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PCIe Hot Plug support standardization challenges in ATCA

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Throughout the last decade, ATCA solidified its position as one of the main standards for advanced Physics instrumentation, in particular hard real-time control and data acquisition applications, using PCIe as the preferred communications protocol.

ATCA offers not only highly performant characteristics in data throughput, channel density or power supply/dissipation capabilities, but also special features for high-availability (HA), required for latest and upcoming large-scale endeavours, as is the case of ITER. Hot Swap is one of the main HA features, allowing for a board to be replaced within a Shelf, without powering-off the whole system, thus ensuring continuity of operation.

Platforms using PCIe on the Fabric Interface (PICMG 3.4) must be complemented with the PCIe Hot Plug functionality, so that hot insertion/extraction of (hardware) Boards is followed by the respective add/removal of the (software) PCIe devices and other higher-level interacting applications. However, PICMG 3.4 does not specify an implementation for Hot Plug.

From a customised Hot Plug solution, developed by IPFN for the ITER Fast Plant System Controller ATCA platform, this paper identifies the main issues for achieving PCIe Hot-Plug support in ATCA, such as implementability of Hot Plug Elements, generation and management of Hot Plug Events, and compatibility with ATCA Hot Swap. Also addressed are matters of Hot Plug for PCIe external cable connections, as many PICMG 3.4 systems use external host computers. This paper aims to stimulate the discussion within the PICMG community towards a standardization of Hot Plug in ATCA.

Minioral

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Description

PCIe

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