

GPONDoctor 10000 FTTH expert

Dual GPON and XGSPON protocol analyser



GPONDoctor 10000 is a dual GPON and XGSPON protocol analyser that captures upstream and downstream bit level data and interprets PLOAM and OMCI level control information. It can also (a) extract user traffic at the Ethernet layer, (b) measure optical power, (c) detect and report line faults. Aimed at troubleshooting, certification and interoperability analysis, it is an excellent solution for operators, installers and manufacturers.

With the ability to perform interoperability checks and conformance validation, it is a valuable tool for ensuring network compliance. Through its two operating modes, XGS-PON mode and GPON mode, it offers the functionalities of the GPONDoctor 9500 and GPONDoctor 4500 respectively, in a self-contained unit. Therefore it processes OAM, PLOAM, and OMCI management information and allows for real-time traffic extraction of multimedia services. GPON Doctor 10000 is Self-contained test solution essential for maintaining optimal network performance. As a portable tool designed for interoperability testing, it is an ideal solution for GPON and XGSPON telecom operators during the deployment, maintenance, and troubleshooting phases of XGS/GPON. It is also valuable for ONUs/OLT vendors for conformity and interoperability validation.

Protocol Analysis

The analysis software interprets the captured data, enabling the user to trace all control frames. Moreover, it can estimate the network topology of GPON and XGSPON ONT and OLT state machines, established data channels, exchanged configuration, E/R OMCI diagrams, analysis, and bandwidth graphs for each ONT per T-CONT.

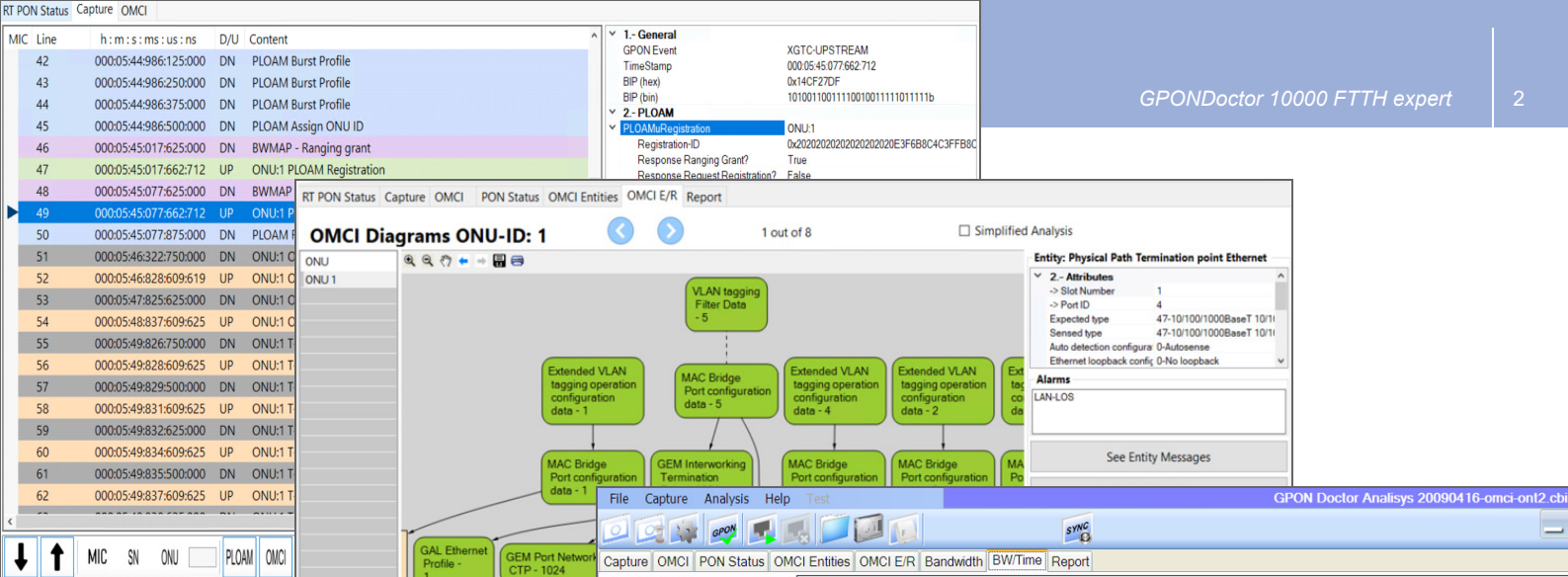
Traffic Capture

GPON Doctor 10k is a powerful tool comprised of a high-performance hardware capture card, portable battery-powered chassis, and robust software application. It captures all upstream and downstream data simultaneously, enabling identification of PON status, entities, and their relations, as well as bandwidth allocation/consumption and deviations from standard.

