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# AS-Rev pathTrace issue

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Christophe Mangin

Mitsubishi Electric

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# Background of comment

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## 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

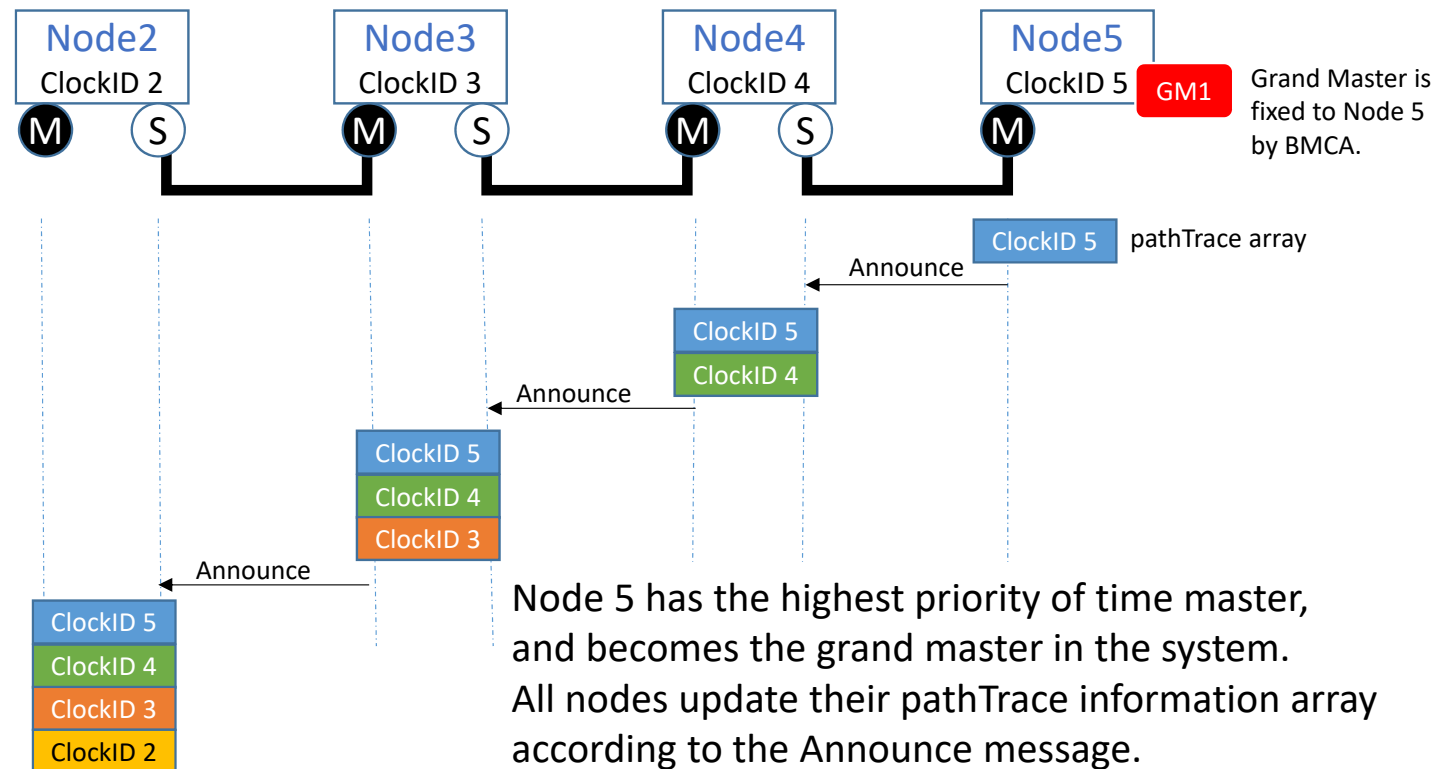
The portState and pathTrace switch according to the new GM as fast as possible.

