HELIX

Simplifying PON

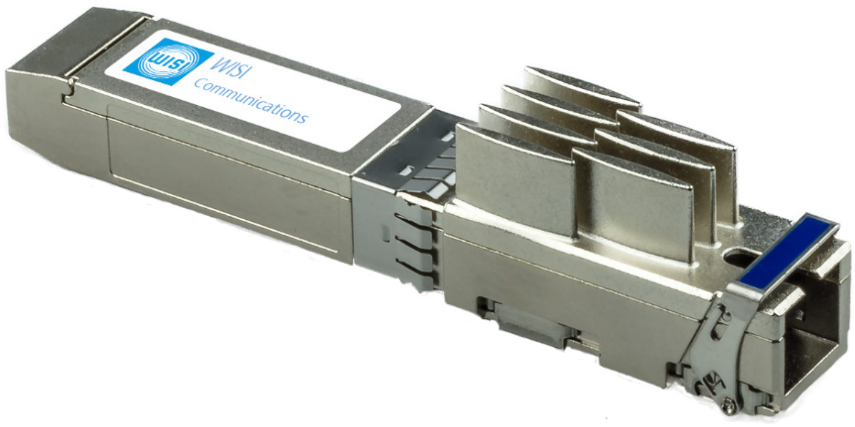
Accelerate your PON networks with symmetrical 10 G.

PON OLT deployments are unnecessarily complex, and typically include multiple layers of proprietary switch and PON IC networking.

Practical OLT design considerations can greatly reduce the implementation complexity and cost of mass-market fiber networks.

In creating the world's first pluggable OLT, Tibit has reengineered the PON from the ground up to streamline carrier OLT deployment.

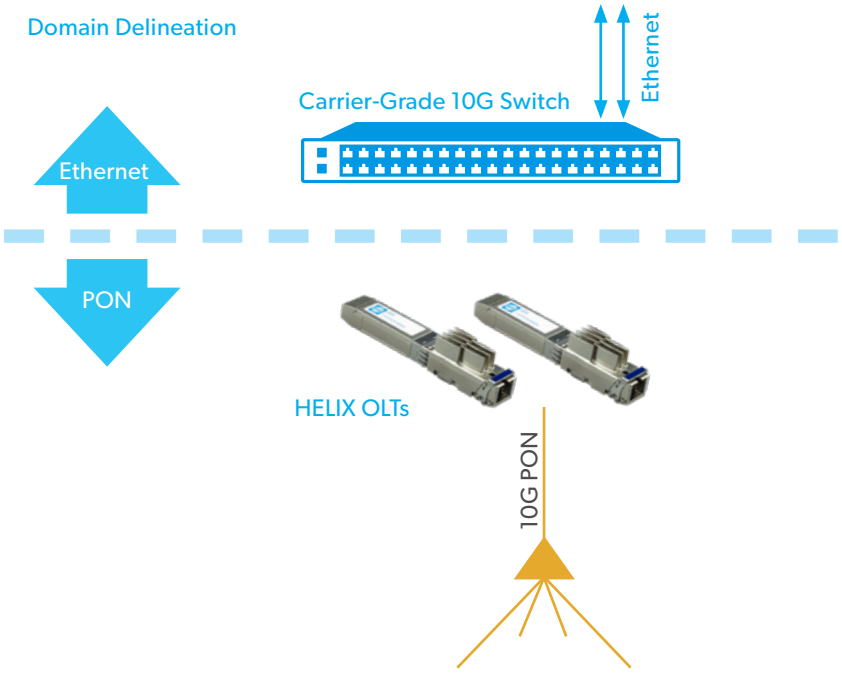
The following architectural design principles describe practical simplifications HELIX introduces to the network:



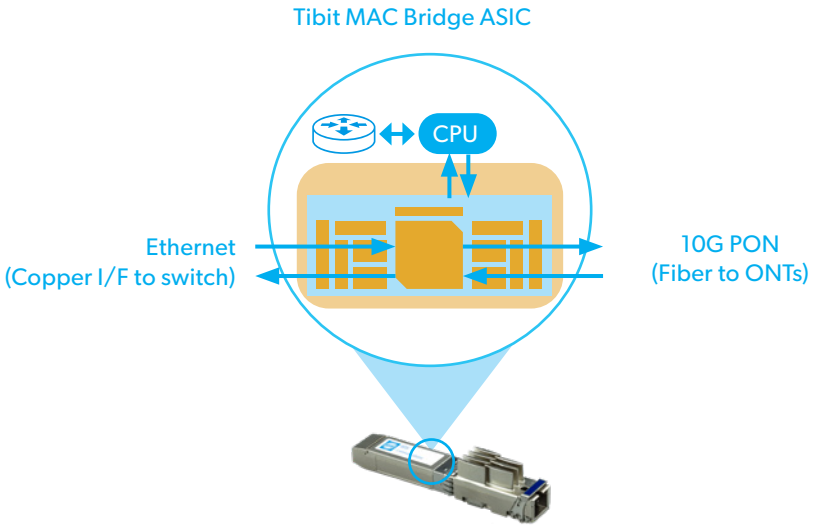
HELIX
SFP+ Pluggable 10G OLT

1. Clearly Separate PON & Switch Domains

The HELIX OLT integrates all 10G PON MAC and PHY capabilities into a standards based, SFP+ pluggable transceiver module. All PON Pysical Layer and Data Link layer functionality is managed within the device itself, including: Ethernet-to-PON frame processing, DBA [Dynamic Bandwidth Allocation] upstream traffic scheduling/shaping, FEC [Forward Error Correction], SAR [Segmentation and Reassembly], PON encryption, OLT Management Command processing, MACsec, and more.

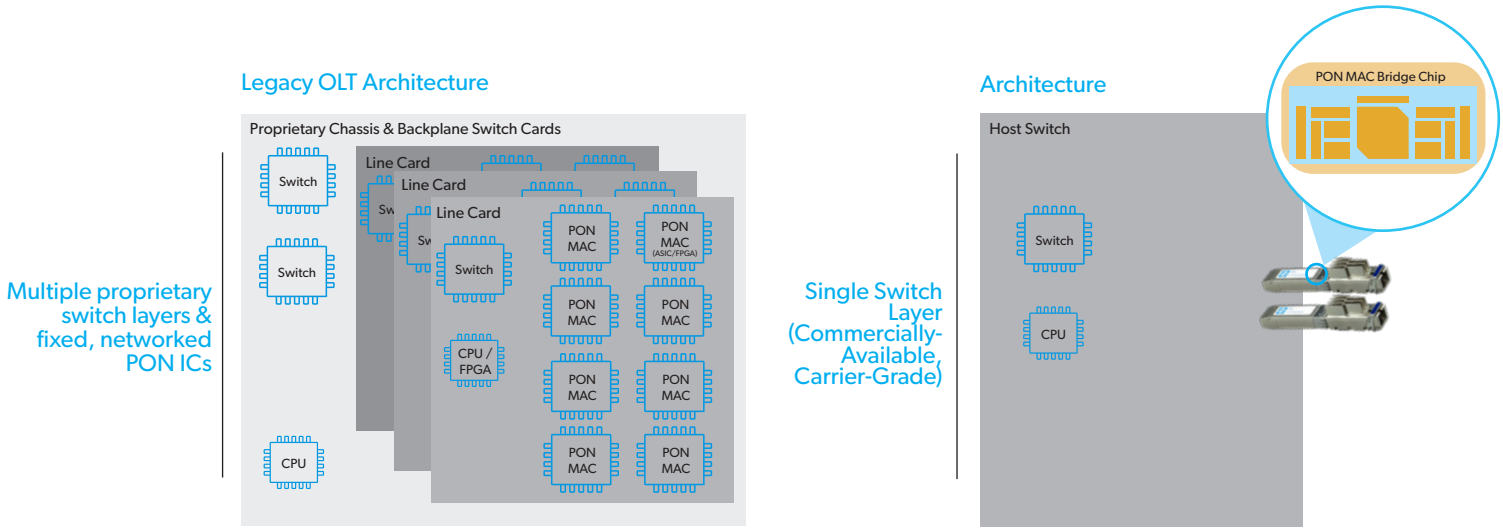


This high level of functionality is enabled by Tibit's Ethernet-to-10G PON MAC bridge ASIC. Inter-domain frame processing and PON traffic scheduling are both implemented at line rate on the Tibit ASIC to create a highly-efficient OLT. When this chipset is integrated into the full pluggable solution, it creates a single-port bridge between the Ethernet and PON domains, allowing all PON-specific hardware functionality to be contained within the HELIX OLT device.
The result is the world's most compact (and cost-reduced) 10G OLT.



