**INTERPRETATION IC 135-2020-27 OF
ANSI/ASHRAE STANDARD 135-2020 BACnet® -
A Data Communication Protocol for Building
Automation and Control Networks**

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Reference: This request for interpretation refers to the requirements presented in ANSI/ASHRAE Standard 135-2020, Clauses AB.2.1, AB.4.2, AB.4.2.2 and Figure AB-8, regarding Destination Virtual Address.

Background: **Clause AB.2.1** defines the header field Destination Virtual Address as:

> The optional 6-octet 'Destination Virtual Address' field indicates the VMAC address of the destination node or the broadcast VMAC. If the **immediate receiver** of a unicast BVLC message is also the final destination of the message, then the 'Destination Virtual Address' field **shall be omitted**.

Observation: the only way that the "immediate receiver" is the "final destination" is in the direct connect case, since the "Hub Function" itself is never the final destination. Therefore, this "shall be omitted" applies unequivocally to the direct connect case.

Clause AB.2.1 also defines Source Virtual Address in a similar manner:

> The optional 6-octet 'Originating Virtual Address' field indicates the VMAC address of the node that originally initiated the BVLC message. If the **sender** of the message is also the **originator** of the message, then the 'Originating Virtual Address' field **shall be omitted** and the receiver shall **assume** the 'Originating Virtual Address' to be the VMAC of the sender.

Observation: The symmetry of these two reveal the guiding principle to not transmit assumable/redundant information. This follows the design of the NPCI that removes forbids/removes SADR and DADR addresses that are redundant with datalink SA and DA.

FURTHER,

**Clause AB.4.2**, the clause on the Node Switch, says:

> For direct connection messages, **both the source and destination** VMAC address **shall be omitted**.

THEREFORE,

Is seems clear that Destination Virtual Address is never present in direct connect since it is expressly forbidden in two different clauses.

HOWEVER,

Figure AB-8 for "Inbound Messages" shows "DA = A or Absent" which **seems to imply** that DA can be present for direct connect.
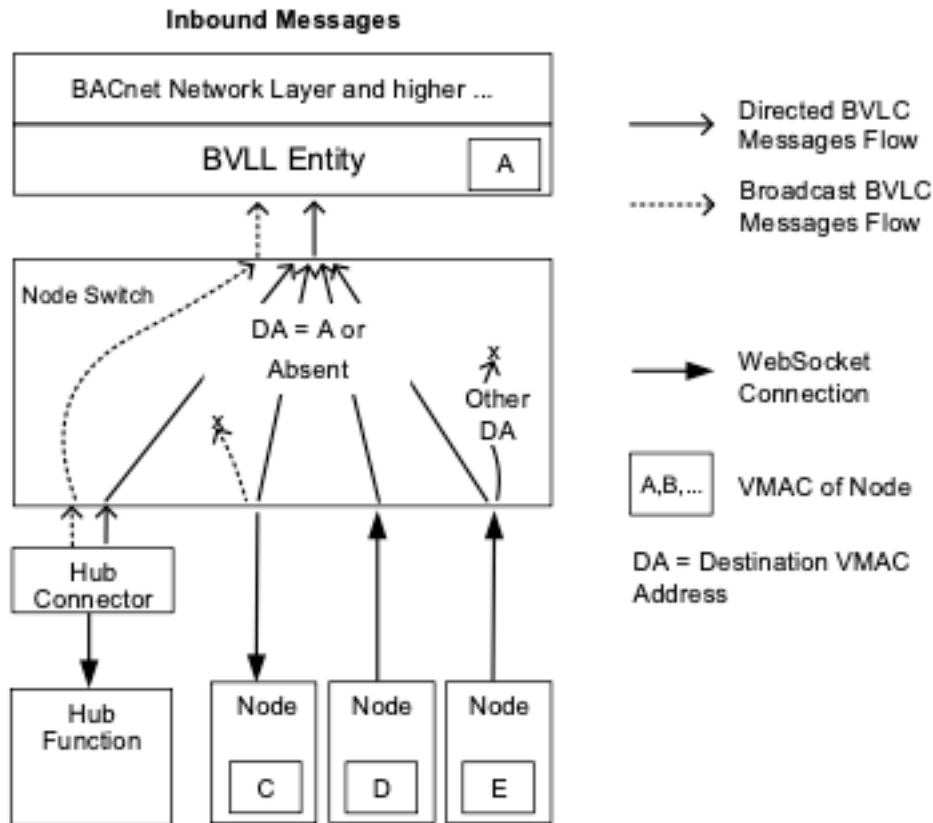
AND,

