
**Intelligent transport systems —
Reference model architecture(s) for the
ITS sector —**

**Part 1:
ITS service domains, service groups and
services**

iTeh STANDARD PREVIEW

(standards) (E) (A)

*Systemes intelligents de transport (ITS) — Architecture(s) de modèle de
référence pour le secteur ITS*

Partie 1: Domaines de service, groupes de service et services ITS

<https://standards.iteh.ai/catalog/standards/sist/29371b1c-a242-422c-8043-a9f9120381ca/iso-14813-1-2007>



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 14813-1:2007](https://standards.iteh.ai/catalog/standards/sist/29371b1c-a242-422c-8043-a9f9120381ca/iso-14813-1-2007)

<https://standards.iteh.ai/catalog/standards/sist/29371b1c-a242-422c-8043-a9f9120381ca/iso-14813-1-2007>

© ISO 2007

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword.....	iv
Introduction	v
1 Scope	1
2 Terms and definitions.....	1
3 Abbreviated terms	2
4 General requirements.....	3
4.1 ITS service domains, service groups and services	3
4.2 ITS users.....	4
5 ITS service domains	4
6 ITS service groups for each domain.....	5
6.1 Traveller information service groups	5
6.2 Traffic management and operations service groups	7
6.3 Vehicle service groups.....	10
6.4 Freight transport service groups	12
6.5 Public transport service groups.....	15
6.6 Emergency service groups.....	15
6.7 Transport-related electronic payment service groups	17
6.8 Road transport-related personal safety.....	18
6.9 Weather and environmental conditions monitoring service groups.....	19
6.10 Disaster response management and coordination service groups	20
6.11 National security service groups.....	20
6.12 ITS Data Management.....	21
7 Summary of ITS reference architecture service hierarchy.....	22
Bibliography	28

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 14813-1 was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*.

This first edition cancels and replaces Technical Report ISO/TR 14813-1:1999, which has been technically revised.

ISO 14813 consists of the following parts, under the general title *Intelligent transport systems — Reference model architecture(s) for the ITS sector*:

- <https://standards.iteh.ai/catalog/standards/sist/29371b1c-a242-422c-8043-a919120381ca/iso-14813-1-2007>
- *Part 1: ITS service domains, service groups and services* [Technical Report]
 - *Part 2: Core TICS reference architecture* [Technical Report]
 - *Part 3: Example elaboration* [Technical Report]
 - *Part 4: Reference model tutorial* [Technical Report]
 - *Part 5: Requirements for architecture description in TICS standards* [Technical Report]
 - *Part 6: Data presentation in ASN.1* [Technical Report]

Introduction

Originally referred to in ISO/TR 14813-1 as Fundamental Services, ITS service domains and groups reflect the evolution of technology-oriented transportation practices and applications. This has become of increasing importance and interest as the scope of Intelligent Transport Systems (ITS) expands beyond its original applications in road traffic management, traveller information and electronic payment systems. ITS is now also expected to address:

- Transport network operations and maintenance activities;
- Freight mobility and intermodal connectivity;
- Multi-modal travel including both pre-trip and on-trip information and journey planning;
- Variable road pricing strategies for freight and personal travel;
- Emergency and natural disaster-related response activities and coordination; and
- National security needs related to transportation infrastructure.

Additionally, ITS activities as described above will also interface with more generalized activities and environments outside the transport sector. For example, road pricing and revenue systems activities may interface with electronic commerce, or eCommerce activities, and may thus utilize standards and principles associated with the banking industry along with generally accepted accounting principles. The addressing of national security and coordination issues also requires addressing specific national standards related to civil defence, emergency communications and other procedures. These interfaces, while largely outside the scope of TC 204, are nevertheless critical external influences on the functionality of the various services supported by ITS service domains and groups.

