



International
Standard

ISO 16484-5

**Building automation and control
systems (BACS) —**

**Part 5:
Data communication protocol**

*Systèmes d'automatisation et de gestion technique du bâtiment
(BACS) —*

Partie 5: Protocole de communication de données

**Eighth edition
2026-08**

Sample Document

get full document from standards.iteh.ai



COPYRIGHT PROTECTED DOCUMENT

© ISO 2026

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
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

CONTENTS

Foreword	xi
FOREWORD	xii
1 PURPOSE	1
2 SCOPE	1
3 DEFINITIONS	1
3.1 Terms Adopted from International Standards	1
3.2 Terms Defined for this Standard	2
3.3 Abbreviations and Acronyms Used in this Standard	8
4 BACnet PROTOCOL ARCHITECTURE	12
4.1 The BACnet Collapsed Architecture	13
4.2 BACnet Network Topology	15
4.3 Security	16
5 THE APPLICATION LAYER	17
5.1 The Application Layer Model	17
5.2 Segmentation of BACnet Messages	23
5.3 Transmission of BACnet APDUs	24
5.4 Application Protocol State Machines	28
5.5 Application Protocol Time Sequence Diagrams	46
5.6 Application Layer Service Conventions	55
6 THE NETWORK LAYER	57
6.1 Network Layer Service Specification	57
6.2 Network Layer PDU Structure	59
6.3 Messages for Multiple Recipients	65
6.4 Network Layer Protocol Messages	65
6.5 Network Layer Procedures	69
6.6 BACnet Routers	71
6.7 Point-To-Point Half-Routers	76
7 DATA LINK/PHYSICAL LAYERS: Ethernet (ISO 8802-3) LAN	81
7.1 The Use of ISO 8802-2 Logical Link Control (LLC)	81
7.2 Parameters Required by the LLC Primitives	81
7.3 Parameters Required by the MAC Primitives	81
7.4 Physical Media	81
8 DATA LINK/PHYSICAL LAYERS: ARCNET (ATA 878.1) LAN	82
8.1 The Use of ISO 8802-2 Logical Link Control (LLC)	82
8.2 Parameters Required by the LLC Primitives	82
8.3 Mapping the LLC Services to the ARCNET MAC Layer	82
8.4 Parameters Required by the MAC Primitives	82
8.5 Physical Media	82
9 DATA LINK/PHYSICAL LAYERS: MULTIDROP SERIAL BUS/TOKEN PASSING (MS/TP) LAN	84
9.1 Service Specification	84
9.2 Physical Layer	86
9.3 MS/TP Frame Format	96
9.4 Overview of the MS/TP Network	98
9.5 MS/TP Medium Access Control	99
9.6 Cyclic Redundancy Check (CRC)	120
9.7 Interfacing MS/TP LANs with Other BACnet LANs	121
9.8 Responding BACnet User Processing of Messages from MS/TP	121
9.9 Repeaters	122
9.10 COBS (Consistent Overhead Byte Stuffing) Encoding	123
9.11 Documenting MS/TP Node Design Choices	127
10 DATA LINK/PHYSICAL LAYERS: POINT-TO-POINT (PTP)	128
10.1 Overview	128
10.2 Service Specification	128
10.3 Point-to-Point Frame Format	133

