

How Does and Will GNSS (Galileo) Aid More Efficient Freight?

User Requirements of Urban Logistics for Guaranteed Galileo Value Added Services

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Folie 1

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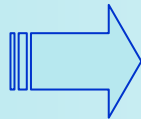


Fraunhofer IFF Testbeds for GNSS and Indoor Navigation/Localization

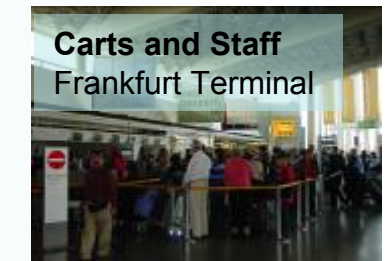
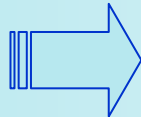
Transportation and Logistics



Last Mile



Individuals and Staff



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Outline

- ▶ Intelligent logistics today and tomorrow
- ▶ Best4City
- ▶ Galileo
- ▶ Case study
- ▶ Conclusion

Intelligent Logistics for Small Volume Goods: Present → 2025

Present	2025
Theft of goods is increasing over theft of utility vehicles	Value of the transported goods, e.g. W -> O, or at airports is steadily increasing Near-cash goods are targets
Valuable goods in special transport vehicles	High value goods are concealed in regular transports
Telematic system are commonly used both for local and for long-distance transports	Tracking technologies for smaller parts of complete freight are omnipresent.
City logistics is not yet established	Modular systems enable more flexible loading of a vehicle
Road transport does not have standardized containers for smaller freight units	Smaller containers for smaller shipments - standardized variants for intermodal traffic
Specialized solutions apply value added services (Care - Cool - Fresh - Safe - Secure - Live)	Value added services are subject to permanent monitoring
Routing is based on static maps and traffic information	Routing is based on individual information for the driver

Cf. “ ifmo – Zukunft der Mobilität”

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Ongoing Monitoring of Logistics Processes

		Discrete IT Support in Incoming Goods Processes - Present				
IT	Process	Receiving Inspection	Quantity Check	Quality Check	Storage Unit Generation	Documentation
	Identification					
	Localization					
	Condition Monitoring					
	Communication					

		Permanent IT Support in Incoming Goods Processes - Future				
IT	Process	Receiving Inspection	Quantity Check	Quality Check	Storage Unit Generation	Documentation
	Identification					
	Localization					
	Condition Monitoring					
	Communication					

Best4City: Galileo Supported Low Volume Commercial Transportation



Based on an interchangeable trailer for small trucks (3.5 t)

Sponsored by the Federal Ministry of Transport, Building and Urban Affairs and by the Saxony-Anhalt Ministry of Regional Development and Transportation (No. 70.791/2006)

Folie 6

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Best4City: Galileo Supported Low Volume Commercial Transportation

