ANSI/ASHRAE Addendum d to
ANSI/ASHRAE Standard 135-2004

ASHRAE STANDARD

BACnet®

A Data Communication Protocol for Building Automation and Control Networks

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[This foreword and the "rationales" on the following pages are not part of this standard. They are merely informative and do not contain requirements necessary for conformance to the standard.]

FOREWORD

Addendum 135*d* to ANSI/ASHRAE Standard 135-2004 contains a number of changes to the current standard. These modifications are the result of change proposals made pursuant to the ASHRAE continuous maintenance procedures and of deliberations within Standing Standard Project Committee 135.

SSPC 135 wishes to recognize the efforts of the following people in developing this addendum: Dr. Martin Burns, Dr. Michael Kintner-Myers, Sharon Dinges, David Fisher, Bernhard Isler, Roland Laird, Jerald P. Martocci, Hans-Joachim Mundt, H. Michael Newman, Stuart Donaldson, and David Ritter. The committee is also grateful to Andrey Golovin, René Quirighetti, and Takeji Toyoda.

The changes in Addendum 135d are summarized below.

135-2004*d*-1. Add a new Structured View object type, p. 1.
135-2004*d*-2. Allow acknowledgement of unseen TO-OFFNORMAL event notifications, p. 7.
135-2004*d*-3. Relax the Private Transfer and Text Message BIBB requirements, p.8.
135-2004*d*-4. Exclude LIFE_SAFETY and BUFFER_READY notifications from the Alarm Notifications BIBBs, p. 9.
135-2004*d*-5. Establish the minimum requirements for a BACnet device with an application layer, p. 11.
135-2004*d*-6. Remove the requirement for the DM-DOB-A BIBB from the B-OWS and B-BC device profiles, p. 13.
135-2004*d*-7. Relax mandated values for APDU timeouts and retries when configurable, and change default values, p. 14.
135-2004*d*-8. Fix EventCount handling error in MS/TP Master Node State Machine, p. 15.
135-2004*d*-9. Permit routers to use a local network number in Device_Address_Binding, p. 17.
135-2004*d*-10. Identify conditionally writable properties, p.18.
135-2004*d*-11. Specify Error returns for the AcknowledgeAlarm service, p.19.

In the following document, language to be added to existing clauses of ANSI/ASHRAE 135-2004 and Addenda is indicated through the use of *italics*, while deletions are indicated by ~~strikethrough~~. Where entirely new subclauses are added, plain type is used throughout.

135-2004*d*-1. Add a new Structured View object type.

Rationale
There is need for a network-visible presentation of BACnet objects in an application-centered or structural manner, as opposed to the flat list of objects presented by the Device object's Object_List property.

Addendum 135-2004*d*-1

[Add new **Clause 12.25,** p.246, and renumber existing **Clause 12.25** and subsequent clauses, including tables and figures]

12.25 Structured View Object Type

The Structured View object type defines a standardized object that provides a container to hold references to subordinate objects, which may include other Structured View objects, thereby allowing multilevel hierarchies to be created. The hierarchies are intended to convey a structure or organization such as a geographical distribution or application organization. Subordinate objects may reside in the same device as the Structured View object or in other devices on the network.

The Structured View object and its properties are summarized in Table 12-29 and described in detail in this subclause.

Table 12-29. Properties of the Structured View Object Type

Property Identifier	Property Datatype	Conformance Code
Object_Identifier	BACnetObjectIdentifier	R
Object_Name	CharacterString	R
Object_Type	BACnetObjectType	R
Description	CharacterString	O
Node_Type	BACnetNodeType	R
Node_Subtype	CharacterString	O
Subordinate_List	BACnetARRAY[N] of BACnetDeviceObjectReference	R
Subordinate_Annotations	BACnetARRAY[N] of CharacterString	O
Profile_Name	CharacterString	O

12.25.1 Object_Identifier

This property, of type BACnetObjectIdentifier, is a numeric code that is used to identify the object. It shall be unique within the BACnet Device that maintains it.

12.25.2 Object_Name

This property, of type CharacterString, shall represent a name for the object that is unique within the BACnet Device that maintains it. The minimum length of the string shall be one character. The set of characters used in the Object_Name shall be restricted to printable characters.

12.25.3 Object_Type

This property, of type BACnetObjectType, indicates membership in a particular object type class. The value of this property shall be STRUCTURED_VIEW.

