

CL 136 Link Training – Update Request Behavior

IEEE P802.3cd Task Force

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Problem Description

- Clause 136 link training process differs from clause 72, for example:
 - Single coefficient update request vs multiple coefficients update request.
 - Multiple presets vs initialize and single preset initial conditions.
- The responder behavior is defined by the “Coefficient update state diagram”.
- The requestor behavior is not explicitly defined, which can lead to misinterpretations by implementers.
- The presentation provides a proposal for the requestor behavior definition

Responder behavior

- Transition from NEW_INDEX/WAIT to NEW_REQUEST
 - Upon individual request reception.
 - Additional “round” of NEW_INDEX will take place before the transition, in case the local coefficient index (k) is not set to the requested *coef_sel* value.
- Transition from NEW_REQUEST to WAIT
 - Upon reception of “hold” coefficient request.
 - Initiating New request, can’t be performed without receiving “hold” request, regardless to *coef_sel* value.
- No transition between NEW_REQUEST and NEW_IC states.
- There is an assumption that the requestor follows a sequence of operations that matches the responder state machine transitions.

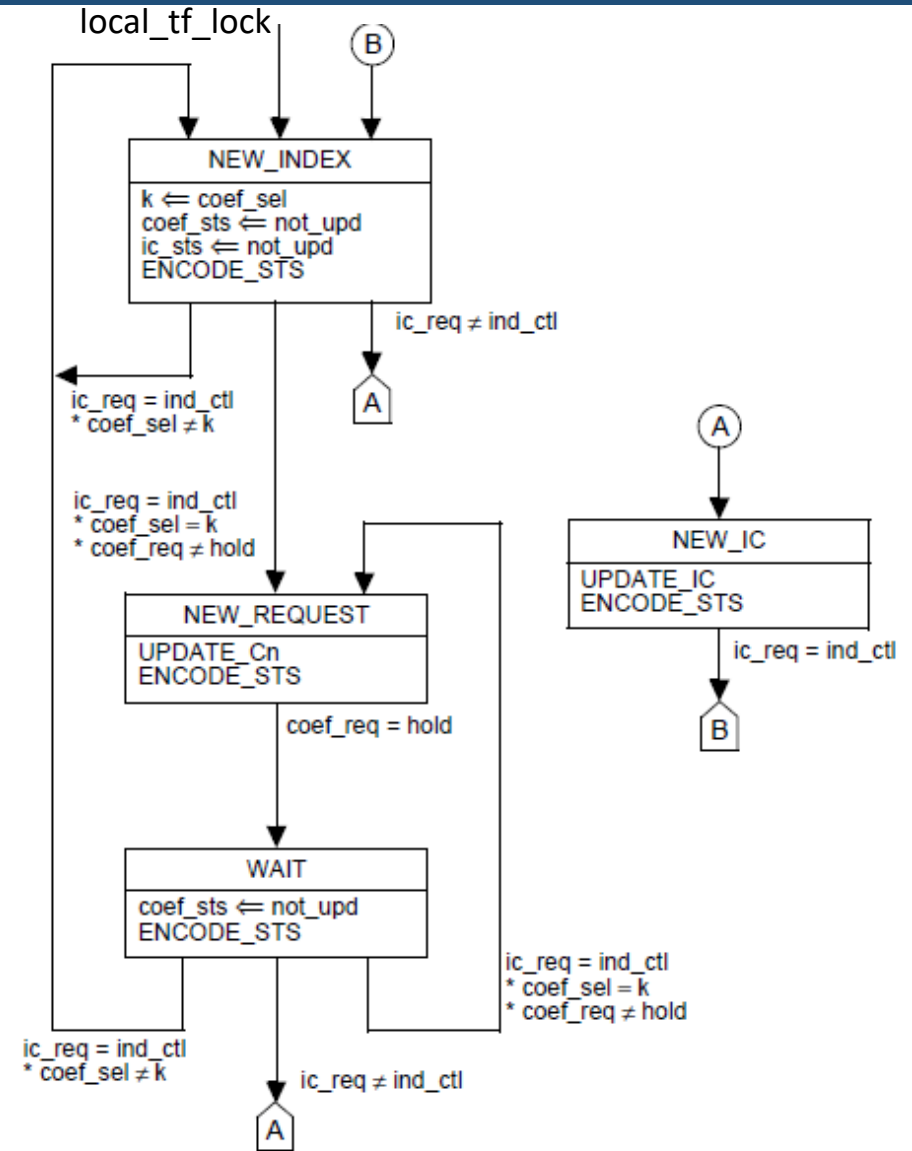
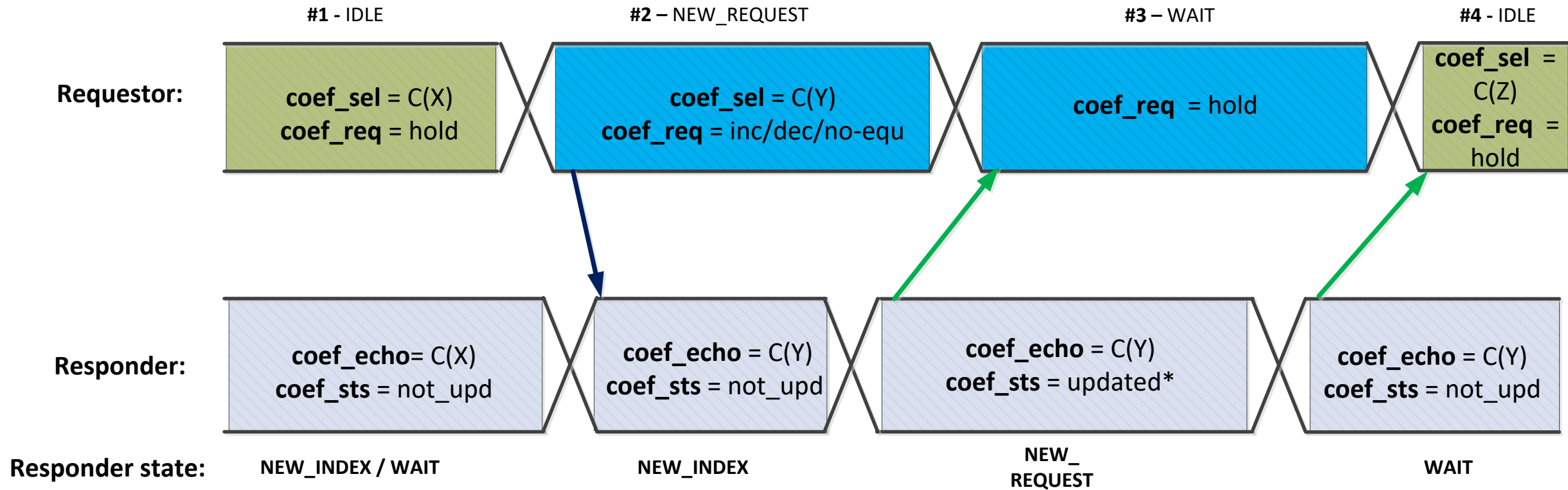