2. Remove Proprietary Switching Layers

Legacy PON solutions embed MAC layers inside one or more proprietary switch domains. This adds unnecessary complexity (and cost) to PON applications. Operator services are restricted to capabilities that are available within these proprietary switch layers. Implementation of new Ethernet-related services require the carrier to contract with the OLT solution vendor to implement within their proprietary switching domains.

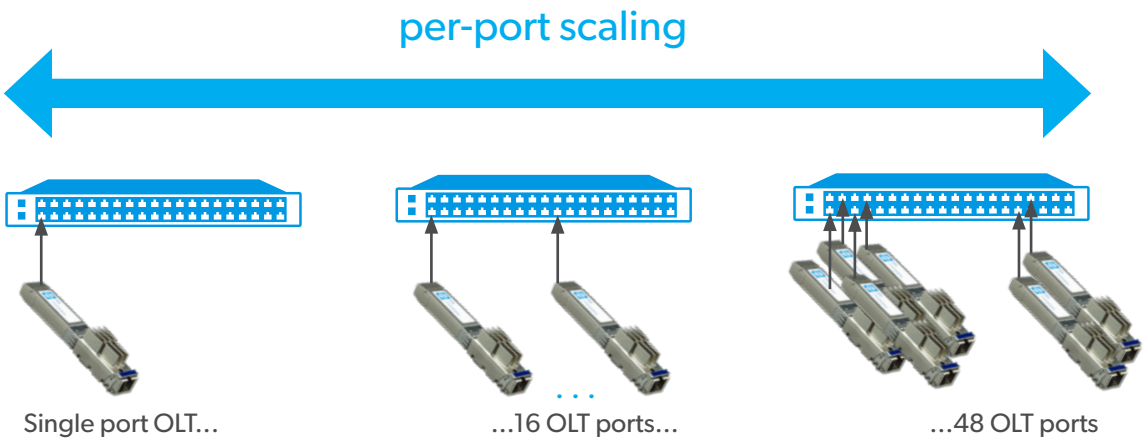


In creating an Ethernet-pluggable OLT device, The HELIX OLT connects directly into commercially available 10G Ethernet switches. This allows carriers to select best-in-class Ethernet solutions that are most suited for their applications. In many cases, this allows carrier to use switch models already deployed in their networks (and purchased at volume prices).

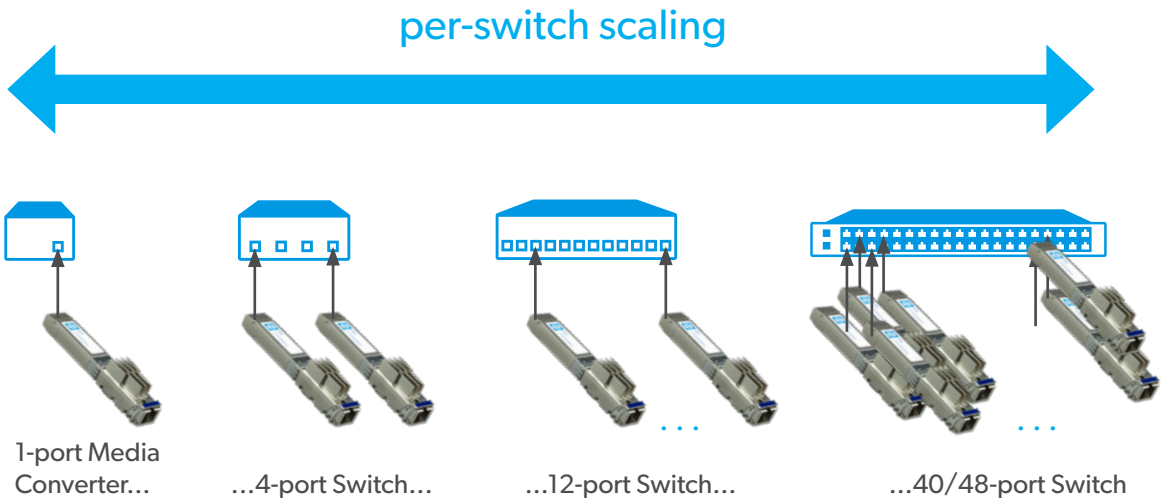
3. Enable Modular Scalability

The HELIX OLT provides three unique dimensions of scalability to carrier networks:

Scale by port: In any switch environment, the virtual OLT solution can scale on a per-port basis. This provides scalable economics to let a carrier deploy only what is needed as PON capacity grows.

