

# GPONDOCTOR 4000

## RUGGEDIZED FTTH GPON Networks Tester

### FEATURES

#### Capture+Test+Evaluate in 1 click

GPONDoctor™ 4000 gathers all control and management information from the PON and by using a smart **testing** engine it is capable of inferring the network topology and verifying the ITU-T G. 984.x recommendation level of compliance. Its automatic adaptive synchronization, automatic calibration and easy interface makes it ready to be used from the first day.

#### Troubleshooting a GPON network

Evaluates and detects problems in a GPON, identifying the origin of the malfunction and its source.

#### Real time user traffic extraction

GPON Doctor™ 8000 extracts, decrypts and reassembles user traffic at Ethernet layer, in real time. This traffic is made available at the 10/100/1000BaseT interface. Possible applications are: QoS/QoE monitoring, network performance and upper layer **test**. Its hardware decoder fully supports AES automatic decryption combined with FEC encoding.

#### Service regeneration and QoS/QoE Evaluation

GPONDoctor™ 4000 can regenerate services established over a PON network. Multicast video can be sniffed & reassembled in real time and played as in Customers' premises. This feature is perfect to identify services optimum performance deviation over a PON.

#### Real time GPON Capture

GPONDoctor™ 4000 captures GTC and OMCI messages within the PON in Real Time. Highlight negotiation processes and configurations, while showing the current status of ONTs, GEM and TCONT.

#### Detailed diagrams of OMCI entities and BW allocation

Easy to understand and complete entity-relation OMCI diagram, including alarms and errors. Bandwidth allocation per ONT and TCONT and its evolution in time. Real time Upstream bandwidth consumption.

#### Portable and autonomous

Rugged and portable chassis with a weight of less than 3Kg and a battery with an autonomy of around 1 hour at full working operation.

**GPONDOCTOR**  
FTTH analysis & monitoring tools



### DESCRIPTION

**GPONDoctor 4000** is a portable, passive, chipset-less GPON FTTH protocol sniffer and **tester**. Connected to any location within your PON distribution network (ODN), will capture downstream and upstream bit-level information. Provides comprehensive **testing** of the GTC layer: OAM, PLOAM, and OMCI. GPON Doctor™ is mainly oriented for conformance and interoperability tests it is a perfect tool for labs and field application engineers engaged in GPON deployment or for GPON active elements developers/integrators.

GPON 4000 mainly oriented for **problem detection, certification and interoperability tests**, being a perfect tool for lab application engineers engaged in GPON deployment phase or GPON active elements developers/integrators.

GPONDoctor 4000 is a complete and autonomous solution: Composed by a GPON capture + evaluator card, a "state of the art" chassis and a processing software capable of testing and evaluating the captured data. Based on our own implementation, the capture hardware includes last generation optical modules and great processing power. Capable of synchronizing with the downstream and upstream data flow of the GPON fiber, performing automatic calibration, and allowing long length captures. It also **extracts and decrypts in real-time Ethernet traffic** from the upper layer, allowing to regenerate services like video or VoIP.

The **Test** Software interprets the captured data and allows the operator to inspect the control flow from the first to the last frame, selecting and filtering data following configurable criteria. It also **tests** the content of the control information, inferring the topology and state of a GPON network: ONTs detected, data channels established, configuration exchanged, **OMCI E/R diagram, bandwidth test and, graphics for every ONT and by TCONT.**

Based in **Windows 7 Embedded**, GPON Doctor can include (according to customer needs) other office and **test** tools for other service protocols used over GPON. Very intuitive and usable, with a very low learning curve that lets you start using it right from the start.

**APPLICATIONS**

**Troubleshooting in PON and GPON networks**

With the aim of reducing the ONTs price it is important that any OLT is capable to interact with any ONT regardless its manufacturer. However, GPON has a number of intrinsic characteristics that could make difficult the interoperability among manufacturers:

- Commercial implementations from earlier versions of the standard.
- Problems during the activation process.
- Misinterpretation of the standard.
- OMCI, a very broad standard open to interpretations.
- Heterogeneity among operators.
- Attenuation in a GPON circuit can be very high due to the sum of fibre splitting, connectorization (Insertion loss), fusion splice, and distance in the fiber.

All these factors imply a great challenge in the deployment of GPON networks.

**Non-invasive Capture**

The GPONDoctor 4000 transparently tests traffic within a FTTH network. Moreover, its automatic calibration and built-in touch screen, makes it possible with just one click to have a full capture of GPON network traffic. The capture can be very long and allows captured data export to XML format for later test.

