Issues with ONU re-registration in 802.3ca

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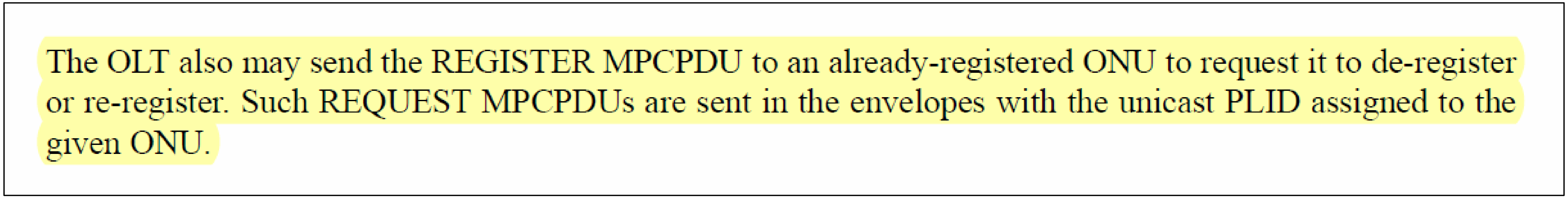
ONU Re-registration

- ONU Re-registration operation is described in 802.3ca

In 144.3.6.4



The OLT also may send the REGISTER MPCPDU to an already-registered ONU to request it to de-register or re-register. Such REQUEST MPCPDUs are sent in the envelopes with the unicast PLID assigned to the given ONU.

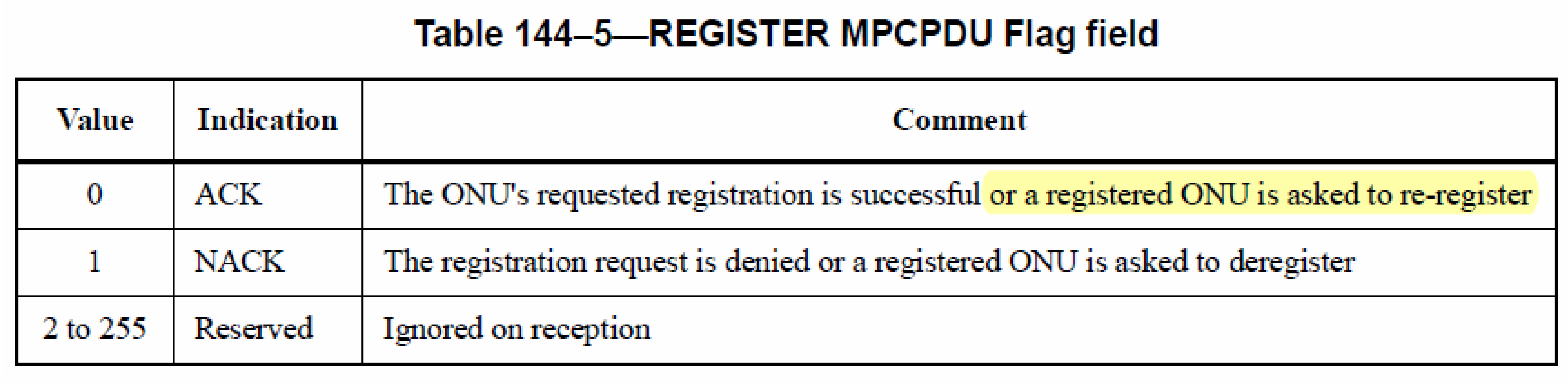


Table 144–5—REGISTER MPCPDU Flag field

Value	Indication	Comment
0	ACK	The ONU's requested registration is successful or a registered ONU is asked to re-register
1	NACK	The registration request is denied or a registered ONU is asked to deregister
2 to 255	Reserved	Ignored on reception

Problem statement

- The spec says that the OLT can request a registered ONU to de-register or re-register
  - De-registration means that ONU becomes unregistered and will participate in discovery and registration process (the ONU will send REGISTER_REQ MPCPDU)
  - Re-registration means that ONU will update its registration parameters (PLID, MLID, Sp1Length, Sp2Length, or Sp3Length) without becoming unregistered. After updating the parameters, ONU just sends REGISTER_ACK.

- ONU Registration state diagram 144-22 supports re-registration, but the OLT Registration state diagram 144-21 can never send a REGISTER MPCPDU for re-registration. This is an error in the state diagram.

