ICE-COOLer

Direct Attached PCIe Gen3 over fiber Expansion Appliance

Power Side

I/O and Interface Side

Overview

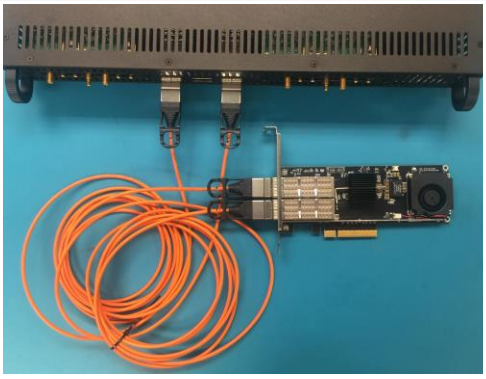
The ICE-COOLer is a one rack unit (1U) appliance used extend a single internal x8 PCIe bus server slot to two (or more) external slots over fiber

Features

- **PCI-Express Gen3 endpoint connection over optical link**
- **Expands a single internal x8 PCIe Gen3 server slot to two (or more) external slots**
- **Holds up to 2 ICE-PIC6 series DSP cards (Limited speed and configurations)**
- **Holds up to 2 ICE-PIC7/ICE-PIC8 series DSP cards (including long format cards)**
- **Supports up to 4 I/O modules, 2 crossbar interfaces, and 4 processor modules**
- **Rigid multi-point PCIe card mount for increased vibration / shipping tolerance**
- **Up to 8 GB/s bidirectional bandwidth between server and external chassis**
- **Up to 100 meter separation between server and external chassis**
- **Employs COTS QSFP+ fiber interfaces**
- **Driver-less expansion interface (transparent to OS)**
- **Cards in external chassis appear as local devices on server PCIe bus**
- **Front/Back or Back/Front rack mount options**
- **Integrated over-temperature protection**
- **Redundant hot-swap 380 W power supplies, 1+1**
- **Redundant 8-way cooling**
- **½ length/½ height low power (8 W) PCIe host bus adapter card in server (included)**
- **Can be daisy-chained with additional ICE-COOLER appliances**

Applications

- **ICE-PIC card installation in 1U or space constrained servers**
- **Remote data acquisition and FPGA processing**
- **Ground loop / power decoupling between host server and remote PCIe cards**
- **High reliability operations**
- **High density HPC installations with FPGA acceleration**



Remoting Feature Explained

The PCI-Express bus is extended over fiber as shown in this diagram with a ½ height, ½ length, 8-Lane ICE interface card included with the ICE-COOLer unit. With the ICE interface card installed in a compatible host computer 8-lane PCIe slot, the two ICEPIC cards installed in the 1U COOLer appear on the bus of the host computer as if they were installed in the computer directly. Using the ICE-COOLer in this way allows the acquisition portion of the processing thread to be installed in a different location than the processing computers.

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ICE Enterprises

Innovative Computer Engineering

ICE-COOLer

Direct Attached PCIe Gen3 over fiber Expansion Appliance

Remotes a PCIe 8-Lane slot to a 1U chassis with ICE-PIC cards via fiber

Add an ICE-RAID to record or playback packets from the ICE-COOler

ICE-RAID (2U-48TB/3U-96TB/4U-140TB available)

Analog/SONET/Packet/Network Recording

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ICE Enterprises - *20 Years of Innovative Computer Engineering*

Cards /Devices /Appliances/Packet Engines

ICEPIC — PCI Express Card
ICEPIC1 PCI 32bit · ICEPIC2 PCI 32bit · ICEPIC3 PCI 32bit · ICEPIC4 PCI 64bit · ICEPIC5 PCIX 64bit · ICEPIC6 PCIe Gen1 · ICEPIC7 PCIe Gen2 · ICEPIC8 PCIe Gen3 6GB/sec

ICEPOD — Ultra Portable High Speed Recorder (HSR) "Shoe Box Size"
ICEPOD6 · ICEPOD6.5 · ICEPOD8 M8-HSR 2600MB/sec Removable Storage

ICEPAC — Ultra Portable Device "Pocket Size" / Quad 10 GbE Network Output
ICEPAC 400MB/sec Dual I/O Site

ICE BLOCK (Network Attached ICE-Cards/Modules)
Dual 40 GbE or Quad 10 GbE Network-Attached Appliance
(8TB Record/Playback option available)
Network Attached 1U Appliance Hosting Dual ICEPIC Cards

