GPONDoctor 4500 FTTH analyzer

Optical Access

Standalone, portable and rugged FTTH GPON protocol analyzer (XGS-PON upgradeable) GPON Doctor™ 4500 is a professional tool for troubleshooting, monitoring and debugging a Fiber to the Home GPON-based network. It is the perfect companion for on-site FTTH troubleshooting related to GPON protocol or IP service delivery.

Complete Appliance

GPON Doctor 4500 is a chipset-less portable passive GPON FTTH protocol analyzer. It connects to a distribution fiber point of a GPON network and captures bit-level data in downstream and upstream, interpreting all control information at PLOAM and OMCI levels.

Capture+Analyze in 1 click

Designed for troubleshooting, certification and interoperability analysis, it is ideal for operators and installers of GPON deployments as well as GPON hardware manufacturers. GPON Doctor 4500 is a complete and self-contained solution consisting of GPON data acquisition hardware, a high-performance chassis/device, and software for analyzing the acquired data.The capture hardware is self-implemented with state-of-the-art optical modules and large processing capacity. It is capable of synchronizing with the upload and download link at any point of the GPON fiber and automatically calibrates itself, enabling long-term captures. It also extracts and decrypts Ethernet traffic from the upper layer in real time, allowing services such as video or VoIP to be regenerated.

Troubleshooting, Certification & Interoperability tool

The software interprets the data and allows the operator to review the trace from the first to the last frame. It also performs an analysis of the control messages and provides an estimate of the of the GPON network topology: ONTs, status of ONT and OLT state machines ONTs and OLTs, established data channels, exchanged configuration, OMCI E/R diagrams, analysis and bandwidth graphs for each ONT per T-CONT.

Based on Windows 10, it allows the integration (according to customer needs) of analysis and and management tools for other service protocols used over GPON. Very easy to and intuitive, with a very low learning curve that allows you to start using it from the very first moment.

ALBEDO

Real-time extraction

Extracts and decrypts real-time Ethernet layer user traffic available on the 10/100/1000BaseT interface for upper-layer monitoring and analysis using an external analyzer and/or other tools. The decryption hardware fully implements automatic AES decryption combined with FEC encryption.

Real-time GPON Capture

GPON Doctor 4500 captures OMCI and GTC messages over the fiber in real time to facilitate monitoring of negotiation processes and configurations, and shows the status of ONTs, GEM ports, and T-CONTs in real time.

Autonomous and Portable

Weighing less than 2 kg with a dual high-capacity LiPo battery that provides approximately 1 hour of autonomy when fully operational.

Certification

From the captured data, GPON Doctor deduces the network topology and applies a set of rules to certify whether the ITU-T G.984.x recommendation is met. Its automatic adaptive timing, automatic calibration and intuitive interface make it easy to use from day one.

Accurate detection of problems in a GPON network Evaluates and detects problems in a GPON network, detailing the equipment causing the problem and the cause of the failure.

Regeneration and QoS

Evaluation GPON Doctor 4500 can regenerate the services established in a PON network. For example, you can extract and reassemble multicast video in real time and view it on the GPON Doctor 4500 screen. This feature is perfect for evaluating the QoS and QoE of services configured over a PON.

Analysis with Diagrams

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

Chipset-Less Implementation Captures hardware manufactured exclusively for this device. Results are independent of the proprietary implementation of any GPON equipment vendor.

Applications

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.

Neutral analysis and Capture

GPON-Doctor™ 4500 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.

