pma_reset = ON +
link_control = DISABLE

PMATX_DISABLE_TX

tx_enable ⇐ FALSE
tx_gmii_enable ⇐ FALSE

link_control = ENABLE

PMATX_ENABLE_TX

tx_enable ⇐ TRUE
tx_gmii_enable ⇐ FALSE

link_status = OK

PMATX_PCS_DATA

tx_gmii_enable ⇐ TRUE

link_status = FAIL

Figure 0–1—PHY TX control state diagram

pma_reset = ON +
link_control = DISABLE

PMARX_DISABLE

s1_synch ⇐ NOT_OK
rcvr_clock_lock ⇐ NOT_OK
rx_gmii_enable ⇐ FALSE

link_control = ENABLE

PMARX_TIMING_COARSE

s1_synch = OK

PMARX_TIMING_FINE

rcvr_clock_lock = OK

s1_synch = NOT_OK

PMARX_EQ_TRAINING

rcvr_hdr_lock = OK

s1_synch = NOT_OK +
rcvr_clock_lock = NOT_OK

PMARX_THP_INIT

rcvr_thp_lock = OK

rcvr_hdr_lock = NOT_OK

PMARX_CHK_QUALITY

rx_gmii_enable ⇐ FALSE

link_status = OK

rcvr_hdr_lock = NOT_OK

PMARX_PCS_DATA

rx_gmii_enable ⇐ TRUE

link_status = FAIL

rcvr_hdr_lock = NOT_OK
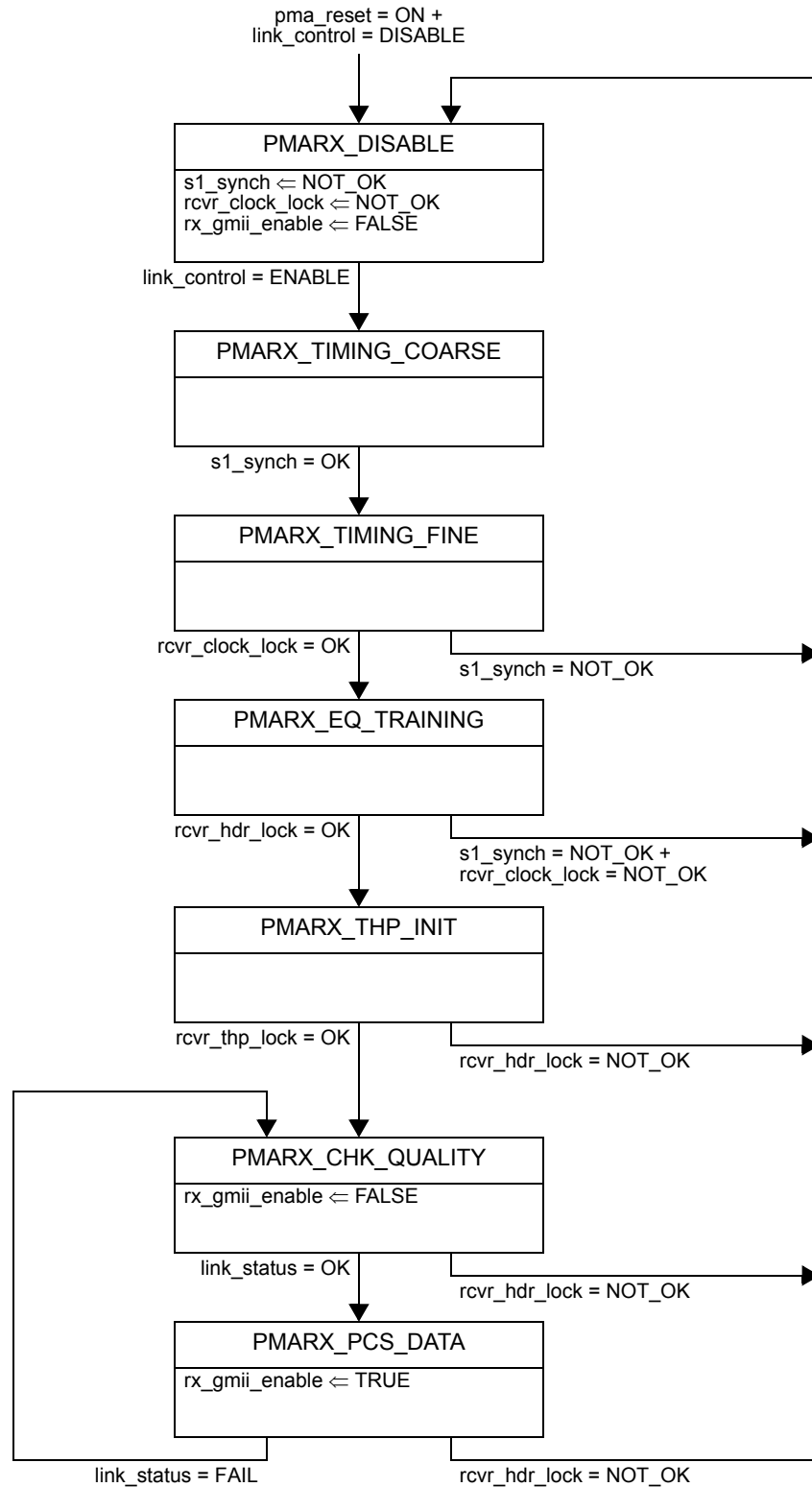
Figure 0–2—PHY RX control state diagram

