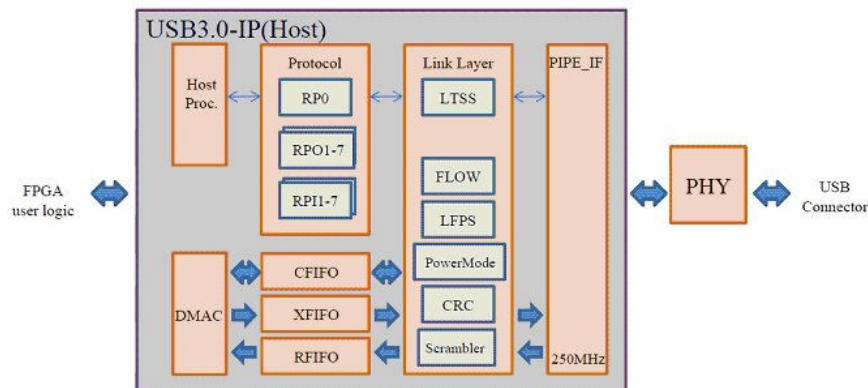


Enchant your product with SuperSpeed!

USB3.0-IP Core intruduction

- IP Core to support USB3.0 SuperSpeed for Host (USB3H-IP) or Device (USB3D-IP)
- Includes Protocol&Link Layer as well as DMAC,Host I/F, and PIPE I/F
- Practical implementation is provided by reference design.



* LTSSM: Link Training and Status State Machine, LFPS: Low Frequency Periodic Signaling

USB3.0-IP Core merit1

- Supports SuperSpeed(5.0Gbps) of USB3.0 Standard.
- Provides controller function of either Host or Device side.
- Connects with external PHY device. (TUSB1310A of T.I)
- Includes USB3.0 PIPE interface. (250MHz@16bit)
- Saves FPGA resource usage by limiting SuperSpeed only.

Device-IP Core (USB3D-IP)	Family	Example Device	Fmax (MHz)	Slices ¹	IOB ²	GCLK	BRAM	MULT ⁷ DSP48E	DCM / CMT	Design Tools
	Spartan [®] 6 (LXT)	XC6SLX45T-3FGG484	182	2582	68	2	9	0	2	ISE [®] 12.3i

Host-IP Core (USB3H-IP)	Family	Example Device	Fmax (MHz)	Slices ¹	IOB ²	GCLK	BRAM	MULT ⁷ DSP48E	DCM / CMT	Design Tools
	Spartan [®] 6 (LXT)	XC6SLX45T-3FGG484	180	2627	70	2	9	0	2	ISE [®] 12.3i

USB3.0-IP resource report (1 Control, 2 IN/OUT each)

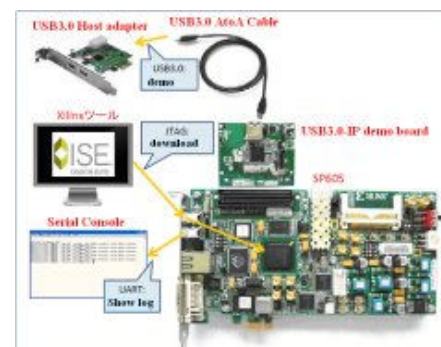
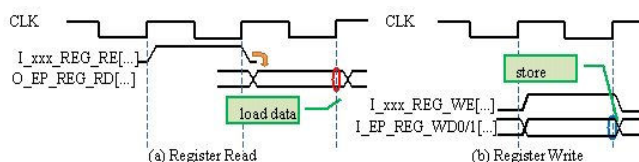
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USB3.0-IP Core merit2

- Supports 15 IN/OUT Endpoints at maximum.
 - 1 Control Endpoint
 - 7 IN/OUT Endpoints each at maximum.
- Supports all transport type.
 - (Control/Bulk/Isochronous/Interrupt)
- Real board evaluation with Xilinx FPGA board
 - (Both Host-IP and Device-IP)
- Simple and easy connection user I/F.



