Smart Mobility: the Cooperative ITS Corridor is deploying the future
Abraham Bot – Christian Leitzke – Manfred Harrer
On 10th June 2013 ministers representing the Netherlands, Germany and Austria, the countries initiating the corridor, signed the Memorandum of Understanding.
• Mobility is a key factor both for individual freedom and the quality of life as well as for economic success.

• Against the background of dynamically growing transport needs, ensuring comprehensive mobility is a vital task for the future.

• Intelligent Transportation Systems (ITS) can make a major contribution to the mobility of the future.

• In the national ITS action plans of Germany, Austria and the Netherlands Cooperative Intelligent Transport Systems and Services (C-ITS) are an important building block for enhancing road safety as well as for improving transport and energy efficiency.

• An effective coordination and collaboration among the road authorities, the automotive sector and the further providers of C-ITS are essential for a successful deployment of these systems and services.
• **Christian Leitzke – Hessen Mobil Road- and Traffic Management (DE)**
  - Further introduction of the project
  - Status in Germany
  - Privacy and IT Security

• **Abraham Bot – Rijkswaterstaat (NL)**
  - Status in the Netherlands
  - The way ahead

• **Manfred Harrer – ASFINAG (AT)**
  - ECo-AT – the Austrian Testbed for Cooperative Systems
  - Use Cases and Scope of the ECo-AT Specifications
  - C-ITS Testing in ECo-AT
  - The Living Lab Concept

• **Questions**
The first applications in the corridor Rotterdam – Frankfurt/M. – Vienna

VEHICLE DATA
- Vehicle position
- Vehicle speed
- Rain
- Mist
- ...

ROAD WORKS WARNING
- Road works Position
- Geometry of lane
- ...

Other Service Providers

ITS Central Station

Mobile Network

Warning trailer

ETSI G5

WLAN

ETSI G5

WLAN

Cooperative ITS Corridor
Joint deployment

Two First Services
1. **Preliminary development and "proof-of-concept"**
   - with roadworks warning trailers in Hesse around Frankfurt/Main,
   - by doing tests on the motorways A16 and A58 and
   - within the Austrian project ECO-AT

2. **Introduction of the two first applications in the Cooperative ITS Corridor (NL – DE – AT)**
   - Road Works Warning
   - Improved traffic management by cooperative vehicle data

3. **Introduction at national level**

The Corridor is the basis for the further development of cooperative services.
Overview Time Schedule C-ITS Corridor (DE)

- **2014**
  - System Architecture
- **2015**
  - IT-Security and Privacy
  - Iterative Specification, Development and Testing ITS Central Station and ITS Roadside Station
- **2016**
  - Participation of the automotive industry in each test cycle
- **2017**
  - Trial operation
  - Roll-out

Operation and Evaluation

Stand: 23.03.16
• **Anonymous Information**
  – Link to an identity impossible → private access
  – Possible threat to security, no prosecution possible

• **Pseudonyms**
  – Link to an identity not given, but possible
  – Compromise between Security and Privacy needs

• **Personally Identifiable Information**
  – Explicitly linked to one user → secure access
  – Possible threat to privacy, PII can be gathered & fused

• **Different “Pseudonym Certificates” are used**

• **Data Protection in Germany still limits the use**
  – Explicit explanation for gather data is required
  – What is not explicitly allowed must be deleted

Random numbers, salted & hashed, etc....

Credit card, license, Passport, etc....

Pseudonyms
• Varying complexity
• Varying Security/Privacy

Privacy & IT Security
• **Public and private Root Certificate Authorities separated**
  – PCs exchanged – common rules ensure interoperability
  – Only valid within public PKI – different policies used

• **Allows to update policies independently**
  – Different security levels possible while being interoperable
  – Public LTCs might start with different certificate format and key length
Development and testing of IRS

• The software version of the IRS for the stand alone operation mode was developed by Hessen Mobil and tested in the 4th quarter of 2015.

The basic functionalities are working successfully:

• data transfer (from/to ITS Central station (ICS))
• receiving additional DENM-information from ICS
• sending DENM with extended content to vehicles

• Currently Hessen Mobil is working on the development and implementation of software and interfaces for the operation mode with a ICS link and on the implementation of IT security and the integration in a PKI.
Development and testing of ICS

- The development of the software modules for the ICS has started by Hessen Mobil in the 3rd quarter of 2015.
- The sending/receiving of DENM/CAM and the expanding of DENM-information for the IRS as the basic functions of the ICS were successfully tested in the 3rd test cycle in November 2015.
- Currently Hessen Mobil is working on the development and testing of the transferable and the proprietary subsystem of the ICS.
- Some developed interfaces were part of the last test cycle. The specification of the interfaces will be refined with additional requirements detected through enclosed testcycles.
- Further, the definition of a geo-service is in progress. Presently Hessen Mobil is elaborating a requirement analysis for the geo-service.
• For the year 2016 two further tests are planned in Hessen:
  – for the 2\textsuperscript{nd} quarter an overall system test with integrated IT-security
  – for 3\textsuperscript{rd}/4\textsuperscript{th} quarter a trial test for six months with a lot of trailers

