

# RapXG™ Overview



# About New Wave

New Wave DV provides high performance network interface cards, system level products, FPGA IP cores, and custom engineering for:

- › High-bandwidth low-latency network interfaces
- › Programmable network interfaces
- › System critical networks
- › Hardware offload engines
- › Network capture/record/playback
- › Special protocol support



# Introducing...

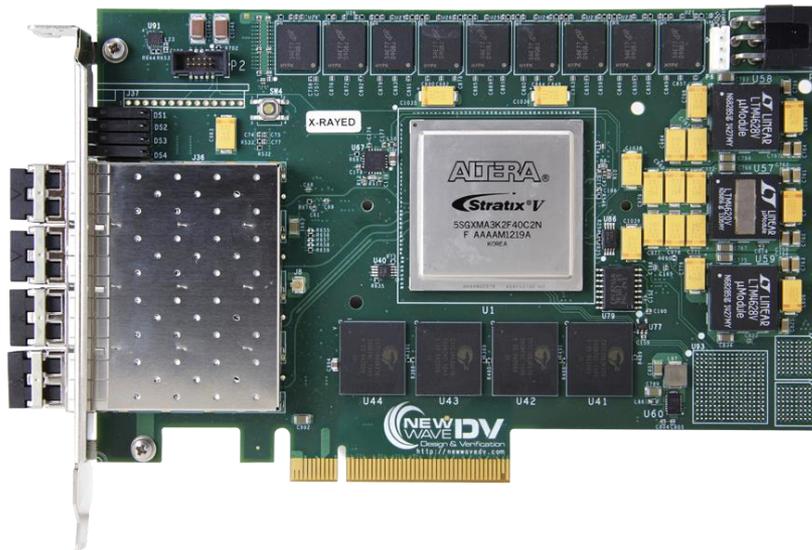
## The RapXG™

- › Quad SFP+ ports supporting and copper connectors
- › IRIG-A, B, and G time synchronization
- › PCAP Next Generation file format
- › Programmable capture size and hardware filters
- › Low latency, multi-threaded DMA host interface



# The Heart of the System

## V5031 FPGA Card



- › Quad 10 Gigabit Ethernet SFP/SFP+ ports
- › Altera Stratix V FPGA (scalable from A3 to AB)
- › 8-lane PCI Express Gen 3 host interface
- › New Wave DV high bandwidth network traffic capture design with 10G EPON PCS and MAC layer

