cOS Ripple-2

REMOTE PHY NODE

The Harmonic cOS Ripple-2 Remote PHY node (RPN) is an advanced, hardended outdoor enclosure for networks tasked with delivering video, data and voice services over coax.

Compact and cost-effective, the Ripple-2 RPN houses the cOS Pebble-1 Remote PHY device (RPD), which supports distributed access architectures defined by CableLabs® MHAv2 specification. The Ripple-2 node is capable of hosting a single Pebble-2 RPD, plus one Jetty remote switch module, to allow hybrid DOCSIS/PON deployment.

Ripple-2 is part of the Harmonic cOS software-based CCAP system, which also includes cOS Core vCMTS software. Fundamentally changing the business dynamics of cable delivery, cOS introduces cable operators to unprecedented scalability, agility and cost savings. The end-to-end solution supports centralized and distributed cable access architectures that enable the fast deployment of IP-based and legacy data, video, and voice services — and sustainable capacity growth. All cOS components work together to resolve space and power constraints in the headend and hub, eliminate dependence on hardware upgrade cycles, and provide multi-dimensional scaling.

The Ripple-2 RPN connects with cOS Core vCMTS software to support evolving fiber deep deployments with added features, and to allow for future network growth. Multiple configurations of the RPN using various combinations of Pebble-2 RPD, or a Jetty R-switch are available, supporting up to 2 downstream and 4 upstream ports, alongside 5 PON R-OLT ports. Software-controlled DSxUS segmentation allows full flexibility in running the node with any one of the following segmentation options: 1x1, 1x2, 2x2, and 2x4 (DSxUS) segments. Ripple-2 also supports built-in port for local RF channel insertion.

Featured in the RPN is an integrated RF launch amplifier, a modular tray that provides superior RF performance and built-in remote configuration functionality, replacing traditional plug-ins. Remote RF configuration through cOS Core software includes forward and return segmentation, forward-path gain and tilt, return-path attenuation and mute switches (for troubleshooting ingress problems), and select hybrid enable/disable for turning off unused output ports. This capability simplifies initial installation and RPD replacement, eliminates the need for third-party monitoring solutions, and enables quick remote troubleshooting while reducing truck rolls.

The Ripple-2 RPN includes advanced features such as per-port RF output power monitoring and closed-loop output power. For added reliability, the RPN may host the innovative "Buoy" power backup module, which protects against brief power interruptions. Also supported is a "Last Gasp" alarm to indicate failure of AC power feed, and advanced wear-tracking monitoring to indicate when key components approach their life expectancy. The Ripple-2 RPN housing also supports AC power feed via a dedicated port.

HIGHLIGHTS

- Hardened enclosure for Pebble-2 RPD, and Jetty R-switch
- Supports up to 1218 MHz forward and 204 MHz return bandwidth
- Modular RF launch amplifier with four high-output level ports (64 dBmV/channel)
- Software-controlled output power may be tuned down to support BAU applications
- Tamper switch for unauthorized access alarming

- Remotely configurable forward gain and tilt
- Remote controlled return mute switch/attenuation for ingress control
- Hybrid disable configuration to conserve power on unused ports
- Variety of RPD modules for network growth with automatically configured segmentation
- Fiber entry ports on both sides of the housing, with fiber management tray and channel for easy access

- Innovative "Buoy" power backup module protects against brief power interruption
- Last gasp alarm - Power Supply monitors the AC input voltage and provides status alarm when voltage drops below minimum operating range
- RF Tray provides easy plant upgrades with offering field replaceable Diplex Filters. Diplex Filters can be swapped in the field for plant expansions
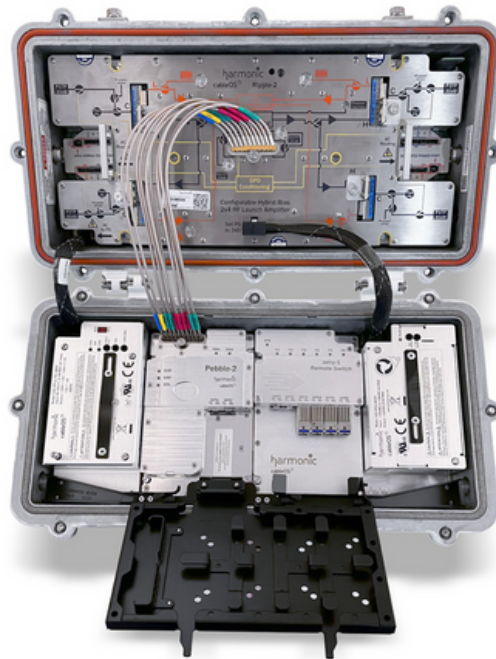
Each Ripple-2 node can house one RPD, one Jetty, two PSUs and an RF launch amplifier.

