
**Intelligent transport systems —
Localized communications — Optical
camera communication**

*Systèmes intelligents de transport — Communications localisées —
Communication par caméra optique*



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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Localized communications are an essential component of hybrid communications in Intelligent Transport Systems (ITS). Various access technologies are suited for localized communications. An increasing interest of ITS stakeholders for Cooperative ITS (C-ITS), Urban ITS (U-ITS), and Advanced Driver Assistance Systems (ADAS) is on the access technology in OCC (Optical Camera Communication) specified by IEEE.

OCC is capable of:

- a) interoperating with cameras and LEDs devices, and
- b) receiving messages from LED sources, and transmitting messages from back light and front light of vehicles to other vehicles.

The purpose of OCC is broadcast dissemination of ITS information from:

- light sources (traffic light, street light, traffic sign), and
- vehicles

to other vehicles (one-to-many); see [Figure 1](#).

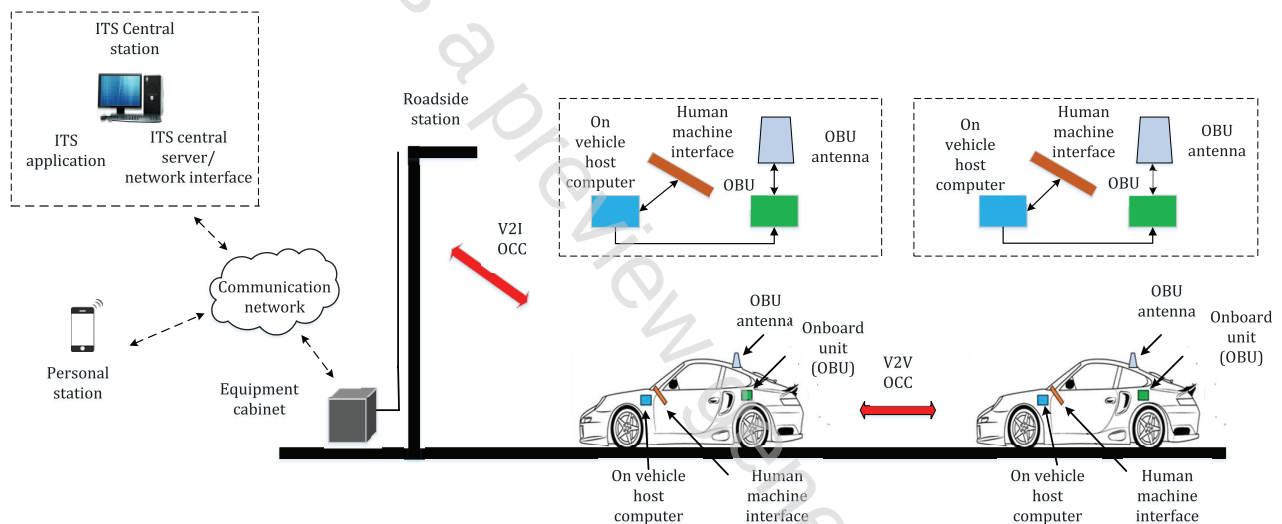
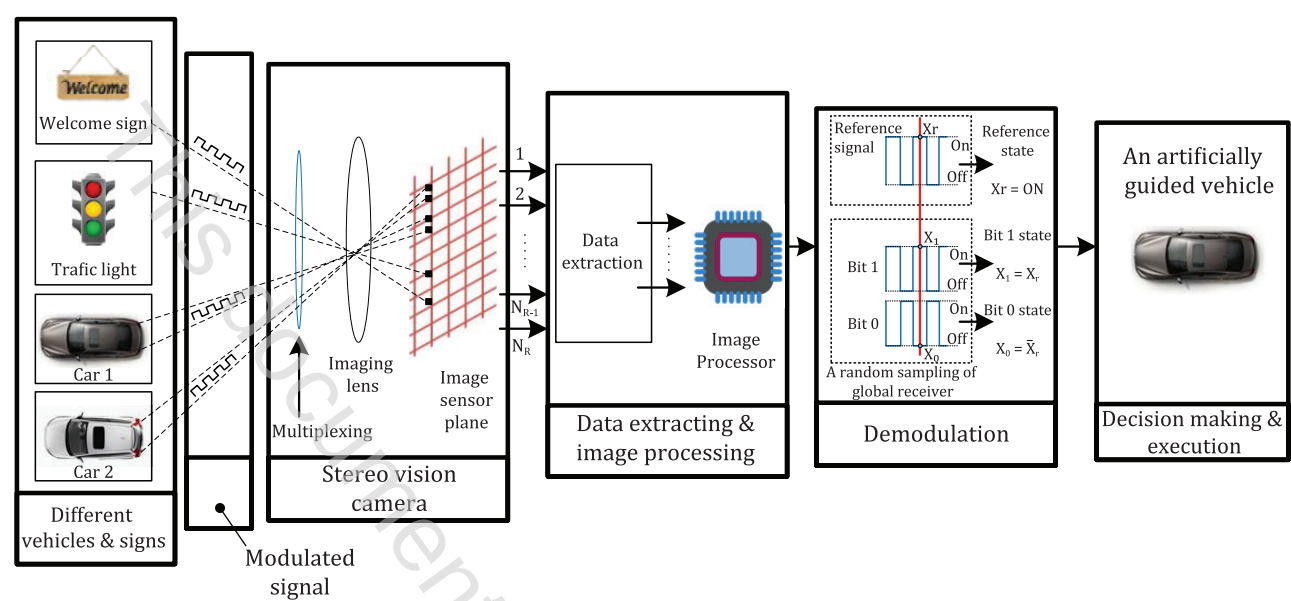


