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 pour la gestion d'objets —
Partie 7: Paramètres de communications actives d'une interface d'air à 433 MHz
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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.

ISO/IEC 18000-7 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 18000-7:2008), which has been technically revised.

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
— 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:

<table>
<thead>
<tr>
<th>Feature</th>
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<tbody>
<tr>
<td>identify tag in range;</td>
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<tr>
<td>read data;</td>
</tr>
<tr>
<td>write data or handle read-only systems gracefully;</td>
</tr>
<tr>
<td>selection by group or address;</td>
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<tr>
<td>graceful handling of multiple tags in the field of view;</td>
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<tr>
<td>error detection.</td>
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</table>

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 a patent concerning radio frequency identification technology given in 6.2. ISO and IEC take no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured ISO and IEC that he is willing to negotiate licenses under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with ISO and IEC. Information may be obtained from the following.

<table>
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<tr>
<th>Patent number</th>
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<td>US 5640151</td>
<td>Communication system for communicating with tags</td>
<td>Savi Technology</td>
<td>Hurst Arthur, VP, General Counsel, Savi Technology, Inc., 351 East Evelyn Ave., Mountain View, CA 94041, USA</td>
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<td>US 11/432684</td>
<td>Method and apparatus for efficient data transmission from a tag</td>
<td>Savi Technology</td>
<td>Hurst Arthur, VP, General Counsel, Savi Technology, Inc., 351 East Evelyn Ave., Mountain View, CA 94041, USA</td>
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<td>US 6,470,045</td>
<td>Communication protocol between a transceiver unit and transponders or transceiver associated with said unit</td>
<td>EM Microelectronic Marin SA</td>
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<td>US 6,784,787</td>
<td>Identification systems</td>
<td>Zebra Technologies</td>
<td>Eric McAlpine, IP Counsel, Legal Department, 333 Corporate Woods Parkway, Vernon Hills, IL 60061-3109, USA</td>
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<td>EP 1 031 046</td>
<td>Electronic identification systems</td>
<td>Zebra Technologies</td>
<td>Eric McAlpine, IP Counsel, Legal Department, 333 Corporate Woods Parkway, Vernon Hills, IL 60061-3109, USA</td>
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<td>US 6,480,143</td>
<td>Passive transponder</td>
<td>Zebra Technologies</td>
<td>Eric McAlpine, IP Counsel, Legal Department, 333 Corporate Woods Parkway, Vernon Hills, IL 60061-3109, USA</td>
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<td>US 5,680,459</td>
<td>Delayed reset mode model for electronic identification system</td>
<td>Zebra Technologies</td>
<td>Eric McAlpine, IP Counsel, Legal Department, 333 Corporate Woods Parkway, Vernon Hills, IL 60061-3109, USA</td>
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<td>US 5,537,105</td>
<td>Electronic identification systems</td>
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<td>US 5,966,083</td>
<td>Methods and apparatus for reducing power consumption of an active transponder</td>
<td>University of Pittsburgh</td>
<td>Marc S. Malandro, Ph.D., CLP, University of Pittsburgh, 200 Gardner Steel Conference Center, Thackeray &amp; O’Hara Streets, Pittsburgh, PA 15260, USA</td>
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<td>US 5,995,017</td>
<td>Methods and apparatus for switching a transponder to an active state, and asset management systems employing same</td>
<td>University of Pittsburgh</td>
<td>Marc S. Malandro, Ph.D., CLP, University of Pittsburgh, 200 Gardner Steel Conference Center, Thackeray &amp; O’Hara Streets, Pittsburgh, PA 15260, USA</td>
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<td>US 7375637</td>
<td>System and method for real time asset location and tracking</td>
<td>University of Pittsburgh</td>
<td>Marc S. Malandro, Ph.D., CLP, University of Pittsburgh, 200 Gardner Steel Conference Center, Thackeray &amp; O’Hara Streets, Pittsburgh, PA 15260, USA</td>
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<td>US 6563417</td>
<td>Interrogation, monitoring and data exchange using RFID Tags</td>
<td>Identec Solutions</td>
<td>Stefan Schwiers, CTO, R&amp;D Department, Identec Solutions AG, Millennium Park 2, 6890 Lustenau, Austria</td>
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<td>EP 99117640.5-2215</td>
<td>System for monitoring, tracking, and handling of objects</td>
<td>Identec Solutions</td>
<td>Stefan Schwiers, CTO, R&amp;D Department, Identec Solutions AG, Millennium Park 2, 6890 Lustenau, Austria</td>
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<td>US 7345576</td>
<td>Method and apparatus for resolving RFID based object traffic transactions to single container in the presence of a plurality of containers</td>
<td>Identec Solutions</td>
<td>Stefan Schwiers, CTO, R&amp;D Department, Identec Solutions AG, Millennium Park 2, 6890 Lustenau, Austria</td>
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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 or IEC shall not be held responsible for identifying any or all such patent rights.
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 interoperability 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.