Public Review Draft

Proposed Addendum *bv* to Standard 135-2016, BACnet® - A Data Communication Protocol for Building Automation and Control Networks

First Public Review (April 2020)
(Draft shows Proposed Changes to Current Standard)

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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

The purpose of this addendum is to present a proposed change for public review. 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.

135-2016*bv*-1. Add new property Write_Every_Scheduled_Action to the Schedule object, p. 3
135-2016*bv*-2. Fix XML namespace, p. 5
135-2016*bv*-3. Preventing Remote Traffic Duplication, p. 6

In the following document, language to be added to existing clauses of ANSI/ASHRAE 135-2016 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. Only this new and deleted text is open to comment at this time. All other material in this document is provided for context only and is not open for public review comment except as it relates to the proposed changes.

The use of placeholders like X, Y, Z, X1, X2, N, NN, x, n, ?, etc., should not be interpreted as literal values of the final published version. These placeholders will be assigned actual numbers/letters only after final publication approval of the addendum.

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135-2016*bv*-1. Add new property Write_Every_Scheduled_Action to the Schedule object

Rationale

IC135-2010-1 clarifies that it is a local matter how the Schedule object behaves on a transition to a new time-value pair in effect that results in an unchanged Present_Value.

This change adds a new property that indicates if the Present_Value is written to properties referenced on a change of the time-value pair in effect, even if the value does not change.

[Change **Table 12-28**, p. 292]

Table 12-28. Properties of the Schedule Object Type

Property Identifier	Property Datatype	Conformance Code
…		
Reliability_Evaluation_Inhibit	BOOLEAN	O
Write_Every_Scheduled_Action	*BOOLEAN*	*O*
Property_List	BACnetARRAY[N] of BACnetPropertyIdentifier	R
Tags	BACnetARRAY[N] of BACnetNameValue	O
Profile_Location	CharacterString	O
Profile_Name	CharacterString	O

[1] At least one of these properties is required**.**
[2] These properties are required if the object supports intrinsic reporting.
[3] These properties shall be present only if the object supports intrinsic reporting.

[Change **Clause 12.24.4**, p. 293]

12.24.4   Present_Value
This property indicates the current value of the schedule, which may be any primitive datatype. As a result, most analog, binary, and enumerated values may be scheduled. This property shall be writable when Out_Of_Service is TRUE (see Clause 12.24.14).

~~Any change in the value of this property shall be written to all members of the List_Of_Object_Property_References property. An error writing to any member of the list shall not stop the Schedule object from writing to the remaining members.~~

The normal calculation of the value of the Present_Value property is illustrated as follows (the actual algorithm used is a local matter but shall yield the same results as this one):

1. Find the highest relative priority (as defined by Clause 12.24.8) Exception_Schedule array element that is in effect for the current day and whose current value (see method below) is not NULL, and assign that value to the Present_Value property.
2. If the Present_Value was not assigned in the previous step, then evaluate the current value of the Weekly_Schedule array element for the current day and if that value is not NULL, assign it to the Present_Value property.
3. If the Present_Value was not assigned in the previous steps, then assign the value of the Schedule_Default property to the Present_Value property.

The method for evaluating the current value of a schedule (either exception or weekly) is to find the latest element in the list of BACnetTimeValues that occurs on or before the current time, and then use that element's value as the current value for the schedule. If no such element is found, then the current value for the schedule shall be NULL.

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These calculations are such that they can be performed at any time and the correct value of Present_Value property will result. These calculations shall be performed at 00:00 each day, whenever the device resets, whenever properties that can affect the results are changed, whenever the time in the device changes by an amount that may have an effect on the calculation result, and at other times, as required, to maintain the correct value of the Present_Value property through the normal passage of time.

Note that the Present_Value property will be assigned the value of the Schedule_Default property at 00:00 of any given day, unless there is an entry for 00:00 in effect for that day. If a scheduled event logically begins on one day and ends on another, an entry at 00:00 shall be placed in the schedule that is in effect for the second day, and for any subsequent days of the event's duration, to ensure the correct result whenever Present_Value is calculated.