# Background

## 1. Condition

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

**M** :Master Port  
**S** :Slave Port

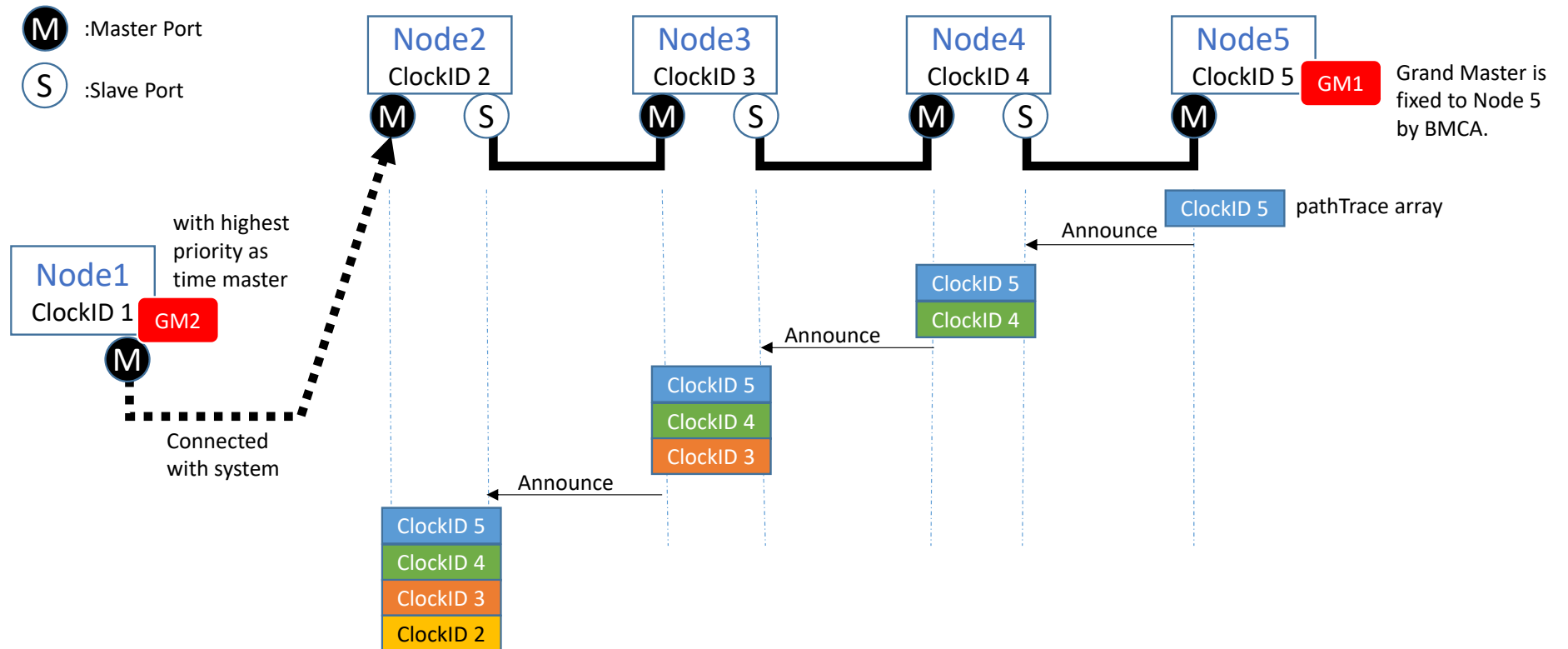


Node 5 has the highest priority of time master, and becomes the grand master in the system. All nodes update their pathTrace information array according to the Announce message.

