

### Cost Effective Switch Fabric Solutions for Smaller-Capacity Multi-Service Provisioning Platforms, Scalable to High-end Systems

The AMCC PRS 5G and PRS 20G devices are members of the Packet Routing Switch (PRS) multi-purpose switch fabric family. They bring greater granularity and Internet class of service to smaller-capacity systems such as remote access devices, enterprise networking equipment, and low-end SAN systems. The PRS 5G and PRS 20G provide a flexible switching solution to satisfy the demand of applications offering 5-20 Gbps of full-duplex aggregate user bandwidth with an overspeed factor of two.

An integral part of a complete system solution with AMCC network processors, traffic managers, framers, and software tools, the seamless upgrade path of the PRS 5G and PRS 20G to higher-capacity solutions, such as the PRS 80G, enables customers to develop efficient, smaller-capacity systems today, and easily evolve to larger systems in the future.

The PRS 5G and PRS 20G chips are implemented with IBM 0.13 micron technology, use IBM 3.2-Gbps high-speed serial links, and introduce new system design options, such as PL3 interfaces for network processors and traffic managers (in addition to CSIX-L1).

### Dual Functionality, Switch and Fabric Interface, for Single Design of User Cards Across Entire Product Lines

The PRS 5G and PRS 20G solutions are hardware and software compatible with the PRS 80G, PRS 64Gu, and

PRS Q-64G high-end switch devices. The PRS 5G and PRS 20G devices can operate as either switching devices located on user cards of smaller-capacity systems, or switch fabric interface devices of user cards connected to the PRS central switch of a high-end system. Known as PRS C48X and PRS C192X when used as fabric interfaces, these devices address the scalability needs of product lines that offer users full-duplex bandwidth ranges between 5 Gbps and 320 Gbps.

As switches for 5-20 Gbps platforms, the PRS 5G and PRS 20G are an ideal solution for cost-competitive, advanced services applications, such as medium-range routers with high-demand packet processing for network access/edge aggregation; 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.

As fabric interface devices for line cards, the PRS 5G and PRS 20G (PRS C48X and PRS C192X) enable cards designed for 5-20 Gbps platforms to be used 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). Cards implementing the PRS C48X or PRS C192X fabric interface can equip single-stage switching systems based on PRS 80G, PRS 64Gu, or PRS Q-64G switch devices, offering up to 320 Gbps of full-duplex 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 smaller-capacity systems up to high-end, chassis-based solutions capable of switching up to 320 Gbps of full-duplex aggregate user traffic, while optimizing and protecting their line card design investments. With such OEM offerings, operators can deploy entry versions of next-generation, chassis-based platforms, while they are introducing

## - Highlights -

### Switching Solutions for 5-20 Gbps Advanced Services Applications, Optimized to Extend into the 20-320 Gbps Range

- Multi-purpose devices operating as a switch fabric for thin appliances, or a fabric interface for chassis-based systems
- PRS 5G Switch Fabric providing more than 2.5-Gbps of full-duplex user bandwidth for 5-20 Gbps meshed switch systems (no central switch fabric)
- PRS 20G Switch Fabric providing more than 10-Gbps of full-duplex user bandwidth for 10 Gbps (single-card) or 20 Gbps (two-card) smaller-capacity systems
- Embedded 3.2-Gbps SerDes, with 8b/10b coding, for an overspeed factor of two
- CSIX-L1 and PL3 standard fabric interfaces for high-density cards with up to four multi-GE/OC-48c network processor or one 10-Gbps/OC-192c network processor
- Complete multi-GE/OC-48c solution with the AMCC nP3700 Integrated Network Processor / Traffic Manager
- Enabling standard-based AdvancedTCA™-compliant system designs
- Product line designs in the 5-to-320 Gbps range, within the same proven PRS Packet Routing Switch architecture and technology
- Same cards for pizza boxes and chassis-based systems, for optimized investments in card design, manufacturing and supply
- Highly-scalable solutions preserving customer investments in network processor cards

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.