Any change in the value of this property shall be written to all members of the List_Of_Object_Property_References property. An error writing to any member of the list shall not stop the Schedule object from writing to the remaining members.

If the Write_Every_Scheduled_Action property is present and TRUE, all members of the List_Of_Object_Property_References property shall be written when a new time-value pair or when the Schedule_Default property comes into effect regardless of whether the value of the Present_Value property changes or not (see Clause 12.24.X).

[Insert new **Clause 12.24.x,** p. 297]

12.24.X   Write_Every_Scheduled_Action

This property, of type BOOLEAN, indicates whether (TRUE) or not (FALSE) the value of the Present_Value property shall be written to the members of the List_Of_Object_Property_References property when a new time-value pair or when the Schedule_Default property comes into effect, regardless of the resulting value of the Present_Value property. This includes a new time-value pair coming into effect due to a change in the device's time.

When Write_Every_Scheduled_Action is FALSE, or not present, the schedule shall write to the members of the List_Of_Object_Property_References property only when the calculated Present_Value has changed, or the previously calculated Present_Value is unknown due to external influences, such as might be the case after a device restart.

[Insert into production **BACnetPropertyIdentifier** in **Clause 21**, p. 845]

BACnetPropertyIdentifier ::= ENUMERATED {   -- see below for numerical order
        . . .
        window-samples   (148),
        write-every-scheduled-action   *(n),*
        . . .
-- numerical order reference
        . . .
        -- see represents   (491),
        -- see write-every-scheduled-action   *(n),*

. . .

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135-2016*bv*-2. Fix XML namespace

Rationale

The namespace is currently defined in Clause Q.2.1, which defines the <CSML> wrapper for use "in file contexts". However, immediately above Q.2.1, the standard shows that for "other contexts", any element can be the top-level element. Being "top-level" implies that it must include xmlns and other top-level things like defaultLocale. So, the definition of the xmlns seems misplaced.

Additionally, and unfortunately, all of the examples (50 of them) show the xmlns as "http://bacnet.org/csml/1.2". It is therefore not entirely clear whether we should change all the examples or to change the definition to match the examples, since, for example, the GitLab files followed the shorter format of the examples, ignoring the definition in Clause Q.2.1.

This proposal suggests using the shorter lowercase format from now on. Additionally, since we intend to always have earlier versions be a subset of the current version, there is no reason for consumers to reject earlier versions. So, for interoperability, this proposal "raises the bar" for consumers to be required to accept earlier versions and the "variant" from the examples: "http://bacnet.org/csml/1.2".

[Change **Clause Q.2**, p. 1144]

Q.2 XML Document Structure

The XML elements and attributes defined in this annex may be used for a variety of purposes. *When stored in files, they* ~~and~~ are always enclosed in a <CSML> element ~~when stored in files~~. [remove paragraph break] When used in other contexts, such as web services, any of the elements, other than <Definitions>, <TagDefinitions>, and <Includes>, that are defined as allowed children of <CSML> can be used as the top level element. In these cases, the XML namespace specifier and optional *attributes* ~~'defaultLocale' attribute~~ defined for the CSML element shall be placed on the top level element.

The current XML namespace is "http://bacnet.org/csml/1.4". Since this standard makes changes to the XML syntax by addition rather than redefinition, it is required that implementations also accept past namespaces as a proper subset of the current namespace. The past namespaces are:
  a) *"http://www.bacnet.org/CSML/1.0"*
  b) *"http://www.bacnet.org/CSML/1.1"*
  c) *"http://www.bacnet.org/CSML/1.2"*
  d) *"http://www.bacnet.org/CSML/1.3"*
  e) *"http://bacnet.org/csml/1.2"*

[Change **Clause Q.2.1**, p. 1145]

Q.2.1 <CSML>

When used in a file context, the XML syntax defined by this annex is enclosed in the element <CSML> ("Control Systems Modeling Language") ~~that has an xml namespace of "http://www.bacnet.org/CSML/1.2"~~.