12.25.4 Description

This property, of type CharacterString, is a string of printable characters whose content is not restricted.

12.25.5 Node_Type

This property, of type BACnetNodeType, provides a general classification of the object in the hierarchy of objects.

It is intended as a general suggestion to a client application about the contents of a Structured View object, and is not intended to convey an exact definition. Further refinement of classification is provided by the Node_Subtype property. The allowable values for this property are:

{UNKNOWN, SYSTEM, NETWORK, DEVICE, ORGANIZATIONAL, AREA, EQUIPMENT, POINT, COLLECTION, PROPERTY, FUNCTIONAL, OTHER}

Where the following are suggested interpretations:

UNKNOWN	Indicates that a value for Node_Type is not available or has not been configured at this time
SYSTEM	An entire mechanical system
NETWORK	A communications network
DEVICE	Contains a set of elements which collectively represents a BACnet device, a logical device, or a physical device
ORGANIZATIONAL	Business concepts such as departments or people
AREA	Geographical concept such as a campus, building, floor, etc.
EQUIPMENT	Single piece of equipment that may be a collection of "Points"
POINT	Contains a set of elements which collectively defines a single point of data, either a physical input or output of a control or monitoring device, or a software calculation or configuration setting
COLLECTION	A generic container used to group things together, such as a collection of references to all space temperatures in a building
PROPERTY	Defines a characteristic or parameter of the parent node
FUNCTIONAL	Single system component such as a control module or a logical component such as a function block
OTHER	Everything that does not fit into one of these broad categories

12.25.6 Node_Subtype

This property, of type CharacterString, is a string of printable characters whose content is not restricted. It provides a more specific classification of the object in the hierarchy of objects, providing a short description of the item represented by the node.

12.25.7 Subordinate_List

This property is a BACnetARRAY of BACnetDeviceObjectReference that defines the members of the current Structured View.

By including references to ‘child’ Structured View objects, multilevel hierarchies may be created.

If the optional device identifier is not present for a particular Subordinate_List member, then that object must reside in the same device that maintains the Structured View object. If Subordinate_List is writable using WriteProperty services, the Subordinate_List may optionally be restricted to reference-only objects in the local device. To avoid recursion, it is suggested that a single Structured View object should be referenced only once in the hierarchy.

If the size of the Subordinate_List array is changed, the size of the Subordinate_Annotations array, if present, shall also be changed to the same size. Uninitialized Subordinate_List array elements shall be given the instance number 4194303.

A Subordinate_List array element whose instance number is equal to 4194303 shall be considered uninitialized and shall be ignored.

12.25.8 Subordinate_Annotations

This optional property, a BACnetARRAY of CharacterString, shall be used to define a text string description for each member of the Subordinate_List. The content of these strings is not restricted.

If the size of this array is changed, the size of the Subordinate_List array shall also be changed to the same size.

12.25.9 Profile_Name

This optional property, of type CharacterString, is the name of an object profile to which this object conforms. To ensure uniqueness, a profile name must begin with a vendor identifier code (see Clause 23) in base-10 integer format, followed by a dash. All subsequent characters are administered by the organization registered with that vendor identifier code. The vendor identifier code that prefixes the profile name shall indicate the organization that publishes and maintains the profile document named by the remainder of the profile name. This vendor identifier need not have any relationship to the vendor identifier of the device within which the object resides.

A profile defines a set of additional properties, behavior, and/or requirements for this object beyond those specified here. This standard defines only the format of the names of profiles. The definition of the profiles themselves is outside the scope of this standard.

[Change **Table 12-13**, p.178]

Table 12-13. Properties of the Device Object Type

Property Identifier	Property Datatype	Conformance Code
...	...	...
Protocol_Object_Types_Supported	BACnetObjectTypesSupported	R
Object_List	BACnetARRAY[N]of BACnetObjectIdentifier	R
Structured_Object_List	*BACnetARRAY[N]of BACnetObjectIdentifier*	*O*
Max_APDU_Length_Accepted	Unsigned	R
...	...	...

[Insert new **Clause 12.11.17**, p.180, renumbering existing **Clause 12.11.17** and subsequent clauses]

12.11.17 Structured_Object_List

This optional property is a BACnetARRAY of BACnetObjectIdentifier. Entries in the array reference objects chosen for use as starting points for the traversal of object hierarchies. The objects directly referenced by this property shall be restricted to Structured View and Life Safety Zone objects.