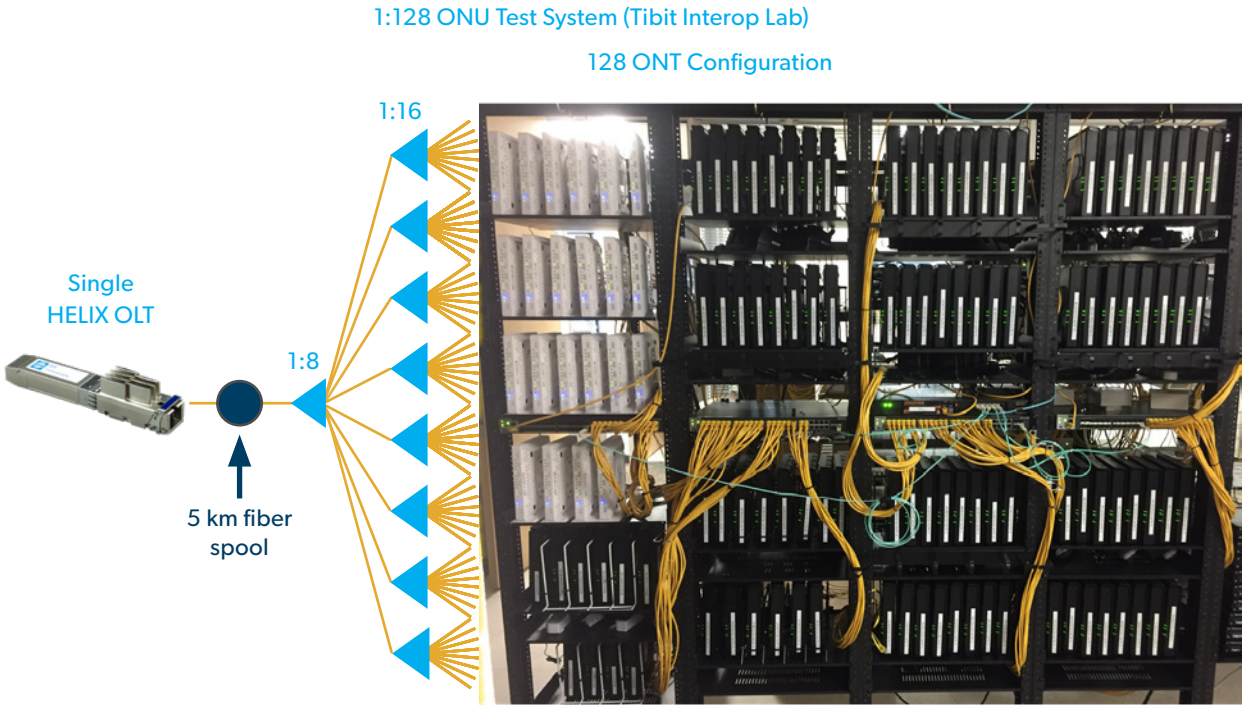


Scale by switch host: The virtual OLT enables both the smallest and largest 10G PON solution in world with a single OLT solution. In the smallest configuration, a HELIX OLT can operate in an Ethernet media converter device to provide a single instance of 10G PON with minimal host-overhead costs. In the largest configuration, a 24, 32, 40 or 48-port Ethernet switch with the HELIX OLT creates the world's highest-density 10G PON solution per rack unit. Stacked, these high-density units can form an OLT solution capable of serving well over 100,000 subscribers from a single central office rack.



