



GPON Doctor 9k7 analyser

Portable XGS-PON Analyser

The GPON Doctor 9k7 (GPD 9k5) is a reliable device designed for detecting, monitoring, and resolving issues related to FTTH XGSPON-based networks. It is highly portable, battery-powered, and built to withstand rugged field conditions, making it the ideal choice for identifying and troubleshooting protocols or IP services.

Furthermore, it can perform interoperability checks and conformance validation, making it a valuable tool for ensuring network compliance. GPON Doctor 9k7 is a highly capable and self-contained test solution that expertly processes OAM, PLOAM, and OMCI management information. Its real-time traffic extraction of multimedia services is unparalleled, making it the ideal solution for XGS-PON telecom operators during the deployment, maintenance, and troubleshooting phases of XGS/GPON. Additionally, it is a valuable tool for ONUs/OLT vendors seeking 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 the XGS-PON. 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

Its high-performance hardware capture card, portable battery-powered chassis, and robust software application make it the ideal solution for efficient network monitoring. GPD 9k5 is a powerful tool that captures all upstream and downstream data simultaneously, enabling the identification of PON status, entities, and their relations, as well as bandwidth allocation, consumption, and deviations from the standard.

Vendor interoperability & Protocol certification tool

Our capture card hardware is designed with advanced optical modules and processing capabilities, allowing it to easily extract and decode Ethernet traffic from GEM ports, including real-time video or VoIP.

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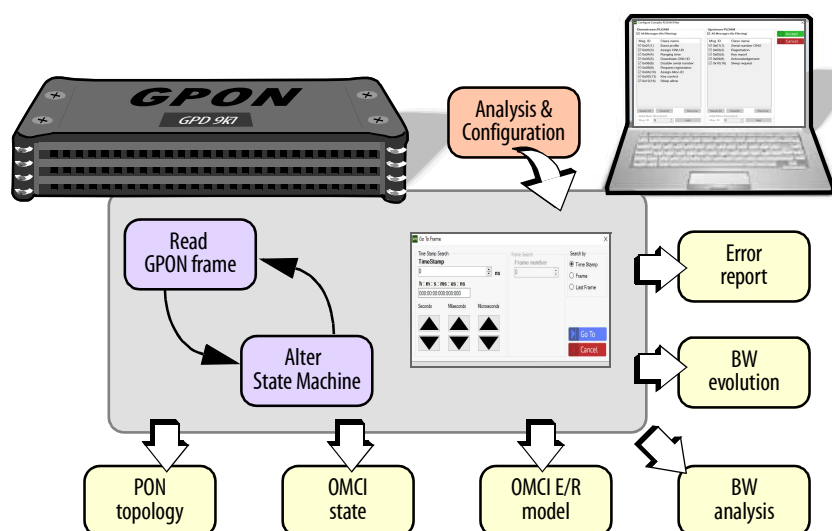


Fig 1. GPON Doctor infers the state of the FTTH network under analysis.

Features

Traffic Capture

GPON-Doctor 9k7's Traffic Capture feature extracts and decodes FTTH traffic using ITU-T standards. It identifies the topology of ONT, OLT, and data channels, creating graphs that display the bandwidths of each channel. Two real-time capture modes are available:

1. full capture for troubleshooting
2. long-time to identify deviations.

The software analyzes data and presents it graphically for the analysis of XGS/GPON installations. It confidently highlights the offending devices and provides a clear cause of failure.

With just one click

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

Real-time XGS-PON Capture

The tool captures data from the fiber at a bit-level in both downstream and upstream directions, including OMCI and XGSTC/GTC messages, to facilitate the monitoring of negotiation processes and configurations. It provides real-time updates on the status of ONTs, XGEM ports, and T-CONTs, displaying the topology.

Diagrams

The OMCI entity/relationship diagram presents alarms and errors, along with bandwidth allocation diagrams for ONT and TCONT. Additionally, optional bandwidth allocation time evolution diagrams can be included.

Network topology

The network topology is determined by analyzing the captured data through XGS-PON control information, specifically OAM, PLOAM, OMCI, and DBA. This analysis provides a comprehensive understanding of the composition and status of network components, including the ONTs and the OLT.

