



C-ITS Use in Cities: what are the next C-ITS applications for smart mobility in cities?

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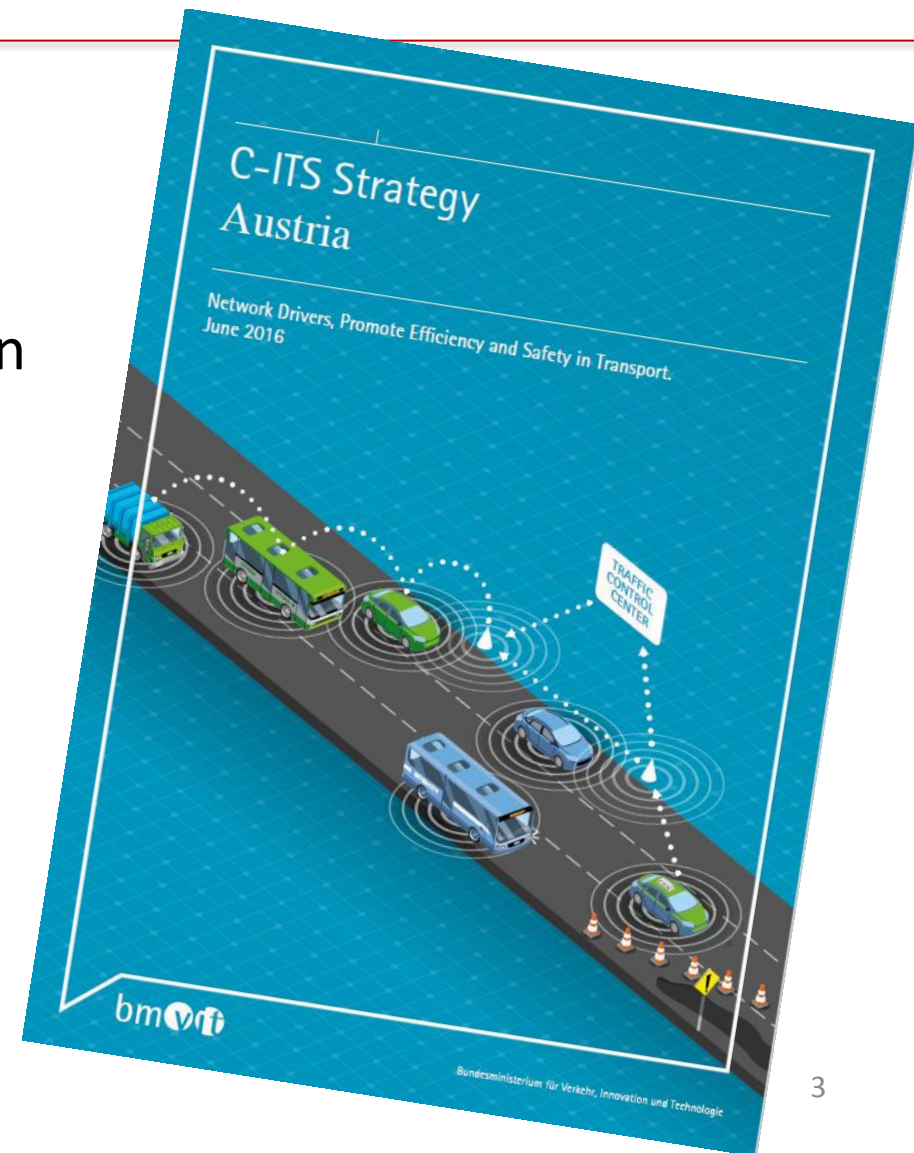
Connected mobility

- A new phase of digital-age transportation
- C-ITS technology has been well researched
- New challenges for cities in terms of digital infrastructure , cooperativity and connectivity of infrastructure
- Close alignment of all stakeholders (public/private)

