



# BACnet Protocol Guide for KFP-A Series Control Panels

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# Content

<b>Important information</b>	<b>ii</b>
About this guide	ii
Limitation of liability	ii
Advisory messages	iii
<b>About BACnet</b>	<b>1</b>
Introduction	1
Interoperability	1
Devices	2
Objects and object properties	2
Services	3
BACnet/IP	4
Implementation	6
<b>BACnet object types</b>	<b>7</b>
Device object type	7
Life Safety Point object type	11
Life Safety Zone object type	29
BitString Value object type	36
Binary Output object type	39
<b>Enumerated BACnet data types</b>	<b>45</b>
<b>BACnet errors</b>	<b>53</b>

# Important information

## About this guide

The purpose of this guide is to describe the BACnet object types used for KFP-A Series control panel applications.

The standard referenced to create the control panel BACnet implementation is ANSI/ASHRAE Standard 135-2012.

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**Caution:** Read this guide, all related control panel documentation, and all related BACnet protocol standards and specifications entirely before creating BACnet applications.

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**WARNING:** Warning messages advise you of hazards that could result in injury or loss of life. They tell you which actions to take or to avoid in order to prevent the injury or loss of life.

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**Caution:** Caution messages advise you of possible equipment damage. They tell you which actions to take or to avoid in order to prevent the damage.

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**Note:** Note messages advise you of the possible loss of time or effort. They describe how to avoid the loss. Notes are also used to point out important information that you should read.



# About BACnet

## Introduction

BACnet® (Building Automation Control Network) is a data communication protocol for building automation and control networks.

Originally developed in 1987 under the auspices of the American Society of Heating Refrigerating and Air-conditioning Engineers (ASHRAE), BACnet has been an ANSI standard since 1995 and an ISO standard since 2003.

BACnet uses an object-oriented model for abstracting and representing information. BACnet includes 54 standard objects that cover many common applications.

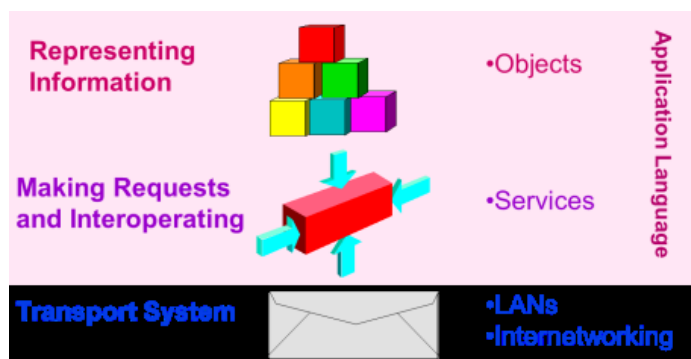
## Interoperability

BACnet is a standard data communication protocol that enables interoperability between different building systems and devices in building automation and control applications.

The BACnet data communication protocol defines standard methods that manufacturers can implement to make components and systems that can be interoperable with other BACnet components and systems.

BACnet addresses the goal of interoperability by defining a generalized model of how automation devices work, a method for describing the information that they contain, and a method for describing protocols that one device can use to ask another device to perform a desired action (see Figure 1 below).

Figure 1: BACnet interoperability



## Devices

A BACnet device is often comprised of a microprocessor-based controller and software combination that is designed to understand and use the BACnet protocol.

Every BACnet device contains a device object that defines certain device information, including the device object identifier or instance number. A BACnet device object instance number must be field-configurable to be unique across the entire BACnet network where the device is installed. For brevity this number is often called the device instance. In addition to the device instance, each BACnet device contains information about the device and any input and output points that it monitors and controls.

## Objects and object properties

### Objects

All information within an interoperable BACnet device is modelled in terms of one or more information objects. Each object represents some important component of the device, or some collection of information that may be of interest to other BACnet devices. Objects may represent single pieces of information, or multiple pieces of information (such as a logical grouping). Objects represent either physical or virtual information, such as analog and binary inputs and outputs, control algorithms, specific applications, and calculations.

Each object is identified with an object identifier. An object identifier is a 32-bit binary number containing a code for the object type and the object instance number. In addition, every object, no matter its purpose or function, has a collection of properties that define the object. Each property includes at least a name and a value.

### Object properties

Objects have a collection of properties, based on the function and purpose of the object. Each property contains two pieces of information: a property identifier and its value.

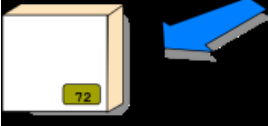
Property identifiers are numbers that uniquely identify a given property in the context of the object type.

Properties may be defined as read-only or read/write. A property's purpose is to allow other BACnet devices to read information about the object containing the property, and potentially write (change) a different value to the property.

For each standard BACnet object type, the BACnet standard defines which properties are required and which are optional.



Figure 2: BACnet objects



Object_Name	SPACE TEMP
Object_Type	ANALOG INPUT
Present_Value	72.3
Status_Flags	Normal, InService
High_Limit	78.0
Low_Limit	68.0

## Services

BACnet services are formal requests that one BACnet device sends to another BACnet device to ask it to do something.

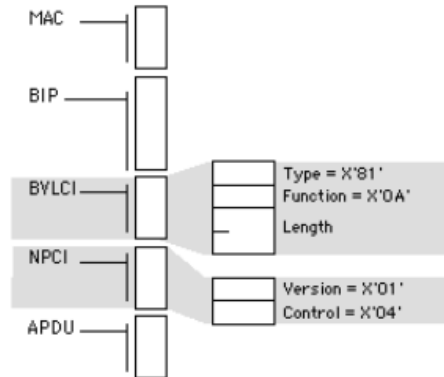
Services are grouped into five categories:

- Object access (read, write, create, delete)
- Device management (discover, time synchronization, initialize, backup, and restore database)
- Alarm and event (alarms, changes of state)
- File transfer (trend data, program transfer)
- Virtual terminal (human machine interface via prompts and menus)

# BACnet/IP

BACnet/IP uses a standard UDP/IP stack to send and receive messages. The Application Protocol Data Unit (APDU) packet is encapsulated in a UDP/IP packet and called BACnet/IP.

Figure 3: BACnet/IP Original-Unicast-NPDU.



A BACnet/IP takes the form of a BACnet Virtual Link Control Information (BVLCI) + Network Protocol Data Unit (NPDU) (Network Protocol Control Information (NPCI) + APDU).

The NPCI contains the version number of the BACnet protocol in the first byte. The second byte indicates that a reply is expected.

The BVLCI indicates that this is an Original-Unicast-NPDU, used to send directed NPDUs to another BACnet/IP device or router.

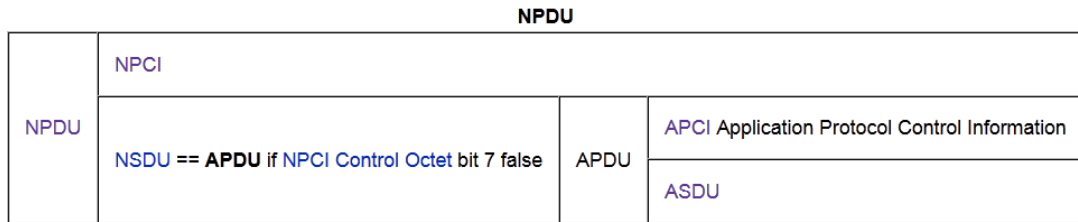
The maximum NPDU length for BACnet data link technologies is shown in the table below.

Data link technology	Maximum NPDU length
Ethernet	1497
ARCNET	501
MS/TP	501
Point-To-Point	501
LonTalk	228
BACnet/IP	1497
ZigBee	501

## BACnet APDU

BACnet APDUs carry the Application Layer parameters. The maximum size of an APDU is specified by the device Max\_APDU\_Length\_Accepted (see “Device object type” on page 7).

**Figure 4: BACnet NPDU format**



The APCI is the header, or the fixed part, of the APDU. It includes:

- The type of APDU
- The Information to carry out the reassembly of segmented messages

The variable portion of each APDU containing service-specific information is encoded according to BACnet-specific rules. Eight types of BACnet APDU types exist:

- BACnet-Unconfirmed-Request-PDU
- BACnet-Confirmed-Request-PDU
- BACnet-SimpleACK-PDU
- BACnet-ComplexACK-PDU
- BACnet-SegmentedACK-PDU
- BACnet-Abort-PDU
- BACnet-Error-PDU
- BACnet-Reject-PDU

## Implementation

The BACnet implementation for control panels allows:

- Monitoring the status for all devices in the control panel network
- Executing selected control panel operations

The following services and object types are supported.

Services	Initiate request	Execute request
Object Access – Read Property	No	Yes
Object Access – Write Property	No	Yes

**Note:** Multiple register writes is not implemented as normal operation consists of monitoring (with only occasional operation commands).

Different object types are used to hold the status of control panels, zones, and devices in the network.

