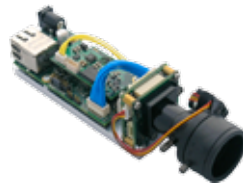




Product Selector Guide 2010

Version 2.3



Extending the Possibilities

Stretch is the pioneer and world leader in the field of software configurable processors, the first to embed programmable logic within the processor. Stretch offers a state-of-the-art development environment, multiple development platforms and reference designs, as well as production-ready OEM solutions. S6000 family processors are optimized for high-speed video and image processing. Reference designs include PCIe Digital Video Recorder add-in cards and Intelligent Encoding IP cameras.

Stretch designs are available as development platforms for customers who want to use Stretch processors in their own applications, or as production-ready products for OEMs and system integrators. The production-ready designs are delivered with firmware to make deployment fast and efficient, and with source code for all host software to make porting of existing applications easy. Development platforms are delivered with source code for the integrated firmware to facilitate product differentiation.

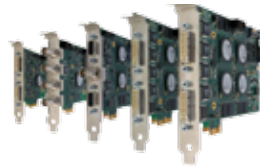
Whether you are an engineer looking to design a product from the processor up, or a system integrator looking for a production-ready product to speed your time to market, Stretch has the solution you need.

Stretch Product Portfolio



S6000 Family of Software Configurable Processors (SCP)

- Second generation SCPs for video and image processing



Video Surveillance Reference Design Kits

- PCIe H.264 DVR add-in card reference design kits (CIF to HD)
- High definition hybrid standalone DVR reference design
- S6105 high definition H.264 intelligent IP camera with embedded analytics
- S6106 standard definition, low power H.264 intelligent IP camera with embedded analytics
- Cost-effective CIF resolution capture and compression reference design kits



VRC6000 Series DVR Card OEM Solutions

- 16-, 8-, and 4-channel PCIe DVR add-in cards
- High definition, D1, and CIF resolutions
- True H.264 encode
- Full frame rate and resolution capture and encode
- Embedded analytics and Intelligent Encoder for efficient storage



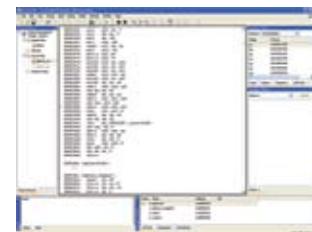
VCC6000 Series Video Capture Cards

- High density capture-only versions of the VRC6000 cards
- Complete software solution including rich API and host drivers
- Full frame rate and resolution for ultimate video quality



Robust Applications Software

- Easy and intuitive API
- CODEC plug-ins
 - » H.264 AVC, H.264 Scalable Video CODEC (SVC), MJPEG, MPEG4, G.711
- Built-in video analytics
- Video preprocessing and de-interlacing
- Video scaling and tiling
- Video enhancement and noise reduction
- On-screen display and Alpha blending



Stretch Integrated Development Environment

- Complete tool suite for C/C++ code development and debug

Software Configurable Processor Technology



Software configurable processors combine traditional RISC processors and programmable logic, extracting the benefits of both.

Tight coupling of RISC processors to a programmable compute fabric embedded directly inside the processor's data path provides unprecedented performance for embedded computing.

Stretch's patented Instruction Set Extension Fabric (ISEF) is a software configurable compute fabric that lets system designers extend the processor instruction set and define new instructions. These "extension instructions" are defined in C/C++ and then automatically synthesized, placed, and routed into the ISEF — providing computational acceleration for any algorithm that can be expressed in C/C++.

The tight coupling between the RISC processor and the ISEF means that Stretch software configurable processors can be programmed using the familiar C/C++ programming language — no need to learn esoteric parallel programming methodologies or to use RTL languages. By using C/C++, developers can easily differentiate their products and quickly adapt to changing requirements or new standards.

S6000 Software Configurable Processors

The S6000 family of devices is ideally suited for video processing applications. Offering the lowest cost per channel of any programmable solution, S6000 devices are offered in a variety of package, speed grade, and temperature options, allowing developers to pick the device best suited for their applications.

The S6 SCP Engine

The S6 SCP Engine has Stretch's second generation ISEF embedded directly within the Tensilica® Xtensa® LX dual-issue VLIW processor architecture. By implementing custom instructions within the ISEF, developers can crush software hot spots and dramatically accelerate their applications.

