DRAFT INTERNATIONAL STANDARD ISO/IEC 14908-1

Attributed to ISO/IEC JTC 1 by the Central Secretariat (see page iii)

Voting begins on **2007-12-21** | Voting terminates on **2008-05-21**

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION
INTERNATIONAL ELECTROTECHNICAL COMMISSION • МЕЖДУНАРОДНАЯ ЭЛЕКТРОТЕХНИЧЕСКАЯ КОММИСИЯ • COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

FAST-TRACK PROCEDURE

Open Data Communication in Building Automation, Controls and Building Management — Control Network Protocol —

Part 1:
Protocol Stack

Communication de données ouverte en immotique, contrôles et gestion d'immeuble — Protocole de réseau de contrôle —

Partie 1: Pile de protocole

ICS 35.200; 35.240.99

In accordance with the provisions of Council Resolution 21/1986 this DIS is circulated in the English language only.

Conformément aux dispositions de la Résolution du Conseil 21/1986, ce DIS est distribué en version anglaise seulement.

NOTE FROM ITTF

This draft International Standard is submitted for JTC 1 national body vote under the Fast-Track Procedure.

In accordance with Resolution 30 of the JTC 1 Berlin Plenary 1993, the proposer of this document recommends assignment of ISO/IEC 14908-1 to JTC 1/SC 25.

"FAST-TRACK" PROCEDURE

1 Any P-member and any Category A liaison organization of ISO/IEC JTC 1 may propose that an existing standard from any source be submitted directly for vote as a DIS. The criteria for proposing an existing standard for the fast-track procedure are a matter for each proposer to decide.

2 The proposal shall be received by the ITTF which will take the following actions.

2.1 To settle the copyright and/or trade mark situation with the proposer, so that the proposed text can be freely copied and distributed within JTC 1 without restriction.

2.2 To assess in consultation with the JTC 1 secretariat which SC is competent for the subject covered by the proposed standard and to ascertain that there is no evident contradiction with other International Standards.

2.3 To distribute the text of the proposed standard as a DIS. In case of particularly bulky documents the ITTF may demand the necessary number of copies from the proposer.

3 The period for combined DIS voting shall be six months. In order to be accepted the DIS must be supported by 75 % of the votes cast (abstention is not counted as a vote) and by two-thirds of the P-members voting of JTC 1.

4 At the end of the voting period, the comments received, whether editorial only or technical, will be dealt with by a working group appointed by the secretariat of the relevant SC.

5 If, after the deliberations of this WG, the requirements of 3 above are met, the amended text shall be sent to the ITTF by the secretariat of the relevant SC for publication as an International Standard.

If it is impossible to agree to a text meeting the above requirements, the proposal has failed and the procedure is terminated.

In either case the WG shall prepare a full report which will be circulated by the ITTF.

6 If the proposed standard is accepted and published, its maintenance will be handled by JTC 1.

Contents

page

Foreword

This European Standard (EN 14908-1:2005) has been prepared by 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 May 2006, and conflicting national standards shall be withdrawn at the latest by May 2006.

This European Standard supersedes ENV 13154—2:1998.

CEN draws attention to the fact that it is claimed that compliance with this European Standard may involve the use of patents. The patents that pertain to this European Standard are listed in Annex F.

CEN/TC247 confirms that this European Standard contains patents and like rights claiming by Echelon Corporation. The Echelon Corporation declared to CEN its willingness to negotiate licenses under patents or rights with applicants throughout the world on reasonable terms and conditions without any discrimination.

NOTE For licensing information, contact: Echelon Corporation, 4015 Meridian Avenue, San Jose, CA 94304, USA, phone +1-408-938-5234, fax: +1-408-790-3800 http://www.echelon.com.

This European Standard is part of a series of European Standards for open data transmission in building automation, control and in building management systems. The content of this standard covers the data communications used for management, automation/control and field functions. This European Standard is based on the American standards EIA/CEA-709.1-B Control Network Protocol Specification.

The EN 14908-1 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 : *Project Implementation Guideline*

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

Introduction

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

This European Standard is to be used by all involved in design, manufacture, engineering, installation and commissioning activities.

This European Standard has been made in response to the essential requirements of the Constructive Products Directive.

1 Scope

This specification applies to a communication protocol for networked control systems. The protocol provides peer-to-peer communication for networked control and is suitable for implementing both peer-to-peer and master-slave control strategies. This specification describes services in layers 2 - 7. In the layer 2 (data link layer) specification, it also describes the MAC sub-layer interface to the physical layer. The physical layer provides a choice of transmission media. The interface described in this specification supports multiple transmission media at the physical layer. In the layer 7 specification, it includes a description of the types of messages used by applications to exchange application and network management data.

