ITS World Congress 2015

Bordeaux, 5-9/10/2015

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ECo-AT

Cooperative ITS Corridor – Joint Deployment NL/DE/AT

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The Official Start

On 10 June 2013 ministers representing Germany, Austria and the Netherlands, the countries initiating the corridor, signed the Memorandum of Understanding.

The C-ITS Corridor NL-DE-AT

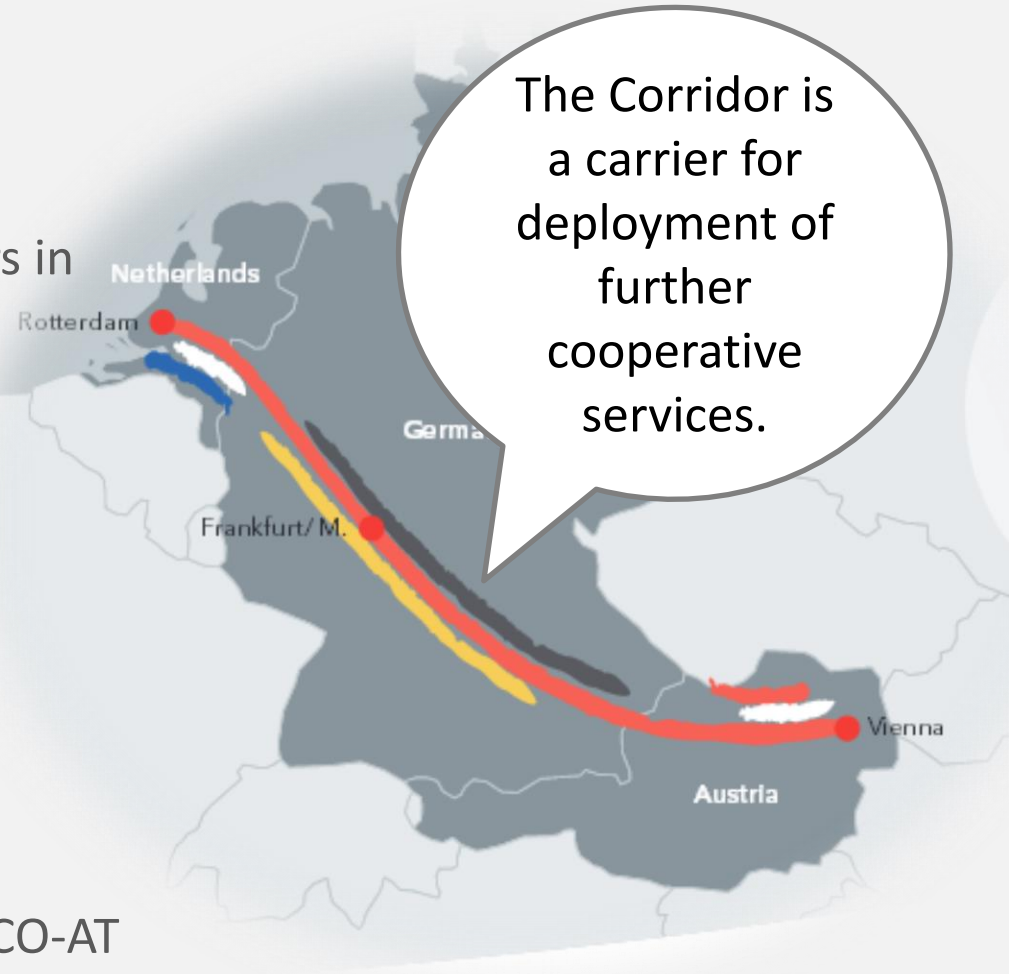
Providing a basis for standardized, international, future-oriented cooperative ITS services

- A joint road map for the introduction of the initial cooperative ITS services
- Common functional descriptions of the initial cooperative ITS services and technical specifications
- Start of the actual implementation of the initial cooperative ITS services

The Phases

1. Pre-development and proof-of-concept
   - within the Austrian project ECO-AT,
   - with road works safety trailers in Hessen around Frankfurt/M.
   - by extension of Dutch Test-site DITCM

2. Nationwide Deployment of Road Works Warning and Probe Vehicle Data in the Cooperative ITS Corridor (NL – DE – AT)
   - within the Austrian project ECO-AT



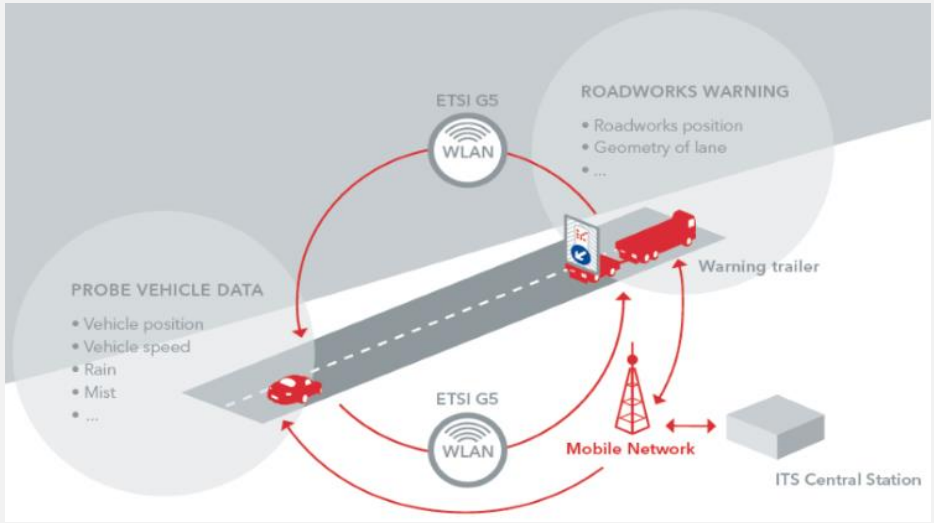
The Use Cases in the Corridor

At least two use cases will be implemented jointly along the whole corridor:

- **Road Works Warning**
  Vehicles approaching a road works site will be warned and informed directly in the vehicle in addition to the conventional signage means. The exact location, start and end time and site-phases will be provided.
- **Improved Traffic Management by using Vehicular Data**

  In the future the roadside C-ITS infrastructure can detect vehicular road traffic and event data (security relevant as well as road availability data) and will provide it to the traffic control centers (TCC).

