Hi·G·Tek

Highly Intelligent RFID Solutions

Liquid Logistics Monitoring using Active RFID Technologies

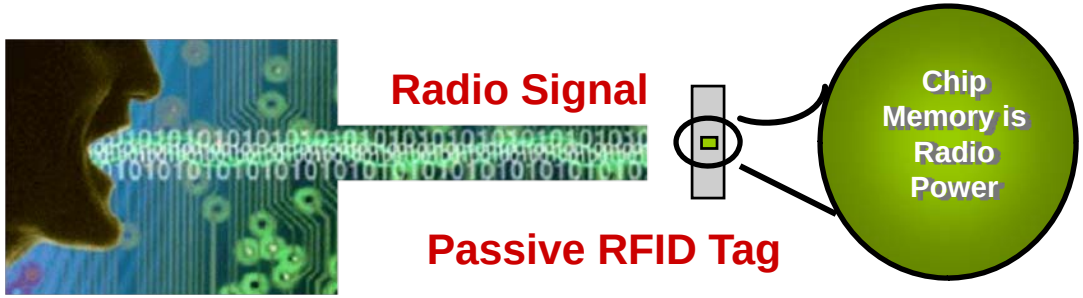
International Summit on Agricultural and Food Transportation

Washington D.C.

December 3, 2008

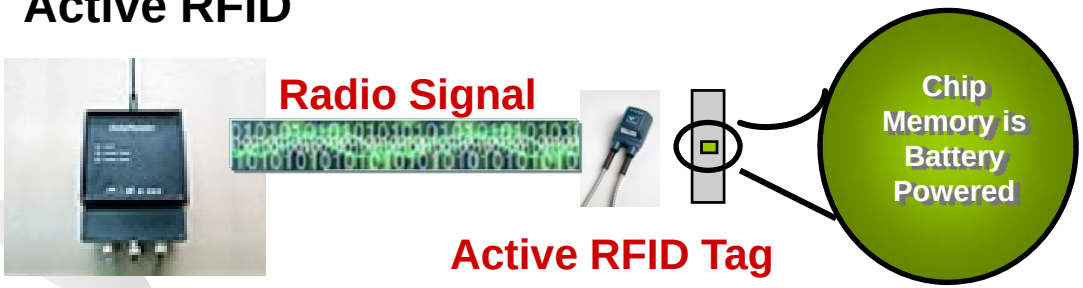
RFID Basics: Passive and Active Tags and Readers

Passive RFID



Reader "speaks" to tag and tag uses energy to modulate and respond

Active RFID



Reader "listens" for tags. Tag beacon via clock, interrogation, or sensor trigger.

A tag that ***stores information*** and ***exchanges it*** by radio signal

Reader languages are called "protocols"