# Background

## 1. Condition

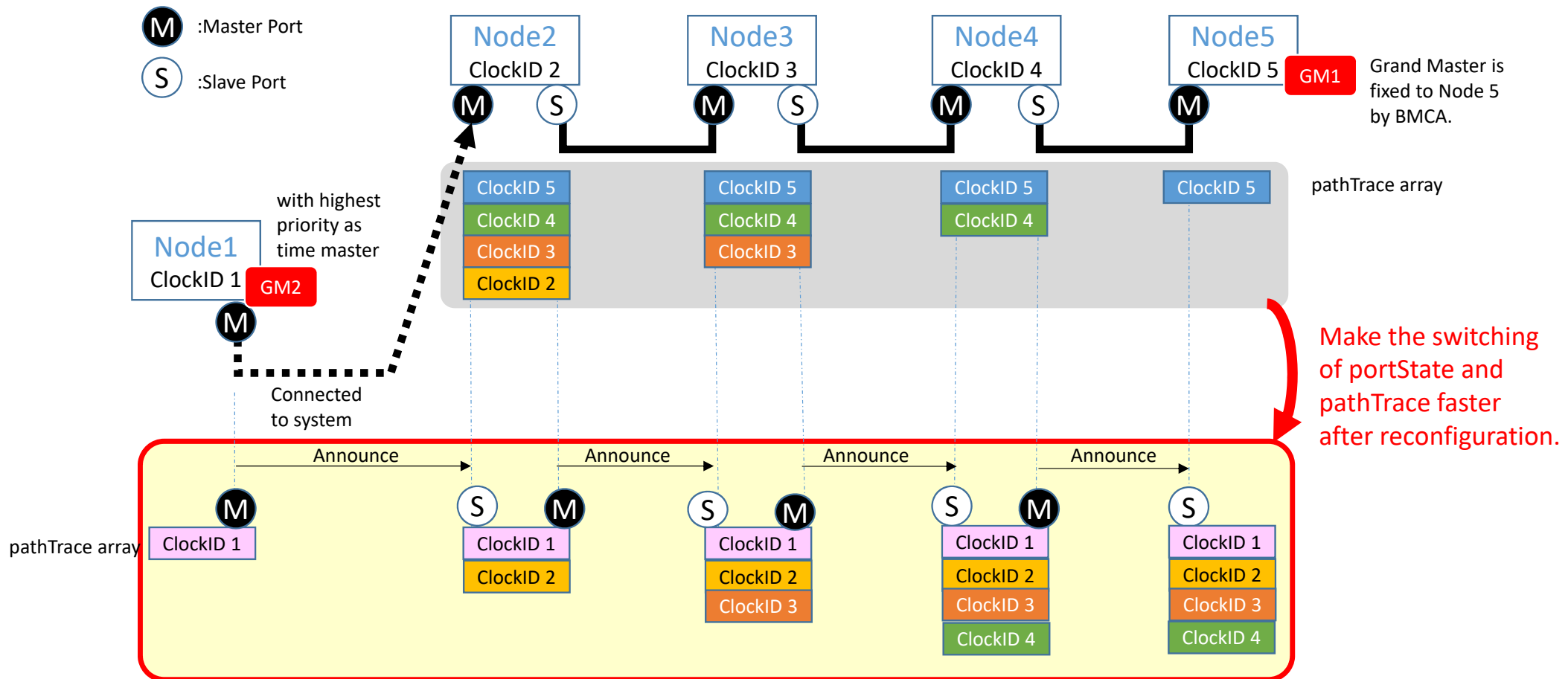
- a) TSN devices have 2 ports and are connected with line topology.
- b) The portState of all nodes have been decided once after BMCA.
- c) A node with the highest priority time master is connected.



# Background

## 2. Expected behavior

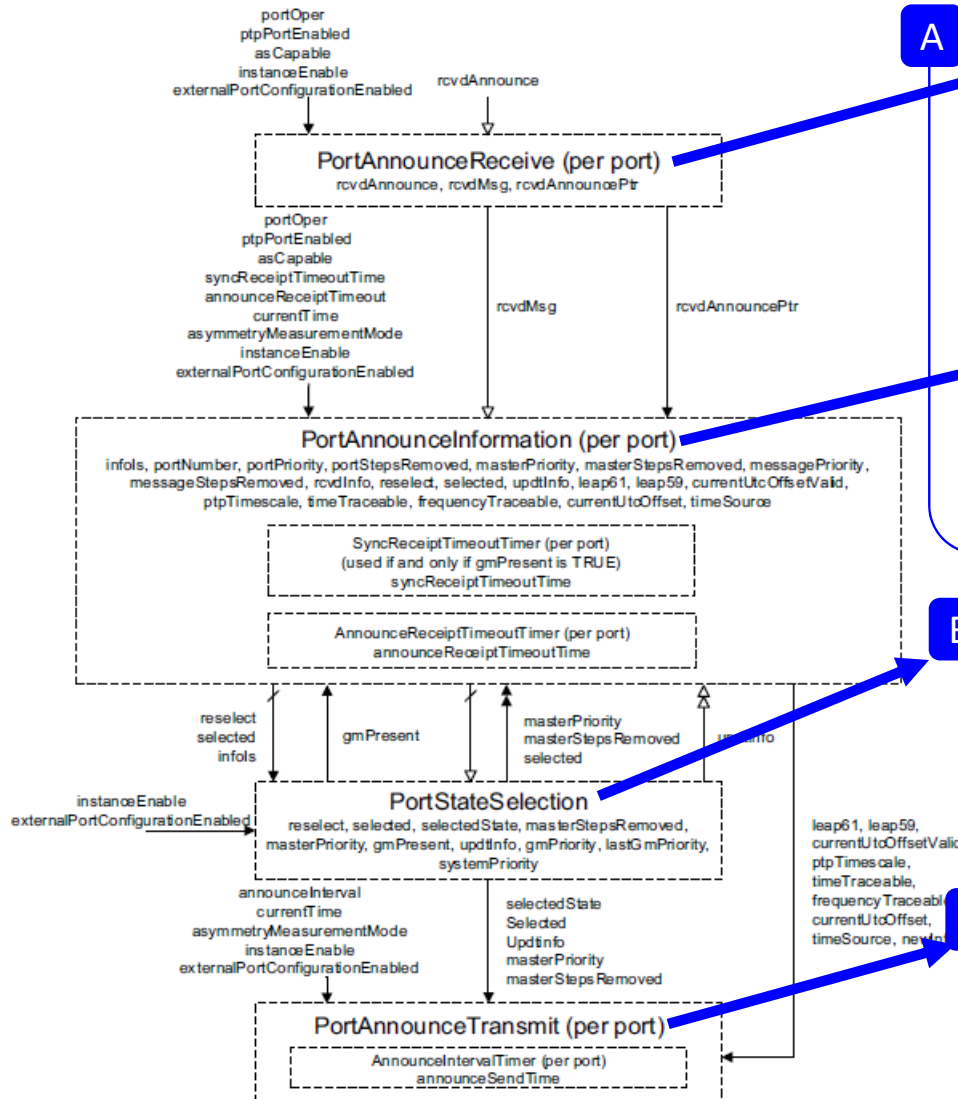
The portState and pathTrace switch according to the new GM as fast as possible.



