



Common C-ITS Service Definitions

Road Works Warning (RWW)

Extensive Work Zone

C-Roads Platform

Working Group 2 Technical Aspects

Taskforce 2 Service Harmonisation

Publication History

Version	Date	Description, updates and changes	Status
0.1	16.10.2019	Input from Austria adapted to the European template	Input
0.2	17.10.2019	Further improvement, minor editing	Draft
0.3	28.10.2019	Improvements from remarks	Draft
0.4	25.03.2020	Added draft TF3 input	Draft
1.7.0.TF.5	08.05.2020	Inserted new template	Draft
1.7.0.TF.6	08.05.2020	Clean version of version 1.7.0.TF.5	Draft

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1 Functional Description of Road Works Warning (RWW)

1.1 <Service Name> service introduction

Service introduction	
Summary	If applicable
Background	If applicable
Objective	If applicable
Expected benefits	If applicable
Use Cases	If applicable

1.2 Extensive Work Zone

Type of road network	All
Type of vehicle	All
Use case introduction	
Summary	<ul style="list-style-type: none"> The road user receives information about one or several significant changes in road topology due to a road works site. In this use case, the changes are more specific than a lane closure or a road closure. It can include several changes on the same site.
Background	In comparison to other RWW use cases, this use case can include significant changes in road topology, such as the usage of an additional lane from the other driving direction or an additional lane next to the original road (emergency lane or other) and include multiple shifts of topology along the way, including different driving speed regulations.
Objective	<ul style="list-style-type: none"> To allow road users to anticipate complex topological changes on a road works site on the road ahead and to adapt their speed and lane on the road. To inform vehicles about lane specific multiple speed limits. To inform vehicles about road signs / driving regulations applicable to the roadworks, lane specific if needed (e.g. vehicle width restrictions).
Desired behaviour	<ul style="list-style-type: none"> <u>The road user</u> is aware of the situation on the road and can adapt and apply the driving behaviour to the road situation (braking, changing lanes, etc), in order to avoid accidents. <u>The automated vehicle</u> can set its speed to the new speed limit if applicable. With the information about the changed road topology, the automated vehicle is aware of not using the original road topology. Additionally, it is able to inform the driver in time about the adjustment of driving requirements.
Expected benefits	<ul style="list-style-type: none"> Reduce the risk and number of accidents and dangerous situations for road users and workers. Informing the road user about a risk of discomfort on the road (slowing down, manoeuvring). Improved traffic management due to less traffic relevant events on the road.
Use case description	
Situation	<ul style="list-style-type: none"> Roadworks equipped with warning beacons / temporary road signs / illuminated lights arrows, on a road with separate carriageways or on a dual carriageway. Carriageway crossover. Modification of the lane geometry (e.g. new yellow lane markings that overwrite the white ones).
Logic of transmission	I2V
Actors and relations	<ul style="list-style-type: none"> The Road operator is the originator of the information of the message. It can be the Traffic Operations Center, or a road operator vehicle if no connection to the central station ("stand alone mode"). The road user approaching the area is the end user of this service (receives the information/message). Service provider: the road works planner of the road operator, a management system or the RSU on the trailer (in case of the "stand alone mode").
Scenario	<p>1) TOC triggered:</p> <p>1) The road operator programs mobile and planned road works in its Traffic Management System (TMS). The information contains all the elements that can be used to precisely describe the work zone (start / end position of the work zone, duration). This zone will not be entirely used by the operating agents; they will set markings around the actual work site within this zone.</p>

<p>Display / alert principle</p>	<ol style="list-style-type: none"> 2) Additional information can be added, such as the speed limit of each neutralized portion or the new topology of the road. 3) The message is then broadcasted to the road users. 4) The vehicle receives the information, processes it, and displays it to the driver. <p>2) Stand-alone Mode:</p> <ol style="list-style-type: none"> 1) The message is sent by a mobile RSU mounted on a road operator vehicle (e.g. trailer) without a connection to a central station. 2) The message contains a basic set of information (event speed, position, arrow position) 3) There is no additional information from a management system 4) The message is then broadcasted to the road users. 5) The vehicle receives the information, processes it, and displays it to the driver <p>3) Augmented (Stand-alone then TOC Triggered):</p> <ol style="list-style-type: none"> 1) The message is broadcasted to the road users by a mobile RSU mounted on a road operator vehicle (e.g. trailer), firstly without additional information from the TOC. 2) The message contains a basic set of information (event speed, position, arrow position) 3) Then, the TOC can send messages with additional information. 4) The vehicle receives the information, processes it, and displays it to the driver <p>When the road user arrives near the work zone site, he receives information to allow him to adjust his speed and position on the road to avoid dangerous situations.</p> <p>The information needs to be displayed on the HMI early enough, and is moderately intrusive (at the manufacturer's decision).</p>
<p>Functional Constraints / dependencies</p>	
<p>Interoperability requirements</p>	
<p>Message profile requirements</p>	<p>Such a complex scenario needs other message formats than only the DENM, which could be:</p> <ul style="list-style-type: none"> • DENM to alert to the RWW, and IVIM to describe the layout and specificities • MAPEM <p>A DENM shall be generated as specified in the other RWW UC. Additionally, an IVIM shall be generated as specified in section 3.2.2.1 of the <i>C-ITS Message Profiles and Parameters</i> document and the DF connectedDenms shall contain the id of the generated DENM for that EWZ.</p>
<p>Security and data protection requirements</p> <p>Communication technology requirements</p> <p>Test and validation requirements</p>	