Strategic framework

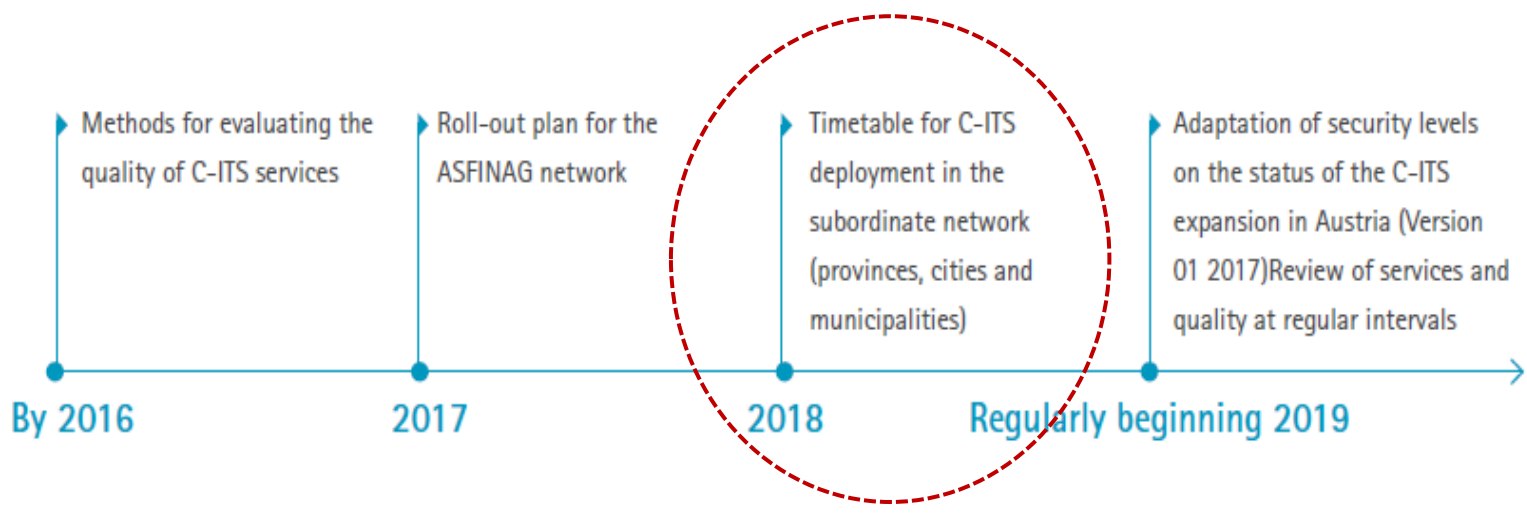
- Strategic guidance for the medium-term implementation

- Implementation targets until 2020
 - for motorways
 - for 2nd level road network or
 - for cities



Strategic framework

C-ITS Roll-Out plan (C-ITS Strategy for Austria)



Strategic framework

„Day 1“ C-ITS applications in urban areas acc. to C-ITS Strategy

Application / Service	C-ITS Message Basis	Supported by Deployment and Specification Activity	Further Key Technology Building Blocks	V2V / V2I
Signal violation / Intersection Safety	SPAT/ MAP	C-ITS Corridor Car2Car-CC MoU		V2I
Traffic signal priority request by designated vehicles	SPAT/ MAP	Infrastructure Industry; Cities; PT organisations		V2I
Green Light Optimal Speed Advisory (GLOSA)	SPAT/ MAP	Car2Car-CC MoU	Forecast required	V2I

