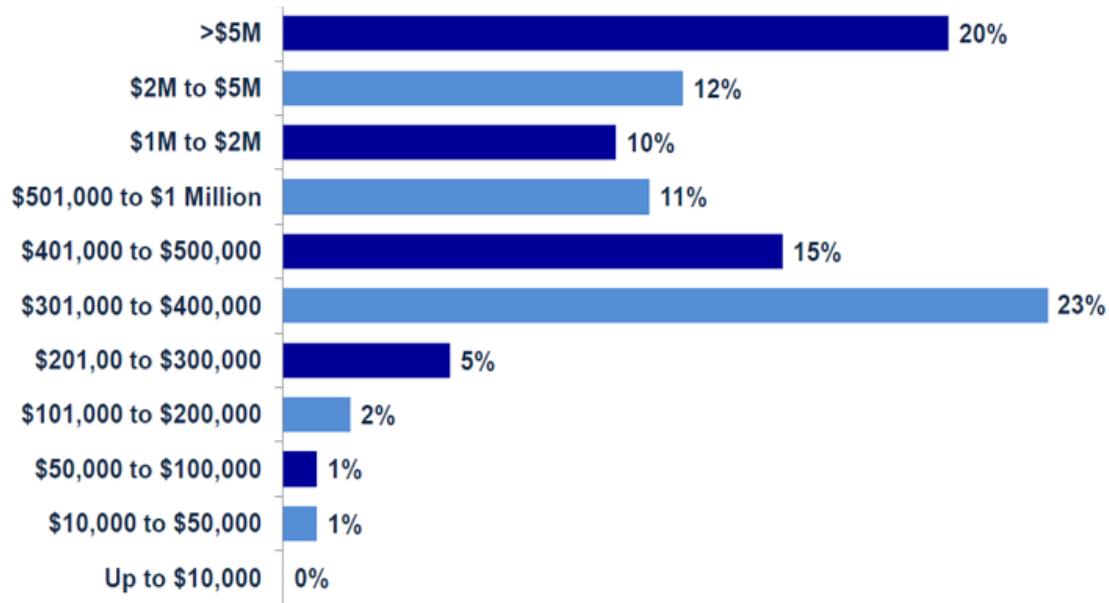


Server-Grade RAS and Advanced ECC Functions for Resilient CXL-based Systems

Presenter: Sandeep Dattaprasad, Senior Product Manager, Astera Labs



Need for Reliability Availability & Serviceability (RAS) in Datacenters

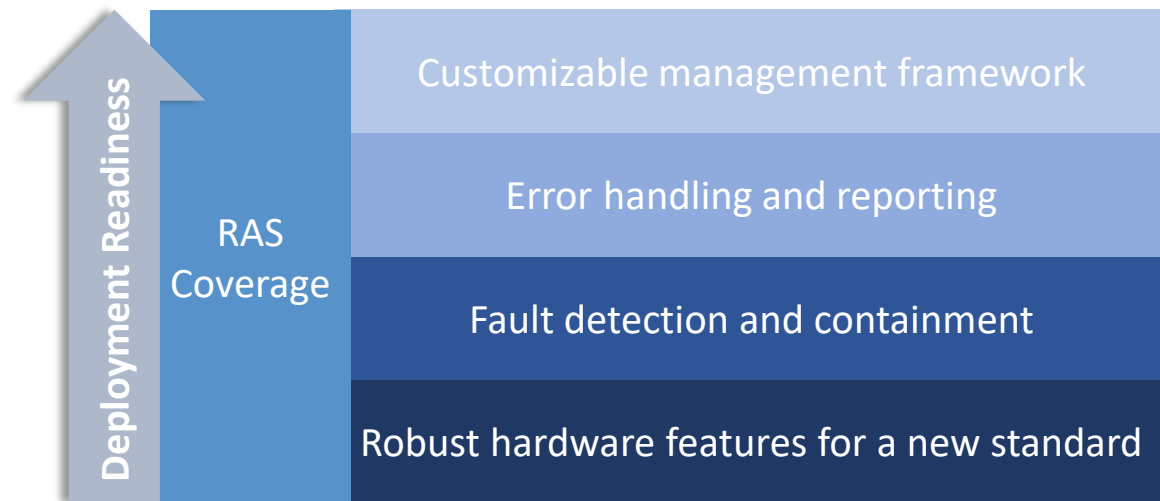


Hourly Cost of Downtime

(Source: ITIC 2022-2023 Global Server Hardware reliability & Server Security Survey Results)