Vendor interoperability & Protocol certification tool

The capture card hardware has been purposely designed with advanced optical modules and processing capabilities. It can extract and decode Ethernet traffic, including real-time Video or VoIP, from GEM ports.





Features

Traffic Capture

GPONDoctor 10000 captures OMCI and XGS-TC/GTC messages over the fiber in real time to facilitate the monitoring of negotiation processes and configurations, displaying in real time the status of ONTs, XGEM/GEM ports and T-CONTs. The software analyses data and presents it in a graphical format for the analysis of XGS/GPON installations. It highlights the offending devices and cause of failure.

With just one click,

GPON Doctor can identify any issues in real-time by connecting to a fiber termination point within the XGS-PON network.

Evaluation rules

Accurate detection of problems in an XGS-GPON or GPON network Evaluates and detects problems in XGS-GPON or GPON networks, detailing the offending devices and the cause of the failure.

GPON and XGSPON Capture

The capture hardware is self-implemented with state-of-the-art optical modules and high processing capacity. Capable of synchronizing with the downlink and uplink at

any point in the XGS-GPON or GPON network and calibrating itself automatically, allowing long duration captures.

Network topology

From the captured data GPD 10k deduces the network topology and applies a set of rules to certify whether the ITU-T G.9807.x or ITU-T G.984.x recommendation is met providing continuous updates on the status of ONTs, XGEM ports and T-CONTs while displaying the topology.

QoS assessment

Regeneration of established services on a PON network is possible. 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 services configured over 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 time evolution of bandwidth allocation.

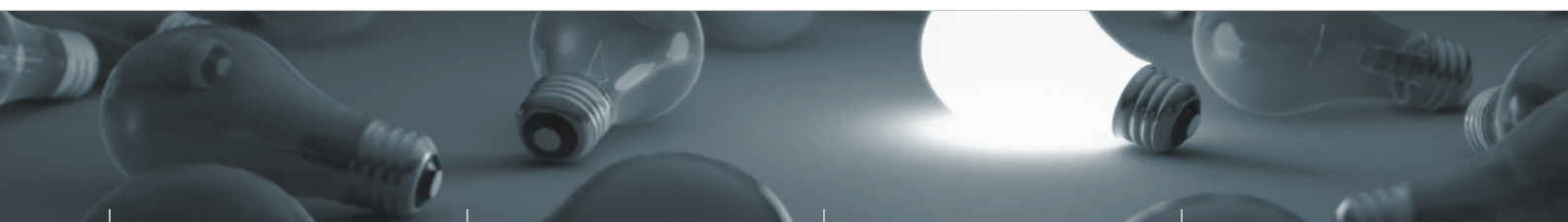
Ethernet data traffic

Allows real-time extraction and decryption of user traffic for monitoring and analysis by external tools. The decoding hardware fully implements automatic AES decryption combined with FEC encryption.

New features

Optical Power Meter and Line Error detection and reporting.