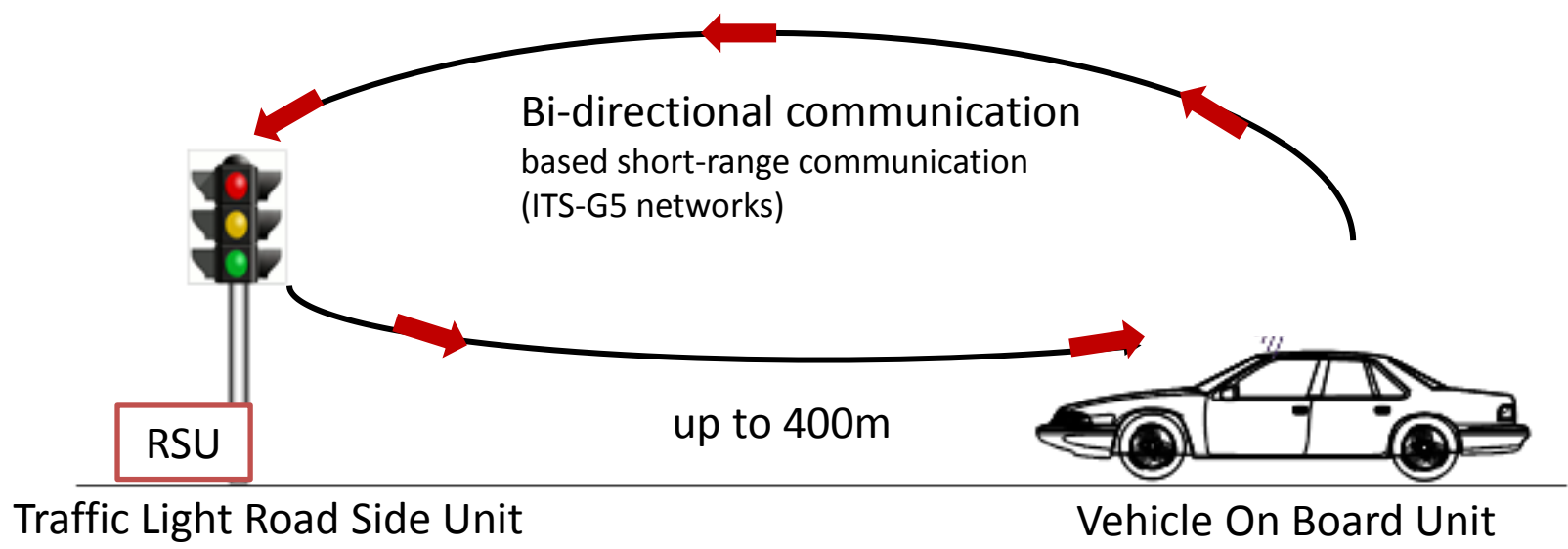
SPaT/MAP

Signal Phase and Timing / Map Data

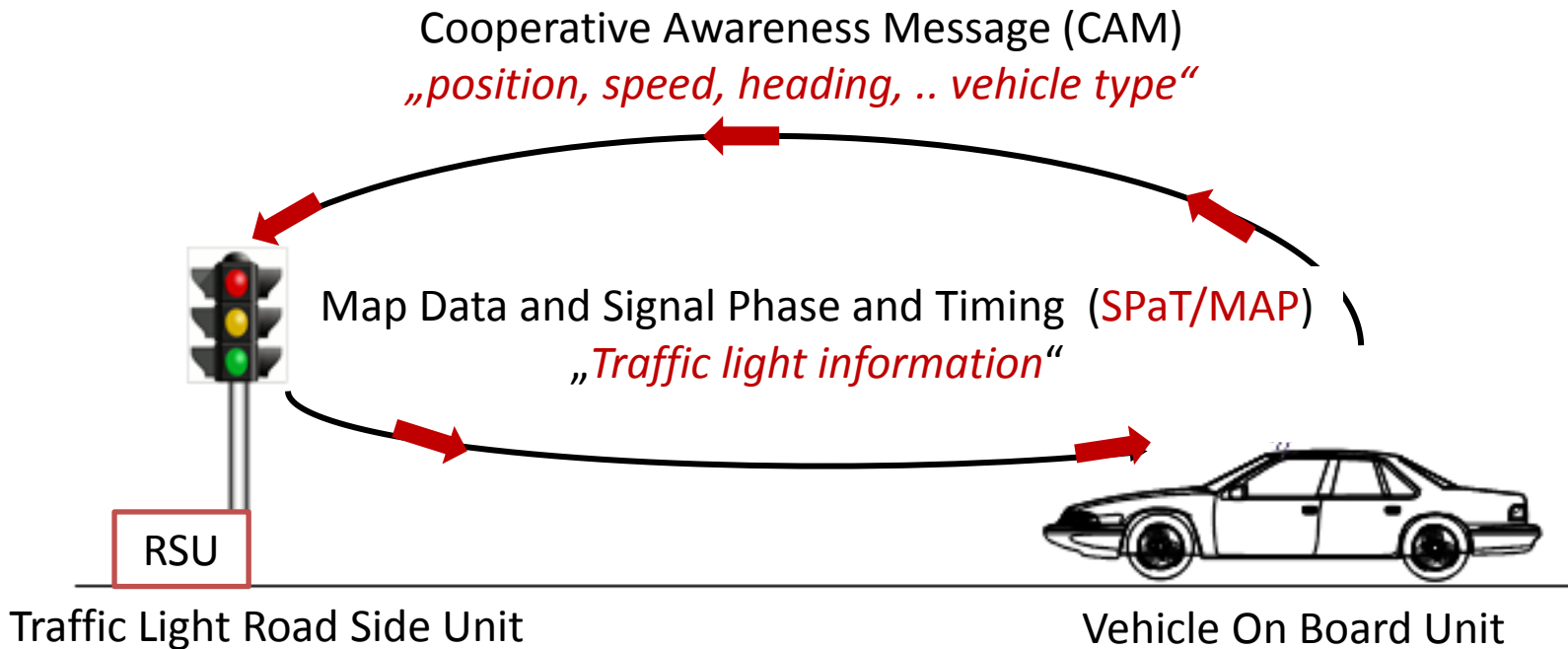
- there are standardised applications for C-ITS which concern traffic signals and signal phases
- the basic information package for an intelligent intersection is referred to the “SPaT/MAP” message set
- Standardisation body = DSRC committee of the SAE International (Society of Automotive Engineers (SAE))
- Dedicated Short Range Communications (DSRC) Message Set Dictionary - J2735
- issued in Nov 2015 – **ready for implementation!**