ICE COOLer (PCIe Attached over Fiber ICE-Cards/Modules)
Advanced Connection Over Optically Linked er
PCIe Remote Attached 1U Chassis Hosting Dual ICEPIC Cards

ICE GigEXD / TGigEXD
1 Gigabit and 10 Gigabit Data Conversion device (Stand Alone and up to 4-Channel 1U Chassis)
GigEXD 1Gbit · Works w/ ICE-AA2D · TenGigEXD 10Gbit with 4 Tuners · Works w/ D2AWGr2

ICE-DPI8 (Deep Packet Inspection)
PCI Express Card / Dual 40G or Quad 10G - Intel® XL710 Interface
Heavy Load Packet Processing/Inspection

Modules – Analog / Digital / Optical / Network / Packet Engine

1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018

Analog Digitizers

Analog to Digital A2D 12 Bit
250 MS/sec ICE-A2Dr9 · 500 MS/sec ICE-A2Dr10 · 250 MS/sec ICE-A2Dr13 · Dual 1.6 GS/sec 750 MHz BW ICE-A2Dm18

Analog to Digital A2D 14 Bit
105 MS/sec ICE-A2Dr7 · 125 MS/sec ICE-A2Dr8 · 250 MS/sec ICE-A2Dm14 · Currently in Prototype · Dual 3 GS/sec 1500 MHz BW ICE-A2Dm20

L-Band 900-2200 MHz Tuner
900-2200 MHz 85 MHz BW ICE-LB2Dr2 · 900-2200 MHz 120 MHz BW ICE-LB2Dr3

Digital to Analog DAC
160 MS/sec ICE-D2Ar2 · 200 MS/sec ICE-D2Ar9 · ICE-D2AWG 110 MHz BW 0-500MHz IF · ICE-D2RF 50 MHz BW 70-4000MHz RF · ICE-D2AWG-m3 5GSPS DAC / 400+ MHz BW 0-2500 MHz CF Direct RF Up to 7000 MHz Mixed

Processors

Processor Modules Xilinx and Altera Gate Array "Sandbox"
DTDM · DTDMX · V5M · V6M Vertex · K8M Xilinx UltraScale · A8M Altera/Intel® Arria 10

Optical

SONET Optical Modules
SONETr1 OC3 · SONETr2 OC12 · SONETr4 OC48 · SONETr5 Dual OC48 · SONETr6 Dual OC192 · SONETr7 Dual OC192 Enhanced

Packet Engines

Raw Packet I/O Modules [Dual 10G]
UDP 10Gr2 · UDP 10Gr3

Packet Processing Modules (For ICE-DPI8 Card) [Quad 10G / Dual 40 GbE]
Deep Packet Inspection Processor

1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018

Analog/Optical/Packet Rack and Portable Recorders

ICE Recorder Technology — Speed Progression (Megabytes/sec)
20 MB/S · 80 MB/S · 320 MB/S · 1250 MB/S · 1400 MB/S · 2800+ MB/S · 4000+ MB/S

Custom Analog Recorders — Many Models-Call for a Solution
ICECAP20 · ICECAP80 · ICECAP320 · ICECAP1250 · ICECAP WB1400 · ICECAP 1600 Quad 400MB/s

Rack Mount Optical Recorders
Tandem OC192 SONET OC192/10G | Dual 1400MB/s ICEPIC8 | SONETR7

Portable Small 12 Volt DC Analog Recorders
ICEPOD8 HSR Dual 1400 MB/S (2800 MB/S)

Portable Small 12 Volt DC Optical Recorders
ICEPOD8 HSR Tandem SONET OC192 10G ICE-SONETr7

Portable ICE Briefcase Recorders — "Server-in-a-Briefcase"
Original QT360 Briefcase 2003 · ICE Briefcase XEON Series 48GB RAM Hosting Dual ICEPIC6 Cards · ICE Briefcase Intel® XEON V4 Series 128GB RAM Hosting Dual ICEPIC8 Cards

Custom Packet Recorders (4 Channel / 400Megabyte/sec/channel Packet Recorder)
Example Model listed here - Many Models-Call for a Solution
ICE-CSC-M2012 Quad 400MB/s

Recorders Rackmount and Portable Technology

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