

An Economical, Scalable Switch Fabric Solution for Advanced Services Applications

The PRS 16G/C192 switch fabric is a multipurpose device designed to operate as either a standalone PRS 16G switch or a PRS C192 fabric interface chip. It provides a flexible solution to satisfy the demand of applications offering 10-20 Gbps aggregate user bandwidth, while addressing the scalability needs of product lines that offer bandwidth ranges between 10-20 Gbps and 320 Gbps.

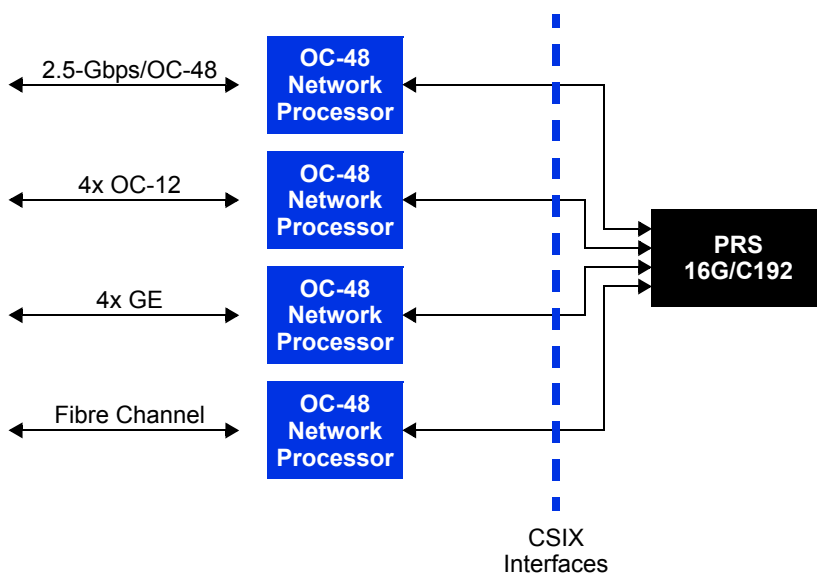
As a switch for 10-20 Gbps platforms, the PRS 16G/C192 is an ideal solution for cost-competitive, advanced services applications, such as medium-range routers for network access/edge aggregation with high-demanding packet processing; remote location thin appliances for firewall, SSL, VPN, security, intrusion detection; data center server appliances with deep packet processing; NAS/SAN equipment; and, more generally, service applications requiring a 10-Gbps uplink capability. All of these services are running in the network processors attached to the PRS 16G/C192 switch ports.

As a fabric interface for linecards, the PRS 16G/C192, enables switch/ adapter cards designed for 10-20 Gbps entry platforms to be used as line cards in chassis-based platforms addressing the higher capacity needs of applications in the Metro/WAN, wireless infrastructure, and enterprise (data center, NAS/SAN, high-end LAN).

- Highlights -

Single-Chip Switch for Network Access, Network Edge, and Data Center Applications

- Multipurpose device operating as the switch fabric of thin appliances, or the fabric interface of chassis-based adapter cards
- 10-Gbps full-duplex switch, with standard network processor interface, enabling single switch/ adapter card designs
- Fabric interface for linecards with up to four 2.5-Gbps/OC-48c network processors or one 10-Gbps/OC-192c network processor
- Extended product line and market coverage within same proven AMCC PRS Packet Routing Switch architecture and technology
- Design commonalities across products with a single device for low-end and high-end systems
- Optimized investments with common switch fabric skills and design re-use across product line
- Optimized cost solution for advanced services applications



In conjunction with switch designs based on PRS 64Gu or PRS Q-64G devices, adapter cards implementing the PRS C192 fabric interface can equip single-stage switching systems offering today up to 320 Gbps of user bandwidth.

The integration of self-switching and fabric interface capabilities into a single device provides system vendors with an easy path to scale their platforms from low-end boxes up to high-end, chassis-based solutions capable of switching up to 320 Gbps of aggregate full-duplex user traffic, while optimizing and protecting their line card design investments.

This enables offerings that allow operators to deploy entry versions of their next-generation, chassis-based platforms, while they are introducing advanced IP-based services, for example, merging data and voice over Quality-of-Service (QoS)-aware networks, implementing virtual private networks (VPNs), or deploying security applications closer to the end users.

Single-Chip or Two-Chip Switch Fabric with Seamless Network Processor Connection – PRS 16G Functions

The PRS 16G/C192 switch fabric device offers an economical solution that enables the implementation of 10-20 Gbps systems.

A single chip operates as a 10-Gbps full-duplex switch fabric providing 4x4 switch ports at 2.5-Gbps/OC-48c speed with standard CSIX-L1 interface.

In a two chip configuration, the PRS 16G/C192 can operate as an 8x8 port, 2.5-Gbps/OC-48c switch fabric, thus offering an aggregate full-duplex throughput of 20 Gbps.