2 Normative references

Not applicable

3 Terms and definitions

For the purposes of this European Standard, the following subclause introduces the basic terminology employed throughout this European Standard. Most of it is commonly used and the terms have the same meaning in both the general and the standard context. However, for some terms, there are subtle differences. For example, in general, bridges do selective forwarding based on the layer 2 destination address. There are no layer 2 addresses in this standard protocol, so bridges forward all packets, as long as the domain address in the packet matches a domain of which the bridge is a member. Routers, in general, perform network address modification so that two protocols with the same transport layer but different network layers can be connected to form a single logical network. Routers of this standard may perform network address modification, but typically they only examine the network address fields and selectively forward packets based on the network layer address fields.

3.1
Channel
physical unit of bandwidth linking one or more communication nodes. Refer to Annex E for further explanation of the relationship between a channel and a subnet

3.2
Physical Repeater
device that reconditions the incoming physical layer signal on one channel and retransmits it on to another channel

3.3
Store-and-Forward Repeater
device that stores and then reproduces data packets on to a second channel

3.4
Bridge
device that connects two channels (x and y); forwards all packets from x to y and vice versa, as long as the packets originate on one of the domain(s) that the bridge belongs to

3.5
Configuration
non-volatile information used by the device to customise its operation. There is configuration data for the correct operation of the protocol in each device, and optionally, for application operation. The network configuration data stored in each device has a checksum associated with the data. Examples of network configuration data are node addresses, communication media parameters such as priority settings, etc. Application configuration information is application specific

3.6
Domain
virtual network that is the network unit of management and administration. Group and subnet (see below) addresses are assigned by the administrator responsible for the domain, and they have meaning only in the context of that domain

3.7
Flexible Domain
used in conjunction with Unique_Node_ID and broadcast addressing. A node responds to a Unique_Node_ID-addressed message if the address matches, regardless of the domain on which the message was sent. To respond so that the sender receives it, the response must be sent on the domain in which it was received. Furthermore, this domain must be remembered for the duration of the transaction so that duplicate detection of any retries is possible. This transitory domain entry at a node is called the flexible domain. How many flexible domain entries a node supports is up to the implementation. However, a minimum of 1 is required

3.8
Subnet
set of nodes accessible through the same link layer protocol; a routing abstraction for a channel; in this standard subnets are limited to a maximum of 127 nodes

3.9
Node
abstraction for a physical node that represents the highest degree of address resolvability on a network. A node is identified (addressed) within a subnet by its (logical) node identifier. A physical node may belong to more than one subnet; when it does, it is assigned one (logical) node number for each subnet to which it belongs. A physical node may belong to at most two subnets; these subnets must be in different domains. A node may also be identified (absolutely) within a network by its Unique_Node_ID

3.10
Group
uniquely identifiable set of nodes within a domain. Within this set, individual members are identified by their member number. Groups facilitate one-to-many communication and are intended to support functional addressing

3.11
Router
device that routes data packets to their respective destinations by selectively forwarding from subnet to subnet; a router always connects two (sets of) subnets; routers may modify network layer address fields. Routers may be set to one of four modes: repeater mode, bridge mode, learning mode, and configured mode. In repeater mode, packets are forwarded if they are received with no errors. In bridge mode, packets are forwarded if they are received with no errors and match a domain that the router is a member of. Routers in learning mode learn the topology by examining packet traffic, while routers that are set to configured mode have the network topology stored in their memory and make their routing decisions solely upon the contents of their configured tables

3.12
(Application) Gateway
interconnects networks at their highest protocol layers (often two different protocols). Two domains can also be connected through an application gateway

3.13
Beta1
period immediately following the end of a packet cycle. A node attempting to transmit monitors the state of the channel, and if it detects no transmission during the Beta1 period, it determines the channel to be idle

3.14
Beta2
randomising slot. A node wishing to transmit generates a random delay T. This delay is an integer number of randomising slots of duration Beta2

3.15
Network Variable
variable in an application program whose value is automatically propagated over the network whenever a new value is assigned to it

3.16
Standard Network Variable Types (SNVTs)
variables with agreed-upon semantics. These variables are interpreted by all applications in the same way, and are the basis for interoperability. Definition of specific SNVTs is beyond the scope of this European Standard

3.17
Manual service request Message
network management message containing a node's Unique_Node_ID. Used by a network management device that receives this message to install and configure the node. May be generated by application or system code. May be triggered by external hardware event, e.g., driving a "manual service request" input low

3.18
Transaction
sequence of messages that are correlated together. For example, a request and the responses to the request are all part of a single transaction. A transaction succeeds when all the expected messages from every node involved in the transaction are received at least once. A transaction fails in this European Standard if any of the expected messages within the transaction are not received. Retries of messages within a transaction are used to increase the probability of success of a transaction in the presence of transient errors

4 Symbols and abbreviations

4.1 Symbols and Graphical Representations

Figure 1 shows the basic topology of networks based on this protocol and the symbolic representations used in this European Standard.

