INTERNATIONAL STANDARD

ISO/IEC 18000-63

First edition
2013-01-15

Information technology — Radio frequency identification for item management —

Part 63: Parameters for air interface communications at 860 MHz to 960 MHz Type C

Technologies de l'information — Identification par radiofréquence (RFID) pour la gestion d'objets —

Partie 63: Paramètres de communications d'une interface radio entre 860 MHz et 960 MHz, Type C

Reference number
ISO/IEC 18000-63:2013(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

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.

ISO/IEC 18000-63 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 31, *Automatic identification and data capture techniques*.

ISO/IEC 18000 consists of the following parts, under the general title *Information technology — Radio frequency identification for item management*:

— *Part 1: Reference architecture and definition of parameters to be standardized*

— *Part 2: Parameters for air interface communications below 135 kHz*

— *Part 3: Parameters for air interface communications at 13,56 MHz*

— *Part 4: Parameters for air interface communications at 2,45 GHz*

— *Part 6: Parameters for air interface communications at 860 MHz to 960 MHz General*

— *Part 61: Parameters for air interface communications at 860 MHz to 960 MHz Type A*

— *Part 62: Parameters for air interface communications at 860 MHz to 960 MHz Type B*

— *Part 63: Parameters for air interface communications at 860 MHz to 960 MHz Type C*

— *Part 64: Parameters for air interface communications at 860 MHz to 960 MHz Type D*

— *Part 7: Parameters for active air interface communications at 433 MHz*

Introduction

This part of ISO/IEC 18000 describes a passive backscatter radio frequency identification (RFID) system that supports the following system capabilities:

- identification and communication with multiple tags in the field;
- selection of a subgroup of tags for identification or with which to communicate;
- reading from and writing to or rewriting data many times to individual tags;
- user-controlled permanently lockable memory;
- data integrity protection;
- Interrogator-to-tag communications link with error detection;
- tag-to-Interrogator communications link with error detection;
- support for both passive back-scatter tags with or without batteries.

This part of ISO/IEC 18000 specifies the physical and logical requirements for a passive-backscatter, RFID system operating in the 860 MHz to 960 MHz frequency range. The system comprises Interrogators, also known as readers, and tags, also known as labels.

An Interrogator transmits information to a tag by modulating an RF signal in the 860 MHz to 960 MHz frequency range. The tag receives both information and operating energy from this RF signal. Passive tags are those which receive all of their operating energy from the Interrogator's RF waveform. If tags maintain a battery then they may operate using some passive principles; however, they do not necessarily get all their operating energy from the Interrogator's RF waveform.

An Interrogator receives information from a tag by transmitting a continuous-wave (CW) RF signal to the tag; the tag responds by modulating the reflection coefficient of its antenna, thereby backscattering an information signal to the Interrogator. The system is Interrogator-Talks-First (ITF), meaning that a tag modulates its antenna reflection coefficient with an information signal only after being directed to do so by an Interrogator.

Interrogators and tags are not required to talk simultaneously; rather, communications are half-duplex, meaning that Interrogators talk and tags listen, or vice versa.

The International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) draw attention to the fact that it is claimed that compliance with this document may involve the use of patents concerning radio frequency identification technology.

ISO and IEC take no position concerning the evidence, validity and scope of these patent rights.

The holders of these patent rights have assured ISO and IEC that they are willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statements of the holders of these patent rights are registered with ISO and IEC.

