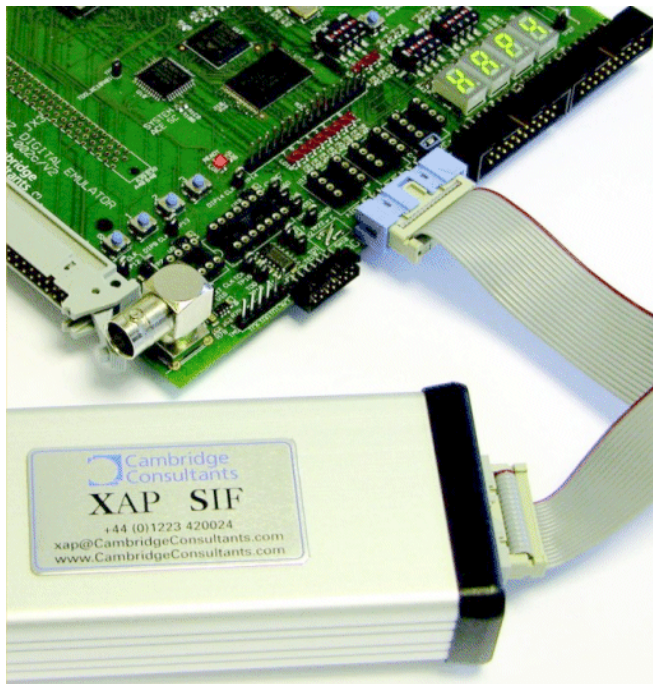


SIF debug interface



SIF is a powerful hardware and software debug technology for use in ASICs, FPGAs and other semiconductor products and electronic systems.

The SIF software tools, hardware and silicon IP are based around Cambridge Consultants' proprietary Serial Interface definition that is used to provide debug and control functionality in System on Chip ASICs. SIF technology is incorporated within all of Cambridge Consultants' XAP[®] processor cores.

Developers using SIF can quickly investigate real time system behaviour in conjunction with their development and debug tool chain, for example Cambridge Consultants' xIDE toolkit. SIF pods and digital logic enable non-invasive access into the memory map of any IC design.

SIF can be used for development, characterisation, production test, calibration and field service.

Powerful debug tools

SIF is a patented four-wire serial interface that allows non-invasive control, debugging and event logging in target hardware such as ASIC or FPGA devices and the embedded systems in which they operate. SIF provides complete access to memory and registers without interfering with device operation or timing in any way.

SIF connects to the developer's computer using SIF pods that are available with USB or printer port interfaces. The SIF PC software drivers enable multiple applications to simultaneously access all memory-mapped functions in a device through a single SIF Pod connecting to SIF logic within the device under test.

If required SIF can be run across a JTAG connection via a standard JTAG pod with only slight loss of functionality and performance.

Within an ASIC, SIF can also provide an internal parallel interface to XAP processor cores.

Non-invasive access

Using SIF, a software development system such as xIDE can make non-invasive reads and writes to processing, memory and peripheral elements within an ASIC or FPGA device. This is useful for many purposes:

- Software download and interactive debugging - start, stop, single-step, break-points.
- Flash memory programming
- Memory read and write
- Data acquisition and logging e.g. to test analogue functions
- Device characterisation followed by production testing
- PCB production test, calibration and field service
- Functional communications in the final application

SIF networks can be configured with multiple master development systems and up to four slave devices per pod.

Debug applications

The SIF comes with graphical user interface application called SIF Explorer that handles configuring the SIF and most standard data logging and configuration tasks.

- SIF configuration tool
- SIF API test
- SIF XAP controller
- SIF data logger
- SIF data writer

SIF has been widely implemented in ASIC and FPGA devices at Cambridge Consultants and elsewhere. The cost of implementing SIF's logic within a device is around 1,000 gates, which allows developers to read and write memory and register space in real time without affecting timing. SIF is normally implemented in an ASIC with a processor core such as our XAP processors or our APE2 configurable DSP.

SIF architecture

Standard SIF software includes a SIF device driver and SIF Explorer - an application for configuring and communicating with the hardware.

