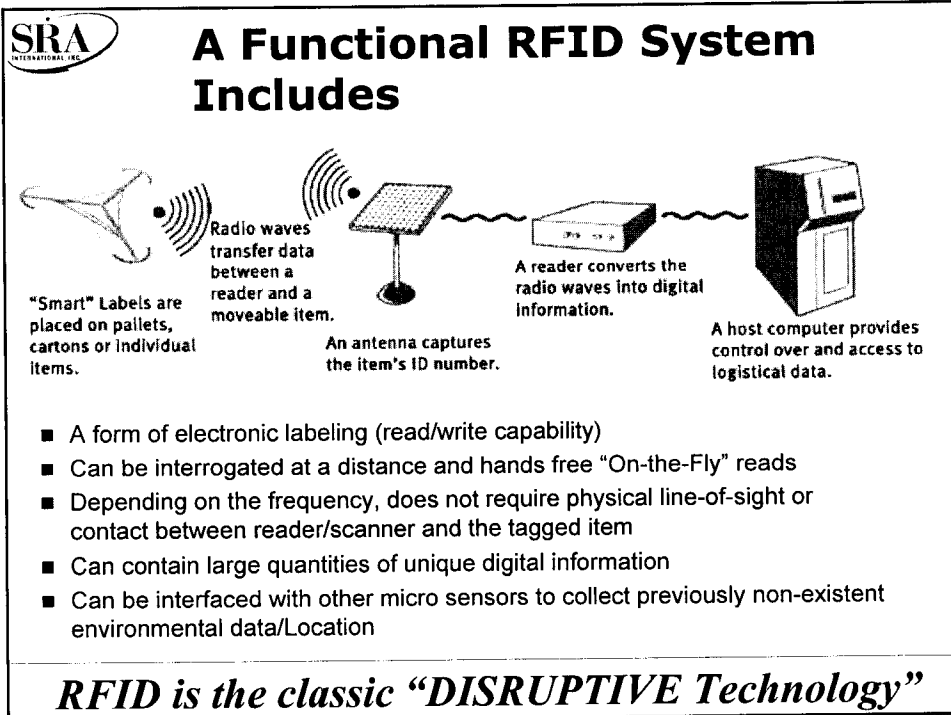


# RFID: Radio Frequency Identification

Information Security Privacy  
Advisory Board (ISPAB)

30 March, 2005

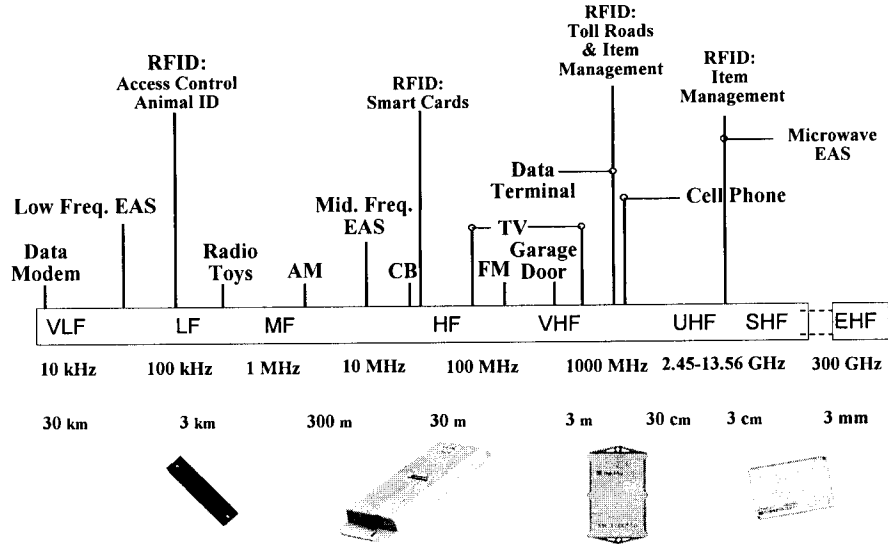
By:  
Nicholas Tsougas





# The RF Spectrum

Frequency Common Name	
125 KHz	Low frequency
13.56 MHz	High frequency (HF)
860-960 MHz	Ultra-high frequency (UHF)
2.45 GHz	Microwave