# Technical Specs

## NETWORK INTERFACE

- › Quad 10 Gigabit EPON SFP+ ports
- › Quad 1 Gigabit EPON SFP+ ports

## TIME SYNCHRONIZATION

- › IRIG-A, B, and G time synchronization via a front panel SMA connector

## FILTERS

- › 128 programmable 5-tuple filters

## PACKET RECORD

- › PCAP Next Generation format or raw data format

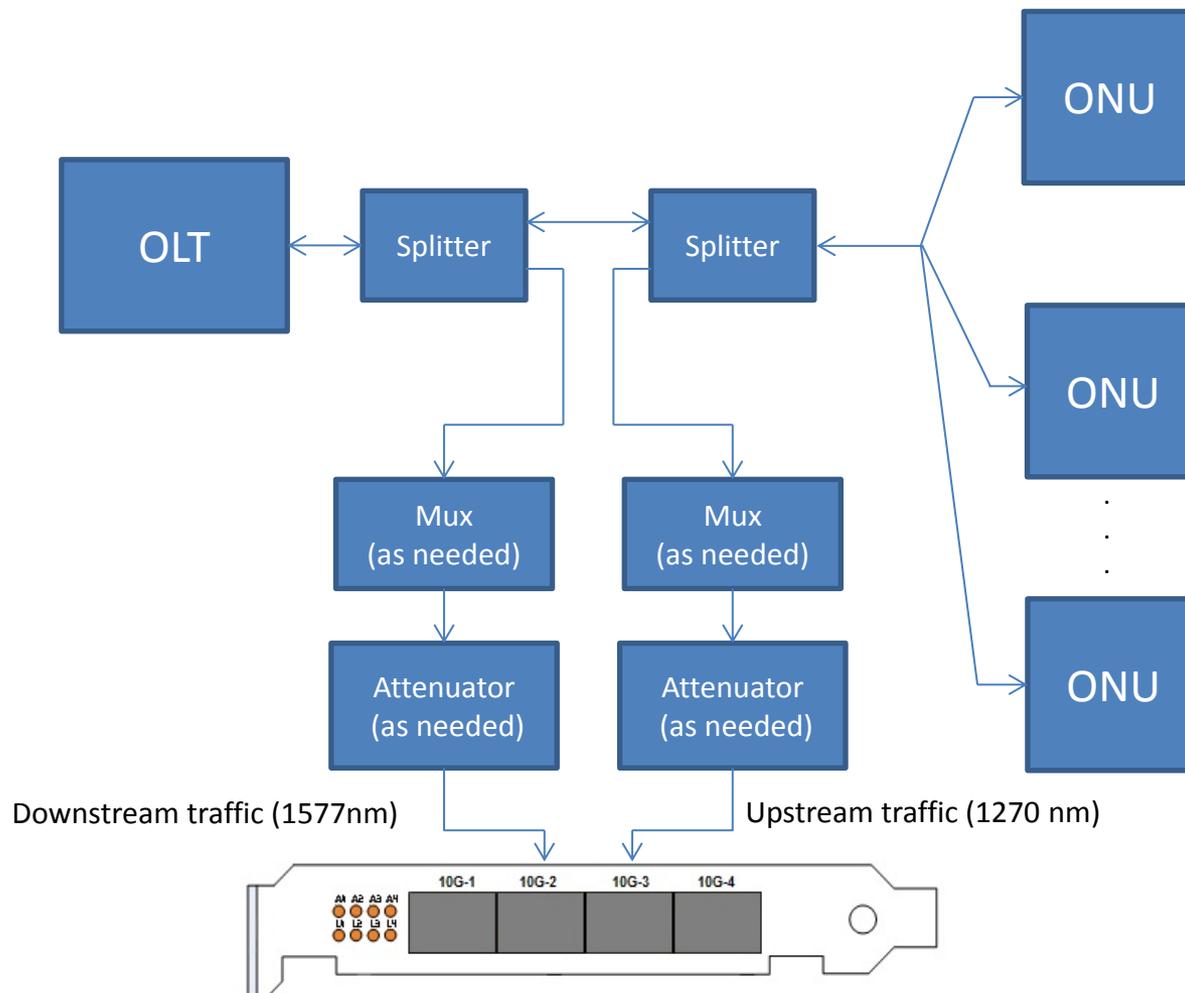
## HOST INTERFACE

- › x8 PCI Express Gen 3

## BENEFITS

- › Full bandwidth upstream and downstream simultaneous capture
- › PCAP Next Generation file format for integration with Wireshark and other 3<sup>rd</sup> party tools
- › Programmable capture size and hardware filters
- › Low latency, multi-threaded DMA host interface
- › Out of the box up capture operation, API available for custom application development

# Example System Setup



# Capture Details

- › Standard RapXG™ configuration provides ports for monitoring both upstream (ONU's) and downstream (OLT) traffic simultaneously at full bandwidth
- › RapXG™ uses a unique method of acquiring incoming signal lock of current ONU sender at time of transmission, capture does not depend on allocated transmit schedule
  - › Allows detection of incorrect ONU operation
  - › Proven capture method over 10's of millions of consecutive packets from interleaving ONU's
  - › Requires no measurement of fiber distance, transmit times, or any other offsets

# Hardware Filters

- › Hardware based programmable filters allow for selectable packet passing on:
  - › LLID (Specific to EPON)
  - › Protocol (TCP, UDP, etc...)
  - › Source/Destination IP Address
  - › Source/Destination Port Number
- › Using filters can significantly reduce traffic captured for analysis to only traffic of interest

# Wireshark Integration

Wireshark® installed on RapXG™ system  
has modifications providing EPON packet decodes

