INFOTEHNOLOOGIA
Raadiosageduse tuvastaja üksuse haldamiseks
Osa 6: Raadioliidese edastusparameetrid 860 MHz kuni 960 MHz juures
Üldist

Information technology
Radio frequency identification for item management
Part 6: Parameters for air interface communications at 860 MHz to 960 MHz
General
(ISO/IEC 18000-6:2013)

EESTI STANDARDIKESKUS
ESTONIAN CENTRE FOR STANDARDISATION

EESTI STANDARDI EESSÕNA	NATIONAL FOREWORD
See Eesti standard EVS-ISO/IEC 18000-6:2013 „Infotehnoloogia. Raadiosageduse tuvastaja üksuse haldamiseks. Osa 6: Raadioliidese edastusparameetrid 860 MHz kuni 960 MHz juures. Üldist“ sisaldab rahvusvahelise standardi ISO/IEC 18000-6:2013 „Information technology. Radio frequency identification for item management. Part 6: Parameters for air interface communications at 860 MHz to 960 MHz. General“ identset ingliskeelset teksti.	This Estonian Standard EVS-ISO/IEC 18000-6:2013 consists of the identical English text of the International Standard ISO/IEC 18000-6:2013 „Information technology. Radio frequency identification for item management. Part 6: Parameters for air interface communications at 860 MHz to 960 MHz. General“.
Ettepaneku rahvusvahelise standardi ümbertrüki meetodil ülevõtuks on esitanud EVS/TK 4, standardi avaldamist on korraldanud Eesti Standardikeskus.	Proposal to adopt the International Standard by reprint method has been presented by EVS/TK 4, the Estonian standard has been published by the Estonian Centre for Standardisation.
Standard EVS-ISO/IEC 18000-6:2013 on jõustunud sellekohase teate avaldamisega EVS Teataja 2013. aasta juunikuu numbris.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Käsitlusala

See ISO/IEC 18000 osa defineerib raadioliidese raadiosageduse tuvastamise (RFID) seadmetele, mis töötavad 860 MHz kuni 960 MHz tööstusliku, teadusliku ja meditsiinilise (ISM) eesmärgiga raadiosagedusalas, mida kasutatakse üksuse haldamise rakendustes. See pakub ühtset tehnilist kirjeldust RFID seadmetele, mida saavad kasutada RFID rakenduse standardeid arendavad ISO komisjonid. Selle ISO/IEC 18000 osa eesmärk on võimaldada ühilduvust ja julgustada toodete koostalitlusvõimet kasvaval RFID rahvusvahelisel turul. Standard defineerib edastus- ja tagasisidelingi tehniliste omaduste parameetrid, sealhulgas, aga mitte ainult, töösageduse, töökanali täpsuse, kasutatava kanali ribalaiuse, maksimaalse efektiivse isotroopse kiirgusvõimsuse (EIRP), vääremissiooni, modulatsiooni, töötsükli, andmekodeerimise, andmemahu, andmemahu täpsuse, andmete saatmise järjekorra ning vajadusel töökanalite, sageduse hüpitamise kiiruse, vahetamismeetodi, jaotusjada ja koodiedastuskiiruse parameetrid. Lisaks määratleb see kommunikatsiooniprotokolli, mida kasutatakse raadioliideses.

See ISO/IEC 18000 osa koos standarditega ISO/IEC 18000-61, ISO/IEC 18000-62, ISO/IEC 18000-63 ja ISO/IEC 18000-64 täpsustab füüsikalised ja loogikanõuded RFID süsteemile passiivtagasipeegeldaja, ülekuulaja-räägib-esimesena (ITF) ja märgistatu-räägib-ainult-pärast-kuulamist (TOTAL). Süsteem hõlmab Ülekuulajajaid, mis on tuntud ka kui lugejad, ning Märgistatuid, mis on tuntud ka kui sildid. Ülekuulaja saab Märgistatult informatsiooni, edastades püsiva laine (CW) RF signaali Märgistatule; Märgistatu vastab, moduleerides oma antenni peegelduse koefitsiendi ja seeläbi peegeldades informatsioonisignaali tagasi Ülekuulajale. Süsteem on ITF, tähendades seda, et Märgistatu moduleerib oma antenni peegelduse koefitsiendi koos infosignaaliga ainult pärast Ülekuulajalt või TOTAL-ilt saadud juhiseid, tähendades seda, et Märgistatu moduleerib oma antenni peegelduse koefitsiendi koos infosignaaliga pärast sisenemist Ülekuulaja alale pärast esimest Ülekuulaja modulatsiooni kuulmist, selgitamaks välja, kas süsteem on ITF või mitte.

See ISO/IEC 18000 osa sisaldab ühte neljatüübilist režiimi. Nelja tüübi detailsed tehnilised erinevused on esitatud parameetrite tabelis.

Tüübid A, B ja C on ITF. Tüüp A kasutab edastuslingis impulsisageduse kodeerimist (PIE) ning adaptiivset ALOHA põrkearbitraaži algoritmi. Tüüp B kasutab edastuslingis Manchesteri ja adaptiivset kahendpuu põrkearbitraaži algoritmi. Tüüp C kasutab edastuslingis PIE-t ja juhuslikku põrkearbitraaži algoritmi.

