802.3dj D2.2
Comment Resolution
Optical Track

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Introduction

- This slide package was assembled by the 802.3dj editorial team to provide background and detailed resolutions to aid in comment resolution.
- Specifically, these slides are for the various optical-track comments.

Tx FRx

Numerous Comments

<Tx FRx, D2.2 180.9.9.1>

180.9.9.1 Functional receiver (FRx) definition

The functional receiver (FRx) is a variable optical attenuator (VOA) followed by an optical receiver (ORx) that complies with characteristics in Table 180–8. VOA level is given by Equation (180–27). The transmitter under test is connected to the FRx by a short test SMF, or patch cord.

$$\mathit{VOA\_level} = \mathit{Tx\_DUT\_power\_budget} - \mathit{Test\_SMF\_power\_budget} - \mathit{ORx\_TECQ\_allocation} - \mathit{Test\_margin} \quad (180\text{–}27)$$

where:

Tx_DUT_power_budget	added to *RxS_OMA*@TECQ = 0 gives *Tx_DUT_OMA*(min) in Table 180–7 and is given by Equation (180–28)
Test_SMF_power_budget	is the sum of Test SMF MPI, DGD and DUT CD penalty estimates and is given in Equation (180–29)
ORx_TECQ_allocation	is the difference between *ORx_RxS@DUT_TECQ* and *RxS_OMA@TECQ=0* and is given by Equation (180–30)
Test_margin is additional	*ORx_OMA* which reduces operating BER and equals 1.5dB

$$\mathit{Tx\_DUT\_power\_budget} = \mathit{Channel\_insertion\_loss} + \mathit{MPI\_DGD\_penalty\_allocation} + \max(\mathit{DUT\_TDECQ}, \mathit{DUT\_TECQ}) \quad (180\text{–}28)$$

where:

Channel_insertion_loss	is "Channel insertion loss" given in Table 180–9
MPI_DGD_penalty_allocation	is "MPI DGD penalty allocation" as given in Table 180–9
DUT_TDECQ	is the TDECQ measured for the Tx DUT
DUT_TECQ	is the TECQ measured for the Tx DUT

<Tx FRx, D2.2 180.9.9.1>

$$\mathit{Test\_SMF\_power\_budget} = \mathit{Test\_SMF\_loss} + \mathit{Test\_SMF\_MPI{+}DGD\_penalty} + \mathit{Test\_SMF\_DUT\_CD} \quad (180\text{–}29)$$

where:

Test_SMF_loss	is an estimate of the actual channel insertion loss of the test SMF
Test_SMF_MPI+DGD_penalty	is an estimate of the actual MPI and DGD penalty of the test SMF
TEST_SMF_DUT_CD	is an estimate of the Tx DUT actual CD penalty over the test SMF
Test_SMF_power_budget	loss and penalty are zero

$$\mathit{ORx\_TECQ\_allocation} = \mathit{ORx\_RS@DUT\_TECQ} - \mathit{RxS\_OMA@TECQ{=}0} \quad (180\text{–}30)$$

where:

ORx_RS@DUT_TECQ	is the ORx receiver sensitivity at the TECQ measured for the Tx DUT
RxS_OMA@TECQ=0	is the receiver sensitivity OMA for TECQ >= 0.9 dB extrapolated down to TECQ = 0 dB and is given in Table 180–8(-4.3 dBm)

<Tx FRx, Proposed D2.3 180.9.9>

180.9.9 Transmitter functional symbol error histogram

In 180.9.9 change the last sentence from
“The transmitter functional symbol error histogram is measured using the test pattern defined in Table 180–14.”
To
“The transmitter functional symbol error histogram is measured using the test pattern as given in Table 180–14.”

<Tx FRx, Proposed D2.3 180.9.9.1>

181.9.9.1 Functional receiver (FRx) definition

The functional receiver (FRx) is a variable optical attenuator (VOA) followed by an optical receiver (ORx) that complies with characteristics as given in Table 180–8. VOA level is given by Equation (180–27). The transmitter under test is connected to the FRx by a test fiber, which meets the transmitter compliance channel specifications as given in Table 180-15

VOA_level = Tx_DUT_power_budget – Test_fiber_power_budget – ORx_TECQ_allocation – Test_margin (180–27)

where:
—Tx_DUT_power_budget is the transmitter under test power budget as given in Table 180-9, except using measured instead of maximum TDECQ, and is given by Equation (180–28)
—Test_fiber_power_budget is the sum of estimates of the test fiber channel insertion loss, MPI, DGD and transmitter under test chromatic dispersion (CD) penalties, and is given by Equation (180–29)
—ORx_TECQ_allocation is the difference between ORx_RxS@DUT_TECQ and RxS_OMA@TECQ=0 and is given by Equation (180–30)
—Test_margin is additional ORx_OMA which reduces operating BER and equals 1.5dB