  ECo-AT is working on the definition of additional use cases.



Strategic Goals
Road Works Warning

- Increase the safety of road works personnel by warning approaching vehicles in the vicinity of the construction site
- Increase road safety by early indication of road works on the motorway network
- Knowledge of the current location of road works and the current phase of long-term construction sites in the traffic control center to improve road works management and road network management
- Dissemination of more accurate information for traffic information services
- Supporting the distribution of C-ITS technology in the vehicle to bring the road works information timely, accurate and on the relevant road section directly in the vehicle
- As road operator to utilize the technology later for other applications in the vehicle

Strategic Goals

Improved Traffic Management by using Vehicular Data

- Improve the road section and network management - and thus avoid congestion - with more comprehensive data on the availability of the road (e.g. travel times and effects influencing the availability)
- Improve the incident management through timely availability of accurate information about disturbances / events on the road network
- Creation of an provider independent access to vehicle data by direct road-side detection and thus introducing a new "core technology" in traffic management
- Supporting the distribution of C-ITS technology in the vehicle in order to make this technology usable for further applications for road operators

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Strategic Goals

Strategic Environment

C-ITS Strategies in Europe

- September 2015
  - › Publication of the “Strategy of automated and connected driving” by BMVI
- October 2015
  - › Publication of the “C-ITS Strategy for Austria” by BMVIT
- First half of 2016
  - › Publication of the C-ITS Strategy by the European Commission

Strategic Goals in the C-ITS Corridor

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- Highly accurate detection of all daily roadworks in terms of location and timing
- Information to drivers about the current location, traffic limitations and traffic conditions of long-term roadworks with the classification “risk of congestion”
- Use of the generated traffic data for the improvement of traffic management, particularly for the acceleration and quality enhancement of incident and roadworks management
- Direct, on-time and accurate information to equipped vehicles of incident messages, danger warnings and lane guidance on the route
- Highly accurate detection of the traffic situation at equipped route sections and roadworks

Qualitative Goals

1. Applications are available at the corridor and are accepted by customers and used regularly.
2. Applications are operated with a high and verified IT standard for users and partners, especially concerning IT-security.
3. In comparisons to RDS-TMS improvements in terms of timley and location related information for the driver during the journey
4. Use of anonymised traffic data for the main tasks of road operators, especially in the filed of traffic management
5. Guarantee the access and the use of the Living Lab for the validation and test in the course of the roll out

Quantitative Goals

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1. Defined applications are available in equipped vehicles on equipped route sections.
2. The location detection of daily roadworks on the corridor has an accuracy of min. 100 metres in terms of location and min. 15 minutes in terms of timing regarding the begin and end.
3. Time of the detection of an incident till the transmission into vehicles is lower than 3 minutes on equipped route sections.
4. All long-term roadworks at the corridor which have an essential traffic impact send at least 90 % of defined messages by the applications to equipped vehicles.

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Implementation of C-ITS on Austrian motorways until 2020…

…leads to the improvement of information and safety for connected vehicles!

The ECo-AT project

European Corridor – Austrian Testbed for Cooperative Systems

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- ECo-AT is the Austrian project to create harmonised and standardised Cooperative ITS applications jointly with partners in Germany and the Netherlands
- Implementation project in 2 phases (Definition & Testing, Implementation)
- Duration 2Q/2013 – 2Q/2017
- Overall budget of Euro 10 Mio.
- Funded by Austrian Climate and Energy Fund
- The project is led by the Austrian motorway operator ASFINAG
- Project partners are:

ASFINAG, ITS Vienna Region, VOLVO, ftw Creating Communication Technologies, bast, kapsch, HiTec marketing, SIEMENS, swarco