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Specification status in D8.0

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**A** After received Announce, the qualifyAnnounce (rcvdAnnouncePtr) is called in the “10.3.11. PortAnnounceReceive state machine”.

< P119 in D8.0 > 10.3.11.2.1 qualifyAnnounce (rcvdAnnouncePtr): ...  
 d) ... 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.

**B** 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.

**C** 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”.

< P124 in D8.0 > 10.3.13.2.4 updtStatesTree(): ...  
 i) 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).z

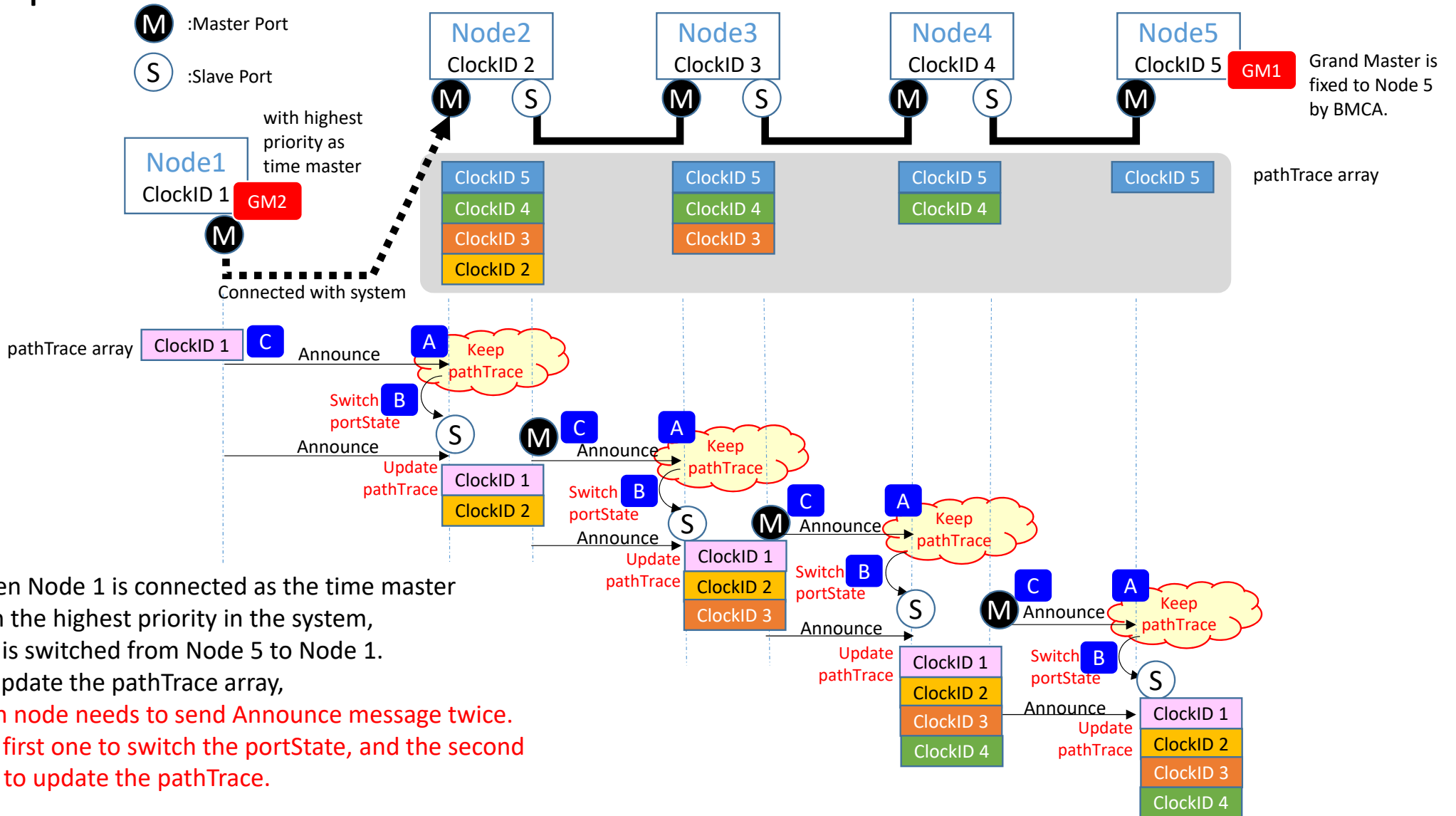
**C** After the portState is decided to MasterPort, Announce is sent from it.