ONU state diagram supports re-registration

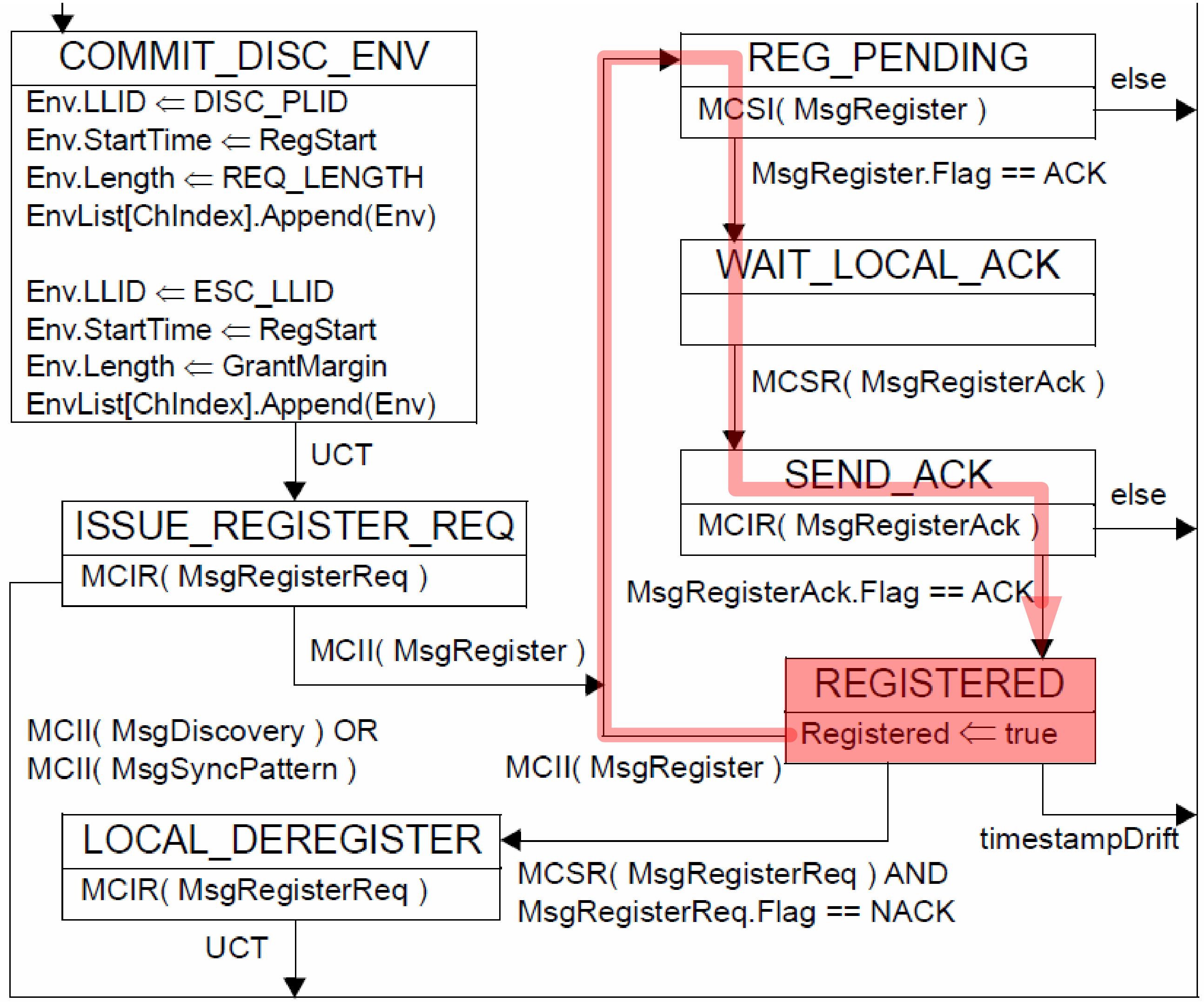
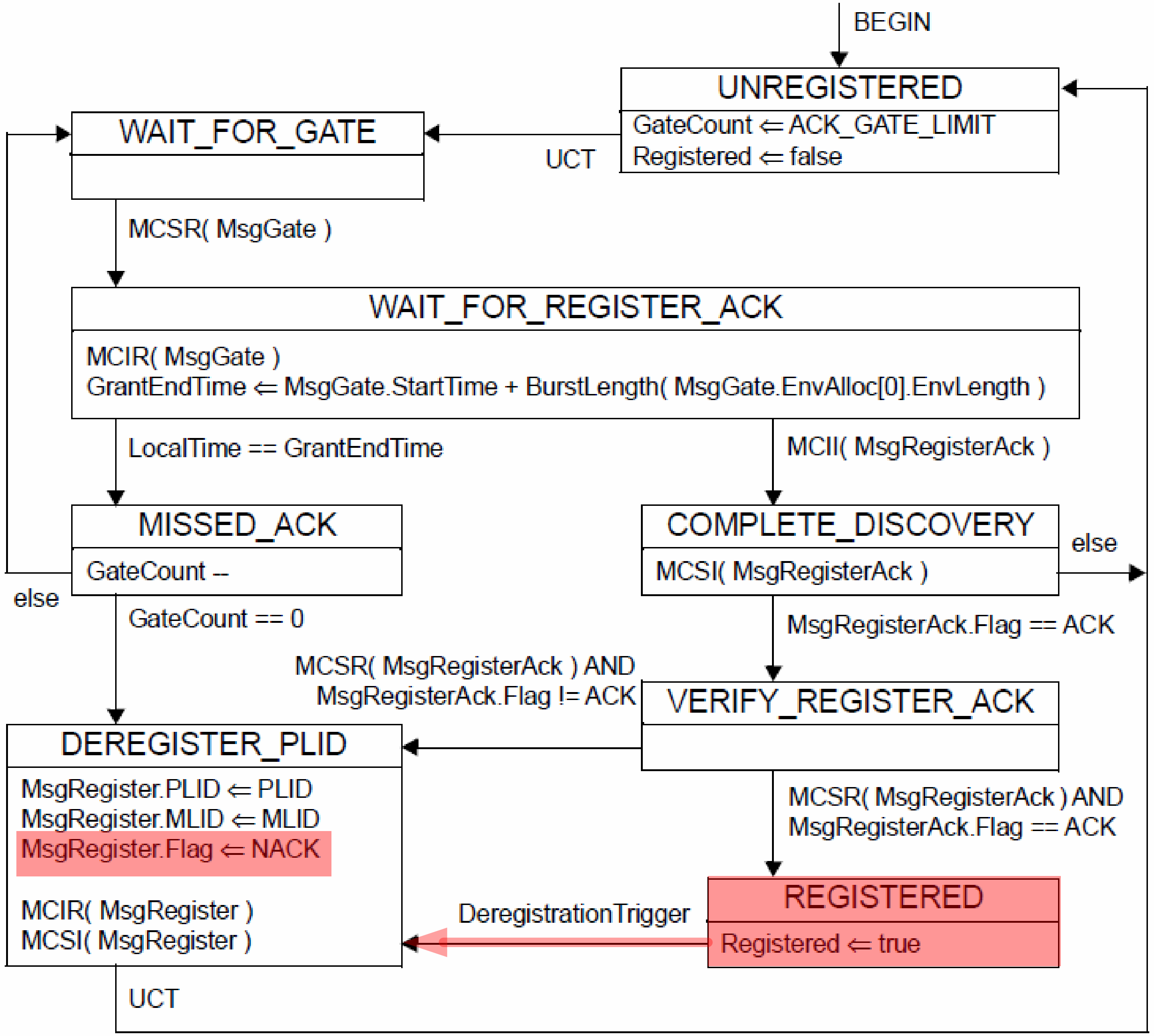


