

SLOVENSKI STANDARD
oSIST prEN ISO 22510:2018
01-junij-2018

Odperta izmenjava podatkov pri avtomatizaciji stavb, regulaciji in upravljanju stavb - Elektronski sistemi za stanovanja in stavbe - Komunikacija KNTnet/IP (ISO/DIS 22510:2018)

Open data communication in building automation, controls and building management - Home and building electronic systems - KNXnet/IP communication (ISO/DIS 22510:2018)

Offene Datenkommunikation für die Gebäudeautomation und Gebäudemanagement - Elektrische Systemtechnik für Heim und Gebäude - Teil 2: KNXnet/IP-Kommunikation (ISO/DIS 22510:2018)

<https://standards.iteh.ai/catalog/standards/sist/a5f5fe12-3f2d-4223-bf7c-6afad93f87a3/sist-en-iso-22510-2020>

Réseau ouvert de communication de données pour l'automatisation, la régulation et la gestion technique du bâtiment - Systèmes électroniques pour les foyers domestiques et les bâtiments - Communication KNX/IP (ISO/DIS 22510:2018)

Ta slovenski standard je istoveten z: prEN ISO 22510

ICS:

35.240.67	Uporabniške rešitve IT v gradbeništvu	IT applications in building and construction industry
97.120	Avtomatske krmilne naprave za dom	Automatic controls for household use

oSIST prEN ISO 22510:2018

en,fr,de

DRAFT INTERNATIONAL STANDARD

ISO/DIS 22510

ISO/TC 205

Secretariat: ANSI

Voting begins on:
2018-04-05Voting terminates on:
2018-06-28

Open data communication in building automation, controls and building management — Home and building electronic systems — KNXnet/IP communication

Réseau ouvert de communication de données pour l'automatisation, la régulation et la gestion technique du bâtiment — Systèmes électroniques pour les foyers domestiques et les bâtiments — Communication KNX/IP

ICS: 91.040.01; 35.240.67

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 22510:2020](https://standards.iteh.ai/catalog/standards/sist/a5f5fe12-3f2d-4223-bf7c-6afad93f87a3/sist-en-iso-22510-2020)

<https://standards.iteh.ai/catalog/standards/sist/a5f5fe12-3f2d-4223-bf7c-6afad93f87a3/sist-en-iso-22510-2020>

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENT AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE AND MAY NOT BE REFERRED TO AS AN INTERNATIONAL STANDARD UNTIL PUBLISHED AS SUCH.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

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.

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING



Reference number
ISO/DIS 22510:2018(E)

© ISO 2018

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN ISO 22510:2020

<https://standards.iteh.ai/catalog/standards/sist/a5f5fe12-3f2d-4223-bf7c-6afad93f87a3/sist-en-iso-22510-2020>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2018

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, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Published in Switzerland

Contents	Page
European Foreword.....	5
1 Scope	10
2 Normative references	11
3 Terms and definitions	11
4 Symbols and abbreviations	14
5 Requirements	16
5.1 Clause 1: Overview	16
5.1.1 KNXnet/IP Document Clauses.....	16
5.1.2 Mandatory and optional implementation of IP protocols.....	18
5.2 Clause 2: Core	20
5.2.1 Scope.....	20
5.2.2 KNXnet/IP frames.....	21
5.2.3 Host protocol independence.....	22
5.2.4 Discovery and self description.....	24
5.2.5 Communication Channels.....	25
5.2.6 General implementation guidelines.....	28
5.2.7 Data Packet structures.....	32
5.2.8 IP Networks.....	52
5.2.9 Minimum supported services.....	62
5.3 Clause 3: Device Management Specification	63
5.3.1 Scope.....	63
5.3.2 KNXnet/IP Device Management.....	63
5.3.3 Implementation rules and guidelines.....	76
5.3.4 Data packet structures.....	77
5.3.5 Minimum Profiles.....	81
5.4 Clause 4: Tunnelling	82
5.4.1 Scope.....	82
5.4.2 Tunnelling of KNX telegrams.....	82
5.4.3 Configuration and Management.....	86
5.4.4 Frame structures.....	87
5.4.5 Minimum Profiles.....	96
5.5 Clause 5: Routing	97
5.5.1 Scope.....	97
5.5.2 KNXnet/IP Routing of KNX telegrams.....	97
5.5.3 Implementation rules and guidelines.....	109
5.5.4 Configuration and Management.....	111
5.5.5 Data packet structures.....	112
5.5.6 Minimum Profiles.....	114
5.6 Clause 6: Remote Diagnosis and Configuration	115
5.6.1 Scope.....	115
5.6.2 Remote Diagnosis of KNXnet/IP devices.....	115
5.6.3 Configuration and Management.....	116
5.6.4 Data packet structures.....	116
5.6.5 Certification.....	121
5.7 Clause 7: Secured Communication	122

