FULCRUM microsystems

PivotPoint™ FM1010

Application Example — Adding Flexibility to Single-Interface NPUs

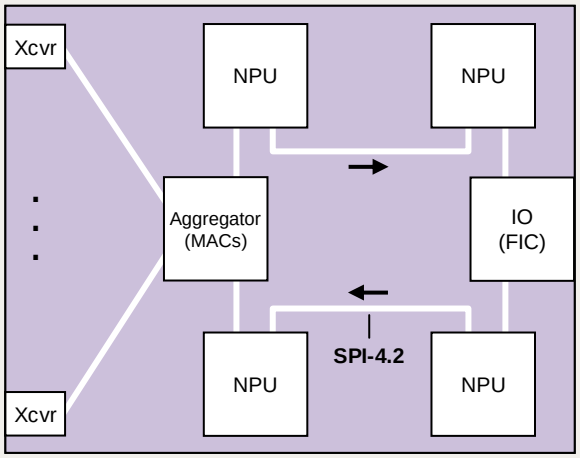
The PivotPoint FM1010 is a highly-efficient solution for seamlessly and intelligently interconnecting multiple chips with SPI-4.2 interfaces. Using advanced switching, the PivotPoint FM1010 converts a fixed-configuration half-duplex daisy-chain of devices with SPI-4 interfaces (such as NPUs, traffic managers, co-processors, search engines, custom ASICs, and FPGAs) into a fully-connected, dynamically-reconfigurable full-duplex resource pool, enabling more efficient use of the silicon resources, and eliminating the custom glue logic that often accompanies complex system designs.

The PivotPoint FM1010 complements the most popular network processors, such as the Intel IXP28x0 and the EZchip NP-1c, both of which contain a single SPI-4.2 interface. With PivotPoint, the devices can operate in sophisticated full-duplex and multi-path applications that are beyond their original scope.

Today's Fixed Configuration Solution

Many popular network processors contain a single duplex SPI-4 interface, and, in order to gain performance and application flexibility, designers often have the need to array multiple devices together to deliver programmable high-speed networking systems. With a single SPI-4 interface, designers currently must daisy-chain the network processors together to create a system (as shown in the following diagram).

Line Card Based on Single-Interface NPUs

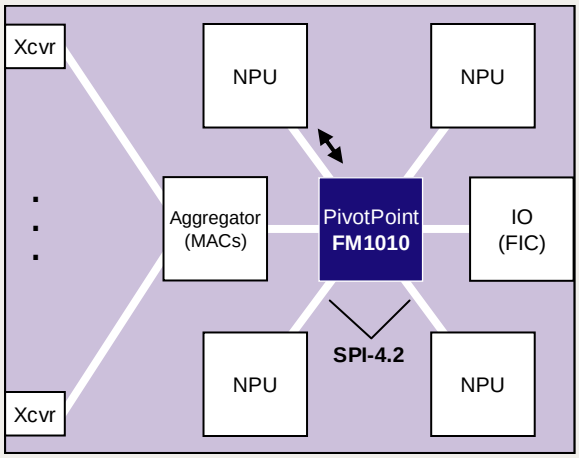


The resulting system is hard configured and necessarily optimized for a particular set of applications – since loading and resource balance decisions for both the ingress and egress paths must be made on the front-end of the design. Also, in this configuration, each device must actively transport traffic to the downstream device, even if traffic is not destined for the device, robbing performance from the "pass-through" device.

Flexibility via PivotPoint Interconnectivity

PivotPoint is a perfect complement to these one-arm devices, converting an inflexible fixed-configuration system to a completely malleable pool of packet processing resources. With PivotPoint as the central system interconnect, traffic can be transported from one device to any other device – directly, without having to pass through neighboring network processor devices.

Line Card Leveraging PivotPoint



By using a combination of static port and channel mapping, and dynamic source routing, architectures supporting a variety of packet processing paradigms can be created, including two of the most popular "scatter-gather" and "pipeline processing" paradigms.

With the addition of the PivotPoint FM1010 to multi-NPU system, designers gain complete flexibility in allocating packet processing resources to best optimize performance. The NPU devices no longer need to be dedicated to either the ingress or egress path. PivotPoint allows each device to be configured optimally for a particular application as either an ingress resource, an egress resource, or a shared resource.

