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Title: Retimer Default Transition Compliance Mode
Applied to: Appendix E rev1p1

Brief description of the functional changes:

The default transition for retimers to Compliance Mode can be enabled based on following observations.

1. The original motivation was to prevent a host DFP from falsely entering Compliance Mode that is not recoverable. We applied this requirement to a captive retimer associated with DFP for the same reason. After evaluation, it is concluded that this requirement does not apply to retimers.
    a. A false entry to Compliance Mode by UFP is recoverable by a USB 3.1 host initiating Warm Reset (refer to Sec 7.5.4).
        - A downstream port shall transition to Rx.Detect upon the 360-ms timer timeout (tPollingLFPSTimeout) if cPollingTimeout is less than two and Compliance Mode is disabled.
        - A downstream port shall transition to eSS.Inactive upon the 360-ms timer timeout (tPollingLFPSTimeout) and cPollingTimeout is two.
    b. A captive retimer, regardless of its association with DFP or UFP, if unexpectedly entering Compliance Mode, can be recovered the same way as device UFP. The same applies to retimers in active cable.
2. Implementations prior to USB 3.1 relies on proprietary mechanisms to recover a device entering Compliance Mode. This applies to active cables too.

The functional changes include the following.

1. Retimer to enable transition path to Compliance Mode by default.
2. Retimer to transition to Rx.Detect in Polling.SpeedDetect if the 360-ms timer times out and a successful Polling.LFPS/SCD handshake is not achieved.

Additional editorial change: remove the non-existent transition path from Recovery to Compliance Mode

Benefits as a result of the changes:

No longer require the following approaches for a retimer to enable its transition path to Compliance Mode

1. Based on hub DFP sending SCD2 if a captive retimer is associated with DFP.
2. Based on proprietary sideband message if a captive retimer is associated with UFP – key benefit

Simplified RTSSM in Polling.SpeedDetect

An assessment of the impact to the existing revision and systems that currently conform to the USB specification:

Only applies to new implementations. No changes necessary to existing implementations relying on either SCD2 or proprietary sideband messages for a retimer to enable its transition path to Compliance Mode.

An analysis of the hardware implications:

Only applies to new implementations

An analysis of the software implications:

No SW change is required

An analysis of the compliance testing implications:

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No to existing test infrastructure for captive retimers. Standalone and active cable test compliance under development.

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Actual Change

(a). From Text (and location): E.3.2.1 Rx.Detect Requirement

- The re-timer shall enable the transition path to Compliance Mode if SCD2 is detected or if directed. Note that for a captive re-timer, the transition path to Compliance Mode by default is disabled. If it is associated with a DFP, it will receive SCD2 to enable this transition path. If it is associated with an UFP, it will rely on vendor specific mechanism to enable the transition path.

(a). To Text (and location): E.3.2.1 Rx.Detect Requirement

- The re-timer shall enable the transition path to Compliance Mode by default upon power-on.

(b). From Text (and location): E.3.2.2 Exit from Rx.Detect

- The re-timer shall enter Compliance Mode upon timeout of the tPollingLFPSTimeout timer and either one of the following conditions.
    - Only SCD2 is received at one of its ports.
    - If directed. Note that a captive re-timer associated with a device will not receive SCD2 from device. The mechanism to enable the transition path to Compliance mode is vendor specific.

(b). To Text (and location): E.3.2.2 Exit from Rx.Detect

- The re-timer shall enter Compliance Mode upon the first timeout of the tPollingLFPSTimeout timer after power-on.

(c). From Text (and location): E.3.4.1.1 Polling.SpeedDetect Requirements

- The re-timer shall enable the transition path to Compliance Mode at its other port if only SCD2 is detected.

(c). To Text (and location): E.3.4.1.1 Polling.SpeedDetect Requirements

(d). From Text (and location): E.3.4.1.2 Exit from Polling.SpeedDetect

- Both ports of the re-timer shall enter Compliance Mode upon the first timeout of the tPollingLFPSTimeout timer after power-on when the following three conditions are met.
    - SCD2 is received upon entry to the substate.
    - No Polling.LFPS handshake is achieved.
    - The condition to transition to Polling.RxEQ or Polling.LFPSPlus is not met.
- The re-timer shall transition to Polling.RxEQ for SS operation if the following two conditions are met.
    - Re-timer successfully observed on each port that at least four consecutive Polling.LFPS bursts are transmitted after receiving one.