5.7.1	Scope	122
5.7.2	Stack and communication	123
5.7.3	Management Procedures	166
5.7.4	Synchronizing timers	169
Annex A (normative) List of codes		171
A.1	Introduction	171
A.2	Common constants	171
A.3	KNXnet/IP services	171
A.3.1	Service type number ranges	171
A.3.2	Core KNXnet/IP services	172
A.3.3	Device Management services	173
A.3.4	Tunnelling services	173
A.3.5	Routing services	173
A.3.6	Remote Logging services	174
A.3.7	Remote Diagnosis and Configuration	174
A.3.8	Object Server services	174
A.4	Connection types	174
A.4.1	KNXnet/IP Secure services	175
A.5	Error codes	175
A.5.1	Common error codes	175
A.5.2	CONNECT RESPONSE status codes	176
A.5.3	CONNECTIONSTATE_RESPONSE status codes	177
A.5.4	Tunnelling CONNECT_ACK error codes	177
A.5.5	Device Management DEVICE_CONFIGURATION_ACK status codes	177
A.6	Description Information Block (DIB)	178
A.7	Host protocol codes	179
A.8	Timeout constants	179
A.9	Internet Protocol constants	180
Annex B (informative) Binary examples of KNXnet/IP IP frames		181
B.1	SEARCH_REQUEST	181
B.2	SEARCH_RESPONSE	181
B.3	DESCRIPTION_REQUEST	184
B.4	DESCRIPTION_RESPONSE	185
B.5	CONNECT_REQUEST	188
B.6	CONNECT_RESPONSE	189
B.7	CONNECTIONSTATE_REQUEST	190
B.8	CONNECTIONSTATE_RESPONSE	190
B.9	DISCONNECT_REQUEST	191
B.10	DISCONNECT_RESPONSE	191
B.11	DEVICE_CONFIGURATION_REQUEST	192
B.12	DEVICE_CONFIGURATION_ACK	192
B.13	TUNNELLING_REQUEST	193
B.14	TUNNELLING_ACK	193
B.15	ROUTING_INDICATION	194
B.16	ROUTING_LOST_MESSAGE	194
B.17	ROUTING_BUSY	195
B.18	REMOTE_DIAGNOSTIC_REQUEST	196
B.19	REMOTE_DIAGNOSTIC_RESPONSE	196
B.20	REMOTE_BASIC_CONFIGURATION_REQUEST	199
B.21	REMOTE_RESET_REQUEST	200
Annex C (normative) KNXnet/IP Parameter Object		201
Annex D (normative) Common External Messaging Interface (cEMI)		205
D.1	cEMI	205
D.1.1	cEMI: message format and services	205

prEN ISO 22510:2018 (E)

D.1.2	Common EMI: Local Device Management.....	234
	Annex E (normative) Coupler Resources.....	239
E.1	Introduction.....	239
E.2	Device Object.....	239
E.2.1	PID_SERVICE_CONTROL (PID = 8).....	239
E.2.2	PID_DEVICE_CONTROL (PID = 14).....	240
E.2.3	PID_ROUTING_COUNT (PID = 51).....	240
E.2.4	PID_ERROR_FLAGS (PID = 53).....	240
E.2.5	PID_PROGMODE (PID = 54).....	241
E.3	Router Object.....	241
E.3.1	General.....	241
E.3.2	PID_LOAD_STATE_CONTROL (PID = 5).....	242
E.3.3	PID_LINE_STATUS (PID = 51).....	242
E.3.4	PID_MAIN_LCCONFIG (52) / PID_SUB_LCCONFIG (PID = 53).....	243
E.3.5	PID_MAIN_LCGRPCONFIG (54) / PID_SUB_LCGRPCONFIG (PID = 55).....	244
E.3.6	PID_ROUTETABLE_CONTROL (PID = 56).....	244
E.3.7	PID_COUPL_SERV_CONTROL (PID = 57).....	248
	Bibliography.....	250

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN ISO 22510:2020

<https://standards.iteh.ai/catalog/standards/sist/a5f5fe12-3f2d-4223-bf7c-6afad93f87a3/sist-en-iso-22510-2020>

European Foreword

This document (EN ISO 22510:2018) has been prepared by Technical Committee ISO/TC 205 “Building environment design” in collaboration with Technical Committee CEN/TC 247 „Building Automation, Controls and Building Management” the secretariat of which is held by SNV.

