

GPON-Extender 1:4

Description

GPON Extender 1:4 is an optoelectronic repeater developed to extend the range in a GPON Passive Optical Network. This card uses reshaping, retiming and resample to carry upstream (1310nm) and downstream (1490nm) lambdas including an optional EDFA gain block of low-noise factor. This amplifier transports any digital or analogical signal at 1550nm.

Digital diagnostic

When this card is inserted in a managed chassis (MetroSAE/MiniSAE), it is possible to monitor fiber fails and to change all optical parameters of optical amplifier (RX power, TX power, temperature, gain, etc).

Low noise factor

Noise addition in fibre is avoided by using optical reshaping in signal conditionings, unlike it occurs in other PON extender implementation RSOA based. When TELNET GPON EXTENDER includes amplification block, an optical filter limits amplification noise in 1550nm lambda, without effect on 1310 and 1490nm channels.

Supports All PON parameters

GPON Extender is capable of working under all the possibilities defined on the ITU-T G.984.2 standard. Tested against the most restrictive parameters: 32 bits guard time, 5 bytes preamble on ranged mode.

Extender Cascading

It is possible to link several GPON Extenders to increase even more the PON range.



Features

PON Extender

This card can be inserted at any point of the PON and allows to extend a GPON signal up to 60Km maintaining additionally a 1550nm downstream overlaid lambda

Optional Optical amplifier inside

This card performs a reshaping of 1490 and 1310 GPON optical signals and integrates an optical EDFA hi-efficiency amplifier (Gain 20dB) and low-noise factor (NF<5dB). It permits to amplify a 1550nm downstream signal (CATV/digital)

Regenerator 1:4

1 input regenerated into 4 separate outputs, which can losslessly multiply by 4 the splitting factor in the GPON network.

Remote OMCI management

GPON-Extender 1:4 can be managed through OMCI compliance with the standard ITU-T G.984.4 Amendment 1.

SFP optical modules

SFP optical transceivers for greater flexibility in configuring PON networks, thus enabling WDM configurations.

RSOA alternative

The electro-optical conversion performed by GPON EXTENDER does not add noise to the fibre link. It is an interesting and economical alternative to other devices developed using RSOA technology. It is possible to add multiple repeater in cascade relaxing GPON preambles in OLT.

Extending a GPON network from 20Km to 60Km

There are times when its wanted to cover a residential area or a rural area that is located more than 2Km from the nearest central where an OLT can placed. Through GPON signal regeneration, the length of a GPON network can be extended to reach these points, reaching a distance of up to 60km by eliminating the attenuation due to distance.

These are the 60km maximum logical distance that can exist in a GPON network between the OLT and furthest ONT, and can be achieved by concatenating several GPON-Extender, since each of the network equipment will extend approximately 20Km, always depending on the particular characteristics of each link.

In this deployment model, we extended the distance where the users are located to up to 60km from the plant, allowing to lower both CAPEX and OPEX, by removing an otherwise necessary OLT nearer to the deployment area.

If necessary, several GPON-Extenders can be chained to achieve the desired distance and signal strength adequate for the number of users and subsequent splitting level.

Extending the number of users in a GPON network from 64 to 128

In the following case study, assume a GPON network in which we want to provide service to 128 users. This implies that after passing through the passive splitters, the signal would have a power of 1/128 times the power emitted by the OLT, without the added attenuation by distance and by connectorization.

In this scenario, a GPON-Extender regenerator can be placed after the first level of splitting into one or more branches of the network, regenerating and amplifying the signal completely and thus allowing that they may be in turn re-divided into other branches, each in a new optical division level and thus reaching up to the 128 users the standard is prepared for.

