

BittWorks II Toolkit

Application Development Software for BittWare FPGA Boards

The **BittWorks II Toolkit** is a suite of development tools for BittWare’s FPGA-based hardware that serves as the main interface between the BittWare board and the host system. The Toolkit includes drivers, libraries, utilities, and example projects for accessing, integrating, and developing applications for the BittWare board. Utilities and drivers connect the board to the host – whether via PCIe, USB, Ethernet, or serial port – and provide easy access to the board’s system monitoring features and Flash programming. Extensive libraries provide a consistent, intuitive API for integrating the board into the system, and example projects illustrate data movement and provide a starting point for development. The Toolkit supports 64-bit Windows and Linux platforms.

BittWorks II Toolkit Contents

Libraries

- **BwHIL**: Control a local or remote BittWare board
- **BmcLib**: Control the BMC on a BittWare board

Utilities

- **BwConfig**: Control BittWare hardware in a PC
- **BwServer**: Access the BittWare hardware remotely
- **BwShell**: Quickly debug live FPGA
- **BwMonitor**: View board health

Drivers

- **BwPCI**: Customizable PCI Express driver for Linux
- **Jungo**: Generic driver for Windows

Examples and reference designs

Installers

BittWorks II Capabilities

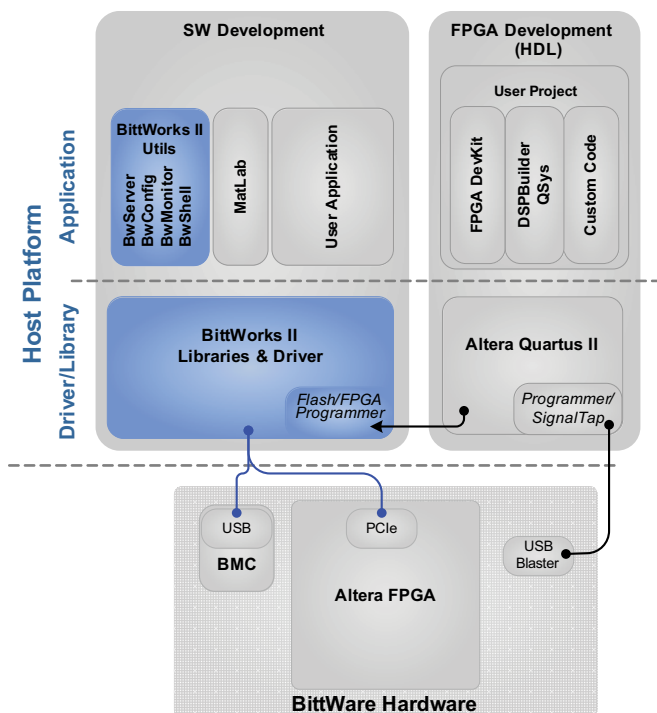
During Development

- Device setup, device information
- FPGA developer controls and debugs live FPGA images

During Development & Application Run-Time

- Driver and APIs for system integration
- Flash loading and FPGA booting
- Virtual PCIe hot-swap reduces time spent waiting for system reboots
- Monitor board health via Board Management Controller (BMC)
- Remote board upgrades: FPGA loads, BMC firmware, programmable clocks

BittWorks II tools provide drivers, libraries, utilities, and example projects to make your software and FPGA development easier and more efficient.



Libraries

The BittWorks II Toolkit libraries provide a stable API that scales with new boards. The functions are C-callable and are cross-platform, allowing them to be run anywhere that Linux or Windows runs.

BwHIL

The BittWorks Host Interface Library (BwHIL) is a library of C-callable functions for controlling BittWare boards.

- Supports PCIe and USB devices
- Includes functions for FPGA configuration, reset, memory access
- Includes functions for Flash loading, erasing, memory access
- Supports virtual PCIe hot-swap

BmcLib

BmcLib is a function library to control the BMC on a BittWare board.

- Manage board sensors
- Program clocks and voltages
- Perform firmware field-upgrades

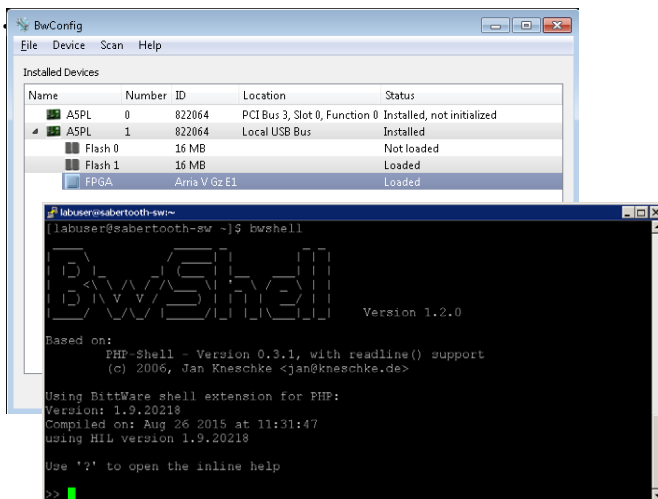
Utilities

The Toolkit features several utilities that allow you to configure your device in the system, interact with FPGA projects and debug the FPGA, control the BMC on your board, and access the board from a remote system.

