Recommended Text for Coefficient Update SM.

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TEXAS INSTRUMENTS

Supporters

- XXXX
- XXXX

TEXAS INSTRUMENTS

Changes to existing Text

- ## Edit 72.5.10.2.6.2 to fit use of SM
  - Suggested text in following slides

- ## Add new section 72.5.10.2.x "Coefficient Update Process"
  - Suggested text in following slides
- Add Coefficient Update State Diagram and variable Function definitions
  - As in following slides
    - Based on szczepanek_02_0605 with Fulvio's corrections, and signed requirement on integer variables removed.
- Correct references to Over-run & Under-run to Maximum and Minimum throughout document
  - Table 45-58—10GBASE-KR local status report register bit definitions
  - 72.5.10.2.5 Coefficient (k) update
  - Table 72-3—Status report field
  - 72.6.1.8 Transmitter Output Waveform

TEXAS INSTRUMENTS

Current 72.5.10.2.6.2 text

72.5.10.2.6.2 Tap (k) update status

Each coefficient, k, is assigned a 2-bit field describing the status of pending updates to the coefficient. Four status encodings are defined: not updated underflow, and overflow. The default state for a given tap is not_updated. Upon implementation of a received increment or decrement request, the status shall be reported as updated. If an increment request is received for a tap that is at its maximum value, then the status shall be reported as overflow. If a decrement request is received for a tap that is at its minimum value, then the status shall be reported as underflow. The updated (or underflow or overflow) state shall continue to be reported until a hold request is received, at which time the status shall revert to not _updated.

The valid range for k is –1 to +5 where k = 0 denotes the main, or gain, tap. The encoding of the coefficient update shall be as shown in Table 72–3.

TEXAS INSTRUMENTS

Proposed 72.5.10.2.6.2 text

72.5.10.2.6.2 Tap (k) update status

Each coefficient, k, is assigned a 2-bit field describing the status of pending updates to the coefficient. Four status encodings are defined: not updated, updated, maximum, and minimum.

These status encodings indicate the corresponding state of the coefficient update State Machine for tap k.

The valid range for k is –1 to +5 where k = 0 denotes the main, or gain, tap. The encoding of the coefficient update shall be as shown in Table 72-3.

Proposed "Coefficient Update Process" text
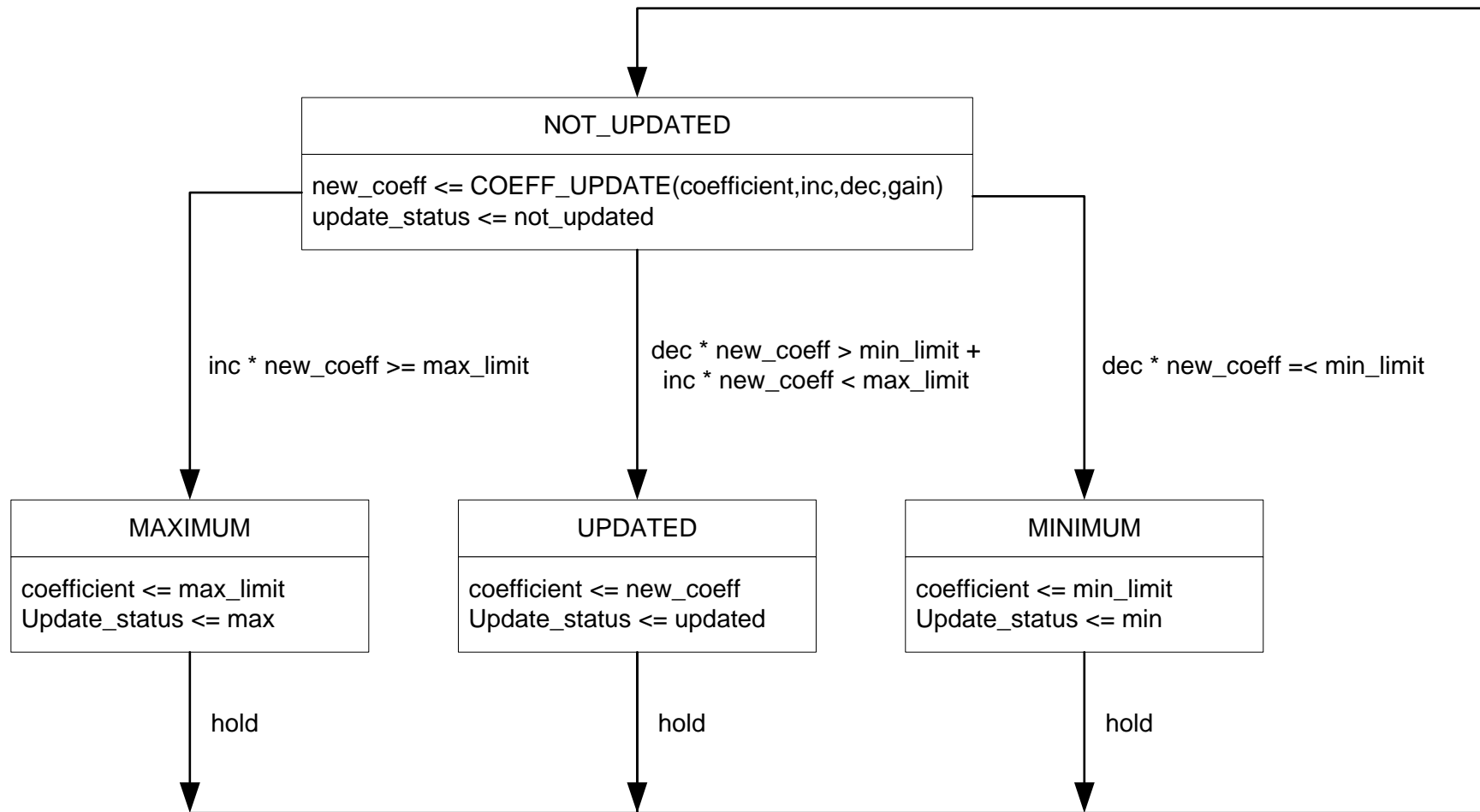
72.5.10.2.x Coefficient Update Process

