Draft Functional Description of Day One Application [In-Vehicle Information] from the point of view of the Amsterdam Group

Version: 3.1	**Date:** 2016 – 04 - 15
Release Status: Released	**Document Type:**
Status: Completed	

Abstract:

The focus of this document is the In-Vehicle Information (IVI) service which informs drivers by means of Infrastructure2Vehicle (I2V) and In-Car technology. The present document incorporates that part of the IVI to be deployed at day one. It therefore covers de specific In Vehicle Signs (IVS) related use-case information as currently being communicated by means of (conventional) road signs, for both mandatory and advisory policies. The (relevant) information of the road signs (based on a certain policy) are presented to the road user through the Human Machine Interface (HMI) in the vehicle. This functional Description is a Day One Application from the point of view of the Amsterdam Group.

Changes since last version:

Updated document template

Outstanding Issues:

Document History

Date	Name	Action	Version number
2014	P. Spaanderman	First version	v0.1
2014	P. Spaanderman	Elaborated document	v1.0
2015	P. Spaanderman	Further elaboration	v2.0
2015	P. Spaanderman	Further elaboration	v3.0
2016-04-15	P. Spaanderman	Updates for publication	v3.1

Content

Introduction

The focus of this document is the In-Vehicle Information (IVI) service which informs drivers by means of Infrastructure2Vehicle (I2V) and In-Car technology. The present document incorporates that part of the IVI to be deployed at day one. It therefore covers de specific In Vehicle Signs (IVS) related use-case information as currently being communicated by means of (conventional) road signs, for both mandatory and advisory policies. The (relevant) information of the road signs (based on a certain policy) are presented to the road user through the Human Machine Interface (HMI) in the vehicle.

This functional Description is a Day One Application from the point of view of the Amsterdam Group.

Scope

The in-Vehicle Information Functional description describes on a functional level, how to alert the driver about present speed policy/advices and other relevant (hazard) information. It includes recommendations and contextual regulations (e.g. for speed limits or parking) by means of technology, communication and security methods, there is no difference between speed limits and for instance a road warning or priority sign. Both types of information have a certain regime in a specific area and direction. For this functional description, in-vehicle Information could provide a wide range of traffic information whether the signs are static, dynamic, virtual, mandatory or not etc.

Besides that signs can be either static or dynamic (for instance VMS or matrix signs) signs can also be different in terms of road type and environment (i.e. on highways and in urban areas). Especially in urban areas much more different (detailed) signs are being used, including signs that are not applicable for all types of driver, see also figure 1 (to a lesser extent this also applies for highways).

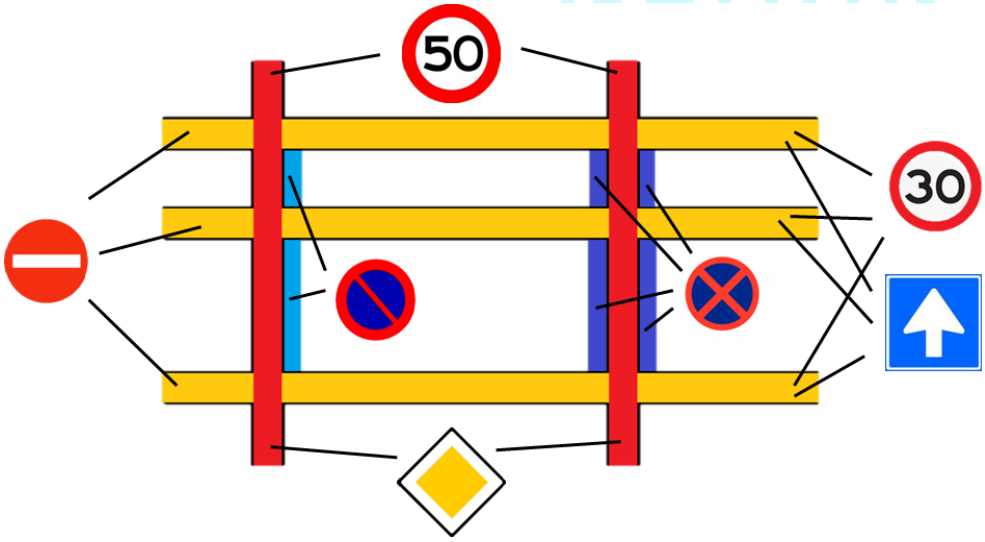


Figure 1 Different types of signs and regimes in an urban area

Day one v.s. day two application

In terms of complexity (more information at the same time demands more from the technique), highway is a day one application, and the urban area / rural road could be seen as a day two development.

In detail the following matrix (figure 2) explain more about the differences between day one and day two development for the highway use case. Here the focus on IVS for day 1 can be recognized.