10.4	PTP Medium Access Control Protocol	135
11	DATA LINK/PHYSICAL LAYERS: LonTalk (ISO/IEC 14908.1) LAN	157
11.1	The Use of ISO 8802-2 Logical Link Control (LLC)	157
11.2	Parameters Required by the LLC Primitives	157
11.3	Mapping the LLC Services to the LonTalk Application Layer	157
11.4	Parameters Required by the Application Layer Primitives	157
11.5	Physical Media	158
12	MODELING CONTROL DEVICES AS A COLLECTION OF OBJECTS	160
12.1	Object Characteristics and Requirements	160
12.2	Analog Input Object Type	167
12.3	Analog Output Object Type	174
12.4	Analog Value Object Type	182
12.5	Averaging Object Type	190
12.6	Binary Input Object Type	194
12.7	Binary Output Object Type	201
12.8	Binary Value Object Type	210
12.9	Calendar Object Type	218
12.10	Command Object Type	221
12.11	Device Object Type	228
12.12	Event Enrollment Object Type	244
12.13	File Object Type	253
12.14	Group Object Type	257
12.15	Life Safety Point Object Type	260
12.16	Life Safety Zone Object Type	268
12.17	Loop Object Type	276
12.18	Multi-state Input Object Type	286
12.19	Multi-state Output Object Type	292
12.20	Multi-state Value Object Type	299
12.21	Notification Class Object Type	307
12.22	Program Object Type	313
12.23	Pulse Converter Object Type	320
12.24	Schedule Object Type	328
12.25	Trend Log Object Type	336
12.26	Access Door Object Type	347
12.27	Event Log Object Type	357
12.28	Load Control Object Type	365
12.29	Structured View Object Type	376
12.30	Trend Log Multiple Object Type	381
12.31	Access Point Object Type	391
12.32	Access Zone Object Type	409
12.33	Access User Object Type	418
12.34	Access Rights Object Type	422
12.35	Access Credential Object Type	429
12.36	Credential Data Input Object Type	439
12.37	CharacterString Value Object Type	446
12.38	DateTime Value Object Type	453
12.39	Large Analog Value Object Type	459
12.40	BitString Value Object Type	467
12.41	OctetString Value Object Type	474
12.42	Time Value Object Type	479
12.43	Integer Value Object Type	485
12.44	Positive Integer Value Object Type	493
12.45	Date Value Object Type	501
12.46	DateTime Pattern Value Object Type	507
12.47	Time Pattern Value Object Type	513
12.48	Date Pattern Value Object Type	519
12.49	Deleted Clause	525

12.50	Global Group Object Type.....	526
12.51	Notification Forwarder Object Type.....	534
12.52	Alert Enrollment Object Type	542
12.53	Channel Object Type	546
12.54	Lighting Output Object Type.....	557
12.55	Binary Lighting Output Object Type.....	575
12.56	Network Port Object Type.....	587
12.57	Timer Object Type.....	629
12.58	Elevator Group Object Type.....	642
12.59	Lift Object Type.....	646
12.60	Escalator Object Type.....	659
12.61	Accumulator Object Type.....	667
12.62	Staging Object Type	677
12.63	Audit Reporter Object Type.....	688
12.64	Audit Log Object Type.....	694
12.65	Color Object Type	701
12.66	Color Temperature Object Type	707
13	ALARM AND EVENT SERVICES.....	714
13.1	Change of Value Reporting	714
13.2	Event Reporting	719
13.3	Event Algorithms.....	732
13.4	Fault Algorithms	764
13.5	AcknowledgeAlarm Service	772
13.6	ConfirmedCOVNotification Service.....	774
13.7	UnconfirmedCOVNotification Service.....	776
13.8	ConfirmedEventNotification Service.....	777
13.9	UnconfirmedEventNotification Service.....	780
13.10	GetAlarmSummary Service	783
13.11	GetEnrollmentSummary Service	785
13.12	GetEventInformation Service	788
13.13	LifeSafetyOperation Service.....	791
13.14	SubscribeCOV Service	793
13.15	SubscribeCOVProperty Service.....	796
13.16	SubscribeCOVPropertyMultiple Service.....	799
13.17	ConfirmedCOVNotificationMultiple Service.....	805
13.18	UnconfirmedCOVNotificationMultiple Service.....	808
13.19	AuditLogQuery	810
13.20	ConfirmedAuditNotification.....	814
13.21	UnconfirmedAuditNotification.....	815
14	FILE ACCESS SERVICES.....	816
14.1	AtomicReadFile Service	816
14.2	AtomicWriteFile Service	819
15	OBJECT ACCESS SERVICES	822
15.1	AddListElement Service	822
15.2	RemoveListElement Service.....	825
15.3	CreateObject Service	827
15.4	DeleteObject Service	830
15.5	ReadProperty Service	831
15.6	Deleted Clause	833
15.7	ReadPropertyMultiple Service.....	834
15.8	ReadRange Service	837
15.9	WriteProperty Service.....	845
15.10	WritePropertyMultiple Service.....	848
15.11	WriteGroup Service	851
16	REMOTE DEVICE MANAGEMENT SERVICES	853
16.1	DeviceCommunicationControl Service	853
16.2	ConfirmedPrivateTransfer Service	855