Research Project 2007/2008

Solutions for low volume inner city transportation 2.5 – 3.5 t

Competence Center GmbH

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Folie 7

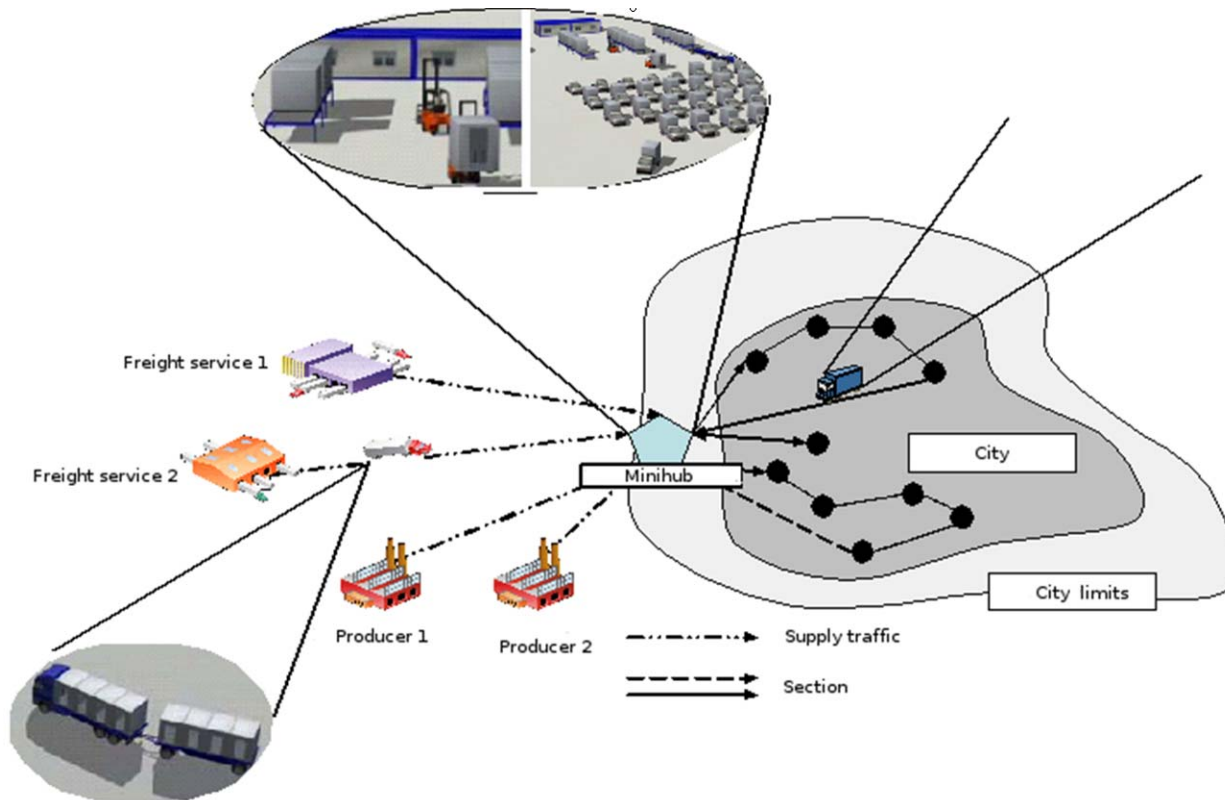
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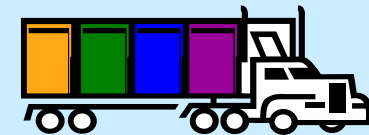
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Best4City Concept



height: 2.40m
width: 1.70 m
length: 2.60 m



4 interchangeable trailers
per truck

Folie 8

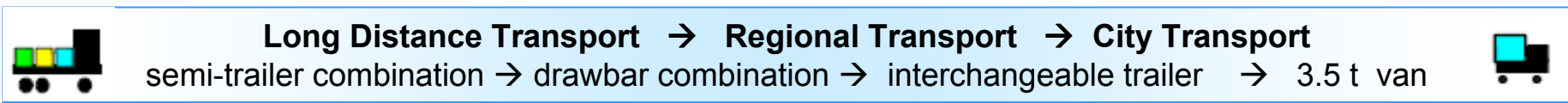
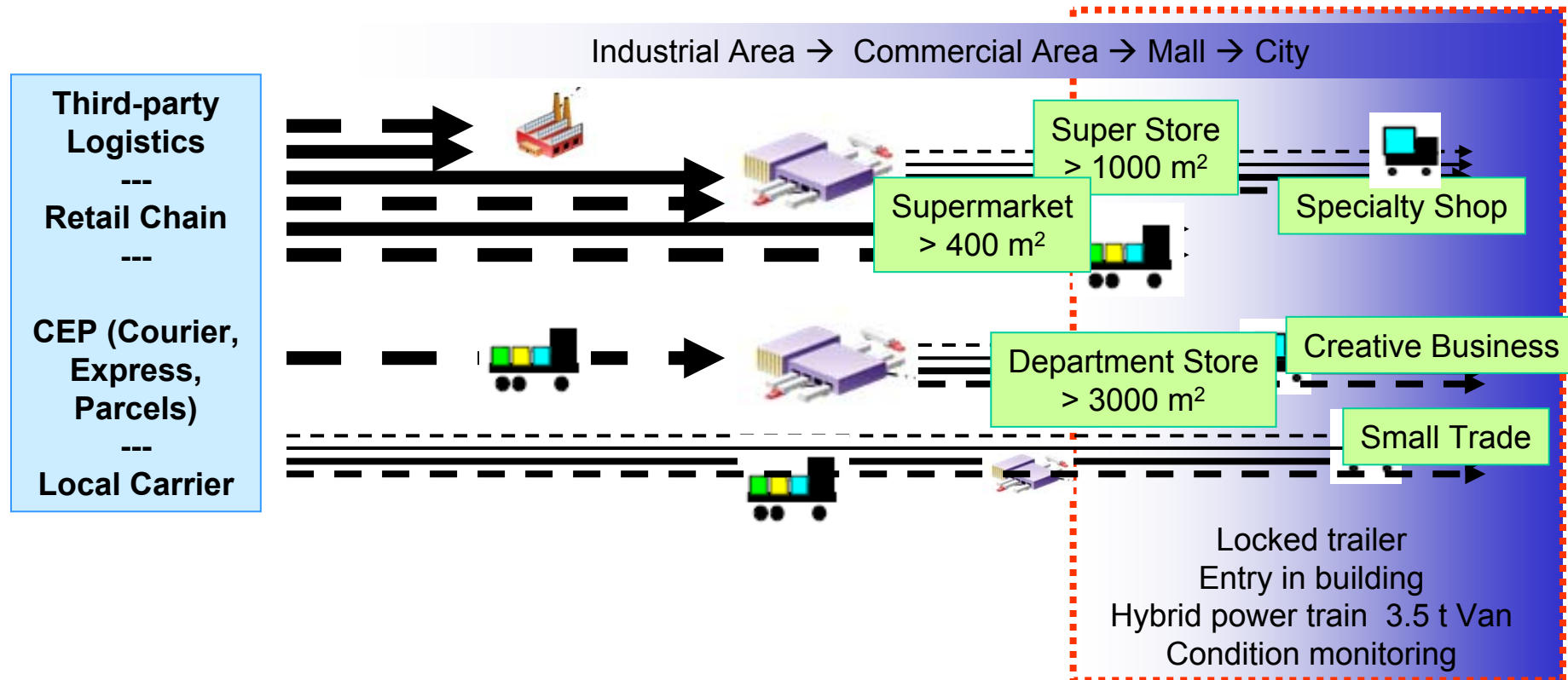
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Area of Conflict: Commercial Transportation in Cities