pma_reset = ON +
link_control = DISABLE +
rcvr_hdr_lock = NOT_OK

LINK_DOWN

link_status ⇐ FAIL
rem_rcvr_status ⇐ NOT_OK

new_rxblock_event *
hdr_crc16_status = OK *
REMPHD.RX.LINKSTATUS = OK

LINK_REMOK

link_status ⇐ FAIL
rem_rcvr_status ⇐ OK

loc_rcvr_status = OK

new_rxphd_event *
hdr_crc16_status = OK *
REMPHD.RX.LINKSTATUS = NOT_OK

LINK_UP

link_status ⇐ OK

new_rxphd_event *
hdr_crc16_status = OK *
REMPHD.RX.LINKSTATUS = NOT_OK

loc_rcvr_status = NOT_OK
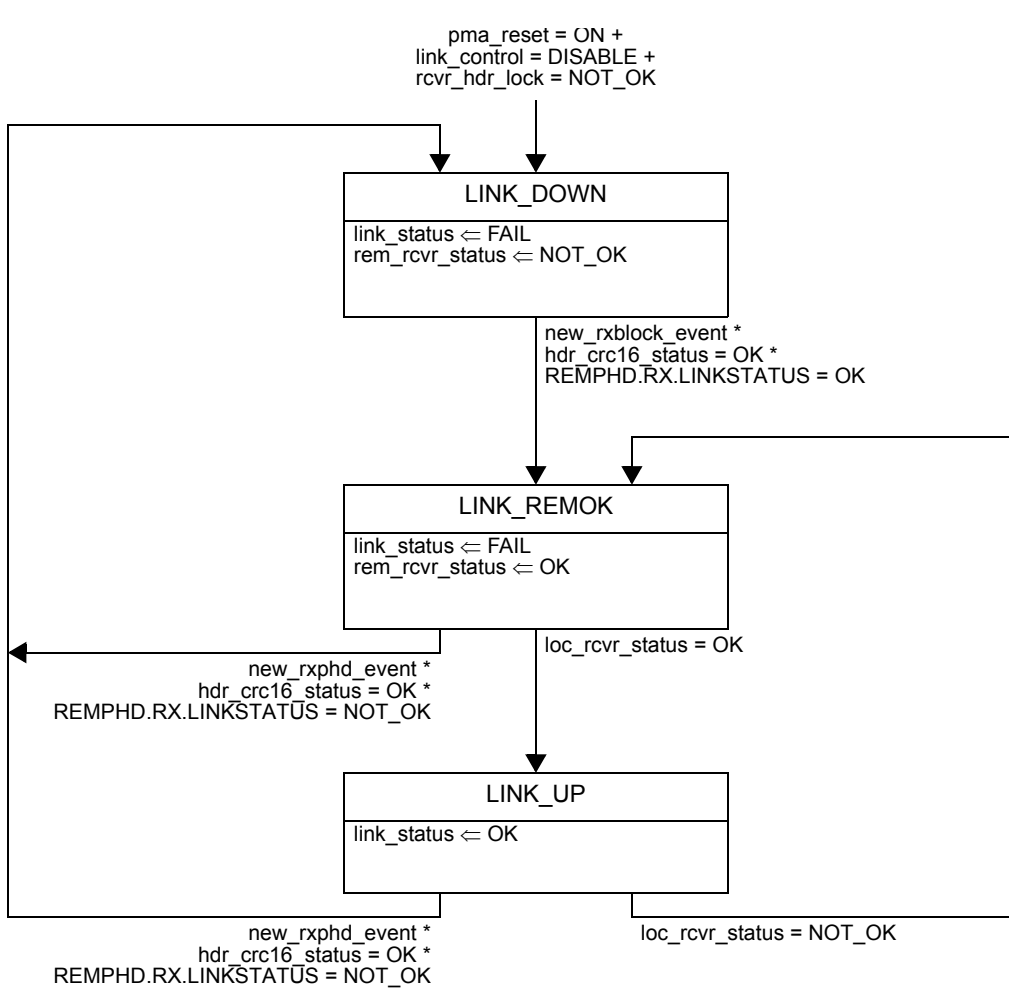
Figure 0–3—Link monitor state diagram

pma_reset = ON +
link_control = DISABLE

```
                    ┌──────────────────────────────────┐
                    │        LOCHDR_UNLOCK             │
                    ├──────────────────────────────────┤
                    │ loc_rcvr_hdr_lock ⇐ NOT_OK       │
                    │ LOCPHD.RX.HDRSTATUS ⇐ NOT_OK     │
                    │ hdr_fail_count ⇐ 0               │
                    └──────────────────────────────────┘
```

new_rxphd_event *
hdr_crc16_status = OK

```
                    ┌──────────────────────────────────┐
                    │         LOCHDR_LOCK              │
                    ├──────────────────────────────────┤
                    │ loc_rcvr_hdr_lock ⇐ OK           │
                    │ LOCPHD.RX.HDRSTATUS ⇐ OK         │
                    └──────────────────────────────────┘
```

hdr_fail_count = 2 +
s1_synch = NOT_OK +
rcvr_clock_lock = NOT_OK

new_rxphd_event *
hdr_crc16_status = NOT_OK

new_rxphd_event *
hdr_crc16_status = OK

```
┌──────────────────────────────────┐     ┌──────────────────────────────────┐
│      LOCHDR_EVAL_RESET          │     │       LOCHDR_EVAL_FAIL          │
├──────────────────────────────────┤     ├──────────────────────────────────┤
│ hdr_fail_count ⇐ 0              │     │ hdr_fail_count ⇐ hdr_fail_count + 1 │
└──────────────────────────────────┘     └──────────────────────────────────┘
```