16.3	UnconfirmedPrivateTransfer Service	857
16.4	ReinitializeDevice Service.....	858
16.5	ConfirmedTextMessage Service.....	860
16.6	UnconfirmedTextMessage Service.....	862
16.7	TimeSynchronization Service.....	863
16.8	UTCTimeSynchronization Service.....	864
16.9	Who-Has and I-Have Services.....	865
16.10	Who-Is and I-Am Services.....	867
16.11	Who-Am-I and You-Are Services	869
17	AUTHENTICATION AND AUTHORIZATION SERVICES.....	872
17.1	Overview.....	872
17.2	Trust of Intermediaries.....	873
17.3	Authentication.....	874
17.4	Authorization	876
17.5	Conformance Requirements.....	882
17.6	AuthRequest Service.....	883
18	ERROR, REJECT, and ABORT CODES	887
18.1	Error Class - DEVICE	887
18.2	Error Class - OBJECT	887
18.3	Error Class - PROPERTY	888
18.4	Error Class - RESOURCES	890
18.5	Error Class - SECURITY.....	890
18.6	Error Class - SERVICES	892
18.7	Error Class - COMMUNICATION	893
18.8	Error Class - VT.....	898
18.9	Reject Reason	898
18.10	Abort Reason	899
18.11	Confirmed Service Common Errors	900
19	BACnet PROCEDURES	901
19.1	Backup and Restore	901
19.2	Command Prioritization.....	906
19.3	Device Restart Procedure.....	911
19.4	Determining Maximum Conveyable APDU	912
19.5	Value Source Mechanism	914
19.6	Audit Logging.....	916
19.7	Unconfigured Device Discovery and Address Assignment.....	927
19.8	Replacing Certificates in a BACnet/SC Network	928
19.9	Device Address Proxying	930
20	ENCODING BACnet PROTOCOL DATA UNITS	934
20.1	Encoding the Fixed Part of BACnet APDUs	935
20.2	Encoding the Variable Part of BACnet APDUs	947
21	FORMAL DESCRIPTION OF APPLICATION PROTOCOL DATA UNITS.....	963
21.1	APDU Definitions.....	963
21.2	Confirmed Service Productions	965
21.3	Unconfirmed Service Productions	976
21.4	Error Productions.....	980
21.5	Application Types.....	992
21.6	Base Types.....	994
22	CONFORMANCE AND INTEROPERABILITY	1082
22.1	Conformance to BACnet.....	1082
22.2	BACnet Interoperability	1083
23	EXTENDING BACnet TO ACCOMMODATE VENDOR PROPRIETARY INFORMATION.....	1085
23.1	Extending Enumeration Values	1085
23.2	Using the PrivateTransfer Services to Invoke Non-Standardized Services	1086
23.3	Adding Proprietary Properties to a Standardized Object	1086
23.4	Adding Proprietary Object Types to BACnet	1087
23.5	Restrictions on Extending BACnet.....	1087

