ADDENDA

BACnet™

Data Communication Protocol for Building Automation and Control Networks

ASHRAE Standing Standard Project Committee 135
Cognizant TC: TC 1.4, Control Theory and Application
SPLS Liaison: Mark P. Modera

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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*as* to ANSI/ASHRAE Standard 135-2012 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. The proposed changes are summarized below.

135-2012*as*-1 Add Value Source Information, p. 2

In the following document, language to be added to existing clauses of ANSI/ASHRAE 135-2012 and Addenda is indicated through the use of *italics*, while deletions are indicated by ~~strikethrough~~. Where entirely new subclauses are proposed to be added, plain type is used throughout.

135-2012*as*-1 Add Value Source Information

[Add an entry to every "**Table 12-X.** Properties of..." for object types that are required to support command prioritization except the Channel object.]

Table 12-X. Properties of...

Property Identifier	Property Datatype	Conformance Code
... *Current_Command_Priority* …	*BACnetOptionalUnsigned*	*R*

[Add an entry to every "**Table 12-X.** Properties of..." for object types for which command prioritization is optional.]

Table 12-X. Properties of...

Property Identifier	Property Datatype	Conformance Code
... *Current_Command_Priority* …	*BACnetOptionalUnsigned*	O^x

^{x} These properties are required if, and shall be present only if, Present_Value is commandable.

[Insert **Clause 12.X.Y** into all object types for which command prioritization is required or optional.]

12.X.Y Current_Command_Priority

This read-only property, of type BACnetOptionalUnsigned, indicates the currently active priority.

The value of this property shall be equal to the index of the entry in the Priority_Array from which the Present_Value's value has been taken. If Present_Value has taken on the value of Relinquish_Default, this property shall have the value Null.

[Add entries to every "**Table 12-X.** Properties of..." for all object types for which command prioritization is required or optional except the Channel object.]

Table 12-X. Properties of...

Property Identifier	Property Datatype	Conformance Code
... *Value_Source* *Value_Source_Array* *Last_Command_Time* *Command_Time_Array* …	*BACnetValueSource* *BACnetARRAY[16] of BACnetValueSource* *BACnetTimeStamp* *BACnetARRAY[16] of BACnetTimeStamp*	$O^{x1,y1,z}$ $O^{x2,y2}$ $O^{x2,y2}$ O^{y2}

^{x1}*This property is required if the object supports the value source mechanism.*
^{x2}*These properties are required if the object supports the value source mechanism and is commandable.*
^{y1}*This property shall be present only if the object supports the value source mechanism.*
^{y2}*These properties shall be present only if the object supports the value source mechanism and is commandable.*
^{z} *This property shall be writable as described in Clause 19.X.*

[Add entries to tables "**Table 12-X.** Properties of..." for the Command, Load Control, and Channel object types.]

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Table 12-X. Properties of...

Property Identifier	Property Datatype	Conformance Code
... *Value_Source* …	*BACnetValueSource*	$O^{x,y,z}$

^{x} *This property is required if the object supports the value source mechanism.*

^{y} *This property shall be present only if the object supports the value source mechanism.*

^{z} *This property shall be writable as described in Clause 19.X.*

[Insert **Clause 12.X.Y1** into: all object types for which command prioritization is required or optional, plus the Command, Load Control, and Channel object types.]

12.X.Y1   Value_Source

This property, of type BACnetValueSource, indicates the source of the value of the Present_Value. The Value_Source property and its use in the value source mechanism are described in Clause 19.X.

[Add entries to tables "**Table 12-X.** Properties of..." for the Life Safety Point and Life Safety Zone object types.]

Table 12-X. Properties of...

Property Identifier	Property Datatype	Conformance Code
... *Value_Source* …	*BACnetValueSource*	$O^{x,y,z}$

^{x} *This property is required if the object supports the value source mechanism.*

^{y} *This property shall be present only if the object supports the value source mechanism.*

^{z} *This property shall be writable as described in Clause 19.X.*

[Insert **Clause 12.X.Y1** into the Life Safety Point and Life Safety Zone object types.]

12.X.Y1   Value_Source

This property, of type BACnetValueSource, indicates the source of the value of the Mode property. The Value_Source property and its use in the value source mechanism are described in Clause 19.X.

[Insert **Clause 12.X.Y2** into all object types for which command prioritization is required or optional.]

