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Information technology — Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary —

Part 3: Radio frequency identification (RFID)

Technologies de l'information — Techniques automatiques d'identification et de saisie de données (AIDC) — Vocabulaire harmonisé —

Partie 3: Identification par radiofréquence (RFID)

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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.

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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.

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ISO/IEC 19762-3 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 19762-3:2005), which has been technically revised.

ISO/IEC 19762 consists of the following parts, under the general title *Information technology — Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary*:

— *Part 1: General terms relating to AIDC*

— *Part 2: Optically readable media (ORM)*

— *Part 3: Radio frequency identification (RFID)*

— *Part 4: General terms relating to radio communications*

— *Part 5: Locating systems*

Introduction

ISO/IEC 19762 is intended to facilitate international communication in information technology, specifically in the area of automatic identification and data capture (AIDC) techniques. It provides a listing of terms and definitions used across multiple AIDC techniques.

Abbreviations used within each part of ISO/IEC 19762 and an index of all definitions used within each part of ISO/IEC 19762 are found at the end of the relevant part.

Information technology — Automatic identification and data capture (AIDC) techniques — Harmonized vocabulary —

Part 3:
Radio frequency identification (RFID)

1 Scope

This part of ISO/IEC 19762 provides terms and definitions unique to radio frequency identification (RFID) in the area of automatic identification and data capture techniques. This glossary of terms enables the communication between non-specialist users and specialists in RFID through a common understanding of basic and advanced concepts.

2 Classification of entries

The numbering system employed within ISO/IEC 19762 is in the format nn.nn.nnn, in which the first two numbers (***nn***.nn.nnn) represent the "Top Level" reflecting whether the term is related to 01 = common to all AIDC techniques, 02 = common to all optically readable media, 03 = linear bar code symbols, 04 = two-dimensional symbols, 05 = radio frequency identification, 06 = general terms relating to radio, 07 = real time locating systems, and 08 = MIIM. The second two numbers (nn.***nn***.nnn) represent the "Mid Level" reflecting whether the term is related to 01 = basic concepts/data, 02 = technical features, 03 symbology, 04 = hardware, and 05 = applications. The third two or three numbers (nn.nn.***nnn***) represent the "Fine" reflecting a sequence of terms.

The numbering in this part of ISO/IEC 19762 employs "Top Level" numbers (**nn**.nn.nnn) of 05.

3 Terms and definitions

05.01.01
radio frequency identification
RFID
use of electromagnetic or inductive coupling in the radio frequency portion of the spectrum to communicate to or from a tag through a variety of modulation and encoding schemes to uniquely read the identity of an RF Tag

05.01.02
backscatter(1)
process whereby a **transponder** responds to a reader/interrogation signal or field by modulating and re-radiating or transmitting the response signal at the same carrier **frequency**

05.01.03
backscatter(2)
technique for retrieving information from a **tag** in which the narrow band energy from the **interrogator** is reflected back to the interrogator in varying degrees as the impedance of the tag **antenna** is modulated

05.01.04
awake
state at which the **tag's** receiver is powered and able to receive and respond to a transmission from a compliant **interrogator**

05.01.05
enrolment
process by which a **tag** initially becomes associated with an **interrogator**

05.01.06
false activation
response due to the result of a 'foreign' or non-assigned **transponder** entering the **interrogation zone** of a radio frequency **identification** system and effecting a response, erroneous or otherwise

05.01.07
family of tags
group of **tags** with differing capabilities which are nevertheless capable of communicating ID numbers and/or data with a common **interrogator**

05.01.08
in field reporting
mode of operation in which a **reader/interrogator** reports a t**ransponder** ID when the transponder enters the **interrogation zone** and then periodically at a prescribed interval of time while the tag remains in the interrogation zone

cf. **out of field reporting**

05.01.09
out of field reporting
mode of operation in which the identification of a **transponder** is reported as or once the transponder leaves the reader **interrogation zone**

05.01.10
interrogation
process of communicating with and reading a **transponder**

05.01.11
interrogation zone
region in which a **transponder** or group of transponders can be effectively read by an associated **radio frequency identification** reader/interrogator

05.01.12
tag ID
generic reference to either a manufacturer **tag ID** or user **tag ID**

05.01.13
user tag ID
user-defined **tag** identifier

NOTE The user **tag ID** may not be a unique identifier.