SPaT/MAP

Intelligent intersection



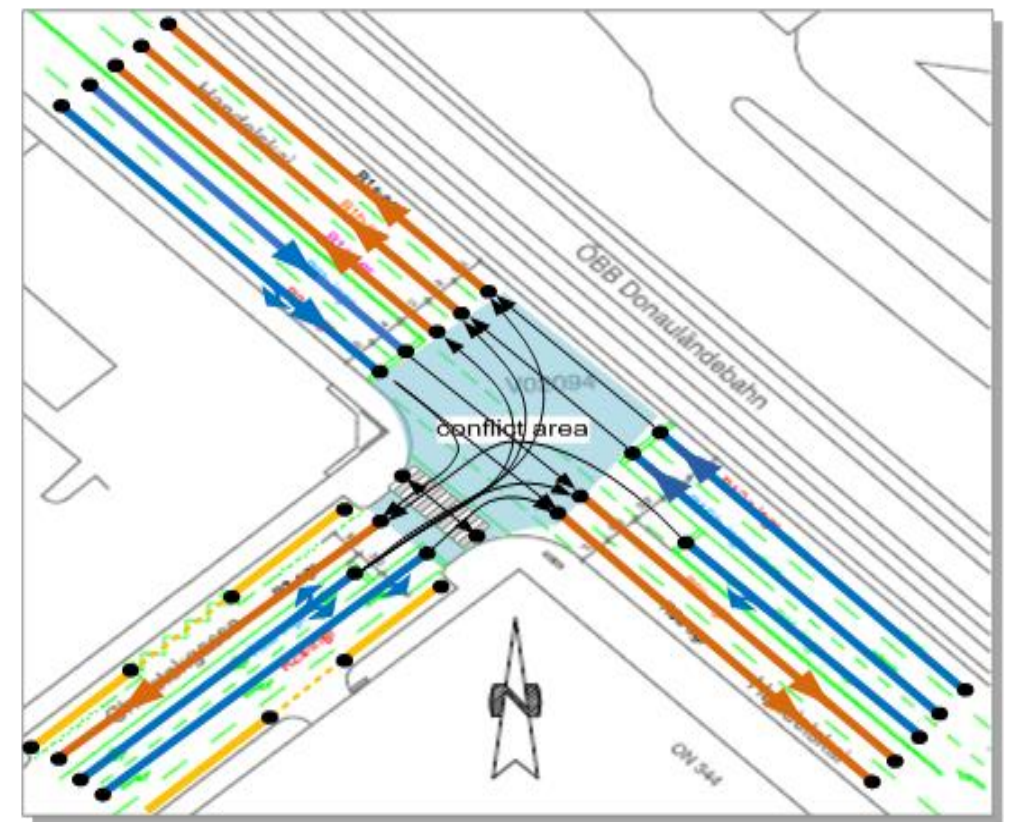
SPaT/MAP



Objective = Provide vehicles connected to the system with information enabling a **safe and efficient** passage

MAP Data

- Number of lanes and links between the segments
- Types of lanes (public transport, bicycle, vehicles, pedestrians)
- Possible restrictions at lanes
- Signal group index (defines the groups of traffic lights with common manoeuvres)