[Add to **Clause 21**, **BACnetObjectType** production, p. 421]
[Note: The Trend Log Multiple object is defined in Addendum 135-2004*b*-3.]

BACnetObjectType ::= ENUMERATED {
…
-- see multi-state-value (19),
structured-view (29),
..
-- enumeration 27 is used in Addendum b to ANSI/ASHRAE 135-2004 (135b-1)
-- enumeration 28 is used in Addendum e to ANSI/ASHRAE 135-2004 (135e-1)
-- see structured-view (29),
...
}

[Add to **Clause 21**, **BACnetObjectTypesSupported** production, p. 422]

BACnetObjectTypesSupported ::= ENUMERATED {
…
schedule (17),
-- structured-view (29),
-- Objects added after 2004
-- enumerations 25 through 27 are used in Addendum b to ANSI/ASHRAE 135-2004(135b-1,-2 and -3)
-- enumeration 28 is used in Addendum e to ANSI/ASHRAE 135-2004(135e-1)
structured-view (29)
}

[Add to **21**, **BACnetPropertyIdentifier** production (distributed alphabetically), pp. 423-428]

BACnetPropertyIdentifier ::= ENUMERATED {
...
modification-date (71),
node-subtype (207),
node-type (208),
...
stop-when-full (144),
structured-object-list (209),
subordinate-annotations (210),
subordinate-list (211),
...
-- enumerations 193-206 are used in Addendum b to ANSI/ASHRAE 135-2004(135b-2)
-- see node-subtype (207),
-- see node-type (208),
-- see structured-object-list (209),
-- see subordinate-annotations (210),
-- see subordinate-list (211),
...
}

-- The special property identifiers "all", "optional", and "required" are reserved for use in the ReadPropertyConditional and
-- ReadPropertyMultiple services or services not defined in this standard.
--
-- Enumerated values 0-511 are reserved for definition by ASHRAE. Enumerated values 512-4194303 may be used by
-- others subject to the procedures and constraints described in Clause 23. ~~The highest enumeration used in this version is 206.~~

[Add new **BACnetNodeType** enumeration to **Clause 21**, page 419]

BACnetNodeType ::= ENUMERATED {
unknown (0),
system (1),
network (2),
device (3),
organizational (4),
area (5),
equipment (6),
point (7),
collection (8),

```
        property            (9),
        functional          (10),
        other               (11),
        }
```

[Add to **Annex C**, p. 464]

```
    STRUCTURED-VIEW ::= SEQUENCE {
        object-identifier       [75]  BACnetObjectIdentifier,
        object-name             [77]  CharacterString,
        object-type             [79]  BACnetObjectType,
        description             [28]  CharacterString OPTIONAL,
        node-type               [208] BACnetNodeType OPTIONAL,
        node-subtype            [207] CharacterString OPTIONAL,
        subordinate-list        [211] SEQUENCE OF BACnetDeviceObjectReference,  -- accessed as a BACnetARRAY
        subordinate-annotations [210] SEQUENCE OF CharacterString OPTIONAL, -- accessed as a BACnetARRAY
        profile-name            [167] CharacterString OPTIONAL
        }
```

[Change **Annex C**, p. 457]

```
    DEVICE ::= SEQUENCE {
        …
        object-list                 [76]  SEQUENCE OF BACnetObjectIdentifier,  -- accessed as a BACnetARRAY
        structured-object-list      [209] SEQUENCE OF BACnetObjectIdentifier OPTIONAL,    -- accessed as a
    BACnetARRAY
        max-APDU-length-supported   [62] Unsigned,
        …
        }
```

[Add new **Annex D.25**, p.483, and renumber existing **Annex D.25** and subsequent examples.]

D.25 Example of a Structured View object

In this example, the objects comprising an air handling unit application are structured using a Structured View Object.

```
Property:   Object_Identifier =         (Structured View, Instance 1)
Property:   Object_Name =               "AHU1"
Property:   Object_Type =               STRUCTURED_VIEW
Property:   Description =               "Air Handling Unit 1"
Property:   Node_Type =                 equipment
Property:   Node_Subtype =              “AHU”
Property:   Subordinate_List =          ((Schedule, Instance 4),
                                         (Analog Value, Instance 3),
                                         (Analog Value, Instance 4),
                                         ((Device, Instance 2), (Analog Input, Instance 1)),
                                         (Analog Input, Instance 1),
                                         (Analog Input, Instance 2),
                                         (Structured View, Instance 2),
                                         (Structured View, Instance 3),
                                         (Structured View, Instance 4))
Property:   Subordinate_Annotations =   (“AHU1 Mode Schedule”,
                                         “AHU1 Heating Setpoint”,
                                         “AHU1 Cooling Setpoint”,
                                         “Outside Air Temperature”,
                                         “AHU1 Supply Air Temperature”,
```

