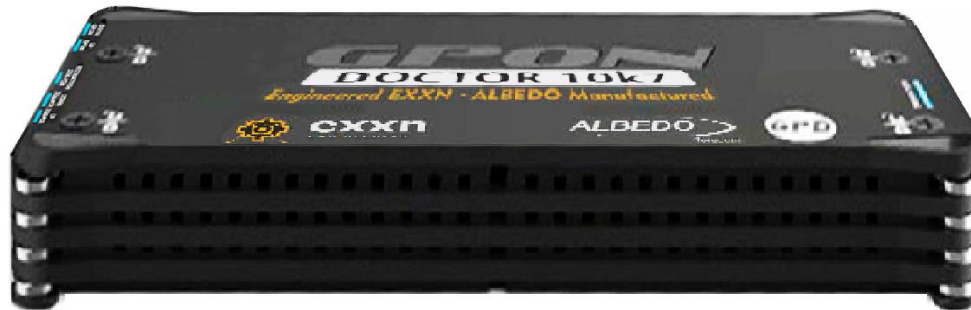


GPON Doctor 9k7



New generation GPON Analysers for FTTH access with GPON or XGSPON architectures.



Three Models: 4k7 / 9k7 / 10k7

		4K7	9K7	10K7
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	●	●	●
	Capture and interpretation of Bandwidth Maps for bandwidth allocation on operation	●	●	●
	Real-time capture mode	●	●	●
	Background capture mode	●	●	●
	Scheduled capture mode	●	●	●
	Messages color scheme to facilitate visualization and analysis of the capture	●	●	●
	Capture exportable to CBIN5 format	●	●	●
	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)	●	●	●
	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.984 and generation of a list of specification violations	●	●	●
	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 user traffic of up to 6 simultaneous GPON through virtual Ethernet interface over USB 3.0	●	●	●
	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	Upstream FEC errors monitor	●	●	●
	Downstream FEC errors monitor	●	●	●
	Downstream HEC errors in SFC, OC, HLenD, BWMMap 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 GPON ONT SC/PC TX 1310 nm / RX 1490 nm B+ (2.5Gbps)	●	●	●
	SFP GPON OLT SC/UPC TX 1490 nm / RX1310 nm (1.25Gbps)	●	●	●
	SFP+ XGSPON ONT SC/UPC TX 1270 nm / RX1577 nm (9.953Gbps)	●	●	●
	SFP+ XGSPON OLT SC/UPC TX 1577 nm / RX1270 nm (9.953Gbps)	●	●	●

- Included
- Included in GPON license
- Included in XGSPON license





- Troubleshooting operator GPON & XGS-PON deployments
- GPON & XGS-PON network optimisation
- Interoperability analysis between OLT and ONT vendors
- GPON & XGS-PON chipset development
- Real-time IP services traffic extraction
- Automation of GPON test plans

◆ GPON Doctor 4k7

- Downstream: SFP single mode 1490nm @2,5Gbps
- Upstream: SFP single mode 1310nm @1,25Gbps
- RJ45 interface for traffic extraction

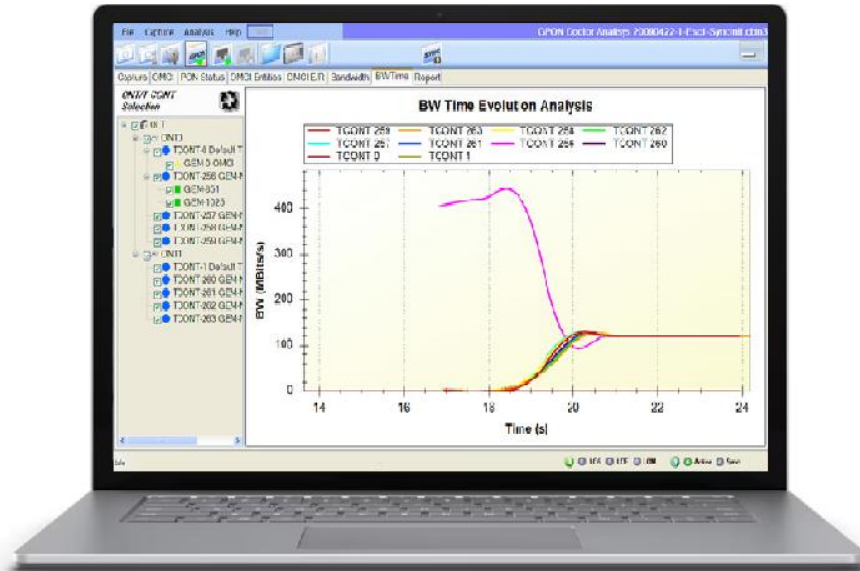
◆ GPON Doctor 9k7

- Down: SFP single mode 1578nm @10Gbps
- Ups: SFP single mode 1270nm @10Gbps
- RJ45 interface for traffic extraction

