



## Cost Comparison of the 10G-EPON PMDs

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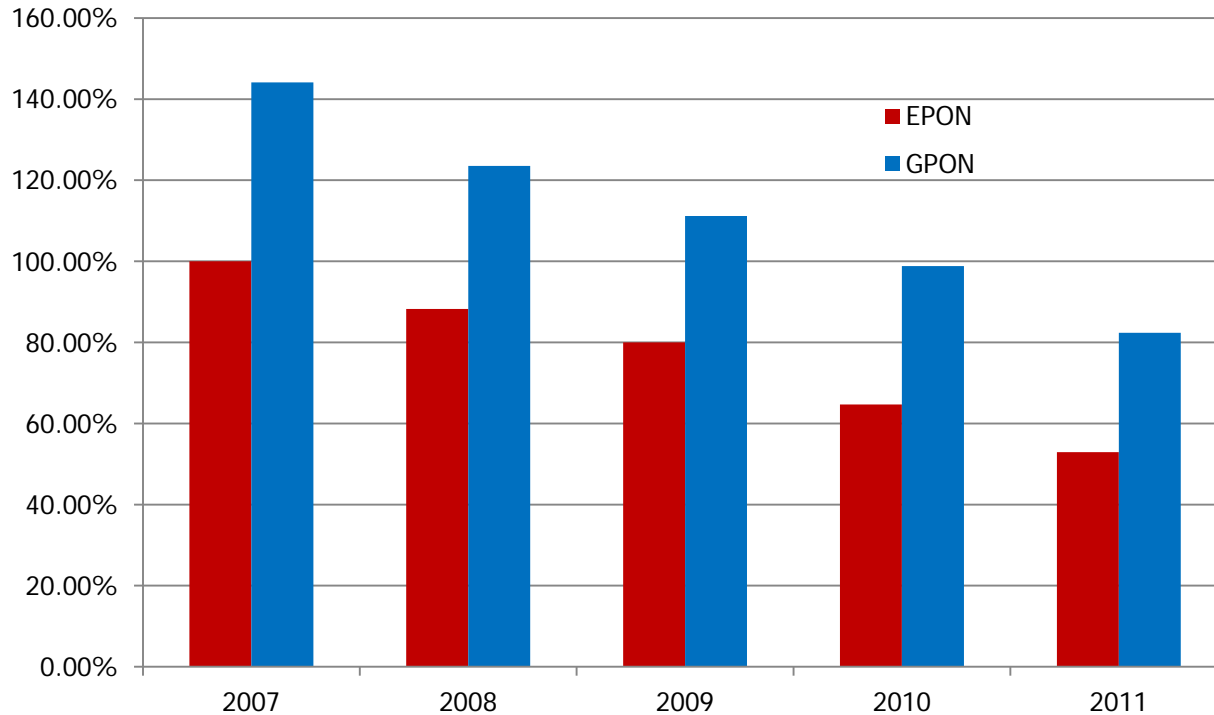
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# Cost Evolution of EPON PMDs

- 1G-EPON PMDs have been deployed in tens of millions since 802.3ah was released in 2004. The 1G-EPON modules are available from many suppliers. The cost of the EPON PMDs keep dropping about 15%-20% every year.
- 10G-EPON PMDs are available from several manufacturers. The cost of the 10G-EPON PMDs has been dropped significantly with the volume increasing.
- Link budget improvement and development of EPON/10G-EPON transceivers has not stopped. It is expected that the cost will not be increased too much when the link budget reaches higher.

