

Chassis Management Inspired by MOSA SOSA – HOST – VITA

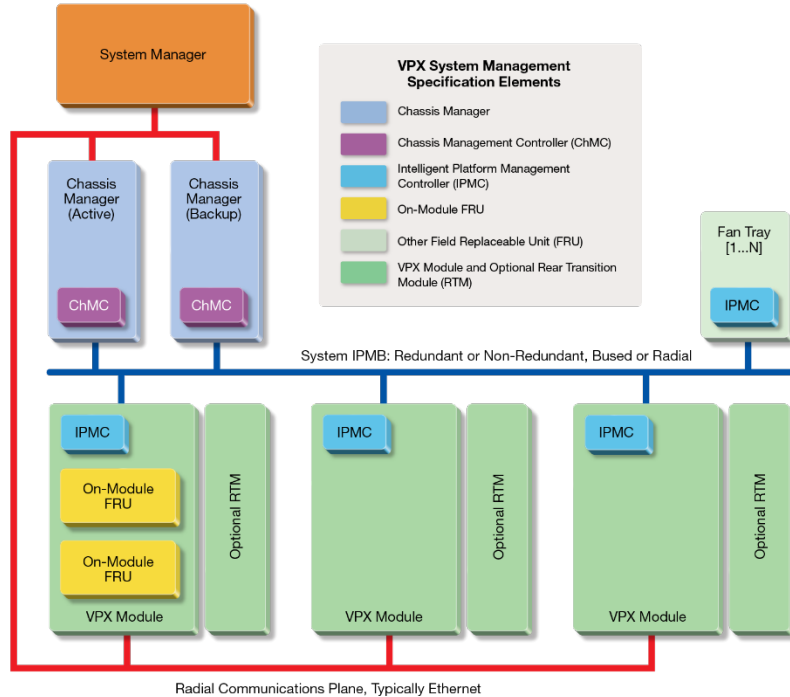
Ken Grob



Introduction

Update on SOSA Chassis Management: Keeping Systems Healthy

- **Brief Update on Chassis Management Basics for Rugged Systems**
- **A look toward Requirements and Capabilities driven by SOSA**
- **ECO-SYSTEM interoperability test Demo**
- **A look at next steps and innovation from Industry**
- **Available MOSA Eco-System Hardware**



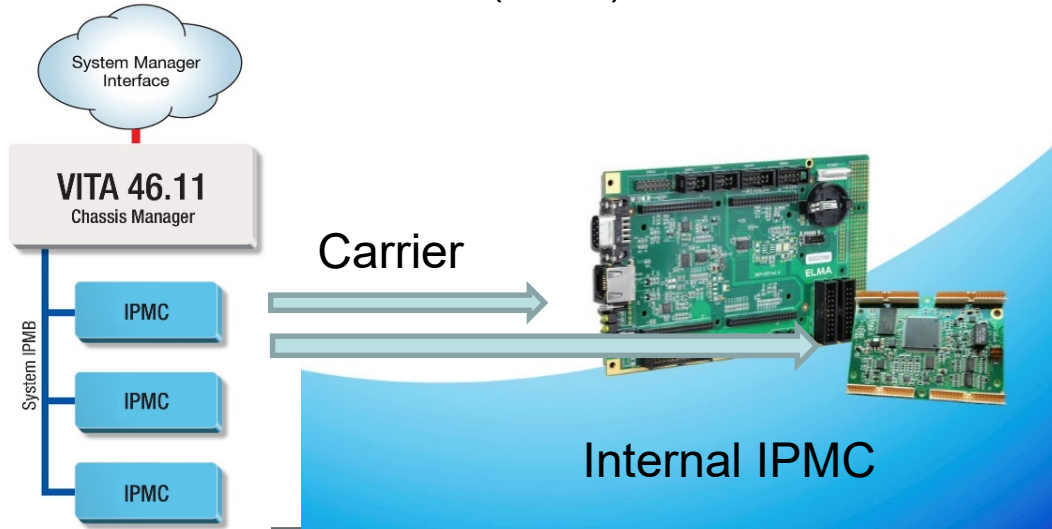
- For system management OpenVPX references ANSI/VITA 46.11, “System Management on VPX”
- Leverages ATCA (Advanced Telecommunications Computing Architecture) hardware management
 - VPX systems do not implement hot swap
 - VITA 46.11 adds some features such as mandatory sensors for voltage, temperature, and overall health
- Management subsystem features
 - Inventory management
 - Sensor and diagnostics management
 - System configuration and recovery (reset and/or power cycle)
- Management uses a separate power rail and can be used to monitor and control managed FRUs (Field Replaceable Units), even when their payload power is off

