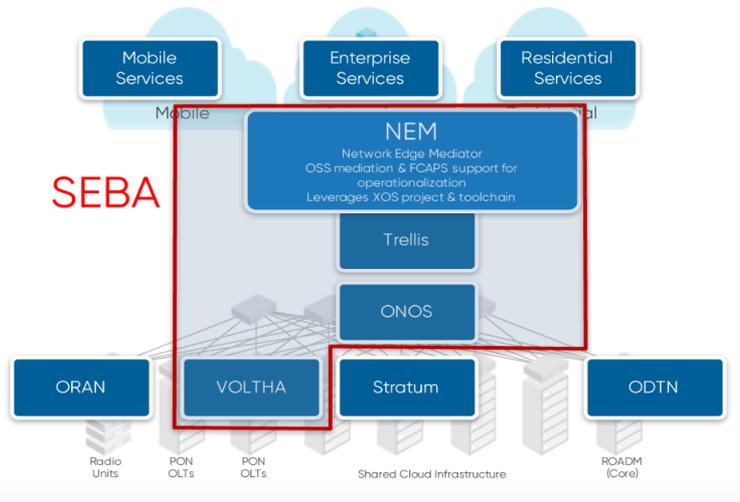




SEBA White Box Access: XGS-PON and Beyond

Jeff Catlin
Edgecore Networks

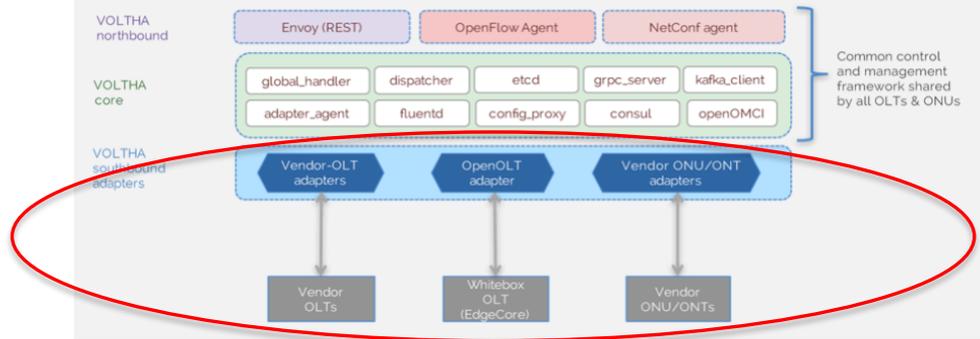
Where do SEBA “White Box” devices reside?



SEBA Exemplar

Virtual OLT Hardware Abstraction (VOLTHA)™

VOLTHA hides PON-level details (T-CONT, GEM ports, OMCI etc.) from the SDN controller, and abstracts each PON as a pseudo-Ethernet switch easily programmed by the SDN controller



SEBA White Box Access Products

What are SEBA White Box devices?

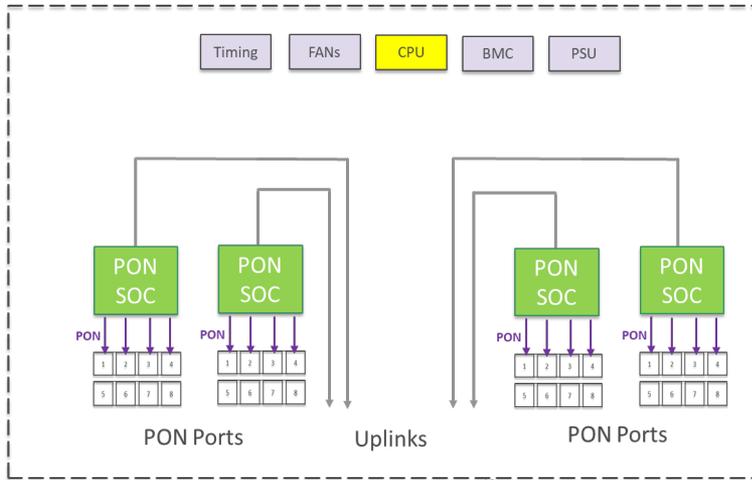
- Disaggregated hardware designs
 - Preferably an open design through OCP or TIP but not mandatory
- Ability to run various NOS options including Open-OLT driver/adapter
 - XGS-PON/GPON today future EPON, G.Fast, etc.
- Participation in ONF SEBA group

