# Objectives

## CAR 2 CAR Communication Consortium

### About the C2C-CC

Enhancing road safety and traffic efficiency by means of Cooperative Intelligent Transport Systems and Services (C-ITS) is the dedicated goal of the CAR 2 CAR Communication Consortium. The industrial driven, non-commercial association was founded in 2002 by vehicle manufacturers affiliated with the idea of cooperative road traffic based on Vehicle-to-Vehicle Communications (V2V) and supported by Vehicle-to-Infrastructure Communications (V2I). The Consortium members represent worldwide major vehicle manufactures, equipment suppliers and research organisations.

Over the years, the CAR 2 CAR Communication Consortium has evolved to be one of the key players in preparing the initial deployment of C-ITS in Europe and the subsequent innovation phases. CAR 2 CAR members focus on wireless V2V communication applications based on ITS-G5 and concentrate all efforts on creating standards to ensure the interoperability of cooperative systems, spanning all vehicle classes across borders and brands. As a key contributor, the CAR 2 CAR Communication Consortium and its members work in close cooperation with the European and international standardisation organisations.

### Disclaimer

## Document information

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| **Number:** | 2035 | **Version:** | n.a. | **Date:** | 2024-07-12 |
| **Title:** | Objectives | | | **Document Type:** | RS |
| **Release** | 2.0.1 | | | | |
| **Release Status:** | Public | | | | |
| **Status:** | Final | | | | |

**Table 1: Document information**

## Changes since last version

| Date | Changes | Edited by | Approved |
|---|---|---|---|
| 2024-07-12 | • minor adaptions in context of the introduction of the R2 C2C-CC Feature document<br>• moved references chapter into dedicated references document | Release Management | Steering Committee |
| 2023-12-15 | initial document | Release Management | Steering Committee |

**Table 2: Changes since last version**

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# 1 Introduction

**Other (informational)** **RS_OBJ_00147**

Cooperative Intelligent Transport Systems (C-ITS) are a specific subset of Intelligent Transport Systems (ITS) and are defined as a network of systems in which communication partners (vehicles, traffic infrastructure and service providers) exchange information as the basis for a new level of traffic safety and efficiency improvement. As a result of this definition C-ITS is seen as a key technology to fulfil the EU objective ‘vision zero’. This means that almost no more traffic participants are killed or have a heavy accident in traffic.

The wide scope of the C-ITS definition affects all parts of traffic and thus involves many different stakeholders. This set of stakeholders may also comprise international entities or Standards Developing Organizations (SDO) of different nations. A stakeholder representing automotive industry in field of C-ITS is the CAR 2 CAR Communication Consortium (C2C-CC): an association of vehicle manufacturers, suppliers, road operators and research organizations. The primary objective of the C2C-CC is to ensure interoperability in field of C-ITS between different vehicle manufacturers and with road infrastructure.

## 2 Scope

**Other (informational)** **RS_OBJ_00146**

The present document provides objectives regarding C-ITS from C2C-CC point of view. They focus on vehicles but can be applied to other traffic participants too.

In terms of C2C-CC an objective is defined as an abstract requirement without any further specification about its details. An objective itself is always further detailed by at least one of two ways:

- by a feature, which describes a desired ability in scope of vehicles. The feature again is detailed by one or more requirements, which contains the implementation details.
- by a feature request, which describes an expected ability for every other entity outside vehicle scope (e.g. other traffic participants). The feature request again is detailed by one or more requirement requests, if necessary.

Thus, an objective can be considered as the most abstract requirement. This implies that an objective itself is not directly testable. An objective can be assumed as ‘tested’, if all of its detailing features or feature requests are assumed as ‘tested’. An exemplary structure of this relation between the mentioned requirement layers is in shown in Figure 1.

Note: The objectives describe a specification status, which shall be reached in a major release starting from a specific minor release of that major release, from which on the major release is considered complete. That means the specification set is not necessarily feature complete from the first minor release(s) of that major release.