  - Upon timeout of the tPollingSCDLFPSTimeout timer.
- The re-timer shall transition to Polling.PortConfig if it has observed successful LBPM handshake for port match.
- The re-timer shall transition to Rx.Detect if one of the following conditions is met.
  - Warm Reset is detected.
  - The tPollingLBPMLFPSTimeout timer has expired.
  - The tPollingLFPSTimeout timer has expired and the condition to transition to Compliance Mode, Polling.RxEQ or Polling.LFPSPlus are not met.

(d). To Text (and location): E.3.4.1.2 Exit from Polling.SpeedDetect

- The re-timer shall transition to Polling.RxEQ for SS operation if the following two conditions are met.
  - Re-timer successfully observed on each port that at least four consecutive Polling.LFPS bursts are transmitted after receiving one.
  - Upon timeout of the tPollingSCDLFPSTimeout timer.
- The re-timer shall transition to Polling.PortConfig if it has observed successful LBPM handshake for port match.
- The re-timer shall transition to Rx.Detect if one of the following conditions is met.
  - Warm Reset is detected.
  - The tPollingLBPMLFPSTimeout timer has expired.
  - The tPollingLFPSTimeout timer has expired and the conditions to transition to Polling.RxEQ, or Polling.PortMatch are not met. Note that this condition also applies to the first tPollingLFPSTimeout timer timeout upon power-on.