The value of pathTrace array is copied into the pathSequence of the Announce.  
 < P130 in D8.0 > 10.3.16.2.1 txAnnounce (): ...  
 f) 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 ...

Figure 10-11—Best master clock selection state machines—overview and interrelationships



# Specification status in D8.0



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# Suggested Remedy

# Suggested Remedy

## (1) Page 116 in 10.3.10 Per-port global variables

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### 10.3.10 Per-port global variables

**10.3.10.1 announceReceiptTimeoutTimeInterval:** the time interval after which announce receipt occurs if an Announce message has not been received during the interval. The announceReceiptTimeoutTimeInterval is equal to announceReceiptTimeout (see 10.7.3.2) multiplied by announceInterval (see 10.3.10.8) for the port at the other end of the link to which this port is attached. The value of announceInterval for the port at the other end of the link is computed from logMessageInterval of the received Announce message (see 10.6.2.2.14). The data type for announceReceiptTimeoutTimeInterval is UScaledNs. The variable infoIs is used only by the BMCA, i.e., not by the explicit port state configuration option.

**10.3.10.2 announceSlowdown:** a Boolean that is set to TRUE if the AnnounceIntervalSetting state machine (see Figure 10-19) receives a TLV that requests a larger Announce message transmission interval (see 10.7.2.2), and FALSE otherwise. When announceSlowdown is set to TRUE, the PortAnnounce state machine (see Figure 10-18) continues to send Announce messages at the old (i.e., faster) rate until a number of Announce messages equal to announceReceiptTimeout (see 10.7.3.2) have been sent, but with the logMessageInterval field of the PTP common header set equal to the new announce interval (i.e., corresponding to the slower rate). After announceReceiptTimeout Announce messages have been sent, subsequent Announce messages are sent at the new (i.e., slower) rate, and with the logMessageInterval field of the PTP common header set to the new announce interval. This variable is used both by the BMCA and the explicit port state configuration option. When announceSlowdown is set to FALSE, the PortAnnounceTransmit state machine immediately sends Announce messages at the new (i.e., slower) rate.

NOTE—If a receiver of Announce messages requests a slower rate, the receiver will continue to use the upstream announceInterval value, which it obtains from the logMessageInterval field of received Announce messages, until it receives an Announce message where that value has changed. If, immediately after requesting a slower Announce message rate, up to announceReceiptTimeout consecutive Announce messages sent to the receiver are lost, announce receipt timeout could occur if the sender had changed to the slower rate immediately. Delaying the slowing down of the sending rate of Announce messages for announceReceiptTimeout messages prevents this from happening.

**10.3.10.3 oldAnnounceInterval:** the saved value of the previous announce interval, when a new announce interval is requested via a Signaling message that contains a message interval request TLV. The data type for

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.

