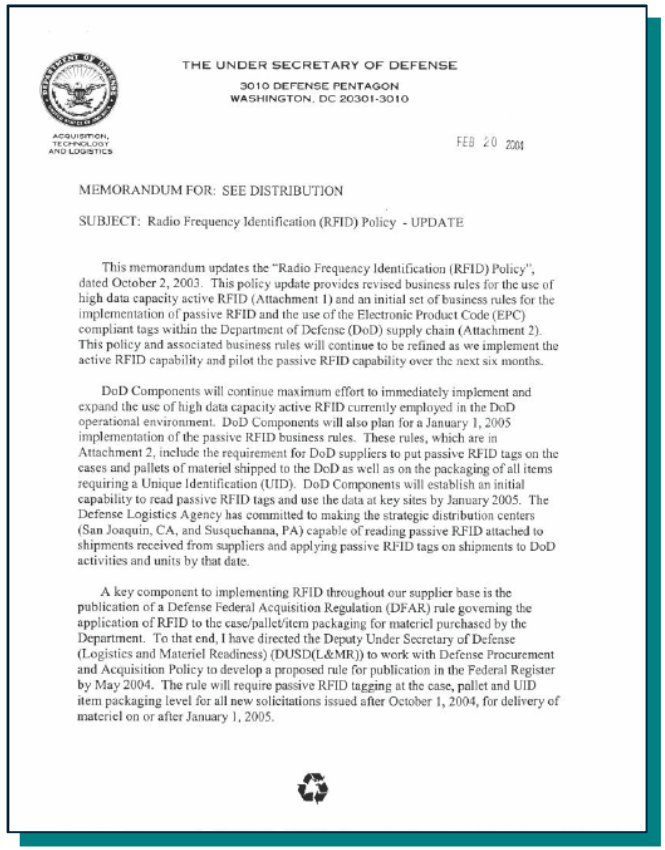
Why the rush? WalMART and DoD



THE UNDER SECRETARY OF DEFENSE
3010 DEFENSE PENTAGON
WASHINGTON, DC 20301-3010

ACQUISITION, TECHNOLOGY AND LOGISTICS

FEB 20 2004

MEMORANDUM FOR: SEE DISTRIBUTION

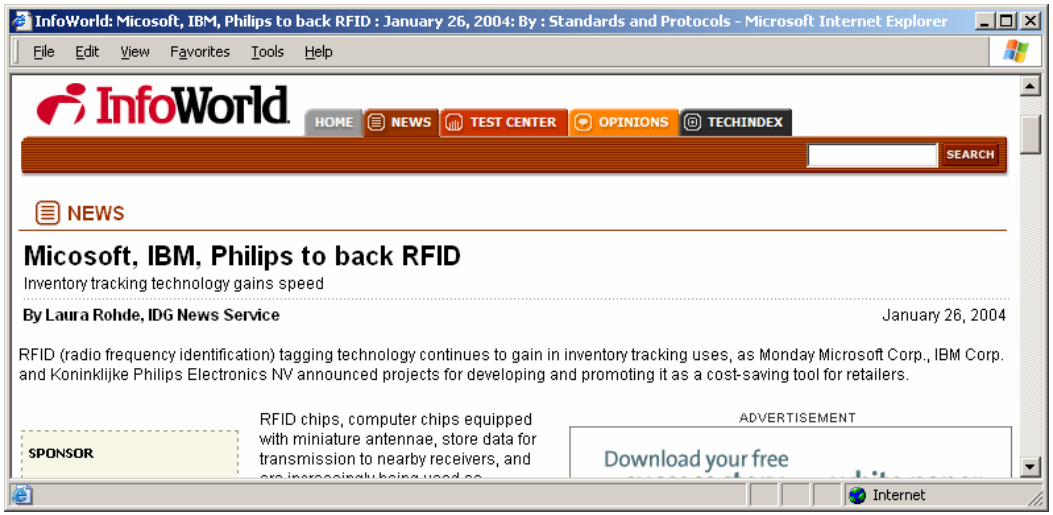
SUBJECT: Radio Frequency Identification (RFID) Policy - UPDATE

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 refined as we implement the active RFID capability and pilot the passive RFID capability over the next six months.

