Hewlett Packard Enterprise

Technical white paper

HPE Edgeline Converged Edge Systems management

Embedded and consolidated systems management make data center-class power and control at the edge a reality

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Introduction

Today, enormous volumes of Big Data is created at the edge—including the manufacturing floor, college campus, wind farm, power plant, oil rig, telecommunications outpost, sports arena, and intelligent vehicle. This is driving demand for powerful, data center-class compute and management technology at the edge, where the data is created and must be analyzed.

HPE Edgeline Converged Edge Systems bring together the best features and practices from the IT world with the unique requirements of the operations technology (OT) world in a single, ruggedized system that implements data center-level compute and management technology at the edge. To facilitate the convergence of OT and IT, HPE designed the Edgeline portfolio with three foundational principles in mind:

1. Bring high-performance compute, powered by Intel® Xeon® processors, to the edge, enabling applications that traditionally run in the data center or cloud to run near the data source without compromise or modifications.
2. Enable data acquisition and control where the applications are running to reduce transfer issues and provide faster insights and better business agility.
3. Provide enterprise-class embedded and on-premises consolidated management for systems at the edge for faster time to deployment, higher system and application availability, and significantly quicker time to resolution when issues arise.

The first two principles are covered in detail in our Edgeline Family Guide, which focuses on how HPE is extending the enterprise from the data center and cloud to the edge. This technical white paper covers the third point, with details on HPE products and services that enable enterprise-class management at the edge, as depicted in Figure 1.

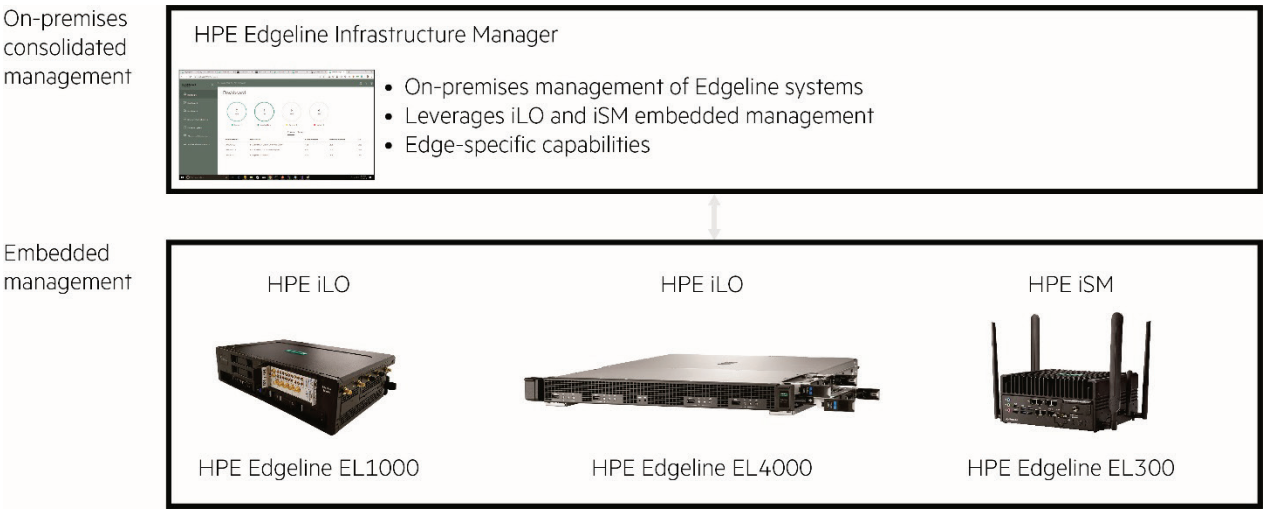

Figure 1. HPE Edgeline Management overview

HPE, through its Compaq lineage, has been the leader in systems management since introducing the first fully managed x86 servers in the early 1990s. Today, HPE builds on this legacy to deliver fully managed systems for the edge.

HPE edge management strategy

Whether operating a single system or hundreds, deploying, updating, and maintaining optimal operations can be a challenge. This is magnified when systems are running in environments other than traditional data centers.

Managing systems in a data center environment is a well-understood science, and HPE has long been a leader in providing server management resources that deliver new levels of automation, simplicity, and security. Managing at the edge is a new computing paradigm that brings with it a new set of challenges, including:

- Managing devices located in a wide variety of locations, such as remote offices, oil wells, refineries, factories, airplanes, vehicles, and farms
- Dealing with a variety of connectivity scenarios—such as wired Ethernet, Wi-Fi, and cellular—with differing bandwidth capabilities and often nonpersistent connections
- Enabling non-IT staff with systems management at the edge

To answer these challenges, HPE is pioneering a new set of solutions. HPE Edgeline Converged Edge Systems are built around an edge management architecture that delivers a simple, efficient, and scalable set of management capabilities that lower the cost of management. These design goals are met by combining the embedded management foundation built into each HPE Edgeline system with tools to facilitate centralized management of multiple systems.