Object type	Services	Control panel object type
Device	Read	Control panel Information
Life Safety Point	Read	Control panel Device Status (Inputs and Outputs)
Life Safety Zone	Read	Control panel Zone Status
BitString Value	Read	Global Control panels Status Flags
	Read	Control panel Status Flags
Binary Output	Read/Write	Execute Reset
	Read/Write	Execute Panel Silence
	Read/Write	Set Sounders Start/Stop
	Read/Write	Set Sounders Delay On/Off
	Read/Write	Set Fire Protection Delay On/Off
	Read/Write	Execute Fire Protection Override Delay
	Read/Write	Set Fire Routing Delay On/Off
	Read/Write	Execute Fire Routing Override Delay

# BACnet object types

This section describes the following control panel object types:

- Device object type (Read)
- Life Safety Point object type (Read)
- Life Safety Zone object type (Read)
- BitString Value object type (Read)
- Binary Output object type (Read/Write)

## Device object type

The following read-only properties are supported for this object type.

Property identifier	Property data type	Value
Object_Identifier	BACnetObjectIdentifier	0x02 0x00 0x00 0x01
ObjectType		Standard object type Object Type = DEVICE
Instance Number		Instance Number = 1
Object_Name	CharacterString	[Local Panel Name]
Object_Type	BACnetObjectType	DEVICE (8)
System_Status	BACnetDeviceStatus	OPERATIONAL (0)
Vendor_Name	CharacterString	“Carrier Fire & Security”
Vendor_Identifier	Unsigned16	78
Model_Name	CharacterString	[Local Panel Type]
Firmware_Revision	CharacterString	[Firmware Panel Version]
Application_Software_Version	CharacterString	[Firmware Panel Version]
Protocol_Version	Unsigned32	1
Protocol_Revision	Unsigned32	14
Protocol_Services_Supported	BACnetServicesSupported	0x00 0x00 0x09 Read Property = Supported Write Property = Supported
Protocol_Object_Types_Supported	BACnetObjectTypesSupported	Device = Supported LifeSafetyPoint = Supported LifeSafetyZone = Supported BitString Value = Supported Binary Output = Supported
Object_List	BACnetARRAY of BACnetObjectIdentifier	List of BACnetObjectIdentifier of all objects of the BACnet device
Max_APDU_Length_Accepted	Unsigned32	1476
Segmentation_Supported	BACnetSegmentation	NO SEGMENTATION (3)
APDU_Timeout	Unsigned32	10000
Number_Of_APDU_Retries	Unsigned32	3

Property identifier	Property data type	Value
Device_Address_Binding	BACnetLIST of BACnetAddressBinding	Object Identifier (0x02 0x00 0x00 0x01) Local Network (0) Local Panel MAC Address
Database_Revision	Unsigned32	1
Property_List	BACnetARRAY of BACnetPropertyIdentifier	System-status (112) Vendor-name (121) Vendor-identifier (120) Model-name (70) Firmware-revision (44) Application-software-version (12) Protocol-version (98) Protocol-revision (139) Protocol-services-supported (97) Protocol-object-types-supported (96) Object-list (76) Max_APDU-length-accepted (62) Segmentation-supported (107) APDU-timeout (11) Number-of-APDU-retries (73) Device-address-binding (30) Database-revision (155)

### Object\_Identifier

This property indicates the numeric code of the object. It is unique across the network.

### Object\_Name

This property indicates the name of the object. It is unique across the network. The minimum length of the string is one character.

### Object\_Type

This property indicates membership of an object type class.

### System\_Status

This property indicates the current physical and logical status of the BACnet Device.

### Vendor\_Name

This property indicates the name of the manufacturer of the BACnet device.

### Vendor\_Identifier

This property indicates the unique vendor identification code used to distinguish proprietary extensions of the protocol.

### Model\_Name

This property indicates the model name of the BACnet device.

### **Firmware\_Revision**

This property indicates the firmware version of the BACnet device (3.5 or later).

### **Application\_Software\_Version**

This property indicates the application software version installed on the machine (3.5 or later).

### **Protocol\_Version**

This property indicates the BACnet protocol version supported by the BACnet device. Every major revision of BACnet increases this version number by one.

### **Protocol\_Revision**

This property indicates the minor revision level of the BACnet standard.

### **Protocol\_Services\_Supported**

This property indicates which standardized protocol services are executed by the device protocol implementation.

### **Protocol\_Object\_Types\_Supported**

This property indicates which standardized object types can be present in the device protocol implementation.

### **Object\_List**

This property is a BACnetARRAY of BACnetObjectIdentifier, with one Object\_Identifier for each object within the device that is accessible through BACnet devices.

### **Max\_APDU\_Length\_Accepted**

This property indicates the maximum number of octets that may be contained in a single, indivisible application layer protocol data unit (APDU). The minimum value of this property 50.

### **Segmentation\_Supported**

This property indicates whether the BACnet device supports segmentation of messages and, if so, whether it supports segmented transmission, reception, or both.

### **APDU\_Timeout**

This property indicates the amount of time (in milliseconds) between retransmissions of an APDU requiring acknowledgment for which no acknowledgment has been received.

A suggested default value for this property is 6.000 ms for devices that permit modifications of this parameter. Otherwise, the default value is 10.000 ms.

This value is non-zero if the Device object property Number\_Of\_APDU\_Retries is non-zero.

### **Number\_Of\_APDU\_Retries**

This property indicates the maximum number of times that an APDU is retransmitted.

A suggested default value for this property is 3.

If the device does not perform retries, then this property is set to zero. If the value of this property is greater than zero, a non-zero value is required in Device object property APDU\_Timeout property.

### **Device\_Address\_Binding**

This property consists of a BACnet Object Identifier of a BACnet device object and a BACnet device address in the form of BACnetAddress.

### **Database\_Revision**

This property indicates the logical revision number for the device database. It is updated when an object is created, when an object is deleted, when an object's name is changed, or when a restore is performed.

### **Property\_List**

This property is a BACnetARRAY of property identifiers, with one property identifier for each property that exists within the object.

The Object\_Name, Object\_Type, Object\_Identifier, and Property\_List properties are not included in the list.



## Life Safety Point object type

The following read-only properties are supported for this object type.

Property identifier	Property data type	Data type	Value
Object_Identifier	BACnetObjectIdentifier	Unsigned 32-bit value	0x05 0x40 0x00 0xXX
ObjectType		Data Type	Standard object type Object Type = LIFE_SAFETY_POINT
Instance Number			Instance Number = XX
Object_Name	CharacterString	Null terminated ASCII string	"Panel ID Loop ID Device ID "
Object_Type	BACnetObjectType	Unsigned 32-bit value	LIFE_SAFETY_POINT (21)
Present_Value	BACnetLifeSafetyState	Unsigned 32-bit value	
Tracking_Value	BACnetLifeSafetyState	Unsigned 32-bit value	
Status_Flags	BACnetStatusFlags	Unsigned 16-bit value	
Fault	BOOLEAN		FALSE (0)
In Alarm	BOOLEAN		FALSE (0)
Overridden	BOOLEAN		FALSE (0)
Out Of Service	BOOLEAN		FALSE (0)
Event_State	BACnetEventState	Unsigned 32-bit value	NORMAL (0)
Reliability	BACnetReliability	Unsigned 32-bit value	NO-FAULT-DETECTED (0)
Out_Of_Service	BOOLEAN	Single bit value	FALSE (0)
Accepted_Modes	BACnetLIST of BACnetListSafetyMode	List of Unsigned 32-bit value	Read Property Service Error Error Class – PROPERTY Error Code – VALUE OUT OF RANGE
Silenced	BACnetSilencedState	Unsigned 32-bit value	UNSILENCED (0)
Operation_Expected	BACnetLifeSafetyOperation	Unsigned 32-bit value	NONE (0)
Property_List	BACnetARRAY of BACnetPropertyIdentifier	Array of Unsigned 8-bit value Data Type	Present-value (85) Tracking-value (164) Status-flags (111) Event-state (36) Reliability (103) Out-of-service (81) Accepted-modes (175) Silence (163) Operation-expected (161)

## Object\_Identifier

This property indicates the numeric code of the object. It is unique within the BACnet device that maintains it.

The object type field contains the object type class.

The object instance field is the numerical object instance. Object instances range from 0 to 4194303.

