


TNO innovation for life

Infrastructural Message Sets Standardization at CEN and ISO

Status January 2014

Paul Spaandermann, TNO, NL


TNO innovation for life

Infrastructural Message Sets

SIGNAL. PHASE AND TIMING (SPAT)
ROAD TOPOLOGY (MAP)
PRIORITY AND PRE-EMPTION (SRM, SSM)

PROBE VEHICLE DATA (PVD, PDM)

IN VEHICLE INFORMATION (IVI)


TNO innovation for life

SIGNAL. PHASE AND TIMING (SPAT)
ROAD TOPOLOGY (MAP)
PRIORITY AND PRE-EMPTION (SRM, SSM)

(DT8.1 IN CEN/TC278/WG16 & ISO/TC204/WG18)


TNO innovation for life

SPAT, MAP, SRM, SSM *CEN ISO TS 19091*

SPAT, MAP, SRM and SSM

What is the purpose?

- To inform vehicles about road situations in terms of road topologies as well as traffic management related information such as traffic light status and to provide special vehicles prioritized access at specific road segments to improve traffic safety and efficiency.

What is the expectation?

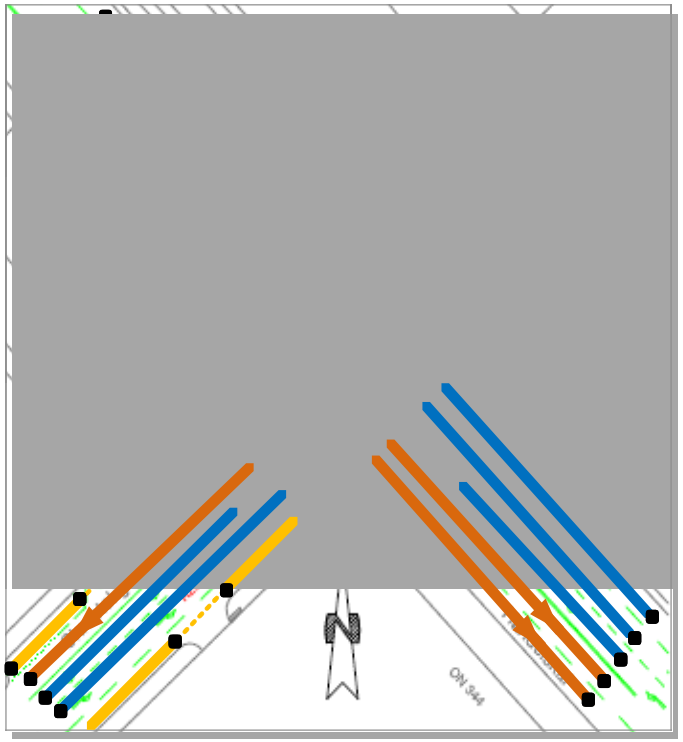
- For Road Operators to be able to more fluently manage the traffic flow and thereby the traffic throughput of the network and improve safety.
- For the Road Users to get though traffic more efficiently and safely. Get informed better and in advance for traffic light status in the car.
- For Fleet Operators such as busses, trucks and emergency vehicles to request priority passage and for efficiency and reliability of public transport and freight management.
- To support the Basis Set of Applications (BSA)


TNO innovation for life

SPAT, MAP, SRM, SSM *CEN ISO TS 19091*

What is MAP?

The MAP message defines the topology of an infrastructure area. It includes all the roads for vehicles, public transportation and the paths for pedestrian crossings. The area described covers about 200 m of the approaches, starting from the position of the stop line.
If a neighbor intersection is closer than 400 meters, the MAP description may be done up to an extent of approximately the half distance between the intersections.