- Challenges in Datacenters
 - Reliability of hardware and software
 - Interruptions to mission-critical applications
 - Increase in TCO due to RAS
 - Hourly downtime cost in 2023 > \$300K
- RAS features are critical for seamless operation

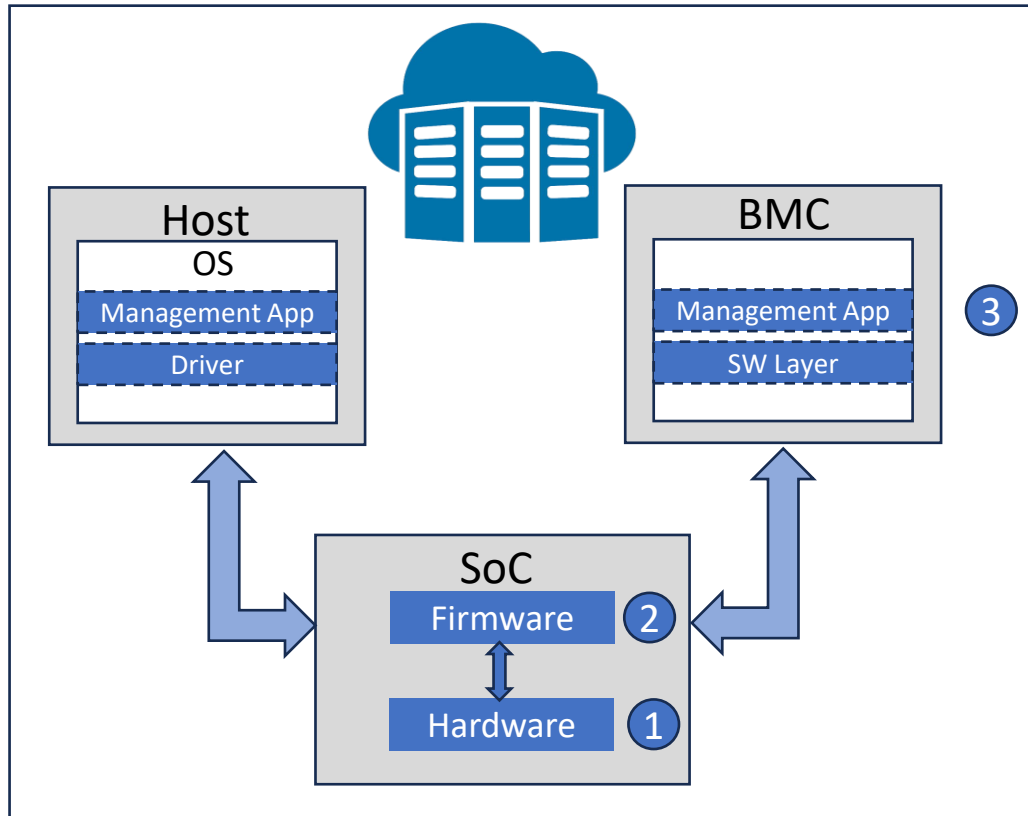
RAS on CXL-based Systems



- Achieving high-levels of service availability
 - Robust HW features
 - Error detection and correction on all interfaces
 - Fault detection and containment
 - Features to isolate and replace of faulty HW
 - Error handling and reporting
 - Log & report with minimal performance impact
 - Customizable SW management framework
 - Tailored to existing platform RAS applications
 - Reduce development time and cost