Figure 144–22—ONU Registration state diagram

1. A registered ONU receives REGISTER MPCPDU on its assigned PLID
2. ONU transitions to state REG_PENDING. *Registered* variable remains ‘true’. Payload of REGISTER MPCPDU is passed to MPCP Client.
3. If REGISTER Flag was ACK (i.e., this is a re-registration), go to state WAIT_LOCAL_ACK and wait for the MPCP client to confirm setting new parameters.
4. When new parameters are confirmed, generate REGISTER_ACK MPCPDU and queue it for transmission (may be on a new PLID).
5. Return to REGISTERED state.

OLT Registration Completion state diagram



BEGIN

UNREGISTERED
GateCount ⇐ ACK_GATE_LIMIT
Registered ⇐ false

UCT

WAIT_FOR_GATE

MCSR(MsgGate)

WAIT_FOR_REGISTER_ACK
MCIR(MsgGate)
GrantEndTime ⇐ MsgGate.StartTime + BurstLength(MsgGate.EnvAlloc[0].EnvLength)

LocalTime == GrantEndTime

MCII(MsgRegisterAck)

MISSED_ACK
GateCount --

else

COMPLETE_DISCOVERY
MCSI(MsgRegisterAck)

else

GateCount == 0

MsgRegisterAck.Flag == ACK

MCSR(MsgRegisterAck) AND
MsgRegisterAck.Flag != ACK

VERIFY_REGISTER_ACK

DEREGISTER_PLID
MsgRegister.PLID ⇐ PLID
MsgRegister.MLID ⇐ MLID
MsgRegister.Flag ⇐ NACK

