AS-Rev pathTrace issue

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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.

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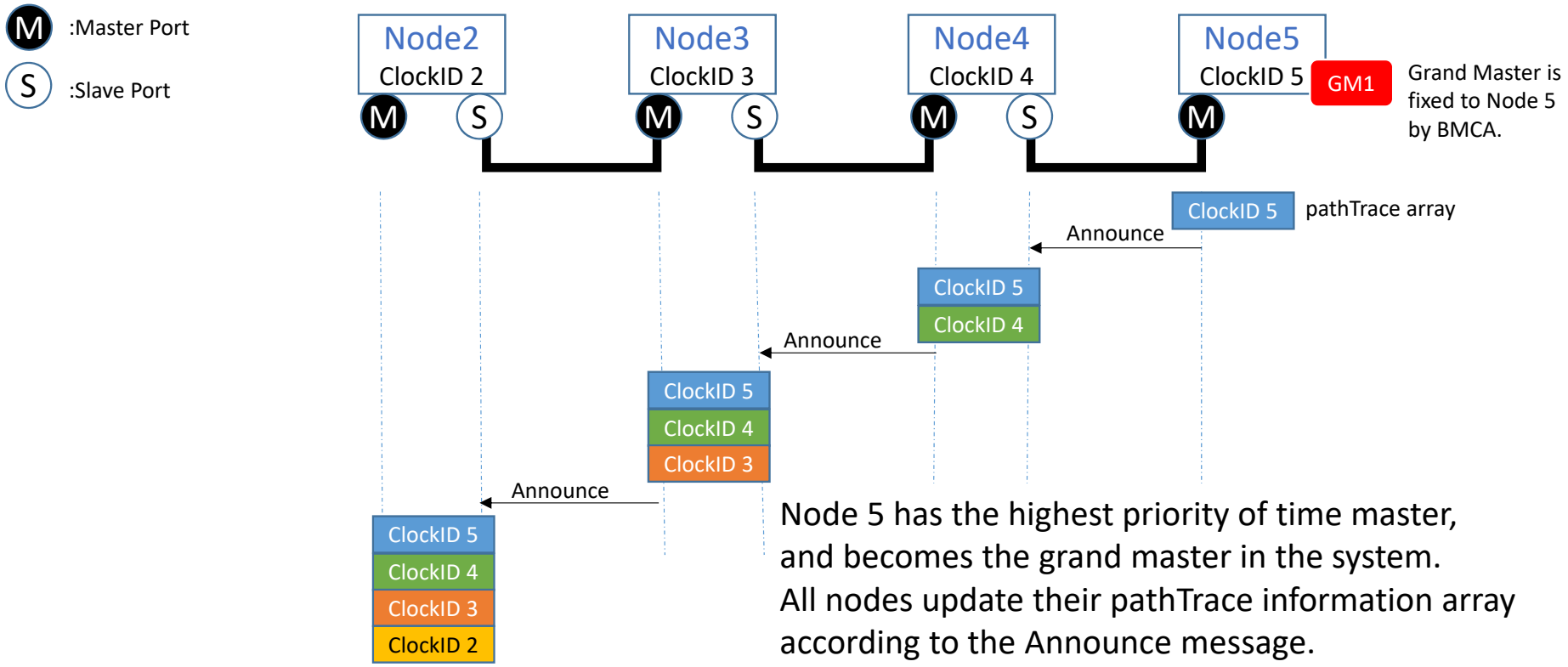

Node 5 has the highest priority of time master, and becomes the grand master in the system.
All nodes update their pathTrace information array according to the Announce message.