This document is currently submitted to the CEN Enquiry

Endorsement notice

The text of ISO 22510:2018 has been approved by CEN as EN ISO 22510:2018 without any modification.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN ISO 22510:2020

<https://standards.iteh.ai/catalog/standards/sist/a5f5fe12-3f2d-4223-bf7c-6afad93f87a3/sist-en-iso-22510-2020>

prEN ISO 22510:2018 (E)**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 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 to the possibility that some of the elements of this document may be the subject of patent rights. 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 on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 205, *Building environment design*.

Introduction

This International Standard is intended for the design of new buildings and the retrofit of existing buildings in terms of acceptable indoor environment, practical energy conservation and efficiency.

KNXnet/IP is a protocol designed to transport KNX home and building electronic system (HBES) control frames over an IP network. It is used as an infrastructure backbone for connecting KNX sub-networks, as a communication medium for KNX-IP devices and to provide IP based services for clients (e.g. connecting a tool software to a KNX installation). The main advantages of using IP for these purposes are that IP network infrastructure is inexpensive, available almost everywhere and that the distance of two communication parties on an IP network is virtually unlimited.

KNXnet/IP differentiates between unicast and multicast services. KNXnet/IP unicast services are used to connect a single client to a single KNXnet/IP server (e.g. KNXnet/IP Tunnelling). KNXnet/IP multicast services are mainly used to connect different KNX sub-networks using IP communication on the KNX backbone. The KNXnet/IP Routing services are defined for this purpose. KNXnet/IP multicast services build on top of IP multicast.

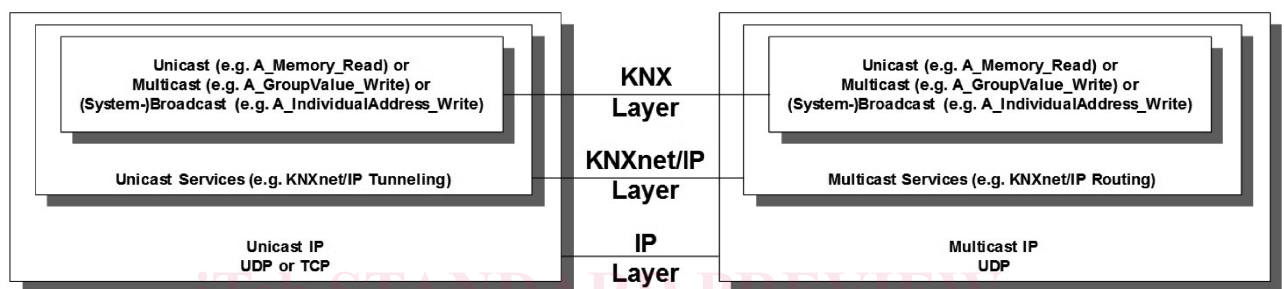


Figure 1 — Unicast and Multicast in the sense of KNX, KNXnet/IP and IP

This standard defines the integration of KNX protocol implementations within the Internet Protocol (IP) named KNXnet/IP. It defines a standard protocol, which is implemented within KNX devices, Engineering Tool Software (ETS) and other implementations to support KNX data exchange over IP networks. In fact, KNXnet/IP provides a general framework, which accommodates several specialised “Service Protocols” in a modular and extendible fashion.

The KNXnet/IP specification consists of the following clauses as specified in further detail in section 5, Requirements:

- Clause 1, Overview
- Clause 2, Core Specification
- Clause 3, Device Management
- Clause 4, Tunnelling
- Clause 5, Routing
- Clause 6, Remote Diagnosis and Configuration
- Clause 7, Secured Communication

Additional clauses may be added to the KNXnet/IP specification in the future at which time Clause 1 “Overview” as well as Annex A will need to be updated.

prEN ISO 22510:2018 (E)

KNXnet/IP supports different software implementations on top of the protocol. More specifically, these software implementations can be Building Management, Facility Management, Energy Management, or simply Data Base and SCADA (Supervision, Control and Data Acquisition) packages.

