



Meeting customer demands with PECFF

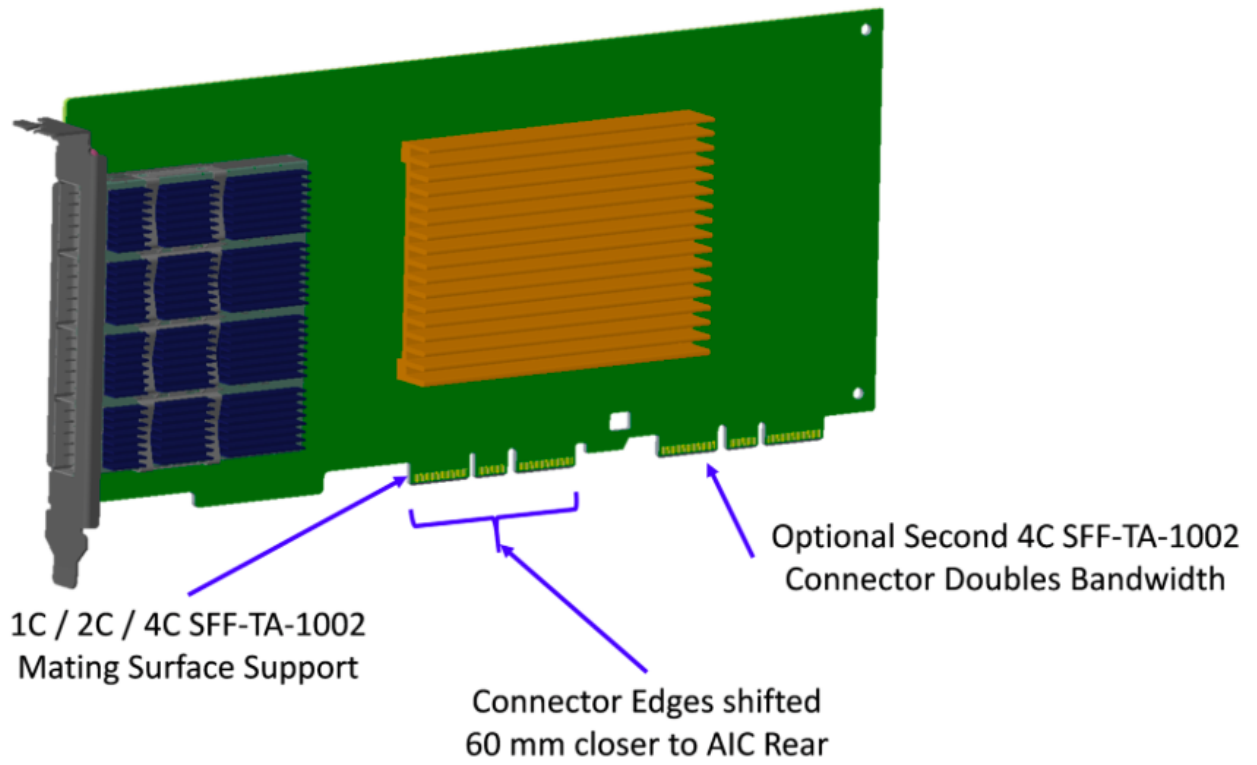
Introduction

PECFF (PCIe® Enclosure Compatible Form Factor) is a new mechanical form factor developed by Gen-Z members to meet new and future customer demands and to reduce solution cost and complexity. PECFF is mechanically compatible with enclosures that support the PCIe CEM AIC (Add-in Card). PECFF is intentionally not compatible with PCIe CEM connectors to avoid customer confusion and to incorporate multiple innovations.

PECFF Compliance, Capabilities and Benefits

PECFF complies with the SFF-TA-1002 connector mating interface. SFF-TA-1002 is a high-performance and high-density connector system whose mechanical and electrical specification was developed and donated by the Gen-Z Consortium to SNIA/SFF to enable high-volume adoption by multiple industry bodies. SFF-TA-1002 supports the PCIe PHY up to 32 GT/s and the 802.3 electrical up to 112 GT/s PAM4. In addition to supporting high-speed signaling, SFF-TA-1002 delivers numerous industry and customer benefits.