◆ GPON Doctor 10k7

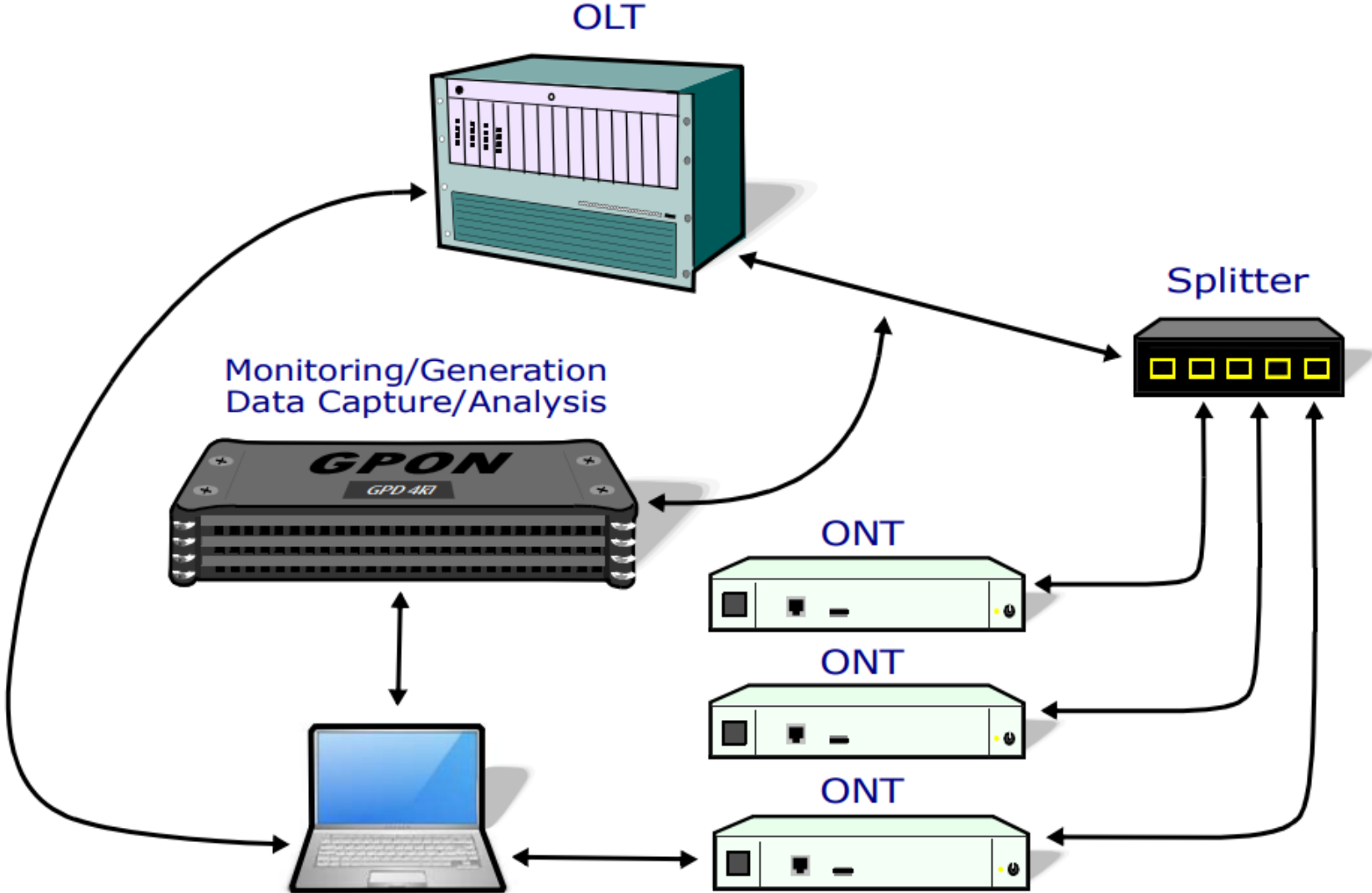
- 1: DS XGSPON: SFP single mode 1578nm @10Gbps
- 2: US XGSPON: SFP single mode 1270nm @10Gbps
- 3: Reserved for future use
- 4: DS GPON: SFP single mode 1490nm @2,5Gbps
- 5: US GPON: SFP single mode 1310nm @1,25Gbps