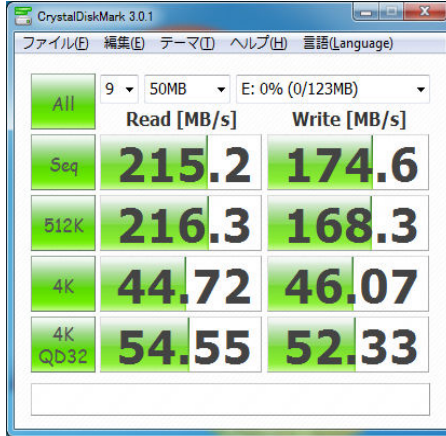
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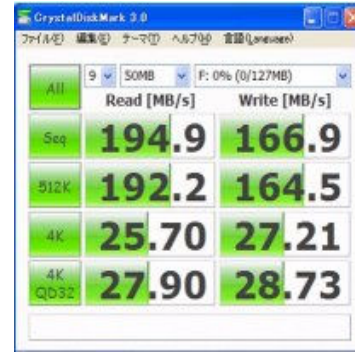
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Device-IP Core performance

- **Best performance in existing USB3.0 system.**
 - High performance at both sequential and random access.
 - Provides design that minimizes overhead.



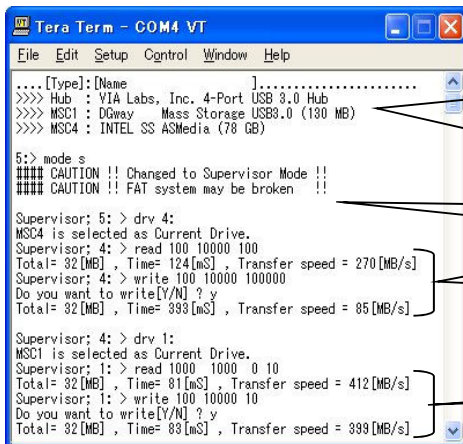
USB3D-IP benchmark result



(Reference: competitor result)

Host-IP Core performance

- **Extracts SuperSpeed upper limit!**
 - Raw sequential access (non-FAT) result:
 - **Read=412MB/s, Write=399MB/s (use USB3.0 RamDisk)**



USB3H-IP performance result

Environment:

- * Use SP-605 Host reference design.
- * Connect 4 port USB3.0-Hub (from VIA)
- * Assign drv1 as RamDisk emulation drive
- * Assign drv4 as Intel-SSD via ASMedia bridge

Raw data (non-FAT) performance

SSD Read=270MB/s, Write=85MB/s

RamDisk drive

Read=412MB/s, Write=399MB/s

(Note) drv1 RamDisk is SP-605 with Device-IP reference design.

Core product line up

- Supported FPGA and Core product

Product Info.	Spartan-6	Virtex-6
Device-IP Core	USB3D-IP002	USB3D-IP003
Host-IP Core	USB3H-IP002	USB3H-IP003

