



PON Update

September 16, 2021



- Harmonic PON Solution
 - Overview
 - Use Cases
 - Open ONU approach
 - Provisioning
 - Scale
- Q&A

PON Solution Overview

CableOS evolution towards PON and Ethernet



- Extremely easy to add PON onto your HFC services!
- Fully virtualized
- Converged operation for DOCSIS and PON
- Remote and centralized architectures
- Multiple remote device options (3rd party switch, Pebble, Jetty, R-OLT plug)
- Open to any 3rd party ONU
- Unified IP addressing management
- Supporting L2 and L3 CIN with PON interfaces in switches or remote PHY devices

Provide all Access solutions to broadband operators

DOCSIS over HFC

FTTH (XGS, 10GE PON) over PON

Virtualizing the operator Headend

Cloud Native Platform

Multitenant Application

CableOS Portfolio



cableOS Central

CLOUD SERVICES

24/7 Operation

Realtime Telemetry

Access Life Cycle Manager

Engagement tool



ACCESS APPLICATIONS

cableOS Apps

3RD PARTY APPS

vCMTS

vBNG

Service Provisioning

Video edge cache

5G Core

LLD

vOLT

PMA

Speedtest Servers (Ookla)



CORE PLATFORM

cableOS Platform

Cloud-Native Broadband Platform

Multi Tenancy, Multi-Access

High availability

Flexible compute architecture

Rich APIs

Shared services (telemetry, logging)

EDGE DEVICES

INDOOR SHELVES

Reef

Wave

OUTDOOR NODE

Ripple+

Shell

RPD

Pebble

Pebble-2

R-OLT

Fin

R-SWITCH

Jetty



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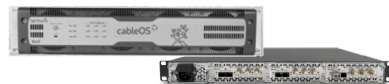
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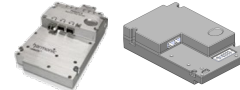
Shell



RPD

Pebble

Pebble-2



R-OLT

Fin



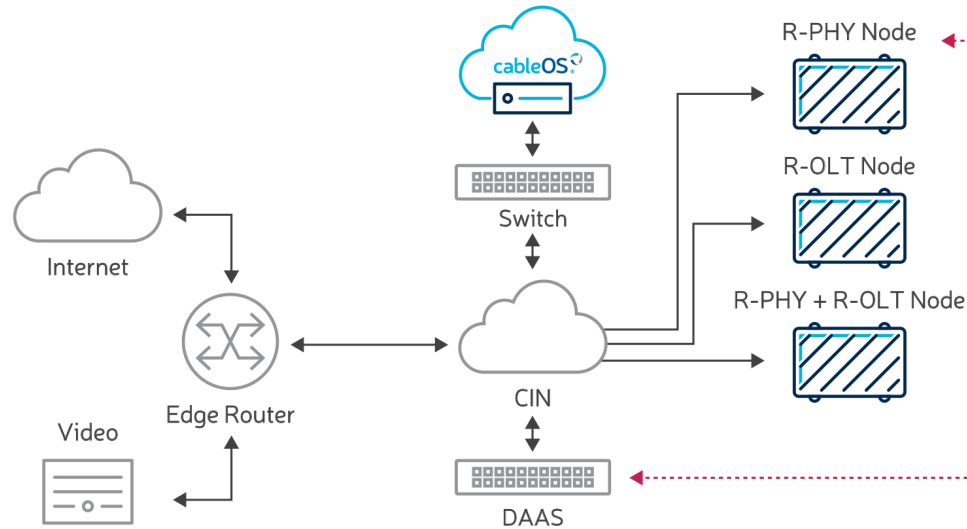
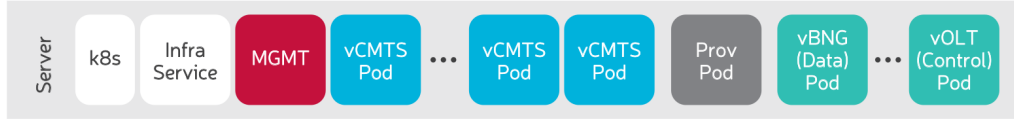
R-SWITCH

Jetty



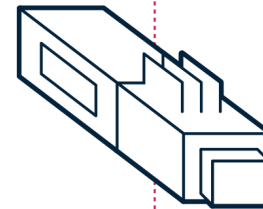
A SINGLE SOLUTION FOR HFC DOCSIS AND PON/FTTH