24	DELETED CLAUSE	1088
25	REFERENCES	1089
	ANNEX A - PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (NORMATIVE)	1094
	ANNEX B - GUIDE TO SPECIFYING BACnet DEVICES (INFORMATIVE)	1098
	ANNEX C - Removed	1099
	ANNEX D - Removed	1100
	ANNEX E - EXAMPLES OF BACnet APPLICATION SERVICES (INFORMATIVE)	1101
	E.1 Alarm and Event Services	1101
	E.2 File Access Services	1106
	E.3 Object Access Services	1107
	E.4 Remote Device Management Services	1114
	E.5 Virtual Terminal Services	1117
	ANNEX F - EXAMPLES OF APDU ENCODING (INFORMATIVE)	1120
	F.1 Example Encodings for Alarm and Event Services	1120
	F.2 Example Encodings for File Access Services	1131
	F.3 Example Encodings for Object Access Services	1134
	F.4 Example Encodings for Remote Device Management Services	1144
	F.5 Example Encodings for Virtual Terminal Services	1150
	ANNEX G - CALCULATION OF CRC (INFORMATIVE)	1153
	G.1 Calculation of the Header CRC	1153
	G.2 Calculation of the Data CRC	1159
	G.3 Calculation of the Encoded CRC-32K	1163
	ANNEX H - COMBINING BACnet NETWORKS WITH NON-BACnet NETWORKS (NORMATIVE)	1167
	H.1 BACnet Gateways	1167
	H.2 Requirements and Best Practices for BACnet Gateway Implementations	1167
	H.3 Using BACnet with the DARPA Internet Protocols	1169
	H.4 Using BACnet with the IPX Protocol	1171
	H.5 Using BACnet with EIB/KNX	1172
	H.6 Using BACnet with the Former BACnet/WS Web Services Interface Defined by Annex N	1182
	H.7 Virtual MAC Addressing	1183
	ANNEX I - COMMANDABLE PROPERTIES WITH MINIMUM ON AND OFF TIMES (INFORMATIVE)	1185
	ANNEX J - BACnet/IP (NORMATIVE)	1187
	J.1 General	1187
	J.2 BACnet Virtual Link Layer	1188
	J.3 BACnet/IP Directed Messages	1191
	J.4 BACnet/IP Broadcast Messages	1191
	J.5 Addition of Foreign B/IP Devices to an Existing B/IP Network	1194
	J.6 Routing Between B/IP and non-B/IP BACnet Networks	1195
	J.7 Routing Between Two B/IP BACnet Networks	1196
	J.8 Use of IP Multicast within BACnet/IP	1202
	ANNEX K - BACnet INTEROPERABILITY BUILDING BLOCKS (BIBBs) (NORMATIVE)	1203
	K.1 Data Sharing BIBBs	1203
	K.2 Alarm and Event Management BIBBs	1224
	K.3 Scheduling BIBBs	1237
	K.4 Trending BIBBs	1242
	K.5 Device Management BIBBs	1245
	K.6 Network Management BIBBs	1253
	K.7 Gateway BIBBs	1257
	K.8 Audit Reporting BIBBs	1258
	K.9 Authentication and Authorization BIBBs	1259
	ANNEX L - DESCRIPTIONS AND PROFILES OF STANDARDIZED BACnet DEVICES (NORMATIVE)	1261
	L.1 Operator Interface Profiles	1261
	L.2 Life Safety Operator Interface Profiles	1264
	L.3 Access Control Operator Interface Profiles	1267
	L.4 Controller Profiles	1270
	L.5 Life Safety Controller Profiles	1272

L.6 Access Control Controller Profiles.....	1274
L.7 Miscellaneous Profiles.....	1276
L.8 BACnet General (B-GENERAL) Profile	1279
L.9 Lighting Operator Interface Profiles	1280
L.10 Lighting Control Station Profiles	1282
L.11 Lighting Controller Profiles	1283
L.12 Elevator Operator Interface Profiles.....	1285
L.13 Elevator Controller Profiles	1287
L.14 Authentication and Authorization Profiles.....	1289
ANNEX M - GUIDE TO EVENT NOTIFICATION PRIORITY ASSIGNMENTS (INFORMATIVE)	1290
M.1 Life Safety Message Group (0 - 31).....	1290
M.2 Property Safety Message Group (32 - 63).....	1291
M.3 Supervisory Message Group (64 - 95).....	1292
M.4 Trouble Message Group (96 - 127)	1292
M.5 Miscellaneous Higher Priority Message Group (128 - 191)	1293
M.6 Miscellaneous Lower Priority Message Group (192 - 255).....	1293
ANNEX N - FORMER BACnet/WS WEB SERVICES INTERFACE (INFORMATIVE)	1294
N.1 Data Model.....	1294
N.2 Paths.....	1295
N.3 Normalized Points.....	1296
N.4 Reference Nodes.....	1296
N.5 Localization.....	1297
N.6 Security	1297
N.7 Sessions.....	1297
N.8 Attributes.....	1297
N.9 Standard Nodes	1303
N.10 Encodings.....	1304
N.11 Service Options	1305
N.12 Services.....	1307
N.13 Errors.....	1325
N.14 Extending BACnet/WS.....	1326
ANNEX O - BACnet OVER ZigBee AS A DATA LINK LAYER (NORMATIVE)	1327
O.1 General	1327
O.2 ZigBee Overview.....	1327
O.3 Definitions.....	1328
O.4 Unicast Addressing.....	1328
O.5 Broadcast Addressing	1328
O.6 BACnet/ZigBee Data Link Layer (BZLL).....	1329
O.7 Maximum Payload Size	1332
O.8 Vendor Specific Commands	1332
ANNEX P - BACnet ENCODING OF STANDARD AUTHENTICATION FACTOR FORMATS (NORMATIVE)	1333
ANNEX Q - XML DATA FORMATS (NORMATIVE)	1339
Q.1 Introduction.....	1339
Q.2 XML Document Structure	1343
Q.3 Expressing Data.....	1346
Q.5 Expressing Values	1348
Q.6 Binary Encoding and Access Rules.....	1350
Q.7 Extensibility.....	1350
Q.8 BACnet URI Scheme	1351
ANNEX R - MAPPING NETWORK LAYER ERRORS (NORMATIVE)	1352
ANNEX S - Removed	1353
ANNEX T - COBS (CONSISTENT OVERHEAD BYTE STUFFING) FUNCTIONS (INFORMATIVE)	1354
T.1 Preparing a COBS-Encoded MS/TP Frame for Transmission	1354
T.2 Decoding an Extended MS/TP Frame upon Reception.....	1357
T.3 Example COBS-Encoded Frame - Who-Has Service	1359
ANNEX U - BACnet/IPv6 (NORMATIVE).....	1361

