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

Part 1: ITS service domains, service groups and services

Systèmes 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

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Foreword

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 204, *Intelligent transport systems*.

This second edition cancels and replaces the first edition (ISO 14813-1:2007), 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*:

— *Part 1: ITS fundamental services*

— *Part 5: Requirements for architecture description in ITS standards*

— *Part 6: Data presentation in ASN.1*

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Introduction

Intelligent transport systems (ITS) service domains and groups reflect the evolution of technology-oriented transportation practices and applications. So far this has been in the road transport domain, but ITS is beginning to appear in the maritime and rail transport domains. This has become of increasing importance and interest as the scope of ITS expands beyond its original range of services in road traffic management, traveller information and electronic payment systems. ITS is now also expected to address services in the following areas of the road transport domain:

— Transport network operations and maintenance activities;

— Freight mobility and inter-modal connectivity;

— Multi-modal travel including both pre-trip and on-trip information and journey planning where the trip starts and/or finishes in the road transport domain;

— Variable road pricing strategies for freight and personal travel;

— Emergency and natural disaster-related response activities and coordination;

— National security needs related to transportation infrastructure;

— Cooperative-ITS – sometimes referred to as 'connected vehicles' or 'connected vehicle/highway systems'.

Services in some of the areas identified above also interface with more generalized activities and environments outside the road transport domain. For example, it is possible for road pricing and revenue systems activities to interface with electronic commerce, or eCommerce activities, and 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 must all be mapped to one or more of the ITS domains, service groups and services described in this part of ISO 14813. Additionally, the development of a standard international data dictionary and registry for ITS requires the ability to address both current and emerging services that ITS can provide.

To this end, the ITS service domains, groups and services presented in this part of ISO 14813 serve as a framework for developing ITS architectures and ITS-related concepts of operation, which in turn lead to the definition of the appropriate requirements, functionality and standards necessary to deploy specific ITS services. As the range 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 how they might be used as the input to ITS architectures. The Service Domains that apply to ITS are listed in 6.1 with each defining the nature of the activities provided. Each of these Domains is then covered by separate annexes in this part of ISO 14813, each of which includes the descriptions of its own Service Groups and Services. The Service Groups describe more specific activities that are part of the Domain and the Services provide the more detailed description of what is provided within each Service Group.

The way in which the descriptions of the services are used in ITS architectures depends on the methodology that has been adopted for their creation. Thus the service descriptions can be used to generate 'use cases' which are the input to an ITS architecture created using object orientated methodology (see other parts of the ISO 14813 series), or 'user needs', which are the input to an ITS architecture created using the process orientated methodology (see ISO/TR 26999).