“AHU1 Exhaust Air Temperature”,
“AHU1 Preheater Subsystem”,
“AHU1 Fan Supply Air Subsystem ”,
“AHU1 Fan Exhaust Air Subsystem”)

[Change **Annex D.11**, p. 471]

D.11 Examples of a Device object

Example 1: A "sophisticated" BACnet device.

…

Property:	Object_List =	((Analog Input, Instance 1), (Analog Input, Instance 2), ...)
Property:	*Structured_Object_List =*	*((Structured View, Instance 1), (Structured View, Instance 2))*
Property:	Max_APDU_Length_Accepted =	480

…

135-2004*d*-2. Allow acknowledgement of unseen TO-OFFNORMAL event notifications.

Rationale
There is a need to be able to acknowledge a transition to an offnormal state other than OFFNORMAL (such as to HIGH_LIMIT or LOW_LIMIT) when the event-generating object is no longer in that offnormal state and the acknowledging device did not receive the event notification for the transition to the offnormal state.

Addendum 135-2004*d*-2

[Change Clause **13.5.1.4**, p.269]

13.5.1.4 Event State Acknowledged

This parameter, of type BACnetEventState, shall ~~be equal to~~ *match* the value of the 'To State' from the event notification that is being acknowledged. *The 'Event State Acknowledged' matches the 'To State' if they are equal, or if 'Event State Acknowledged' is OFFNORMAL and 'To State' is any "offnormal" state (such as HIGH_LIMIT).* This parameter is included so that the remote device that initiated the event notification can ensure that the state being acknowledged is recorded in the Acked_Transitions property of the initiating object.

135-2004*d*-3. Relax the Private Transfer and Text Message BIBB requirements.

Rationale
There is a desire for devices to not have to support both the confirmed and unconfirmed forms of the Text Message services in order to claim conformance to the DM-TM-* BIBBs. In addition, it was determined that the Private Transfer BIBBs were not needed.

Addendum 135-2004*d*-3

[Delete Annex K.5.7 and Annex K.5.8 and renumber subsequent clauses]

[Change **Annex K.5.9**, p.585]

K.5.9 BIBB – Device Management-Text Message-A (DM-TM-A)

The A device initiates the transmission of text messages. The interpretation and subsequent processing of the message is a local matter.

BACnet Service	Initiate	Execute
ConfirmedTextMessage	~~*x*~~ *x*[1]	
UnconfirmedTextMessage	~~*x*~~ *x*[1]	

[1]*The A device must support initiation of at least one of these services.*

135-2004*d*-4. Exclude LIFE_SAFETY and BUFFER_READY notifications from the Alarm Notifications BIBBs.

Rationale
The CHANGE_OF_LIFE_SAFETY and BUFFER_READY event notifications are different from, and outside the scope of, the standard alarm notification functionality, and should be covered by separate BIBBs.

Addendum 135-2004*d*-4

[Change **Annex K.2.1** through **K.2.3**, p.580]

K.2.1 BIBB - Alarm and Event-Notification-A (AE-N-A)

The A device processes notifications about alarms and other events.

BACnet Service	Initiate	Execute
ConfirmedEventNotification		x
UnconfirmedEventNotification		x

Devices claiming conformance to AE-N-A shall be able to process notifications from any standard or proprietary event-generating object of any standard or proprietary event type *(excluding the CHANGE_OF_LIFE_SAFETY and/or BUFFER_READY event types)*.

K.2.2 BIBB - Alarm and Event-Notification Internal-B (AE-N-I-B)

Device B generates notifications about alarms and other events.