MAP Data

Crossing in Vienna - showing reference point and nodes for the single lanes (ECo-AT, 2015)



MAP_No: mNo Latitude: Lat_val_mG Longitude: Lon_val_G PosTyp ITEM
 DX_Coord DY_Coord Sig_Gr IntSec_ID Source: Source_name
 stationID: stat_ID Speed: Sval Heading: Hval Timestamp: tstamp_v Date: dd.mm.jjjj_hh:mm:ss -
 >Additional_Parameters

MAP_No: 053 Latitude: 48.2122192 Longitude: 16.4232349 Geo_Pos InID_2002 Source:
 S_b8:cb:49 stationID: 2002 Speed: 000 Heading: 000 Timestamp: 3509562948 Date: 11.05.2016
 14:03:39,588

MAP_No: 053 RLatitud: 48.2120972 RLongitud: 16.4232611 Ref_Pos
 MAP_No: 053 DLatitud: 48.2121277 DLongitud: 16.4234750 Lan_110 ltm-00 x: 1587 y: 340
 MAP_No: 053 DLatitud: 48.2114751 DLongitud: 16.4243833 Lan_110 ltm-01 x: 6738 y: -7265
 MAP_No: 053 DLatitud: 48.2108113 DLongitud: 16.4253249 Lan_110 ltm-02 x: 6985 y: -7389
 MAP_No: 053 Con_110 ltm-2

Sig_Gr: 1 ConTo:-135
 MAP_No: 053 Con_110 ltm-0 Sig_Gr: 1 ConTo:-136
 MAP_No: 053 DLatitud: 48.2120389 DLongitud: 16.4235306 Lan_111 ltm-00 x: 1999 y: -649
 MAP_No: 053 DLatitud: 48.2114529 DLongitud: 16.4243528 Lan_111 ltm-01 x: 6099 y: -6523
 MAP_No: 053 DLatitud: 48.2107947 DLongitud: 16.4253056 Lan_111 ltm-02 x: 7068 y: -7327
 MAP_No: 053 Con_111 ltm-1

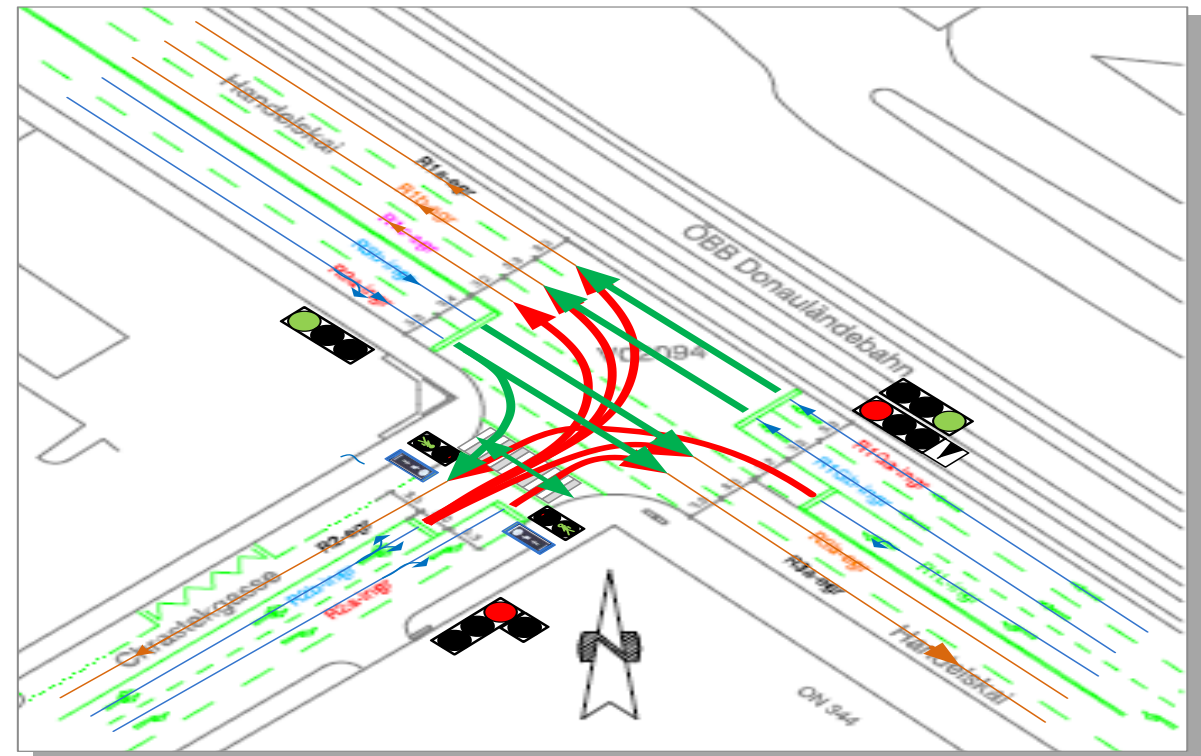
Sig_Gr: 2 ConTo:-125
 MAP_No: 053 DLatitud: 48.2120833 DLongitud: 16.4234055 Lan_115 ltm-00 x: 1071 y: -155
 MAP_No: 053 DLatitud: 48.2114279 DLongitud: 16.4243250 Lan_115 ltm-01 x: 6821 y: -7296
 MAP_No: 053 DLatitud: 48.2107780 DLongitud: 16.4252695 Lan_115 ltm-02 x: 7006 y: -7235
 MAP_No: 053 DLatitud: 48.2120639 DLongitud: 16.4233750 Lan_116 ltm-00 x: 845 y: -371
 MAP_No: 053 DLatitud: 48.2114057 DLongitud: 16.4242945 Lan_116 ltm-01 x: 6821 y: -7327
 MAP_No: 053 DLatitud: 48.2107585 DLongitud: 16.4252334 Lan_116 ltm-02 x: 6965 y: -7204
 MAP_No: 053 DLatitud: 48.2120750 DLongitud: 16.4231555 Lan_120 ltm-00 x: -783 y: -247
 MAP_No: 053 DLatitud: 48.2117639 DLongitud: 16.4226722 Lan_120 ltm-01 x: -3585 y: -3463
 MAP_No: 053 Con_120 ltm-1