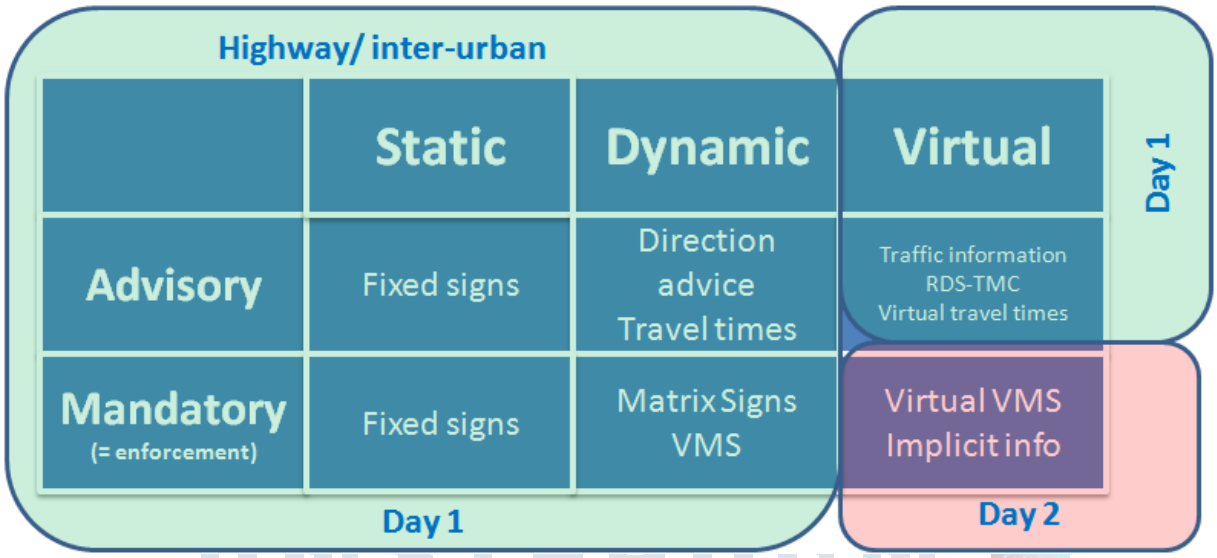


Figure 2 Matrix of day one and day two applications on Highways/ inter urban

Roles and responsibilities

In this functional document the roles and responsibilities for in-Vehicle Information will not be addressed. Together with the other two functional documents, Road Works Warning (RWW) and Probe Vehicle Data (PVD-PDM), a separate document is made for the roles and responsibilities.

References

Normative

1. CEN TS_ISO_TS_17425 '' Intelligent transport systems — Co-operative ITS — Data exchange specification for in-vehicle presentation of external road and traffic related data''
2. CEN TS_ISO_TS_17426 '' Intelligent transport systems (ITS) — Co-operative systems — Contextual speeds''

Informative

< .. >

Definitions & Abbreviations

Definitions

Day-one applications: are the applications implemented in the first deployment of phase of deployment of the basic set of applications.

Relevance area: concerns the area for which the sign / measure is applicable.

Awareness area: covers the area from which the sign can be visually observed.

Abbreviations

CEN	European Committee for Standardization
ETSI	European Telecommunications Standards Institute
HMI	Human machine interface
I2V	Infrastructure to vehicle
IVI	In Vehicle Information
IVS	In Vehicle Signage
ITS	Intelligent Transport System
OEM	Original equipment manufacturer
R-ITS-S	Roadside ITS Station
RSU	Road side unit
TCC	Traffic Control centre
V-ITS-S	Vehicle ITS Station
VMS	Variable Message Sign

IVI basic service introduction

Rationale

It is important to have a good and clear scope and demarcation of the different types of information and signs. But even more important is to understand that each different sign has a certain *policy* or *regime* from the road authority behind it. When we reflect this on the in-Vehicle Information it is clear that not every physical sign needs to be presented in-car; some road signs are only relevant for specific vehicle types. For example a width restriction is only applicable for trucks and special types of large vehicles.

We can define 'mandatory' signs according to the Vienna convention categorization, road signs and signals, see also annex A:

- A Danger warning signs
- B Priority signs
- C Prohibitory or restrictive signs
- D Mandatory signs
- E Special Regulation Signs
- F Information, facilities, or service signs
- G Direction, position, or indication sign
- H Additional panels

Road operators provide *information*, the decision on how this information is shown to end users is a choice of the OEMs or service providers. The road operator is responsible for deciding what information is mandatory to show in-car. In addition to that HMI best practices and guidelines could be provided but how it is presented may be decided and differ from OEM to OEM.

It is important to notice that the "traditional" fixed road signs alongside the roads are mostly regulatory signs (of course there are also fixed advisory signs) and will in the first-day applications of in-Vehicle Information, always have the highest priority. The information presented by means of in-Vehicle Information is not legally binding.

Also the scope is rather clear, there are still some open issues and questions. In Annex D an overview of these issues is given, where we take an assumption how to address these issues.

Expected benefits

The purpose of the in-Vehicle Information Information is to enable the driver to have on time access to all relevant (from a road operator's perspective, road operator authorized) information continuously, based on the time and location of the vehicle, but also based on the characteristics and type of the vehicle. The information can either be presented automatically (warnings based on certain triggers) or on request, when asked for (driver wants to check something). The sign information which will be presented through the HMI automatically is characterized by the (policy) area and direction of the vehicle. Only information relevant for the driver might be presented via the HMI. This basically concerns regulatory information for the specific type of road user (type of vehicle). Information not of relevance, for example info for another direction, will not be presented. The driver will have the option to ask for additional information, if available.

The service improves the awareness of road users by giving them access to the relevant information (for that type of vehicle) at the right time and location (and not only at a specific location/point on the road). Filtering/priority setting should be done to prevent overload of information to the end user. Another added value of a cooperative approach is that the information can be transmitted language independent and can be expanded by providing (more) context. It allows users to set preferences (text, speech, pictograms, pictures, colour schemes, size, font, etc.) within certain boundaries. Of course there need to be consistency of information through all channels. This latter is to be determined by e.g. the car manufacturers.

Expected benefits are:

1. Reduce accidents and increase road safety;
    a. Lower the chance that traffic signs are overseen so that the driver will be able to adjust its behaviour in time, when necessary (decrease the chance of traffic signs not being noticed);
    b. Improve understanding of difficult contextual signs (some signs are not self-explanatory in the short moment drivers can see it visually);
    c. Increase awareness level of drivers on road regulations.

2. Smooth traffic and avoid congestions / traffic efficiency;
3. Lesser pollution /Environmental and sustainable efficiency.

IVI basic service

Functional description

The development of use cases is here applied to clarify and define the functional usage of in-Vehicle Information, procedures and presentation in the HMI, but also to identify the needs of the road users. First this will be described from the user's perspective and in the next paragraph for the road operator's perspective. With the help of different scenarios as an example how the service eventually could work (see annex B en C), the use cases are formed.

User's Perspective

For in-Vehicle Information from the user's point of view, there are different use cases, both for highway (inter urban) and urban/ rural roads. This distinction is made because of the difference in level of detail of the Information and policies active in the two geographical/type areas. On the highway for instance, the speed limit is one of the most important signs presented. But in an urban area, besides speed limit, parking policies and priority signs are also relevant. The priority signs are much more present in urban areas and often a lot of signs are very close to each other. From a road operators perspective we do not make this distinction, see next chapter.