12.X.Y2 Value_Source_Array

This read-only property, of type BACnetARRAY[16] of BACnetValueSource, indicates the source of the last command at each priority. See Clause 19.X for a description of the value source mechanism.

If no commands have been received at a particular priority, the associated entry in the array shall have the value 'None'.

[Insert **Clause 12.X.Y3** into all object types for which command prioritization is required or optional.]

12.X.Y3 Last_Command_Time

This read-only property, of type BACnetTimeStamp, indicates the time at which the Present_Value, Current_Command_Priority, or Value_Source last changed. See Clause 19.X for a description of the value source mechanism.

[Insert **Clause 12.X.Y4** into all object types for which command prioritization is required or optional.]

12.X.Y4 Command_Time_Array

This read-only property, of type BACnetARRAY[16] of BACnetTimeStamp, indicates the time at which each priority was last commanded or relinquished. See Clause 19.X for a description of the value source mechanism.

[Change **Clause 19.2.1.4**, p. 611]

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19.2.1.4 ~~Command~~ *Value* **Source** ~~ID~~

~~There is no provision for maintaining command source identification as part of the priority table. Any implementation of command source identification is vendor-specific in nature.~~
The optional identification of value sources is described in Clause 19.X.

[Insert **Clause 19.X**, p. 613]

19.X Value Source Mechanism

In building control systems, an object may be manipulated by a number of entities, and it may be important to know which entity is the current source of the current Present_Value (or Mode in the case of Life Safety objects). The priority at which an object is commanded indicates the general process that is controlling it (scheduling, manual override, etc.), the value source mechanism allows for an object to indicate the device, and/or object that was the source of the command or write operation.

The rest of this clause refers to the Present_Value property when describing the value source mechanism. This is done for clarity of the specification. When considering the mechanism for objects which apply it to a different property (such as Mode in the case of Life Safety objects), references to Present_Value are to be understood as references to the property that the mechanism is actually applied to.

The Channel object is a commandable object type but instead of having a Priority_Array, it just passes the priority through when writing to target properties. As such, it behaves like a non-commandable object when considering the value source mechanism. When the Channel object writes or commands objects, the value source for the operation is the Channel object.

By default, the value source mechanism only identifies the device that was the source of the write or command operation. The mechanism does allow, but does not require, client devices to update the value source information to accurately identify the object that is the true source of the operation.

19.X.1 Value Source Properties

For commandable Present_Value properties, the value source mechanism works in conjunction with command prioritization to identify which device or object has commanded, or relinquished, a value at each of the priority levels.

For non-commandable Present_Value properties, the value source mechanism identifies the source of the last write operation.

19.X.1.1 Present_Value, Priority_Array, Relinquish_Default

See Clause 19.2 for a description of command prioritization.

19.X.1.2 Value_Source

The Value_Source property indicates the source of the current Present_Value. The value indicates either the device or the object that provided the current value of the Present_Value property.

For commandable Present_Value properties, the value of the property is taken from the entry of the Value_Source_Array which is related to the Priority_Array entry which provided the current Present_Value. For example, if the Present_Value is from index 8 of the Priority_Array, then the Value_Source property shall have the value from index 8 of the Value_Source_Array.

If there is no active value source, i.e., the Present_Value has taken on the value of Relinquish_Default, then the Value_Source property shall have the value 'None'.

For non-commandable Present_Value properties, the Value_Source is either the value that is set when the Present_Value was last written, or is the value provided by the source device after the Present_Value was last written. In objects with a non-commandable Present_Value property, there will be no Value_Source_Array property.

19.X.1.3 Value_Source_Array

The Value_Source_Array property holds the last value source for each priority. When the Present_Value is commanded, the Value_Source_Array is updated to indicate where the command originated.

When a property is written or commanded, the value source information is set to the source device's device object, if known, or the source device's network address if the device instance is not known.

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When Present_Value is commanded or written by the local device, the value source information shall be updated. If the operation was initiated by a local object, then that object shall be identified in the value source information.

When minimum on / off control takes effect, or relinquishes, the value source used for priority 6 is the commanded object (i.e., the object which contains the Value_Source_Array property.)

