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Information technology — Radio frequency identification for item management software system infrastructure —

Part 5: Device interface

Technologies de l'information — Identification de radiofréquence (RFID) pour la gestion d'élément — Infrastructure de systèmes logiciels —

Partie 5: Interface de dispositif

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

This second edition cancels and replaces the first edition (ISO/IEC 24791-5:2012), which has been technically revised.

The main change is as follows: references to ISO/IEC 19762 and Type C of ISO/IEC 18000-63:2021 have been corrected.

A list of all parts in the ISO/IEC 24791 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

Radio frequency identification (RFID) air interface technology is based on non-contact electro-magnetic communication among interrogators and tags. RFID software systems are composed of RFID interrogators, intermediate software systems, and applications that provide control and coordination of air interface operation, tag information exchange, and health and performance management of system components. RFID technology is expected to increase effectiveness in many aspects of business by further advancing the capabilities of automatic identification and data capture (AIDC). To achieve this goal through the successful adoption of RFID technology into real business environments, RFID devices, software systems and business applications must provide secure and interoperable services, interfaces and technologies. This is the goal of the ISO/IEC 24791 series, which cover RFID software system infrastructure (SSI). The composition and operations of SSI exist in systems that implement other RFID standards, such as the ISO/IEC 18000 series which describes air interfaces, and ISO/IEC 15962, the ISO/IEC 15963 series and ISO/IEC 24753 which describe data and interface functions.

The goal of this document is to define a device interface that provides RFID controlling software with low-level access to RFID air interface hardware. This low-level access gives programmers a degree of control over the sequencing of air protocol commands and direct access to air protocol command parameter. Using this low-level interface, programmers can optimize RFID data access and control operations.

The interface defined by this document supports the following features:

— efficient, binary transfer syntax over transmission control protocol/internet protocol (TCP/IP);

— access to RFID air protocol commands and command parameters;

— support for optimized RFID tag access operations whereby multiple operations can be performed on a tag with minimal tag state changes;

— direct read or write access to all data on an RFID tag;

— read one or more individual tag data items (encoded as defined by ISO/IEC 15962) as specified by their '0 object identifier (OID) using uniform resource name (URN) notation;

— [optional] decode data items (encoded as defined by ISO/IEC 15962) into their Unicode representation (UTF-8 encoded) – encoding data items is not supported;

— support for RFID air protocol type defined by Type C of ISO/IEC 18000-63:2021.

The interface defined in this document provides access to RFID air protocol commands and their respective command parameters. Therefore, using this interface, tag memory banks can be locked, tags can be killed, and raw-binary RFID tag data can be accessed directly on a tag for both reading and writing. In addition, individual data items (encoded as defined by ISO/IEC 15962) can be read by specifying each data item's OID. Optionally, the interrogator can decode data items read into their character string representation. If the interrogator cannot decode a data item, then it will return the entire encoded package within which the data item resides. In this case, it is the responsibility of higher-level software to further decode the data item. The interface does not support RFID tag data encoding. It is the responsibility of higher-level software (i.e. software outside the interface defined by this document) to perform data encoding (e.g. by binary tag data representation as defined by ISO/IEC 15962) that is stored on RFID tags.

This document is an extension to GS1™ LLRP. As does GS1™ LLRP, this document defines both the abstract functional capabilities of the interrogator interface and the binary transfer syntax between the interrogator and a controlling system device. The transfer syntax is defined to be communicated over TCP/IP.

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Information technology — Radio frequency identification for item management software system infrastructure —

Part 5: Device interface

1 Scope

This document specifies an interface within the software system infrastructure (SSI) that provides radio frequency identification (RFID) system control components with low-level access to RFID interrogators for the purpose of optimizing RFID data access and control operations. This interface is designed to be modular with the ability to support multiple RFID air protocols. However, in this document, the only RFID air protocol supported is ISO/IEC 18000-63:2021.

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 8859-1, *Information technology — 8-bit single-byte coded graphic character sets — Part 1: Latin alphabet No. 1*

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

GS1™ LLRP, *Low Level Reader Protocol*

3 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
endpoint
one of two components that either implements and exposes an *interface* (3.1) to other components or uses the interface of another component

3.2
interrogator
component that implements and exposes the interrogator *interface* (3.1) to other system components

3.3
client endpoint
component that uses the interrogator *interface* (3.1) to access interrogators

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3.4
interface
shared boundary between two functional units, defined by various characteristics pertaining to the functions, physical or software interconnections, signal exchanges, and other characteristics, as appropriate

3.5
interrogator controller
system component, possibly a distinct physical device, which is capable of exercising the data, control and management of interrogators

3.6
data set
binary representation of a data element's identifier and its associated data value that is encoded according to the rules defined by the ISO/IEC 15962 standard access method

3.7
data item
pairing of a data element's identifier and its associated data value that is encoded according to the rules in ISO/IEC 15962, regardless of access method

3.8
encoded package
self-describing binary data from an RFID tag memory bank that, when given the memory bank's data format storage identifier (DFSID) (which defines the ISO/IEC 15962 access method and data format), decoding software can fully decode the individual *data item(s)* (3.7) to extract the encapsulated data

4 Abbreviated terms

For the purposes of this document, the symbols and abbreviated terms given in ISO/IEC 19762 and the following apply.

AFI	Application field identifier
AIDC	Automatic identification and data capture
DSFID	Data storage format identifier
LLRP	Low level reader protocol
RF	Radio frequency
SSI	Software system infrastructure
UML	Unified modelling language

5 Conformance

In order to conform to this document, the requirements of GS1™ LLRP and the requirements of GS1™ LLRP extensions defined in Clause 9 shall be met. Clause 9 is partitioned into subclauses and each subclause includes a specific conformance requirement subclause. Therefore, conformance to Clause 9 is defined by the "shall" statements of the conformance requirement subclauses of Clause 9. GS1™ LLRP also has specific conformance requirement paragraphs. Conformance to GS1™ LLRP is defined by the "shall" statements of the conformance requirement paragraphs found in GS1™ LLRP. While adherence to each subclause of Clause 9 is optional, once it has been decided to implement a subclause of Clause 9, the respective conformance requirements shall be met.

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