



ASHRAE ADDENDA

Method of Test for Conformance to BACnet[®]

Approved by the ASHRAE Standards Committee on January 29, 2011; by the ASHRAE Board of Directors on February 2, 2011; and by the American National Standards Institute on February 3, 2011.

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[This foreword and the “rationale” on the following page are not part of this standard. They are merely informative and do not contain requirements necessary for conformance to the standard.]

FOREWORD

Addendum 135.1*e* to ANSI/ASHRAE Standard 135.1-2009 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 changes are summarized below.

135.1-2009*e*-1. Revise BACnet/IP tests, p. 2.

In the following document, language added to existing clauses of ANSI/ASHRAE 135.1-2009 and addenda is indicated through the use of *italics*, while deletions are indicated by ~~striketrough~~. Where entirely new subclauses are added, plain type is used throughout.

135.1-2009e-1. Revise BACnet/IP tests.

Rationale

The BBMD BACnet/IP tests in 135.1-2009 were written for the one-hop method for distribution of broadcasts. As one-hop distribution is not practical over the Internet, two-hop distribution is the method most used and therefore tested. Many of the 2009 edition tests specify fixed IP addresses and subnet masks, which results in inflexibility for the tester. Other tests have minor errors and omissions. Functionality such as a non-BBMD device operating as a foreign device and a BBMD-device with a server application do not have tests. This addendum resolves these problems and also resolves the ambiguity regarding the grace period and remaining time in foreign device registrations.

Addendum 135.1-2009e-1

[Change **Clause 14.1.7**, p. 458]

[Reason for Change: The original test specified a unicast message in step 1, which is incorrect for a Forwarded-NPDU on an IP subnet. The Originating-Device is specified. Also, step 3 now specifies clearly what the IUT is not to do.]

14.1.7 Forwarded-NPDU (One-hop Distribution)

Purpose: To verify that an IUT, not configured as a BBMD, will process a Forwarded-NPDU message.

Configuration Requirements: The IUT shall not be configured as a BBMD. The TD shall be on a different IP subnet than that of the IUT.

Test Steps:

1. TRANSMIT ~~DESTINATION = IUT~~ DA = Directed IP Broadcast to IUT's IP Subnet, SOURCE = TD, Forwarded-NPDU, Originating-Device = TD, NPDU = Who-Is
2. RECEIVE ~~DESTINATION = Local IP Broadcast~~ DA = Local IP Broadcast, SOURCE = IUT, Original-Broadcast-NPDU, NPDU = I-Am
3. CHECK (The IUT shall not ~~take any additional action~~ issue any Forwarded-NPDUs)

[Add new **Clause 14.1.X**, p. 459]

[Reason for Change: No relevant test exists in 135.1 to test this functionality]

14.1.X Forwarded-NPDU (Two-hop Distribution)

Purpose: To verify that an IUT, not configured as a BBMD, will process a Forwarded-NPDU message.

Configuration Requirements: The IUT should not be configured as a BBMD. The TD shall be on the same subnet as the IUT. D1 is a device on a different IP subnet than the TD.

Test Steps:

1. TRANSMIT DA = Local IP Broadcast, SOURCE = TD, Forwarded-NPDU, Originating-Device = D1, NPDU = Who-Is
2. RECEIVE DA = Local IP Broadcast, SOURCE = IUT,

Original-Broadcast-NPDU,
NPDU = I-Am

3. CHECK (The IUT shall not issue any Forwarded-NPDUs)

[Change **Clause 14.1.8**, p. 458]

[Reason for Change: The original test specified a unicast message in step 1, which is incorrect for a Original-Broadcast-NPDU on an IP subnet. Also, step 3 now specifies clearly what the IUT is not to do.]

14.1.8 Original-Broadcast-NPDU

Purpose: To verify that an IUT, not configured as a BBMD, will process an Original-Broadcast-NPDU message.