Embedded management

The management engine that is built into each HPE Edgeline system is the foundation for management at the edge. It begins with the core capabilities of Integrated Lights Out (iLO)—built into the HPE Edgeline EL1000 and EL4000 systems. It is extended with edge-specific capabilities enabled by the HPE Edgeline Integrated System Manager (iSM)—embedded in the new EL300 system. iLO and iSM provide local management of the Edgeline systems, so the system deploys easily and operates reliably. These components enable users to directly manage individual systems and enable centralized tools for consolidated management of multiple systems.

The iLO and iSM modules provide the key capabilities required to successfully manage an individual system. These include:

- Device configuration
- Health monitoring
- Event logging and alerting
- Graphical user interface (GUI) and command line interface (CLI) for user access
- Industry standard Redfish representational state transfer (REST) interface for programmatic access
- Security

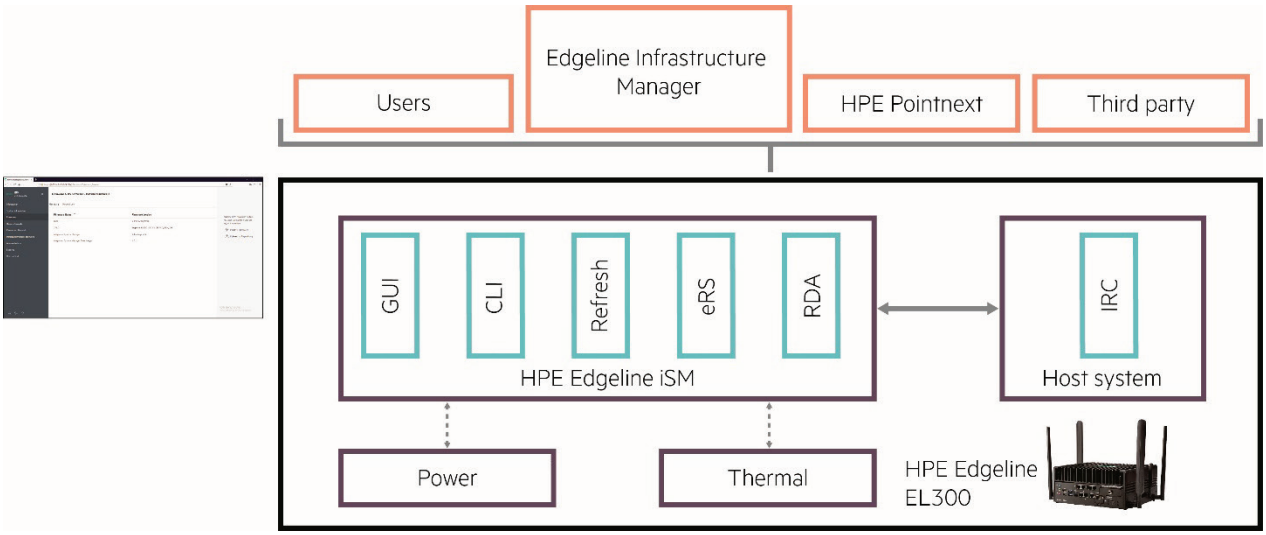

Figure 2. HPE Edgeline EL300 Converged Edge System management architecture

Features, functions, and benefits

System configuration

The starting point for a well-managed system is the ability to easily set up a system and update its configuration when necessary. This includes the ability to configure the management subsystem as well as the host system settings (for example, the BIOS settings). iLO and iSM provide the ability to manage system configuration both locally and remotely using the GUI, CLI, or REST API.

System update

Keeping system firmware up to date is critical for secure and reliable operations. HPE Edgeline embedded management modules provide the ability to update the firmware manually, using GUI or CLI, or in a scripted, programmatic manner using the Redfish API.

Health monitoring

Ongoing monitoring of system health—including identifying issues, logging events, and alerting on failures—helps maintain reliable system operation. HPE iLO and iSM will identify and alert system admins on issues with HPE Edgeline subsystems such as power, thermals, CPU, memory, and storage.

System access

While the HPE Edgeline systems management subsystem is designed to operate on its own with minimal user interaction, certain scenarios and usage models require access to the management subsystem. A browser-based GUI and an SSH-based CLI facilitate user access. From these interfaces, users can access the features and functions of the embedded management subsystem. To enable systems to be managed from a centralized tool or administrator-created scripts, the industry standard Redfish REST API provides programmatic access to the embedded management functions.