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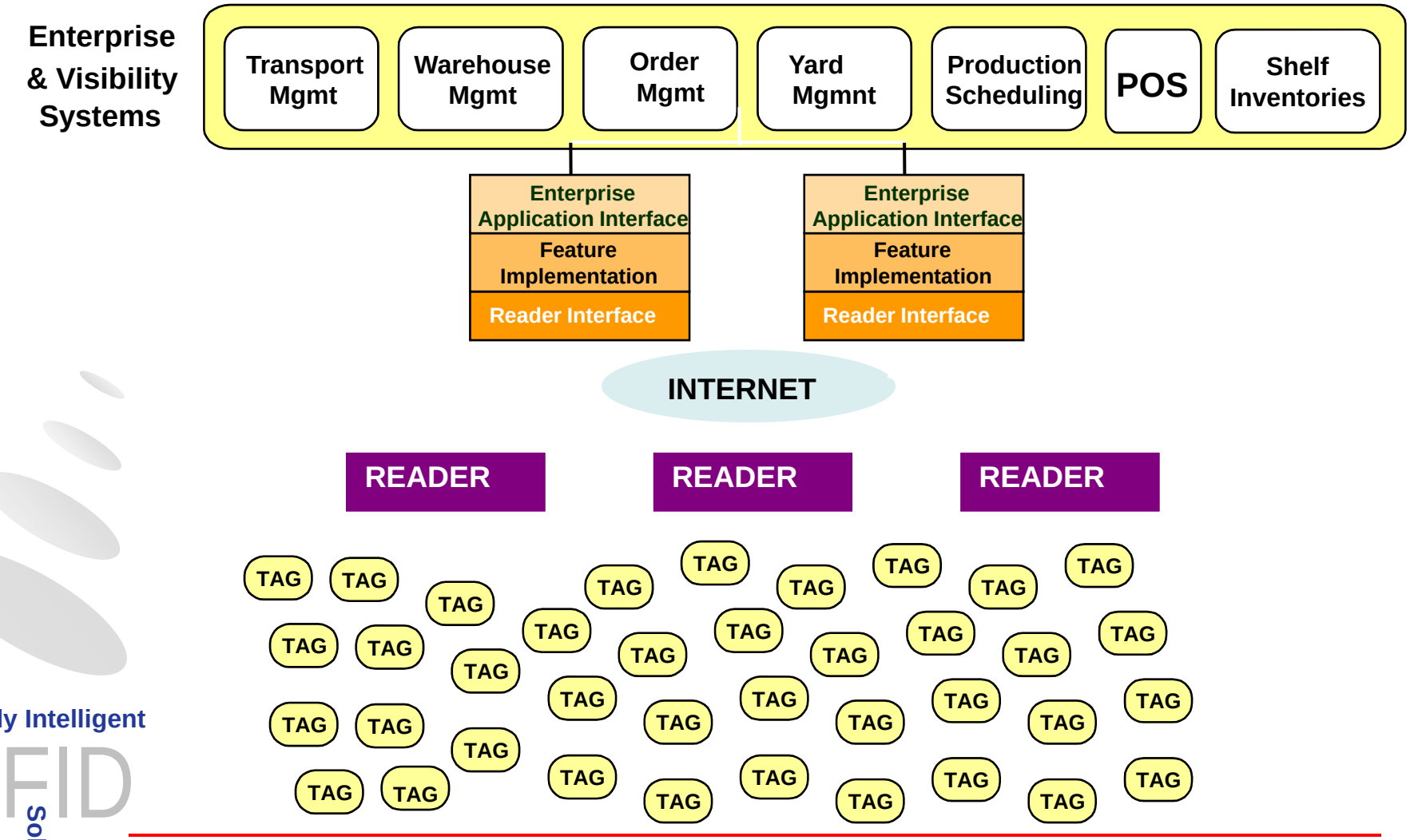
RFID Technology should be matched to the Application Needs

	Passive "What is it?'	Active "Where and how is it?"
Technology Attributes	• Inexpensive, disposable tags (<$0.30) • No internal power • Replaces barcode systems • Costly antennas and power amplifiers • Short range • Read efficiency dependent on environment	• Reusable battery powered RFID tags • Long range • Many simultaneous tag reads • More expensive • Readers are smaller and cheaper
Typical Applications	• Replacement for bar codes • Lower value, higher volume assets • Read points set at choke points	• Higher value assets • Used more in mobile applications • Read reliability is required • Logistics and mobile asset tracking
Market Characteristics	• High Expectations with WalMart and DOD mandates • Large potential volumes • ROI questionable • Lots of hype, recent disillusionment • Many competitors	• Niche oriented markets • Great potential • Many proprietary competitors