Test Steps:

1. TRANSMIT ~~DESTINATION = IUT~~ DA = Local IP Broadcast , SOURCE = TD,
Original-Broadcast-NPDU,
NPDU = Who-Is
2. RECEIVE ~~DESTINATION = Local IP Broadcast~~ DA = Local IP Broadcast , SOURCE = IUT,
Original-Broadcast-NPDU,
NPDU = I-Am
3. CHECK (The IUT shall not ~~take any additional action~~ issue any Forwarded-NPDUs)

[Change **Clause 14.1.9**, p. 458]

[Reason for Change: The original test specified the source as D1 in step 1. D1 is not defined.]

14.1.9 Original-Unicast-NPDU

Purpose: To verify that an IUT, not configured as a BBMD, will process an Original-Unicast-NPDU message.

Test Steps:

1. TRANSMIT DESTINATION = IUT, SOURCE = ~~D1~~TD,
Original-Unicast-NPDU,
NPDU = BACnet ReadProperty-Request
2. RECEIVE DESTINATION = TD, SOURCE = IUT,
Original-Unicast-NPDU,
NPDU = ReadProperty-ACK

[Change **Clause 14.2**, p. 459]

[Reason for Change: Originally these tests were for non-BBMD Devices. It was recognized that a test for a BBMD device with a server application was also needed, so these tests were expanded to include both non-BBMD devices and BBMD devices. Because the non-BBMD tests in this section duplicate the tests 14.1.7, 14.1.8, and 14.1.9, they were removed from this section. This resulted in these tests being exclusively for BBMD devices. BBMD tests were modified to reference Figure 14-1. This was done to enable the tester to choose IP address and subnet mask settings as appropriate and to clarify the role of the TD in each test.]

14.2 ~~Non-BBMD B/IP device~~ Device with a Server Application

This group of tests verifies that a *BBMD B/IP device that is not a BBMD* with a server application will correctly process NPDU's conveyed in the NPDU portion of Forwarded-NPDU, Original-Broadcast-NPDU and Original-Unicast-NPDU messages.

~~Configuration Requirements: Before this group of tests is performed, the IUT shall be configured so that the BBMD option is off. The IUT shall be made to go through its startup procedure. A server application shall be running.~~
~~Configuration Requirements: A server application shall be running in the IUT. For one-hop distribution tests the Internet Routers in Figure 14-1 must be configured to forward directed broadcasts.~~

Notes to Tester: Figure 14-1 shows the logical network configuration for tests 14.2 – 14.7. The complete network is not required for the tests, so long as the IUT can receive packets formed as though they arrived from the specified device. The role of the TD when executing the TRANSMIT statement in each test is specified. The TD must also monitor the IUT's subnet throughout all tests and RECEIVE shall mean from the IUT's subnet. To accomplish this, the TD may be multi-homed or another TD can be used to monitor the IUT's subnet.

The term Local IP Broadcast means that the host portion of the destination IP addresses is all 1's and the MAC layer destination address is also a broadcast. The term Directed IP Broadcast means that the host portion of the destination IP address is all 1's and the MAC layer destination address is equal to the routers MAC address. The host portion of the IP address is those bits that are 0 in the subnet mask. The tester shall choose appropriate IP addresses and subnet masks for each of the devices.

