End-of-Burst Indication

Current Approach *(D1.8023)*

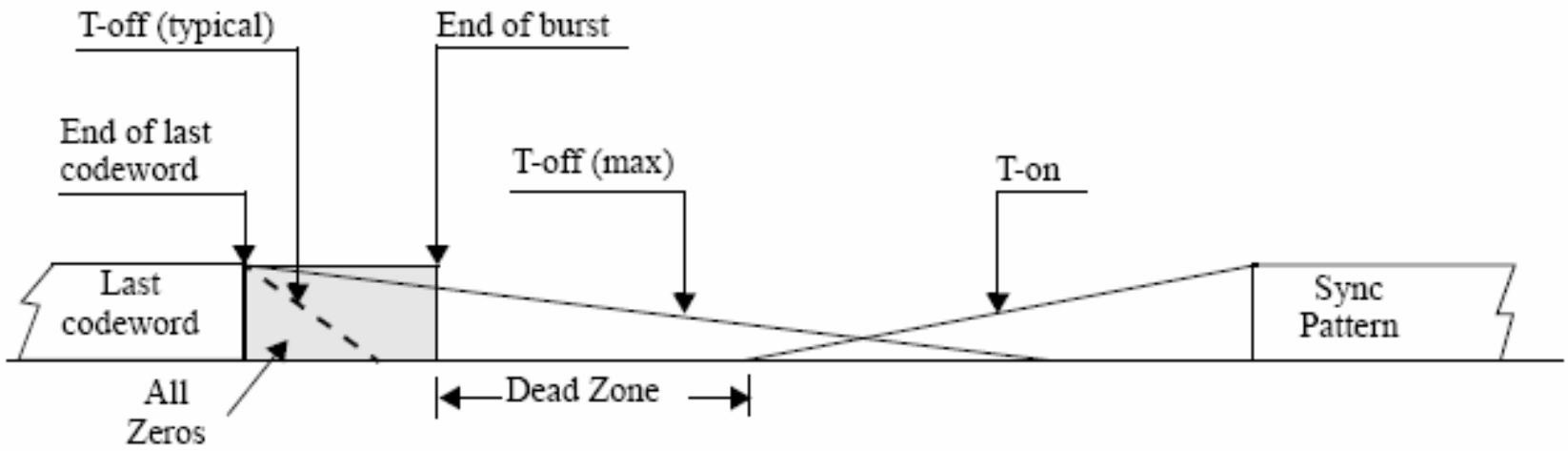
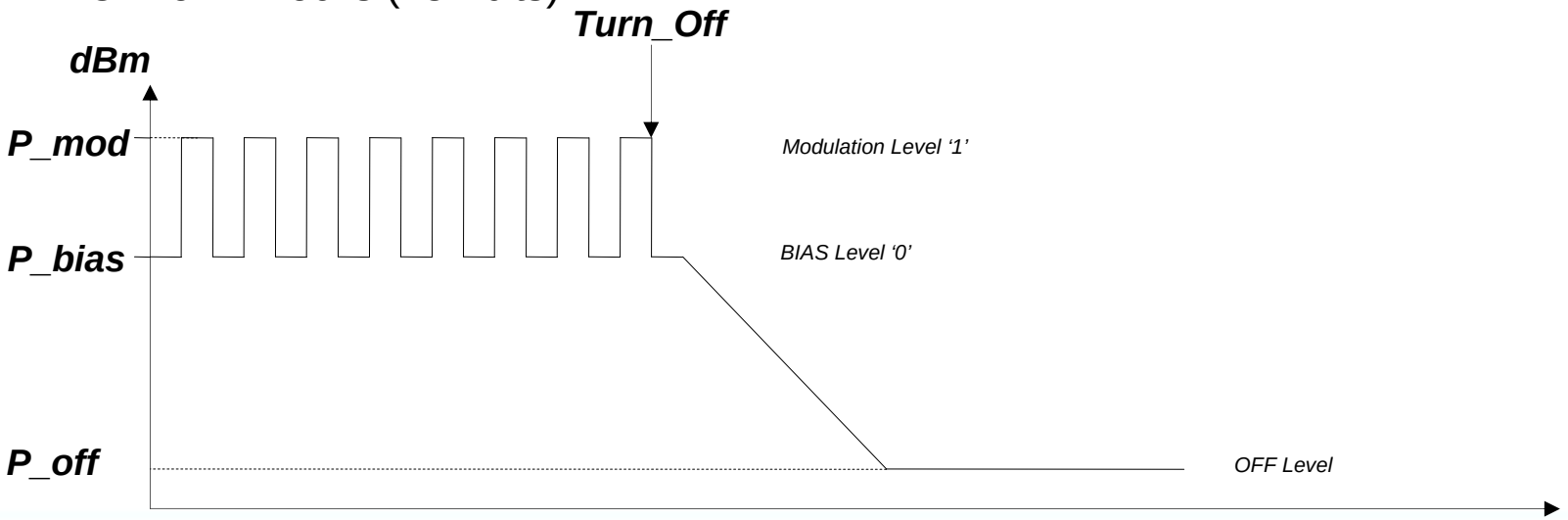