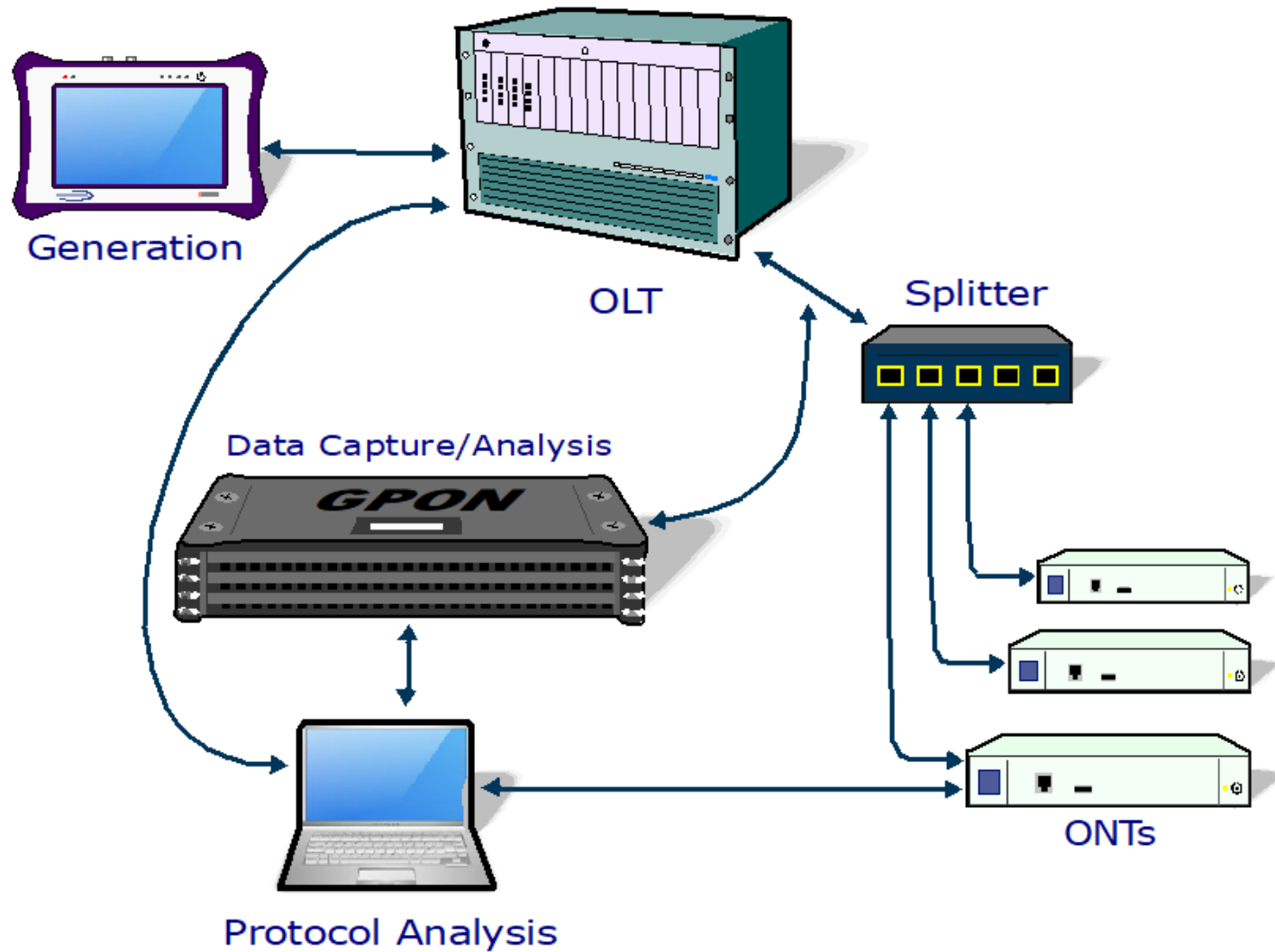


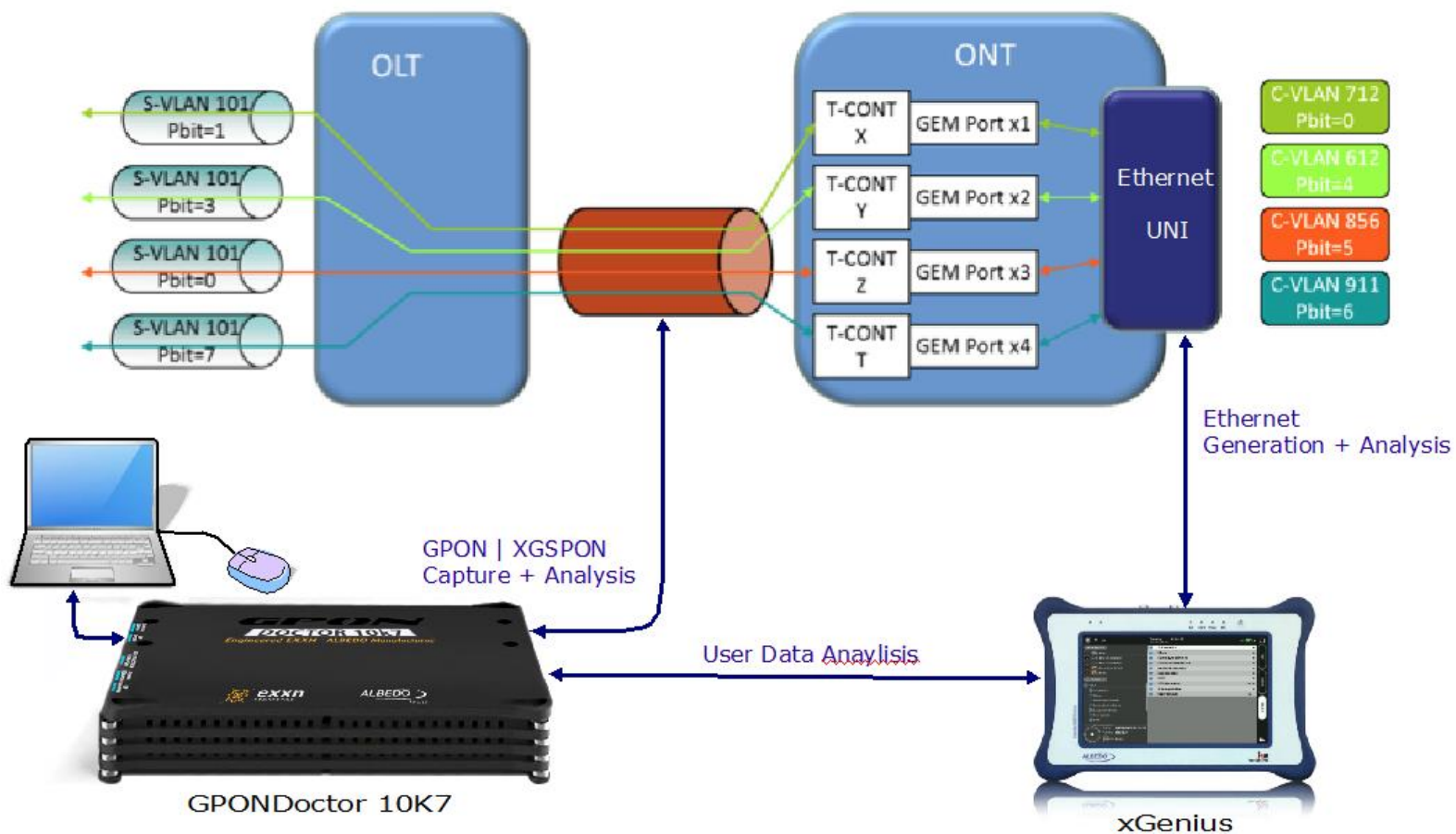


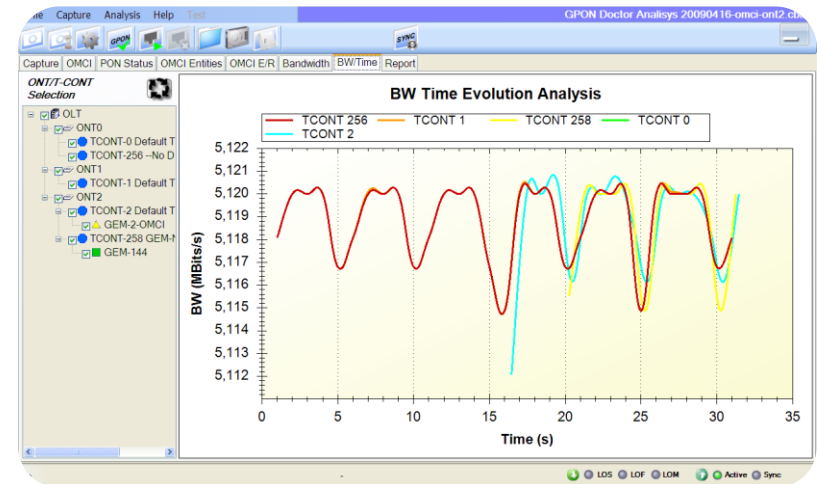
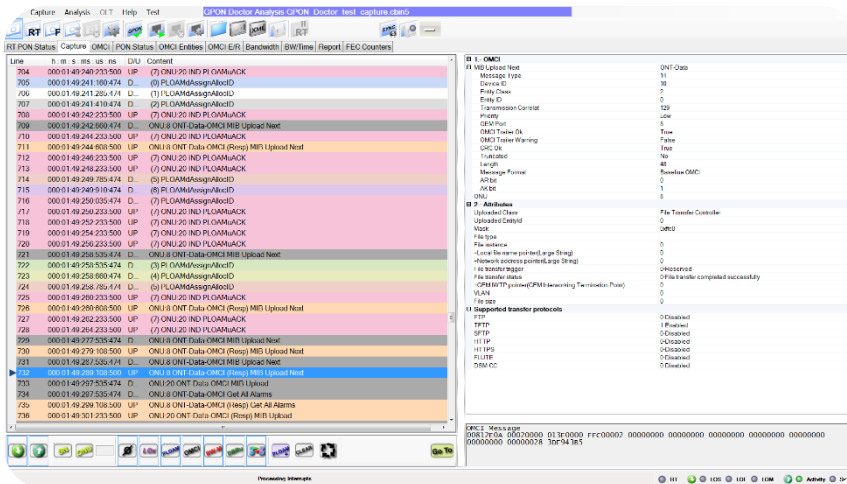
- Gigabit Ethernet Capture/Management Port: QinQ VLAN Transparent/Stripping configurable
- WiFi 802.11ac interface, both for sniffing and IP management purposes