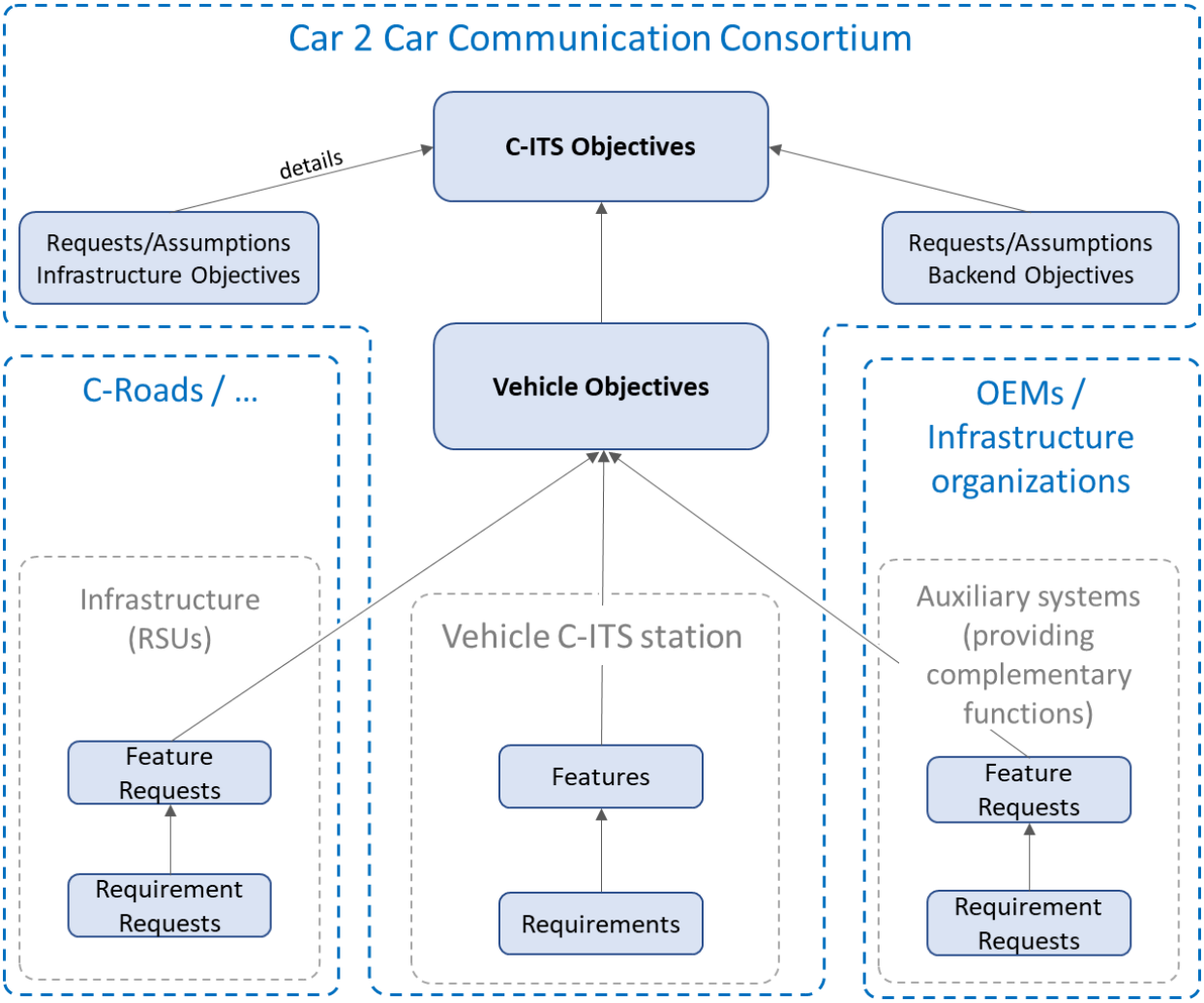


**Figure 1: Structure of the relation between objectives, features/feature requests and requirements/requirements requests.**

## 3 Conventions used

**Other (informational)** **RS_OBJ_00152**

Conventions used in this and other C2C-CC specification documents can be found in [C2CCC ConV].