Sig_Gr: 3 ConTo:-116
 MAP_No: 053 DLatitud: 48.2120972 DLongitud: 16.4231278 Lan_121 ltm-00 x: -989 y: 0

SPaT

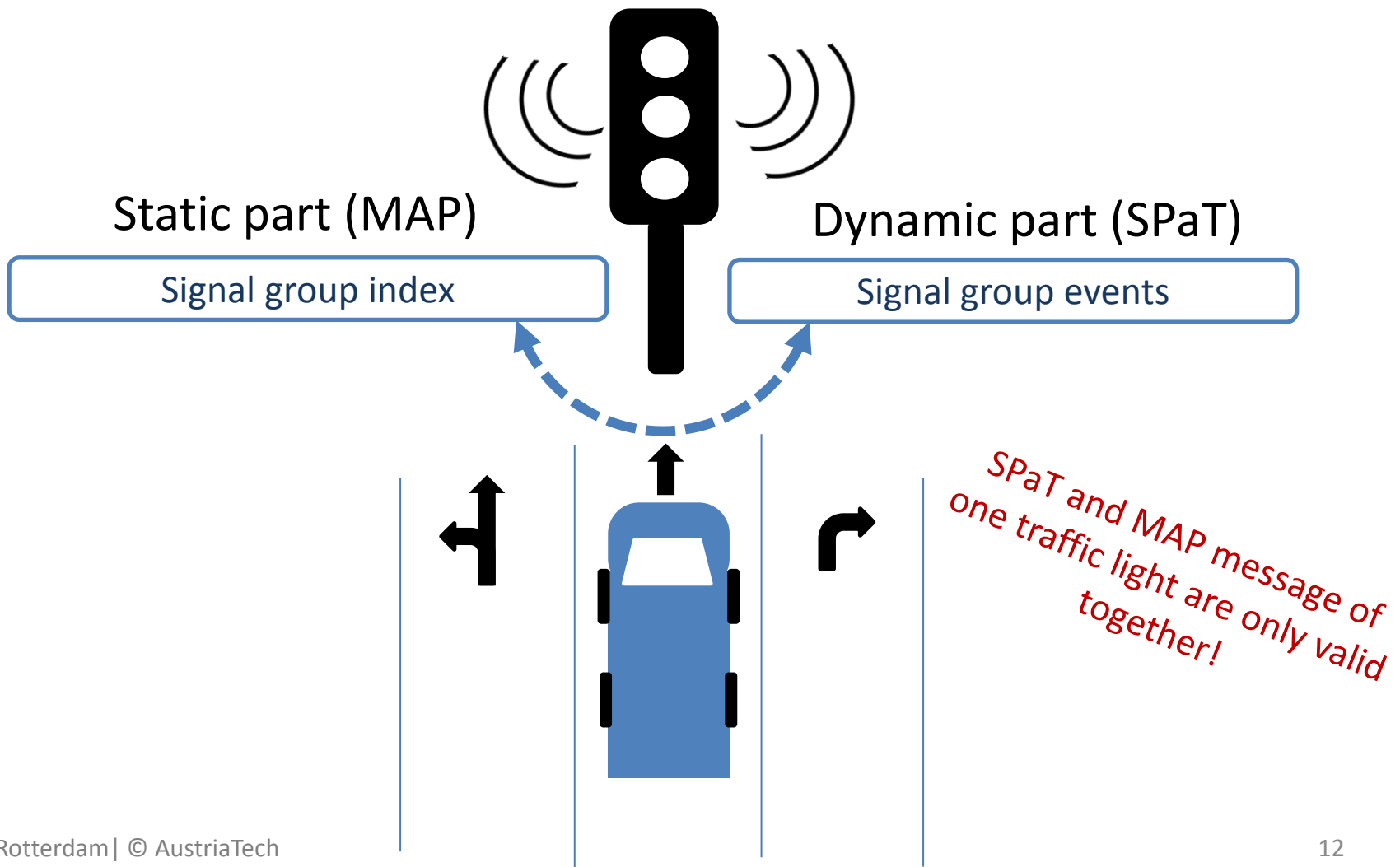
Signal Phase and Timing

- provides the travellers/drivers information about