BACnet Service	Initiate	Execute
ConfirmedEventNotification	x	
UnconfirmedEventNotification	x	

Devices claiming conformance to AE-N-I-B shall also support either Intrinsic or Algorithmic reporting. Any device that supports the generation of event notifications that require operator acknowledgment must support AE-ACK-B. *Devices that only support generation of CHANGE_OF_LIFE_SAFETY and/or BUFFER_READY notifications shall not claim support for this BIBB.*

K.2.3 BIBB - Alarm and Event-Notification External-B (AE-N-E-B)

Device B contains an Event Enrollment object that monitors values in another device. Device B is capable of generating event notifications for alarm conditions based on value(s) in another device. Devices conforming to this BIBB must conform to DS-RP-A, AE-N-I-B, and must support at least 1 Event Enrollment object with an Object_Property_Reference property that supports references to properties in objects contained in other devices. Any device that supports the generation of event notifications that require operator acknowledgment must support AE-ACK-B. *Devices that only support Event Enrollment objects that only support generation of CHANGE_OF_LIFE_SAFETY and/or BUFFER_READY notifications shall not claim support for this BIBB.*

[Change **Annex K.2.12** and **K.2.13**, p.581]

K.2.12 BIBB - Alarm and Event-LifeSafety-A (AE-LS-A)

~~Device A requests silence or reset operations from life safety device B.~~ *Life safety device A is able to process and acknowledge life safety notifications and is able to request silence and reset operations from life safety device B.*

BACnet Service	Initiate	Execute
LifeSafetyOperation	x	
ConfirmedEventNotification		*x*
UnconfirmedEventNotification		*x*
AcknowledgeAlarm	*x*	

K.2.13 BIBB - Alarm and Event-LifeSafety-B (AE-LS-B)

Life safety device B ~~responds to silence or reset requests from device A.~~*is able to generate life safety notifications and is able to process silence and reset operations on its life safety objects.*

BACnet Service	Initiate	Execute
LifeSafetyOperation		x
ConfirmedEventNotification	*x*	
UnconfirmedEventNotification	*x*	

Devices claiming conformance to AE-LS-B shall support at least one instance of a Life Safety Point or Life Safety Zone object. *Any device that supports the generation of event notifications that require operator acknowledgment shall support AE-ACK-B.*

135-2004*d*-5. Establish the minimum requirements for a BACnet device with an application layer.

Rationale
There is a need for a minimum set of requirements for BACnet devices with application layers to ensure interoperability.

Addendum 135-2004*d*-5

[Add new Clause **22.1.5**, p. 435]

22.1.5 Minimum Device Requirements

A device that conforms to the BACnet protocol and contains an application layer shall:

(a) contain exactly one Device object,
(b) execute the ReadProperty service,
(c) execute the Who-Has and Who-Is services (and thus initiate the I-Have and I-Am services) unless the device is an MS/TP slave device,
(d) execute the WriteProperty service if the device executes the WritePropertyMultiple, AddListElement or RemoveListElement services,
(e) allow the WriteProperty service to modify any properties that are modifiable by the AddListElement or RemoveListElement services, and
(f) execute the WriteProperty service if the device contains any objects with properties that are required to be writable.

[Change **Annex L.5**, p.592]

L.5 BACnet Smart Actuator (B-SA)

…

Device and Network Management
- ~~No requirement~~
- *Ability to respond to queries about its status*
- *Ability to respond to requests for information about any of its objects*

[Change **Annex L.6**, p.592]

L.6 BACnet Smart Sensor (B-SS)

…

Device and Network Management
- ~~No requirement~~
- *Ability to respond to queries about its status*
- *Ability to respond to requests for information about any of its objects*

[Change **Annex L.7**, p.593]

L.7 Profiles of the Standard BACnet Devices

The following tables indicate which BIBBs must be supported by each device type for each interoperability area.
...

	B-OWS	**B-BC**	**B-AAC**	**B-ASC**	**B-SA**	**B-SS**
Device &	DM-DDB-A,B	DM-DDB-A,B	DM-DDB-B	DM-DDB-B	*DM-DDB-B*[1]	*DM-DDB-B*[1]
Network Mgmt	~~DM-DOB-A,B~~ *DM-DOB-B*	~~DM-DOB-A,B~~ *DM-DOB-B*	DM-DOB-B	DM-DOB-B	*DM-DOB-B*[1]	*DM-DOB-B*[1]
	DM-DCC-A	DM-DCC-B	DM-DCC-B	DM-DCC-B		
	DM-TS-A	DM-TS-B or DM-UTC-B	DM-TS-B or DM-UTC-B			
	DM-UTC-A					
	DM-RD-A	DM-RD-B	DM-RD-B			
	DM-BR-A	DM-BR-B				
	NM-CE-A	NM-CE-A				

[1] *Not required if the device is a BACnet MS/TP Slave.*

135-2004*d*-6. Remove the requirement for the DM-DOB-A BIBB from the B-OWS and B-BC device profiles.

