



The industry's lowest priced, fully featured Software Communications Architecture (SCA) enabled Waveform Design Studio (WDS). Preconfigured with a fully licensed software stack and Zeligsoft Software's powerful SCA development tools, the flexComm™ Waveform Design Studio® increases productivity by equipping each designer on the project team with their own personal black-side development environment.

Benefits

- Provides a low priced development environment for waveforms to be deployed on Spectrum's SDR-3000 and SDR-4000 based deployment platforms
- Incorporates field-proven (Technology Readiness Level 9) software defined radio (SDR) technology
- Supports multi-channel radio development using a highly scalable and modular architecture
- Enables emulation of co-site interference
- Allows technology demonstrations in many airborne, maritime and fixed installation environments
- Preconfigured with all relevant licenses enabling development to begin immediately out-of-the-box

Applications

Rapid development of SCA enabled waveform applications

- Tactical Military Communications
- Military Satellite Communications
- Law Enforcement

Features

- Supports two receive and two transmit channels at industry standard 10.7, 21.4 and 70 MHz IF with bandwidths in excess of 30 MHz
- "RF to Ethernet" support for HF/VHF frequency bands
- Based on Intel® workstation architecture exploiting proven Spectrum flexComm tools and technology
- Incorporates a single Xilinx® Virtex-4™ FPGA and multiple TI TMS320C6416 DSP processing devices all interconnected through high performance communications fabrics
- Integrated Zeligsoft development tools providing a complete SCA development environment with code generation capability
- Supports Microsoft® Windows® XP operating system
- Comprehensive training, maintenance, support and professional services available

Description

The flexComm Waveform Design Studio is a fully integrated, commercial off-the-shelf (COTS) platform supporting waveform design from "RF to Ethernet" for the HF and VHF frequency bands as well as industry standard IF frequencies. This software defined radio (SDR) platform allows each designer to have access to "industrial strength" hardware and software for waveform development. All software is pre-configured on an Intel-based workstation and ready for rapid waveform development.