**PRS 5G Switch Fabric for 5-20 Gbps Meshed Switch Systems (No Central Switch Fabric)**

The PRS 5G (PRS C48X) switch fabric device provides 2.5 Gbps of full-duplex minimum aggregate user bandwidth. It allows smooth growth of smaller-capacity systems by the simple addition of PRS 5G-based blades, without any central switch fabric. Eight

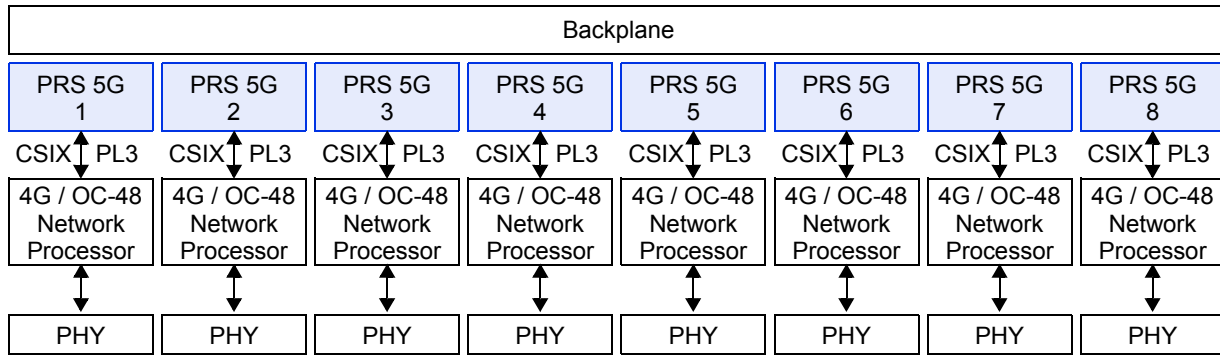
PRS 5G devices can be linked together in a meshed topology to enable the design of systems with up to eight user blades, each with a PRS 5G device attaching a network processor such as the AMCC nP3700 Integrated Network Processor / Traffic Manager (see **Figure 1** and **Figure 2**).

More compact blades, housing multiple network processors, can be implemented with PRS 20G devices. The PRS 20G can also operate in a meshed configuration with the PRS 5G to provide 10-Gbps uplink capability in smaller-capacity systems (see **Figure 3**).

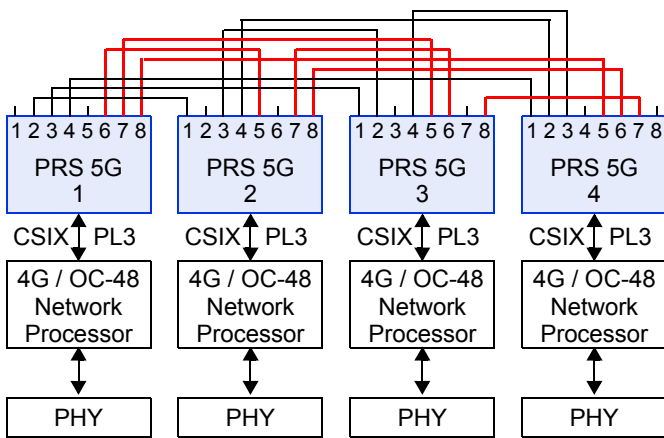
The PRS 5G blades can be designed to preserve the possibility of adding a

central PRS switch, when needed to extend the system capacity. This is possible because the PRS 5G alternately operates as a PRS C48X switch fabric interface providing queuing manager functionality for PRS core switches. As a result, the same PRS 5G blades can be used in both meshed and centralized switch fabric topologies, thus optimizing OEM and user investments in PRS 5G-based blades.

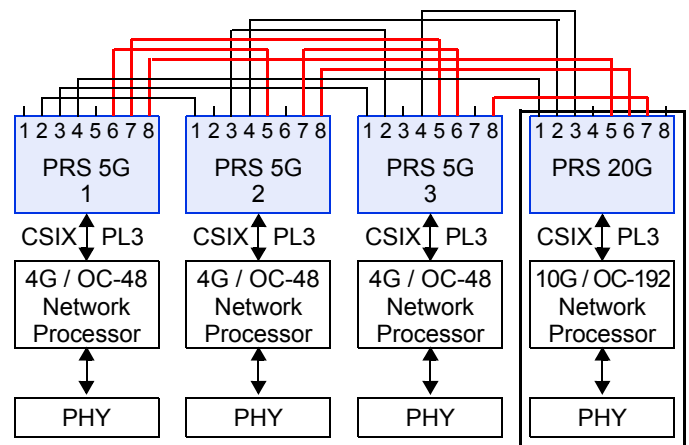
A standard-based AdvancedTCA™ chassis can be used in the design of PRS systems that can evolve from a few tens of Gbps to 100 or 120 Gbps of full-duplex user bandwidth.