DoD Components will continue maximum effort to immediately implement and expand the use of high data capacity active RFID currently employed in the DoD operational environment. DoD Components will also plan for a January 1, 2005 implementation of the passive RFID business rules. These rules, which are in Attachment 2, include the requirement for DoD suppliers to put passive RFID tags on the cases and pallets of materiel shipped to the DoD as well as on the packaging of all items requiring a Unique Identification (UID). DoD Components will establish an initial capability to read passive RFID tags and use the data at key sites by January 2005. The Defense Logistics Agency has committed to making the strategic distribution centers (San Joaquin, CA, and Susquehanna, PA) capable of reading passive RFID attached to shipments received from suppliers and applying passive RFID tags on shipments to DoD activities and units by that date.

A key component to implementing RFID throughout our supplier base is the publication of a Defense Federal Acquisition Regulation (DFAR) rule governing the application of RFID to the case/pallet/item packaging for materiel purchased by the Department. To that end, I have directed the Deputy Under Secretary of Defense (Logistics and Materiel Readiness) (DUSD(L&MR)) to work with Defense Procurement and Acquisition Policy to develop a proposed rule for publication in the Federal Register by May 2004. The rule will require passive RFID tagging at the case, pallet and UID item packaging level for all new solicitations issued after October 1, 2004, for delivery of materiel on or after January 1, 2005.

RFID Everywhere



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)

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

What is AIT?

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

Tags on invent

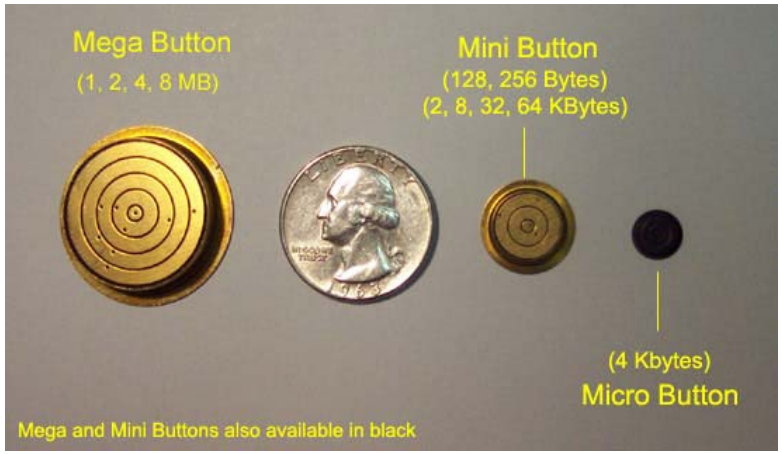
Tags on trucks for border control

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.

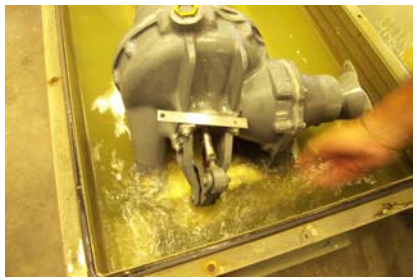
. . . if associates had to wear a different kind of vest

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

Original Project

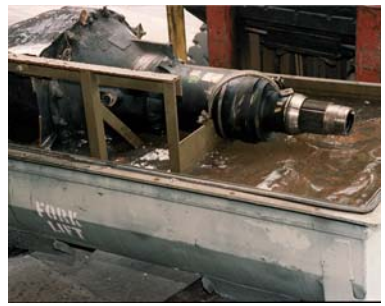
Water / Moisture Intrusion

H-46 Gear Box



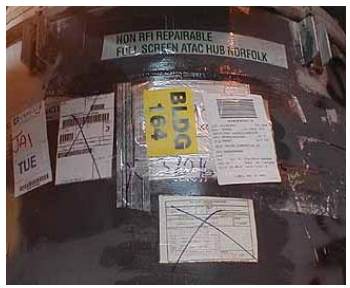
H-3 Tail Rotor Gearbox

Corrosion Inside TF-34 Engine (S-3)