General RFID Architecture



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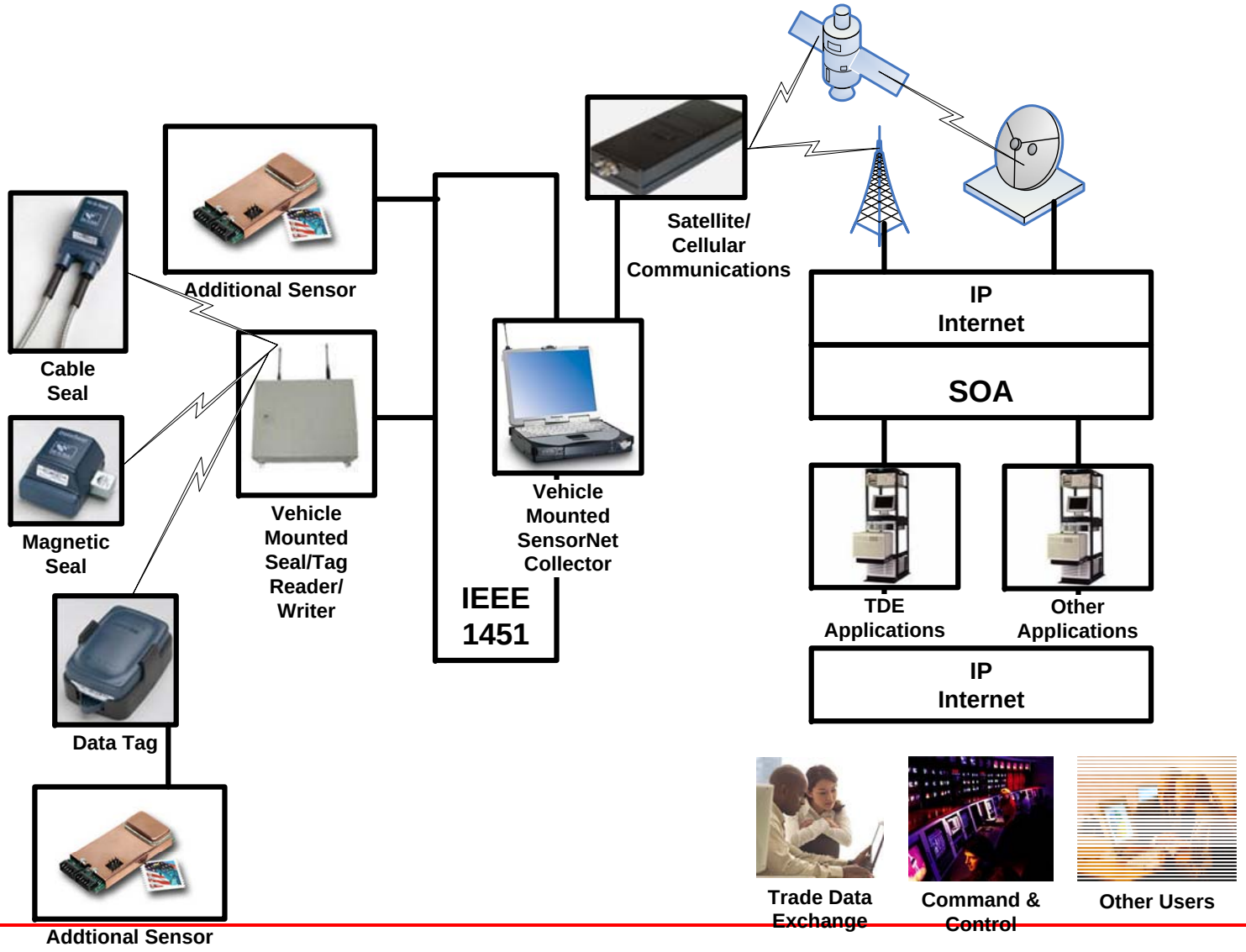
RFID Solutions Link Operational Environments to Business Systems



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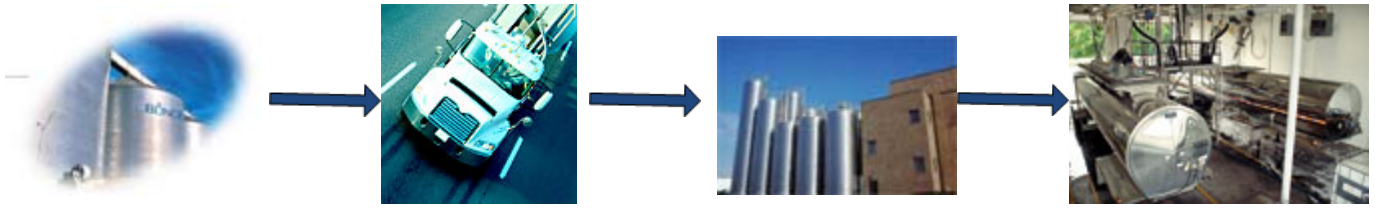
Liquid Food Distribution

Security & Management

End to End Visibility of Liquid Food in the Supply Chain



Product Pick Up | **In Transit** | **Product Delivery** | **Tank Wash**

- **Validate Integrity of the Load to reduce rejections**
- **Electronic Manifest yields faster time to cash**
- **Compliance with new Food Purity requirements**
- **Temperature Monitoring and Reconciliation**
- **“Green” Reusable Seal**
- **Improves Driver Safety conditions**
- **Added Security can reduce Insurance Premiums**

