SLOVENSKI STANDARD
oSIST prEN ISO 24014-1:2014

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Javni prevoz - Interoperabilni sistem vodenja (pre)voznin - 1. del: Arhitektura (ISO/DIS 24014-1:2014)

Public transport - Interoperable fare management system - Part 1: Architecture (ISO/DIS 24014-1:2014)

Öffentlicher Verkehr - Interoperables Fahrgeldmanagement System - Teil 1: Architektur (ISO/DIS 24014-1:2014)

Transport public - Système de gestion tarifaire interopérable - Partie 1: Architecture (ISO/DIS 24014-1:2014)

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Public transport — Interoperable fare management system —

Part 1: Architecture

Transport public — Système de gestion tarifaire interopérable —

Partie 1: Architecture

[Revision of first edition (ISO 24014-1:2007)]

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ISO/CEN PARALLEL PROCESSING

This draft has been developed within the European Committee for Standardization (CEN), and processed under the **CEN lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

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Contents

Page

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 24014-1 was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*, Subcommittee SC , and by Technical Committee CEN/TC 278, *Intelligent transport systems* in collaboration.

This second/third/... edition cancels and replaces the first/second/... edition (EN ISO 24014-1:2007), [clause(s) / subclause(s) / table(s) / figure(s) / annex(es)] of which [has / have] been technically revised.

ISO 24014 consists of the following parts, under the general title *Public transport — Interoperable fare management system*:

— Part 1: Architecture

— Part 2: Business practices

— Part 3: Multi application media

Introduction

Fare management (FM) encompasses all the processes designed to manage the distribution and use of fare products in a public transport environment.

Fare management is called interoperable (IFM) when it enables the customer to use a portable electronic medium (e.g. a contact/contactless smart card) with compatible equipment (e.g. at stops, with retail systems, at platform entry points or on board vehicles). IFM concepts can also be applied to fare management systems not using electronic media.

Potential benefits for the customer include reductions in queuing, special and combined fares, one Medium for multiple applications, loyalty programmes and seamless journeys.

Interoperability of fare management systems also provides benefits to operators and the other parties involved. However, it requires an overall system architecture that defines the system functionalities, the actors involved and their roles, the relationships and the interfaces between them.

Interoperability requires also the definition of a security scheme to protect privacy, integrity and confidentiality between the actors to ensure fair and secure data flow within the IFM system (IFMS).The overall architecture is the subject of this part of ISO 24014, which recognizes the need for legal and commercial agreements between members of an IFM, but does not specify their form. The technical specifications of the Component parts, and particularly the standards for Customer Media (e.g. smart cards), are not included.

Note that there is not one single IFM. Individual operators, consortia of operators, public authorities and private companies can manage and/or participate in IFMs. An IFM can span country boundaries, and can be combined with other IFMs. Implementations of IFMSs require security and registration functionalities. This part of ISO 24014 allows for the distribution of these functions to enable the coordination/convergence of existing IFMSs to work together.

The overall architecture is the subject of this part of ISO 24014, which recognizes the need for legal and commercial agreements between members of an IFM, but does not specify their form. The technical specifications of the Component, and particularly the standards for Customer Media (e.g. smart cards), are not included.

This part of ISO 24014 intends to provide three main benefits.

a) It provides a framework for an interoperable fare management implementation with a minimum of complexity.

b) It aims to shorten the time and lower the cost of IFM procurement, as both suppliers and purchasers understand what is being purchased. Procurement against an open standard reduces cost, as it avoids the need for expensive bespoke system development and provides for second sourcing.

c) It aims to simplify Interoperability between IFMs to the benefit of all stakeholders.

The work has benefited from the architecture work done in Electronic Fee Collection (CEN/TC 278/WG 1) and other domains, including the following:

— ISO/TS 14904, *Road transport and traffic telematics — Electronic fee collection (EFC) — Interface specification for clearing between operators*;

— ISO/TS 17573, *Road Transport and Traffic Telematics — Electronic Fee Collection (EFC) — Systems architecture for vehicle related transport services*;

— existing international data security standards.

Public transport — Interoperable fare management system — Part 1: Architecture

1 Scope

This part of ISO 24014 provides the basis for the development of multi-operator/multi-service Interoperable public surface (including subways) transport Fare Management Systems (IFMSs) on a national and international level.

This part of ISO 24014 is applicable to bodies in public transport and related services which agree that their systems need to interoperate.

While this part of ISO 24014 does not imply that existing interoperable fare management systems need to be changed, it applies, so far as it is practically possible, to extensions of these.

This part of ISO 24014 covers the definition of a conceptual framework, which is independent of organisational and physical implementation. Any reference within this part of ISO 24014 to organisational or physical implementation is purely informative.

The objective of this part of ISO 24014 is to define a reference functional architecture for IFMSs and to identify the requirements that are relevant to ensure Interoperability between several actors in the context of the use of electronic tickets.