Remote virtual presence

Because HPE Edgeline systems are often installed at remote sites or in hard-to-access locations providing administrators with the ability to interact with remote systems as if they were physically present is highly useful. Edgeline systems include both Virtual Media and Integrated Remote Console (IRC) capabilities for this purpose. Both capabilities are crucial for remote operation. Virtual Media can enable the Edgeline device to access remote storage (for example, to remotely boot an ISO to install or update the operating system). Integrated Remote Console provides access to the Edgeline system's keyboard, mouse, and video as if the user were sitting in front of the system.

Security

When systems are deployed in areas where physical and network access are not tightly locked down, securing the system by other means is paramount. The Edgeline subsystem incorporates several features that are critical to providing a secure OT device. These include:

- Role-based user access and management
- Hardware root of trust embedded in the silicon
- Secure erase and remote system disable
- Power button lockout
- Secure firmware updating
- Chassis intrusion detection
- Audit logs

Network access

Centralized management capabilities are accessed across a network. For systems within a data center, network access has always been via a wired Ethernet connection. More flexibility is required for systems at the edge. The new Edgeline systems with iSM can be managed via wired Ethernet connection as well as via Wi-Fi and cellular technology. This means that the systems are not bound to locations with a wired network. Systems can be deployed and managed in a number of different scenarios that were not previously possible. This includes cases where the network bandwidth is limited and where the connection is only active when needed.

Centralized management

The HPE Edgeline Infrastructure Manager (EIM) provides the ability to manage multiple HPE Edgeline systems from a single pane of glass. This reduces the need for users to bounce from system to system when checking for issues or performing updates.

EIM provides key capabilities that can be applied to multiple systems:

- Manual and automated device discovery
- Health monitoring
- Firmware updates completed individually or concurrently, with one operation for multiple systems
- Aggregated health logs for managed systems
- Dashboard with an at-a-glance summary view of all managed systems

EIM supports managing the HPE Edgeline EL1000, EL4000, and EL300 Converged Edge Systems.

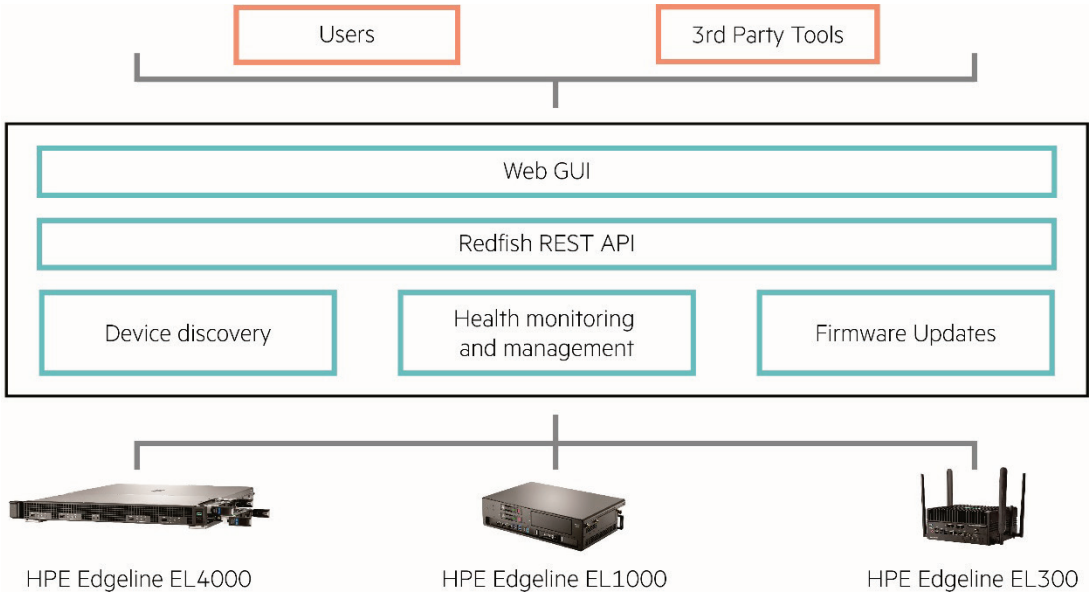

Figure 3. EIM architecture and interfaces

EIM interfaces with individual Edgeline systems via the Redfish REST API provided by iLO and iSM. Through this interface, EIM monitors the health of each system, manages the system configuration, and updates system firmware.

EIM's REST API can be used to script actions against multiple systems or to interface with a third-party management tool.

Users access EIM using a browser-based GUI to view the status of all systems as well as take action against the systems. EIM leverages role-based user access to control which users can monitor and manage systems.

Success lies at the edge

HPE Edgeline Converged Edge Systems provide uncompromised enterprise-class compute, storage, and management at the edge. In addition to improved reliability and security, Edgeline systems significantly streamline management with embedded system management and single-pane-of-glass monitoring and management for multiple Edgeline systems, regardless of physical location.

Learn more at

hpe.com/info/edgeline

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