Most of these packages need to be configured for the specific user application. In order to simplify this process and cut costs for engineering, KNXnet/IP provides simple engineering interfaces, namely a description “language” for the underlying KNX system. This may be done off-line, e.g. generated as an ETS export file, or on-line by a mechanism that self-describes the underlying KNX system (reading data from the system itself).

In conjunction with the EIB/KNX-to-BACnet mapping described in EN ISO 16484-5, EIB/KNX installations can very easily be integrated into BACnet system environments.

KNXnet/IP supports:

- on-the-fly change-over between Operational modes (configuration, operation);
- event driven mechanisms;
- connections with a delay time greater than $t_{\text{KNX_transfer_timeout}}$ (e.g. network connection via satellite).

Clause 1, Overview

Clause 1 “Overview” provides a general overview of KNXnet/IP.

Clause 2, Core specification

Clause 2 “Core Specification” defines a standard protocol that is implemented within KNXnet/IP devices and the Engineering Tool Software to support KNX data exchange over IP networks.

This specific implementation of the protocol over the Internet Protocol (IP) is called KNXnet/IP.

This specification addresses:

- definition of data packets sent over the IP host protocol network for KNXnet/IP communication;
- discovery and self-description of KNXnet/IP servers;
- configuration and establishment of a communication channel between a KNXnet/IP client and a KNXnet/IP server.

Clause 3, Device Management

Clause 3 “Device Management” defines services for remote configuration and remote management of KNXnet/IP servers.

Clause 4, Tunnelling

Clause 4 “Tunnelling” defines services for point-to-point exchange of KNX telegrams over an IP network between a KNXnet/IP device acting as a server and a KNXnet/IP Client. This point-to-point exchange may be established by a super ordinate system for building automation or management functions or by an Engineering Tool Software. It supports all ETS functions for download, test, and analysis of KNX

devices on KNX networks connected via KNXnet/IP servers. This includes changes of single KNX device object properties.

Tunnelling assumes that a data transmission round-trip between a KNXnet/IP Tunnelling client and KNXnet/IP servers takes less than $t_{\text{KNX_transfer_timeouts}}$.

Clause 5, Routing

Clause 5 “Routing” defines services for a point-to-multipoint exchange of KNX telegrams over an IP network between KNXnet/IP routers and/or KNX/IP devices.

Clause 6, Remote Diagnosis and Configuration

Clause 6 “Remote Diagnosis and Configuration” defines services for a point-to-point exchange of KNX telegrams over an IP network between KNXnet/IP routers and/or KNX/IP devices. The services provide means for diagnosing communication settings and for changing these remotely.

Clause 7, Secured Communication

Clause 7 “Secured Communication” of the KNXnet/IP specification defines the security wrapper for securing KNXnet/IP unicast and multicast traffic, putting an additional layer of security – transparent to all existing KNXnet/IP services – around the complete KNXnet/IP traffic.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN ISO 22510:2020

<https://standards.iteh.ai/catalog/standards/sist/a5f5fe12-3f2d-4223-bf7c-6afad93f87a3/sist-en-iso-22510-2020>

prEN ISO 22510:2018 (E)

1 Scope

This International Standard defines the integration of KNX protocol implementations on top of Internet Protocol (IP) networks, called KNXnet/IP. It describes a standard protocol for KNX devices connected to an IP network, called KNXnet/IP devices. The IP network acts as a fast (compared to KNX Twisted Pair transmission speed) backbone in KNX installations.

Widespread deployment of data networks using the Internet Protocol (IP) presents an opportunity to expand building control communication beyond the local KNX control bus, providing:

- remote configuration;
- remote operation (including control and annunciation);
- fast interface from LAN to KNX and vice versa;
- WAN connection between KNX systems (where an installed KNX system is at least one line);
- an interface to super ordinate building management and energy management systems.

A KNXnet/IP system contains at least these elements:

- one EIB line with up to 64 (255) EIB devices;
OR
one KNX segment (KNX-TP1, KNX-RF, KNX-PL110);
- a KNX-to-IP network connection device (called KNXnet/IP server);

and typically additional

- software for remote functions residing on e.g. a workstation (may be data base application, BACnet Building Management System, browser, etc.).

Figure 1 shows a typical scenario where a KNXnet/IP client (e.g. running ETS) accesses multiple KNX installed systems or KNX subnetworks via an IP network. The KNXnet/IP client may access one or more KNXnet/IP servers at a time. For subnetwork, routing server-to-server communication is possible.

