AS-Rev pathTrace issue

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Background of comment
Background

**Comment**

With the current logic of the PortAnnounceReceive and PortAnnounceInformation state machines, there is a delay of one Announce message for the pathTraceArray to be updated when there is reconfiguration that causes the current GM and/or current parent PTP port to change. This is because the logic for updating the pathTrace array is done by the qualifyAnnounce function of the Port AnnounceReceive state machine; however, this state machine is invoked when an Announce message is received, before it is determined whether the Announce message is received on a slave port.

1. **Condition**
   a) TSN devices have 2 ports and are connected with line topology.
   b) The portState of all nodes have been decided once after BMCA.
   c) A node with the highest priority time master is connected.

2. **Expected behavior**
   The portState and pathTrace switch according to the new GM as fast as possible.
Background

1. Condition

a) TSN devices have 2 ports and are connected with line topology.

b) The port state of all nodes have been decided once after BMCA.

c) A node with the highest priority time master is connected.

Node 5 has the highest priority of time master, and becomes the grand master in the system. All nodes update their pathTrace information array according to the Announce message.
Background

1. Condition

a) TSN devices have 2 ports and are connected with line topology.
b) The portState of all nodes have been decided once after BMCA.
c) A node with the highest priority time master is connected.
2. Expected behavior

The portState and pathTrace switch according to the new GM as fast as possible.

**Background**

Node1

ClockID 1

with highest priority as time master

Connected to system

GM2

: Master Port

S : Slave Port

Node2

ClockID 2

Announce

Node3

ClockID 3

Announce

Node4

ClockID 4

Announce

Node5

ClockID 5

Announce

GM1

Grand Master is fixed to Node 5 by BMCA.

pathTrace array

GM1

ClockID 5

ClockID 4

ClockID 3

ClockID 2

with highest priority as time master

Connected to system

pathTrace array

M: Master Port

S: Slave Port

Make the switching of portState and pathTrace faster after reconfiguration.
Specification status in D8.0
After received Announce, the qualifyAnnounce (rcvdAnnouncePtr) is called in the “10.3.11. PortAnnounceReceive state machine”. If a path trace TLV is present and the portState is SlavePort, the pathSequence array field of the TLV is copied to the global array pathTrace, and thisClock is appended to pathTrace (i.e., is added to the end of the array). Then the rcvdMsg becomes TRUE.

When the rcvdMsg is TRUE, the rcvInfo() is called in the “10.3.12 PortAnnounce Information state machine”. When the received Announce has the highest priority, the reselect becomes TRUE and the rcvdMsg becomes FALSE. And the pathSequence field in the received Announce is NOT copied into the pathTrace array because the rcvdMsg becomes FALSE before the portState is decided to SlavePort.

After detected the GM with the highest priority, the reselect becomes TRUE, and the portState is decided in the “10.3.13 PortStateSelection state machine”. If the clockIdentity member of the systemIdentity (see 10.3.2) member of gmPriority (see 10.3.9.21) is equal to thisClock (see 10.2.4.22), i.e., if the current PTP Instance is the grandmaster, the pathTrace array is set to contain the single element thisClock (see 10.2.4.22).

After the portState is decided to MasterPort, Announce is sent from it. The value of pathTrace array is copied into the pathSequence of the Announce.

Figure 10-11—Best master clock selection state machines—overview and interrelationships
When Node 1 is connected as the time master with the highest priority in the system, GM is switched from Node 5 to Node 1. To update the pathTrace array, each node needs to send Announce message twice. The first one to switch the portState, and the second one to update the pathTrace.
Suggested Remedy
Add the following global variable in 10.3.10.

**receivedPathTrace**: an array in which the pathSequence array field of the path trace TLV of the most recently received Announce message is saved. The data type for receivedPathTrace is clockIdentity[N], where N is the number of entries in the pathSequence array field.

In addition, add this variable to Table 10-3.
10.3.11.2 State machine functions

10.3.11.2.1 qualifyAnnounce (rcvdAnnouncePtr): qualifies the received Announce message pointed to by rcvdAnnouncePtr as follows:

a) If the Announce message was sent by the current PTP Instance, i.e., if sourcePortIdentity.clockIdentity (see 10.6.2.2.11 and 8.5.2) is equal to thisClock (see 10.2.4.22), the Announce message is not qualified and FALSE is returned;

b) If the stepsRemoved field is greater than or equal to 255, the Announce message is not qualified and FALSE is returned;

c) If a path trace TLV is present and one of the elements of the pathSequence array field of the path trace TLV is equal to thisClock (i.e., the clockIdentity of the current PTP Instance, see 10.2.4.22), the Announce message is not qualified and FALSE is returned;

d) Otherwise, the Announce message is qualified and TRUE is returned. If a path trace TLV is present and the portState of the port is SlavePort, the pathSequence array field of the TLV is copied to the global array pathTrace, and thisClock is appended to pathTrace (i.e., is added to the end of the array). If a path trace TLV is not present, the pathTrace array is set to the empty array (i.e., an array of zero elements). See 10.3.9.23 for a description of the path trace feature.

Change to the following text.
Otherwise, the Announce message is qualified and TRUE is returned. If a path trace TLV is present, it is saved in the per port global variable receivedPathTrace. If a path trace TLV is not present, the per port global variable receivedPathTrace is set to the empty array.
Change to the following text.

if a path trace TLV is present and one of the elements of the pathSequence array field of the path trace TLV is equal to thisClock (i.e., the clockIdentity of the current PTP Instance, see 10.2.4.22), the Announce message is not qualified and FALSE is returned; otherwise, the Announce message is qualified and TRUE is returned. If a path trace TLV is present, it is saved in the per port global variable receivedPathTrace. If a path trace TLV is not present, the per port global variable receivedPathTrace is set to the empty array.
Add the following text.
The per port global variable receivedPathTrace, for this port, is copied to the per PTP Instance global array pathTrace and, if it is not empty, thisClock is appended to pathTrace.
According to the suggested remedy (2) and (3), the pathSequence in Announce is saved in the receivedPathTrace if a path trace TLV is present.

According to the suggested remedy (4), the receivedPathTrace is copied to the pathTrace immediately after the portState is decided to SlavePort.

After the portState is decided to MasterPort, Announce is sent from it. The value of pathTrace array is copied into the pathSequence of the Announce.

A path trace TLV (see 10.6.3.3) is constructed, with its pathSequence field (see 10.6.3.4) set equal to the pathTrace array (see 10.3.9.23). If appending the...
To update the pathTrace array, each node needs to send Announce message once. The pathSequence of Announce is saved in the receivedPathTrace, and the pathTrace is updated immediately after the portState is switched to SlavePort.
Thank you very much for your attention.