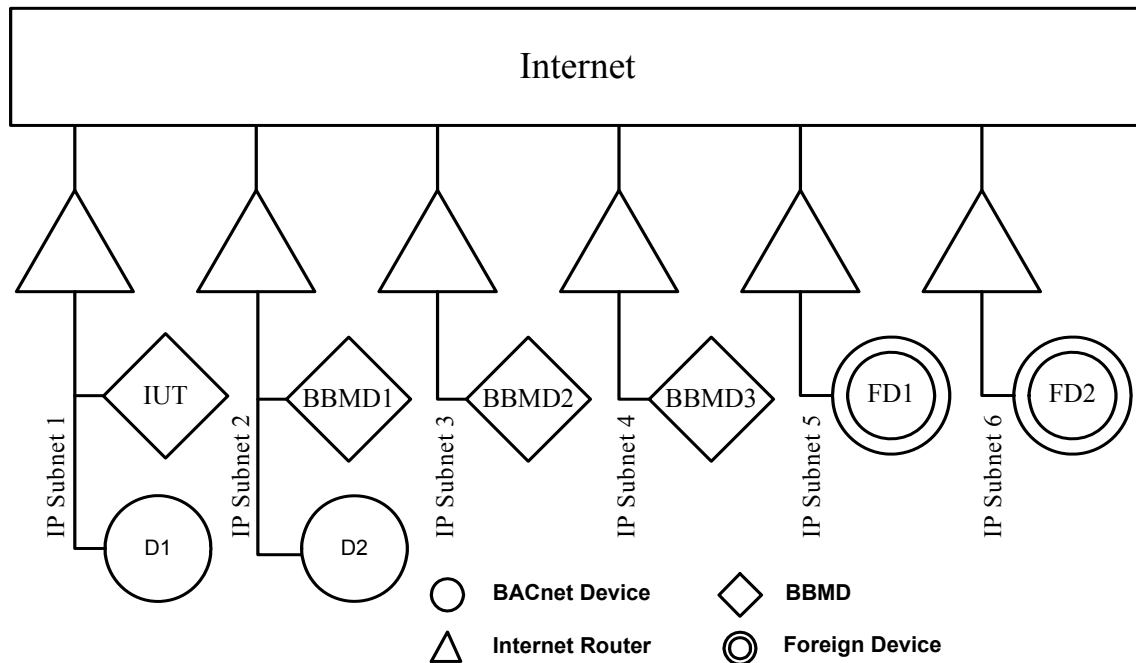


Figure 14-1. Logical network configuration for BBMD tests.

[Change Clause 14.2.1, p. 459]

14.2.1Execute Forwarded-NPDU

Purpose: To verify that the IUT, ~~not configured as a BBMD,~~ will pass a Forwarded-NPDU message to its Application Entity.

~~Configuration Requirements: The TD shall be configured so that SNET/SADR fields in the Network Layer header shall not be present in step 1.~~

Test Steps:

1. TRANSMIT DESTINATION = IUT, SOURCE = TD;

- ~~— Forwarded-NPDU,~~
- ~~— NPDU = Who-Is~~
- 2. ~~RECEIVE DESTINATION = Local IP Broadcast, SOURCE = IUT,~~
- ~~— Original Broadcast NPDU,~~
- ~~— NPDU = I-Am~~

Configuration Requirements: The TD shall take the role of BBMD1. DNET/DADR and SNET/SADR fields in the Network Layer header shall not be present in step 1.

This test is broken into separate tests for one-hop distribution and two-hop distribution.

14.2.1.1 Execute Forwarded-NPDU (One-hop Distribution)

Configuration Requirements: The IUT shall be configured with a BDT that contains:

| <i>B/IP Address</i> | <i>Broadcast Distribution Mask</i> |
|---------------------|------------------------------------|
| <i>IUT</i> | <i>IP Subnet 1 subnet mask</i> |
| <i>BBMD1</i> | <i>IP Subnet 2 subnet mask</i> |

Test Steps:

1. **TRANSMIT**
*DA = Directed IP Broadcast to IP Subnet 1,
 SA = BBMD1,
 Forwarded-NPDU,
 Originating-Device = BBMD1,
 NPDU = Who-Is*
2. **RECEIVE**
*DA = Local IP Broadcast,
 SA = IUT,
 Original-Broadcast-NPDU,
 NPDU = I-Am*
3. **RECEIVE**
*DA = Directed IP Broadcast to IP Subnet 2,
 SA = IUT,
 Forwarded-NPDU,
 Originating-Device = IUT,
 NPDU = I-Am*
4. **CHECK** *(The IUT does not forward or resend the Who-Is packet out the port on which it was received)*

Notes to Tester: The order of the messages transmitted by the IUT is not significant.

