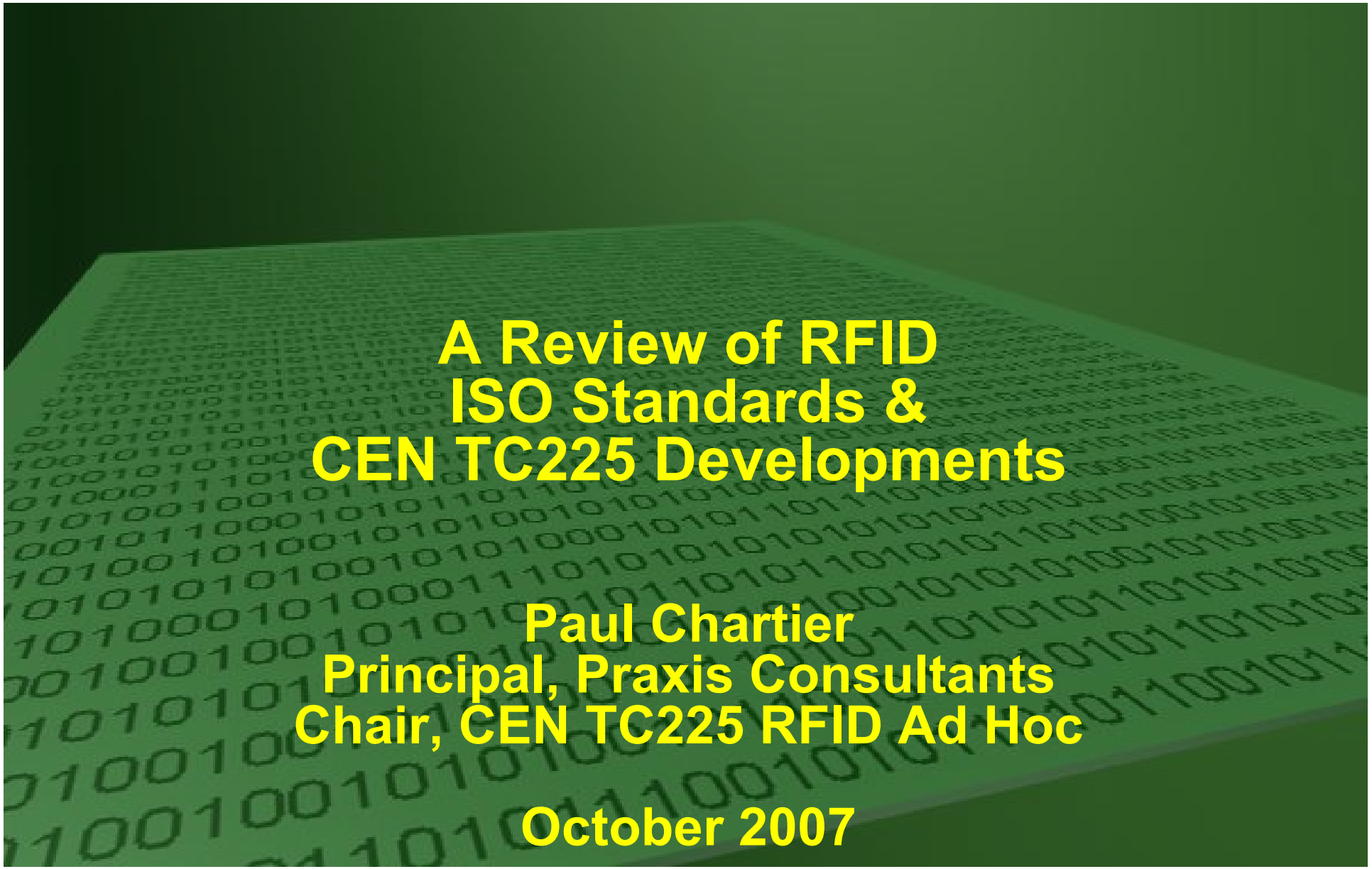

A Review of RFID ISO Standards & CEN TC225 Developments

Paul Chartier
Principal, Praxis Consultants
Chair, CEN TC225 RFID Ad Hoc

October 2007

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RFID Standards
Types of Standard

