GPON Expresse®

ASSIA Software Solutions

Reliably Fast Broadband & Wi-Fi for the Home

ASSIA Overview

Market Leader in Diagnostics and Optimization Software

DSL & Optical Broadband and Residential Wi-Fi

Machine Learning Cloud Technology

Improves Subscriber Internet Performance, Reliability, QoE

35+ Top Tier Global Customer Base	99% Historical Customer Retention	90+ Patent Families
50%+ Growth in Revenues in 2017	~100M Internet Connections Managed	10X Typical ROI for Customers

Key Customers

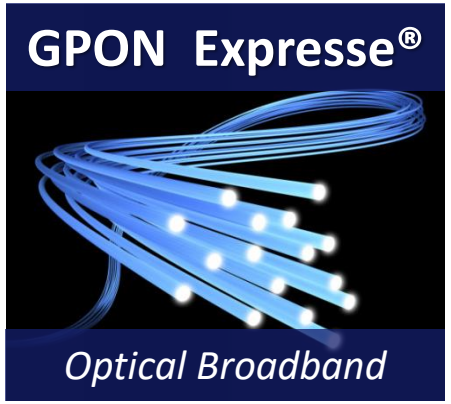
ASSIA® Software Solutions

SOFTWARE SOLUTIONS

Driving Subscriber Satisfaction Up & Churn Down while Reducing Costs for over 30 Service Providers around the world

Reliably Fast Broadband & Wi-Fi for the Home

Market Leading Cloud Based Management, Diagnostics & Optimization serving over 100 Million Homes



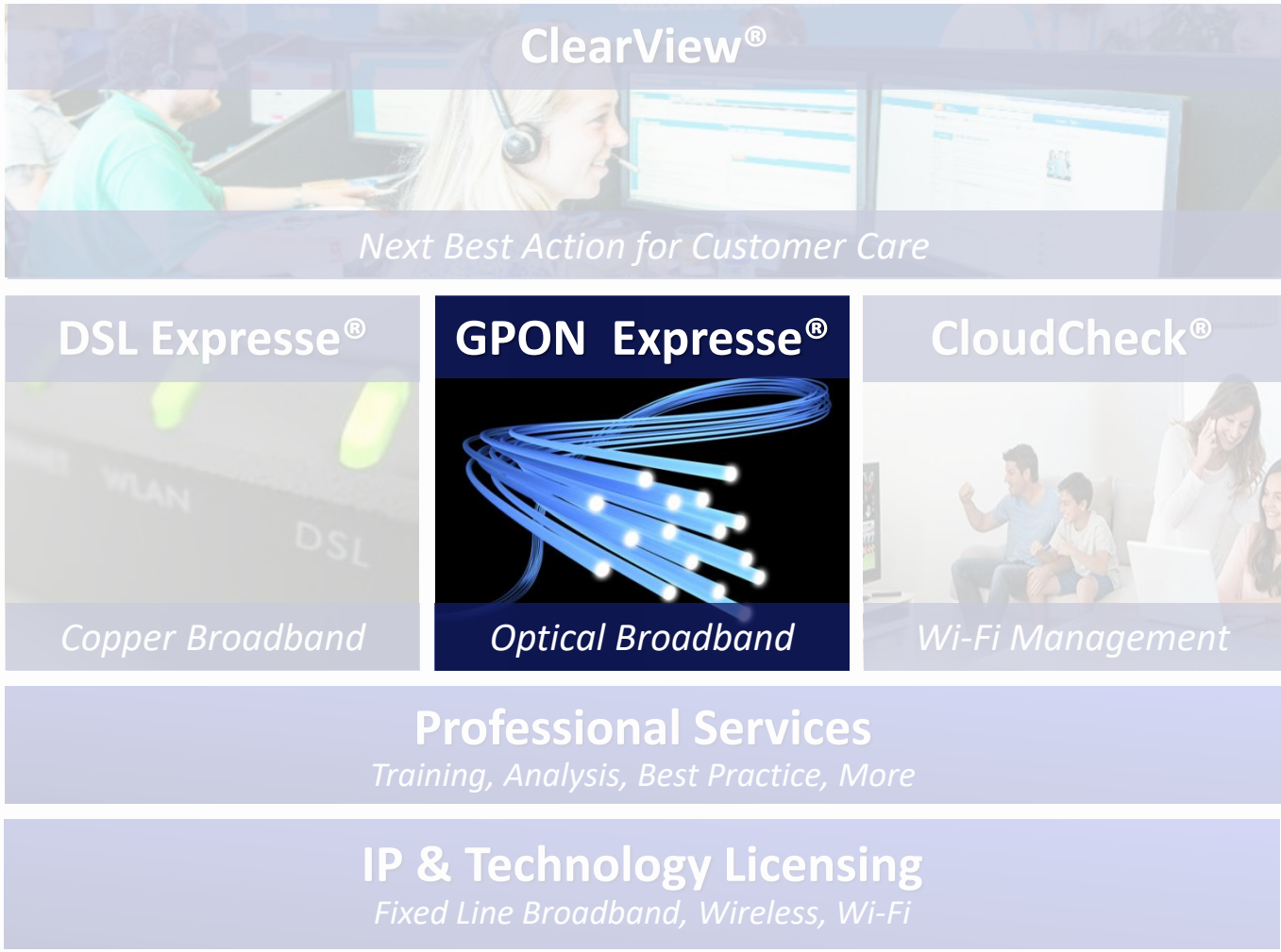
Professional Services
Training, Analysis, Best Practice, More