The IFMS includes all the functions involved in the fare management process, such as

— management of Application;

— management of Products;

— security management;

— certification, registration and identification.

This part of ISO 24014 defines the following main elements:

— identification of the different IFM-roles in relation to the overall fare management system;

— a generic model of IFMS describing the logical and functional architecture and the interfaces within the system and with other IFMSs;

— Use Cases describing the interactions and data flows between the different functional IFM-roles;

— security requirements.

This part of ISO 24014 excludes consideration of

— the physical Medium and its management;

— the technical aspects of the interface between the Medium and the Medium Access Device;

— the data exchanges between the Medium and the Medium Access Device;

NOTE The data exchanges between the Medium and the Medium Access Device are proposed by other standardisation committees.

— the financial aspects of fare management systems (e.g. customer payments, method of payment, settlement, apportionment, reconciliation).

2 Terms and definitions

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

2.1
action list
list of items related to IFM Applications or Products, downloaded to Medium Access Devices (MADs), processed by the MAD if and when a specific IFM Application or Product referenced in the list is encountered by that MAD

2.2
actor
a person, an Organisation or another (sub)system playing a coherent set of functions when interacting with the IFM system within a particular Use Case

2.3
application rules
Application Owner requirements

2.4
application specification
specification of functions, data elements and security scheme according to the Application Rules

2.5
application template
executable technical pattern of the Application Specification

2.6
application
implemented and initialised Application Template

Note 1 to entry: The Application is identified by a unique identifier.

Note 2 to entry: The Application houses Products and other optional Customer information (Customer details, Customer preferences).

Note 3 to entry: The Application can be fully installed on a customer media or distributed on the customer media and the IFM back offices

2.7
commercial rules
rules defining the settlement and commission within the IFMS

2.8
component
any piece of hardware and/or software that performs one or more functions in the IFMS

2.9
component provider
anyone who wants to bring a Component to the IFMS

2.10
IFM functional model
Model to define functions of IFM-roles and how they interact.

2.11
ifm policies
commercial, technical, security and privacy objectives of IFM

2.12
IFM-role
abstract object performing a set of functions in an IFM functional model

2.13
interoperable fare management
includes all the functions involved in the fare management process such as Management of Application, Products, Security and Certification, Registration and Identification to enable Customers to travel with participating Service Operators using a single portable electronic medium

2.14
interoperable fare management system
includes all technical, commercial, security and legal elements which enable an Interoperable Fare Management

2.15
medium
physical carrier of Applications

2.15
message
set of data elements transferred between two IFM-roles

2.16
customer medium
Medium initialised with an Application through an Application contract

2.17
medium access device
MAD
device with the necessary facilities (hardware and software) to communicate with a Customer Medium

2.18
organisation
legal entity covering the functions and implied responsibilities of one or more of the following operational IFM-roles: Application Owner, Application Retailer, Product Owner, Product Retailer, Service Operator, and Collection and Forwarding

2.19
pricing rules
rules defining the price and payment / billing relationships to the customer

2.20
product rules
set of Usage, Pricing and Commercial Rules defined by the Product Owner

2.21
product specification
complete specification of functions, data elements and security scheme according to the Product Rules

2.22
product template
technical pattern of the Product Specification

Note 1 to entry: The Product Template is identified by a unique identifier.

2.23
product
instance of a Product Template stored in an Application

Note 1 to entry: It is identified by a unique identifier and enables the customer to benefit from a service provided by a Service Operator.

2.24
role
abstract object performing a set of functions

2.25
security policy
Objectives of the IFM to secure the public interests and the assets within the IFM

2.26
set of rules
regulations for achieving IFM Policies expressed as technical, commercial, security and legal requirements and standards relevant only to the IFMS

2.29
trigger
event that causes the execution of a Use Case

2.30
usage rules
rules defining the usage time, the usage area, the personal status and the type of service

2.31
use case
description of a process, by defining a sequence of actions performed by one or more Actors and by the system itself

3 Abbreviated terms

IFM Interoperable Fare Management

IFMS Interoperable Fare Management System

PP Protection Profile

PT Public Transport

SSS Security Subsystem

TOE Target Of Evaluation

4 Requirements

The purpose of ISO 24014 is to achieve Interoperability throughout fare management systems, while making sure that participating companies in public transport remain as commercially free as possible to design their own implementation in pursuing their own business strategies.

Specific requirements of the IFMS model are as follows.

— A Customer shall be able to travel with all participating operators (the seamless journey) using a single Medium.

— There shall be a capability to extract data appropriate to the revenue-sharing and statistical requirements of the transport operators.

— The same Medium may carry additional Applications; conversely, other media may carry the IFM Application.

— The ticketing methods associated with the Application shall offer the opportunity to reduce the current time taken to enter/exit the public transport system and may reduce payment handling costs significantly.

