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Information technology — Sensor Network Reference Architecture (SNRA) – Part 2: Vocabulary and Terminology

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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ISO/IEC 29182-2 was prepared by Working Group ISO/IEC JTC 1/WG 7, Working Group on Sensor Network.

ISO/IEC 29182 consists of the following parts, under the general title Information technology — Sensor networks: Sensor Network Reference Architecture (SNRA):

— Part 1: General overview and requirements

— Part 2: Vocabulary/Terminology

— Part 3: Reference architecture views

— Part 4: Entity models

— Part 5: Interface definitions

— Part 6: Application profiles

— Part 7: Interoperability guidelines

Introduction

The main purpose of this part is to provide a general description of concepts in the field of sensor networks and to be used as a guidance of developing other parts of ISO/IEC 29182. Terms defined in this part are to be understood in the field of sensor networks.

ISO/IEC 29182 standards comprise of seven parts.

Part 1 provides the general overview and the requirements identified for reference architecture.

Part 2 part provides the definitions of all the terminology and vocabulary used in the sensor network reference architecture.

Part 3 provides the reference architecture views, e.g., business, operational, systems, technical as well as different presentation of the architecture, e.g., functional, logical, etc.

Part 4 provides the description of entity models, e.g., system, subsystem, component models, with their interfaces, functional descriptions, and how they are used in the reference architecture and for implementation.

Part 5 provides detailed, supportive information on the interfaces among the entity models in the reference architecture. The interface definitions include the data/information descriptions, system level specifications, and so on.

Part 6 provides the application profiles that are derived from studies of use cases, scenarios, etc., for sensor network based applications and services.

Part 7 provides the design principles for interoperability based on the reference architecture which is developed with interoperability requirements.

These International Standards can be used by sensor network designers, software developers and service providers to meet customer requirements and the organization’s own requirements for interoperability.

Information technology — Sensor Network Reference Architecture (SNRA) – Part 2: Vocabulary and Terminology

1 Scope

This part of ISO/IEC 29182 is intended to facilitate international standards in sensor networks. It presents terms and definition of selected concepts relevant to the field of sensor networks. It establishes a general description of concepts in this field and identifies the relationships among those concepts. It could be used as a guidance of developing other parts of ISO/IEC 29182.

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 772:1996, Hydrometric determinations -- Vocabulary and symbols

ISO/IEC 2382-8:1998, Information technology -- Vocabulary -- Part 8: Security

ISO/IEC 2382-26:1993, Information technology -- Vocabulary -- Part 26: Open systems interconnection

ISO 7498-2:1989, Information processing systems -- Open Systems Interconnection -- Basic Reference Model -- Part 2: Security Architecture

ISO/IEC 8802-3:2000, Information technology -- Telecommunications and information exchange between systems -- Local and metropolitan area networks -- Specific requirements -- Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications

ISO 10160:1997, Information and documentation -- Open Systems Interconnection -- Interlibrary Loan Application Service Definition

ISO/IEC 18014-2:2002, Information technology -- Security techniques -- Time-stamping services -- Part 2: Mechanisms producing independent tokens

Editor's note: new version 2009.

ISO/IEC 18028-2:2006, Information technology -- Security techniques -- IT network security -- Part 2: Network security architecture

ISO/IEC WD 20005, Services and Interfaces Supporting Collaborative Information Processing in Intelligent Sensor Networks

IEEE std 802.15.4-2006, Information technology— Telecommunications and information exchange between systems— Local and metropolitan area networks— Specific requirements Part 15.4: Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low-Rate Wireless Personal Area Networks (WPANs)

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 General

3.1.1
Actuator
An actuator is a device that performs physical response caused by input signal.

3.1.2
Sensor
A sensor is a device that observes and measures phenomenon/phenomena and physical property and converts the measurement result into a signal.

Note: (1) Signal can be electrical, chemical, or other types of sensory responses; (2) Signal can be represented by 1-D, 2-D, 3-D, or higher dimensional data.

Editor's Note: Modification of definition of sensor in SGSN Technical Document 2.3.1.1.

3.1.3
Sensor network
A system of spatially distributed sensor networks nodes interacting with each other and, depending on applications, interacting with other infrastructure in order to acquire, process, transfer, and provide information extracted from the physical world with a primary function of information gathering.

- **Note:** A sensor network may have some control capability.
- **Note**: Distinguishing features of a sensor network is that it can include: wide area coverage, radio networks, flexibility of purpose, self-organising topologies, openness, providing data for multiple applications, etc.

3.1.4
Sensor network gateway
A device, which links between sensor network and other networks, has capabilities of protocol transferring and data exchange.

3.1.5
Sensor network node
It is known as any network element in sensor network.

3.1.6
Sensor node
In the context of sensor network, a sensor node is a network element that performs detection and has data processing, networking and management capabilities.

Editor's Note: Modification of definition of sensor node in SGSN Technical Document 2.3.1.3.

3.2 Reference architecture

3.2.1
Reference architecture of sensor network
Editor's note: Need input from other part of ISO/IEC 29182.

3.2.2
Reference model of sensor network
Editor's note: Need input from other part of ISO/IEC 29182.

3.2.3
Sensor network application
Use cases of sensor networks, which provide a set of functions to users.

3.2.4
Sensor network service
A set of functions offered by sensor network nodes and sensor network.

Editor's Note: Modification of definition of sensor network service in SGSN Technical Document 2.3.3.

3.3 Communication and networking
3.3.1 Protocol stack
3.3.1.1
Application layer
The layer that provides means for the sensor networks application processes to exchange meaningful information.

