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Solution Brief

Integrating Battle Short and Cold Start into COTS Open Systems

Tailoring ATCA for Military/Aerospace Deployment

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Military and aerospace systems integrators are leveraging COTS open standards such as AdvancedTCA (ATCA) and MicroTCA (MTCA) to improve their system performance while reducing costs. As these standards were originally defined for the telecom industry, VadaTech has developed key features, which are typically not required in commercial environments, to address the harsh conditions faced by soldiers, sailors and pilots.

One of the areas offering additional functionality is shelf management. The shelf manager monitors and controls the payload blades and other field replaceable units (FRUs) in a system, such as fans and power supplies. The shelf manager can take action or report a situation to the system manager, according to the rules set by the system designer.

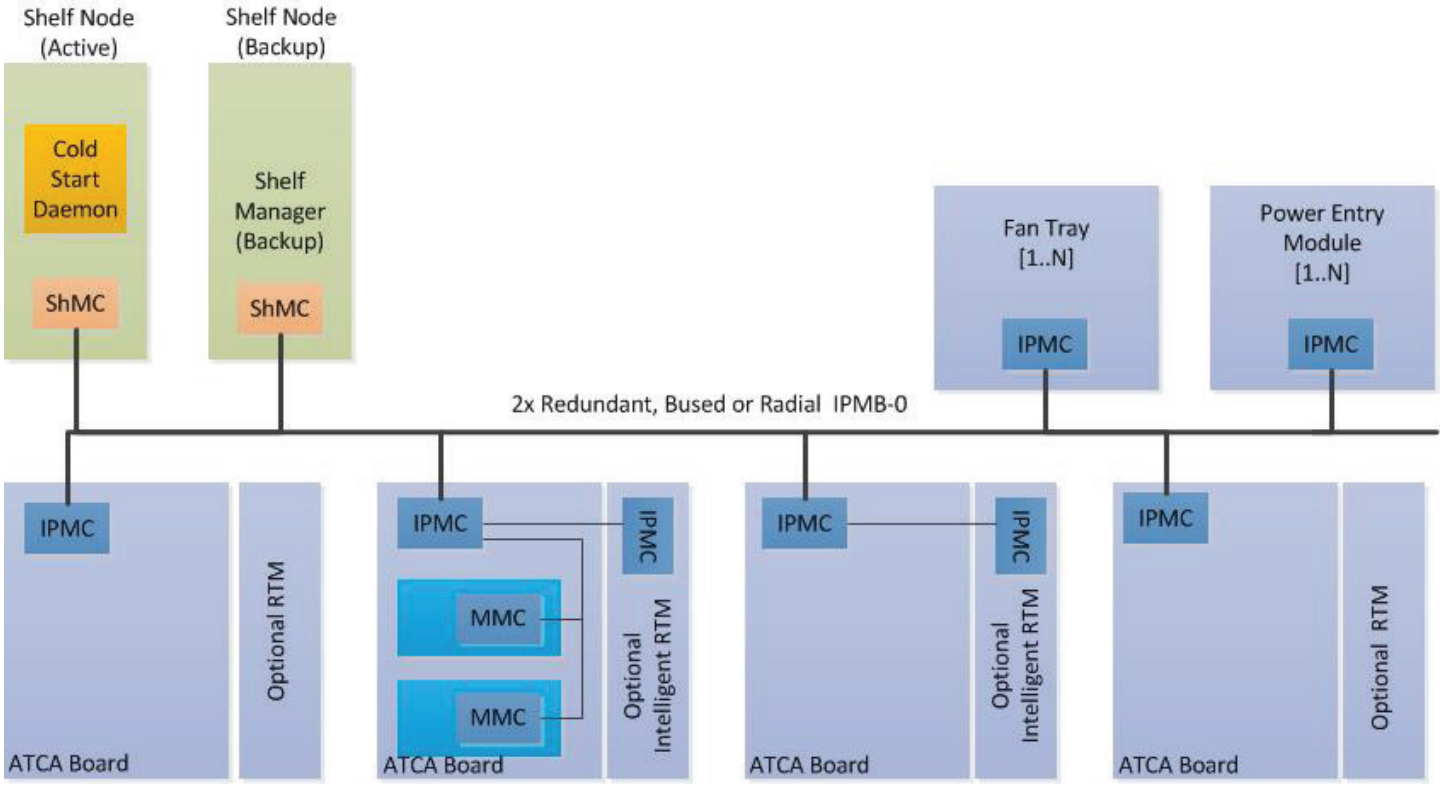
VadaTech has integrated battle short and cold start features into its ATCA and MTCA shelf managers:

- Battle short allows an operator to temporarily bypass certain safety features in a system to ensure completion of the mission without interruption due to those safety features.
- Cold start allows integrators to start a system safely in extreme cold environments without damaging components.