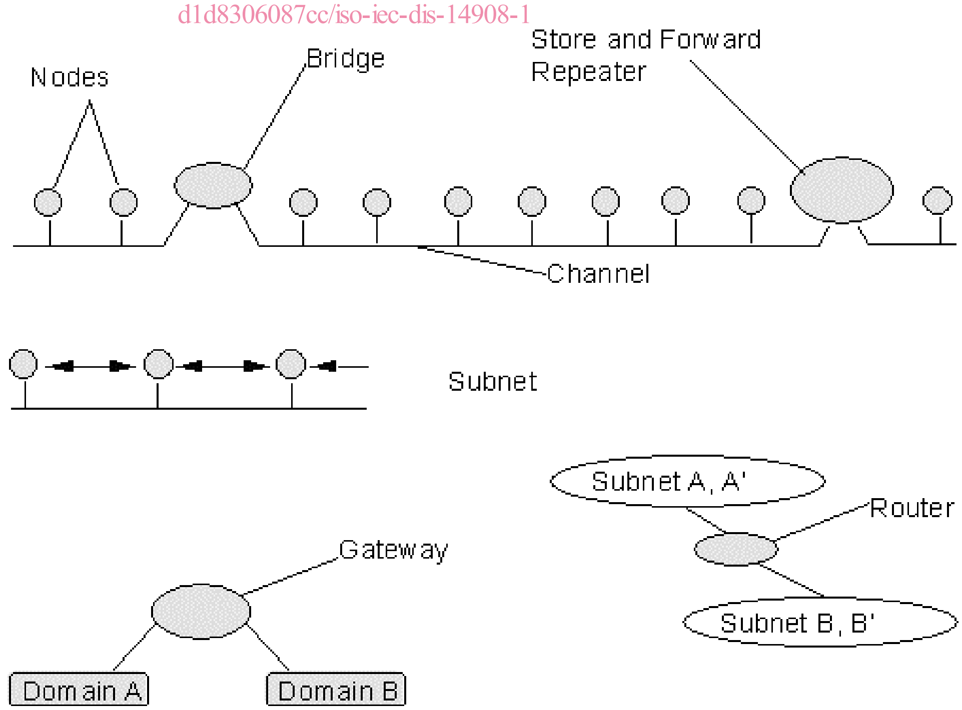

Figure 1 — Network Topology & Symbols

The layering of this protocol is described using standard OSI terminology, as shown in Figure 2.

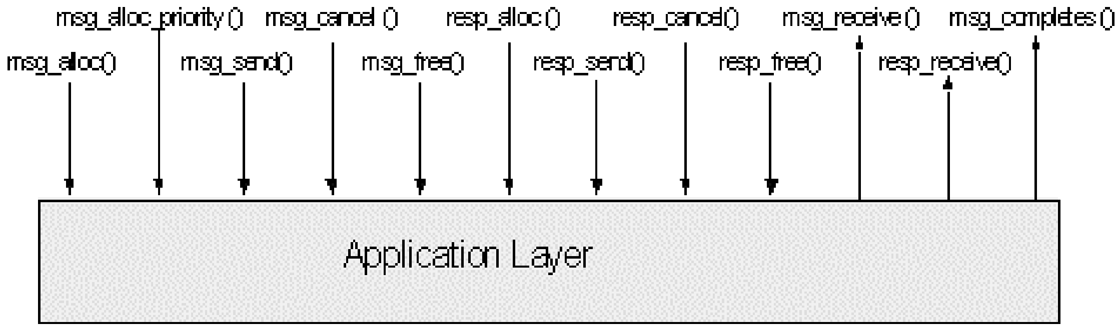

Figure 2 — Protocol Terminology

4.2 Abbreviations

— CNP Control Network Protocol

The Protocol Data Unit (PDU) abbreviations used throughout this European Standard are:

— PPDU Physical Protocol Data Unit, or frame

— MPDU MAC Protocol Data Unit, or frame

— LPDU Link Protocol Data Unit, or frame

— NPDU Network Protocol Data Unit, or packet

— TPDU Transport Protocol Data Unit, or a message/ack

— SPDU Session Protocol Data Unit, or request/response

— NMPDU Network Management Protocol Data Unit

— DPDU Diagnostic Protocol Data Unit

— APDU Application Protocol Data Unit

— FSM Finite State Machine (diagram)

Annex D (PDU Summary) contains the details of these PDUs.

5 Overview of Protocol Layering

The protocol specified by this European Standard consists of the layers shown in Figure 3. Each layer is described below.

Multiple physical layer protocols and data encoding methods are allowed in systems based on this European Standard. Each encoding scheme is medium-dependent.

The *MAC* (Medium Access Control) sublayer employs a collision avoidance algorithm called Predictive *p*-persistent CSMA (Carrier Sense, Multiple Access). For a number of reasons, including simplicity and compatibility with the multicast protocol, the link *layer* supports a simple connectionless service. Its functions are limited to framing, frame encoding, and error detection, with no error recovery by re-transmission.