**Note:** The Device ID for all Start/End instances in the table below is DEV\_1-DEV\_256.

Start object instance	End object instance	Panel ID	Loop ID
1	256	PANEL_1	LOOP_1
257	512		LOOP_2
513	768		LOOP_3
769	1024		LOOP_4
2049	2304	PANEL_2	LOOP_1
2305	2560		LOOP_2
2561	2816		LOOP_3
2817	3072		LOOP_4
4097	4352	PANEL_3	LOOP_1
4353	4608		LOOP_2
4609	4864		LOOP_3
4865	5120		LOOP_4
6145	6400	PANEL_4	LOOP_1
6401	6656		LOOP_2
6657	6912		LOOP_3
6913	7168		LOOP_4
8193	8448	PANEL_5	LOOP_1
8449	8704		LOOP_2
8705	8960		LOOP_3
8961	9216		LOOP_4
10241	10496	PANEL_6	LOOP_1
10497	10752		LOOP_2
10753	11008		LOOP_3
11009	11264		LOOP_4
12289	12544	PANEL_7	LOOP_1
12545	12800		LOOP_2
12801	13056		LOOP_3
13057	13312		LOOP_4
14337	14592	PANEL_8	LOOP_1

Start object instance	End object instance	Panel ID	Loop ID
14593	14848		LOOP_2
14849	15104		LOOP_3
15105	15360		LOOP_4
16385	16640	PANEL_9	LOOP_1
16641	16896		LOOP_2
16897	17152		LOOP_3
17153	17408		LOOP_4
18433	18688	PANEL_10	LOOP_1
18689	18944		LOOP_2
18945	19200		LOOP_3
19201	19456		LOOP_4
20481	20736	PANEL_11	LOOP_1
20737	20992		LOOP_2
20993	21248		LOOP_3
21249	21504		LOOP_4
22529	22784	PANEL_12	LOOP_1
22785	23040		LOOP_2
23041	23296		LOOP_3
23297	23552		LOOP_4
24577	24832	PANEL_13	LOOP_1
24833	25088		LOOP_2
25089	25344		LOOP_3
25345	25600		LOOP_4
26625	26880	PANEL_14	LOOP_1
26881	27136		LOOP_2
27137	27392		LOOP_3
27393	27648		LOOP_4
28673	28928	PANEL_15	LOOP_1
28929	29184		LOOP_2
29185	29440		LOOP_3
29441	29696		LOOP_4
30721	30976	PANEL_16	LOOP_1
30977	31232		LOOP_2
31233	31488		LOOP_3
31489	31744		LOOP_4
32769	33024	PANEL_17	LOOP_1
33025	33280		LOOP_2
33281	33536		LOOP_3

Start object instance	End object instance	Panel ID	Loop ID
33537	33792		LOOP_4
34817	35072	PANEL_18	LOOP_1
35073	35328		LOOP_2
35329	35584		LOOP_3
35585	35840		LOOP_4
36865	37120	PANEL_19	LOOP_1
37121	37376		LOOP_2
37377	37632		LOOP_3
37633	37888		LOOP_4
38913	39168	PANEL_20	LOOP_1
39169	39424		LOOP_2
39425	39680		LOOP_3
39681	39936		LOOP_4
40961	41216	PANEL_21	LOOP_1
41217	41472		LOOP_2
41473	41728		LOOP_3
41729	41984		LOOP_4
43009	43264	PANEL_22	LOOP_1
43265	43520		LOOP_2
43521	43776		LOOP_3
43777	44032		LOOP_4
45057	45312	PANEL_23	LOOP_1
45313	45568		LOOP_2
45569	45824		LOOP_3
45825	46080		LOOP_4
47105	47360	PANEL_24	LOOP_1
47361	47616		LOOP_2
47617	47872		LOOP_3
47873	48128		LOOP_4
49153	49408	PANEL_25	LOOP_1
49409	49664		LOOP_2
49665	49920		LOOP_3
49921	50176		LOOP_4
51201	51456	PANEL_26	LOOP_1
51457	51712		LOOP_2
51713	51968		LOOP_3
51969	52224		LOOP_4
53249	53504	PANEL_27	LOOP_1

Start object instance	End object instance	Panel ID	Loop ID
53505	53760		LOOP_2
53761	54016		LOOP_3
54017	54272		LOOP_4
55297	55552	PANEL_28	LOOP_1
55553	55808		LOOP_2
55809	56064		LOOP_3
56065	56320		LOOP_4
57345	57600	PANEL_29	LOOP_1
57601	57856		LOOP_2
57857	58112		LOOP_3
58113	58368		LOOP_4
59393	59648	PANEL_30	LOOP_1
59649	59904		LOOP_2
59905	60160		LOOP_3
60161	60416		LOOP_4
61441	61696	PANEL_31	LOOP_1
61697	61952		LOOP_2
61953	62208		LOOP_3
62209	62464		LOOP_4
63489	63744	PANEL_32	LOOP_1
63745	64000		LOOP_2
64001	64256		LOOP_3
64257	64512		LOOP_4
65537	65792	PANEL_33	LOOP_1
65793	66048		LOOP_2
66049	66304		LOOP_3
66305	66560		LOOP_4
67585	67840	PANEL_34	LOOP_1
67841	68096		LOOP_2
68097	68352		LOOP_3
68353	68608		LOOP_4
69633	69888	PANEL_35	LOOP_1
69889	70144		LOOP_2
70145	70400		LOOP_3
70401	70656		LOOP_4
71681	71936	PANEL_36	LOOP_1
71937	72192		LOOP_2
72193	72448		LOOP_3

Start object instance	End object instance	Panel ID	Loop ID
72449	72704		LOOP_4
73729	73984	PANEL_37	LOOP_1
73985	74240		LOOP_2
74241	74496		LOOP_3
74497	74752		LOOP_4
75777	76032	PANEL_38	LOOP_1
76033	76288		LOOP_2
76289	76544		LOOP_3
76545	76800		LOOP_4
77825	78080	PANEL_39	LOOP_1
78081	78336		LOOP_2
78337	78592		LOOP_3
78593	78848		LOOP_4
79873	80128	PANEL_40	LOOP_1
80129	80384		LOOP_2
80385	80640		LOOP_3
80641	80896		LOOP_4
81921	82176	PANEL_41	LOOP_1
82177	82432		LOOP_2
82433	82688		LOOP_3
82689	82944		LOOP_4
83969	84224	PANEL_42	LOOP_1
84225	84480		LOOP_2
84481	84736		LOOP_3
84737	84992		LOOP_4
86017	86272	PANEL_43	LOOP_1
86273	86528		LOOP_2
86529	86784		LOOP_3
86785	87040		LOOP_4
88065	88320	PANEL_44	LOOP_1
88321	88576		LOOP_2
88577	88832		LOOP_3
88833	89088		LOOP_4
90113	90368	PANEL_45	LOOP_1
90369	90624		LOOP_2
90625	90880		LOOP_3
90881	91136		LOOP_4
92161	92416	PANEL_46	LOOP_1

Start object instance	End object instance	Panel ID	Loop ID
92417	92672		LOOP_2
92673	92928		LOOP_3
92929	93184		LOOP_4
94209	94464	PANEL_47	LOOP_1
94465	94720		LOOP_2
94721	94976		LOOP_3
94977	95232		LOOP_4
96257	96512	PANEL_48	LOOP_1
96513	96768		LOOP_2
96769	97024		LOOP_3
97025	97280		LOOP_4
98305	98560	PANEL_49	LOOP_1
98561	98816		LOOP_2
98817	99072		LOOP_3
99073	99328		LOOP_4
100353	100608	PANEL_50	LOOP_1
100609	100864		LOOP_2
100865	101120		LOOP_3
101121	101376		LOOP_4
102401	102656	PANEL_51	LOOP_1
102657	102912		LOOP_2
102913	103168		LOOP_3
103169	103424		LOOP_4
104449	104704	PANEL_52	LOOP_1
104705	104960		LOOP_2
104961	105216		LOOP_3
105217	105472		LOOP_4
106497	106752	PANEL_53	LOOP_1
106753	107008		LOOP_2
107009	107264		LOOP_3
107265	107520		LOOP_4
108545	108800	PANEL_54	LOOP_1
108801	109056		LOOP_2
109057	109312		LOOP_3
109313	109568		LOOP_4
110593	110848	PANEL_55	LOOP_1
110849	111104		LOOP_2
111105	111360		LOOP_3

Start object instance	End object instance	Panel ID	Loop ID
111361	111616		LOOP_4
112641	112896	PANEL_56	LOOP_1
112897	113152		LOOP_2
113153	113408		LOOP_3
113409	113664		LOOP_4
114689	114944	PANEL_57	LOOP_1
114945	115200		LOOP_2
115201	115456		LOOP_3
115457	115712		LOOP_4
116737	116992	PANEL_58	LOOP_1
116993	117248		LOOP_2
117249	117504		LOOP_3
117505	117760		LOOP_4
118785	119040	PANEL_59	LOOP_1
119041	119296		LOOP_2
119297	119552		LOOP_3
119553	119808		LOOP_4
120833	121088	PANEL_60	LOOP_1
121089	121344		LOOP_2
121345	121600		LOOP_3
121601	121856		LOOP_4
122881	123136	PANEL_61	LOOP_1
123137	123392		LOOP_2
123393	123648		LOOP_3
123649	123904		LOOP_4
124929	125184	PANEL_62	LOOP_1
125185	125440		LOOP_2
125441	125696		LOOP_3
125697	125952		LOOP_4
126977	127232	PANEL_63	LOOP_1
127233	127488		LOOP_2
127489	127744		LOOP_3
127745	128000		LOOP_4
129025	129280	PANEL_64	LOOP_1
129281	129536		LOOP_2
129537	129792		LOOP_3
129793	130048		LOOP_4
131073	131328	PANEL_65	LOOP_1