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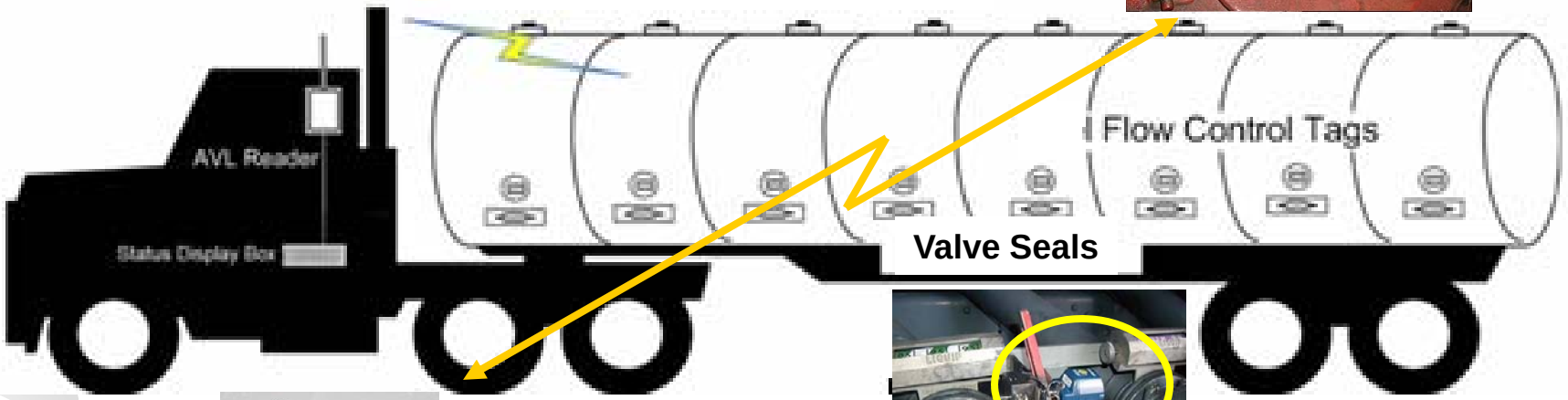
Tanker Truck Monitoring System

GPS

GPRS/Satellite Comms

Internet

Hatch Seals



AVL Reader connected to OBC

Provides wireless Connections to:

- **Temperature sensors**
- **Flow Meters**
- **Level Sensors**

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Example Installation

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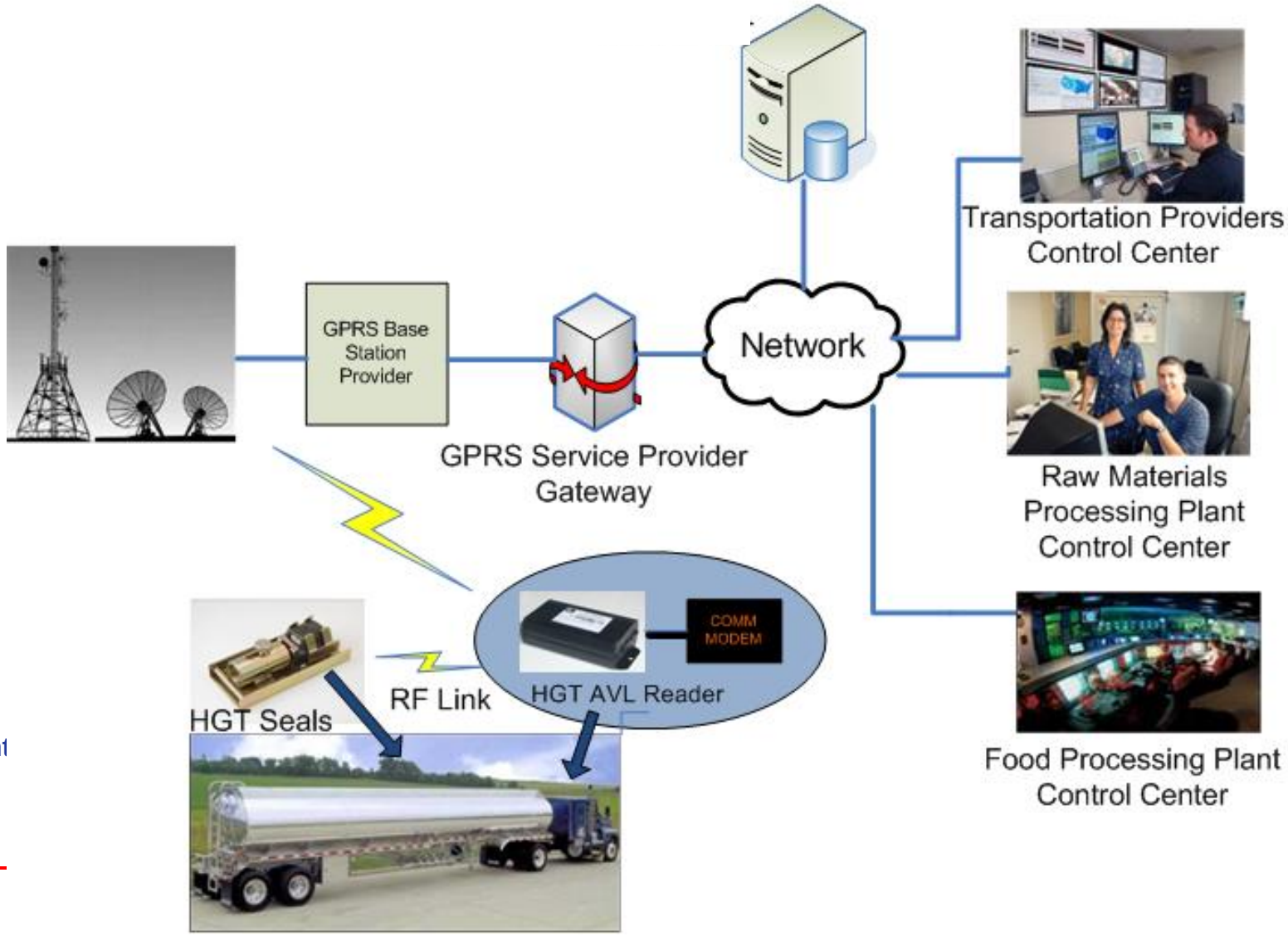
In Transit Visibility of Liquid Food