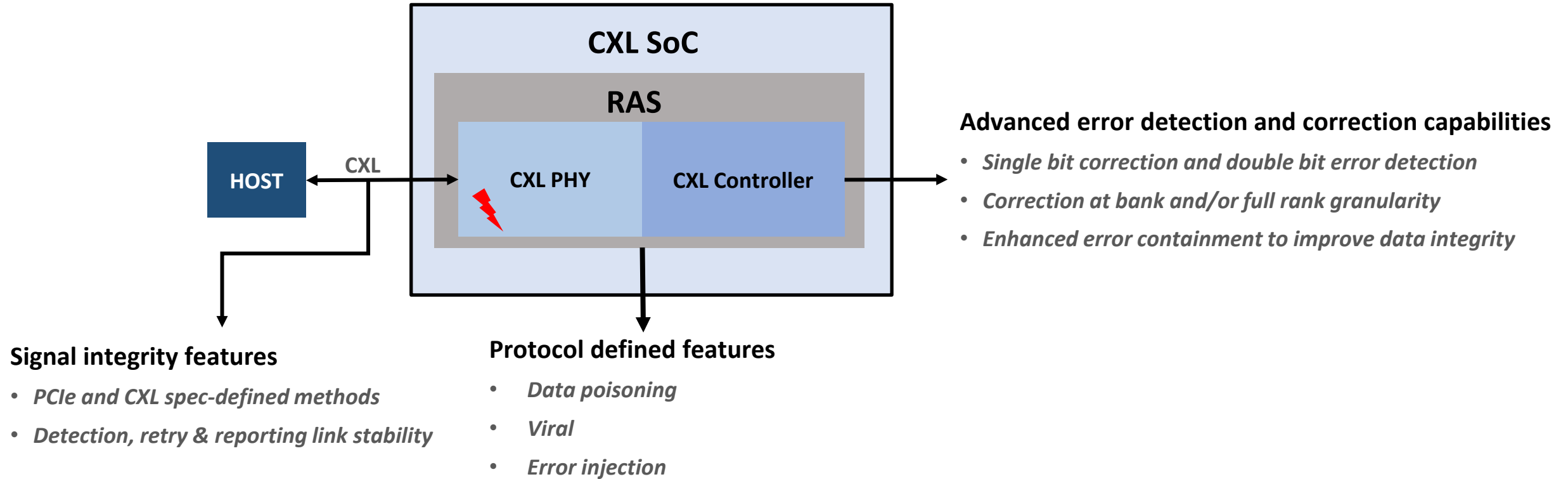
Drive a strong business value through a reliable platform that achieves 99.999% uptime