H-46 Transmission

Misidentified / Mislabeled Inventory



Rotor Container

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…

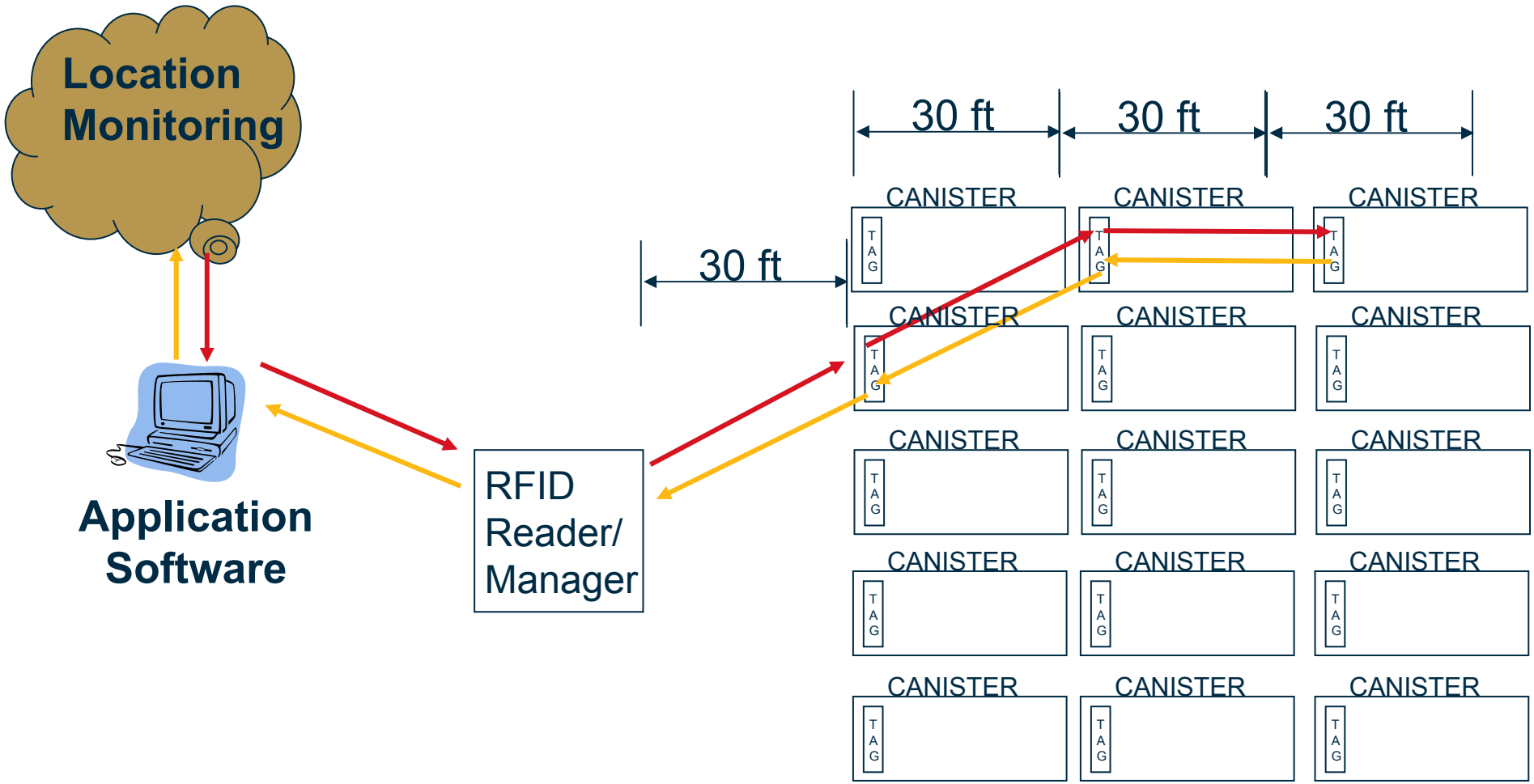
GTRI- SOLUTION

Integrated Sensor RFID with location (ISRFID™)