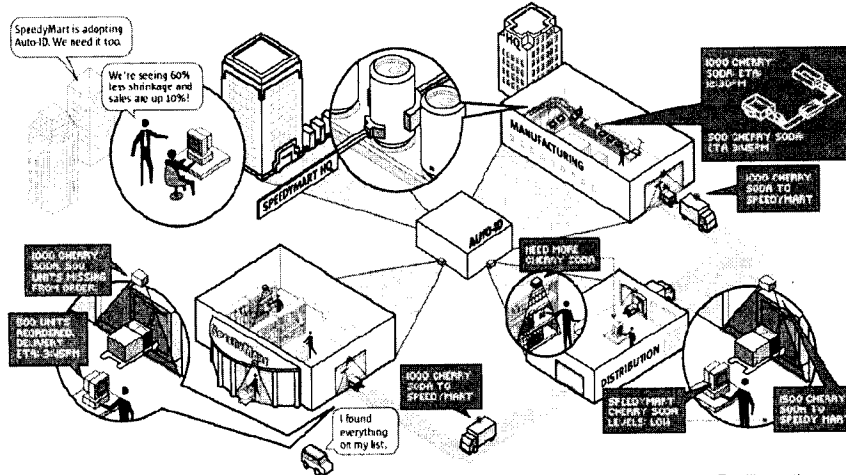


# Current RFID Applications

Transportation	Manufacturing	Security	Financial	Other
Airline Transponder	AGV Control	Access Control	Electronic Cash	Animal Identification
Container ID	Assembly Line ID	Auto Immobilizer	Automated Fueling	Finish Line
Global Positioning	Configuration Management	Baggage Tag	Payphone Token	Gambling Token
Pallet ID	Factory Automation	Boarding Pass	Ski Tickets	Gas Cylinder ID
Parking Control	Forklift Positioning	EAS	University Cards	Laundry Tracking
Toll Collection	Inventory Control	Electronic Keys	Food Service	Loyalty Programs
Traffic Management	Maintenance	Fleet Management	Time & Attendance	Medical Device ID
Truck Fleet Tracking	Paint Shop	People Locating	Document Control	Membership Cards
Rail Car Identification	Process Control	Security Areas		Mining
Parcel Logistics	Tire man/tracking	Theft Prevention		Patient ID/tracking
Vehicle Movement	Brand Identification	Vehicle Access Control		Library tracking
Passenger Tracking	Supply Chain Mgmt	Counterfeiting		



## The EPCglobal Network vision



For illustrative use only

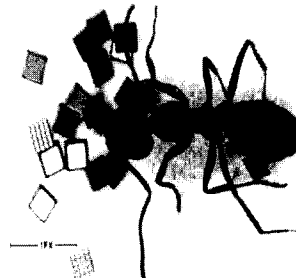
Source: Auto-ID center

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## RFID means a world with billions of ant-sized, five-cent computers

- Highly mobile
- Contain personal information
- Subject to surreptitious scanning
- Again, no cryptography...
- Access control difficult to achieve
- Data privacy difficult to achieve





## Passive RFID in the DOD Supply Chain

- Tagged items/cases/pallets shipped from suppliers
- Shipment/order data to DOD
  - *Advanced Ship Notice (ASN)* Required
- Shipment/order data captured in DOD Data Environment
- Will accept SSCC, SGTIN, DOD data construct
- RFID tag read on arrival at DOD Receiving Point
- Use EPCglobal compliant Class 0 & 1
- Tag read generates *Transaction of Record* (*Receipt, Acceptance, Close-out, Payment, Inventory, etc.*)