In terms of complexity (more information at the same time demands more from the technique), the use case Highway / inter-urban is a day one application, and the urban area / rural road could be seen as a day two development (see figure 3). Next we will describe highway use case in functional, in Annex B we will give a detailed description of both explanatory scenarios (also a use case for urban too).

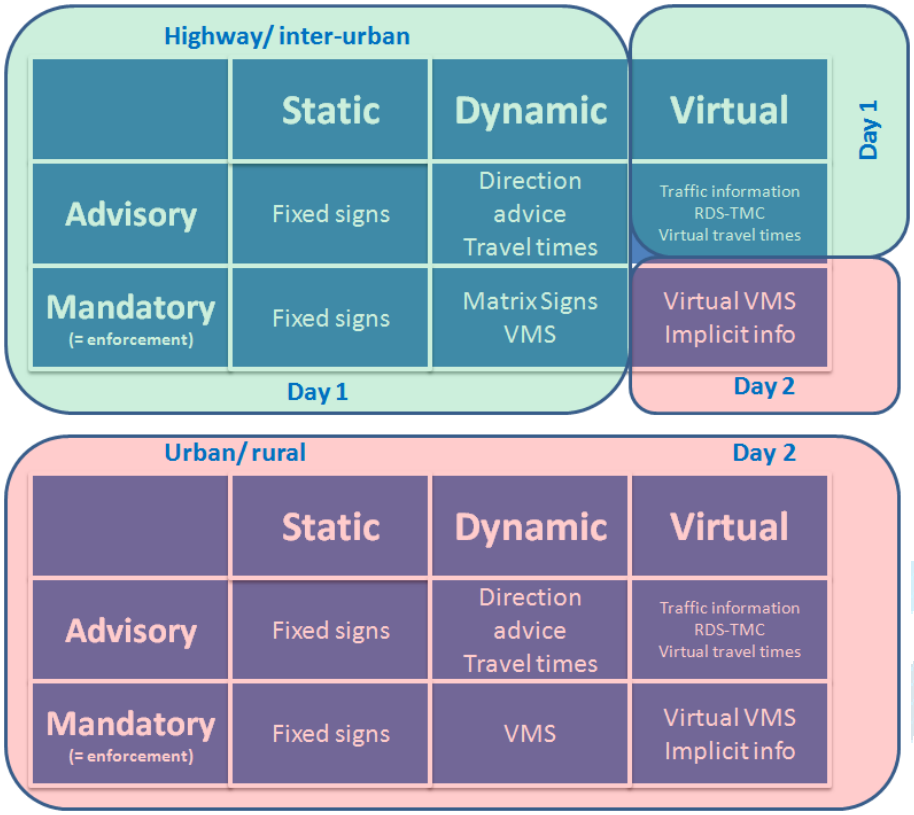


Figure 3 Highway (day one) vs urban (day two)

Highway/ inter-urban

Functional description of In vehicle Information from the user's perspective:

A vehicle approaches a traffic sign or area (e.g. speed limit zone) and receives an in-Vehicle information message (IVI message) through ITS G5 / DSRC / 802.11p (WLAN communication). The announcement of the signs has to be presented to the driver in due time via the HMI (time, distance and speed), sufficient for reacting in time to adapt e.g. the speed accordingly, not later than a conventional sign would be valid. As the vehicle passes the sign, the in-Vehicle system has to present (display) the sign currently in force. The signs will be available through the HMI as long as they are valid for the driver. Depending on HMI design it can either be presented on request (pull) or automatically (push). In this use case no attention will be given to the different HMI types and possibilities to present the information (visual, speech, etc.). This aspect is the responsibility of the OEM's (based on safety regulation and multiple information flows in car/priority of information/different users and target groups) and might be personalised according to the special needs of the driver (see for example figure 4). The HMI possibilities that are given in the scenario in annex B and C, are pure mentioned as an example.

The minimum requirement would be to have information on applicable Information (e.g. current speed limit) available in-Vehicle all the time, and to present it at least at the start of the relevance area.

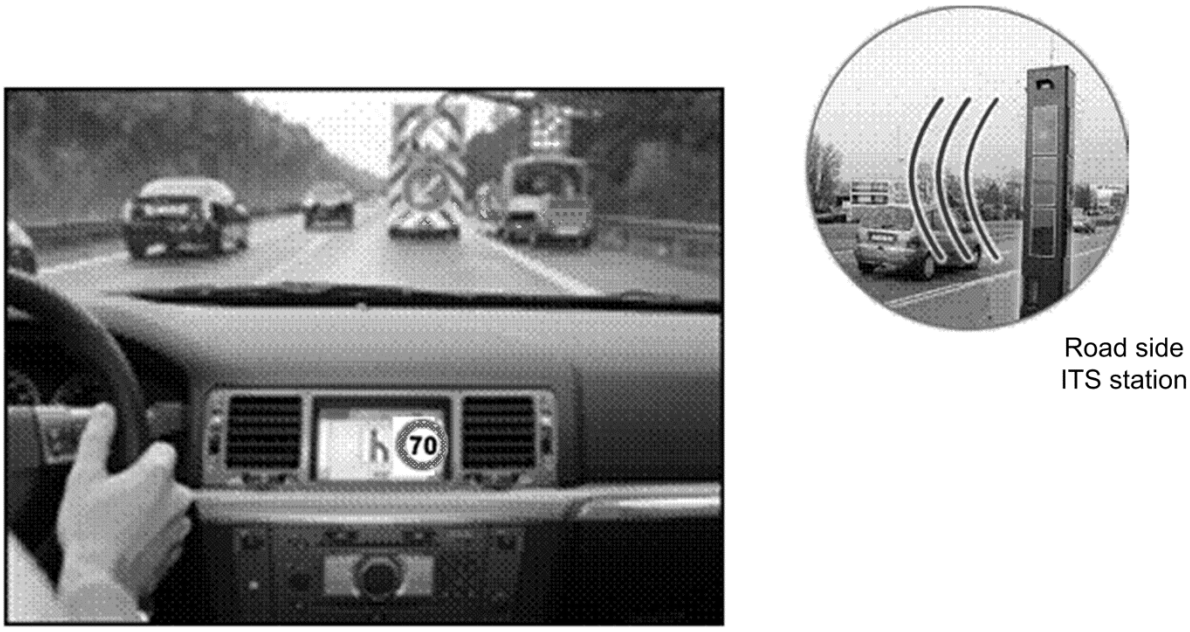


Figure 4 example IVS from user's perspective (from: CEN TS_ISO_TS_17425)