- **Technology - air interface**
  defines what it does
- **Conformance & Performance**
  compares actual devices with standards
- **“Middleware” protocols**
  how data and instructions are processed
- **Data content**
  how business data is supported
- **Applications**
  making it work for a specific sector

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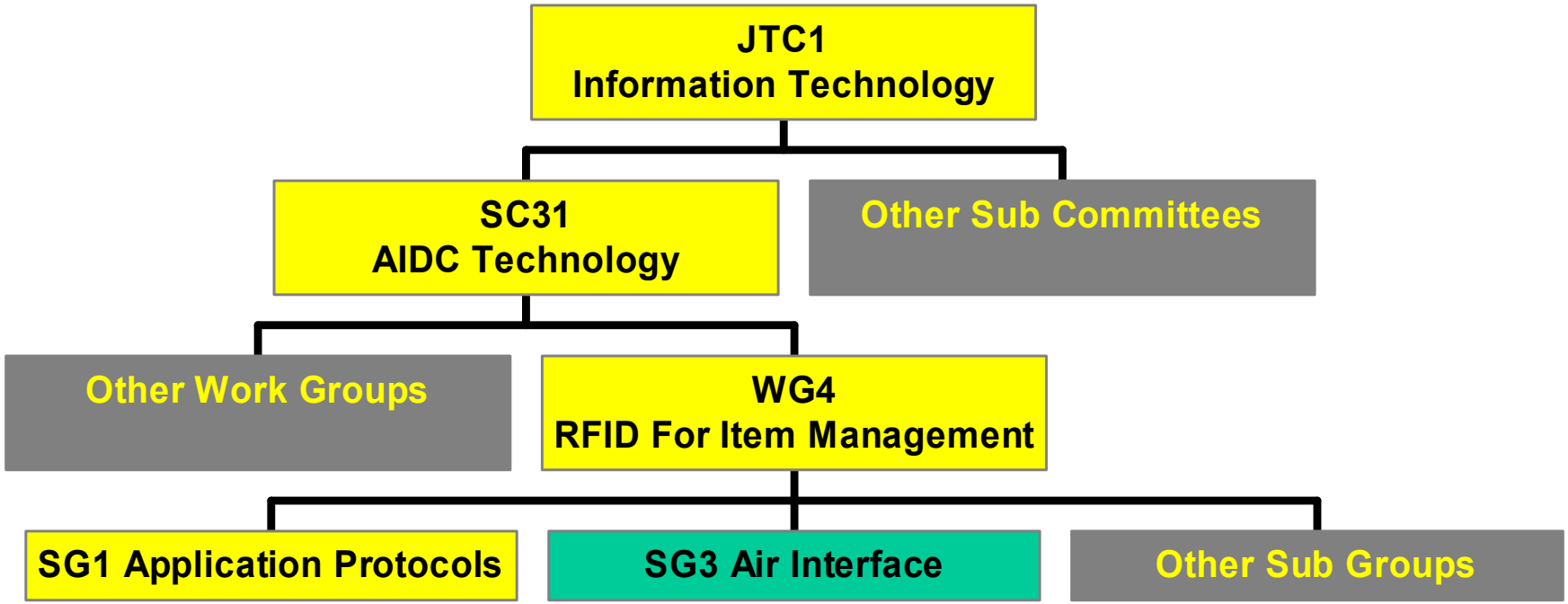
ISO/IEC STANDARDISATION
SC 31 Structure



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JTC1 SC31 WG4 RFID for Item Management Work Items for SG3

- *ISO/IEC 18000 Parameters for Air Interface Communications* with particular parts defined as follows:
  - Part 1 – definition of parameters
  - Part 2 – two types operating below 135KHz
  - Part 3 – two modes operating at 13.56 MHz
  - Part 4 – two modes operating at 2.45 GHz
  - Part 5 – not published
  - Part 6 – three types operating at 860 to 960 MHz
  - Part 7 – one mode operating at 433 MHz (active tag technology)
- Work continues with revisions (eg Sensors) and new candidates