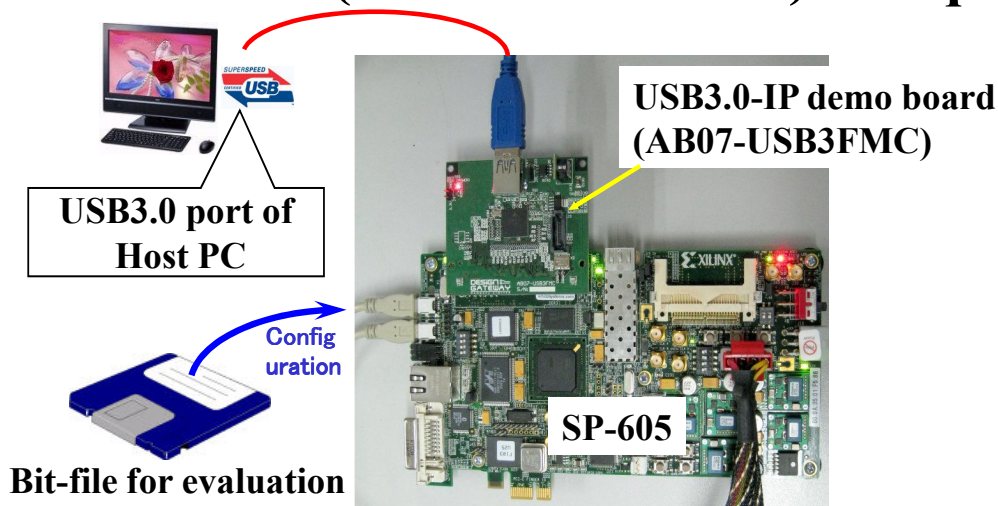


- Next product plan
 - Support Virtex-7/Kintex-7/Artix-7



Evaluation bit-file for Spartan-6

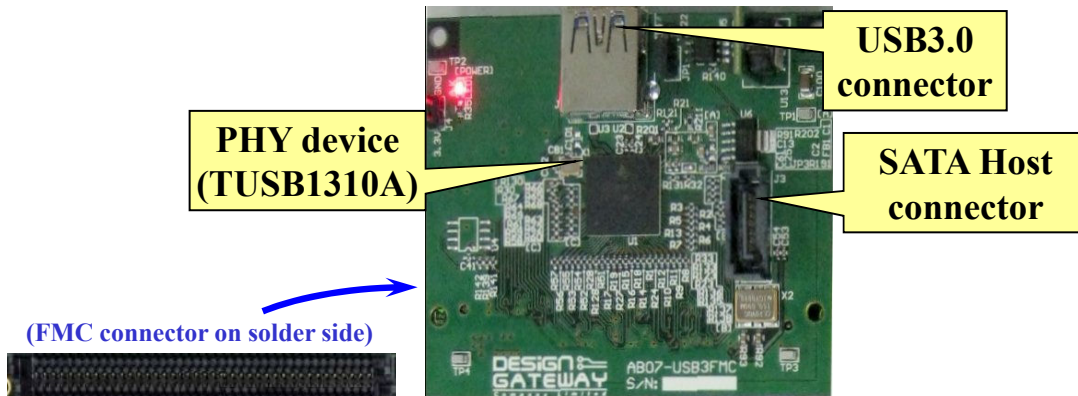
- Free bit-file for evaluation using SP-605
- Demo board (AB07-USB3FMC) is required



USB3.0-IP evaluation environment

Demo board (AB07-USB3FMC)

- Connects with FMC on SP-605/ML-605
- Mounts TUSB1310A (T.I) and peripheral circuit
- Mounts additional SATA Host connector



AB07-USB3FMC

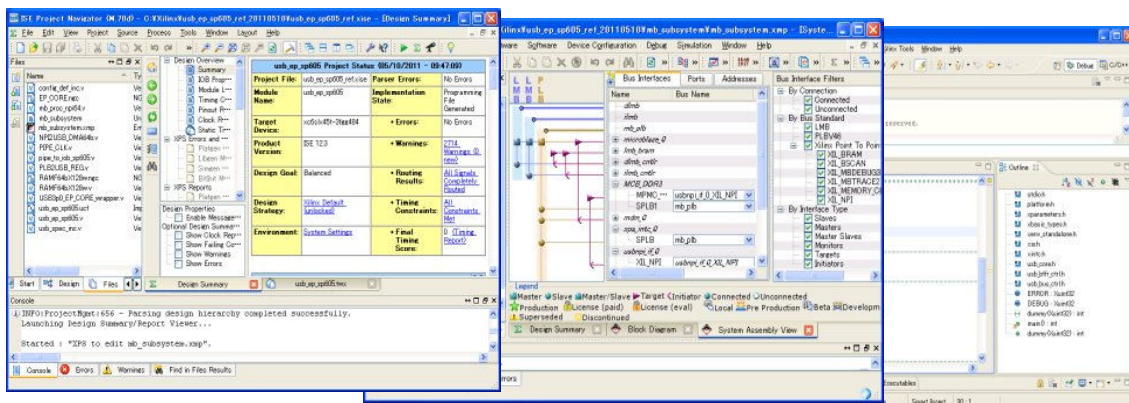
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Reference Design (Summary)

