
**Information technology — Radio
frequency identification (RFID) for item
management — Application protocol:
encoding and processing rules for
sensors and batteries**

*Technologies de l'information — Identification par radiofréquence
(RFID) pour gestion d'objets — Protocole d'application: règles de
codage et de traitement pour capteurs et batteries*



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Contents

Page

Foreword	v
Introduction.....	vi
1 Scope	1
2 Normative references	1
3 Terms, definitions and abbreviations.....	2
3.1 Terms and definitions	2
3.2 Abbreviations.....	3
4 Conformance	3
5 Basic Model.....	3
5.1 Logical interface model	3
5.2 The sensor information model for full function sensors	6
5.3 The sensor information model for simple sensors.....	7
6 Real time clock (RTC).....	8
6.1 General requirements	8
6.2 Presentation of time to the application	8
6.3 Encoding of the time stamp	8
6.4 Converting between the two time presentations	8
6.5 Setting the RTC.....	9
6.6 Time synchronisation	9
7 Full function sensors	10
7.1 General	10
7.2 Sensor identifier	11
7.3 Sensor characteristics record (Type 1).....	11
7.4 Sampling and configuration record.....	11
7.5 Event administration record.....	12
7.6 Event records.....	12
8 Simple sensors	13
8.1 General	13
8.2 Implementations	13
8.3 Record structures.....	13
8.4 Memory mapped simple sensor.....	15
8.5 Ported simple sensor	16
9 Processing functional application commands and responses	17
9.1 General	17
9.2 Processing full function sensors functional application commands and responses	17
9.3 Processing simple sensors functional application commands and responses.....	36
10 Processing rules for full function sensors based on IEEE 1451.7 type 001	46
10.1 General	46
10.2 1451.7 sensor ID – 64-bit unique sensor identifier	47
10.3 Primary sensor characteristics TEDS (Type 1)	47
10.4 Sampling and Configuration Record	49
10.5 Event Administration Record	51
10.6 Event records.....	54
11 Processing rules for simple sensors	61
11.1 General	61
11.2 Read-Simple-Sensor-Data-Block processing	61

11.3	Processing manufacturer data	63
11.4	Processing calibration data	65
11.5	Processing sample and configuration data	66
11.6	Processing event time and observed data	66
11.7	Processing time synchronisation data	66
11.8	Encoding the Sample-And-Configuration data	66
11.9	Decoding and processing the Sample-Counter value from the Event record	67
11.10	Decoding observed data	67
Annex A (normative) ISO/IEC 18000 sensor driver descriptions		69
Annex B (informative) UTC time: useful information		71
Bibliography		73

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.

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Introduction

The technology of radio frequency identification (RFID) is based on non-contact electronic communication across an air interface. The structure of the bits stored in the memory of the RFID tag is invisible and accessible between the RFID tag and the interrogator only by the use of the appropriate air interface protocol, as specified in the corresponding part of ISO/IEC 18000. Since the initial publication of ISO/IEC 18000, it has become possible to add sensors to the RFID tag using various physical methods, but always using the air interface protocol as a consistent means of communicating between the RFID tag and the interrogator.

For sensor information, functional commands from the application and responses from the interrogator are processed in a standard way. This allows equipment to be interoperable and, in the special case of the sensor attached to or integrated within an RFID tag, enables configuration parameters to be encoded in one system's implementation with the resultant sensory information to be read at a later time in a completely different and unknown system's implementation. The data bits stored on each RFID tag and sensor must be formatted in such a way as to be reliably read at the point of use if the sensor is to fulfil its basic objective. The integrity of this is achieved through the use of an application protocol, for example as supported by the functional commands specified in ISO/IEC 15961 and as specified in ISO/IEC 24791.

Manufacturers of radio frequency identification equipment (interrogators, RFID tags, etc.), manufacturers of sensors, and users of RFID technology supporting sensors each require a publicly available application protocol. This International Standard specifies the sensor encoding and processing rules, which are independent of any of the air interface standards defined in the various parts of ISO/IEC 18000. As such, the sensor encoding and processing rules are consistent components in the RFID system that can, independently, evolve to support additional air interface protocols and different types of sensors.

This International Standard specifies the overall process and methodologies developed to format and process sensory information in a standardized manner and provide an interface with the appropriate air interface protocol.

The transfer of sensory information and other related data to and from the application is supported by the use of the object identifiers standard, as defined in this International Standard.

Information technology — Radio frequency identification (RFID) for item management — Application protocol: encoding and processing rules for sensors and batteries

1 Scope

This International Standard defines a minimum application protocol to support sensors and the monitoring of batteries in conjunction with RFID tags utilizing the air interface as defined in the ISO/IEC 18000 series.

This application protocol for sensors applies to RFID tags irrespective of their operating frequency. This application protocol is agnostic to how the sensor(s) are connected to or integrated within the RFID tag; however, the communication between the interrogator and the sensor(s) is always through the RFID tag. This will allow the interrogator and application to understand a compliant sensor's characteristics and process its information without prior knowledge of that sensor. This will allow sensors to announce their sense activity and the units of measurement to the interrogator.

This International Standard provides common encoding rules for identifying sensors, their functions, and their delivered measurements. It also defines the process rules to support the following functions:

- selecting and de-selecting a particular sensory function when more than one is supported by the RFID tag;

NOTE The measurement of time or battery life can be considered as separate sensory functions.

- setting sensor parameters both initially and ongoing;
- starting and stopping the monitoring function of a sensor;
- accessing sensor data; and
- carrying out basic processing of sensor data and interpreting this into a format that is meaningful for an application.

2 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 18000-6, *Information technology — Radio frequency identification for item management — Part 6: Parameters for air interface communications at 860 MHz to 960 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)*

IEEE 1451.7, *Standard for Smart Transducer Interface for Sensors and Actuators — Transducers to Radio Frequency Identification (RFID) Systems Communication Protocols and Transducer Electronic Data Sheet Formats*