Heterogeneous Network Access of the Intelligent Container

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Overview

- Motivation
- Scenarios
- Requirements
- System Architecture
- Intelligent Container
- Heterogeneous Network Access
- Project Plan
- Summary
Motivation

Surveillance of goods along the supply chain is needed

Full surveillance is possible by today's information and communication technology

Development of a concept of a future telemetric system

- Autonomous evaluation, decision and communication
- Data from real transport processes
  - For enhanced scenarios for theoretical handling of autonomous control
  - For further developments of the sensor system and the communication unit
Scenarios

Road Transport
- Food distribution to hotels and restaurants
- Different temperature zones on one vehicle
- Improvement on quality and returned items

Sea Transport
- Import of tropical fruits across the atlantic ocean
- Identification of local ripening deviations in containers

Partners
Requirements

- Spatially distributed, item level control of transport conditions
- Detection of type of good
- Assessment of the transport conditions
- Communication of the measurement data respectively the assessment
Intelligent Container

Components of the Intelligent Container
- RFID subsystem
- Wireless Sensor Network
- Server Backend
- Agent System
- Communication Gateway
System Architecture

Road Transport

Sea Transport

RFID Reader
Sensor Network
Communication Gateway
Cargobull Telematics Unit
Cargobull Web Service
VPN & Web Server
User

RFID Reader
Sensor Network
Communication Gateway
Satellite
Internet
Web Server
User
Heterogeneous Network Access

Trade-off: Communication technology
- Cost efficient
- Information to the owner/customer

Heterogeneity of the communication network access
- WLAN
- UMTS/GPRS
- Satellite

Adaptation to the network
- Notifications when using UMTS/GPRS or satellite
- Full measurement update when using WLAN

Mobility concept based on VPN
- Keeps good and surveiller connected

Diagram:
- Customer Contact
- Vehicles
- Pallettes
- Goods
- Customers
- Communication
Delayed Communication

- **Bandwidth**: WLAN and UMTS
- **Price**: Red bars
- **Data Transmitted**: Small Status Update and Full Sensor Upload

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*Image: SFB 637 Teilprojekt T4*
Enhanced Communication

Current CSM

Current NetworkManager

CSM enhanced NetworkManager
Communication Service Module

- start_communication(processID, profileID)
  - ack(sessionID, error)
- update(sessionID, profileID)
  - ack(sessionID, error)
- network_status(sessionID, profileID)
  - network_status(status)
- stop_communication(sessionID)
  - ack(sessionID, error)
Project Plans

1. Test Phase
   - On sea in Dec. 2008

2. Test Phase
   - On road in summer 2009
   - On sea in summer 2009
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