**Figure 1: 8x8 Meshed Adapters Through Passive Backplane**



**Figure 2: 4x4 Meshed Adapters Redundancy Through Passive Backplane**



**Figure 3: Meshed Adapters Through Passive Backplane with Uplink Aggregation**

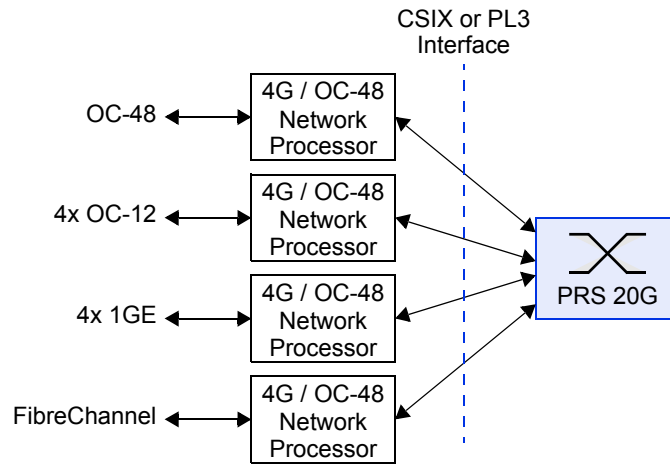
**PRS 20G Switch Fabric for 10 Gbps (Single-card) or 20 Gbps (Two-cards) Smaller-Capacity Systems**

The PRS 20G (PRS C192X) switch fabric device enables the implementation of one-card or two-card systems providing 10-20 Gbps of full-duplex minimum aggregate user bandwidth.

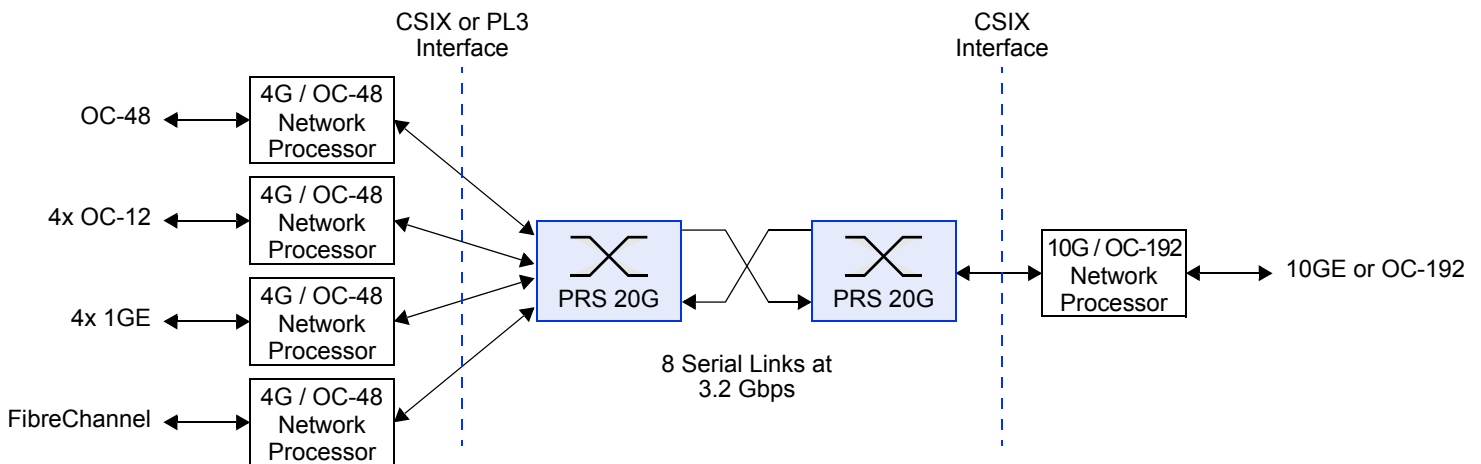
A single device operates as a 10-Gbps full-duplex switch fabric providing 4x4 switch ports at 2.5-Gbps/OC-48c speed, with a standard CSIX-L1 or PL3 interface to network processors such as the AMCC nP3700 Integrated Network Processor / Traffic Manager (see **Figure 4**).