# Suggested Remedy

## (2) Page 119 in 10.3.11.2.1 qualifyAnnounce (rcvAnnouncePtr)

1       **10.3.11.2 State machine functions**  
2  
3       **10.3.11.2.1 qualifyAnnounce (rcvdAnnouncePtr):** qualifies the received Announce message pointed to by  
4       rcvdAnnouncePtr as follows:  
5       a) If the Announce message was sent by the current PTP Instance, i.e., if  
6       sourcePortIdentity.clockIdentity (see 10.6.2.2.11 and 8.5.2) is equal to thisClock (see 10.2.4.22), the  
7       Announce message is not qualified and FALSE is returned;  
8       b) If the stepsRemoved field is greater than or equal to 255, the Announce message is not qualified and  
9       FALSE is returned;  
10      c) If a path trace TLV is present and one of the elements of the pathSequence array field of the path  
11      trace TLV is equal to thisClock (i.e., the clockIdentity of the current PTP Instance, see 10.2.4.22),  
12      the Announce message is not qualified and FALSE is returned;  
13      d) Otherwise, the Announce message is qualified and TRUE is returned. If a path trace TLV is present  
14      and the portState of the port is SlavePort, the pathSequence array field of the TLV is copied to the  
15      global array pathTrace, and thisClock is appended to pathTrace (i.e., is added to the end of the  
16      array). If a path trace TLV is not present, the pathTrace array is set to the empty array (i.e., an array  
17      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.

# Suggested Remedy

## (3) Page 232 in 13.1.3.4 Acceptable master table feature

22     **13.1.3.4 Acceptable master table feature**  
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24     The acceptable master table feature shall modify the operation  
25  
26     a) If `acceptableMasterTableEnabled` for a port is `FALSE`  
27         its subclauses.  
28     b) If `acceptableMasterTableEnabled` for a port is `TRUE`,  
29         1) The function `qualifyAnnounce()` of the `PortAnn`  
30             is replaced by the following:  
31  
32             **qualifyAnnounce (rcvdAnnouncePtr):** qualifies the received Announce message pointed to  
33             by `rcvdAnnouncePtr` as follows:  
34                 i) if the Announce message was sent by the current PTP Instance, i.e., if  
35                     `sourcePortIdentity.clockIdentity` (see 10.6.2.2.11 and 8.5.2) is equal to `thisClock` (see  
36                     10.2.4.22), the Announce message is not qualified and `FALSE` is returned;  
37                 ii) if the `stepsRemoved` field is greater than or equal to 255, the Announce message is not  
38                     qualified and `FALSE` is returned;  
39                 iii) if the `sourcePortIdentity` of the Announce message is not equal to the `sourcePortIdentity`  
40                     of one of the entries of the `acceptableMasterTable`, `FALSE` is returned;  
41                 iv) if a path trace TLV is present and one of the elements of the `pathSequence` array field of  
42                     the path trace TLV is equal to `thisClock` (i.e., the `clockIdentity` of the current PTP  
43                     Instance, see 10.2.4.22), the Announce message is not qualified and `FALSE` is returned;  
44                     otherwise, the Announce message is qualified and `TRUE` is returned. If a path trace  
45                     TLV is present and the port state of the port is `SlavePort`, the `pathSequence` array field of  
46                     the TLV is copied to the global array `pathTrace`, and `thisClock` is appended to `pathTrace`  
47                     (i.e., is added to the end of the array).  
48                 2) If the `alternatePriority1` member of the `AcceptableMaster` array element that corresponds to the

