



## 40G UDPIP Hardware Protocol Stack Core

### Features

The core Implements a 40G UDPIP hardware protocol stack that enables high speed communication over a LAN or a point-to-point connection. It is ideal to offload systems from demanding tasks of UDP/IP and to enable media streaming in both FPGA and RISC designs.

The core supports ARP request, reply and manages 32-entry ARP cache. ICMP ping reply is included. The core provides DHCP client engine, which can get an IP address from external DHCP servers. The 40G UDPIP Core implements V3 IGMP membership Query/Report messaging. The IP jumbo packets are supported as well as UDP port, IP source IP address filters and VLAN.

Configurable IP/UDP checksum generation and validation are implemented. MDIO bus access to external device via AXI4-Lite bus is included. IP RAW packets and User packets (ex. TCP and ARP packets) are supported in both TX and RX.

IP fragmentation and TCP hardware protocol stack companion core are available on demand.

The core supports 32 TX UDP channels and 32 RX channels which consists of 16 UDP channels, 10 IP RAW channels and 6 User channels (TCP and ARP). Each of the RX channels can be configured and associated with any of 5 RX ports. Each of the TX channels can be used to send packets on any of 5 TX Ports.

The core connects to user logic through Control Interface of AXI4-Lite buses; 5 RX Ports of AXI4-Stream buses and 5 TX Ports of AXI4-Stream buses.

The core connects to 40G MAC module through AXI4-Stream bus. KMX 40G MAC and PCS cores are available to our customers.

The core is designed to well handle exceptions of internal memory exhaustion and invalid incoming packets while it makes the max use of internal memory to deal with TX and RX burst traffic effectively.

There is a fully implemented reference design with the core and its VHDL source code is shipped with the core delivery.

### Full 40G UDPIP Hardware Stack Core

- 40G Ethernet
- IPv4
- Transmit and Receive
- Five RX ports with 32 RX channels and Five TX ports with 32 TX channels
- ARP client/server with 32 entry ARP table
- ICMP (Ping Reply)
- IGMP v3 membership Query/Report messaging
- Multicast
- UDP Port Filtering
- 801.1Q tagging for VLAN
- UDP/IP Checksum generation and validation
- DHCP client engine
- TCP hardware protocol stack companion core available on demand
- IP raw packets
- Run time programmable network parameters
- Control/Status interface
- Separate clock domains for packet processing and control interfaces.
- IP Fragmentation available on demand
- MAC, PCS, MDIO modules
- External MDIO access via AXI4-Lite bus

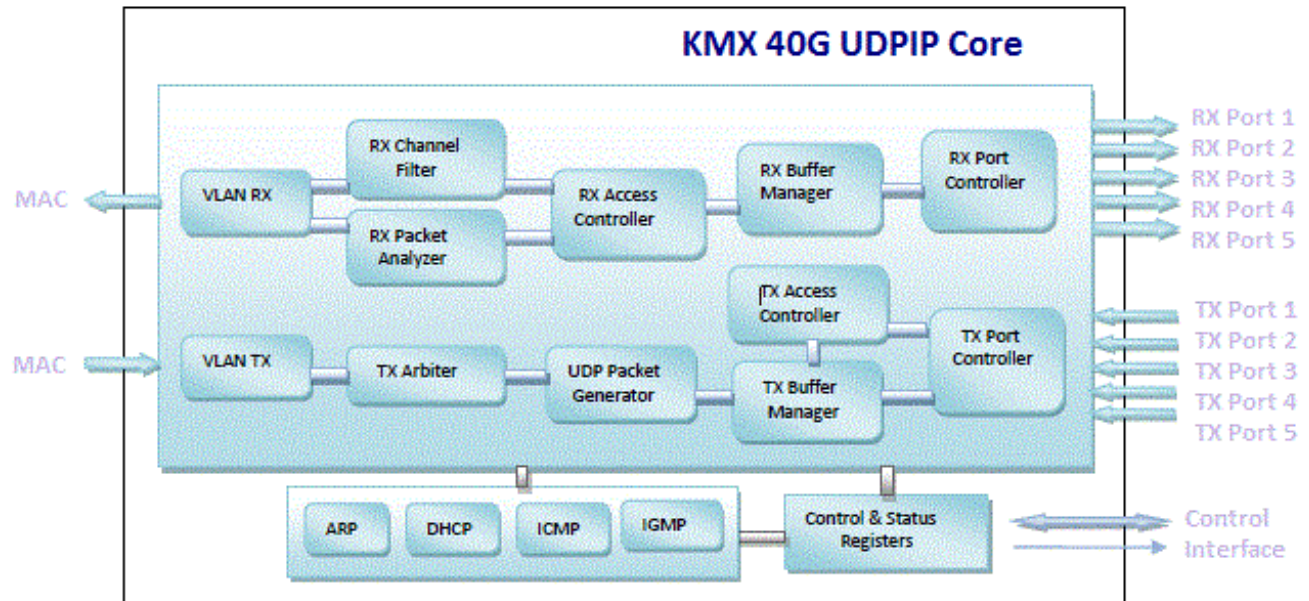


Figure 1 KMX 40G UDP/IP Core Architecture

## Applications

The core is widely used in applications where ultra-low, deterministic latency and high performance of throughput are required, such as video, image and audio streaming over Ethernet, IP cameras VOIP and smart phones, high frequency trading system, high-speed communication data centers, device monitoring and control over IP networks.

## Implementation Results

The 40G UDP/IP Core has been evaluated on both Xilinx and Altera platforms. The core is highly pipelined, optimized to achieve ultra-low latency and high performance. The following list the core sample resource utilization on Xilinx Kintex UltraScale+ FPGA device KCU116 board.

Core Configuration	LUT	LUTRAM	BRAM	FF
5 RX Ports & 5 TX Ports	10764	696	17	9029

## Support

The cores as delivered are warranted against defects. Any update of core and free technical support 7 days a week and 24 hours a day are provided to the customers with a valid KMX license.

## Deliverables

The core in netlist format included, the delivery package contains everything required for successful integration, including VHDL source code of reference design and test bench, verification scripts, constrain file, synthesis scripts and related documents. Free companion cores such as MDIO, serial debug command, auto-configuration are shipped with the core to help customers with easier and efficient integration.

## Contact

Please contact KMX Embedded Core team, if you are interested in KMX 40G UDPIP core.

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