the dynamic data when approaching the intersection
- Signal status of the lane connections (manoeuvre)



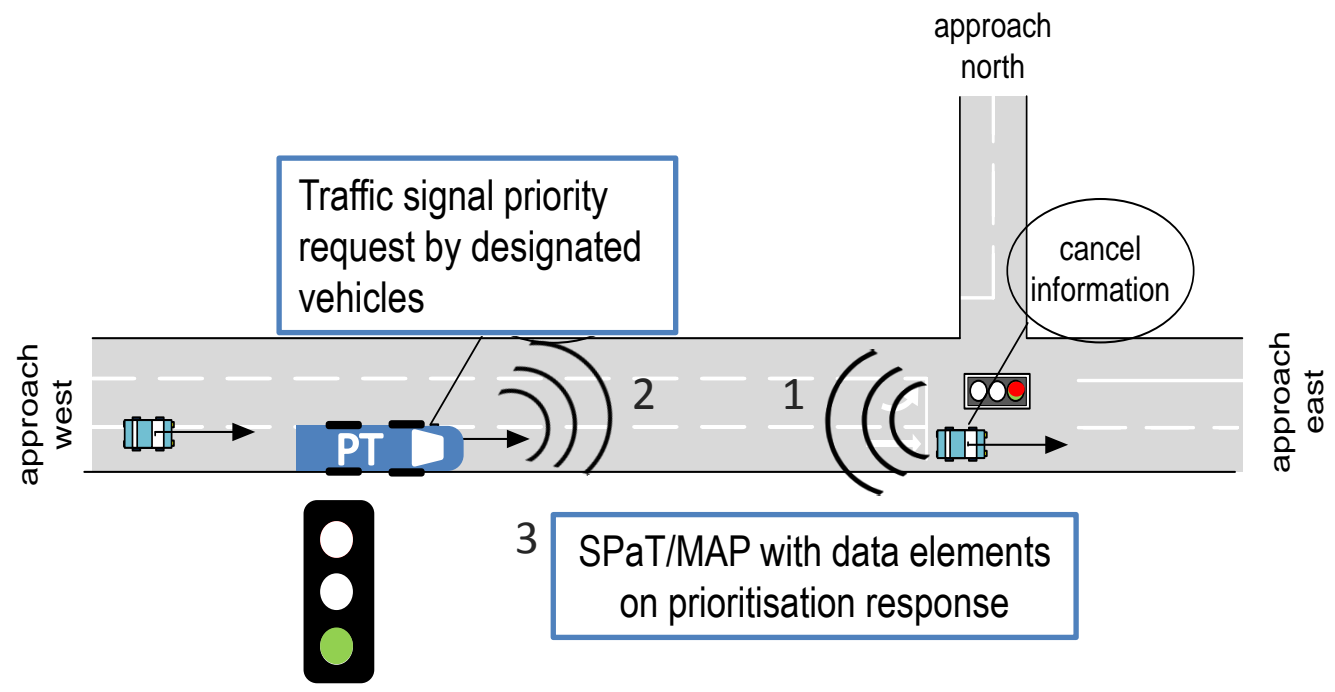
Signal status and manoeuvre from SPaT message form Vienna crossing ECo-AT (2015)