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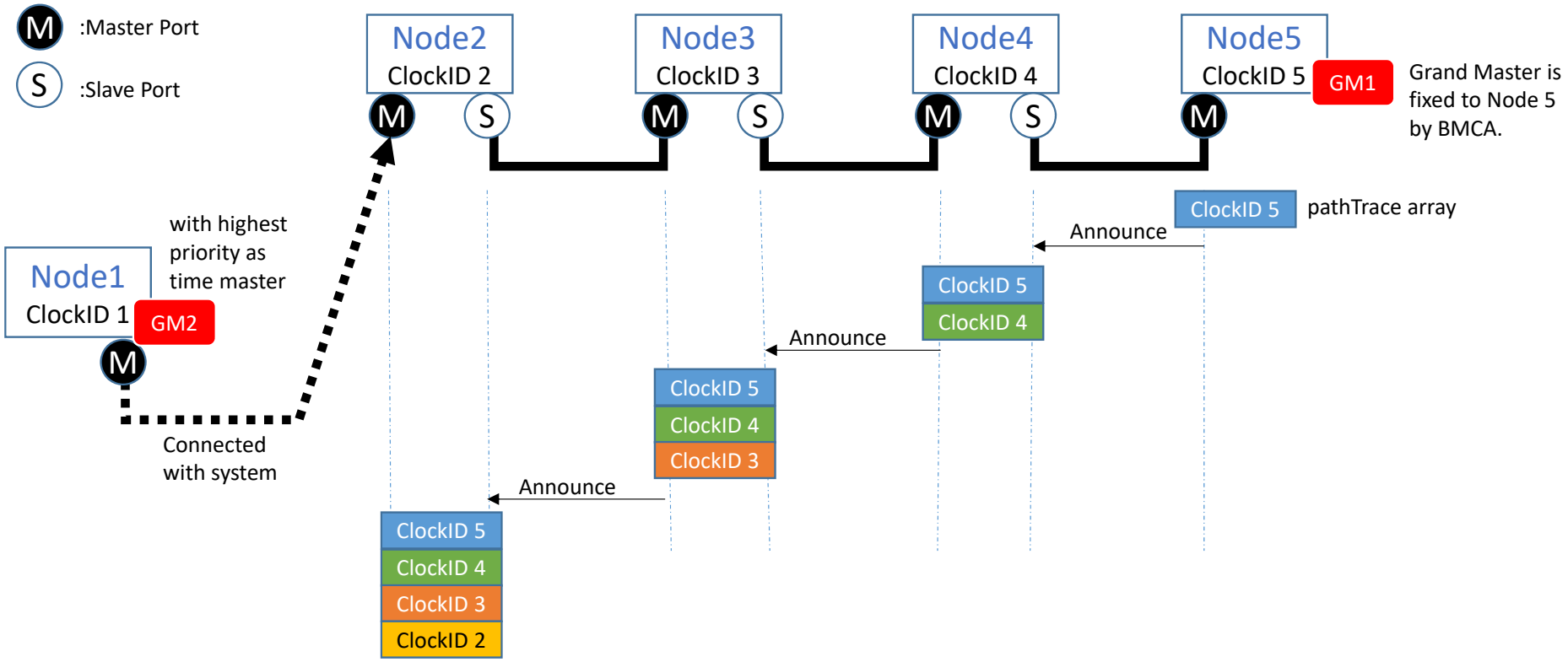
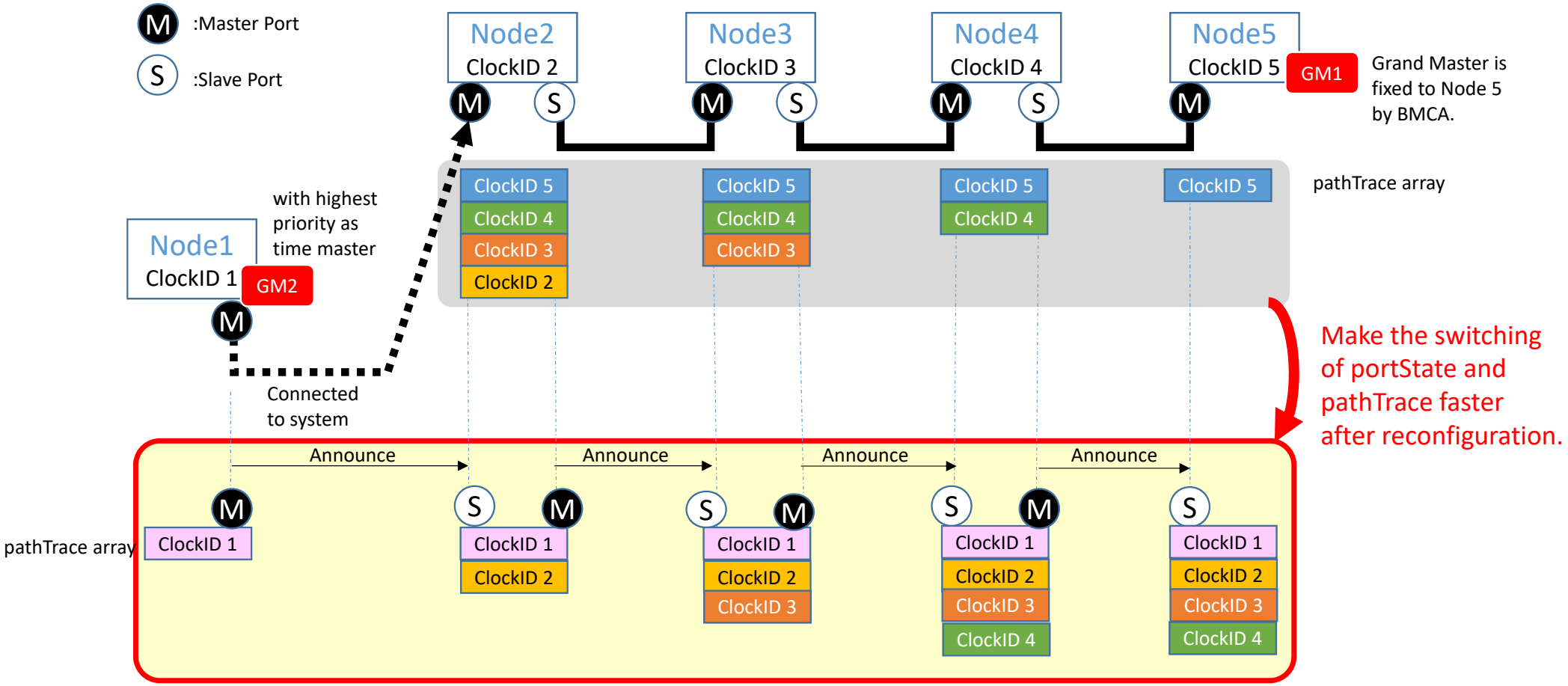