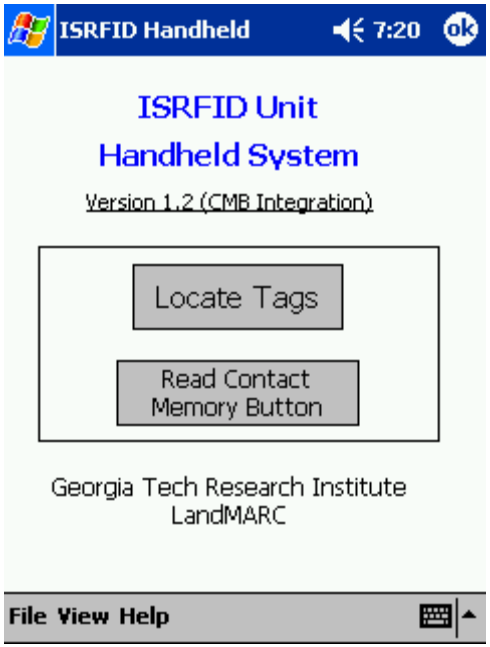
- **RFID Tag**
  - Sensors – can be expanded to include chemical sensors
    - Temperature, Humidity, Pressure
    - Chemical & Biological
    - Integrity
  - Microprocessor – allows for programming of information
  - Transceiver – (915 MHZ)
  - I2C Bus – allows for additional features to be added such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

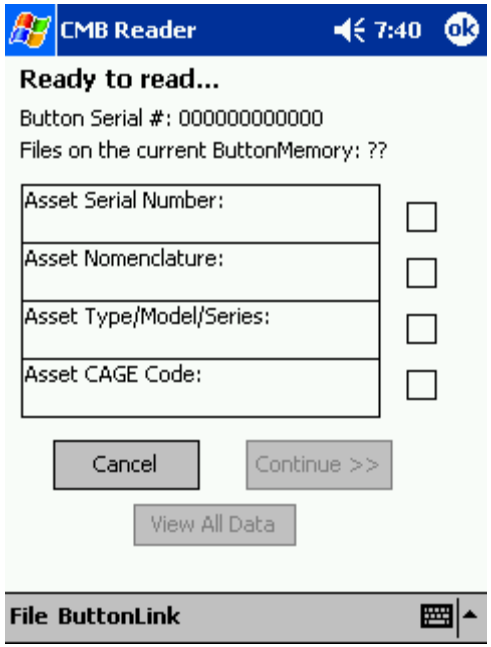
H8 Tag

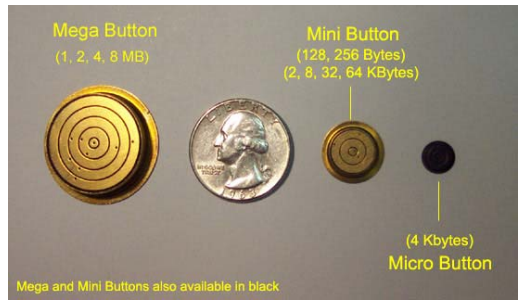
Networked RFID Tags



CMB Project


ISRFID Handheld
7:20
ok
ISRFID Unit
Handheld System
Version 1.2 (CMB Integration)
Locate Tags
Read Contact Memory Button
Georgia Tech Research Institute
LandMARC
File View Help


CMB Reader
7:40
ok
Ready to read...
Button Serial #: 000000000000
Files on the current ButtonMemory: ??
Asset Serial Number:
Asset Nomenclature:
Asset Type/Model/Series:
Asset CAGE Code:
Cancel
Continue >>
View All Data
File ButtonLink