UCT   UCT

Figure 0–4—Local PHD reception monitor state diagram

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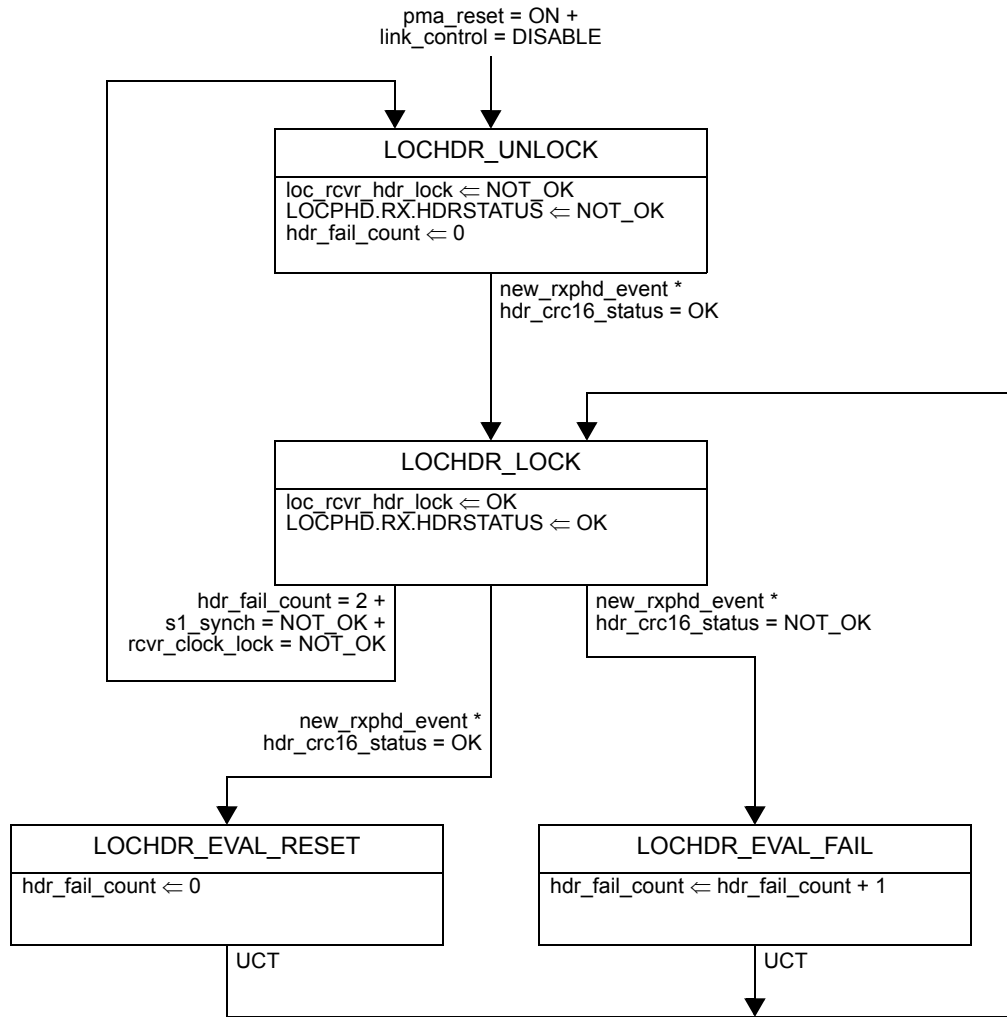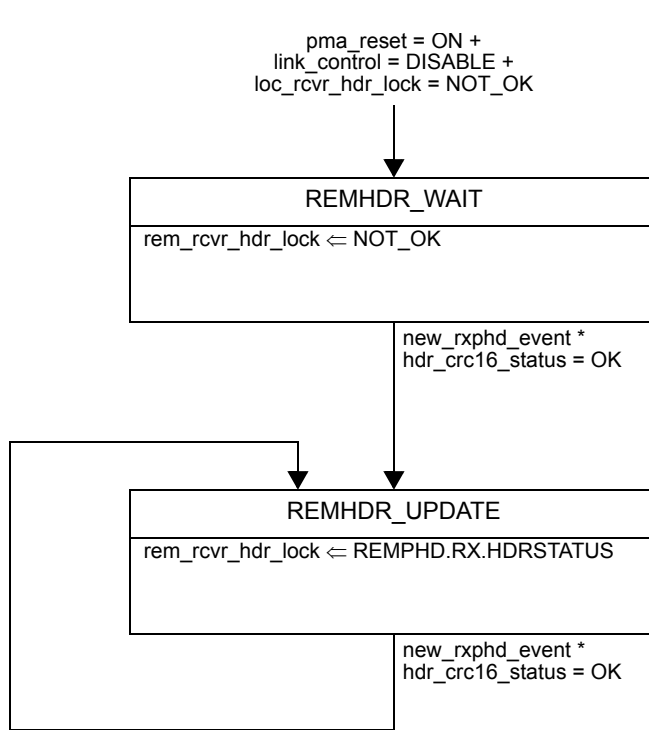42
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pma_reset = ON +
link_control = DISABLE +
loc_rcvr_hdr_lock = NOT_OK

REMHDR_WAIT

rem_rcvr_hdr_lock ⟸ NOT_OK

new_rxphd_event *
hdr_crc16_status = OK

REMHDR_UPDATE

rem_rcvr_hdr_lock ⟸ REMPHD.RX.HDRSTATUS

new_rxphd_event *
hdr_crc16_status = OK

Figure 0–5—Remote PHD reception monitor state diagram

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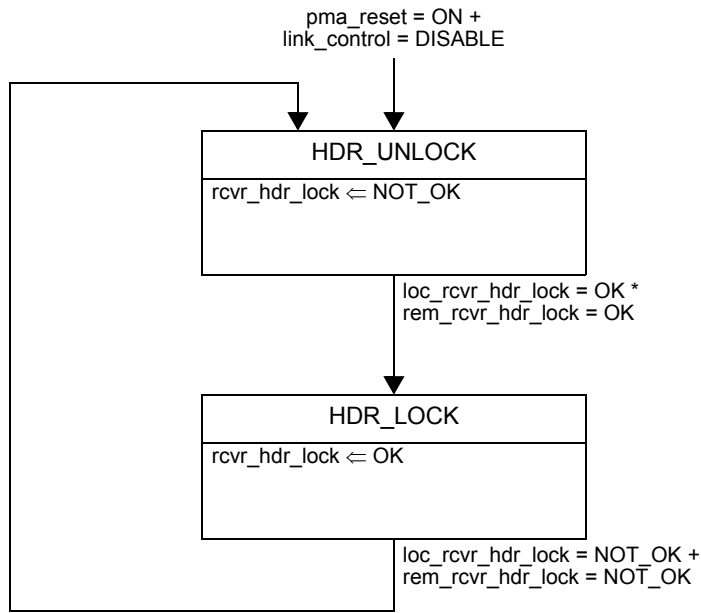42
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pma_reset = ON +
link_control = DISABLE

```
                              ┌──────────────────────────┐
                              │       HDR_UNLOCK         │
                              ├──────────────────────────┤
                              │ rcvr_hdr_lock ⇐ NOT_OK   │
                              │                          │
                              └──────────────────────────┘
```

loc_rcvr_hdr_lock = OK *
rem_rcvr_hdr_lock = OK

```
                              ┌──────────────────────────┐
                              │        HDR_LOCK          │
                              ├──────────────────────────┤
                              │ rcvr_hdr_lock ⇐ OK       │
                              │                          │
                              └──────────────────────────┘
```

loc_rcvr_hdr_lock = NOT_OK +
rem_rcvr_hdr_lock = NOT_OK

Figure 0–6—PHD monitor state diagram

pma_reset = ON +
link_control = DISABLE +
rcvr_hdr_lock = NOT_OK

```
┌──────────────────────────────────────────────┐
│               THPTX_DISABLE                    │
├──────────────────────────────────────────────┤
│ LOCPHD.TX.NEXT.THP.SETID ⇐ 0                   │
│ loc_thp_coef ⇐ 0                               │
│                                                │
│                                                │
└──────────────────────────────────────────────┘
```

rcvr_hdr_lock = OK

```
┌──────────────────────────────────────────────┐
│             THPTX_WAITFOR_REQ                  │
├──────────────────────────────────────────────┤
│ req_thp_setid ⇐ 0                              │
│                                                │
└──────────────────────────────────────────────┘
```

new_rxphd_event *
hdr_crc16_status = OK *
(REMPHD.RX.REQ.THP.SETID > 0)

```
┌──────────────────────────────────────────────┐
│             THPTX_RECEIVE_REQ                  │
├──────────────────────────────────────────────┤
│ req_thp_setid ⇐ REMPHD.RX.REQ.THP.SETID        │
│ req_thp_coef ⇐ REMPHD.RX.REQ.THP.COEF          │
│ LOCPHD.TX.NEXT.THP.SETID ⇐ REMPHD.RX.REQ.THP.SETID │
└──────────────────────────────────────────────┘
```