SEBA Whitebox device software

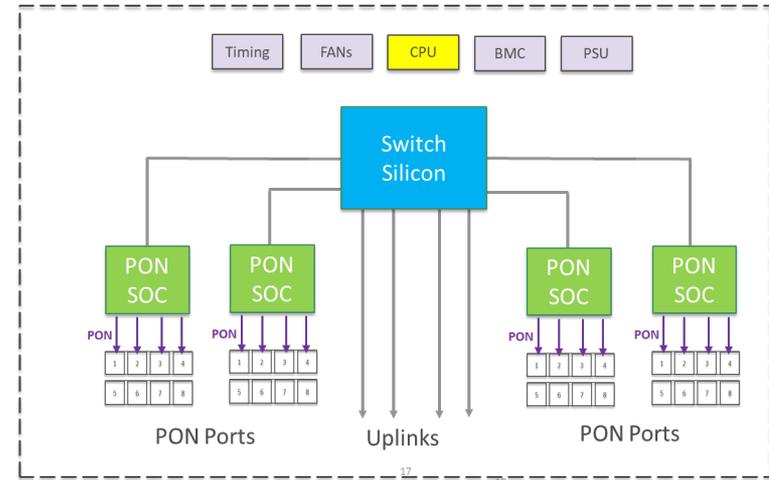
- Base software package used for SEBA devices
 - ONIE (OCP)
 - Open Network Linux (OCP)
 - Redfish baseline management profile (OCP)
 - OF-DPA and/or Stratum (Trellis Switches) (ONF)
 - Open OLT adapter and driver support for PON devices (ONF)

SEBA White Box designs

Without embedded switch silicon



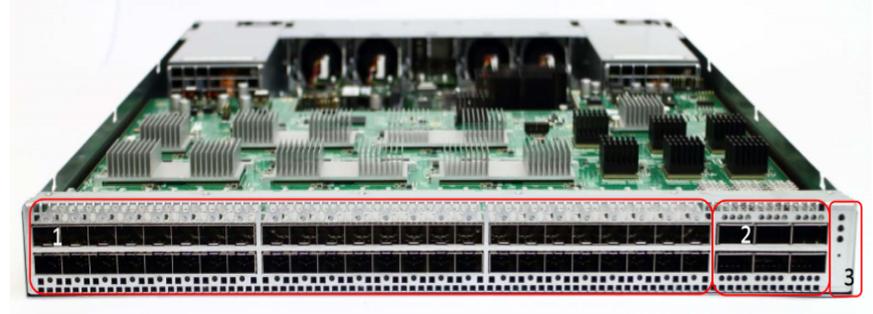
With embedded switch silicon



Today's view of SEBA White Box options

- Celestica / AT&T design – Initial specification for Open GPON OLT drafted by AT&T 6/9/2015 in OCP Telco group.
 - Resulting product produced by Celestica
 - 48*SFP GPON ports + 24*10G uplink ports (housed in 6*QSFP connectors)
 - Does not support switch silicon in design each SOC has 2*10G uplinks
 - Design based upon Micorsemi PAS5211 GPON SOC *12

Celestica OLT



Today's view of SEBA White Box options

- Edgecore / AT&T design: Initial specification produced by AT&T 3/3/2016 in OCP for a 16 port Open XGS-PON OLT
- Resulting product produced by Edgecore Networks
- 16*XFP XGS-PON ports
 - HW Capable of 10G EPON
- 4*QSFP28 100G Uplinks
- Includes internal switch silicon
 - Broadcom Qumran-AX
- Broadcom "Maple" XGS-PON SOC