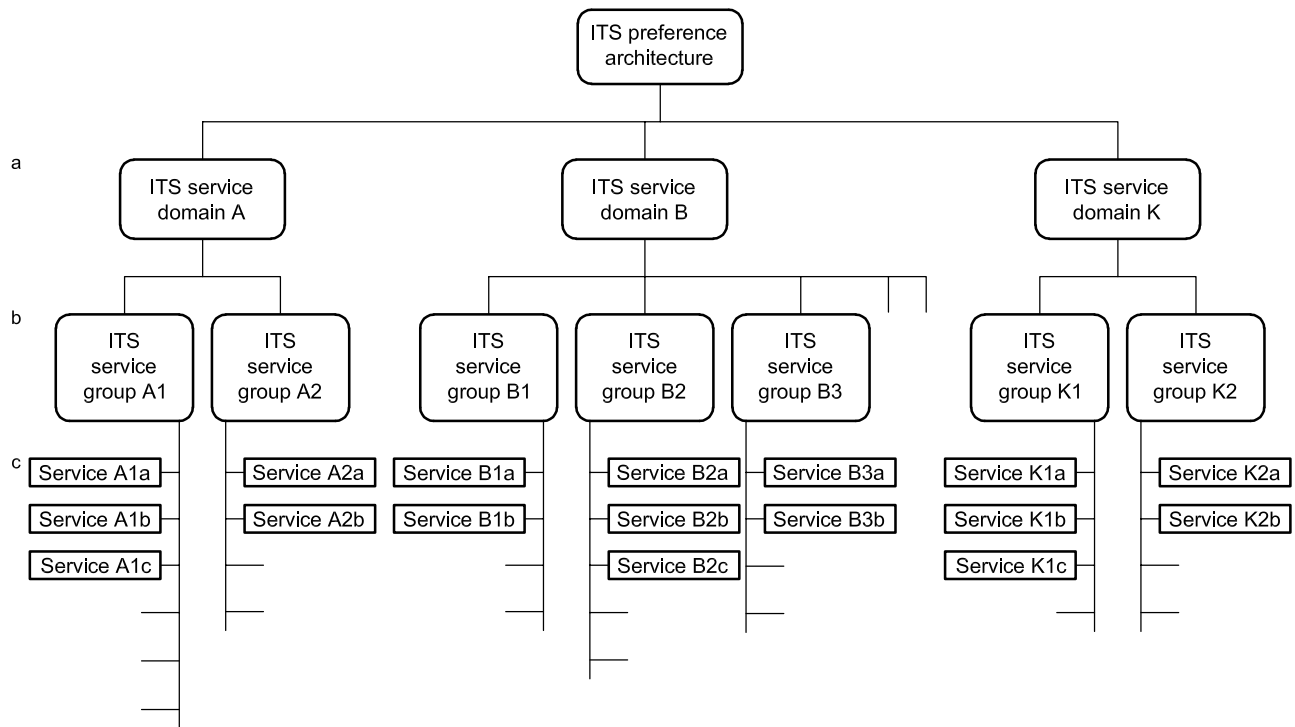
The standards that have been developed within TC 204 may all be mapped to one or more of the ITS service groups defined in this part of ISO 14813. At the same time, the applications for these standards are becoming broader. Additionally, the development of a standard international data dictionary and registry for ITS requires the ability to address both current and emerging applications.

To this end, the ITS service domains and groups presented in this document serve as a framework for developing ITS-related concepts of operation, which in turn lead to the definition of the appropriate requirements and standards necessary to deploy specific ITS applications. As the definition of transportation activities that utilize ITS tools has broadened, the original Fundamental Services developed by TC 204 are now revised and expanded into ITS service domains and groups.

Figure 1 illustrates the hierarchy of functional definitions, and the basis upon which user-oriented architecture views (known as use cases) are derived (refer to the other parts of ISO 14813, which further define the ITS applications of Unified Modeling Language, including use cases, to document the architecture).

In order to develop a cohesive reference architecture, and in order to establish the relationship and interdependencies of the various ITS services, it is beneficial to first determine the underlying ITS services. Thus, the purpose of this International Standard is to identify the ITS service groups and the domains within which the service groups reside, within the current perception of the ITS sector.

ITS service domains and groups, while they build upon existing US, European Union, Japanese, and other international and national taxonomies, or classification systems, can also provide a common descriptive basis for comparing these taxonomies, as well as others being developed throughout the world.



Key

- a Service domains (A, B, C, etc.) define the nature of the activities provided.
- b Service groups (N1, N2, N3, etc.) define more specific activities carried out in the service domain, but do not define the actors.
- c Services further define activity in terms of the actors involved (e.g. users, travel modes). They also serve as a basis for most elemental use cases (user view of architecture).

Figure 1 — ITS services hierarchy of definitions for ITS reference architecture

ISO TC 204 Working Group 1

ISO TC 204 WG 1's prime objectives are to provide services to ISO TC 204 and its working groups.

The specific mission of WG 1 is to:

“Provide ISO TC 204, its working groups, related bodies and those involved in the ITS sector, with a reference model of conceptual reference architecture(s) that show the structure and inter-relationships of the sector...”

