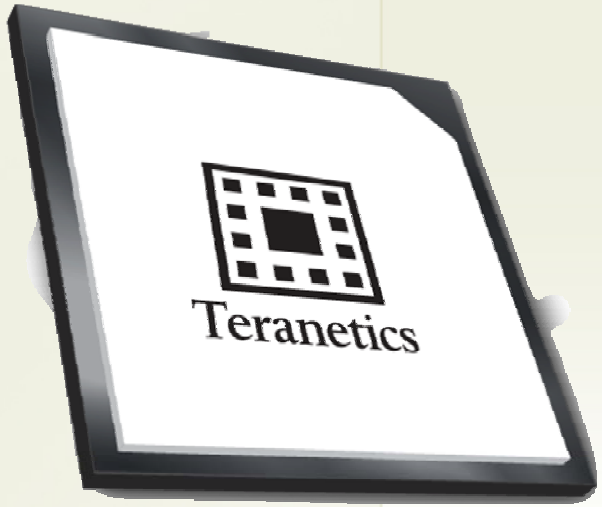

Additional Test Modes Definition for 10GBASE-T LPI

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Supporters

- ADD YOUR NAME HERE

Test Modes - Overview

- Problem: 10GBASE-T added new signaling type (Alert) and new signaling schedule (Staggering Quiet/Refresh cycle). New Test Modes have to be added to ensure correctness of the implementation
- Requirements:
  - Verify Alert Pattern implementation – as stated in 55.4.2.2.1
  - Verify Full Quiet/Refresh scheme implementation – as specified at 55.3.5
    - Q: Do we need to do it for all 4 Tr options? Can be little bit costly…
  - Verify frequency stability – as specified at 55.5.3.5
- Method of implementation: Update register 1.132 with two new test:
  - 1.132.9 – Test Mode 8 – for Alert pattern
  - 1.132.8 – Test Mode 9 – for Quiet/Refresh and Frequency stability
  - 1.132.7:6 – For Tr value selection while at Test Mode 9

Test Mode 8 – Alert Pattern testing

- Alert is Transmitted without THP, using PAM-2 mapping scheme. It should be visible enough at the Tx output.
- Test Mode proposal: Test pattern to consist
  - 128 zeros
  - Master Alert Pattern (No THP, PBO-0)
  - 128 zeros
  - Slave Alert Pattern (No THP, PBO-0)
- Test Pattern to be Transmitted on channel A only
- Test Fixture 1 should be used for this test – as specified at clause 55.5.2.1, Figure 55-28
- In order to pass the test, Master and Slave Alert patterns should be compliant with clause 55.4.2.2.1 definitions

Alert Testing Procedure – *À la UNH…*

1. Configure the DUT so that it is operating in transmitter test mode 8 – that is, set bit 1.132.9
2. Connect pair A from the MDI to test fixture 1 – see Figure 55-28
3. Synchronize to either Master or Slave version of the Alert Pattern. Capture data with Oscilloscope
4. Analyze captured patterns by comparing it to those defined in clause 55.4.2.2.1
5. For enhanced accuracy, repeat steps 3-6 multiple times. All measurements should provide identical results.
6. See an example of the Test Setup below – taken from UNH Test suite for 10GBASE-T PMA compliance, Figure 55.5.A.1

