

CEA Standard

Control Networking Protocol Specification Part 5: Implementation- Application-Layer-Guidelines

CEA-709.5

June 2015



CEA[®]
Consumer Electronics Association

www.CE.org

NOTICE

Consumer Electronics Association (CEA[®]) Standards, Bulletins and other technical publications are designed to serve the public interest through eliminating misunderstandings between manufacturers and purchasers, facilitating interchangeability and improvement of products, and assisting the purchaser in selecting and obtaining with minimum delay the proper product for his particular need. Existence of such Standards, Bulletins and other technical publications shall not in any respect preclude any member or nonmember of CEA from manufacturing or selling products not conforming to such Standards, Bulletins or other technical publications, nor shall the existence of such Standards, Bulletins and other technical publications preclude their voluntary use by those other than CEA members, whether the standard is to be used either domestically or internationally.

Standards, Bulletins and other technical publications are adopted by CEA in accordance with the American National Standards Institute (ANSI) patent policy. By such action, CEA does not assume any liability to any patent owner, nor does it assume any obligation whatever to parties adopting the Standard, Bulletin or other technical publication.

This document does not purport to address all safety problems associated with its use or all applicable regulatory requirements. It is the responsibility of the user of this document to establish appropriate safety and health practices and to determine the applicability of regulatory limitations before its use.

This document is copyrighted by the Consumer Electronics Association (CEA[®]) and may not be reproduced, in whole or part, without written permission. Federal copyright law prohibits unauthorized reproduction of this document by any means. Organizations may obtain permission to reproduce a limited number of copies by entering into a license agreement. Requests to reproduce text, data, charts, figures or other material should be made to CEA.

(Formulated under the cognizance of the CEA **R7 Consumer Electronics Networking Committee.**)

Published by
©CONSUMER ELECTRONICS ASSOCIATION 2015
Technology & Standards Department
www.CE.org

All rights reserved

FOREWORD

This standard was developed by the Consumer Electronics Association under the auspices of the R7 Consumer Electronics Networking Committee.

CONTENTS

INTRODUCTION	1
TAGS	1
OVERVIEW	1
1 SCOPE	2
2 REFERENCES	2
2.1 NORMATIVE REFERENCES	2
2.1.1 <i>Normative Reference List</i>	3
2.1.2 <i>Normative Reference Acquisition</i>	3
3 TERMS AND DEFINITIONS	3
3.1 APPLICATION SET	3
3.2 BASE TYPE	3
3.3 CHANGEABLE-TYPE NETWORK VARIABLE	3
3.4 CONFIGURATION PROPERTY (CP) DATA VALUE USED TO CONFIGURE THE APPLICATION PROGRAM IN A DEVICE	4
3.5 CONFIGURATION-PROPERTY MEMBER	4
3.6 CONFIGURATION-PROPERTY MEMBER NUMBER	4
3.7 CONFIGURATION-PROPERTY TYPE INDEX	4
3.8 DEVICE	4
3.9 DEVICE CHANNEL ID	4
3.10 DEVICE CLASS	4
3.11 DEVICE INTERFACE	4
3.12 DEVICE-LOCATION FIELD	4
3.13 DEVICE SELF-DOCUMENTATION STRING DSDS	5
3.14 DEVICE SUBCLASS	5
3.15 DYNAMIC FUNCTIONAL BLOCK	5
3.16 DYNAMIC NETWORK VARIABLE	5
3.17 FORMAT	5
3.18 FUNCTIONAL BLOCK	5
3.19 FUNCTIONAL-BLOCK INDEX	5
3.20 FUNCTIONAL PROFILE FP	5
3.21 FUNCTIONAL-PROFILE KEY	6
3.22 FUNCTIONAL-PROFILE MEMBER	6
3.23 FUNCTIONAL-PROFILE MEMBER NUMBER	6
3.24 FUNCTIONAL-PROFILE NUMBER	6
3.25 FUNCTIONAL-PROFILE SELECTOR	6
3.26 FUNCTIONAL-PROFILE TEMPLATE	7
3.27 GLOBAL INDEX	7
3.28 INHERITING PROFILE	7
3.29 INTEROPERABILITY	7
3.30 CNP DEVICE	7
3.31 CNP NETWORK	7
3.32 MANUFACTURER ID MID	7
3.33 NETWORK-INTERFACE SELECTION	7
3.34 NETWORK VARIABLE NV	8
3.35 NETWORK-VARIABLE DECLARATION	8
3.36 NETWORK-VARIABLE INDEX	8
3.37 NETWORK-VARIABLE MEMBER	8
3.38 NETWORK-VARIABLE MEMBER NUMBER	8
3.39 NETWORK-VARIABLE PROGRAMMATIC NAME	8
3.40 NETWORK-VARIABLE SELECTION	8
3.41 NETWORK-VARIABLE TYPE	8
3.42 NETWORK-VARIABLE TYPE INDEX	9