U.1 General	1361
U.2 BACnet/IPv6 BACnet Virtual Link Layer	1362
U.3 BACnet/IPv6 Directed Messages	1366
U.4 BACnet/IPv6 Broadcast Messages	1366
U.5 BACnet /IPv6 VMAC Table Management	1371
ANNEX V - MIGRATION FROM SOAP SERVICES (INFORMATIVE)	1373
V.1 Services	1373
V.2 Service Options	1375
ANNEX W - BACnet/WS RESTful WEB SERVICES INTERFACE (NORMATIVE)	1377
W.1 Data Model	1377
W.2 Paths	1377
W.3 Security	1378
W.4 Sessions	1388
W.5 Standard Data Items	1388
W.6 Metadata	1393
W.7 Functions	1393
W.8 Query Parameters	1395
W.9 Representation of Data	1397
W.10 Representation of Metadata	1397
W.11 Representation of Logs	1398
W.12 Filtering Items	1403
W.13 Limiting Number of Items	1405
W.14 Selecting Children	1405
W.15 Controlling Content of Data Representations	1405
W.16 Specifying Ranges	1409
W.17 Localized Values	1411
W.18 Accessing Individual Tags and Bits	1412
W.19 Semantics	1412
W.20 Links and Relationships	1412
W.21 Foreign XML and Other Media Types	1412
W.22 Logical Modeling	1413
W.23 Mapped Modeling	1414
W.24 Commandability	1414
W.25 Writability and Visibility	1414
W.26 Working with Optional Data	1416
W.27 Working with Optional Metadata	1416
W.28 Creating Data	1417
W.29 Setting Data	1418
W.30 Deleting Data	1420
W.31 Parentally Inherited Values	1420
W.32 Concurrency Control	1420
W.33 Server Support for Data Definitions	1421
W.34 Server Support for Metadata	1421
W.35 Client Implementation Guidelines	1422
W.36 Subscriptions	1423
W.37 Reading Multiple Resources	1424
W.38 Writing Multiple Resources	1426
W.39 Mapping of BACnet Systems	1426
W.40 Errors	1430
W.41 Examples	1432
ANNEX X - EXTENDED DISCOVERY OF DEVICES, PROFILES, AND VIEWS (NORMATIVE)	1460
X.1 Profiles	1460
X.2 xdd Files	1461
X.3 Example of Definition of Objects, Properties, and Datatypes	1462
X.4 Views	1463
X.5 PICS Declarations	1469