Best4City: Results of Talks with Local Government and Businesses

→ Roundtable talks with local government and businesses identified future needs and wants on the part of participants.

Municipal Policy	Carrier / Retailer
Stimulate business in cities Focus: creative business	Isolate processes
Increase cities' attractiveness by reducing impacts of commercial transport (noise, dust, etc.) City toll, green zone, nighttime noise exposure	Relocate transfer of goods More flexibility when shipping and receiving convenience products
Improve accident statistics by reducing large-volume inner city commercial transport (heavy vehicles)	Develop alternative, temporarily limited warehousing options
	Concentrate shipments
	Increase safety and security in logistics processes
	Increase flexibility of transfer of goods

Interchangeable Trailer Scenarios

- ▶ Low cost
 - ▶ Outdoor tracking only (GSM, (A)GNSS)
 - ▶ Main goal: Common use for a variety of transportation tasks
- ▶ High-end
 - ▶ Outdoor tracking
 - ▶ Indoor tracking (UWB, WLAN, RFID, etc.)
 - ▶ Main goal: Intelligent freight tracking up through assembly lines
- ▶ Safety-critical transports
 - ▶ Additional sensors to monitor orientation
 - ▶ Rule-based applications
 - ▶ Main goal: Complete (uninterrupted) real-time monitoring of location and status of freight

Safety-critical Transports: Monitoring and Documentation

- ▶ Valuable Goods
 - ▶ Money transports
 - ▶ Mobile ATM
- ▶ Sensitive Goods
 - ▶ Fresh
 - ▶ Temperature-sensitive
 - ▶ Breakable
- ▶ Documentation and Certification
 - ▶ Event logging
 - ▶ Trajectory logging

Hazard Analysis and Critical Control Point HACCP

protective system for edibles and consumers

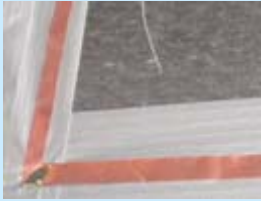
Observation of edible's critical points - method
of continuous supervision - action taking -
documentation

Customs Security Program (CSP)

Introduces proper security controls to safeguard
the domestic market and, in close cooperation
with major trading partners throughout the world,
secure international supply chains.

