



Technical Report

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Intelligent transport systems — Smart streetlighting management platform for road traffic safety enhancement — Overview and use cases

*Systèmes de transport intelligents — Plateforme intelligente
pour la gestion de l'éclairage public afin d'améliorer la sécurité
routière — Présentation générale et cas d'usage*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 document 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

0.1 Background

With the integration of core technologies from the Fourth Industrial Revolution—such as Artificial Intelligence (AI) and big data—along with advancements in streetlighting systems, the development and deployment of smart streetlighting platforms that deliver comprehensive information related to traffic, safety, and the environment are spreading rapidly.

The smart streetlighting management platform (SSMP) is a system in which detection devices—such as closed-circuit television (CCTV) cameras and radar sensors—are installed on roadside streetlights to collect and analyse real-time environmental data. Based on this analysis, the platform provides a range of services, including accident risk alerts, pedestrian safety support, identification of illegally parked or stopped vehicles, and relocation warnings.

For instance, when a pedestrian is crossing at a crosswalk under a flashing green signal and a speeding vehicle is detected approaching the area, the SSMP activates a variable message sign (VMS) and gobo lighting to issue a visual warning to the driver. Simultaneously, an audible alert is broadcast via speakers to inform pedestrians of the approaching vehicle, thereby prompting a swift and safe retreat to the sidewalk.

This document introduces the concept of the SSMP. While the technical content reflects an initial Korean implementation, the purpose of this document is to provide illustrative reference information that can be adapted and applied by other countries and regions considering the adoption of similar platforms, thereby ensuring global relevance.

0.2 Overview

This document introduces the SSMP, developed and implemented in Korea, presented here as a representative case study. While the content reflects the Korean implementation, it is intended as an illustrative, not prescriptive, reference to support international stakeholders planning to establish similar systems and to ensure adaptability across diverse national contexts. It presents general information, system components, and representative use cases of the platform.

The general information section outlines the SSMP's purpose and provides an overview of key service areas—such as crosswalks, crossroads, school zones, tunnels, and bridges—along with methods for delivering safety information, including alerts, warnings, and guidance.

The system components section details the platform's components and core functions, which are categorized into the central platform, local platform, intelligent edge units, and smart streetlighting.

The use case section describes each service provided by the SSMP and explains interactions between its various components. These use cases are based on the Korean implementation and are presented as illustrative examples, not prescriptive requirements, intended to support international understanding and potential adaptation in diverse regional contexts. [Annex A](#) provides data definitions established during the development and operation of the SSMP in Korea. In addition, a comparative table is included to support the adoption and operation of SSMP in different national contexts, aligning the data used in Korea with international standards such as National Transportation Communications for Intelligent Transportation Systems (NTCIP) standards and European Telecommunications Standards Institute (ETSI) standards. The comparative information is provided for reference purposes only, without reproducing normative content from those standards, thereby supporting interoperability and facilitating adaptation in global contexts.

0.3 Document approach and layout

This document specifies the following:

- a) General information regarding SSMP ([Clause 5](#)).
- b) System components of SSMP ([Clause 6](#)).
- c) Use cases of SSMP ([Clause 7](#)).

d) Comparison of data between Korea, NTCIP, and ETSI ([Annex A](#)).

The data exchange message comparison table among Korea, NTCIP, and ETSI is available electronically at <https://standards.iso.org/iso/tr/19482/ed-1/en>.

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Intelligent transport systems — Smart streetlighting management platform for road traffic safety enhancement — Overview and use cases

1 Scope

This document establishes the smart streetlighting management platform (SSMP) as a representative case study, based on the Korean implementation. This document provides practical, non-normative reference information to support other countries considering the adoption of similar systems.

This document provides information on:

- the system components of SSMP, the roles and functions of each individual component;
- the classification, naming, descriptions, and operational procedures of traffic safety service use cases enabled by SSMP.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

3.1

smart streetlighting management platform

SSMP

platform that manages smart streetlighting to enhance traffic safety

Note 1 to entry: The SSMP is typically installed on roadside streetlights and can comprise a centre platform, local platforms, intelligent edge units (IEUs), sensor devices and information provision devices.

