TECHNICAL SPECIFICATION

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Intelligent transport systems — Data interfaces between centres for transport information and control systems —

Part 4:

Data interfaces between centres for Intelligent transport systems (ITS) using XML (Profile B)

Systèmes de transport intelligents - Interface de données entre centres pour les systèmes de commande et d'information des transports —

Partie 4: Interfaces de données entre centres pour systèmes de transport intelligents (ITS) utilisant XML (Profil B)

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Foreword

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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).

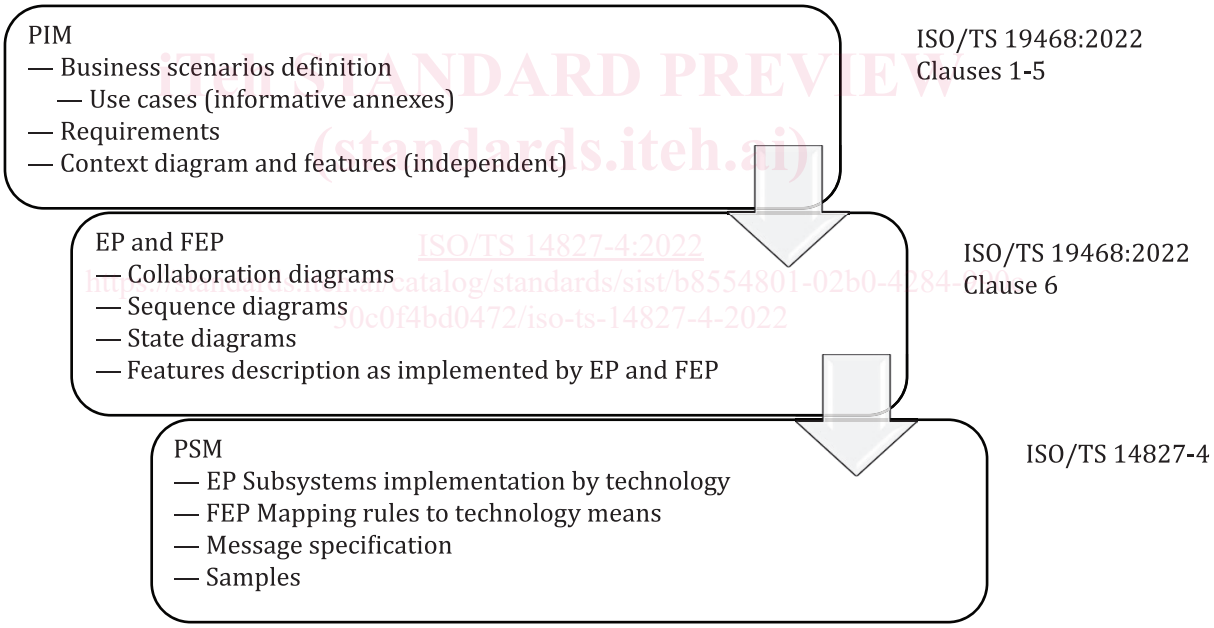
A list of all parts in the ISO 14827 series can be found on the ISO website.

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

Data exchange among centres is a baseline service for implementing intelligent transport system (ITS) services. For interoperability purposes, data delivery and collaborative ITS services need to be implemented according to certain specifications based on fully-described interfaces. The functional exchange profiles implementing push and pull exchange patterns aim to guarantee timely and reliable delivery of information, based on a defined level of service and user requirements. These depend on application level. A variety of options for implementing exchange are therefore described. These enable several interoperable exchange patterns with required features to fully satisfy user requirements: from Snapshot Pull/Push to Simple Push to Stateful Push, also considering a service request/service feedback collaborative ITS services business scenario, which allows interoperable exchange among any number of interconnected and collaborating elements to implement traffic management and traffic information services orchestrated among several ITS actors.

