

Optional 1588 States not used in 802.1AS-Rev

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Introduction

- ❑ In the recent P1588 face-to-face meeting, participants who also attend IEEE 802.1 TSN were asked if 802.1AS is using the optional feature, in the P1588-Rev draft, for not using certain 1588 states
 - If so, it was asked if 802.1AS-Rev explicitly says that this feature is used
- ❑ The meeting was reminded of the fact that this feature was added to P1588-Rev at the request of the 802.1 TSN TG
- ❑ Based on this, an action item was taken to discuss this in the 802.1 TSN TG and clarify exactly what aspects (if any) of this feature are used
- ❑ This presentation initiates discussion of this topic
- ❑ It is recommended that the conclusions of this discussion be sent in a liaison to the P1588 WG
 - Such a liaison could be generated at the upcoming 802.1 plenary meeting (March 2017)
- ❑ Note: This optional feature is specified in 17.7 of P1588/D1.1. This section also specifies optional use of the foreign master feature. 802.1AS does not use the foreign master feature. This is stated in several places in 802.1AS, including Annex F, where the PTP profile is described

1588 Port States

□ The following are the port states present in the 1588 state machine, for a full 1588 BC or OC (a subset are present for the 1588 slave-only Ordinary Clock (SOOC); the SOOC is not of interest here because it is not used in 802.1AS-Rev

- MASTER
- SLAVE
- PASSIVE
- PRE_MASTER
- UNCALIBRATED
- INITIALIZING
- FAULTY
- DISABLED
- LISTENING

□ With the new optional feature, the following states are optional:
PRE_MASTER, UNCALIBRATED, DISABLED, FAULTY, LISTENING

IEEE P802.1AS-Rev Port States

- IEEE 802.1AS-2011 and IEEE P802.1AS-Rev certainly use MASTER, SLAVE, PASSIVE, and DISABLED
 - This is indicated in Table 10-1 of 802.AS-Rev/D4.5
- Note: The 802.1AS port states (previously called Port Roles, in 802.1AS-2011), are not necessarily the names of state boxes in the 802.1AS state machines
 - Rather, they are indicated by various state variables in the state machines (e.g., the global array `selectedState[]`), where the index indicates the port
 - 802.1AS and 1588 use different state machine formulations
 - 1588 has a single, overall, Mealy state machine for the full BC or OC (and a reduced version for the SOOC), with events that cause transitions on the branches
 - The boxes in the state machine can represent multiple states; in addition, a single state can exist in multiple boxes
 - Actions that occur when a state transition occurs, or when in a state, are described mainly in text or flowcharts
 - In contrast, 802.1AS has many cooperating state machines, which encompass all aspects of the protocol
 - Actions that occur when in a state of a state machine are described in C-like code in the state box; as mentioned above, the 1588-like states actually are represented by state variables of the code

Correspondence between 1588 and 802.1AS Port States

- As a result of the above, it might be difficult in some cases to determine where in 802.1AS an aspect of the 1588 state machine exists, and where in 1588 an aspect of one or more 802.1AS state machines exist
 - However, the task in this presentation is to determine (or at least discuss) which of the 1588 optional states are or are not present in 802.1AS

Status of 1588 optional states in 802.1AS - 1

❑ DISABLED (called DisabledPort in 802.1AS):

- This state is in Table 10-1 of 802.1AS-Rev/D4.5, and is used
- A port is in this state if portOper, ptpPortEnabled, and asCapable are not all TRUE
 - We might want to modify the definition to omit asCapable, as a port for which asCapable is FALSE still sends, receives, and processes peer delay messages

❑ PRE_MASTER

- This state is not used; 802.1AS has no pre_master qualification delay
- This is stated in F.3 of 802.1AS

❑ UNCALIBRATED

- This state is not used; 802.1AS does not specify filtering (e.g., with PLLs or servo-loops) in the time-aware relays
- This is stated in 7.5 of 802.1AS, but should also be stated in Annex F

❑ FAULTY

- This state is not used
- The conditions that lead to this state in 1588 (i.e., the SYNCHRONIZATION_FAULT event) are implementation-specific

Status of 1588 optional states in 802.1AS - 2

□ LISTENING

- This is defined as follows in P1588/D1.1 (Table 18):
 - The PTP Port is waiting for the announceReceiptTimeout to expire or to receive an Announce message from a Master PTP Instance. The purpose of this state is to allow orderly addition of PTP Instances to a domain. A PTP Port in this state shall not place any PTP messages on its communication path except for Pdelay_Req, Pdelay_Resp, Pdelay_Resp_Follow_Up, or signaling messages, or PTP management messages that are a required response to another PTP management message.
- This state is entered by a port in 1588 just after the port has initialized
- This state is exited in 1588 when announce receipt timeout occurs, or a state decision event (e.g., receipt of an Announce message) occurs

Status of 1588 optional states in 802.1AS - 2

□ LISTENING (cont.)

- In 802.1AS, just after initialization, and before any Announce messages have been received or announce receipt timeout or sync receipt timeout have occurred, the PortStateSelection State Machine is invoked, and the function updtStatesTree() is invoked
 - It appears that, at this point, the portPriorityVector has not been set on any port
 - In addition, the port is not disabled
 - It appears that a port state is not set at this point (i.e., selectedState[j] is not set for any port j)
- These points need to be examined further; possibly a value ListeningPort could be defined for selectedState, and set at this point

□ More discussion of the LISTENING state is needed

□ In any case, a liaison to the P1588 WG should be sent from the upcoming plenary meeting, with whatever conclusions are reached then

- If not all points are resolved by then, the liaison should indicate what still needs discussion)

Thank you