SLOVENSKI STANDARD
SIST EN 14908-3:2014

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Odprta izmenjava podatkov v avtomatizaciji stavb in izvršnih elementov ter pri upravljanju stavb - Protokol regulacijske mreže - 3. del: Specifikacija kanala močnostnega napajanja

Open Data Communication in Building Automation, Controls and Building Management - Control Network Protocol - Part 3: Power Line Channel Specification

Firmenneutrale Datenkommunikation für die Gebäudeautomation und Gebäudemanagement - Gebäudedatennetzprotokoll - Teil 3: Kommunikation über die Stromversorgungsleitungen

Réseau ouvert de communication de données pour l'automatisation, la régulation et la gestion technique du bâtiment - Protocole de contrôle du réseau - Partie 3 : Spécifications des communications par courants porteurs

Ta slovenski standard je istoveten z: **EN 14908-3:2014**

ICS:

35.240.99	Uporabniške rešitve IT na drugih področjih	IT applications in other fields
97.120	Avtomatske krmilne naprave za dom	Automatic controls for household use

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Open Data Communication in Building Automation, Controls and Building Management - Control Network Protocol - Part 3: Power Line Channel Specification

Réseau ouvert de communication de données pour l'automatisation, la régulation et la gestion technique du bâtiment - Protocole de contrôle du réseau - Partie 3 : Spécifications des communications par courants porteurs

Offene Datenkommunikation für die Gebäudeautomation und Gebäudemanagement - Gebäude-Netzwerk-Protokoll - Teil 3: Kommunikation über die Stromversorgungsleitungen

This European Standard was approved by CEN on 12 April 2013.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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Foreword

This document (EN 14908-3:2014) has been prepared by Technical Committee CEN/TC 247 “Building Automation, Controls and Building Management”, the secretariat of which is held by SNV.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2014 and conflicting national standards shall be withdrawn at the latest by October 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 14908-3:2006.

This European Standard is part of a series of standards for open data transmission in building automation, control and in building management systems. The content of this European Standard covers the data communications used for management, automation/control and field functions.

EN 14908-3 is part of a series of European Standards under the general title *Control Network Protocol (CNP)*, which comprises the following parts:

Part 1: *Protocol stack;*

Part 2: *Twisted pair communication;*

Part 3: *Power line channel specification;*

Part 4: *IP-Communication;*

Part 5: *Implementation;*

Part 6: *Application elements.*

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This part of EN 14908 specifies the Control Network Power Line (PL) Channel and serves as a companion document to EN 14908-1:2014. Its purpose is to present the information necessary for the development of a PL physical network and nodes to communicate and share information over that network. This is one of a series of documents covering the various media that comprise the CNP standard.

This part of EN 14908 covers the complete physical layer (OSI layer 1) including the interface to the Medium Access Control (MAC) Sub-Layer and the interface to the medium. It includes parameters specific to the PL channel type, even though the parameters may be controlled at an OSI layer other than layer 1. This part of EN 14908 also provides a set of guideline physical and electrical specifications for the power line environment as an aid in developing products for that environment.

This part of EN 14908 has been prepared to provide mechanisms through which various vendors of building automation, control and of building management systems may exchange information in a standardised way. It defines communication capabilities.

This part of EN 14908 is used by all involved in design, manufacture, engineering, installation and commissioning activities.

The CNP specification model is based on the OSI 7-layer model Reference Model. There are also important extensions to the OSI Reference Model. Figure 1 shows the scope of this specification in reference to the entire CNP model. In this European Standard, only the parts of the model relevant to power line communication are specified. Anything outside this boundary is covered in other parts of the standard. Similar specifications exist for other CNP media.