05.01.14
manufacturer tag ID
reference number which uniquely identifies the **tag**

05.01.15
orientation sensitivity
sensitivity of response for a **transponder** expressed as a function of angular variation or orientation

05.01.16
phantom transaction
report of a non-existent **tag**

05.01.17
INCITS T6
technical committee of the ANSI accredited standards developer responsible for the development of **RFID** technical standards within the United States

NOTE Formerly known as X3T6 and NCITS T6.

05.01.18
rate
quantity of tags per unit time including impulse and steady state

NOTE Tag population will be both static and dynamic.

05.02.01
identify
process of tag segregation and isolation, resulting in a uniquely addressable means to communicate with a **tag** (the tag ID)

NOTE Application data has not been accessed.

05.02.02
identification range
range at which an RFID system can reliably identify desired tags under defined conditions

05.02.03
identification rate
rate at which an RFID system can reliably identify desired tags under defined conditions

05.02.04
read
process of tag transaction to retrieve information from identified tag population, including both single byte and multiple byte transactions

05.02.05
read range
range at which an RFID system can reliably read from desired tags under defined conditions

05.02.06
read rate
rate at which an RFID system may reliably read desired tags under defined conditions

05.02.07
write(1)
process of tag transaction to write information into identified tag population

NOTE This process will include both single byte and multiple byte transactions. Write with verification will be available.

05.02.08
write range
range at which an RFID system may reliably write to desired tags under defined conditions

05.02.09
write rate
rate at which an RFID system may reliably write to desired tags under defined conditions

05.02.10
pick rate
percentage detection rate for an **RF** system

NOTE This is a function the speed of throughput, **tag** orientation, number of tags present, etc.

05.02.11
in-use programming
tags in read/write systems that have the ability to read from and **write** to a **transponder** while it is attached to the object or item for which it is being used

05.02.12
re-programmability
ability to change the data content of a **transponder** using a suitable **programming** device

cf. **in-use programming**

05.02.13
read only
transponder in which the data is stored in an unchangeable manner and can therefore only be read

cf. **factory programming**

05.02.14
field programming
programming information into the **tags** after the tag has been shipped from the manufacturer to an OEM customer or end user or in some cases to the manufacturer's distribution locations

NOTE Field programming usually occurs before the tag is installed on the object to be identified. This approach enables the introduction of data relevant to the specifics of the application into the tag at any time; however, the tag would typically have to be removed from its object. In some cases, change or duplication of all data in the tag is possible. In other cases, some portion is reserved for factory **programming**. This might include a unique tag serial number, for example. Field programming is usually associated with **Write Once Read Many (WORM)** and **read/write (RW)** devices. The data entered into a **transponder** may be by a combination of factory and field programming.

cf. **factory programming**, **field programming**

05.02.15
factory programming
entering of data into a **transponder** as part of the manufacturing process, resulting in a read-only **tag**

cf. **field programming**

05.02.16
return link (**uplink**)
communications from **tag** to **interrogator**

05.02.17
roaming
ability of a **tag** to move from one **interrogator's** cell to another

05.02.18
selection
process by which an **interrogator** requests that a specific **tag** or subset of tags responds to the interrogator

05.02.19
separation
operational distance between two **tags** or between a tag and the **interrogator**

05.02.20
shadowing
condition in which an object located between an **interrogator** and a **tag** obscures the signals thus preventing a successful transaction

05.02.21
abstract syntax
⟨OSI Presentation Service⟩ specification of application layer **data** or application protocol control information by using notation rules that are independent of the encoding technique used to represent them

05.02.22
inventoried flag
flag that indicates whether a tag may respond to an interrogator

NOTE Tags maintain a separate inventoried flag for each of four sessions, where each flag has symmetric A and B values within any given session, and in which interrogators typically inventory tags from A to B followed by a re-inventory of tags from B back to A (or vice versa).