Programmable Accelerator — Optimized for Video Processing

The programmable accelerator in S6000 devices increases performance for common video processing algorithms, including entropy encoding, motion estimation, audio acceleration, and encryption.

Processor Array Technology – Painless Scalability

The S6100 and S6105 feature processor array technology — the ability to easily and gluelessly scale S6000 devices into multiprocessor systems. With dedicated physical-layer interface circuitry, network interfacing, and switching, the processor array off-loads all inter-processor networking tasks.

Robust System Integration

S6000 devices have a multiplicity of programmable I/Os to gluelessly interface to a variety of video and wireless devices. The Quad Data Port supports transmission and reception of standard definition and high definition video, and streaming of raw data. S6000 devices seamlessly and directly interface to myriad devices to reduce system costs to the absolute minimum.

The S6000 Family

S6100 — Full-featured device for PCI Express-based DVRs or wireless base stations. Capable of four channels of H.264 encoding.

S6105 — High-performance for high definition video encoding or wireless base stations. Capable of supporting 1.3MP sensors and encoding 30fps of H.264.

S6106 — Low power option for standard definition video encoding plus video analytics.

S6107 — Low power option for standard definition video encoding plus video analytics with added PCIe for video capture card or streamer applications.

S6000 Family Devices

Ordering Code	Max Frequency (1.2 V)	Max Frequency (1.0 V)	DDR2	Data Ports	PCI Express	Array Interface Matrix (AIM)	Ethernet MAC	UARTs	Enhanced Generic Interface Bus (eGIB)	General Purpose I/O (GPIO)	I ² S Ports	SPI, TWI, Boot	Package	Operating Temperature
S6100PHC-3 S6100PHI-3	300MHz	200MHz	16/32-bit, DDR2 667	4	x1, x4	Yes	10/100/1000	2	4 Chip Selects, 42 Addr/Data	24	2	Yes	27x27mm HSBGA 1.0mm Ball Pitch	C: T _j 0°C – 100°C I: T _j -40°C – 124°C
S6105PHC-3 S6105PHI-3	300MHz	200MHz	16/32-bit, DDR2 667	4	N/A	Yes	10/100/1000	2	4 Chip Selects, 42 Addr/Data	24	2	Yes	27x27mm HSBGA 1.0mm Ball Pitch	C: T _j 0°C – 100°C I: T _j -40°C – 124°C
S6106PBC-2L S6106PBI-2L	N/A	167MHz	16-bit, DDR2 600	2	N/A	No	10/100/1000	2	2 Chip Selects, 25 Addr/Data	18	2	Yes	17x17mm PBGA 0.8mm Ball Pitch	C: T _j 0°C – 100°C I: T _j -10°C – 124°C
S6106PBC-3 S6106PBI-3	N/A	200MHz	16-bit, DDR2 600	2	N/A	No	10/100/1000	2	2 Chip Selects, 25 Addr/Data	18	2	Yes	17x17mm PBGA 0.8mm Ball Pitch	C: T _j 0°C – 100°C I: T _j -10°C – 124°C
S6107PBC-3 S6107PBI-3	200MHz	N/A	16-bit, DDR2 667	2	x1	No	10/100/1000	2	2 Chip Selects, 25 Addr/Data	18	2	Yes	17x17mm PBGA 0.8mm Ball Pitch	C: T _j 0°C – 100°C I: T _j -40°C – 124°C

C = Commercial
I = Industrial

Reference Design Kits Overview



Evaluation Reference Design Kit

Stretch has developed a wide variety of reference design kits featuring the S6000 software configurable processor. These kits are designed to provide a development platform for designers developing highly differentiated products using Stretch technology. The kits contain schematics of the supplied hardware and source code for all the supplied software (with the exception of the Intelligent Encoder, which is supplied as object code).

The kits are compatible with the standard Stretch development and debug environment and are provided with an Ethernet-based debug solution. Using the kits, designers can evaluate Stretch software configurable processor technology and perform analysis of video quality. By selecting the reference design closest to their application requirements from the wide selection available from Stretch, they



Full Reference Design Kit

can expedite the design, development, and debug of their similar product with a minimum of program risk.

Reference design kits are available in two versions. Evaluation versions allow designers to

evaluate Stretch technology, develop comparable applications and, using the hardware supplied with the kits, take the design to completion. Full reference design kits contain all the software and source code found in the evaluation kits, and, in addition, contain hardware design files for the supplied card as well as a distribution license for the software. Using a full reference design kit, designers can develop their own derivative hardware products, develop software applications based on the supplied source, and ship the complete solution under their own brand name.

