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Intelligent transport systems — Roadside modules AP-DATEX data interface —

Part 2: Generalised field device basic management

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Foreword

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

A list of all parts in the ISO 22741 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

0.1 Background

The need for standardized communication with field devices is growing around the world. Several countries have already adopted application profile data exchange (AP-DATEX) based field device communication standards.

There is a growing opinion, supported by empirical evidence, that standardizing this activity will result in improved intelligent transport service (ITS) performance, reduced cost, reduced deployment time, and improved maintainability. The ISO 22741 series extends ISO 15784-3 by defining the management information necessary to monitor, configure and control features of field devices. The data elements defined in all parts of the ISO 22741 series may be used with any protocol, but were designed with an expectation that they would be used with one of the ISO 15784-3 protocols.

By using the approach described in this document, agencies can specify open procurements and systems can be expanded geographically in an open and non-proprietary manner, which reduces the costs, speeds and deployment, and simplifies the integration.

0.2 Overview

AP-DATEX is a collection of well thought-out and well-proven concepts and principles. AP-DATEX employs the sound principles of abstraction and standardization. This has led to AP-DATEX being widely accepted as the prime choice for communication between management systems and devices on the Internet, and other communications networks.

This document defines management information for ITS field devices following the AP-DATEX conventions.

0.3 Document approach and layout

This document defines:

a) user needs that are deemed to be common to many types of field devices (Clause 7);

b) requirements for implementing the identified user needs, organized by major feature (Clause 8);

c) design elements that are to be used in implementing the requirements (Clause 9).

Intelligent transport systems — Roadside modules AP-DATEX data interface —

Part 2:
Generalised field device basic management

1 Scope

Field devices are a key component in intelligent transport systems (ITS). Field devices include traffic signals, message signs, weather stations, traffic sensors, roadside equipment for connected ITS (C-ITS) environments, etc.

Field devices often need to exchange information with central devices (managers). Field devices can be quite complex necessitating the standardization of many data concepts for exchange. As such, the ISO 22741 series is divided into several individual parts.

This document identifies basic user needs for the management of virtually any field device and traces these needs to interoperable designs. This includes the ability to identify the device, its capabilities, and its status.

ISO 22741-1 provides additional details about how the ISO 22741 series relates to the overall ITS architecture.

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 22741-1, *Intelligent transport systems — Roadside modules AP-DATEX data interface —Part 1: Overview*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 22741-1 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

I/O input and output

PROM programmable read-only memory

RAM random-access memory

UPS uninterrupted power supply

5 Conformance

This document specifies conformance tables based on the requirements of ISO 22741-1. These tables identify the user needs associated with the part, indicate whether they are mandatory or optional for conformance to that part, and trace each feature to the requirements.

6 Architecture

6.1 General

This document defines data for the management and control of roadside field equipment. Figure 1 (ISO/TS 20684-1:2021) depicts the physical view of an interface between manager and field equipment. Manager, which is the manager of the field equipment, can be a central system, another field device, a maintenance laptop, or any other device that supports the defined interface.

The field equipment located in the field (e.g. along the roadside) shall have a connection to the manager and may have any number of connections to other ITS-S or external systems.

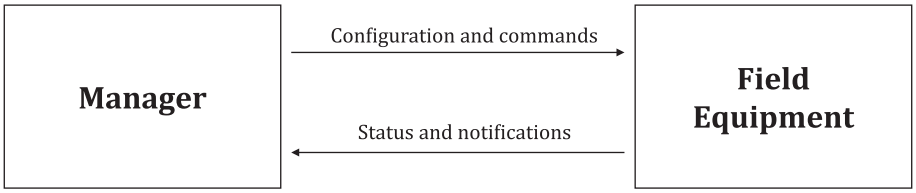

Figure 1 — Physical view of interface

6.2 Functional view of the interface

This document specifies the data concepts used to manage a field device. This document does not define the logic used to manage the field device or the protocols used to exchange the defined data elements. However, the data concepts defined in this document have been defined with the assumption that they would be exchanged using an AP-DATEX.

6.3 Physical view of interface

This document addresses interfaces between field equipment and the physical objects that can potentially manage the field equipment, typically centres and other field equipment. Specific information flows considered within the scope of this document include:

a) device identification;

b) information used to initialize, configure, and control the field device.

This document also defines other flows as deemed necessary during the development of detailed designs.

6.4 Communications view of interface

This document addresses the data within the application and management entities of the ITS-S architecture reference model as depicted in Figure 2.