KEY FEATURES

- Reliable results
- PON Passive
- Position-independent
- Capture+Test+Evaluate
- Full XGS/GPON Capture
- Real-time IP Services traffic extraction
- Remote Test
- automatic calibration
- Service regeneration
- QoS Evaluation

OLT

Splitter

Monitoring/Generation
Data Capture/Analysis

GPON
DOCTOR 4500
DOCTOR 9500

ONT

ONT

ONT
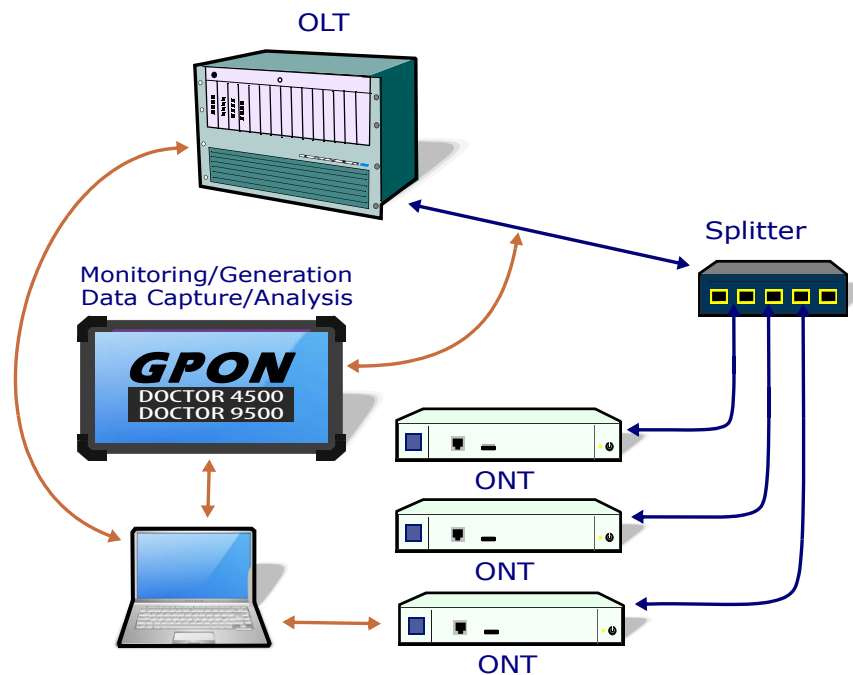
Capture modes

GPONDoctor 4500 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.

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™ 4500 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 analyzed by upper-layer protocol analyzers, either external or by a software. The combination of the GPONDoctor with a traffic generator and, an external or internal analyzer that incorporates GPONDoctor 4500, is a powerful setup to validate the correct 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.

APPLICATIONS

- Identification of problems
- GPON 984.x interoperability
- Diagnosis of incidents and
- Analysis of protocols
- Certifications
- GPON Laboratories

ALBEDO

GPON Doctor 4500 Features	
General	• Fundamental tool for GPON networks optimum deployment • Events and deviations Diagnosis and Analysis for already deployed GPON networks • Interoperability troubleshooting among multi-vendors equipment coexisting in a Telco access network • Analysis of user traffic within the GPON Networks through its Ethernet interface • ITU-T G984.x, G988 interoperability test • GPON problems delimiting within an FTTH network • Full knowledge of the Network state and all its active elements (OLT/ONTs)
Operation	• Capture OAM + PLOAM control data and OMCI messages (full support) • Real Time PLOAM + OMCI + Negotiation messages capture • Several capture modes: Full and Long duration • Low attenuation (<1.5 dB) external fiber tap module, perfect for field environment. It can be installed as a fixed testing point • Ruggedized (MIL-STD-810G & IP-810G) portable form factor. Very Low Weight: <1.8 kg • Battery Powered: more than 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/G988 standards generating a list of standard inconsistencies and violations • Bandwidth distribution analysis per T-CONTs for every ONT • Real-Time IP Services regeneration and monitoring: Multicast Video, Voice • Automatic calibration • Real-time User data traffic extraction at the Ethernet layer • Windows 10 Pro Operating System • Automatic behavior: capture, analyze, and evaluate in one click • Captures storage for further analysis by the GPONDoctor • Hardware/software customization upon request
GPON Interfaces	• Downstream: SFP Single Mode 1490nm (2,5Gbps) module • Upstream: Single Mode 1310nm (1,25Gbps)
XGPON Interfaces	• Downstream: SFP Single Mode 1578nm (10Gbps) module • Upstream: Single Mode 1270nm (10Gbps)
Platform	• 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