14.2.1.2 Execute Forwarded-NPDU (Two-hop Distribution)

Configuration Requirements: The IUT shall be configured with a BDT that contains:

| <i>B/IP Address</i> | <i>Broadcast Distribution Mask</i> |
|---------------------|------------------------------------|
| <i>IUT</i> | <i>255.255.255.255</i> |
| <i>BBMD1</i> | <i>255.255.255.255</i> |

Test Steps:

1. **TRANSMIT**
*DA = IUT,
 SA = BBMD1,
 Forwarded-NPDU,*

- Originating-Device = BBMD1,*
NPDU = Who-Is
2. *RECEIVE*
DA = Local IP Broadcast,
SA = IUT,
Forwarded-NPDU,
Originating-Device = BBMD1,
NPDU = Who-Is
3. *RECEIVE*
DA = Local IP Broadcast,
SA = IUT,
Original-Broadcast-NPDU,
NPDU = I-Am
4. *RECEIVE*
DA = BBMD1,
SA = IUT,
Forwarded-NPDU,
Originating-Device = IUT,
NPDU = I-Am

Notes to Tester: The order of the messages transmitted by the IUT is not significant.

[Change **Clause 14.2.2**, p. 459]

14.2.2 Execute Original-Broadcast-NPDU

Purpose: To verify that the IUT, ~~not configured as a BBMD~~, will pass an Original-Broadcast-NPDU message to its Application Entity.

~~Configuration Requirements: DNET/DADR and SNET/SADR fields in the Network Layer header shall not be present in step 1.~~

~~Test Steps:~~

- ~~1. TRANSMIT DESTINATION = IUT, SOURCE = TD,
 — Original Broadcast NPDU,
 — NPDU = Who-Is~~
- ~~2. RECEIVE DESTINATION = TD, SOURCE = IUT,
 — Original Broadcast NPDU,
 — NPDU = I-Am~~

~~Configuration Requirements: The TD shall take the role of device D1. DNET/DADR and SNET/SADR fields in the Network Layer header shall not be present in step 1.~~

~~This test is broken into separate tests for one-hop distribution and two-hop distribution.~~

14.2.2.1 Execute Original-Broadcast-NPDU (One-hop Distribution)

Configuration Requirements: The IUT shall be configured with a BDT that contains:

| | |
|---------------------|------------------------------------|
| <i>B/IP Address</i> | <i>Broadcast Distribution Mask</i> |
| <i>IUT</i> | <i>IP Subnet 1 subnet mask</i> |
| <i>BBMD1</i> | <i>IP Subnet 2 subnet mask</i> |

Test Steps:

1. TRANSMIT
*DA = Local IP Broadcast,
SA = DI,
Original-Broadcast-NPDU,
NPDU = Who-Is*
2. RECEIVE
*DA = Directed IP Broadcast to IP Subnet 2,
SA = IUT,
Forwarded-NPDU,
Originating-Device = DI,
NPDU = Who-Is*
3. RECEIVE
*DA = Local IP Broadcast,
SA = IUT,
Original-Broadcast-NPDU,
NPDU = I-Am*
4. RECEIVE
*DA = Directed IP Broadcast to IP Subnet 2,
SA = IUT,
Forwarded-NPDU,
Originating-Device = IUT,
NPDU = I-Am*

Notes to Tester: The order of the messages transmitted by the IUT is not significant.

14.2.2.2 Execute Original-Broadcast-NPDU (Two-hop Distribution)

Configuration Requirements: The IUT shall be configured with a BDT that contains:

| <i>B/IP Address</i> | <i>Broadcast Distribution Mask</i> |
|---------------------|------------------------------------|
| <i>IUT</i> | <i>255.255.255.255</i> |
| <i>BBMD1</i> | <i>255.255.255.255</i> |

Test Steps:

1. TRANSMIT
*DA = Local IP Broadcast,
SA = DI,
Original-Broadcast-NPDU,
NPDU = Who-Is*
2. RECEIVE
*DA = BBMD1,
SA = IUT,
Forwarded-NPDU,
Originating-Device = DI,
NPDU = Who-Is*
3. RECEIVE
*DA = Local IP Broadcast,
SA = IUT,
Original-Broadcast-NPDU,
NPDU = I-Am*
4. RECEIVE
DA=BBMD1,

*SA=IUT,
Forwarded-NPDU,
Originating-Device = IUT,
NPDU = I-Am*

Notes to Tester: The order of the messages transmitted by the IUT is not significant.