Start object instance	End object instance	Panel ID	Loop ID
131329	131584		LOOP_2
131585	131840		LOOP_3
131841	132096		LOOP_4
133121	133376	PANEL_66	LOOP_1
133377	133632		LOOP_2
133633	133888		LOOP_3
133889	134144		LOOP_4
135169	135424	PANEL_67	LOOP_1
135425	135680		LOOP_2
135681	135936		LOOP_3
135937	136192		LOOP_4
137217	137472	PANEL_68	LOOP_1
137473	137728		LOOP_2
137729	137984		LOOP_3
137985	138240		LOOP_4
139265	139520	PANEL_69	LOOP_1
139521	139776		LOOP_2
139777	140032		LOOP_3
140033	140288		LOOP_4
141313	141568	PANEL_70	LOOP_1
141569	141824		LOOP_2
141825	142080		LOOP_3
142081	142336		LOOP_4
143361	143616	PANEL_71	LOOP_1
143617	143872		LOOP_2
143873	144128		LOOP_3
144129	144384		LOOP_4
145409	145664	PANEL_72	LOOP_1
145665	145920		LOOP_2
145921	146176		LOOP_3
146177	146432		LOOP_4
147457	147712	PANEL_73	LOOP_1
147713	147968		LOOP_2
147969	148224		LOOP_3
148225	148480		LOOP_4
149505	149760	PANEL_74	LOOP_1
149761	150016		LOOP_2
150017	150272		LOOP_3

Start object instance	End object instance	Panel ID	Loop ID
150273	150528		LOOP_4
151553	151808	PANEL_75	LOOP_1
151809	152064		LOOP_2
152065	152320		LOOP_3
152321	152576		LOOP_4
153601	153856	PANEL_76	LOOP_1
153857	154112		LOOP_2
154113	154368		LOOP_3
154369	154624		LOOP_4
155649	155904	PANEL_77	LOOP_1
155905	156160		LOOP_2
156161	156416		LOOP_3
156417	156672		LOOP_4
157697	157952	PANEL_78	LOOP_1
157953	158208		LOOP_2
158209	158464		LOOP_3
158465	158720		LOOP_4
159745	160000	PANEL_79	LOOP_1
160001	160256		LOOP_2
160257	160512		LOOP_3
160513	160768		LOOP_4
161793	162048	PANEL_80	LOOP_1
162049	162304		LOOP_2
162305	162560		LOOP_3
162561	162816		LOOP_4
163841	164096	PANEL_81	LOOP_1
164097	164352		LOOP_2
164353	164608		LOOP_3
164609	164864		LOOP_4
165889	166144	PANEL_82	LOOP_1
166145	166400		LOOP_2
166401	166656		LOOP_3
166657	166912		LOOP_4
167937	168192	PANEL_83	LOOP_1
168193	168448		LOOP_2
168449	168704		LOOP_3
168705	168960		LOOP_4
169985	170240	PANEL_84	LOOP_1

Start object instance	End object instance	Panel ID	Loop ID
170241	170496		LOOP_2
170497	170752		LOOP_3
170753	171008		LOOP_4
172033	172288	PANEL_85	LOOP_1
172289	172544		LOOP_2
172545	172800		LOOP_3
172801	173056		LOOP_4
174081	174336	PANEL_86	LOOP_1
174337	174592		LOOP_2
174593	174848		LOOP_3
174849	175104		LOOP_4
176129	176384	PANEL_87	LOOP_1
176385	176640		LOOP_2
176641	176896		LOOP_3
176897	177152		LOOP_4
178177	178432	PANEL_88	LOOP_1
178433	178688		LOOP_2
178689	178944		LOOP_3
178945	179200		LOOP_4
180225	180480	PANEL_89	LOOP_1
180481	180736		LOOP_2
180737	180992		LOOP_3
180993	181248		LOOP_4
182273	182528	PANEL_90	LOOP_1
182529	182784		LOOP_2
182785	183040		LOOP_3
183041	183296		LOOP_4
184321	184576	PANEL_91	LOOP_1
184577	184832		LOOP_2
184833	185088		LOOP_3
185089	185344		LOOP_4
186369	186624	PANEL_92	LOOP_1
186625	186880		LOOP_2
186881	187136		LOOP_3
187137	187392		LOOP_4
188417	188672	PANEL_93	LOOP_1
188673	188928		LOOP_2
188929	189184		LOOP_3

Start object instance	End object instance	Panel ID	Loop ID
189185	189440		LOOP_4
190465	190720	PANEL_94	LOOP_1
190721	190976		LOOP_2
190977	191232		LOOP_3
191233	191488		LOOP_4
192513	192768	PANEL_95	LOOP_1
192769	193024		LOOP_2
193025	193280		LOOP_3
193281	193536		LOOP_4
194561	194816	PANEL_96	LOOP_1
194817	195072		LOOP_2
195073	195328		LOOP_3
195329	195584		LOOP_4
196609	196864	PANEL_97	LOOP_1
196865	197120		LOOP_2
197121	197376		LOOP_3
197377	197632		LOOP_4
198657	198912	PANEL_98	LOOP_1
198913	199168		LOOP_2
199169	199424		LOOP_3
199425	199680		LOOP_4
200705	200960	PANEL_99	LOOP_1
200961	201216		LOOP_2
201217	201472		LOOP_3
201473	201728		LOOP_4
202753	203008	PANEL_100	LOOP_1
203009	203264		LOOP_2
203265	203520		LOOP_3
203521	203776		LOOP_4
204801	205056	PANEL_101	LOOP_1
205057	205312		LOOP_2
205313	205568		LOOP_3
205569	205824		LOOP_4
206849	207104	PANEL_102	LOOP_1
207105	207360		LOOP_2
207361	207616		LOOP_3
207617	207872		LOOP_4

Start object instance	End object instance	Panel ID	Loop ID
208897	209152	PANEL_103	LOOP_1
209153	209408		LOOP_2
209409	209664		LOOP_3
209665	209920		LOOP_4
210945	211200	PANEL_104	LOOP_1
211201	211456		LOOP_2
211457	211712		LOOP_3
211713	211968		LOOP_4
212993	213248	PANEL_105	LOOP_1
213249	213504		LOOP_2
213505	213760		LOOP_3
213761	214016		LOOP_4
215041	215296	PANEL_106	LOOP_1
215297	215552		LOOP_2
215553	215808		LOOP_3
215809	216064		LOOP_4
217089	217344	PANEL_107	LOOP_1
217345	217600		LOOP_2
217601	217856		LOOP_3
217857	218112		LOOP_4
219137	219392	PANEL_108	LOOP_1
219393	219648		LOOP_2
219649	219904		LOOP_3
219905	220160		LOOP_4
221185	221440	PANEL_109	LOOP_1
221441	221696		LOOP_2
221697	221952		LOOP_3
221953	222208		LOOP_4
223233	223488	PANEL_110	LOOP_1
223489	223744		LOOP_2
223745	224000		LOOP_3
224001	224256		LOOP_4
225281	225536	PANEL_111	LOOP_1
225537	225792		LOOP_2
225793	226048		LOOP_3
226049	226304		LOOP_4

Start object instance	End object instance	Panel ID	Loop ID
227329	227584	PANEL_112	LOOP_1
227585	227840		LOOP_2
227841	228096		LOOP_3
228097	228352		LOOP_4
229377	229632	PANEL_113	LOOP_1
229633	229888		LOOP_2
229889	230144		LOOP_3
230145	230400		LOOP_4
231425	231680	PANEL_114	LOOP_1
231681	231936		LOOP_2
231937	232192		LOOP_3
232193	232448		LOOP_4
233473	233728	PANEL_115	LOOP_1
233729	233984		LOOP_2
233985	234240		LOOP_3
234241	234496		LOOP_4
235521	235776	PANEL_116	LOOP_1
235777	236032		LOOP_2
236033	236288		LOOP_3
236289	236544		LOOP_4
237569	237824	PANEL_117	LOOP_1
237825	238080		LOOP_2
238081	238336		LOOP_3
238337	238592		LOOP_4
239617	239872	PANEL_118	LOOP_1
239873	240128		LOOP_2
240129	240384		LOOP_3
240385	240640		LOOP_4
241665	241920	PANEL_119	LOOP_1
241921	242176		LOOP_2
242177	242432		LOOP_3
242433	242688		LOOP_4
243713	243968	PANEL_120	LOOP_1
243969	244224		LOOP_2
244225	244480		LOOP_3
244481	244736		LOOP_4

Start object instance	End object instance	Panel ID	Loop ID
245761	246016	PANEL_121	LOOP_1
246017	246272		LOOP_2
246273	246528		LOOP_3
246529	246784		LOOP_4
247809	248064	PANEL_122	LOOP_1
248065	248320		LOOP_2
248321	248576		LOOP_3
248577	248832		LOOP_4
249857	250112	PANEL_123	LOOP_1
250113	250368		LOOP_2
250369	250624		LOOP_3
250625	250880		LOOP_4
251905	252160	PANEL_124	LOOP_1
252161	252416		LOOP_2
252417	252672		LOOP_3
252673	252928		LOOP_4
253953	254208	PANEL_125	LOOP_1
254209	254464		LOOP_2
254465	254720		LOOP_3
254721	254976		LOOP_4
256001	256256	PANEL_126	LOOP_1
256257	256512		LOOP_2
256513	256768		LOOP_3
256769	257024		LOOP_4
258049	258304	PANEL_127	LOOP_1
258305	258560		LOOP_2
258561	258816		LOOP_3
258817	259072		LOOP_4
260097	260352	PANEL_128	LOOP_1
260353	260608		LOOP_2
260609	260864		LOOP_3
260865	261120		LOOP_4

## Object\_Name

This property indicates the name of the object. It is unique within the BACnet device that maintains it. The minimum length of the string is one character.