Figure 92–16—ONU burst transmission termination

The Problem with the Current Approach

- When the Laser Diode is Turned OFF, there is no meaning for any transmission ‘0’ or ‘1’ anymore
- When the Guard Time, at the OLT Receiver, is longer than the CID Time Constant, the stability of the Limiting Amplifier output depends on the architecture of the LIA and the input Noise
- Signal OK – Signal_OK indicates that the input signal is below its threshold
- The AC Coupling at the OLT receiver provides stable output as function to the Time Constant (RC)
- AC Coupling receiver designed to support up to 64 bits of CID
- In order to receive consecutive 2 Blocks of ‘0’, the Time Constant should support CID of 2 Blocks (132 bits)



Why we can't trust Signal_OK

- According to 802.3 Clause 51:

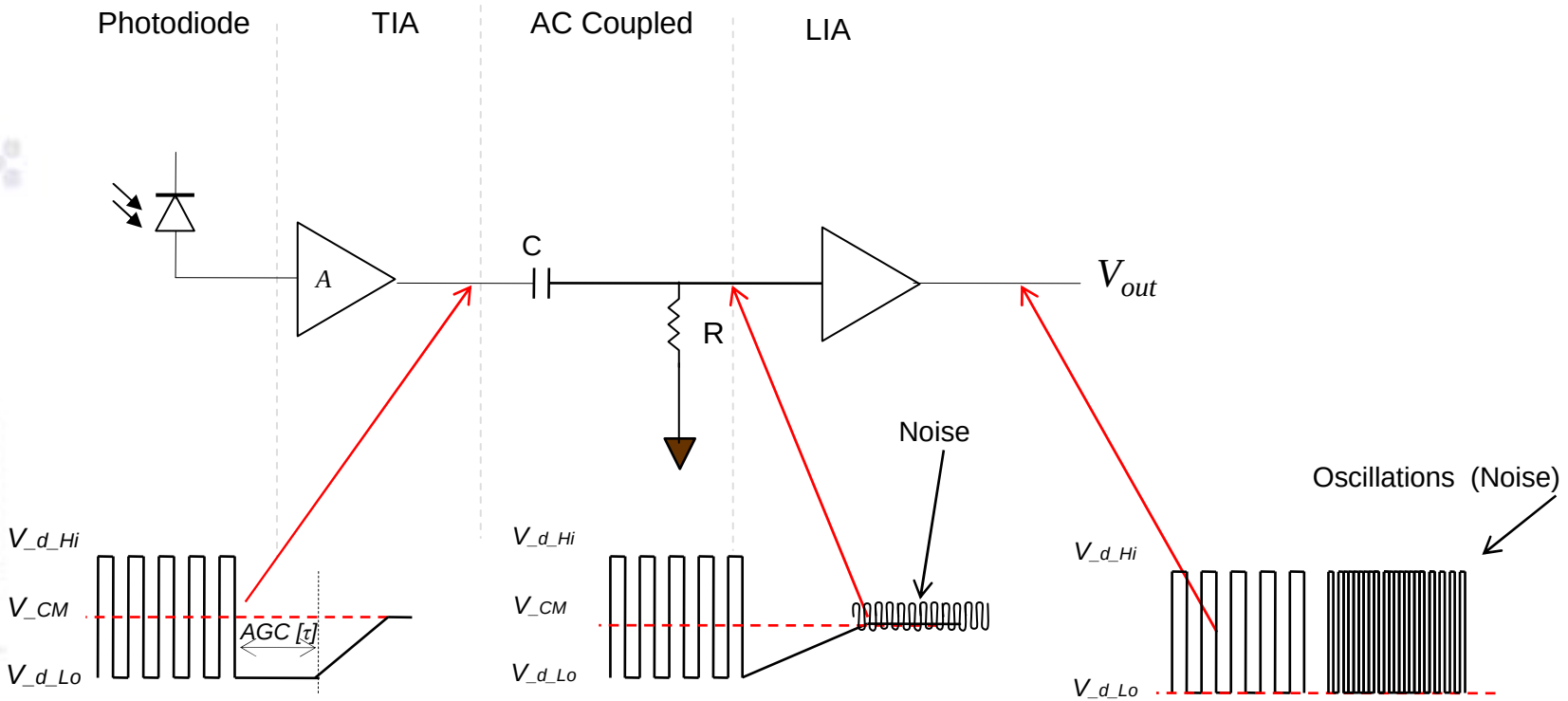
51.2.3.1 Semantics of the service primitive