[Change **Clause 14.2.3**, p. 459]

14.2.3 Execute Original-Unicast-NPDU

Purpose: To verify that the IUT, ~~not configured as a BBMD~~, will pass ~~a~~*an* Original-Unicast-NPDU message to its Application Entity.

~~Configuration Requirements: DNET/DADR and SNET/SADR fields in the Network Layer header shall not be present in step 1.~~

~~Test Steps:~~

- ~~1. TRANSMIT DESTINATION = IUT, SOURCE = TD,
— Original Unicast NPDU,
— NPDU = Read Property~~
- ~~2. RECEIVE DESTINATION = TD, SOURCE = IUT,
— Original Unicast NPDU,
— NPDU = Read Property Ack~~

Configuration Requirements: The TD shall take the role of device D1. DNET/DADR and SNET/SADR fields in the Network Layer header shall not be present in step 1. The IUT shall be configured with a BDT that contains:

| <i>B/IP Address</i> | <i>Broadcast Distribution Mask</i> |
|---------------------|------------------------------------|
| <i>IUT</i> | <i>255.255.255.255</i> |
| <i>BBMD1</i> | <i>255.255.255.255</i> |

Test Steps:

- 1. TRANSMIT
 - DA = IUT,*
 - SA = DI,*
 - Original-Unicast-NPDU,*
 - NPDU = Read-Property*
- 2. RECEIVE
 - DA = DI,*
 - SA = IUT,*
 - Original-Unicast-NPDU,*
 - NPDU = Read-Property-Ack*
- 3. CHECK (*The IUT does not forward to BBMD1 either packet from step 1 or step 2*)

[Change **Clause 14.3**, p. 460]

14.3 Broadcast Distribution Table Operations

[Reason for Change: The original tests were designed for one-hop distribution. As the BTL made one-hop distribution optional, these tests have been modified for two-hop distribution. The tests were modified to reference figure 14-1 to be consistent with all the BBMD tests.]

This group of tests verifies that a BACnet Broadcast Management Device ~~without a FDT~~ will correctly perform BDT operations.

~~Configuration Requirements: Before this group of tests is performed, the IUT shall be configured so that BBMD option is on, FDT option is off. BDT shall contain two entries:~~

| B/IP Address | Label | Subnet Mask |
|--------------------|-------|-------------|
| 123.4.5.6: 0xBAC0 | IUT | 255.0.0.0 |
| 123.7.8.10: 0xBAC4 | | 255.255.0.0 |

~~Configuration Requirements: The TD shall take the role of device D1. The IUT shall be configured with a BDT that contains:~~

| B/IP Address | Broadcast Distribution Mask |
|--------------|-----------------------------|
| IUT | 255.255.255.255 |
| BBMD1 | 255.255.255.255 |

The IUT shall be made to go through its startup procedure. ~~No applications shall be running.~~

[Change Clause 14.3.1, p. 460]

14.3.1 ~~Startup Configuring of the Broadcast Distribution Table~~ *Execute Write-Broadcast-Distribution-Table (Table Growth)*

Purpose: To verify that the IUT, configured as a BBMD, will ~~configure its Broadcast Distribution Table during the initialization procedure.~~ *execute a Write-Broadcast-Distribution-Table request when the new table is greater than the current table.*

Configuration Requirements: The IUT is configured as required in 14.3.