IP Camera Reference Design Kits

S6105 IP Camera Reference Design Kit



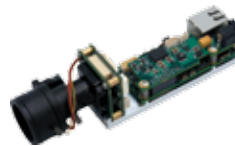
S6105 IP Camera RDK

The Stretch S6105 IP Camera Reference Design Kit (RDK) is a production-ready design based on the revolutionary S6105 software configurable processor. Optimized for low material costs and high

performance, this reference design provides a breakthrough feature set and price point while offering processor bandwidth for video analytics or proprietary image processing.

The S6105 IP camera application software is based upon the Stretch Intelligent Encoder Software Development Kit (SDK), and is capable of performing H.264 SVC compression at 30fps on video streams up to 1.3 megapixels (MP) with simultaneous G.711 audio encode. Leveraging the power of the analytics algorithms embedded within the Intelligent Encoder, the RDK is able to automatically adjust its compression parameters to optimize the bit rate of the encoded stream. In this way, as the degree of motion in a scene changes, the bit rate is automatically adjusted to consume only the bandwidth needed to represent the scene at that particular point. The result is a dramatic drop in network bandwidth consumption.

S6106 IP Camera Reference Design Kit



S6106 IP Camera RDK

The Stretch S6106 IP Camera Reference Design Kit (RDK) is an ultra-compact IP camera reference design based on the S6106 software configurable processor. With the main board measuring just 32mm x 72mm, the design is small

enough to fit within the smallest of mechanical enclosures. The high level of integration achieved with the S6106 results in a low-complexity board design with low power consumption.

The S6106 can process and compress multiple video streams at 30fps using the H.264 SVC standard, allowing the streams to be scaled to transit low bandwidth networks or be decoded by client devices with limited decode capability. The processor has enough power to compress full resolution and frame rate video from the supplied wide dynamic range D1 sensor, while simultaneously performing complex video analytics. The S6106 IP Camera RDK application is based upon the Stretch Intelligent Encoder, giving it multi-stream and multi-CODEC capability. A Web server embedded in the application software makes configuration of the design easy and intuitive using the rich graphical user interface.

IP Camera Reference Design Kits

Ordering Code	Description
HW-EVK-S6105CAM	S6105 IP Camera Reference Design Evaluation Kit – Includes IP camera card, cabling, evaluation version of the Intelligent Encoder SDK with H.264 encoder plug-in, and source code for the camera application
HW-RDK-S6105CAM	S6105 IP Camera Reference Design Kit – Includes evaluation kit contents plus PCB layout files, schematics, bill of materials, and distribution license for the Intelligent Encoder SDK with H.264 encoder plug-in
HW-EVK-S6106CAM1	S6106 IP Camera Reference Design Evaluation Kit – Includes IP camera card, cabling, evaluation version of the Intelligent Encoder SDK with H.264 encoder plug-in, and source code for the camera application
HW-RDK--S6106CAM1	S6106 IP Camera Reference Design Kit – Includes evaluation kit contents plus PCB layout files, schematics, bill of materials, and distribution license for the Intelligent Encoder SDK with H.264 encoder plug-in

DVR Add-in Card Reference Design Kits

VCC6000 Series



VCC6416

VCC6000 Series capture cards provide a versatile development platform for Stretch software configurable technology. They provide 4, 8 or 16 channels of video capture, and are supplied with embedded software that implements a state-of-the-art video capture system. In their default configuration, they are capable of capturing full frame rate D1 video and performing video processing on each captured stream. Video preprocessing algorithms include motion-dependent de-interlacing, noise reduction, and scaling. Video analytics algorithms are also run within the video preprocessing engine and include tamper detection, night detection, and motion detection. Analytics are run within user-definable regions of interest and can be configured using the card's rich API. Reference design kits are supplied with the embedded software's source code to speed the design of derivative products. The cards are compatible with the standard Stretch development and debug environment and are provided with an Ethernet-based debug solution for designers developing their own firmware loads.

VCC6000 Series capture cards provide a versatile development platform for Stretch software configurable technology. They provide 4, 8 or 16 channels of video capture, and are supplied with embedded software

form true H.264 AVC and H.264 SVC encoding. Constant Quality modes ensure that host system storage consumption is kept to an absolute minimum, while the results of the embedded analytics can be used to dynamically optimize encode parameters.