There are multiple instantiations of ITS architecture to be considered. This deliverable embraces architecture concepts from the following participants:

- Other TC 204 working groups,
- CEN TC 278 working groups,
- Japanese initiatives,
- European Union initiatives,
- US ITS program,
- Australian initiatives,

- Canadian initiatives,
- Korean initiatives,
- Chinese Taipei initiatives, and
- Other architecture international activities.

Full documentation of all possible architectural approaches is obviously not feasible given the high level of resources required to carry this out. Indeed, full documentation and description of all possible approaches is undesirable as an item for standardization.

A defined and consistent approach is, however, required to facilitate reuse and interoperability.

By combining the work of major contributions such as the definitions of user services in the United States, Japan, Chinese Taipei and Korea, along with the European Union definition of user needs, the working group has used the basic hypothesis that it is possible to define a set of ITS service domains and groups that can be used in a variety of combinations and configurations, to provide an outline description of the different ITS architecture approaches. It is assumed that the scope of the ITS sector will always have a definable boundary (which will change over time).

iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 14813-1:2007](https://standards.iteh.ai/catalog/standards/sist/29371b1c-a242-422c-8043-a9f9120381ca/iso-14813-1-2007)

<https://standards.iteh.ai/catalog/standards/sist/29371b1c-a242-422c-8043-a9f9120381ca/iso-14813-1-2007>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 14813-1:2007

<https://standards.iteh.ai/catalog/standards/sist/29371b1c-a242-422c-8043-a9f9120381ca/iso-14813-1-2007>

Intelligent transport systems — Reference model architecture(s) for the ITS sector —

Part 1: ITS service domains, service groups and services

1 Scope

This International Standard provides a definition of the primary services and application areas that can be provided to Intelligent Transport Systems (ITS) Users. Those with a common purpose can be collected together in ITS service domains, and within these there can be a number of ITS service groups for particular parts of the domain. This International Standard identifies 11 service domains, within which numerous groups are then defined. Within this framework, there are varying levels of detail related to definition of different services. These details differ from nation to nation, depending on whether the specific national architecture building blocks are based directly upon services or on groups of functions. Thus, the intent is to address groups of services and the respective domains within which they fit. As these domains and service groups evolve over time, it is intended that this International Standard be revised to include them.

This International Standard is applicable to the working groups of ISO TC 204 and other TCs which are developing International Standards for the ITS sector and associated sectors whose boundaries cross into the ITS sector (such as some aspects of urban light railways, intermodal freight and fleet). This International Standard is designed to provide information and explanation to those developing ITS International Standards and to those developing specifications, implementations and deployments for ITS.

This International Standard is advisory and informative. It is designed to assist the integration of services into a cohesive reference architecture, assist interoperability and common data definition. Specifically, services defined within the service groups will be the basis for definition of use cases and the resultant reference architecture functionality, along with definition of applicable data within data dictionaries, as well as applicable communications and data exchange standards.

2 Terms and definitions

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

2.1

actor

one who enables or influences an action or for whom an action has been completed

2.2

dispatch

action that requests specific resources to perform particular services

EXAMPLE The emergency communications centre dispatches an ambulance in response to an incident where it is determined the victim must be taken to a hospital.

2.3

ITS service

product or activity targeted to a specific type of ITS user

ISO 14813-1:2007(E)

2.4

ITS service domain

specific application area which comprises one or more service groups

2.5

ITS service group

one or more similar or complementary services provided to ITS users

2.6

ITS stakeholder

person or organization involved in some way in the deployment of ITS

NOTE Their involvement can be through use, manufacture of products, provision of services or regulation.

2.7

ITS user

one who directly receives and can act on ITS data or control products

NOTE An ITS user is one who receives, directly or indirectly, or provides to, the transaction of an ITS service; these users of ITS services may be human, systems or environment monitoring.

2.8

navigation

ITS service which provides directional information to an individual during a trip

2.9

paratransit

non-scheduled, non-fixed route public transport services for customers requiring special assistance and access to specific destinations at a user-requested time (e.g. disabled or elderly persons)

2.10

probe data

vehicle sensor information that is processed, formatted and transmitted to a land-based centre for processing to create a good understanding of the driving environment

<https://standards.iteh.ai/catalog/standards/sist/29371b1c-a242-422c-8043-a69129381c2/iso-14813-1-2007>

2.11

probe vehicle system

vehicle probe

comprises vehicles which collect and transmit probe data, and land-based centres which do probe processing

NOTE 1 Probe processing builds an accurate understanding of the overall roadway and driving environment by fusing and analyzing probe data sent from multiple vehicles and data from other data sources.

NOTE 2 This processed probe data can then be delivered back to vehicles to help them and their drivers perform better, to public authorities to help them manage the transportation system, and to other users for a variety of purposes.