See the MIT VITA Tutorial for more details

Chassis Management

VITA 46.11 Chassis Management

- A Chassis Manager interfaces to and controls resources in the chassis, such as fans, Power Supplies and Plug-In cards
- Plug-In Carrier Cards support IPMB via Intelligent Platform Controller (IPMC)



*Elma Chassis
Manager Module*

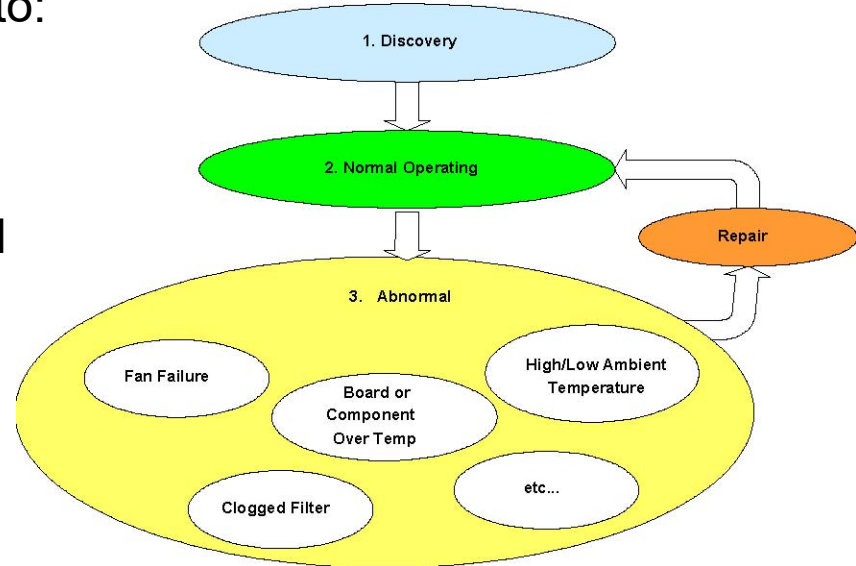


Chassis Manager – What does it do?

Overview

A Chassis Manager's primary function is to:

- Discover all FRUs (IPMCs) in the Chassis
- Monitor the sensors for each FRU
- Report or repair any abnormal or failed sensors
- Report fan failures or clogged filters.
- Adjust the fan speed for over/under temperature conditions
- Report or shut down due to over/under voltage/current conditions.



Power Supplies are Now Intelligent

SOSA Introduces VITA 46.11 to power supply module

- For reporting and control
- Power supplies can accept commands
- Smart board is added inside the Power Supply
- The Power Supply now interfaces via the Intelligent Platform Interface Bus or IPMB



3U VPX

*Behlman
VITA 62 power modules*



6U VPX

- **SOSA Snapshot 2 requires the Chassis Manager to be compliant to VITA 46.11 Tier 2 as well as HOST Tier 2.**