SPaT/MAP



Benefits

Prioritisation of Pubic transport and/or emergency vehicles



Benefits

Green and Safe Driving through Optimized Traffic Flows

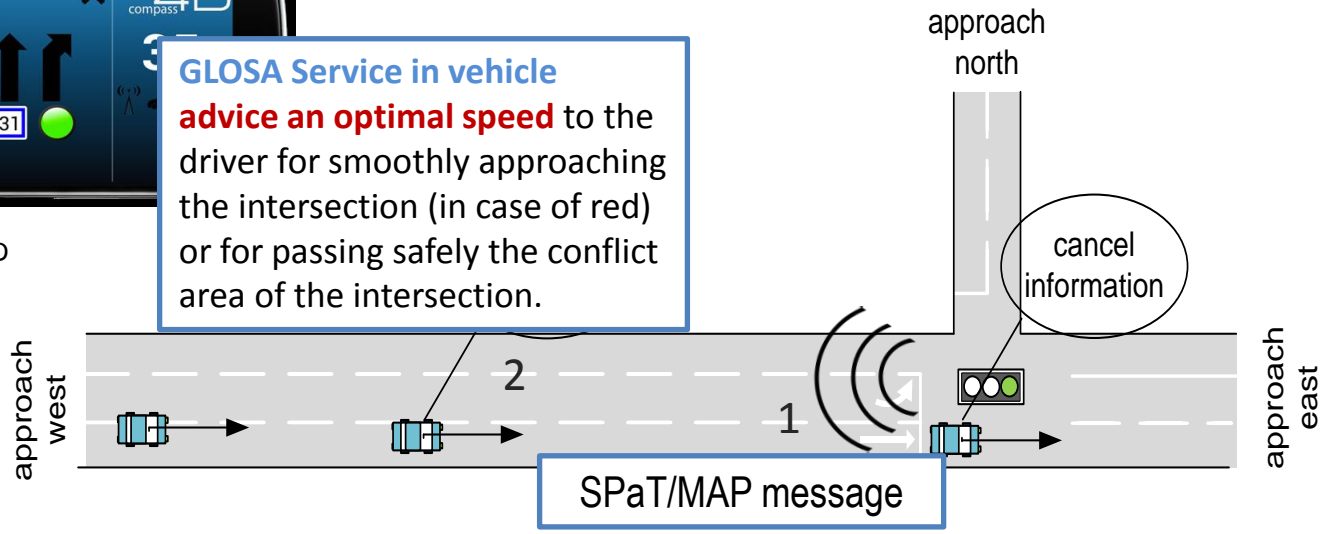
- reduction of stops at intersections
- reduction of fuel consumption
- reduction of CO2 emissions

Green Light Optimal Speed Advice



© COMPASS 4D

GLOSA Service in vehicle
advise an **optimal speed** to the driver for smoothly approaching the intersection (in case of red) or for passing safely the conflict area of the intersection.



Conclusions

- C-ITS basic messages have been researched and standardised and are ready for use
- Implementation is currently going on (vehicles manufactures, road operators and authorities)
- Exploit C-ITS applications fully in the city environment by collaboration between cities the „technology providers“
- Cities are most important when it comes to the roll-out for complex intersections
- Start with real world testing at single intersections (or at a limited sequence of traffic lights)
- Include Public Transport priority (based on C-ITS) from the beginning (flexibility and adaptive use)

Conclusions

for more information:

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AustriaTech's **Policy Brief** for Cities
„Connected Mobility for Cities“

can be downloaded soon at

<http://www.austriatech.at>