IP & Technology Licensing
Fixed Line Broadband, Wireless, Wi-Fi

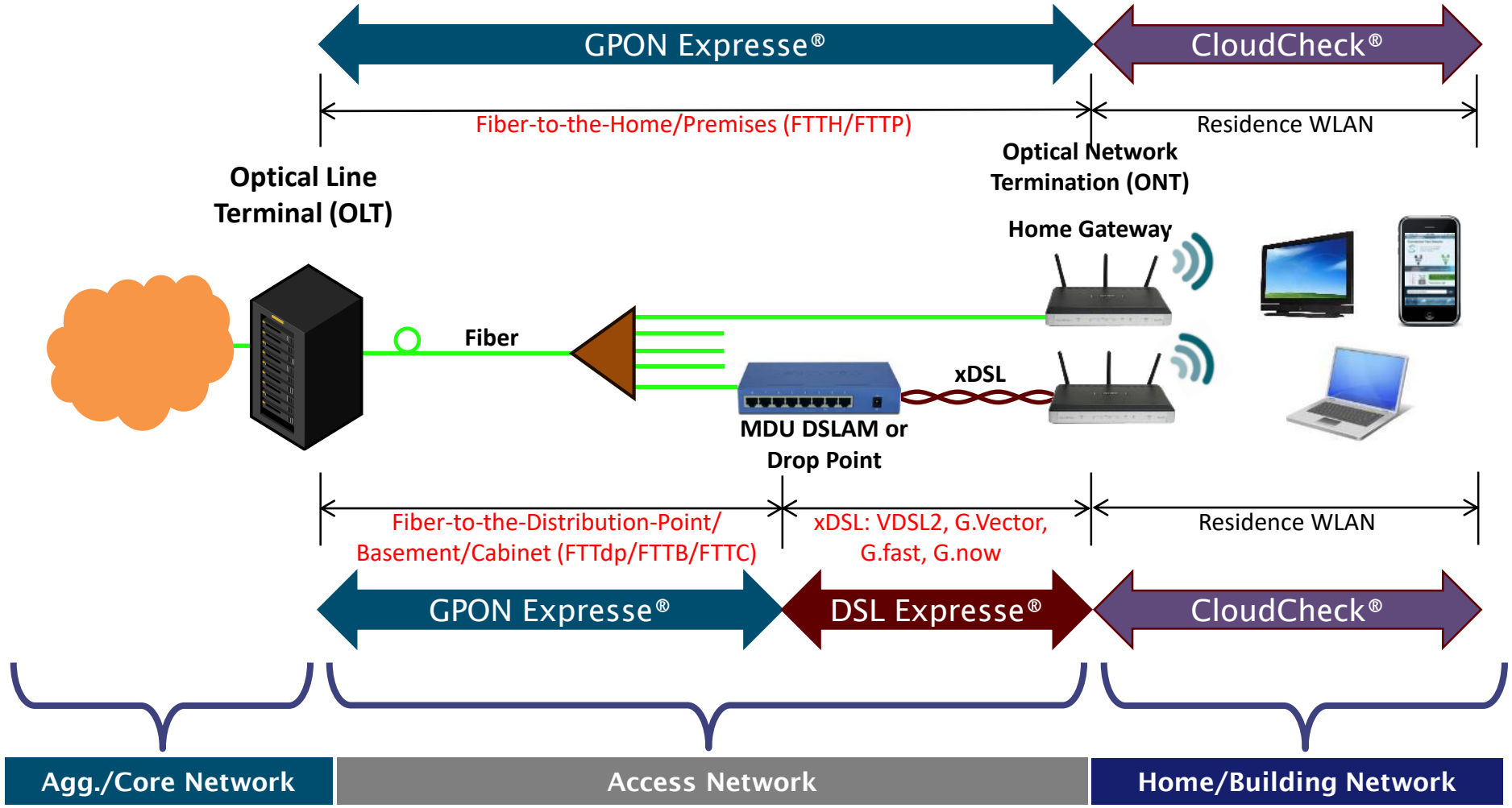
ASSIA

ASSIA GPON Expresse®

- Extends the Expresse® product family by adding support for Gigabit Passive Optical Network (GPON) technology
- Providing functionality that simplifies the operation of a fiber-based access network.