**Smart Network test and evaluation**

The smart test software interprets the captured data and translates it into a graphical and categorized format that can be easily used for in-depth test of GPON protocol conformance, interoperability evaluation, bandwidth assignments and field deployment troubleshooting.

The data captured by the GPONDoctor 4000 are tested to enable the view of:

- GPON network topology: ONTs detected, ONTs and OLT. operational status, data channels established.
- Entities created and the detailed relationships among them, including errors and alarms generated.
- Bandwidth assignment plots per ONT and TCONT and its evolution in time.
- Degree of compliance with the standard, by applying an evaluation system for the ITU-T G.984.x recommendation based on contextualized dynamic rules.

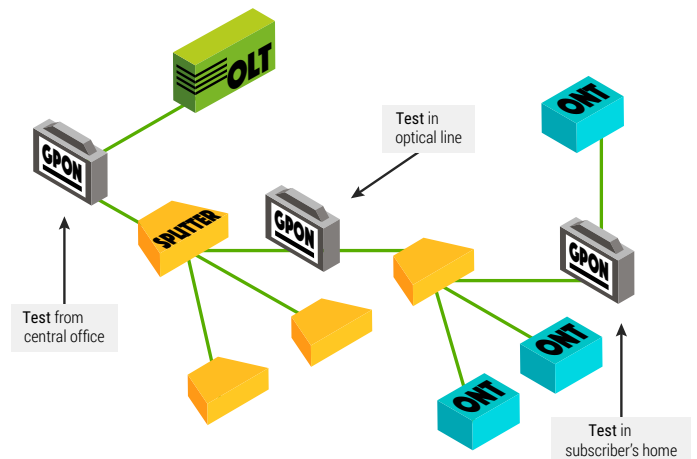
**Real time upper layer Ethernet traffic extraction**

GPONDoctor 4000 allows clear-text user traffic extraction in real-time for both upstream and downstream. The traffic is extracted at Ethernet layer.

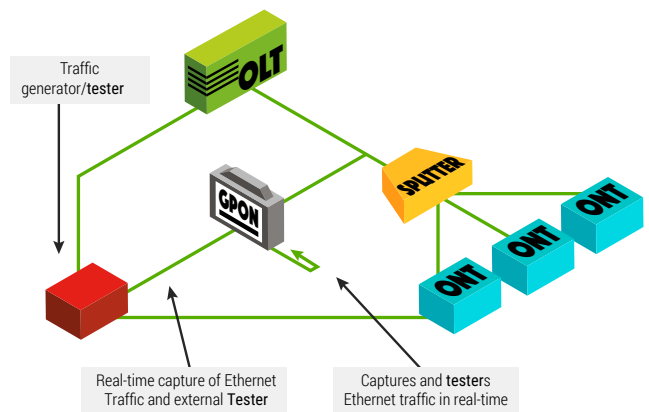
This traffic can be further tested by upper layer protocol testers, either external or by a network protocol tester software installed within the GPONDoctor 4000.

The combination of the GPONDoctor 4000 with a traffic generator, and an external or internal tester that incorporates GPONDoctor 4000, is a powerful setup to verify the correct transmission of data over the network.

**This feature can be also used to regenerate in real-time services in GPONDoctor 4000 itself: watching Multicast Video flows in its screen, hearing sound of voice services, test QoS & QoE, etc.**