05.02.23
inventory round
period initiated by a query command and terminated by either a subsequent query command (which also starts a new inventory round) or a select command

05.02.24
permalocked
memory location whose lock status is unchangeable (i.e. the memory location is permanently locked or permanently unlocked)

05.02.25
persistent memory
memory whose state is maintained during a brief loss of tag power

05.02.26
persistent flag
flag value whose state is maintained during a brief loss of tag power

05.02.27
transfer syntax
abstract syntax and concrete syntax used in the transfer of data between open systems

NOTE The term ‘transfer syntax’ is sometimes used to mean encoding rules, and sometimes used to mean the representation of bits in data while in transit.

05.02.28
type reference
name, in ASN.1 syntax, associated uniquely with a characteristic

EXAMPLE **ObjectId**

05.02.29
application family identifier
AFI
mechanism used in the **data protocol** and the air interface protocol to select a class of RFID tags relevant to an application, or aspect of an application, and to ignore further communications with other classes of RFID tags with different identifiers

05.02.30
data format
mechanism used in the **data protocol** to identify how **object identifiers** are encoded on the RFID tag, and (where possible) identify a particular data dictionary for the set of relevant object identifiers for that application

05.02.31
write once/read many
WORM
transponder that can be partially or totally programmed once by the user, and thereafter only read

05.02.32
write protection
capability provided in the **tag** design which permits all or part of the memory to be shielded from modification, superimposition or erasure

05.02.33
command/response unit
part of the **data protocol processor** that processes application commands and sends responses to control encoding, decoding, structuring of the **logical memory** and transfer to the **tag driver**

05.02.34
data compaction
mechanism or algorithm to process the original data so that it is represented efficiently in fewer octets in a data carrier than in the original presentation

05.02.35
data compactor
implementation of the data compaction process defined in ISO/IEC 15962

05.02.36
data protocol processor
implementation of the processes defined in ISO/IEC 15962, including the **data compactor**, **formatter**, **logical memory**, and **command/response unit**

05.02.37
element name
component of a **reference type** or enumerated list in **ASN.1** syntax

05.02.38
formatter
implementation of the data formatting process defined in ISO/IEC 15962

05.02.39
singulation
identifying an individual tag in a multiple-tag environment

05.02.40
slot
point in an inventory round at which a tag may respond

NOTE Slot is the value output by a tag's slot counter; tags reply when their slot (i.e. the value in their slot counter) is zero.

05.02.41
tag-identification layer
set of functions and commands used by an interrogator to identify and modify tags

NOTE Also known as the operating procedure.

05.02.42
octet
ordered sequence of eight bits considered as a unit, equivalent to an 8-bit byte

NOTE The term is used in preference to 'byte' in ISO/IEC 19762 and in the ASN.1 standards to avoid confusion in cases where there is a hardware association, e.g. 7-bit byte, 16-bit byte.

05.02.43
object
well-defined piece of information, definition, or specification that requires a name in order to identify its use in an instance of communication

05.02.44
object identifier
objectID
OID
value (distinguishable from all other such values) which is associated with an object

05.02.45
object identifier type
simple ASN.1 type whose distinguished values are the set of all object identifiers allocated in accordance with the rules of ISO/IEC 8824-1 | ITU-T X.680.

05.02.46
relative-OID
particular object identifier that constitutes the remaining arcs after the root-OID

05.02.47
root-OID
particular object identifier that constitutes the first, second and subsequent common arcs of a set of object identifiers (hence the common root)

NOTE The root-OID followed immediately by the relative-OID equates to the complete object identifier.

05.02.48
response
feedback received by the application from an application command sent to the **data protocol processor**

05.02.49
batch reading
process or capability of a **radio frequency identification reader/interrogator** to read a number of **transponders** present within the system's **interrogation zone** at the same time

05.02.50
multiple readings
See **batch reading**.