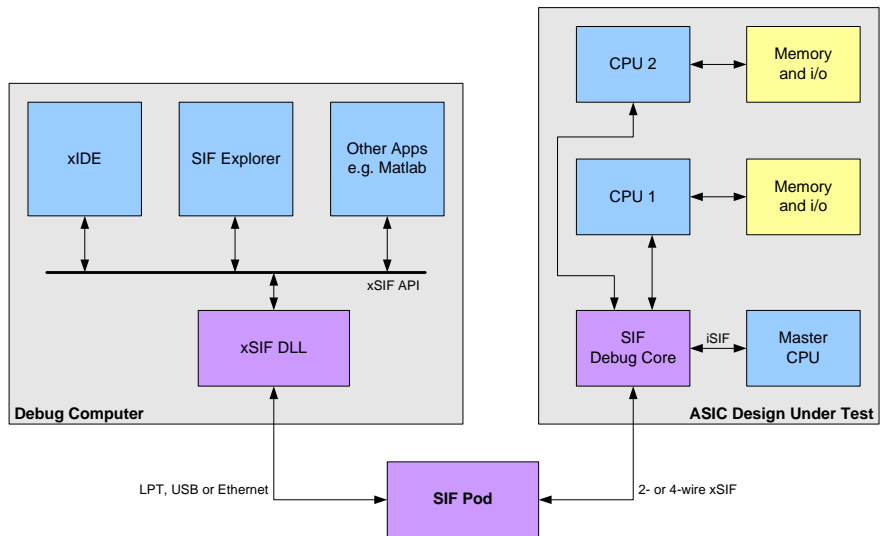
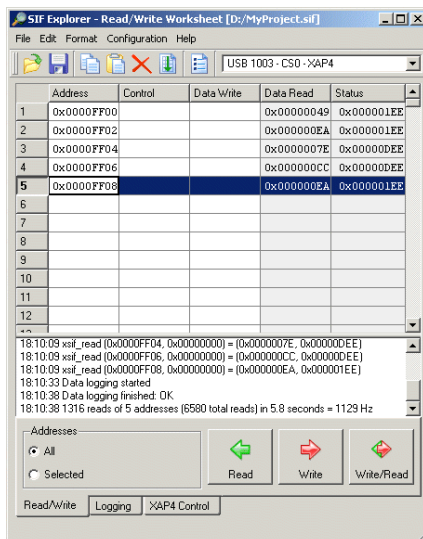
SIF is also integrated into xIDE, the Cambridge Consultants' integrated software development and debug environment.

Additional software is available to support MATLAB via custom MEX functions. Labview programs can also be used.

All of the above use the documented SIF Application Programming Interface through which developers can also access their hardware using their own application and prototyping software. SIF drivers run under Windows 2000 or XP.

SIF debug logic is built into all of Cambridge Consultants' XAP processor cores. SIF can also be used with the APE2 configurable DSP, where its non-invasive nature ensures signal processing is unaffected by debug, event logging and data collection.

SIF Explorer



SIF hardware and software

There are many variants of SIF test hardware offering a choice of connection to the user's computer, such as the SIF USB pod and the SIF LPT printer port pod. These connect up to four application boards with a 16-way connector.

Just four pins are all that is required for SIF to communicate with an ASIC or other IC device.

The USB SIF pod supports shift rates of up to 24 MHz, thus enabling high-speed data logging. 32-bit word data can be sampled and read from the device under test at up to 600,000 times a second.

SIF can also run over JTAG and via a standard JTAG pod for compatibility with requirements such as boundary scan.

SIF technology has also been applied over local area networks such as Ethernet for debugging distributed ASICs operating in a wireless data mesh.

SIF availability

SIF technology is used on all processor-based ASIC projects at Cambridge Consultants to accelerate development and debugging and to verify correct operation of products before committing them to manufacturing.

The non-invasive visibility that SIF provides allows prototype silicon to be quickly evaluated and characterised thus reducing risk and cost for ASIC projects. For example an incoming data stream from an ADC can be grabbed by SIF and a run of samples can be automatically logged into a spreadsheet.

Thereafter SIF may be employed for production testing, calibration, field servicing and maintenance. SIF is particularly useful for production test and calibration of analogue/mixed-signal devices.

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