Test and identification in GPON Networks

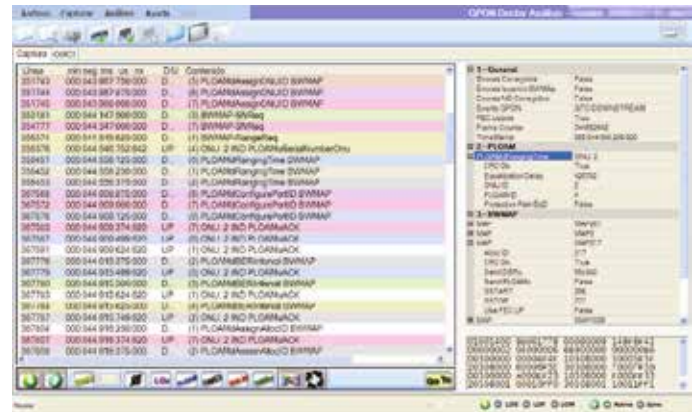


Real-time user traffic extraction

**APPLICATIONS**



Start screen



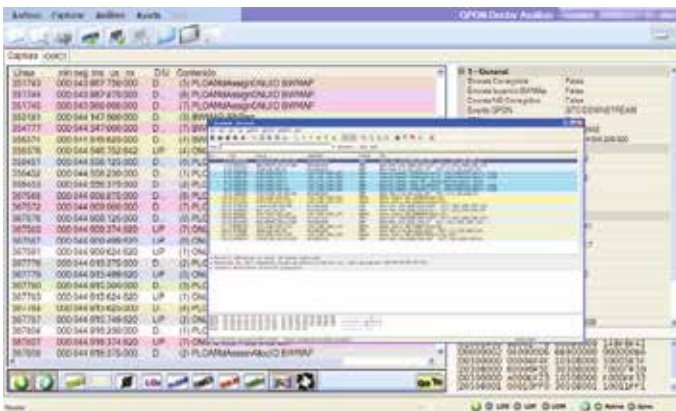
Control traffic test GPON G.984.3 and G.988



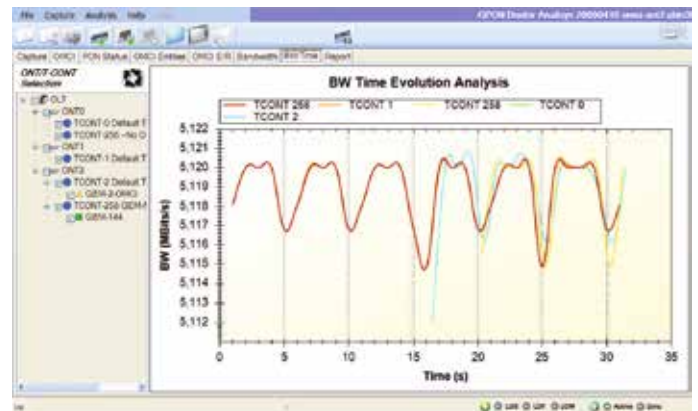
ONTs GPON state (GTC and OMCI)



Entity/relation diagram of OMCI entities



Real Time Extraction using Industry standard application



Test of bandwidth distribution per ONT and TCONT



## TECHNICAL SPECIFICATIONS

### Application examples

GPON networks deployment, equipment development and certification.

Interoperability troubleshooting among different vendors equipment coexisting in a Telco access network.

Diagnosis and **Test** of events and deviations for already deployed GPON networks.

Evaluation of protocol compliance during the development of GPON OLTs and ONTs.

**Test** of user traffic and evaluation of quality of services in the GPON Networks through its Ethernet interface.

GPON Auditing and Optimization.

Real time supervision of the Network state and all its active elements (ONTs).

### Technical features

Capture OAM + PLOAM control data and OMCI messages (full support).

Real Time PLOAM + OMCI + Negotiation messages capture.

Long duration captures.

Low attenuation (<1.5 dB) external fibre tap module, perfect for field environment. Can be installed as fixed testing point.

Ruggedized (MIL-810F) portable form factor. Very Low Weight: <3.5 kg.

Battery Powered: ~1 hour of full power operational time.

Infers the GTC machines in ONTs state and the ONTs OMCI entities state/value.

Infers network topology: ONU/ONTs, OLT.

Evaluation of the compliance degree with the ITU-G.984.x standard, generating a list of standard inconsistencies and violations.

Bandwidth distribution **test** per T-CONTs for every ONT.

Real Time Service regeneration and monitoring: Multicast Video, Voice.

Adaptative synchronization and automatic calibration.

Real time Ethernet traffic extraction and services decryption, regeneration and monitoring: Multicast Video, Voice...

Windows 7 Embedded Operating System.

Automatic behaviour: capture, **test** and evaluate in one click.

Captures storage for further **test** by the GPONDoctor 4000.

Size with transport case: 311 x 232 x 100 mm.

### Interfaces

Touch screen (High definition colour TFT, 12", 1024x768).

Gigabit Ethernet Capture/Management Port: QinQ Transparent/Stripping configurable.

Wi-Fi B/G interface, both for sniffing and IP management purposes.

Gigabit Ethernet over GPON Real Time Extraction port: External network protocol **tester** plug in.

2x USB 2.0 to easy transfer data, traces and reports export.

GPON capture interfaces:

- Downstream: SC/APC Single Mode 1490nm (2,5Gbps).
- Upstream: SC/APC Single Mode 1310nm (1,25Gbps).



# GPON

## DOCTOR 4000

GPON-Doctor, GPON-Doctor 2000, GPON-Doctor 4000, GPONDoctor 8000 and GPON-Doctor Olt-e are registered trademarks.

#### CONTACT INFORMATION

##### GPONDoctor Scoop

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