PMA_SIGNAL.indication (SIGNAL_OK)

The SIGNAL_OK can take one of two values: OK or FAIL. A value of FAIL denotes that invalid data is being presented to the PMA client. A value of OK does not guarantee valid data is being presented to the PMA client.

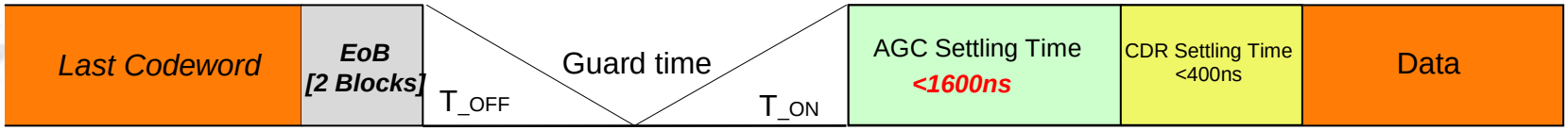
An AC Coupled Receiver

- Assume the OLT AFE is AC coupled



- The V_{LIA_In} aspire to reach the $C_{\_CM}$ when no data is present at the LIA input
- At this situation, the Common Mode noise might exceed the LIA threshold and the LIA output will be '1'

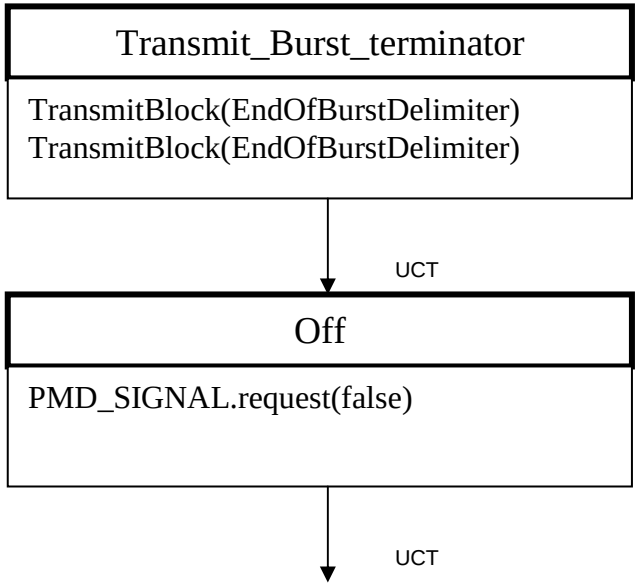
An Alternative Approach: Timing



- 802.3av has been specified the AGC Settling time to be 800ns (max) when 64 bits of CID were allowed
- Since we are using 132 bits of "CID" for End-of-Burst Indication, we need to double the AGC Settling Time to ***1600ns!***