A PECFF AIC can support a second SFF-TA-1002 connector to double the available bandwidth and support additional links/connectivity. The second connector is flipped 180° to reduce high-speed signal trace lengths from the card edge to the ASIC device on the AIC. In the example shown below, a quad-port 400 GbE NIC, which requires 200+ GB/s of I/O bandwidth can be delivered through a dual-connector PECFF that supports PCIe 32 GT/s signaling.

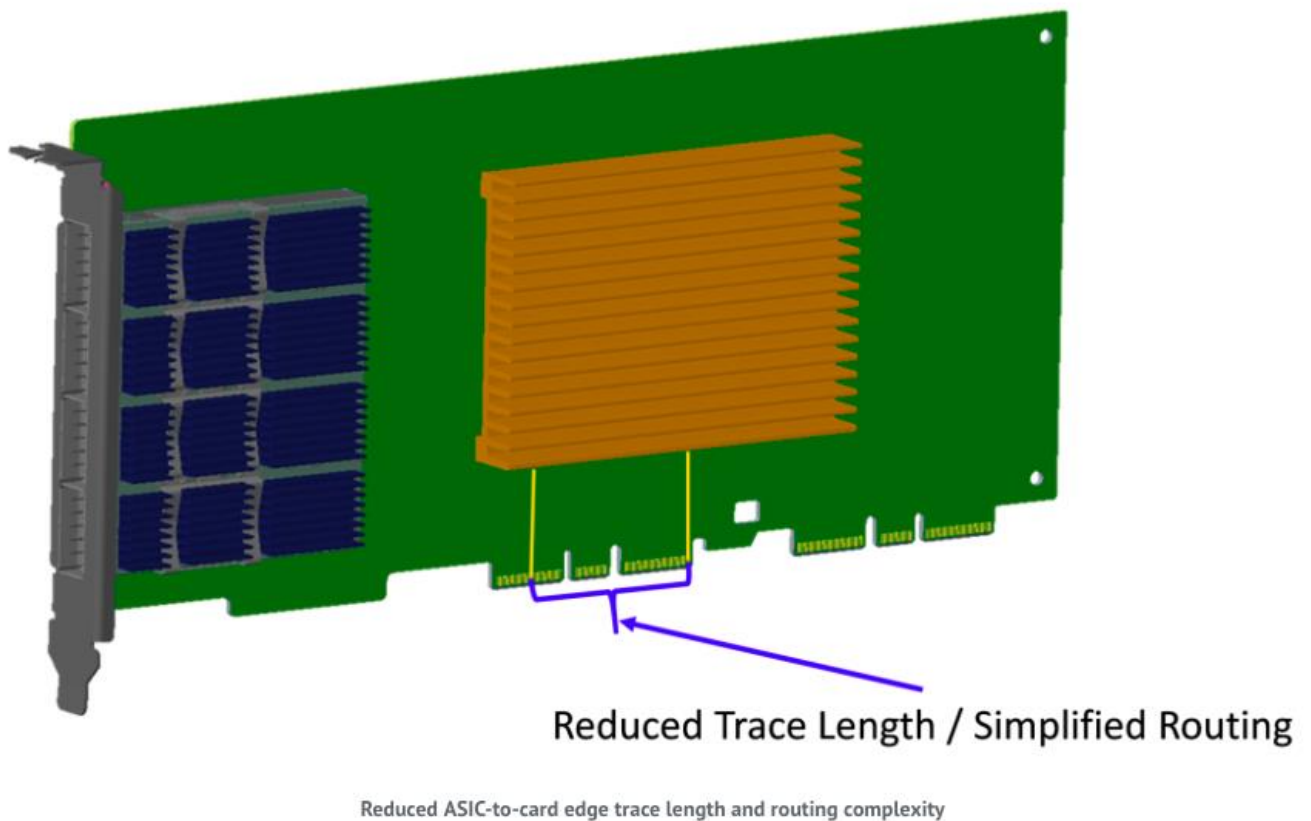


PECCF Connector benefits



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Reduced Channel Length / Reduced Layers and Cost

In addition, PECFF shifts the connector mating interface 60 mm closer to the rear of the AIC when compared to standard PCIe CEM AICs to reduce physical channel length between the AIC and a processor or switch on the host. This enables a motherboard to recover approximately 2 dB of loss at 16 GT/s and approximately 4 dB of loss at 32 GT/s (recovered loss will depend upon the board material used). Reduced physical channel lengths on the host can simplify trace layout, possibly reduce the number of motherboard layers, and can eliminate the need for retimers and high-cost, low-loss PCB materials. Furthermore, shifting the card edge towards the AIC rear can reduce ASIC-to-card edge trace length and routing complexity.