<Tx FRx, Proposed D2.3 180.9.9.1>

Tx_DUT_power_budget = Channel_insertion_loss + MPI_DGD_penalty_allocation + max(DUT_TDECQ, DUT_TECQ) (180–28)

where:
—Channel_insertion_loss is “Channel insertion loss” as given in Table 180–9
—MPI_DGD_penalty_allocation is “MPI DGD penalty allocation” as given in Table 180–9
—DUT_TDECQ is the TDECQ measured for the transmitter under test
—DUT_TECQ is the TECQ measured for the transmitter under test

<Tx FRx, Proposed D2.3 180.9.9.1>

Test_fiber_power_budget = Test_fiber_loss + Test_fiber_MPI+DGD_penalty + Test_fiber_DUT_CD (180–29)

where:
— Test_fiber_loss is an estimate of the actual channel insertion loss of the test fiber
— Test_fiber_MPI+DGD_penalty is an estimate of the actual MPI and DGD penalty of the test fiber
— Test_fiber_DUT_CD is an estimate of the transmitter under test actual CD penalty over the test fiber

ORx_TECQ_allocation = ORx_RS@DUT_TECQ – RxS_OMA@TECQ=0 (180–30)

where:
— ORx_RS@DUT_TECQ is the ORx receiver sensitivity at the TECQ measured for the transmitter under test
—RxS_OMA@TECQ=0 is the receiver sensitivity OMA for TECQ >= 0.9 dB, as given in Table 180–8, extrapolated down to TECQ = 0 dB (-4.3 dBm)

<Tx FRx, D2.2 181.9.9>

181.9.9 Transmitter functional symbol error histogram

The transmitter functional symbol error histogram mask for each lane is given in Table 180–18. The transmitter functional symbol error histogram is measured using the method defined in 180.9.9 with the following exceptions:

— The transmitter functional symbol error histogram is measured using the test pattern defined in Table 181–12.

— The Functional Receiver (FRx) is a variable optical attenuator (VOA) followed by an Optical Receiver (ORx) that complies with characteristics in Table 181–6. The VOA level is given by Equation (180–27). Tx_DUT is connected to FRx by longer Test SMF, or emulator mainly of chromatic dispersion penalty (CD), with compliance channel specifications in Table 181–13

where in Equation (180–27)

— *Tx_DUT_power_budget* added to *RxS_OMA@TECQ=0* gives *Tx_DUT_OMA(min)* in Table 181–5 and is given by Equation (180–28)

where in Equation (180–28)

— *Channel_insertion_loss* is “Channel insertion loss” given in Table 181–7

— *MPI_DGD_penalty_allocation* is “MPI DGD penalty allocation” as given in Table 181–7

where in Equation (180–29)

— *Test_SMF_power_budget*, loss and penalty are non-zero.

where in Equation (180–30)

— *RxS_OMA@TECQ=0* is the receiver sensitivity OMA for TECQ >= 0.9 dB extrapolated down to TECQ = 0 dB and is given in Table 181–6 (-4.1 dBm).

<Tx FRx, Proposed D2.3 181.9.9>

181.9.9 Transmitter functional symbol error histogram

The transmitter functional symbol error histogram mask for each lane is given in Table 180–18. The transmitter functional symbol error histogram is measured using the method defined in 180.9.9 with the following exceptions:

— The transmitter functional symbol error histogram is measured using the test pattern as given in Table 181–12.
— The Functional Receiver (FRx) is a variable optical attenuator (VOA) followed by an Optical Receiver (ORx) that complies with characteristics as given in Table 181–6. The VOA level is given by Equation (180–27). The transmitter under test is connected to the FRx by a test fiber which meets the transmitter compliance channel specifications as given in Table 181–13

<Tx FRx, Proposed D2.3 181.9.9>

where in Equation (180–27)
— Tx_DUT_power_budget is the transmitter under test power budget as in Table 181-7, except using measured instead of maximum TDECQ, and is given by Equation (180–28)

where in Equation (180–28)
— Channel_insertion_loss is “Channel insertion loss” as given in Table 181–7
— MPI_DGD_penalty_allocation is “MPI DGD penalty allocation” as given in Table 181–7

where in Equation (180–30)
— RxS_OMA@TECQ=0 is the receiver sensitivity OMA for TECQ >= 0.9 dB, as given in Table 181–6, extrapolated down to TECQ = 0 dB (-4.1 dBm).

<Tx FRx, D2.2 182.9.9>

182.9.9 Transmitter functional symbol error histogram

The transmitter functional symbol error histogram mask for each lane is given in Table 180–18. The transmitter functional symbol error histogram is measured using the method defined in 180.9.9 with the following exceptions:

— The transmitter functional symbol error histogram is measured using the test pattern defined in Table 182–14.