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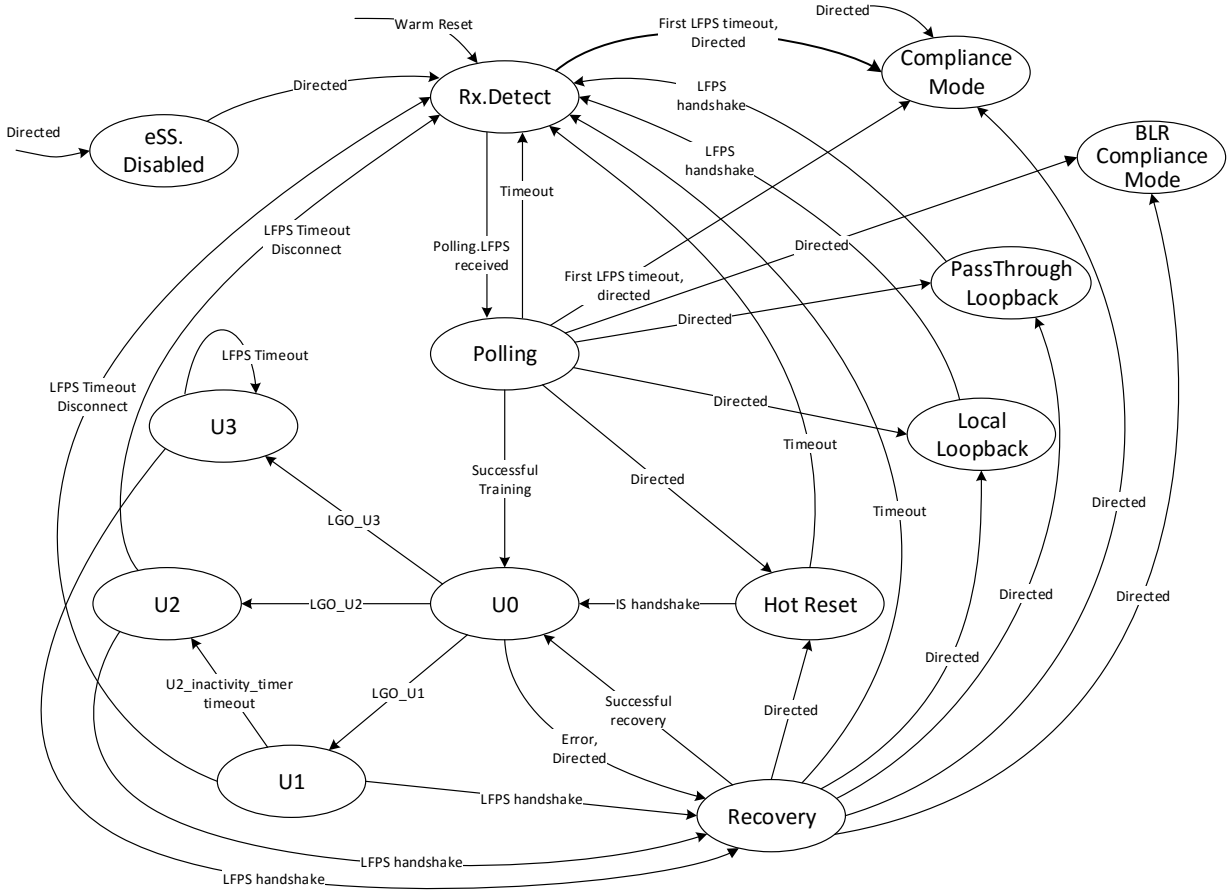
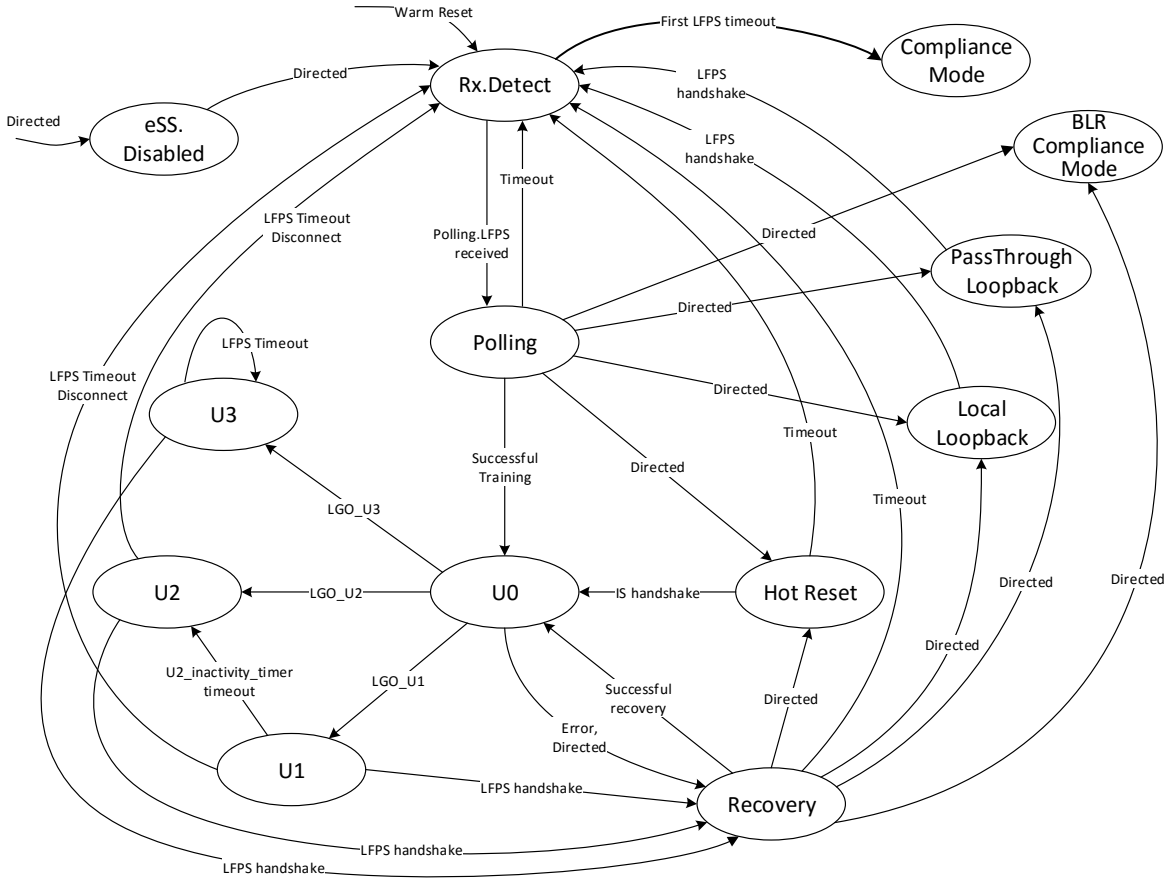
(e). From Figure (and location): Figure E-6. Re-timer Training and Status State Machine