Figure 136-9—Coefficient update state diagram

Requestor behavior for coefficient request

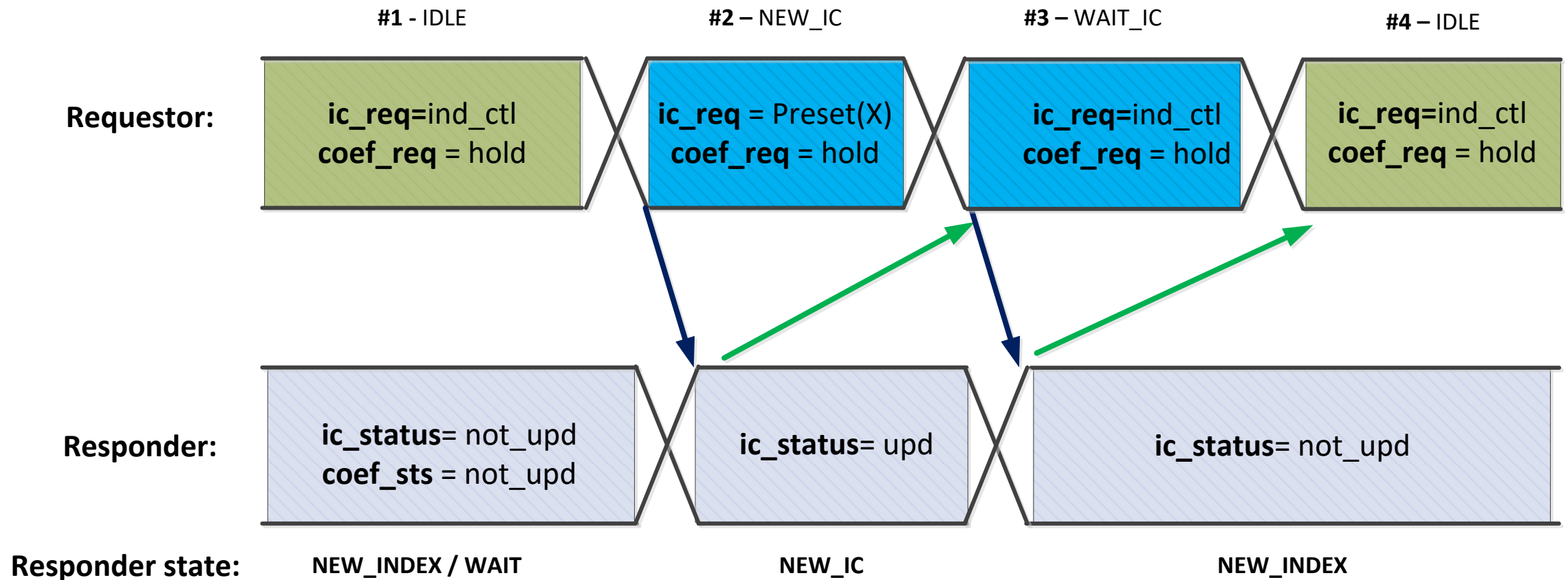


- can initiate a new request



- For #2 maintain the $coef_sel$ and $coef_req$ values
For #3 maintain the $coef_req$ hold value

Requestor behavior for IC request



- can initiate a new request



- maintain the *ic_req* and *coef_req* values

Proposal: Add description for the requestor behavior

- A request to change a coefficient is made by using the following procedure:
 - Wait until the received coefficient status bits (136.8.11.3.7) indicate "not updated".
 - Set the coefficient select bits (136.8.11.2.3) and coefficient request bits (136.8.11.2.4) to the desired values. This may be done in one step (both fields updated in the same training frame) or sequentially
 - Wait until the received coefficient status bits (136.8.11.3.7) do not indicate "not updated".
 - Set the coefficient request bits (136.8.11.2.4) to "hold".
- A request to change the initial condition is made by using the following procedure:
 - If any other request was previously sent, wait until both the initial condition status bits (136.8.11.3.4) and the coefficient status bits (136.8.11.3.7) indicate "not_updated".
 - Set the initial condition request bits (136.8.11.2.1) to the desired pre-defined transmitter equalizer configuration (preset).
 - Wait until the initial condition status bits (136.8.11.3.4) indicate "updated".
 - Set the initial condition request bits (136.8.11.2.1) to individual coefficient control, and set the coefficient request bits (136.8.11.2.4) to "hold".
- A procedure must be completed before initiating a new individual coefficient update request or initial condition update request.

Coefficient Update State Machine Improvement

- Remove the need to send “hold” on subsequent individual coefficient requests of different coefficients.
 - Useful when all the coefficients have to be updated.
- The requestor will identify a response to the requested coefficient according to the received coefficient select echo.
- Modify the condition for a transition to WAIT to:
 $\text{coef_req} = \text{hold} \mid \text{coef_sel} \neq k$

