Road Works Warning Service - Functional Description

Version: 1.0	**Date:** 2016 – 04 - 12
Release Status: Released	**Document Type:** white paper
Status: Completed	

Abstract:

The scope of this document is the functional description of the C-ITS Service Road Works Warning. This does not include the organisational structures (like roles and responsibilities). Furthermore this document is technology agnostic and does not focus on implementation details, this decision is to be made by the stakeholders involved in the deployment of Road Works Warning.

Changes since last version:

Update of figures, references updated

Outstanding Issues:

Due to the large number of possible layouts for long-term road works and the extensive description needed for the more complex scenarios, long-term road works will be included in the next release of the document.

Document History

Date	Name	Action	Version number
2014	Teresina Herb	Initial draft	v0.1
2015	Teresina Herb	Elaboration of document	v0.2
2016-04-12	Sandro Berndt	Version for publication	v1.0

Content

Introduction

The list of Day one applications defined by the Amsterdam Group (AG) is derived from the ETSI TC ITS defined "Basic Set of Applications" (BSA) [i.1] that can be deployed within a three-year time frame after the completion. A number of these applications are infrastructure-related. The corresponding service specifications do not exist yet. Therefore expert teams within the Amsterdam Group did draft functional description for those services – one of the services is Road Works Warning.

Scope

The scope of this document is the functional description of the C-ITS Service Road Works Warning. This does not include the organisational structures (like roles and responsibilities). These can be found in the report of the Amsterdam Group Task on Roles and Responsibilities. Furthermore this document is technology agnostic and does not focus on implementation details, this decision is to be made by the stakeholders involved in the deployment of Road Works Warning.

References

Normative

- [1] ETSI EN 302 637-3 (V1.2.2) "Intelligent Transport Systems (ITS); Users and applications requirements; Part 3: Decentralized Environmental Notification Basic Service".
- [2] Amsterdam Group RWW Message Set and Triggering Conditions

Informative

[i.1] ETSI TR 102 638 (V1.1.1): "Intelligent Transport Systems (ITS); Vehicular Communications; Basic Set of Applications; Definitions".

Abbreviations

C-ITS	Co-operative ITS
C-ITS-S	Central ITS Station (also “ICS” - ITS Central Station)
DENM	Decentralized Environmental Notification Message
GPS	Global Positioning System
HMI	Human Machine Interface
ITS	Intelligent Transport System
ITS-S	ITS Station
R-ITS-S	Roadside ITS Station (also “IRS” - ITS Roadside Station)
RWW	Road Works Warning
TCC	Traffic Control Center
TMC	Traffic Management Center
V-ITS-S	Vehicle ITS Station (also “IVS”- ITS Vehicle Station)

Introduction

Rationale

The use case Road Works Warning informs drivers of road works, the corresponding parameters and associated obstruction (e.g. lane closed) on the route ahead. The purpose is to alert the driver in time to increase awareness and to inform of potentially dangerous conditions. It should be noted that some aspects of a road works message overlap with information required for – or used in – other use cases, e.g. information on speed limits will also be needed for the “In-Vehicle Signage” use case.

Expected Benefits

Warning road users via dynamic in-vehicle information about road works that potentially disrupt traffic flow, the service is expected to improve road safety. If information is available on a work site potentially disrupting traffic flow, the driver can adapt his or her speed suitable to the situation and increase his or her awareness. It is also expected that the service will improve the safety of the road workers at road work sites and prevents road work property damages.

The added value of a cooperative approach is increased accuracy of the road works information in time and location for the benefit of the end user. It will also be possible to explain the background of the road works and thus raise user acceptance. When conveyed upstream, it may contribute to more

efficient route planning and network usage, complementing existing channels providing this type of information to navigation services.

Road Works Warning service

Functional description

Various distribution channels for the service “Road Works Warning” towards road users exist; in the following schemes the main options are depicted.

Option 1: Road Works Warning transmitted to the driver – Trailer in “Stand-Alone” mode

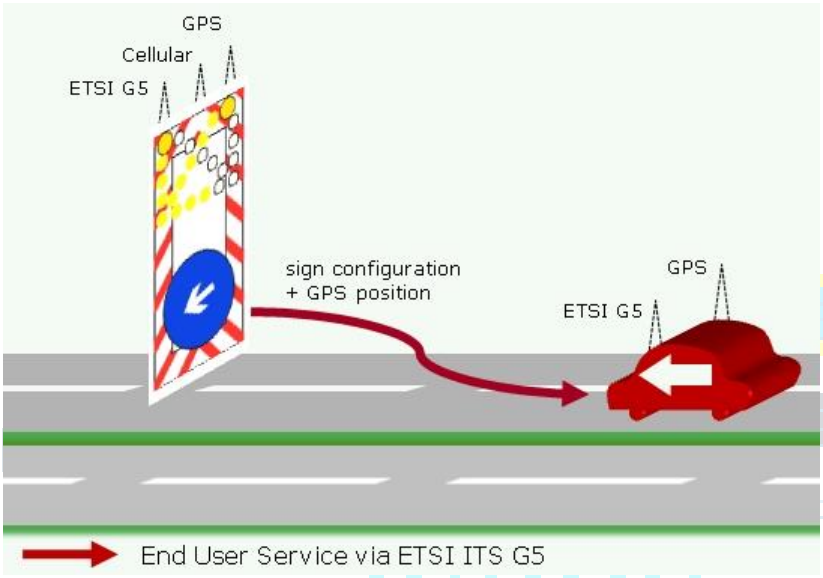

Figure 1 Use case illustration for Road Works Warning in “Stand-alone” mode

User's Perspective

The driver approaches a stationary or mobile road works site. The driver's vehicle HMI presents a warning to the driver. The information provided complies to the functional, operational and technical requirements as specified.