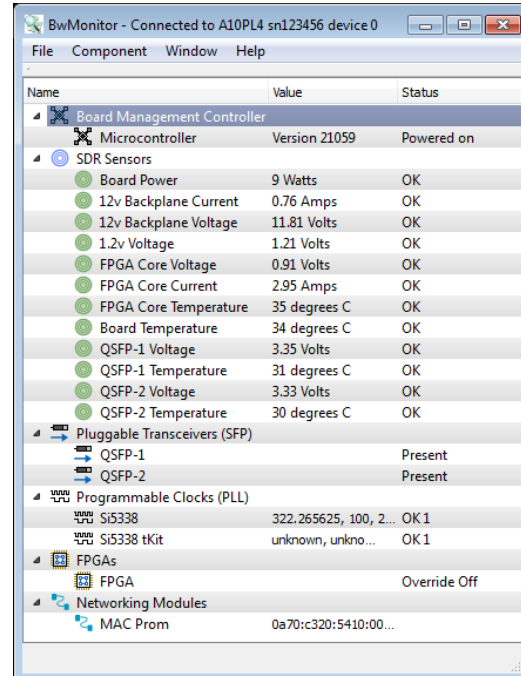
BwConfig

BwConfig is an interface for configuring BittWare devices in a system.

- Control BittWare hardware in PC
- Scan and map new devices via PCIe or USB
- View device resources and information
- Control FPGA booting and Flash loading
- Backup Flash to restore a factory default image over PCIe



BwConfig and BwShell are Toolkit utilities that provide access to your BittWare hardware



BwMonitor provides a view into the baseboard management capabilities of your BittWare hardware.

BwShell

BwShell is an interactive command-line shell for PHP scripting that provides access to the BwHIL API and the BittWare hardware.

- Quick debug of live FPGA
- Large PHP standard library and extensions
- Refer to FPGA Development Kit components by name without hard-coding addresses
- Access nearly all library functions
- Inline help

BwMonitor

BwMonitor is an interface for controlling the Board Management Controller (BMC) on a BittWare board

- View board health
- Read and log sensors
- Control sensor thresholds that determine when the board will shut down
- Load programmable clocks
- Voltage overrides
- Access devices via I²C
- Upgrade the BMC firmware
- Monitor the board over PCIe or USB

BwServer

BwServer provides remote access to the BittWare board over a TCP/IP network via the BwHIL.

- TCP/IP server for accessing Toolkit programs from a remote machine
- Can be used with or without a user interface
- Allows daisy-chaining of multiple BwServers
- Supports unique names and access restrictions

BittWorks II

Drivers

The BittWorks II Toolkit includes drivers for Linux and Windows. The Linux driver is BittWare's fully customizable PCI Express driver, and Windows systems use a standard Jungo driver.

BwPCI

BwPCI is a customizable PCI Express driver for Linux.

- Full source code included
- Fully customizable interrupt service routines
- Customer control for lowest latency, highest throughput
- MSI support
- User / Kernel interaction and custom command support
- Use with any PCI vendor / device ID

Jungo Windows Driver

Windows systems use a standard driver from Jungo.

- Customizable interrupt service routines
- MSI support
- Use with BittWare vendor / device IDs

Examples

Several reference designs are available to provide a starting point for your application development. These examples are available to download on BittWare's developer site.

Installers

Download installers for the Toolkit from BittWare's developer site: developer.bittware.com. The Toolkit installs quickly and allows you to begin using your BittWare hardware immediately.

Linux Packages

- 64-bit Linux
- .RPM for Centos
- .DEB for Ubuntu

Windows Installer

- 64-bit Windows



Support Resources

Developer.bittware.com

BittWare's developer site at <https://developer.bittware.com> provides many resources to help you get started with the BittWorks II Toolkit. Once you create an account, you can log in and download the latest release of the Toolkit, view complete online documentation for all of your BittWare products, and find reference designs and examples.

BittWare Technical Support

BittWare's support team of technical experts are available to answer any installation and usage questions for BittWare products, while also providing assistance with more advanced technical problems that may arise. With your developer site account, you can create and access your technical support issues in our issue tracking system.

FPGA Development Kit Integration

The BittWorks II Toolkit is tightly integrated with BittWare's FPGA Development Kit (FDK), which provides FPGA board support IP and integration for BittWare's FPGA-based boards.

- FDK is used to build IP, and the Toolkit is used to load the IP into Flash or the FPGA.
- FDK contains a 'Discovery ROM' component which provides the Toolkit tools with IP-awareness. IP-awareness is the ability to refer to live FPGA components and their memory regions and registers by their names and instances in software.
- **Coming Soon:** FDK will contain a software library, using functions in the BittWorks II Toolkit HIL for low-level access, that gives user applications IP-awareness.