

10G .3ca upstream PMD

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Supporters

100G-EPON

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10G .3ca upstream PMD

- ❑ 10G EPON uses RS(255,223) FEC and the optical parameters are defined in 802.3, Tables 75-6 and 75-8.
- ❑ 802.3ca has selected LDPC(18493,15677) FEC for 25G upstream channels in order to obtain a 1.5 dB coding gain.
- ❑ This same LDPC FEC will be used by upstream .3ca 10G channels from 25G/10G ONUs.
- ❑ Question: should .3ca 10G channels take advantage of this 1.5 dB coding gain in order to relax 10G upstream optical parameters?
 - Specifically, improved OLT receiver sensitivity would allow for lower ONU transmit power
- ❑ Propose not to do this
 - 10G EPON (symmetrical) ONU PR30 (29 dB loss budget) modules are already able to meet the existing Tx specification (4 dBm) at low cost
 - Therefore do not create a new class of optics. We want US0-B to use the same exact optics as 10G EPON. (US0-A will be the same except for the different wavelength).
 - Therefore 10G upstream .3ca channels should point to the same Tables 75-6 and 75-8 in 802.3.
 - The additional coding gain will be used for extra margin in the (10G) OLT receiver. If anything, the dual-rate OLT Rx will likely need the extra 1.5dB more than the ONU Tx will.

.3ca 10G upstream channels associated with 25G/10G ONUs, operating on US0-A or US0-B wavelengths, should re-use the PMD requirements of 10G EPON in 802.3, Tables 75-6 and 75-8, with the following exceptions

1. Bit error ratio (max) should be changed from $1e-3$ to $1e-2$
2. Footnote "a" in Table 75-6 should refer to .3ca LDPC FEC
3. A different "wavelength (range)" should be specified for US0-A

Moved: Ed Harstead

Seconded:

For:

Against:

Abstain:

Backup: 10G EPON upstream PMD

Table 75-6—PR type OLT PMD receive characteristics

Description	10GBASE-PR-D1	10GBASE-PR-D2, 10GBASE-PR-D3	10GBASE-PR-D4	Unit
Signaling speed (range)	10.3125 ± 100 ppm			GBd
Wavelength (range)	1260 to 1280			nm
Bit error ratio (max) ^a	10 ⁻³			–
Average receive power (max)	–1	–6	–9	dBm
Damage threshold (max) ^b	0	–5	–8	dBm
Receiver sensitivity (max)	–24	–28	–29	dBm
Receiver sensitivity OMA (max)	–23.22 (4.77)	–27.22 (1.99)	–28.22 (1.51)	dBm (μW)
Signal detect threshold (min)	–45			dBm
Receiver reflectance (max)	–12			dB
Stressed receive sensitivity (max) ^c	–21	–25	–27	dBm
Stressed receive sensitivity OMA (max)	–20.22 (9.51)	–24.22 (3.79)	–26.22 (2.39)	dBm (μW)
Vertical eye-closure penalty ^d	2.99			dB
T _{receiver_settling} (max) ^e	800			ns
Stressed eye jitter	0.3			UI pk-to-pk
Jitter corner frequency for a sinusoidal jitter	4			MHz
Sinusoidal jitter limits for stressed receiver conformance test (min, max)	(0.05, 0.15)			UI

^aThe BER of 10⁻¹² is achieved by the utilization of FEC as described in 76.3.

^bDirect ONU-OLT connection may result in damage of the receiver.

^cThe stressed receiver sensitivity is mandatory.

^dVertical eye closure penalty and the jitter specifications are test conditions for measuring stressed receiver sensitivity. They are not required characteristics of the receiver.

^eT_{receiver_settling} represents an upper bound. Optics with better performance may be used in compliant implementations, since the OLT notifies the ONUs of its requirements in terms of the T_{receiver_settling} time via the SYNC_TIME_PMD parameter (see 77.3.3.2).

Table 75-8—PR type ONU PMD transmit characteristics

Description	10GBASE-PR-U1	10GBASE-PR-U3	10GBASE-PR-U4	Unit
Signaling speed (range)	10.3125 ± 100 ppm			GBd
Wavelength (range)	1260 to 1280			nm
Side Mode Suppression Ratio (min) ^a	30			dB
Average launch power (max)	4	9	9	dBm
Average launch power (min) ^b	–1	4	6	dBm
Average launch power of OFF transmitter (max)	–45			dBm
Extinction ratio (min)	6			dB
RIN ₁₅ OMA (max)	–128			dB/Hz
Launch OMA (min) ^b	–0.22 (0.95)	4.78 (3.01)	6.78 (4.77)	dBm (mW)
Transmitter eye mask definition {X1, X2, X3, Y1, Y2, Y3} ^c	{0.25, 0.40, 0.45, 0.25, 0.28, 0.40}			UI
T _{on} (max)	512			ns
T _{off} (max)	512			ns
Optical return loss tolerance (max)	15			dB
Transmitter reflectance (max)	–10			dB
Transmitter and dispersion penalty (max) ^d	3-0	3-0	2	dB
Decision timing offset for transmitter and dispersion penalty	±0.0625			UI

^aTransmitter is a single longitudinal mode device. Chirp is allowed such that the total optical path penalty does not exceed that found in Table 75B-2.

^bMinimum average launch power and minimum launch OMA are valid for ER = 6 dB (see Figure 75-5 for details).

^cAs defined in Figure 75-8.

^dIf a transmitter has a lower TDP, the minimum transmitter launch OMA (OMA_{min}) and average minimum launch power (AVP_{min}) may be relaxed by the amount 3-0 dB – TDP for 10GBASE-PR-U1 and 10GBASE-PR-U3 and 2 dB – TDP for 10G-BASE-PR-U4.