Road Operator's Perspective

The road operator starts the road works. Therefore they park a road works safety trailer according to national regulation. When opening the sign, the transmission of Road Works Warning is started, with messages being transmitted periodically and thus containing always the current position of the trailer (important in case of mobile road works). When the road works is finished, the sign is closed. This stops the transmission of the Road Works Warning.

Only information available in the road works safety trailer or entered manually by staff (optionally derived from a central road works planning system) on-site can be transmitted to the vehicle.

Option 2: Road Works Warning transmitted to the driver – Basic Service

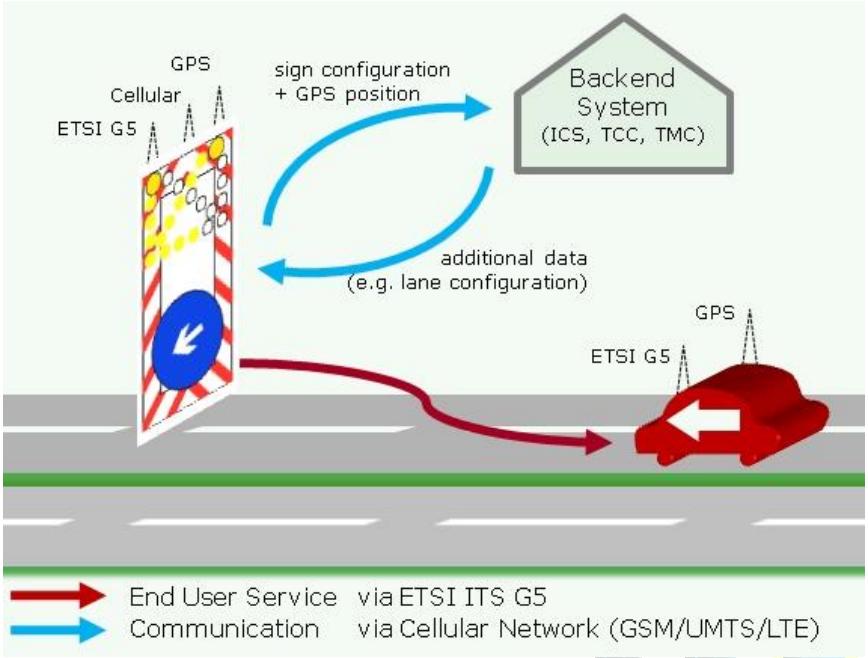

Figure 2 Use case illustration for Road Works Warning in "Basic Service" mode

User's Perspective

The driver approaches a road works site. The vehicle HMI presents a warning to the driver, information on the road works might be presented (e.g. lane closed). The information may be augmented by further information from the Traffic Control Centre (e.g. complementary attributes of the road works or information about further downstream road works). Additional information might be transmitted to the driver on request.

Road Operator's Perspective

The road operator starts the road works. Therefore they park a road works safety trailer according to national regulation. When opening the sign, the road works safety trailer transmits its position and arrow sign configuration to the traffic control centre. The traffic control centre completes the received information with additional Traffic Control Centre specific information on the road works. The enhanced information is transmitted to the road works safety trailer for further use. When the road works are finished, the sign is closed. This stops the transmission of the Road Works Warning.

NOTE: If there is sufficient capacity on the communication channel, other road works information (long distance) are provided to the vehicle and might lead to updated routing information for the driver. The traffic control centre provides this road works information to the road works safety trailer for distribution to the vehicles.

Option 3: Road Works Information via roadside stations – network-wide and strategic