Test Steps:

1. ~~TRANSMIT DESTINATION = IUT, SOURCE = TD,~~
~~— Read Broadcast Distribution Table~~
 2. ~~RECEIVE DESTINATION = TD, SOURCE = IUT,~~
~~— Read Broadcast Distribution Table Ack,~~
~~— List of BDT Entries~~
 3. CHECK (List of BDT Entries consisting of two entries (order unspecified))

| | |
|----------------------|-------------|
| (123.4.5.6: 0xBAC0) | 255.0.0.0 |
| (123.7.8.10: 0xBAC4) | 255.255.0.0 |
-

Test Steps:

1. TRANSMIT
 - DA = IUT,
 - SA = D1,
 - Write-Broadcast-Distribution-Table,
 - (List of BDT Entries consisting of

| | |
|-------|-----------------|
| BBMD1 | 255.255.255.255 |
| BBMD2 | 255.255.255.255 |
| BBMD3 | 255.255.255.255 |
| IUT | 255.255.255.255 |
2. RECEIVE
 - DA = D1,

```

    SA = IUT,
    BVLC-Result message,
    'Result Code' = Successful completion
3. TRANSMIT
    DA = IUT,
    SA = DI,
    Read-Broadcast-Distribution-Table
4. RECEIVE
    DA = DI,
    SA = IUT,
    Read-Broadcast-Distribution-Table-Ack,
    List of BDT Entries
5. CHECK (List of BDT Entries consisting of four entries (order unspecified))
    BBMD1          255.255.255.255
    BBMD2          255.255.255.255
    BBMD3          255.255.255.255
    IUT            255.255.255.255
)

```

[Change Clause 14.3.2, p. 460]

14.3.2 Execute Write-Broadcast-Distribution-Table (Table Growth Shrinkage)

Purpose: To verify that the IUT, configured as a BBMD, will execute Write-Broadcast-Distribution-Table request when new table is ~~greater~~ smaller than the current ~~one~~-table.

Test Steps:

```

1. TRANSMIT DESTINATION = IUT, SOURCE = TD,
   Write Broadcast Distribution Table,
   (List of BDT Entries consisting of
       (123.4.5.6: 0xBAC0)    255.0.0.0
       (123.7.8.9: 0xBAC4)    255.0.0.0
       (123.7.8.9: 0xBAC5)    255.255.0.0
       (123.7.8.9: 0xBAC6)    255.255.255.0
   )
2. RECEIVE DESTINATION = TD, SOURCE = IUT,
   BVLC-Result message,
   'Result Code' = 0
3. TRANSMIT DESTINATION = IUT, SOURCE = TD,
   Read Broadcast Distribution Table
4. RECEIVE DESTINATION = TD, SOURCE = IUT,
   Read Broadcast Distribution Table Ack,
   List of BDT Entries
5. CHECK (List of BDT Entries consisting of four entries (order unspecified))
       (123.4.5.6: 0xBAC0)    255.0.0.0
       (123.7.8.9: 0xBAC4)    255.0.0.0
       (123.7.8.9: 0xBAC5)    255.255.0.0
       (123.7.8.9: 0xBAC6)    255.255.255.0

```

Configuration Requirements: The IUT's BDT has a minimum of four entries.

Test Steps:

1. TRANSMIT

- DA = IUT,*
SA = DI,
Write-Broadcast-Distribution-Table,
(List of BDT entries consisting of three entries
BBMD2 255.255.255.255
BBMD3 255.255.255.255
IUT 255.255.255.255
)
 2. *RECEIVE*
DA = DI,
SA = IUT,
BVLC-Result,
'Result Code' = Successful completion
 3. *TRANSMIT*
DA = IUT,
SA = DI,
Read-Broadcast-Distribution-Table
 4. *RECEIVE*
DA = DI,
SA = IUT,
Read-Broadcast-Distribution-Table-Ack,
List of BDT entries
 5. *CHECK (List of BDT entries consisting of three entries (order unspecified)*
BBMD2 255.255.255.255
BBMD3 255.255.255.255
IUT 255.255.255.255
)

[Change Clause 14.3.3, p. 461]

14.3.3 ~~Execute Write Broadcast Distribution Table (Table Shrinkage)~~

~~Purpose: To verify that the IUT, configured as a BBMD, will execute Write Broadcast Distribution Table request when new table is smaller than the current table. Also, this test verifies that IUT will correctly identify itself in the table being written.~~