This document aims to define and describe the requirements on XML messages for implementing messages using XML Profile B. In particular, it is intended to be used in platform-specific implementations using simple object access protocol (SOAP) web services to enable DATEX II (EN 16157-1) XML coded messages for Snapshot Pull, Snapshot Push, Simple Push and Stateful Push. It is additionally relevant to collaborative ITS services (CISs) such as Simple CIS and Stateful CIS exchange patterns with relative functional exchange profiles as described by ISO/TS 19468. Figure 1 describes the relationship between exchange-related documents.



Key

PIM	platform-independent model
EP	exchange pattern
FEP	functional exchange profile
PSM	platform-specific model

Figure 1 — Relationship between exchange-related documents

The message structure defined in this document refers to the "basic exchange data model" and derived data dictionary defined in ISO/TS 19468:2022, Annex C, which is implemented in XML schema by the DATEX II methodology defined in EN 16157-1.

This document is not intended to conflict with existing standards on interfaces of data exchange among ITS centres.

Intelligent transport systems — Data interfaces between centres for transport information and control systems —

Part 4:
Data interfaces between centres for Intelligent transport systems (ITS) using XML (Profile B)

1 Scope

This document, based on ISO/TS 19468, specifies a platform-specific method for implementing data exchange among centres based on simple object access protocol (SOAP), supporting the EN 16157 series (DATEX II) for Push/Pull data delivery and service request/feedback collaborative intelligent transport system (ITS) services.

This document defines the message rules and procedures for communication between transport information and control systems using XML (Profile B).

This document clarifies how to package end-application messages and relevant data.

The payload data definition used in specific end-applications and the exact structure of the content payload delivered in the messages are beyond the scope of this document.

Rules and procedures for exchanging data-packets in lower communication layers are also out of the scope of this document. These functionalities can be implemented using generic protocols defined in the industry standards. However, this document does define how to use these protocols.

2 Normative references

The following documents are referred to in the text in such a way that some of or all 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/TS 19468, *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*

RFC 2616, *Hypertext Transfer Protocol — HTTP/1.1*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TS 19468 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/

4 Abbreviated terms

For the purposes of this document, the abbreviated terms given in ISO/TS 19468 and the following apply

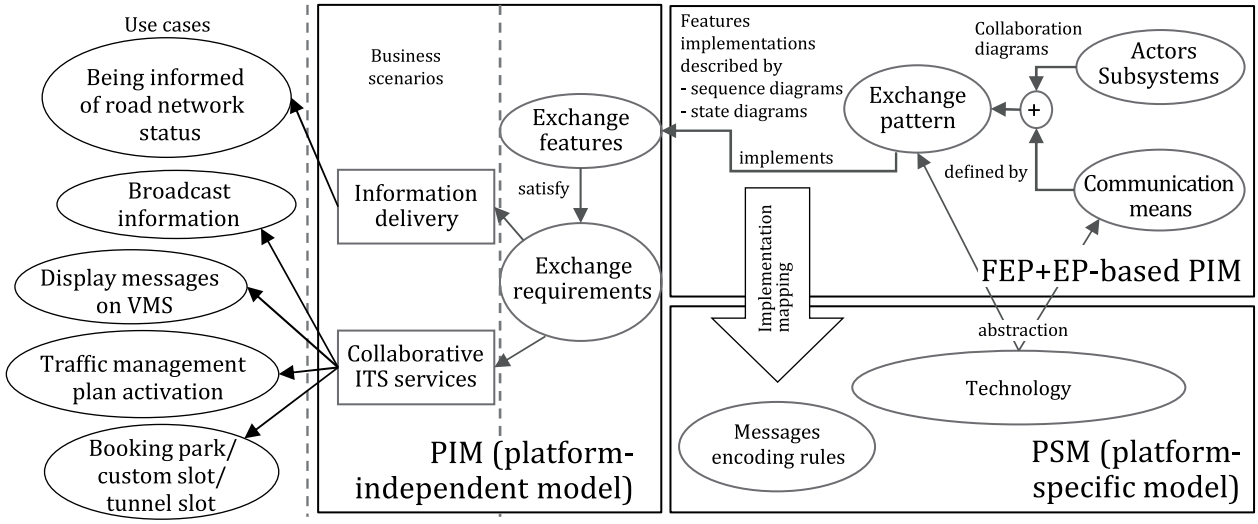
B2B	business to business
CIS	collaborative ITS services
EP	exchange pattern
FEP	functional exchange profile
IANA	Internet Assigned Numbers Authority
ITS	intelligent transport systems
PIM	platform-independent model
PSM	platform-specific model
SAML	security assertions markup language
UCS	universal multi-octet coded character set
UTF	UCS transfer format
VMS	variable message sign
WS	web service
XACML	extensible access control markup language
XMLDSG	XML digital signature
XMLENC	XML encryption