Background

2. Expected behavior

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



Specification status in D8.0

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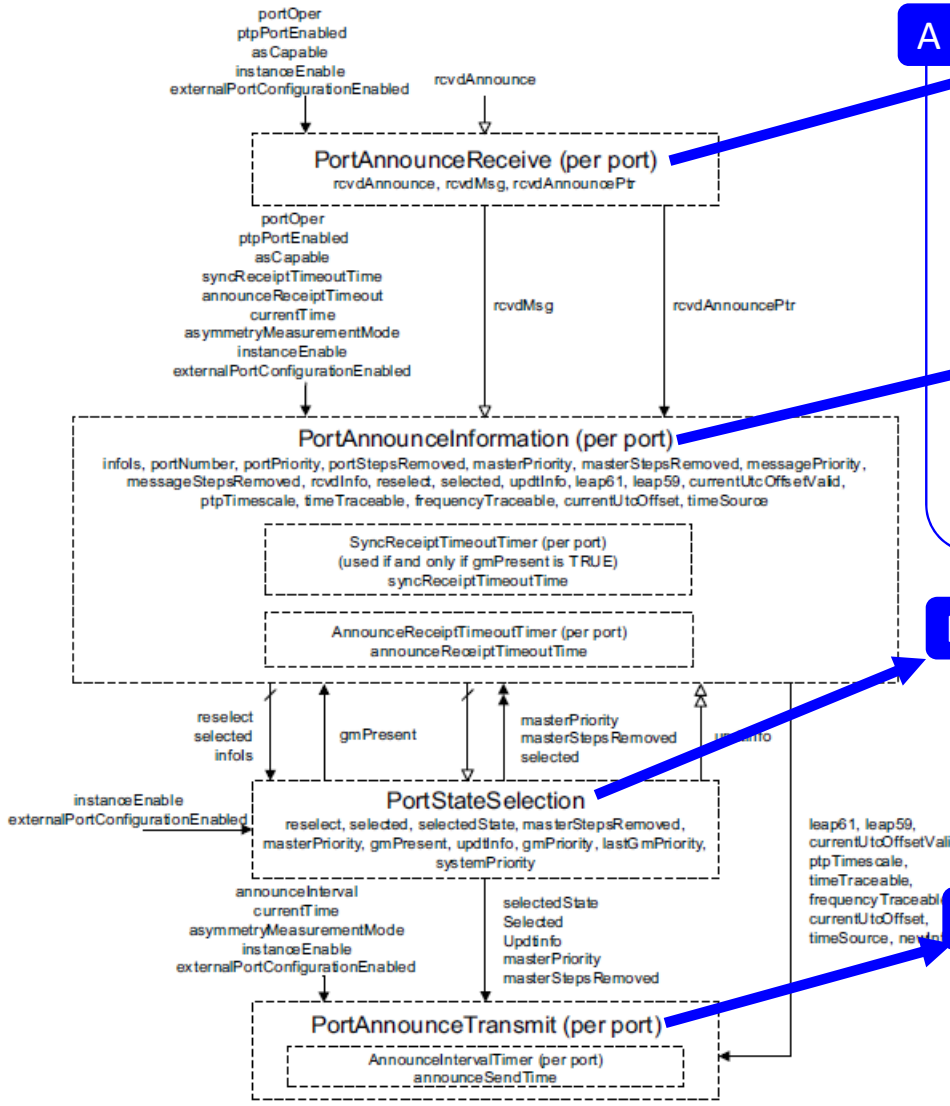


A

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.

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.

B

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.

