
**Information technology — Radio
frequency identification for item
management —**

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

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

*Partie 7: Paramètres de communications actives d'une interface radio
à 433 MHz*



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Contents

Page

| | |
|---|------------|
| Foreword | iv |
| Introduction | v |
| 1 Scope | 1 |
| 2 Conformance | 1 |
| 2.1 RF emissions general population..... | 1 |
| 2.2 RF emissions and susceptibility health care setting..... | 1 |
| 2.3 Command structure and extensibility..... | 1 |
| 2.4 Mandatory commands..... | 2 |
| 2.5 Optional commands..... | 2 |
| 2.6 Custom commands..... | 2 |
| 2.7 Proprietary commands..... | 2 |
| 3 Normative references | 2 |
| 4 Terms and definitions | 3 |
| 5 Symbols and abbreviated terms | 3 |
| 6 433,92 MHz active narrowband specification | 3 |
| 6.1 Physical layer..... | 3 |
| 6.2 Data Link layer..... | 4 |
| 6.3 Tag commands..... | 16 |
| 6.4 Tag collection and collision arbitration..... | 50 |
| 6.5 Multi-packet UDB Collection..... | 53 |
| 6.6 Physical and Media Access Control (MAC) parameters..... | 55 |
| 6.7 Security architecture..... | 59 |
| 7 Extended Mode | 78 |
| 7.1 General description..... | 78 |
| 7.2 Physical (PHY) Layer..... | 81 |
| 7.3 MAC Layer..... | 86 |
| 7.4 Application layer Framework..... | 111 |
| Annex A (normative) Co-existence of different application standards based on ISO/IEC 18000-7 | 188 |
| Annex B (informative) Derivation of Session Key K_S Using SHA-1 | 190 |
| Annex C (informative) Overview of PKI and Digital Certificates | 191 |
| Annex D (normative) Implementation of ISO/IEC/IEEE 21451-7 Sensors into ISO/IEC 18000-7 | 193 |
| Annex E (informative) Example of ISO 15962, 6-bit Encoded Data on an ISO/IEC 18000-7 Tag | 200 |
| Bibliography | 202 |

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.

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 31, *Automatic identification and data capture techniques*.

This fourth edition cancels and replaces the third edition (ISO/IEC 18000-7:2009), which has been technically revised and extended.

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 is intended to address radio frequency identification (RFID) devices operating in the 433 MHz frequency band, providing an air interface implementation for wireless, non-contact information system equipment for item management applications. Typical applications operate at ranges greater than one metre.

The RFID system includes a host system and RFID equipment (interrogator and tags). The host system runs an application program, which controls interfaces with the RFID equipment. The RFID equipment is composed of two principal components: tags and interrogators. The tag is intended for attachment to an item, which a user wishes to manage. It is capable of storing a tag serial number and other data regarding the tag or item and of communicating this information to the interrogator. The interrogator is a device, which communicates to tags in its RF communication range. The interrogator controls the protocol, reads information from the tag, directs the tag to store data in some cases, and ensures message delivery and validity. This system uses an active tag.

RFID systems defined by this part of ISO/IEC 18000 provide the following minimum features:

- identify tag in range;
- read data;
- write data or handle read-only systems gracefully;
- selection by group or address;
- graceful handling of multiple tags in the field of view;
- error detection.

This part of ISO/IEC 18000 consists of two modes, Base and Extended. The following simplified differences should be drawn between the two modes:

- Base Mode defined in [clause 6](#) is backwards compatible and includes all features described in the last revision of this part of ISO/IEC 18000 (ISO/IEC 18000-7:2009) with the addition of security features as described in [clause 6.7](#).
- Extended Mode defined in [clause 7](#) is new to this part of ISO/IEC 18000. Extended Mode presents a new communication protocol stack (PHY, MAC and Application layers) and provides an extended feature set that addresses more complex user and deployment requirements.

Substantive differences exist between Base Mode and Extended Mode across all layers of the communication protocol (PHY, MAC and Application). However, both modes may co-exist in any given physical environment.

All parties are directed to consider carefully their use model before determining the most appropriate mode.