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ISO RFID Standards
Air Interface Standards

Various aspects can be covered, but key are:

- The air interface: frequency, modulation, bit encoding
- Anticollision
  - the ability to almost simultaneously address a number of tags unambiguously
  - not always a requirement
- Commands and responses that address memory in terms of blocks (or words, or pages)

Air Interface Standards
ISO/IEC 18000

ISO/IEC 18000 Parameters for air interface communications		
Spectrum	**Frequency**	**Standard**
Low frequency	<135 KHz	ISO/IEC 18000-2
High frequency	13.56 MHz	ISO/IEC 18000-3
UHF	433 MHz	ISO/IEC 18000-7
UHF	860 -960 MHz	ISO/IEC 18000-6
Microwave	2.45 GHz	ISO/IEC 18000-4

- Part 1 – Reference architecture & definition of parameters

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ISO RFID Standards
Conformance & Performance

- **Conformance:** "Fulfilment of a product, process or service of specified requirements"
  - ISO/IEC 18047 - RFID device conformance test methods – *Technical Report* [This is a multi-part standard to align with ISO/IEC 18000]
- **Performance:** "Manner, quality or measure of a function"
  - ISO/IEC 18046 - RF Tag and interrogator performance test methods – *Technical Report*

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JTC1 SC31 WG4 RFID for Item Management Work Items for SG1

- Data Protocol standards: ISO/IEC 15961 and 15962
- Management of data constructs
- ISO/IEC 24753 *Encoding and processing rules for sensors and batteries*
- ISO/IEC 24791 *Software System Infrastructure*

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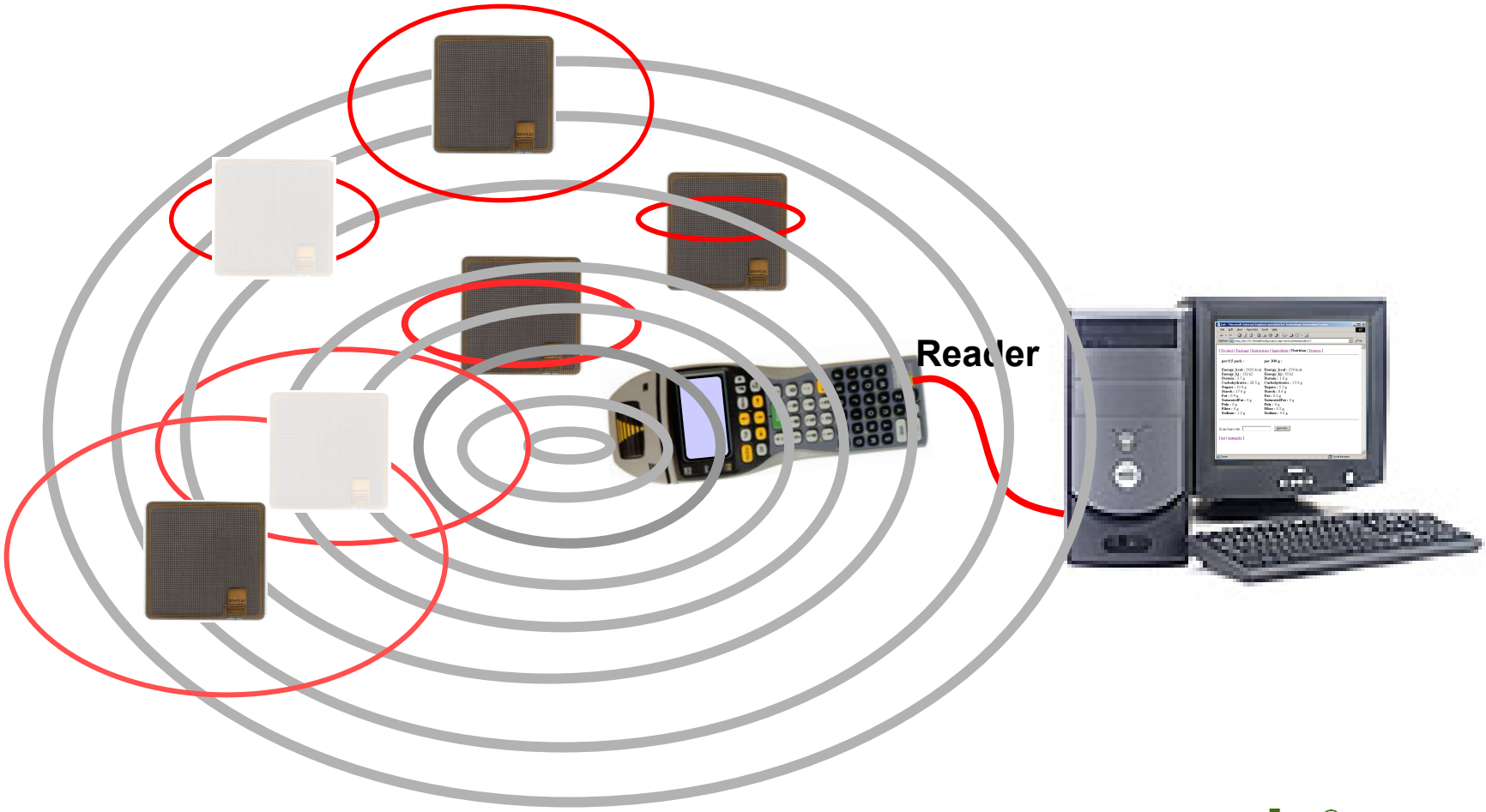
The AFI: A Powerful Tool to Select Only Relevant Tags