Cloud-Native Platform



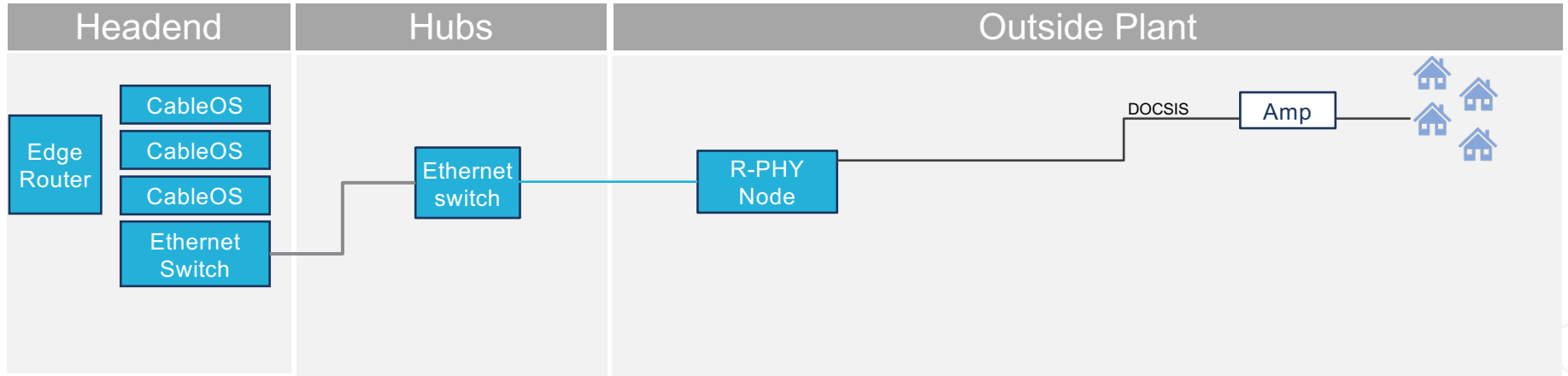
PON Interface SFP+

Outdoor

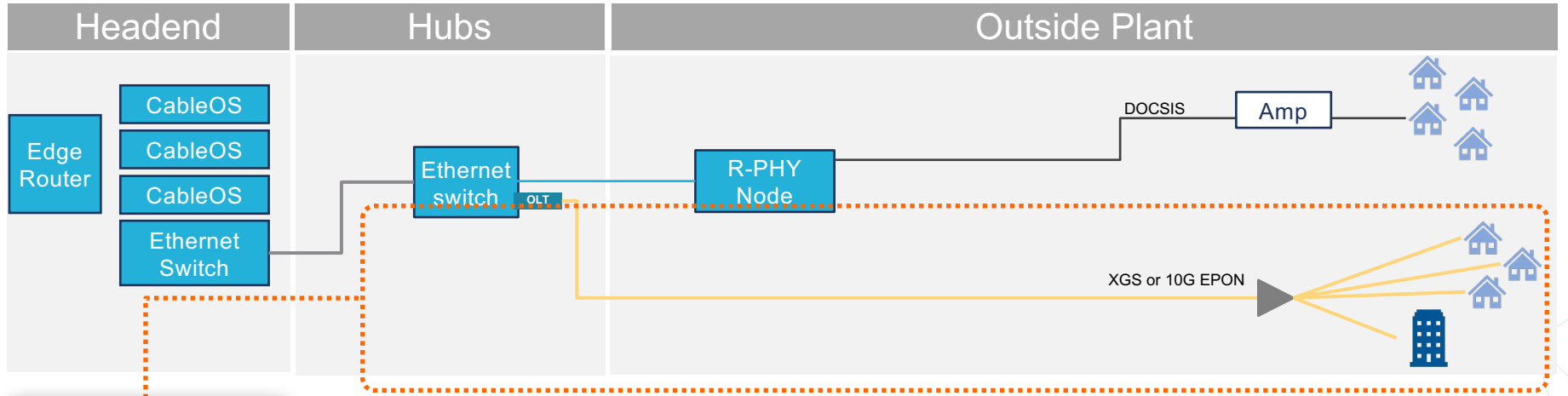


Indoor

PON – Deployment Use cases



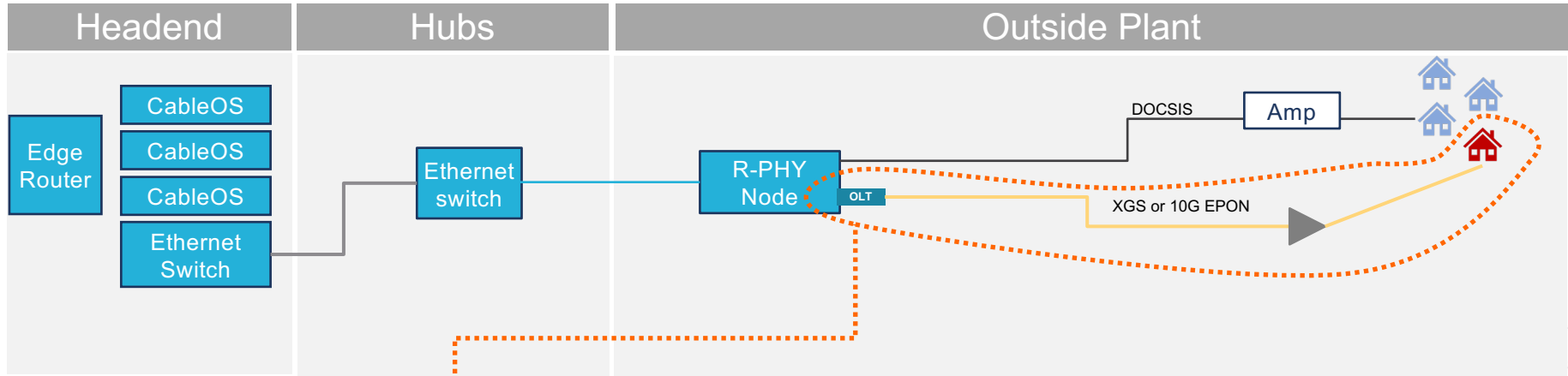
PON – Deployment Use cases



Green Field / Centralized

Add single PON port where needed