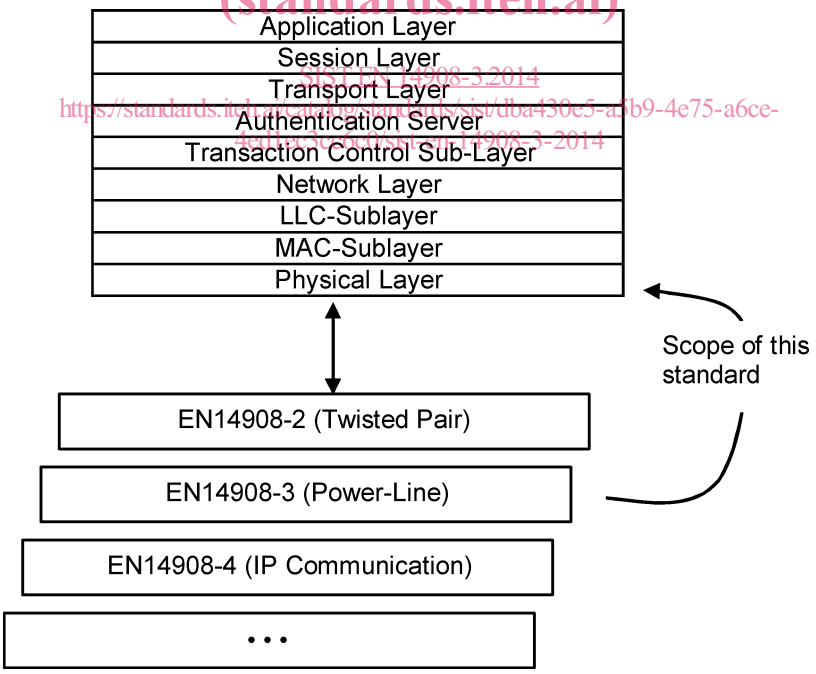

Figure 1 — Relationship of CNP 3 specification to the CNP 1 specification

1 Scope

This European Standard specifies all the information necessary to facilitate the exchange of data and control information over the power line medium for networked control systems in commercial Building Automation, Controls and Building Management.

This European Standard establishes a minimal set of rules for compliance. It does not rule out extended services to be provided, given that the rules are adhered to within the system. It is the intention of the standard to permit extended services (defined by users) to coexist.

Certain aspects of this standard are defined in other documents. These documents are referenced where relevant. In the case where a referenced standard conflicts with this European Standard, this part of EN 14908 will prevail.

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.

EN 14908-1:2014, *Open Data Communication in Building Automation, Controls and Building Management – Control Network Protocol — Part 1: Protocol Stack*

EN 50065-1, *Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148,5 kHz — Part 1: General requirements, frequency bands and electromagnetic disturbances*

EN 50065-2-1, *Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148,5 kHz —Part 2-1: Immunity requirements for mains communications equipment and systems operating in the range of frequencies 95 kHz to 148,5 kHz and intended for use in residential, commercial and light industrial environments*

EN 50065-2-2, *Signalling on low-voltage electrical installations in the frequency range 3 kHz to 148,5 kHz — Part 2-2: Immunity requirements for mains communications equipment and systems operating in the range of frequencies 95 kHz to 148,5 kHz and intended for use in industrial environments*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 14908-1:2014 and the following, specifically with the power line medium and physical layer shown in Figure 1, apply.

3.1
PL node
user node attached to the power line medium at a tap that meets the requirements of this specification

3.2
line cord
cable not part of the power line network that allows a node located away from the power line network to be connected to the network

3.3
power line network
communication network based on power distribution lines (“power lines”), from the final distribution transformer to and including all homes served by that transformer, including all wiring in those homes

3.4
non-network-powered node
compatible node that attaches to the power line network but does not draw any power from the network

4 General description

4.1 Electrical safety

This clause gives several recommendations related to safety concerns with respect to this European Standard.

This discussion is not complete, nor does it address all possible safety issues. The designer is urged to consult, among other things, the relevant local and national electrical codes for the country of intended use. Local codes may supplement national electrical codes and impose additional safety related requirements.

Products conforming to this European Standard shall be designed, constructed, assembled, tested and installed following recognised safety provisions appropriate to products covered by the standard.

Power line network cables are subject to at least five direct electrical safety hazards during their use:

- high-energy transients coupled into the power line network from external environmental sources;
- possible differences between safety grounds to which network components are connected;
- possible high voltages on neutral or ground wiring;
- possible open safety grounds;
- high short-circuit current levels available at interface.

