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Intelligent transport systems — Data interfaces between centres for transport information and control systems — Platform-independent model specifications for data exchange protocols for transport information and control systems

bsi.

National foreword

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A list of organizations represented on this committee can be obtained on request to its committee manager.

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Systèmes de transport intelligents - Interface de données entre centres pour les systèmes de commande et d'information des transports - Spécification du modèle indépendant de plateforme pour les protocoles d'échange de données pour les systèmes de commande et d'information des transports (ISO/TS 19468:2022)

Intelligente Verkehrssysteme - Datenschnittstelle zwischen Verkehrszentralen und Steuerungssystemen - Plattformunabhängige Modellspezifikationen für Datenaustauschprotokolle für Verkehrsinformationen und Steuerungssysteme (ISO/TS 19468:2022)

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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

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Endorsement notice

The text of ISO/TS 19468:2022 has been approved by CEN as CEN ISO/TS 19468:2022 without any modification.

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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 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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This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 278, *Intelligent transport systems,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO/TS 19468:2019), which has been technically revised.

The main changes are as follows:

— UML Communication diagrams have been improved (introduction of Agents and Interfaces to define actor subsystems interactions and addition of subclause 5.8 to describe UML modeling methodology adopted);

— Void input parameter has been defined;

— Description of FEP+EP implementation has been improved with appropriate normative language;

— Publish Subscrube Exchange Pattern has been removed;

— Collaborative Intellignet Transport Systems (ITS) services requirements and features have been reviewed and added in Clause 5 and Annexes B and E;

— Collaborative ITS service FEP+EP PIM description has been introduced in Clauses 10 and 11;

— Annex C has been reviewed, introducing new classes and attributes to support the implementation of features used in other exchange patterns;

— Annex H has been deleted;

— Certain figures have been improved.

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Introduction

This document defines a common set of data exchange specifications to support the vision of a seamless interoperable exchange of traffic and travel information across boundaries, including national, urban, interurban, road administrations, infrastructure providers and service providers. Standardization in this context is a vital constituent to ensure interoperability, reduction of risk, reduction of the cost base, promotion of open marketplaces and many social, economic and community benefits to be gained from more informed travellers, network managers and transport operators.

Especially in Europe, delivering transport policy in line with the White Paper[13] issued by the European Commission requires co-ordination of traffic management and development of seamless pan European services. With the aim of supporting sustainable mobility in Europe, the European Commission has been supporting the development of information exchange mainly between the actors of the road traffic management domain for a number of years.

This document supports a methodology that is extensible.

To be able to successfully connect systems and start exchanging data in an interoperable and easy way, there is a need to describe and agree on how this exchange ought to be achieved. This is set out in a data exchange specification. Data exchanges in different scenarios can have different needs and requirements. Therefore, several data exchange specifications can be needed.

Data exchange specifications need to address two main issues. Firstly, they model the stakeholders and actors involved in data exchange, each potentially in different roles, as well as abstract exchange patterns for their interactions. Secondly, they select a suitable implementation platform and clearly specify how the abstract scenarios and patterns are effectively implemented on this platform.

The diagram in Figure 1 shows such an abstract communication scenario from the perspective of a road operator who requires data exchange interfaces between the different components of its own operational systems, either between centre-side components or between centre and field devices, but also to exchange information with other road operators or service providers.