Rationale
The BIBBs required for the B-OWS and B-BC profiles include the BIBB DM-DOB-A (e.g., initiate Who-Has) for which there is no standard use case or support in BACnet.

Addendum 135-2004*d*-6

[Change **Annex L.1**, p.590]

L.1 BACnet Operator Workstation (B-OWS)

...

Device and Network Management

- Ability to respond to queries about its status
- Ability to respond to requests for information about any of its objects
- Display of information about the status of any device on the BACnet internetwork
- ~~Display of information about any object in the BACnet internetwork~~
- Ability to silence a device on the network that is transmitting erroneous data

...

[Change **Annex L.7**, p.593]

L.7 Profiles of the Standard BACnet Devices

The following tables indicate which BIBBs must be supported by each device type for each interoperability area.

...

	B-OWS	**B-BC**	**B-AAC**	**B-ASC**	**B-SA**	**B-SS**
Device &	DM-DDB-A,B	DM-DDB-A,B	DM-DDB-B	DM-DDB-B		
Network Mgmt	~~DM-DOB-A,B~~ *DM-DOB-B*	~~DM-DOB-A,B~~ *DM-DOB-B*	DM-DOB-B	DM-DOB-B		
	DM-DCC-A	DM-DCC-B	DM-DCC-B	DM-DCC-B		
	DM-TS-A	DM-TS-B or DM-UTC-B	DM-TS-B or DM-UTC-B			
	DM-UTC-A					
	DM-RD-A	DM-RD-B	DM-RD-B			
	DM-BR-A	DM-BR-B				
	NM-CE-A	NM-CE-A				

135-2004*d*-7. Relax mandated values for APDU timeouts and retries when configurable, and change default values.

Rationale
Experiences with installing and operating BACnet systems have led to a preference for different values for APDU timeouts and retries than originally specified and a preference for flexibility in the default values in devices supplied by vendors.

Addendum 135-2004*d*-7

[Change **12.11.26**, p.181]

12.11.26 APDU_Segment_Timeout

The APDU_Segment_Timeout property, of type Unsigned, shall indicate the amount of time in milliseconds between retransmission of an APDU segment. ~~The~~ *A suggested* default value for this property ~~shall be 2000~~ *is 5,000* milliseconds. This value shall be non-zero if the Device object property called Number_Of_APDU_Retries is non-zero. See 5.3. If segmentation of any kind is supported, then the APDU_Segment_Timeout property shall be present.

In order to achieve reliable communication, it is recommended that the values of the APDU_Segment_Timeout properties of the Device objects of all intercommunicating devices should contain the same value.

[Change **12.11.27**, p.181]

12.11.27 APDU_Timeout

The APDU_Timeout property, of type Unsigned, shall indicate the amount of time in milliseconds between retransmissions of an APDU requiring acknowledgment for which no acknowledgment has been received. ~~The~~ *A suggested* default value for this property ~~shall be 3,000~~ *is 6,000* milliseconds for devices that permit modification of this parameter. Otherwise, the default value shall be ~~60,000~~ *10,000* milliseconds. This value shall be non-zero if the Device object property called Number_Of_APDU_Retries is non-zero. See 5.3.

In order to achieve reliable communication, it is recommended that the values of the APDU_Timeout properties of the Device objects of all intercommunicating devices should contain the same value.

[Change **12.11.28**, p.181]

12.11.28 Number_Of_APDU_Retries

The Number_Of_APDU_Retries property, of type Unsigned, shall indicate the maximum number of times that an APDU shall be retransmitted. ~~The~~ *A suggested* default value for this property ~~shall be~~ *is* 3. If this device does not perform retries, then this property shall be set to zero. If the value of this property is greater than zero, a non-zero value shall be placed in the Device object APDU_Timeout property. See 5.3.

135-2004*d*-8. Fix EventCount handling error in MS/TP Master Node State Machine.

