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Predictable Success

USB 3.0

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The Need for SuperSpeed USB

Target Applications

Media Storage

Media Creators

Media Players

Set-Top Boxes

Digital TVs

Mobile Internet Devices

Create, Store and Carry More!
Faster Sync-and-Go for Work and Play

DesignWare SuperSpeed USB 3.0

10x Faster Than USB 2.0

27GB HD Video Transfer

USB 2.0 ~ 14 minutes

USB 3.0 ~ 70 seconds

Complete IP Solution
From the Leader in USB IP for 7 Years in a Row*

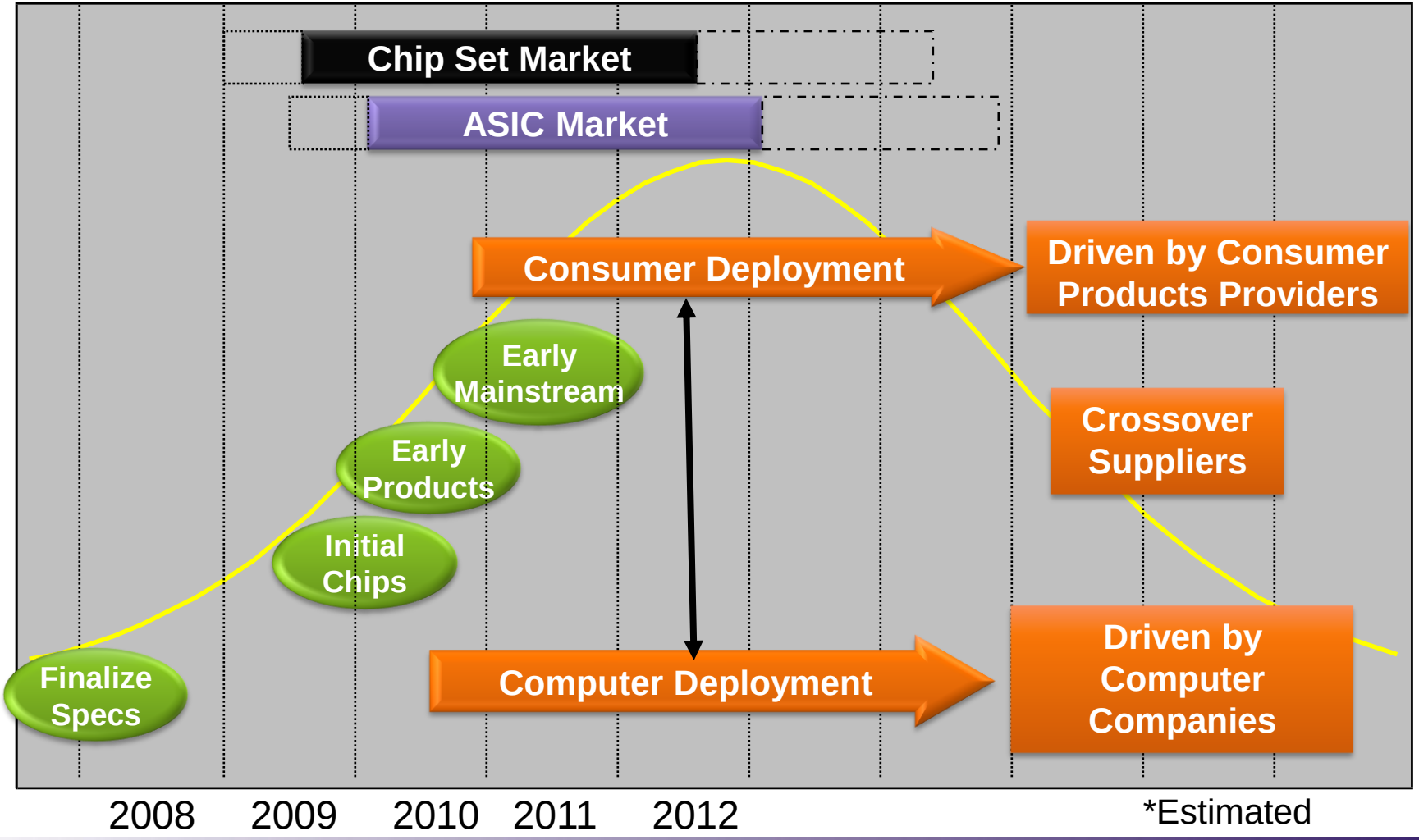
Gartner/Dataquest 2008

USB 3.0 – SuperSpeed

- **What?**
  - SuperSpeed USB – Wired evolution of USB
  - 10x performance improvement vs. USB 2.0
  - Backward compatible connector, 4 additional lines
  - Software compatible at the driver and application level
- **Why?**
  - Faster Sync and Go for cameras, camcorders, thumbsticks, cards, video players, music players, mobile PCs, handheld PCs…
- **When?**
  - Version 1.0 – Available Now – Released Nov 17, 2008
  - USB–IF targeting Q3 09 for first products
  - Broad deployment of products expected by Q3 2010

	USB Flash	SD Movie	HD Camcorder Flash	HD Movie	HD Camcorder HDD
	1 GB	**6 GB**	**16 GB**	**27 GB**	**160 GB**
USB 1.1	22 min	2.2 hr	5.9 hr	9.3 hr	56 hr
USB 2.0	33 sec	3.3 min	8.9 min	13.9 min	84 min
USB 3.0	**3.3 sec**	**20 sec**	**53.3 sec**	**70 sec**	**7 min**

SuperSpeed USB Market Adoption*