- Real operation on SP-605/ML-605 and demo board.
 - ISE/EDK/SDK project of evaluation bit-file
- Provides all HDL source code except IP-Core.
 - Also provides MicroBlaze firmware by C source



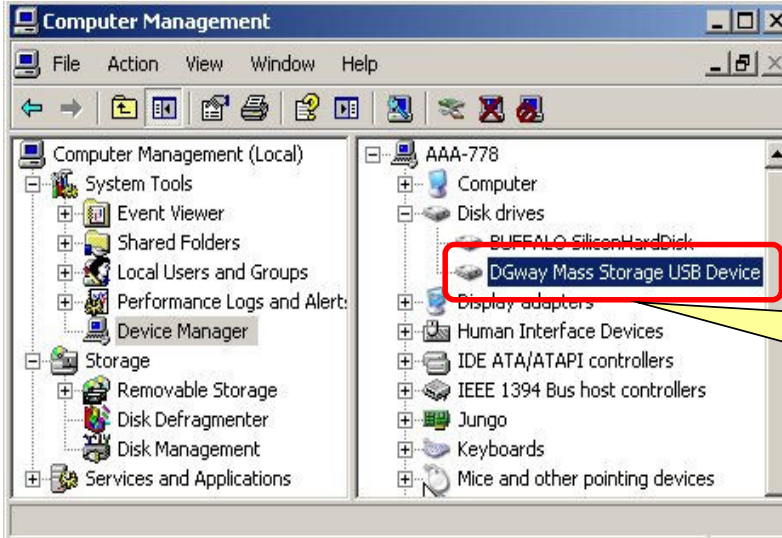
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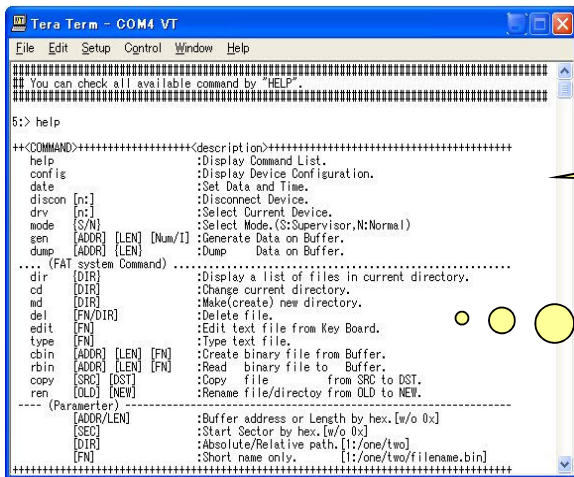
Reference Design (Device function)

- HostPC can recognize storage class device
- Emulate RamDisk by DDR3 on SP-605



Reference Design (Host function)