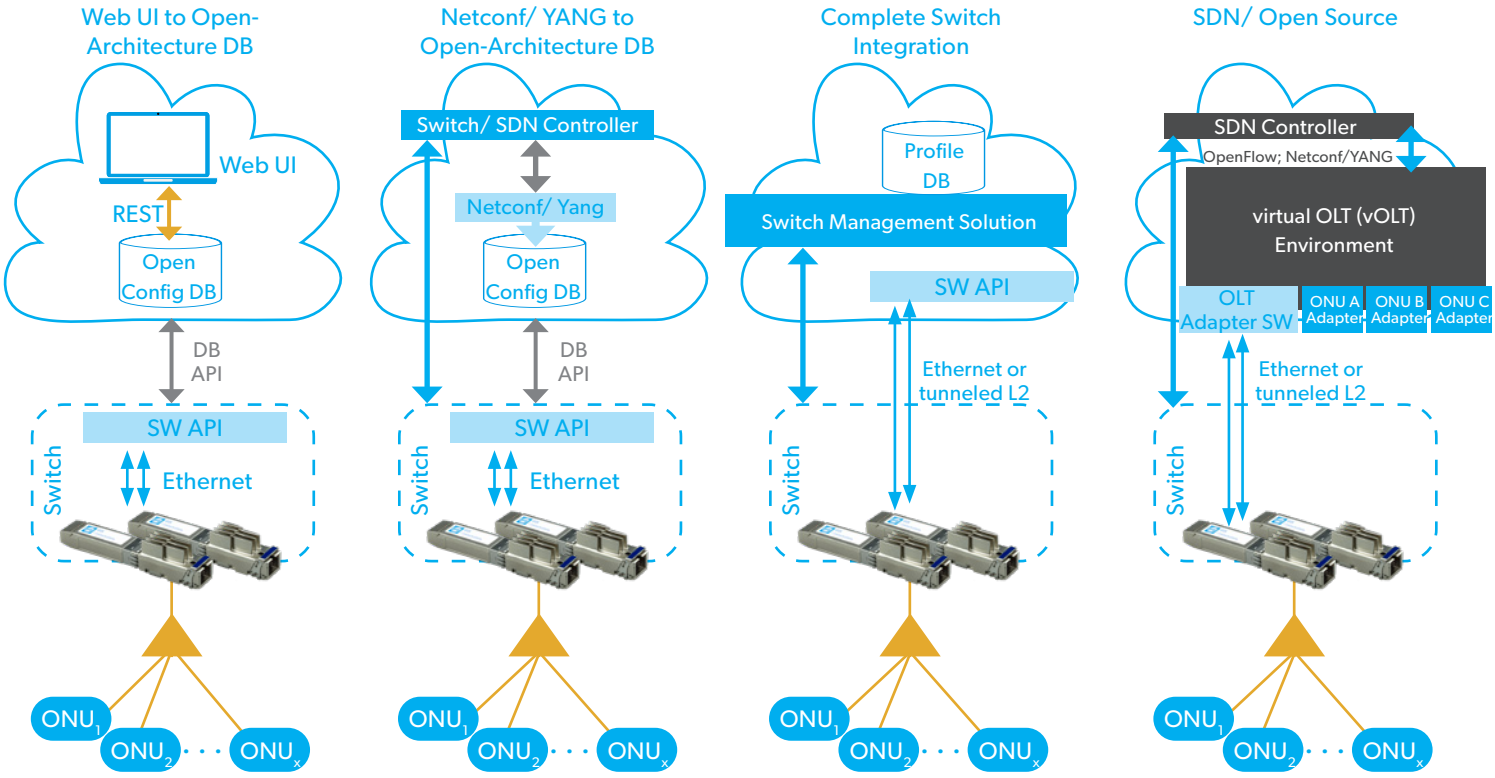
Scale by management needs: By enabling true cloud-based management environments (described below) for both the OLT and subtended ONTs, a management solution can flexibly scale as the PON deployment grows. It can also evolve as new management constructs like SDN and open-source management solutions become available. The HELIX OLT's Class N2/PR30+ link budget, industry-leading launch power, and high receive sensitivity all exceed the performance of many chassis-based solutions. Combined, they enable a fourth dimension of scalability for ONT density. HELIX OLTs support split ratios up to 1:128 ONTs per OLT.

As a feature-rich MAC-layer device, each HELIX OLT enables 500 schedulable services, and 200 total services.