Rationale
A subtle error was discovered in the MS/TP Master Node's handling of the variable EventCount that could cause unnecessary transitions between the IDLE and NO_TOKEN states if there is no token, as follows:
- The state machine enters IDLE with EventCount greater than $\mathbf{N_{min_octets}}$
- If there is no token, SilenceTimer will eventually exceed $\mathbf{T_{no_token}}$
- The state machine then takes the LostToken transition to the NO_TOKEN state
- Because EventCount is not zero, the state machine immediately takes the SawFrame transition back to IDLE
- Because SilenceTimer still exceeds $\mathbf{T_{no_token}}$, the state machine immediately transitions back to NO_TOKEN
Analysis of the situation revealed cases where EventCount was being unnecessarily set to zero.
The following changes correct these situations.

Addendum 135-2004*d*-8

[Change **Clause 9.5.6.2**, p.87]

9.5.6.2 IDLE

LostToken
If SilenceTimer is greater than or equal to $\mathbf{T_{no_token}}$,

then assume that the token has been lost. *Set EventCount to zero and enter* ~~Enter~~ the NO_TOKEN state.
...

[Change **Clause 9.5.6.5**, p.90]

9.5.6.5 DONE_WITH_TOKEN
…
SoleMasterRestartMaintenancePFM
If FrameCount is greater than or equal to $N_{max_info_frames}$, TokenCount is greater than or equal to N_{poll}, (PS+1) modulo (N_{max_master}+1) is equal to NS, and SoleMaster is TRUE,

then set PS to (NS+1) modulo ($\mathbf{N_{max_master}}$ +1); call SendFrame to transmit a Poll For Master to PS; set NS to TS (no known successor node); set ~~RetryCount, TokenCount, and EventCount~~ *RetryCount and TokenCount* to zero; and enter the POLL_FOR_MASTER state to find a new successor to TS.

[Change **Clause 9.5.6.6**, p.90]

9.5.6.6 PASS_TOKEN
…
FindNewSuccessor
If SilenceTimer is greater than or equal to $\mathbf{T_{usage_timeout}}$ and RetryCount is greater than or equal to $\mathbf{N_{retry_token}}$,

Then assume that NS has failed. Set PS to (NS+1) modulo ($\mathbf{N_{max_master}}$ +1); call SendFrame to transmit a Poll For Master to PS; set NS to TS (no known successor node); set ~~RetryCount, TokenCount, and EventCount~~ *RetryCount and TokenCount* to zero; and enter the POLL_FOR_MASTER state to find a new successor to TS.

[Change **Clause 9.5.6.7**, p.90]

9.5.6.7 NO_TOKEN
…
GenerateToken
If SilenceTimer is greater than or equal to $\mathbf{T_{no_token}}$+($\mathbf{T_{slot}}$*TS) and SilenceTimer is less than $\mathbf{T_{no_token}}$+($\mathbf{T_{slot}}$*(TS+1)),

then assume that this node is the lowest numerical address on the network and is empowered to create a token. Set PS to (TS+1) modulo ($\mathbf{N}_{\mathbf{max_master}}$+1); call SendFrame to transmit a Poll For Master frame to PS; set NS to TS (indicating that the next station is unknown); set ~~TokenCount, RetryCount, and EventCount~~ *RetryCount and TokenCount* to zero; and enter the POLL_FOR_MASTER state to find a new successor to TS.

135-2004*d*-9. Permit routers to use a local network number in Device_Address_Binding.

Rationale
A router knows its local network number and should be permitted to use that in the Device object's Device_Address_Binding property.

Addendum 135-2004*d*-9

[Change **Clause 12.11.33**, p.182]

12.11.33 Device_Address_Binding

The Device_Address_Binding property is a List of BACnetAddressBinding each of which consists of a BACnet Object_Identifier of a BACnet Device object and a BACnet device address in the form of a BACnetAddress. Entries in the list identify the actual device addresses that will be used when the remote device must be accessed via a BACnet service request. A value of zero ~~shall~~ *may* be used for the network-number portion of BACnetAddress entries for other devices residing on the same network as this device. The list may be empty if no device identifier-device address bindings are currently known to the device.

135-2004*d*-10. Identify conditionally writable properties.

Rationale
Some properties may or may not be writable at any particular time as a function of some operation or setting. The following change provides a means for identifying these properties.

