

### Benefits

- Provides a low cost software defined radio (SDR) solution as part of the *flexComm*™ SDR-2000 and Waveform Design Studio™ platforms
- Supports applications requiring high-speed, low latency, deterministic data paths
- Modular architecture supports multiple combinations of processing and I/O mezzanine cards
- Suitable for use in a Windows® or Linux\* desktop environment
- Scalable for future system expansion

### Applications

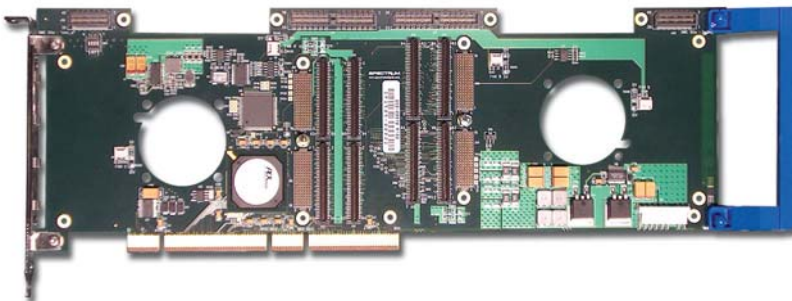
- Military Satellite Communications (MILSATCOM)
  - Satellite earth stations
  - Land and mobile systems
- Electronic Warfare (EW)
- Signals Intelligence (COMINT & ELINT)
  - Wideband Spectral Analysis
  - Multi-channel Direction Finding
  - Channelized Receiver

### Features

- High-speed communications fabric supporting both Solano and Parallel RapidIO\* technologies to provide low latency deterministic data paths to processing devices
- Two ePMC/XMC sites support a wide variety of industry standard I/O and signal processing modules
- Up to 800 MB/s full-duplex data bandwidth for module-to-module communications via Solano RapidIO\* technologies
- Interboard data bandwidth between two PRO-2900 boards in a system is up to 800 MB/s
- Local PCI-X bus provides soft real-time communications to the ePMC/XMC sites for payload data and control
- Standard PCI/PCI-X interface to the SDR-2000 and Waveform Design Studio PC motherboard, through a PCI-X to PCI-X semi-transparent bridge chip
- Dedicated high-speed links between the JN4 connectors on the ePMC/XMC sites with additional connectivity available to JN4 through independent edge connectors
- Supports Windows® XP and Linux Host\* OS

### Description

The PRO-2900 is a PCI-X-based carrier card with dual Enhanced PMC (ePMC)/XMC sites. This unique carrier card can be used within Spectrum's SDR-2000 family and the Waveform Design Studio to interface to Spectrum I/O, FPGA, and DSP processing engines as well as industry standard PMC/XMC mezzanine cards. The mezzanine card interface is supported for up to two PMC, ePMC or XMC modules per PRO-2900 carrier card. Using multiple independent communication fabrics and GPIO ports interconnecting the mezzanine sites, numerous combinations of FPGA, DSP and GPP signal processing devices can be utilized to support a wide range of software defined radio (SDR) applications.



\* See future options section of this datasheet.