The VRC6000 Series spans a range from D1 resolution to high definition. Using HDcctv technology, VRC6000HD Series cards use existing coaxial cables to provide an easy upgrade to high definition video.

As with the VCC6000 Series, the VRC6000 Series is available as an evaluation reference design kit or as a full reference design kit.

The VRC6000 Series also includes the VDC6004 4-channel decode and display card that delivers a highly versatile multi-channel spot monitor capability. Decoding, scaling, and tiling multiple video channels, the card can drive up to four spot monitor outputs.



VRC6016

VRC6000 Series

VRC6000 Series cards feature the same video processing capabilities as the VCC6000 Series, with the addition of the Stretch Intelligent Encoder. This gives the cards the ability to per-

VRC6000C Series



VRC6016C

VRC6000C Series cards share all the features of the VRC6000 Series, but capture CIF resolution video.

In addition to their CIF video processing capabilities, VRC6000C Series cards can process D1

video. The VRC6016C processes 16 CIF channels or eight D1 channels, the VRC6008C processes eight CIF channels or four channels D1.

PCIe DVR Add-in Card Reference Design Kits

Ordering Code	Audio/Video Inputs	Input Type	Capture or Compression Resolution	Video Compression	PCIe Width	Video Output	Matrix Video Display Output
HW-EVK-VCC6008 HW-RDK-VCC6008	8	BNC Cable	D1, CIF, 4CIF, DCIF, QCIF	N/A	x1	N/A	N/A
HW-EVK-VCC6416 HW-RDK-VCC6416	16	BNC Cable	D1, CIF, 4CIF, DCIF, QCIF	N/A	x4	N/A	N/A
HW-EVK-VRC6004 HW-RDK-VRC6004	4	BNC Jacks	D1, CIF, 4CIF, DCIF, QCIF	H.264 SVC, H.264 AVC, MPEG4, MJPEG	x1	N/A	N/A
HW-EVK-VRC6008 HW-RDK-VRC6008	8	BNC Cable	D1, CIF, 4CIF, DCIF, QCIF	H.264 SVC, H.264 AVC, MPEG4, MJPEG	x1	BNC Jack	No
HW-EVK-VRC6016 HW-RDK-VRC6016	16	BNC Cable	D1, CIF, 4CIF, DCIF, QCIF	H.264 SVC, H.264 AVC, MPEG4, MJPEG	x1	BNC Cable	Yes
HW-EVK-VRC6016E HW-RDK-VRC6016E	16	Header on Card	D1, CIF, 4CIF, DCIF, QCIF	H.264 SVC, H.264 AVC, MPEG4, MJPEG	x1	Header on Card	Yes
HW-EVK-VRC6416 HW-RDK-VRC6416	16	BNC Cable	D1, CIF, 4CIF, DCIF, QCIF	H.264 SVC, H.264 AVC, MPEG4, MJPEG	x4	BNC Cable	Yes
HW-EVK-VRC6404HD HW-RDK-VRC6404HD	4	BNC Jacks	1080p, 720p	H.264 SVC, H.264 AVC, MPEG4, MJPEG	x4	HDMI Conn.	Yes
HW-EVK-VRC6004HD HW-RDK-VRC6004HD	4	BNC Jacks	1080p, 720p	H.264 SVC, H.264 AVC, MPEG4, MJPEG	x1	HDMI Conn.	Yes
HW-EVK-VRC6008C HW-RDK-VRC6008C	8	BNC Cable	D1, CIF, QCIF	H.264 SVC, H.264 AVC, MPEG4, MJPEG	x1	BNC Jack	No
HW-EVK-VRC6016C HW-RDK-VRC6016C	16	BNC Cable	D1, CIF, 2CIF, QCIF	H.264 SVC, H.264 AVC, MPEG4, MJPEG	x1	BNC Cable	No
HW-EVK-VDC6004 HW-RDK-VDC6004	N/A	N/A	N/A	H.264 Decode	x1	BNC Cable	Yes

Standalone Solution



VRM6016 Standalone DVR

Stretch VRM6016 16 Channel Hybrid Standalone DVR

The Stretch VRM6016 is a versatile, standalone DVR reference design that features Stretch S6000 family

software configurable processors. Setting a new performance point for the surveillance industry, the VRM6016 uses up to eight S6000 devices to:

- Encode up to 16 channels of D1 video
- Decode up to 32 channels of H.264-encoded D1 video
- Scale and tile two high definition HDMI outputs
- Scale and tile one D1 resolution analog output
- Scale and tile one VGA resolution video output

The VRM6016 reference design can be the starting point for a portfolio of products, each with highly optimized material costs. The scalability of S6000 family devices means that derivative designs with as few as three S6000 devices can easily be created to implement a subset of the functionality of the full eight-chip design.