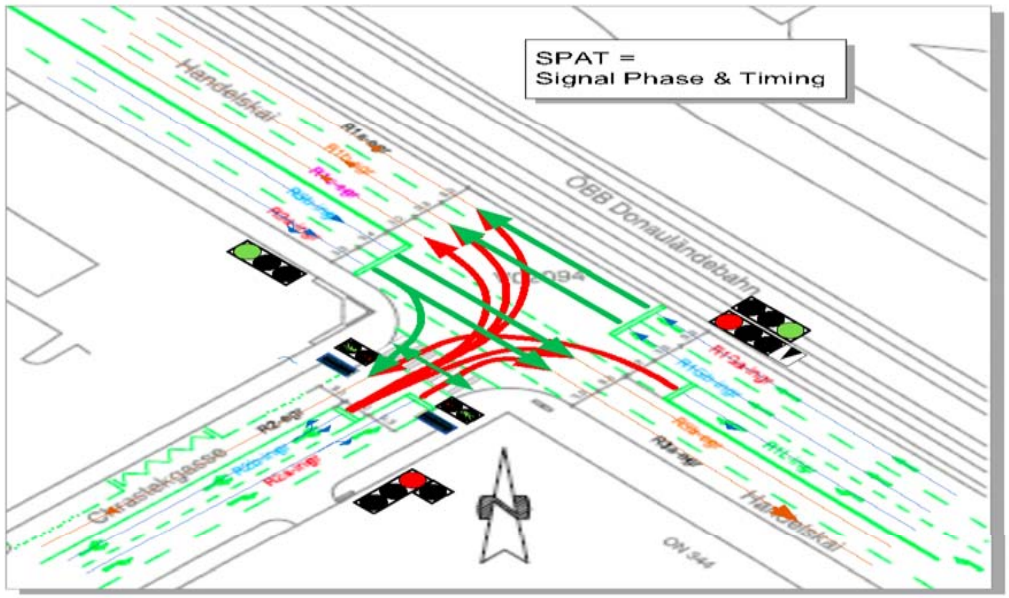


SPAT, MAP, SRM, SSM *CEN ISO TS 19091*

What is SPAT?

The SPAT message defines the status of the signals in an intersection. The status information includes general operational states of the traffic controller, the current signal state, the residual time of the state before changing in to the next state, the right of way or each allowed maneuver and assistance for crossing the conflict area of.

Additionally SPAT may include detailed green way advisory information and the status for public transport prioritization.




TNO innovation for life

SPAT, MAP, SRM, SSM *CEN ISO TS 19091*

Situation

- Joint Work Item (WI) established at CEN/TC278/WG16 & ISO/TC204/WG18 as part of the M/453 activities.
  2 activities are established:
  - The creation of the CEN ISO TS 19091 specifying the messages, related message structures and data elements of SPAT, MAP, SSM and SRM.
    - To ensure that required application requirements are met an intensive application overview was created and is included as informative reference.
    - As there are differences between the different regions (Europe, North America, Asia-Pacific) it is expected that there will be different profiles to allow choice for the specific situations or regions.
    - Besides SPAT and MAP, for priority and pre-emption support at intersections the message types Single Request Message (SRM) and Signal Status Message (SSM) will be defined.
  - Liaison with SAE: Strong support from CEN and ISO since Dec 2012 to modify SAE J2735 to meet apparent needs for immediate deployment based of trials conducted to date and to harmonize the message sets.


SPAT, MAP, SRM, SSM *CEN ISO TS 19091*

- ***CEN ISO TS 19091 (VA/CEN lead)***
  - ***Document structure at current thinking***
    - Introduction
    - Reference to revised SAE SPaT & MAP messages (Normative)
      - Mechanism to allow regional teams to add new elements and the new elements should be informed to other regional teams, for potential inclusion to the baseline future release if suited.
    - Annex A (Informative): App use cases & traceability
    - Regional Annexes
      - Which elements are required/optional
      - New elements that are not yet included in the SAE J2735 SPaT & MAP baseline
    - Annex B (Normative) – EU
    - Annex C (Normative) – JPN
    - Annex D (Normative) – US
    - Annex X (Normative) – Korea, Australia, etc.