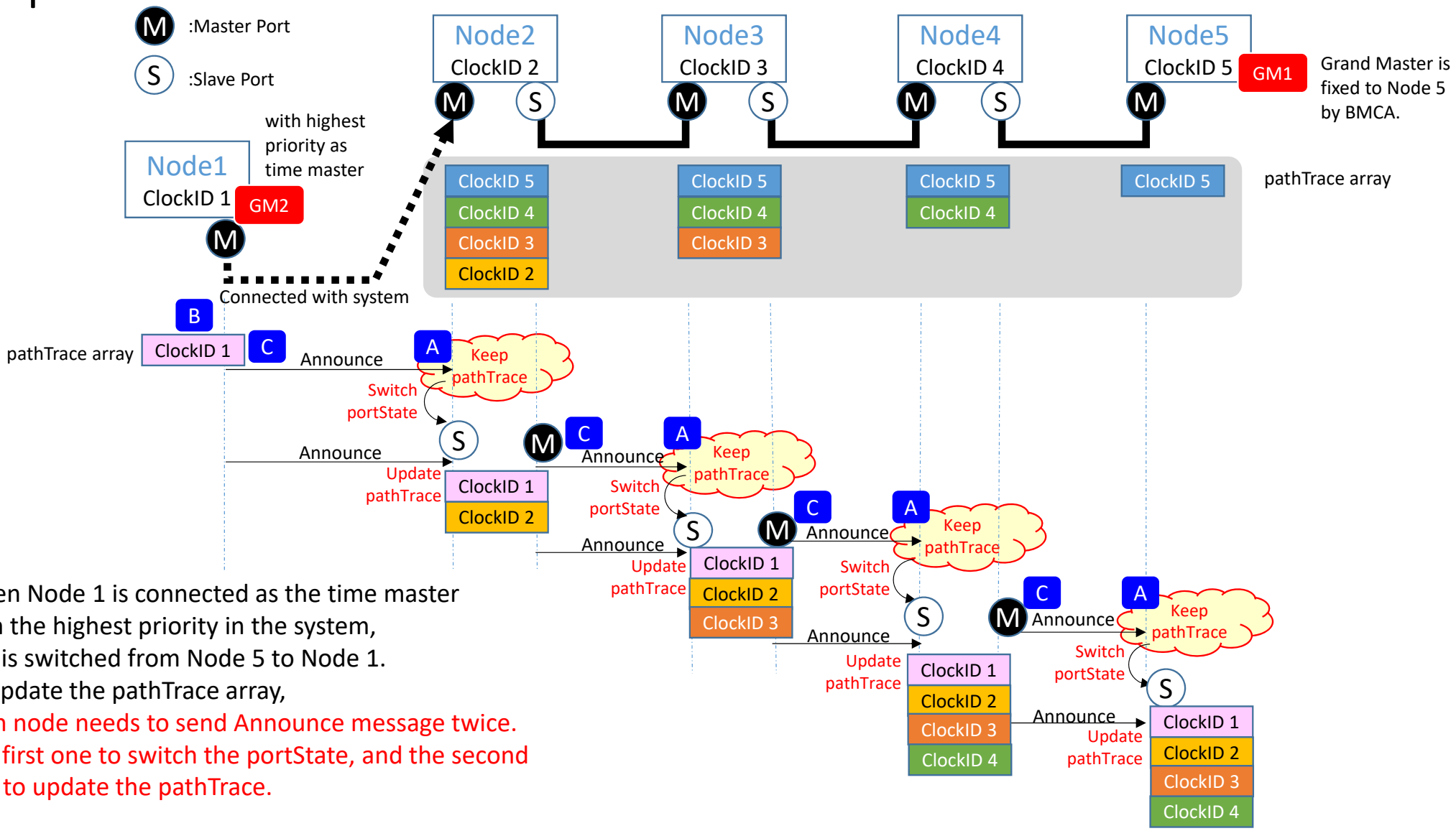
The value of pathTrace array is copied into the pathSequence of the Announce.

< 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



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

Suggested Remedy

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

10.3.10 Per-port global variables

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

10.3.10.2 announceSlowdown: a Boolean that is set to TRUE if the AnnounceIntervalSetting stat
(see Figure 10-19) receives a TLV that requests a larger Announce message transmission int
10.7.2.2), and FALSE otherwise. When announceSlowdown is set to TRUE, the PortAnnounc
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 qalifyAnnounce (rcvAnnouncePtr)

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.

Suggested Remedy

(3) Page 232 in 13.1.3.4 Acceptable master table feature

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.

13.1.3.4 Acceptable master table feature

The acceptable master table feature shall modify the operation

a) If acceptableMasterTableEnabled for a port is FALSE
its subclauses.

b) If acceptableMasterTableEnabled for a port is TRUE,

1) The function qualifyAnnounce() of the PortAnn
is replaced by the following:

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

i) 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;

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

iii) if the sourcePortIdentity of the Announce message is not equal to the sourcePortIdentity of one of the entries of the acceptableMasterTable, FALSE is returned;

iv) 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 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).