[Change **Clause Q.1.1.1**, p. 1141]

Q.1.1.1 XML Requirements and Restrictions

...
Consumers are required to:
  (a) parse and check *that* the ~~single~~ default namespace specifier "xmlns" ~~specified~~*matches the values listed* in Clause ~~Q.2.1~~*Q.2*.
  (b) …

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135-2016*bv*-3. Preventing Remote Traffic Duplication

Rationale

Clause 6.5.3, method 4 ("unknown router case"), states that an initiating device is allowed to use a broadcast MAC address for traffic destined for remote networks, expecting the appropriate router to pick it up and forward it to its destination.

The problem is that the clause on routing remote traffic (6.5.4) does not address this case, and so a strict implementation "as written" results in routers sending the received packets to the "next router" even though the next router is in fact on the same network as the originating device and has already seen and routed the original message. This results in duplicate messages arriving at the final destination.

We need to prevent message duplication by adding a case for detecting this situation to the clause on routing remote traffic (6.5.4) and by updating the routing flow chart diagram 6-12.

The implied behavior for reflecting unicast messages sent to the wrong router is codified as well with language added to 6.5.4. These messages will be reflected on to the correct router.
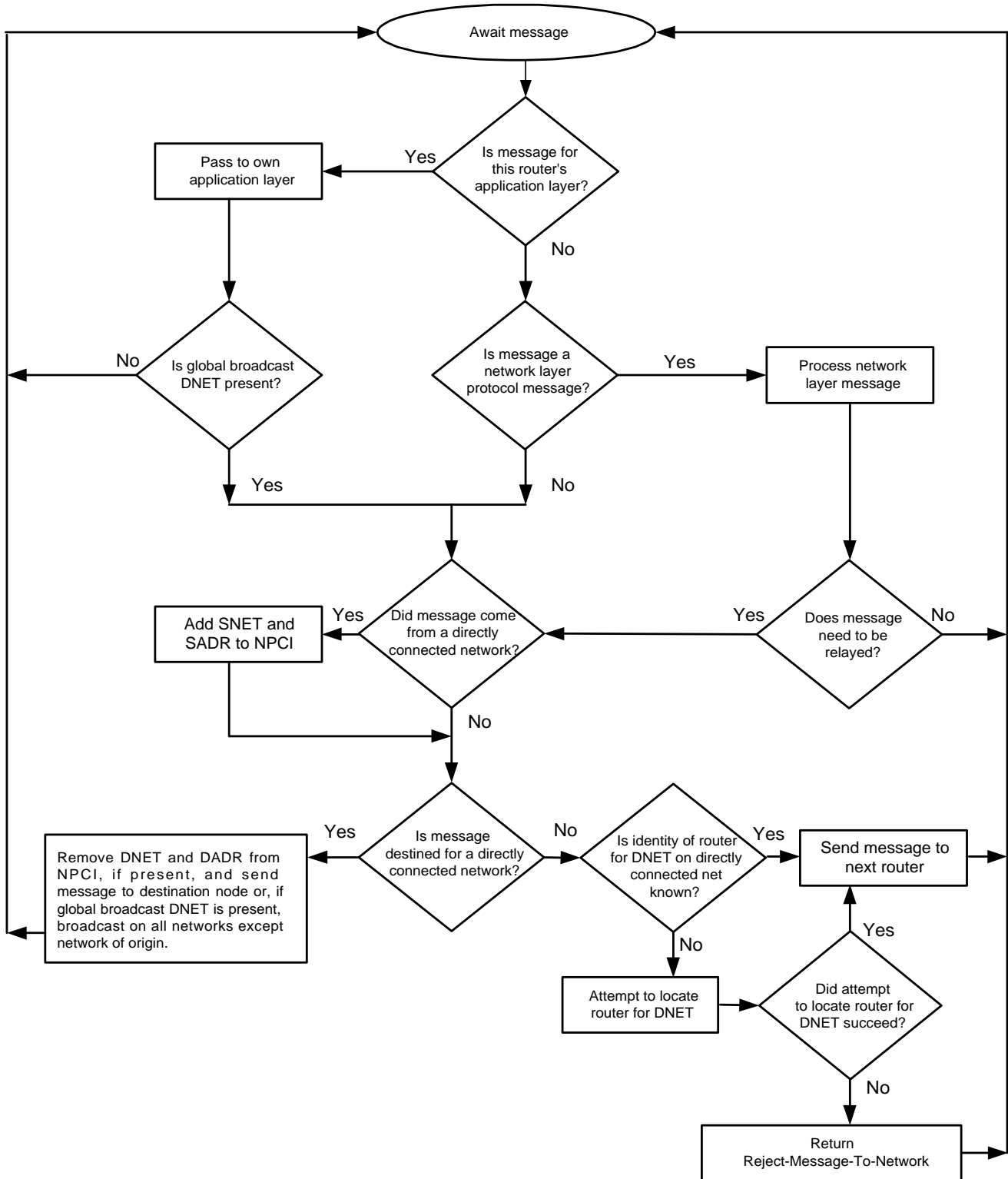
[Change Clause **6.5.4**, p. 66]