Figure 1 — OCC based ITS Communication

OCC is considered for usage in:

- 1) roadside ITS station units (ITS-SUs), and
- 2) vehicle ITS-SUs.

OCC is intended to provide information to vehicles, see [Figure 2](#).

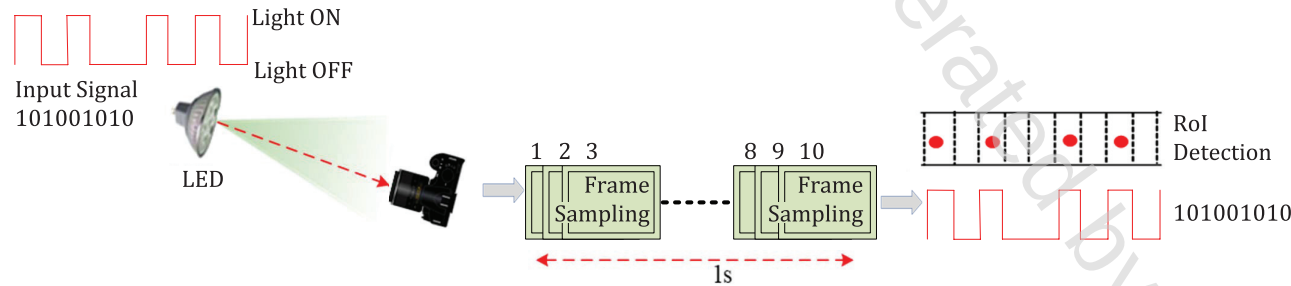


OCC uses LEDs as transmitters and cameras as receivers with visible light or near IR (NIR). Characteristics of OCC are:

- visibility (visible light band);
- no regulation in optical frequency;
- harmlessness to human health (infrared and visible light band);
- non-interference with CIs based on radio waves; and
- licence-free operation.

See also Reference [6].

Figure 3 shows the basic operation of OCC. OCC supports ITS applications for vehicular scenarios such as those already proposed by universities and companies[2], [8], [9].



Intelligent transport systems — Localized communications — Optical camera communication

1 Scope

This document specifies OCC (Optical Camera Communication) as an access technology for localized communications applicable in ITS stations conforming with ISO 21217.

OCC access technology is specified for the implementation context of ISO 21218. This document provides specifications of a communication interface (CI) named "ITS-OCC".

This document specifies the additions to and deviations from IEEE 802.15.7:2018 which are required in order to make ITS-OCC CIs compatible with:

- the ITS station and communication architecture specified in ISO 21217, and
- the hybrid communications support specified in ISO 21218.

This document specifies:

- an OCC profile of IEEE 802.15.7:2018 for usage in C-ITS;
- details of CAL (ISO 21218); and
- details of MAE (ISO 21218, ISO 24102-3).

NOTE Considering safety-related services involving communications between a vehicle and a roadside station being performed on the basis of OCC, it is noted that, due to shadowing, communications can be interrupted or blocked for a significantly long time.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 17419, *Intelligent transport systems — Cooperative systems — Globally unique identification*

ISO 21217, *Intelligent Transport System — Communications access for land mobiles (CALM) — Architecture*

ISO 21218, *Intelligent transport systems — Hybrid communications — Access technology support*

ISO/IEC 8825-2, *Information technology — ASN.1 encoding rules: Specification of Packed Encoding Rules (PER) — Part 2*

IEEE 802.15.7:2018, *IEEE standard for Optical Wireless Communication (OWC)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21217, ISO 21218, and IEEE 802.15.7:2018 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>