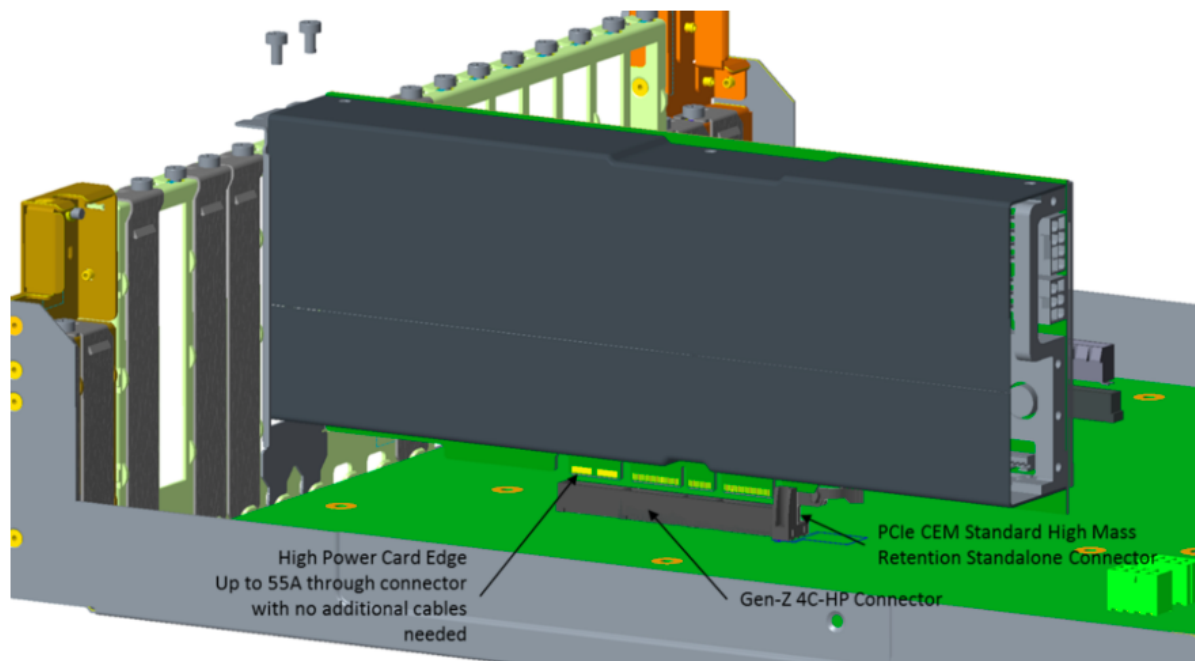


GEN Z

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Eliminating the Need for HP Cables & Connectors

The Gen-Z Scalable Connector specification includes a new 4C-HP (high power) connector that enables high-power applications — up to 660W of power using 12V and up to 1024W of power using 48V. Additionally, 48V PECFF AICs may be supported in 48V hosts to capture the associated power efficiencies compared to 12V. Routing all power through the 4C-HP connector eliminates the need for separate high-power cables and connectors, reduces platform cost and complexity, and simplifies manufacturing and serviceability.