flexComm Waveform Design Studio

Block Diagram

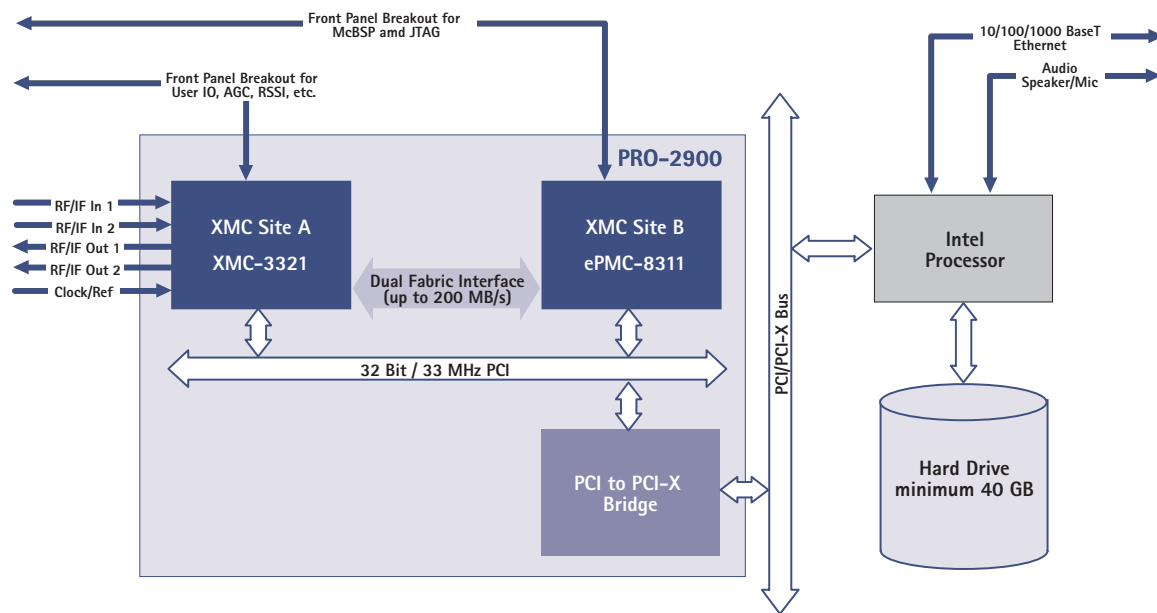


Figure 1. Block diagram of *flexComm* Waveform Design Studio

Architecture

The *flexComm* Waveform Design Studio integrates a high performance Xilinx Virtex-4-based IF transceiver (XMC-3321) with multiple TI TMS320C6416-based multiprocessing engines (ePMC-8311) in an Intel-based workstation, allowing a single reconfigurable platform to support the development of both narrow and wideband waveforms. This SCA-enabled software operating environment is ideal for individual waveform developers who intend to port their waveforms to deployable platforms, such as the *flexComm* SDR-3000 and SDR-4000.

For more information on SDR-3000 and SDR-4000, please see www.spectrumsignal.com/products.

[XMC-3321]

The XMC-3321 is a key component in Spectrum's series of software defined radio modules. The XMC- 3321 has dual input 14-bit ADCs sampling at up to 105 MSPS and dual output 14-bit DACs, each sampling at up to 300 MSPS in a single-width ANSI VITA 42.0 XMC form factor. The ADCs and DACs are integrated with a single user programmable Xilinx Virtex-4 SX55 device for wide bandwidth signal processing and filtering in the digital domain.

The ANSI VITA 42.0 XMC base standard defines physical features that enable switched communications between a standard mezzanine card and its carrier. The XMC interface on the XMC-3321 is capable of supporting either Spectrum's high-speed Solano Communications Technology, which is the technology used in the *flexComm* Waveform Design Studio, or industry standard ANSI VITA 42.1 Parallel RapidIO. The Solano Communications Technology used in the enhanced PMC (ePMC) specification provides high bandwidth deterministic data paths between ePMC mezzanine modules and ePMC carriers. Each Solano high-speed link is capable of greater than 200 MB/s full-duplex communications and requires much less power than RapidIO. Two Solano links are electrically equivalent to one RapidIO link.

For more information, please see the XMC-3321 datasheet.

[ePMC-8311]

The ePMC-8311 is a dual TI C6416 digital signal processing (DSP)-based multiprocessing engine designed for communication applications and is available as a single-width ePMC form factor. The two C6416 DSPs operate at 1 GHz and feature built-in Viterbi and Turbo co-processors, which are well suited for wireless communications architectures. Separate control and data paths are provided. Two of eight dedicated high-speed, low latency, deterministic data paths offer a reconfigurable data flow to the DSPs.

For more information, please see the ePMC-8310 family datasheet.

[PRO-2900]

The PRO-2900 is a PCI/PCI-X-based ePMC/XMC carrier card with two XMC sites that can also host ePMC modules. The carrier supports a local 66 MHz, 32-bit PCI bus (64-bit devices are supported) from the mezzanine sites to the PCI-X to PCI-X bridge. The two mezzanine sites are also interconnected through a high-speed communications fabric using the onboard XMC connectors. Additionally, each mezzanine site can communicate with mezzanine modules hosted on a second PRO-2900 carrier through a cable connection supporting the same high-speed fabric.

For more information, please see the PRO-2900 datasheet.

Software

The *flexComm* Waveform Design Studio includes a comprehensive software suite incorporating all of the tools necessary to develop deployable waveforms. This include the Windows XP operating system, the OCI TAO Object Request Broker (ORB) and Zeligsoft Component Enabler™ (CE) with Harris SCA Core Framework, along with an SCA enabled sample application that acts as a starting point for waveform development.

