INTERNATIONAL STANDARD

ISO/IEC 24753

First edition
2011-09-01

Information technology — Radio frequency identification (RFID) for item management — Application protocol: encoding and processing rules for sensors and batteries

Technologies de l'information — Identification par radiofréquence (RFID) pour gestion d'objets — Protocole d'application: règles de codage et de traitement pour capteurs et batteries

Reference number
ISO/IEC 24753:2011(E)

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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national 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 and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 24753 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 31, *Automatic identification and data capture techniques*.

Introduction

The technology of radio frequency identification (RFID) is based on non-contact electronic communication across an air interface. The structure of the bits stored in the memory of the RFID tag is invisible and accessible between the RFID tag and the interrogator only by the use of the appropriate air interface protocol, as specified in the corresponding part of ISO/IEC 18000. Since the initial publication of ISO/IEC 18000, it has become possible to add sensors to the RFID tag using various physical methods, but always using the air interface protocol as a consistent means of communicating between the RFID tag and the interrogator.

For sensor information, functional commands from the application and responses from the interrogator are processed in a standard way. This allows equipment to be interoperable and, in the special case of the sensor attached to or integrated within an RFID tag, enables configuration parameters to be encoded in one system's implementation with the resultant sensory information to be read at a later time in a completely different and unknown system's implementation. The data bits stored on each RFID tag and sensor must be formatted in such a way as to be reliably read at the point of use if the sensor is to fulfil its basic objective. The integrity of this is achieved through the use of an application protocol, for example as supported by the functional commands specified in ISO/IEC 15961 and as specified in ISO/IEC 24791.

Manufacturers of radio frequency identification equipment (interrogators, RFID tags, etc.), manufacturers of sensors, and users of RFID technology supporting sensors each require a publicly available application protocol. This International Standard specifies the sensor encoding and processing rules, which are independent of any of the air interface standards defined in the various parts of ISO/IEC 18000. As such, the sensor encoding and processing rules are consistent components in the RFID system that can, independently, evolve to support additional air interface protocols and different types of sensors.

This International Standard specifies the overall process and methodologies developed to format and process sensory information in a standardized manner and provide an interface with the appropriate air interface protocol.

The transfer of sensory information and other related data to and from the application is supported by the use of the object identifiers standard, as defined in this International Standard.

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1 Scope

This International Standard defines a minimum application protocol to support sensors and the monitoring of batteries in conjunction with RFID tags utilizing the air interface as defined in the ISO/IEC 18000 series.

This application protocol for sensors applies to RFID tags irrespective of their operating frequency. This application protocol is agnostic to how the sensor(s) are connected to or integrated within the RFID tag; however, the communication between the interrogator and the sensor(s) is always through the RFID tag. This will allow the interrogator and application to understand a compliant sensor's characteristics and process its information without prior knowledge of that sensor. This will allow sensors to announce their sense activity and the units of measurement to the interrogator.

This International Standard provides common encoding rules for identifying sensors, their functions, and their delivered measurements. It also defines the process rules to support the following functions:

— selecting and de-selecting a particular sensory function when more than one is supported by the RFID tag;

NOTE The measurement of time or battery life can be considered as separate sensory functions.

— setting sensor parameters both initially and ongoing;

— starting and stopping the monitoring function of a sensor;

— accessing sensor data; and

— carrying out basic processing of sensor data and interpreting this into a format that is meaningful for an application.

2 Normative references

The following referenced documents are indispensable for the application 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/IEC 18000-6, *Information technology — Radio frequency identification for item management — Part 6: Parameters for air interface communications at 860 MHz to 960 MHz*

ISO/IEC 19762-1, *Information technology — Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary — Part 1: General terms relating to AIDC*

ISO/IEC 19762-3, *Information technology — Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary — Part 3: Radio frequency identification (RFID)*

IEEE 1451.7, *Standard for Smart Transducer Interface for Sensors and Actuators — Transducers to Radio Frequency Identification (RFID) Systems Communication Protocols and Transducer Electronic Data Sheet Formats*