## Object\_Type

This property indicates membership of an object type class. The value of this property is LIFE\_SAFETY\_POINT.

## Present\_Value

This property indicates the state of the Life Safety Point object. The means of deriving the Present\_Value is a local matter.

Present\_Value may latch non-NORMAL state values until reset.

This property represents the control panel device status as shown in the table below.

Control panel device status	BACnetLifeSafetyState
Device in Normal status	Quiet (0)
Device in Prealarm	Prealarm (1)
Device in Alarm	Alarm (2)
Device in Fault	Fault (3)
Device in Test	Test-active (10)
Device Disabled	Blocked (19)
Device in Prealarm-Fault	Fault-Prealarm (4)
Device in Alarm-Fault	Fault-alarm (5)

## Tracking\_Value

This property indicates the non-latched state of the Life Safety Point object. The means of deriving the state is a local matter.

Unlike Present\_Value, which may latch non-NORMAL state values until reset, Tracking\_Value continuously tracks changes in the state.



## Status\_Flags

This property indicates the general health of the Life Safety Point object via four Boolean flags. Three of the flags are associated with values of other properties of this object.

The four flags are shown in the table below.

Flag	Description
IN_ALARM	Logical FALSE (0) if Event_State has a value of NORMAL, otherwise logical TRUE (1).
FAULT	Logical TRUE (1) if Reliability is present and does not have a value of NO_FAULT_DETECTED, otherwise logical FALSE (0).
OVERRIDDEN	Logical TRUE (1) if the point has been overridden by some mechanism local to the BACnet device. In this context "overridden" is taken to mean that Present_Value and Reliability are no longer tracking changes to the physical input. Otherwise, the value is logical FALSE (0).
OUT_OF_SERVICE	Logical TRUE (1) if Out_Of_Service has a value of TRUE, otherwise logical FALSE (0).

## Event\_State

This property indicates whether an object has an active event state associated with it.

If the object supports event reporting, then Event\_State indicates the event state of the object. If the object does not support event reporting then the value of this property is NORMAL.

## Reliability

This property indicates whether Present\_Value or the operation of the physical input(s) in question are reliable as far as the BACnet device or operator can determine and, if not, why.

## Out\_Of\_Service

This property indicates whether the inputs the object represents are not in service.

This means that Present\_Value is decoupled from the input and will not track changes to the input when the value of Out\_Of\_Service is TRUE.

While Out\_Of\_Service is TRUE, Present\_Value may be changed to any value as a means of simulating specific conditions or for testing purposes.

## Silenced

This property indicates whether the most recently occurring transition of the object that produced an audible or visual indication has been silenced by the receipt of a LifeSafetyOperation service request or a local process.

## Operation\_Expected

This property indicates the next operation expected by the object to handle a specific life safety situation.

### **Accepted\_Modes**

This property indicates all values that Mode accepts when written to using BACnet services. If a write is denied, an “Error Class” PROPERTY and an “Error Code” of VALUE\_OUT\_OF\_SERVICE is returned.

### **Property\_List**

This property is a BACnetARRAY of property identifiers, with one property identifier for each property that exists within the object.

The Object\_Name, Object\_Type, Object\_Identifier, and Property\_List properties are not included in the list.

## Life Safety Zone object type

The following read-only properties are supported for this object type.

Property identifier	Property data type	Data type	Value
Object_Identifier	BACnetObjectIdentifier	Unsigned 32-bit value	0x05 0x80 0x00 0x01
ObjectType		Data Type	Standard object type Object Type = LIFE_SAFETY_ZONE
Instance Number			Instance Number = XX
Object_Name	CharacterString	Null terminated ASCII string	"Panel ID Zone ID"
Object_Type	BACnetObjectType	Unsigned 32-bit value	LIFE_SAFETY_ZONE (22)
Present_Value	BACnetLifeSafetyState	Unsigned 32-bit value	
Tracking_Value	BACnetLifeSafetyState	Unsigned 32-bit value	
Status_Flags	BACnetStatusFlags	Unsigned 16-bit value	
Fault	BOOLEAN		FALSE (0)
In Alarm	BOOLEAN		FALSE (0)
Overridden	BOOLEAN		FALSE (0)
Out Of Service	BOOLEAN		FALSE (0)
Event_State	BACnetEventState	Unsigned 32-bit value	NORMAL (0)
Reliability	BACnetReliability	Unsigned 32-bit value	NO-FAULT-DETECTED (0)
Out_Of_Service	BOOLEAN	Single bit value	FALSE (0)
Accepted_Modes	BACnetLIST of BACnetLifeSafetyMode	List of Unsigned 32-bit value	Read Property Service Error Error Class – PROPERTY Error Code – VALUE OUT OF RANGE
Silenced	BACnetSilencedState	Unsigned 32-bit value	UNSILENCED (0)
Operation_Expected	BACnetLifeSafetyOperation	Unsigned 32-bit value	NONE (0)
Zone_Members	BACnetLIST of BACnetDeviceObjectReference	List of Unsigned 32-bit value	List of BACnetObjectIdentifier of devices of the zone.
Property_List	BACnetARRAY of BACnetPropertyIdentifier	Array of Unsigned 8-bit value Data Type	Present-value (85) Tracking-value (164) Status-flags (111) Event-state (36) Reliability (103) Out-of-service (81) Accepted-modes (175) Silence (163) Operation-expected (161) Zone-members (165)

## Object\_Identifier

This property indicates the numeric code of the object. It is unique within the BACnet device that maintains it.

The object type field contains the object type class.

The object instance field is the numerical object instance. Object instances range from 0 to 4194303.

**Note:** The Zone ID for all Start/End instances in the table below is ZONE\_1-ZONE\_9999.

Start object instance	End object instance	Panel ID
1	9999	PANEL_1
10001	19999	PANEL_2
20001	29999	PANEL_3
30001	39999	PANEL_4
40001	49999	PANEL_5
50001	59999	PANEL_6
60001	69999	PANEL_7
70001	79999	PANEL_8
80001	89999	PANEL_9
90001	99999	PANEL_10
100001	109999	PANEL_11
110001	119999	PANEL_12
120001	129999	PANEL_13
130001	139999	PANEL_14
140001	149999	PANEL_15
150001	159999	PANEL_16
160001	169999	PANEL_17
170001	179999	PANEL_18
180001	189999	PANEL_19
190001	199999	PANEL_20
200001	209999	PANEL_21
210001	219999	PANEL_22
220001	229999	PANEL_23
230001	239999	PANEL_24
240001	249999	PANEL_25
250001	259999	PANEL_26
260001	269999	PANEL_27
270001	279999	PANEL_28
280001	289999	PANEL_29

<b>Start object instance</b>	<b>End object instance</b>	<b>Panel ID</b>
290001	299999	PANEL_30
300001	309999	PANEL_31
310001	319999	PANEL_32
320001	329999	PANEL_33
330001	339999	PANEL_34
340001	349999	PANEL_35
350001	359999	PANEL_36
360001	369999	PANEL_37
370001	379999	PANEL_38
380001	389999	PANEL_39
390001	399999	PANEL_40
400001	409999	PANEL_41
410001	419999	PANEL_42
420001	429999	PANEL_43
430001	439999	PANEL_44
440001	449999	PANEL_45
450001	459999	PANEL_46
460001	469999	PANEL_47
470001	479999	PANEL_48
480001	489999	PANEL_49
490001	499999	PANEL_50
500001	509999	PANEL_51
510001	519999	PANEL_52
520001	529999	PANEL_53
530001	539999	PANEL_54
540001	549999	PANEL_55
550001	559999	PANEL_56
560001	569999	PANEL_57
570001	579999	PANEL_58
580001	589999	PANEL_59
590001	599999	PANEL_60
600001	609999	PANEL_61
610001	619999	PANEL_62
620001	629999	PANEL_63
630001	639999	PANEL_64
640001	649999	PANEL_65
650001	659999	PANEL_66
660001	669999	PANEL_67