~~Test Steps:~~

- ~~1. TRANSMIT DESTINATION = IUT, SOURCE = TD,~~
~~— Write Broadcast Distribution Table,~~
~~— (List of BDT entries consisting of three entries~~
~~(123.7.8.9: 0xBAC4) 255.0.0.0~~
~~(123.4.5.6: 0xBAC0) 255.0.0.0~~
~~(123.7.8.9: 0xBAC5) 255.255.0.0~~
~~—)~~
~~2. RECEIVE DESTINATION = TD, SOURCE = IUT,~~
~~— BVLC-Result,~~
~~— 'Result Code' = 0~~
~~3. TRANSMIT DESTINATION = IUT, SOURCE = TD,~~
~~— Read Broadcast Distribution Table~~
~~4. RECEIVE DESTINATION = TD, SOURCE = IUT,~~
~~— Read Broadcast Distribution Table Ack,~~
~~— List of BDT entries~~
~~5. CHECK (List of BDT entries consisting of three entries (order unspecified)~~
~~(123.4.5.6: 0xBAC0) 255.0.0.0~~
~~(123.7.8.9: 0xBAC4) 255.0.0.0~~

~~(123.7.8.9: 0xBAC5)~~ ~~255.255.0.0~~

→

14.3.3 Verify Broadcast Distribution Table Created from the Configuration Saved During the Previous Session

Purpose: To verify that a BBMD will update the BDT in the local configuration database and initialize it at startup.

Configuration Requirements: The IUT's BDT does not consist of the same entries as are written in step 1.

Test Steps:

1. TRANSMIT
 - DA = IUT,
 - SA = DI,
 - Write-Broadcast-Distribution-Table,
 - (List of BDT entries consisting of three entries

| | |
|-------|-----------------|
| IUT | 255.255.255.255 |
| BBMD1 | 255.255.255.255 |
| BBMD2 | 255.255.255.255 |
2. RECEIVE
 - DA = DI,
 - SA = IUT,
 - BVLC-Result,
 - 'Result Code' = Successful completion
3. WAIT (Vendor specified period for BDT to be saved in non-volatile memory)
4. MAKE (the IUT reset)
5. TRANSMIT
 - DA = IUT,
 - SA = DI,
 - Read-Broadcast-Distribution-Table
6. RECEIVE
 - DA = DI,
 - SA = IUT,
 - Read-Broadcast-Distribution-Table-Ack,
 - List of BDT Entries
7. CHECK (List of BDT Entries consisting of three entries (order unspecified)

| | |
|-------|-----------------|
| IUT | 255.255.255.255 |
| BBMD1 | 255.255.255.255 |
| BBMD2 | 255.255.255.255 |

[Change **Clause 14.5.2**, p. 464]

[Reason for Change: The original tests were designed for one-hop distribution. A two-hop distribution version of the test was added. The test was modified to include a BDT with 4 entries, rather than 3, as this is the minimum the BTL requires. The tests were modified to reference figure 14-1 to be consistent with all the BBMD tests.]

14.5.2 Original-Broadcast-NPDU Message Which Shall Be Forwarded

Purpose: To verify that the IUT, configured as a BBMD without an FDT *or with an empty FDT*, will handle an Original-Broadcast-NPDU message.

Test Steps:

1. ~~TRANSMIT DESTINATION = IUT, SOURCE = TD,
 — Original Broadcast-NPDU,
 — NPDU = Who-Is~~
2. ~~RECEIVE DESTINATION = (123.255.255.255, 0xBAC4), SOURCE = IUT,
 — Forwarded NPDU,
 — NPDU = Who-Is~~
3. ~~RECEIVE DESTINATION = (123.7.255.255, 0xBAC5), SOURCE = IUT,
 — Forwarded NPDU,
 — NPDU = Who-Is~~

Configuration Requirements: The TD shall take the role of device D1 on the IUT's subnet. DNET/DADR and SNET/SADR fields in the Network Layer header shall not be present in step 1.

This test is broken into separate tests for one-hop distribution and two-hop distribution.

