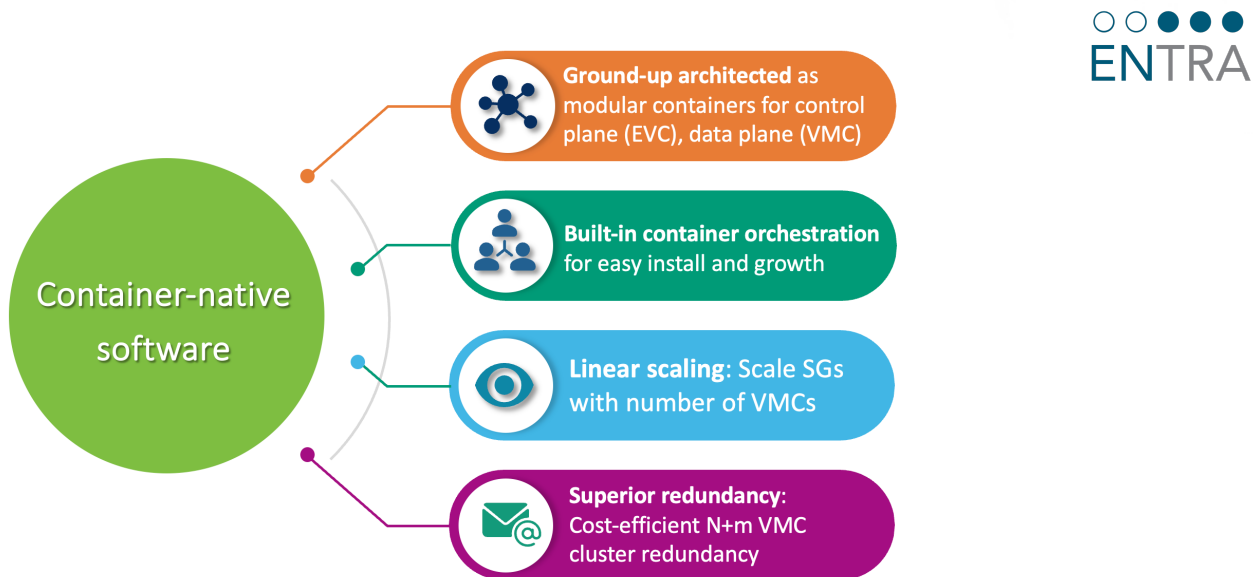The Entra® vCMTS is a virtualized disaggregated cable modem termination system (CMTS) built using modern cloud technology. It runs on standard x86 servers that manage multiple software components. By combining Vecima's top-notch DOCSIS® compatibility with this advanced cloud design, Entra vCMTS offers cable operators a highly scalable, fast, and reliable solution.

The cloud-native design gives operators more flexibility than older, hardware-based systems. It eliminates the restrictions of traditional chassis-based systems and outdated virtualized architecture, while offering an easy-to-use solution that doesn't rely on Kubernetes for container management.

Container-native software

- **Ground-up architected** as modular containers for control plane (EVC), data plane (VMC)
- **Built-in container orchestration** for easy install and growth
- **Linear scaling**: Scale SGs with number of VMCs
- **Superior redundancy**: Cost-efficient N+m VMC cluster redundancy

System

The Entra vCMTS is composed of a control plane container (EVC) and many data plane containers (VMCs). These could be on the same server or separated at different locations.

The Entra vCMTS functions as the Remote PHY Principal Core, DOCSIS Core, and RPNs in a disaggregated CMTS, offering the functionality of a traditional CMTS in a flexible, scalable way. As operators deploy RPDs, they spin up new VMCs on existing servers and add new servers when capacity nears its peak in the vCMTS cluster.
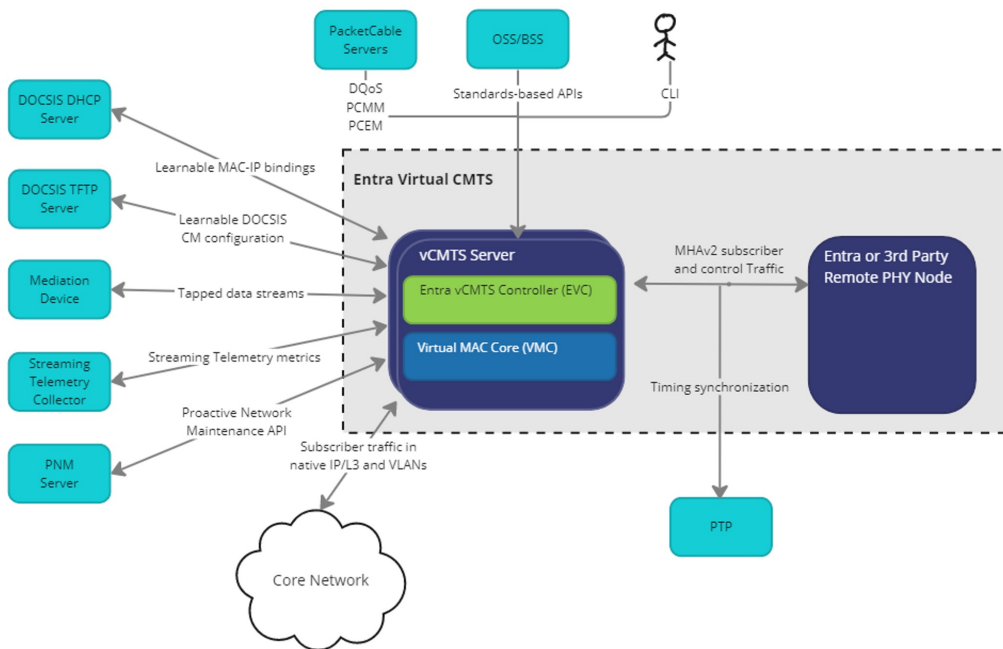
Efficient API-Driven Integration