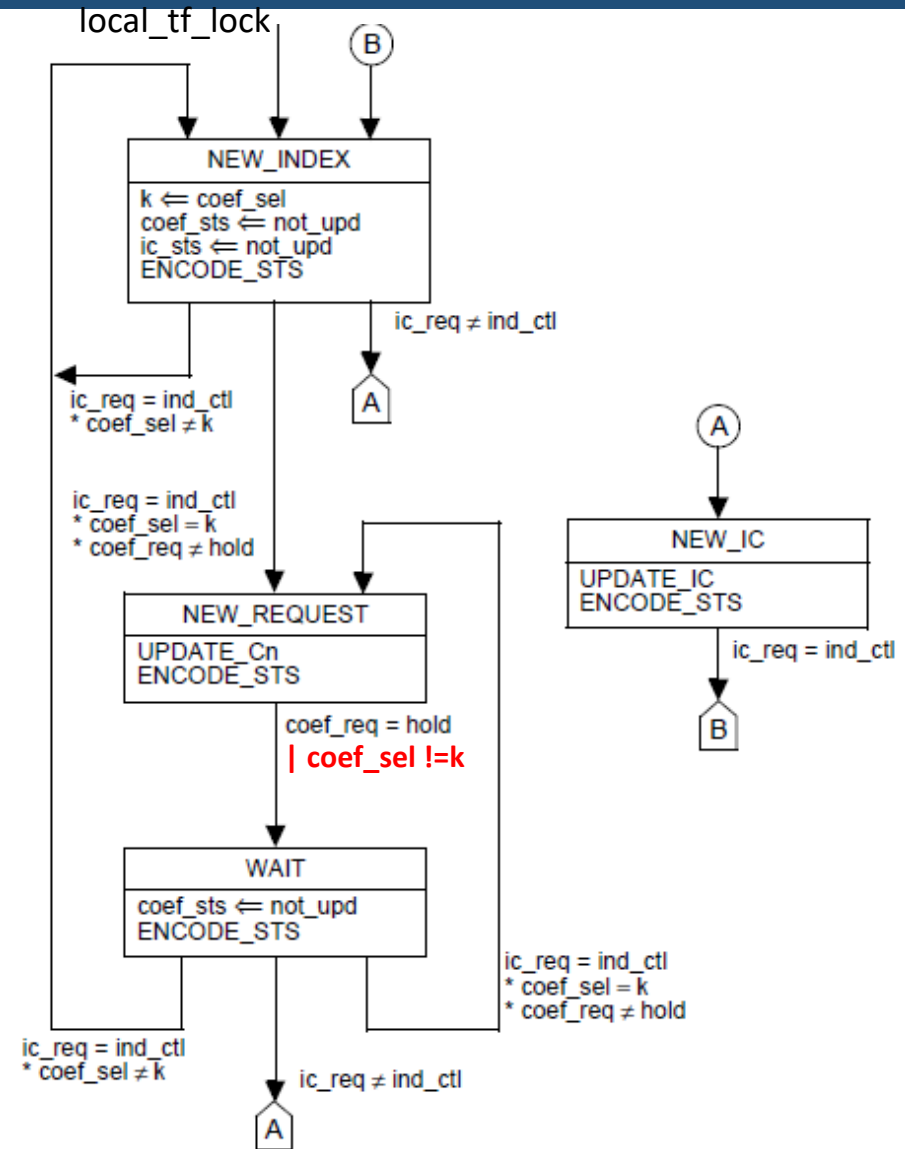


Figure 136-9—Coefficient update state diagram

Coefficient Update State Machine Improvement – requestor behavior description

- A request to change a coefficient is made by using the following procedure:
 - Set the coefficient select bits (136.8.11.2.3) and coefficient request bits (136.8.11.2.4) to the desired values. This may be done in one step (both fields updated in the same training frame) or sequentially
 - Wait until the received coefficient status bits (136.8.11.3.7) do not indicate "not updated" and the coefficient select echo bits (136.8.11.3.6) indicates the requested coefficient select value.
 - If the subsequent request updates the same coefficient or requests a new initial condition, set the coefficient request bits (136.8.11.2.4) to "hold" and wait until the received coefficient status bits (136.8.11.3.7) indicate "not updated".
- A request to change the initial condition is made by using the following procedure:
 - Set the initial condition request bits (136.8.11.2.1) to the desired pre-defined transmitter equalizer configuration (preset).
 - Wait until the initial condition status bits (136.8.11.3.4) indicate "updated".
 - Set the initial condition request bits (136.8.11.2.1) to individual coefficient control, and set the coefficient request bits (136.8.11.2.4) to "hold".
 - wait until both the initial condition status bits (136.8.11.3.4) and the coefficient status bits (136.8.11.3.7) indicate "not_updated".
- A procedure must be completed before initiating a new individual coefficient update request or initial condition update request.

Thank You