— The functional receiver (FRx) is a variable optical attenuator (VOA) followed by an optical receiver (ORx) that complies with characteristics in Table 182–8. The VOA level is given by Equation (180–27). The transmitter under test is connected to FRx by longer test SMF, or emulator mainly of chromatic dispersion penalty (CD), with compliance channel specifications in Table 182–15

where in Equation (180–27)

— *Tx_DUT_power_budget* added to *RxS_OMA@TECQ=0* gives *Tx_DUT_OMA(min)* in Table 182–7 and is given by Equation (180–28)

where in Equation (180–28)

— *Channel_insertion_loss* is “Channel insertion loss” given in Table 182–9

— *MPI_DGD_penalty_allocation* is “MPI DGD penalty allocation” as given in Table 182–9

where in Equation (180–29)

— *Test_SMF_power_budget*, loss and penalty are non-zero.

where in Equation (180–30)

— *RxS_OMA@TECQ=0* is the receiver sensitivity OMA for TECQ >= 0.9 dB extrapolated down to TECQ = 0 dB and is given in Table 182–8 (-5.3 dBm).

<Tx FRx, Proposed D2.3 182.9.9>

182.9.9 Transmitter functional symbol error histogram

The transmitter functional symbol error histogram mask for each lane is given in Table 180–18. The transmitter functional symbol error histogram is measured using the method defined in 180.9.9 with the following exceptions:

— The transmitter functional symbol error histogram is measured using the test pattern defined in Table 182–14.
— The functional receiver (FRx) is a variable optical attenuator (VOA) followed by an optical receiver (ORx) that complies with characteristics in Table 182–8. The VOA level is given by Equation (180–27). The VOA level is given by Equation (180–27). The transmitter under test is connected to the FRx by a test fiber which meets the transmitter compliance channel specifications in Table 182–15

<Tx FRx, Proposed D2.3 182.9.9>

where in Equation (180–27)
Tx_DUT_power_budget is the transmitter under test power budget as in Table 182-9, except using measured instead of maximum TDECQ, and is given by Equation (180–28)

where in Equation (180–28)
— Channel_insertion_loss is “Channel insertion loss” given in Table 182–9
— MPI_DGD_penalty_allocation is “MPI DGD penalty allocation” as given in Table 182–9

where in Equation (180–30)
— RxS_OMA@TECQ=0 is the receiver sensitivity OMA for TECQ >= 0.9 dB, as given in Table 182–8, extrapolated down to TECQ = 0 dB (-5.3 dBm).

Tx FRx, D2.2 183.9.9>

183.9.9 Transmitter functional symbol error histogram

The transmitter functional symbol error histogram mask for each lane is given in Table 180–18. The transmitter functional symbol error histogram is measured using the method defined in 180.9.9 with the following exceptions:

— The transmitter functional symbol error histogram is measured using the test pattern defined in Table 183–14.

— The functional receiver (FRx) is a variable optical attenuator (VOA) followed by an optical receiver (ORx) that complies with characteristics in Table 183–7. The VOA level is given by Equation (180–27).The transmitter under test is connected to FRx by longer test SMF, or emulator mainly of chromatic dispersion penalty (CD), with compliance channel specifications in Table 183–15

where in Equation (180–27)

— *Tx_DUT_power_budget* added to *RxS_OMA@TECQ=0* gives *Tx_DUT_OMA(min)* in Table 183–6 and is given by Equation (180–28)

where in Equation (180–28)

— *Channel_insertion_loss* is “Channel insertion loss” given in Table 183–8

— *MPI_DGD_penalty_allocation* is “MPI DGD penalty allocation” as given in Table 183–8

where in Equation (180–29)

— *Test_SMF_power_budget*, loss and penalty are non-zero.

where in Equation (180–30)

— *RxS_OMA@TECQ=0* is the receiver sensitivity OMA for TECQ >= 0.9 dB extrapolated down to TECQ = 0 dB and is given in Table 183–7 (-4.6 dBm for 800GBASE-FR4, -6.9 dBm for 800GBASE-LR4).

<Tx FRx, Proposed D2.3 183.9.9>

183.9.9 Transmitter functional symbol error histogram

The transmitter functional symbol error histogram mask for each lane is given in Table 180–18. The transmitter functional symbol error histogram is measured using the method defined in 180.9.9 with the following exceptions:

— The transmitter functional symbol error histogram is measured using the test pattern as given in Table 183–14.
— The functional receiver (FRx) is a variable optical attenuator (VOA) followed by an optical receiver (ORx) that complies with characteristics as given in Table 183–7. The VOA level is given by Equation (180–27). The transmitter under test is connected to the FRx by a test fiber which meets the transmitter compliance channel specifications as given in Table 183–15

<Tx FRx, Proposed D2.3 183.9.9>

where in Equation (180–27)
— Tx_DUT_power_budget is the transmitter under test power budget as given in Table 183-8, except using measured instead of maximum TDECQ, and is given by Equation (180–28)

where in Equation (180–28)
— Channel_insertion_loss is “Channel insertion loss” as given in Table 183–8
— MPI_DGD_penalty_allocation is “MPI DGD penalty allocation” as given in Table 183–8

where in Equation (180–30)
— RxS_OMA@TECQ=0 is the receiver sensitivity OMA for TECQ >= 0.9 dB for 800GBASE-FR4 and TECQ >= 1.4 dB for 800GBASE-LR4, as given in Table 183–7, extrapolated down to TECQ = 0 dB (-4.6 dBm for 800GBASE-FR4, -6.9 dBm for 800GBASE-LR4).