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Intelligent transport systems —Mobility integration —ITS data aggregation role and functional model

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This document was prepared by Technical Committee ISO/TC 204, Intelligent transport systems.

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.

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Introduction

Currently, more than 70-% of the world's people live in cities. The proportion of people living in cities is rising around the world as civilisations develop and congregate around cities where there are more employment opportunities. Societies develop more innovatively and rapidly in cities, and they present better entertainment opportunities, adding to their attraction. The Economist magazine recently forecast that by 2045, an extra 2-billion people will live in urban areas. The resulting concentration of population creates various issues such as road congestion due to an increase in vehicle population and environmental pollution due to exhaust gas and tyre erosion. These issues have been attributed to increases in the number of delivery trucks, taxis and town centre traffic and are further exacerbated by obstacles to the effective use of urban space due to the private ownership of cars (parking lots, street parking).

The pressures caused by scientific advice that significant action and change of behaviour is needed to ameliorate the adverse effects of climate change require a more environmentally friendly use of the transport system.

It is recognized that there is also road infrastructure deterioration, a lack of provision of information on the use of public transportation, driver shortages due to the increase in the number of elderly people and the inconvenience of multimodal fare payments, and action to improve the situation is urgently needed.

The International Data Corporation forecasts that of the USD 81-billion that will be spent on smart city technology in 2020, nearly a quarter will go into fixed visual surveillance, smart outdoor lighting, and advanced public transit.

Eventually, this is likely to mean high speed trains and driverless cars. Consultancy McKinsey forecasts that up to 15-% of passenger vehicles sold globally in 2030 will be fully automated, while revenues in the automotive sector could nearly double to USD 6-.7-trillion thanks to shared mobility (car-sharing, e-hailing) and data connectivity services (including apps and car software upgrades).

Changing consumer tastes are also calling for new types of infrastructure. Today's city dwellers, for example, increasingly shop online and expect ever faster delivery times. To meet their needs, modern urban areas need the support of last-minute distribution centres, backed by out-of-town warehouses.

Therefore, in recent years, in Europe, studies on the development of mobility integration standards have been active to solve urban problems. There are various movements around the world making efforts to address these issues. In the United States, intelligent transport systems (ITS) technology is used to try to solve these urban problems, as in the Smart City Pilot Project. Columbus, Ohio has been selected as a smart city pilot project which is currently being designed in detail. Important key factors here are the core architectural elements of smart cities, and urban ITS sharing of probe data (also called sensor data), connected cars and automated driving. In addition, new issues have been recognized with the introduction of the connected car to the real world in respect of privacy protection, the need to strengthen security measures, big data collection and processing measures, which are becoming important considerations.

In terms of the effective use of urban space, it is hoped that the introduction of connected cars and automated driving can significantly reduce the requirements for urban parking lots (redistribution of road space). If technology can eliminate congestion, the city road area usage can also be minimized and reallocated (space utilization improvement) to improve the living environment of, and quality of life in, the city. In addition, the environment around the road will be improved by improving enforcement (e.g. overloaded vehicles). On the other hand, even in rural areas, it is possible to introduce automated driving robot taxis and other shared mobility that saves labour (and is therefore more affordable) and improves the mobility of elderly people.

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To achieve this requires the realization of various issues, for example:

— cooperation with harmonization of de-jure standards such as ISO and industry de facto standards;

— recognition of the significance of international standardization (e.g., to reduce implementation costs);

— recognition of the significance of harmonization activities by countries around the world;

— cooperation and contribution between ISO/TC 22 for in-vehicle systems and ISO/TC 204 for ITS technology.

As mentioned above, automated driving mobility is expected to play an important role both in cities and in rural areas. The main effects are, as described above, the reduction of traffic accidents, reduction of environmental burden, elimination of traffic congestion, realization of effective use of urban space, etc.

ITS technology is an important element for realizing smart cities, and it is important to clearly understand the role model of ITS service applications when developing standards to achieve these objectives.

This document gives an important overview of the options for this objective. Considering the emerging direction of mobility electrification, automated driving, and the direction of an environmentally friendly society, incorporating other urban data such as traffic management into the city management will improve the mobility of urban society. It is important to consider the creation of a common open role model for smart city data platforms (such as the ISO 15638series15638 series service framework]. Similar platforms will be necessary for the realization of the future mobility such as automated driving and electrification of vehicles. A common role model will be developed for all modes of vehicle, including public transport, general passenger vehicles and heavy vehicles. The incorporation of electronic regulation is especially important for automated vehicles, and it is essential to incorporate it as a core element of urban ITS.

This document describes how ITS data can be presented, interchanged, and used by smart cities. This document does not describe smart city use cases for ITS data in any detail nor does it describe in detail any specific ITS use cases. It is focused on the generic role model for data exchange between ITS and smart cities.

The necessary security and data exchange protocols have now been finalized to provide a secure ITS interface, with the approval of ISO/TS 21177, i.e. exchange information with bi-directional protection.

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Intelligent transport systems —Mobility Integration —ITS data aggregation role and functional model

1 Scope

This document describes a basic role and functional model of the intelligent transport systems (ITS) data aggregation role, which is a basic role of ISO/TR 4445. It provides a paradigm describing:

a) a framework for the provision of ITS data aggregation for cooperative ITS service application;

b) a description of the concept of a role and functional model for such roles;

c) a conceptual architecture between actors involved in the provision/receipt of ITS data aggregation;

d) references for the key documents on which the architecture is based; ~~ana~~

e) a taxonomy of the organization of generic procedures.

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2 Normative references

The following documents are referred to in the text in such a way that some or all of 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 14812, *Intelligent transport systems — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TS 14812 apply.

ISO and IEC maintain ~~terminological~~terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at ~~http://www.iso.org/obp~~https://www.iso.org/obp

— IEC Electropedia: available at ~~http://www.electropedia.org/~~https://www.electropedia.org/

4 Abbreviated terms

CONOPS	concept of operations

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