14.5.2.1 Original-Broadcast-NPDU Message Which Shall Be Forwarded (One-hop Distribution)

Configuration Requirements: The IUT shall be configured with a BDT that contains:

| <i>B/IP Address</i> | <i>Broadcast Distribution Mask</i> |
|---------------------|------------------------------------|
| <i>IUT</i> | <i>IP Subnet 1 subnet mask</i> |
| <i>BBMD1</i> | <i>IP Subnet 2 subnet mask</i> |
| <i>BBMD2</i> | <i>IP Subnet 3 subnet mask</i> |
| <i>BBMD3</i> | <i>IP Subnet 4 subnet mask</i> |

Test Steps:

1. **TRANSMIT**
*DA = Local IP Broadcast,
 SA = D1,
 Original-Broadcast-NPDU,
 NPDU = Who-Is*
2. **RECEIVE**
*DA = Directed IP Broadcast to IP Subnet 2,
 SA = IUT,
 Forwarded-NPDU,
 Originating-Device = D1,
 NPDU = Who-Is*
3. **RECEIVE**
*DA = Directed IP Broadcast to IP Subnet 3,
 SA = IUT,
 Forwarded-NPDU,
 Originating-Device = D1,
 NPDU = Who-Is*
4. **RECEIVE**
*DA = Directed IP Broadcast to IP Subnet 4,
 SA = IUT,
 Forwarded-NPDU,
 Originating-Device = D1,
 NPDU = Who-Is*

Notes to Tester: The order of the messages transmitted by the IUT is not significant.

14.5.2.2 Original-Broadcast-NPDU Message Which Shall Be Forwarded (Two-hop Distribution)

Configuration Requirements: The IUT shall be configured with a BDT that contains:

| <i>B/IP Address</i> | <i>Broadcast Distribution Mask</i> |
|---------------------|------------------------------------|
| <i>IUT</i> | <i>255.255.255.255</i> |
| <i>BBMD1</i> | <i>255.255.255.255</i> |
| <i>BBMD2</i> | <i>255.255.255.255</i> |
| <i>BBMD3</i> | <i>255.255.255.255</i> |

Test Steps:

1. TRANSMIT
 - DA = Local IP Broadcast,*
 - SA = D1,*
 - Original-Broadcast-NPDU,*
 - NPDU = Who-Is*
2. RECEIVE
 - DA = BBMD1,*
 - SA = IUT,*
 - Forwarded-NPDU,*
 - Originating-Device = D1,*
 - NPDU = Who-Is*
3. RECEIVE
 - DA = BBMD2,*
 - SA = IUT,*
 - Forwarded-NPDU,*
 - Originating-Device = D1,*
 - NPDU = Who-Is*
4. RECEIVE
 - DA = BBMD3,*
 - SA = IUT,*
 - Forwarded-NPDU,*
 - Originating-Device = D1,*
 - NPDU = Who-Is*

Notes to Tester: The order of the messages transmitted by the IUT is not significant.

[Change **Clause 14.6.2**, p. 464]

[Reason for Change: A draft of Annex J (BACnet/IP) contained text that allowed foreign devices to register for an indefinite period by sending a Register-Foreign-Device message with the Time-to-Live parameter value of zero to a BBMD. Indefinite (permanent) foreign device registration was removed from Annex J before it was published as an ASHRAE standard, but some tests in 135.1 still rely on indefinite foreign device registration]

14.6.2 Execute Permanent Foreign Device Registration

~~Purpose: To verify that the IUT will handle a Register Foreign Device Table request when an infinite Time To Live value is supplied. There is no provision for permanent (indefinite) foreign device registration, so this test has been removed.~~

~~Test Steps:~~

- ~~1. TRANSMIT DESTINATION = IUT, SOURCE = FD1,
 — Register Foreign Device Table,
 — 'Time To Live' = 0~~
- ~~2. RECEIVE DESTINATION = FD1, SOURCE = IUT,
 — BVLC Result,
 — 'Result Code' = 0~~