- IP Services Real-Time Extraction port: 1000Base-T External network protocol analyser plugin
- USB 3.0 to easy transfer data, traces and reports (all range)

GPD 4K7 in GPON networks

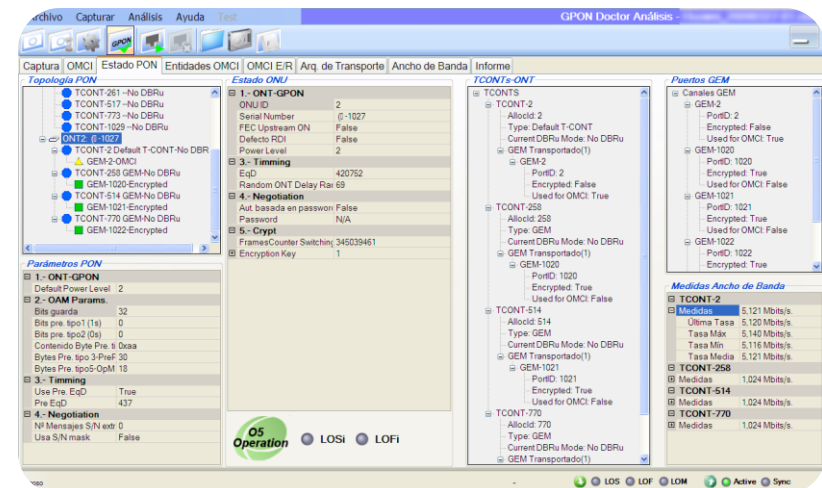
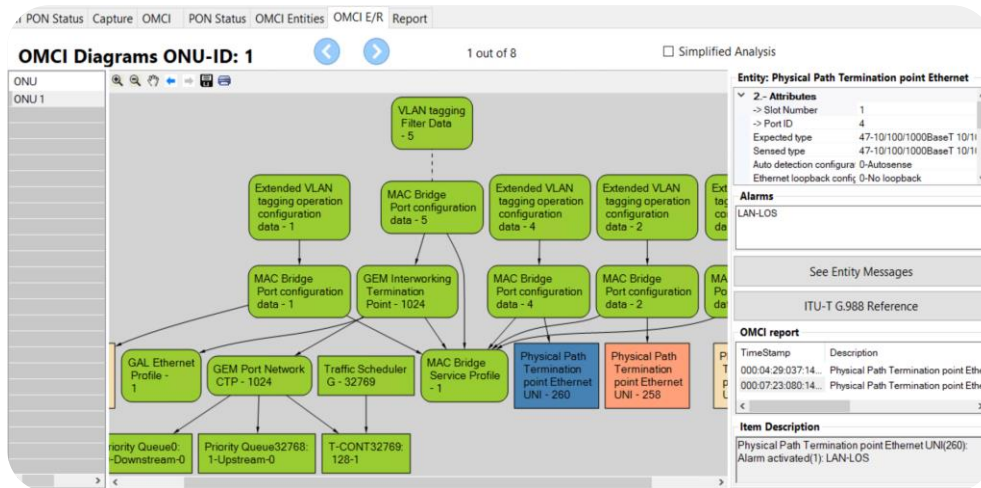