2.12

route guidance

service which utilizes directional information, destination or real-time data to select an appropriate route, either prior to or during a trip

3 Abbreviated terms

HAZMAT

HAZardous MATerials

ITS

Intelligent Transport Systems

TICS

Transport Information and Control Systems
(old term for ITS)

UML

Unified Modeling Language

4 General requirements**4.1 ITS service domains, service groups and services****4.1.1 Characteristics of ITS service domains**

ITS systems vary in their implementation either because of the organization within a specific geographic region, or according to the perception of any actor.

This is regardless of any specific implementation services and groups of services which are provided in functionally different (although often interrelated) application areas. These application areas are the highest level of abstraction in an ITS architecture, and are called service domains.

ITS services do not represent the technology or the functionality of an ITS system included in any ITS applications.

Examples of ITS service domains include traffic management, traveller information, freight and fleet management, etc.

4.1.2 Characteristics of ITS service groups

A service domain comprises one or more types of ITS service. Each type of ITS service may comprise several instances of related services. These collations of related ITS service instances are called ITS service groups. Therefore, an ITS service group consists of one or more similar or complementary services provided to ITS users.

There are several characteristics of ITS service groups and services contained within:

- a) Each ITS service group is oriented to a specific activity related to management of or information about the road transport network, that is divided into specific services that should address particular users or modes.
- b) The name of each service group should reflect the type of activities supported (e.g. pre-trip information).
- c) Each service within the service group should reference both the service group activity and the nature of the users or modes supported by the service (e.g. pre-trip information – public transport).
- d) Each level of the hierarchy should be at an equivalent level of granularity.

4.1.3 Characteristics of ITS services

An ITS service consists of a product or activity provided to a specific ITS user. ITS services may therefore be considered as the elemental building blocks of any ITS architecture/system.

The level of detail in this part of ISO 14813 is focused at the level of domains and service groups, and not specific services. Different countries partition their reference architectures in different ways: some through more granular service or needs definition, others at a higher level of abstraction. Thus, elaboration of specific ITS services are not defined in this International Standard, although examples are provided.

Elaboration of specific ITS services shall be undertaken in a consistent manner throughout any specific architecture. There are several methodologies that assist the development of consistent elaboration.

Elementary services can be elaborated by using particularization about service groups. Different viewpoints may result in different elaborations.

Parts 2, 3 and 4 of ISO 14813 provide one methodology using the UML. However, the ISO ITS architecture standards that do not require the use of a specific methodology and other techniques, such as process decomposition, may also be used.

ISO 14813-5 provides guidance as to the requirements for architecture description in ITS standards; ISO 17452 provides further assistance and guidance.

4.2 ITS users

In general, one may say that ITS users are partners, one who receives an ITS service through interaction with the ITS system. They have elsewhere been described as *“those who want the benefit of ITS systems, those who use ITS systems, those who manufacture or operate ITS systems, and those who regulate and control transport using ITS systems”*. By definition, all human interaction with ITS systems involves external actors interfacing at the boundary of the system.

NOTE Humans interacting with an ITS system are sometimes called external ITS users.

5 ITS service domains

Categorization of ITS activities is one of the first steps in defining the universe of activities supported by the reference architecture. It serves to delineate different sectors of the ITS industry (and are roughly parallel with current TC 204 working group activities).

The following lists and describes 11 ITS service domains. These are:

- Traveller information: Provision of both static and dynamic information about the transport network to users, including modal options and transfers.
- Traffic management and operations: The management of the movement of vehicles, travellers and pedestrians throughout the road transport network.
- Vehicle services: Enhancement of safety, security and efficiency in vehicle operations, by warnings and assistances to users or control vehicle operations.
- Freight transport: The management of commercial vehicle operations, freight and fleet management, and activities that expedite the authorization process for cargo at national and jurisdictional boundaries and expedite cross-modal transfers for authorized cargo.
- Public transport: Operation of public transport services and the provision of operational information to the operator and user, including multi-modal aspects.
- Emergency: Services delivered in response to incidents that are categorized as emergencies.
- Transport-related electronic payment: Transactions and reservations for transport-related services.
- Road transport-related personal safety: Protection of transport users including pedestrians and vulnerable users.
- Weather and environmental conditions monitoring: Activities that monitor and notify weather and environmental conditions.
- Disaster response management and coordination: Road transport-based activities in response to natural disasters, civil disturbances or terror attacks.
- National security: Activities that directly protect or mitigate physical or operational harm to persons and facilities due to natural disasters, civil disturbances or terror attacks.