

GPONDoctor 1000 XGS PON analyzer

Optical Access

GPONDoctor 10000 is a chipset-less passive portable dual analyzer of FTTH XGS-GPON and GPON protocols. Once connected to a point in the distribution fiber of the network it captures data at the down-stream and upstream bit-level, interpreting all the control information at PLOAM and OMCI levels.

Certification of Installations

The analyzer is oriented to the detection of problems, certification and analysis of interoperability, being ideal for operators and installers of XGS-GPON / GPON deployment as well as manufacturers of equipment.

Troubleshooting, Certification & Interoperability tool

It is a complete and autonomous solution: composed of an XGS-GPON and GPON data capture hardware board, a high-performance chassis / equipment and analysis and evaluation software for the captured data.

Protocol Capture & Analysis

The capture hardware is self-implemented with the latest generation optical modules and high processing capacity. Capable of synchronizing with the upstream and downstream link at any point in the XGS-GPON or GPON network and of being automatically calibrated, allowing long-term captures. Optionally, it also extracts and decrypts traffic in real time from the upper layer, allowing regeneration of services such as Video or VoIP.

All-in One appliance

The software for analysis interprets the captured data and allows you to review the trace from the first to the last control frame. It is able to create an estimate of the XGS-PON / GPON network topology: ONTs, status of the state machines of the ONTs and OLTs, established data channels, exchanged configuration, E / R OMCI diagrams, analysis and graphs of bandwidth for each ONT per T-CONT.

GPONDoctor 10000

Features

Capture & analyse data

From the data captured, GPONDoctor 10000 deduces the network topology and applies a series of rules to certify if the ITU-T G.9807.x or ITU-T G.984.x recommendation is met. Its automatic adaptive timing and calibration and intuitive interface make it easy to use from day one.

Dual equipment

XGS-PON or GPON analyzer (selectable in app) Portable ruggedized equipment that allows, in the same device, to select the analysis mode: XGS-PON or GPON protocol. Accurate detection of problems in an XGS-GPON or GPON network. It evaluates and detects problems identifying the devices that may cause them and the failure.

Capture modes

GPONDoctor 10000 has several captures modes, from a “Full capture” to get all control and management traffic for in-depth troubleshooting to “Real-Time” that allows captures over long time periods to identify deviations from expected behavior.

The information captured can also be shared with other experts that can analyze it in their own computers using the GPONDoctor™ software.

Capture GPON in real time

GPONDoctor 10000 captures OMCI and XGS-TC / GTC messages on the fiber in real time to facilitate the monitoring of negotiation processes and configurations, showing in real time the status of ONTs, XGEM / GEM ports and T-CONTs. Extraction of upper layer (Ethernet) traffic in real time allowing the extraction and decryption in real time of user traffic for its monitoring and external analysis. The decoding implements fully automatic AES decryption with FEC encoding.

100% reliable results

Full GPONDoctor implementation, not using any commercial ONT/OLT chipset. The results obtained are not biased by any specific vendor implementation.

Neutral analysis and Capture

GPON-Doctor™ 10000 analyzes traffic within an FTTH network according to the ITU-T standards. Moreover, its automatic calibration and built-in touch screen into a high-performance chassis make it possible to get a full capture and analysis of GPON network traffic in just one-click.

QoS evaluation

It is possible to regenerate the services established in a PON network. For example, you can extract and reassemble multicast video in real time to be displayed on the GPONDoctor screen. This feature is perfect for evaluating the QoS and QoE of the services configured on a PON.

Diagrams

OMCI entity / relationship diagrams and bandwidth analysis Displays a detailed OMCI entity / relationship diagram including alarms and errors, bandwidth allocation diagrams by ONT and T-CONT, and optional diagrams of the evolution over time of the allocation of bandwidth.

New functions

Optical Power and Error Detection / Reporting are GPONDoctor 10000 offers two new licensed functionalities with the possibility to act as an optical power meter and it allows the detection and generation of online error reports.

Chipset-Less

Chipset-Less Implementation ideal for data capture hardware manufactured exclusively for this equipment. The results are independent of the proprietary implementation of the XGS-GPON and GPON equipment manufacturer.

No interference

No interference on PON behavior: Captures data from the fiber transparently without modifying or intercepting data transmitted across the network.