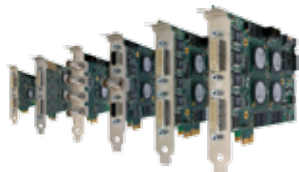
The self-contained VRM6016 standalone DVR design features a Freescale MPC8377 PowerPC with a PCIe bus to gluelessly interface to the S6000 family processors. The PowerPC runs the Linux operating system and provides a powerful processor on which to run DVR application soft-

ware. The VRM6016 uses the same Software Development Kit (SDK) and Application Programming Interface (API) found in all Stretch DVR reference designs, ensuring rapid porting of application software. The PowerPC also provides high-performance digital interfaces such as gigabit Ethernet, SATA, eSATA, and USB to ensure ultimate system performance.

The VRM6016 features hexaplex operation to support simultaneous live view, recording, decoding, back-up, IP camera control, and remote viewing at resolutions from D1 to full high definition. There are two HDcctv compliant inputs for interfacing directly to high definition cameras. Dual-channel HDMI output capability ensures that the crisp, high definition images are maintained from capture and compression right through to their display on high definition monitors.

Supplied in a 19-inch rack enclosure with fully-functional front and back panels, a 1TB internal disk drive, and a demonstration application, the VRM6016 is ready to capture video right out of the box. Supported by standard Stretch tools, it is also a powerful development platform. It is fully compatible with the Stretch Intelligent Encoder and all Stretch CODEC plug-ins, including the Stretch H.264 Scalable Video CODEC (SVC).

OEM Solutions



VCC6000 Series PCIe DVR Cards

Stretch PCIe DVR Add-in Cards

All cards in the Stretch VCC6000, VRC6000, and VRC6000C Series DVR Reference Design Kits are also available as produc-

tion-ready units. Designed for OEM integration, these cards are delivered with a full firmware load and all the host drivers required to quickly integrate the cards into a host platform.

A rich and intuitive API is used to interface third-party software to all Stretch DVR cards, making porting of applications rapid and straightforward. All video capture and processing is handled by the card and can be configured with simple API commands. Furthermore, the same rich API is common across all VCC6000 Series and VRC6000 Series cards. System designers need only port application code once to ship capture and compression cards under their own brand name.

Stretch VRC6000SW Software and API

The firmware load for OEM versions of the VRC6000 Series cards is a full-featured, precompiled and optimized firmware image. It contains the Stretch Intelligent Encoder with an unwatermarked version of all the Stretch CODECs, including H.264 SVC. Embedded analytics and Constant Quality modes ensure that optimum quality is maintained and that minimum disk space is consumed.

Firmware for OEM versions of VCC6000 Series cards performs the same video preprocessing and embedded analytics, but does not contain the Intelligent Encoder. Full frame rate and resolution capture ensures the best possible image quality while the single-chip design sets a new cost-per-channel price point for the industry.

Software for VCC6000 and VRC6000 Series OEM cards includes:

- VCC6000 and VRC6000 Series firmware images
- Software development kit (SDK)
- Rich API library
- Host software, drivers, and source code
- Reference DVR application example

The software itself resides on the host system and is loaded into the card during the start-up process. This ensures that future upgrades and enhancements are as simple as copying a new firmware file to the PC, making systems using Stretch technology future-proof.

The OEM card solutions are shipped with one year of product maintenance, during which time additional features and enhancements are made available to integrators wishing to take advantage of the latest technologies.



Stretch Development Environment

Stretch Integrated Development Environment

The Stretch Integrated Development Environment (IDE) unifies development of compute-intensive application software and configuration of the Instruction Set Extension Fabric (ISEF) in the Stretch S6000 family of software configurable processors. The Stretch IDE provides an intuitive development flow and a simple methodology for application development. Within the Stretch IDE, developers use standard C/C++ methods to create complete applications including the specialized Extension Instructions of software configurable processors.