TNO innovation for life

SPAT, MAP, SRM, SSM *CEN ISO TS 19091*

- ***Status***
- **CEN ISO TS 19091 related**
  - A draft version is available for internal evaluation at WG level
    - The regions related content to be added
    - Additional requirements to be identified
    - Data concepts investigated
    - Investigate what is needed for SSM/SRM
    - Comments received from Korea, Japan and Europe to be resolved
    - Document to be restructured
    - Next step: TC review in Q3/2014
- **SAE J2735 related**
  - A update proposal for the J2735 has been realized. This incorporates significant changes and added element aspects as requested by Europe, Japan and Korea so far. This proposal is now for balloting to SAE.


TNO innovation for life

PROBE VEHICLE DATA (PVD) AND PROBE DATA MANAGEMENT (PDM)

(DT8.2 IN CEN/TC278/WG16 & ISO/TC204/WG18)


TNO innovation for life

PVD, PDM

Preliminary stage

Probe Vehicle Data

CEN ISO TS xxxxx “Functional Characteristics of Probe Data exchange”

- ***What is the purpose?***
  - Provide operators with vehicle collected general specific but none individual information related to road safety, road throughput and reduction of CO_2 emissions.
- ***What is the expectation?***
  - For Road Operators to get better trustworthy information about the current situation of traffic and the roads to avoid accidents, manage vehicle density and road throughput, road quality and notify on weather conditions.
  - For the Road User to be better prepared for hazardous situation on the road like for black ice situations realizing less accidents, providing better time prediction (arriving at destination) and less fuel consumption.


TNO innovation for life

PVD, PDM

Preliminary stage

The European context

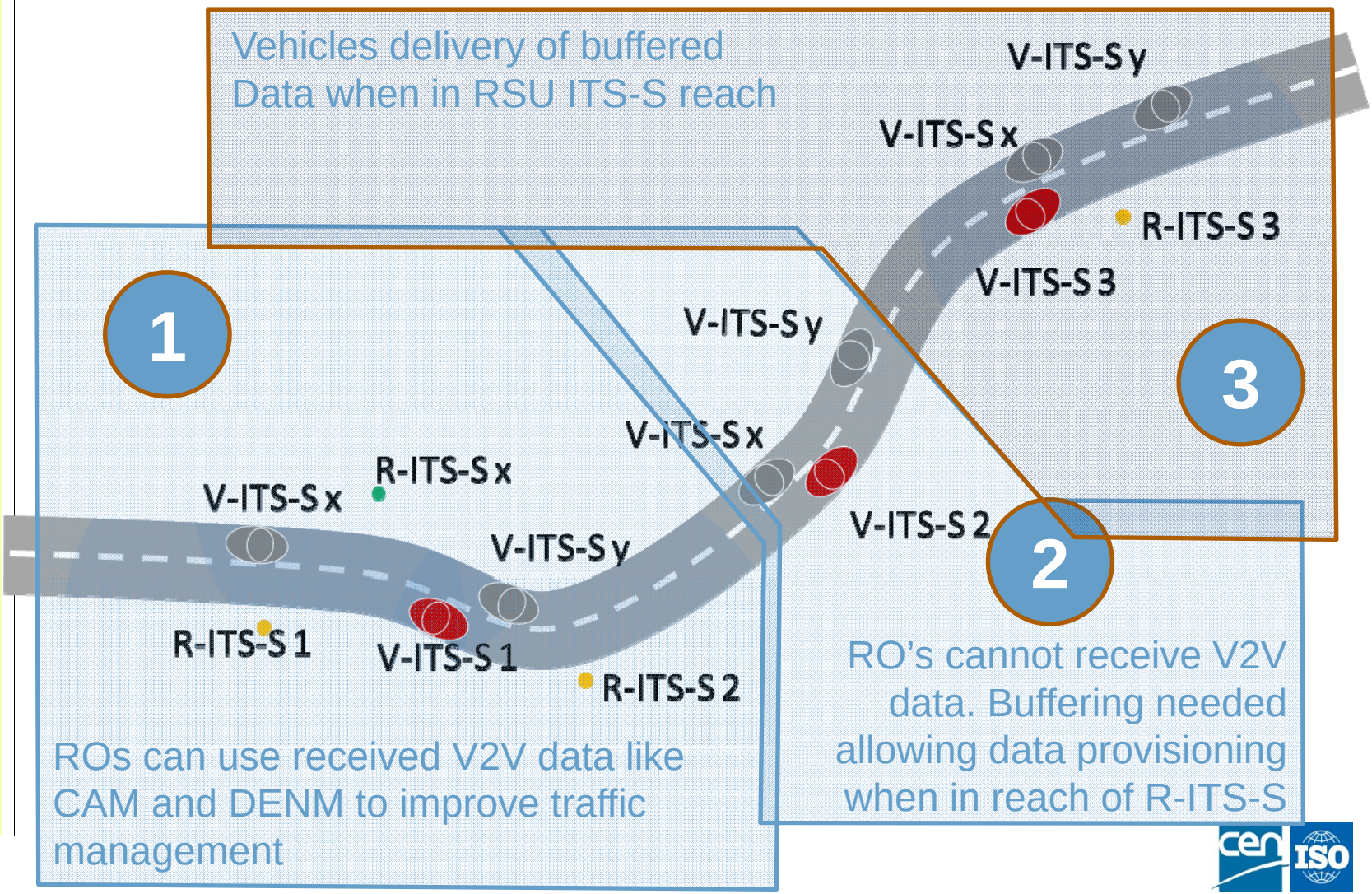
- It is specified for day-1 applications that vehicles shall provide most relevant Road Operator real-time information by means of awareness messages (CAM) as well as hazardous situation information exchange supporting messages (DENM) to enable notification of the different situations to others including Road Operators.
- Road Operators however will not be able to receive all relevant messages at all locations along the roads. Probe Data will ensure the acceptance of relevant information from locations the messages could not be received.