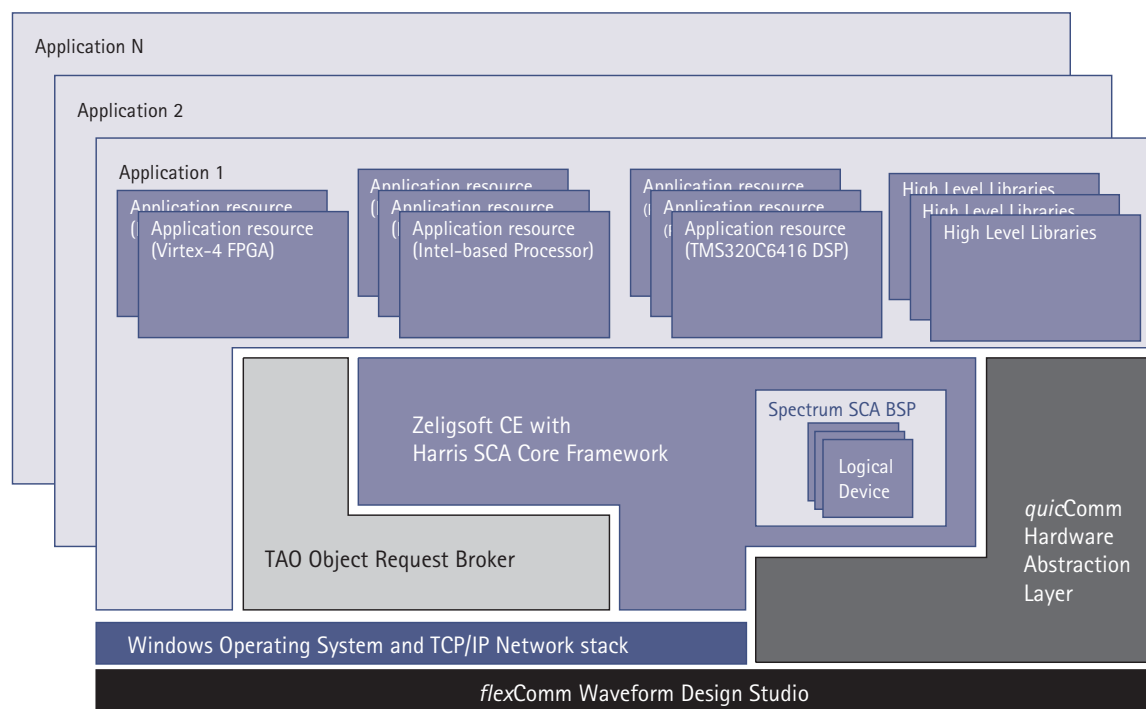


Figure 2. *flexComm* Waveform Design Studio Software Suite

[*quicComm* Software Development Kit (SDK)]

quicComm is a high-performance software development tool that provides an Application Programming Interface (API) for interprocessor and I/O-to-processor communications. *quicComm* has been a standard on Spectrum's products since 2000 and therefore spans all of our processing technologies, including DSPs, general purpose processors (GPPs), interfaces to FPGAs and I/O. *quicComm* enables developers to rapidly create multiprocessing communication applications with a mixture of processing engines, communication fabrics and I/O devices. *quicComm* provides:

- Configuration and control of the Solano links between the processors and between mezzanine sites
- Initiation and management of data transfers
- Management of the following interrupts:
 - From the XMC-3321 and ePMC-8311 modules to the Windows host,
 - From the Windows host to the ePMC-8311 DSP module, and
 - Between the processors on the ePMC-8311 module
- Dynamic loading on a processor without affecting other processors
- FPGA wrappers to abstract all board level interfaces on each FPGA, including the interfaces to the analog converters, communication fabrics and control. The wrapper is designed so users can expedite the integration of third party or custom FPGA IP cores.

Please see the *quicComm* datasheet for more details about the benefits and features of *quicComm*.

[Operating System]

Microsoft Windows XP operating system is loaded on the Intel-based workstation.

[Zeligsoft Development Tools and Harris SCA Core Framework]

Zeligsoft Component Enabler is a model-driven visual development tool that enables developers across a project team to configure and validate SCA compliant radio platforms and waveform applications. This model driven technology allows users to automatically generate the complete set of SCA compliant XML descriptor files – reducing development time from months to days. Harris Corporation's proven SCA Core Framework is integrated with the Zeligsoft CE tools and the *flexComm* Waveform Design Studio. Zeligsoft Code Generator (an add-in to CE) enables industrial strength SCA component code generation. For more information, please see the Zeligsoft website at www.zeligsoft.com.