Synopsys USB 3.0 Device and TI PHY Interoperability Testing

Texas Instruments introduces first SuperSpeed USB-compliant transceiver test chip

Website

Transceiver to be shown at the USB Developers Conference will help speed implementation of SuperSpeed USB

DALLAS, May 14 /PRNewswire/ -- Texas Instruments Incorporated (TI) (NYSE: TXN) , an active member of the SuperSpeed USB 3.0 promoters group, today introduced a new 5 Gbps transceiver test chip designed to the USB 3.0 specification version 1.0. The new transceiver demonstrat SuperSpee

The new Su SuperSpee controller a said John K advance ne

Synopsys Demonstrates DesignWare SuperSpeed USB 3.0 Controller IP at the SuperSpeed USB Developer's Conference

PRNewswire
MOUNTAIN VIEW, Calif.
(NASDAQ-NMS:SNPS)
May 14, 2009

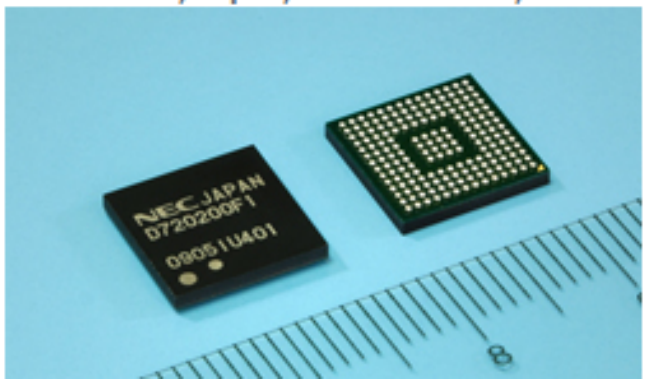
Demonstration Shows Interoperability of Texas Instruments' Transceiver and Synopsys' DesignWare Digital Controller IP

MOUNTAIN VIEW, Calif., May 14 /PRNewswire-FirstCall/ --Synopsys, Inc. (NASDAQ: SNPS), a world leader in software and IP for semiconductor design and manufacturing, today announced its DesignWare® SuperSpeed USB 3.0 digital controller IP has tested successfully for interoperability with Texas Instrument's (TI) SuperSpeed USB 3.0 transceiver. The companies will demonstrate the joint solution at the upcoming SuperSpeed USB Developers Conference in Tokyo, Japan on May 20-21, 2009.