Project Objectives for ECo-AT

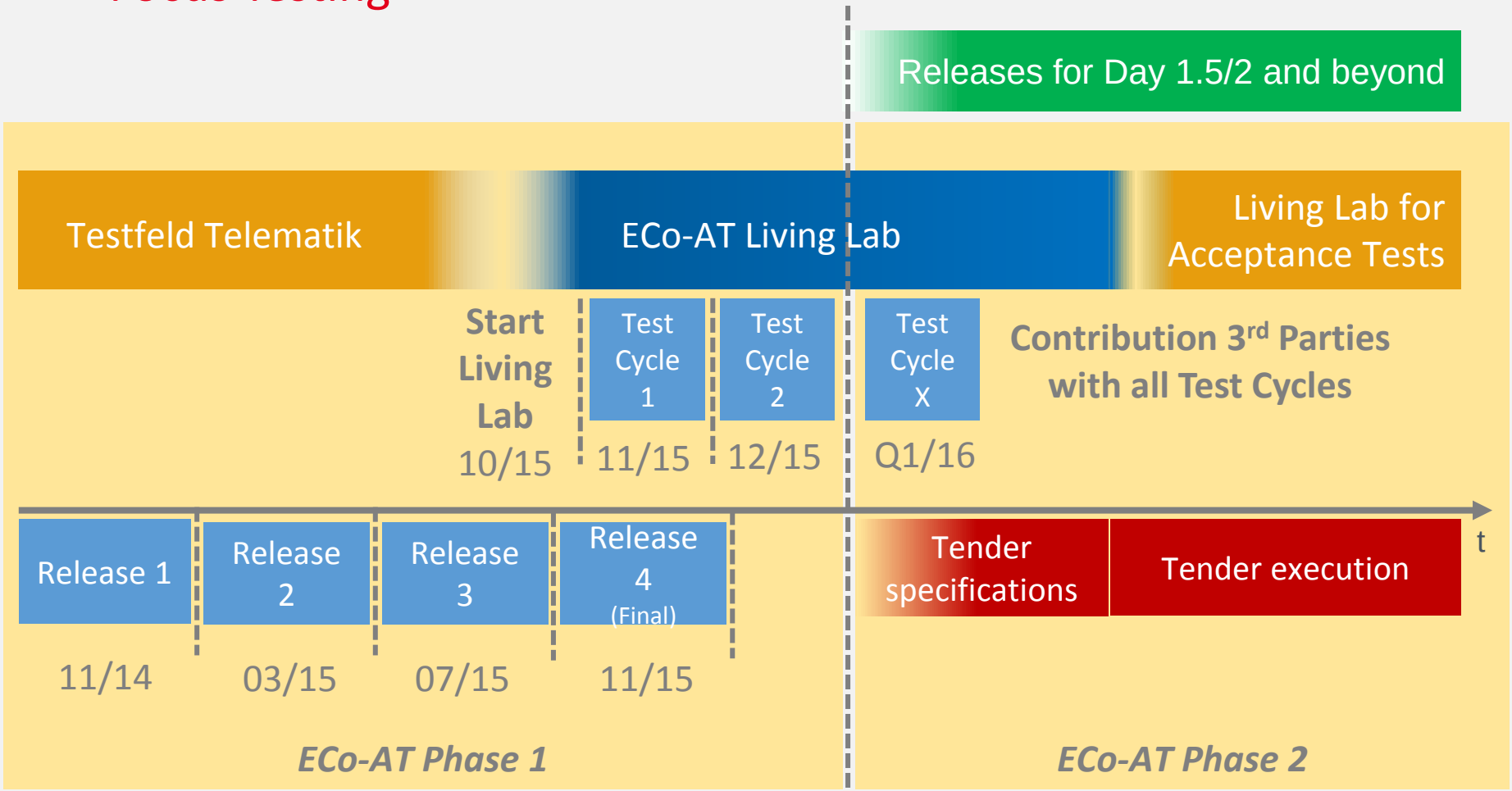
- To close the gap between R&D and implementation for a harmonised role out of C-ITS in the corridor
    - by defining in cooperation with industry partners all elements in the value chain for C-ITS,
    - by adapting industry partners products and internal ASFINAG procedures,
    - By testing the overall system in a living lab environment and finally
    - by procuring and implementing the Day One services on a corridor in Austria

Major Topics for ECo-AT

- Use Cases
- Roles & Responsibilities
- System architecture for whole value chain
- Traffic Control Centre (TCC)
- Road Side Units (RSU)
- Co-Existence (5,8 / 5,9 GHz)
- Convergence (5,9 GHz with cellular systems)
- Upwards Compatibility
- Conformance Testing
- Definition and Implementation of a Living Lab
- Tender procedure – procurement
- Conformance Testing
- Roll Out and Operation

Project Time Schedule

Focus Testing



ECo-AT Living Lab Corner Stones

- The Living Lab will start from 1st of October
- The document “Guideline for Living Lab” holds all information on the framework conditions in the Living Lab (Everybody who has received the ECo-AT Release documents has received the document, all other can request the full set of ECo-AT documents via www.eco-at.info)
- All interested parties should actively communicate their interest to contribute to the Living Lab via office@eco-at.info
- Currently the Eco-AT consortium is defining the test cases to be executed in the Living Lab
- All interested parties will be invited to contribute to this work
- There are two test cycles planned currently: one in November, one in December

Achievements End of Phase 1

General Public

- All Day 1 Use Cases of ECo-AT Phase 1 were defined and specified.
- The system specification for Day 1 Use Cases was defined and specified.
- The Living Lab framework is set up and open for project partners and third parties.
- Key components have been installed fully compliant with ECo-AT system specifications. Process experiences and findings have been gathered.
- Entirely transparent process during all stages of the project; publication of all release documents including multiple iteration discussions with the general public, industry, OEMs, C-ITS corridor partners as well as other road operators.
- Operative testing in the Living Lab starts in QU4/2015 (all Day 1 Use Cases) for project partners and third parties.
- Roadworks Warning Use Case and Probe Vehicle Data Use Case are harmonised across the C-ITS Corridor.
- The test time schedule is harmonised with the C-ITS Corridor partners.

Achievements End of Phase 1

Policy Layer – General Motivation

- With the completion of ECo-AT Phase 1 ASFINAG is very well prepared for immediately responding to any C-ITS launch decision of the Automotive Industry (actually expected any day in the near future). This will make efficient use of the prerequisite for introducing and supporting C-ITS services at Austrian motorways.
- A C-ITS infrastructure investment decision before the C-ITS launch of the Automotive Industry is beyond commercial or economic validity.
- The Use Cases “Road Works Warning and Information” as well as “Vehicle Data for Traffic Management” were selected due to the attractive impact of C-ITS infrastructure even with low penetration of vehicles.

Achievements End of Phase 1

Policy Layer - Processes

- Entirely transparent process during all parts of the project; publication of all release documents including multiple iteration discussions with the general public, industry, OEMs, C-ITS corridor partners as well as other road operators.
- The specifications have been provided to more than 200 interested stakeholders worldwide.

Achievements End of Phase 1

Policy Layer - Use cases – Motivation and Success

- Roadworks Warning Use Case and Probe Vehicle Data Use Case are harmonized across the C-ITS Corridor (three countries).
- Hungarian road operator's C-ITS pilot infrastructure tender was based on the ECo-AT specifications. This adds external validity to ECo-AT specification documents.
- Dutch C-ITS Corridor partners have adopted the ECo-AT Road Works Warning Specifications.
- RWW-Use Case has been harmonised with French stakeholders via the SCOOP@EU-Project.
- Huge national and international industry interest at several public release presentations –with significant interest from stakeholders outside automotive and infrastructure industry (e.g. SAP, Ericsson, Intel, IBM,…).