After commanding or writing the Present_Value of an object, the device, and only the device which wrote or commanded the value, may update the value source information, at the same priority as the command in case of commanding, to set the source device instance or to indicate the object that initiated the operation. The writing or commanding device accomplishes this by writing to the Value_Source property at the same priority that the Present_Value was written or commanded at. Writing to the Value_Source property may be requested by a subsequent ReadProperty request or, when WritePropertyMultiple is used, by a respective property value subsequent to the property value written or commanded. Attempts to write to the Value_Source property by a device other than the device that wrote the property or commanded the property at a particular priority shall cause an error being returned and the write to Value_Source shall not be performed.

For commandable objects, when the Value_Source is written, the value is placed into Value_Source_Array at the entry that corresponds to the priority it was written and the Value_Source property will be updated only if that is the current command priority.

19.X.1.4 Last_Command_Time

Last_Command_Time indicates the time at which the Present_Value, Current_Command_Priority, or Value_Source last changed due to a command or write of Present_Value. The Last_Command_Time is not updated when Value_Source is written directly.

Note that when Present_Value changes due to a relinquish command, the Last_Command_Time indicates the time at which the relinquish command was received and not the earlier time at which the now current priority command was provided.

19.X.2 Change of Value Reporting With Value Source Information

To allow reporting of value source information along with the value of the property, COV subscriptions for the Value_Source property are handled differently than for other properties.

When Value_Source is subscribed to, via SubscribeCOVProperty, COV notifications will be sent under the same circumstances as COV for the Present_Value of the object, and whenever the value of Value_Source changes. See Table 13-1x for more information on COV reporting for the Value_Source property.

It is a local matter whether 1 or 2 notifications are generated in the case where the Value_Source property is written directly with updated information. In the case where a single notification is generated, that notification shall include the updated value source.

[Insert **Table 13-1x**, p. 463]

Table 13-1x. Criteria for COV Reporting for Properties with Specialized Criteria.

Property	Criteria	Properties Reported
Value_Source (for commandable properties)	If criteria for the COV reporting for the object are met (as per Table 13-1) 　or 　　Value_Source changes[1] 　or Current_Command_Priority changes	The values listed for the object in Table 13-1 (if present in the table, otherwise Present_Value and Status_Flags), Value_Source, Last_Command_Time, Current_Command_Priority
Value_Source (for non-commandable properties)	If criteria for the COV reporting for the object are met (as per Table 13-1) 　or Value_Source changes[1]	The values listed for the object in Table 13-1 (if present in the table, otherwise Present_Value and Status_Flags), Value_Source

[1] See Clause 19.X.2 for further requirements on notifications related to Value_Source changes.

[Insert into **Clause 21**, p. 667]

BACnetValueSource ::= CHOICE {
       none   [0] NULL,
       object   [1] BACnetDeviceObjectReference,
       address   [2] BACnetAddress
}

[Insert into **Clause 21**, p. 693]

BACnetOptionalUnsigned ::= CHOICE {
   null   NULL,
   unsigned   Unsigned
}

[Modify **Clause 21**, p. 694]

BACnetPropertyIdentifier ::= ENUMERATED {
   …

client-cov-increment	(127),
command-time-array	*(430),*
current-command-priority	*(431),*
…	
last-access-point	(276),
last-command-time	*(432),*
last-credential-added	(277),
…	
value-change-time	(192),
value-source	*(433),*
value-source-array	*(434),*
variance-value	(151),
…	
-- see egress-active	(386),
-- see command-time-array	*(430),*
-- see current-command-priority	*(431),*
-- see last-command-time	*(432),*
-- see value-source	*(433),*
-- see value-source-array	*(434),*
…	

}

[Insert **Clause K.1.X**, p. 882]

K.1.X BIBB - Data Sharing-Value Source Information-B (DS-VSI-B)

The B device implements the value source mechanism described in Clause 19 in all of its commandable objects and 0 or more of its non-commandable objects. For B devices that do not contain any commandable objects, the device shall implement the value source mechanism for at least one non-commandable object.

[Add a new entry to **History of Revisions**, p. 1006]

(This History of Revisions is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard.)

HISTORY OF REVISIONS

Protocol		Summary of Changes to the Standard
Version	Revision	
…	…	**…**
1	17	**Addendum *as* to ANSI/ASHRAE 135-2012** Approved by the ASHRAE Standards Committee Xxxx xx, 2015; by the ASHRAE Board of Directors Xxxx xx, 2015; and by the American National Standards Institute Xxxx xx, 2015. 1. Add Value Source Information

POLICY STATEMENT DEFINING ASHRAE'S CONCERN
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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.

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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.

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