The Entra vCMTS integrates with the following components:

- OSS/BSS: Provides system configuration and management applications through standards-based APIs (e.g., NETCONF, SNMP, and IPDR)

- PacketCable Servers: Support PacketCable QoS-enabled services, such as voice (PacketCable 1.5 and 2.0), multimedia (PacketCable Multimedia), and accounting (PacketCable Event Messages)

- DOCSIS® DHCP Servers: Provide IP addresses to RPDs, Cable Modems, (CMs), and Customer Premises Equipment

- DOCSIS TFTP Server: Provides CMs with their DOCSIS configuration files

- Mediation Devices: Support lawful intercept functions

- Streaming Telemetry Collectors: Collect streaming telemetry metrics and improve operational visibility PNM Servers: Implement proactive network maintenance functions for the vCMTS

- PTP: Provides a shared timing base between the vCMTS and RPNs

- Core Network: Handles raw subscriber traffic coming from and going to the vCMTS

The Entra vCMTS approaches operator back-office integration through an API-first approach, meaning that all operations available over standard CLI and SNMP interfaces are also available over standards-based NETCONF and RESTCONF APIs. Legacy interfaces, such as IPDR and polled SNMP, are supported for metrics collection. Vecima will offer direct integration to operator data lake Kafka buses and support new standards-based gNMI streaming telemetry collectors as operator customers require them.

Scaling

Entra vCMTS scales linearly to hundreds of service groups without requiring new clusters. Operators can add servers as new service groups are needed. This flexibility allows operators to adjust cluster size based on the head-end. Different CPU generations can be used within the same cluster, ensuring hardware investment protection.

DOCSIS® Feature Support

The Entra vCMTS solution is a fully featured Remote PHY solution with support for MHAv2, DOCSIS 3.1, DOCSIS 3.1+, and DOCSIS 4.0 specifications and features.
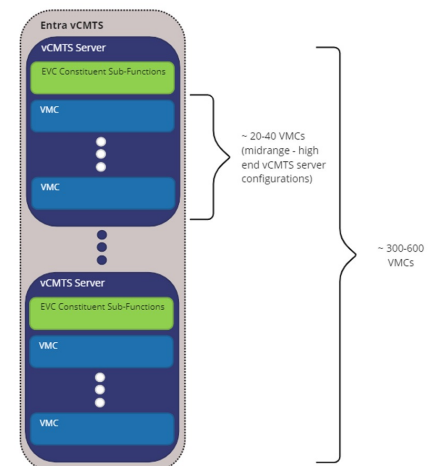
Highlights

MHAv2

- R-PHY specifications: R-PHY, R-DEPI, R-UEPIR-PHY key features:, R-OSSI, R-OOB, R-DTI, GCP, and R-PHY MIBs

- R-PHY key features:

  - DOCSIS channels (DS SC-QAM, OFDM, US SC-QAM, and OFDMA) OOB, NDF, and NDR
  - Time synchronization
  - Diagnostic tones
  - DEPI latency measurement
  - RPD buffer depth monitoring
  - CCAP output data rate control
  - Virtual splitting and combining

DOCSIS®

- DOCSIS specifications: PHY, MULPI, OSSI, SEC, PacketCable, DSG, and DOCSIS MIBs.DOCSIS channels (DS SC-QAM, OFDM, US SC-QAM, and OFDMA)
    - BPI+ V1 (DOCSIS 3.1, DOCSIS 3.1+), and BPI+ V2 (DOCSIS 4.0) DHCP proxy
    - TFTP proxy
    - Source address verification
    - Channel bonding
    - Load balancing
    - DOCSIS set-top gateway
    - Lawful intercept
    - L2VPN/BsoD
    - Fault management and reporting
        - Event reporting and logging
        - Alarms
    - Proactive network maintenance
        - Embedded vCMTS functionality Viavi XPERTrak
        - Viavi QAMTrak
        - Kronback
    - Profile management – internal to the vCMTS OUDP leakage detection
    - PacketCable voice and multimedia applications Low-latency DOCSIS
    - DOCSIS 3.1, DOCSIS 3.1+, and DOCSIS 4.0

Built-in Layer 3 Router

Entra vCMTS includes a Layer 3 IP/MPLS router that directly interfaces with core-facing routers. With full support for routing protocols, such as BGP, OSPF, IS-IS-MT, and MPLS, operators don't need an external router to manage subscriber routers. All protocols support IPv4 and IPv6, offering maximum deployment flexibility. Each routing instance can work with one or more VMCs, reducing costs associated with routable IP addresses.

Industry-Leading Resiliency

Entra vCMTS is built with industry-leading resiliency principles, featuring modular containers for the control and data plane to eliminate single points of failure. VMC containers are protected by cost-effective stateful N+m redundancy, providing unmatched reliability. The control plane uses 1:1 stateful high-availability protection. Each container can be patch upgraded individually without taking the entire system offline. This allows seamless fixes while the system remains operational. Real-time graphical dashboards provide up-to-date insights into each container and subsystem.

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