These electrical safety hazards should be alleviated for the network to perform properly. In addition to provisions for properly handling these faults in an operational system, special measures should be taken to maintain the intended safety features during changes of an existing network.

All wire and wiring to which nodes connect should conform to wiring standards of the appropriate national code for the country of intended use and should have been inspected to comply with that code.

4.2 Functional partitioning of PL specification

This specification divides the complete power line environment into two basic parts: the powerline medium and the node physical access specification.

The medium specification concerns the capabilities and properties of the physical medium. This encompasses such items as its bandwidth, frequency allocation, electrical and physical specifications, connectors etc.

The node physical access specification deals with the physical properties of that part of the node that makes contact with the medium. Also described is the interface between the physical layer and the symbol-encoding sub-layer.

5 Power Line Medium specifications

5.1 Power

The nodes should not rely on the line frequency for timing or synchronisation to perform communications. AC power may be used to power the interface and application needs of a node.

5.2 Data channel

The channel occupies bandwidth from 125 kHz to 140 kHz frequency band, as defined in EN 50065-1, as a Binary Phase Shift Keyed (BPSK) modulated carrier. This channel is used to send protocol messages containing control, status, configuration and diagnostic information. The rules established in the CNP Medium Access Control (MAC) Layers and above shall be followed. The signalling characteristics of the channel are described in Clause 6.

5.3 Physical and electrical specifications

Physical and electrical specifications for the PL medium are not formally given in this European Standard since: 1) the PL medium is assumed to already exist in any environment using power line communications and; 2) this specification lacks control over the installation of the power line medium, its physical properties, topology, or other devices connected to the medium.

5.4 Connectors and coupling

If a connector is used to attach a CNP node to the power line network (as opposed to a direct connection), then the connector shall meet the following requirements:

- the connector shall impose a negligible signal loss (less than 0,1 dB) from the power line network and the attached node;
- the connector shall not impose any signal or voltage loss (greater than 0,1 dB) to the power line network (with or without a node connected to the connector).

Single-phase power line node connectors are assumed to fit standard electrical outlets appropriate for the country of use and may or may not include a connection to the protective conductor of such outlets if present. Signalling shall only be between phase and neutral conductors and no functional connection shall be made to the protective conductor.

Multi-phase powerline nodes may use any of the connection schemes given in EN 50065-1 permitting signalling between all phases simultaneously and the neutral conductor or between any of the phase conductors individually and the neutral conductor. No functional connection shall be made to the protective conductor.

5.5 Signal coupling between phases

Signal coupling between phases in multi-phase installations may be achieved by using phase couplers according to EN 50065-4-1.

5.6 Surge protection and related devices

Certain surge protection and related frequency selective protection devices may be installed on the power network. These devices may attenuate the CNP channel waveform sufficiently to prevent operation in part or the entire network. Precautions should be taken such that the device chosen does not substantially attenuate the signals in the 125 kHz to 140 kHz range.

6 PL Node specifications

6.1 Compliance

PL nodes shall comply with the requirements of EN 50065-1 and with either EN 50065-2-1 or EN 50065-2-2 depending upon the intended field of application of the nodes.

PL nodes shall comply with the additional requirements given in Clause 5 and 6.2 to 6.6.

6.2 Interface to MAC sub-layer

The data is passed from the MAC sub-layer to the PL transceiver in an 8 bit byte format containing a L2Hdr byte, the NPDU and a 16 bit CRC as described in 6.3, 6.4 and 6.5 of EN 14908-1:2014. The PL transceiver encodes each byte of data into an 11 bit word and adds a bit sync pattern, a word sync word and an End-of-Frame consisting of two EndofPacket (EOP) words. The entire packet is shown below in Figure 2. The bit sync pattern consists of 24 bits of alternating "10". The word sync word is "11001111011". The EndofPacket word is "11100110011". The bit sync pattern provides clock timing information. The word sync pattern provides bit polarity and word boundary information.