Netcope
Development Kit

OVERVIEW

Netcope Development Kit (NDK) is a development framework that enables rapid development of network applications for FPGA-based cards. The framework creates a hardware-independent abstract layer upon specific hardware cards, solves repetitive tasks of network appliances development such as network and host interface communication, and provides generic interface for the embedded application core.

These features enable customers to design their applications in dramatically reduced time and with reduced expenses as well as to achieve maximal application performance. Furthermore, NDK makes customer's solution independent of the specific hardware board, network physical interface and host bus system.

FEATURES

- High performance scalable framework
- Rapid development of FPGA applications
- Dramatically reduced development time
- Abstract communication interfaces
- Flexible on-chip bus architecture
- Ultra-fast DMA transfers and zero-copy accesses
- User application independent of specific hardware
- Support of APIs: PCAP, Intel DPDK, Linux interface

SUPPORTED FPGA BOARDS

Netcope Development Kit is available for all Netcope Technologies FPGA boards supporting up to 100 Gbps Ethernet.

NFB-200G2QL   **NFB-100G2Q**

DELIVERABLES

- Fully synthesizable NDK IP cores
- NDK simulation model
- Synthesis and simulation scripts
- Reference application core
- FPGA card drivers for Linux OS
- Command-line tools for Linux OS
- User, programmer and installation manuals
- Extended support (optionally)

SOFTWARE-LIKE DEVELOPMENT FOR FPGAS

Netcope Development Kit keeps up with current innovations in the field of programmable hardware and leverages advantages of high-level development techniques. Integration of Xilinx's High Level Synthesis tools and SDAccel Development Environment into NDK allows developers to use high-level languages and libraries like C, C++ and OpenCL for time and performance-efficient development.

Highly-optimized Netcope Technologies IP cores for handling common tasks like communication over network and PCI Express bus together with user application core developed with high-level development tools provide powerful framework that significantly shortens time-to-market.

APPLICATIONS

- Networking and communications
  - Traffic monitoring
  - IDS / IPS solutions
  - Testing and measurement
  - Traffic encryption / decryption
  - Network functions virtualization (NFV)
- High-performance computation
  - Cryptography
  - Signal processing
- Low latency applications
  - Electronic trading

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FRAMEWORK ARCHITECTURE

Netcope development kit is divided into a firmware part for on-board FPGA chip and a software part for a host computer. Firmware and software parts communicate with each other over PCI Express bus. According to this architecture, user application is divided into a hardware accelerated part running in the FPGA chip and a software application running on CPUs of the host computer.
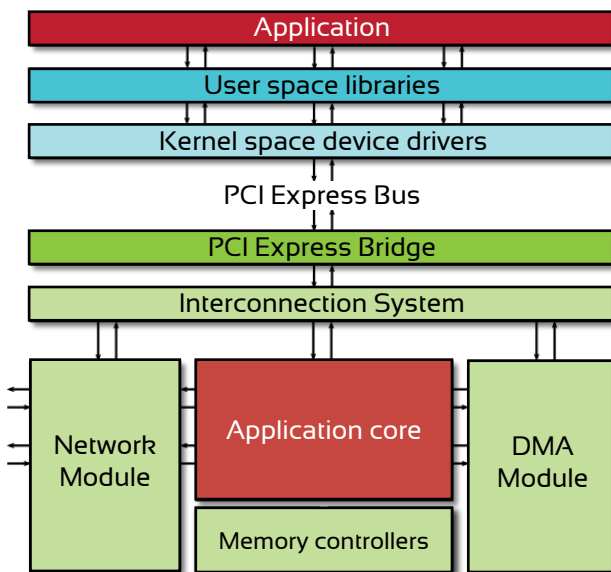
Hardware part of NDK integrates hardware-dependent building blocks and provides unified and configurable interface to the user software application. The basic elements of NDK are network modules for Ethernet, memory controllers, DMA modules and a flexible on-chip interconnection system with high-speed bus connection to the host computer via PCI Express bus.

Software part of NDK creates a transparent interface between an application core running in the FPGA and a software application running on a host computer. Apart from OS drivers and development libraries, it also contains ready-to-use command-line tools.

HOST SYSTEM CONNECTIVITY

One of the important parts of Netcope Development Kit is PCI Express interconnection system used for communication between hardware and software part of NDK. It is optimized for throughput of more than 100 Gbps in both directions (full duplex) while providing very low latency and communication overhead.

COMMUNICATION INTERFACES

Inside of the FPGA chip, the communication with network interfaces is performed by the network interface module implementing the Ethernet MAC layer. Incoming packets are forwarded to the application core using AXI4-Stream-compatible protocol. Timestamps with nanosecond precision can be generated for each incoming packet. Communication of the application core towards software is divided into different receive queues (DMA channels) depending on the requested throughput. These channels provide abstract hardware-software data pipes. There is also memory-based, AXI4-Lite-compatible bus available for register-based accesses and configuration.

Software part of Netcope Development Kit includes a set of development tools, communication libraries and device drivers with well-defined interfaces. Single read and write operations as well as DMA transfers can be used to access FPGA application core. The device drivers allow fast packet transfers between the application core and software application via highly optimized, zero-copy interface, Intel DPDK, packet capture library (PCAP) or standard system network interface.

ADVANCED IP CORES

Netcope Technologies offers first-in-class communication IP cores and IP cores for network traffic processing:

▶ **Ethernet MAC IP Core** (Included in NDK) Covers MAC layer and necessary parts of PCS and PMA layers for 40G and 100G Ethernet. Easy-to-use integration with high-speed point-to-point interface and low-speed configuration interface.

▶ **PCI Express IP Core** (Included in NDK) Fast data transfers between a card and a host memory through an abstract streaming interface. Near-zero CPU load; zero-copy, memory-mapped access to data; more than 100 Gbps throughput for PCIe Gen 3 x16.

▶ **Packet Header Processor** Highly configurable IP core for packet header parsing and header field extraction; MPLS / VLAN / IPv6 support, run-time configurable header field extraction, resource efficient implementation.

▶ **Please contact us for information about more IP cores.**

ORDERING INFORMATION

Please contact Netcope Technologies for pricing and additional information about this product.

www.netcope.com