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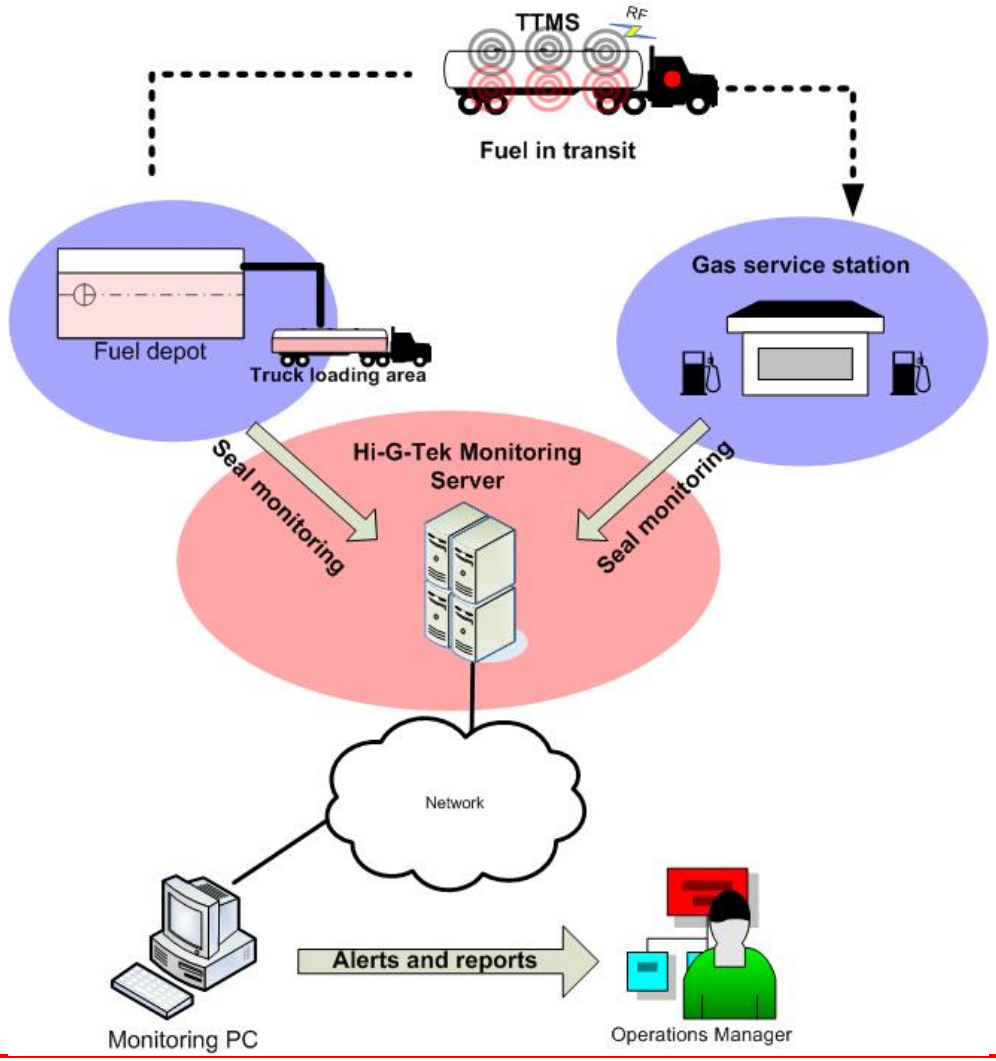
Supporting Infrastructure



