AS-Rev pathTrace issue

11 March 2019
Christophe Mangin
Mitsubishi Electric
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 portState 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.
Background

2. Expected behavior

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

Node1: ClockID 1

Node2: ClockID 2

Node3: ClockID 3

Node4: ClockID 4

Node5: ClockID 5

GM1: Grand Master is fixed to Node 5 by BMCA.

pathTrace array

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”.

When the rcvdMsg is TRUE, the rcvInfo() is called in the “10.3.12 PortAnnounce
Information state machine”.

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”.

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.
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.
Suggested Remedy

(4) Page 121 in 10.3.13.2.4 updtStatesTree()

18     f) assigns the port state for port j and sets selectedState[j] equal to this port state, as follows, for j = 1, 19     2, ..., numberPorts:
20            1) If the port is disabled (infoIs == Disabled), selectedState[j] is set to DisabledPort.
21            2) If asymmetryMeasurementMode is TRUE, selectedState[j] is set to PassivePort and updtInfo is set to FALSE.
22            3) If announce receipt timeout, or sync receipt timeout with gmPresent set to TRUE, have occurred (infoIs == Aged), updtInfo is set to TRUE and selectedState[j] is set to MasterPort.
23            4) If the portPriorityVector was derived from another port on the PTP Instance or from the PTP Instance itself as the root (infoIs == Mine), selectedState[j] is set to MasterPort. In addition, updtInfo is set to TRUE if the portPriorityVector differs from the masterPriorityVector or portStepsRemoved differs from masterStepsRemoved.
24            5) If the portPriorityVector was received in an Announce message and announce receipt timeout, or sync receipt timeout with gmPresent TRUE, have not occurred (infoIs == Received), and the gmPriorityVector is now derived from the portPriorityVector, selectedState[j] is set to SlavePort and updtInfo is set to FALSE.
25            6) If the portPriorityVector was received in an Announce message and announce receipt timeout, or sync receipt timeout with gmPresent TRUE, have not occurred (infoIs == Received), the gmPriorityVector is not new derived from the portPriorityVector, the masterPriorityVector is not better than the portPriorityVector does not hold, and the portPriorityVector does not hold, selectedState[j] is set to PassivePort and updtInfo is set to FALSE.
26            7) If the portPriorityVector was received in an Announce message and announce receipt timeout, or sync receipt timeout with gmPresent TRUE, have not occurred (infoIs == Received), the gmPriorityVector is not new derived from the portPriorityVector, the masterPriorityVector is not better than the portPriorityVector does not hold, and the portPriorityVector does not hold, selectedState[j] is set to PassivePort and updtInfo is set to FALSE.

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 10.6.3.3.4) 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.