All controls and settings on Ripple-2 are performed remotely using the cOS CLI. Remote control functionality and minimal plug- ins allow for simplified setup and removes the need for technician guesswork for forward- and return-path segmentation settings. All configuration settings are stored in non-volatile memory in the RPN itself. Upon replacement of any modular RPN component, the new component automatically receives the replaced component configuration.

The RF launch amplifier is capable of supporting today and tomorrow's ever-changing optical networks. Two fiber entry ports on the tray allow for ease of use and provide ample storage for future growth.

World-Class Service and Support

With thousands of successful installations, Harmonic possesses unique, extensive knowledge of the cable edge environment and unsurpassed expertise in managing live production networks. Harmonic technical support and field engineers possess decades of collective experience in the cable industry and have the ability to go far beyond optimal deployment strategies and troubleshooting. The Harmonic Global Service and Support organization also understands the intricacies of every ancillary system touched by the edge network, from back-office video control planes to IP backbones to deep-fiber HFC nodes.
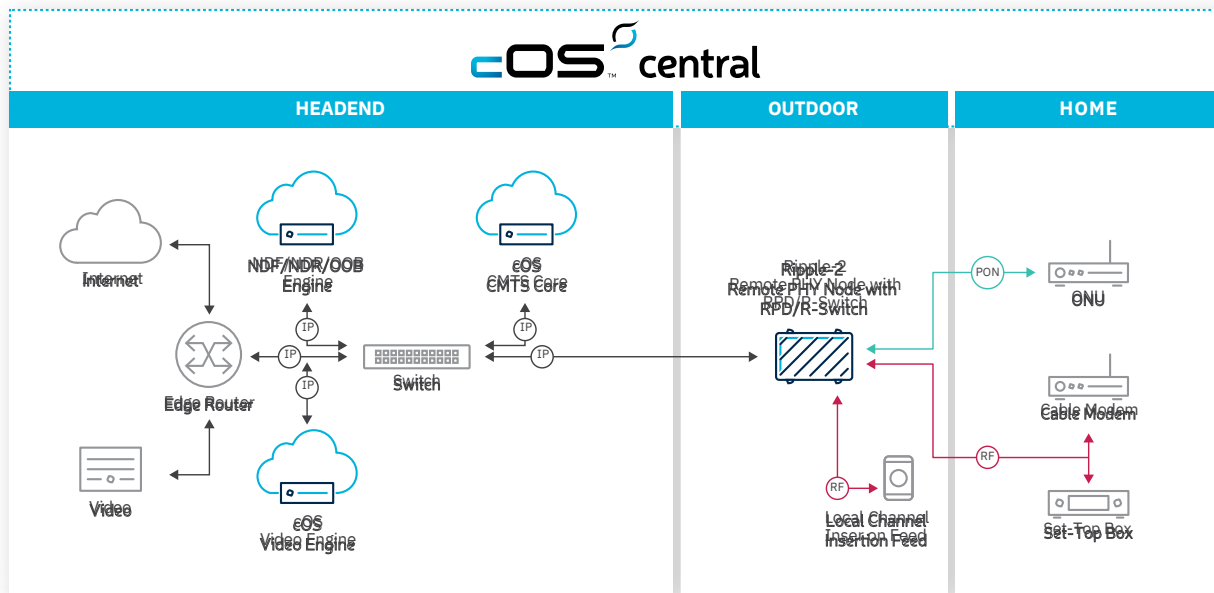
cOS Virtualized Cable Access Solution