4. Implement Virtualized, Cloud-based Management

Clear PON domain separation enables another key design objective. By concentrating all PON-specific MAC & PHY hardware functionality within the HELIX OLT itself, it allows PON management to exist as a true cloud-based solution – implemented only in software, hosted on commercially available servers, SDN-ready, and flexibly located anywhere in a carrier network.
The bridge ASIC in the HELIX OLT contains an embedded CPU which processes OLT management commands for a wide range of PON configurations, including per-link SLA configurations, VLAN management, PON scheduling profiles, FEC controls, and other OLT functionality. Management commands are sent as data payload in standard L2 Ethernet frames (or tunneled in L3 IP frames) to individual HELIX OLTs in a switch. This allows the PON management to exist as a software-only implementation, and be implemented anywhere in the network.



5. Implement "Interoperability by Design"

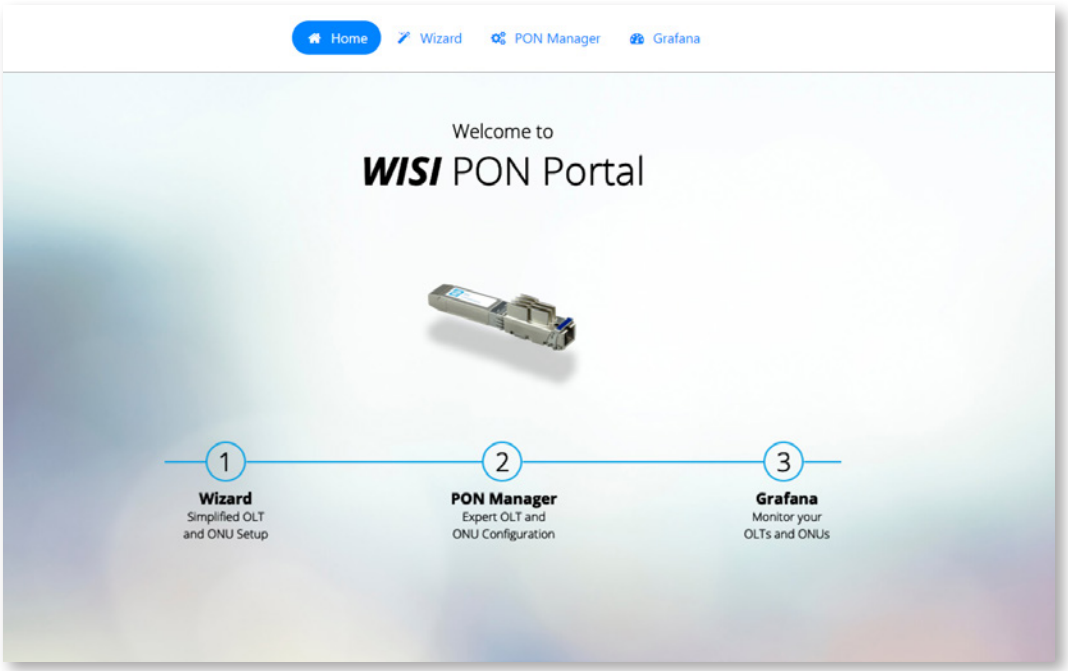
OLT-to- ONT/ONU interoperability should be part of the core design of OLT solutions. This often has the single largest impact on per-line cost for carriers, and yet is extremely difficult to implement on legacy OLT solutions that bury OMCI engines deep inside complex architectures.

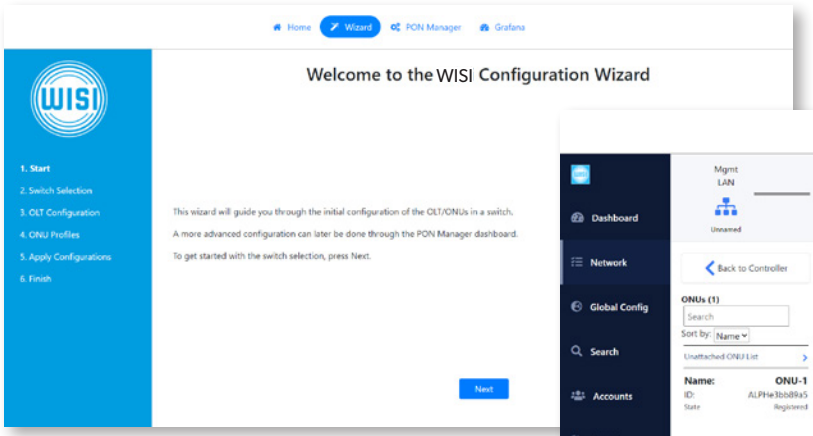
WISI's virtual OLT solution provides interoperability by design. As with OLT management frames, OMCI messages are payload in Ethernet frames sent to the OLT. (The same is true of 10G EPON OAM messages). The HELIX OLT effectively performs MAC-header translation between the Ethernet and PON MAC domains to forward OMCI messages to/from the intended ONT.