MCIR(MsgRegister)
MCSI(MsgRegister)

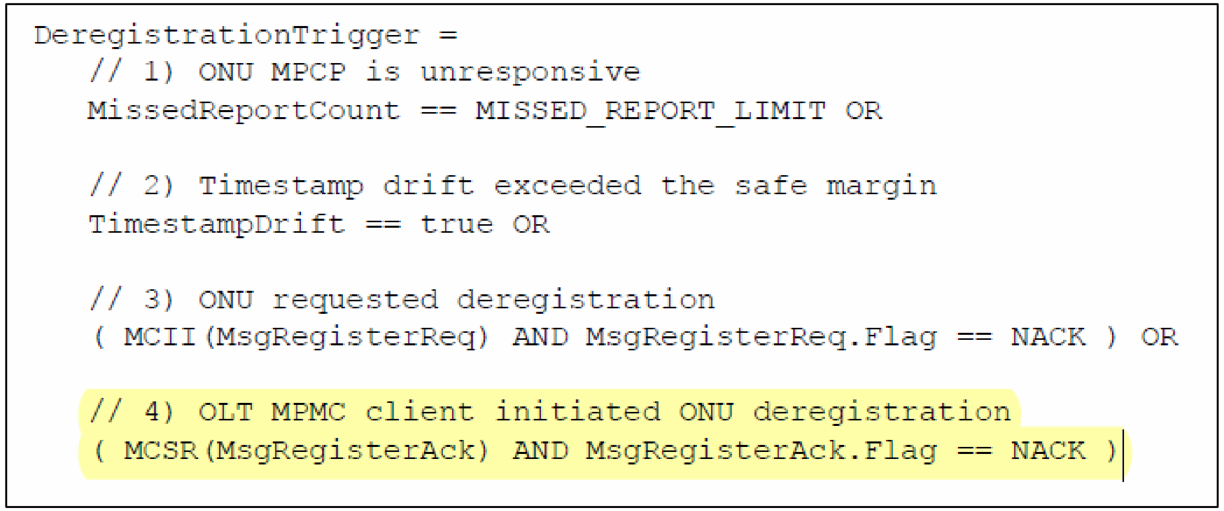
MCSR(MsgRegisterAck) AND
MsgRegisterAck.Flag == ACK

DeregistrationTrigger

REGISTERED
Registered ⇐ true

UCT

Figure 144–21—OLT Registration Completion state diagram



```
DeregistrationTrigger =
   // 1) ONU MPCP is unresponsive
   MissedReportCount == MISSED_REPORT_LIMIT OR

   // 2) Timestamp drift exceeded the safe margin
   TimestampDrift == true OR

   // 3) ONU requested deregistration
   ( MCII(MsgRegisterReq) AND MsgRegisterReq.Flag == NACK ) OR

   // 4) OLT MPMC client initiated ONU deregistration
   ( MCSR(MsgRegisterAck) AND MsgRegisterAck.Flag == NACK )
```

1. *DeregistrationTrigger* only activates when OLT wants to deregister the ONU

2. OLT always sends REGISTER MPCPDU with Flag = NACK (in state DEREGISTER_PLID). In no state can the OLT send REGISTER with Flag = ACK.

3. Another issue: Deregistration REGISTER MPCPDU does not carry *Sp1Length*, *SP2Length*, *SP3Length* and *EchoPendingEnvelopes* values, in violation of 144.3.6.4.