PON – Deployment Use cases



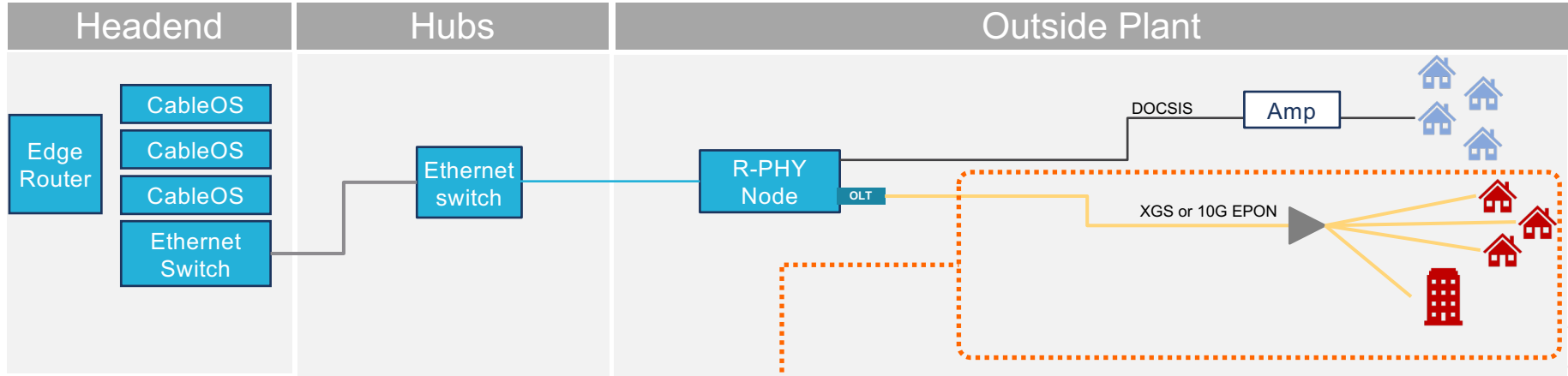
Green Field / Centralized

- Add single PON port where needed

Cap & Grow For High end users

- Use the existing RPHY IP network
- Surgically offload high consumption users to FTTH
- Upsell Fiber service