Achievements End of Phase 1

Policy Layer - Living lab

- ECo-AT provides a unique functionally operational living lab (test infrastructure) in Europe. In an outstanding way a road operator and the ITS-infrastructure industry together provide the possibility for external partners to test new technologies based on common specifications and also get full support (including C-ITS central station messages) from one party.
- Interface and end-to-end conformance tests guarantee the service functionality and will be provided in parallel and after the launch of C-ITS infrastructure in Phase II
- The test time schedule is harmonised across the C-ITS Corridor partners.
- ECo-AT living lab is open to Third Parties in a way and to an extent unique in Europe.

Achievements End of Phase 1

Policy Layer - Contribution to the Austrian ITS policy

- At the ITS-World Conference in Bordeaux ECo-AT is represented at the common AT/GE/NL-C-ITS-Corridor-Booth as well as at the ITS Austria Booth.
- ECo-AT has significantly contributed to the preparation and implementation of the Austrian C-ITS strategy.
- ECo-AT has strengthened BMVIT's position, ASFINAG's and all project partners' positions in Europe. ECo-At is the Austrian spearhead activity in the C-ITS domain; this capitalizes on the leading role of Austrian partners, the transparent specification process as well as the setting-up of the ECo-AT living lab.
- The ECo-AT Living Lab Concept is the unique Austrian contribution to the C-ITS Corridor.

Achievements End of Phase 1

Policy Layer -European dimension of the C-ITS Corridor

- The C-ITS Corridor can serve as a workable “Blueprint” for Europe.
- 3-2-1: The C-ITS Corridor links three countries, with two common use-cases under one specification set.

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Release 3 &
Use Case Overview

Peter Meckel

Releases in ECo-AT

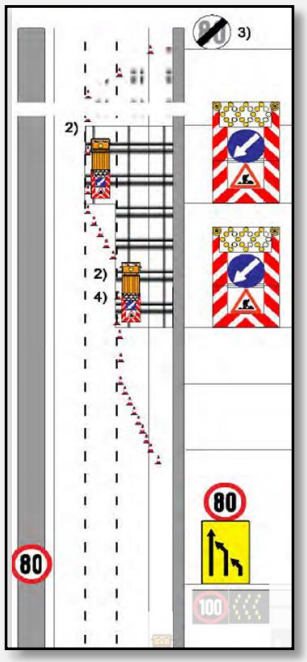
In ECo-AT Phase 1 all project partners will cooperate on the development of system architecture specifications. These system architecture specifications will be developed in 4 releases and each release will be published for public consultation:

- Release 1 in 11/2014
- Release 2 in 03/2015
- **Release 3 in 07/2015**
- Release 4 (Final) in 11/2015

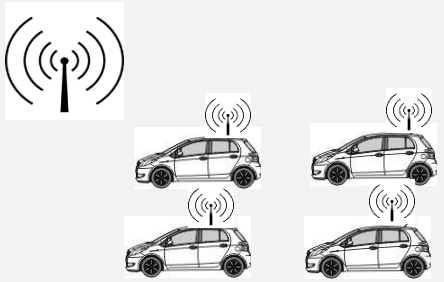
Use Cases in ECo-AT

- **Corridor Use Cases**
  - Roadworks Warning (RWW)
  - Probe-Vehicle Data (PVD)
- **ECo-AT Use Cases**
  - In-Vehicle Information (IVI)
  - Intersection Safety (ISS)
  - Other DENM Applications: Events

RWW

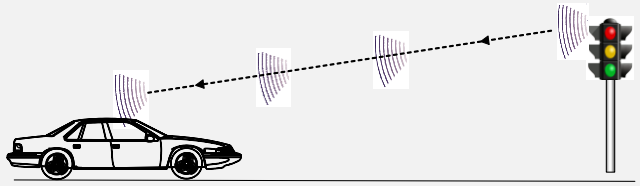


PVD



IVI

ISS



Use Cases Day 1

	Day 1			Day 2
Use Case	Release 1	Release 2	Release 3/4	
Road works warning (RWW) • Emergency, Short Term • Mobile RW • Long Term RW	X	X	X	
In-vehicle-information (IVI) • Dynamic signs • Static Signs	Draft	X	X	
Probe vehicle data (PVD) • aggregation of CAM • PVD including PDM	Draft	X		X
Intersection Safety (ISS)	Draft	X		
Other DENM based applications • TCC initiated DENMs based on traffic information content • Processing of DENM from the vehicles	Draft	X	X	
Multimodal information (MIF)	Feasibility Study			

Release 3 Documents

Overview of 19 Documents (+6)

Overview on the set of Release Documents	ECo-AT_SWP2.3_ExplanatoryReleaseNote_v03.00.pdf
Use case Overview	ECo-AT_SWP2.1_OverviewOnUseCases_v03.00.pdf
Use case Road Works Warning (RWW)	ECo-AT_SWP2.1_RoadWorksWarning_v03.00.pdf
Use case In-Vehicle Information (IVI)	ECo-AT_SWP2.1_InVehicleInformation_v03.00.pdf
Use case Probe Vehicle Data (PVD) / CAM Aggregation	ECo-AT_SWP2.1_CAM_Aggregation_v03.00.pdf
Use case Intersection Safety (ISS)	ECo-AT_SWP2.1_IntersectionSafety_v03.00.pdf
Use case Other DENM Applications	ECo-AT_SWP2.1_DENM_Applications_v03.00.pdf
System overview	ECo-AT_SWP2.3_SystemOverview_v03.00.pdf
Security Concept	ECo-AT_SWP3.4_Security_v03.00.pdf
Convergence of ITS-G5 with cellular communication systems	ECo-AT_SWP3.6_ConvergenceStrategy_v03.00.pdf
Concept for Upwards Compatibility	ECo-AT_SWP2.7_UpwardsCompatibility_v03.00.pdf
Living Lab Concept	ECo-AT_SWP3.7_LivingLab_v03.00.pdf
C-ITS System Monitoring	ECo-AT_SWP2.3_SystemMonitoring_v03.00.pdf
C-ITS Functional Description	**ECo-AT_SWP3.1_C-ITS-S_Functional_Description_v03.00.pdf**
Interface 1 (IF1) TCC <-> C-ITS-S Data Specification	**ECo-AT_SWP3.1_IF1_DataSpecification_v03.00.pdf**
Interface 3 (IF3) C-ITS-S <-> R-ITS-S – ITS G5 Communication	**ECo-AT_SWP3.1_IF3_Communication_v03.00.pdf**
Interface 3 (IF3) C-ITS-S <-> R-ITS-S – R-ITS-S Device Management	**ECo-AT_SWP3.1_IF3_Management_v03.00.pdf**
R-ITS-S Functional Description	**ECo-AT_SWP3.2_R-ITS-S_Functional_Description_v03.00.pdf**
V-ITS-S Functional Description	**ECo-AT_SWP3.3_V-ITS-S_Functional Description_v03.00.pdf**