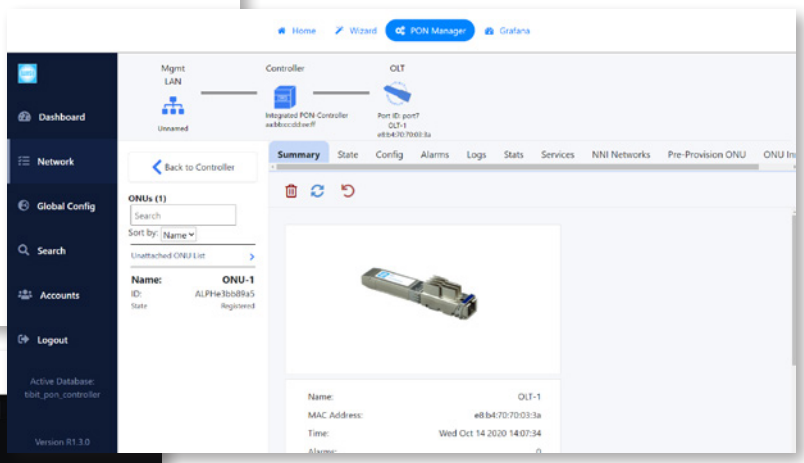
The OMCI content is not altered at the OLT, which means OMCI in a HELIX solution can be created by any software-based OMCI engine in the cloud.

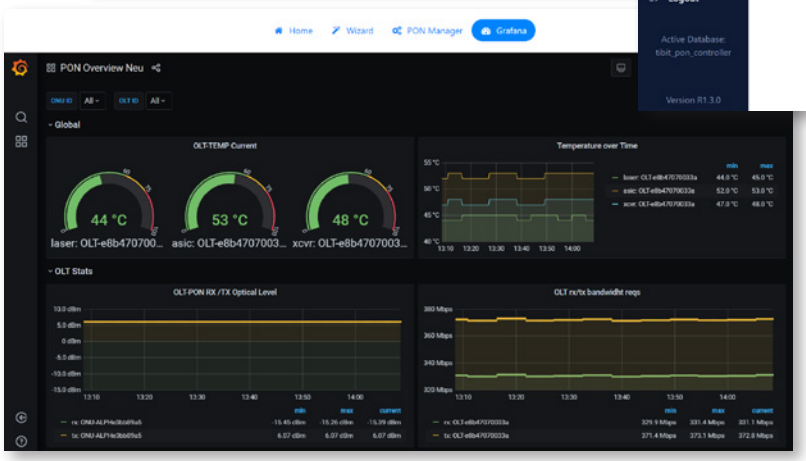
6. WISI PON Portal Solution – HELIX

WISI's PON Portal Solution is the entry level installation for new customers. It covers different installation sizes from Lab to small city carrier scenarios. A completely GUI based configuration and maintenance interface allows the configuration of OLTs and ONU services profiles. The PON Portal is divided into three main sections that depict the different phases during a PON lifecycle. The "Wizard" quickly enables OLTs and ONUs service turnups while the PON Manager provides a detailed configuration interface. Once the PON is in operation, all necessary KPIs can be derived from the detailed PON dashboards to understand the trending of those KPIs and to understand traffic patterns.