Authorized Economic Operator AEO

Fraunhofer IFF Intelligent Box Components



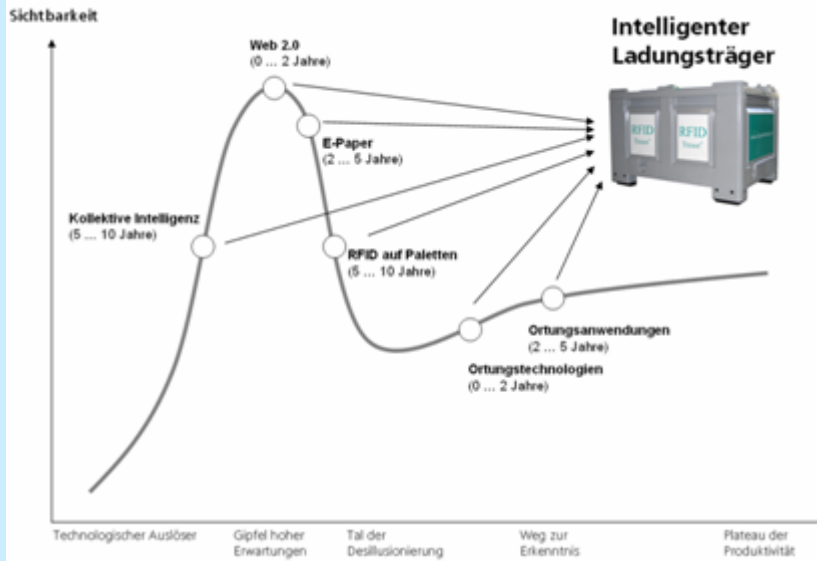
Simple Antennas



Small Multiplexer



Off-road Navigation



Fraunhofer IFF at the DHL Innovation Center



Behavior Monitoring



RF Test Truck

Simulation Study Using a 3-D Model of the City of Magdeburg

► Simulated shadowing with a 3-D model

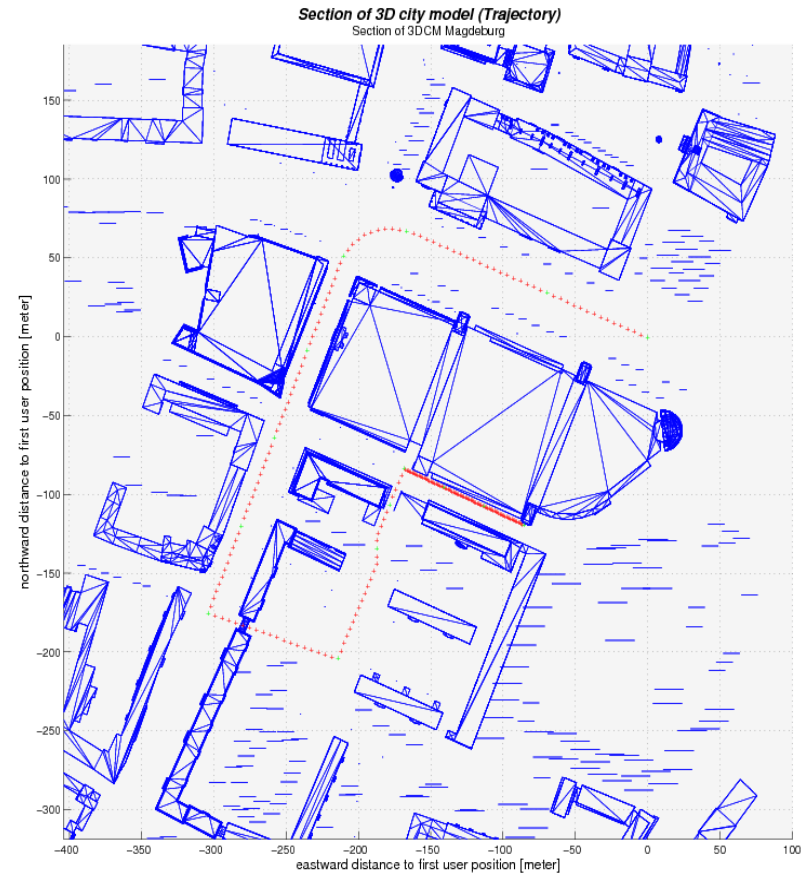


- Simulation of a delivery to a shopping mall
- Availability of GPS and Galileo Satellites along the trajectory