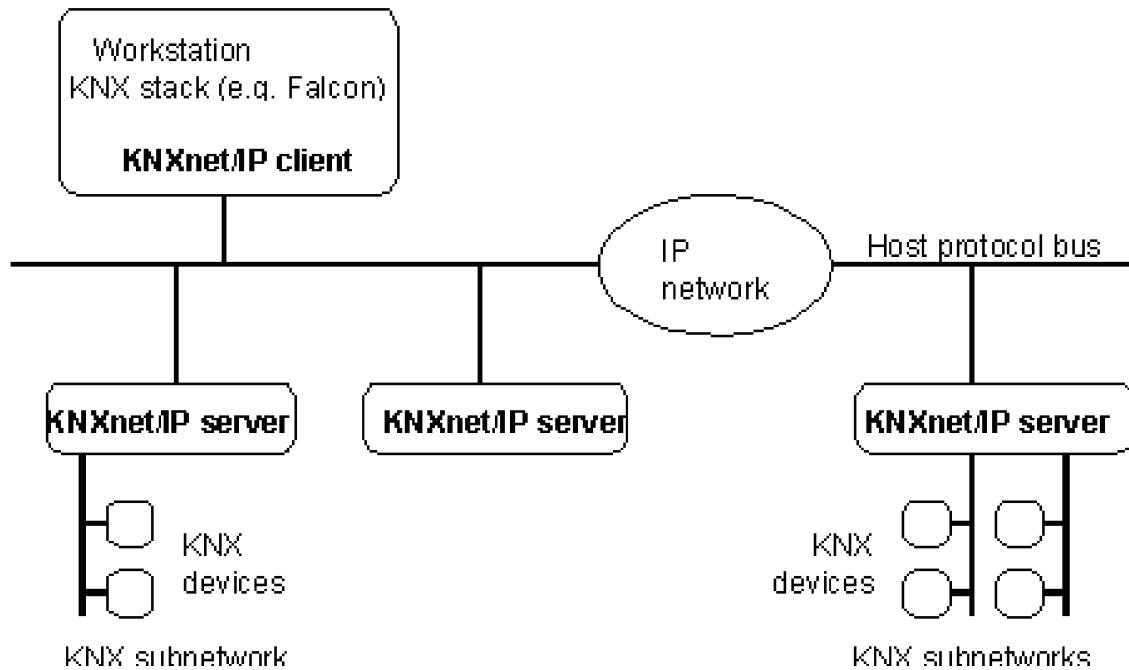


Figure 2 — Device types and configuration examples

2 Normative references

Not applicable.

3 Terms and definitions

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

3.1

Backbone Key

The key used for encryption and message authentication of secure KNXnet/IP multicast communication in a KNXnet/IP Routing multicast group. This key will be configured by ETS and is a shared secret between all members of the secure KNXnet/IP Routing multicast group.

3.2

Cipher Text

Cipher text is a generic term that denotes the encrypted data.

Note 1 to entry: Cipher text opposes to plain data.

3.3

common External Message Interface

cEMI

generic structure for medium independent KNX messages

Note 1 to entry: cEMI (common EMI) frames are used to encapsulate KNX messages within Internet Protocol (IP) packets.

3.4

communication channel

logical connection between a KNXnet/IP client and a KNXnet/IP server (or, in case of routing, between two or more KNXnet/IP servers)

prEN ISO 22510:2018 (E)

Note 1 to entry: A communication channel consists of one or more connections on the definition of the host protocol used for KNXnet/IP.

3.5 communication channel

as defined by the KNXnet/IP Core specification, this is represented by one or two IP channels

3.6 Engineering Tool Software ETS

software used to configure KNX devices

3.7 Host Protocol Address Information HPAI

structure holding the IP host protocol address information used to address a KNXnet/IP endpoint on another KNXnet/IP device

3.8 IP channel

logical connection between two IP host/port endpoints

Note 1 to entry: IP channels are either a guaranteed, reliable TCP (transmission control protocol) or an unreliable point-to-point or multicast (in case of routing) UDP (user datagram protocol) connection.

3.9 KNX node

device implementing a KNX protocol stack and fulfilling the requirements according to the KNX standard

3.10 Internet Control Message Protocol ICMP

extension to the Internet Protocol (IP) for error, control, and informational messages

Note 1 to entry: ICMP is defined by RFC ¹⁾ 92 and supports packet containing error, control, and informational messages. The PING command, for example, uses ICMP to test an Internet connection.

1) Request for Comment: Internet Standards defined by the Internet Engineering Task Force (IETF) are firstly published as RFCs.