Fiber to the Home Portable GPON Analyzer

Description

GPON Doctor™ 2000 is a passive, chipset-less GPON FTTH protocol sniffer and analyser. Connected to any location within your PON distribution network (ODN), will capture downstream and upstream bit-level information. Provides a fast and easy to understood analysis of the GTC layer: OAM, PLOAM, and OMCI. GPON Doctor™ 2000 is a perfect tool for standards conformance compliance, network monitoring and troubleshooting. Ideal for test-labs and field application engineers engaged in GPON deployment and maintenance as well as for GPON OLT/ONUs manufacturers.

Capture+Analyze+Evaluate
GPON Doctor™ 2000 is a complete portable and easy to carry on solution: it is composed by a small and lightweight chassis (278x202x44.45mm), a PCIe1 host cable adapter and a processing software capable of analysing and evaluating the captured data. Based on our own implementation, the capture hardware includes last generation optical modules and powerful computing engine. Capable of synchronizing with the Downstream and Upstream data flow of the GPON fibre and performing automatic calibration.

The Analysis Engine interprets the captured data and provide all the tools for engineers to inspect the control flow while adding useful information for debugging and troubleshooting. From the content of the control information, it infers the topology and state of a GPON network: ONTs detected, data channels established, configuration exchanged, bandwidth analysis and graphics for every ONT and by TCONT.

The GPON Protocol Evaluation System applies a set of contextualized, dynamic rules to test if the captured traffic complies with the ITU-T G.984.x protocol: Generating a final report listing all protocol violations of possible sources of malfunction. Captured can exported in XML, the E/R diagram in HTML and the Final report in Text. It also includes “SW desktop” licenses for “off-line” debugging of captured information.

Features

Capture+Analyze+Evaluate in 1 click
GPONDoctor™ 2000 gathers all control and management information from the PON and by using an smart analysis engine it is capable of inferring in “Real Time” the network topology while verifying the G.984.0 recommendation level of compliance. Its automatic adaptive synchronization, automatic calibration and easy interface makes it ready to be used just from the start.

Troubleshooting a GPON network
Detects and identifies all problems within a GPON network, uncovering the origin of the malfunction and its source.

Real time user traffic extraction
GPON Doctor™ 2000 extracts, decrypts and reassembles user traffic at Ethernet layer in real time. This traffic is forwarded to its 10/100/1000BaseT interface. Its hardware decoder fully supports AES automatic decryption combined with FEC encoding. Possible applications are: QoS/QoE monitoring, network performance and upper layer analysis.

Service regeneration and QoS/QoE Evaluation
GPON Doctor™ 2000 can regenerate services established over a PON network. Multicast video can be sniffed & reassembled in real time and reproduced as in Customers’ premises. This feature is perfect to identify services optimum performance deviation over a PON.

Real time operation
GPON Doctor™ 2000 captures and displays PON Topology, 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 per GEM port.
Troubleshooting in PON and GPON networks
With the aim of widening ONTs offer, it is important that any OLT interoperates with all available ONUs in the market. However, GPON has a number of intrinsic characteristics that is currently making difficult to achieve the desired level of the interoperability:
- Coexistence of products with different standard versions.
- Problems during the activation process.
- Different ways of implementing the standards
- OMCI, a very broad and with “vendor specific” options.
- Heterogeneity among operators.

Furthermore, the structure of a PON network is a fibre that is further divided using optical power splitters. The “degree of splitting”, defined as the number of divisions that the fibre goes through before reaching an ONT, determines the percentage of optical power arriving to that ONT. 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 fibre, and thus, some of the network active elements may be operating under stress conditions.

In order to reach the optimum performance state of a GPON network, during the deployment and maintenance, all causes of interference need to be debugged by tools like GPONDoctor 2000.

Non-invasive Capture
Once a Network is deployed, it is required that the usage of a test tool does not impact in its behaviour. Therefore, GPON-Doctor™ 2000 transparently sniffs traffic within a FTTH network. Moreover, its automatic calibration and stand alone configuration enables full capture of GPON network traffic without disturbing the communication between the OLT and ONTs.

The capture can be very long (e.g. 30 minutes) and allows captured data export to XML format for later analysis in desktop computers.

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

The results from the GPON Doctor™ analysis show:
- GPON network topology: ONTs detected, ONTs and OLT operational status, data channels established,
- Entities created and the relationship among them,
- Bandwidth assignment graphics per ONT and TCONT,
- Degree of standard conformance, by applying an evaluation smart engine, based on contextualized dynamic rules, against the ITU-T G.984.x protocol.

Real time upper layer Ethernet traffic extraction
GPON-Doctor™ 2000 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 analysed by upper layer protocol analyzers, either external or by a software network protocol analyzer installed within the host PC/Laptop.

The combination of the GPON Doctor™ 2000 with a traffic generator and GPON OLT emulator, like GPON-Doctor™ OLT-e, is a powerful setup to verify the correct ONTs behaviour over a GPON network.

This feature can be also used to regenerate services inside GPON Doctor™: Play Multicast Video flows, hear sound of voice services in realtime, analyze QoS & QoE.
Start screen
Control traffic analysis: 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
Analysis of bandwidth distribution per ONT and TCONT
Application examples

Fundamental tool for GPON network deployment and maintenance.
Diagnosis and Analysis of events and deviations for already deployed GPON networks.
Interoperability troubleshooting among different vendors equipment coexisting in a Telco access network.
Triple play services assurance by user traffic Quality of Experience monitoring
Broadband Forum ONU's conformance testing.
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 (~30 minutes)
Infers the GTC machines in ONTs state and the ONTs OMCI entitles state/value.
Infers network topology: ONU/ONTs, OLT.
Bandwidth distribution analysis per T-CONTs for every ONT.
Evaluation of the compliance degree with the ITU-G.984.x standard, generating a list of standard inconsistencies and violations.
Real Time Service regeneration and monitoring: Multicast Video, Voice
Automatic calibration.
Real time upper layer Ethernet traffic extraction.
Automatic behaviour: capture, analyse and evaluate in one click.
Captures storage for further analysis by the GPON-Doctor™.
Low attenuation (<1.5 dB) external fibre tap module, perfect for field environment. Can be installed as fixed testing point
Ruggedized portable form factor. Very Low Weight.
Easy to carry form factor: 278x202x44.45mm
Hardware/software customization upon request.

Interfaces

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

GPON capture interfaces:
- Downstream: SFP Single Mode 1490nm (2.5Gbps) module, SM 1310nm optional
- Upstream: Single Mode 1310nm (1.25Gbps)

PCIe x1 Host cable adapter options
- Express card PCIe x1 Host cable adapter (for Laptops)
- PCIe x1 Host cable Adapter (for Desktop computers)