TNO innovation for life

Why Probe-Data?

Preliminary stage

PVD, PDM




TNO innovation for life

PVD, PDM

Preliminary stage

Probe Data

Outside European

- Probe Data standards are developed within ISO/TC204/WG16.
- Additional knowledge shows that further improvement of these standards as well as creating new work-items are needed.
- Alignment of CEN/TC278/WG16 & ISO/TC204/WG18 and ISO/TC204/WG16 activities resulted in a cooperation agreement with shared responsibilities and cross WG contribution between the WG's.

Project		Editor	WG16	WG18	Joint project
22837	Probe Data	Sato-san	R	p	yes
25114	Probe Data Management	xxx[2)]	p	R	yes
29284	Event Based Probe Data	Sato-san	R	p	yes
NWI	Probe data Service Architecture	Ito-san, Sato-san	R		no
24100	Personal data protection	Sato-san, Ito-san	R	p	yes
NWI	Functional Characteristics of Probe Data exchange	Paul Sp.	p	R	yes
NP 16461	Privacy and Integrity protection	Ito-san	R	p	yes

cen ISO


TNO innovation for life

PVD, PDM

Preliminary stage

Probe Data

What can be expected

- The NWIP “Functional Characteristic of Probe Data exchange” will be approved by CEN/TC278 and ISO/TC204 in Q2/2014. The standard will be developed in 2014/2015.
- Cooperation with the ISO/TC204/WG16 is on-going related to the other probe data projects in ISO.
- Harmonization with SAE J2735 will take place.
- Harmonization with ETSI TC ITS message sets is needed also.

Project		Editor	WG16	WG18	Joint project
22837	Probe Data	Sato-san	R	p	yes
25114	Probe Data Management	xxx[2)]	p	R	yes
29284	Event Based Probe Data	Sato-san	R	p	yes
NWI	Probe data Service Architecture	Ito-san, Sato-san	R		no
24100	Personal data protection	Sato-san, Ito-san	R	p	yes
NWI	Functional Characteristics of Probe Data exchange	Paul Sp.	p	R	yes
NP 16461	Privacy and Integrity protection	Ito-san	R	p	yes


TNO innovation for life

IN VEHICLE INFORMATION (IVI)

(DT8.3 IN CEN/TC278/WG16 & ISO/TC204/WG18)


TNO innovation for life

CEN ISO TS 19321

IVI

In Vehicle Information

- ***What is the purpose?***
  - To inform the road user and vehicles about travel information and road signs such as currently situated at the roadside.
- ***What is the expectation?***
  - For Road Operators to reduce the amount of signs along the road, begin able to provide additional services like contextual speed and better manage traffic flow.
  - For the Road User to get only informed about road information when it is applicable to the situation this specific road user is in. Get more efficient and will less fuel consumption to the final destination.

