

# FEC Gain Requirement for 10GEPON Downstream

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**Subject:** IEEE 802.3 10Gb/s PHY for EPON Study Group

**Abstract:** This presentation describes a study about FEC gain requirement for downstream 10G using commercially available devices.

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- Downstream: 10G serial; Upstream: 1G
- Loss budget: 21 dB, 26 dB, 29 dB (3 Classes)
  - Share 1GEPON's condition: 21 dB, 26 dB
  - 29 dB is being discussed
- Transmission distance: 10 km, 20 km
- Downstream wavelength: 1490 nm
- Upstream wavelength: 1310 nm
- Use commercially available devices
- Fiber & Splitter conditions: Same as 1GEPON's

- For loss budget 21 dB
  - Tx: DFB
  - Rx: PD
  
- For loss budget 26 dB and 29 dB
  - Tx: EA-DFB due to the transmission limit up to 10 km when applying the direct modulated LD
  - Rx: PD or APD

# FEC Gain Required for Downstream 10G

Loss Budget (Distance)	21 dB (10 km)		26 dB Case1 (20 km)		26 dB Case2 (20 km)		29 dB (20 km)	
Tx Power (OLT)	DFB	(min.) +2 dBm	EA-DFB + SOA	(min.) +6 dBm	EA-DFB	(min.) +3 dBm	EA-DFB	(min.) +3 dBm
Rx Sensitivity (ONT)	PD	(avg.) -15 dBm	PD	(avg.) -15 dBm	PD	(avg.) -15 dBm	APD	(avg.) -21 dBm
w/o FEC Loss Budget	17 dB		21 dB		18 dB		24 dB	
<b>Required FEC Gain</b>	4 dB		5 dB		8 dB		5 dB	

## ■ Overall

Studied FEC gain requirement for 10GEPON  
Downstream with commercially available devices

## ■ FEC

- Mandatory
- At least 5 dB is required
- Desirable 8 dB, for 26 dB Case2 to reduce cost of Rx

## ■ Issues

- Need to study technologically and economically optimum configuration using optical amplifier (SOA or EDFA) with FEC