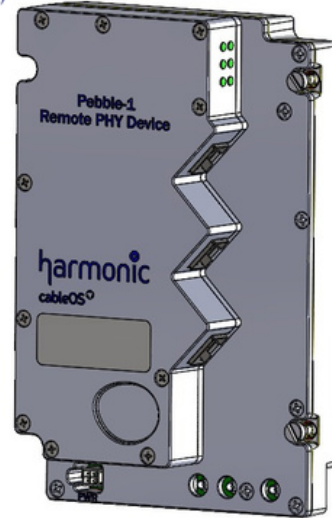


# cOS Pebble-1-BK

REMOTE PHY MODULE



## The Harmonic cOS Pebble-1 module is a Remote PHY device (RPD) that supports distributed access architectures defined by CableLabs® MHA v2 specification.

The module is designed for use with the Wisi Slim CD93 Module, a hardened outdoor enclosure for networks tasked with delivering video, data and voice services over coax.

Pebble-1, Ripple-1, Shell-1 and LR45 are part of the Harmonic cOS software-based CCAP solution, which also includes the cOS Core CMTS server and Reef-1, Wave-1 and NSG Pro cable access platforms. 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 Pebble-1 module interfaces with the cOS Core server to support evolving fiber deep deployments with high-speed video and data traffic. Compliance with the CableLabs DOCSIS DRFI Annex D and PHY 3.1 specification assure full RF spectrum coverage and extend network capacity, while a full-featured tool set for downstream/upstream spectrum monitoring and support for DOCSIS 3.1 proactive network maintenance (PNM) add operational efficiency. In addition to DOCSIS, Pebble-1 generates SCTE 55-1, 55-2 pilots for, leakage detection, delivers FM radio and telemetry signals. The precision IEEE 1588 PTP servo algorithm synchronizes all elements of the cOS solution and can also be used to provide Time as a Service.

One or two Pebble-1 modules can be used with a single Ripple-1 node, supporting one downstream and two upstream ports. Multiple segment configurations are available, including 1x1, 1x2, 2x2, 2x3 and 2x4. A Layer 2 Ethernet switch that supports three 10-Gb external ports and a rich set of protocols speeds the flow of traffic between the cOS core server and CPEs, and also enables redundancy and daisy chaining. All module and node controls and settings are performed remotely using the cOS CLI and are stored in non-volatile memory in the node.

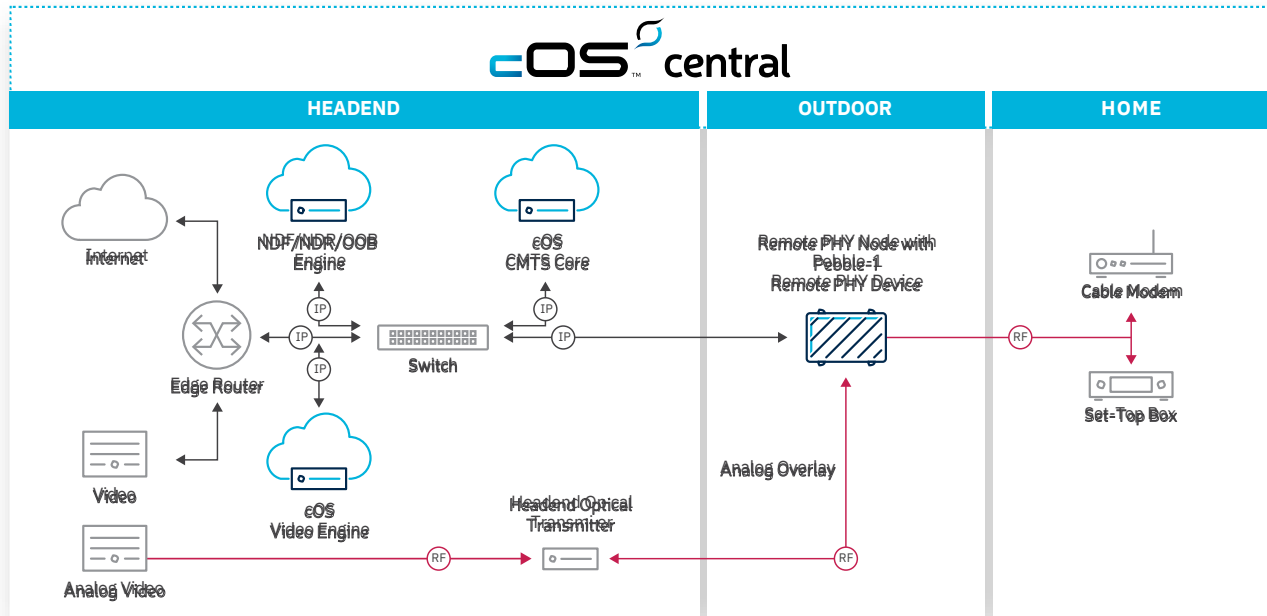
The Pebble-1 AO RPD model offers analog overlay in addition to the standard Pebble-1 functionality. For analog overlay capabilities, the Pebble-1-AO RPD model provides support for combining forward analog signals in the RPD for traditional video channel distribution over analog optical networks.