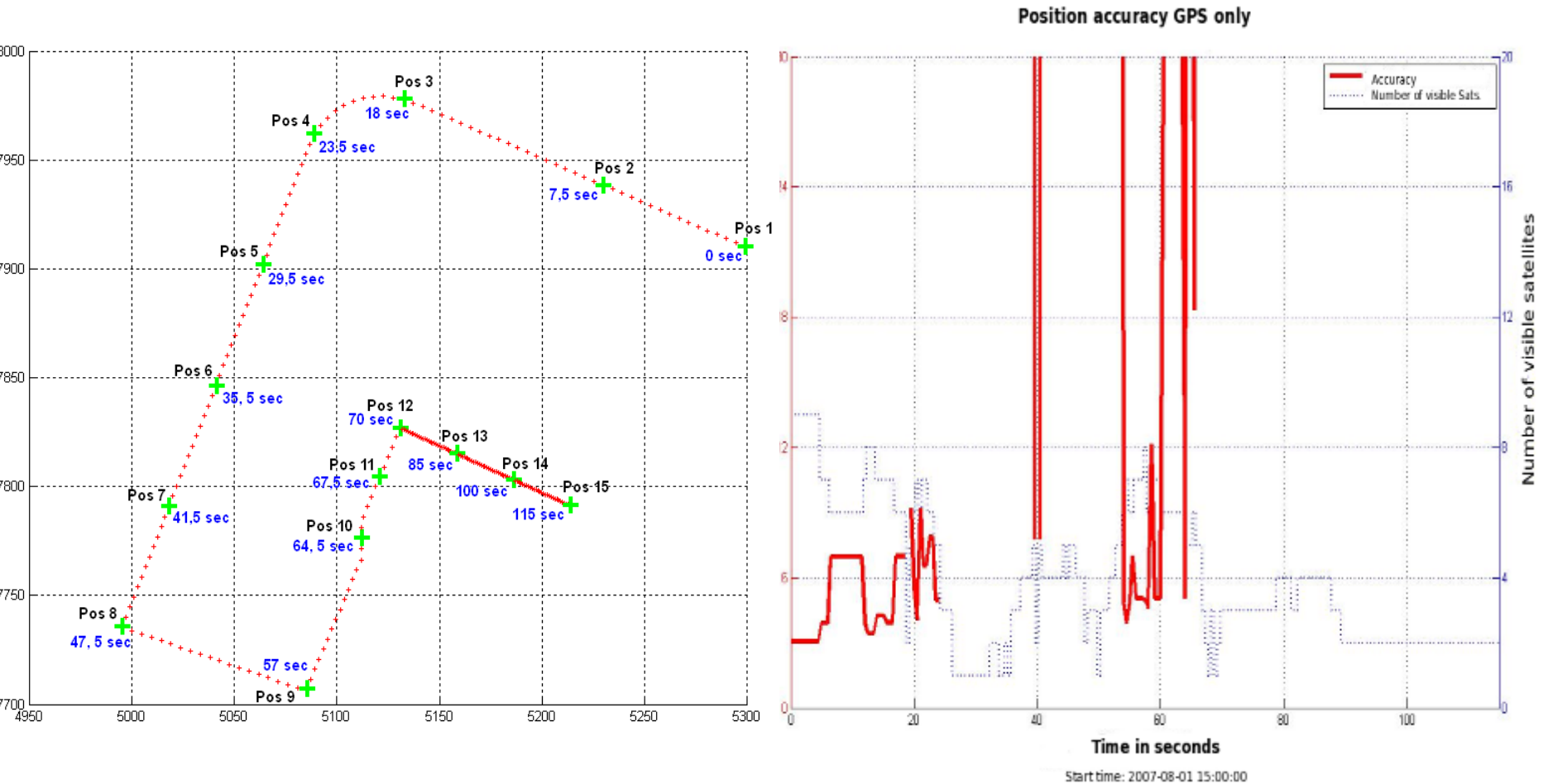
Best4City: Simulation of Trajectory Positioning



