OpenSAF™

The Open Service Availability Framework

OpenHPI & PLMc in OpenSAF

Michael Bishop

HP Linux-Telco

May 2010

When one teaches, *two* learn.

--Robert A. Heinlein

I do not fear computers. I fear the *lack* of them.

--Isaac Asimov

What we *need* is a machine that will let us see the other guy's point of view.

--Arthur C. Clarke

Overview

- The Need for Programmatic Hardware Management in OpenSAF
- OpenHPI Project
- OpenHPI 2.15.0 Coming this Summer
- History of OpenHPI in OpenSAF
- Introduction of PLM
- OpenHPI in OpenSAF R4
- Advent of PLMc To Fill in the Gaps
- OpenHPI and PLMc Complement Each Other

The Need for Programmatic Hardware Management in OpenSAF

- OpenSAF needs hardware management APIs for dealing with:
  - Node Power-on, Power-off, Hard Reset
  - Managing Hotswap Events
  - Responding to Sensor Events
    - fans
    - temperatures
    - hardware faults (memory, power supply, etc.)
- OpenHPI provides out-of-band APIs to handle these needs

OpenHPI Project

- Project initiated in 2004
- Open Source (hosted on SourceForge)
- BSD-style license
- Supports plug-in architecture w/ 9 distinct plugin modules
- Mature codebase (~200K lines of code)
- Supports latest SAForum spec: SAI-HPI-B.03.01
- Flexible standalone operation – or easily layered in management stack
- Many sample clients (e.g., hpitop, hpi_shell) support ease-of-use

OpenHPI 2.15.0 Coming This Summer

- Developer release
- New simulator plug-in with dynamic configuration of simulated hardware
- Build restructure / cleanup
- Power management controls for HP c-Class
- Many bug fixes

History of OpenHPI in OpenSAF

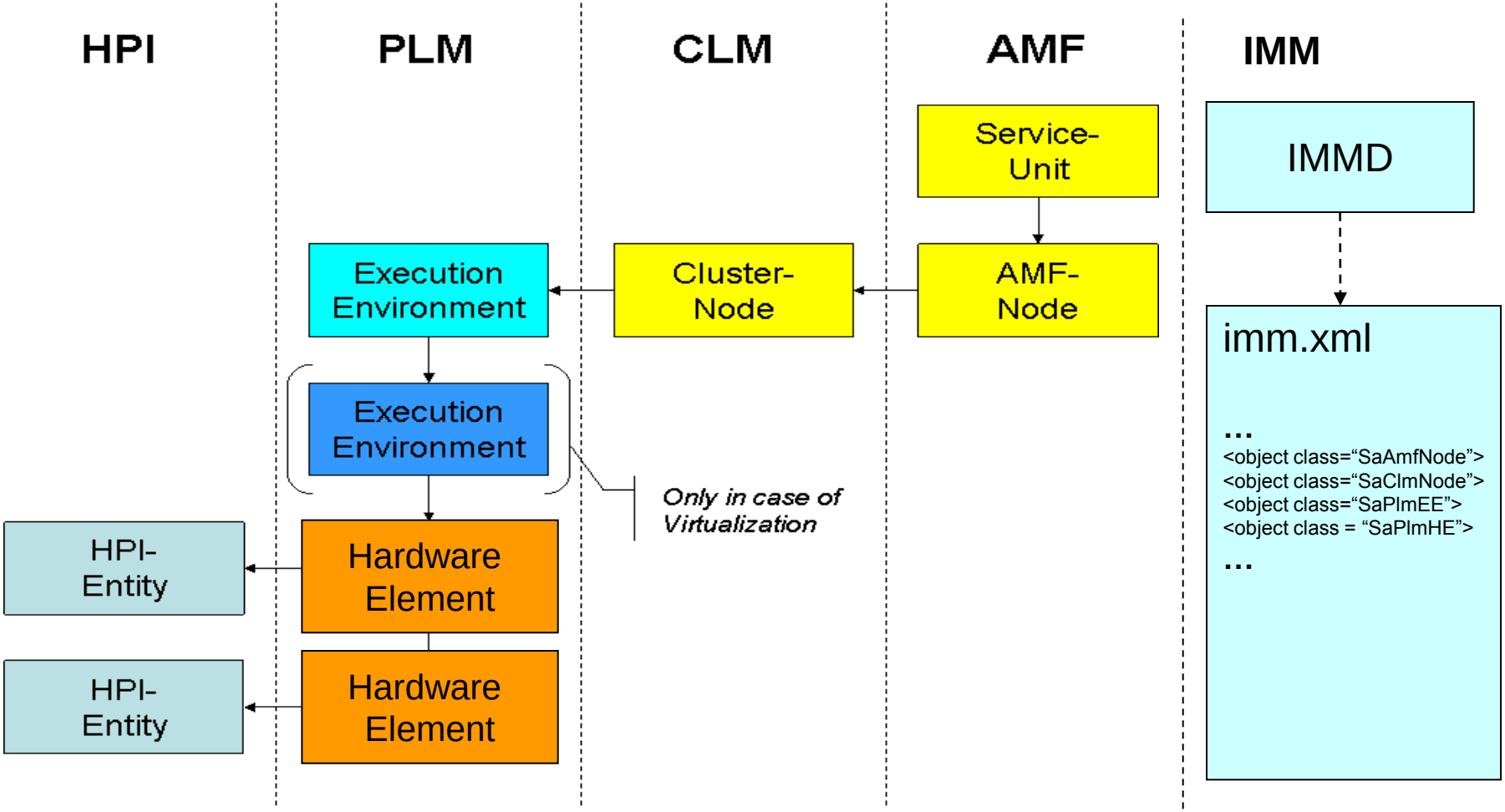
Date	OSAF Release	Notes
Aug 14, 2007	**1.0-2**	**No HPI support. (Transition from HPI-A spec to HPI-B spec)**
Aug 11, 2008	**2.0**	**HISv support for HPI-A and HPI-B 2.0 spec (ATCA, HP c-Class)**
Jun 4, 2009	**3.0**	**HISv support for HPI-B 3.0 spec. Entity path lookup fn, Additional hw platforms**
Summer 2010	**4.0**	**HISv removed. PLM support for HPI-B 3.0 spec, Multi-platform**