2) If the alternatePriority1 member of the AcceptableMaster array element that corresponds to the

Suggested Remedy

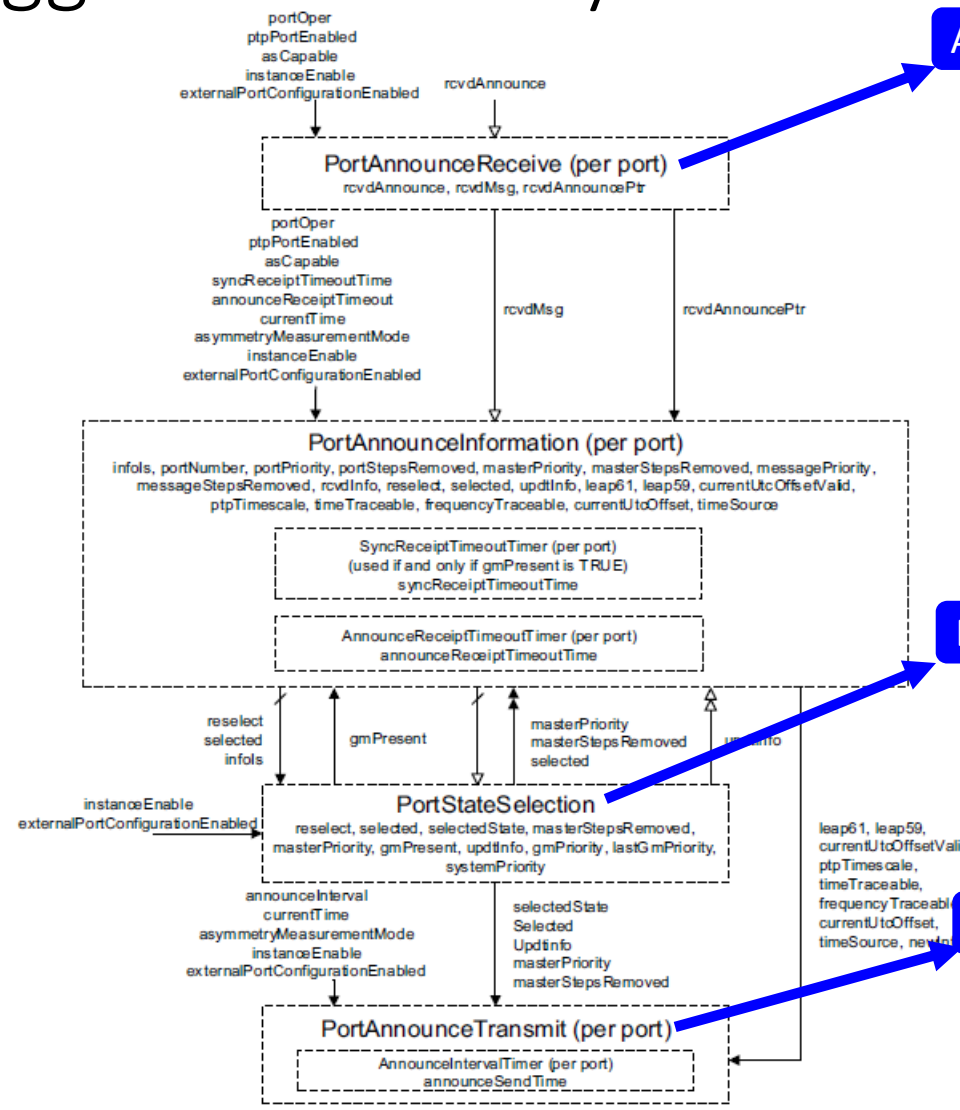
(4) Page 121 in 10.3.13.2.4 updtStatesTree()

f) assigns the port state for port j and sets selectedState[j] equal to this port state, as follows, for j = 1, 2, ..., numberPorts:

1) If the port is disabled (infoIs == Disabled), selectedState[j] is set to DisabledPort.
2) If asymmetryMeasurementMode is TRUE, selectedState[j] is set to PassivePort and updtInfo is set to FALSE.
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.
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.
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.
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, the portPriorityVector *does not* match the portPriorityVector, and selectedState[j] is set to PassivePort and updtInfo is
7) If the portPriorityVector w ... out