Editor's Note: Modification of 26.02.03 in ISO/IEC 2382-26:1993 and 3.1.2 in ISO 10160:1997

3.3.1.2
Media access control
The data link sublayer that is responsible for transferring sensor network data to and from the Physical Layer.

Editor's Note: Modification of 1.4.167 in ISO/IEC 8802-3:2000.

3.3.1.3
Network layer
The layer provides for the entities the means for transferring blocks of sensor network data, by routing and switching through the network between systems in which those entities reside.

Editor's Note: Modification of 26.02.07 in ISO/IEC 2382-26:1993.

3.3.1.4
Personal area network
A personal area network is the interconnection of sensor network nodes within the range of an individual person, typically within a range of 10 meters.

3.3.1.5
Physical layer
The layer that provides the mechanical, electrical, functional, and procedural means to establish, maintain and release physical connections for transfer of sensor network data over a transmission medium.

Editor's Note: Modification of 26.02.09 in ISO/IEC 2382-26:1993.

3.3.2 Basic function
3.3.2.1
Association
The service used to establish membership for a sensor network node in a sensor network.

Note: reference to 3.2 in IEEE std 802.15.4-2006

3.3.2.2
Coordinator
A device that is responsible for association and disassociation in sensor network.

3.3.2.3
Disassociation
The service used to terminate membership for a sensor network node in a sensor network.

3.3.2.4
Relay

A process of receiving, augmenting and regenerating signals from sensor network nodes to extend the coverage of sensor network.

3.3.2.5
Routing
A process of forwarding sensor network data from a source node to a destination node based on certain rules.

3.4 Data and information processing
3.4.1 Data
3.4.1.1
Sensor network characteristic data
Data generated after processing sensor network raw data which has particular property.

Example: Sensor network characteristic data can be generated by classification of raw data or extraction of features from raw data.

3.4.1.2
Sensor network decision data
Further processed data used to provide decision service for users based on sensor network raw data or sensor network characteristic data.

3.4.1.3
Sensor network metadata
Data that describes property of sensing data.

3.4.1.4
Sensor network raw data
Unprocessed data directly from the measurement of variables in physical world.

Editor's Note: modification of 1.136 in ISO 772:1996

3.4.1.5
Sensor network sensing data
Data generated by acquiring and processing various measurements from observations in physical world to describe property or status of physical world; sensor network sensing data may be raw data, characteristic data or decision data.

3.4.2 Information processing
3.4.2.1
Aggregation
The process of merging data of multiple sensor network nodes.

3.4.2.2
Collaborative information processing
A form of information processing in which multiple discrete components or entities participate in a manner of collaboration, in order to enhance processing efficiency and to improve quality and reliability of the results.

Editor's Note: Reference to ISO/IEC WD 20005

3.4.2.3
Fusion
The process of acquiring new information with higher quality by processing a set of data or sets of data.

3.4.2.4
Information
Knowledge concerning things, facts and concept, which is able to be exchanged between users or between entities.

3.4.2.5
Information processing

The manipulation of data or information so that new data or information which is implicit in the original be appeared in a useful form, or with which further information processing can be applied and/or be utilized to make appropriate response within the context of an objective, problem or situation.

Editor's Note: Reference to ISO/IEC WD 20005

3.5 Interface
3.5.1
Data interface
The abstract description of characteristic parameter of physical interface, and data type and exchange protocol carried on physical interface.

3.5.2
Physical interface
The adaptation specification used to connect output signal of sensor on sensor node.

3.5.3
Sensor interface
A set of software, hardware and protocol specification used to attach sensor on sensor node, which mainly consists of physical interface and data interface.

3.6 Security and privacy
3.6.1
Authentication
The provision of assurance of the claimed identity of a sensor network entity.

Editor's Note: Modification of 009 in ISO/IEC 18014-2:2002.

3.6.2
Authorization
Granting of rights to an entity in sensor network, which includes the granting of access based on access rights.

Editor's Note: Modification of 08.01.16 in ISO/IEC 2382-8:1998.

3.6.3
Availability
The property of being accessible and useable upon demand by an authorized sensor network entity or a user.

Editor's Note: Modification of 3.4 in ISO/IEC 18028-2:2006.

3.6.4
Confidentiality
The property that information is not made available or disclosed to unauthorized individuals, entities, or processes.

Editor's Note: Reference 3.3.16 in ISO 7498-2:1989.

3.6.5
Data integrity
The property that sensor network data has not been altered or destroyed in an unauthorized manner.

Editor's Note: Modification of 002 in ISO/IEC 18014-2:2002.

3.6.6
Data security
Validity of sensor network data during data processing and transmission, including confidentiality, data integrity and freshness.

3.7 Service supporting
3.7.1
Device management of sensor network
Control and maintenance of property, identifier and status of devices in sensor network.

3.7.2
Identification
The process of recognizing sensor network nodes and describing their object property.

3.7.3
Identifier
A value that unambiguously identifies sensor network nodes, which may be presented by digit, character, symbol or any other data type.

3.7.4
Network management of sensor network
Management of network sources and attributions in sensor network to assure quality of service.

3.7.5
Quality of Service in sensor network
The combined effect of service performance of sensor network, which determines the satisfaction of users.

3.7.6
Sensor network middleware
Reusable software module or service programme that provides logical functions for sensor network application and sensor network service.

3.8 Others
3.8.1
Physical world
Objective reality that can be sensed and detected.

Annex A
(informative)

Alphabetical index

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