3.2

centre platform

platform that supervises and coordinates multiple local platforms

Note 1 to entry: The centre platform is usually installed at a traffic information centre.

3.3

local platform

platform that manages multiple intelligent edge units (IEUs)

Note 1 to entry: A local platform can generate response information for detected events.

**3.4
intelligent edge unit
IEU**

edge device associated with smart streetlighting

Note 1 to entry: An IEU can collect and process sensor data and provide safety information via information provision devices.

**3.5
sensor device**

device that collects environmental data

Note 1 to entry: Sensor devices are usually installed on smart streetlighting [e.g. CCTV, radar, road weather information system (RWIS)].

**3.6
information provision device
IPD**

device that provides safety information to road users

Note 1 to entry: IPDs are usually installed on smart streetlighting [e.g. gobo lighting, variable message sign (VMS), visual signal, speaker].

**3.7
smart streetlighting**

roadside pole equipped with information provision devices controlled by an intelligent edge unit (IEU)

Note 1 to entry: The IEU relies upon data from sensor devices, which can also be installed on the pole.

4 Abbreviated terms

| | |
|-------|---|
| ASN.1 | abstract syntax notation one |
| C-ITS | cooperative intelligent transport systems |
| CP | centre platform |
| IEU | intelligent edge unit |
| IPD | information provision device |
| LP | local platform |
| RWIS | road weather information system |
| SSMP | smart streetlighting management platform |
| VMS | variable message sign |

5 General Information

5.1 Overview of the smart streetlighting management platform (SSMP)

The SSMP integrates data collected from CCTV, radar, and RWIS sensors in areas with high accident risk—locations where traffic accidents frequently occur. By analysing this integrated data, the platform detects potential incident scenarios that can lead to road traffic accidents and provides corresponding safety information.

The types of event scenarios detected by SSMP include the following:

- Jaywalking pedestrians (e.g., signal violations or crossing outside designated crosswalks).
- Pedestrians with insufficient green signal time for crossing.
- Vehicles violating the stop line.
- Risk of rear-end collisions involving unprotected left-turn waiting vehicles.
- Risk of collisions between vehicles and pedestrians during right turns.
- Presence of illegally parked or stopped vehicles.
- Movement of pedestrian groups near roadways.
- Approach of vehicles exceeding speed limits.
- Presence of slow-moving vehicles ahead.
- Occurrence of unexpected hazards ahead.

The IEU is a key component of SSMP. It collects and analyses real-time environmental data through sensor devices, including object classification (e.g., object types such as vehicles and pedestrians, along with their location, direction, and speed). When an event scenario is detected, the system delivers safety information (such as hazard alerts, warnings, guidance, and related information) via information provision devices, in accordance with predefined response scenarios tailored to the specific type of event. At this stage, the IEU exchanges and shares information with other IEUs through the local platform to enable coordinated traffic safety management across sections where smart streetlights are installed.

The SSMP features the following three key characteristics:

- Through information linkage across the IEU, local platform, and centre platform, the SSMP can detect and respond to hazardous situations not only at specific points but also across extended roadway sections.
- Each IEU is capable of independently analysing the surrounding environmental data it collects and detecting event scenarios in real time, providing safety information to road users in a timely manner. This reduces the time required for the traffic information centre to review and assess the data collected by the IEUs, thereby alleviating the operational burden on system administrators.
- The SSMP offers the advantage of enabling the addition or expansion of service scenarios in the field through software updates to the local platform—one of the core components of smart streetlighting—without needing to replace existing hardware.

The benefits of the SSMP are as follows:

- While existing roadside streetlights have traditionally functioned as auxiliary facilities to enhance night-time visibility, the application of sensors, AI, and ICT technologies transforms them into intelligent traffic safety infrastructure capable of detecting accident-related events and delivering real-time safety information.
- By leveraging infrastructure-to-vehicle ICT technologies, the SSMP can extend both its service coverage and functional scope, making it applicable to broader domains such as C-ITS and smart city initiatives.

5.2 Priority service coverage areas

The service coverage areas designated in Korea's SSMP implementation and pilot project are as follows (see [Figure 1](#)).

- Crossroad.
- Crosswalk.