Edgecore ASXvOLT16



Today's view of SEBA White Box options

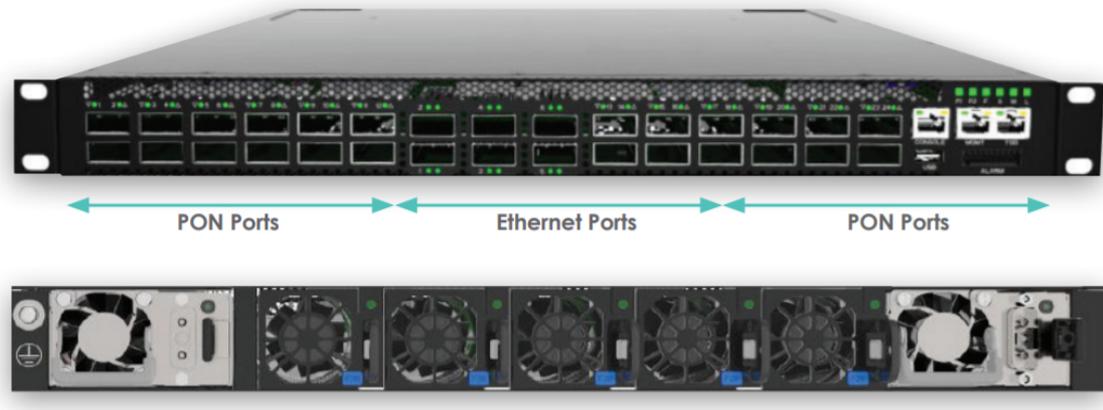
- Edgecore/Deutsche Telekom Design:
Initial specification produced by DT
9/14/2017 in OCP for an Open GPON-
OLT
- Resulting product produced by Edgecore
Networks
 - 64*SFP GPON Ports
 - 2*QSFP28 100G Uplinks
 - 8*SFP28 25G Uplinks
 - Includes internal switch silicon Broadcom
Qumran-AX
 - Broadcom “Maple” GPON SOC

Edgecore ASGvOLT64



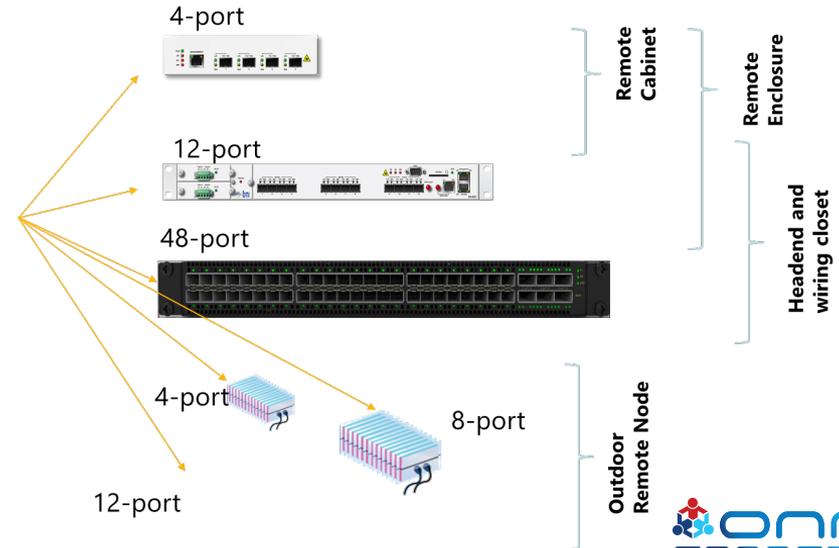
Today's view of SEBA White Box offerings

- CIG - FPGA Based XGS-PON OLT
- 24 * XFP XGS-PON Ports
 - HW Capable of 10G EPON
- 6 * QSFP28 100G Uplinks
 - Includes internal switching silicon
- X86 Control plane processor



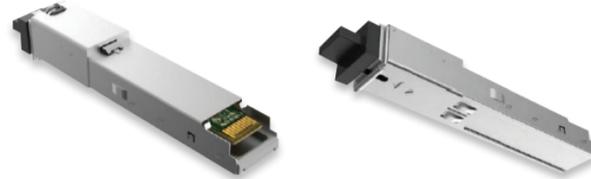
Today's View of SEBA White Box offerings

- TiBiT Worlds first pluggable OLT !
- Support for XGS-PON
 - HW capable of 10G EPON
- Can be used in any White Box 10G Ethernet Switch