Road Operator's Perspective

Road operators can use in-Vehicle Information to relay road information and rulings to the drivers. This can be done by the use of Roadside ITS Stations (R-ITS-S), which broadcasts this information to the passing vehicles. To get a better understanding of the needs of the road operators in the case of in-Vehicle Information, three use cases are identified;

- Standalone R-ITS-S;
- R-ITS-S which are part of a dynamic stand-alone system;
- R-ITS-S which are part of a dynamic network (centrally), on-line controlled by the road operator.

The three cases cover (all) the different systems available to the road operators at this time.

Standalone units can be used to relay rulings for an area to the drivers. For instance the maximum allowed speed in that area or an area which is forbidden to enter. The second case is used for dynamic systems that operate autonomous, for instance dynamic speed regulations by means of a motorway control system, during fog and congestion. The third case is the use of R-ITS-S which are part of a network which can be controlled directly by the road operator via a Traffic Control Centre (TCC). The different broadcast modes are of course not necessarily tied to different sign types.

Translated to the road signs, it is not necessary to have a R-ITS-S for each single sign, one R-ITS-S can cover a certain area and "transmit" details of more road signs (see figure 5). It is possible to implement In-Vehicle Information in a way that not every road sign is paired with a single R-ITS-S.

This might require R-ITS-S to be connected to a TCC, in order to be able to manage this. In a stand-alone solution, the R-ITS-S will transmit only the local Information information – but does not require any connection with the TCC. Both solutions have advantages / disadvantages. It is up to the road operator which implementation to choose.

Different road signs have different types of regimes and policies (Example: one R-ITS-S can send out information about the speed limit, but also alert about the coming train intersection and also about the prohibition to park your car alongside the road). This way a more network oriented approach is created, rather than local. Basically a R-ITS-S might transmit the In-Vehicle information for the whole network.

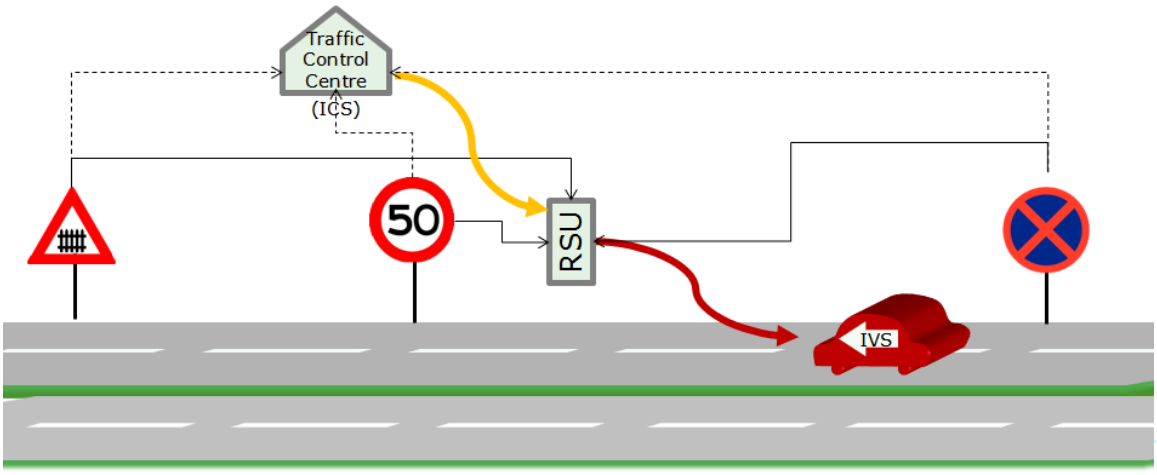


Figure 5 Not every sign needs to have a R-ITS-S

Standalone R-ITS-S

A road operator wants to set a maximum speed limit on a highway. He therefore places a R-ITS-S next to the road on which the speed limit is in effect (it is as well possible to transmit speed information of the whole network). The R-ITS-S transmit the speed limit to passing cars (see figure 6). In the area prior to the maximum speed area a R-ITS-S is placed which relays the information about the upcoming speed limit (static, this R-ITS-S is not connected to the downstream signs). This is done to give drivers a heads-up warning of the approaching speed limit.