The Stretch IDE provides a single environment for performing the following tasks:

Functional development — Compile, run, and debug application code and Extension Instructions directly on the host (x86) processor

Performance tuning — Compile and run application code with Extension Instructions using a cycle-accurate instruction set simulator

System verification — Download and run application code on a target system or on a Stretch development board

In-circuit debugging — Download and debug application code on the target system through a JTAG interface

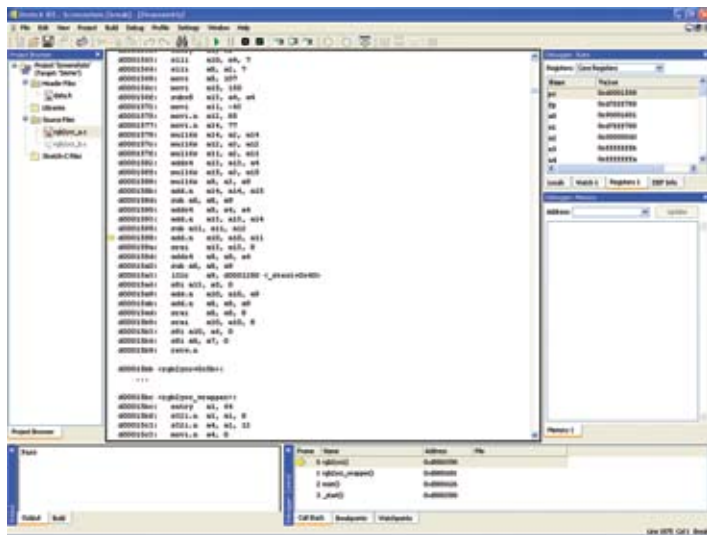
Stretch Software Development Flow

Creation — Taking existing C/C++ code, and using the Stretch-provided profiler to identify “hot spots,” sections of code that are taking too many cycles to process.

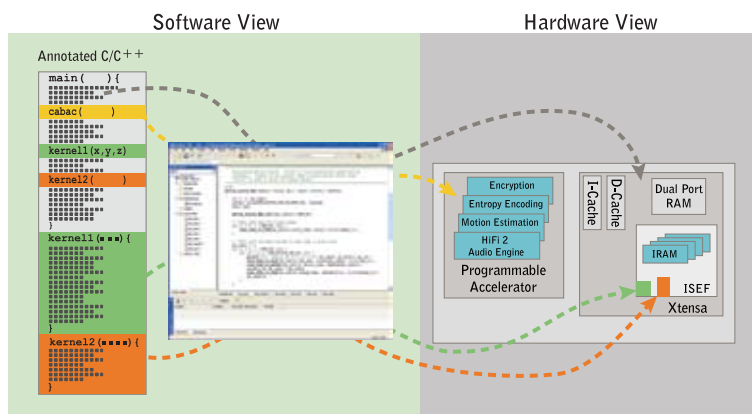
Optimization — Targeting the identified code as an Extension Instruction for the Stretch C compiler to pipeline, place, and route automatically into the Instruction Set Extension Fabric, creating a bit stream for the ISEF. The ISEF is reconfigurable and the processor automatically loads the needed bit stream into the ISEF.

The remaining C/C++ code executes either in the powerful VLIW RISC processor in the Stretch device, or on the programmable accelerator in the S6000 Family device.

Simulation and Debugging — Stretch provides a complete suite of software and hardware-based simulation and debugging options to speed your design to market.



Stretch IDE



Software Development Flow

Stretch IDE Components

Software Creation	Text Editor	A dynamic environment for editing C/C++ and Stretch C source code
	Project Manager	A resource for managing projects, builds, boards, and licenses
	Processor Array Manager	An easy way to describe the processor array topology and to direct the compiler to build applications for multiprocessor systems based on the S6000 family
Optimization	Stretch C Compiler	An integrated C/C++ and Stretch C compiler for compiling both application code and Extension Instructions
	Debugger	A powerful source-based debugging environment for application code as well as Extension Instructions
	Profiler	An instruction-level and event-level profiler for providing detailed information about program execution
	Instruction Set Simulator	A fast and cycle-accurate simulator used for debugging, performance measurement, and profiling
Support Libraries	Stretch BIOS (SBIOS)	Run-time libraries for C and C++, handlers for exceptions and interrupts, and drivers for S6000 series peripherals
	Processor Array BIOS (PABIOS)	Run-time libraries and communication toolkit for S6000 multiprocessor systems. Provides a cooperative multitasking kernel, task management, and inter-task communications such as semaphore, mutexing, and data streaming



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