ASSIA® End-to-End: Fiber or Hybrid Fiber/Copper + Home Wi-fi



GPON Expresse®: Built on the Foundation of DSL Expresse®

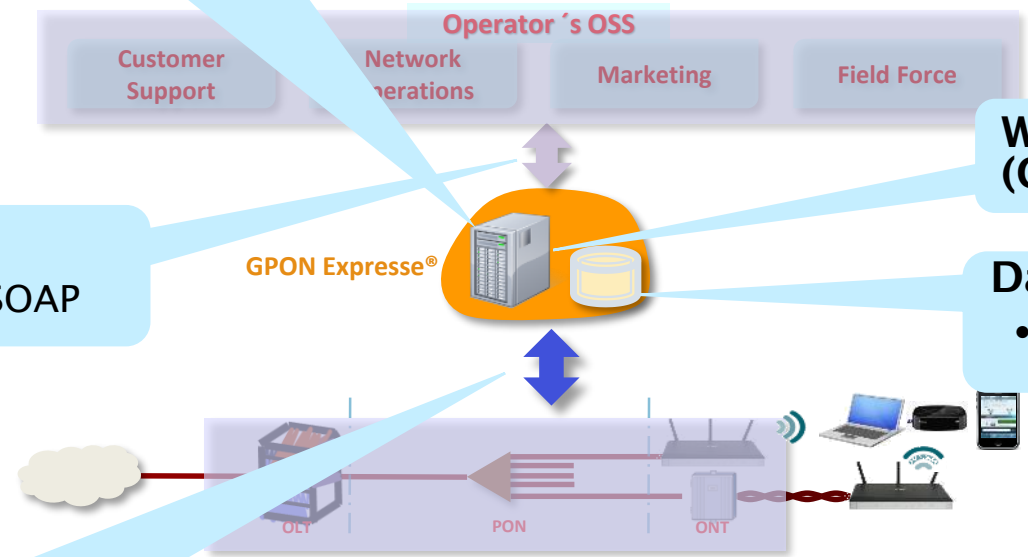
- 100% Software Platform
  - **Collects & analyzes data** from GPON network elements (OLTs)
  - Automatically provides **diagnostics and performance** for the whole network
  - Includes a **powerful GUI** for diagnosis and resolution of issues
  - Provides **approximate location of the fault, e.g., OLT, feeder, collector, distribution segments or the ONT**
- 100% OLT Vendor agnostic
- Scalable to accommodate millions of subscribers/links
- Northbound API for powerful OSS, BSS, and operator service application integration

GPON Expresse®:

a powerful Monitoring, Analysis, and Diagnostics tool

GPON Expresse® Architecture

Expresse®
- Performance monitor
- Optimization
- Fault detection & localization



Web client interface (GUI)

Northbound API
- Open, XML over SOAP

Database (RDBMS)
- Oracle database for raw data, analysis results

Southbound interface
- Vendor neutral, per-device plug-in

GPON Expresse® Analytics

Link Layer

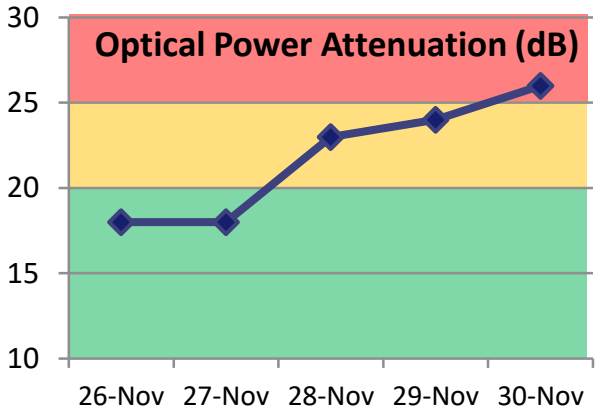
- Optical attenuation
- Comparison with link budget calculated from ODN inventory
- Optical operational params (temp., voltage)