(e). To Figure (and location): Figure E-6. Re-timer Training and Status State Machine



(f). From Figure (and location): Figure E-7. Polling Substate Machine

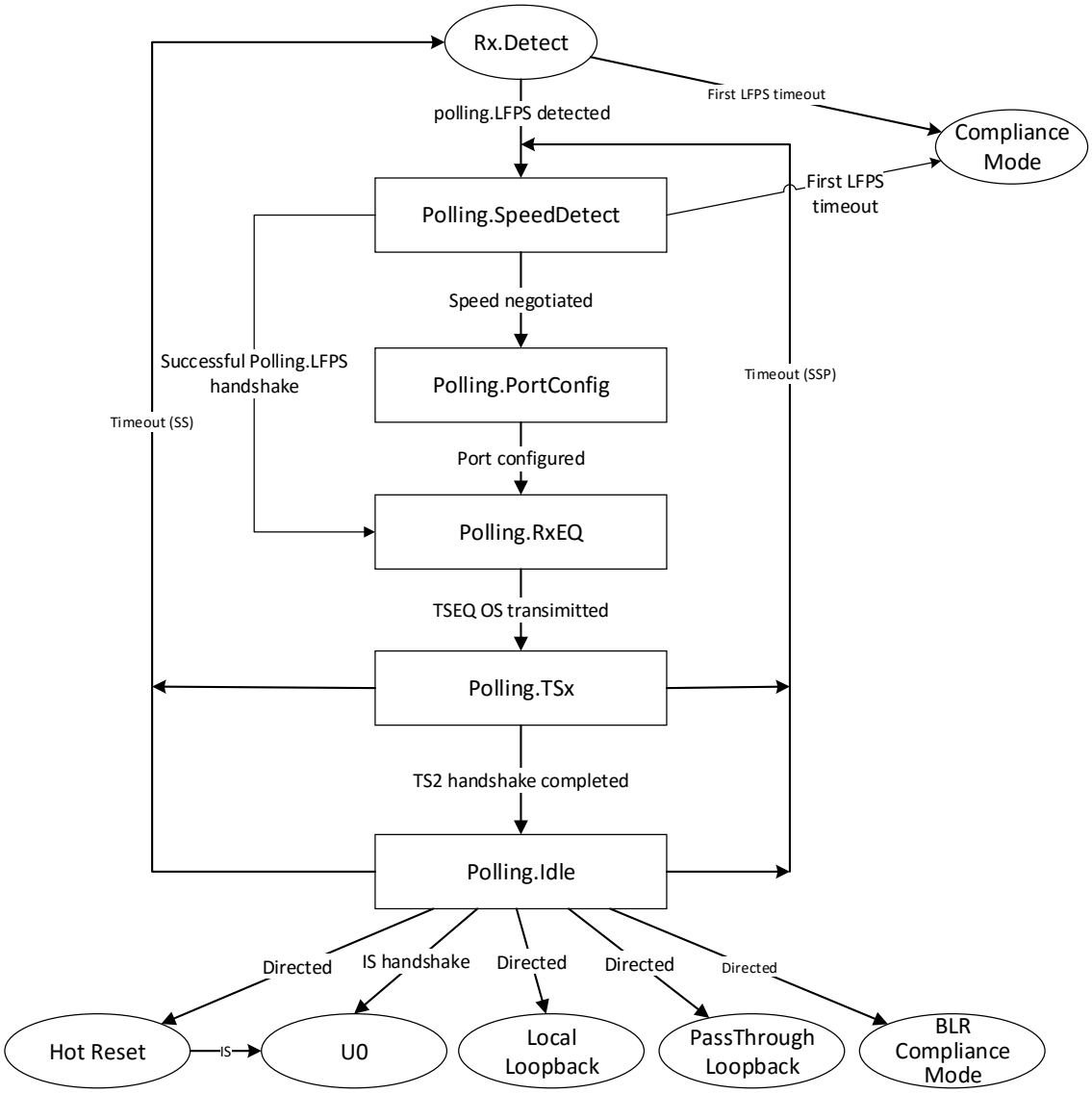


