1000BASE-T1 Transmitter Test Modes

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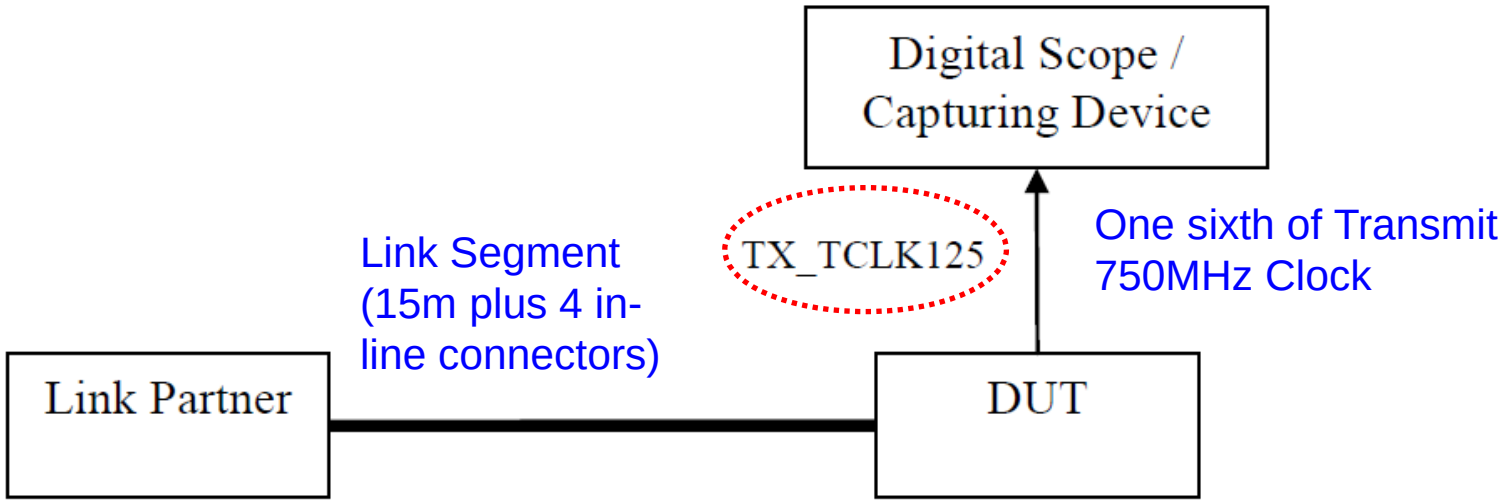
Outline

- Transmitter tests for 1000BASE-T1 are briefly discussed.
- Test fixtures and limits are proposed for transmitter jitter and droop.
- Test fixtures and limits are also reviewed for transmitter distortion and PSD as per earlier contributions.
- A test for BER monitoring is also proposed.

Transmitter Test Modes

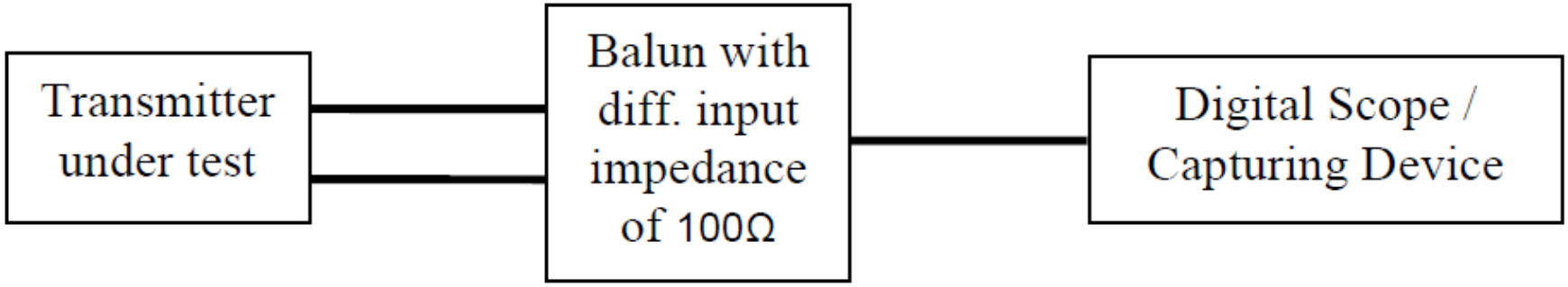
0 0 0	Normal operation.
0 0 1	**Test mode 1**—Setting MASTER and SLAVE PHYs for transmit clock jitter test in normal mode.
0 1 0	**Test mode 2**—Transmit MDI jitter test in MASTER mode.
0 1 1	Reserved.
1 0 0	**Test mode 4**—Transmit distortion test.
1 0 1	**Test mode 5**—Normal operation in Idle mode. This is for the PSD Mask test.
1 1 0	**Test mode 6**—Transmitter droop test.
1 1 1	**Test mode 7**—Normal operation with zero data pattern. This is for BER monitoring.