Start object instance	End object instance	Panel ID
670001	679999	PANEL_68
680001	689999	PANEL_69
690001	699999	PANEL_70
700001	709999	PANEL_71
710001	719999	PANEL_72
720001	729999	PANEL_73
730001	739999	PANEL_74
740001	749999	PANEL_75
750001	759999	PANEL_76
760001	769999	PANEL_77
770001	779999	PANEL_78
780001	789999	PANEL_79
790001	799999	PANEL_80
800001	809999	PANEL_81
810001	819999	PANEL_82
820001	829999	PANEL_83
830001	839999	PANEL_84
840001	849999	PANEL_85
850001	859999	PANEL_86
860001	869999	PANEL_87
870001	879999	PANEL_88
880001	889999	PANEL_89
890001	899999	PANEL_90
900001	909999	PANEL_91
910001	919999	PANEL_92
920001	929999	PANEL_93
930001	939999	PANEL_94
940001	949999	PANEL_95
950001	959999	PANEL_96
960001	969999	PANEL_97
970001	979999	PANEL_98
980001	989999	PANEL_99
990001	999999	PANEL_100
1000001	1009999	PANEL_101
1010001	1019999	PANEL_102
1020001	1029999	PANEL_103
1030001	1039999	PANEL_104
1040001	1049999	PANEL_105

Start object instance	End object instance	Panel ID
1050001	1059999	PANEL_106
1060001	1069999	PANEL_107
1070001	1079999	PANEL_108
1080001	1089999	PANEL_109
1090001	1099999	PANEL_101
1100001	1109999	PANEL_111
1110001	1119999	PANEL_112
1120001	1129999	PANEL_113
1130001	1139999	PANEL_114
1140001	1149999	PANEL_115
1150001	1159999	PANEL_116
1160001	1169999	PANEL_117
1170001	1179999	PANEL_118
1180001	1189999	PANEL_119
1190001	1199999	PANEL_120
1200001	1209999	PANEL_121
1210001	1219999	PANEL_122
1220001	1229999	PANEL_123
1230001	1239999	PANEL_124
1240001	1249999	PANEL_125
1250001	1259999	PANEL_126
1260001	1269999	PANEL_127
1270001	1279999	PANEL_128

### **Object\_Name**

This property indicates the name of the object. It is unique within the BACnet Device that maintains it. The minimum length of the string is one character.

### **Object\_Type**

This property indicates membership of an object type class. The value of this property is LIFE\_SAFETY\_ZONE.

### **Present\_Value**

This property indicates the state of the Life Safety Zone object. The means of deriving the Present\_Value is a local matter.

Present\_Value may latch non-NORMAL state values until reset.

This property represents the control panel zone status, as shown in the table below.

Control panel zone status	BACnetLifeSafetyState
Zone in Normal status	Quiet (0)
Zone in Alert	Prealarm (1)
Zone in Alarm	Alarm (2)
Zone in Fault	Fault (3)
Zone in Test	Test-active (10)
Zone Disabled	Blocked (19)
Zone in Alert-Fault	Fault-Prealarm (4)
Zone in Alarm-Fault	Fault-alarm (5)

## Tracking\_Value

This property indicates the non-latched state of the Life Safety Zone object. The means of deriving the state is a local matter.

Unlike Present\_Value, which may latch non-NORMAL state values until reset, Tracking\_Value continuously tracks changes in the state.

## Status\_Flags

This property indicates the general health of the Life Safety Zone object via four Boolean flags. Three of the flags are associated with values of other properties of this object.

The four flags are shown in the table below.

Flag	Description
IN_ALARM	Logical FALSE (0) if Event_State has a value of NORMAL, otherwise logical TRUE (1).
FAULT	Logical TRUE (1) if Reliability is present and does not have a value of NO_FAULT_DETECTED, otherwise logical FALSE (0).
OVERRIDDEN	Logical TRUE (1) if the point has been overridden by some mechanism local to the BACnet device. In this context "overridden" is taken to mean that Present_Value and Reliability are no longer tracking changes to the physical input. Otherwise, the value is logical FALSE (0).
OUT_OF_SERVICE	Logical TRUE (1) if Out_Of_Service has a value of TRUE, otherwise logical FALSE (0).

## Event\_State

This property indicates whether an object has an active event state associated with it.

If the object supports event reporting, then Event\_State indicates the event state of the object. If the object does not support event reporting then the value of this property is NORMAL.

## Reliability

This property indicates whether Present\_Value or the operation of the physical input(s) in question are reliable as far as the BACnet device or operator can determine and, if not, why.



### **Out\_Of\_Service**

This property indicates whether the inputs the object represents are not in service.

This means that Present\_Value is decoupled from the input and will not track changes to the input when the value of Out\_Of\_Service is TRUE.

While Out\_Of\_Service is TRUE, Present\_Value may be changed to any value as a means of simulating specific conditions or for testing purposes.

### **Silenced**

This property indicates whether the most recently occurring transition of the object that produced an audible or visual indication has been silenced by the receipt of a LifeSafetyOperation service request or a local process.

### **Operation\_Expected**

This property indicates the next operation expected by the object to handle a specific life safety situation.

### **Accepted\_Modes**

This property indicates all values that Mode accepts when written to using BACnet services. If a write is denied, an “Error Class” PROPERTY and an “Error Code” of VALUE\_OUT\_OF\_SERVICE is returned.

See “BACnet errors” on page 53 for more information on errors.

### **Property\_List**

This property is a BACnetARRAY of property identifiers, with one property identifier for each property that exists within the object.

The Object\_Name, Object\_Type, Object\_Identifier, and Property\_List properties are not included in the list.

### **Zone\_Members**

This property indicates which Life Safety Point and Life Safety Zone objects are members of the zone represented by the object.

## BitString Value object type

The following read-only properties are supported for this object type.

Property identifier	Property data type	Data type	Value
Object_Identifier	BACnetObjectIdentifier	Unsigned 32-bit value	0x03 0x40 0x00 0xXX
ObjectType			Standard object type Object Type = BitString Value
Instance Number			Instance Number = XX
Object_Name	CharacterString	Null terminated ASCII string	"Panel ID: XX Status" "Local Panel Status" "Global Status"
Object_Type	BACnetObjectType	Unsigned 32-bit value	BitString Value (39)
Present_Value	BITSTRING		
Status_Flags	BACnetStatusFlags	Unsigned 16-bit value	
Fault	BOOLEAN		FALSE (0)
In Alarm	BOOLEAN		FALSE (0)
Overridden	BOOLEAN		FALSE (0)
Out Of Service	BOOLEAN		FALSE (0)
Property_List	BACnetARRAY of BACnetPropertyIdentifier	Array of Unsigned 8-bit value	Present-value (85) Status-flags (111)

### Object\_Identifier

This property indicates the numeric code of the object. It is unique within the BACnet device that maintains it.

The object type field contains the object type class.

The object instance field is the numerical object instance. Object instances range from 0 to 4194303.

Object instance	Panel ID
0	Local Panel
1-128	1-128
255	Global Status

### Object\_Name

This property indicates the name of the object. It is unique within the BACnet Device that maintains it. The minimum length of the string is one character.

### Object\_Type

This property indicates membership of an object type class. The value of this property is BITSTRING\_VALUE.

### Present\_Value

This property indicates the current value of the object. Present\_Value is writable when Out\_Of\_Service is TRUE.

<b>BitString</b>	<b>Control panel status flags</b>
0	Reserved
1	Reserved
2	MCP alarm
3	Daynight mode (1=nightmode/0=daymode)
4	Test functional condition
5	Disable functional condition
6	Fault functional condition
7	Alarm functional condition
8	Reserved
9	Sounders on Test
10	Sounders override time elapsed
11	Sounders disabled
12	Sounders outputs silenced
13	Sounders outputs activated
14	Sounders activation delay in progress
15	Sounders delay enabled
16	Reserved
17	Reserved
18	Fire Routing: Test ON
19	Fire Routing: Disabled
20	Fire Routing: Acknowledged
21	Fire Routing: Outputs activated
22	Fire Routing: Activation delay in progress
23	Fire Routing: Delay enabled
24	Reserved
25	Reserved
26	Fire Protection: Test ON
27	Fire Protection: Disabled
28	Fire Protection: Acknowledged
29	Fire Protection: Outputs activated
30	Fire Protection: Activation delay in progress
31	Fire Protection: Delay enabled

## Status\_Flags

This property indicates the general health of the BitString Value object via four Boolean flags. Three of the flags are associated with values of other properties of this object.

The four flags are shown in the table below.

Flag	Description
IN_ALARM	Logical FALSE (0) if Event_State has a value of NORMAL, otherwise logical TRUE (1).
FAULT	Logical TRUE (1) if Reliability is present and does not have a value of NO_FAULT_DETECTED, otherwise logical FALSE (0).
OVERRIDDEN	Logical TRUE (1) if the point has been overridden by some mechanism local to the BACnet device. In this context "overridden" is taken to mean that Present_Value and Reliability are no longer tracking changes to the physical input. Otherwise, the value is logical FALSE (0).
OUT_OF_SERVICE	Logical TRUE (1) if Out_Of_Service has a value of TRUE, otherwise logical FALSE (0).

## Property\_List

This property is a BACnetARRAY of property identifiers, with one property identifier for each property that exists within the object.

The Object\_Name, Object\_Type, Object\_Identifier, and Property\_List properties are not included in the list.

## Binary Output object type

The following read-only and read/write properties are supported for this object type.