Rule 5.3.1-8

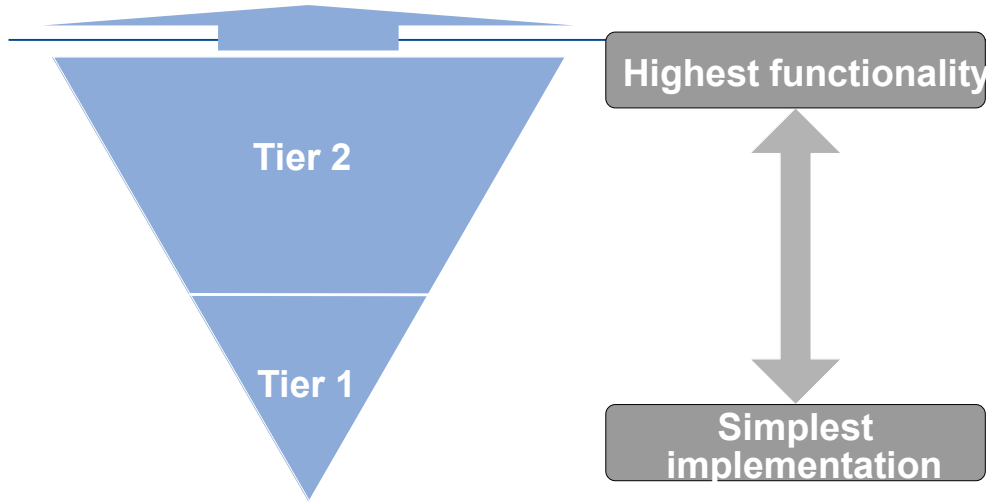
The Chassis Manager **shall** comply with the ANSI/VITA 46.11 Tier 2 Chassis Manager requirements. Conformance Methodology: (A)

Rule 5.3.1-9

The Chassis Manager **shall** comply with the HOST OpenVPX Core Technology Tier 2 Standard v3.0 Chassis Manager requirements. Conformance Methodology: (A)

- **HOST Tier 2 also calls out VITA 46.11 Tier 2.**

Tier-2 vs. Tier-1



- **Minimum capabilities of a Tier-1 IPMC:**
 - Be responsible for System IPMB start-up and fault handling.
 - Support the discovery of the FRU it controls.
 - Support access to the management information for the FRU it controls.
- **Min capabilities of a Tier-2 IPMC, in addition to Tier-1:**
 - Participate in event generation and reception.
 - Support Dynamic Sensor Devices.
 - Optionally support Subsidiary FRUs.

- **Minimum capabilities of a Tier-1 Chassis Manager:**

- Maintain an FRU population table containing information for each FRU in the Chassis, be it a Plug-In Module or another type of Chassis FRU.
- Bridge between the System Manager logical layer and the IPMC logical layer.
- Maintain IPMC state information for each IPMC in the Chassis.

- **Minimum capabilities of a Tier-2 Chassis Manager, in addition to Tier-1:**

- Support the discovery of each FRU in the Chassis, be it a Plug-In Module or another type of Chassis FRU.
- Support management of Chassis infrastructure (power supplies, fans, etc.) including temperature, voltage, and intrusion sensors as well as power and thermal management.
- Participate in event generation and reception.
- Support event logging.
- Support Dynamic Sensor Devices.
- Support FRU recovery, including FRU reset and power cycling.
- FRU Payload Control – power, reset, graceful reboot & initiating diagnostics

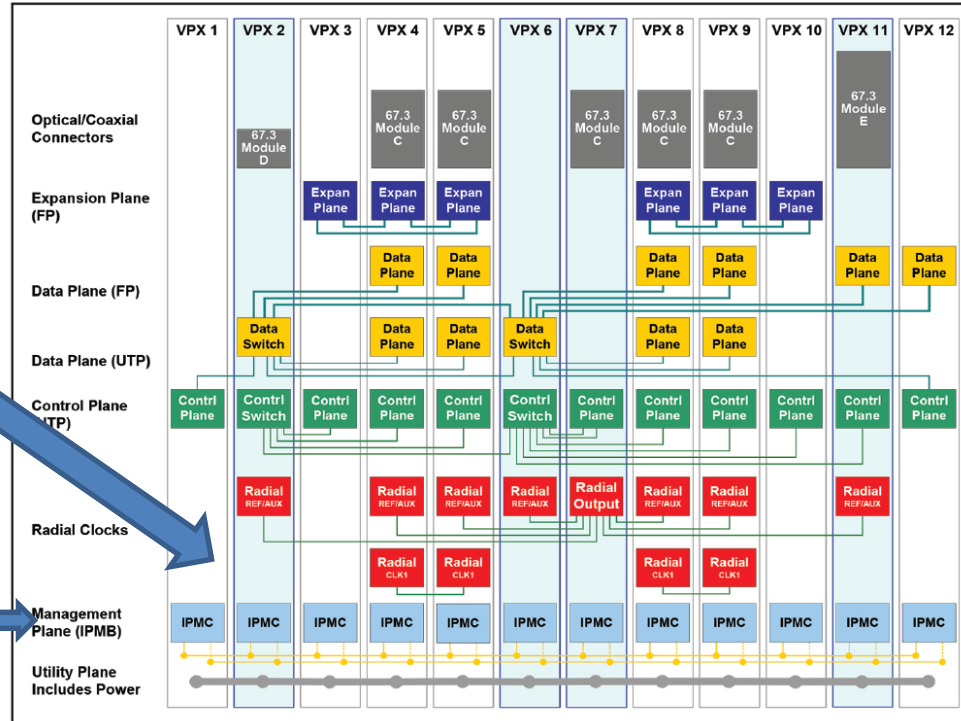
What is IPMB vs IPMI?