RAS Architecture in Datacenters

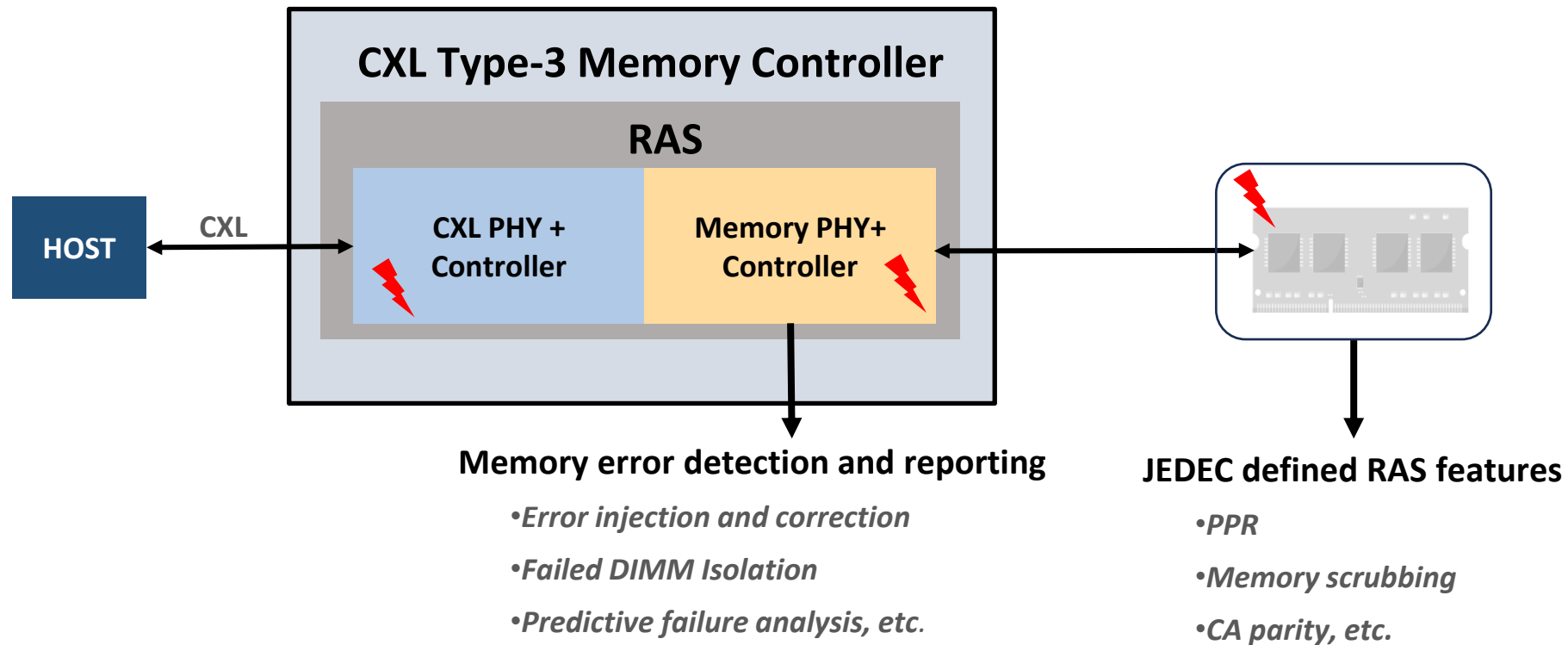


- RAS requirements in Datacenters
 - Extensive hardware capabilities
 - Firmware capabilities
 - Monitoring and management capabilities

