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Information technology — Real time locating systems (RTLS) —

Part 61: Low rate pulse repetition frequency Ultra Wide Band (UWB) air interface

Technologies de l'information — Systèmes de localisation en temps réel (RTLS) —

Partie 61: Interface d'air ultra large à bas taux de bande de fréquence de répétition d'impulsion (UWB)

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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.

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 24730-61 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 31, *Automatic identification and data capture techniques*.

ISO/IEC 24730 consists of the following parts, under the general title *Information technology — Real time locating systems (RTLS)*:

— *Part 1: Application program interface (API)*

— *Part 2: Direct Sequence Spread Spectrum (DSSS) 2,4 GHz air interface protocol*

— *Part 5: Chirp spread spectrum (CSS) at 2,4 GHz air interface*

— *Part 21: Direct Sequence Spread Spectrum (DSSS) 2,4 GHz air interface protocol: Transmitters operating with a single spread code and employing a DBPSK data encoding and BPSK spreading scheme*

— *Part 22: Direct Sequence Spread Spectrum (DSSS) 2,4 GHz air interface protocol: Transmitters operating with multiple spread codes and employing a QPSK data encoding and Walsh offset QPSK (WOQPSK) spreading scheme*

— *Part 61: Low rate pulse repetition frequency Ultra Wide Band (UWB) air interface*

— *Part 62: High rate pulse repetition frequency Ultra Wide Band (UWB) air interface*

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Introduction

This series of standards defines an air interface protocol for Real Time Locating Systems (RTLS) for use in asset management and is intended to allow for compatibility and to encourage interoperability of products for the growing RTLS market.

This document establishes an air interface technical standard for Real Time Locating Systems that operates within the 6 – 10.6 GHz unlicensed band. RTLSs are wireless systems with the ability to locate the position of an item anywhere in a defined space (local/campus, wide area/regional, global) at a point in time that is, or is close to, real time. Position is derived by measurements of the physical properties of the radio link.

Conceptually there are four classifications of RTLS:

- Locating an asset via satellite - requires line-of-sight - accuracy to 10 meters
- Locating an asset in a controlled area, e.g., warehouse, campus, airport - area of interest is instrumented - accuracy to 3 meters
- Locating an asset in a more confined area - area of interest is instrumented - accuracy to tens of centimetres
- Locating an asset over a terrestrial area using a terrestrial mounted readers over a wide area, cell phone towers for example – accuracy 200 meters

With a further two methods of locating an object which are really Radio Frequency Identification (RFID) rather than RTLS:

- Locating an asset by virtue of the fact that the asset has passed point A at a certain time and has not passed point B
- Locating an asset by virtue of providing a homing signal whereby a person with a handheld can find an asset

Method of location is through identification and location, generally through multilateration types

- Time of Flight Ranging Systems
- Amplitude Triangulation
- Time Difference of Arrival (TDOA)
- Cellular Triangulation
- Satellite Multilateration
- Angle of Arrival

This standard defines the air interface protocol needed for the creation of an RTLS system. There are many types of location algorithms that could be used. Examples of location algorithms are given in Annex A.

Significant portions of this standard were excerpted from IEEE 802.15.4a-2007, *IEEE Standard for 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) Amendment 1: Add Alternate PHYs* and from IEEE 802.15.4f-2012, *IEEE Standard for Local and metropolitan area networks — Part 15.4: Low-Rate Wireless Personal Area Networks (LR-WPANs) Amendment 2: Active Radio Frequency Identification (RFID) System Physical Layer*, copyright IEEE, and reproduced with permission by limited license from IEEE. Permission for further use of this material must be obtained from IEEE. Requests may be sent to stds-ipr@ieee.org

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Information technology — Real time locating systems (RTLS) —

Part 61:
Low rate pulse repetition frequency Ultra Wide Band (UWB) air interface

1 Scope

This part of ISO/IEC 24730 defines the physical layer (PHY) and tag management layer (TML) of an ultra wide band (UWB) air interface protocol that supports one directional simplex communication readers and tags of a real time locating system (RTLS). This protocol is best utilized for low-data-rate wireless connectivity with fixed, portable, and moving devices with very limited battery consumption requirements.

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/IEEE 8802-15-4, *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)*

ISO/IEC 15963, *Information technology — Radio frequency identification for item management – Unique identification for RF tags*

ISO/IEC 19762, *Information technology AIDC techniques — Harmonized vocabulary — (all parts)*

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