Test mode 1— Transmitter Clock Jitter



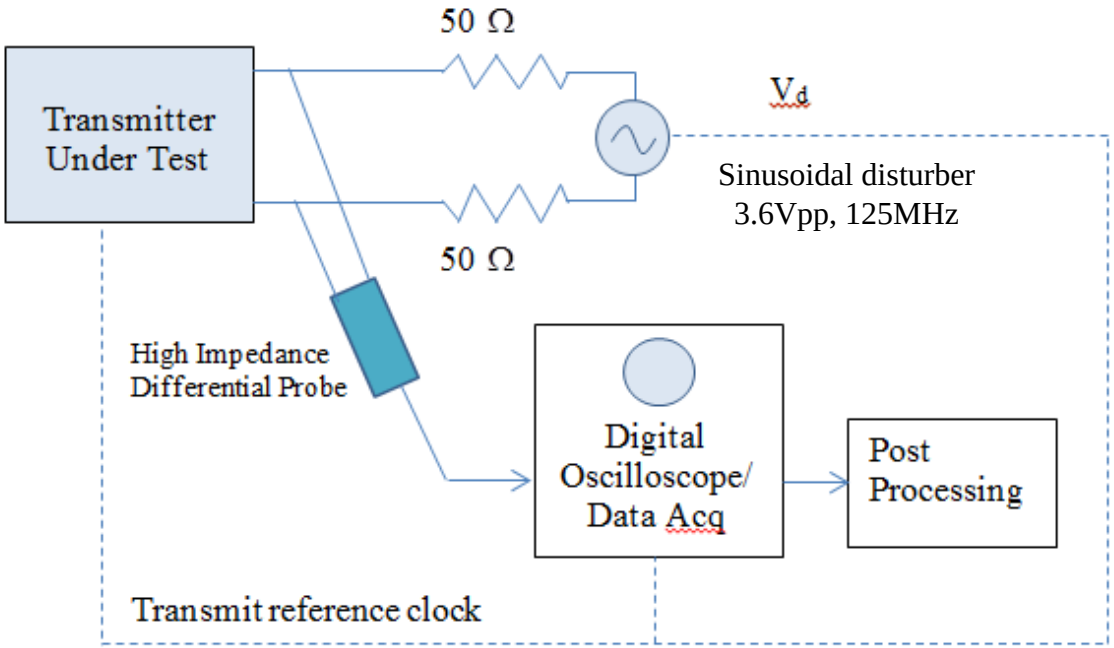
- Two PHYs linked and DUT provides access to a reduced frequency version of transmit clock (750MHz/6=125MHz)
- For SLAVE, jitter in 1ms should be less than 10ps rms and 100ps peak to peak
- For MASTER, jitter in 1ms should be less than 5ps rms and 50ps peak to peak

Test mode 2—Transmitter MDI jitter (MASTER)