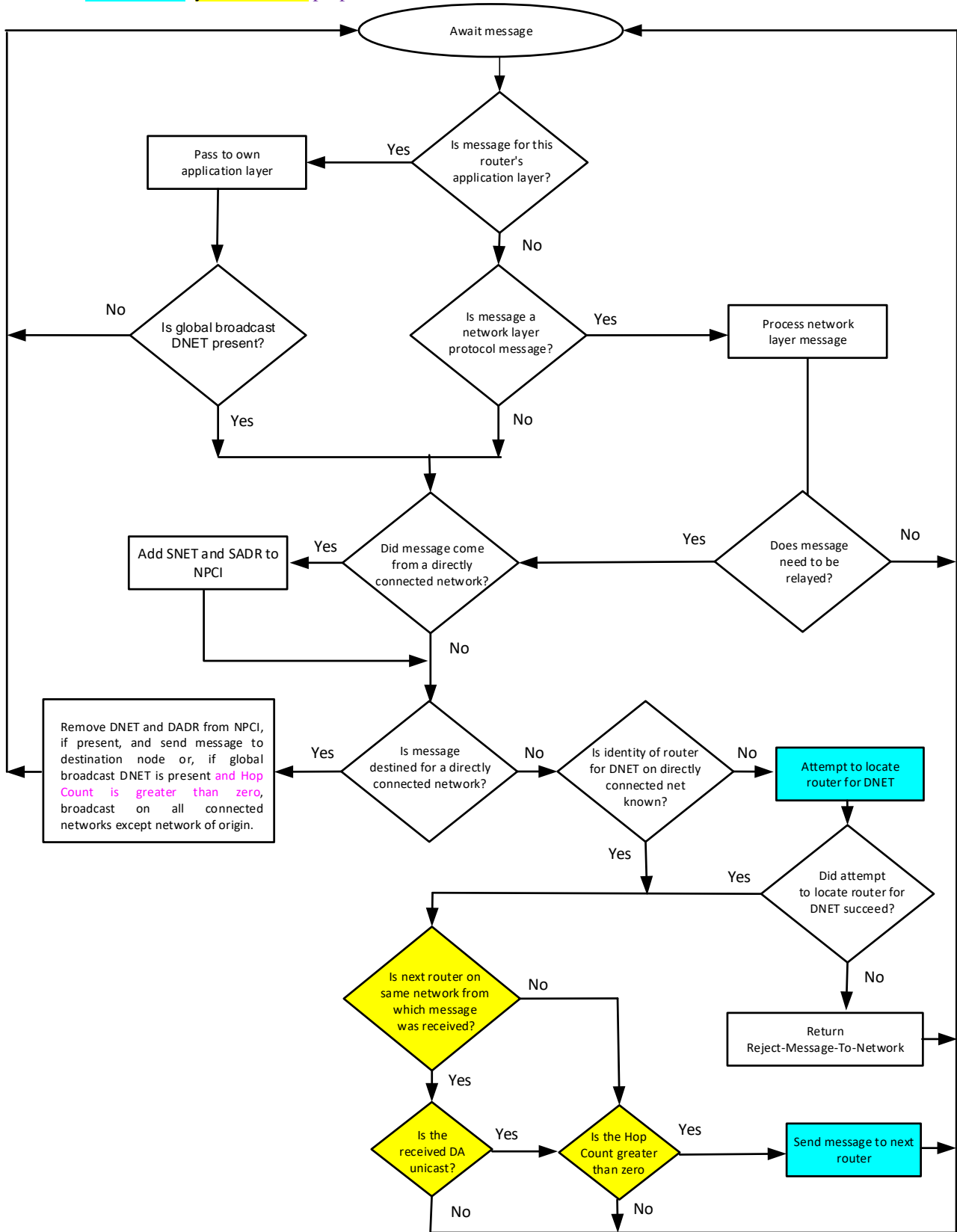**6.5.4   Network Layer Procedures for the Receipt of Remote Traffic**
…
Three possibilities exist: either the router is directly connected to the network referred to by DNET, the message must be relayed to another router for further transmission, or a global broadcast is required. In the first case, DNET, DADR, and Hop Count shall be removed from the NPCI and the message shall be sent directly to the destination device with DA set equal to DADR. The control octet shall be adjusted accordingly to indicate only the presence of SNET and SADR. In the second case, if the Hop Count is still greater than zero, the message shall be sent to the next router on the path to the destination network. *In the case where the next router is on the same network from which the message was received, the message shall only be sent to the next router if the incoming message was unicast and thus not already received by the next router.* If the next router is unknown, an attempt shall be made to identify it using a Who-Is-Router-To-Network message. If the Hop Count is zero, *or the next router is on the same network from which the message was received and the DA of the incoming message is not a unicast*, then the message shall be discarded. If the DNET global broadcast network number is present and the Hop Count is greater than zero, the router shall broadcast the message on each network to which the router is directly connected, except the network of origin, using the broadcast address appropriate to each data link. If the DNET global broadcast network number is present and the Hop Count is zero, then the message shall be discarded.