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RFID Data Protocol
Revisions to ISO/IEC 15961 & 15962

- 15961-1: 15961 (pub October 2004) needs to be simplified with respect to the data constructs topics
- 15961-2: Rules for new Registration Authority for AFIs and other data constructs
- 15961-3: Specification of data constructs

- 15961-4: Commands for sensors
- 15962: New encoding and data mapping processes

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New Work: Sensors
Technical & Application Issues

- There are a variety of sensor & battery developments making links with RFID feasible & economically viable
- In supply chains additional sensory information (e.g. temperature, moisture content) can be captured via the RFID tag
- Technical challenges:
  - low cost sensors are the likely focus
  - wireless, but unknown, so different from wireless networks
  - self declaring sensors - the sensor & tag might not be known

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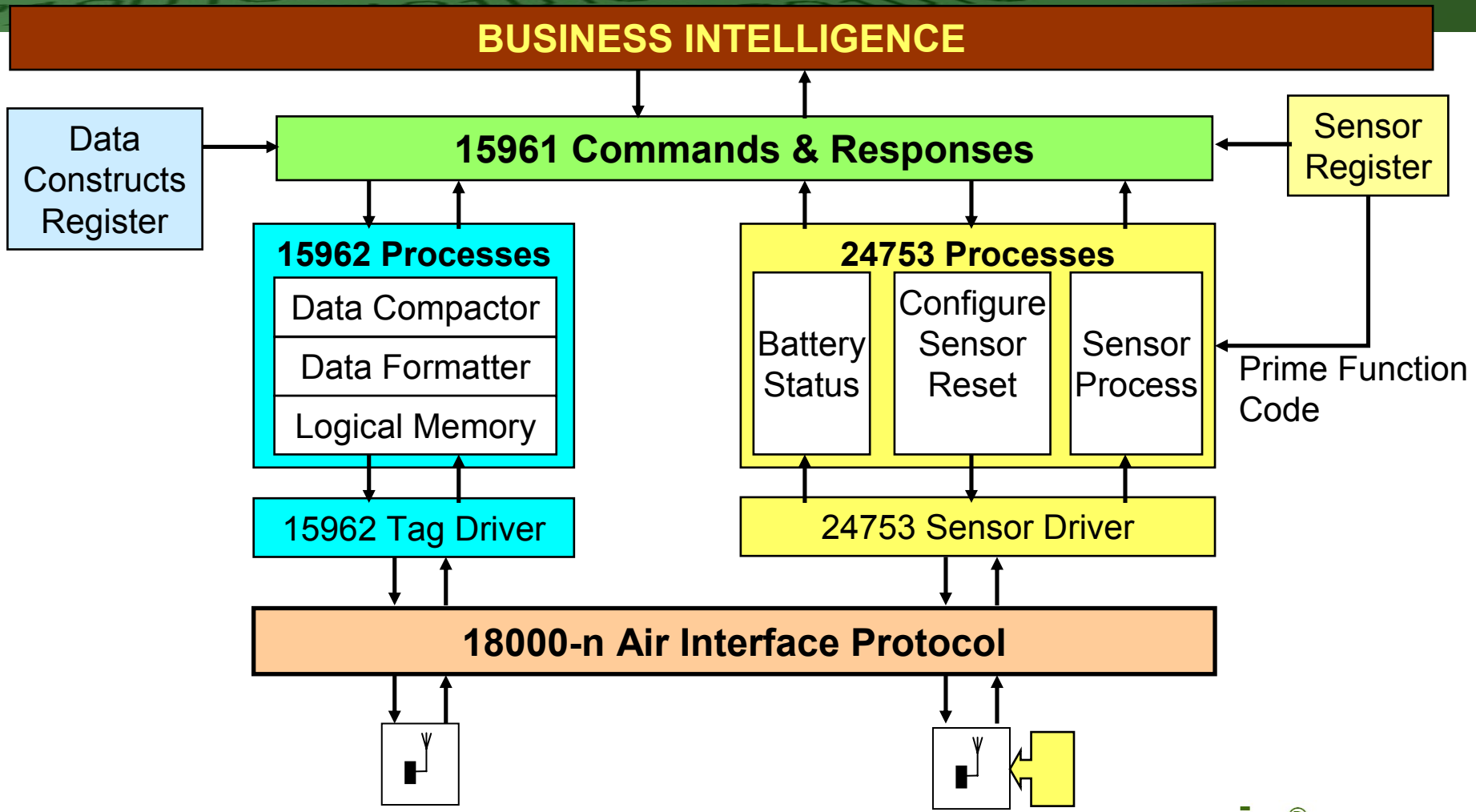
Combining Data Protocol & Sensors