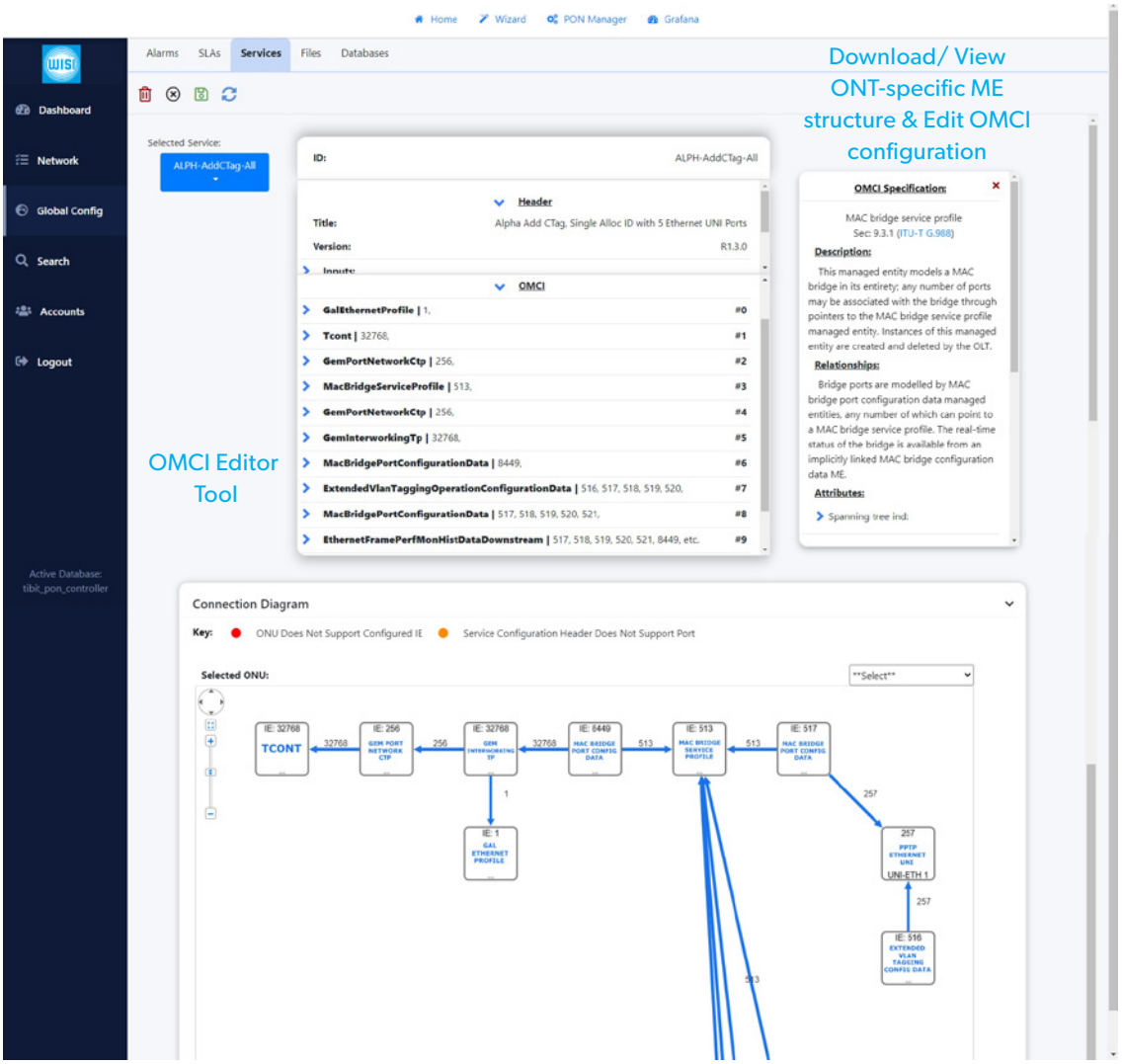
7. Open the OMCI Development Environment

WISI maintains a robust ecosystem for testing, developing, and implementing OMCI interoperability within our own software management constructs, and with partners. In 2020 we began rolling out tools to our subscribers which capitalize on our Interoperability by Design solution and open management architecture. These tools allow rapid development of OMCI inter-operability by exposing MIB uploads, ME [Managed Entity] configuration diagrams, and tools for real-time design of OMCI scripts. Contact your WISI sales rep. for more details.

Config Toolset

OMCI Editor Tool

Download/ View ONT-specific ME structure & Edit OMCI configuration



Tibit's engineering teams have been developing PON solutions since the advent of commercial PON technology, including 10 generations of PON semiconductors. We understand well the requirements for next-generation OLTs; we focus our expertise on implementing simpler solutions that meet practical needs of the carriers which must operate these solutions in scale.

To find out more about WISI and our OLT solutions, contact us at:
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