

ISO #####-#:####(X)/DTS 7344

ISO-/TC_104/SC_4/WG_2

Secretariat: ANSI AFNOR

Date: 2023-11-22

Short-range ~~Wireless Sensor~~ wireless sensor to Device Communication device communication

iTeh Standards

(<https://standards.itih.ai>)
WD stage
Document Preview

ISO/DTS 7344

<https://standards.itih.ai/catalog/standards-39f-bef5-7b8c0367d187/iso-dts-7344> **Warning for WDs and CDs**

This document is not an ISO International Standard. It is distributed for review and comment. It is subject to change without notice and may not be referred to as an International Standard.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

To help you, this guide on writing standards was produced by the ISO/TMB and is available at <https://www.iso.org/iso/how-to-write-standards.pdf>

A model manuscript of a draft International Standard (known as "The Rice Model") is available at <https://www.iso.org/iso/model-document-rice-model.pdf>

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

[ISO/DTS 7344](https://standards.itih.ai/catalog/standards/sist/7e0c899b-b645-439f-bef5-7b8c0367d187/iso-dts-7344)

<https://standards.itih.ai/catalog/standards/sist/7e0c899b-b645-439f-bef5-7b8c0367d187/iso-dts-7344>

© ISO 2023

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11

Fax: +41 22 749 09 47

E-mail: copyright@iso.org
Website: www.iso.org

Published in Switzerland

iTeh Standards (<https://standards.iteh.ai>) Document Preview

[ISO/DTS 7344](#)

<https://standards.iteh.ai/catalog/standards/sist/7e0c899b-b645-439f-bef5-7b8c0367d187/iso-dts-7344>

Contents

Foreword	v
Introduction.....	vi
1 Scope	1
2 Normative References.....	1
3 Terms and definitions	2
4 Abbreviated terms.....	4
5 General information.....	4
5.1 General requirements	4
5.1.1 Unlicensed frequency spectrum definition	4
5.1.2 Wireless sensor network architecture.....	5
5.2 Definition of the sensor to device communication	6
5.2.1 Possible types of interaction between sensor and device based on installation location	7
5.2.2 Sensor to device pairing.....	10
5.2.3 Firmware updates.....	10
5.2.4 Periodicity of the sending interval and latency of reporting	10
5.2.5 Periodic and event-based communication	12
6 Sensor to device communication.....	13
6.1 Requirements of non-proprietary sensor to device communication.....	13
6.2 Definition of standardized sensor to device communication.....	13
7 Safety and regulatory considerations.....	13
Bibliography	15

Foreword	iv
Introduction.....	v
Short-range Wireless Sensor to Device Communication	1
1 Scope	1
2 Normative References.....	1
3 Terms and definitions	2
4 Abbreviated Terms.....	2
5 General Information.....	2
5.1 General requirements	2
5.2 Definition of the sensor to device communication	3
6 Sensor to Device Communication.....	6
6.1 Requirements of Non-proprietary Sensor to Device Communication.....	6
6.2 Industrial Requirements for Non-proprietary Sensor to Device Communication.....	8
7 Safety and Regulatory Considerations.....	8
Bibliography	9

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part-1. In particular, the different approval criteria needed for the different types of ISO ~~documents~~document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part-2 (see www.iso.org/directives).

~~Attention is drawn~~ISO draws attention to the possibility that ~~some of the~~ elementsimplementation of this document may ~~be~~involve the subjectuse of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights- in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights. ~~Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).~~

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 104, *Freight containers*, Subcommittee SC-4, —*Identification and communication*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The use of wireless communication has expanded globally thanks to new wireless standards and very low-cost transceiver chips and modules. However, there is a need to specify the use of open protocols and intended behaviour in diverse use cases, to allow compatibility of hardware from different origins. Wireless communication capability has become an easy and relatively low-cost addition to almost any [Internet of things \(IoT\)](#) device in transport and logistics, where a wireless feature can enhance performance, convenience, and/or marketability. In the machine-to-machine communication space, remote keyless entry (RKE) and remote pairing are the most widespread. A wireless temperature sensor within a cargo container, for instance, can transmit temperature updates to the IoT device, which serves as a gateway to the Internet thus providing a “near real-time”⁴ temperature monitoring for sensitive cargo. When choosing a communication technology between the measuring sensor and the IoT device in one environment, e.g. a freight container, the operational context is playing a crucial role, i.e. container design, distance from sensor to IoT device, location of both on/in a container and communication protocols that support these hardware items.