[Change **Figure 6-12**, p. 67]

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FROM:

Await message

Is message for this router's application layer?

Yes → Pass to own application layer

No

Is global broadcast DNET present?

No →

Yes →

Is message a network layer protocol message?

Yes → Process network layer message

No

Did message come from a directly connected network?

Yes → Add SNET and SADR to NPCI

No

Does message need to be relayed?

Yes

No →

Is message destined for a directly connected network?

Yes → Remove DNET and DADR from NPCI, if present, and send message to destination node or, if global broadcast DNET is present, broadcast on all networks except network of origin.

No → Is identity of router for DNET on directly connected net known?

Yes → Send message to next router

No → Attempt to locate router for DNET

Did attempt to locate router for DNET succeed?

Yes → Send message to next router

No → Return Reject-Message-To-Network

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TO: Note to Reviewer: the coloring in this figure is for explanatory purposes and will not be part of the published addendum. blue=moved, yellow=added purple=added text

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[Add a new entry to **History of Revisions**, p. 1364]

HISTORY OF REVISIONS

. . .	. . .	. . .
1	X	**Addendum *bv* to ANSI/ASHRAE Standard 135-2016** Approved by ASHRAE on MONTH DAY, 20XX; and by the American National Standards Institute on MONTH DAY, 20XX. 1. Add new property Write_Every_Scheduled_Action to the Schedule object 2. Fix XML namespace 3. Preventing Remote Traffic Duplication