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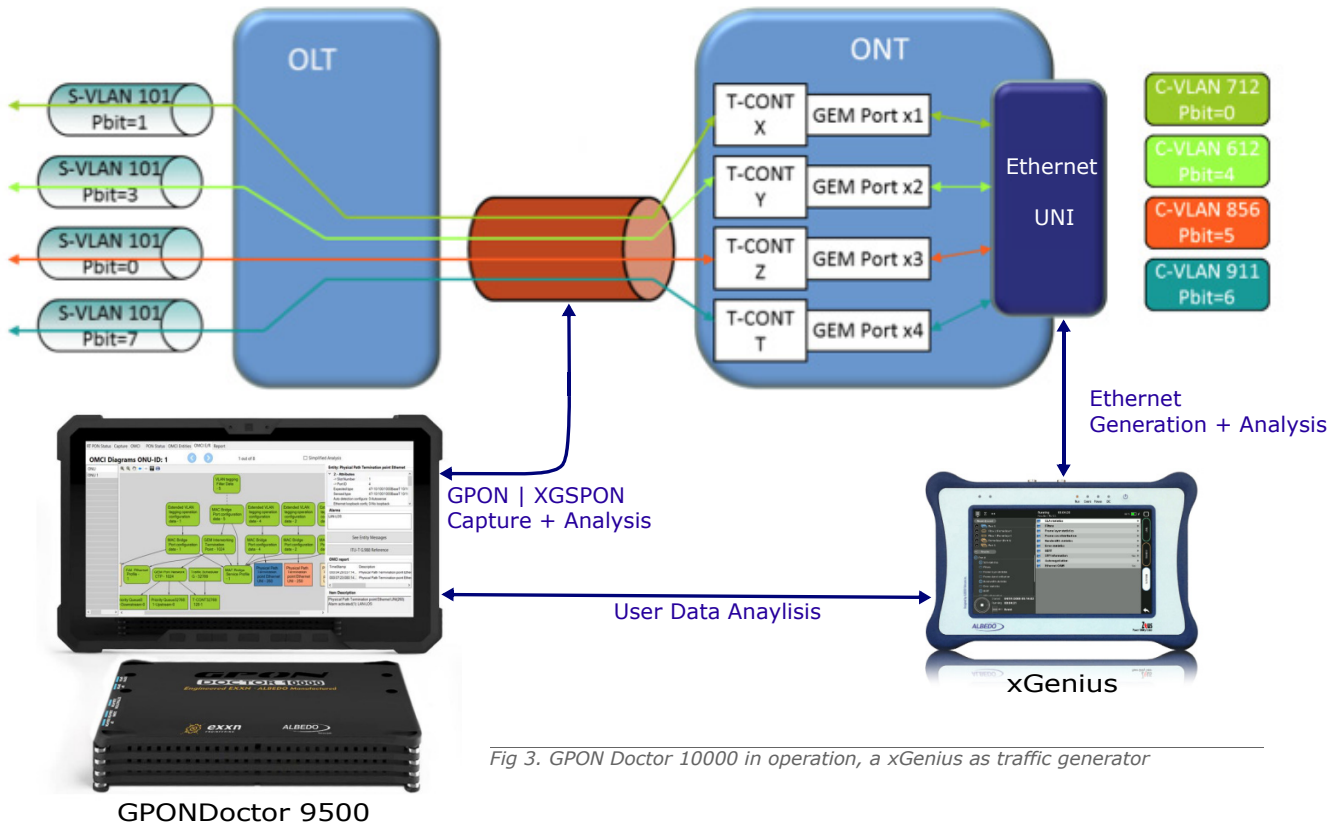


Fig 3. GPON Doctor 10000 in operation, a xGenius as traffic generator

GPON applications

GPON & XGSPON analysis

CAPEX can be significantly lowered by implementing multi-vendor ONUs. This requires any OLT to communicate with any ONT, irrespective of the manufacturer. The fundamental concerns of FTTH networks must be tackled:

- Commercial use of various versions of the standard,
- and ONUs and OLTs made by a different manufacturer may not be accepted.
- OMCI can be complex and vendors may misinterpret the standard.
- The heterogeneity of IP service provisioning is also a reason for errors.

FTTH acceptance

It's important to understand the fundamentals of PON networks as resulting of the splitter only a portion of the power arriving at an ONT. As such, it's crucial to

USERS

- Manufacturers
- Laboratories
- Operators
- Installers

APPLICATIONS

- Installation
- Troubleshooting
- Interoperability
- Analysis of protocols
- Protocol compliance

KEY FEATURES

- GPON + XGSPON analysis
- Topology representation
- Bandwidth allocation
- QoS assessment
- Events and deviations
- Chipset-Less
- Transparent captures
- Automatic calibration
- Windows application
- IP Services certification
- Optical Power Meter

keep this attenuation in check to avoid any failures during challenging conditions.