PON – Deployment Use cases



Green Field / Centralized

- Add single PON port where needed

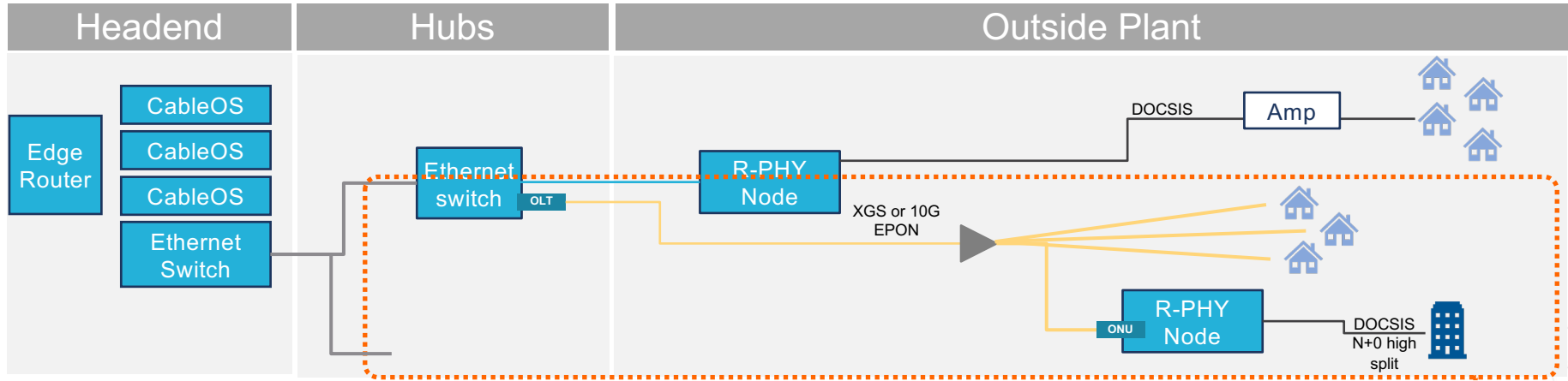
Cap & Grow For High end users

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New housing in Brownfield areas

- Use the existing RPHY IP network
- Add OLT for new housing in the area
- Fiber ready / Fiber Island Strategic

PON – Deployment Use cases



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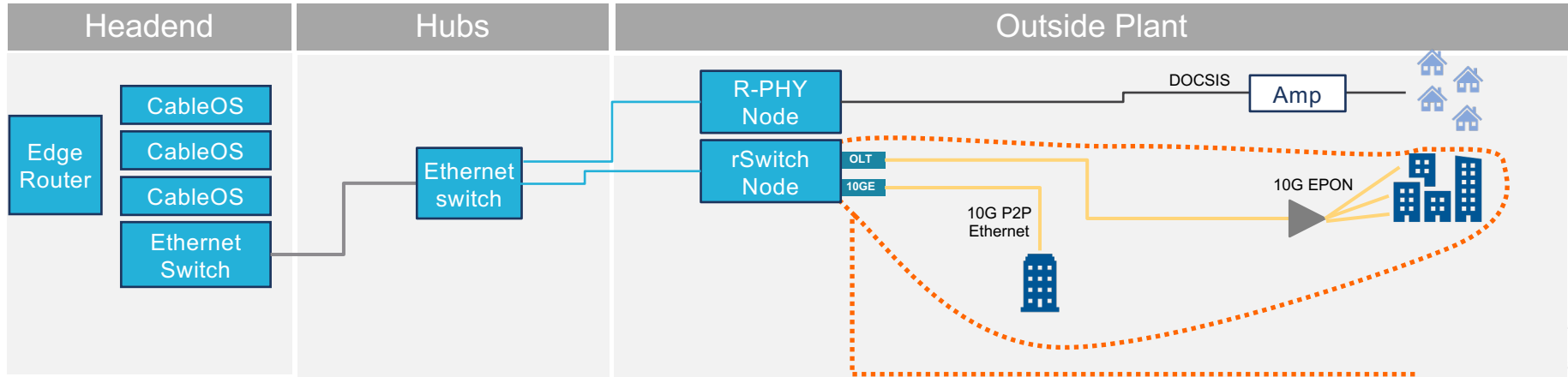
New housing in Brownfield areas

- Use the existing RPHY IP network
- Add OLT for new housing in the area
- Fiber ready / Fiber Island Strategic

MDUs, PON to Coax solution

- Use XGS as a transport
- Convert PON to COAX to feed existing MDU wiring
- Low investment, Fast TTM, remove in-home work

PON – Deployment Use cases



Green Field / Centralized

Add single PON port where needed

Cap & Grow (Isolating high consumption users)