CEA-709.5

3.43	UNIQUE NODE ID	9
3.44	NODE.....	9
3.45	PASSIVE CONFIGURATION TOOL PCT	9
3.46	PRIMARY FUNCTIONAL BLOCK	9
3.47	PRIMARY FUNCTIONAL PROFILE	9
3.48	PROPRIETARY DATA.....	9
3.49	SELF-DOCUMENTATION STRING SD STRING.....	9
3.50	SELF-DOCUMENTATION TEXT	10
3.51	SHARED-MEDIA CHANNEL.....	10
3.52	STANDARD CONFIGURATION-PROPERTY TYPE SCPT.....	10
3.53	STANDARD NETWORK-VARIABLE TYPE SNVT.....	10
3.54	STANDARD PROGRAM ID SPID	10
3.55	STATIC FUNCTIONAL BLOCK.....	10
3.56	STATIC NETWORK VARIABLE	10
3.57	SUBSYSTEM.....	10
3.58	SUCCESSFUL COMMISSIONING.....	11
3.59	SYSTEM	11
3.60	UNCONFIGURED DEVICE.....	11
3.61	USAGE	11
3.62	USAGE ID	11
3.63	USER DATA.....	11
3.64	WINK FUNCTION.....	11
4	DEVICE INTERFACES	11
4.1	GENERAL.....	11
4.2	UNIQUE NODE ID	12
4.3	STANDARD PROGRAM ID.....	13
4.3.1	GENERAL.....	13
4.4	GUIDELINE 4.3: A DEVICE SHALL IMPLEMENT A STANDARD PROGRAM ID AS DEFINED IN 4.3, STANDARD PROGRAM ID	13
4.4.1	<i>Format Field</i>	13
4.4.2	<i>Manufacturer Field</i>	13
4.4.3	<i>Device Class Field</i>	13
4.4.4	<i>Usage Field</i>	14
4.4.4.1	<i>General</i>	14
4.4.5	<i>Channel Type Field</i>	15
4.4.6	<i>Model Number Field</i>	15
4.5	DEVICE CHANNEL ID.....	15
4.6	DEVICE LOCATION FIELD.....	15
4.7	DEVICE SELF-DOCUMENTATION STRING (DSDS).....	16
4.8	FUNCTIONAL BLOCKS	17
4.8.1	<i>General</i>	17
4.8.2	<i>Implementing a Functional Block</i>	19
4.8.3	<i>Network Variables</i>	20
4.8.4	<i>Configuration Properties</i>	27
4.9	DEVICE AND FUNCTIONAL BLOCK VERSIONING.....	38
4.10	DEVICE INTERFACE (XIF) FILE	39
5	RESOURCE FILES	40
5.1	RESOURCE FILE DEFINITIONS	40
5.1.2	<i>Type Definitions</i>	41
5.1.3	<i>Functional Profiles</i>	44
5.1.4	<i>Language Strings</i>	47
5.1.5	<i>Formats</i>	48
5.2	IDENTIFYING APPROPRIATE RESOURCES.....	51