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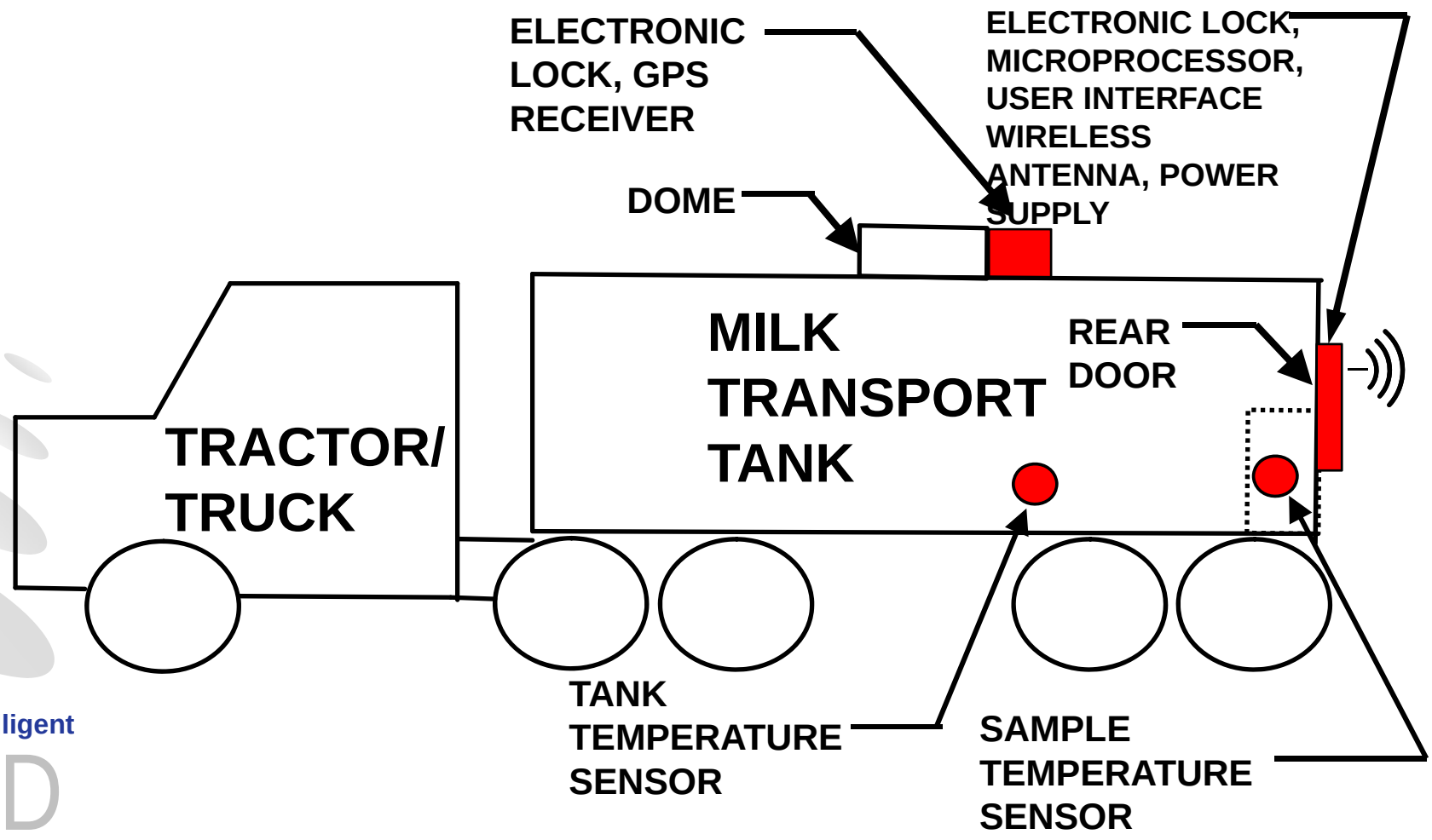
Milk Transport Monitoring Project at the University of Kentucky

Courtesy of Fred Payne, Chris Thompson University of Kentucky

Transport Monitoring System (TMS)