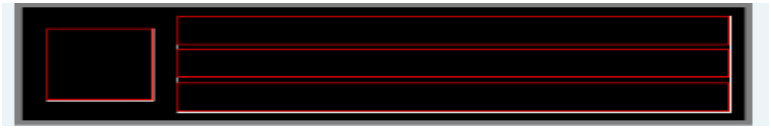
TNO innovation for life

CEN ISO TS 19321

IVI

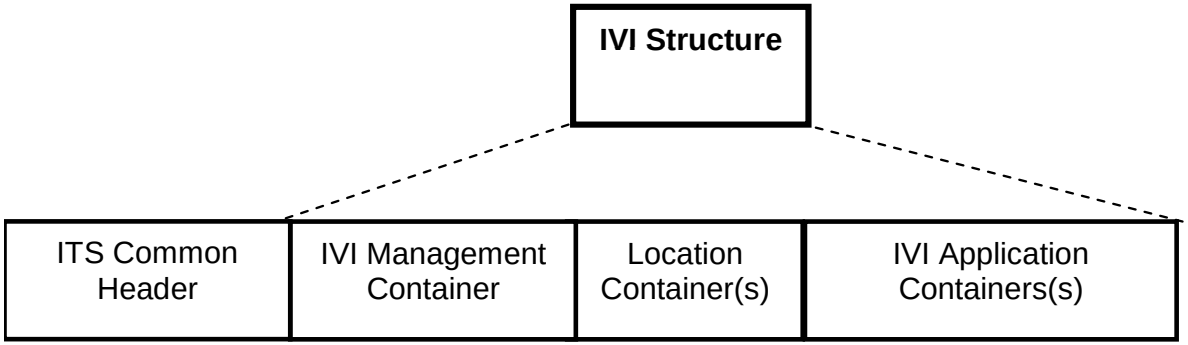
Supported configurations of IVI

- Fixed signs (examples:)
- Mechanic (Rotating prism) VMS (Variable Message Signs)
- (Light Emitting) VMS with various pictograms
- (Light Emitting) Text VMS incl. Pictogram (optional)
- Full Matrix signs and mixed static & VMS signs
- Compliant with DATEX II approach (VMSCharacteristics/VMSMessage)