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:

| |
|---|
| Patent Holder: Legal Name CISC Semiconductor 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: Legal Name Impinj, Inc. Contact for license application: Name & Department Stacy Jones Address 701 N 34th Street, Suite 300 Address Seattle, WA 98103, USA Tel. +1 206 834 1032 Fax +1 206 517 5262 E-mail stacy.jones@impinj.com URL (optional) www.impinj.com |

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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 7: Parameters for active air interface communications at 433 MHz

1 Scope

This part of ISO/IEC 18000 defines the air interface for radio frequency identification (RFID) devices operating as an active RF tag in the 433 MHz band used in item management applications. It provides a common technical specification for RFID devices that can be used by ISO technical 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. This part of ISO/IEC 18000 defines the forward and return link parameters for technical attributes including, but not limited to, operating frequency, operating channel accuracy, occupied channel bandwidth, maximum power, 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. This part of ISO/IEC 18000 further defines the communications protocol used in the air interface.

2 Conformance

The rules for evaluation of RFID device conformity to this part of ISO/IEC 18000 are defined in ISO/IEC TR 18047-7.

2.1 RF emissions general population

Device manufacturers claiming conformance to this part of ISO/IEC 18000 shall declare on their own responsibility that RF emissions do not exceed the maximum permitted exposure limits recommended by either IEEE C95.1:2005 or ICNIRP according to IEC 62369-1. If a device manufacturer is unsure which recommendation is to be cited for compliance, the manufacturer shall declare on their own responsibility to ICNIRP limits.

2.2 RF emissions and susceptibility health care setting

Device manufacturers claiming conformance to this part of ISO/IEC 18000 shall declare on their own responsibility that RF emissions and susceptibility comply with IEC 60601-1-2.

2.3 Command structure and extensibility

This part of ISO/IEC 18000 includes a definition of the structure of command codes between an interrogator and a tag and indicates how many positions are available for future extensions.

Command specification clauses provide a full definition of the command and its presentation.

Each command is labelled as being “mandatory” or “optional”.

The clauses of this part of ISO/IEC 18000 make provisions for “custom” and “proprietary” commands.

2.4 Mandatory commands

A mandatory command shall be supported by all tags that claim to be compliant and all interrogators which claim compliance shall support all mandatory commands.

2.5 Optional commands

Optional commands are commands that are specified as such within this part of ISO/IEC 18000. Interrogators shall be technically capable of performing all optional commands that are specified in this part of ISO/IEC 18000 (although they need not be set up to do so). Tags may or may not support optional commands.

If an optional command is used, it shall be implemented in the manner specified in this part of ISO/IEC 18000.

2.6 Custom commands

Custom commands may be permitted by those applying this part of ISO/IEC 18000, but they are not specified in this part of ISO/IEC 18000.

A custom command shall not solely duplicate the functionality of any mandatory or optional command defined in this part of ISO/IEC 18000 by a different method. An interrogator shall use a custom command only in accordance with the specifications of the tag manufacturer.

2.7 Proprietary commands

Proprietary commands may be permitted by those applying this part of ISO/IEC 18000, but they are not specified in this part of ISO/IEC 18000.

A proprietary command shall not solely duplicate the functionality of any mandatory or optional command defined in this part of ISO/IEC 18000 by a different method. All proprietary commands shall be disabled before the tag leaves the tag manufacturer. Proprietary commands are intended for manufacturing purposes and shall not be used in field-deployed RFID systems.

3 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 15459 (all parts), *Information technology — Unique identifiers*

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

ISO/IEC TR 18047-7, *Information technology — Radio frequency identification device conformance test methods — Part 7: Test methods for active air interface communications at 433 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)*

IEC 62369-1, *Ed. 1.0, Evaluation of human exposure to electromagnetic fields from short range devices (SRDs) in various applications over the frequency range 0 GHz to 300 GHz — Part 1: Fields produced by devices used for electronic article surveillance, radio frequency identification and similar systems*

IEC 60601-1-2, *Medical electrical equipment — Part 1-2: General requirements for basic safety and essential performance — Collateral standard: Electromagnetic compatibility — Requirements and tests*

ICNIRP Guidelines, *Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)*, International Commission on Non-Ionizing Radiation Protection

IEEE C95.1:2005, *IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz*

IEEE Std 802.15.4, *IEEE Standard for Local and metropolitan area networks Part 15.4: Low-Rate Wireless Personal Area Networks (LR-WPANs)*