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Courtesy of Fred Payne, Chris Tompson University of Kentucky

Milk Transport Security System Design

PRINTER

WIRELESS BLUETOOTH

DATA USERS:
- •MARKETING AGENCIES
- •TRANSPORTATION CO.
- •MILK PLANTS

RCODE

Wireless

Wi-Fi

Wireless

Cellular

DATA SERVER

SECURITY MONITORING SYSTEM (SMS)

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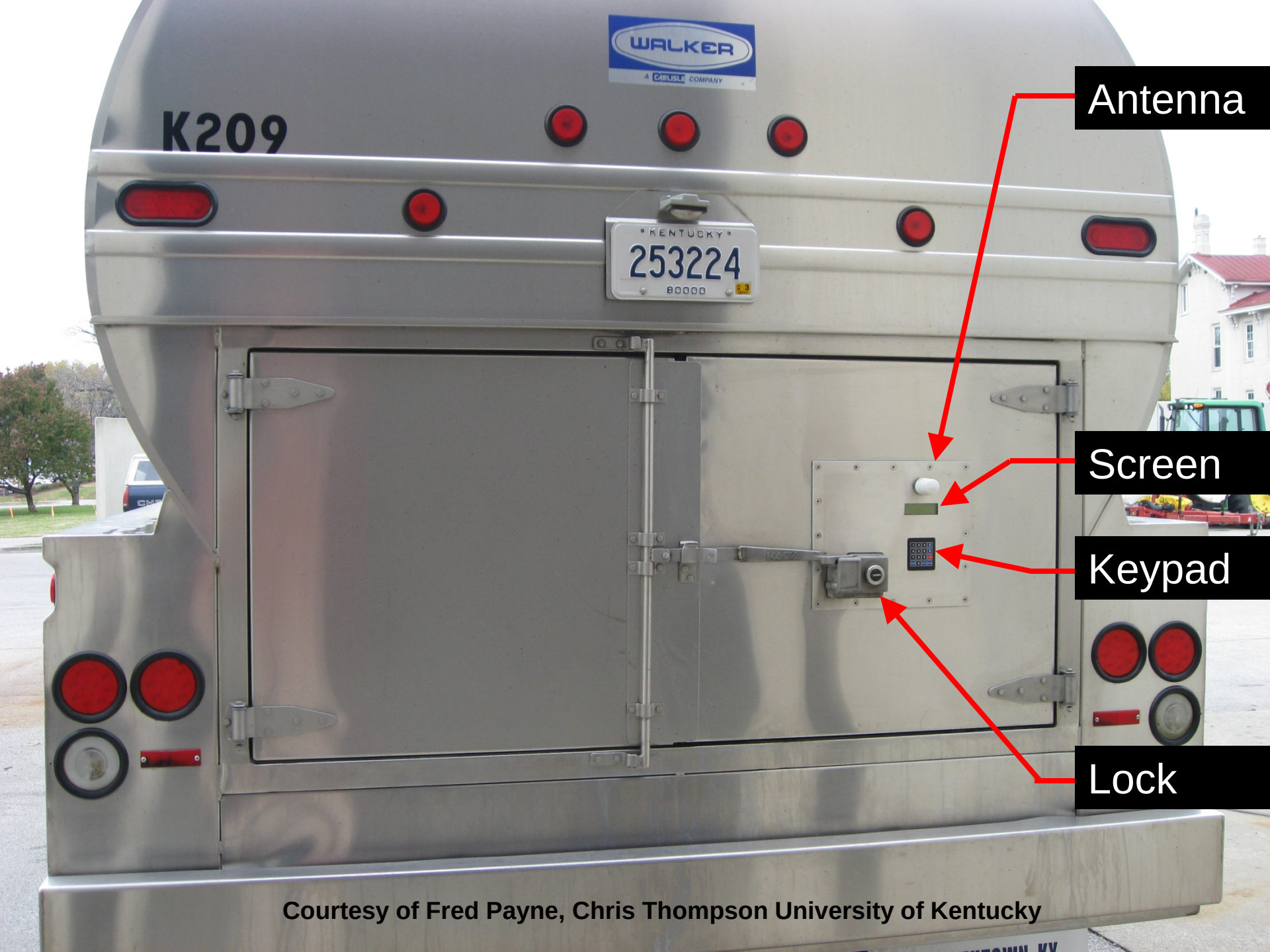
LOCKS
GPS
TEMPERATURE
USER INTERFACE