Today's View of SEBA White Box offerings

- TiBit - Pluggable XGS-PON/EPON ONU
- CIG - Pluggable XGS-PON/EPON ONU
- Other ONUs – Alpha Networks, Celestica, Iskratel, MoviStar



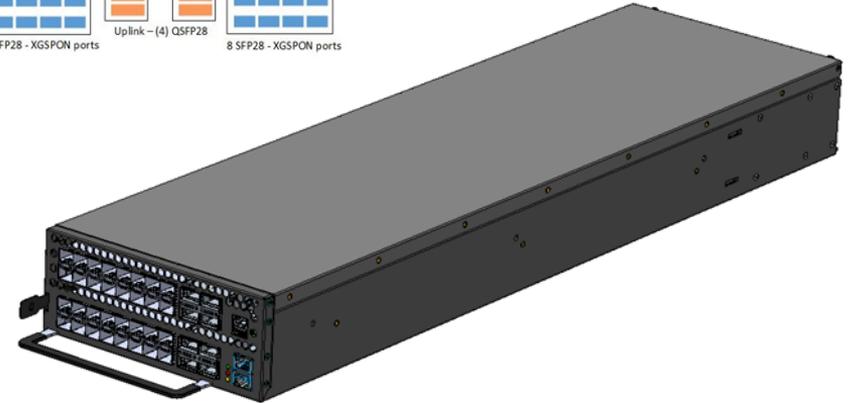
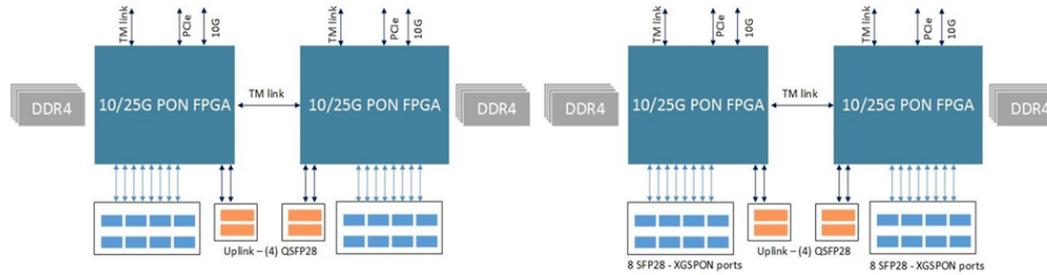
View of future SEBA White Box offerings

- Future products utilize SFP+/28 ports for high speed PON connectivity compared to XFP in use today
- Future products support various PON options in HW including GPON, EPON, XGS-PON, 10G-EPON, NG-PON2, 25G-EPON
- Coexistence mode is supported on single physical PON port.

View of future SEBA White Box offerings

- AT&T Draft specification in OCP for Open Programmable-PON OLT
 - Specification has standard 19" rack and OCP CG19 form factors
 - 32 * **SFP+/28** PON Ports 8* QSFP28 100G Uplinks
 - Specification calls for FPGA based PON SOC
 - Support for 25G PON with reduced operational port count
 - Specification does not require (although optional) internal switching silicon
 - Specification does not require (although optional) control plane CPU