Use the existing RPHY IP network

Surgically offload high consumption users to FTTH

Minimal investment with high ARPU

New housing in Brownfield areas

Use the existing RPHY IP network

Add OLT for new housing in the area

Fiber ready / Fiber Island Strategic

MDUs, PON to Coax solution

Use XGS as a transport

Convert PON to COAX to feed existing MDU wiring

Low investment, Fast TTM, remove in-home work

Business Services

SMBs can be offloaded from DOCSIS to PON

Enterprise customers can also be served via ActiveE from rSwitch

Headend

Hubs

Network

UNIFIED ACCESS PLATFORM

CONVERGED PROVISIONING AND OPERATIONS

Green Field / Centralized

Add single PON port where needed

Cap & Grow (Isolating high consumption users)

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New housing in Brownfield areas

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Strategic

MDUs, PON to Coax solution

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Business Services

SMBs can be offloaded from DOCSIS to PON

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Components

vOLT:

Performs onboarding, configuration, and monitoring of the Fin and ONUs

vBNG

Responsible for all user traffic management

Performs DS QoS, per flow classification, filtering

Service Provisioning Application

DOCSIS Provisioning – vCMs are created for every ONU

Northbound Provisioning – CLI or YANG

Fin

Performs all PON MAC layer functionality

E-Temp or I-Temp
E-Temp has a more powerful laser



Description	E-Temp	I-Temp
Deployment	Headend and Outdoor Cabinet	Remote Node or Cabinet
Optic Class	N2 / PR30	"N0" / PR10+
Distance	1:64 @20km, 1:128 max	1:16 @20km, 1:64 max
Temp	-20 to 75° C	-40 to 85° C
Power	2.5W / 3.3W	2.2W / 2.8W
Case	7 - fin	4 - fin
Part Number	COS-FIN1-30-E-H0	COS-FIN1-10-I-H0

vOLT + vBNG + Fin = "vCMTS with PON ports"

R-PHY, PON and Ethernet Devices



Pebble RPD

- 3 x 1/10 Gbps ports
- For DOCSIS and/or PON
- Supports Integrated OLT
 - 10G EPON or XGS-PON OLT, ONU
 - 10G EPON or XGS-PON Cortina ONU
- Recommended OLT
 - I-TEMP OLT PR10
 - I-TEMP ONU HW



Switch

- 3rd party Ethernet switch
- Front to back cooling for the OLT
- L2 / L3 forwarding
- VXLAN
- Recommended OLT
 - E-Temp OLT PR30
 - I-TEMP OLT PR10



Jetty R-Switch

- Harden outdoor/remote switch
- 270Gbps switching throughput
- Flexible/modular ports design

Options	WAN Ports	Service Ports
10G EPON XGS	2x10G – 80km DWDM	4 x Fin (for 10G EPON or XGS)
Ethernet	2x10G – 80km DWDM	4 x SFP+ (Active Ethernet)

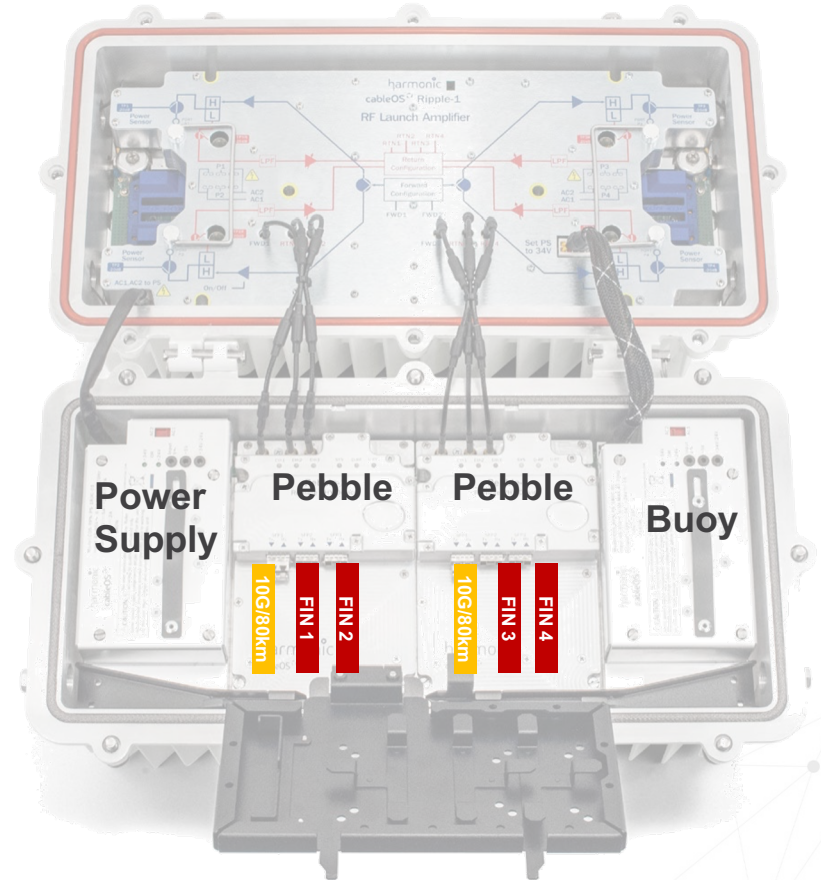
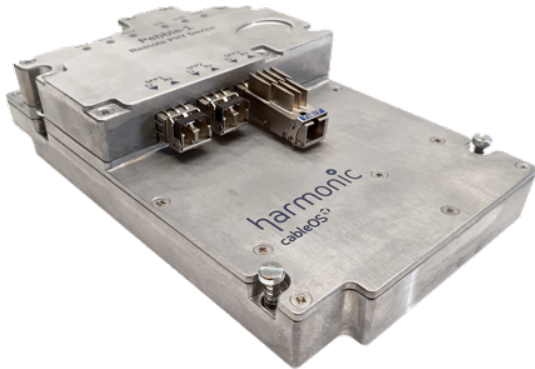
DAAS Aggregation switch with 48 x Fin