DATA USERS:
- •MARKETING AGENCIES
- •TRANSPORTATION CO.
- •MILK PLANTS

Courtesy of Fred Payne, Chris Thompson University of Kentucky



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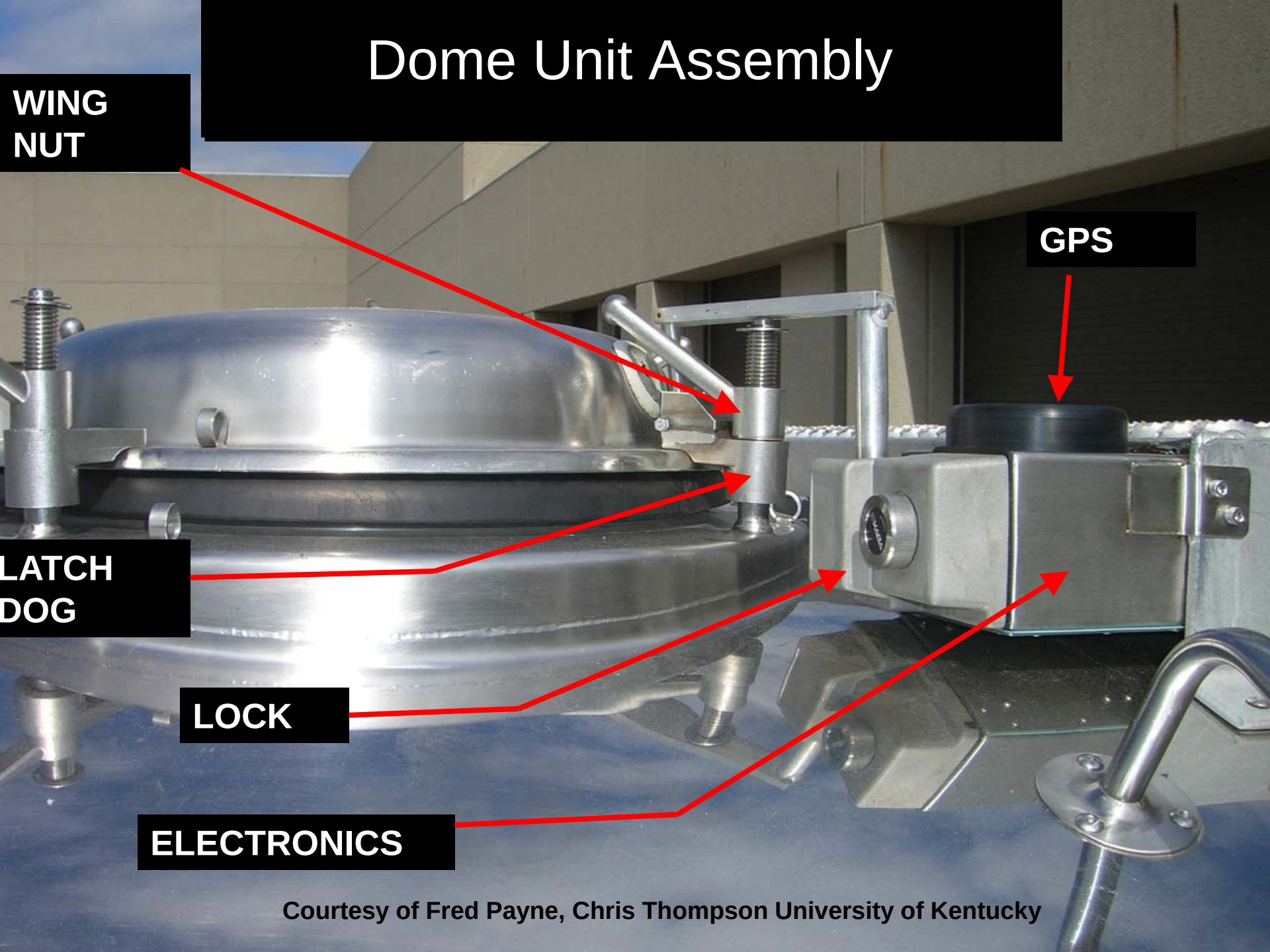
Dome Unit Assembly



Courtesy of Fred Payne, Chris Thompson University of Kentucky

Field Testing

- October-November 2007 Intermittent Testing
- February-April 2008 Intermittent Testing
- May-June 2008 Continuous Testing
- August-September 2008 Intermittent Testing

Courtesy of Fred Payne, Chris Thompson University of Kentucky

Questions?

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