• Evaluation of the infrastructure components during the trial test

• The first draft of the operational concept will be finalized in Q2/2016
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• Questions
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- **13 October**
  - workshop presentation
  - first specs
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**Testing:**
- **11 Nov.: A16** - Fieldtest live RWW
- **25 Nov.: Frankfurt** - NL-participation German Test Cycle
- **15 Dec.: A58** - test RWW on infrastructure
  - Shockwave Control project
- **30 & 31 March** - NL-participation German Test Cycle
Test on the A16
Test on the A16
Test on the A16
Tests in Frankfurt
Test A58: RWW on Infra Shockwave Project
# Next Phase

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<th>road</th>
<th>situation</th>
<th>goal</th>
<th>focus of activities</th>
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<tbody>
<tr>
<td>A</td>
<td>A16 - Gantries (MTM)</td>
<td>Developing general solution for situation with gantries</td>
<td>- installing fixed RSUs</td>
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<td>- FO-network</td>
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<td>- integration with central information systems (central unit)</td>
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road | situation | goal | focus of activities
--- | --- | --- | ---
D | A67 | • No gantries  
• Mobile gantries for road works | • Developing a general solution for situations without gantries/MTM  
• Mobile (portable) RSUs  
• RSU on mobile gantries or trailers  
• Back-office connection |
Next Phase

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<tr>
<td>A58</td>
<td>• Shockwave control project</td>
<td>• Using 3rd party infra e.g. Shockwave Control project</td>
<td>• Mutual learning</td>
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<td>• Gantries</td>
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<td>• RWW and PVD A58 Infra</td>
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<td>• Collecting &amp; presenting data in the Helmond traffic centre.</td>
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Next phase

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<td>A2</td>
<td>• Gantries</td>
<td>• Developing of a processesmodel</td>
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<td>• Brabant corridor</td>
<td>• Impact on road operator proces</td>
<td>• Demonstration of processes in the</td>
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<td>• of C-ITS services.</td>
<td>Helmond Traffic Centre</td>
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<td>• Impact PVD, security and privacy</td>
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• Questions
• ECo-AT is the Austrian part of the corridor
• Focus on infrastructure-based cooperative systems
• ECo-AT Specifications define communication from the Traffic Control Center to the Roadside
• Use Cases
  – Road Works Warning (RWW)
  – In-Vehicle Information (IVI)
  – Probe Vehicle Data (via CAM aggregation)
  – Other DENM (event information)
  – SPAT/MAP (traffic signal phases)
Scope of the ECo-AT Specification

- Traffic Information
  - Vehicle Data

Central ITS Station (C-ITS-S)

Roadside Stations

Vehicles

ASFINAG

Event Database

DATEX II  ECo-AT Specification  ETSI+ISO Standards
ECo-AT Project Timeline

2014

2015

2016

2017

2018

ECo-AT
Phase 1 - Specification

Phase 1+

ECo-AT
Phase 2 - Roll out

Testfeld Telematik

ECo-AT Living Lab

Conformance Testing

• Tests with OEMs
• Cross border testing

Real-life test between specification und roll-out
Planned Releases and Test Cycles

ECo-AT Phase 1+

- Test cycles are organized together with OEMs / third parties
- Results of test cycles are incorporated in new releases
• ECo-AT Specifications can be requested free of charge at http://eco-at.info/
• A newsletter informs about new releases
• The basis for deployment of Cooperative ITS is already in place
• A Living Lab on Austrian Highways provides unique testing possibilities for C-ITS under real traffic conditions
Roadside Installations (R-ITS-S) around Vienna are deployed.

Eco-AT Partner R-ITS-S
ECo-AT Partner Traffic Lights (LSS)
Potential 3rd Party Sites

Central ITS-S Installations (C-ITS-S)
+ Roadworks trailer and a stationary test area
- Infrastructure for wireless communication with vehicles (ITS-G5) on gantries
- Open for ECo-AT partners and 3rd parties
ECo-AT Test Cycle 3

- Test Cycle 3 took place March 1-3, 2016 in Vienna, Austria
- ECo-AT Participants:
  - asfinag
  - kapsch
  - austriatech
  - siemens
  - swarco

- OEM Participants:
  - denso
  - honda
  - hyundai
  - volvo
  - cohdawireless
  - commsignia
- Local use case tests at parking lot
- Tests in the Living Lab
  - 30 predefined events / messages sent out by 19 Road Side Stations
  - 5 traffic lights sending intersection information
  - 2 test routes including detailed storyboards
• Messages for all ECo-AT Use Cases were sent out in the Living Lab
• OEMs were able to receive, decode and interpret the ECo-AT message set

• Infrastructure-based C-ITS messages work for vehicles
  • Data content is comprehensible if properly encoded
  • Message positioning (points, traces) based on TCC data is accurate enough for vehicles to properly place messages

• Detailed analysis is still ongoing, results will be integrated in the next release
Summary

Abraham Bot – Rijkswaterstaat (NL)
The C-ITS Corridor provides an international basis for standardized and forward-looking cooperative ITS services

- Safe and efficient mobility through cooperative services
- Implementation of first cooperative applications in the C-ITS Corridor
- Joint approach pursued by road operators, the automotive industry and mobility service providers
- Basis for the gradual introduction of cooperative systems in Europe
Thank you for your kind attention

Questions or Suggestions?
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