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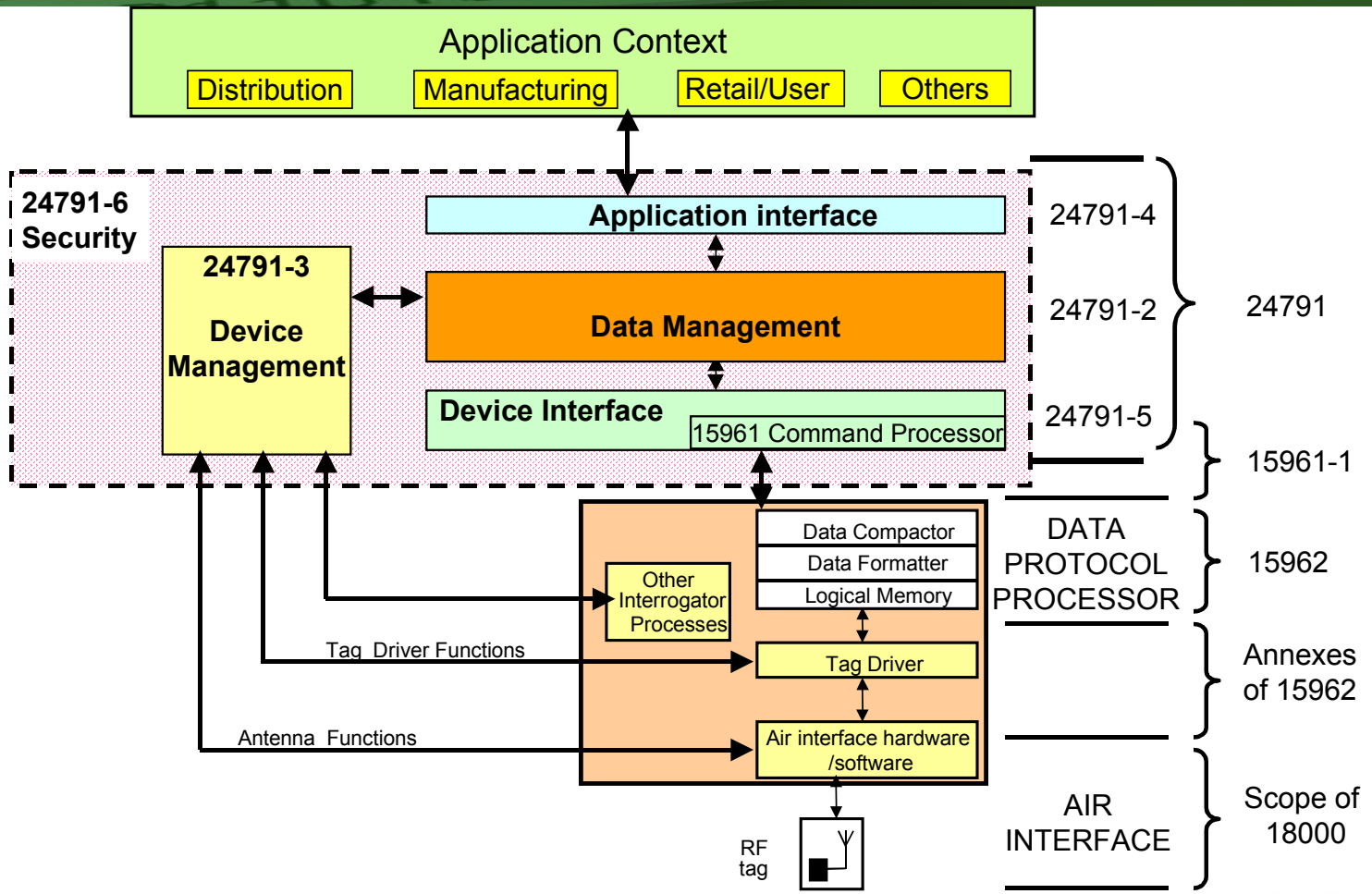
New Work: ISO/IEC 24791 (Parts 1 to 5) Software System Infrastructure