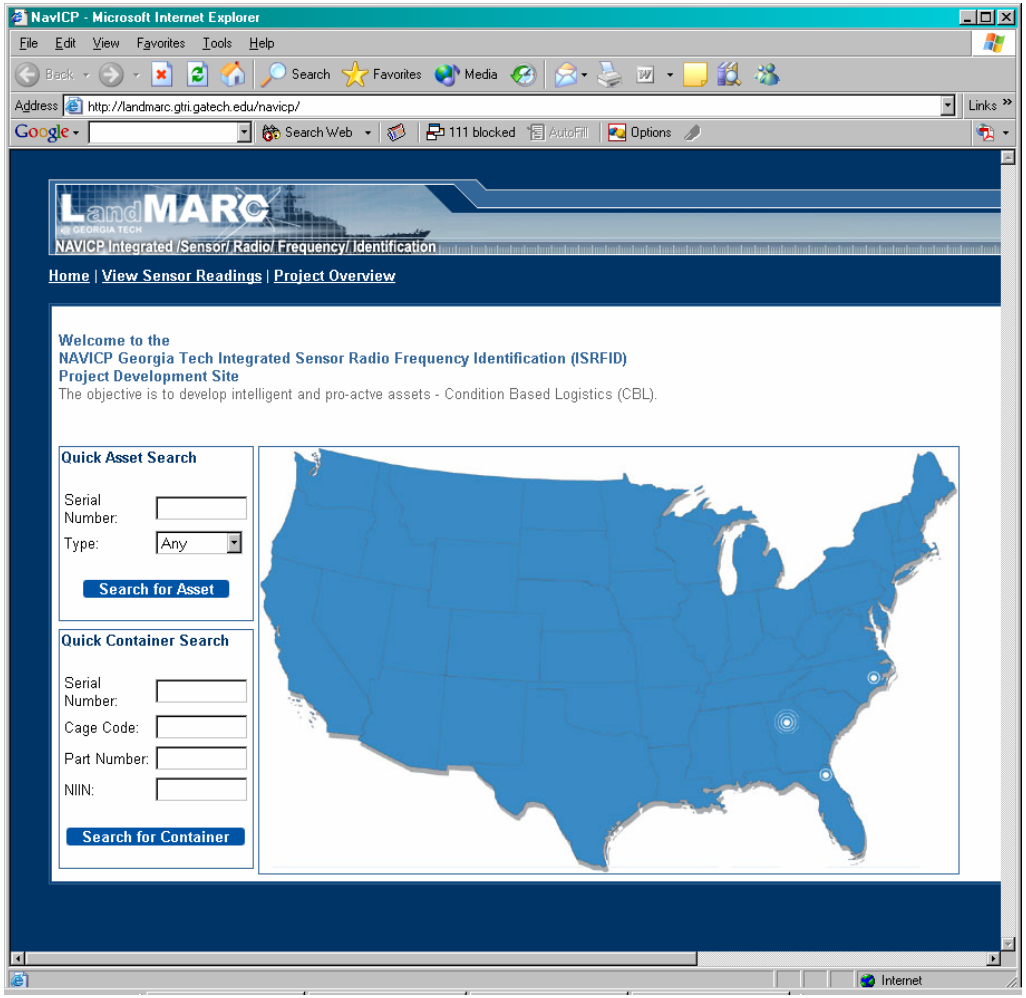

Mega Button
(1, 2, 4, 8 MB)
Mini Button
(128, 256 Bytes)
(2, 8, 32, 64 KBytes)
(4 Kbytes)
Micro Button
Mega and Mini Buttons also available in black