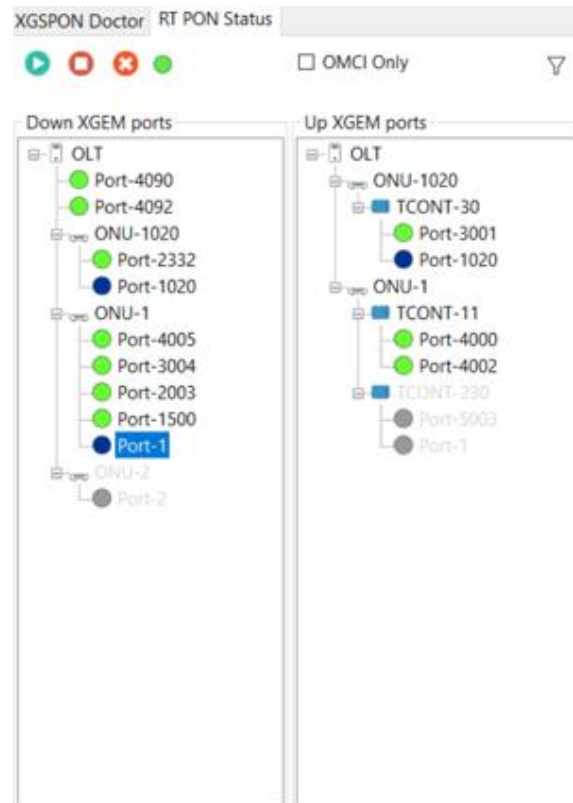


- Fundamental tool for optimisation of GPON network deployment
- Events, deviation diagnosis and analysis for deployed GPON networks
- Interoperability troubleshooting between multi-vendors equipment coexisting in a telco access network
- Analysis of user traffic within the GPON through the Ethernet interface
- ITU-T G984.x, G988 interoperability test (GPON)
- ITU-T G.9807.1/G.987.2/G.987.3/G.988 interoperability test (XGSPON)
- GPON issues delimitation within an FTTH network.
- Full knowledge of the PON state and all its active elements (OLT/ONTs)