In a two-card system, the two PRS 20G devices can operate as an 8x8 port switch fabric, with each port supporting

2.5-Gbps/OC-48c speeds, thus offering an aggregate full-duplex throughput of 20 Gbps. As another two-card configuration, one of the PRS 20G devices can be configured with a single 10-Gbps/OC-192c port with a standard CSIX interface to a network processor, so as to provide the uplink aggregating the traffic of the four 2.5-Gbps/OC-48c ports of the other card (see **Figure 5**).



**Figure 4: PRS 20G as a 4x4 Switch**



**Figure 5: PRS 20G in a 5x5 Switch with Uplink Aggregation**

**PRS 5G (PRS C48X) and PRS 20G (PRS C192X) Switch Fabric Device Features**

- 2.5-Gbps (PRS 5G) and 10-Gbps (PRS 20G) full-duplex user bandwidth switch devices with an overspeed of two towards the backplane
- Embedded IBM 3.2-Gbps SerDes, with 8b/10b coding and XAUI-compliant high-speed serial links
- PRS 5G (PRS C48X): CSIX-L1 or PL3-based (POS-PHY Level 3 / OIF-SPI3-01.0) 32-bit wide interface for multi-GE / OC-48 network processors
- PRS 20G (PRS C192X): CSIX-L1 64-bit wide or 128-bit wide interface for a 10-Gbps / OC-192 network processor or 4x CSIX-L1 or PL3-based (POS-PHY Level 3 / OIF-SPI3-01.0) 32-bit wide interfaces for multi-GE / OC-48 network processors.
- PRS 20G (PRS C192X) operation in subport mode or, in conjunction with the PRS 80G switch core, in quad PRS 5G (PRS C48X) mode, for more integrated line card solutions
- Dual-switch attachment for redundant switch plane operations (central switch configurations)
- Highly-efficient multicast and broadcast mechanism
- Ingress virtual output queuing (VOQ) per destination port and priority, with

separate multicast queues, preventing head-of-line blocking

- Up to four levels of traffic priority (CoS) and four programmable ingress queue thresholds (ingress CSIX / PL3 flow control per destination port and priority)
- Packet scheduling: strict priority scheduling, credit table (weighted round-robin), exhaustive highest priority first
- Implements flow control bit map mapping to ease adapter redundancy schemes
- End-to-end packet payload protection, with optional cyclic redundancy check insertion
- Internal loop back support for both the CSIX / PL3 interface and switch interface
- Hardware compatibility with PRS 80G switch core device via SerDes operating at 3.2 Gbps
- Backward compatibility with PRS 64Gu switch core device via SerDes operating at 2.5 Gbps (overspeed factor of 1.6)
- Backward compatibility with PRS Q-64G switch core device via SerDes operating at 2.5 Gbps (overspeed factor of 1.6 for PRS 20G / PRS C192X, or 6.4 for PRS 5G / PRS C48X)

**Enablement Tools for an Expedited Time to Market**

To facilitate the evaluation and prototyping of complete solutions, reference switch boards featuring the AMCC PRS 5G and PRS 20G, respectively, are available for installation in evaluation platforms.

To help reduce development time and cost, AMCC offers PRS 64Gu, PRS 80G and PRS Q-64G switch evaluation platforms, switch core reference designs, and reference software to operate switch boards.

To allow system vendors to evaluate multi-vendor solutions, the PRS boards and platforms are enabled for attachment of other suppliers' NPU platforms. Board design services and board manufacturing capabilities complement the AMCC PRS offering.

**Specifications**

	PRS 5G (PRS C48X)	PRS 20G (PRS C192X)
Technology	0.13 μm	0.13 μm
Supply voltage	1.5 V, 2.5 V	1.5 V, 2.5 V
Typical power @100% traffic	5 Watts	9.5 Watts
Junction °C	0°C to 125°C	0°C to 125°C
Package	899-ball FC-PBGA	937-ball CBGA
mm x mm (pitch)	31x31 (1 mm)	32.5x32.5 (1 mm)

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