Addendum 135-2004*d*-10

[Change **Annex A**, p.450]

…
Standard Object Types Supported:

An object type is supported if it may be present in the device. For each standard Object Type supported provide the following data:

1) Whether objects of this type are dynamically creatable
2) Whether objects of this type are dynamically deletable
3) List of the optional properties supported
4) List of all properties that are writable where not otherwise required by this standard
5) List of all properties that are conditionally writable where not otherwise required by this standard
~~5)~~ *6)* List of proprietary properties and for each its property identifier, datatype, and meaning
~~6)~~ *7)* List of any property range restrictions

135-2004*d*-11. Specify Error returns for the AcknowledgeAlarm service.

Rationale
A comprehensive set of reviews has shown the need for additional error codes to accurately convey the error situations being reported.

Addendum 135-2004*d*-11

[Change **Clause 13.5.1.4**, p.269]

13.5.1.4 Event State Acknowledged

This parameter, of type BACnetEventState, shall be equal to the value of the 'To State' from the event notification that is being acknowledged. This parameter is included so that the remote device that initiated the event notification can ensure that the state being acknowledged is recorded in the Acked_Transitions property of the initiating object.

An 'Event State Acknowledged' of OFFNORMAL shall match any off-normal event state.

[Change **Clause 13.5.2**, p.270]

13.5.2 Service Procedure

After verifying the validity of the request, the responding BACnet-user shall attempt to locate the specified object. If the object exists and if the 'Time Stamp' parameter matches the most recent time for the event being acknowledged, then the bit in the Acked_Transitions property of the object that corresponds to the value of the 'Event State Acknowledged' parameter is acknowledged by changing the bit value to one, and a 'Result(+)' primitive shall be issued. Otherwise, a 'Result(-)' primitive shall be issued. If the acknowledgment was successful, causing a 'Result(+)' to be issued, then an event notification, with a 'Notify Type' parameter equal to ACK_NOTIFICATION, shall also be issued. The acknowledgment notification shall use the same type of service (confirmed or unconfirmed) directed to the same recipients to which the original confirmed or unconfirmed event notification was sent.

The 'Error Class' and 'Error Code' to be returned for specific situations are as follows:

Situation	*Error Class*	*Error Code*
The object does not exist.	*OBJECT*	*UNKNOWN_OBJECT*
The object exists but does not support or is not configured for event generation.	*OBJECT*	*NO_ALARM_ CONFIGURED*
The requesting BACnet device does not have appropriate authorization to Acknowledge this alarm.	*SERVICES*	*SERVICE_REQUEST_DENIED*
The timestamp provided in the AcknowledgeAlarm message does not match with the latest timestamp for the transition being acknowledged.	*SERVICES*	*INVALID_TIMESTAMP*
The 'Event State Acknowledged' does not match the 'To State' parameter of the original Event Notification message. An 'Event State Acknowledged' of OFFNORMAL shall match any off-normal event state.	*SERVICES*	*INVALID_EVENT_STATE*

[Add new **Clause 18.2.2**, p.354, and renumber existing **Clause 18.2.2** and subsequent clauses.]

18.2.2 NO_ALARM_CONFIGURED - The BACnet object referenced by the service does not support, or is not configured for, event generation.

[Add new **Clause 18.6.8**, p.356, and renumber existing **Clause 18.6.8** and subsequent clauses.]

18.6.8 INVALID_EVENT_STATE - The 'Event State Acknowledged' parameter conveyed by an AcknowledgeAlarm service request does not match the ‘To State’ parameter of the most recent occurrence of the same transition type of the event being acknowledged.

[Change **Clause 21**, **Error** production, p.406]
[Note: Additional Error enumerations are defined in Addendum 135-2004*b*-11.]

```
Error ::= SEQUENCE {
    ...
    error-code      ENUMERATED {
                    other                       (0),
                    ...
                    invalid-data-type           (9),
                    invalid-event-state         (73),
                    ...
                    missing-required-parameter  (16),
                    network-down                (58),
                    no-alarm-configured         (74),
                    ...
                    -- see invalid-event-state   (73),
                    -- see no-alarm-configured   (74),
                    ...
                    }
    -- Enumerated values 0-255 are reserved for definition by ASHRAE. Enumerated values
    -- 256-65535 may be used by others subject to the procedures and constraints described
    -- in Clause 23. ~~The last enumeration used in this version is 47.~~

    ...
```

POLICY STATEMENT DEFINING ASHRAE'S CONCERN FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES

ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the standards and guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive technical committee structure, continue to generate up-to-date standards and guidelines where appropriate and adopt, recommend, and promote those new and revised standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating standards and guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.