Clause AB.4.2.2 is written with the assumption that either or both of Destination and Source addresses are *possibly* present.

AB.4.2.2 Inbound Messages

On receipt of a unicast BVLC message from any current direct connection or the hub connector whose **destination VMAC is the VMAC of the local BVLL entity, or the destination VMAC address is absent**, the message shall be forwarded to the local BVLL entity. All other unicast BVLC messages shall be discarded.

On receipt of a broadcast BVLC message from the hub connector, the message shall be forwarded to the local BVLL entity. On receipt of a broadcast BVLC message from a direct connection, the message shall be discarded.

For unicast BVLC messages received **from a direct connection whose destination VMAC address is absent**, the hub switch shall indicate the VMAC address of the local BVLL entity as the destination VMAC address to the local BVLL entity.

For unicast BVLC messages received **from a direct connection in which the originating VMAC address is absent**, the hub switch shall forward the connection peer node's VMAC address as the originating VMAC address to the local BVLL entity.

This has led to confusion and interoperability problems in the field where implementations ignore the first two mandates to omit the addresses and instead only read AB.4.2.2 and conclude that they are both independently optional.

Interpretation: First, it has to be observed that Clause AB.4.2 is about the **Node Switch**, not Direct Connect, as evidenced by Figure AB-8.

Second, the interface in the figure at the bottom edge of the Node Switch is not standardized and we do not rule on the internal contents of those API parameters.

Third, the lines coming to the "DA = A or absent" text are from **both** the direct connections and the Hub Connector.

Therefore, this text is technically correct, as it is trying to apply to both cases. In the Hub Connector case, the DA **might be present in the internal API** if it is *added* by the Hub Connector, even though it is absent on the wire from the Hub Function to the Hub Connector.

Further, the first paragraph of AB.4.2.2 is awkwardly written, as it attempts to also apply to **both** the Hub Connector and Direct Connections, just as the figure does. The presence or absence depends on the internal path and **does not imply presence on the wire**.

> On receipt of a unicast BVLC message **from any current direct connection *or* the hub connector** whose destination VMAC is the VMAC of the local BVLL entity, or the destination VMAC address is absent, the message shall be forwarded to the local BVLL entity. All other unicast BVLC messages shall be discarded.

Finally, the last two paragraphs of AB.4.2.2 are just wrong and contain errata left over from earlier drafts before the mandates to omit the addresses were written. Note also, the typo of "hub switch". Both corrected below:

> For unicast BVLC messages received from a direct connection ~~whose destination VMAC address is absent~~, the ~~hub~~ *node* switch shall indicate the VMAC address of the local BVLL entity as the destination VMAC address to the local BVLL entity.

For unicast BVLC messages received from a direct connection ~~in which the originating VMAC address is absent~~, the ~~hub~~ *node* switch shall forward the connection peer node's VMAC address as the originating VMAC address to the local BVLL entity.

Is it correct that:

- The twice-indicated mandate to omit the Destination Virtual Address is unequivocal in Clauses AB.2.1 and AB.4.2.
- The confusing text in Figure AB-8 addresses *both* the internal Hub Connector API and Direct Connect cases and is therefore *not* a permission to send Destination Virtual Address on the wire.
- The *implications* made by last two paragraphs of AB.4.2.2 contain errata that do not override the explicit *mandates* in AB.2.1 and AB.4.2

Question: Is this Interpretation correct?

Answer: Yes

Comments: The last two paragraphs of AB.4.2.2 contain errata will be corrected. The Figure AB-8 contains errata and will also be corrected.