Quelle: Google Earth



Best4City: Horizontal Accuracy GPS Alone



Folie 16

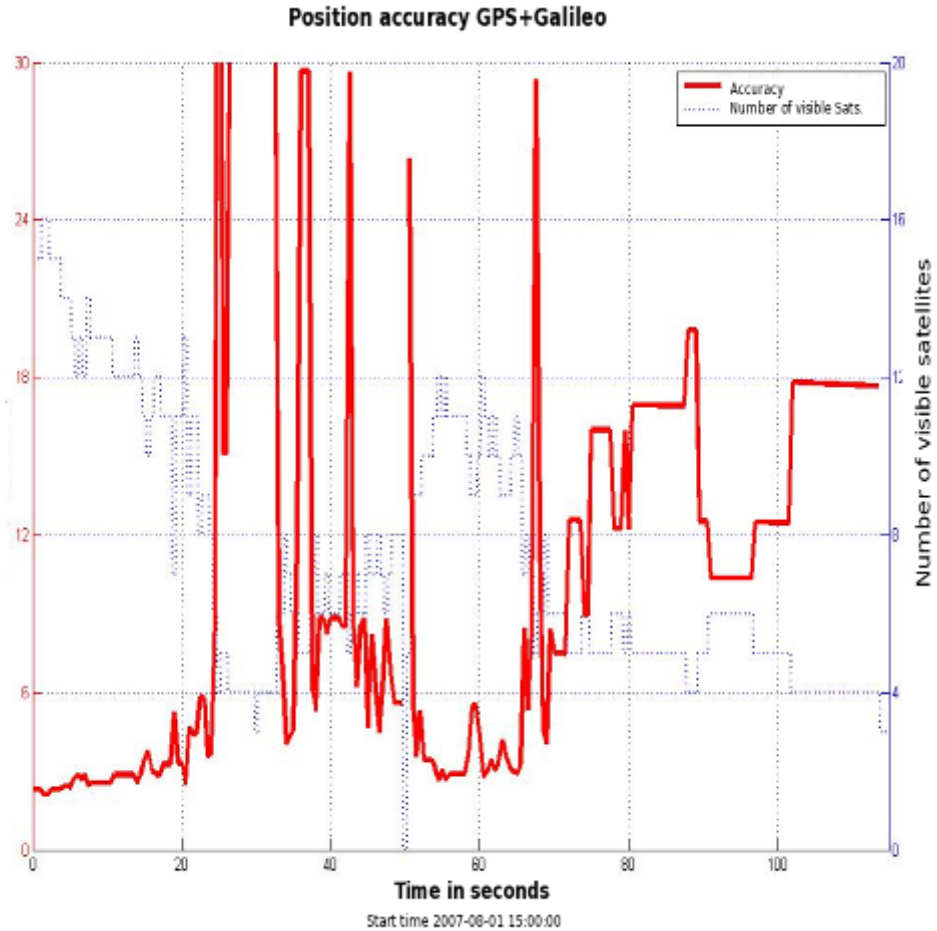
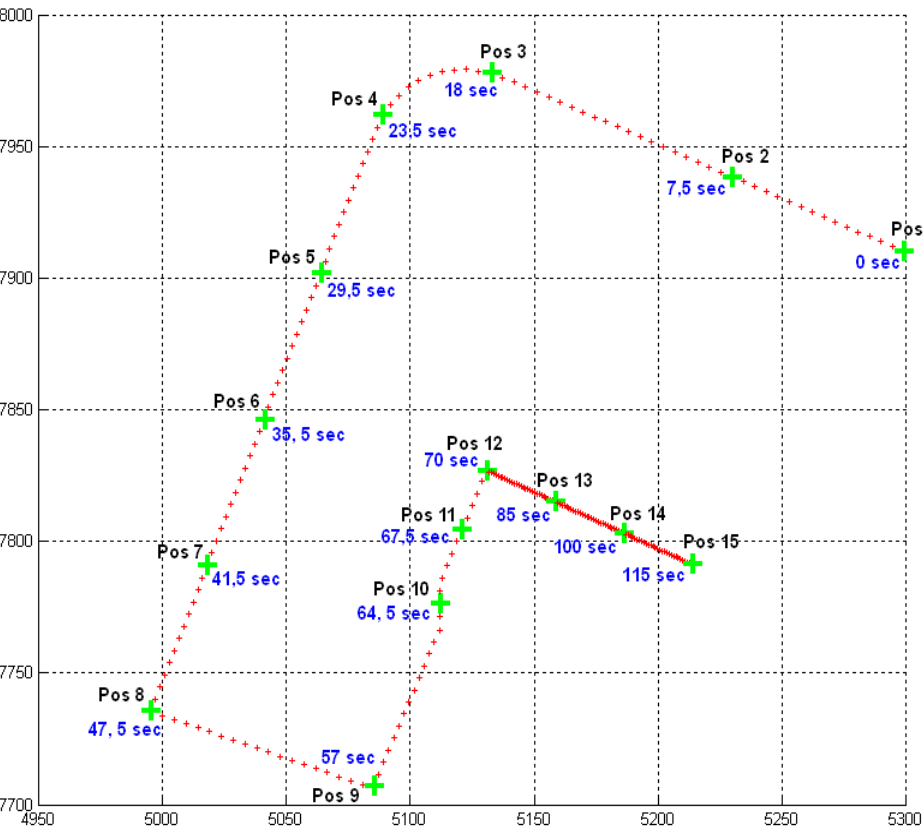
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Best4City: Horizontal Accuracy GPS + Galileo