# 4 Definitions

**Definition** **RS_OBJ_00149**

Vehicle C-ITS station: a vehicle ITS station as defined in [EN 302 665] and further specified in this C2C-CC release.

In comparison with C2C-CC release 1, in C2C-CC release 2 the term vehicle C-ITS station explicitly includes C-ITS stations mounted in any kind of vehicle, including:

- Agricultural machines – UNECE vehicle category T, see [ECE R.E.3],
- Busses – UNECE vehicle categories M2 and M3, see [ECE R.E.3],
- Cars – UNECE vehicle categories M1 and N1, see [ECE R.E.3],
- *To be decided:* Drones,
- E-bike – no UNECE definition available yet
    - According to recent proposal for UNECE definition, see [WP.5/GE.5]:
        - Cycles with Type1 motor,
        - Speed Cycles with Type2 motor or
        - Wide Carrier Cycles with Type1 or Type2 motor
    - as long as no UNECE definition is available:
        - EPAC (Electrically Power Assisted Cycles): pedal-driven vehicle with a maximum cut-off speed of no more than 32km/h
            - For EU according the Machinery Directive [EU D42] (with harmonized standard [EN 15194]), with a maximum cut-off speed of 25km/h.
            - For US according class 1, based on classification of PeopleForBikes (see below)
        - S-EPAC (Speed-EPAC): pedal-driven vehicle with a maximum cut-off speed of no more than 45 km/h
            - For EU according Regulation [EU R168]
            - For US according class 3, based on classification of PeopleForBikes (see below)
        - Pedal-driven vehicles, that equipped with an additional throttle
            - For US according class 2, based on classification of PeopleForBikes (see below)

        Note: The US classification is based on this definition ([PFB Law], which was adopted by more than 30 US states.
- PTWs – EU regulation [EU R168] categories L1e and L3e,
- Rail vehicles
- *To be decided:* Trailers
- Trucks – UNECE vehicle categories N2 and N3, see [ECE R.E.3],

either originally equipped or retrofitted.

Note: A particular vehicle C-ITS station from the above categories might not be able or designed to implement all features and to fulfil all requirements. But if a feature/requirement is implemented then it is required to be compliant with the C2C-CC specification.

**Definition** **RS_OBJ_00434**

Backward compatible: A vehicle C-ITS station based on Release x+1 (Rx+1) is backward compatible when:

- Rx+1 is able to obtain the same level of services of a Rx station in an environment based on Rx (see also Figure 2) and

  Rx+1 is specified in a such a way, that C-ITS stations implemented based on Rx is able to maintain its full functionality in an environment based on Rx+1 (see also Figure 3)