PECFF 4C-HP Connector support

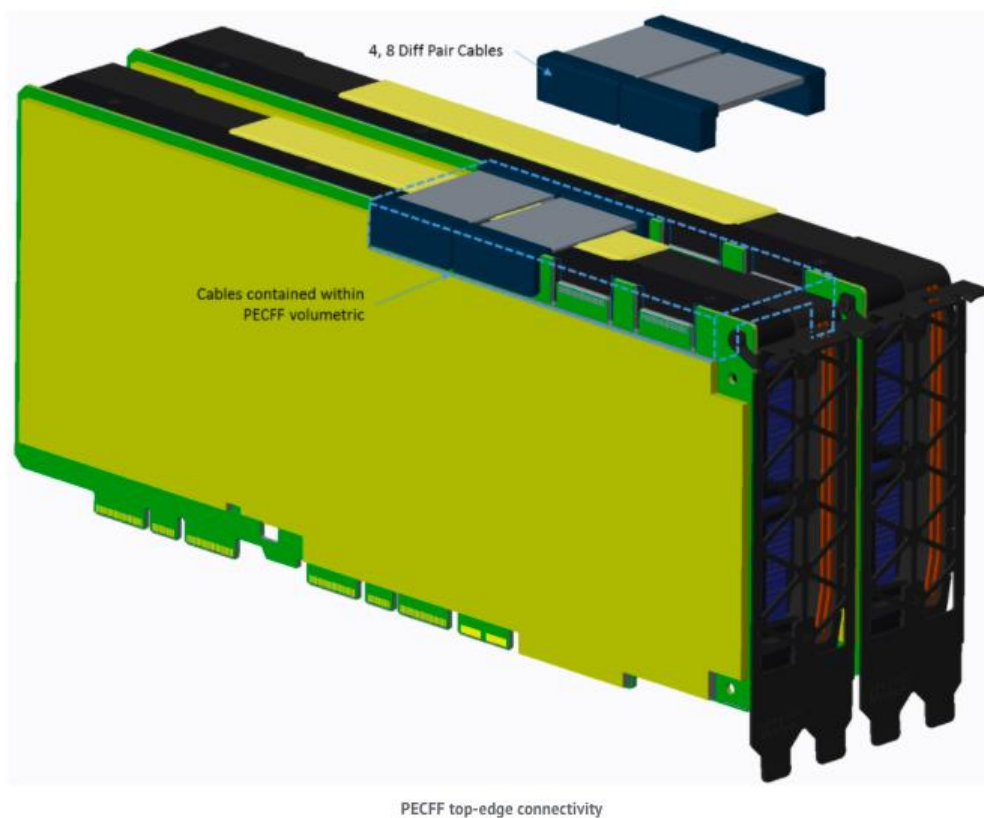


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Multiple Topologies & Connectivity Options

To enable multiple AICs to be interconnected without requiring an intermediate switch and to enable additional PCIe or Gen-Z links to an AIC

without requiring motherboard enablement, PECFF supports top-edge connectivity. The PECFF top edge supports up to 128 differential signals organized into 8, 16-differential signal groups, plus reserve pins for additional vendor-defined functions. The card edge supports the same pin dimensions and pitch as SFF-TA-1002, and can support PCIe, Gen-Z, and/or vendor-defined physical layers and protocols. In order to enable AIC vendors and customers to meet their solution-specific needs, PECFF does not specify the top-edge connector or latching implementation. Multiple AICs can be connected using cables as illustrated below or using small boards with integrated connectors and traces. Multiple topologies and connectivity options can be supported using any combination of links and link widths.



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PECFF Industry & Customer Benefits

PECFF provides the following industry and customer benefits:

- PECFF supports the high-volume, fully-interoperable SFF-TA-1002/Gen-Z Scalable Connectors. These connectors support up to 112 GT/s signaling, which will provide many years of use across multiple market segments without requiring redesign.
- PECFF has a low barrier for adoption as PECFF does not require new mechanical enclosures and is similarly sized to PCIe CEM AICs to take advantage of existing manufacturing infrastructure.
- PECFF eliminates the need for separate high-power cables and associated connectors. This reduces cost, manufacturing complexity, and improves serviceability.
- When combined with the Gen-Z protocol, PECFF can support any component or media type.
- PECFF simplifies platform design and manufacturing
 - Can eliminate the need for high-cost, low-loss board materials and retimers by reducing trace lengths
 - Can use Gen-Z Scalable Connector internal cables to repurpose slots or to provide additional bandwidth/connectivity using top-edge connectivity without requiring custom motherboards.
 - Can support multiple links and multiple connectors to eliminate single points of failure and stranded resources, reducing the amount of replicated hardware and enable optimal resource use and provisioning.
- PECFF supports 48V, which provides greater power efficiency.
- PECFF allows for both active and passive air and liquid-based cooling.