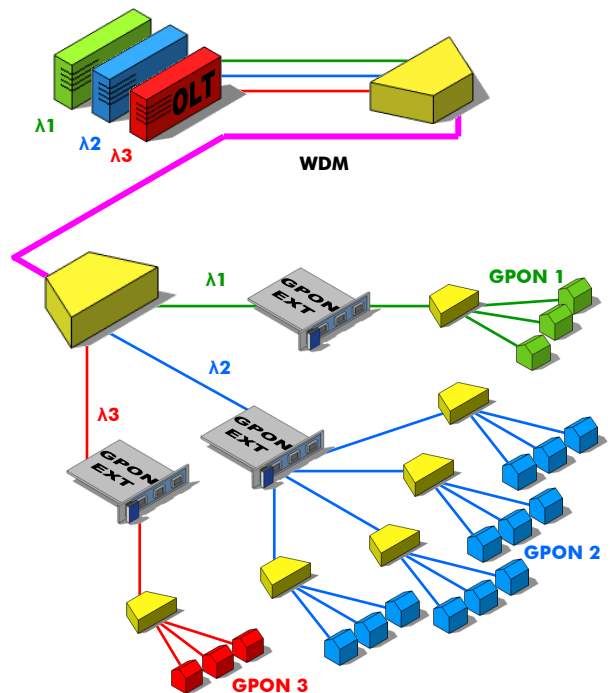
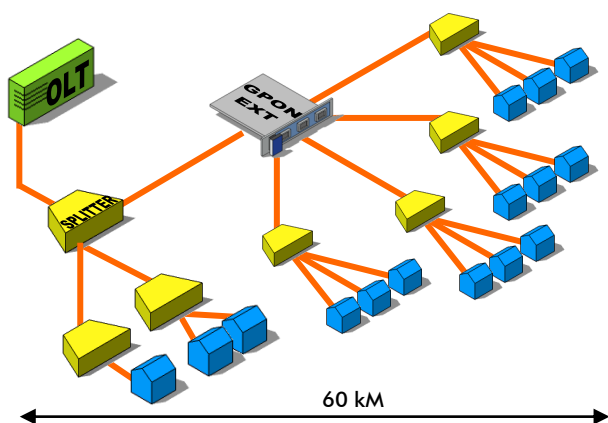
In this way the investment is maximized by achieving the maximum use of network coverage and service to give the maximum number of users it can support the ITU-T G.984 protocol, since otherwise the number of users that can be given service would be limited by the optical budget, having to find other solutions to enlist new potential users in the area of the GPON network .

WDM in the PON: Interchangeable SFP Transceivers

The GPON Extender integrates swappable SFP transceivers, which provides a great flexibility of settings in PON networks using unconventional lambdas on to implement Trunk-PON over WDM. (Using colored transceivers).

In the example shown below can be seen 3 different PON using different optical transceivers and windows and sharing a same optical fiber using WDM.

After the shared optical fiber the signal is splitted back in a WDM multiplexer and sent to a GPON Extender configured for each of the lambdas used. Additionally, the GPON Extender 1:4 allows 4 outputs fully regenerated, thereby saving an additional level of splitting that may serve to maximize the number of users in the PON network.



Technical Specifications

General features

- Extends GPON signal to up to 60 kilometers
- Extends the users of a GPON network to up to 128
- Able to work on all the possibilities defined in the standard UIT-T G.984.2.
- It does not add noise to the fiber link
- Several repeaters can be added in cascade
- Several GPON Extenders can be linked to further increase scope of the PON network

Technical specifications

- Regeneration of the signal and clock to transport the lambdas in upstream (1310nm) and downstream (1490nm)*
- 1 input, 4 output.
- Swappable SFP optical modules
- Optional high-efficiency (20dB gain) and low noise figure (NF <5dB) EDFA 1550nm amplification
- Remote management through OMCI according to ITU-T G.984.4 standard Amendment 1.
- Compatible with TELNET MetroSAE and TriSAE chassis

Time parameters*

Parameter	Sym.	Min	Typ	Max	Unit
Hi/lo Ratio	Hi/Lo		15		dB
Packet-to-packet spacing	Tg	25			Ns
BM RX Stabilization Period	Ts			8	Ns
Optical Delay via repeater					
Downstream	t		9		
Upstream	t		2		Ns

Optical budget power*

zParameters	TypeB
RX Sensitivity in DS	-28/-8 dBm
RX Sensitivity in US	-26/-10 dBm
TX Power in DS	2.0 dBm
TX Power in US	1 dBm
Extinction ratio of TX in US	>20 dBm

* Dependent on the SFP optical transceiver used in the configuration.



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