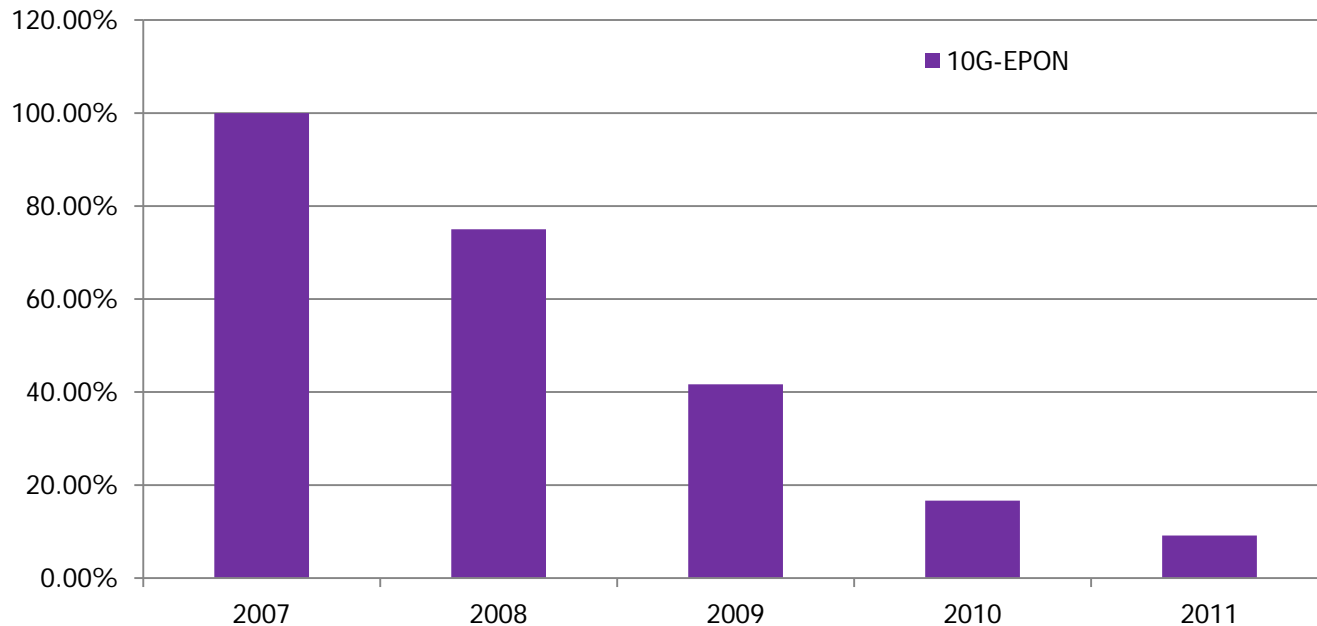
# EPON/GPON ONU Cost Trend



➤ The cost of both EPON and GPON modules drops about 15%-20% annually.

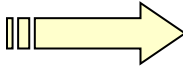
# 10G-EPON ONU Cost Trend

## 10G-EPON



➤ The cost of 10G-EPON modules drops about 30%-50% annually from the engineering stage to the volume production.

# Cost Comparison with Link Budget

	<b>Previous Spec</b>		<b>New Spec</b>	<b>Cost Variation</b>
<b>EPON</b>	PX-20		PX-20+	0%
<b>GPON</b>	Class B+		Class C	15%
<b>10G-EPON</b>	PR-30		PR-40/PR-50	???

➤ Higher splitting ratio and longer reach is in demand, but the cost is expected to be the same.

# Downstream Link Budget

## 1G-EPON Downstream

	<b>TX Power</b>	<b>Rx Sensitivity</b>	<b>Link Budget</b>
<b>IEEE802.3ah PX20</b>	+2dBm	-24dBm	26dB
<b>Actual Min</b>	+3dBm	-28dBm	31dB
<b>Actual Typical</b>	+4.5dBm	-29dBm	33.5dB

- Current 1G-EPON modules can support for 31 dB downstream link budget. 1G-EPON can also support for higher power budget classes, at least 33-34dB.

## 10G-EPON Downstream

	<b>TX Power</b>	<b>Rx Sensitivity</b>	<b>Link Budget</b>
<b>IEEE802.3av PR30</b>	+2dBm	-28.5dBm	30.5dB
<b>Actual Min</b>	+2dBm	-28.5dBm	30.5dB
<b>Actual Typical</b>	+5dBm	-30dBm	35dB

- Current 10G-EPON modules can support for 30.5dB downstream link budget. 10G-EPON can also support for higher downstream power budget classes, up to 35dB.
- See [ExEPON 1109 li 1.pdf](#) for more details

# Upstream Link Budget

## 1G-EPON Upstream

	<b>TX Power</b>	<b>Rx Sensitivity</b>	<b>Link Budget</b>
<b>IEEE802.3av PRX30</b>	+0.65dBm	-29.78dBm	30.4dB
<b>Actual Min</b>	+2dBm	-30dBm	32dB
<b>Actual Typical</b>	+3.5dBm	-32dBm	35.5dB

- Current 10G-EPON PRX-30 modules can support for 32 dB upstream link budget. 10G-EPON PRX-30 modules can also support for higher upstream power budget classes, up to 35.5dB.

## 10G-EPON Upstream

	<b>TX Power</b>	<b>Rx Sensitivity</b>	<b>Link Budget</b>
<b>IEEE802.3av PR30</b>	+4dBm	-28dBm	32dBm
<b>Actual Min</b>	+4dBm	-29dBm	32dBm
<b>Actual Typical</b>	+5dBm	-30dBm	35dBm

- Current 10G-EPON PR-30 modules can support for 32 dB upstream link budget, as defined in 802.3av-2009.
- See [ExEPON 1109 li 1.pdf](#) for more details

# Extended 10G-PON Cost Estimation

## 10G-EPON OLT PMDs

Class	Power Budget (dB)	OLT TX and RX (dBm)				Note*	Cost
		1577 TX	1490 TX	1270 RX	1310 RX		
PR30/PRX30	31	2	2	-28	-29.78	Reference	X
Extended	33	4	4	-30	-32	Feasible	1.2X
	35	6	6	-32	-34	Marginal	1.5X
	37	8	8	-34	-36	New Device	>2X

\* The estimation is based on the current available components.



# Summary

- 1G-EPON PMDs have been deployed in tens of millions since 2004. The cost of the EPON PMDs keep dropping about 15%-20% annually.
- 10G-EPON PMDs are available from several manufacturers. The cost has been dropped significantly with the volume deployment.
- Based on the current component technology, the 1G-EPON and 10G-EPON PMDs can meet 33dB link budget with a slightly higher cost increasing.
- To meet the 35dB link budget, the current components are marginal and may need to be optimized.
- To reach 37dB link budget, the OLT TX power and RX sensitivity can be increased by adding new components.