Information on the declared patents may be obtained from:

Contact details	
Patent Holder:	
Legal Name	Atmel Automotive GmbH
Contact for license application:	
Name & Department	Leo Merken, Legal Department, ATMEL Corporation
Address	2325 Orchard Parkway
Address	San Jose, CA 95131 USA
Tel.	+1 408 436 4251
Fax	+1 408 487 2615
E-mail	leo.merken@atmel.com
URL (optional)	
Patent Holder:	
Legal Name	CISC Semiconductor Design+Consulting GmbH
Contact for license application:	
Name & Department	Markus Pistauer, CEO
Address	Lakeside B07
Address	9020 Klagenfurt, Austria
Tel.	+43(463) 508 808
Fax	+43(463) 508 808-18
E-mail	m.pistauer@cisc.at
URL (optional)	www.cisc.at

Patent holder:	
ETRI (Electronics Telecommunication Reseach Institute)	
Contact for license application:	
Name & Department:	Min-Sheo Choi, Intellectual Property Management Team
Address:	138 Gajeongno, Yuseong-gu
Address:	Daejeon, 305-700, Korea
Tel.	+82-42-860-0756
Fax	+82-42-860-3831
E-mail	choims@etri.re.kr
URL (optional)	www.etri.re.kr
Patent Holder:	
Legal Name	Impinj, Inc.
Contact for license application:	
Name & Department	Chris Diorio, CTO
Address	701 N. 34th Street, Suite 300
Address	Seattle, WA 98103, USA
Tel.	+1.206 834 1115
Fax	+1.206 517.5262
E-mail	diorio@impinj.com
URL (optional)	www.impinj.com

Patent Holder:	
Legal Name:	Magellan Technology Pty. Limited
Contact for license application:	
Name & Department:	Ms Jean Angus
Address:	65 Johnston St
Address:	Annandale, NSW 2038, Australia
Tel.	+61 2 9562 9800
Fax	+61 2 9518 7620
E-mail:	license@magellan-technology.com
URL (optional):	www.magellan-technology.com
Patent Holder:	
Legal Name	NXP B.V.
Contact for license application:	
Name & Department	Aaron Waxler – IP Licensing & Claims
Address	411 East Plumeria,
Address	San Jose, CA 95134-1924, USA
Tel.	+1 914 860-4296
Fax	
E-mail	Aaron.Waxler@nxp.com
URL (optional)	

Patent Holder:	
Legal Name	TAGSYS SAS
Contact for license application:	
Name & Department	Mr. Alain Fanet President
Address	785 Voie Antiope, TI Athélia 3
Address	F-13600 La Ciotat
Tel.	+33 332188900
Fax	+33 332188900
E-mail	alain.fanet@tagsysrfid.com
URL (optional)	www.tagsysrfid.com

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified above. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

The latest information on IP that may be applicable to this part of ISO/IEC 18000 can be found at www.iso.org/patents

Information technology — Radio frequency identification for item management —

Part 63: Parameters for air interface communications at 860 MHz to 960 MHz Type C

1 Scope

This part of ISO/IEC 18000 defines the air interface for radio frequency identification (RFID) devices operating in the 860 MHz to 960 MHz Industrial, Scientific, and Medical (ISM) band used in item management applications. It provides a common technical specification for RFID devices that can be used by ISO committees developing RFID application standards. This part of ISO/IEC 18000 is intended to allow for compatibility and to encourage inter-operability of products for the growing RFID market in the international marketplace. It defines the forward and return link parameters for technical attributes including, but not limited to, operating frequency, operating channel accuracy, occupied channel bandwidth, maximum effective isotropic radiated power (EIRP), spurious emissions, modulation, duty cycle, data coding, bit rate, bit rate accuracy, bit transmission order, and, where appropriate, operating channels, frequency hop rate, hop sequence, spreading sequence, and chip rate. It further defines the communications protocol used in the air interface.

This part of ISO/IEC 18000 specifies the physical and logical requirements for a passive-backscatter, Interrogator-Talks-First (ITF) systems. The system comprises Interrogators, also known as readers, and tags, also known as labels. An Interrogator receives information from a tag by transmitting a continuous-wave (CW) RF signal to the tag; the tag responds by modulating the reflection coefficient of its antenna, thereby backscattering an information signal to the Interrogator. The system is ITF, meaning that a tag modulates its antenna reflection coefficient with an information signal only after being directed to do so by an Interrogator.

In detail, this part of ISO/IEC 18000 contains Type C.

Type C uses PIE in the forward link and a random slotted collision-arbitration algorithm.