Each coefficient, k, has an associated Coefficient Update State Machine that controls updates of the coefficient and generates the tap update status field.

The default state for a given tap is not updated. Upon implementation of a received increment or decrement request, the status is reported as updated, maximum, or minimum. Maximum is reported if a received increment request causes the tap value to reach its maximum limit, or if it is already at that limit. Minimum is reported if a received decrement request causes the tap value to reach its minimum limit, or if it is already at that limit.

Once the updated, maximum or minimum state is reported it continues to be reported until a hold request is received, after which the status reverts to not updated.

The coefficient update process responds to Coefficient requests as specified in the State diagram shown in Figure 72-X

Proposed State Machine (one per tap)

```
                              ┌──────────────────────────────────────────────────┐
                              ▼                                                    │
        ┌─────────────────────────────────────────────────────┐                   │
        │                   NOT_UPDATED                         │                  │
        ├─────────────────────────────────────────────────────┤                   │
        │  new_coeff <= COEFF_UPDATE(coefficient,inc,dec,gain) │                   │
        │  update_status <= not_updated                        │                   │
        └─────────────────────────────────────────────────────┘                   │
         │                          │                        │                     │
  inc * new_coeff        dec * new_coeff > min_limit +    dec * new_coeff          │
   >= max_limit            inc * new_coeff < max_limit      =< min_limit           │
         │                          │                        │                     │
         ▼                          ▼                        ▼                     │
  ┌──────────────┐         ┌──────────────┐         ┌──────────────┐              │
  │   MAXIMUM    │         │   UPDATED    │         │   MINIMUM    │              │
  ├──────────────┤         ├──────────────┤         ├──────────────┤              │
  │ coefficient  │         │ coefficient  │         │ coefficient  │              │
  │  <= max_limit│         │  <= new_coeff│         │  <= min_limit│              │
  │ Update_status│         │ Update_status│         │ Update_status│              │
  │  <= max      │         │  <= updated  │         │  <= min      │              │
  └──────────────┘         └──────────────┘         └──────────────┘              │
         │                          │                        │                     │
        hold                       hold                     hold                   │
         │                          │                        │                     │
         └──────────────────────────┴────────────────────────┴─────────────────────┘
```

TEXAS INSTRUMENTS

SM Constants

min_limit

integer constant containing the minimum tap coefficient value

max_limit

integer constant containing the maximum tap coefficient value

- *Note the range/resolution of a tap is determined solely by its associated min_limit & max_limit constants*

TEXAS INSTRUMENTS

SM Variables

inc

Boolean variable asserted when a training frame has been completely received and the coefficient update field of that frame for this tap = "inc", and de-asserted on reception of any other value.

dec

Boolean variable asserted when a training frame has been completely received and the coefficient update field of that frame for this tap = "dec", and de-asserted on reception of any other value.

hold

Boolean variable asserted when a training frame has been completely received and the coefficient update field of that frame for this tap = "hold", and de-asserted on reception of any other value.

coefficient

integer variable containing a value that should be used as the tap coefficient.

new_coeff

integer variable containing the result of increment/decrement operations on the coefficient value

gain

integer variable containing the gain value indicated by the update_gain field of the most recently received training frame.

update_status

value to be transmitted in the Tap Update Status field for this tap of the next transmitted training frame. values : as defined in Table 72-3

TEXAS INSTRUMENTS

SM Functions

COEFF_UPDATE(coefficient,inc,dec,gain)

Adds or subtracts the requested gain value to the coefficient value.

If inc is TRUE the function returns coefficient + gain.

If dec is TRUE the function returns coefficient - gain.

otherwise the function returns coefficient.