## Block Diagram

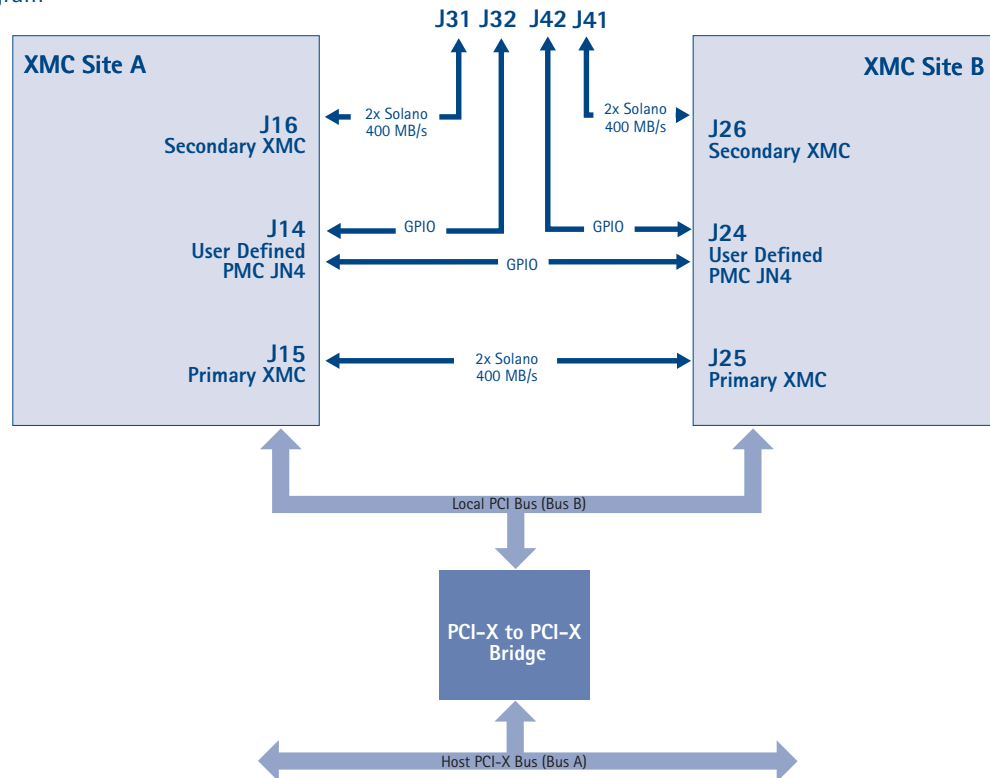


Figure 1. PRO-2900 Block Diagram

## Architecture

The PRO-2900 is a PCI carrier card that supports two ePMC or XMC mezzanine cards and is used to interface Spectrum ePMC and XMC modules to the SDR-2000 product line. Multiple PRO-2900 carrier cards (depending on the server configuration) can be co-located within the SDR-2000 and Waveform Design Studio platforms.

The PRO-2900 supports data transfer rates of up to 800 MB/s, full-duplex, between mezzanine cards co-located on the PRO-2900 carrier card, and between mezzanine cards on other PRO-2900 cards installed within a SDR-2000 or Waveform Design Studio platform. Either Spectrum's high-speed fabric protocol, Solano, or Parallel RapidIO\* is used for these high-speed data transfers.

Solano is electrically compatible with Parallel RapidIO, with two 4-bit Solano links providing equivalent connectivity to a single 8-bit Parallel RapidIO link.

## [ Local PCI/PCI-X Bus ]

A local PCI/PCI-X bus is used to transfer payload and control data between the mezzanine cards installed on the PRO-2900 carrier and the SDR-2000 platform via the PLX 6520 bridge.

The PLX 6520 is a PCI/PCI-X to PCI-X semi-transparent bridge that connects two electrically separate PCI-X bus domains, allowing concurrent operations on both buses. This results in optimal use of the buses in various system configurations and enables hierarchical expansion of I/O bus structures.

## [ High-speed data link between multiple carrier cards ]

Multiple PRO-2900 carrier cards can be installed within the SDR-2000 or Waveform Design Studio platforms. This allows operation of a combination of I/O and signal processing engines resulting in a maximum degree of flexibility necessary to support a wide variety of applications.

The card-to-card linking is accomplished using high-speed data cabling that connects the secondary XMC connector of both XMC sites on one PRO-2900 to the secondary XMC connector of both XMC sites on other PRO-2900s. Using the card-to-card linking, data rates of up to 800 MB/s are supported between mezzanine cards.

\* See future options section of this datasheet.

## Supported ePMC & XMC Modules

Any of Spectrum's ePMC/XMC modules can be supported on the PRO-2900 as a part of an application-specific integrated platform. Typical modules that would be included in one of these platforms are as follows:

### [ XMC-3311 High-Speed Transceiver Module\* ]

The XMC-3311 is a dual input 12-bit A/D and single output 14-bit D/A converter up to 213.33 MSPS in a single-width VITA 42.0 XMC form factor. The ADCs and DAC are integrated with a single user programmable Xilinx® Virtex-4™ LX40/60/80/160 or SX55 FPGA device for wide bandwidth signal processing and filtering in the digital domain. The XMC-3311 supports an external clock input from 110 to 213.33 MSPS. For more information, please see the XMC-3311 datasheet.

### [ External Clock Module\* ]

This external clock has been tested for operation with the XMC-3311 transceiver module. The clock supports various frequency ranges between 100 MHz and 213.33 MHz. As the frequency ranges are non-contiguous, please check the Spectrum web site at [www.spectrumsignal.com](http://www.spectrumsignal.com) for details on the frequency ranges supported by the clock module.

### [ ePMC-8311 DSP-based Multiprocessing Engine ]

The ePMC-8311 DSP module utilizes two 1 GHz TMS3206416 devices from Texas Instruments and is Spectrum's highest performance DSP-based solution for multiprocessing applications. Separate control and data paths are provided to achieve high-speed, deterministic, data transfer with extremely low latency. For more information, please see the ePMC-8310 family datasheet.