This part of ISO/IEC 18000 specifies

— physical interactions (the signalling layer of the communication link) between Interrogators and tags,

— Interrogator and tag operating procedures and commands,

— the collision arbitration scheme used to identify a specific tag in a multiple-tag environment.

2 Conformance

To claim conformance with this part of ISO/IEC 18000, an Interrogator or tag shall comply with all relevant clauses of this part of ISO/IEC 18000, except those marked as “optional”. The Interrogator or tag shall also operate within local radio regulations, which can further restrict operation.

Relevant conformance test methods are provided in ISO/IEC TR 18047-6.

Conformance can also require a license from the owner of any intellectual property utilized by said device.

2.1 Interrogator conformance and obligations

To conform to this part of ISO/IEC 18000, an Interrogator shall

— support Type C

— implement the mandatory commands defined in this part of ISO/IEC 18000;

— modulate/transmit and receive/demodulate a sufficient set of the electrical signals defined in the signalling layer of this part of ISO/IEC 18000 to communicate with conformant tags; and

— operate within the applicable local regulations.

To conform to this part of ISO/IEC 18000, an Interrogator may

— implement any subset of the optional commands defined in this part of ISO/IEC 18000, and

— implement any proprietary and/or custom commands in conformance with this part of ISO/IEC 18000.

To conform to this part of ISO/IEC 18000, the Interrogator shall not

— implement any command that conflicts with this part of ISO/IEC 18000 or any of the parts 61, 62 and 64, or

— require the use of an optional, proprietary, or custom command to meet the requirements of this part of ISO/IEC 18000.

2.2 Tag conformance and obligations

To conform to this part of ISO/IEC 18000, a tag shall:

— support Type C;

— operate over the frequency range from 860 MHz to 960 MHz, inclusive;

— implement the mandatory commands defined in this part of ISO/IEC 18000 for the supported types;

— modulate a backscatter signal only after receiving the requisite command from an Interrogator; and

— conform to local radio regulations.

To conform to this part of ISO/IEC 18000, a tag may

— implement any subset of the optional commands defined in this part of ISO/IEC 18000; and

— implement any proprietary and/or custom commands as defined in Clauses 7.

To conform to this part of ISO/IEC 18000, a tag shall not:

— implement any command that conflicts with this part of ISO/IEC 18000 or any of the parts 61, 62 and 64;

— require the use of an optional, proprietary, or custom command to meet the requirements of this part of ISO/IEC 18000; or

— modulate a backscatter signal unless commanded to do so by an Interrogator using the signalling layer defined in this part of ISO/IEC 18000.

3 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 7816-6, *Identification cards — Integrated circuit cards — Part 6: Interindustry data elements for interchange*

ISO/IEC 15961, *Information technology — Radio frequency identification (RFID) for item management — Data protocol: application interface*

ISO/IEC 15962, *Information technology — Radio frequency identification (RFID) for item management — Data protocol: data encoding rules and logical memory functions*

ISO/IEC 15963, *Information technology — Radio frequency identification for item management — Unique identification for RF tags*

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

EPCglobal Tag Data Standards version 1.3 and above, EPCglobal Inc.

4 Terms and definitions, symbols and abbreviated terms

4.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 19762 (all parts) and the following apply.

4.1.1
battery saver mode
battery saving functionality based on low power threshold detection with optional duty cycling

4.1.2
collision arbitration loop
algorithm used to prepare for and handle a dialogue between an Interrogator and a tag

NOTE This is also known as collision arbitration.

4.1.3
cover-coding
method by which an Interrogator obscures information that it is transmitting to a tag by requesting a random number from the tag, then performing a bit-wise EXOR of the data or password with the received random number, and, finally, transmitting the cover-coded (also called ciphertext) string to the tag, which uncovers the data or password by performing a bit-wise EXOR of the received cover-coded string with the original random number

4.1.4
Dense-Interrogator environment
operating environment within which most or all of the available channels are occupied by active Interrogators

EXAMPLE 25 active Interrogators operating in 25 available channels.