[FPGA Cores]

Virtex-4 compatible cores can be used on the XMC-3321. In order to accelerate FPGA development, high quality cores can be obtained via a variety of means. Spectrum's Application Engineering Services (AES) organization routinely develops custom IP cores for clients. For more information on custom cores, please contact Spectrum Sales. The Xilinx IP center contains a wide range of free cores including digital upconverters, downconverters, FFTs and filters. The Xilinx AllianceCORE program is a cooperative effort between Xilinx and independent third-party core developers, resulting in a broad selection of industry-standard solutions. RF Engines Ltd. (www.rfel.com) provides individual IP cores and integrated turn-key designs for digital RF signal processing that are highly optimized in terms of speed, power and size compared to cores available from the major FPGA vendors. These include pipelined FFT, tunable PFT, half-band filters, FIR filters, windowing functions and CORDICS. Spectrum can integrate these off-the-shelf cores into your system. Contact Spectrum Sales for more information.

[Xilinx's ISE Foundation]

ISE Foundation is an integrated programmable logic design environment. It includes schematic capture, power analysis tools, physical synthesis for FPGAs, advanced Place and Route Algorithms, HDL Advisors and Timing Cross-Probing. ISE Foundation also contains COREgenerator, a graphical interactive design entry tool that is used to create high-level modules. COREgenerator gives access to a library of hundreds of FPGA IP cores, many of them free, from Xilinx and third-party vendors. This library includes DSP applications such as digital down converters (DDC), direct digital synthesizers (DDS), FIR filters, FFT, numerically controlled oscillator (NCO), memory controller and much more. Xilinx's System Generator tool can also be used to graphically design and simulate FPGA-based algorithms within the Simulink environment from The MathWorks. This software option can be included with your *flexComm* Waveform Design Studio order.

[DSP Debug and Compile Tools]

Spectrum builds on Texas Instrument's proven eXpressDSP™ software tools to provide multiprocessing tools and configuration utilities that enable application developers to work at a system level. The ePMC-8311 DSP module supports TI Code Composer Studio™ Development Tools. This software option can be included with your *flexComm* WDS order.

[System Examples]

Comprehensive system examples illustrating typical application data flows are provided as a tool to accelerate design efforts. These examples include the source code to facilitate rapid customization. Spectrum's Application Engineering Services team can be engaged to modify or extend the existing example feature set to meet specific customer needs. Contact Spectrum Sales for more information.

[Training and Support]

Spectrum's Technical Training and Support Services are designed to help you find quick and efficient solutions to overcome obstacles or resolve technical problems that may otherwise jeopardize your project milestones and deliverables. The Spectrum team is comprised of experienced Application Engineers who will take the time to understand your application's needs and deliver optimal solutions.

More information on Spectrum's Training and Support Services can be found at www.spectrumsignal.com/support/technical_support.pdf.