Figure E-7. Polling Substate Machine

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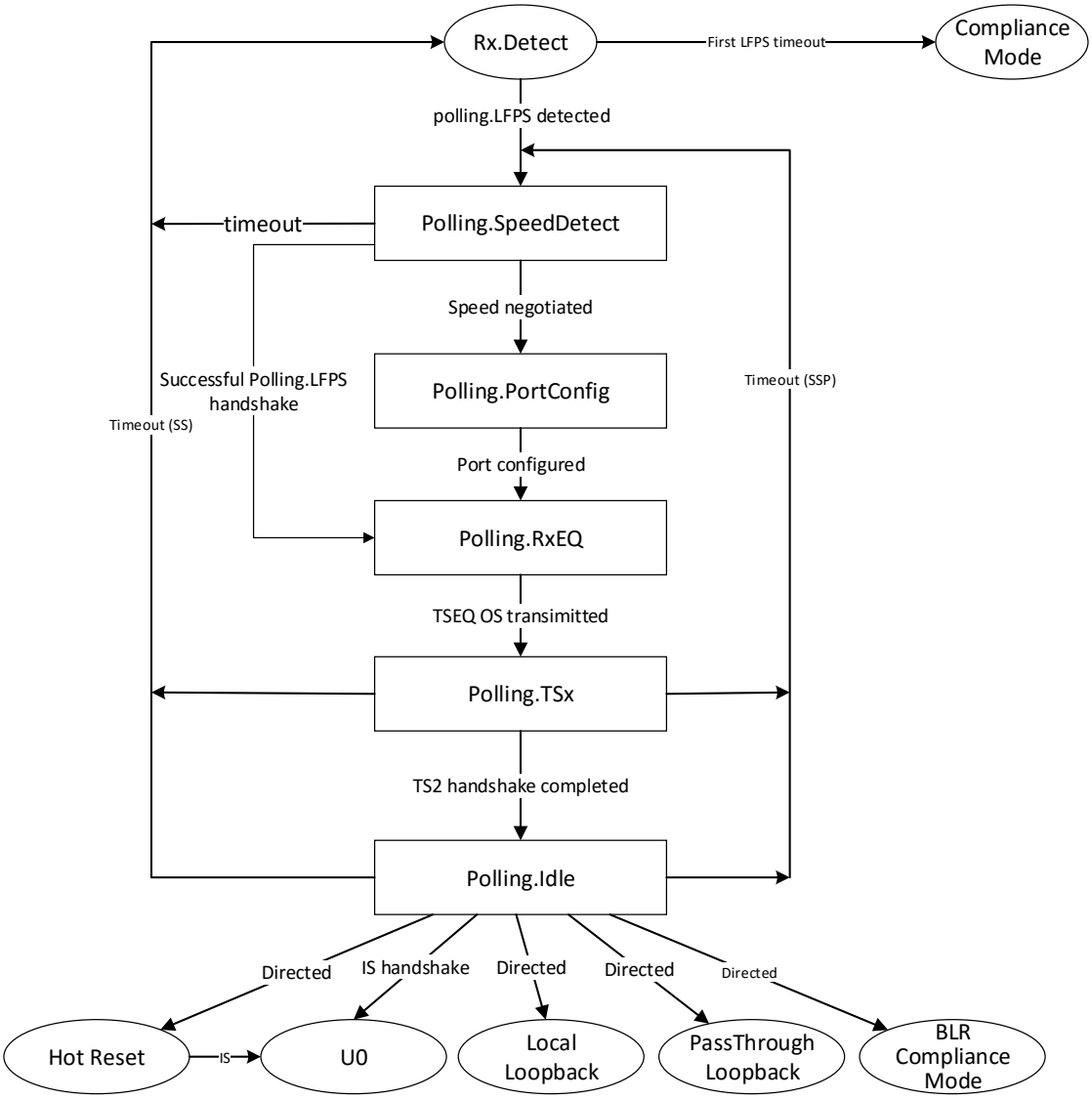

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