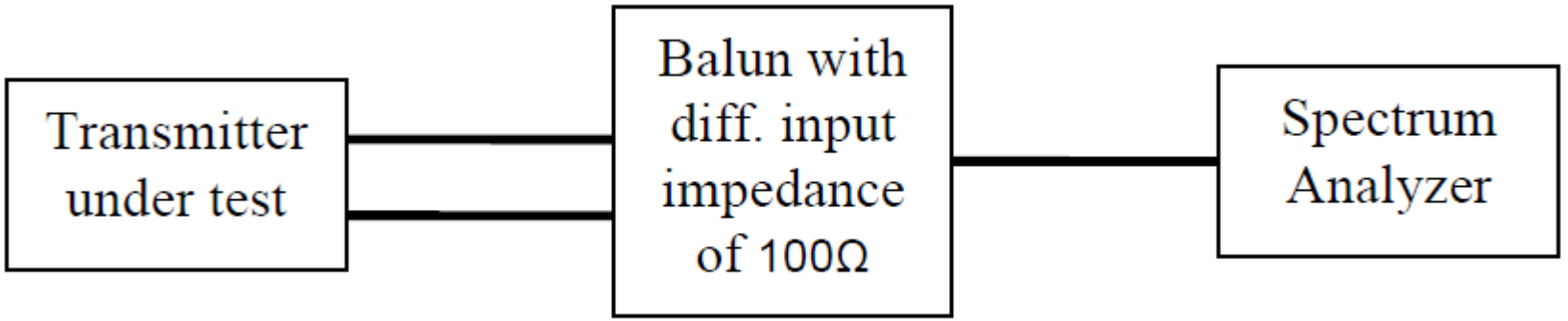
- 125MHz test pattern (3 symbols of +1 followed by 3 symbols of -1) in MASTER timing mode
- Jitter in 1ms should be less than 5ps rms and 50ps peak to peak

Test mode 4—Transmitter distortion



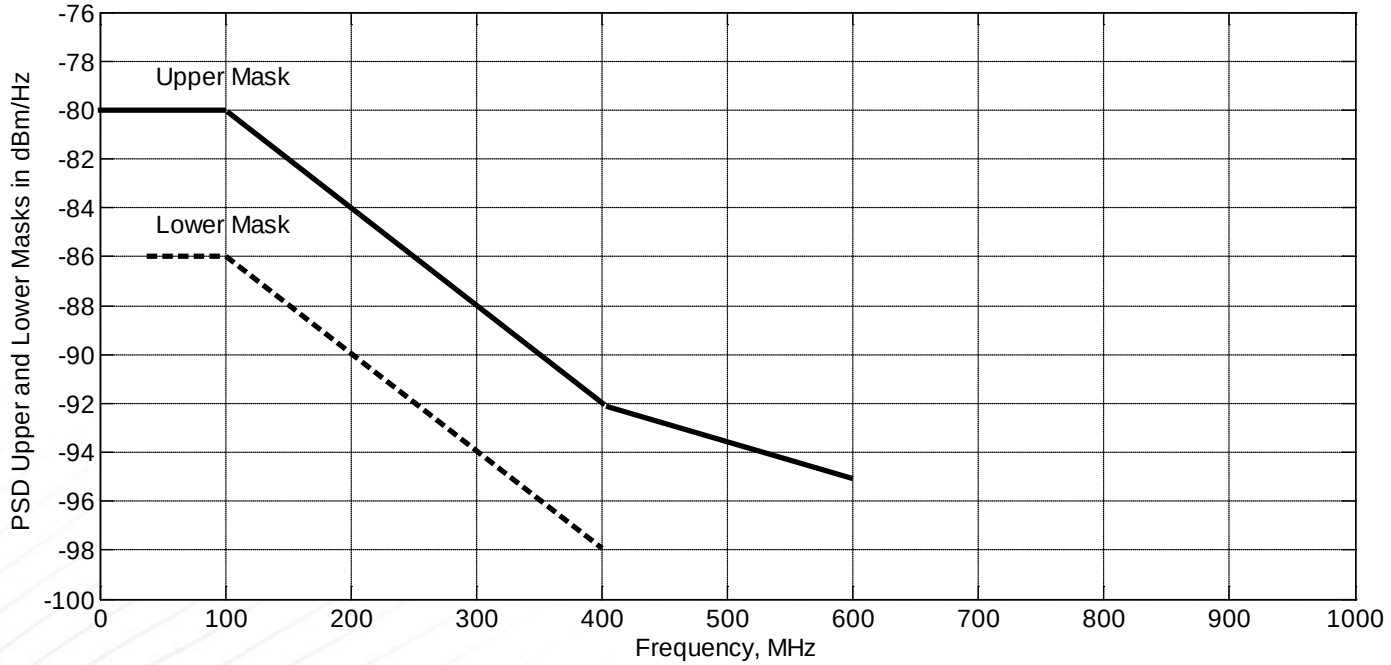
- PHY sends the specified test pattern (see chini_3bp_01_1114)
- The sinusoidal disturber and the scope clock are synchronized with transmit reference clock
- The peak normalized distortion shall be less than 10mV (see chini_3bp_01_1114)