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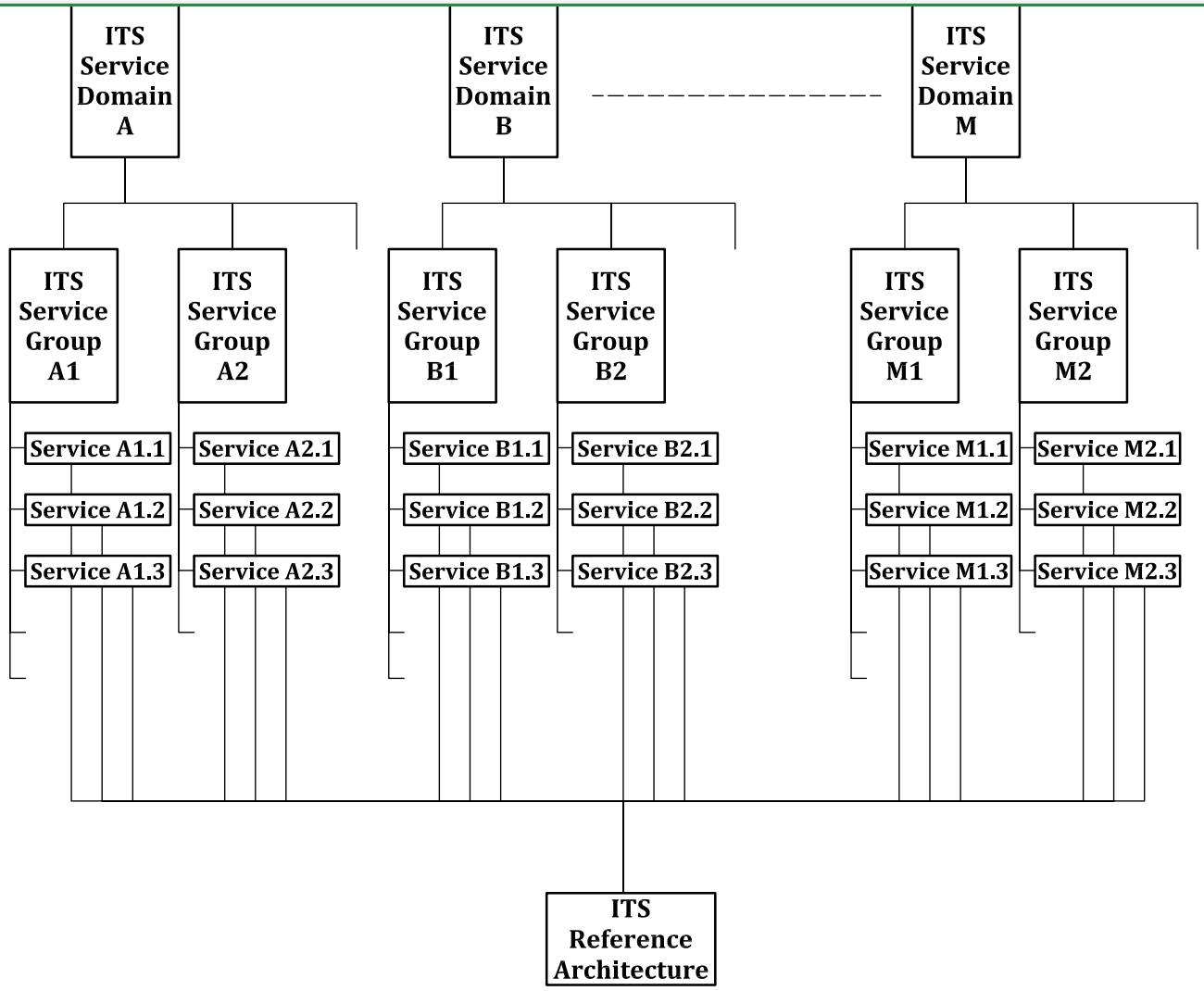

Figure 1 — ITS services — Hierarchy of definitions for 'ITS reference architecture'

In order to develop a cohesive reference architecture, and in order to establish the relationship and interdependencies of the various 'intelligent transport systems' (ITS) services, it is beneficial to firstly determine the underlying ITS services. Thus, the purpose of this part of ISO 14813 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 U.S., 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.

Currently there are many instantiations of ITS architecture in use around the world, with fragments of ITS architectures being used as the basis for several International Standards. This part of ISO 14813 embraces architecture concepts from the following sources:

— Other ITS architecture activities from several parts of the world, including the US National ITS Architecture and the European ITS Framework (FRAME) Architecture;

— Other ISO TC 204 and CEN TC278 working groups.

Most if not all ITS architectures that are in use around the world are based on either the US National ITS Architecture or the European ITS Framework (FRAME) Architecture. Unfortunately, the terminology used by these two ITS architectures is similar but not identical. The following table provides a high-

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level comparison between some key terms used in these two ITS architectures that are relevant to this part of ISO 14813.

ISO 14813-1	**US Architecture**	**FRAME Architecture**
Actor	Terminator	Terminator/Actor
ITS Service Domain	User Service Bundle	ITS Service Group
ITS Service Group	User Service	ITS Service Topic
ITS Service	User Service Requirement	ITS Service

Note that in the FRAME Architecture, many of the terminators are classed as “generic”. This means that they have several forms (called “actors”) for specific instances. An example of this is the terminator “Driver”, which has specific instances that include actors such as drivers of private cars, plus drivers of other vehicle types, e.g. public transport, freight and emergency.

By combining the results of the work that has been done to develop these two architectures the working group has used the basic hypothesis that it is possible to define a set of ‘ITS service domains, groups and services’ that can be used in a variety of combinations and configurations, to provide an outline description of the different ITS architecture approaches.

Full documentation of all possible architectural approaches is 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 standardisation. A defined and consistent approach is however required to facilitate reuse and interoperability.

Users of this part of ISO 14813 should note that it is also possible to use a sub-set of the Services as the starting point for the creation of an ITS architecture for a particular ITS implementation. It is possible to add specific services that are peculiar to that implementation in order that the ITS architecture will support all that the stakeholders would like ITS to provide.

A further important point to note is that it is assumed that the scope of the ITS sector always has a definable boundary. Experience over the last 20 to 30 years has shown that this will change over time and that it will be necessary for this International Standard to be revised again after five years, if not before.

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