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Information technology — Telecommunications and information exchange between systems — Magnetic field area network (MFAN) —

Part 4:
Security Protocol for Authentication

Technologies de l'information — Téléinformatique — Réseau de zone de champ magnétique (MFAN)

iTeh STANDARD PREVIEW
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Contents

Page

Foreword

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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 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).

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The committee responsible for this document is ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems*.

This first edition of ISO/IEC 15149-4, together with ISO/IEC 15149-1, ISO/IEC 15149-2, and ISO/IEC 15149-3, cancels and replaces ISO/IEC 15149:2011, which has been technically revised.

ISO/IEC 15149 consists of the following parts, under the general title *Information technology — Telecommunications and information exchange between systems*:

— *Part 1: Air Interface*

— *Part 2: In-Band Control Protocol for Wireless Power Transfer*

— *Part 3: Relay Protocol for Extended Range*

— *Part 4: Security Protocol for Authentication*

Introduction

This part of ISO/IEC 15149 provides protocols for magnetic field area networks (MFAN). MFAN can support the service based on wireless communication and wireless power transfer in harsh environments. MFAN is composed of four protocols; air interface, in-band control protocol, relay protocol and security protocol for authentication.

The International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) draw attention to the fact that it is claimed that compliance with this document may involve the use of patents concerning MFSec technology given in this part of ISO/IEC 15149.

ISO and IEC take no position concerning the evidence, validity and scope of these patent rights.

The holders of these patent rights have assured the ISO and IEC that they are willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statements of the holders of these patent rights are registered with ISO and IEC.

Information on the declared patents may be obtained from:

Patent Holder: China IWNCOMM Co., Ltd.

Address: A201, QinFengGe, Xi'an Software Park, No. 68, Keji 2nd Road, Xi'an Hi-Tech Industrial Development Zone, Xi'an Shaanxi, P. R. China 710075

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Information technology — Telecommunications and information exchange between systems — Magnetic field area network (MFAN) —

Part 4:
Security Protocol for Authentication

1 Scope

This part of ISO/IEC 15149 specifies security protocol for authentication in magnetic field networks.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 15149-1:2014, *Information technology — Telecommunications and information exchange between systems — Magnetic field area network (MFAN) — Part 1: Air Interface*

ISO/IEC 15149-3:2016, *Information technology — Telecommunications and information exchange between systems — Magnetic field area network (MFAN) — Part 3: Relay Protocol for Extended Range*

3 Terms and definitions

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

3.1
Magnetic Field Area Network
MFAN
wireless network that provides reliable communication in harsh environments using magnetic field

3.2
Magnetic Field Area Network – Coordinator
MFAN-C
device that manages the connection and release of nodes within the communication area and the sending and receiving time of data in an MFAN

3.3
Magnetic Field Area Network – Node
MFAN-N
A device except the coordinator that forms a network in an MFAN

4 Symbols and abbreviated terms

4.1 Symbols

$\oplus$ exclusive or

|| concatenation

O_n fixed value

+   binary addition

4.2 Abbreviated terms

AuRc   Authentication Response Confirmation

AuRq   Authentication Request

AuRs   Authentication Reponse

MFSec   MFAN Security

PSK   Pre-Shared Key

RN   Random Number

RNc   Random Number generated by Coordinator

RNn   Random Number generated by Node

SORNc   Secret Output with Random Number computed by Coordinator

SORNn   Secret Output with Random Number computed by Node

SRNc   Secret Random Number generated by Coordinator

SRNn   Secret Random Number generated by Node

SS   Shared Secret

UID   Unique Identifier

UID^C   Unique Identifier of Coordinator

UID^N   Unique Identifier of Node

5 Overview

MFAN, like some other networks, e.g. Wireless Sensor Networks, suffered from many specific network security threats. To countermeasure those threats, some security procedures should be deployed in such networks.

The security threats of networks, which are specified in the ITU-T X.800 and ITU-T X.805, are applicable to MFAN, as follows:

— Destruction of information and/or other resources

— Corruption or modification of information

— Disclosure of information

In addition, the specific threats to nodes such as sensor mode compromise, eavesdropping, privacy of sensed data, denial of service attack, and malicious use of commodity network are also applicable to MFAN.

The following security requirements specified in ITU-T X.805 could be applicable to MFAN:

— Data Confidentiality

— Data Authentication/identification

— Data Integrity

This part of ISO/IEC 15149 specifies an MFAN security (MFSec) protocol that uses the exclusive or operation for mutual authentication between MFAN-C and MFAN-N. See Annex A for security considerations of MFSec.

NOTE   The exclusive or is extremely common as a component in complex ciphers. By itself, using a constant repeating key, a simple exclusive or crypto can trivially be broken using frequency analysis. If the content of any message can be guessed or otherwise known then the key can be revealed (the exclusive or crypto is vulnerable to a known-plaintext attack, since plaintext⊕ciphertext=key). Its primary advantage is that it is simple to implement, and that the exclusive or operation is computationally inexpensive. A simple repeating exclusive or crypto is therefore sometimes used for hiding information in cases where either no particular or light security is required.

6   Network elements

6.1   General

The security network elements of MFAN consist of time and physical elements.

6.2   Time element

Specified in ISO/IEC 15149-3:2016, 6.2.

6.3   Physical element

Specified in ISO/IEC 15149-3:2016, 6.3.

6.4   Address element

Specified in ISO/IEC 15149-3:2016, 6.4.

7   Network functions

7.1   General

The superframe of MFSec protocol consists of request, response and confirmation period. The authentication protocol requires that MFAN-C and MFAN-N shall have a PSK with 8-octet before they start the authentication procedure. How to generate and set a high quality PSK is out of the scope of this standard. The key update function is not supported in this international standard. Figure 1 shows the MFSec protocol message exchange.