- Up to 48 PON ports per RU



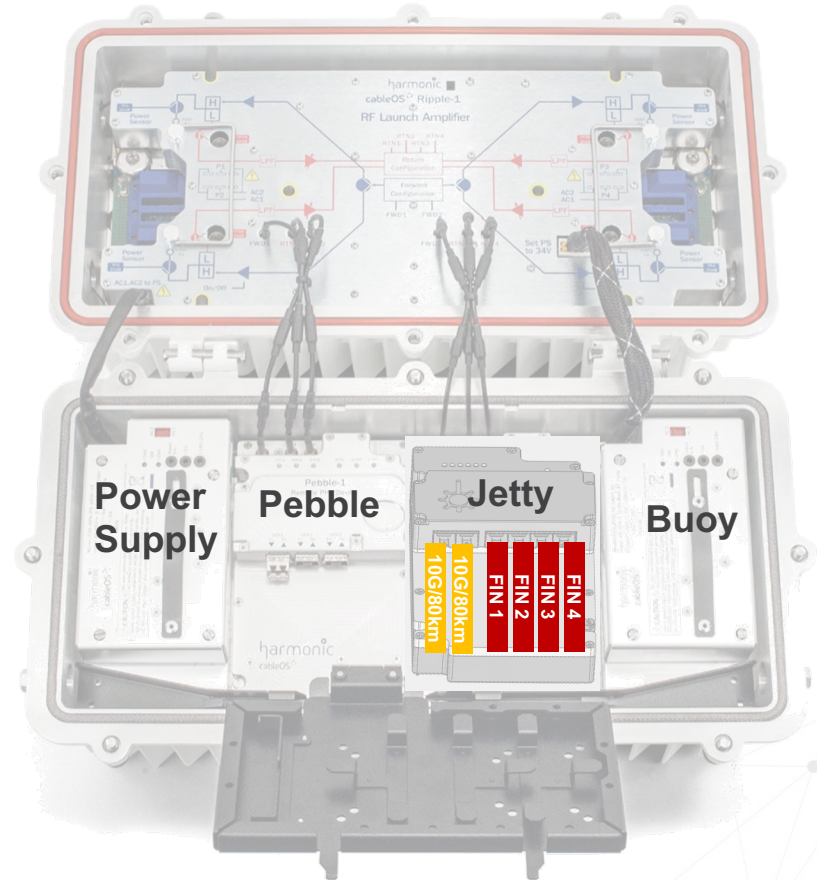
Remote OLT deployment

- 2 Pebble (3x10G switch)
- Port configuration
 - #1: 10G/1550
 - #2: FIN 10G EPON / XGS
 - #3: FIN 10G EPON / XGS
- Buoy UPS
- < 50W