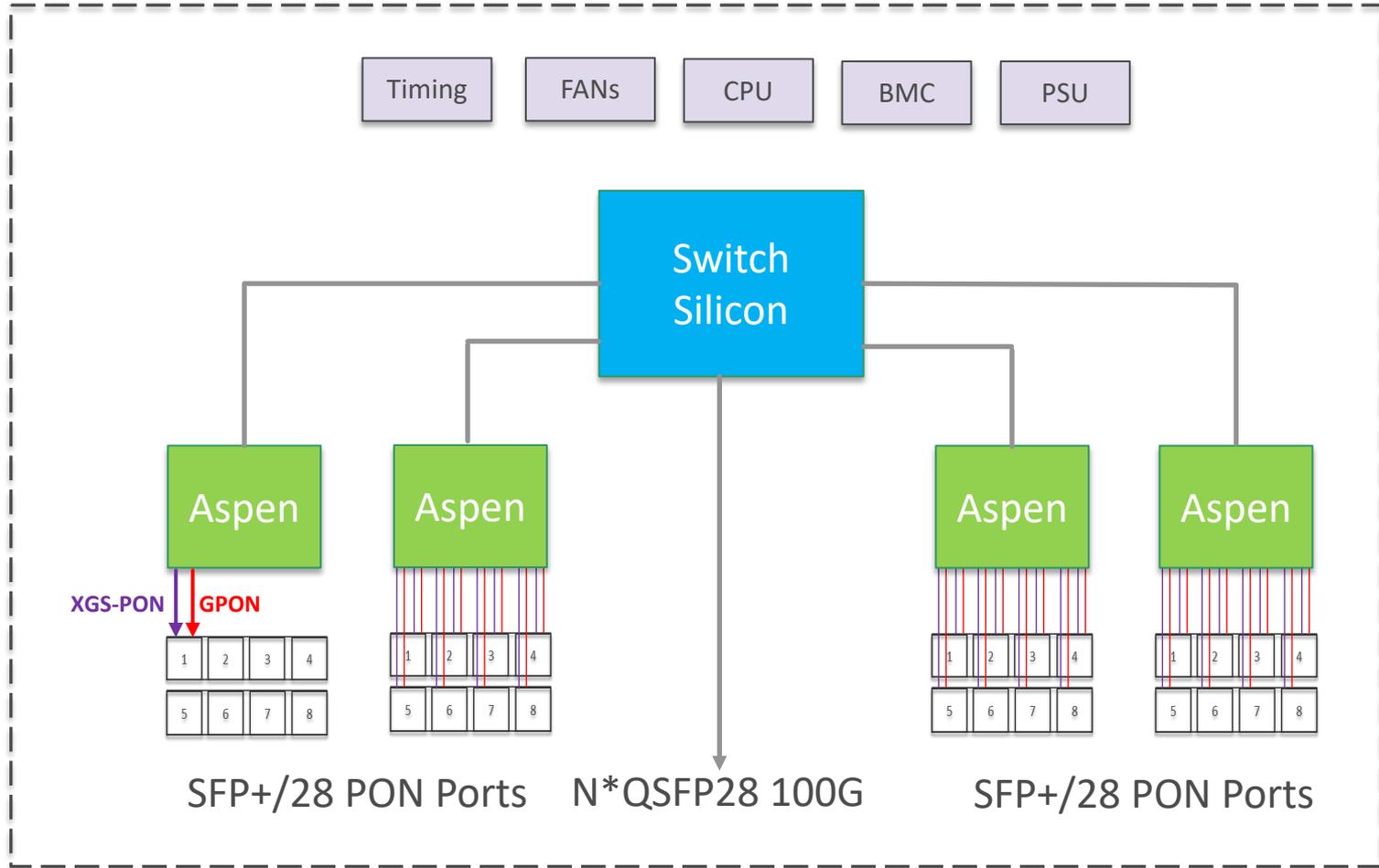
View of future SEBA White Box offerings



View of future SEBA White Box offerings

- Next generation silicon based XGS-PON OLT
 - Support for Broadcom BCM68650 “Aspen” PON SOC
 - Aspen supports 16 * XGS-PON ports
 - OLT Support for 32 * **SFP+/28 physical** PON ports
 - Each SFP28 PON port can support “Coexistence Mode” with two PON trees (GPON and XGS-PON) simultaneously
 - Quadplexer SFP+ module provides different wavelengths for each PON tree
 - Support for 25G PON with reduced operational port count
 - Reduced port count OLT versions for outdoor plant compliant environment

View of future SEBA White Box offerings



Other possible SEBA White Box offerings

- Numerous G.fast specifications approved in OCP Telco group and awaiting follow on products
- Introduction of EPON VOLTHA adapter for devices capable of EPON/XGS-PON (GPON)
- Introduction of 25G-EPON operational mode

Next Steps

- If you're a carrier get involved in ONF and OCP and specify your product needs!
- If you're a vendor participate and contribute your designs and resources to OCP and ONF !
- If you are an integrator choose products for your solution that carry the OCP Logo and run ONF software solutions !

• https://www.opencompute.org/products?refinementList%5Bcategory%5D=&refinementList%5Bsolution_provider%5D=&page=1



Thank You