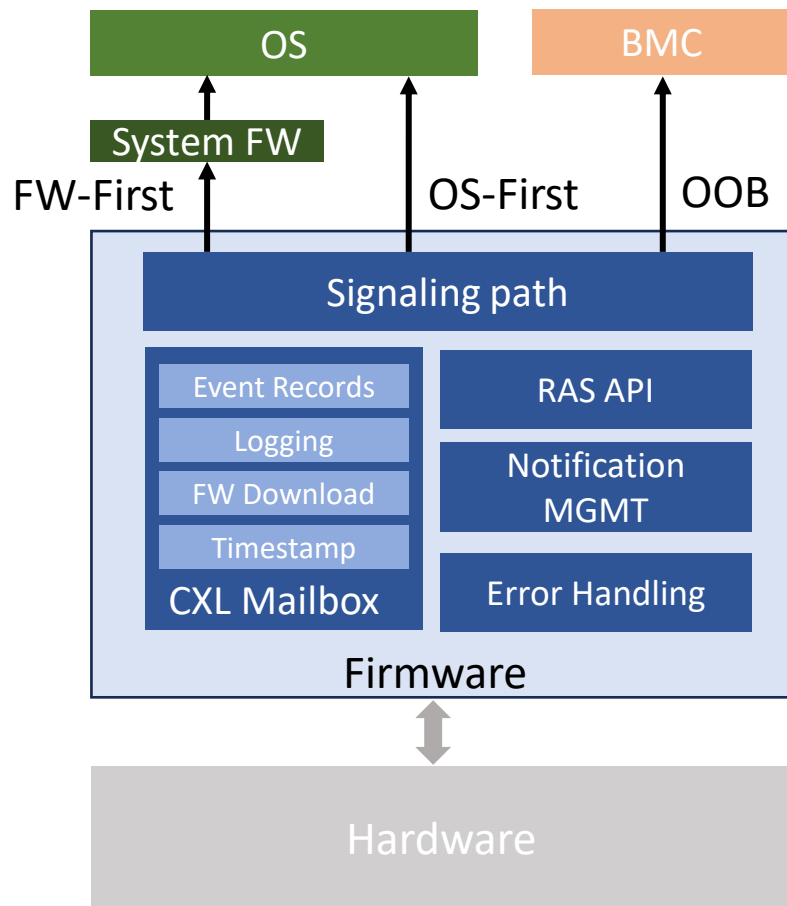
RAS Features for CXL



RAS Features for CXL-Attached Memory

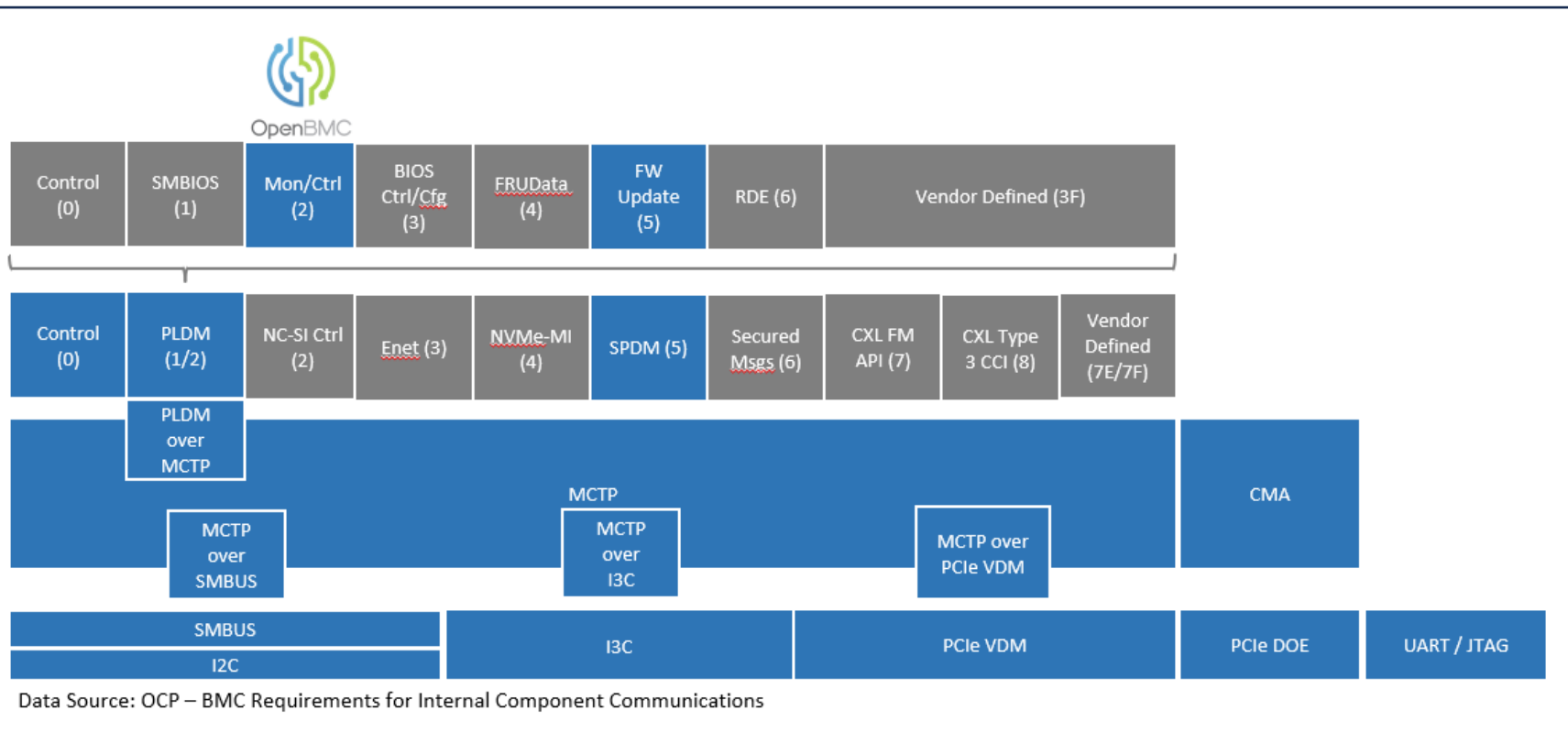


Firmware RAS Feature



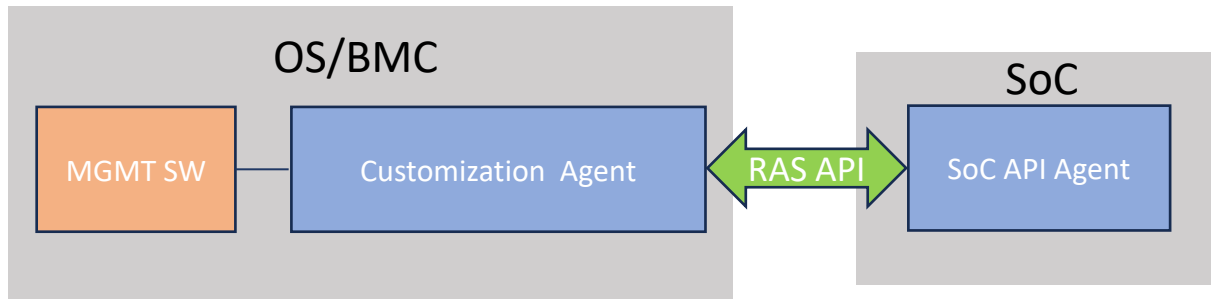
- Comprehensive firmware features for RAS
 - Spec-defined error handling mechanisms
 - Primary and secondary CXL mailbox
 - Event records
 - Logging
 - FW info/download, etc
- Notification manager