### [ ePMC-8120 FPGA-based Processing Engine\* ]

The ePMC-8120 is a single-width ePMC module, 32-bit/33 MHz PCI device capable of operating in a master or slave mode, with PCI burst DMA capability. The ePMC-8120 is equipped with a modular front panel to support a variety of I/O formats. It incorporates a single Xilinx Virtex-II XC2V6000 FPGA for processing, as well as multiple output paths. A high-speed interface to the carrier board can be established via the Solano Communication ICs. The module features two Double Data Rate (DDR) SDRAM banks with 512 MB total capacity. For more information, please see the ePMC-8120 datasheet.

### [ XMC-3321 Dual Transceiver Module ]

The XMC-3321 supports industry standard IF frequencies including 10.7, 21.4 and 70 MHz through the use of dual 14-bit A/D converters sampling at up to 105 MSPS and dual 14-bit D/A converters sampling at up to 300 MSPS in a single-width XMC form factor. The XMC (ANSI VITA 42.0) standard is fully compatible with IEEE P1386.1 PMC standard but offers the additional benefit of dedicated high-speed links between an XMC-compliant carrier and its mezzanine modules. The XMC-3321 is capable of supporting either the Solano Communication Technology or Parallel RapidIO (ANSI VITA 42.1) via the high-speed XMC interface. The module also features a single user programmable Xilinx Virtex-4 SX55 FPGA device for wide bandwidth signal processing and filtering in the digital domain. For more information, please see the XMC-3321 datasheet.

### [ XMC-8131 FPGA-based Processing Engine XMC Module\* ]

The XMC-8131 incorporates a single programmable Xilinx® Virtex-4 FPGA device which is available in various sizes supporting from 41,472 logic cells (LX40) to 152,064 logic cells (LX160). SX55 is also available. A second Xilinx Virtex-4 FPGA is used to offload the communications to the carrier board from the user parts. This high-speed communications can be done via a dual Parallel RapidIO industry standard VITA 42.1 connection, or four low power Solano Communication IC compatible links. The module features two banks of DDR2 SDRAM totaling 512 MB of capacity. For more information, please see the XMC-8131 datasheet.

## Software

Software for the PRO-2900 and installed modules is provided with each SDR-2000 and Waveform Design Studio platform. Other software may be required as well. Check the datasheets for the SDR-2000 platforms, Waveform Design Studio and individual modules for additional detail.

\* See future options section of this datasheet.

## Specifications

[ general ]	Form Factor	Full-length PCI-X card
[ local buses ]	XMC to XMC Fabric interface	Dual-Solano interface between primary XMC connectors on each PMC site
	User Defined I/O Board	Differential pairs and single-ended lines between JN4 on each PMC site and to the transition module
	Module Control Bus	Local PCI/PCI-X bus via bus bridge to the host PCI-X bus
[ external interface ]	Host	PCI-X
	Fabric inter-board connection	Dual-Solano interface to secondary XMC connector on each PMC site
	User inter-board connection	Differential pairs and single-ended lines mapped to JN4 on each PMC site
[ mezzanine ]	XMC	Dual ePMC/XMC
[ host requirements ]	Operating System	Microsoft Windows XP, Windows Server 2003, Linux (Red Hat 5.3)
[ electrical ]	Supply Voltage (DC)	+5.0V and +3.3V
	Current Consumption	0.5A at +5.0V and 0.5A at +3.3V
[ mechanical ]	Size	Full-length PCI-X card
[ environmental ]	Temperature	Operating temperature range of 10 to 35 degrees C Storage temperature to be announced
	RoHS	5 of 6 compliant (Pb in solder exemption). For RoHS ordering information, other RoHS compliance options or certificates of compliance, please contact Spectrum Sales
[ ordering information ]		For specific RoHS compliance of individual part numbers, please contact Spectrum Sales.
	600-00023	PRO-2900 ePMC/XMC to PCI carrier
[ custom configurations ]		For custom configuration, please contact Spectrum Sales
[ additional options ]	ePMC-8311	TI DSP-based multiprocessing engine
	XMC-3321	Dual transceiver module
[ future options ]		Future options may be implemented at the discretion of Vecima Networks Inc. or its subsidiaries based on market demand.**
	ePMC-8120	Xilinx Virtex-II processing engine
	XMC-3311	High-speed transceiver module and external clock module
	XMC-8131	FPGA processing engine XMC module
	I/O interface	Parallel RapidIO