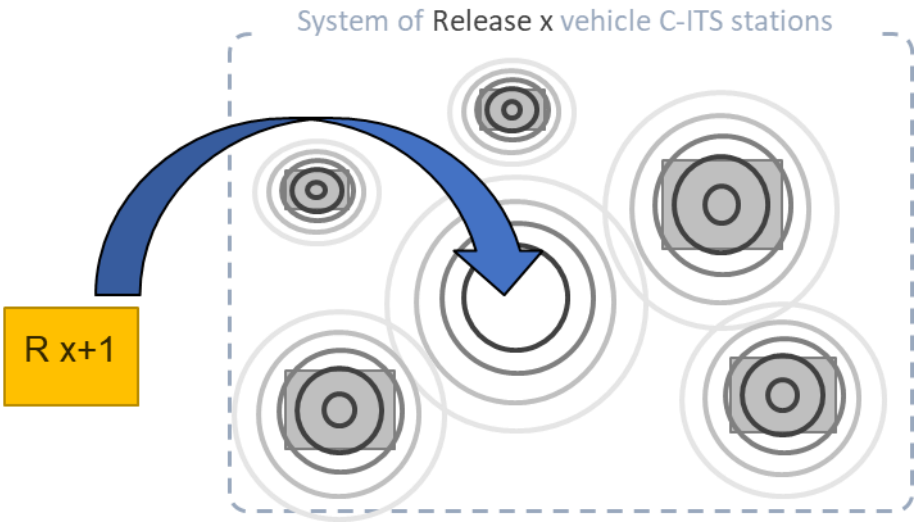


**Figure 2: C-ITS stations implemented based on Release X+1 obtains the same level of services of a Release x station.**

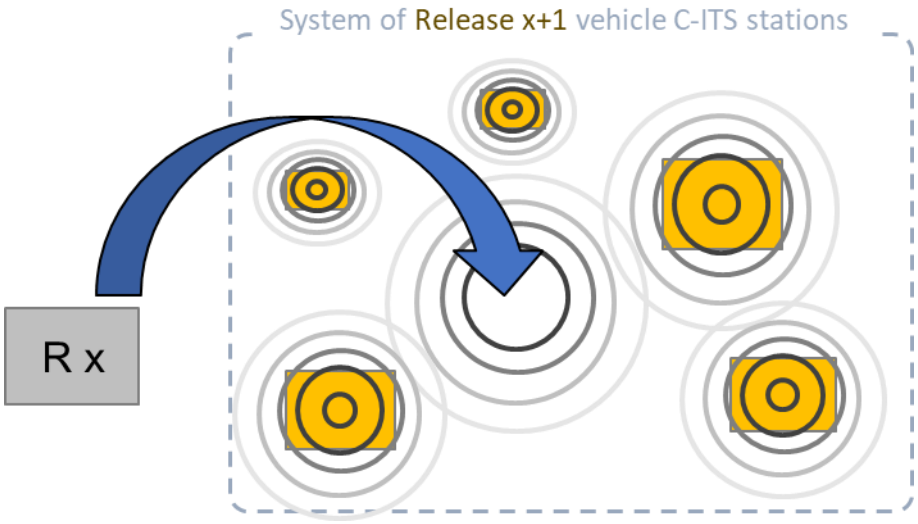


**Figure 3: C-ITS stations implemented based on Release x maintains its full functionality in an environment based on Rx+1.**

**Definition** **RS_OBJ_00433**

‘Misbehaviour: act by a C-ITS station of transmitting false or misleading information, or information that was not authorized by the local policy, either purposefully or unintendedly

EXAMPLE: This includes suspicious behaviour as in wrong message types, contents or frequencies, unauthorized access, incorrect signed or encrypted messages, etc.’ [TR 103 460].

# 5 Vehicle objectives specification

**Objective** **RS_OBJ_00426**

Improvement of road safety and traffic efficiency towards the Vision Zero in road transport, while reducing the environmental footprint shall be supported based on communication between geographically scattered entities. The communication shall have the following characteristics:

- Is ad hoc: This means that no specific network infrastructure is required to establish a communication link;
- Is local: This means that only communication with entities in vicinity of the originator is necessary and
- Has low Latency: This means that the time between the transmission of information and reception of those information is minimal.

Note: this objective is detailed by all other objectives in this document.

**Objective** **RS_OBJ_00428**

To support major benefits for all traffic participants, a single vehicle C-ITS station of any type of vehicle shall be able to generate information for, communicate with and process data from C-ITS stations of different types: beside vehicles this includes Roadside, Personal (e.g. specific categories of Vulnerable Roads Users like pedestrians) and Central C-ITS stations.

NOTE: it assumed that these other types of C-ITS stations are compliant to a profile which is recognized and validated by the C2C-CC such as the C-ROADS profile [C-ITS Message Profile] or CMC Basic Specification [CMC Basic Specification].