5 Conformance

There are no explicit conformance tests in this document. Conformance is achieved if the exchange data conform to the messaging rules of this document.

6 Exchange modelling framework

The model-driven approach defined in ISO/TS 19468 is resumed in Figure 2.



Key

PIM	platform-independent model
EP	exchange pattern
FEP	functional exchange profile
PSM	platform-specific model
VMS	variable message sign

Figure 2 — Model-driven approach from ISO/TS 19468

This document describes the mapping rules in order to implement specific platform Push and Pull and collaborative ITS services (CIS) FEP+EP-based PIM in SOAP web services technology PSMs. PIM-level descriptions of FEP+EP are detailed in ISO/TS 19468; the relevant clauses are referenced in this document.

6.1 Web services definition and options

Web services (WSs) provide standard means of interoperating between different software applications, running on a variety of platforms and/or frameworks. A full definition for "web service" can be found in Reference [6].

Web service definitions offer several options. Table 1 shows the options chosen by the PSMs described in this document.

Table 1 — Web service options

Web service options	Decision
Discovery	Not dynamic: universal description discovery and integration(UDDI) is not used; the WSs are described at https://standards.iso.org/iso/ts/14827/-4/ed-1/en.
Security	The security set-up shall be decided by the supplier, should be negotiated with the clients, and is outside the scope of this document.
Encryption	This shall be agreed between the supplier and the client before starting the data exchange.

6.2 Web services PSM mapping of FEP+EP PIMs

PIM specification to implement FEP+EP PIM based on WS SOAP technology consists in mapping the abstract unified modeling language (UML) messages (invocation methods and data types) defined

at FEP+EP PIM level as UML collaboration and sequence diagrams in ISO/TS 19468 clauses to the corresponding SOAP web service definition language (WSDL) methods and data structure.

6.3 Security aspects related to WS implementation

As described in ISO/TS 19468, security aspects are considered in the exchange specification framework in the general context diagrams, under the aspects of communication features. Security features are described in ISO/TS 19468:2022, 5.7, while security requirements are defined in ISO/TS 19468:2022, Annex B.

As this document is based on exchange communication among centres based on XML, Profile B (e.g. under SOAP webservices and supporting DATEX II), security for such exchange framework based on WS may rely on the WS-security OASIS international standard specification which is widely used within several frameworks (e.g. the JAVA wsse4j, jax-ws, or the .NET WCF). Some aspects of WS-security are also introduced in ISO/TS 19468:2022, Annex D.

The WS-security framework is composed by profiles that define the interoperability rules to be used to attain specific features. Those profiles tackle the necessity to exchange an identification and authentication token (e.g. the username token profile), or how to use XML digital signature (XMLDSG) and XML encryption (XMLENC) to sign and encrypt parts of a SOAP message, respectively, or to support complex scenarios through the combined use of security assertions markup language (SAML) tokens and potentially extensible access control markup language (XACML) access control policies.

WS-Security needs further profiling before its use which is, usually, policy specific (e.g. which algorithm and cipher-suites to be used, canonicalization algorithms, token layouts, compliance with WS-BSP, etc.). This profiling effort which can be specifically based on regional or project specific rules, is outside the scope of the current specification.