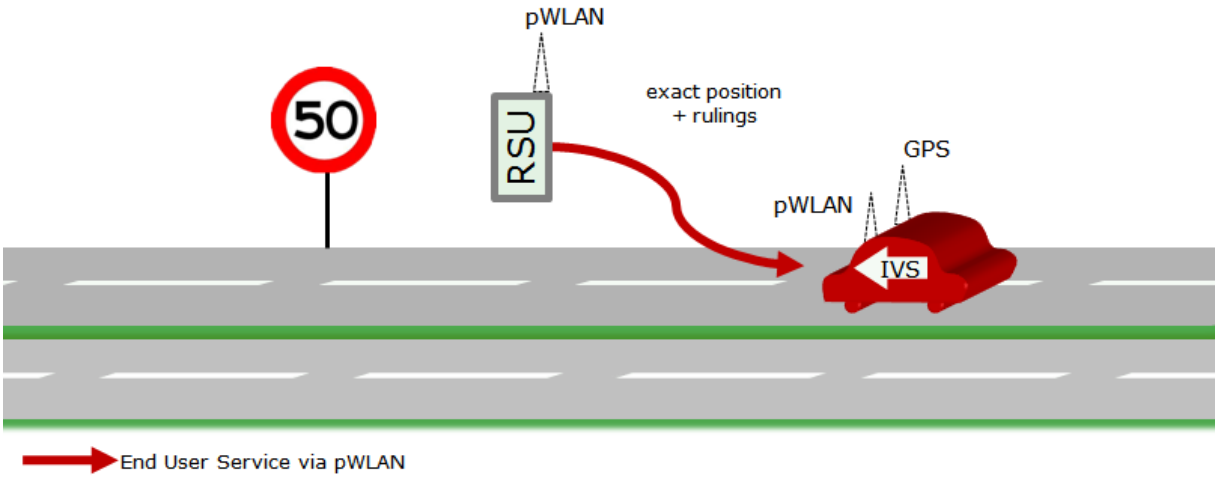


Figure 6 Standalone R-ITS-S

R-ITS-S which are part of a dynamic stand-alone system

Road operators can use autonomous systems to detect incidents which require warnings and lower speeds on the road. For instance fog- , accident and congestion warning are examples of these incidents. These systems can contain a weather station, roadside units combined with variable message signs and loop detectors with sub-centres. When an incident is detected, the system automatically lowers the maximum speed limit by means of matrix signs above the road. In case of in-Vehicle Information this maximum speed which overrules the previous, regular maximum speed is transmitted via R-ITS-S to the cars (see figure 7).

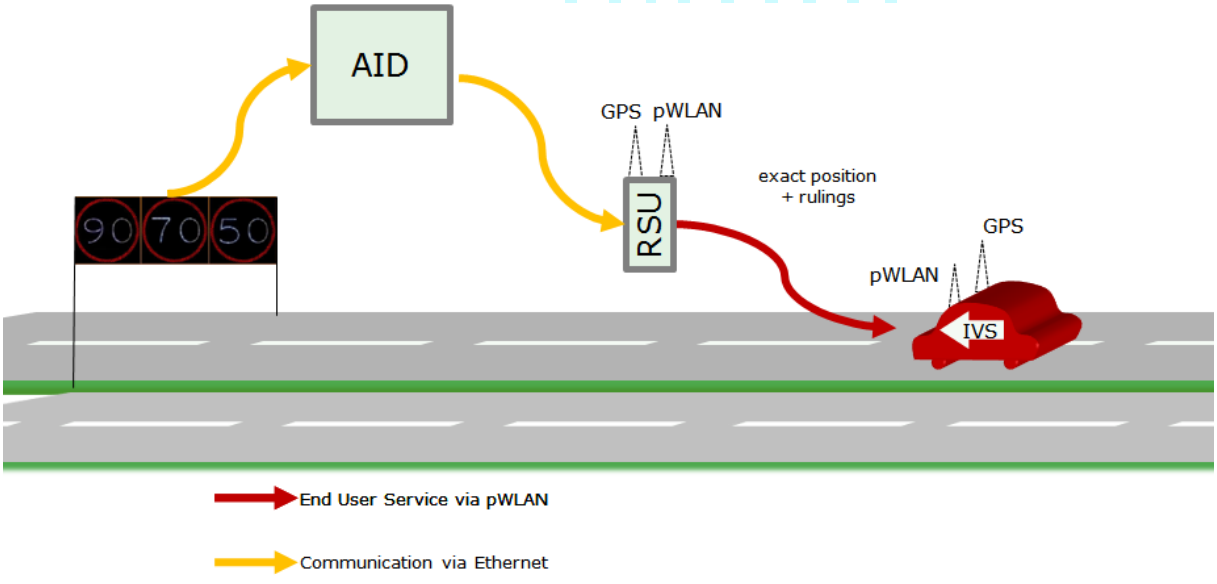


Figure 7 Road side units which are part of a dynamic stand-alone system

R-ITS-S which are part of a dynamic network (centrally TCC)

In the third use case the R-ITS-S which transmit the rulings in the area can directly be controlled by the road operator in the TCC (for instance via a VMS sign, see also figure 8). So the road operator can directly, on-line change rulings and the information presented to the drivers in the car. This way it is possible to dynamically influence the behaviour of the drivers in the cars.