new_txblock_event

```
┌──────────────────────────────────────────────┐
│             THPTX_ANNOUNCE_REQ                 │
├──────────────────────────────────────────────┤
│                                                │
│                                                │
└──────────────────────────────────────────────┘
```

new_txblock_event

```
┌──────────────────────────────────────────────┐
│               THPTX_UPDATE                     │
├──────────────────────────────────────────────┤
│ loc_thp_coef ⇐ req_thp_coef                    │
│                                                │
└──────────────────────────────────────────────┘
```

new_rxphd_event *
hdr_crc16_status = OK *
(REMPHD.RX.REQ.THP.SETID > 0) *
(REMPHD.RX.REQ.THP.SETID ≠ req_thp_setid)
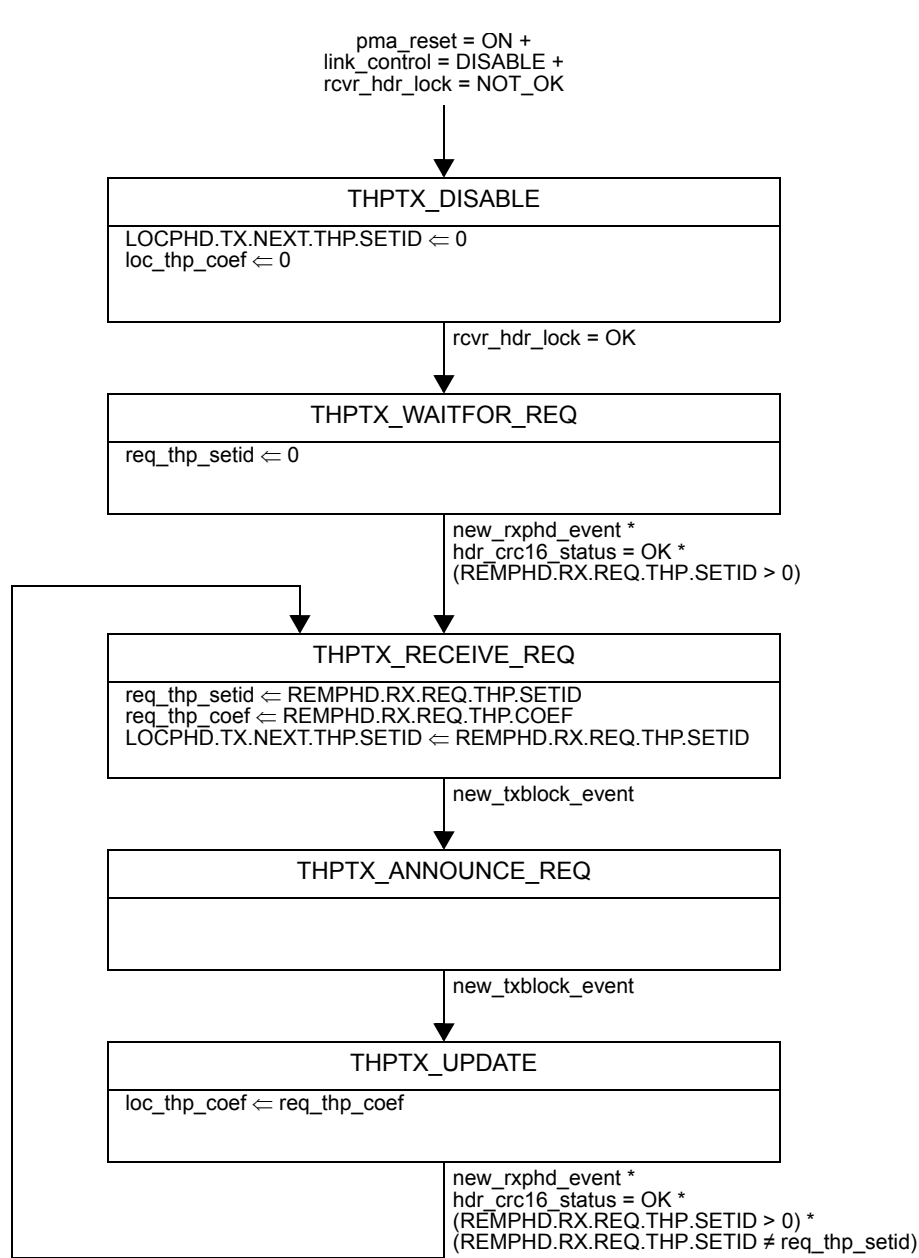
Figure 0–7—Adaptive THP TX state diagram

pma_reset = ON +
link_control = DISABLE +
rcvr_hdr_lock = NOT_OK

```
┌─────────────────────────────────────────┐
│           THPREQ_DISABLE                 │
├─────────────────────────────────────────┤
│ LOCPHD.RX.REQ.THP.SETID ⇐ 0              │
│ thp_setid ⇐ 0                            │
│ rcvr_thp_lock ⇐ NOT_OK                   │
└─────────────────────────────────────────┘
```

rcvr_hdr_lock = OK *
new_thp_coef_event

```
┌─────────────────────────────────────────┐
│           THPREQ_STORE                   │
├─────────────────────────────────────────┤
│ thp_setid ⇐ mod(thp_setid, 3) + 1        │
│ thp_coef ⇐ est_thp_coef                  │
└─────────────────────────────────────────┘
```

UCT

```
┌─────────────────────────────────────────┐
│           THPREQ_REQUEST                 │
├─────────────────────────────────────────┤
│ LOCPHD.RX.REQ.THP.SETID ⇐ thp_setid      │
│ LOCPHD.RX.REQ.THP.COEF ⇐ thp_coef        │
└─────────────────────────────────────────┘
```

new_rxphd_event *
hdr_crc16_status = OK *
(REMPHD.TX.NEXT.THP.SETID = thp_setid)

```
┌─────────────────────────────────────────┐
│           THPREQ_WAITFOR_RX              │
├─────────────────────────────────────────┤
│                                          │
│                                          │
└─────────────────────────────────────────┘
```

new_rxblock_event

```
┌─────────────────────────────────────────┐
│           THPREQ_UPDATE                  │
├─────────────────────────────────────────┤
│ rcvr_thp_lock ⇐ OK                       │
│                                          │
└─────────────────────────────────────────┘
```