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

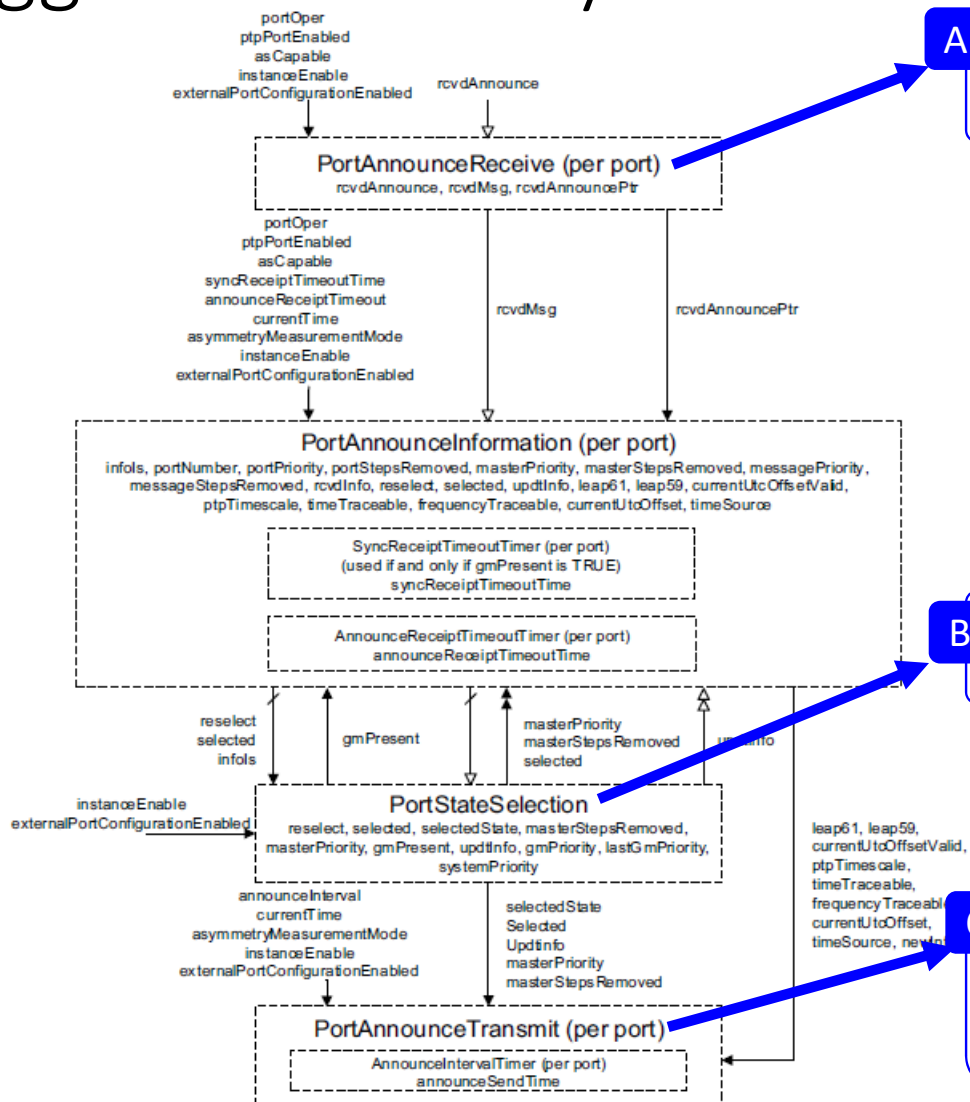
## (4) Page 121 in 10.3.13.2.4 updtStatesTree()

- 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 updInfo is  
22 set to FALSE.
  - 23 3) If announce receipt timeout, or sync receipt timeout with gmPresent set to TRUE, have  
24 occurred (infoIs = Aged), updInfo is set to TRUE and selectedState[j] is set to MasterPort.
  - 25 4) If the portPriorityVector was derived from another port on the PTP Instance or from the PTP  
26 Instance itself as the root (infoIs == Mine), selectedState[j] is set to MasterPort. In addition,  
27 updInfo is set to TRUE if the portPriorityVector differs from the masterPriorityVector or  
28 portStepsRemoved differs from masterStepsRemoved.
  - 29 5) If the portPriorityVector was received in an Announce message and announce receipt timeout,  
30 or sync receipt timeout with gmPresent TRUE, have not occurred (infoIs == Received), and the  
31 gmPriorityVector is now derived from the portPriorityVector, selectedState[j] is set to  
32 SlavePort and updInfo is set to FALSE.
  - 33 6) If the portPriorityVector was received in an Announce message and announce receipt timeout,  
34 or sync receipt timeout with gmPresent TRUE, have not occurred (infoIs == Received), the  
35 gmPriorityVector is not now derived from the portPriorityVector, the masterPriorityVector is  
36 not better than the portPriorityVector, selectedState[j] is set to MasterPort, and updInfo is  
37 set to TRUE if the portPriorityVector does not differ from the masterPriorityVector or  
38 portStepsRemoved does not differ from masterStepsRemoved. If the portPriorityVector is  
39 derived from another port on the PTP Instance or from the PTP Instance itself as the root,  
40 selectedState[j] is set to MasterPort.
  - 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 now derived from the portPriorityVector, the masterPriorityVector is  
not better than the portPriorityVector, selectedState[j] is set to MasterPort, and updInfo is  
set to TRUE if the portPriorityVector does not differ from the masterPriorityVector or  
portStepsRemoved does not differ from masterStepsRemoved.