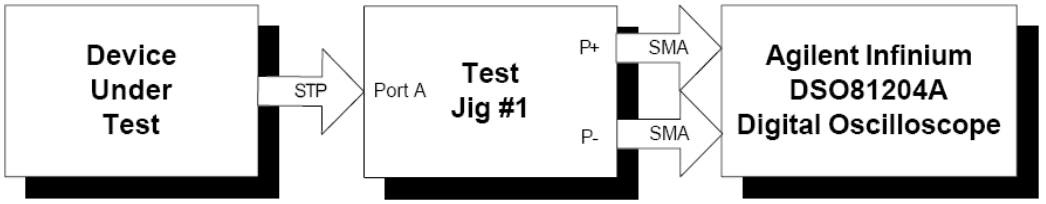


Figure 55.5.A-1: Test Setup #1

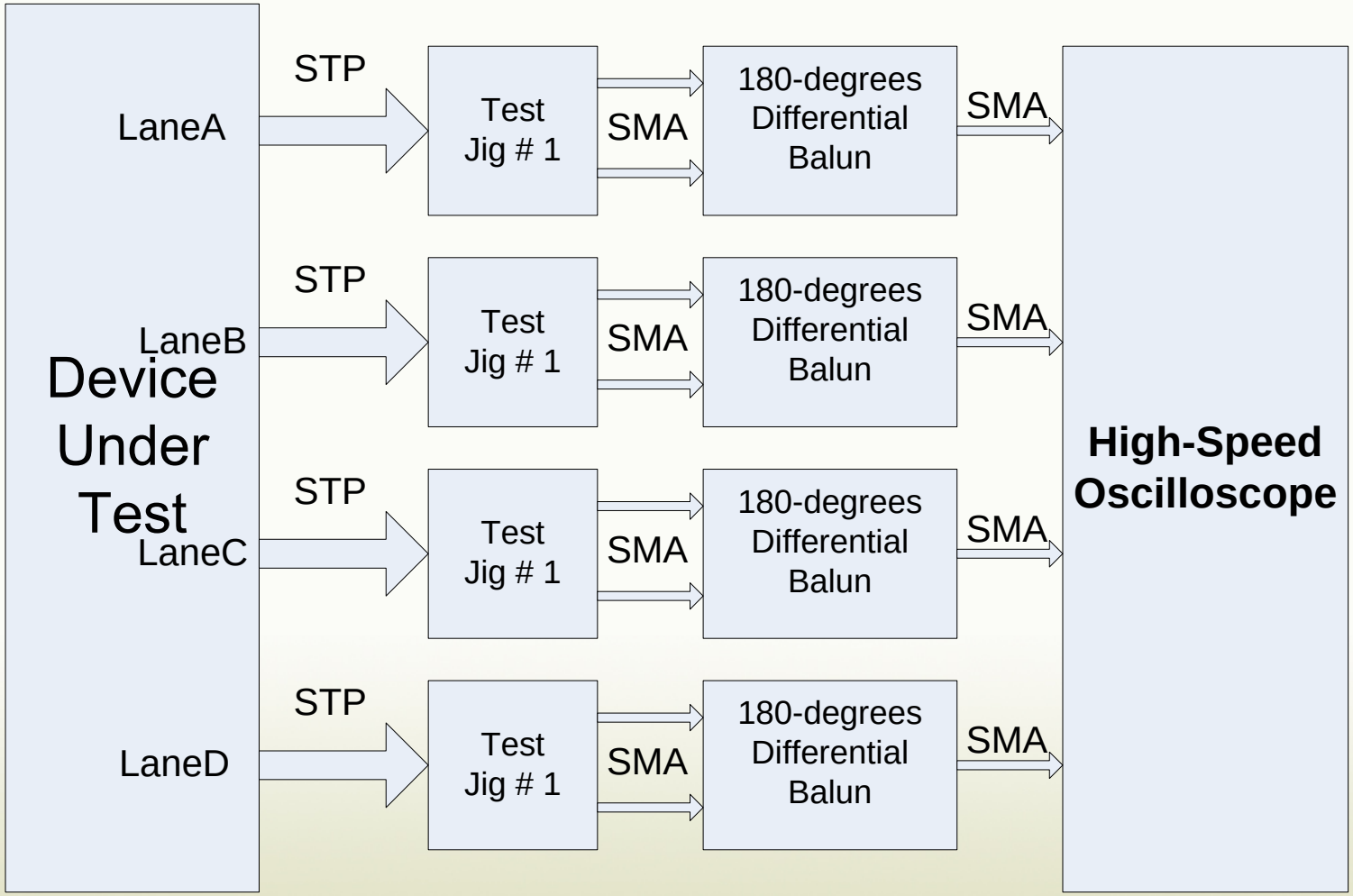
Test Mode 9

- This test mode is for testing Full Quite/Refresh cycle as defined at 55.3.5.
- Test Fixture 1 should be used for this test – as specified at clause 55.5.2.1, Figure 55-28
- When configured to Test Mode 9, PHY goes into LPI mode and performs full LPI cycles in accordance to requested Tr value.
- During Refresh period, PHY should transmit Test Mode 2 pattern {*Two +16 symbols followed by two –16 symbols continually*}
- In order to pass the test
  - Schedule of the Quiet/Refresh Transmission should be compliant with clause 55.3.5 description
  - Frequency stability of the transmitter should be compliant with clause 55.5.3.5 requirement (less then 0.1ppm/sec)

Quiet/Refresh cycle analysis and Frequency stability test procedure

1. Configure the DUT so that it is operating in transmitter test mode 9 – that is, set bit 1.132.8 and configure bits 1.132.7:6 to zero.
2. Connect all four pairs from the MDI to test fixtures 1
3. Synchronize to Refresh pattern on the Lane A. Dump sufficient amount of data for following post-processing
4. Analyze captured patterns by comparing it to the clause 55.3.5 requirements
5. Repeat items 3-4 for other Tr settings (1.132.7:6 = 1,2, and 3).
6. Configure DUT to operate with most power-saving effective Tr setting
7. Capture several Refresh frames on pair A only with interval of several seconds one from other. Analyze captured data in order to make sure it meets frequency stability requirement as defined in clause 55.5.3.5

Test Mode 9 proposed Test Setup



Summary

- Two new test modes have been defined
- Quiet/Refresh cycle scheduling, Frequency stability, and Alert generation are covered
- Test procedures and test setups have been proposed

- Open items:
  - Is proposed coverage enough?
  - Need feedback from other group members whether proposed Test Patterns are sufficient to cover what they are designed for
  - Need feedback from UNH on the feasibility of the testing