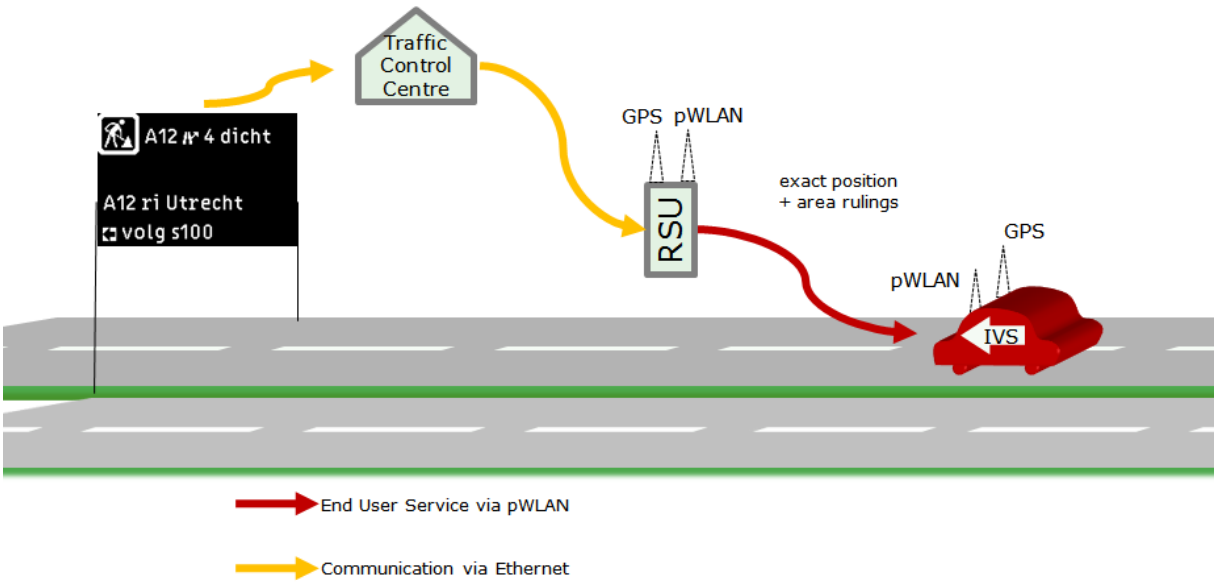


Figure 8 Road side units which are part of a dynamic network

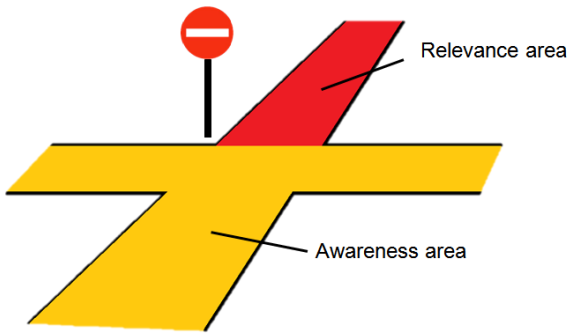
IVI dissemination

Relevance and awareness area

The **relevance area** concerns the area for which the sign / measure is applicable. Although the relevance area is fixed for each separate sign / measure, it can vary depending on time and specific location. (red part in Figure 9)

The **awareness area** for traditional road-signs covers the area from which the sign can be visually observed. (yellow part in Figure 9) A very well know limitation here concerns the weather conditions. In bad weather conditions the driver might notice the road-signs (too) late in order to act adequately. In-Vehicle Information has the strong advantage that it is not depending on the weather conditions. This means that the driver can be informed in time at any moment. Even taking into account his speed and the specific situation and characteristics of the vehicle. So the relevance area

can be communicated earlier/ the awareness area will be increased by In-Vehicle



Information.

Figure 9 Difference between Relevance and awareness area

IVI Format specification

General structure

In-Vehicle Information that need to be defined / set

The in-Vehicle Information service should deal with the following data and information following the DATEX II profile where possible. Note: the message sets contain both the information on the sign but also additional information.

At least the following information need to be send together with the messages from the R-ITS-S:

- Signage (identification / code)
  - A until H (Danger, priority, prohibitory, mandatory etc);
  - Number (e.g. C14);
  - Content (e.g. max. 100 km/u);
  - Time validity;
  - Message Priority;
  - Message type (informative or mandatory);
  - Vehicle classification.
- Coverage
  - Area and direction of relevance (parallel with current fixed signs);
  - Minimum area and direction of awareness;
    - The area of relevance might be larger, depending on speed and characteristics of the vehicle. This parameter can be defined by the OEM and/or services providers.
    - Corresponding data element in the message to which the vehicle can match its own settings.

For an adequate presentation of the relevant information the following In-Vehicle information is of importance (the vehicle needs to provide this information):

- Speed, accurate location and direction of the vehicle;
- Time stamp;
- Driver type and variables;
  - Route;
  - Expected direction;
- Vehicle characteristics (classification, trailer, emission standards etc);
- Priority of incoming and already received information;
- Actual awareness area, based on the received minimum area and the specific (vehicle) conditions;
- Relevance area ;
- How to deal with more than one rule in the same area;
- How to deal with dynamic speed regulation (these conflicts need to be resolved in the functional description of the service).

Also some concrete physical information need to be defined and set:

- Where will the R-ITS-S be installed, having direct impact on where and when the information will be transmitted from the R-ITS-S. Taking into account the awareness and relevance areas;
- Additional information should be transmitted at the same location as the “relevant” information. However it might be decided that this information will not be transmitted at any time, due to capacity restrictions in the transmission channel.

In-Vehicle presentation of information:

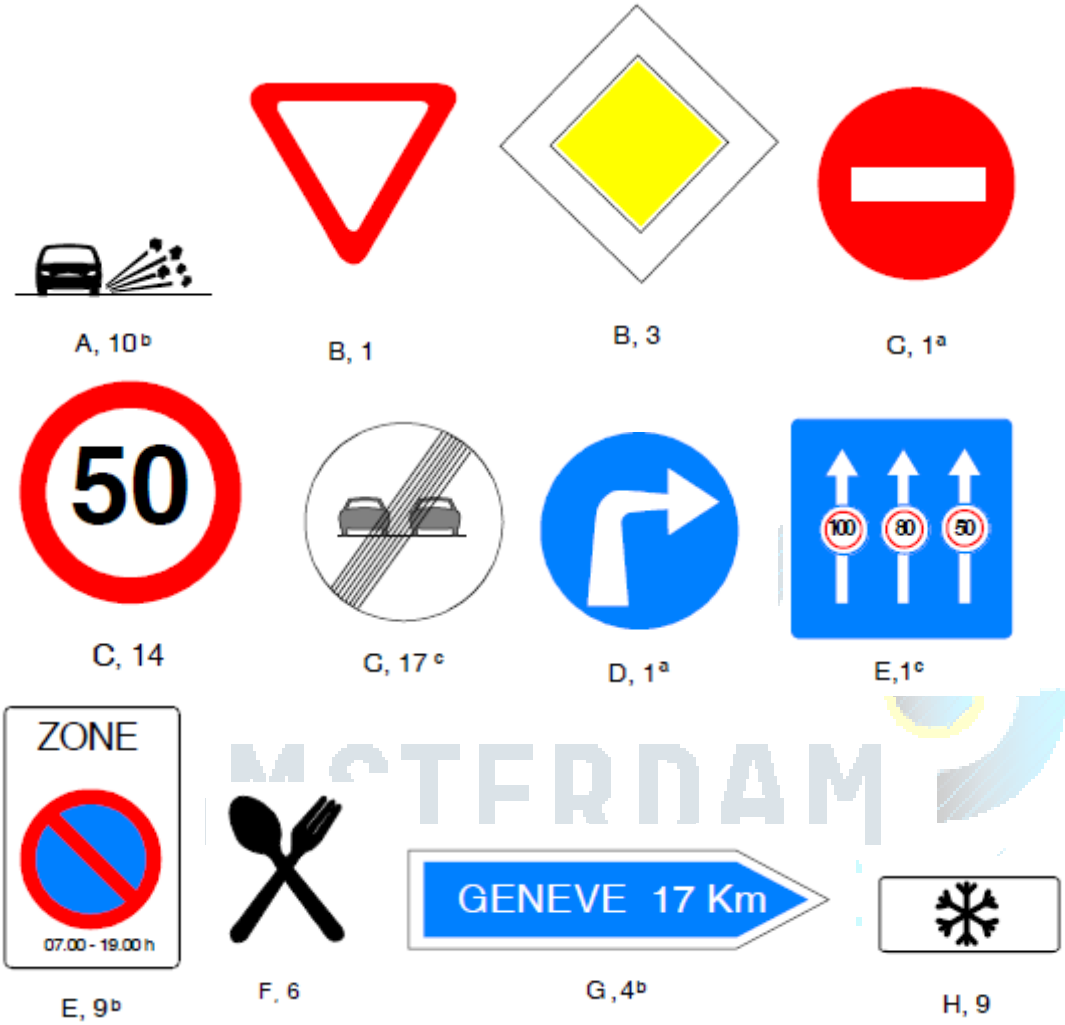
Although it is stated earlier that the HMI is under responsibility of the OEM’s it should be agreed that the information is presented to the driver at least at the same moment as the traditional road signs can be observed by the drivers.