ANNEX Y - ABSTRACT DATA MODEL (NORMATIVE)	1470
Y.1 Model Components	1470
Y.2 Trees	1472
Y.3 Base Types	1474
Y.4 Common Metadata	1475
Y.5 Named Values	1489
Y.6 Named Bits	1492
Y.7 Primitive Values	1493
Y.8 Range Restrictions	1495
Y.9 Engineering Units	1497
Y.10 Length Restrictions	1497
Y.11 Collections	1499
Y.12 Primitive Data	1500
Y.13 Constructed Data	1504
Y.14 Data of Undefined Type	1508
Y.15 Logical Modeling	1508
Y.16 Links	1508
Y.17 Change Indications	1510
Y.18 Definitions, Types, Instances, and Inheritance	1510
Y.19 Data Revisions	1517
Y.20 BACnet-Specific Base Types	1519
Y.21 BACnet-Specific Metadata	1520
ANNEX Z - JSON DATA FORMATS (NORMATIVE)	1522
Z.1 Introduction	1522
Z.2 JSON Document Structure	1526
Z.3 Expressing Data	1528
Z.4 Expressing Metadata	1530
Z.5 Expressing Values	1531
Z.6 Extensibility	1533
ANNEX AA – FILE FORMATS	1535
AA.1 Time Series Data Exchange File Format (NORMATIVE)	1535
AA.2 Certificate Authority Requirements Interchange File Format (NORMATIVE)	1537
ANNEX AB – BACnet Secure Connect (NORMATIVE)	1540
AB.1 BACnet Secure Connect Data link	1540
AB.2 BACnet/SC Virtual Link Layer Messages	1546
AB.3 BACnet/SC Node Operation	1559
AB.4 Node Switch and Direct Connections	1562
AB.5 Hub Function and Hub Connector	1564
AB.6 BACnet/SC Connections	1567
AB.7 Application of WebSockets in BACnet/SC	1572
ANNEX AC - EXAMPLES OF AUTHENTICATION AND AUTHORIZATION (INFORMATIVE)	1578
AC.1 Authentication Examples	1578
AC.2 Authorization Examples	1580
ANNEX AD - BACNET ENERGY SERVICES INTERFACE (NORMATIVE)	1584
AD.1 Introduction to BACnet ESI	1584
AD.2 BACnet ESI Data Classes	1585
AD.3 Data Access	1586
AD.4 Data Definitions	1587
AD.5 Examples	1589
HISTORY OF REVISIONS	1590

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 document should be noted (see www.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 205, *Building environment design*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 247, *Building Automation, Controls and Building Management*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement) and with the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).

This eighth edition cancels and replaces the seventh edition (ISO 16484-5:2022), which has been technically revised.

The main changes are as follows:

— see the detailed list of changes on pages 1506 to 1527.

A list of all parts in the ISO 16484 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

FOREWORD

BACnet, the ASHRAE building automation and control networking protocol, has been designed specifically to meet the communication needs of building automation and control systems for applications such as heating, ventilating, and air-conditioning control, lighting control, access control, and fire detection systems. The BACnet protocol provides mechanisms by which computerized equipment of arbitrary function may exchange information, regardless of the particular building service it performs. As a result, the BACnet protocol may be used by head-end computers, general-purpose direct digital controllers, and application specific or unitary controllers with equal effect.

The motivation for this Standard was the widespread desire of building owners and operators for "interoperability," the ability to integrate equipment from different vendors into a coherent automation and control system - and to do so competitively. To accomplish this, the Standard Project Committee (SPC) solicited and received input from dozens of interested firms and individuals; reviewed all relevant national and international data communications standards, whether de facto or the result of committee activity; and spent countless hours in debate and discussion of the pros and cons of each element of the protocol.

What has emerged from the committee deliberations is a network protocol model with these principal characteristics:

(a) All network devices (except MS/TP subordinates) are peers, but certain peers may have greater privileges and responsibilities than others.

(b) Each network device is modeled as a collection of network-accessible, named entities called "objects." Each object is characterized by a set of attributes or "properties." While this Standard prescribes the most widely applicable object types and their properties, implementors are free to create additional object types if desired. Because the object model can be easily extended, it provides a way for BACnet to evolve in a backward compatible manner as the technology and building needs change.

(c) Communication is accomplished by reading and writing the properties of particular objects and by the mutually acceptable execution of other protocol "services." While this Standard prescribes a comprehensive set of services, mechanisms are also provided for implementors to create additional services if desired.