Folie 17

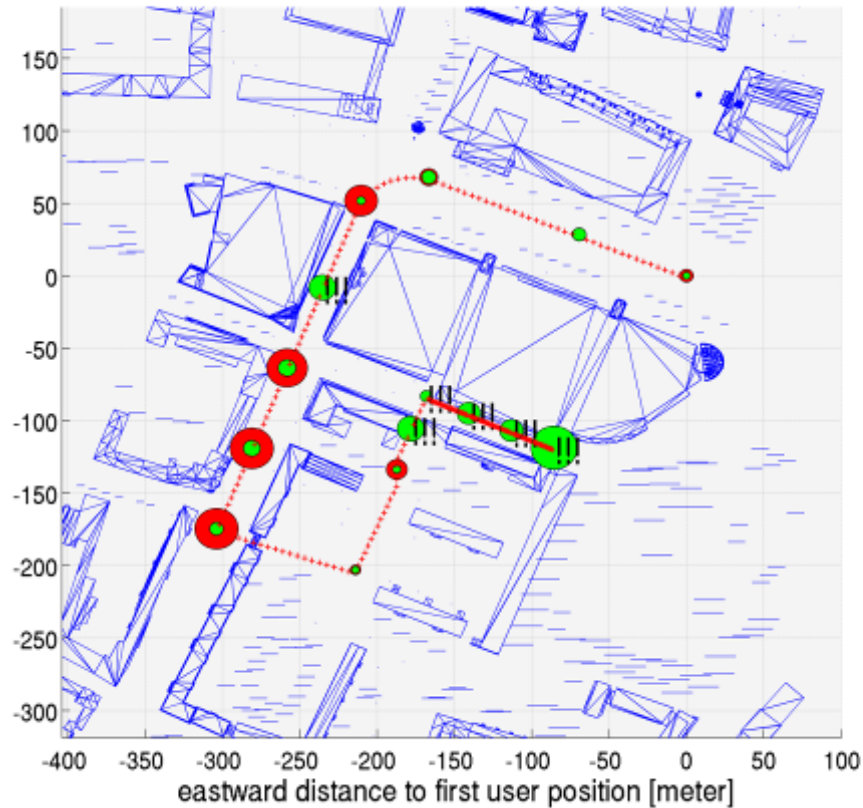
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Mean Horizontal Accuracy (95%)



Legend:

- GPS
- GPS and Galileo

!!! No GPS position available

○ +/- 10m

Conclusion

- ▶ Intelligent city logistics concepts are needed
- ▶ Interchangeable trailers can support flexible logistics under various aspects
- ▶ The need for guaranteed tracking and documentation for all kind of freights is getting more important
- ▶ Galileo will improve the possibilities for more precise and reliable tracking especially in urban environments
- ▶ Value Added Services can be continuously controlled, even in real-time

Value Added Services: Care - Cool - Fresh - Safe - Secure - Live

The true story of the **Meissner Fummel**: In the days when mail was still transported by mail coach, mail from Meissen often arrived in Dresden damaged. It was rumored that the coachman was far too fond of Meissen wine. The Elector of Saxony ordered Meissen's bakers to invent a pastry that was so fragile it would fall apart at the slightest vibration. Should the post coachman deliver this pastry to Dresden in one piece, he would be absolved of all suspicion.

→ Past



→ Present



→ Future



Target: Continuously monitored value added services