— The IFMS model shall comply with data protection and financial services laws/regulations (e.g. privacy).

— The IFMS model shall provide the capability to accommodate new Product Specifications as required, regardless of those already in existence.

— The IFMS model shall recognise and prevent internal or external fraud attacks.

— The IFMS model shall identify the customer while protecting their privacy as appropriate.

— The IFMS model shall protect the privacy of the Customer.

— The IFMS model shall assure the integrity of exchanged data.

— The IFMS model shall enable the implementation of additional services: loyalty programmes, car sharing, park and ride, bike and ride, etc.

— The IFMS model shall provide interface definitions between identified functions within public transport to enable different operator networks to interoperate.

— The IFMS model shall describe interfaces which are essential to enable data-forwarding functions between different operator networks, allowing revenue-sharing agreements to be met.

— The IFMS model shall provide a framework from which commercial agreements may be developed.

— The IFMS model shall be neutral with regard to different technologies which may be deployed [e.g. contact Medium, contactless Medium (short range, wide range), independent of access technologies].

— The IFMS model shall be functionally neutral regarding specific transport Organisation structures.

5 Conceptual framework

The IFMS may be run by a single transport undertaking, a transport authority, an association of public and private companies, or other groups.

An IFM Manager establishes and manages the IFM Policies on behalf of the IFMS. These policies are embedded in the Set of Rules.

To manage the elements of the IFMS dealt with in this part of ISO 24014, the IFM Manager shall appoint

— a Security Manager,

— a Registrar.

The functions and the responsibilities of the Security Manager and the Registrar may be distributed to several Organisations within an IFM. This may be a necessary condition to allow the cooperation of existing IFMSs. An example is shown in B.3. The example also shows how a new common Set of Rules for the joint IFMS is built upon the existing sets of the cooperating IFMSs.

5.1 Description of IFM-roles

IFM-roles are identified by capitalized initial letters.

Product Owner

The Product Owner is responsible for his Products.

Functions of ownership:

— Specifying pricing, Usage Rules and Commercial Rules.

Functions of clearing:

— Trip reconstruction — Product aggregation based on received usage data using Product definition rules;

— Linking of aggregated usage data with acquisition data;

— Preparation of apportionment data based on Product Specification.

Functions of reporting:

— Detailed:

  — acquisition data with no link to usage data within the reporting period;

  — usage data with no link to acquisition data within the reporting period;

  — linked aggregated Product data within the reporting period.

— Summary:

  — apportionment data and clearing report.

— Total acquisition data.

Product Retailer

The Product Retailer sells and terminates Products, collects and refunds value to a customer as authorised by a Product Owner.

The Product Retailer is the only financial interface between the customer and the IFMS related to Products.

Application Retailer

The Application Retailer sells and terminates Applications, collects and refunds value to a customer as authorised by an Application Owner.

The Application Retailer is the only financial interface between the customer and the IFMS related to Applications.

Collection and Forwarding

The IFM-role of Collection and Forwarding is the facilitation of data interchanges of the IFMS. The general functions are data collection and forwarding. They contain at least the following functions.

Functions of collecting:

— Receiving Application Template from Application Owner.

— Receiving Product Template from Product Owner.

— Receiving data from Service Operators.

— Receiving data from Product Retailer.

— Receiving data from Application Retailer.

— Receiving data from other Collection and Forwarding functions.

— Receiving security list data from Security Manager.

— Receiving clearing reports from Product Owner.

— Consistency and completeness check of the data collected on a technical level.

— Receiving the address list of all IFM-roles in the IFM from the Registrar.

Functions of forwarding:

— Forwarding “Not On Us” data to other Collection and Forwarding functions.

— Recording “Not On Us” data.

— Forwarding data with a corrupt destination address to the Security Manager.

— Forwarding “On Us” data to the Product Owner for clearing and reporting.

— Forwarding clearing reports, Application Template, Product Template and security list data to the Product Retailer and Service Operator.

— Forwarding Application Templates and security list data to the Application Retailer and Service Operator.

NOTE The “ON US and NOT ON US” concept is as follows.

— A specific Collection and Forwarding function is to collect data from one IFM-role and forward it to other IFM-roles.

— Logically there may be several COLLECTION AND FORWARDING functions within the IFM.

— IFM-roles may be linked to different COLLECTION AND FORWARDING functions, but each IFM-role can only be linked to one.

— The concept of “ON US and NOT ON US” addresses this connectivity functionality: Data held by a specific COLLECTION AND FORWARDING function is either “ON US” or “NOT ON US” data.

— Data collected by a specific COLLECTION AND FORWARDING function addressed to IFM-roles directly linked to this COLLECTION AND FORWARDING function is termed “ON US” data.

— Data collected by a specific COLLECTION AND FORWARDING function addressed to IFM-roles not linked to this COLLECTION AND FORWARDING function is termed “NOT ON US” data.