## HIGHLIGHTS

- Fully compliant with the CableLabs MHA v2 specification for Remote PHY architectures
- High-speed 10-GbE throughput
- One DS port, two US ports
- Superior RF performance, compliant with DOCSIS DRFI Annex D and 3.1 PHY
- Precision IEEE 1588 PTP synchronization
- Support for DOCSIS 3.1 PNM
- Easy installation into cOS Ripple-1 and third-party nodes
- Remote control via cOS CLI
- Compact size and low power consumption
- 3x SFP+ Ports • OOB protocols • Integrated with leading 3rd party equipment for plant maintenance

## World-Class Service and Support

With thousands of successful installations, Harmonic possesses unique, extensive knowledge of the cable access environment and unsurpassed expertise. Our 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 access network, from back-office video control planes to IP backbones, assuring that the installation of and cut-over to a cOS solution exceeds every customer expectation.



cOS Virtualized Cable Access Solution

## SPECIFICATIONS

### RF

|                |   |
|----------------|---|
| DS Channels US | Any combination of up to 158 SC-QAMs or six 192-MHz OFDM channels |
| Channels DS    | Any combination of up to 12 SC-QAMS or two 96-MHz OFDMA channels  |
| Ports          | One   |
| US Ports       | Up to two   |
| RF Performance | DRFI Annex D compliant<br>DOCSIS                                  |

### TIMING

|                   |                 |
|-------------------|-----------------|
| PTP Protocol      | 1588 slave mode |
| Telecom Profile   | ITU-T G.8275.2  |
| PDV               | 5ms             |
| Network asymmetry | 1ms             |

### OOB AND NETWORK MAINTENANCE

|                         |  |
|-------------------------|--|
| OOB                     | SCTE 55-1, SCTE 55-2   |
| Pilot Generation        | Over operational band  |
| PNM                     | DOCSIS PHY 3.1 compliant   |
| Additional Capabilities | ALC pilots and alignment tones<br>FCC and LTE leakage markers<br>Telemetry for handhelds and addressable taps<br>NDF/NDR |

### CONVERGED INTERCONNECT NETWORK INTERFACE

|                  |   |
|------------------|---|
| Ports            | Three 10 GbE SFP+ Transceivers<br>(Two Ports for Pebble-1-AO) |
| Protocols        | DEPI, UEPI, GCP and other Layer 2 protocols                   |
| Network Topology | Daisy Chain   |

### CONFIGURATION AND MANAGEMENT

|                  |           |
|------------------|-----------|
| SSH, CLI, Syslog | Supported |
| RPD Boot time    | 3 minutes |

### SECURITY

|                          |        |
|--------------------------|--------|
| Authentication           | 802.1x |
| Control Plane Encryption | IPSEC  |

### POWER

|                               |       |
|-------------------------------|-------|
| Low power model, dual US port | < 26W |
|-------------------------------|-------|