

# Extensible FPGA Framework (EFW)

## For HiTech Global HTG-K800 Kintex-Ultrascale PCIe FPGA Module

### Key Framework Features

- Integrated, hardware verified solutions for 1G/10G/40G Ethernet development
- HTG-K800 module targeted system building blocks of Ethernet MAC and PCS, PCIe application interface, AXI4 Interconnect, DDR4 and Flash Memory controllers
- Frameworks bundled with:
  - **All options:** x4/x8 PCIe Gen3 PCIe application interface, AXI4-Lite master/arbiter for memory mapped interface, Field Upgradeable (FuP) controller for in-system Flash programming and I2C controller
  - **Selected Option Based:** Synthesizable binaries and full simulation libraries for GiGE, Low Latency 10G, Ultra-Low Latency 10G, Extreme-Low Latency 10G or 40G Ethernet
- Linux source code device drivers and APIs for PCIe interface
- Unified GUI for the entire EFW with scripting support
- Lowest startup cost for developing complete 1G, 10G and 40G solutions with Kintex Ultrascale FPGA
- Simplified, single-sourced licensing for all FPGA IP cores and drivers

### QUICKEST AND HIGHLY AFFORDABLE 1G, 10G AND 40G ETHERNET DEVELOPMENT WITH HTG-K800 PCIe MODULE

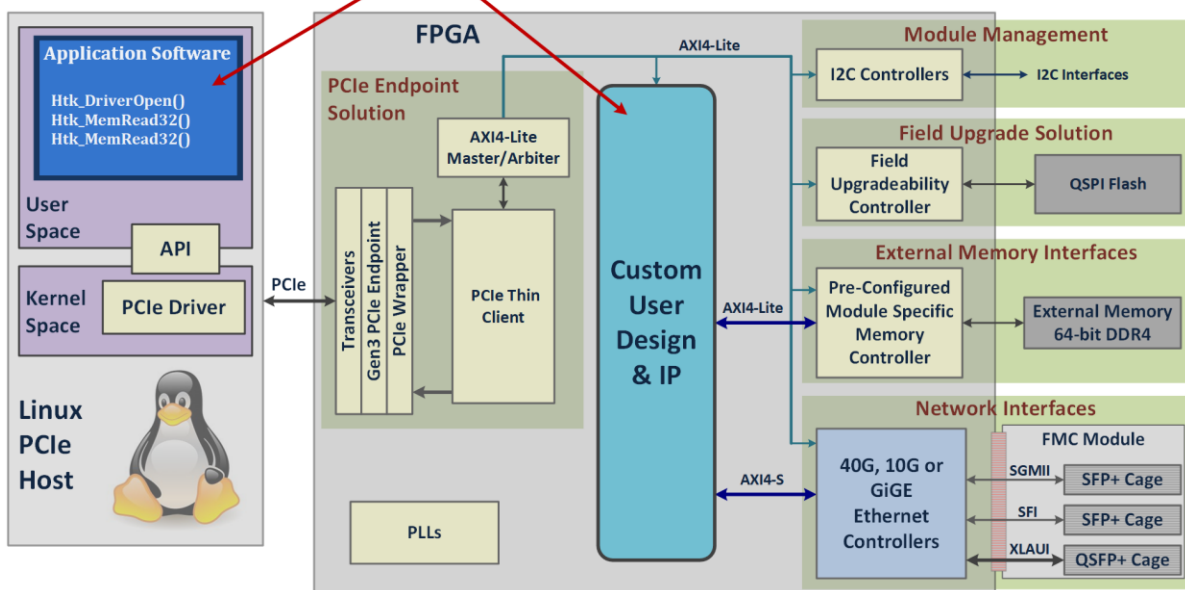
Extensible FPGA Framework (EFW) empowers FPGA developers with a verified set of productivity solutions, including module targeted physical interface components, device drivers and APIs for the HiTech Global HTG-K800 PCIe module.

Frameworks save months of development and debug time by enabling developers to skip the tedious and time-consuming phase of IP core integration, interface verification and firmware development.

Framework Bundled Content	Framework Type				Required FMC Module
	Base	1G	10G	40G	
Linux Device Drivers and APIs (Source)	●	●	●	●	-
x8 Gen3 PCIe hard IP based PCIe Endpoint Wrapper (Verilog)	●	●	●	●	-
PCIe Thin Client for Memory Mapped Access (Netlist)	●	●	●	●	-
AXI4-Lite Master and Arbiter with 32-bit control plane for registers accesses (Verilog)	●	●	●	●	-
32-bit AXI4-Lite Slave for integrating user blocks (Verilog)	●	●	●	●	-
QSPI Flash controller for in-system field upgrades (FuP) (Xilinx)	●	●	●	●	-
I2C Controllers (Netlist)	●	●	●	●	-
SPI Controller (Verilog)	●	●	●	●	-
Targeted DDR4 controllers with AXI4 wrapper (Verilog)	●	●	●	●	-
GiGE MAC with 1000Base-X Interface (Netlist)		●	●	●	FMC-X4SFP+
Low, Ultra-Low and Extreme-Low Latency 10G Ethernet option (Netlist) <b>Latency optimized for financial market applications</b>			●		FMC-X4SFP+ FMC-SFP-OC
40G Ethernet, 128-bit data path (Netlist) <b>Area optimized for low resource utilization</b>				●	FMC-X2QSFP+ FMC-SFP-OC

\* GiGE, 10G and 40G UDP/IP Offload Engine (UOE) IP cores also available

Frameworks Take Care of the Rest  
Just Concentrate on "This" and "This"



## Productivity Features

**PCIe Bus Interface and Management:** Complete PCIe solutions for the HTG-K800 x8 Gen3 PCIe interface. Framework implements a 32-bit AXI4-Lite compliant register access interface for Non-DMA (single read/write) operations.