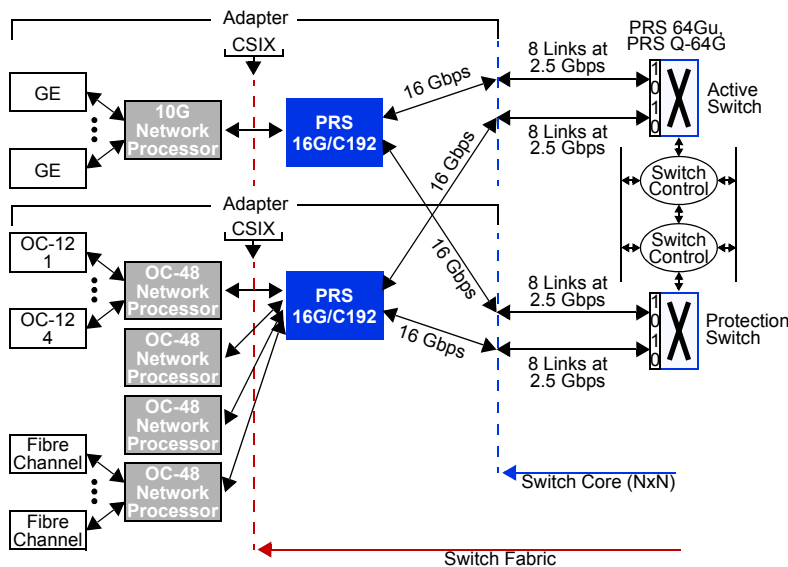
As another two-chip configuration, one of the devices can be configured with a single 10-Gbps/OC-192c port with standard CSIX interface so as to provide the uplink aggregating the traffic of the four 2.5-Gbps/OC-48c ports of the other chip.

The chip features configurable fixed-size packet switching and is capable of supporting either frame-based traffic (through segmentation and reassembly performed by the attached network processors) or cell-based traffic.

Robust Features

The following features provide design flexibility:

- 10-Gbps (stand-alone chip) or 20-Gbps (back-to-back chips) aggregate user bandwidth
- Four 2.5-Gbps/OC-48c NPU attachments or one 10G/OC-192c NPU attachment per chip
- Embedded standard CSIX-L1 interface to Network Processor or Traffic Manager
- Switch/adaptor cards with seamless connection between switch fabric chip and NPU(s)
- Ingress Virtual Output Queuing (VOQ) with up to 1024 unicast queues and eight multicast queues
- Quality-of-Service (QoS) support with four levels of traffic priority and four programmable ingress queue thresholds (ingress CSIX flow control per destination and priority)
- Packet payload protection, with optional cyclic redundancy check insertion
- Packet header parity generation and checking
- Efficient multicast (replication at sending)



40-320 Gbps Switch Applications

Fabric Interface for Highly-Scalable Systems – PRS C192 Functions

The PRS 16G/C192 switch fabric device is designed to alternately operate as a PRS C192 switch fabric interface chip. Located on each adapter card, it supports either a 10G/OC-192c network processor or up to four 2.5G/OC-48c network processors. It performs the queuing manager function of a PRS-based switch that can scale from 4 to 32x10-Gbps/OC-192c switch ports, or 16 to 128x2.5-Gbps/OC-48c switch ports, offering up to 320 Gbps of full-duplex aggregate user bandwidth.

PRS 64Gu and PRS Q-64G switch core devices use 2.5-Gbps high-speed serial links for communication with adapter cards equipped with the PRS C192 fabric interface chip. The PRS 16G/C192 provides one 64- or 128-bit wide CSIX-L1 compliant interface or four 32-bit wide CSIX-L1 compliant interfaces to Network Processors or Traffic Managers.

Redundancy Support for High Availability – PRS C192 Function

To increase availability and meet service providers’ needs and high-demanding applications (24x7), switch fabrics are often designed with two redundant planes. If an element in one plane fails, the other plane can take over. The PRS C192 device supports this crucial capability, in conjunction with the PRS 64Gu or PRS Q-64G switch core devices. Each switch element has a built-in filtering mechanism for redundancy control.

On the line adapter, the PRS C192 chip provides a redundant path with the switch planes, enabling traffic load sharing and switchover between the two switch planes, including maintenance switchover without packet loss.

Highly Efficient Multicast – PRS 16G and PRS C192 Function

Multicast with QoS is an increasingly valued capability in Internet and new service applications. The PRS 64Gu and PRS Q-64G switch core devices, in conjunction with the PRS 16G/C192 device provide a built-in efficient multicast function, easing the design of edge routers and other devices that provide these complex services. To

enable multicasting and maximize product resources utilization, the switch executes a scheme of store once and transmit multiple times (replication at sending). The multicast packet is placed in shared memory and the memory-location index is stored in the output queues corresponding to the target output ports and associated priorities. When used as a standalone switch, the PRS 16G/C192 inherits this leading multicast architecture, and so helps customers to efficiently take advantages of these multicast applications.

Enablement Tools for an Expedited Time to Market

To help reduce development time and cost, AMCC offers PRS 16G/C192, PRS 64Gu, and PRS Q-64G switch evaluation platforms, switch core reference designs, and reference software to operate the switch subsystem control layer. To allow system vendors to evaluate full solutions, the PRS platforms are enabled for attachment of other suppliers’ NPU platforms. Board design services and board manufacturing capabilities complement the AMCC PRS offering.

Specifications

	PRS 16G/C192
Technology	0.18µm (0.11µm L _{eff}) CMOS SA-27E
Power Supply	1.5V or 1.8V, 2.5V
Normal Power Dissipation @100% Traffic	9.8 Watts @ 130-MHz core clock 11.5 Watts @ 166-MHz core clock
Junction Temperature Range	0°C to 125°C
Packaging	37.5mm x 37.5mm 840-ball HyperBGA™ (1.27mm balls pitch)

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