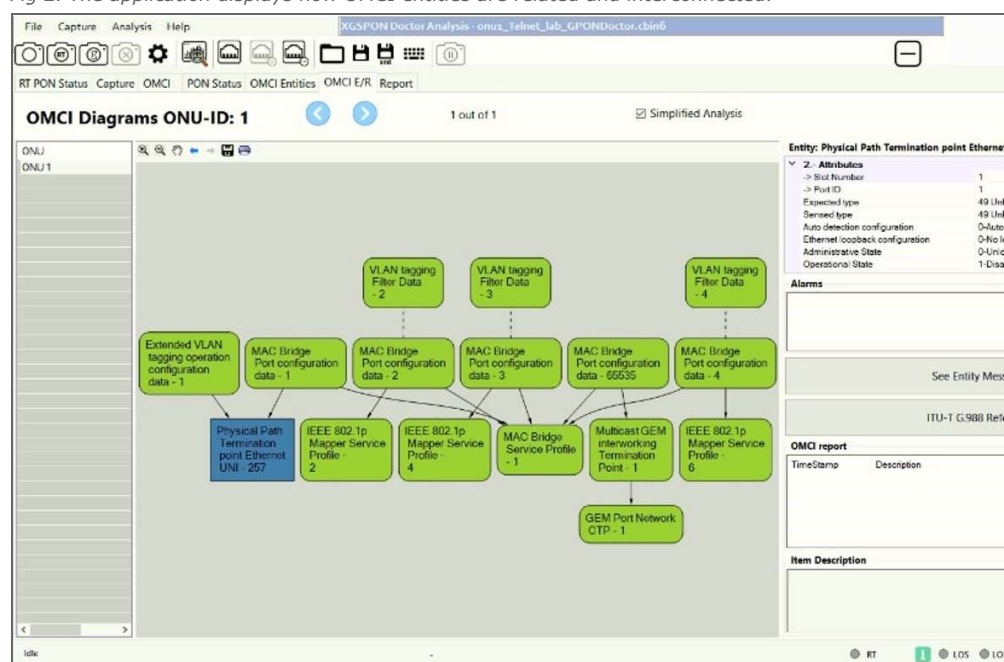
QoS assessment

GPONDoctor 9k7 empowers users to regenerate services on an XGS-PON network. Specifically, it enables real-time extraction and reassembly of multicast video to display on the GPONDoctor screen. This feature is perfect for evaluating the quality of service (QoS) and quality of experience (QoE) of services configured over a PON.

The evaluation rules identify

Evaluation rules are applied to identify deviations from expected behavior regarding protocol conformity to ITU-T G.984.x, G.988, ITU-T G.987.2, G.989.3 standards.

Fig 2. The application displays how OMCI entities are related and interconnected.



GPD applications

XGS in operation

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,
- 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.

KEY FEATURES

- XGSPON networks
- Network topology
- Bandwidth allocation
- QoS assessment
- Events and deviations
- Chipset-Less
- Transparent captures
- Automatic calibration
- Windows application
- IP Services certification
- Self contained solution

APPLICATIONS

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

USERS

- Manufacturers
- Laboratories
- Operators
- Installers

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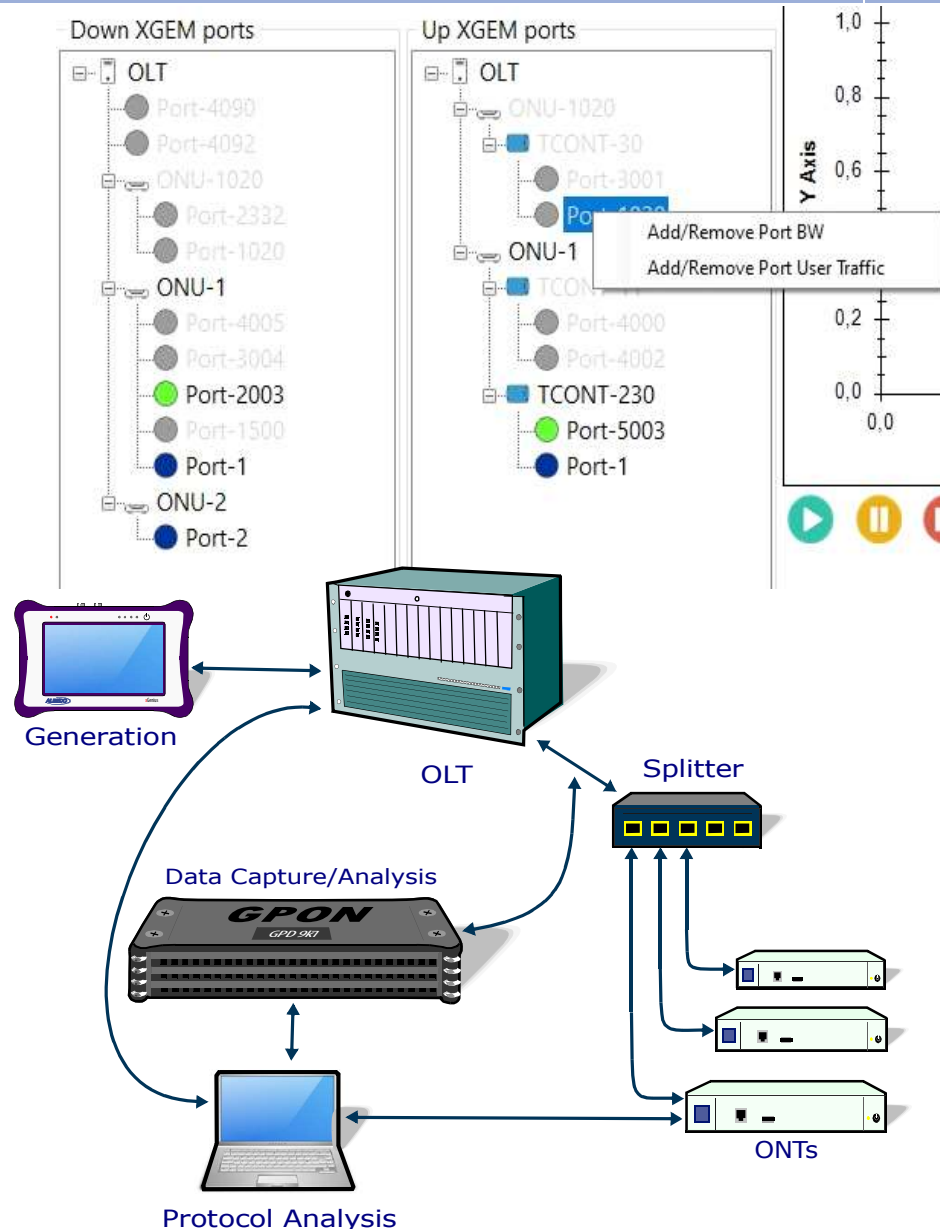