**Parameterized AXI4-Lite Inter-connect:** Complete, fully parameterized 32-bit AXI4-Lite inter-connect with Master, Arbiter and Slave in source (Verilog) code for register access.

**Ethernet Solutions from GiGE to 40Gbps:** HTG-K800 targeted and fully verified Ethernet interfaces using GiGE, Optimal Latency 10Gbps and 40Gbps Ethernet solutions. Ethernet interfaces provided through Hitech Global HTG-FMC-X4SFP+, HTG-FMC-X2QSFP+ and HTG-FMC-SFP-OC FMC modules. Basic L2 packet generators and checkers (netlist) included for quick interface verification through GUI interface. GiGE, 10Gbps and 40Gbps UDP/IP Offload Engine (UOE) IP cores also available for hardware protocol acceleration.

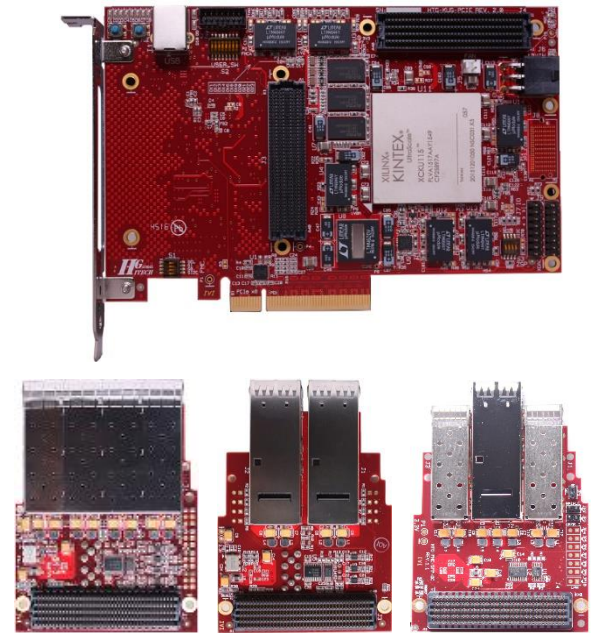
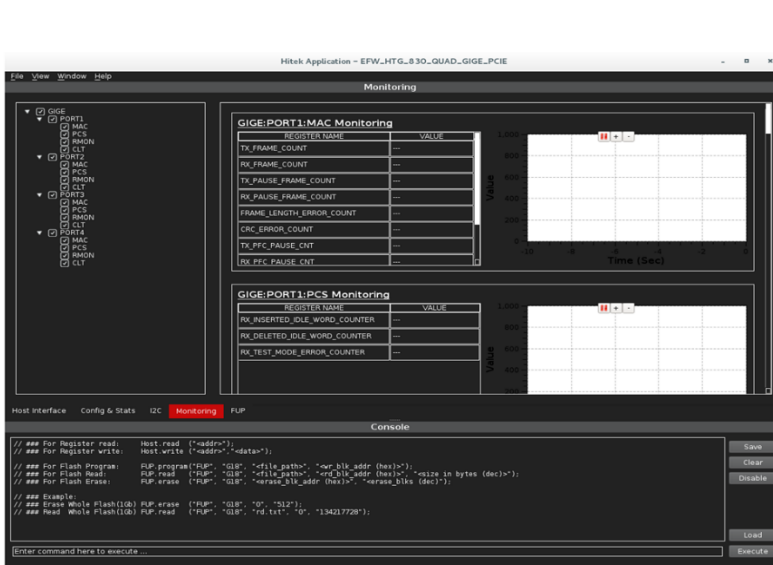
**QSPI Flash Upgrade through PCIe:** Program and erase the Serial Flash memory on the HTG-K800 through the PCIe interface at very high speeds. Integrating the FUP controller allows any user design to be field upgradable through PCIe.

**I2C and SPI Controllers:** Flexible I2C and SPI controllers with AXI4-Lite host interface for peripheral device management.

**Device Drivers:** 64-bit Linux device drivers in source code for register access and interrupts.

**APIs:** C (source code) language function libraries and example test for register access and interrupts in source code.

**GUI Interface:** GUI application (Linux only) for control and configuration of all EFW components.



## Links to IP Core and Module Resources

- 40G Ethernet IP: <http://hiteksys.com/products/fpga-ip-cores/40g-ethernet>
- 10G Low Latency Ethernet IP: <http://hiteksys.com/products/fpga-ip-cores/10g-low-latency-ethernet>
- 10G Ultra-Low Latency Ethernet IP: <http://hiteksys.com/products/fpga-ip-cores/10g-ultra-low-latency-ethernet>
- 10G Extreme-Low Latency Ethernet IP: <http://hiteksys.com/products/fpga-ip-cores/10g-extreme-low-latency-ethernet>

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### Product Ordering Codes

Base (No Ethernet):	HTK-EFW-K800-Base
GiGe Ethernet:	HTK-EFW-K800-1G
Low Latency 10G Ethernet:	HTK-EFW-K800-10G
Ultra-Low Latency 10G:	HTK-EFW-K800-10GU
Extreme-Low Latency 10G:	HTK-EFW-K800-10GEX
40G Ethernet:	HTK-EFW-K800-40G