OEM perspective (desired input)

Tables and picture libraries need to be provided to OEMs/service providers, preferably by or under control of the road authorities.

- Identifiers of the signs and identifiers of countries;
- Service available to download respective image(s) (if not yet in database);
- Description of meaning of signs in different languages also available for download

ANNEX A: Vienna convention categorization signs examples

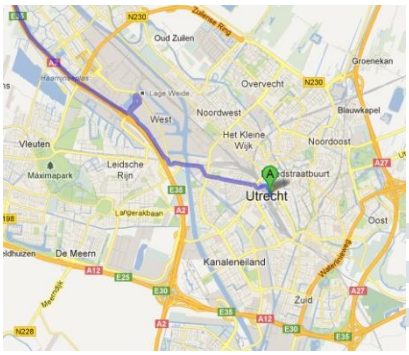


- A Danger warning signs
- B Priority signs
- C Prohibitory or restrictive signs
- D Mandatory signs
- E Special regulation signs
- F Information, facilities, or service signs
- G Direction, position, or indication sign
- H Additional panels

ANNEX B Informative scenarios User's perspective

These annexes contain examples and descriptions of use case scenarios. The HMI possibilities that are given in the scenarios (mostly day two applications) , are pure mentioned as an example. Latter need to be defined by the OEM's.

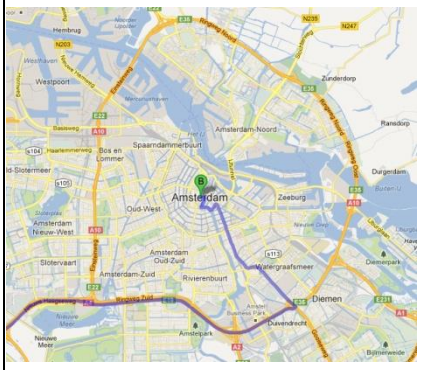
Scenario 1: Highway/ Inter-urban

Scenario Highway/ Inter-urban	
Scenario Description  	A vehicle with trailer enters a highway ramp on the A2 from Utrecht to Amsterdam, during a morning peak hour. The driver gets an in-Vehicle alert via his HMI that the ramp metering is active. This ramp metering is 300m ahead, but not visible yet because of a sharp turn in the ramp. The driver is being alerted about the distance to the stop line of the ramp metering and the HMI alerts the driver via a signal on the screen. When the driver is standing in line for entering the highway, an alert sign pops up on the screen that there are road works taking place in this area. This signal comes from the nearest R-ITS-S. The danger warning sign explains to look out for crossing trucks on the ramp. The vehicle is merging safely on the highway and passes a R-ITS-S near to the ramp and gets new information (policy, speed regime etc) inside the car through the HMI. The speed limit is 120km/u but because the car recognises that a trailer is attached to the tow bar, the speed limit presented to the driver is 90km/u. Also the sign C17 comes visible on the HMI. So it is restricted to pass another vehicle on this part of the highway. After a while new road work comes up and the current speed limit is reduced to 70km/u, and presented to the driver through his HMI. Because there is too much traffic on this time of the day, the Automatic Incident Detection (AID) above the road is triggered and set to 50km/u, 2 km ahead. The current road works speed limit is overruled and the driver gets an in-Vehicle message in time that he is encountering a traffic jam and that the speed limit is reduced to 50km/u in 2km. The matrix signs above the road are now also blinking in the vehicle on the

	screen. Apparently there has been an accident ahead and the left lane is blocked. The matrix sign for the left lane is put on a red cross. But because the car is already on the most right side of the road, the HMI translates the red cross above the road into the vehicle only on a informative way, not in a restrictive way. After the driver leaves the traffic jam behind, the busy traffic is starting to resolve. Morning rush hour is over. But his journey is not, he needs to go to the city centre of Amsterdam. So he takes the next exit. The direction is given via his navigation system and the HMI translated the different direction/locations signs onto the HMI. The exit ramp is still 2km away, but the nearest R-ITS-S sends out a signal that the road of the exit is in bad condition. There is a big hole in the road and drivers are being alerted to slow down. The driver gets this warning in time and decides, because of his heavy trailer, to pass this exit and take the next one.
Offered services and signs	• Dynamic signs (ramp metering, matrix signs) • Static signs (speed, road works, pass restriction, direction) • Hazardous location warning (1a) • Road works warning (2c)
User needs	• In-Vehicle signage on a safe and efficient way • The driver only needs the information applicable for him/her at that moment
Supplier needs	• Not all the information at the same time; take location, situation and speed in mind • Taking Vehicle Characteristics (including parameters) into account (a trailer is attached to the tow bar) • R-ITS-S attached to highway systems (i.e. matrix signs). • R-ITS-S on strategic places along the road (full coverage)
Stakeholders and actors	• Road users