 - Critical/warning/informational events for host and BMC
- Support for inband and OOB signaling paths
 - FW-first via PCIe VDM
 - OS-first for signaling host OS via MSI-X
 - OOB support for BMC
- RAS API framework for customizable software layer

Management Framework for RAS



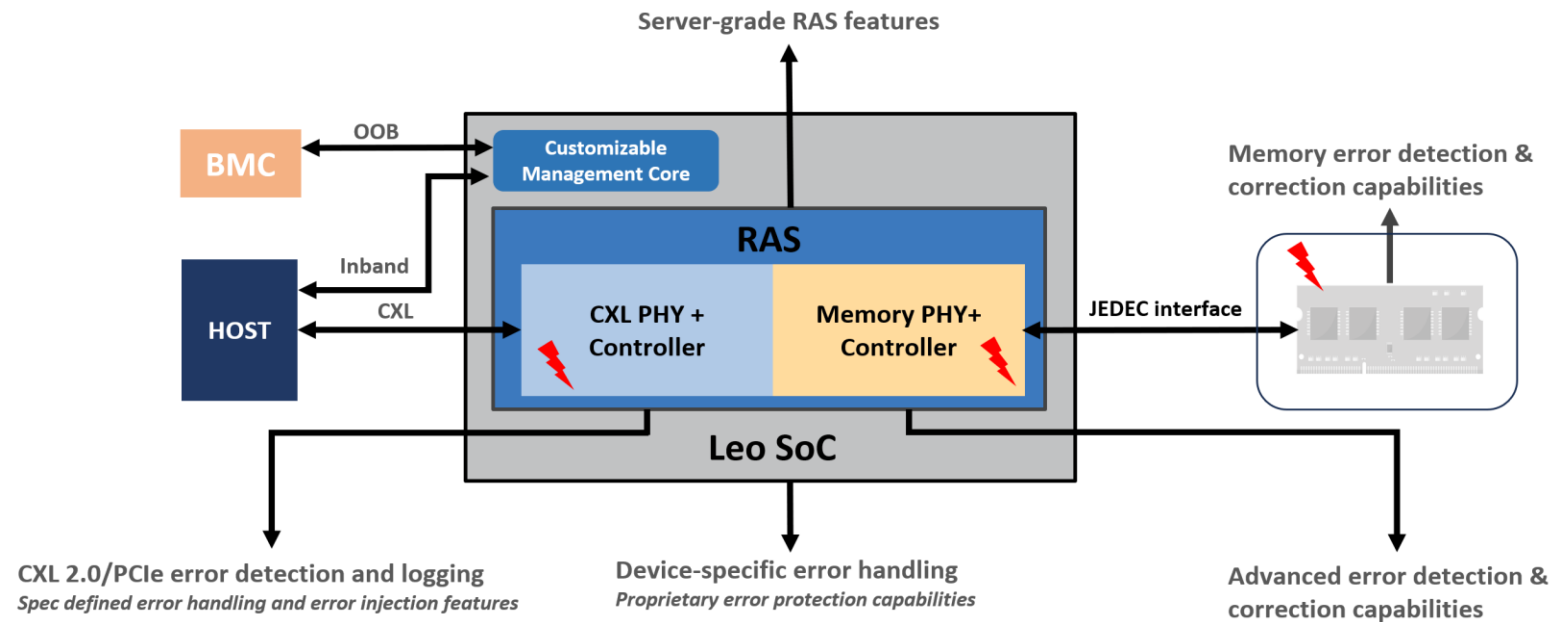
- MCTP
 - SMBUS, I3C, and PCIe VDM
- OpenBMC complaint
- Support for PLDM
- Support for SPDM