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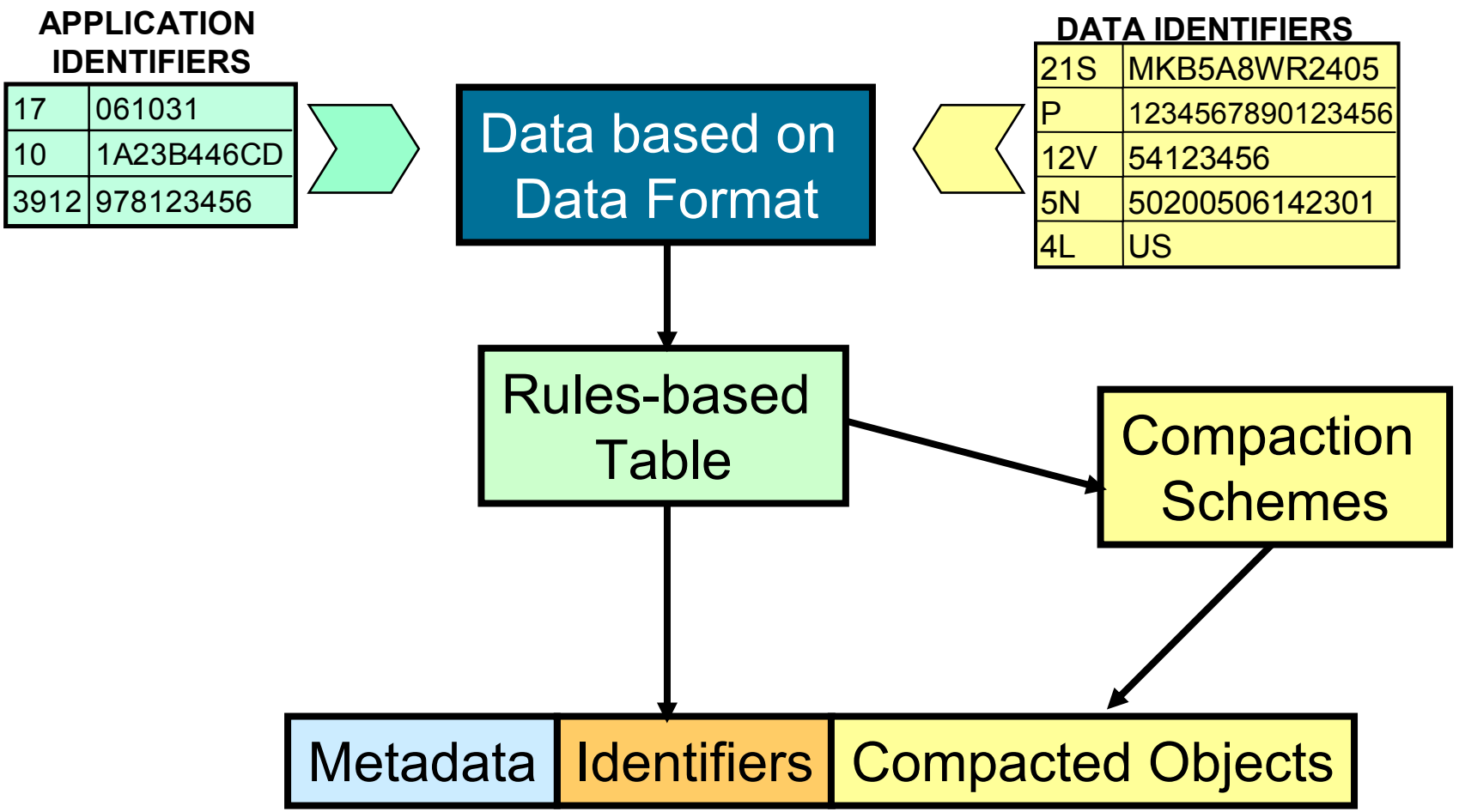
The Packed Object Scheme
The Basic Process



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CEN TC225 and RFID

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

- Until now, focus has been on technology standards; with the task left to JTC1 SC31
- This is a legacy of the bar code standards developed by CEN being offered as inputs to ISO
- The 1st generation RFID technology standards are stable - a sound platform for application developments
- Example: RFID data constructs by NEN
- Opportunity to move forward with a European focus

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2007 ICT Standardisation Work Programme & CEN/TC 225

- RFID is mentioned as one of the three priority domains
- As a result, CEN/TC 225 was invited to create proposals for European standardisation in the field of RFID
- Five proposals developed and proposed:
  - RFID Privacy & Security
  - RFID Implementation Guidelines
  - The Application of RFID in the Manufacturing Sector
  - Automotive Product Authentication & Tracking Using RFID
  - Electronic Customs Forms: Airline Inflight Bonded Goods Sales

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RFID Privacy & Security Deliverable: A Technical Report

- Identify threats to privacy and security
- Identify solutions that have been, or can be, applied
- Create a matrix of solutions and standards - noting that not all technologies can support a given solution
- Prepare a gap analysis
- Identify possibilities solutions from one technology to another
- Identify alternative (possibly 2nd order) solutions