\*exg2

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

Apply a display filter ... <Ctrl-/> Expression... + Apply this filter AdvIO\_MAC

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000000	Commscop_03:67:4e	Spanning-tree-(for-bridges)_01	MAC CTRL	72	Report
2	0.000345630	Commscop_03:66:de	Spanning-tree-(for-bridges)_01	MAC CTRL	72	Report
3	0.001391650	Commscop_03:67:2e	Spanning-tree-(for-bridges)_01	MAC CTRL	72	Report
4	0.001842175	Commscop_03:67:6e	Spanning-tree-(for-bridges)_01	MAC CTRL	72	Report
5	0.003037698	Sumitomo_d5:46:30	Spanning-tree-(for-bridges)_01	MAC CTRL	72	Report
6	0.004900367	commscop_03:67:4e	Spanning-tree-(for-bridges)_01	MAC CTRL	72	Report
7	0.005254871	Commscop_03:66:de	Spanning-tree-(for-bridges)_01	MAC CTRL	72	Report
8	0.006461409	Commscop_03:67:2e	Spanning-tree-(for-bridges)_01	MAC CTRL	72	Report
9	0.006945268	Commscop_03:67:6e	Spanning-tree-(for-bridges)_01	MAC CTRL	72	Report
10	0.008087619	Sumitomo_d5:46:30	Spanning-tree-(for-bridges)_01	MAC CTRL	72	Report

▶ Frame 1: 72 bytes on wire (576 bits), 72 bytes captured (576 bits) on interface 0

- IEEE 802.3 EPON Preamble
  - 0... .. = Mode: Unicast
  - .000 0111 1101 1001 = LLID: 2009 (0x07d9)
  - Frame check sequence: 0xd6 [correct]
- Ethernet II, Src: Commscop\_03:67:4e (00:24:45:03:67:4e), Dst: Spanning-tree-(for-bridges)\_01 (01:80:c2:00:00:01)
  - Destination: Spanning-tree-(for-bridges)\_01 (01:80:c2:00:00:01)
  - Source: Commscop\_03:67:4e (00:24:45:03:67:4e)
  - Type: MAC Control (0x8808)
- MAC Control
  - Opcode: Report (0x0003)
  - Timestamp: 1942210499

```
0000 55 55 d5 55 55 07 d9 d6 01 80 c2 00 00 01 00 24 UU.UU... ..$.
0010 45 03 67 4e 88 08 00 03 73 c3 c7 c3 01 01 00 00 E.gW.... s.....
0020 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0030 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0040 00 00 00 00 52 15 b6 8f .....R...
```

Packets: 10646 · Displayed: 10646 (100.0%) Profile: Default

# Software Provided

- › The RapXG™ system comes pre-loaded with the New Wave software driver and API for interfacing the RapXG™ hardware
- › The driver has two modes of operation
  1. Standard kernel mode: In this mode the card works as any network card operates. An interface is opened and traffic can be captured on the interface using the prebuilt Wireshark installed.
  2. Direct access mode: In this mode users are directly accessing the card via the provided API and bypassing the kernel. This is the mode to be used when developing custom applications. Examples are provided already installed on the system.

# Fielded Units

- › Production units are in the field today with several customers
- › Have completed validation testing with Time Warner / Charter Communications in Virginia
- › CableLabs and others also have units

# Questions?

## FAQ

What is the lead-time for units?

*If in stock, 1 week. Typical lead-time is 8 weeks.*

Are the optics of the system pre-populated?

*Yes, we ship the units with the upstream/downstream optics populated. **We can also ship some of the ports as standard 10G Ethernet**, people have found this useful for traffic generation purposes.*

Are updates provided?

*Yes, as new features are available we can remote update both the software and the programmable hardware (FPGA) with new releases. We can also provide the update package for you to perform the update.*

What is the operating system?

*The OS of the RapXG™ system is Linux based. To date all units have been RedHat, but other Linux variants (CentOS, Ubuntu, etc...) can be supported.*



**Thank You**