	• Road authority • R-ITS-S supplier • Car manufactures (OEM's) • Road workers/ trucks
Preconditions	• 100% range coverage by R-ITS-S on the highway. Every R-ITS-S can be programmed via the central system with every possible sign and/or information. Both time and location variables are given to each policy and sign.
Input	• R-ITS-S policy and regimes (speed limit, C17) • Dynamic events (AID, traffic jam, ramp metering,). R-ITS-S attached to the systems • Environmental (road condition) • Informative (direction, location)
Output	• Static signs on the HMI • HMI alert (blinking) on the screen

Scenario 2: Urban area/ rural roads

Scenario Urban area/ rural roads	
Scenario Description   	A vehicle takes the exit Amsterdam city centre on the ring road A10. The driver needs to go to the city centre for shopping. When he leaves the highway via the exit, the R-ITS-S near the ramp sends out the most important traffic policies for that part of the city. The maximum speed limit is 50km/u everywhere and there is an environmental zone active. The HMI provides the driver with the speed limit and informs him that he can drive everywhere in the environmental zone, because his car is brand new and meets all the current eco standards. When the car is driving on the city corridor, a speed advice is given via the R-ITS-S, to catch the green wave on the coming intersection, just go with the flow. But the next intersection controller is out of order. Because of that, the normal priority rules are effective. The driver gets the sign B3 in his screen, so he has priority on left and right streets. He is also informed about the malfunctioning of the traffic controller, so he has to pay extra attention. The driver turns right on the next intersection and is driving towards a T intersection with a one way road to the left (restricted from this side). Because the car has a sense of the awareness and relevance area (based on location, route and time), the sign C1 is given, because the driver puts on his left indicator. The driver reaches his destination. He wants to park his car alongside the road. A parking policy is active here, it is forbidden to park on this side of the road on odd days. Because the driver starts to park his car, and the date is November 23th, the HMI alerts the driver with a parking restriction and consequences if violated (Ticket process, Towed,..). This time he finds a better parking spot with no restriction on this date or time and parks his car. But he can park his car here for only 1 hour. The sign is given on the HMI. No problem for our driver, he only needs a half an hour max. Other drivers passing by do not get all this information presented since they do not intend to park in that area.

Offered services	• Static signs (informative, priority and restrictive signs) • Signal phase and time, intersection (5) • Wrong way driving (9) • Inter urban parking zone (10) • Parking management (12)

ANNEX C Informative scenarios Road operator's perspective

Scenario R-ITS-S stand alone	
Description	A road operator wants to establish a maximum speed policy and therefore places a R-ITS-S which transmits the maximum speed and the area in which the maximum speed is valid. This maximum speed is not valid for all vehicles. For instance, a truck, a bus or car towing a caravan can have a lower allowable maximum regulatory speed. The signal which is relayed is static. This means it will not respond to changing conditions and when the regime is changed all the static messages should also be changed manually. This can be done physically by a mechanic or over the air through an update.

Scenario R-ITS-S part of a dynamic system	
Description	A road operator wants to inform road users of the maximum allowable speed when incidents like fog or congestion are detected. This detection is done by an autonomous system which in turn decides the maximum speed. This system will send the maximum speed which will overrule the previous maximum speed. For example, the maximum speed on a highway is 120 km/h. After fog is detected by the autonomous system the maximum speed is in steps reduced to 50 km/h. The R-ITS-S connected to the system will relay different maximum speeds. One will send 90 km/h, the other 70 km/h and one in the area of the fog will transmit 50 km/h.

Scenario R-ITS-S part of a dynamic network	
Description	A road operator wants to inform road users dynamically about accidents, speed regulations or congestion. This information and rulings are presented in-car through the means of transmission by R-ITS-S . For example, an accident has happened and the vehicles involved in the accident are blocking one lane. An operator in the traffic control centre wants to inform the drivers that one lane is closed. Also drivers who drive in the lane next to the accident have to be informed about the restriction of the maximum speed. Furthermore drivers upstream have to be informed about the upcoming congestion and about the possible detours. This is all done by transmitting the necessary information via different R-ITS-S to the drivers in the cars.

ANNEX D Assumptions for in-Vehicle Information

Process related assumptions:

1. **Day-one vs day-two applications**: *Although the main focus in day-one applications is on motorways, the urban applications should already be considered in order to include specific requirements directly from the start.*

2. **Mandatory vs optional information:** *Road authorities must decide which information / signs are to be presented mandatory into the vehicle (push) and which information is optional (pull).*

Content related assumptions:

3. **The information presented by means of I2V is not legally binding**: *Information should be handled as "comfort information" and also explained in such a way to the driver, as currently done within navigation systems. Before using the system/service the driver declares to have read the notification that the road signs on the road are legally binding, whatever the in-car systems says.*
   This applies also for possible errors translations of messages and signs.

4. **Implicit information:** *day one application In-Vehicle Information will be limited to the signs (static/ dynamic) and not to general regulation which should be known by drivers as part of the driving education. This will be handled in day two application.*

5. **Information can be vehicle category specific (e.g. no passing for truck)**

6. **Different signs at the same moment:** *More than one message can be valid at a specific moment in a specific area. Messages will be prioritized.*

7. **Safety and relevant information vs contextual information**: *Active "rules and conditions" are to be presented mandatory / automatically (push). Contextual/ informative information can be presented on request (pull).*

8. **V2V:** *V2V for in-Vehicle signage will not be considered in the day one deployment. This means that each vehicle must receive the message directly from the R-ITS-S .*

9. **Standards for current message sets:** *For in-Vehicle Information functional description will be based on the use of In-vehicle Information Message (IVI).*

10. **OEM perspective/ language issue:** *The driver gets information presented by signs familiar to him and in his own language.*