Property identifier	Property data type	Action	Data type	Value
Object_Identifier	BACnetObjectIdentifier	Read	Unsigned 32-bit value	0x01 0040 0x00 0xXX
ObjectType				Standard object type Object Type = Binary Output Instance Number = XX
Instance Number				Instance Number = XX
Object_Name	CharacterString	Read	Null terminated ASCII string	
Object_Type	BACnetObjectType	Read	Unsigned 32-bit value	Binary Output (4)
Present_Value	BACnetBinaryPV	Read/Write	Single bit value	
Status_Flags	BACnetStatusFlags	Read	Unsigned 16-bit value	
Fault	BOOLEAN			FALSE (0)
In Alarm	BOOLEAN			FALSE (0)
Overridden	BOOLEAN			FALSE (0)
Out Of Service	BOOLEAN			FALSE (0)
Event_State	BACnetEventState	Read	Unsigned 32-bit value	NORMAL (0)
Out_Of_Service	BOOLEAN	Read	Single bit value	FALSE (0)
Polarity	BACnetPolarity	Read	Unsigned 32-bit value	NORMAL (0)
Priority_Array	BACnetPriorityARRAY	Read		NULL
Relinquish_Default	BACnetBinaryPV	Read	Single bit value	INACTIVE (0)
Property_List	BACnetARRAY of BACnetPropertyIdentifier	Read	Array of Unsigned 8-bit value	Present-value (85) Status-flags (111) Event-state (36) Out-of-service (81) Polarity (84) Priority-array (87) Relinquish-default (104)

## Object\_Identifier

This property indicates the numeric code of the object. It is unique within the BACnet device that maintains it.

The object type field contains the object type class.

The object instance field is the numerical object instance. Object instances range from 0 to 4194303.

---

<b>Execute Reset</b>	<b>Instance</b>
Local Panel	0
Panel ID (1-128)	1-128
Broadcast	255

---

---

<b>Execute Panel Silence</b>	<b>Instance</b>
Local Panel	1000
Panel ID (1-128)	1001-1128
Broadcast	1255

---

---

<b>Set Sounders Start/Stop</b>	<b>Instance</b>
Local Panel	2000
Panel ID (1-128)	2001-2128
Broadcast	2255

---

---

<b>Set Sounders Delay On/Off</b>	<b>Instance</b>
Local Panel	3000
Panel ID (1-128)	3001-3128
Broadcast	3255

---

---

<b>Set Fire Protection Delay On/Off</b>	<b>Instance</b>
Local Panel	4000
Panel ID (1-128)	4001-4128
Broadcast	4255

---

---

<b>Execute Fire Protection Override Delay</b>	<b>Instance</b>
Local Panel	5000
Panel ID (1-128)	5001-5128
Broadcast	5255

---

---

<b>Set Fire Routing Delay On/Off</b>	<b>Instance</b>
Local Panel	6000
Panel ID (1-128)	6001-6528
Broadcast	6255

---

<b>Execute Fire Routing Override Delay</b>	<b>Instance</b>
Local Panel	7000
Panel ID (1-128)	7001-7128
Broadcast	7255

## Object\_Name

This property indicates the name of the object. It is unique within the BACnet Device that maintains it. The minimum length of the string is one character.

<b>Execute Reset</b>	<b>Instance</b>	<b>Object name</b>
Local Panel	0	Execute Reset-Local Panel
Panel ID (1-128)	1-128	Execute Reset-Panel ID: 1-128
Broadcast	255	Execute Reset-All

<b>Execute Panel Silence</b>	<b>Instance</b>	<b>Object name</b>
Local Panel	1000	Execute Panel Silence-Local Panel
Panel ID (1-128)	1001-1128	Execute Panel Silence-Panel ID: 1-128
Broadcast	1255	Execute Panel Silence-All

<b>Set Sounders Start/Stop</b>	<b>Instance</b>	<b>Object name</b>
Local Panel	2000	Set Sounders-Local Panel
Panel ID (1-128)	2001-2128	Set Sounders-Panel ID: 1-128
Broadcast	2255	Set Sounders-All

<b>Set Sounders Delay On/Off</b>	<b>Instance</b>	<b>Object name</b>
Local Panel	3000	Set Sounders Delay-Local Panel
Panel ID (1-128)	3001-3128	Set Sounders Delay-Panel ID: 1-128
Broadcast	3255	Set Sounders Delay-All

<b>Set Fire Protection Delay On/Off</b>	<b>Instance</b>	<b>Object name</b>
Local Panel	4000	Set Fire Protection Delay-Local Panel
Panel ID (1-128)	4001-4128	Set Fire Protection Delay-Panel ID: 1-128
Broadcast	4255	Set Fire Protection Delay-All

<b>Execute Fire Protection Override Delay</b>	<b>Instance</b>	<b>Object name</b>
Local Panel	5000	Execute Fire Protection Override Delay-Local Panel
Panel ID (1-128)	5001-5128	Execute Fire Protection Override Delay-Panel ID: 1-128
Broadcast	5255	Set Fire Protection Override Delay-All

<b>Set Fire Routing Delay On/Off</b>	<b>Instance</b>	<b>Object name</b>
Local Panel	6000	Set Fire Routing Delay-Local Panel
Panel ID (1-128)	6001-6128	Set Fire Routing Delay-Panel ID: 1-128
Broadcast	6255	Set Fire Routing Delay-All

<b>Execute Fire Routing Override Delay</b>	<b>Instance</b>	<b>Object name</b>
Local Panel	7000	Execute Fire Routing Override Delay-Local Panel
Panel ID (1-128)	7001-7128	Execute Fire Routing Override Delay-Panel ID: 1-128
Broadcast	7255	Set Fire Routing Override Delay-All

### **Object\_Type**

This property indicates membership of an object type class. The value of this property is BINARY\_OUTPUT.

### **Present\_Value**

This property indicates the logical state of the Binary Output – INACTIVE (OFF) or ACTIVE (ON).

#### **Note:**

- If this property is set to ACTIVE or INACTIVE then a Reset command is executed in the panel identifier.
- If this property is set to ACTIVE or INACTIVE then a Panel Silence command is executed in the panel identifier.
- If this property is set to ACTIVE or INACTIVE then a Fire Protection Override Delay command is executed in the panel identifier.
- If this property is set to ACTIVE or INACTIVE then a Fire Routing Override Delay command is executed in the panel identifier.
- If this property is set to ACTIVE then the Sounders Activated condition is enabled, if set to INACTIVE it is disabled.
- If this property is set to ACTIVE then the Sounders Delay status flag is enabled, if set to INACTIVE it is disabled.
- If this property is set to ACTIVE then the Fire Protection Delay status flag is enabled; if set to INACTIVE it is disabled.
- If this property is set to ACTIVE then the Fire Routing Delay status flag is enabled; if set to INACTIVE it is disabled.



## Status\_Flags

This property indicates the general health of the multistate input object via four Boolean flags. Three of the flags are associated with values of other properties of this object.

The four flags are shown in the table below.

Flag	Description
IN_ALARM	Logical FALSE (0) if Event_State has a value of NORMAL, otherwise logical TRUE (1).
FAULT	Logical TRUE (1) if Reliability is present and does not have a value of NO_FAULT_DETECTED, otherwise logical FALSE (0).
OVERRIDDEN	Logical TRUE (1) if the point has been overridden by some mechanism local to the BACnet device. In this context "overridden" is taken to mean that Present_Value and Reliability are no longer tracking changes to the physical input. Otherwise, the value is logical FALSE (0).
OUT_OF_SERVICE	Logical TRUE (1) if Out_Of_Service has a value of TRUE, otherwise logical FALSE (0).

## Event\_State

This property indicates whether an object has an active event state associated with it.

If the object supports event reporting, then Event\_State indicates the event state of the object. If the object does not support event reporting then the value of this property is NORMAL.

## Out\_Of\_Service

This property indicates whether the inputs the object represents are not in service.

This means that Present\_Value is decoupled from the input and will not track changes to the input when the value of Out\_Of\_Service is TRUE.

While Out\_Of\_Service is TRUE, Present\_Value may be changed to any value as a means of simulating specific conditions or for testing purposes.

## Polarity

This property indicates polarity. If Polarity is NORMAL, the ACTIVE state of Present\_Value is ACTIVE or ON. If Polarity is REVERSE, the ACTIVE state of Present\_Value is INACTIVE or OFF.

## Priority\_Array

This property is a BACnetARRAY of prioritized commands that are active for the object.

## Relinquish\_Default

This property indicates the default value used for Present\_Value when all command priority values in Priority\_Array have a NULL value.

## **Property\_List**

This property is a BACnetARRAY of property identifiers, with one property identifier for each property that exists within the object.

The Object\_Name, Object\_Type, Object\_Identifier, and Property\_List properties are not included in the list.

# Enumerated BACnet data types

This section describes the standard enumerated definitions from the BACnet protocol specification.