Test mode 5— Transmitter PSD Mask and power



- PHY in MASTER data mode with data set to zero.
- PSD (rms) measured shall be between upper and lower PSD Masks
- Total transmit power should be below 5dBm.

PSD MASK Upper/Lower (for test mode 5)



Upper PSD MASK

-80 dBm/Hz $0 < f_{MHz} < 100$

(-76 - f_{MHz} /25) dBm/Hz $100 < f_{MHz} < 400$

(-85.6 - f_{MHz} /62.5) dBm/Hz $400 < f_{MHz} < 600$

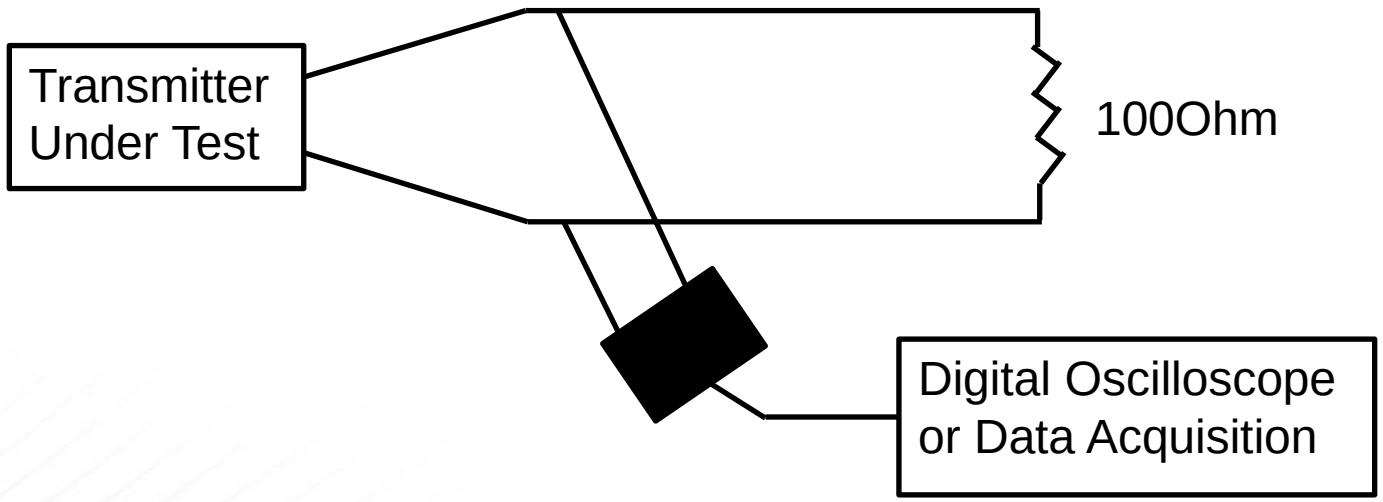
Start at 40MHz to consider for PODL

Lower PSD MASK

-86 dBm/Hz $40 < f_{MHz} < 100$

(-82 - f_{MHz} /25) dBm/Hz $100 < f_{MHz} < 400$

Test mode 6—Transmitter droop



- 25MHz test pattern (15 symbols of +1 followed by 15 symbols of -1)
- Droop of less than 50% from 4ns to 16ns after zero crossing (12ns duration)
- This should allow for PODL high pass corner of up to about10MHz

Conclusions

- Transmitter test modes reviewed, test fixtures and limits proposed for 1000BASE-T1.
- Corresponding text is provided for the 802.3 specification clause 97.5.2. It is proposed that the text be adopted as a baseline for 1000BASE-T1 specification on test modes.