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Chairman RACE netwoork RFID
RFID
Radio transmission of data between tag/transponder and reader
Definitions – RFID

RFID – Radio Frequency IDentification
• Is a technology for wireless communication between a reader and a transponder/tag

RFID can be split into active and passive systems:
• Active systems have a battery in the transponder/tag
• Passive systems have no battery in the transponder/tag
RFID Proof of Concept (period 2005-2008)

- RFID testing for several years with active and semi active solutions
- About 500 wagons has been tagged
- Great results with RFID reading (but no real application developed)

_Suppliers has been:_

Tagmaster   Adage   (Amtrac/Transcore)
One area of interest with RFID are detector measurement and wagon ID!
Carbon Stripe Camera

Carbon stripe fault detection

Digital camera
Flashlight
Radar

Picture analyses
TSI rolling stock — freight wagons

EU legislation for rail transport in Europe

- RFID transponders/tags are not mandatory
- Two passive transponders/tags per wagon, mounted on the left side
- ISO 18000-6 type A air interface
- Reads the individual tag ID/wagon ID, date and time
- Speeds up to 30 km/h
Rail traffic in Europe

60-70% of wagons in Sweden come from other European countries

Need:
- European standard for RFID system
- Standard for information exchange
Navigation – way to GO?

- Speed
- Standards
- Intermodal transports
- TSI
- Active
- Semi active
- Passive
- Customers
- Suppliers

RFID in Rail
External support

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RFID demands for a pre-study (2009)

- Speed over “160” km/h
- Open standard
- Potential EU-standard
- Easy to maintain
- Competitiveness
- Robust
- Possible to use in other transport systems
Pre-study results:

Upgrade TSI

- Upgrade air interface standard to ISO 18000-6 type C
- Speeds up to max speed of the wagon
- Not just for shunting yards but also trackside detection
- Recommend RFID transponder/tag on rolling stock – freight wagons

Position paper

- Finland (RHK) and Sweden (BV)
- EIM – ERA – Commission

Published on EIM website: www.eimrail.org/techpapers.html
GS1 – a standards body

- Owned by its member organisations
- 1.3 million customers
- Offices in 108 countries - operations in 145 countries

GS1 Transport
One of five prioritised GS1 projects
Swedish Rail Project – rail in general
STANDARDS

Air interface:
ISO18000-6 typ C
UHF Gen2 Class1

What
GIAI96

Tagg
Reader

Data / informationstructure
GS1 standards

What

Where

When

Why

EPC IS

What

Where

When

Why

RFID in Rail
EPC

Transponder/tag

Tag number

EPC-kod: GIAI 96

User memory

(Header, FilterValue, Partition, Company Prefix, Individual Asset Reference)

Company prefix, A/B + Wagon number

1/2 + 12 digits
EPCIS

EPCIS Data consists of events, each of which records something that happened in the real world.

Often, though not necessarily, triggered by reading an RFID tag.

An event has four dimensions:

- **What**: what physical objects were involved (EPC or other identifier)
- **When**: when the event took place (timestamp)
- **Where**: where the event took place (location identifier)
- **Why**: what business process step was being carried out
Structure – RFID

GS1 - Standard
EPC Tag
ISO18000-6 C
Reader
Axle counters
Database and Data switch
Company
Internal Information system

What
Where
When
Why
EPCIS

RFID in Rail
RFID Detectors
Register passing vehicles along the track
RFID Detectors

Information protocol – EPCIS

- What – vehicle ID
- Where – detector location
- When – date and time
- Why – direction

RFID in Rail
Ongoing RFID projects:

SSAB: Steel billet train Luleå - Borlänge  *Active RFID*

SCA: Paper wagons Munksund - Holmsund – *Semi-active RFID*

Dry Port: Falköping - Göteborgs hamn - *Passive RFID*

Posten: Post train Stockholm – Göteborg – *Passive RFID*

Volvo: Train shuttle Olofström – Göteborg – (Gent) - *Passive RFID*

Green Cargo: Intermodal transports Helsingborg – Stockholm – *Passive RFID*

SJ: X2000 “high speed” train Stockholm – Göteborg 200km/h - *Passive RFID*
RFID - GPS (satellite positioning)

RFID:
• Know which reader locations a wagon has passed
• Know in which zone (between reader locations) a wagon is

GPS:
• Know in real-time where a train (locomotive + wagons) is

RFID+GPS:
• Know in real-time the exact position of every individual wagon
Benefits for Trafikverket/ Swedish Transport Administration

- Combine detector measurement and alarms with correct vehicle
- Lower costs for track maintenance,
- Less disruption of traffic
- Correct train assembly
- Correct charging
Benefits for Railway companies

- Track and trace wagons
- Proactive vehicle maintenance based on input from trackside detectors
- Combine detector alarms with correct vehicle
- Lower cost for vehicle maintenance
- Less disruption of traffic
- More effective shunting of freight wagons
- Correct train assembly
- Correct charging
Benefits for the customer of cargo transports

- Enables intermodal transport
- Track and trace wagons and freight across the whole of Europe
- Better use of resources
- Lower freight costs
- Reduced environmental impact
- Correct charging
Deployment in Sweden

- Build an infrastructure of 500-700 RFID readers along Swedish Transport Administration’s tracks
  - Major junctions/stations
  - Shunting yards
- Requirements specification for procurement of RFID readers 2010
- Limited installation and deployment 2011
- Full roll-out of RFID readers 2012-2013
Future:

Transport Administration
- Will build the infrastructure with 500-700 readers
- Will strive for a European standard

Railway companies / operators
- Wagon owners will tag their own wagons

Market
- Than it’s up to the market to get use of the information provided to develop new services and business
Future development
Wisenet – RFID

GS1 - Standard

EPCIS

ISO18000-6 C

Reader

Tag

EPC

Database

Data switch

Axle counters

Sensors

Internal system and database

RFID in Rail
Outside Sweden

- Finland
- Norway
- UK
- France (Spain and Poland)
- Belgium
- Switzerland
- Austria
Thank you!

Any questions?