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.
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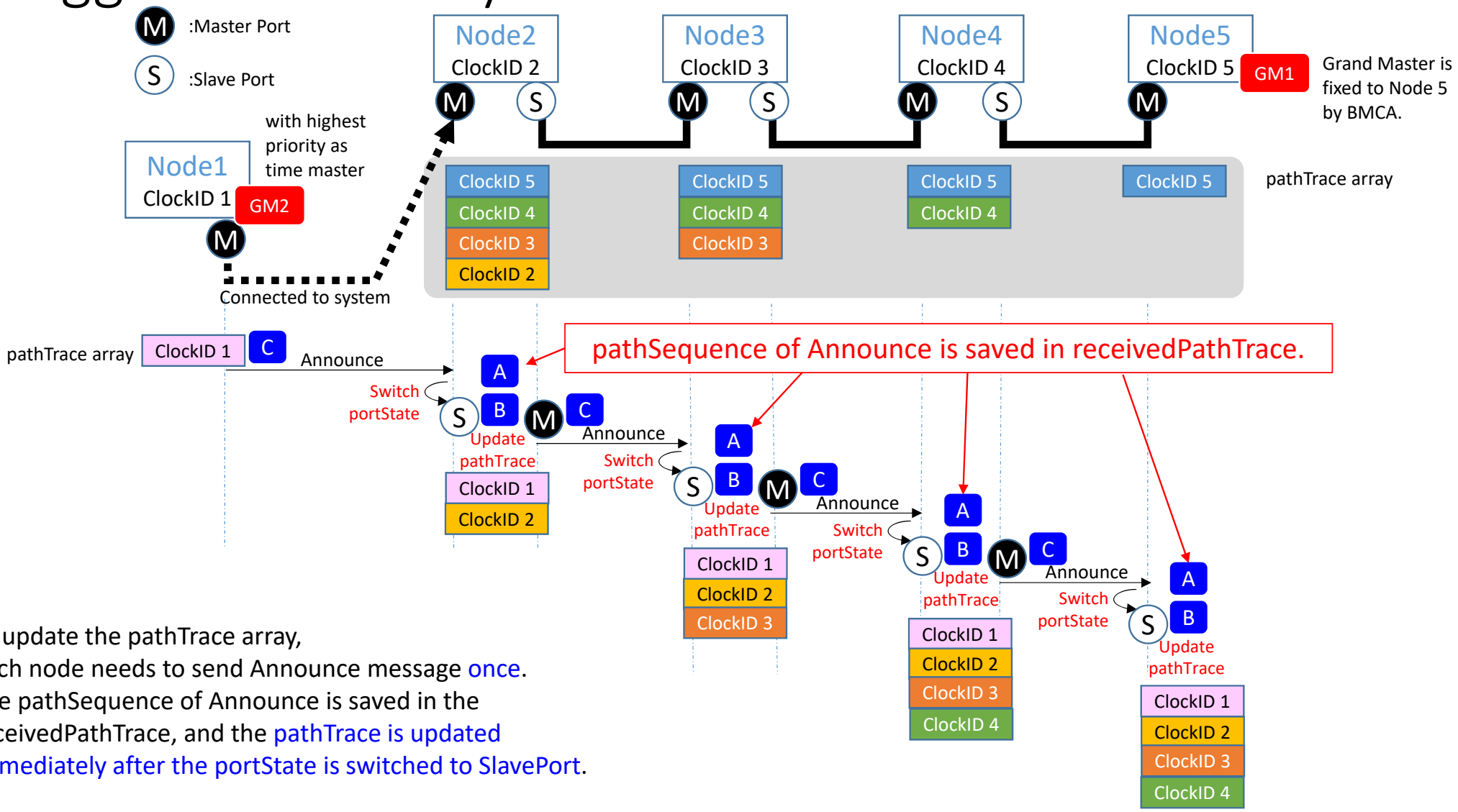

To update the pathTrace array,
each node needs to send Announce message once.
The pathSequence of Announce is saved in the receivedPathTrace, and the pathTrace is updated immediately after the portState is switched to SlavePort.

Thank you very much for your attention.