7 Data Delivery FEP+EP PSM definition

7.1 Overview of Data Delivery PSM definition

The following clauses express requirements for implementation of data delivery business scenarios FEP+EP which are fully described at PIM level in ISO/TS 19468 by referencing their exchange agent and relative interfaces.

NOTE A system can be both a client and a supplier of another system simultaneously, defining multiple separated exchange contexts (e.g. set of exchange nodes defined to exchange information in a specific business scenario with a specified EP+FEP).

7.2 Profile B Snapshot Pull SOAP WS PSM definition

The Profile B Snapshot Pull SOAP WS implementation is defined according to the Snapshot Pull FEP + EP PIM description which is described in ISO/TS 19468:2022, Clause 6**,** where "Snapshot Pull" exchange system functional characteristics and features implementation are fully described.

In the Profile B Snapshot Pull SOAP WS exchange interface, the SOAP WSDL supplier method to implement pullSnapshotData shall be the WSDL method named "pullSnapshotData" which shall not require any input and shall return a "MessageContainer" information XML message data structure.

Messages are implemented by SOAP protocol adding SOAP envelope information. The corresponding WSDL file is given in Annex A of the present document. The XSD definition for Message Container is also described in Annex A.

7.3 Profile B Snapshot Push SOAP WS PSM definition

The Profile B Snapshot Push SOAP WS implementation is defined according to the Snapshot Push FEP + EP PIM description which is described in ISO/TS 19468:2022, Clause 7, where Snapshot Push exchange system functional characteristics and features are fully described.

In the Profile B Snapshot Push SOAP WS exchange interface, the SOAP WSDL client method to implement putSnapshotData shall be the WSDL method named "putSnapshotData" which shall accept as input a "MessageContainer" XML message data structure and shall return an "ExchangeInformation" XML message data structure.

Messages are implemented by SOAP protocol adding SOAP envelope information. The corresponding WSDL file is given in Annex A of the present document. XSD definitions for Message Container and Exchange Information are also described in Annex A.

7.4 Profile B Simple Push SOAP WS PSM definition

The Profile B Simple Push SOAP WS implementation is defined according to the Simple Push FEP + EP PIM description which is described in ISO/TS 19468:2022, Clause 8, where "Simple Push" exchange system functional characteristics and features are fully described.

In the Profile B Simple Push SOAP WS exchange interface:

— the SOAP WSDL client method to implement putSnapshotData shall be the WSDL method named "putSnapshotData" which shall accept as input a "MessageContainer" XML message data structure and shall return an "ExchangeInformation" XML message data structure;

— the SOAP WSDL client method to implement putData shall be the WSDL method named "putData" which shall accept as input a "MessageContainer" XML message data structure and shall return an "ExchangeInformation" XML message data structure;

— the SOAP WSDL client method to implement keepAlive shall be the WSDL method named "keepAlive" which shall accept as input an "ExchangeInformation" XML message data structure and shall return an "ExchangeInformation" XML message data structure;

Messages are implemented by SOAP protocol adding SOAP envelope information. The corresponding WSDL file is given in Annex A of the present document. XSD definitions for Message Container and Exchange Information are also described in Annex A.

7.5 Profile B Stateful Push SOAP WS PSM definition

The Profile B Stateful Push SOAP WS implementation is defined according to the Stateful Push FEP + EP PIM description which is described in ISO/TS 19468:2022, Clause 9, where Stateful Push exchange system functional characteristics and features are fully described.

In the Profile B Stateful Push SOAP WS exchange interface:

— the SOAP WSDL client method to implement openSession shall be the WSDL method named "openSession" which shall accept as input an "ExchangeInformation" XML message data structure and shall return an "ExchangeInformation" XML message data structure;

— the SOAP WSDL client method to implement closeSession shall be the WSDL method named "closeSession" which shall accept as input an "ExchangeInformation" XML message data structure and shall return an "ExchangeInformation" XML message data structure;

— the SOAP WSDL client method to implement putSnapshotData shall be the WSDL method named "putSnapshotData" which shall accept as input a "MessageContainer" XML message data structure and shall return an "ExchangeInformation" XML message data structure;