~~ISO TS 18625: 2017 “Freight Containers – Container Tracking and Monitoring Systems (CTMS): Requirements” has provided~~NOTE So-called “real-time” is mainly used as a commercial term. Due to the limitation of the technology to transmit data non-stop, in order to manage the battery lifetime expectation, connectivity with the cloud computing is done in defined periodical interval, e.g. every 5 min, 15 min, 1 h or similar. Therefore, from a technical point of view, this reference is related to “near real-time”.

~~ISO/TS 18625 provides~~ guidance for a system and its enabling devices, used to track, monitor and/or report the status of the container.² Based on existing technology, ~~this technical specification ISO/TS 18625: 2017 has defined defines~~ three levels (Tier 0, Tier 1 and Tier 2) of capabilities for ~~Container Tracking Device~~container tracking device (CTD) to be matched with the needs of the users (e.g. a shipper, a consolidator, a logistic service provider and more).³

~~The new proposed Technical Specification~~This document refers to CTD as described in Tier 2 of ~~ISO/TS 18625~~ (reporting without a reader using technologies such as satellite or cell phone)⁴ and CTD’s “local” communication within one environment to dependent wireless sensors. Being in one environment, the expected wireless communication between sensors and a CTD ~~could~~can be short-range, however ~~must~~it needs to withstand conditions prescribed by the purpose of such technical application. Therefore, a choice of the applicable technologies is directly related to the types of sensors and measurements they make, container configuration, location of the receiving device, size of the message and minimal sending interval.

Short-range wireless technology refers to the technology that can communicate wirelessly within a smaller diameter region. Short-range wireless communication technology has a considerable application prospect in the field of container equipment and management. Short-range wireless communication technologies are NFC, ~~Wi-Fi~~wireless network protocols based on IEE 802.11 family of standards, IEEE, ~~ZigBee~~802.15.4 based specifications, Bluetooth^{®5}, for example.

¹So-called “real-time” is mainly used as a commercial term. Due to the limitation of the technology to transmit data non-stop, in order to manage the battery lifetime expectation, connectivity with the Cloud Computing is done in defined periodical interval, e.g. every 5 minutes, 15minutes, 1 hour or similar. Therefore, from technical point of view, this reference is related to “near real-time”.

²ISO TS 18625: 2017 (E), p.1.

³Ibid., p.3

⁴Ibid., p.5

⁵ Bluetooth is the trademark of a product supplied by the Bluetooth Special Interest Group. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO/IEC of the product named. Equivalent products may be used if they can be shown to lead to the same results.

~~The proposed technical specification~~ This document describes existing wireless technology on sensor to telematic device communication and defines a list of those communication types which ~~could~~ can be perceived as “open protocols”- non-proprietary license free technology. Non-proprietary technology implemented on both “ends”, sensor and devices/gateway, enables diversity in manufacturing origin of wirelessly communicating active hardware items within one container environment. Therefore, this ~~technical specification document~~ specifically focuses on ~~a)-~~ wireless ~~b)-and~~ short-range communication. The goal of this ~~technical specification document~~ is to enable interoperability among different IoT/telematic hardware manufacturers and encourage the diversification of the applicable to the CTU environment digital solutions. The anticipated effects and benefits are as follows:

- ~~Diversification~~ diversification of connected products available for short-range communication within one container environment;
- ~~Interoperability~~ interoperability between hardware items of different origin used and applied to one freight container;
- ~~Improved~~ improved safety of freight container and quality of the transported goods through digital supervision and monitoring of the transportation conditions;
- ~~Improved~~ improved transparency of freight container transportation condition among the modalities of the supply chain.