Battle Short Mode

During normal operation, integrators will set safety thresholds to prevent damage to electronics equipment in the event of a failure. However, during a critical mission, an operator may need to override the safety

Figure 1: ATCA Shelf Management



thresholds as completing the mission may take priority over the safety of the electronics equipment in use. Historically, operators shorted the fuses in equipment so that it would not shut down when circumstances would damage the equipment, hence the term 'battle short'. Today's electronic systems are far more expensive and advanced and operators require the option to implement battle short mode electronically. Battle short mode can also be useful in non-combat equipment in critical environments, such as nuclear plants where keeping the reactor core cool overrides the safety of the electronic equipment.

VadaTech's Shelf Managers provide the option to configure the system for critical missions. In battle short mode, the shelf manager controls the fans to deal with an over temperature condition reported by sensors in the chassis; however the shelf manager will restrict the boards from deactivating. Therefore, the system continues to operate during the mission.

Higher level system management software can enable and disable battle short mode. The system manager communicates with the shelf manager over a secure RMCP+ session, instructing the shelf manager to switch to battle short mode before the mission and to normal mode after the mission is completed.

After the mission is completed and normal mode is established, the shelf manager can take drastic action on the over temperature conditions within the chassis by deactivating the blades.

Cold Start

Many military and aerospace deployments require the ability to start a system in extreme cold environments, where damage would occur if the electronic system's payload was powered on. The VadaTech Shelf Manager Cold Start feature provides the capability to activate the chassis under these extreme operating conditions. Using this feature, an integrator can preheat the chassis and specify a window of time for the chassis to remain inactivate until it reaches a temperature that is suitable for target payload blades to power on.

Cold Start is a monitoring agent that communicates with the Shelf Manager and monitors the temperature status of the blades installed in the chassis. With Cold Start mode enabled, the target blades are kept at M2 (activation request) state, waiting for the cold start agent to approve activation of the blade. The agent works with information configured by the user to determine the operating conditions that are appropriate for the activation of the target blades.

The configuration also declares a Cold Start Window, a maximum duration of time from power on, within which the blades should reach a configured temperature threshold and can be activated. When the time window has elapsed, the Cold Start application will allow the shelf manager to activate the blades.

Conclusion

Today's critical systems require system health management for mission success. Implementing ATCA shelf management functionality to provide fault tolerance, health management and reporting, system configuration control and hot swap provides the basis to meet these requirements. The addition of VadaTech's specialty features, including battle short and Cold Start, enables architects to deploy these standard architectures in critical military and aerospace systems.

Shelf Management 101

The ATCA shelf manager controls and monitors the blades and intelligent field replaceable units (FRUs), such as fans and power entry modules in the chassis. In the event that a board sensor reports a problem, the shelf manager will take action on the FRU and report the problem to the higher level system manager. Actions range from simple to drastic as defined by the system integrator, for example increasing the fan speed to cool the board or completely shutting the system down.

The shelf manager, FRUs, and blades are interconnected by a redundant pair of Intelligent Platform Management Buses (IPMBs). The shelf manager communicates with the blades and intelligent FRUs with IPMI commands exchanged on the redundant I^2C buses.

Each blade and FRU contains a FRU data store. Using the shelf manager, an integrator can retrieve information such as power requirements, part number, manufacturer and serial number. Integrators can use the configuration data to monitor and control the system and log changes to blades and FRUs.

Without this shelf management capability, configuration logging of events is a manual process and system operators would need to manually remove each computing element, log the data and compare it to an original configuration to see if computing modules were changed in the field. In addition, an untrained operator could trigger a catastrophic operational failure by installing the wrong replacement blade into a slot or locating into the wrong slot during field operations.

Furthermore, the system integrator can use the shelf management structure to provide fault tolerance and hot swap control. In a mission critical application, it is essential that the system continues its intended operation if some part of the system fails. The system architect will determine which elements are critical to the operation and set up redundancy such that the operation can failover in the event of a fault. The system operator will respond to the report by the shelf manager and can safely hot swap the failed FRU during normal operations and return the system to full health.