## BACnetAbortReason

Value	Abort reason
0	OTHER
1	BUFFER_OVERFLOW
2	INVALID_APDU_IN_THIS_STATE
3	PREEMPTED_BY_HIGHER_PRIORITY_TASK
4	SEGMENTATION_NOT_SUPPORTED
5	SECURITY_ERROR
6	INSUFFICIENT_SECURITY
7	WINDOW_SIZE_OUT_OF_RANGE
8	APPLICATION_EXCEEDED_REPLY_TIME
9	OUT_OF_RESOURCES
10	TSM_TIMEOUT
11	APDU_TOO_LONG

## BACnetAddressBinding

```
SEQUENCE {  
    DeviceObjectIdentifier BACnetObjectIdentifier  
    DeviceAddress BACnetAddress  
}
```

## BACnetAddress

```
SEQUENCE {  
    Network-number Unsigned16, (A value of 0 indicates the local network)  
    Mac-address OCTET STRING (A string of length 0 indicates a broadcast)  
}
```

## BACnetBinaryPV

Value	Binary present value
0	INACTIVE
1	ACTIVE

## BACnetDeviceStatus

Value	Status
0	OPERATIONAL
1	OPERATIONAL-READ ONLY
2	DOWNLOAD-REQUIRED
3	DOWNLOAD-IN-PROGRESS
4	NON-OPERATIONAL
5	BACKUP-IN-PROGRESS

## BACnetEventState

Value	State
0	NORMAL
1	FAULT
2	OFF-NORMAL
3	HIGH-LIMIT
4	LOW-LIMIT
5	LIFE-SAFETY-ALARM

## BACnetLifeSafetyState

Value	State
0	QUIET
1	PREALARM
2	ALARM
3	FAULT
4	FAULT-PREALARM
5	FAULT-ALARM
6	NOT-READY
7	ACTIVE
8	TAMPER
9	TEST-ALARM
10	TEST-ACTIVE
11	TEST-FAULT
12	TEST-FAULT-ALARM
13	HOLDUP
14	DURESS
15	TAMPER-ALARM
16	ABNORMAL

Value	State
17	EMERGENCY-POWER
18	DELAYED
19	BLOCKED
20	LOCAL-ALARM
21	GENERAL-ALARM
22	SUPERVISORY
23	TEST-SUPERVISORY

## BACnetLifeSafetyMode

Value	Mode
0	OFF
1	ON
2	TEST
3	MANNED
4	UNMANNED
5	ARMED
6	DISARMED
7	PREARMED
8	SLOW
9	FAST
10	DISCONNECTED
11	ENABLED
12	DISABLED
13	AUTOMATIC-RELEASE-DISABLED
14	DEFAULT

## BACnetLifeSafetyOperation

Value	Operation
0	NONE
1	SILENCE
2	SILENCE-AUDIBLE
3	SILENCE-VISIBLE
4	RESET
5	RESET-ALARM
6	RESET-FAULT
7	UNSILENCE

Value	Operation
8	UNSILENCE-AUDIBLE
9	UNSILENCE-VISUAL

## BACnetObjectIdentifier

A BACnetObjectIdentifier value consists of an object type and an instance number, as shown below.

Bit Number	31 ... 22	21 ... 0
Value	Object Type	Instance Number
Width	10	22

## BACnetObjectType

Value	Object type
0	ANALOG-INPUT
1	ANALOG-OUTPUT
2	ANALOG-VALUE
3	BINARY-INPUT
4	BINARY-OUTPUT
5	BINARY-VALUE
6	CALENDAR
7	COMMAND
8	DEVICE
9	EVENT-ENROLLMENT
10	FILE
11	GROUP
12	LOOP
13	MULTI-STATE-INPUT
14	MULTI-STATE-OUTPUT
15	NOTIFICATION-CLASS
16	PROGRAM
17	SCHEDULE
18	AVERAGING
19	MULTI-STATE-VALUE
20	TREND-LOG
21	LIFE-SAFETY-POINT
22	LIFE-SAFETY-ZONE
23	ACCUMULATOR

<b>Value</b>	<b>Object type</b>
24	PULSE-CONVERTER
25	EVENT-LOG
26	GLOBAL-GROUP
27	TREND-LOG-MULTIPLE
29	LOAD-CONTROL
29	STRUCTURED-VIEW
30	ACCESS-DOOR
31	-
32	ACCESS-CREDENTIAL
33	ACCESS-POINT
34	ACCESS-RIGHTS
35	ACCESS-USER
36	ACCESS-ZONE
37	CREDENTIAL-DATA-INPUT
38	NETWORK-SECURITY
39	BITSTRING VALUE
40	CHARACTERSTRING-VALUE
41	DATE-PATTERN-VALUE
42	DATA-VALUE
43	DATETIME-PATTERN-VALUE
44	DATETIME-VALUE
45	INTEGER-VALUE
46	LARGE-ANALOG-VALUE
47	OCTETSTRING-VALUE
48	POSITIVE-INTEGERS
49	TIME-PATTERN-VALUE
50	TIME-VALUE
51	NOTIFICATION-FORWARDER
52	ALERT-ENROLLMENT
53	CHANNEL
54	LIGHTING-OUTPUT

## BACnetObjectTypesSupported

```
BIT STRING {  
Analog-input      (0),  
Analog-output    (1),  
Analog-value     (2),  
Binary-input     (3),  
Binary-output    (4),  
Binary-value     (5),  
Calendar         (6),  
Command          (7),  
Device           (8),  
....  
Life-safety-point (21),  
Life-safety-zone  (22),  
....  
BitString-value  (39),  
....  
}
```

## BACnetPolarity

Value	Polarity
0	NORMAL
1	REVERSE

## BACnetReliability

Value	Reliability
0	NO-FAULT-DETECTED
1	NO-SENSOR
2	OVER-RANGE
3	UNDER-RANGE
4	OPEN-LOOP
5	SHORTED-LOOP
6	NO-OUTPUT
7	UNRELIABLE-OTHER
8	PROCESS-ERROR
9	MULTI-STATE-FAULT



Value	Reliability
10	CONFIGURATION-FAULT
11	RESERVED
12	COMMUNICATION-FAILURE
13	MEMBER-FAULT
14	MONITORED-OBJECT-FAULT
15	TRIPPED

## BACnetSegmentation

Value	Segmentation
0	SEGMENTED-BOTH
1	SEGMENTED-TRANSMIT
2	SEGMENTED-RECEIVE
3	NO-SEGMENTATION

## BACnetSilencedState

Value	Silenced state
0	UNSILENCED
1	AUDIBLE-SILENCED
2	VISIBLE-SILENCED
3	ALL-SILENCED

## BACnetServicesSupported

BIT STRING {

AcknowledgeAlarm (0),  
 ConfirmedCOVNotification (1),  
 ConfirmedEventNotification (2),  
 GetAlarmSummary (3),  
 GetEnrollmentSummary (4),  
 SubscribeCOV (5),  
 AmoticReadFile (6),  
 AtomicWriteFile (7),  
 AddListElement (8),  
 RemoveListElement (9),  
 CreateObject (10),  
 DeleteObject (11),

```
ReadProperty      (12),
WriteProperty     (13)
....
}
```

### **BACnetStatusFlags**

```
BIT STRING {
In-alarm      (0),
Fault        (1),
Overridden   (2),
Out-of-Service (3)
}
```

### **BACnetDeviceObjectReference**

```
SEQUENCE {
DeviceIdentifier [0] BACnetObjectIdentifier OPTIONAL
ObjectIdentifier [1] BACnetObjectIdentifier
}
```

# BACnet errors

Errors	BACnet APDU	Reason
Invalid BACnet/IP frame	BACnet-Abort-PDU	Other
Not supported BACnet PDU	BACnet-Abort-PDU	Other
Not supported Service	BACnet-Reject-PDU	Unrecognized Service
Not supported Object	BACnet-Error-PDU	Object – Unsupported object type
Not supported Instance Number	BACnet-Error-PDU	Object – Unknown Object
Panel ID offline	BACnet-Error-PDU	Object – Other
Not supported Property	BACnet-Error-PDU	Property – Unknown Property
Error getting some property	BACnet-Error-PDU	Device – Internal Error
Local Panel executing a RESET	BACnet-Error-PDU	Device – Busy

## Error Reject Reason

**UNRECOGNIZED\_SERVICE** – Generated in response to a confirmed request APDU in which the Service Choice field specifies an unknown or unsupported service.

## Error OBJECT

**UNSUPPORTED\_OBJECT\_TYPE** – An object type has been specified in a service parameter that is unknown or unsupported in the addressed BACnet device.

**UNKNOWN\_OBJECT** – An Object Identifier has been specified for an object that does not exist in the object database of the addressed BACnet device.

## Error PROPERTY

**UNKNOWN\_PROPERTY**: A Property Identifier has been specified in a service parameter that is unknown or unsupported in the addressed BACnet device for objects of the referenced object type.

## Error DEVICE

**INTERNAL\_ERROR** – There are cases where some internal error is encountered. These are cases that are never expected to occur, but if they do the manufacturer should be contacted.

**DEVICE\_BUSY** – A service request has been temporarily declined because the addressed BACnet device expects to be involved in higher priority processing for a time in excess of the usual request/confirm timeout period.