(d) Because of this Standard's adherence to the ISO concept of a "layered" communication architecture, the same messages may be exchanged using various network access methods and physical media. This means that BACnet networks may be configured to meet a range of speed and throughput requirements with commensurately varying cost. Multiple BACnet networks can be interconnected within the same system forming an internetwork of arbitrarily large size. This flexibility also provides a way for BACnet to embrace new networking technologies as they are developed.

BACnet was designed to gracefully improve and evolve as both computer technology and demands of building automation systems change. Upon its original publication in 1995, a Standing Standards Project Committee was formed to deliberate enhancements to the protocol under ASHRAE rules for "continuous maintenance." Much has happened since the BACnet standard was first promulgated. BACnet has been translated into Chinese, Japanese, and Korean, and embraced across the globe. BACnet devices have been designed, built and deployed on all seven continents. Suggestions for enhancements and improvements have been continually received, deliberated, and, ultimately, subjected to the same consensus process that produced the original standard. This publication is the result of those deliberations and brings together all of the corrections, refinements, and improvements that have been adopted.

Among the features that have been added to BACnet are: increased capabilities to interconnect systems across wide area networks using Internet Protocols, new objects and services to support fire detection, other life safety applications, lighting, physical access control, and elevator monitoring, capabilities to backup and restore devices, standard ways to collect trend data, new tools to make specifying BACnet systems easier, a mechanism for making interoperable extensions to the standard visible, and many others. The successful addition of these features demonstrates that the concept of a protocol deliberately crafted to permit extension of its capabilities over time as technology and needs change is viable and sound.

The latest update to this standard includes many new capabilities and several clarifications. These new capabilities include a BACnet/SC Certificate Authority Requirements Interchange File Format, support for BACnet/SC configuration including certificate management, Device Proxying, Authentication and Authorization, new Color Object concepts and modernization of language used for defining to MS/TP.

All communication protocols are, in the end, a collection of arbitrary solutions to the problems of information exchange and all are subject to change as time and technology advance. BACnet is no exception. Still, it is the hope of those who have contributed their time, energies, and talents to this work that BACnet will help to fulfill, in the area of building automation and control, the promise of the information age for the public good!

Sample Document

get full document from standards.iteh.ai

Sample Document

get full document from standards.iteh.ai

1 PURPOSE

The purpose of this standard is to define data communication services and protocols for computer equipment used for monitoring and control of HVAC&R and other building systems and to define, in addition, an abstract, object-oriented representation of information communicated between such equipment, thereby facilitating the application and use of digital control technology in buildings.

2 SCOPE

2.1 This protocol provides a comprehensive set of messages for conveying encoded binary, analog, and alphanumeric data between devices including, but not limited to:

- (a) hardware binary input and output values,
- (b) hardware analog input and output values,
- (c) software binary and analog values,
- (d) text string values,
- (e) schedule information,
- (f) alarm and event information,
- (g) files, and
- (h) control logic.

2.2 This protocol models each building automation and control computer as a collection of data structures called "objects," the properties of which represent various aspects of the hardware, software, and operation of the device. These objects provide a means of identifying and accessing information without requiring knowledge of the details of the device's internal design or configuration.

3 DEFINITIONS

3.1 Terms Adopted from International Standards

The following terms used in this standard are defined by international standards or draft standards for open system interconnection (OSI). The definitions are repeated here and a reference to the appropriate standard is provided. Clause 25 contains the titles of all national and international standards referenced in this clause and elsewhere in this standard. Words or phrases in italics refer to terms defined elsewhere in this clause.

abstract syntax: the specification of application layer data or application-protocol-control-information by using notation rules which are independent of the encoding technique used to represent them (ISO 8822).

application: a set of a USER's information processing requirements (ISO 8649).

application-entity: the aspects of an application-process pertinent to OSI (ISO 7498).

application-process: an element within a real open system which performs the information processing for a particular application (ISO 7498).

application-protocol-control-information: information exchanged between application-entities, using presentation services, to coordinate their joint operation (ISO 9545).

application-protocol-data-unit: a unit of data specified in an application protocol and consisting of application-protocol-control-information and possibly application-user-data (ISO 9545).

application-service-element: that part of an application-entity which provides an OSI environment capability, using underlying services when appropriate (ISO 7498).

concrete syntax: those aspects of the rules used in the formal specification of data which embody a specific representation of that data (ISO 7498).