Introduction of PLM

PLM is designed to provide:

- A complete hardware abstraction model
  - HEs and EEs (not PCs, blades, servers, rack mounts, etc.)
  - Layered on OpenHPI – but may run independently if OpenHPI is not available
- Verification of desired cluster definition stored in IMM
- State management for:
  - Presense
  - Readiness
  - Operational
  - Administrative
- Tracking interfaces to provide HW readiness status to other OSAF services
- Access to virtualized resources (future capability)

PLM Architecture



OpenHPI in OpenSAF R4

Features:

- Supports latest HPI spec: SAI-HPI-B.03.01
- Multi-architecture support: ATCA, HP c-Class and Rack Mount (simultaneously – mult-arch clusters)
- Flexible HPI Entity matching in IMM
  - Entity paths
  - Blade type
  - Server model number
  - Wildcard values

OpenHPI in OpenSAF R4

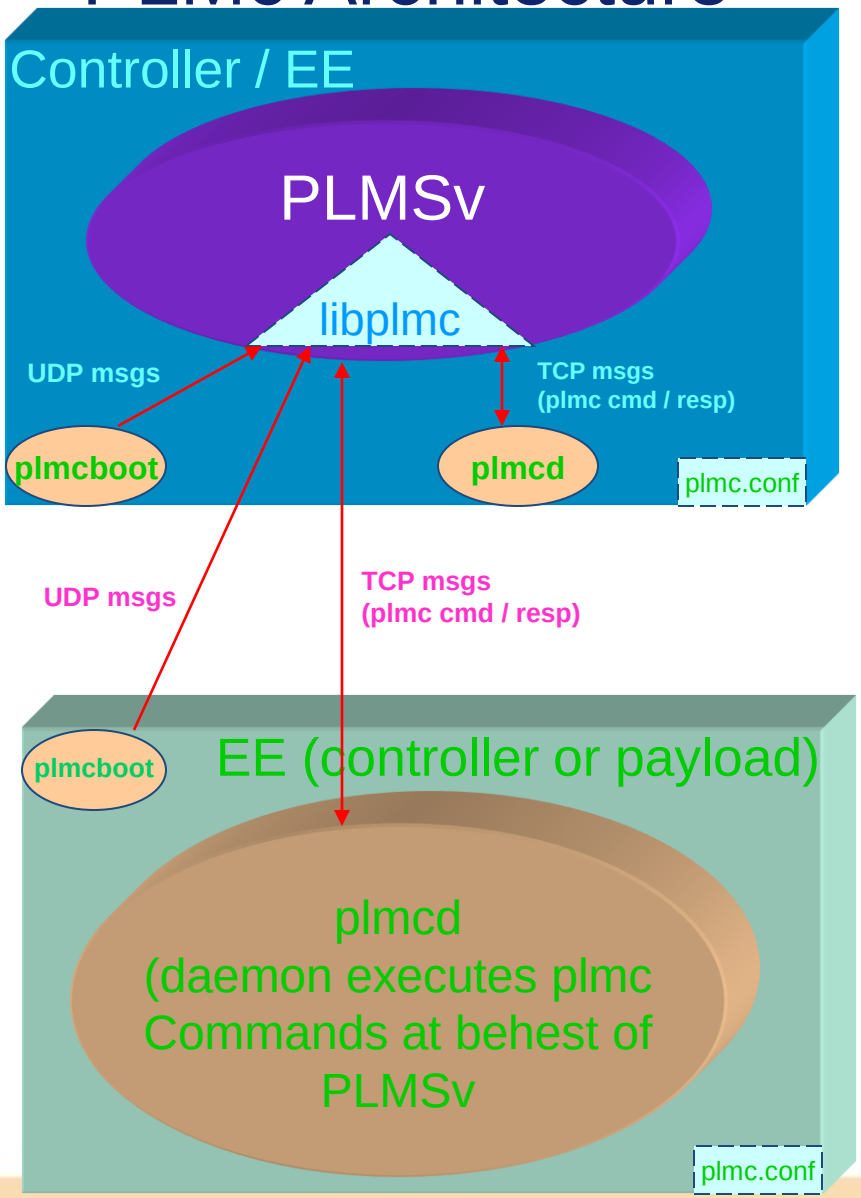
OpenHPI does not support some PLM operations:

- Notifications of OS start, OS ready, OS shutting down, OS shutdown
- Information required to validate a candidate cluster node against IMM cluster definition
- Ability for first controller to startup OpenSAF and OSAF-related services on the other cluster nodes
- Certain PLM administrative Operations
  - PLM Admin Restart
  - PLM Admin Lock
  - PLM Admin Lock Instantiation
  - PLM Admin Unlock