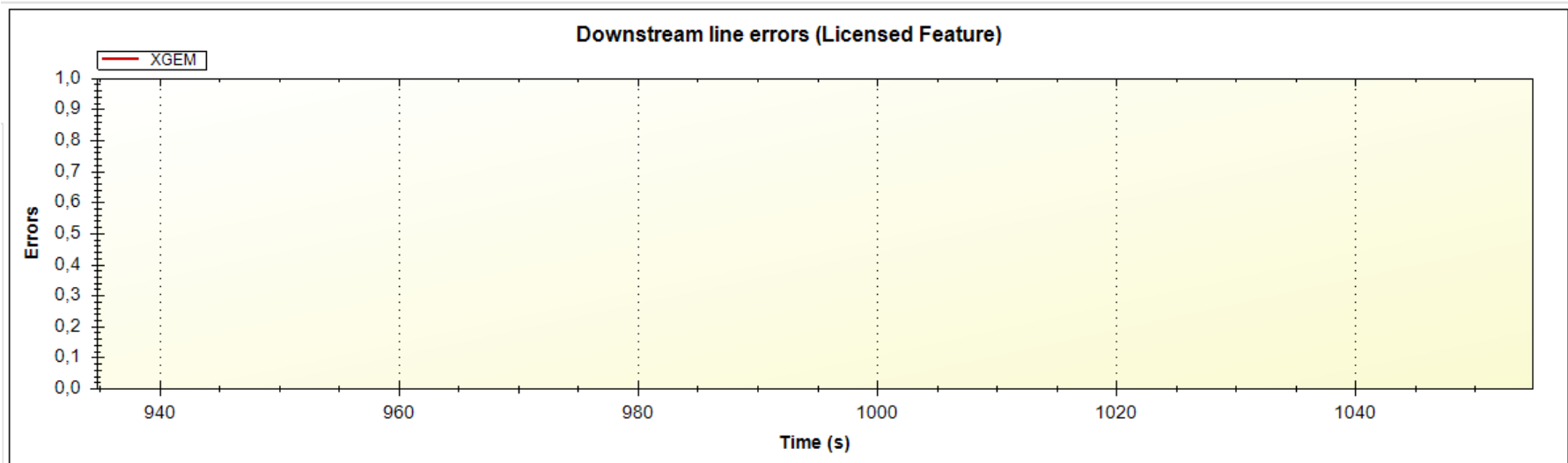


Main features

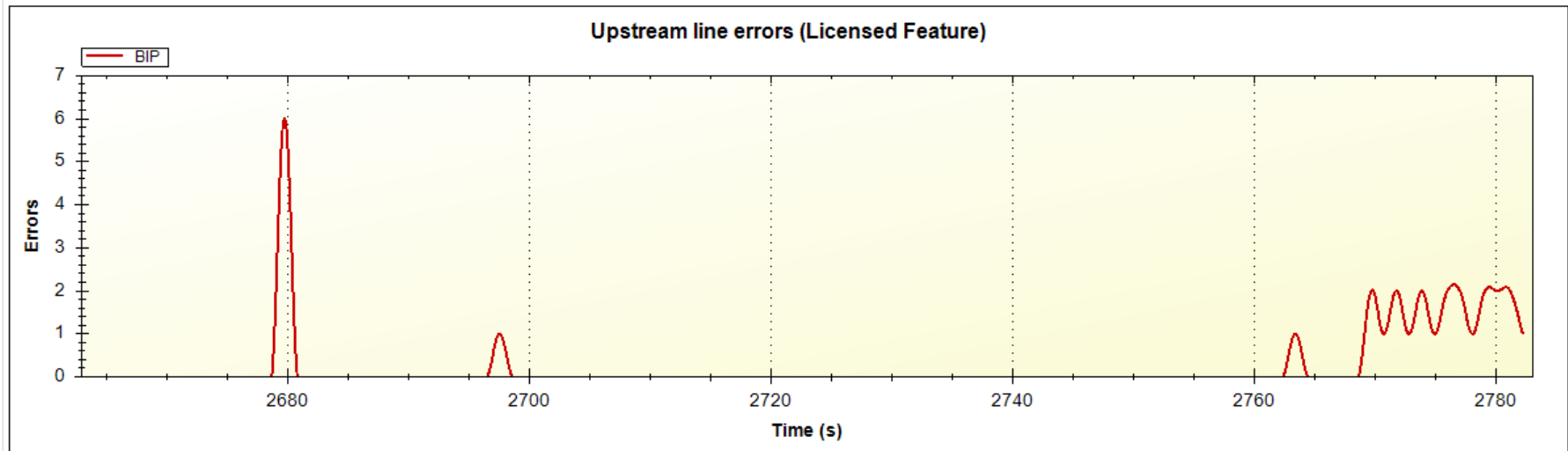
- Capture of GTC frames
- Real-time capture of PLOAM + OMCI + Negotiation BWMaps
- Several capture modes:
 - Real time
 - Scheduled
 - Full
- Displays the PON topology: ONUs, T-CONTs, Ports
- Reports ONTs state
- Report of inconsistencies and violations of ITU-G.984.x/G988
- Real-Time IP Services regeneration and monitoring: Multicast Video, Voice
- Runs on Windows 10 Pro



- Downstream hierarchy: ONTs and Ports detected
- Upstream hierarchy: ONTs, T-CONTs, and Ports detected
- Port Activity



SFC and OC HEC: 0 / 0 / 16,86 M Uncorrectable / Correctable / Received
HLend and BWMap HEC: 0 / 0 / 11,59 M Uncorrectable / Correctable / Received
XGEM header HEC: 0 / 0 / 142,72 G Uncorrectable / Correctable / Received



Fixed FS Header HEC: 0 / 0 / 5,40 M Uncorrectable / Correctable / Received
XGEM header HEC: 0 / 0 / 208,97 M Uncorrectable / Correctable / Received
BIP: 29 / 5,40 M Errors / Bursts



- Assigned to a T-CONT
- Utilisation: Port, ONU, Aggregated

The screenshot displays a network capture tool interface with the following components:

- RT PON Status** tabs: Capture, OMCI
- Message List Table:**

MIC	Line	h:m:s.ms:us:ns	D/U	Content
42		000:05:44:986:125:000	DN	PLOAM Burst Profile
43		000:05:44:986:250:000	DN	PLOAM Burst Profile
44		000:05:44:986:375:000	DN	PLOAM Burst Profile
45		000:05:44:986:500:000	DN	PLOAM Assign ONU ID
46		000:05:45:017:625:000	DN	BWMAP - Ranging grant
47		000:05:45:017:662:712	UP	ONU:1 PLOAM Registration
48		000:05:45:077:625:000	DN	BWMAP - Ranging grant
49		000:05:45:077:662:712	UP	ONU:1 PLOAM Registration
50		000:05:45:077:875:000	DN	PLOAM Ranging Time
51		000:05:46:322:750:000	DN	ONU:1 ONU-Data-OMCI Get
52		000:05:46:828:609:619	UP	ONU:1 ONU-Data-OMCI (Resp) Get
53		000:05:47:825:625:000	DN	ONU:1 ONU-Data-OMCI Get
54		000:05:48:837:609:625	UP	ONU:1 ONU-Data-OMCI (Resp) Get
55		000:05:49:826:750:000	DN	ONU:1 T-CONT-OMCI Get
56		000:05:49:828:609:625	UP	ONU:1 T-CONT-OMCI (Resp) Get
57		000:05:49:829:500:000	DN	ONU:1 T-CONT-OMCI Get
58		000:05:49:831:609:625	UP	ONU:1 T-CONT-OMCI (Resp) Get
59		000:05:49:832:625:000	DN	ONU:1 T-CONT-OMCI Get
60		000:05:49:834:609:625	UP	ONU:1 T-CONT-OMCI (Resp) Get
61		000:05:49:835:500:000	DN	ONU:1 T-CONT-OMCI Get
62		000:05:49:837:609:625	UP	ONU:1 T-CONT-OMCI (Resp) Get
- Message Details Panel (Right):**
 - 1.- General**
 - GPON Event: XGTC-UPSTREAM
 - TimeStamp: 000:05:45:077:662:712
 - BIP (hex): 0x14CF27DF
 - BIP (bin): 10100110011110010011111011111b
 - 2.- PLOAM**
 - PLOAMuRegistration**
 - ONU:1
 - Registration-ID: 0x2020202020202020E3F6B8C4C3FFB8C4C3FF
 - Response Ranging Grant?: True
 - Response Request Registration?: False
 - MIC Ok: True
 - SeqNo: 0
 - ONU ID: 1
 - PLOAM ID: 2
- Hex Dump (Bottom Right):**

```

BIP
14CF27DF
PLOAM
00010200 20202020 20202020 2020E3F6 B8C4C3FF B8C4C3FF
00030000 DC830300 00000000 8C3CF9F6 1B8CF69F 7FBED4C7
    
```
- Control Bar (Bottom):**
 - Navigation: Down, Up, Play
 - Filtering: MIC, SN, ONU, PLOAM, OMCI, BW-M
 - Actions: PLOAM+, Stop, Refresh

- ◆ Real Time capture:
 - PLOAM and OMCI messages
 - BWMAPs: SN Request and Ranging grant
 - Message interpretation

- ◆ Full Capture
 - All GTC messages

RT PON Status Capture OMCI PON Status OMCI Entities OMCI E/R Report

OMCI Diagrams ONU-ID: 1

1 out of 8 Simplified Analysis

ONU
ONU 1

```
graph TD; V[\"VLAN tagging Filter Data - 5\"] -.-> M1[\"MAC Bridge Port configuration data - 5\"]; V -.-> M2[\"MAC Bridge Port configuration data - 4\"]; V -.-> M3[\"MAC Bridge Port configuration data - 2\"]; M1 --> G[\"GEM Interworking Termination Point - 1024\"]; M2 --> M2_1[\"MAC Bridge Port configuration data - 4\"]; M2 --> M2_2[\"MAC Bridge Port configuration data - 2\"]; M3 --> M3_1[\"MAC Bridge Port configuration data - 4\"]; M3 --> M3_2[\"MAC Bridge Port configuration data - 2\"]; G --> S[\"MAC Bridge Service Profile - 1\"]; M2_1 --> S; M2_2 --> S; M3_1 --> S; M3_2 --> S; S --> P1[\"Physical Path Termination point Ethernet UNI - 260\"]; S --> P2[\"Physical Path Termination point Ethernet UNI - 258\"]; S --> GAL[\"GAL Ethernet Profile - 1\"]; S --> GEM[\"GEM Port Network CTP - 1024\"]; S --> TS[\"Traffic Scheduler G - 32769\"]; GAL --> P_Q0[\"Priority Queue0: -Downstream-0\"]; GEM --> P_Q1[\"Priority Queue32768: 1-Upstream-0\"]; TS --> T_C[\"T-CONT32769: 128-1\"]; E[\"Extended VLAN tagging operation configuration data - 1\"]; E --> M1; E --> M2; E --> M3; E --> M2_1; E --> M2_2; E --> M3_1; E --> M3_2;
```

Entity: Physical Path Termination point Ethernet

2.- Attributes

- > Slot Number 1
- > Port ID 4
- Expected type 47-10/100/1000BaseT 10/11
- Sensed type 47-10/100/1000BaseT 10/11
- Auto detection configura 0-Autosense
- Ethernet loopback config 0-No loopback

Alarms

LAN-LOS

See Entity Messages

ITU-T G.988 Reference

OMCI report

TimeStamp	Description
000:04:29:037:14...	Physical Path Termination point Ether
000:07:23:080:14...	Physical Path Termination point Ether

Item Description

Physical Path Termination point Ethernet UNI(260):
Alarm activated(1): LAN-LOS

- OMCI E/R diagrams
- Issues detection

A screenshot of a network traffic capture tool interface. The top part shows a table of captured packets with columns for No., Time, Source, Destination, Protocol, Length, and Info. Packet 106 is highlighted. Below the table, a detailed view of packet 106 is shown, including frame details and Ethernet II header information.