cOS Ripple-2 REMOTE PHY NODE

SPECIFICATIONS

FORWARD-PATH

Operational Bandwidth	Pluggable diplex filters, supporting 3 DS frequency ranges: 54-1218 MHz (low split), 102-1218 MHz (mid split), 246-1218 MHz (high split)
Flatness	+/- 0.75 dB
Linear Tilt	20 dB (nominal) configurable
RF Test Points	-30.0 +/- 1.0 dB
RF Impedance	75 Ω
RF Return Loss	min -15dB, typ -16dB
Port-to-Port Isolation	50 dB
Output Level @ 1218MHz	53 dBmV (nominal QAM actual) with forward spectrum loaded with QAM and/or OFDM channels and 20 dB of tilt, configurable
DS MER	min 41dB on low frequencies, typ 47dB on high frequencies (with nominal tilt)
Local RF Channel Insertion	Up to 4X 6MHz channels, combined into a single input signal
Digital Pre-Distortion	Supported for four RF ports

RETURN-PATH

Operational Bandwidth	Pluggable diplex filters, supporting 3 US frequency ranges: 5-42 MHz (low split), 5-85 MHz (mid split), 5-204 MHz (high split)
Flatness Linear Tilt RF	+/- 0.75 dB
Test Points RF Return	0.0 dB
Loss RF Attenuation	-30.0 +/- 1.0 dB
Port-to-Port Isolation	min -15dB, typ -16dB
Nominal Return Input	Self-optimizing
	50 dB
Level	8 dBmV per 6.4 MHz channel (nominal); configurable
US MER	37 dB (typical)

POWER

Power Supplies Input	One or two
Voltage Range Line	45 - 95 Vrms (QSW)
Frequency Power	47 - 70 Hz
Supply Rated Power	180 W (2A@5Vdc & 5A@34Vdc or 7A@24Vdc)
Consumption Buoy	140 W (Typical with single 2DSx4US RPD)
Power Back-up module	One (optional)
Resilience to AC power interruption	Up to 4 sec (with Buoy installed, with single 2DSx4US RPD)

PHYSICAL

Mounting	Strand and wall
Enclosure	IP67
Dimensions (HxWxD)	11.5 in x 22 in x 11.5 in 29.2 cm x 55.8 cm x 29.2 cm
Weight	~48 lbs/21.7 kg Fully configured
External RF Ports	4 port (2 per side), with software-controlled segmentation
Dedicated powering ports	2 (one on each side)
RF Test Points	4 common (RET&FWD) external TPs (2 per side) 2 FWD internal TPs
External Fiber Ports	2 (1 per side)
Operating Temperature	-40° to 140° F / -40° to +60° C

SUPPORTED 'PEBBLE-2' RPD OPTIONS (1 PER NODE), AND 'JETTY' R-SWITCH (UP TO 2 PER NODE)

COS-PBL2-1X2-P-HR01	1X2 RPD
COS-PBL2-2X2-P-HR01	2X2 RPD
COS-PBL2-2X4-P-HR01	2X4 RPD
COS-JTY1S-6T-2M-HR01	Jetty-1 6X10G R-Switch

ORDERING INFORMATION

Model P/N	Description
COS-RPL2-D31-N-NN-NN-CN-07	RIPPLE-2 D3.1 RPHY NODE, W/O BUOY, W/O PEBBLE
COS-RPL2-D31-N-NN-NN-CB-07	RIPPLE-2 D3.1 RPHY Node, WITH BUOY, W/O PEBBLE
COS-RPL2-PDPLX-H	RIPPLE-2 PLUGGABLE HIGH-SPLIT DIPLEXER (204/246)
COS-RPL2-PDPLX-L	RIPPLE-2 PLUGGABLE LOW-SPLIT DIPLEXER (42/54)
COS-RPL2-PDPLX-M	RIPPLE-2 PLUGGABLE MID-SPLIT DIPLEXER (85/102)