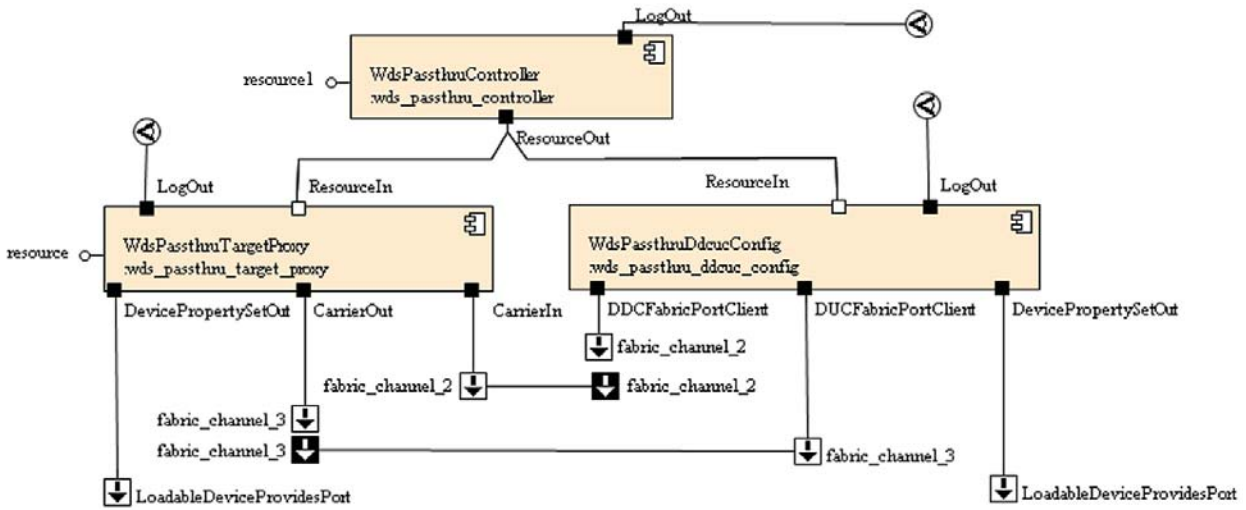


Figure 3. Model of Waveform Design Studio Passthrough Example

Specifications

[analog I/O]	Receiver IF Sample Rate	2 channels at 96 MSPS Other rates 36-105 MSPS available via external sample clock
	Transmit IF Sample Rate	2 channels at 192 MSPS Other rates 36-220 MSPS available via external sample clock
	ADC Input	AC Coupled
	DAC Output	AC Coupled
[processing subsystem]	FPGA	Single Xilinx Virtex-4 XC4V5X55
	DSP	Two TI TMS320C6416 @ 1 GHz
	GPP	Intel Workstation
[external interfaces]	IF In	2 Channels, SSMC Socket, 50 Ohms
	IF Out	2 Channel, SSMC Socket, 50 Ohms
	10 MHz Reference Input	SSMC Socket, 50 Ohms
	Network Interface	10/100/1000 BaseT RJ45 Ethernet Interfaces
	JTAG Connections	Independent ports for Xilinx FPGA and TI DSP JTAG chains
	DSP Serial Interface	McBSP
	GPIO Interface (to FPGA)	4 analog RSSI inputs 2 analog AGC outputs 1 LVTTTL 3 LVDS
[performance]	FPGA to DSP	200MB/s combined total for both DSPs
	DSP to GPP	40 to 60 MB/s
[platform software]	Operating System	Microsoft Windows XP
	Tools	quicComm Software Development Kit, System Examples
[development software]	Operating System	Microsoft Windows XP
	Object Request Broker	OCI TAO v1.3a
	SCA and Tools	Zeligsoft CE with Harris SCA Core Framework
	Other Tools	Microsoft Visual Studio 6, Xilinx Foundation ISE, TI Code Composer Studio
[electrical]	Supply Voltage	Frequency: 47-63 Hz AC Voltage: 100 - 240 Vac
[mechanical]	Size (H x W x D)	Mini-Tower Work Station Chassis: 17.3 x 6.5 X 17.3 in (44.1 x 16.5 x 44.0 cm)
[environmental]	Temperature	Operating temperature range of 10 to 35 degrees C
	RoHS	Please see component level datasheets for RoHS compliance or contact Spectrum Sales
[ordering information]	901-00070	flexComm Waveform Design Studio – Includes XMC-3321, ePMC-8311, PRO-2900, Intel Workstation with keyboard and mouse, Windows XP Operating System, Zeligsoft CE with Harris SCA Core Framework, SCA Board Support Package, quicComm Software Development Kit, OCI TAO ORB, system example, user documentation, cable kit
	901-00072	flexComm Waveform Design Studio without SCA licensing
[additional options]	100-00491	Zeligsoft Project Code Generator
	100-00489	ISE Foundation FPGA Development Tools
	100-00013	Code Composer Studio
	099-00800	Microsoft Visual Studio 2005
	901-00071	DC Coupled Analog IF Input/Output
	TRAINING-060	4 day Waveform Design Studio SDR-2000 training with SCA Training - SSP Burnaby
	TRAINING-061	4 day Waveform Design Studio SDR-2000 training with SCA Training - On Site
	SUPPORT-036	Advanced support and maintenance for SDR-2000
[future options]		Future options may be implemented at the discretion of Vecima Networks Inc. or its subsidiaries based on market demand.**
	FPGA	Single Xilinx Virtex-4 4VLX60
	Modules	Support for XMC-3311 high speed transceiver