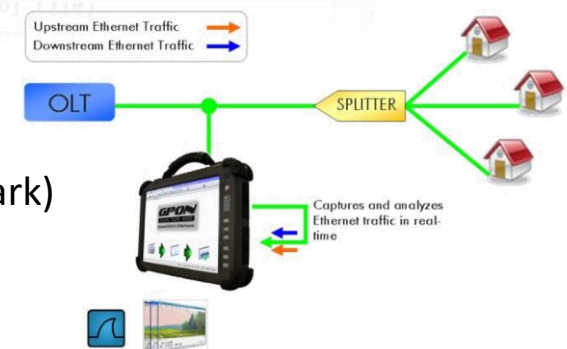
No.	Time	Source	Destination	Protocol	Length	Info
100	58.300064	198.19.1.2	198.19.1.1	IPv4	128	any 0-hop protocol (114)
101	58.300064	198.19.1.2	198.19.1.1	IPv4	128	any 0-hop protocol (114)
102	58.300064	198.19.1.2	198.19.1.1	IPv4	128	any 0-hop protocol (114)
103	58.300064	198.19.1.2	198.19.1.1	IPv4	128	any 0-hop protocol (114)
104	58.300064	198.19.1.2	198.19.1.1	IPv4	128	any 0-hop protocol (114)
105	58.300064	198.19.1.2	198.19.1.1	IPv4	128	any 0-hop protocol (114)
106	58.300064	198.19.1.2	198.19.1.1	IPv4	128	any 0-hop protocol (114)
107	58.300064	198.19.1.2	198.19.1.1	IPv4	128	any 0-hop protocol (114)
108	58.300064	198.19.1.2	198.19.1.1	IPv4	128	any 0-hop protocol (114)
109	58.300064	198.19.1.2	198.19.1.1	IPv4	128	any 0-hop protocol (114)
110	58.300064	198.19.1.2	198.19.1.1	IPv4	128	any 0-hop protocol (114)
111	58.301051	198.19.1.2	198.19.1.1	IPv4	128	any 0-hop protocol (114)
112	58.301051	198.19.1.2	198.19.1.1	IPv4	128	any 0-hop protocol (114)
113	58.301051	198.19.1.2	198.19.1.1	IPv4	128	any 0-hop protocol (114)
114	58.301051	198.19.1.2	198.19.1.1	IPv4	128	any 0-hop protocol (114)
115	58.301051	198.19.1.2	198.19.1.1	IPv4	128	any 0-hop protocol (114)

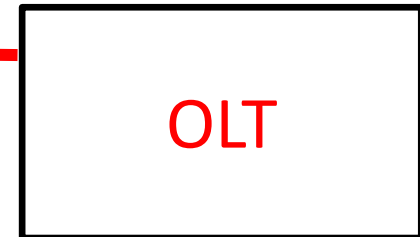
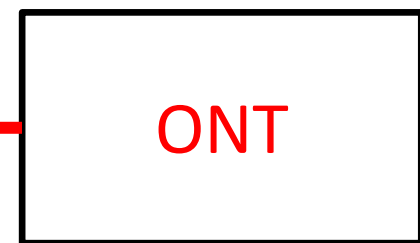
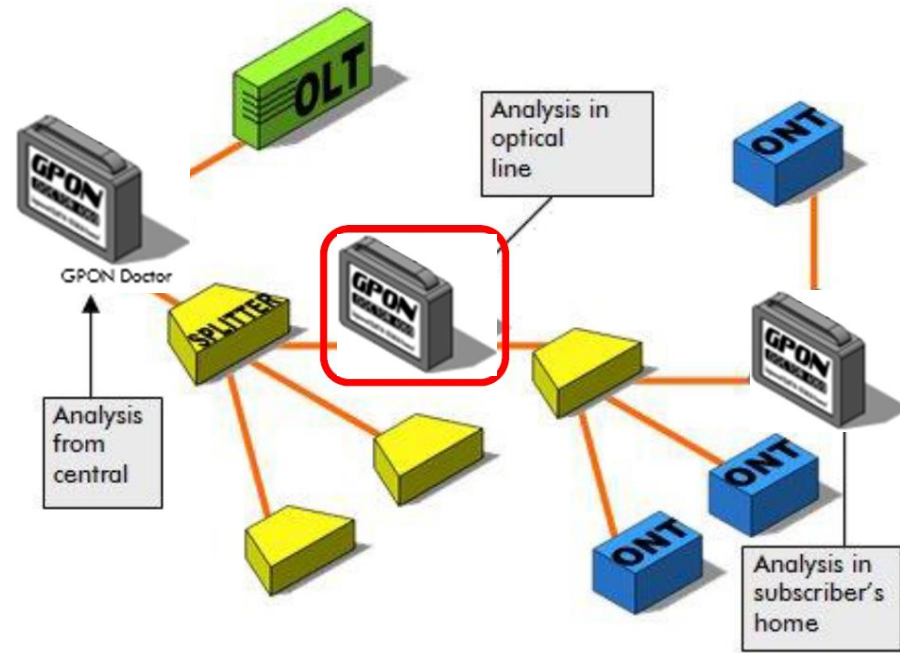
> Frame 106: 128 bytes on wire (1024 bits), 128 bytes captured (1024 bits) on interface \Device\NPF_{7D152ADD-580C-4A6D-9D20-482336...}

> Ethernet II, Src: 00:00:00_00:00:04 (00:00:00:00:00:04), Dst: 00:00:00_00:00:01 (00:00:00:00:00:01)

> 802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 10

- Unlimited ports in downstream and upstream
- Extracted traffic ready to be analysed with a third-party App (WireShark)







- GPON and XGSPON network (remote) diagnostic assistance
- Advanced GPON and XGSPON training
- Customized development of automated test suites
- Tailored development of new functionalities



That's all



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