IP Services supervision

Allows Service traffic extraction in real-time for both upstream and downstream (after decryption at XGSPON level). The traffic is extracted as Ethernet frames. This traffic can be further debugged by Upper Layer Protocol analyzers (Hardware or Software), or by a Software analyzer already installed within the GPON Doctor™.

Optimizing XGS/GPON

CAPEX can be significantly reduced by deploying multi-vendor ONUs. This requires any OLT to be able to interact with any ONT, regardless of manufacturer. The inherent characteristics of GPON networks need to be addressed to facilitate interoperability between vendors:

- Commercial implementations of different versions of the standard.
- Issues during the activation process. ONUs from a different manufacturer than the OLT are not accepted.
- Misinterpretation of the standard.
- OMCI is a broad standard. Especially regarding "Vendor Specific Units".
- Heterogeneity among operators for the provisioning of "IP services".

In addition, the structure of a PON network is a fiber that is split using optical power dividers or splitters. The degree of splitting indicates the percentage of optical power that arrives at an ONT.

Attenuation is the key that must be kept under control to prevent some of the network's active elements from operating under stressed conditions.

Applications

Protocol compliance

The protocol used in the deployment of FTTH XGS-PON networks is characterized by the use of passive optical components to subdivide the stretch of fiber to create a tree-like topology (one point of origin, N destinations). The group of standards, defined by the FSAN, are described in the ITU-T G.988/G.987.2/ G.989.3

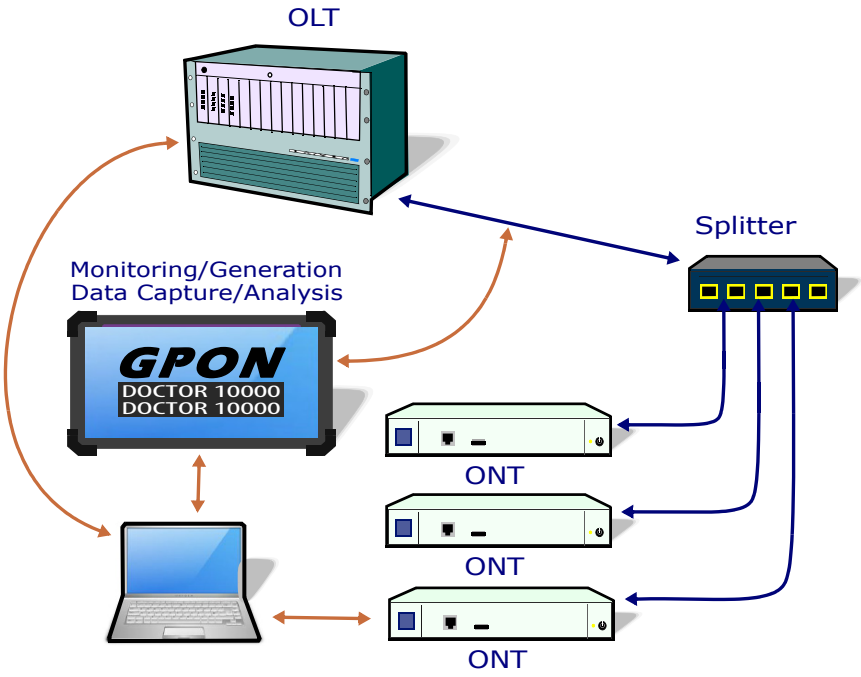
Interoperability

The protocol test is aimed at finding possible errors in the negotiation and transmission between XGS-PON devices due to the standards not being followed. GPONDoctor 10000 is the perfect tool for XGS-GPON Network multi-vendor devices validation by identifying interoperability deficiencies between them.

Troubleshooter

Connected to a fiber termination point in the FTTH XGS-PON distribution network it gets all information needed to identify problems in real-time:

- Captures data from the fiber at bit-level in both downstream and upstream directions.
- Accurate Interpretation of captured XGS-PON control information: from OAM, PLOAM, OMCI, and DBA.
- Fast Data Processing to infer the topological situation and the status of the elements of the network such as the ONTs and the OLT.



- Deviations from expected behavior identification by applying evaluation rules to check the conformity to ITU-T G.988/G.987.2/G.989.3 standards.