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**Objective** **RS_OBJ_00440**

The vehicle C-ITS station shall be backward compatible with a C2C-CC Release 1 station and the C-ROADS Release 2.x.y (see also RS_OBJ_00434).

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**Objective** **RS_OBJ_00427**

To improve the quality of the environmental information for each traffic participant, vehicle C-ITS stations shall support current and predicted status sharing by providing trusted information about its C-ITS subsystem (e.g. the vehicle in which it is installed) and about events occasionally detected by the C-ITS subsystem.

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**Objective** **RS_OBJ_00446**

The vehicle C-ITS station shall further improve the quality of the environmental information for each traffic participant by enabling cooperative functions aimed at sharing trusted

information of non-C-ITS equipped road users (including vulnerable road users) and other detected objects with potential impact on traffic.

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**Objective** **RS_OBJ_00436**

To support unambiguous contextualization of the shared information across possibly different road topology data bases between C-ITS stations, the data provided by the vehicle C-ITS stations should include information reflecting topological features of the road infrastructure.

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**Objective** **RS_OBJ_00447**

To support advanced or optimized traffic light controller management at signalized intersections (e.g. queue estimations, signal time adaptation etc.)
the data provided by the vehicle C-ITS stations should share the vehicle intent for crossing the intersection, include appropriate routing information like planned crossing manoeuvres at the intersections.

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**Objective** **RS_OBJ_00429**

To support cooperative driving automation system features (including driver support features, Automated Driving System features and assisted driving systems) data exchanges between C-ITS stations shall create a new source of beneficial information for those systems.

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**Objective** **RS_OBJ_00431**

The vehicle C-ITS station shall only transmit plausible information with a well-defined quality that reflects the actual physical situation to other C-ITS stations.

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**Objective** **RS_OBJ_00435**

The data exchanged between C-ITS stations shall fulfil the objective RS_OBJ_00431 and additionally meet stricter requirements in terms of accuracy, timeliness and trustworthiness than C2C-CC release 1. This implies that features and requirements of the vehicle C-ITS station shall be adaptable to support those stricter requirements, which might be achievable through future technology improvements.
Note: This is to support cooperative driving automation system features (including driver support features, Automated Driving System features and assisted driving systems).

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**Objective** **RS_OBJ_00157**

The vehicle C-ITS station shall provide services for integrity and authenticity protection.
Note: The integrity of the in-vehicle network should be protected against unwanted actions

emitted by the C2X C2C-CC Basic System.

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**Objective** **RS_OBJ_00441**

The vehicle C-ITS station shall be suitable to be operated under a European wide ad-hoc trusted network.

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**Objective** **RS_OBJ_00408**

The vehicle C-ITS station shall provide measures to protect the privacy of the driver/vehicle and comply with the European GDPR [GDPR].

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**Objective** **RS_OBJ_00438**

The vehicle C-ITS station should provide measures to detect misbehaviour (see RS_OBJ_00433) of other C-ITSs, as well as protocols for its notification.

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**Objective** **RS_OBJ_00437**

The vehicle C-ITS station shall provide measures to enable the functional safe use of the information provided through the communication between C-ITS stations.

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# 6 Appendix

## 6.1 C-ITS objectives

**Other (informational)** **RS_OBJ_00442**

This chapter covers the:

- Overall;
- Requests/assumptions on infrastructure and
- Requests/assumptions on backend

objectives, as put into context in Figure 1 and seen from a C2C-CC perspective.

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*Note: this clause and the following sub clauses will be elaborated together with our cooperation partners, in the field of infrastructure and back backend standardization.*

### 6.1.1 Requests/assumptions infrastructure objectives

Tbd.

### 6.1.2 Requests/assumptions backend objectives

Tbd.

### 6.2 Known Issues

The following issues in this document are known:

1) The definition of the included vehicle types is not completed yet (see RS_OBJ_00149)
2) The clause on ‘C-ITS objectives’ needs to be elaborated together with our cooperation partners, in the field of infrastructure and backend standardization.