in bold: new document in Release 3

Release 3 Documents

Explanatory Note and Use Case Overview

- **Explanatory Note Release 2**
  - Introduction for C-ITS / V2X, ITS Corridor, ECo-AT
  - ECo-AT Phases and Releases
  - Overview on Documents in Release 3
  - Description of changes from Release 2

- **Overview on Use Cases**
  - Overview on ECo-AT Use Cases
  - Definition of Terms (day 1, day 2, release 1, release 2, …)
  - Assignment of Use Cases to day 1 / day 2 and releases

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System Overview

Document Reference:
“ECo-AT_SWP2.3_SystemOverview_v03.00.pdf”

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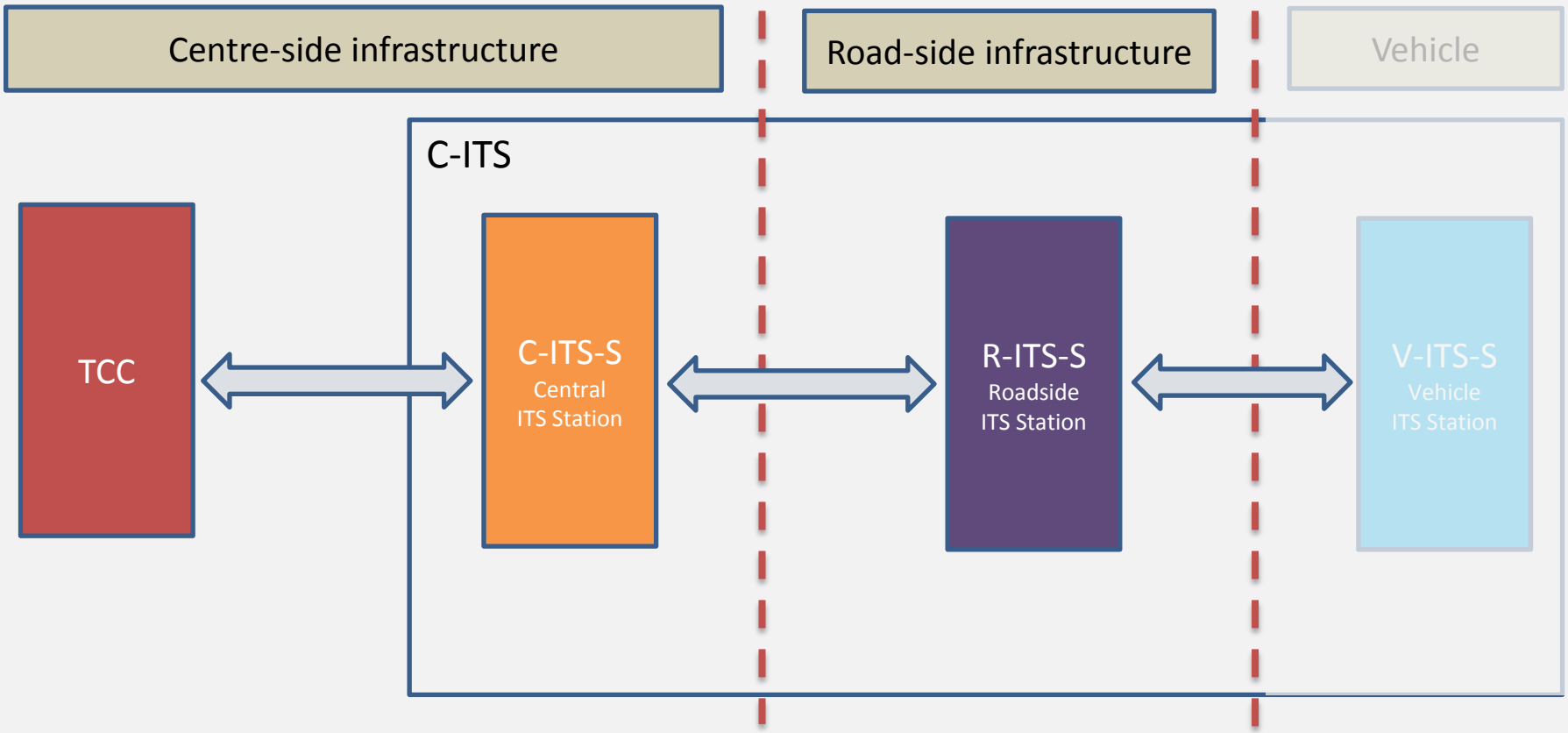
Release 3 Documents