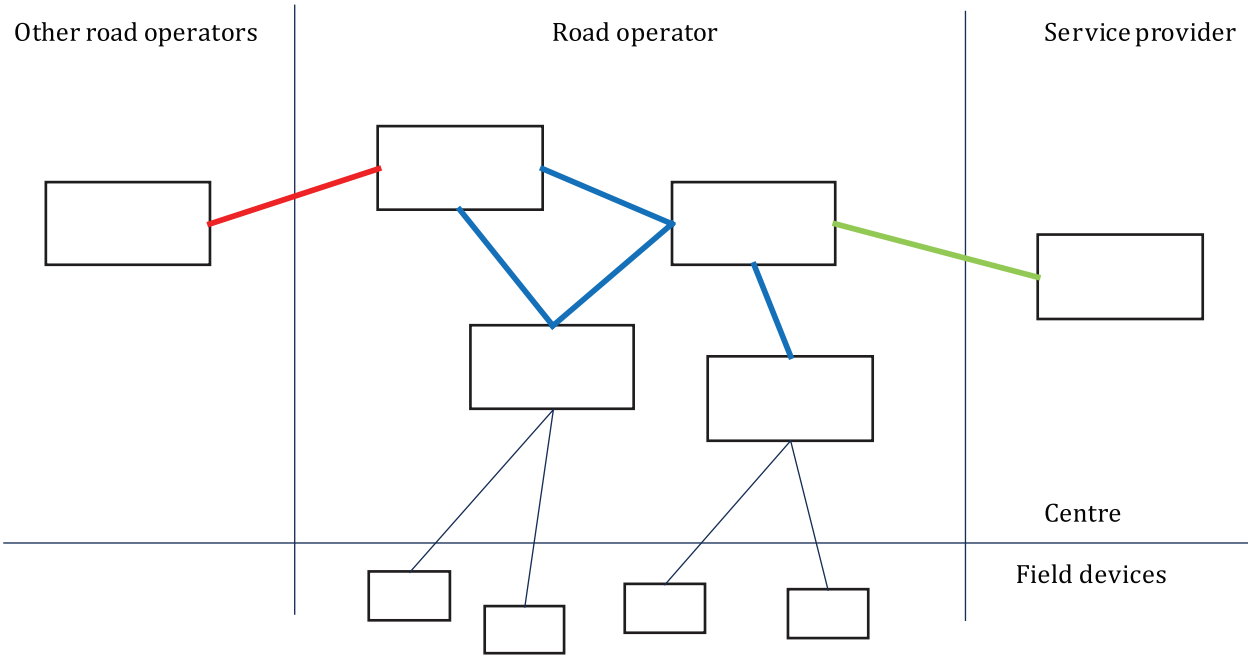


Figure 1 — Abstract communication scenario

While the black links between centre-side components and field devices may use a variety of communication protocols, mostly depending on the physical link conditions, the vast majority of other coloured links between centre-side components, internal to one organization or external to others, are

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based on an internet protocol (IP) network and mostly use the transmission control protocol (TCP) transport layer protocol (user datagram protocol, UDP, is also possible in a few cases).

Nevertheless, as the different colours indicate, they can very well have significantly different requirements. Internal links (blue) can reside in one domain of trust, hence do not require protocols compatible with security gateways. This can already be different for links to other road operators (red) and will certainly not hold for links to other types of organizations, like service providers, via the Internet (green).

While different security requirements offer the most striking and obvious example, there are more criteria that can lead to different preferences on different types of links, e.g. scalability, robustness and integration complexity.

In broad terms, the colours blue – red – green form a hierarchy from more internal, closely-coupled, well-integrated systems towards external, loosely-coupled and non-integrated systems. The world of information and communication technology (ICT) offers a broad range of solutions for these different scenarios, offering different advantages and disadvantages. It is clear that the one-size-fits-all principle will not provide the most efficient way of working here. Even on the highest level of abstraction and inside the ICT domain itself, a well-known battle of paradigms between remote-procedure-call (RPC) type service specifications and RESTful architectures exists. The same clusters of options are found in the domain of ITS standards, where for example the European standard for the real-time information interface relating to public transport operations (SIRI; see the EN 15531 series) introduces both concepts as complementary options: Publish-Subscribe and Request-Response.

Furthermore, the ITS station architecture is not in contradiction with this document but is complementary to what is defined in this document. According to the principles and the taxonomy defined in ISO 21217, this document defines a conceptual notion of:

— How two central ITS (sub-)stations could communicate to:

  — deliver information (application data units);

  — negotiate functional service behaviour for collaborating traffic management functions (even if this use case could not directly be matched to ISO 21217 as it is not about information delivery).

— How a central ITS (sub-)station could communicate to deliver information (application data units) to another ITS station with the characteristics of a central ITS station.

This document specifies the process of defining the exchange characteristics by use case-driven feature selection of relevant parameters for the relevant OSI layers as defined in ISO 21217. Two exchange schemas are considered: information delivery and functional service negotiation between central ITS stations.

The drafting of this document was guided by the following principles:

— interoperability, such that different implementations can successfully engage in a data exchange process;

— supporting of legacy implementations which are based on existing (exchange) specification, in order to maximize investments already made by stakeholders;

— addressing other user profiles, not only road operators, thus making this document available to a broader audience;

— reusing existing (communications) standards, in order to reduce implementation complexity and take benefit of proven and already existing solutions for common ICT problems;

— maintaining a clear separation between the payload content and the exchange model.

Annex A details the adopted methodology for defining this exchange platform-independent model (PIM).

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Intelligent transport systems — Data interfaces between centres for transport information and control systems — Platform-independent model specifications for data exchange protocols for transport information and control systems

1 Scope

This document defines and specifies component facets supporting the exchange and shared usage of data and information in the field of traffic and travel.

The component facets include the framework and context for exchanges, the data content, structure and relationships necessary and the communications specifications, in such a way that they are independent from any defined technical platform.

This document establishes specifications for data exchange between any two instances of the following actors:

— Traffic information centres (TICs);

— Traffic control centres/Traffic management centres (TCCs/TMCs);

— Service providers (SPs).

This document can also be applied for use by other actors, e.g. car park operators.

This document includes the following types of information:

— use cases and associated requirements, and features relative to different exchange situations;

— different functional exchange profiles;

— abstract elements for protocols;

— data model for exchange (informational structures, relationships, roles, attributes and associated data types required).

In order to set up a new technical exchange framework, it is necessary to associate one functional exchange profile with a technical platform providing an interoperability domain where plug-and-play interoperability at a technical level can be expected. The definition of such interoperability domains is out of scope of this document but can be found in other International Standards or Technical Specifications (e.g. the ISO 14827 series).

This document is restricted to data exchange. Definition of payload content models is out of the scope of this document.

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.

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