new_thp_coef_event
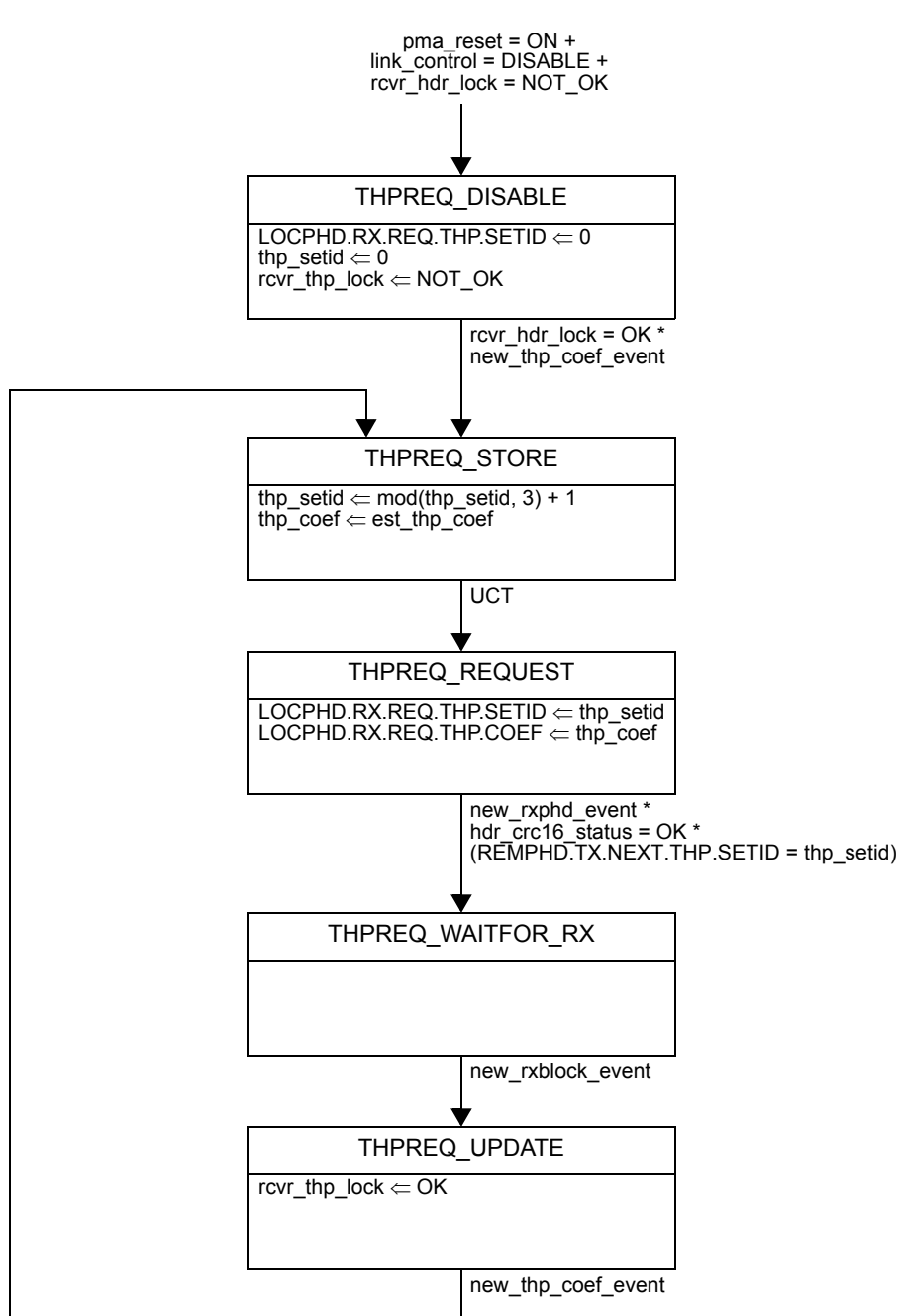
Figure 0–8—Adaptive THP REQ state diagram