Test ensures the compliance

The procedure for implementing FTTH GPOON and XGSPON networks utilises passive optical components to divide the fiber stretch and create a tree-like topology, with a single point of origin and N destinations. These standards are outlined by the FSAN, and detailed in the IITU-T G.9807.x / G.984.x / G.988.

Vendor Interoperability

The protocol test aims to identify possible errors in negotiation and transmission between XGS-PON devices caused by non-compliance with the standards. In cases of multi-vendor validation, GPONDoctor 10000 is necessary to identify interoperability deficiencies.

IP Services certification

The GPONDoctor combined with xGenius, a synthetic traffic generator, allows for a robust setup to verify the accurate transmission of IP services, whether video or data, over the FTTH network. This functionality permits the emulation of IPTV channels, VoD flows, and real-time reproduction of voice streams to analyze QoS and QoE and identify the sources of degradation and failures.

GPON Doctor 10000 Features	
Operation and Applications	<ul style="list-style-type: none"> • Fundamental tool for XGS-PON and GPON networks optimum deployment • Events and deviations Diagnosis and Analysis for already deployed XGS-PON and GPON networks • Interoperability troubleshooting among multi-vendors equipment coexisting in the access network • Analysis of user traffic within the XGS-PON and GPON Networks through its Ethernet interface • Evaluation of protocol compliance in the development of OLTs/ONTs XGS-PON and GPON • Compliance evaluation with the ITU-G.9807.x standard, generating a list of violations of the specifications • ITU-T G.988 list of incompatibilities and violations • ITU-T G.9807.x, G.984.x, G.988 interoperability test • XGS-PON and GPON problems delimiting within an FTTH network • Network Discovery and state and all its active elements (OLT/ONTs) • Infers the XGTC machines in ONTs state and the ONTs OMCI entities state/value • Discovers network topology: ONU/ONTs, OLT • Real-Time IP Services regeneration and monitoring including Multicast Video, Voice • Bandwidth distribution analysis per T-CONTs for every ONT • Determines the status/value of OMCI entities in the ONT and VLAN filtering
Capturing Modes	<p>Capture, analysis, and evaluation Capture modes in XGS-PON and GPON</p> <ul style="list-style-type: none"> • Full captures • Long duration captures (~30 minutes) • Storage for further analysis <p>Protocol Capture</p> <ul style="list-style-type: none"> • PLOAM, • OMCI • OAM • Control data • Negotiation <p>User data extraction</p> <ul style="list-style-type: none"> • Up to 10 Gbps • Ethernet frames • Real-time mode
Capture Interfaces	<ul style="list-style-type: none"> • Low attenuation (<1.5 dB) external fiber tap module <p>GPON Interfaces</p> <ul style="list-style-type: none"> • SFP ONT SC/PC TX1310/RX1490 nm B+ (2.5 Gbps) • OLT SC/UPC TX1490/RX1310nm SFP OLT (1.25 Gbps) <p>XGSPON Interfaces</p> <ul style="list-style-type: none"> • XGS-PON ONT SFP+ SC/UPC TX1270/RX1577 nm (9.953 Gbps) • XGS-PON OLT SFP+ SC/UPC TX1577/RX1270 nm (9.953 Gbps) <p>User Data Traffic</p> <ul style="list-style-type: none"> • Gigabit Ethernet capture and management module: QinQ transparent/ configurable • IP Services Real-Time Extraction port: 1000BASE-T external network protocol analyzer plugging
Platform	<ul style="list-style-type: none"> • Automatic calibration • Wifi B/G interface, both for sniffing and IP management • USB for i/o captured data, traces and reports • Windows Operating System • Dual LiPo battery power supply: ~2 hours autonomy (~1 hour at full power) • Accessories included: extraction splitter, optical modules, set of attenuators (4, 8 and 15 dB), SC/UPC-SCAPC patch cords
Ergonomics	<ul style="list-style-type: none"> • Touch screen 11.6" HD High Definition Colour (1366 x 768) • Ruggedized (MIL-STD-810G & IP-810G) portable form factor • Dimensions: 311 x 232 x 100 mm <p>Weight</p> <ul style="list-style-type: none"> • Appliance weight: <2 kg • Carry Case weight: <7 kg