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.

# Suggested Remedy



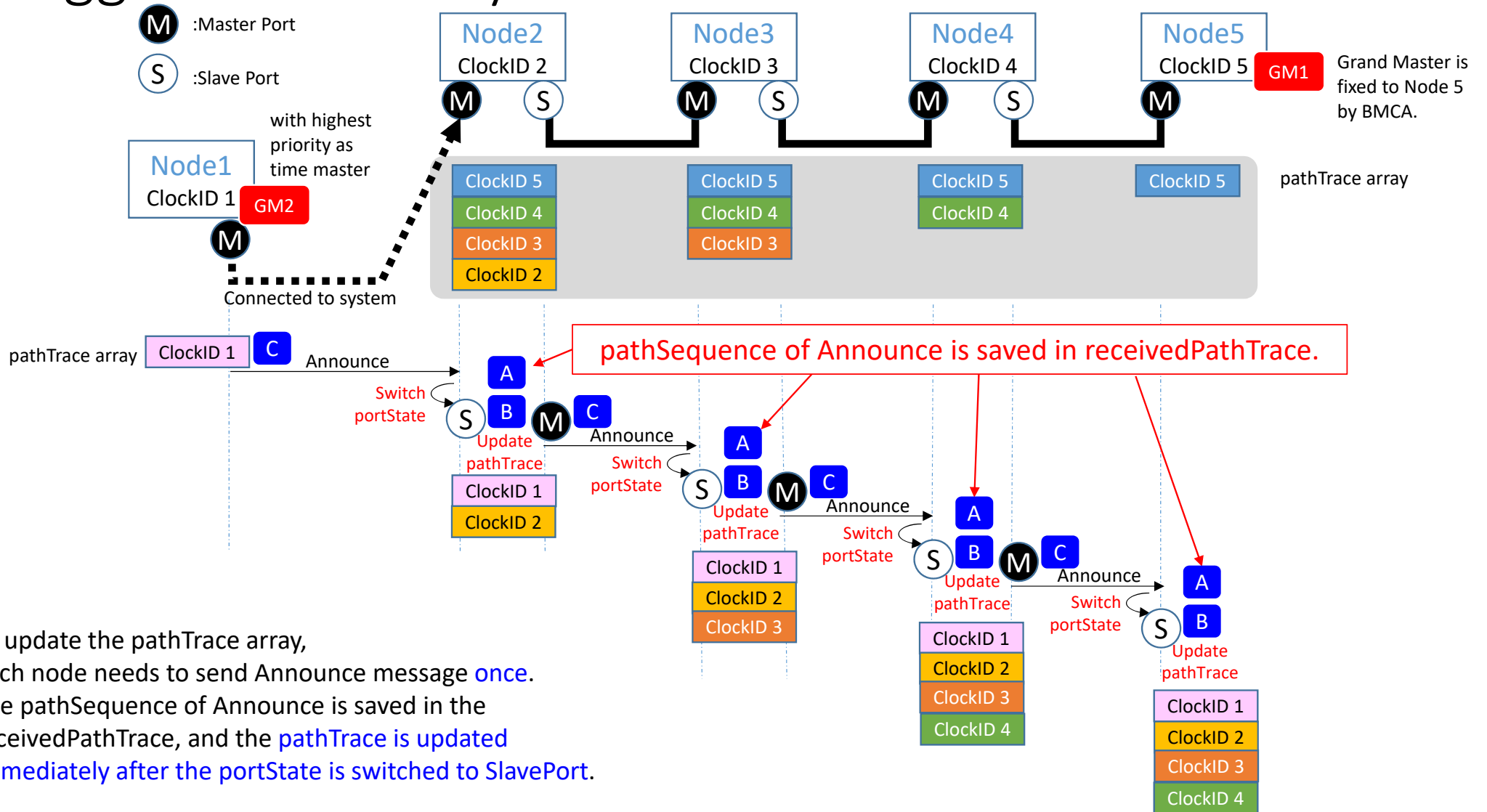
**A** According to the suggested remedy (2) and (3), the pathSequence in Announce is saved in the receivedPathTrace if a path trace TLV is present.

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

**C** 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.   
`< P130 in D8.0 > 10.3.16.2.1 txAnnounce ():` ...  
 f) 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 ...

Figure 10-11—Best master clock selection state machines—overview and interrelationships

# Suggested Remedy



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.



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*Thank you very much for your attention.*