Analysis and Assessment

The analysis software interprets the captured information and translates it into a graphical and categorized format that can be easily used for in-depth analysis of XGS/GPON protocol compliance, interoperability evaluation, bandwidth allocation, and field troubleshooting.
The information collected by the GPON Doctor is analyzed to provide insight into

- GPON network topology: ONTs detected, ONT and OLT operational status, data channels established
- Established entities and the relationship between them
- Bandwidth allocation graphs per ONT and TCONT
- Degree of standards compliance by applying a scoring system for the ITU-T G.984.x, G.988, (ITU-T G.987.2 and G.989.3 with XGS upgrade) protocol based on contextualized dynamic rules.

Real-time IP traffic extraction

GPON-Doctor™ 10000 allows clear-text user traffic extraction in real-time for both upstream and downstream. The traffic is extracted at the Ethernet layer.

Validation

This traffic can be further analysed by upper-layer protocol analysers, either external or by a software. The combination of the GPONDoctor with a traffic generator and, an external or internal analyser that incorporates GPONDoctor 10000, is a powerful setup to validate the transmission of IP services over the network.

This feature can be also used to regenerate IP services inside GPONDoctor™: IPTV channels, VoD flows, reproduce voice stream in realtime so as to analyze their QoS & QoE and identify “Services” degradations.

KEY FEATURES

- Reliable results
- PON Passive
- Position-independent
- Capture+Test+Evaluate
- Full XGS/GPON Capture
- Real-time IP Services traffic extraction
- Remote Test
- Status of the GPON network
- ONT performance
- QoS evaluation

APPLICATIONS

- Manufacturers Labs
- GPON 984.x Interoperability
- Diagnosis of incidents
- Analysis of protocols
- Installers Certifications
- Troubleshooting

BENEFITS

- Portable battery Operated
- Chip-set Independent
- Real Time Capture
- Dual Equipment
- Optical Power
- Real Time operation

Functional Specifications

GPON Doctor 10000 Features	
General	• Diagnosis and analysis of incidents and operation in an established XGS-PON/GPON network • Troubleshooting Interoperability between different manufacturers XGS-PON/ • Fundamental tool in the deployment of a new XGS-PON/GPON network, equipment • development and certifications • Analysis of XGS-PON / GPON protocols from the Ethernet medium • Evaluation of compliance with the protocol in the development of OLTs/ONTs XGS • GPON in the network of an Operator • ITU-T G.9807.x / ITU-T G.984.x / ITU-T G.988 interoperability test • Identification of incidents in an XGS-PON or GPON network • Know the status of the network and all its devices (ONTs)
Operation	• Evaluates the degree of compliance with the ITU-T G.9807.x, ITU-T G.984.x and ITU-T G.988 standard • Generation of a list of incompatibilities and violations of the standard • Low attenuation internal signal extraction module (<1.5 dB), perfect for field testing or laboratory analysis • Automatic behavior: capture, analyze and evaluate in a single click • Long duration captures (~30 minutes) • Infers the network topology: ONTs, OLT • Powered by double LiPo battery: ~2 hours of autonomy (~1 hour at full capacity) • Real-time capture of upper layer Ethernet traffic. Regeneration and monitoring of services • in real time: multicast video, voice • Adaptive synchronization and automatic calibration • Portable rugged equipment (MIL-810F). Reduced weight: <2 kg • Storing the captures for later analysis in GPONDoctor • Infers the status/value of OMCI entities on the ONT and VLAN filtering • Captures OAM + PLOAM control data and OMCI messages + negotiation • Bandwidth analysis per T-CONT for each ONT
GPON Doctor 10000 Interfaces	
GPON Interfaces	• SFP ONT: SC/PC TX 1310nm / RX 1490 nm B+ (2.5 Gbps) • SFP OLT: SC/UPC TX 1490nm / RX 1310 nm (1.25 Gbps)
XGPON Interfaces	• XGS-PON ONT SFP+ SC/UPC TX1270/RX1577 nm (9.953 Gbps) • XGS-PON OLT SFP+ SC/UPC TX1577/RX1270 nm (9.953 Gbps)
GPON Doctor 10000 Platform & Ergonomics	
Platform	• Dimensions: 311x232x100 mm and <2 kg / <9 Kg with transport case • 12" 1920 x 1080 (Full HD) Color High Definition Touchscreen • Wifi B/G interface, both for sniffing and IP management • USB 2.0 for easy export of capture data, traces and reports

GPON DOCTOR 10000