Tüüp D on TOTAL, põhinedes pulss-positsioonkodeeringul või Miller M=2 kodeeritud alakandjal.

See ISO/IEC 18000 osa koos standarditega ISO/IEC 18000-61, ISO/IEC 18000-62, ISO/IEC 18000-63 ja ISO/IEC 18000-64 täpsustab

— ülekuulaja ja märgistatu vahelised (kommunikatsioonilingi signaali kihi) füüsikalised sidemed,

— ülekuulaja ja märgistatu opereerimisprotseduurid ja käsud,

— põrkearbitraaži skeemi, mida kasutatakse spetsiifilise märgi identifitseerimiseks mitmemärgilises keskkonnas.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 35.040

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.

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.

ISO/IEC 18000-6 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 31, *Automatic identification and data capture techniques*.

This third edition, together with ISO/IEC 18000-61, ISO/IEC 18000-62, ISO/IEC 18000-63 and ISO/IEC 18000-64 replaces the second edition (ISO/IEC 18000-6:2010) by splitting it into parts ISO/IEC 18000-6, ISO/IEC 18000-61, ISO/IEC 18000-62, ISO/IEC 18000-63 and ISO/IEC 18000-64.

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 provides the overview 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. The general overview describes four Types called Type A, Type B, Type C and Type D. Details for each part are defined in the following documents:

— Type A ISO/IEC 18000-61

— Type B ISO/IEC 18000-62

— Type C ISO/IEC 18000-63

— Type D ISO/IEC 18000-64

This part of ISO/IEC 18000 together with ISO/IEC 18000-61, ISO/IEC 18000-62, ISO/IEC 18000-63 and ISO/IEC 18000-64 specify 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) for Types A, B and C, 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.

This part of ISO/IEC 18000 further contains an optional “tag only talks after listening” Type D, an enhanced Tag Talks Only (TTO) technique. Type D uses Pulse-Position Encoding (PPE) or Miller encoding in the return link and does not define a dedicated forward link. In fact, tags may implement one of the types defined in this part of ISO/IEC 18000 (A, B, or C) besides Type D in order to allow enhanced tag access techniques.

Information technology — Radio frequency identification for item management —

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

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, together with ISO/IEC 18000-61, ISO/IEC 18000-62, ISO/IEC 18000-63 and ISO/IEC 18000-64 specifies the physical and logical requirements for a passive-backscatter, Interrogator-Talks-First (ITF) or tag-only-talks-after-listening (TOTAL) RFID system. 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, or TOTAL, meaning that a tag modulates its antenna reflection coefficient with an information signal upon entering an Interrogator's field after first listening for Interrogator modulation in order to determine if the system is ITF or not.

This part of ISO/IEC 18000 contains one mode with four types. The detailed technical differences between the four types are shown in the associated parameter tables.

Types A, B and C are ITF. Type A uses Pulse-Interval Encoding (PIE) in the forward link and an adaptive ALOHA collision-arbitration algorithm. Type B uses Manchester in the forward link and an adaptive binary-tree collision-arbitration algorithm. Type C uses PIE in the forward link and a random slotted collision-arbitration algorithm.

Type D is TOTAL based on Pulse Position Encoding or Miller M=2 encoded subcarrier.

This part of ISO/IEC 18000, together with ISO/IEC 18000-61, ISO/IEC 18000-62, ISO/IEC 18000-63 and ISO/IEC 18000-64 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

2.1 Claiming 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.

2.2 Interrogator conformance and obligations

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

— support at least one Type of A, B, C or D – it can optionally support two, three or all four;

— 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

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

2.3 Tag conformance and obligations

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

— support at least one Type of A, B, C or D;

— 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 or, in the case of Type D, only after listening for the absence of ITF modulation; 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, 8 and 9.

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;

— 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 or, in the case of Type D, before listening for the absence of ITF modulation.

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 18000-61, *Information technology — Radio frequency identification for item management — Part 6: Parameters for air interface communications at 860 MHz to 960 MHz Type A*

ISO/IEC 18000-62, *Information technology — Radio frequency identification for item management — Part 6: Parameters for air interface communications at 860 MHz to 960 MHz Type B*

ISO/IEC 18000-63, *Information technology — Radio frequency identification for item management — Part 6: Parameters for air interface communications at 860 MHz to 960 MHz Type C*

ISO/IEC 18000-64, *Information technology — Radio frequency identification for item management — Part 6: Parameters for air interface communications at 860 MHz to 960 MHz Type D*

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

4 Terms, 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
slotted random anticollision
collision-arbitration algorithm where tags load a random (or pseudo-random) number into a slot counter, decrement this slot counter based on Interrogator commands, and reply to the Interrogator when their slot counter reaches zero

4.2 Symbols

M	number of subcarrier cycles per symbol
UII	unique item identifier

4.3 Abbreviated terms

CRC	cyclic redundancy check
CRC-16	sixteen bit CRC