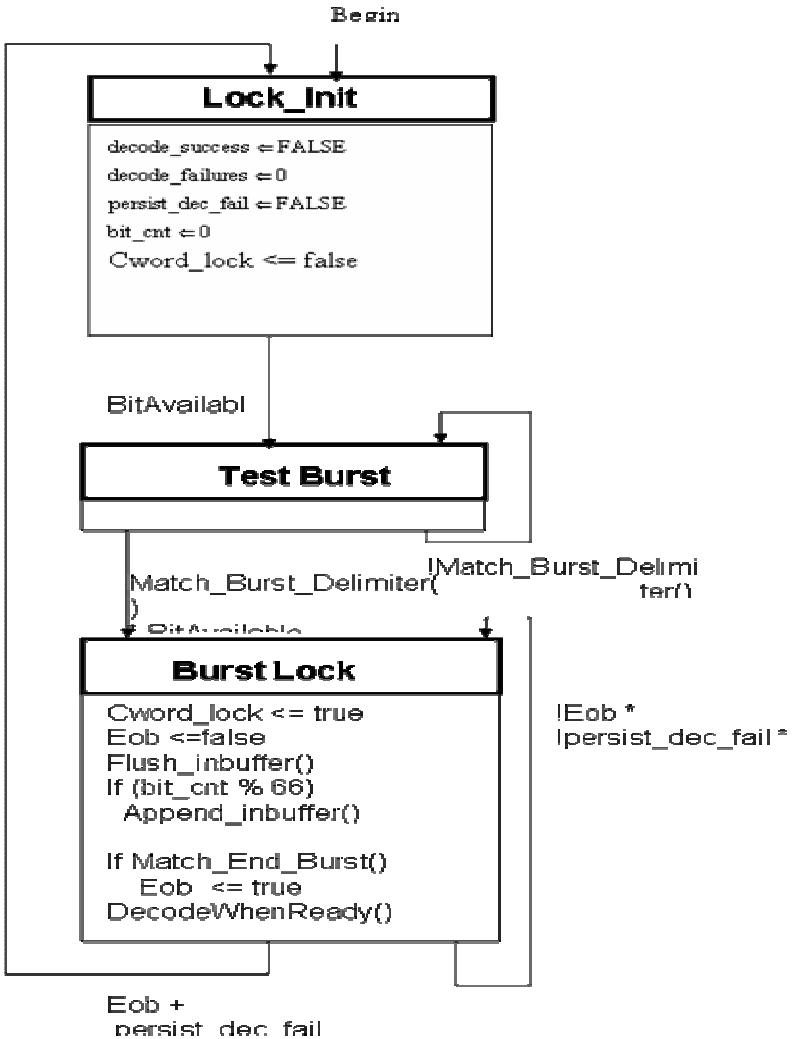
The Alternative: Change to Tx State Diagram

The Transmission_burst_delimiter state now appears **before** laser turnoff in Fig. 92-16



EndOfBurstDelimiter can be any balanced 66b pattern – so 10 followed by 0x555555555555555 is suggested

The Alternative: OLT Sync FSM (92-19)



BitAvailable:

Flag that returns true when and only when there exists an unprocessed bit from the PMA

Match_Burst_Delimiter():

returns true when and only when the Hamming Distance between the Start-of-Burst Delimiter and the last 66bits received is 12 or less

Match_End_Burst():

returns true if and only if a full FEC codeword has been accumulated and the Hamming Distance between the End-of-Burst Delimiter and the last 2 blocks accumulated is 14 or less

PMC-SIERRA

Back Up

Coupling Capacitor – Calculation

$$\Delta V = 10\% V_{P-P}$$

$$\Delta V = \frac{10}{100} V_{P-P}$$

$$\frac{10}{100} V_{P-P} = \frac{V_{P-P}}{2}(1 - e^{\frac{-t}{\tau}})$$

$$e^{\frac{-t}{\tau}} = 1 - \frac{\frac{10}{100} V_{P-P}}{\frac{V_{P-P}}{2}}$$

$$e^{\frac{-t}{\tau}} = 0.5$$

$$t = -\tau \ln 0.5$$

$$t = 0.7\tau$$

$$\tau = 1.44t$$

$$t = N_{2\_Blocks} * T$$

$$\tau = RC$$

$$C = \frac{1.44 * N_{2\_Blocks} * T}{R}$$

$$C = 380\,pf$$

Time Constant

- Time Constant to provide stable consecutive 2 Blocks of ‘1’ or ‘0’
- The Time Constant should be equal to 2 Blocks → 132bits

$$N_{preamble} = \frac{-4 \cdot N_{2\_Blocks}}{\ln(1-X)}$$

Where:

N_{2_Blocks} = Number of bits during 2 Blocks

$N_{preamble}$ = Required Preamble length [bits]

X = Deviation of baseline permitted during CID

$$N = \frac{-5*132}{\ln(1-0.1)} = 6264 bits$$

- In order to maintain 2 consecutive Blocks of ‘1’ or ‘0’, we have to have at least 6264 bits Preamble
- AGC Settling_Time has been defined to be 800ns (8000 bits)