Fig 3. GPON Doctor 9k7 in operation, a xGenius as traffic generator and a Laptop for offline analysis.

FTTH acceptance

It is crucial to understand the basics of PON networks as the splitter only allows a portion of the power to reach an ONT. Monitoring and controlling this attenuation is important to prevent failures during challenging conditions.

Test ensures the compliance

FTTH XGS-PON networks are implemented using passive optical components to divide the fibre 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 ITU-T G.988/G.987.2/G.989.3.

Vendor Interoperability

The protocol test identifies errors in negotiation and transmission between XGS-PON devices caused by non-compliance

with the standards. GPONDoctor 9k7 is necessary to identify interoperability deficiencies in cases of multi-vendor validation.

IP Services certification

The GPONDoctor, in combination with xGenius, a synthetic traffic generator, ensures the accurate transmission of IP services, including video and data, over the FTTH network. This functionality enables 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 with confidence.

Functional Specification

GPON Doctor 9k7 Features	
Capture	- Inference of PON topology: ONU IDs, GEM ports - Real-time detection of activity on GEM ports - Capture and interpretation of PLOAM messages - Capture and interpretation of OMCI messages - Capture and interpretation of Bandwidth Maps for ONT discovery - Real time capture mode - Background capture mode - Scheduled capture mode - Messages color scheme to facilitate visualization and analysis of the capture - Capture exportable to CBIN6 format - Capture exportable to XML format - Powerful filtering system for visualization and capture analysis
Analysis engine	PON characterization - Topology - PON parameters - ONU status (ID, timing parameters, keys negotiated, operation status, Alloc-IDs and GEM ports) Features - List of discovered OMCI entities. Interpretation of their attributes and values - Generation of accurate E/R diagrams - TU-T G.988 reference integrated: quick access to the entity's definition - Evaluation of conformity with ITU-T G.9807 and generation of a list of specification violations - Evaluation of conformity with ITU-T G.988 and generation of a list of specification violations - Characterization of type and level of violations discovered - Direct access to the messages of the entities presenting nonconformities - Exportable analysis in HTML format
User traffic extraction	Extraction of XGSPON user traffic through virtual Ethernet interface over USB 3.0
Bandwidth monitor	- Bandwidth used per port - Bandwidth assigned per Alloc-ID - Bandwidth utilized per ONU - Real-time graphical visualization - Exportable to CSV
Link integrity monitor	- Downstream HEC errors in SFC, OC, HLEnd, BWMap and XGEM header - Upstream HEC errors in Fixed FS Header and XGEM header. BIP errors - Real-time graphical visualization - Exportable to CSV
Automation	- Integrated CLI for remote operation and/or integration into automated certification or verification workflows - Protocol: Telnet - Configurable port
Interfaces	- USB 3.0 - SFP+ XGSPON ONT SC/UPC TX 1270 nm / RX1577 nm (9.953Gbps) - SFP+ XGSPON OLT SC/UPC TX 1577 nm / RX1270 nm (9.953Gbps)
Platform Requirements	- USB 3.0 Interface - Windows Operating System - Accessories included: extraction splitter, optical modules, set of attenuators (4, 8 and 15 dB), SC/UPC-SCAPC patch cords
Ergonomics	Dimensions: 210mm x 160mm x 30mm without SFP's 230mm x 160mm x 30mm with SFP's Weight - Appliance weight: <1 kg