05.02.51
addressability
ability to address bits, fields, pages, **files** or other defined areas of **memory** within a tag

05.02.52
continuous reporting
mode of **reader/interrogator** operation wherein the identification of a **transponder** is reported or communicated continuously while the transponder remains within the **interrogation** field

05.02.53
data field protection
facility to control access to and operations upon items or fields of data stored within the **transponder**

05.02.54
field protection
See **data field protection**.

05.02.55
interoperability(1)
condition that exists between systems, from different vendors, to execute bi-directional data exchange functions, in a manner that allows them to operate effectively together

05.02.56
Interoperability(2)
guarantee of a certain level of compatibility between different implementations of the same standard

NOTE The desired level of compatibility is specific to a given standard, and can be limited to basic services. Interconnection and interoperability are the main objectives of standardization.

05.02.57
memory capacity
measure of the data expressed in bits or bytes, that can be stored in a **transponder**

NOTE The measure may relate simply to the bits that are accessible to the user or to the total assembly of bits, including data identifier and error control bits.

05.02.58
signalling technique
complete description of the **modulation**, data encoding, protocol, and sequences required to communicate between **tags** and **interrogators**

05.02.59
tree algorithm
deterministic algorithm used by the **interrogator** which upon detection of a **collision** searches the available space of possible values of a tag-generated random number until all **tags** are resolved

05.02.60
application command
instruction issued from the application to the **data protocol processor** in order to initiate an action or operation with the RF tag(s) via the interrogator

05.02.61
application memory
area on the RF tag available for storing data written to it

NOTE Sometimes known as user memory.

05.02.62
arc
specific branch of an object identifier tree, with new arcs added as required to define a particular object

NOTE The top three arcs of all object identifiers compliant with ISO/IEC 9834-1 are defined in Annex A of ISO/IEC 9834-1:2005.

05.02.63
basic encoding rules
BER
one of several ASN.1 encoding methods

05.02.64
block
minimum number of bytes on an RF tag that can be in a write transaction, or read transaction, across the air interface

05.02.65
sleep cycle
periodic turning off of non-essential components within an **RF tag** as a means of reducing power demands on the battery

05.02.66
reader talks first
RTF
system in which an RF tag responds with an information signal only after being directed to do so by a reader/interrogator

05.02.67
tag talks first
TTF
communication initialized by a tag upon entering an interrogation field

NOTE The tag is the master, the interrogator the slave. If a communication is established the interrogator can also operate as the master.

05.02.68
tag initiated communication
capability of an active **tag** to transmit a signal to an **interrogator**, which will cause the interrogator to recognize the **tag** and respond

cf. **tag talks first**

05.02.69
tag-to-tag communication
capability of **RF tags** to communicate with each other as well as with an **interrogator**

05.02.70
bi-directional
capable of operating in either of two directions, which are the opposite of each other

EXAMPLE A tag that can be **read** or written from either side is bi-directional.

05.02.71
proximity
closeness of one system component with respect to another, such as that of a **transponder** with respect to a reader

05.02.72
monolithic memory structure
memory storage that is addressable by a single addressing element

05.02.73
segmented memory structure
memory storage that is separated into separate elements and requires multiple addressing elements for access

05.02.74
system information
information held on the RF tag, or generated by unique features of the air interface, that specify **data protocol** parameters to establish the **logical memory** and other formatting rules

05.02.75
tag driver
implementation of the process to transfer data between the **data protocol processor** and the RF tag

05.02.76
training sequence
TSC
dedicated bit sequence to ease the reception for a receiver

05.02.77
random-slotted collision arbitration
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

05.02.78
logical memory
software analogue on the **data protocol processor** of the **logical memory map**

05.02.79
logical memory map
array of contiguous octets of memory on the RF tag, representing the application (or user) memory to be used exclusively for the encoding of **objects**, **OIDs** and their associated **precursor** on the RF tag

cf. **passive tag**

05.04.01
passive tag
RFID device which reflects and modulates a carrier signal received from an interrogator