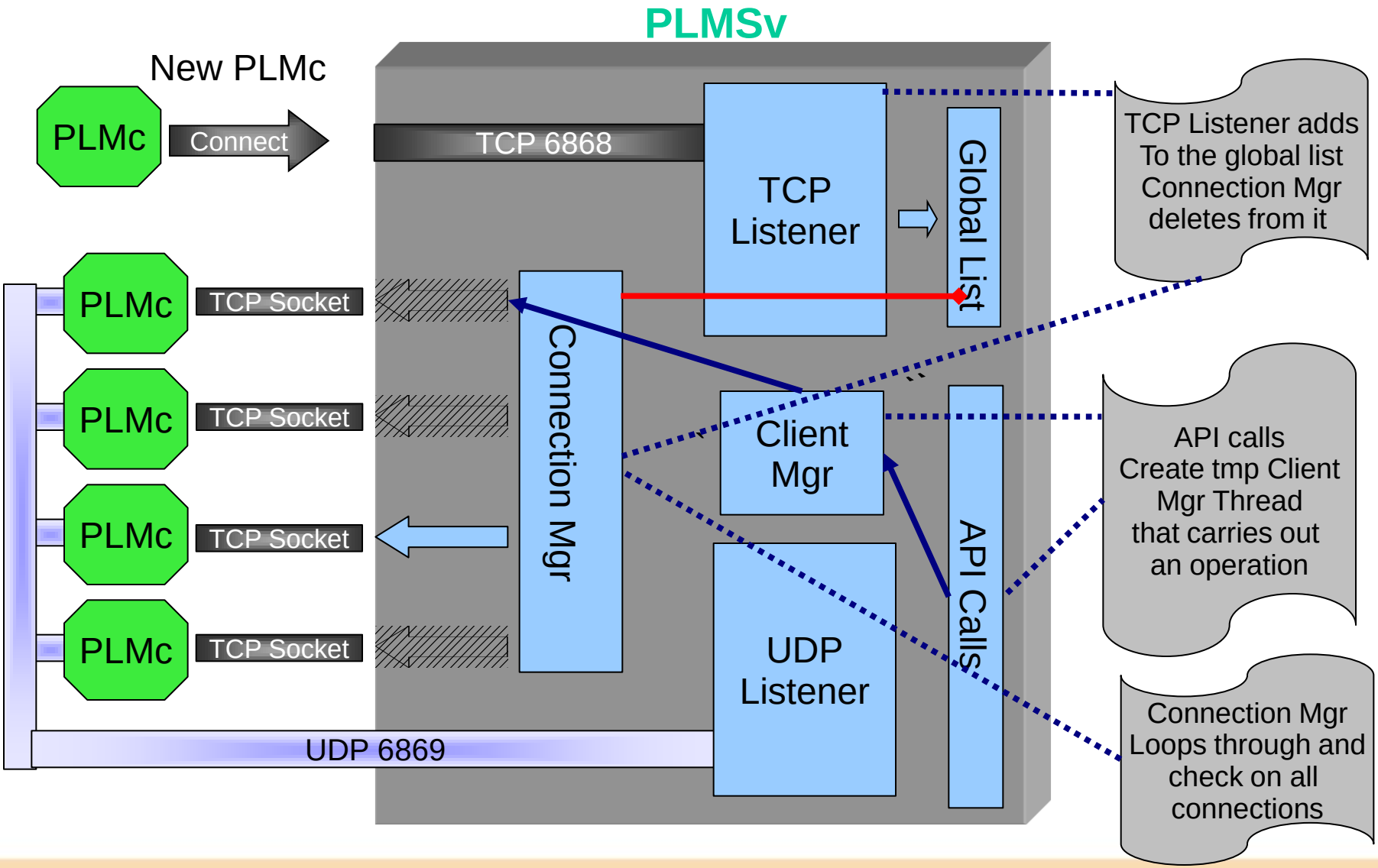
Advent of PLMc to Fill in the Gaps

- PLMc is the PLM co-ordinator
- Provides node-level support designed carry out PLM operations
  - Admin: Restart/Lock/Lock Instantiation/Unlock
  - Starting/stopping OpenSAF-related services
  - Provide EE information (EE_ID, OS type)
- Runs on every Execution Environment (EE)
- Out-of-band operation
  - Runs with or without OpenSAF present on the EE
  - No dependency on OpenHPI
  - Uses simple UDP and TCP messaging
- Stateless and idempotent operation
- Consists of 3 main parts: plmcboot, plmcd, libplmc

PLMc Architecture



PLMc Architecture (cont)



PLMc Commands

Twelve PLMc commands:

- PLMC_GET_ID
- PLMC_GET_PROTOCOL_VER
- PLMC_GET_OSINFO
- PLMC_SA_PLM_ADMIN_UNLOCK
- PLMC_SA_PLM_ADMIN_LOCK_INSTANTIATION
- PLMC_SA_PLM_ADMIN_LOCK
- PLMC_SA_ADMIN_RESTART
- PLMC_OSAF_START
- PLMC_OSAF_STOP
- PLMC_OSAF_SERVICES_START
- PLMC_OSAF_SERVICES_STOP
- PLMC_PLMCD_RESTART

OpenHPI and PLMc Complement Each Other

- OpenHPI provides APIs for managing hardware
- PLMc provides APIs for managing OpenSAF and OpenSAF-related services
- Together, OpenHPI and PLMc provide complete and reliable node management for OpenSAF clusters