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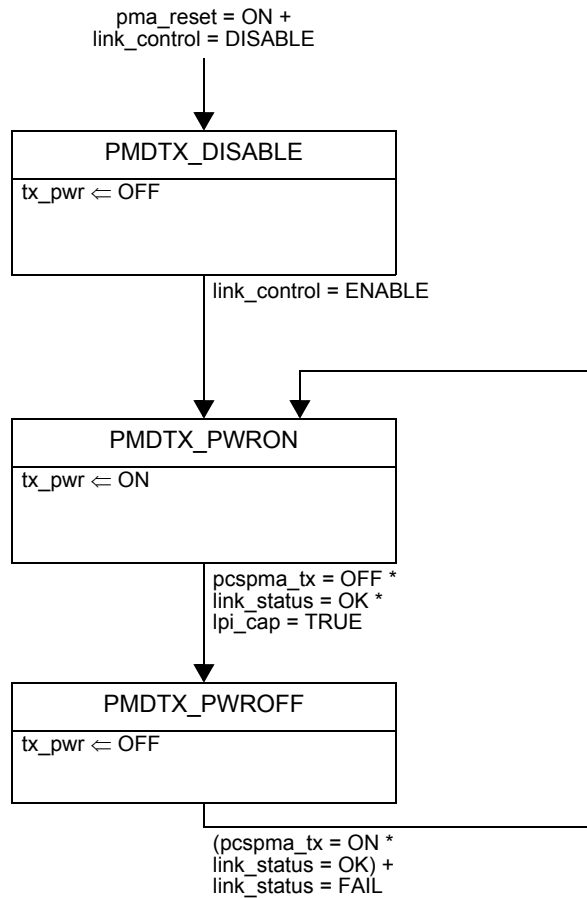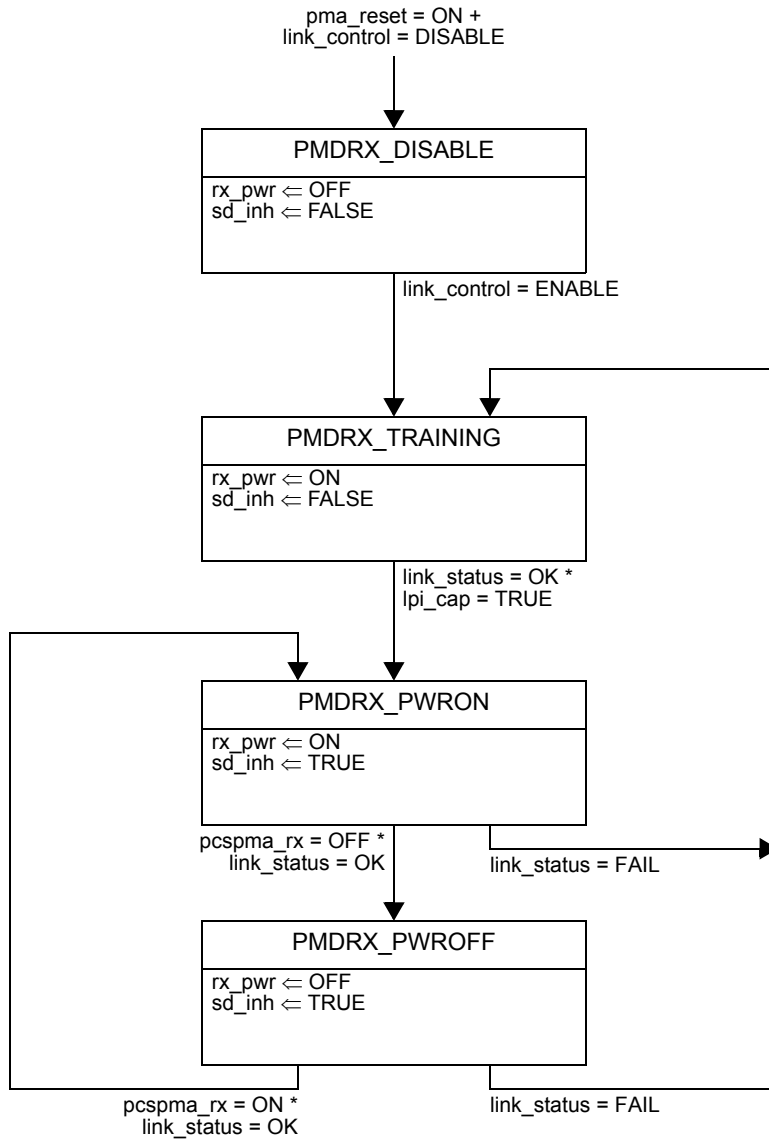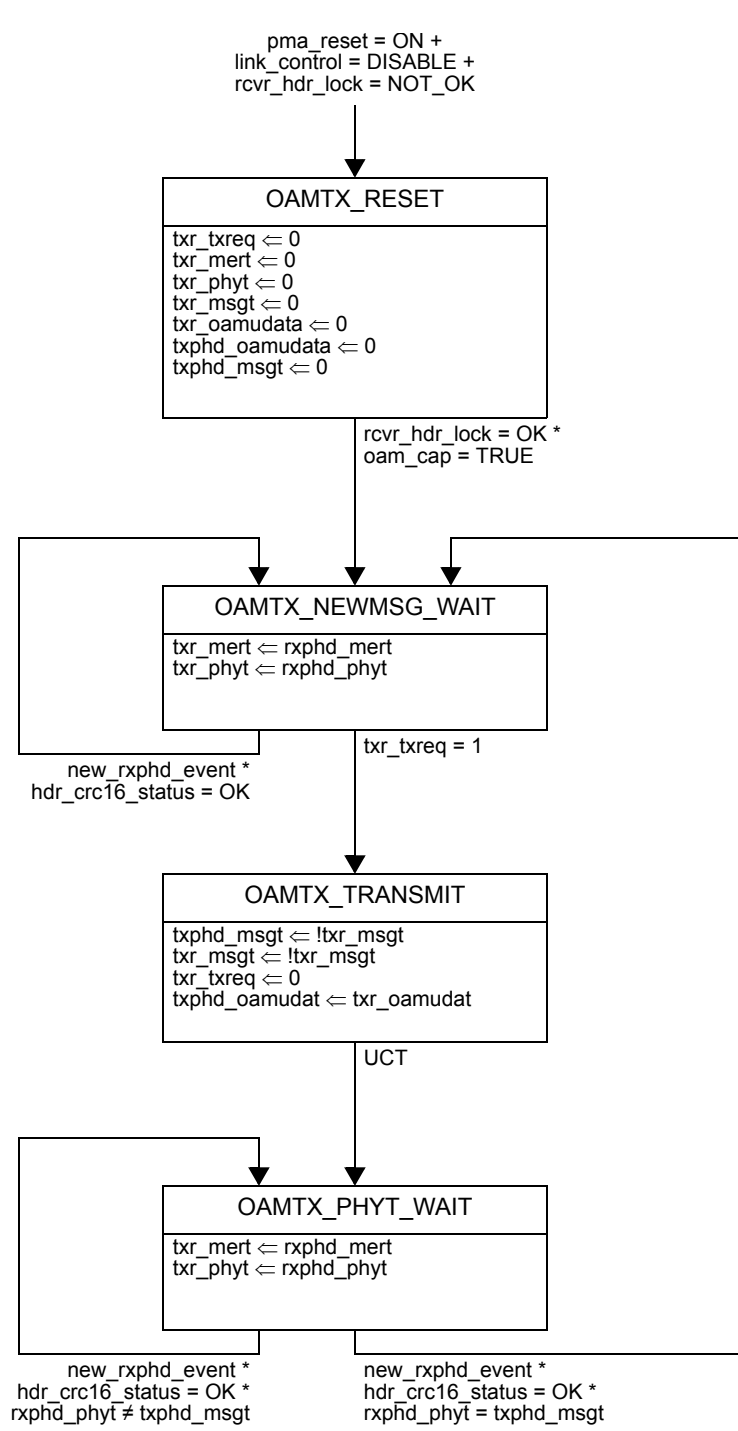43
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pma_reset = ON +
link_control = DISABLE +
rcvr_hdr_lock = NOT_OK

PMAMON_DISABLE

loc_rcvr_status ⇐ NOT_OK
LOCPHD.RX.LINKSTATUS ⇐ NOT_OK
LOCPHD.RX.LINKMARGIN ⇐ 0x80

rcvr_thp_lock = OK

PMAMON_WAITING

new_link_margin_event *
link_margin ≤ 0

new_link_margin_event *
link_margin > 0

PMAMON_FAIL

loc_rcvr_status ⇐ NOT_OK
LOCPHD.RX.LINKSTATUS ⇐ NOT_OK
LOCPHD.RX.LINKMARGIN ⇐ link_margin

new_link_margin_event *
link_margin ≤ 0

new_txblock_event *
link_margin > 0

PMAMON_OK

LOCPHD.RX.LINKSTATUS ⇐ OK
LOCPHD.RX.LINKMARGIN ⇐ link_margin

new_link_margin_event *
link_margin ≤ 0

new_txblock_event

PMAMON_SYNCH

LOCPHD.RX.LINKMARGIN ⇐ link_margin

new_link_margin_event *
link_margin ≤ 0

new_link_margin_event *
link_margin > 0

new_txblock_event

PMAMON_UPDATE

loc_rcvr_status ⇐ OK
LOCPHD.RX.LINKMARGIN ⇐ link_margin

new_link_margin_event *
link_margin ≤ 0

new_link_margin_event *
link_margin > 0

Figure 0–9—PHY quality monitor state diagram

pma_reset = ON +
link_control = DISABLE

```
┌──────────────────────────────────┐
│         PMDTX_DISABLE            │
├──────────────────────────────────┤
│ tx_pwr ⇐ OFF                     │
│                                  │
└──────────────────────────────────┘
```

link_control = ENABLE

```
┌──────────────────────────────────┐
│         PMDTX_PWRON             │
├──────────────────────────────────┤
│ tx_pwr ⇐ ON                      │
│                                  │
└──────────────────────────────────┘
```

pcspma_tx = OFF *
link_status = OK *
lpi_cap = TRUE

```
┌──────────────────────────────────┐
│         PMDTX_PWROFF            │
├──────────────────────────────────┤
│ tx_pwr ⇐ OFF                     │
│                                  │
└──────────────────────────────────┘
```