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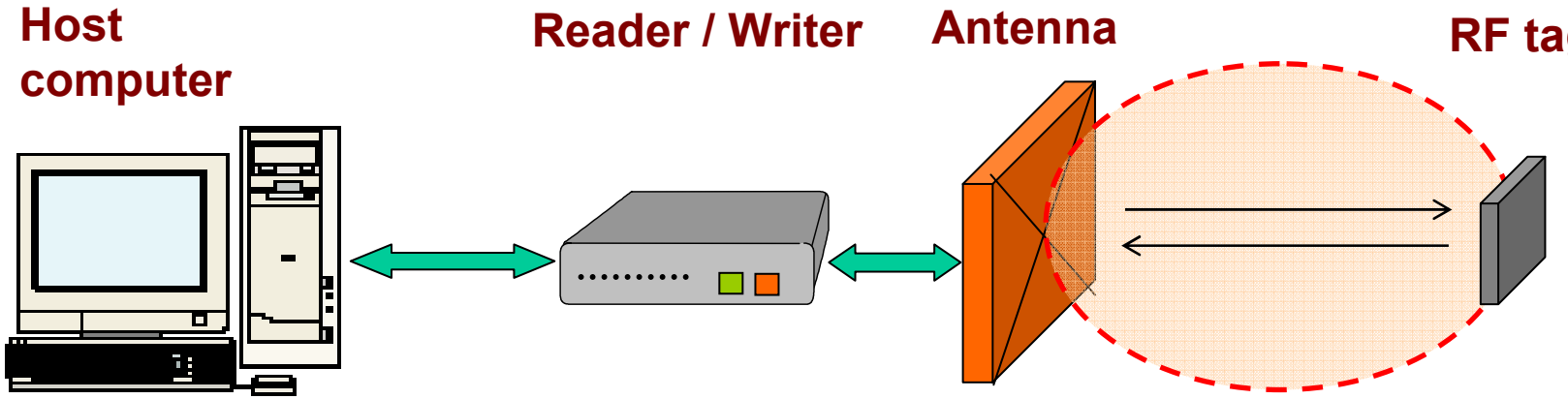
Attacks and Obvious Defence Mechanisms



Data content

Application protocol

Air interface

Hacking & other computer attacks

Conventional defences

Attack message

Validate data content
Restrict network access
Restrict personal access

Reader protocol

No personal data or encryption

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RFID Implementation Guidelines Deliverable: A Technical Report

- Generic technology issues. Examples: physics, power issues, frequencies, memory types
- Closer review for the standardised air interface technologies
- Advise on standards other than air interface
- Advise on implementation issues

Objective: A single source document aimed at end users and as a framework for academic and vocational curricula

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Application of RFID in the Manufacturing Sector Deliverable: A Technical Report

- Automotive sector as a reference - employs 2 million people in Europe
- Mapping of technologies to applications
- Analyse at least 20 applications: e.g. containers, parts marking, RFID and robotics, recycling
- Identify outcomes. Examples:
  - new pan-European initiatives
  - RFID equivalent of EN1573 (Multi-Industry Transport Label)
  - sector standards
  - even advice about closed systems

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Automotive Product Authentication & Tracking Using RFID
Deliverable: A Technical Report

- After-market worth 50 billion Euro per annum
- 5% to 10% of which is possibly counterfeit
- Track and trace (established and new components)
  - chain of custody
  - component usage history
  - recycling of old components
- Possible links to CEN Workshop: Anti-counterfeiting: Protocols for Detection of Counterfeits

  http://www.cen.eu/cenorm/businessdomains/businessdomains/isss/activity/wscpf.asp

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Electronic Customs Forms: Airline Inflight Bonded Goods Sales Deliverable: A Technical Report

- Customs documentation is required for all bonded products not just sales
- IATA has RFID project for inflight trolleys/carts
- This proposal extends the application to secure data capture and electronic messaging for Customs
- Framework for common EU requirements
- Objectives
  - reduced costs for airlines and Customs
  - improved aircraft turnaround at airports

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EU Commission Information Society & Media

- RFID Expert Group: in place until March 2009 [at least]
- CEN & therefore CEN TC225 invited
- Initial focus: Recommendation on RFID and Privacy
- CEN can offer various services, **with prime concern on supportive standards**

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

European Commission
Information Society and Media

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