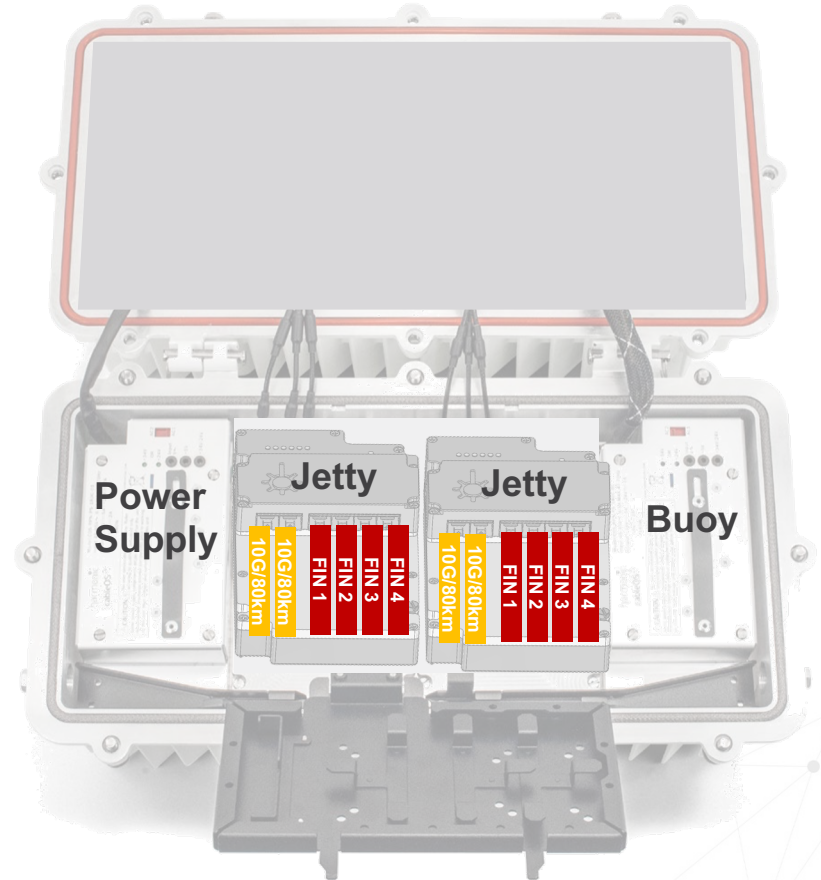
Remote OLT deployment

- 1 Jetty
- Port configuration
 - #1, #2: **10G / 80km**
 - #3, #4, #5, #6: FIN 10G EPON / XGS
- Buoy UPS



Remote OLT deployment

- 2 Jetty
- Port configuration
 - #1, #2: 10G/1550
 - #3, #4: FIN 10G EPON / XGS
- Buoy UPS



Open ONU approach

Advantages:

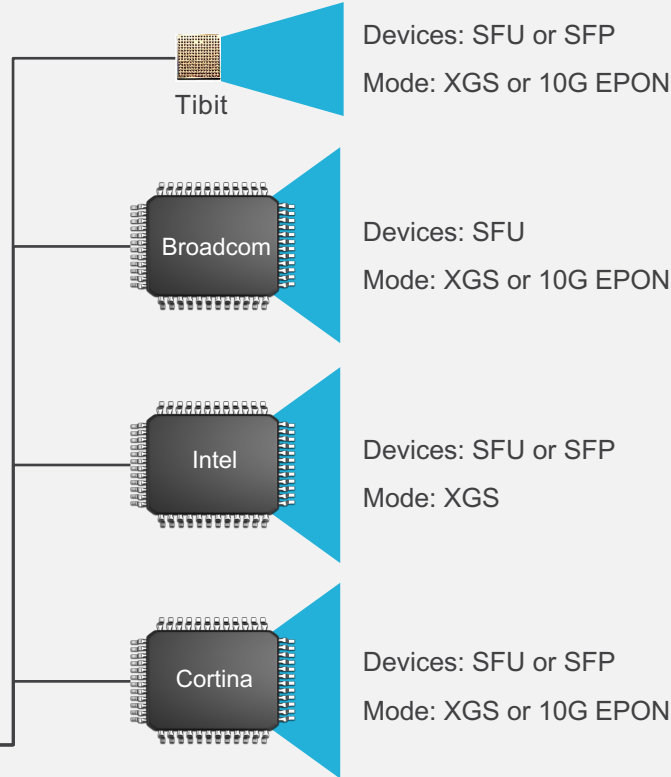
- Best of Breed selection
- Carrier deployment flexibility - BYOB
- Solution longevity
- Lowest-cost solution