(pcspma_tx = ON *
link_status = OK) +
link_status = FAIL

Figure 0–10—PMD TX power control state diagram

pma_reset = ON +
link_control = DISABLE

PMDRX_DISABLE

rx_pwr ⇐ OFF
sd_inh ⇐ FALSE

link_control = ENABLE

PMDRX_TRAINING

rx_pwr ⇐ ON
sd_inh ⇐ FALSE

link_status = OK *
lpi_cap = TRUE

PMDRX_PWRON

rx_pwr ⇐ ON
sd_inh ⇐ TRUE

pcspma_rx = OFF *   link_status = FAIL
link_status = OK

PMDRX_PWROFF

rx_pwr ⇐ OFF
sd_inh ⇐ TRUE

pcspma_rx = ON *   link_status = FAIL
link_status = OK

Figure 0–11—PMD RX power control state diagram

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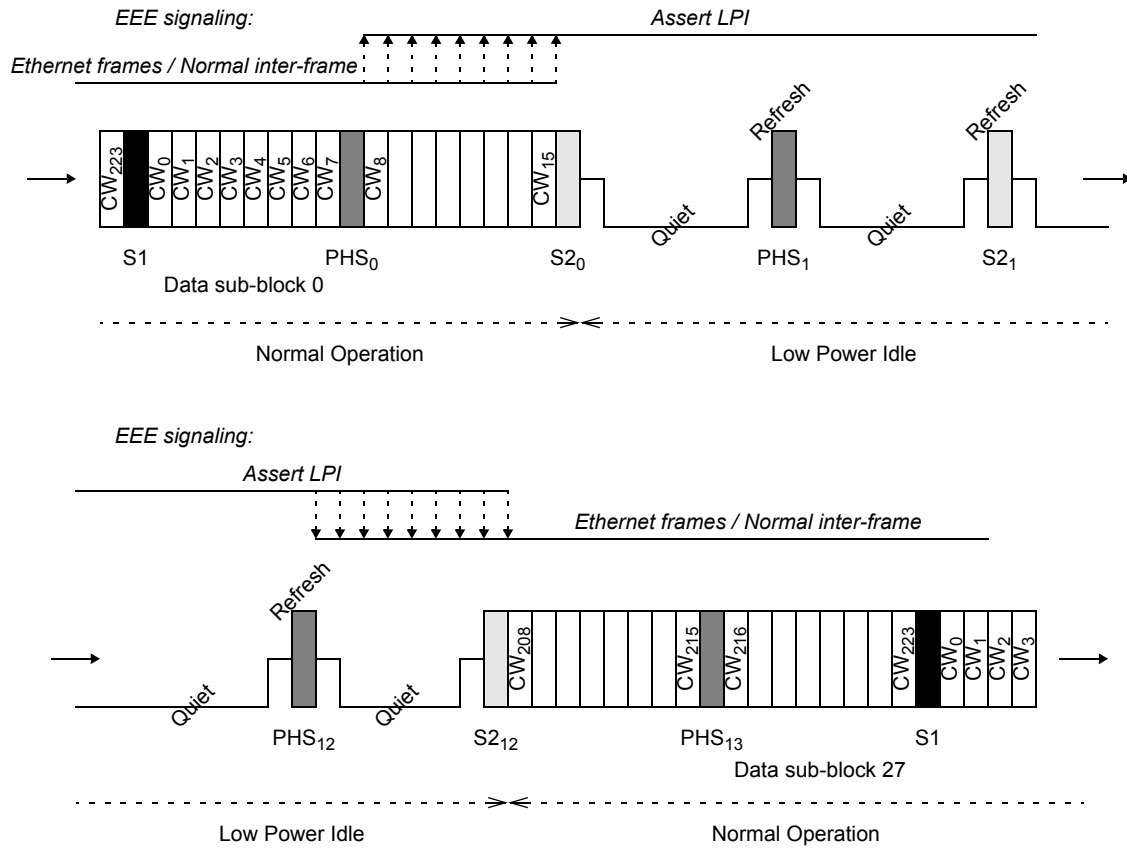40
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pma_reset = ON +
link_control = DISABLE +
rcvr_hdr_lock = NOT_OK

OAMTX_RESET

txr_txreq ⇐ 0
txr_mert ⇐ 0
txr_phyt ⇐ 0
txr_msgt ⇐ 0
txr_oamudata ⇐ 0
txphd_oamudata ⇐ 0
txphd_msgt ⇐ 0

rcvr_hdr_lock = OK *
oam_cap = TRUE

OAMTX_NEWMSG_WAIT

txr_mert ⇐ rxphd_mert
txr_phyt ⇐ rxphd_phyt

new_rxphd_event *
hdr_crc16_status = OK

txr_txreq = 1

OAMTX_TRANSMIT

txphd_msgt ⇐ !txr_msgt
txr_msgt ⇐ !txr_msgt
txr_txreq ⇐ 0
txphd_oamudat ⇐ txr_oamudat