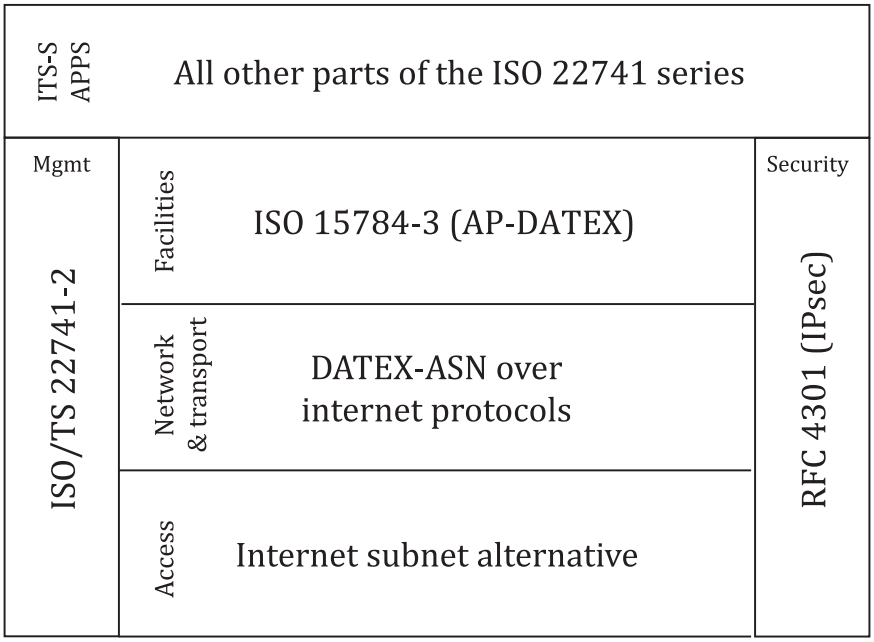

Figure 2 — Architecture reference model

6.5 Security and data protection

DATEX-ASN is typically exchanged using well-known internet protocols, such as UDP/IP or TCP/IP, and can then use IPsec, DTLS, TLS, etc. for security.

7 User needs

7.1 Monitor the field device

A manager needs to be able to identify and monitor the overall capabilities and health of each field device controller and its cabinet to discover anomalous conditions that can potentially affect its operation or security. This will assist the manager in confirming which controller(s) may be in a cabinet, as well as the type and specific instance of each controller and the high-level capabilities offered by the device as well as performing proper maintenance actions.

EXAMPLE A manager that is receiving unexpected errors can wish to verify which device it is communicating with as a part of a debugging process. The manager can also wish to determine if the device configuration has been changed since its last known state so that the appropriate action can be taken if access has not been authorized.

7.2 Monitor and control single-value inputs and outputs

Field devices may be equipped with auxiliary input ports or output ports, or both, that can be connected to simple external devices. It can be necessary for a manager to be able to monitor input ports to enable remote monitoring of simple external devices or control of output ports, or both, to enable remote control of simple external devices.

EXAMPLE 1 A field device can use an auxiliary output to remotely open or close a gate.

EXAMPLE 2 A field device can use an auxiliary input to report current gate position in percentage open.

7.3 Monitor cabinet

7.3.1 Monitor cabinet doors

It can be necessary for a manager to monitor the open/close status of each cabinet door to determine when equipment is being physically accessed.

7.3.2 Monitor and control cabinet fans

It can be necessary for a manager to monitor and control the on/off status of each cabinet fan to manage the cabinet temperature.

7.3.3 Monitor and control cabinet heaters

It can be necessary for a manager to monitor and control the on/off status of each cabinet heater to manage the cabinet temperature.

7.3.4 Monitor cabinet humidity

It can be necessary for a manager to monitor the relative humidity within the cabinet to disable the controller or subsystems in extreme conditions.

7.3.5 Monitor cabinet temperature

It can be necessary for a manager to monitor the air temperature inside of the cabinet to either determine when climate control equipment should be activated or to disable equipment to prevent overheating, or both.

7.3.6 Monitor cabinet AC power

It can be necessary for a manager to monitor the status of the incoming main AC power line, which is typically provided by the power grid to detect when this power is lost or becomes unstable.

7.3.7 Monitor cabinet battery power

It can be necessary for a manager to monitor the status of the battery power system to determine the quality of power and amount of charge available.

7.3.8 Monitor cabinet generator power

It can be necessary for a manager to monitor the status of the cabinet generator power to determine the quality of power being produced and the fuel reserve.

7.3.9 Monitor cabinet solar power

It can be necessary for a manager to monitor the status of the solar power system to determine the amount of power being generated.

7.3.10 Monitor cabinet wind power

It can be necessary for a manager to monitor the status of the wind power system to determine the amount of power being generated.