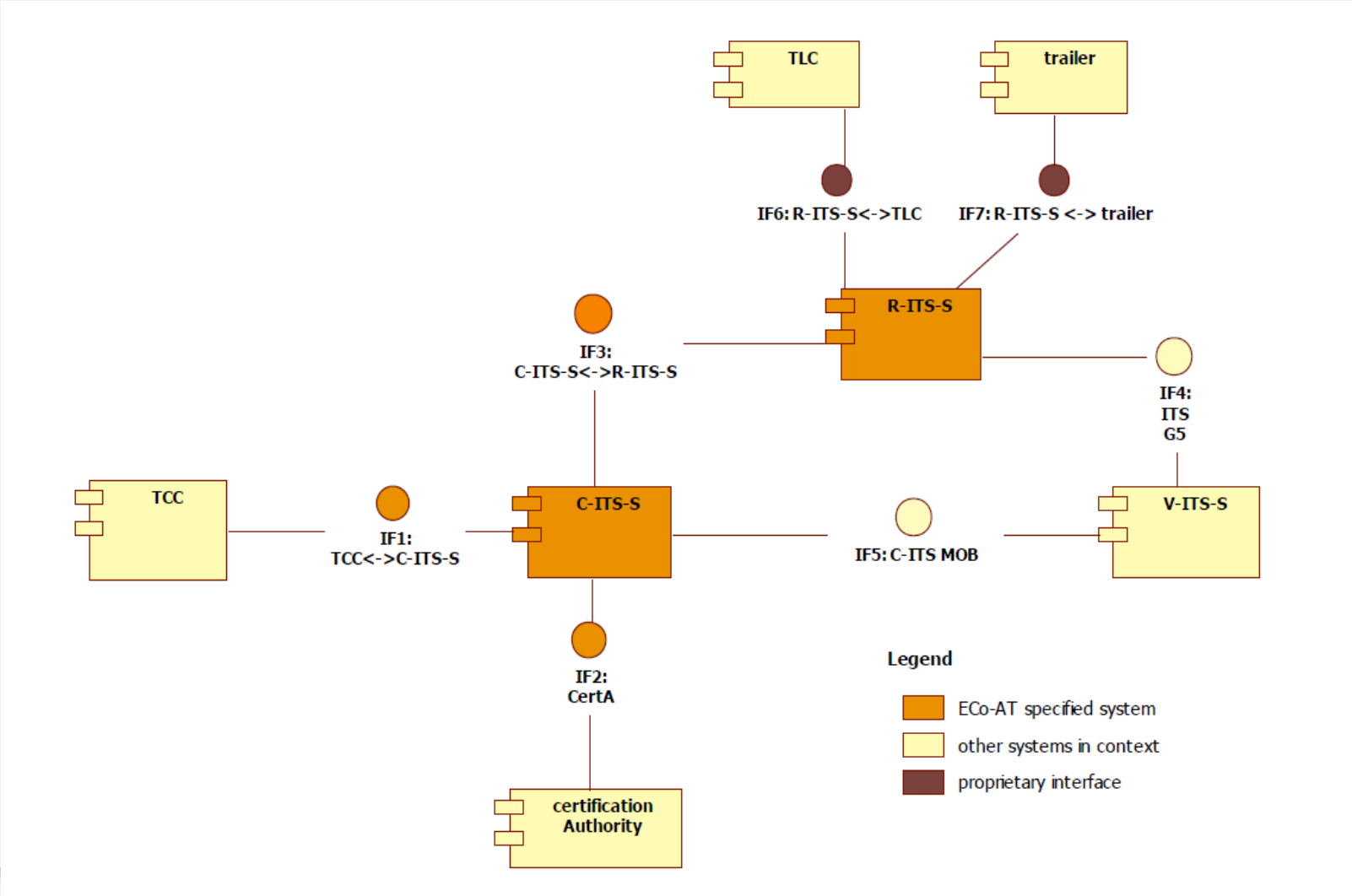
System Overview

- **System Overview**
  - Current status of the ECo-AT project as of Release 3
  - Describes the ECo-AT system (as agreed by all ECo-AT partners)
  - Specification and common understanding for all partners regarding
    - system architecture, system components, interfaces, communication model
    - usage of data elements (referencing to UC documents)
    - message management and system requirements
  - Basis for development of functional requirements in later releases
- **Changes from Release 2**
  - New chapter: 5.3.1 Maintenance and Operations
    - Input coming from security group about operational scenarios. Depending who is operating the system, different architectures have to be considered.
  - Deleted chapter 5.2.2.3 R-ITS-S dissemination selection method
    - This is moved to SWP3.1 (C-ITS-S) document