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Application Example — Harnessing Modularity in High-Speed Systems

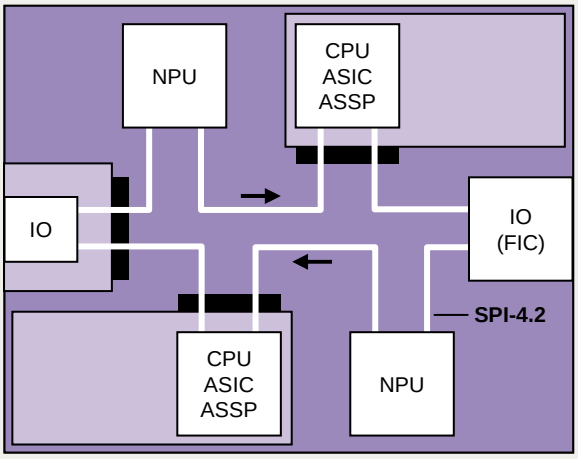
The PivotPoint FM1010 is a highly-efficient solution for seamlessly and intelligently interconnecting multiple chips with SPI-4.2 interfaces. Using advanced switching, the PivotPoint FM1010 converts a fixed-configuration half-duplex daisy-chain of devices with SPI-4 interfaces (such as NPUs, traffic managers, co-processors, search engines, custom ASICs, and FPGAs) into a fully-connected, dynamically-reconfigurable full-duplex resource pool, enabling more efficient use of the silicon resources, and eliminating the custom glue logic that often accompanies complex system designs. PivotPoint enables designers to build modularity into high-speed systems using off-the-shelf components.

Traditional Modular Systems

Equipment designers are increasingly looking to modularity as a key design goal for increasing the overall revenue opportunity for each new design.

Uncertainty abound in today's communications sectors. As the costs of new development projects continue their steady rise, equipment designers are seeking greater flexibility in each new design, which leads to an ability to address a broader market with each design, and – potentially – a longer time in market for each design. A modular design approach, which allows the equipment to be reconfigured to suit a variety of different applications, is a popular method for maximizing the useful life of each new platform.

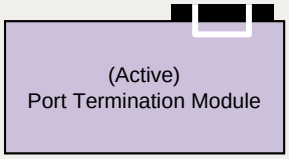
Designing modularity into high-end communications systems can be tricky, however, since the data path is tuned for performance and is susceptible to latency variation and data path noise.



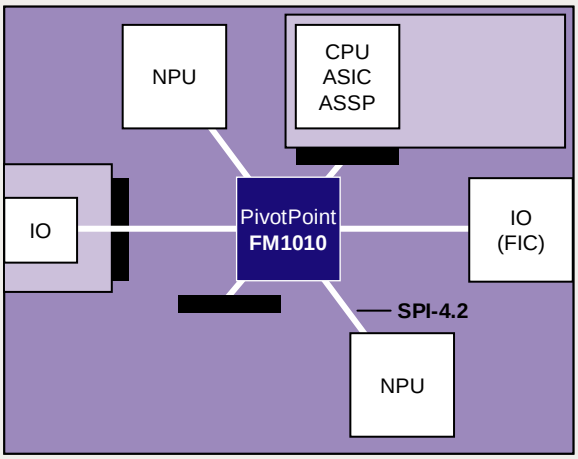
Additionally, daisy-chain designs are vulnerable to module failures. Should a component in the data path fail (or a module be removed), the failure is likely to affect data flow on the data path.

PivotPoint-Enabled Modular Systems

To terminate unoccupied ports and maintain high throughput on the data path, traditional systems require that port termination modules be installed in the absence of mezzanine cards. In the case of the SPI-4.2 interface standard, an active port termination module is often required to regenerate the signal and maintain link fidelity.



By actively terminating unoccupied ports and re-allocating channel and bandwidth assignments (completely under software control), the PivotPoint FM1010 enables the design of complex modular systems without the hassles of port termination modules and manual hardware configuration, or the risks of noise, bit errors, and performance degradation.



The PivotPoint FM1010 is a key building block for simplifying the design and enhancing the operation of modular high-performance communications systems.

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