iTeh Standards (<https://standards.iteh.ai>) Document Preview

ISO/DTS 7344

<https://standards.iteh.ai/catalog/standards/sist/7e0c899b-b645-439f-bef5-7b8c0367d187/iso-dts-7344>

Short-range ~~Wireless~~ Wireless ~~Sensor~~ wireless ~~sensor~~ sensor to ~~Device~~ device ~~communication~~ communication

1 Scope

This ~~technical specification document~~ specifies short-range wireless active communication between two active IoT/telematic hardware items⁶, such as a gateway device and/or a sensor.

NOTE Active hardware item in this document refers to devices and sensors, which have capacity to record and transmit measurements, i.e. data, without external activation through extra accessories, e.g. readers or scanners.

The application of such communications is based on equipment and container type. This ~~specification will include~~ document includes the following discussions:

- ~~—~~ wireless technology choices for wireless communication involving active hardware items, i.e. sensor to device communication;
- ~~—~~ critical design factors of containers and hardware items intended to be used within one container environment;
- ~~—~~ parameters for open protocol communication - possible applications (use cases).

This ~~technical specification doesn't~~ document does not define installation locations for devices and sensors; however, it is expected, that the hardware items ~~will be~~ are installed on the or in the container, based on the following consideration:

- existing regulations and standards;
- ~~Container~~ container design, and specification of the material it is made of;
- ~~Best~~ best possible connection, which enables interoperable communication between sensor and device;
- ~~Cargo~~ cargo and personnel safety.

~~Moreover, due~~ Due to the constant technology development, the number of connected sensors to one gateway device ~~will be~~ are not ~~be~~ defined ~~within~~ in this ~~specification document~~. This ~~paper document~~ assumes that at least one sensor can be connected to at least one gateway device wirelessly.

2 Normative References

~~The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.~~

~~International Convention for the Safety of Life at Sea (SOLAS): 1974~~

⁶~~Active Hardware Item here and further refers to devices and sensors, which have capacity to record and transmit measurements, i.e. data, without external activation through extra accessories, e.g. readers or scanners.~~

ISO/DTS 7344:(E)

~~ISO/TS 18625:2017 Freight Containers—Container Tracking and Monitoring Systems (CTMS): Requirements~~

~~ISO/IEC 60533:2015, Electrical and electronic installations in ships—Electromagnetic compatibility (EMC)—Ships with a metallic hull~~

~~ITU-T K.79 (03/2015) Electromagnetic characterization of the radiated environment in the 2.4 GHz ISM band~~

There are no normative references in this document.

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ~~ISO Online browsing platform: available at <https://www.iso.org/obp>~~ <https://www.iso.org/obp>
- ~~IEC Electropedia: available at <https://www.electropedia.org/>~~ <https://www.electropedia.org/>

~~3.1~~

~~IoT (3.1~~

~~Internet of Things) Hardware~~ **things hardware**

~~IoT hardware~~

~~entity (device) of an IoT system that communicates with other devices and systems over the Internet or other communication systems~~

~~Note-1-to-entry:- It can have sensors or actuators incorporated or interact with other entities.~~

~~3.2~~

~~A CTD (Container Tracking Device as per ISO TS 18625:2017)~~

~~3.2~~

~~container tracking device~~

~~CTD~~

~~device, attached to or an integral part of a container, powered by embedded battery or external source of power;~~

~~Note-1-to-entry:- A CTD can communicate with back-end systems (e.g. ~~Cloud Computing~~ **cloud computing**) over the Internet or other communication systems.~~

~~Note-2-to-entry:- A CTD can have the ability to communicate with other devices, process data and relay messages between back-end and connected devices in which case it becomes a gateway.~~

~~Note-3-to-entry:- A CTD can also have sensors or actuator incorporated on its own.~~