CEA-709.5

5.2.1	<i>Standard and User Resources</i>	51
5.2.2	<i>Using Standard Resources</i>	52
5.2.3	<i>Using User Resources</i>	52
6	NETWORK INSTALLATION	53
6.1	GENERAL.....	53
6.2	NETWORK ADDRESSING	54
6.2.1	<i>Network Addressing Scheme</i>	54
6.2.2	<i>Address-Table Entries</i>	55
6.2.3	<i>Network Variable Aliases</i>	55
6.2.4	<i>Domain-Table Entries</i>	56
6.2.5	<i>Self-Installed Devices</i>	57
6.2.6	<i>Field-Installed Devices</i>	57
6.3	PASSIVE CONFIGURATION TOOLS	58
6.4	SERVICE PIN.....	58
6.5	GATEWAYS TO COMMAND-BASED SYSTEMS.....	59
6.6	SHARED-MEDIA CONSIDERATIONS	60
	ANNEX A - DEVICE RESOURCE FILES (INFORMATIVE)	61

Introduction

This standard is prepared based upon work provided to the Consumer Electronics Association (CEA) R7 Consumer Electronics Networking Committee by LonMark International, a non-profit standards development association. This work has been modified from its original creation to update it to the latest revision. Similar documents have been used in other international standards bodies.

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

The CEA-709.5 is part of a series of ANSI/CEA-709 Standards under the general title *Control Network Protocol (CNP)*, which comprises the following parts:

- Part 1: *Protocol Stack Specification*
- Part 2: *Power Line Channel Specification*
- Part 3: *Twisted-Pair Communication*
- Part 4: *Fiber-Optic Specification*
- Part 5: *Implementation*
- Part 6: *Application Elements*

At present this document exists only in English.

Tags

Descriptors: system management, open systems interconnection, interoperability, device communications, network interconnection, buildings, heating, ventilation, air conditioning, data bus, data transmission, protocols, device profiles, building automation, controls, building management

Overview

This standard specifies the Layered Implementation Guidelines (LIG) for the Control Network Protocol (CNP) Specification: ANSI/CEA-709.1-D. The CNP specification model is based on the ISO Open Systems Interconnection Reference Model. There are also important extensions to the 7-layer OSI Reference Model. Figure 1 shows the scope of this specification in reference to the CNP and companion specifications for handling various data-transport media at the lower ISO protocol layers. A dashed line is used to show that the scope of this standard is not as redundancy to the other specifications covering their respective layers but as a complement to those specifications in implementing them in an interoperable fashion.

In this standard, the guidelines for implementing a device based on CNP are specified to increase the ability for devices to interoperate—regardless of installer or manufacturer of the devices. Anything outside this boundary is covered in other parts of the standard. Similar specifications exist for CNP data-transport media.

Draft CEA-709.5

This standard 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 and internal-documentation requirements.

This standard is contributing to the general US policy for energy savings for building automation, monitoring, and control of energy consuming systems in typical buildings.

ANSI/CEA-709 Control Network Protocol	CEA-709.6 Application Elements			
	CEA-709.5 Implementation Guideline			
	ANSI/CEA-709.1 Protocol Stack			
	ANSI/CEA-709.2 Power Line Channel	ANSI/CEA-709.3 Twisted-Pair Communication	ANSI/CEA-709.4 Fiber-Optic Channel	ANSI/CEA-852.1 Enhanced IP Tunneling Protocol

Figure 1 — Scope of the ANSI/CEA-709 suite of standards

1 Scope

This standard contains all the information necessary to facilitate the exchange of data and control information in an interoperable fashion using ANSI/CEA-709.1-D and its associated data-transport media specifications.

This 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 to coexist and defines the bounds in which those services function, including the format for internal device-documentation of those services. Services outside purvey of this specification—so long as they are adherents of the system—are permitted but will not necessarily be interoperable with any other devices and shall not be essential for the functioning of the device.

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

2 References

2.1 Normative References

The following referenced standards are indispensable for the application of this standard. These standards contain provisions that, through reference in this text, constitute normative provisions of this standard. At the time of publication, the editions indicated were valid. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.