Standardisation of SPaT and MAP
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Source: Roadmap between automotive industry and infrastructure organisations on initial deployment of Cooperative ITS in Europe
Cooperative Standardisation Activities

- Cooperative Projects
- EU Mandate M453
- Standardisation SPaT/MAP
- Requirements for C-Prioritisation
- Standardisation groups
Testfeld Telematik 2011 - 2013

ITS World 2012 Demo

- ITS Demo Tour at public Roads
  - Green Light Optimal Speed Advisory
  - Green Wave Speed Information
  - Remaining Phase Time Display
  - Hazardas Location
  - Road Works Warning
  - In Vehicle Signage
  - Weather Warning
  - Park & Ride
  - …
TEAM - Overview

Project Description
*Make travelers and infrastructure act as a team adapting to each other and to the situation, creating optimised mobility conditions.*

Partners: Fraunhofer (coord), BMW, VOLVO, NEC, TNO, INTEL, HERE, …

External Funding Sources: EC 7th FP

Budget:
- Total (over all years): 17 MEuro

Key Dates
- Project Start: 44/2012
- Field Tests / Integration Testing: 44/2015
- End: 44/2016
TEAM - Objectives

- Collaborative pro-active urban/inter-urban monitoring and ad-hoc control
- Collaborative co-modal route planning
- Collaborative smart intersection for bus priority (intelligent priorities)
- Collaborative public transport optimization
Standardisation at ETSI, CEN/ISO and SAE

EUROPEAN COMMISSION
ENTERPRISE AND INDUSTRY DIRECTORATE-GENERAL

Mandate M453

Innovation policy
ICT for Competitiveness and Innovation

China

TC ITS

TC 278

WG 10 Co-operative Systems

Enterprise-Directorate General

Information and Communications Technologies Standards Board
ICTSB

Standardisation at ETSI TC ITS WG 1 .. 6

- Communication layer (physical, GeoNet, …)
- Mobile applications (V2V)
- Messages: CAM, DENM

Standardisation at CEN TC278 WG 16/ISO TC204 WG 18

- Infrastructure applications
- Overall/Management architecture
- Messages: SPaT, MAP, PDM, PVD, IVI

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Relevant messages for intersection use cases

» MAP

» Topological definition of lanes within an Intersection
» Topological definition of lanes for a road-segment
» Links between the segments
» Type of lanes
» Restrictions at lanes
Relevant messages for intersection use cases

- **SPaT**
  - Signal Phase and Timing
  - Status of traffic controller,
  - Prediction of duration and phases
  - Data elements for prioritisation response
  - Abstract permissions instead of ambiguous colours
  - Permissions linked to manoeuvres instead to lanes
Permissions linked to manouvers

SPAT = Signal Phase & Timing
State Diagram of abstract Permissions

Legend

- Ramp Meter
  Start up
  - Is this a Caltrans Special?

State is Optional
Desired Results
ROW Assignment
Signal indication

State is Required
Desired Results
ROW Assignment
Signal indication

Stop vehicle
Do not proceed unless it's safe
Not Protected
DARK

Stop vehicle
Do not proceed
Not Protected
(US) Red - Flashing

Movement Prohibited
(US) Red

Vehicle prepare to stop, proceed if unable to stop
Movement Protected
(US) Yellow

Stop vehicle
Prepare to Proceed
Movement Prohibited
(US) Pre-Green

Vehicle proceed in direction indicated
Movement Protected
(US) Green

Vehicle proceed in direction indicated
State is Terminating
Movement Not Protected

Vehicle proceed with caution in direction indicated
Movement Not Protected
(US) Yellow - Flashing

Vehicle proceed with caution in non-prohibited direction

MUTCD 4D.29

MUTCD 4D.20A/22A

MUTCD 4D.26
Cooperative Technologies OCIT-O CAR

OCIT-O 3.0

- OCIT-O Lstg
- OCIT-O Car
  - Connection to Central
  - Separate licence
  - CEN TC278
- Configuration/provision
- CAM/DENM data
- PVD/PDM
The Amsterdam Group is a strategic alliance of committed key stakeholders with the objective to facilitate joint deployment of cooperative ITS in Europe.
The Amsterdam Group partners are working on a Road Map on initial deployment of Cooperative ITS in Europe.
Cooperative ITS Corridor and planned day one services
Phased deployment approach in the Cooperative ITS Corridor

Pre-development and proof of-concept of road works safety trailers in Hesse

Deployment of road works safety trailers in the Cooperative ITS corridor Rotterdam–Frankfurt–Vienna

Deployment of road works safety trailers nationwide in Germany
Requirements to “Day One” use cases

The criteria derived by the AG on the short list are:

• Simple and non-complex services that provide end user benefit and supported by a solid business model

• A balanced mix of services that support all environments of C-ITS (urban, rural, inter-urban (all V2I2V) and V2V) which can be regarded as minimum set of services for day one

• Services that are feasible with low/minimum risk to avoid a first day bad image hampering further user acceptance

• Services that provide credibility to C-ITS

• Services that support a fast penetration and offer a platform for further deployment of other services
Proposed “Day One” use cases

Typical V2V in this respect are
1. Hazardous location warning
2. Slow vehicle warning
3. Traffic Jam ahead warning
4. Stationary vehicle warning
5. Emergency Brake light
6. Emergency vehicle warning
7. Motorcycle approaching indication

I2V day one use cases in this respect are
1. Road works warning
2. In-vehicle signage
3. Signal phase and time
4. Probe Vehicle Data
Current European Standards

Approach to Standardisation based on available standards

Amsterdam Group
Applications

Road Works W Application
Probe Data Application
In Vehicle Information Application
Road Crossing Application

Amsterdam Group
Initial specification

Additional specifications
DENM
Additional specifications
CAM

Probe Data PDM, PTD

In Vehicle Information Specifications

CEN/ISO + ETSI
Standards

Updated DENM
Updated CAM

Probe Data PTD
Probe Data PDM

In Vehicle Information IVI
In Vehicle Signage IVS
Contextual Speed Application

Urban Infra. Info
Urban Infra. Info SPaT

SAE 2735 version 2013
Message elements