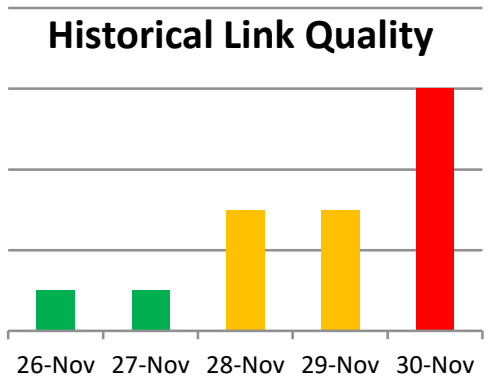
Service Quality

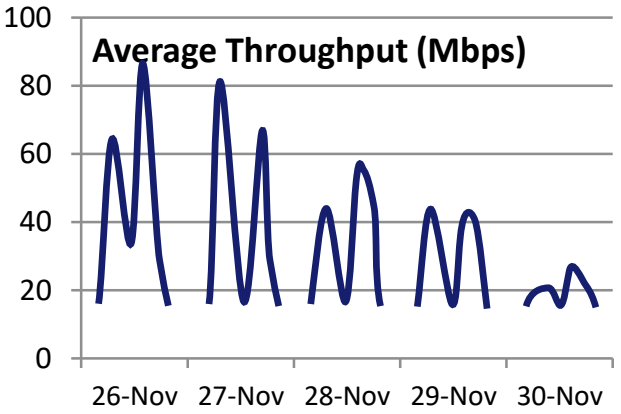
- Link quality indicator
- Quality thresholds configurable per service product as in DSL
- Link Layer metrics
- PHY-layer error counters
- Raised alarms

Throughput

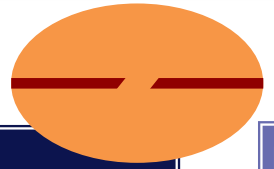
- Average calculated over 15-minute interval
- Depends on usage
- Useful for detecting poor throughput/congestion
- Useful for identifying high bandwidth users





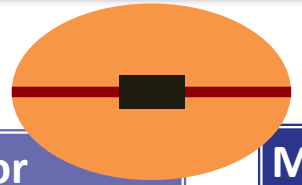


GPON Expresse® Diagnostics



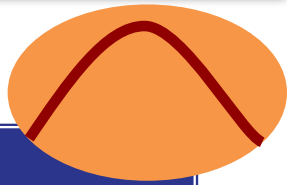
Fiber damage

- Fiber can be crushed, pinched, cracked, broken, or cut
- Typically from mechanical stress
- Typical impact is complete failure



Bad splice, faulty connector

- Can be dirty, contaminated, misaligned, or wet
- Result of improper installation
- Causes excessive attenuation, errors or even failure



Macro/micro-bends

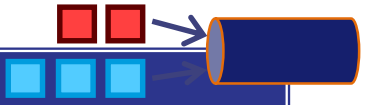
- Fiber cable curvature may exceed specification
- Result of improper installation
- Impact can lead to excessive optical signal attenuation and errors

ONT failure

- Equipment can lose power, be disconnected, or fail
- Typical impact is link degradations, or complete failure
- Rogue ONTs can harm other ONTs in PON, especially in uplink

OLT failure

- Port failure can occur from laser diode aging and malfunction
- Line-card or system hardware can fail
- Typical impact is link failure



Congestion

- PON is a shared medium
- Downlink or uplink congestion can occur at peak usage times
- Impact is degraded quality of service
- Congestion can occur on PON port level, line card level or ONT chassis level (backhaul connection not sufficient)

GPON Expresse® Fundamental Capabilities

Data collection

Operational data

- Link status, raised alarms
- Transmitted/received optical power
- Laser health

Performance data

- Link errors, error seconds, FEC anomalies
- Ethernet traffic data
- Data available as 15-minute counters

Collection modes

- **Automated collection** of operational and historical performance data at scheduled times every day
- **Real-time collection** for both operational and performance data
- **Alarms** traps for a pre-defined set of Service-sensitive links

Analysis

Quality of Service Monitoring

- Link status
- Link layer metrics
- Service layer QoS
- Traffic monitoring and congestion detection

Diagnostics, detection and localization

- Equipment fault flags (Faulty OLT/ONT)
- Fiber fault flags
- Fault location with neighborhood analysis
- ONT Ethernet port issue flags

Analysis modes

- **Daily analysis for all network links**
- **Real-time analysis** using operational and performance data

Thank You

End of Presentation

ASSIA®

Essential to Reliably Fast Connectivity

www.assia-inc.com