

The LACP MUX machine

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This note proposes a further revision of the LACP MUX state machine in P802.1AX-Rev/D0.1¹ Figure 6-22. This aims to bridge the gap between the D0.1 machine and other description of the WTR (Wait To Restore) functionality, correct (what I believe are) some new errors and undesirable features, and explain (what I believe to be) some improved functionality.

1. The proposed MUX machine

The proposed machine ('PMUX', [Figure 1](#)) is based on the D0.1 machine ('MUX0.1'), with the same states and the changes to variable names (port_attached, and Port_Operational) and has (except where I believe changes are required) the same ordering of operations within states². The following is a list, in no particular order, of the PMUX changes to MUX0.1:

- 1) MUX0.1:DETACHED set NTT conditionally on Actor.Sync being TRUE.

However the first time this state is entered (on BEGIN) Actor.Sync has not yet been initialized, so the setting will be random.

Even if Actor.Sync is FALSE on entry to this state, that seems no particular reason for suppressing transmission, as the Partner may well wish to be informed of changed LAG parameters.

PMUX:DETACHED sets NTT unconditionally.

- 2) MUX0.1:ATTACHED_WTR sets wtr_revertive (not previously initialized, which is a problem for MUX0.1:Set) to wtr_revertive_mode. The function of this flag is to hold the machine in MUX0.1:ATTACHED_WTR if wtr_revertive_mode is FALSE. It thus provides the Selection Logic with another control, in addition to Ready and Selected. I believe that this is unnecessary and an awkward split of functionality between the Selection Logic and the Mux machine. If non-revertive behavior is required PMUX returns the failed Aggregation Port to DETACHED. The Selection Logic will see that return. Apart from port_attached becoming FALSE, the Selection Logic had previously set Ready (which is cleared in DETACHED) so there is no confusion between !port_attached because attachment hasn't happened yet and !port_attached due to attachment, followed by Port_Operational, followed by !Port_Operational.

One advantage of the failed non-revertive mode port going to DETACHED is the easier use of STANDBY links (presuming their failure probability is independent) which are then more easily swapped in (rather than changing Select for the failed link and waiting for it to become !port_attached).

- 3) MUX0.1:ATTACHED_WTR supports a wait to restore timeout of zero (immediate restoration on Port_Operational, which I had overlooked in my prior MUX machine proposal), but does so by executing ATTACHED_WTR continuously. That does not make for easy implementation. PMUX deals with that by using a local, rather than global transitions, to enter ATTACHED_WTR.
- 4) MUX0.1 uses the abbreviation Set to simplify conditions in the machine. However I have found this a real nuisance as it obscured searches for use of the underlying variables. By avoiding the use of wtr_revertive, PMUX simplifies these conditions so they can be spelt out in full.
- 5) PMUX allows an Aggregation Port to be attached to an Aggregator without the Selection Logic having to wait for Port_Operational to become TRUE (or suffering from the undesirable effect of engaging WTR - possibly non-revertive) before the port has come into use for the first time. This is particularly beneficial in the simple cases. It is only after the port has become operational and then failed that PMUX invokes WTR.
- 6) MUX0.1:COLLECTING sets NTT conditionally on Collecting not already being TRUE, but it is possible (as Steve has pointed out) that the state might be entered as a consequence of disabling Distributing, so PMUX sets NTT unconditionally.

¹The D0.1 MUX machine was based on Figure 4 of [./docs2017/ax-rev-seaman-wait-to-restore-0117-v01.pdf](#), with a few changes some of which I appreciate.

²Technically the ordering doesn't matter, but it may help comprehension. I note that Steve changed the ordering from my prior proposal, and have avoided reversing those changes without good reason. I have also retained some features of the changed layout, for the same reason.