- **The IPMB is an enhanced i2c bus**
- **The IPMI is the messaging protocol that communicates across the IPMB.**
- **The basic components are the BMC (baseboard Management controller), the IPMB and the IPMC (Intelligent Platform Management Controller).**

Typical Backplane Topology Diagram

Where's the Chassis Manger?
On a wall, in a slot, on a Switch
Location is now not required shown as Slot one or the System Slot
Open VPX has evolved

IPMB shown as dual buss: IPMB-A and IPMB-B
IPMB-A is the default



- To prove out the SOSA/HOST/VITA specifications 5 Vendors agreed to participate in live demos.
- The vendors contributed Hardware, and Engineers to Support the Demo
- Vendors include:
 - Elma providing a CMOSS/SOSA Backplane, and a Chassis Manger
 - Elma providing an IPMC Carrier
 - Concurrent Technologies Providing a Single Board Computer
 - Behlman Electronics providing SMART Vita 62 Power Supplies
 - Crossfield Technologies providing a new USA developed IPMC

3U VPX Chassis Management Inter-Op Demo

Objective:

- Use the current SOSA and HOST standards to prove Plug-In Cards built to those standards. VITA 46.11 Tier II was a requirement. HOST Alignment was a requirement

Goal

- Show interoperability of Plug-In Cards with Chassis Management Components

Participants:

- Elma Electronic Inc.
- Concurrent Technologies
- Behlman Electronics
- Crossfield Technologies



3U VPX Chassis Management Demo

CC SBC from Concurrent Computer TR-E5X/3sd-RCx

- GUI shows cards as icons
- Runs Windows and scans for the identifiable Plug-In Cards

IPMC Test Card – Air Cooled

- 3U VPX CAE050357
- Looks like a Payload Card to Chassis Manager

ELMA Chassis Manager

- Model CAE051762

Behlman VITA 62 Power Supply

VPXtra 700M-IQ1

- 700 Watt DC
- Legacy Rails
- Intelligence Option Added
- Dual Bus IPMB-A, IPMB-B



Further Innovation

- **Further specification of the System Management layer in Snap Shot 3, and Release 1.**
- VITA 62 standardize IPMI messages for Power Supply Parameters

Innovation in Industry

- Crossfield Technologies has developed an IPMC Solution under contract from NAVAIR

The Crossfield IPMC is easily modifiable.

- The IPMC is configured via an IPMC Generator
- This allows quick personalization of the controller. The Chassis Manager solution can adapted to different environments. Initial implementation has been done with a SmartFusion2 SOC FPGA

Crossfield Solutions

- Exploring next Steps:
 - Reconfiguration of VPX Plug-In Cards via IPMC
 - Allows a System Manager to reconfigure a Plug-In card to fit different mission requirements
 - This feature is important to support reduced cost and rapid deployment

- SOSA and HOST Chassis Manager meeting VITA 46.11 Tier-1 and Tier-2 and HOST Tier-2 Specifications
- 3U VPX IPMC Test Card, ELMA
- Conduction Cooled Chassis Manager Card 3U VPX from ELMA
 - Other solutions may also exist
- Intelligent VITA 62 6U VPX Power Supplies, and now availability of 3U VPX VITA 62 Intelligent DC Power Supplies
- Single Board Computers for multiples supplier, meeting the SLT3-PAY-2F2U-14.2.3 Profile, and New Compute Intensive and I/O Intensive profiles, from Concurrent Technologies, and Kontron
- Crossfield IPMC solution is available in chip form or Source Code

ELMA
Your Solution Partner