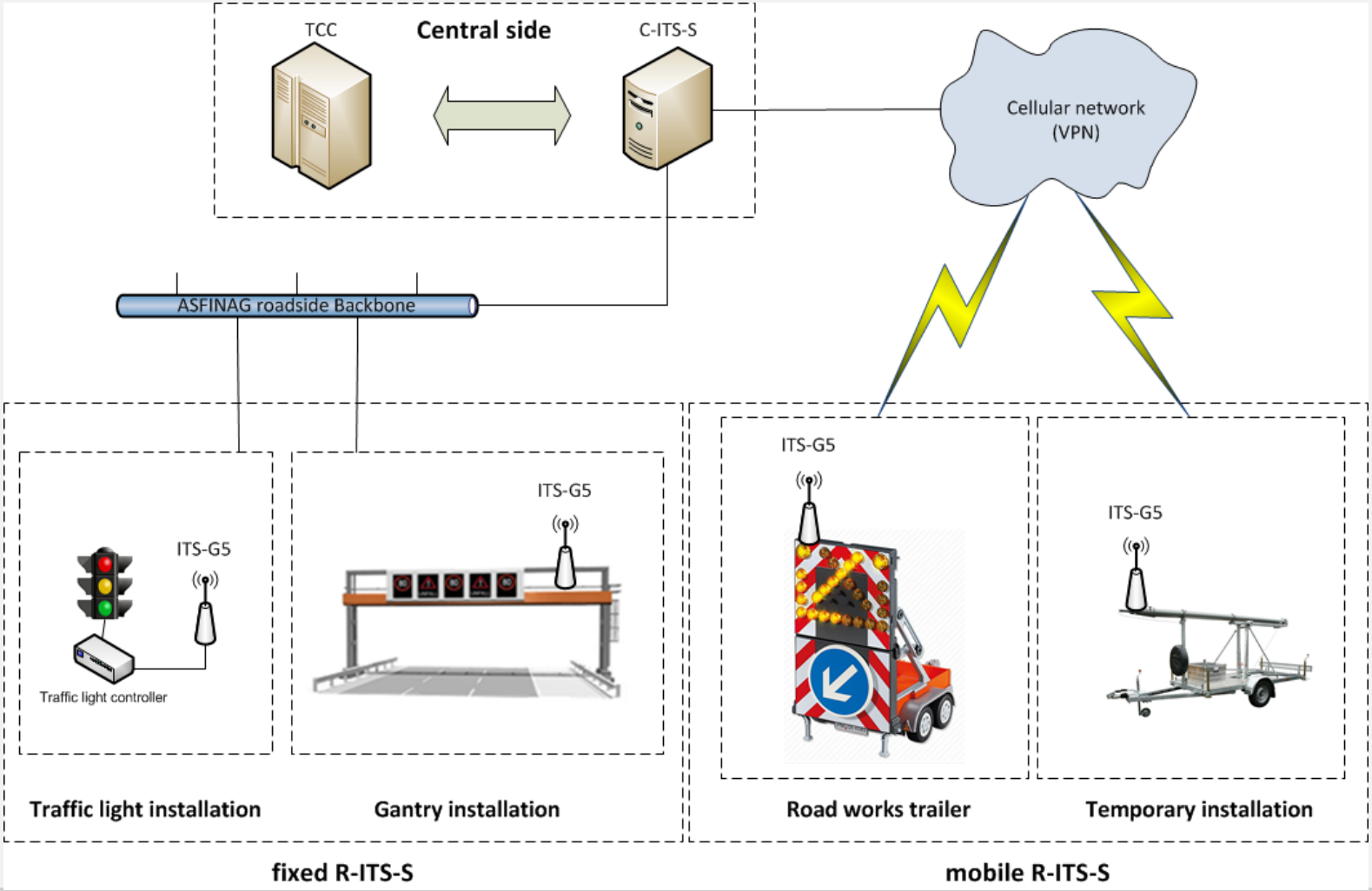
Overview: System Architecture



Overview: System Architecture

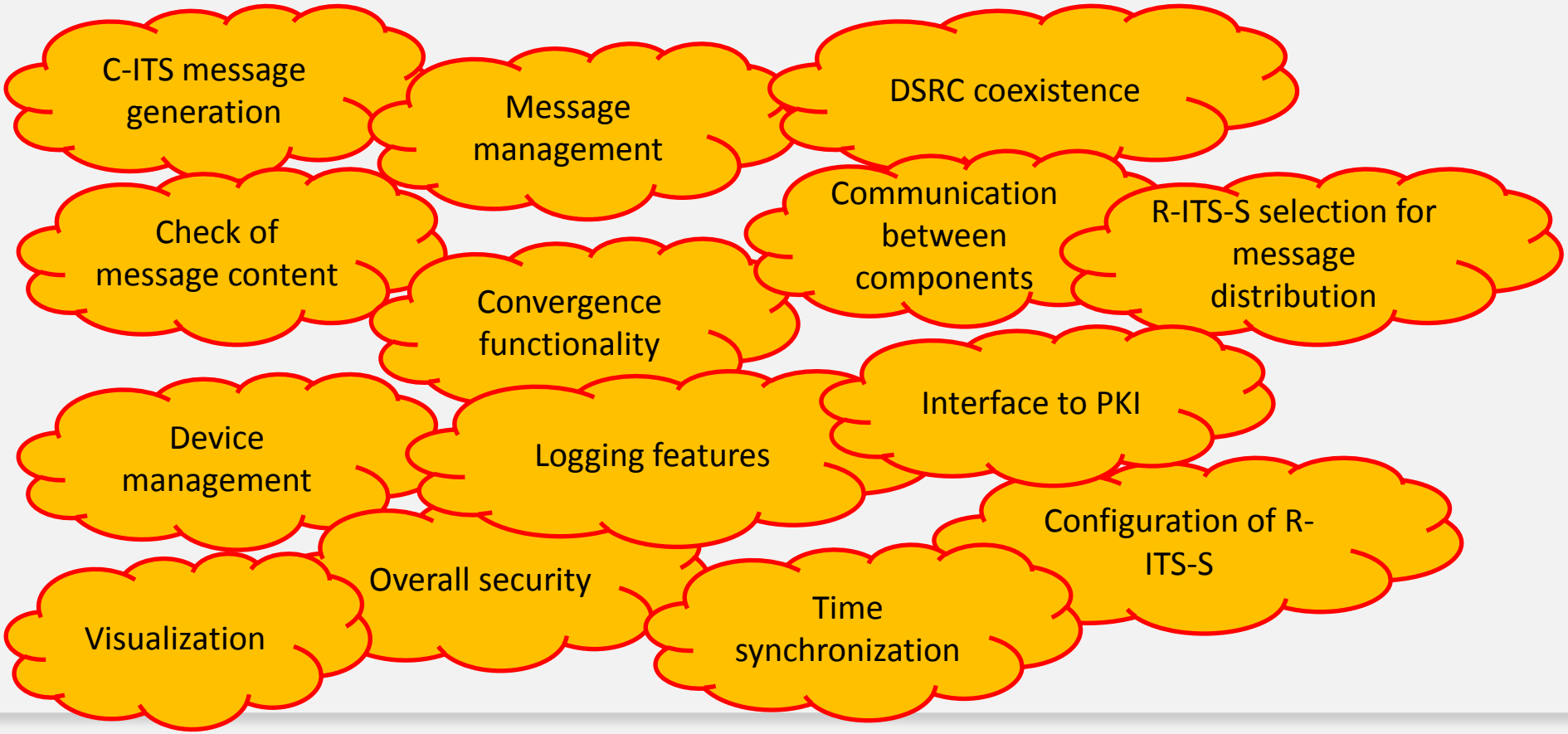


Type of R-ITS-S



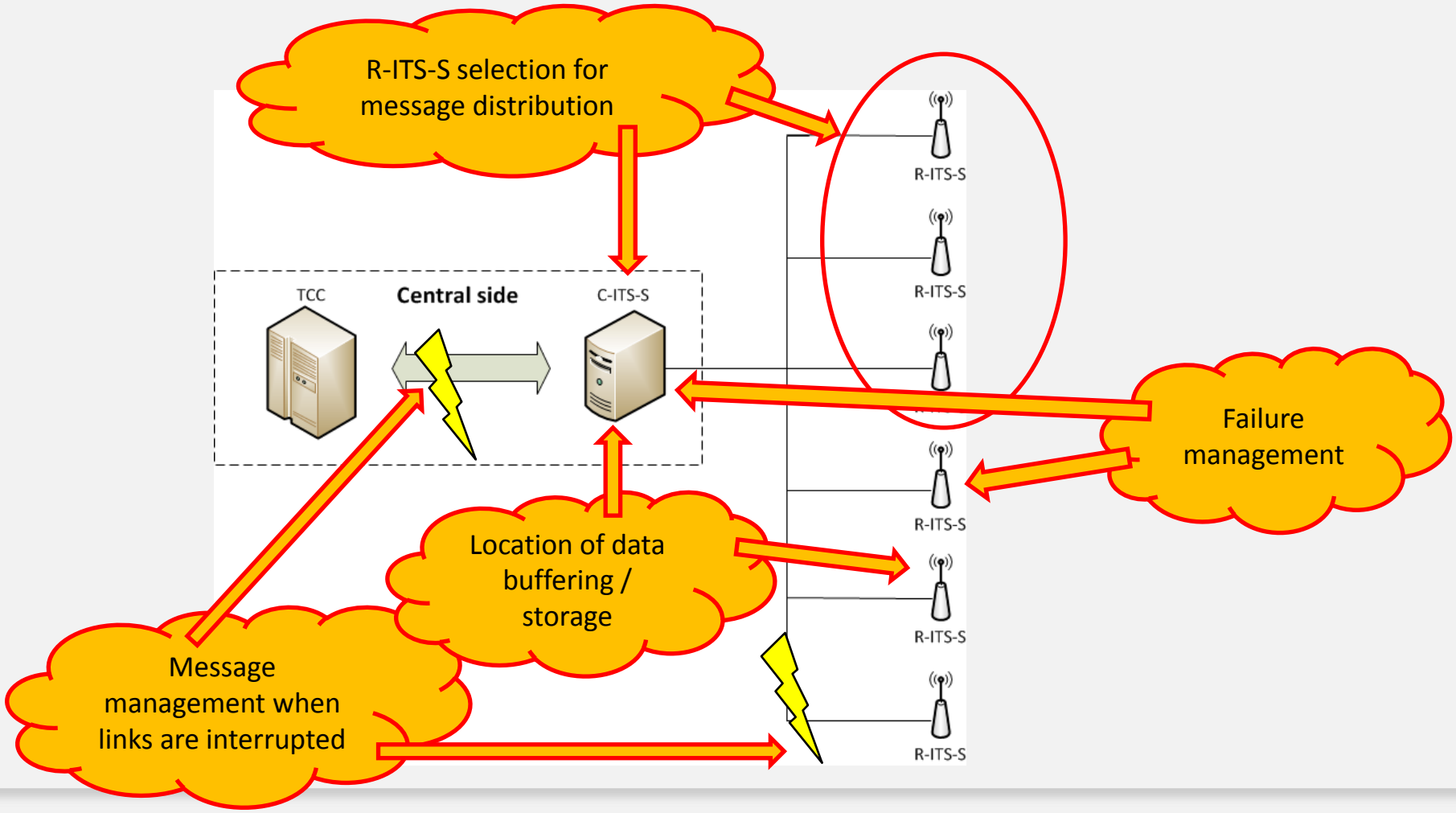
General System Requirements

General requirements are specified for each system component, e.g.,



General Message Management

examples



C-ITS message formats

Cooperative awareness message
periodical triggered

CAM
vehicle information:
location, speed, heading,
station type, exterior lights, …

Decentralized environmental notification message
event triggered

DENM
event information:
type (e.g. RW, accident, adverse weather), location, duration, …

In-vehicle information
information triggered

IVI
road information:
fixed road signs, dynamic message signs, text, …

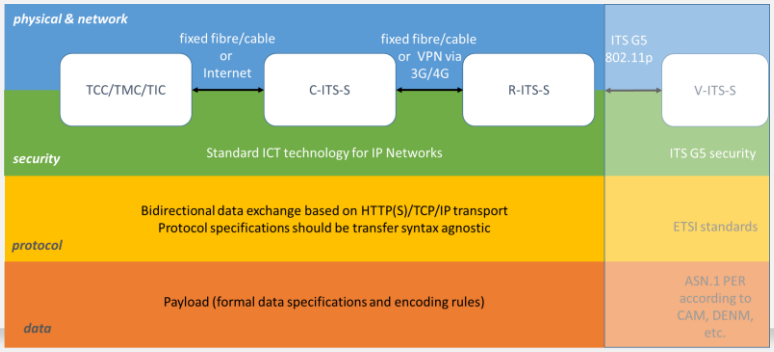
Signal phase and timing / map
periodical triggered

SPaT / MAP
traffic light information:
signal phase, timing, road topology, …

System Overview

Conclusion

- System architecture and communication model specify framework conditions and interfaces that allow a vendor mixed system environment
- ECo-AT strives to harmonise system architecture, communication protocols and interfaces – as much as possible – with the corridor partners and on European level
- While there is in general much consensus, the corridor partners have expressed some different points of view and requirements for some aspects of the system architecture and interfaces – common working groups are trying to harmonise these aspects
- System architecture and interfaces will be fully specified and published as part of the ECo-AT system specification releases



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