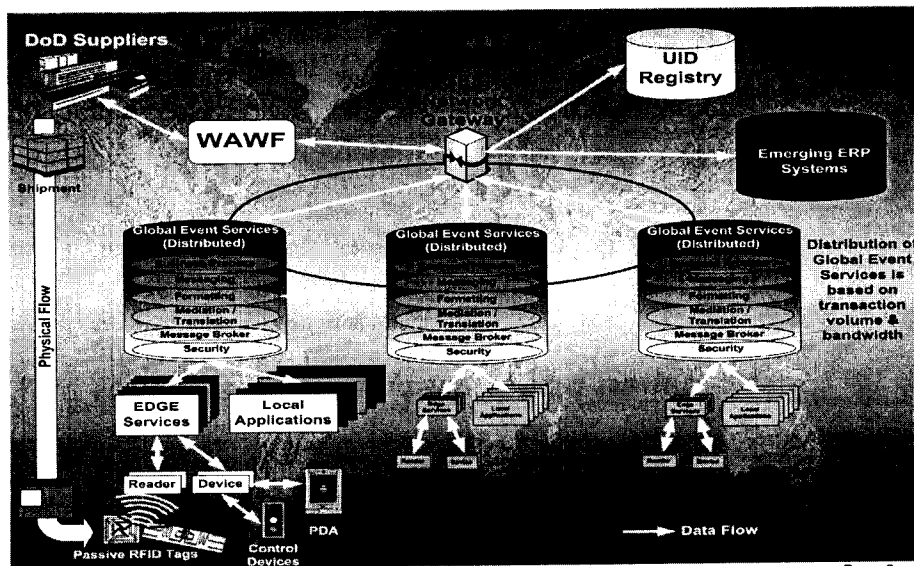


**The focus is on case/carton and pallet**

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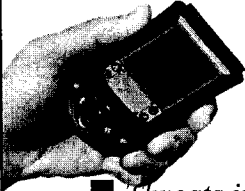
## DOD RFID Architecture & Data Integration



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## RFID Security Threats

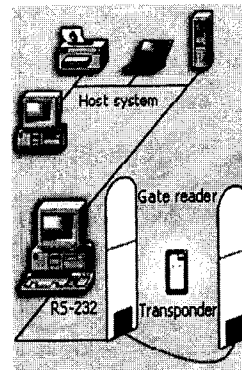


- *Threats include (not all inclusive):*
  - Rogue readers introduced to network (physical security)
  - Rogue access to legitimate readers
  - Counterfeit tags
  - Rogue tags (introduced into network to cause malicious damage or slow-down the network)
  - Eavesdropping or insertion of data into passive tag-reader communications
  - Other threats



## RFID Security Risks and Mitigation (Active & Passive)

- Network-Based Risks (GIG)
  - Network Reader attacks
  - Information attacks (malicious virus introduction)
- Mission Assurance Risks (affect performance of Logistics and other core functions)
  - Monitoring of the Air Interface
  - RTLS, Sensor Tags that always beacon (tags talk first)
  - Data integrity on the Tag (encryption of data on tags)
  - Blocking access to tags (blocker tags, metal encapsulation, etc.)
  - Permanently disabling tags (kill tags)





## RFID Security Risks and Mitigation (Active & Passive)

*Protect and defend information and information systems by ensuring their availability, integrity, authentication, confidentiality, and non-repudiation.*

- “Warfighter” Risks- (Force Protection)
  - Combat system interference
  - Detection (Directional antennas, jamming)
  - Targeting (RF saturation)



What risks can we live with?  
What level of security are we willing to pay for?

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## Challenges Ahead

- *State of the technology*
  - *Read ranges*
  - *Security/Privacy*
- *Economic Issues*
- *Regulatory Issues*
  - *States, FDA, EPA, FCC*
- *Standards*
  - *Air Interface Protocols*
  - *Frequencies*
  - *Data formats/constructs*
- *AIS & Data Architecture*
- *Education & Training*
- *Phasing of implementation*
- *Business systems integration*



***RFID – Future Reality...unlocking the potential***

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## **Back to the Future**

***"I think the industry has sold itself on a program that offers so little return that it simply won't be worth the trouble and expense"***

A Midwest Grocery Chain Executive discussing the potential of the barcode in 1975

**RFID holds *Significant Potential* for the supply chain**