LACP Wait To Restore

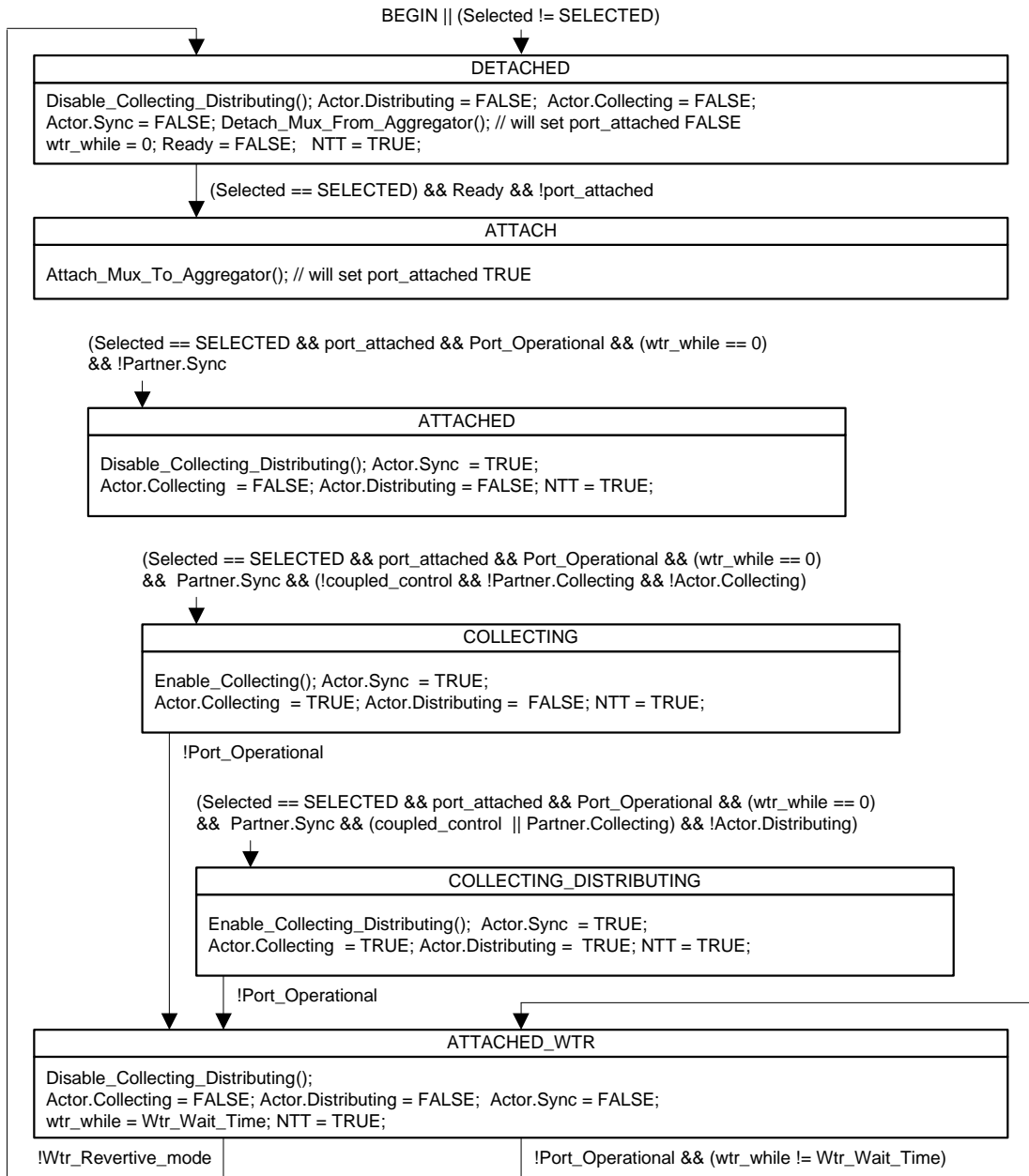


Figure 1—The proposed MUX state machine ‘PMUX’

2. Supporting changes for PMUX

Remove Wrt_Revertive from the list in 1AX-Rev 6.4.7.