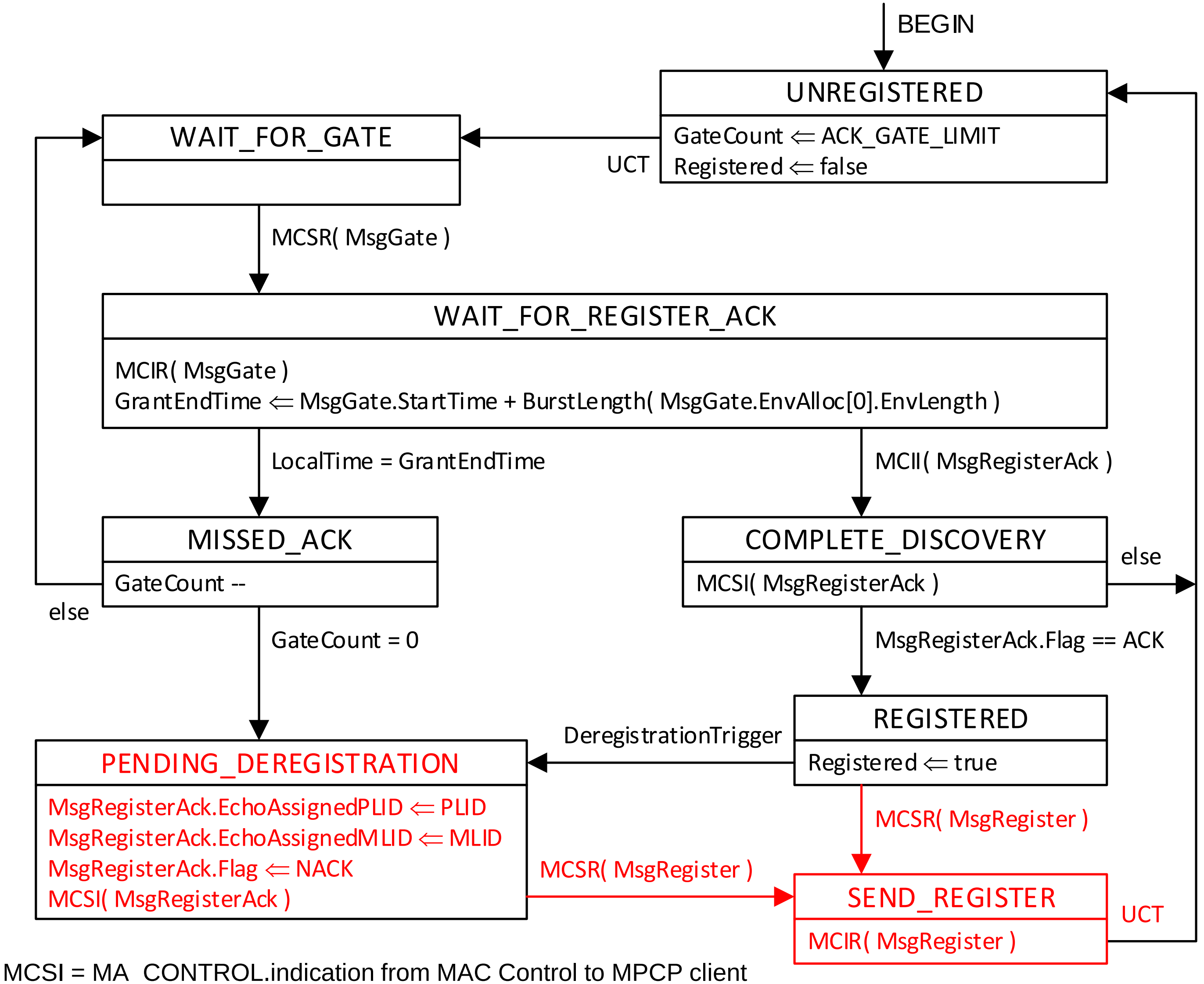
Proposed Remedy (1/2)

- Modify OLT Registration Process state diagram (Fig 144-21) as shown.

- In PENDING_DEREGISTRATION state, the OLT Registration Process informs the MPCP Client about the events that client cannot detect:
  1. REGISTER_ACK form ONU is not received after *ACK_GATE_LIMIT* attempts
  2. *DeregistrationTrigger* is activated (see next slide)

  (Message MsgRegisterAck is formed in the PENDING_DEREGISTRATION state and is passed to local MPCP Client as an indication, i.e., it is reused for local intra-layer signaling).

- The decision to de-register or re-register always comes from the MPCP client.



MCSI = MA_CONTROL.indication from MAC Control to MPCP client
MCSR = MA_CONTROL.request from MPCP client to MAC Control

Proposed Remedy (2/2)

- Modify the definition of the *DeregistrationTrigger* variable (144.3.7.3) to only activate on external events that MPCP client needs to be informed of:
  1. MPCP timeout
  2. Timestamp drift
  3. Received ONU’s request to be deregistered

- The MPCP client does not need to be informed of a decision that it itself made, such as a decision to de-register or re-register an ONU.

DeregistrationTrigger

Type: Boolean

Description: This variable is set to true when at least one of multiple conditions for ONU deregistration becomes true. Otherwise, the variable is set to false. The DeregistrationTrigger is an alias for the following code:

```
DeregistrationTrigger =
    // 1) ONU MPCP is unresponsive
    MissedReportCount == MISSED_REPORT_LIMIT OR

    // 2) Timestamp drift exceeded the safe margin
    TimestampDrift == true OR

    // 3) ONU requested deregistration
    ( MCII(MsgRegisterReq) AND MsgRegisterReq.Flag == NACK ) ~~OR~~

    ~~// 4) OLT MPMC client initiated ONU deregistration~~
    ~~( MCSR(MsgRegisterAck) AND MsgRegisterAck.Flag == NACK )~~
```

Thank you