Harmonic is committed to Open ONU concept

- Interop lab
- Interop test procedures
- Qualification of new models/brands



Any ONU Silicon



harmonic

Any Brand

BOW

CIG

hitron

SAGEMCOM

DKT

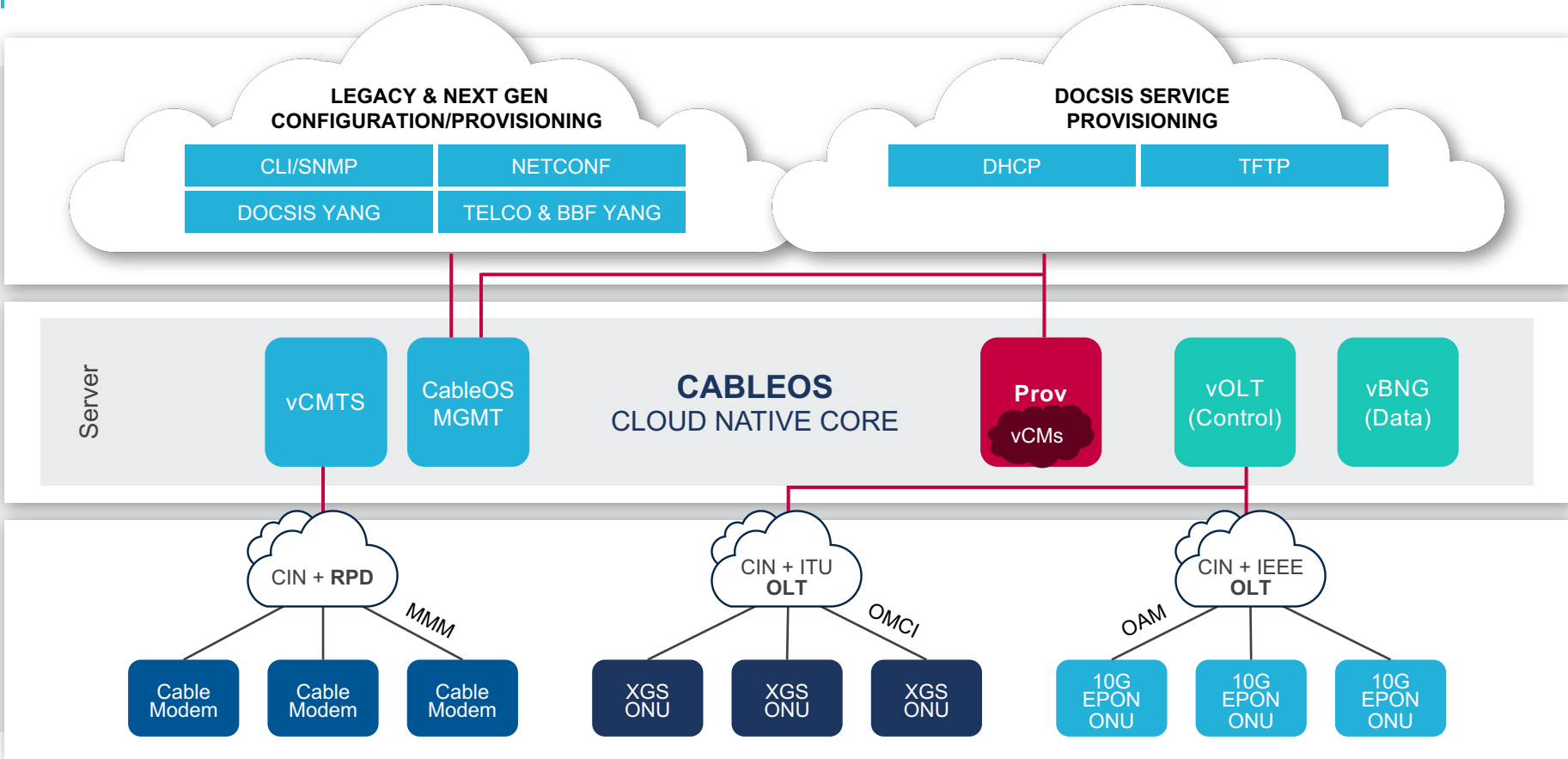
ZYXEL

genexis

Hisense

HUMAX

UNIFORM PROVISIONING FOR ANY ACCESS



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THANK YOU.