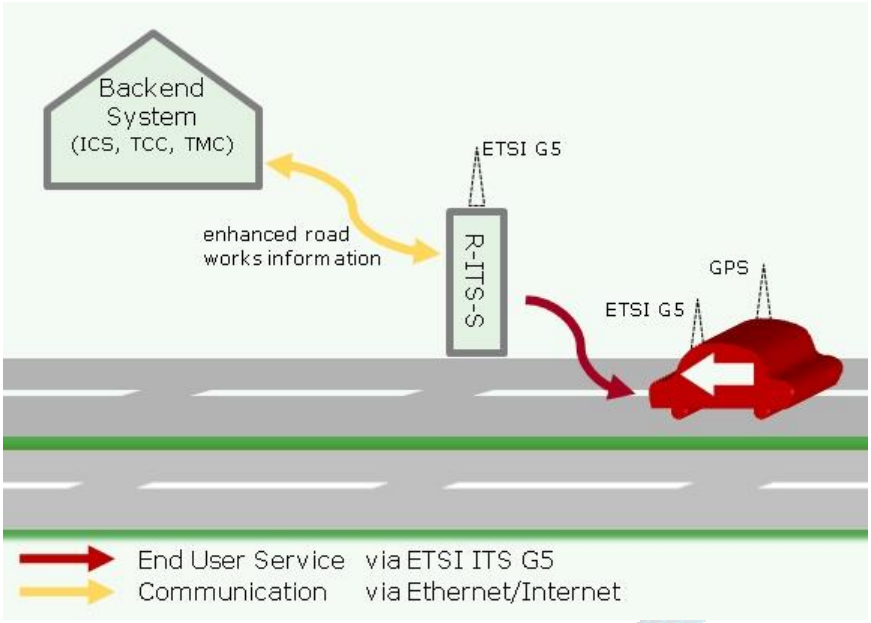

Figure 3 Use case illustration for distribution of network-wide Road Works Warnings

User's Perspective

When passing a Roadside ITS Station (R-ITS-S), the vehicle receives relevant current road works information. The vehicle HMI informs the driver when approaching road works. The recommended route may be adapted based on the received information.

Road Operator's Perspective

The road operator collects all road works information in the traffic control centre. All road works information is provided to the Roadside ITS Stations, filtered according to geographic relevance for passing vehicles.

The Roadside ITS Stations transmits the road works information. The messages selected for transmission by a particular R-ITS-S are repeatedly transmitted in order to ensure that all passing vehicles have a sufficiently high probability of receiving all messages.

In case of updates on the road works information, the traffic control centre distributes an updated version of the network wide road works information to all R-ITS-S affected.

Option 4: Use of Road Works Warning / Information by other services

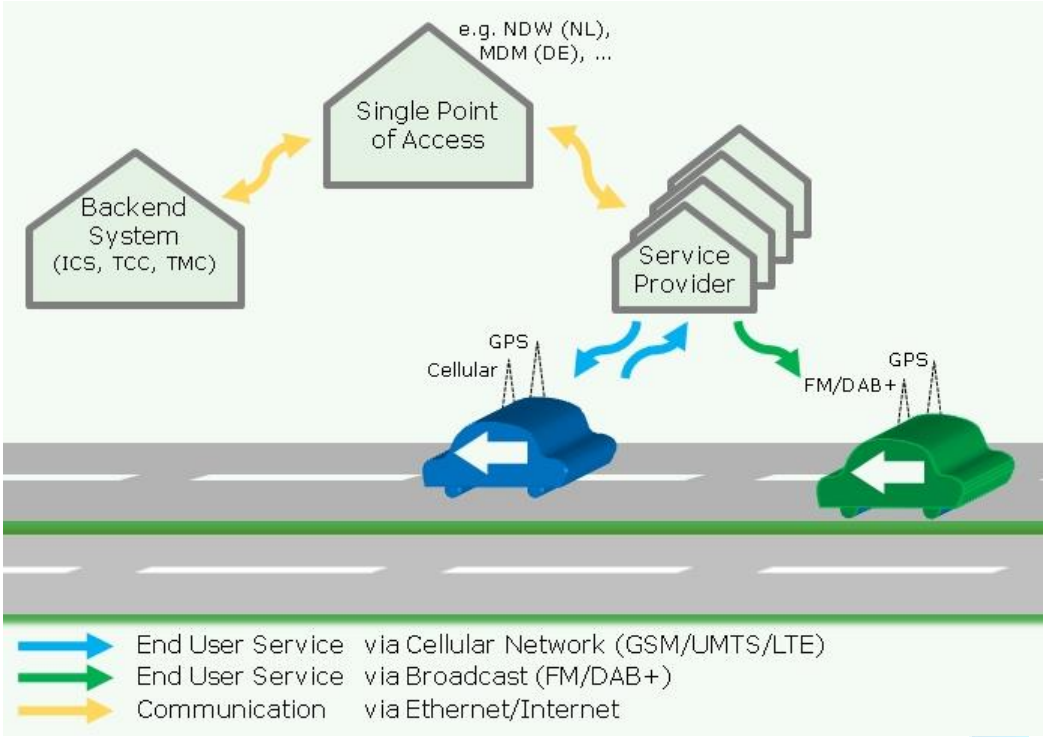

Figure 4 Use case illustration for distribution of Road Works Warnings via Service Providers

The Road Works Warning / Information might serve as input for other Cooperative ITS services. Examples might be the road works information leading to a change in the recommended itinerary. The recommended itinerary service takes the Road Works Warning / Information as input and considers it when calculating the recommended itinerary.

For more details see specification of Recommended Itinerary Service. (TBD)

RWW Format specification

Depending on the use case that is implemented, different Road Works Parameters will be available at the Road Works Safety Trailer and therefore different information can be transmitted to the vehicle.

The information on the location and some parameters of the work site will be provided by the stakeholder responsible for the work site. Additional parameters and details on the road works that are not available on the road works safety trailer can be supplemented by the traffic control centre.

A detailed description of the RWW Message Set and corresponding Triggering Conditions based on the ETSI DENM Standard [1] can be found in [2].