05.04.02
active tag
RFID device having the ability of producing a radio signal

05.04.03
unitized active tag
active **tag** or **transponder** in which the batteries are sealed within the device

05.04.04
asynchronous tag
RF **tag** whose timing is derived from internal, independent oscillator

NOTE In such systems data rates are independent of, and not aligned with, the reader's carrier cycles.

cf. **synchronous tag**

05.04.05
synchronous tag
RF tag whose timing is aligned with each cycle of the reader's carrier

05.04.06
annunciator
device which can be attached to an **RF tag** and which emits a visual or aural signal upon command for purposes of assisting in identifying a **tag** or tagged item

05.04.07
electronic label
alternative term for a **transponder** or **RF tag**

05.04.08
fixed RFID equipment
FE
equipment required to interrogate, receive and interpret the data in the on-board equipment (on-board **transponders**) in order to present the identification

05.04.09
interrogator
fixed or mobile data capture and identification device using a radio frequency **electromagnetic field** to stimulate and effect a modulated data response from a **transponder** or group of transponders present in the **interrogation zone**

05.04.10
reader/interrogator
reader/writer
electronic device for performing the process of retrieving data from and potentially transmitting data to a **transponder** and, as appropriate, the contention and error control management, and **channel** and source **decoding** required to recover and communicate the data entered at source

NOTE The device may also interface with an integral display and/or provide a parallel or serial communications interface to a **host** computer or industrial **controller**.

05.04.11
memory modules
term for a **read/write** or re-programmable **transponder**

cf. **active tag**

05.04.12
RF module/stage
part of a **reader/interrogator** that creates and receives the **RF** signals

05.04.13
automatic equipment identification
AEI
system of identification for equipment that uses the surface transportation infrastructures by means of **transponders** and **interrogators** combined with an unambiguous data structure

05.04.14
radio frequency identification system
automatic identification system and data capture system comprising one or more reader/interrogators and one or more **transponders** in which data **transfer** is achieved by means of suitably modulated inductive or radiating electromagnetic **carriers**

NOTE In such systems **data rates** are derived from and aligned with the reader's carrier cycles.

05.04.15
AFI tag
ISO/IEC 18000-6 Type C or 18000-3 Mode 3 tag with Protocol Control bit 17 set at '1' indicating that what follows is an Application Family Identifier (AFI)

05.04.16
EPC tag
ISO/IEC 18000-6 Type C or 18000-3 Mode 3 tag with Protocol Control bit 17 set at '0' indicating that what follows is an EPC header

05.04.17
proximity sensor
electronic device that detects and signals the presence of a selected object

NOTE When used in association with a **radio frequency identification** system the **sensor** is set up to sense the presence of a tagged or **transponder** carrying object when it enters the vicinity of the **reader/interrogator** so that the reader can then be activated to effect a **read**.

05.05.01
dense-interrogator environment
operating environment within which most or all of the available channels are occupied by active interrogators

EXAMPLE 50 active interrogators operating in 50 available channels

05.05.02
dense-interrogator mode
set of interrogator-to-tag and tag-to-interrogator signaling parameters used in dense-interrogator environments

05.05.03
single-interrogator environment
operating environment within which there is a single active interrogator at any given time

05.05.04
multiple-interrogator environment
operating environment within which a modest number of the available channels are occupied by active interrogators

EXAMPLE 10 active interrogators operating in 50 available channels

05.05.05
RF tag
tag
transponder
electronic label
code plate
transponder plus the information storage mechanism attached to the object

NOTE Although ‘transponder’ is technically the most accurate term, the most common and preferred term is ‘tag’ or ‘RF tag’.

4 Abbreviations

AFI	application family identifier
BER	basic encoding rules
FE	fixed RFID equipment
OID	object identifier
RFID	radio frequency identification
RTF	reader talks first
TSC	training sequence
TTF	tag talks first
WORM	write once/read many

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