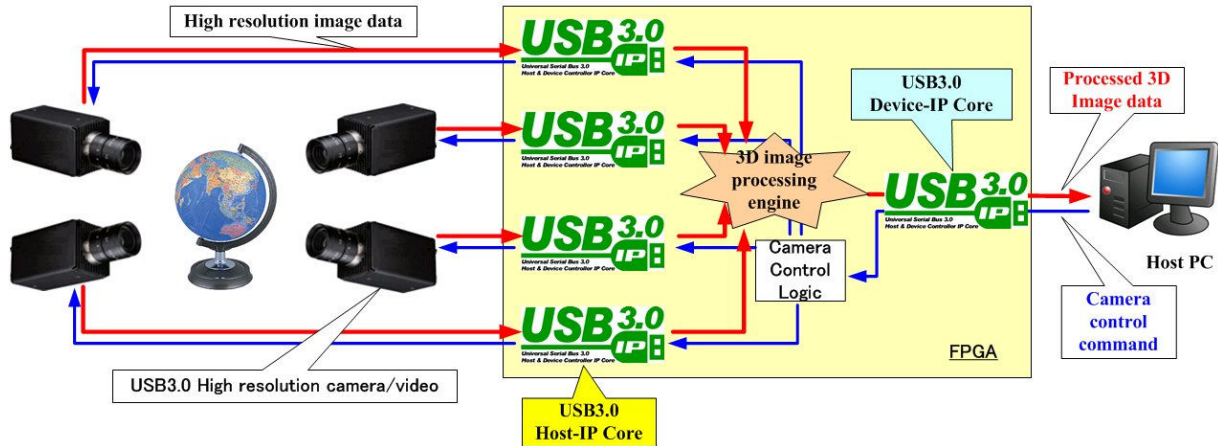
- Access to USB3.0 storage device by FAT16
- Issue command from serial console



FAT operation menu of Host reference design

Application example 1

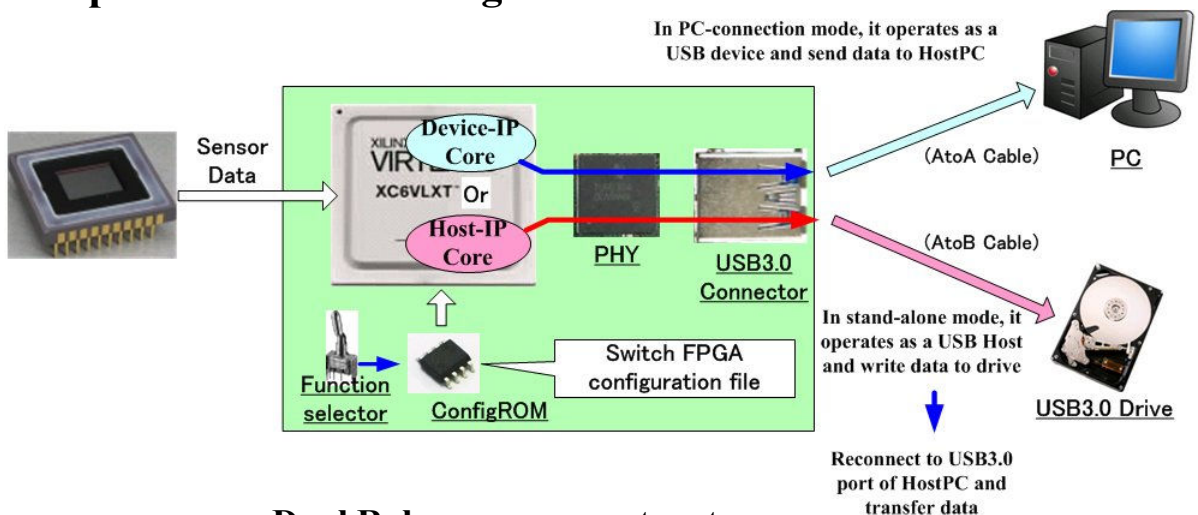
- Connect multiple high-resolution USB3.0 camera/video
- 3D process in FPGA and send data to PC via USB3.0



High resolution 3D image processing system

Application Example 2

- ‘Dual Role’ system that can operate both PC-connection and stand-alone environment
- Prepare individual configuration data for Host/Device function



Dual Role measurement system

Inquiry

- Detailed technical information on Web site
- <http://www.design-gateway.com/> or
- <http://www.dgway.com/products/IP/USB3-IP/index-E.html>
- Inquiry
 - Design Gateway Co.,Ltd.
 - E-mail : sales@design-gateway.com
 - FAX : +662-261-2290



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Revision History

Rev.	Date	Description
1.7XE	2012/07/11	Release English presentation

2012/7/11

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