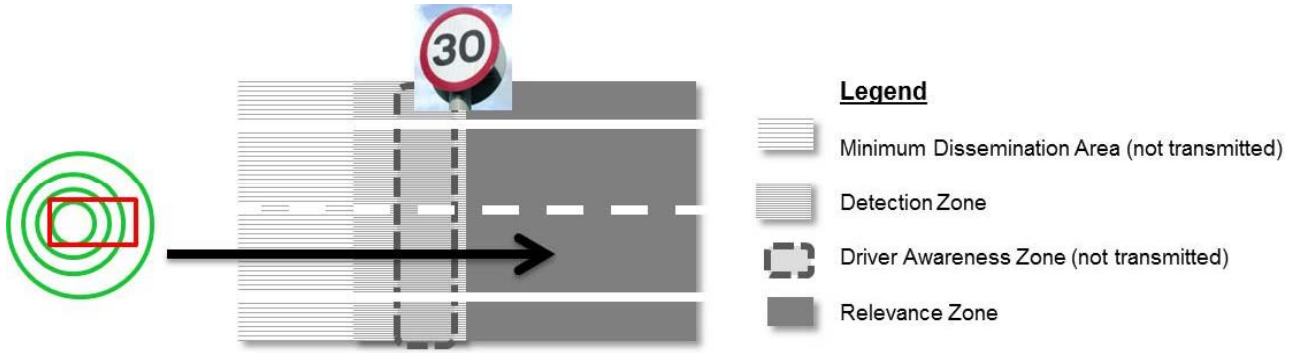
Structural Model

- The IVI container represents the Application Data Unit to be transmitted and received by an ITS station (ITS-S). The container is composed by:
  - One ***IVI Management*** sub-container.
    It is applicable to the entire IVI structure and is mandatory. It provides enough information to handle the IVI container.
  - One or more ***Location sub-containers***.
    It describes the essential information for an application to understand where an IVI is relevant. If one or more Location containers is present in one IVI structure, all Containers carry the same content but are expressed in different forms.
  - One or more ***IVI Application sub-containers***.



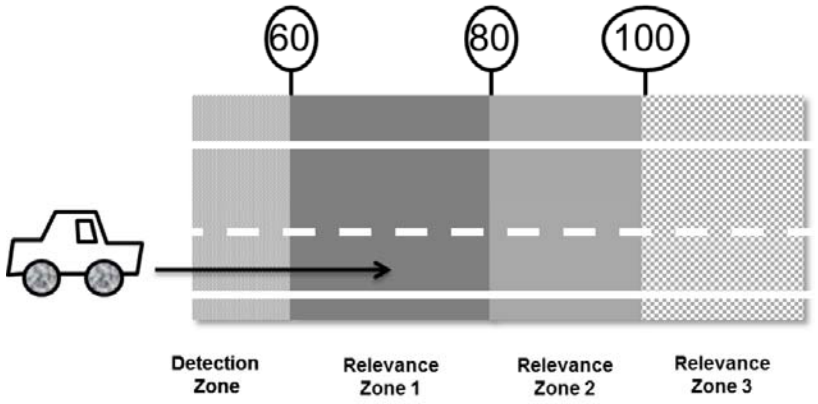
Information Zones

- The IVI container represents the Application Data Unit. When an ITS-S receives an IVI structure, the ITS-S is able to interpret the application information in the context of the appropriate location information. For this there are four zones defined:
  1. Minimum dissemination area (MDA) (refer to ISO 17425);
  2. Detection zone;
  3. Driver awareness zone (DAZ) (refer to ISO 17425);
  4. Relevance zone (RZ).



Information Zones

- The ***Location Container*** contains a definition of one or more zones, which can represent a detection zone, a relevance zone, or both.
- The application information in the ***Application Container*** is self-contained and refers to location information for its spatial validity. Application information of the same type shall not refer to overlapping ***reference zones***. Each ***Application Container*** refers to zones defined in the ***Location Container.***




IVI

CEN ISO TS 19321

- ***CEN ISO TS 19321 (VA/CEN lead)***
  - ***Document structure at current thinking***
    - Normative Structure & IVI Containers
      - IVI Management Container
      - Location Containers (Static, Dynamic)
      - IVI Application Container (IVS, Text, Layout)
    - Normative Definition of content of Data Frames and Data Elements
    - Normative Definition of data syntax in ASN.1 Module
    - Profile for G5 communication (guidelines)
    - Information on use cases (further input expected)
    - Example of pictogram catalogue (input from stakeholders)
  - Linked to CEN ISO TS 17425 Intelligent transport systems - Cooperative ITS – Data exchange specification for in-vehicle presentation of external road and traffic related data,
    and to CEN ISO TS 17426 Intelligent transport systems - Cooperative ITS – Contextual speeds


CEN ISO TS 19321

IVI

Status

- Final draft delivered for comments on WG level
- TC review in Q2/2014
- The TS19321 references to the application specifications
  - TS 17425 for In Vehicle Signage (IVS) and
  - TS 17426 for Contextual Speed.
- In Europe at C2C-CC and Amsterdam Group this TS19321 is being evaluated for first deployment support.


TNO innovation for life

Thank YOU.

Paul.Spaanderman@TNO.nl