Customizable Software for RAS



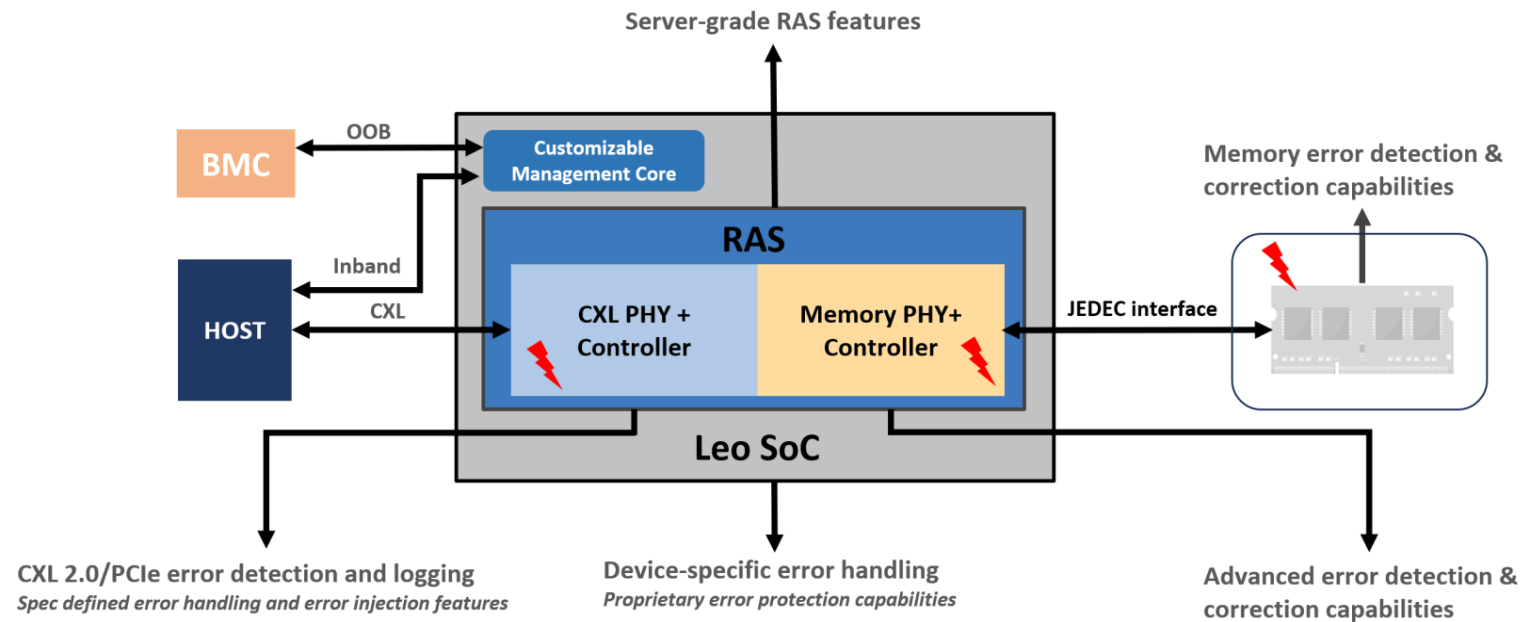
- Customizable software framework for OS/BMC
 - SoC API
 - Integrates and abstracts the hardware details for the management software
 - RAS driver
 - Implements low-level details of the connection interface
 - Implements mailbox
 - Enables customization per platform needs

Leo Memory Connectivity Platform



- Real silicon with server-grade RAS capabilities
 - Developed through deep partnerships with CSP, CPU/GPU and Memory vendors
 - Robust features customized and tested by datacenter customers
 - Customizable RAS features
 - Covers all the interfaces & components
 - Includes CXL 2.0 and proprietary features

Leo Memory Connectivity Platform



- CXL Demos at FMS!
 - High-performance OLTP solution with CXL-attached memory
 - Joint demo with Supermicro and Memverge in Booth 1045
 - CXL RAS capabilities
 - Joint demo with AMD in CXL Consortium kiosk (Booth 725)