Completed Pilot Project
V-22 DT/OT Active RFID

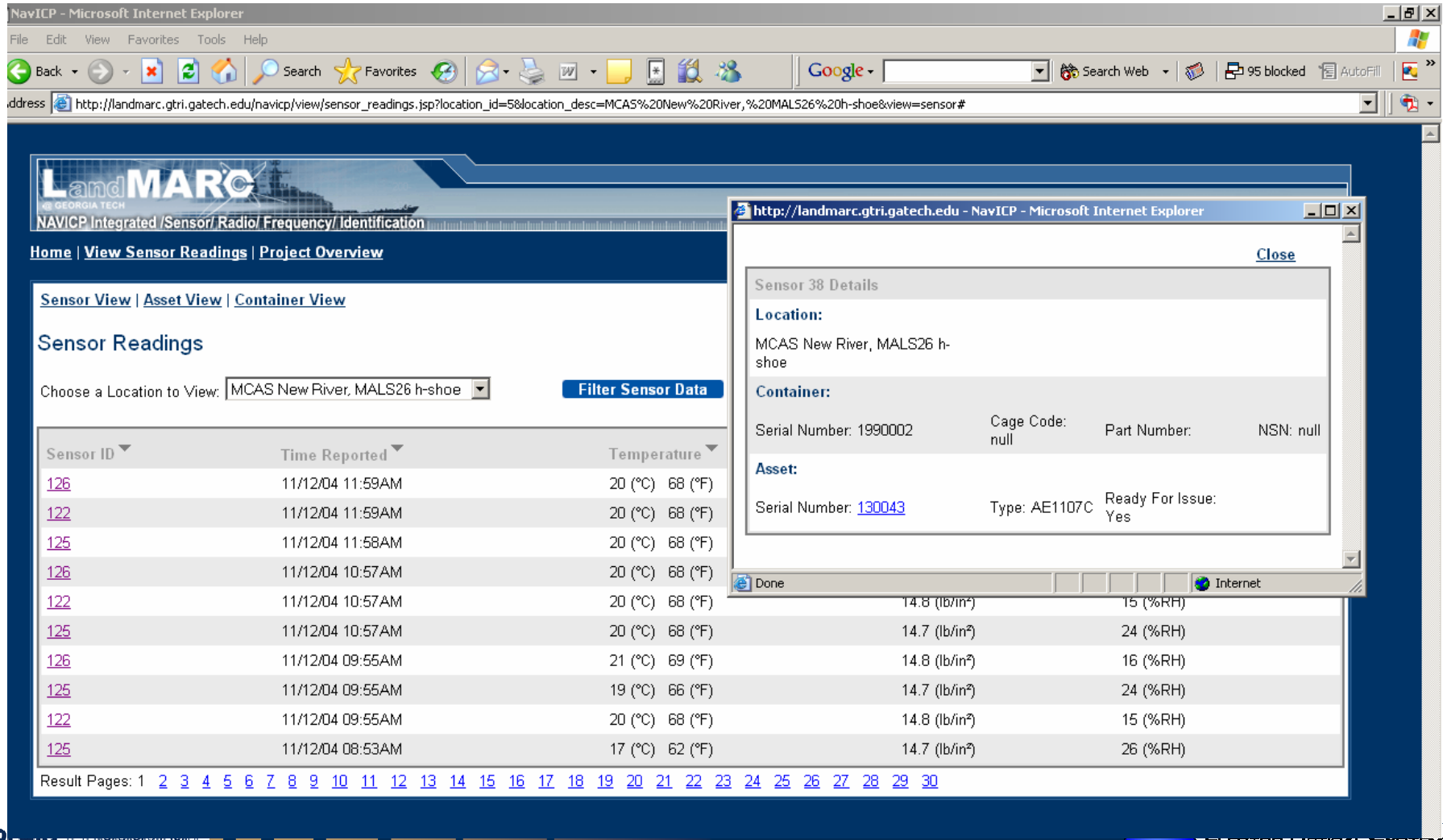
V-22 DT/OT Active RFID - RMS

Installation inside of Horseshoe

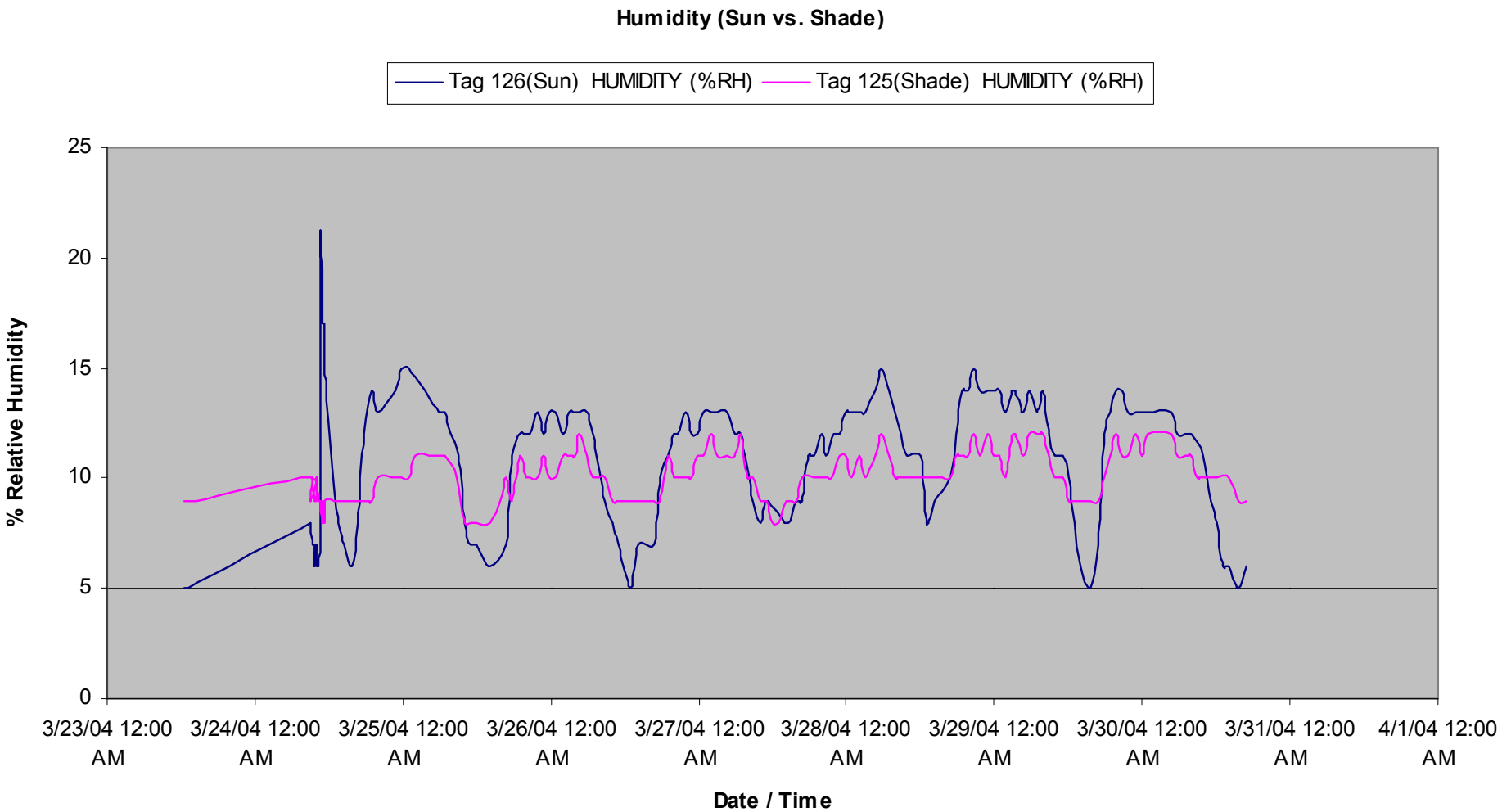
Web-based Asset Management System



Web-Based Asset Management



V-22 DT/OT Active RFID DATA



Humidity (Sun vs. Shade)

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**