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Information technology — Radio frequency identification (RFID) for item management — Data protocol: data encoding rules and logical memory functions

Technologies de l'information — Identification par radiofréquence (RFID) pour la gestion d'objets — Protocole de données: règles d'encodage des données et fonctions logiques de mémoire

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

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

This third edition cancels and replaces the second edition (ISO/IEC 15962:2013), which has been technically revised.

The main changes are as follows:

— editorial changes were made;

— references have been updated.

A list of all parts in the ISO/IEC 15962 series can be found on the ISO and IEC websites.

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 and www.iec.ch/national-committees.

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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 on the memory of the RFID tag is invisible and accessible between the RFID tag and the interrogator only by the use of an air interface protocol, as specified in the appropriate part of the ISO/IEC 18000 series. The result of the transfer of data between an application and an interrogator in open systems requires data to be encoded in a consistent manner on any RFID tag that is part of that open system. This is not only to allow equipment to be interoperable, but in the special case of data carriers, for the data to be encoded on the RFID tag in one system's implementation for it to be read at a later time in a completely different and unknown system's implementation. The data bits stored on each RFID tag must be formatted in such a way as to be reliably read at the point of use if the RFID tag is to fulfil its basic objective. This reliability is achieved through the specification of a Data Protocol using the application-defined arguments defined in ISO/IEC 15961-1 and the data encoding rules of this document. Additionally, ISO/IEC 24791-1 specifies a software system infrastructure architecture that enables RFID system operations between business applications and RFID interrogators. Specific parts of the ISO/IEC 24791 series address data management requirements (ISO/IEC 24791-2) and device interface requirements (ISO/IEC 24791-5). These support defined implementations that incorporate the encoding rules of this document and the functional rules of the commands and responses in ISO/IEC 15961-1.

Manufacturers of RFID equipment (e.g. interrogators, RFID tags) and the users of RFID technology require a standards-based Data Protocol for RFID for item management. ISO/IEC 15961-1, ISO/IEC 15961-2, ISO/IEC 15961-3, this document and the ISO/IEC 24791 series specify this protocol, which is layered above the air interface standards defined in the ISO/IEC 18000 series.

The Data Protocol used to exchange information in an RFID system for item management is specified in ISO/IEC 15961-1 and in this document. Both documents are required for a complete understanding of the Data Protocol in its entirety, but each focuses on one particular interface:

— ISO/IEC 15961-1 addresses the interface with the application system.

— This document deals with the processing of data and its presentation to the RF tag, and the initial processing of data captured from the RF tag.

The transfer of data to and from an application, supported by appropriate application commands, is the subject of ISO/IEC 15961-1. This document specifies the overall process and the methodologies developed to format the application data into a structure to store on the RFID tag.

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Information technology — Radio frequency identification (RFID) for item management — Data protocol: data encoding rules and logical memory functions

1 Scope

This document focuses on encoding the transfer syntax of the application commands defined in ISO/IEC 15961-1. The encodation is in a Logical Memory as a software analogue of the physical memory of the RFID tag being addressed by the interrogator.

This document

— defines the encoded structure of object identifiers;

— specifies the data compaction rules that apply to the encoded data;

— specifies a Precursor for encoding syntax features efficiently;

— specifies formatting rules for the data, e.g. depending on whether a directory is used or not;

— defines how application commands, e.g. to lock data, are transferred to the Tag Driver;

— specifies processes associated with sensory information and the transfers to the Tag Driver;

— defines other communication to the application.

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/IEC 15961-1, *Information technology — Radio frequency identification (RFID) for item management — Data Protocol — Part 1: Application interface*

ISO/IEC 19762, *Information technology — Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary*

3 Terms and definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 19762 and the following 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/

3.1.1
data compaction
mechanism, or algorithm, to process the original data so that it is represented efficiently in fewer bytes in a data carrier than in the original presentation

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3.1.2
data processor
implementation of the processes defined in this document, including the Data Compactor, Formatter, Logical Memory, and Command/Response Unit

3.1.3
precursor
byte, sometimes a sequence of bytes, used in the Directory and No-Directory Access-Methods that acts as metadata for the subsequent Object-Identifier and Object

3.2 Abbreviated terms

FQIDV Fully-qualified ID value

IDLPO ID List Packed Object

IDMPO ID Map Packed Object

PO Packed Object

TBD To be determined

TEI Text element identifier

URN uniform resource name

Since "TDS", "Type A" to "Type D" are commonly used in the industry to refer to the technology components as specified by these standards, the following designations are used in this document:

Type A refers to ISO/IEC 18000-61

Type B refers to ISO/IEC 18000-62

Type C refers to ISO/IEC 18000-63

Type D refers to ISO/IEC 18000-64

TDS refers to GS1 EPC, *Tag Data Standard*

4 Conformance

4.1 Conformance with the air interface

A conformant implementation of this document shall support one or more air interface protocols through the Tag Drivers defined in Annex C. Declarations of conformance shall refer to the specific air interface protocol(s). This applies to encoders, decoders, or more comprehensive devices.

4.2 Conformance with the application interface

4.2.1 Encoders and the application interface

Within the constraints of the air interface protocol supported, a conformant implementation of this document on an encoder shall support the application commands defined in 8.2 and the associated process argument, as defined in Clause 10.

A conformant RFID tag shall have its encoding in a state that can be properly decoded by a conformant decoder (see 4.2.2).

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