UCT

OAMTX_PHYT_WAIT

txr_mert ⇐ rxphd_mert
txr_phyt ⇐ rxphd_phyt

new_rxphd_event *
hdr_crc16_status = OK *
rxphd_phyt ≠ txphd_msgt

new_rxphd_event *
hdr_crc16_status = OK *
rxphd_phyt = txphd_msgt

Figure 0–12—PHY 1000BASE-H OAM transmit control state diagram

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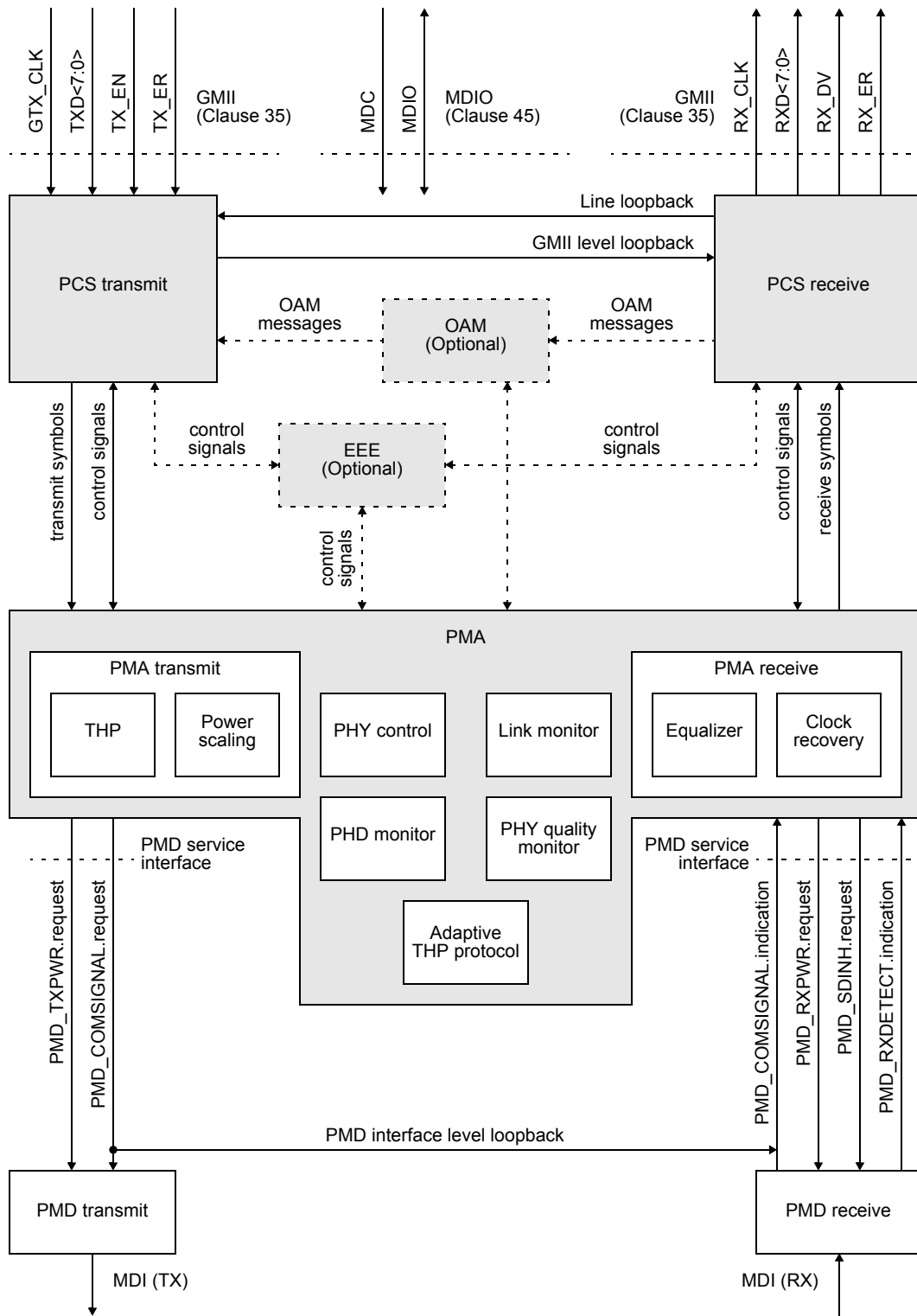44
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pma_reset = ON +
link_control = DISABLE +
rcvr_hdr_lock = NOT_OK

OAMRX_RESET

rxr_rxval ⇐ 0
txphd_phyt ⇐ 0
txphd_mert ⇐ 0
rxr_msgt ⇐ 0
rxr_oamudat ⇐ 0

rcvr_hdr_lock = OK *
oam_cap = TRUE

OAMRX_NEWMSG_WAIT

new_rxphd_event *
hdr_crc16_status = OK
rxphd_msgt ≠ rxr_msgt

OAMRX_RXR_UPDT

rxr_rxval ⇐ 1
rxr_msgt ⇐ rxphd_msgt
rxr_oamudat ⇐ rxphd_oamudat
txphd_phyt ⇐ rxphd_msgt

read_RXOAM_DATA8_event

OAMRX_MERT_UPDT

txphd_mert ⇐ rxr_msgt
rxr_rxval ⇐ 0

UCT
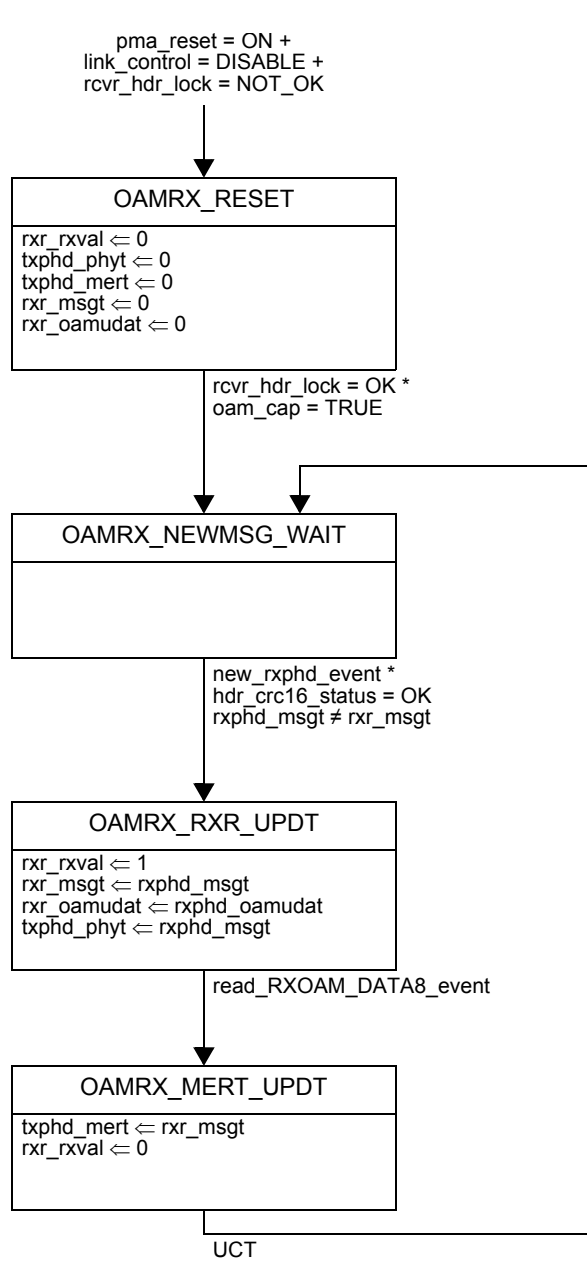
Figure 0–13—PHY 1000BASE-H OAM receive control state diagram

Figure 0–14—LPI operation

Figure 0–15—1000BASE-RHx functional block diagram