NEC announces USB 3.0 Host Production

NEC Electronics Introduces World's First USB 3.0 Host Controller

KAWASAKI, Japan, DUESSELDORF, Germany, SANTA CLARA, Calif. (U.S.A.), May 18, 2009



NEC Electronics today introduced the world's first Universal Serial Bus (USB) host controller (part number µPD720200) for the new SuperSpeed USB 3.0 standard. NEC Electronics expects rapid adoption of the device and standard as the need to transfer larger and larger amounts of information between PCs to external hard-drives, portable electronics devices, and flash-based thumb drives, continues to grow rapidly.
The µPD720200 device is a host controller for PCs and other digital devices, and is based on the new version of the

Pricing and Availability

Samples of NEC Electronics' µPD720200 host controller are expected to be available in June 2009 at US$15 each, along with free Windows® device driver software. Monthly production is expected to reach approximately 1,000,000 units in September 2009. Pricing and availability are subject to change without notice. More information can be found at http://www.necel.com/usb/en/index.html.

USB 3.0 Driver Standards

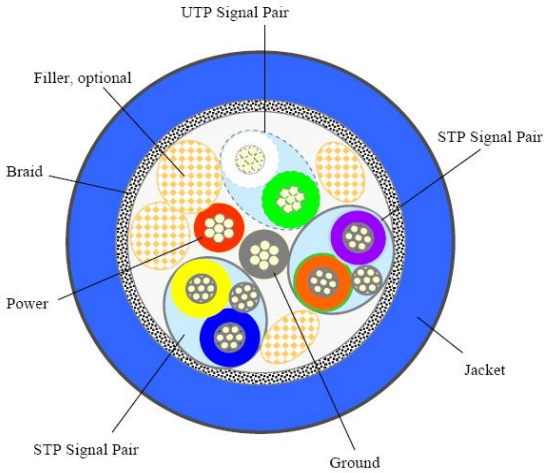
- USB Attached Storage Protocol
  - Class Driver Specification in USB-IF Device Working Group
  - Optimizing for USB 3.0
    - Required for 10x USB 2.0 Rates
  - Good for improving USB 2.0 Transfer Rates

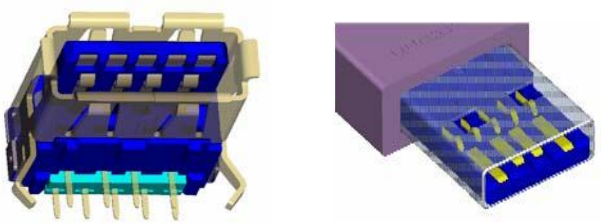
Summary

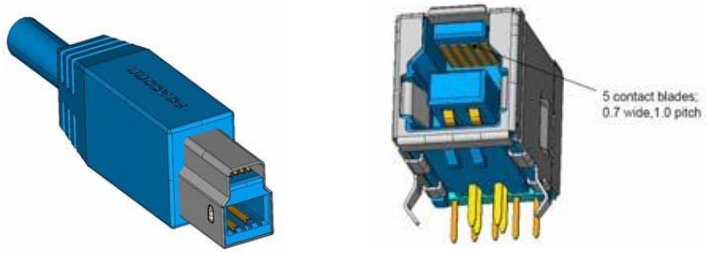
- HD content driving file sizes up
- Greater volumes of content are driving the need for more storage
- Faster transfer rates in demand by consumers

USB 3.0 Specification

- 5Gbs Super-Speed Physical Layer Data Rate
  - Effective Throughput = 4Gbs after 8b10b overhead; 8Gbs with duplex operation
- Compatibility
  - USB 3.0 Host supports LS, FS, HS, and SS
  - USB 3.0 Devices support HS and SS speeds
- Optimized Power Efficiency
  - No host polling, no broadcasting
  - Fast U1 and U2 low power states in addition to traditional suspend (U3)
- Cables/Connectors
  - Additional 2 pairs of shielded twisted pair for super speed duplex
  - Additional 5 pins (2 pair + GND) added
  - Blue Connectors and Cables



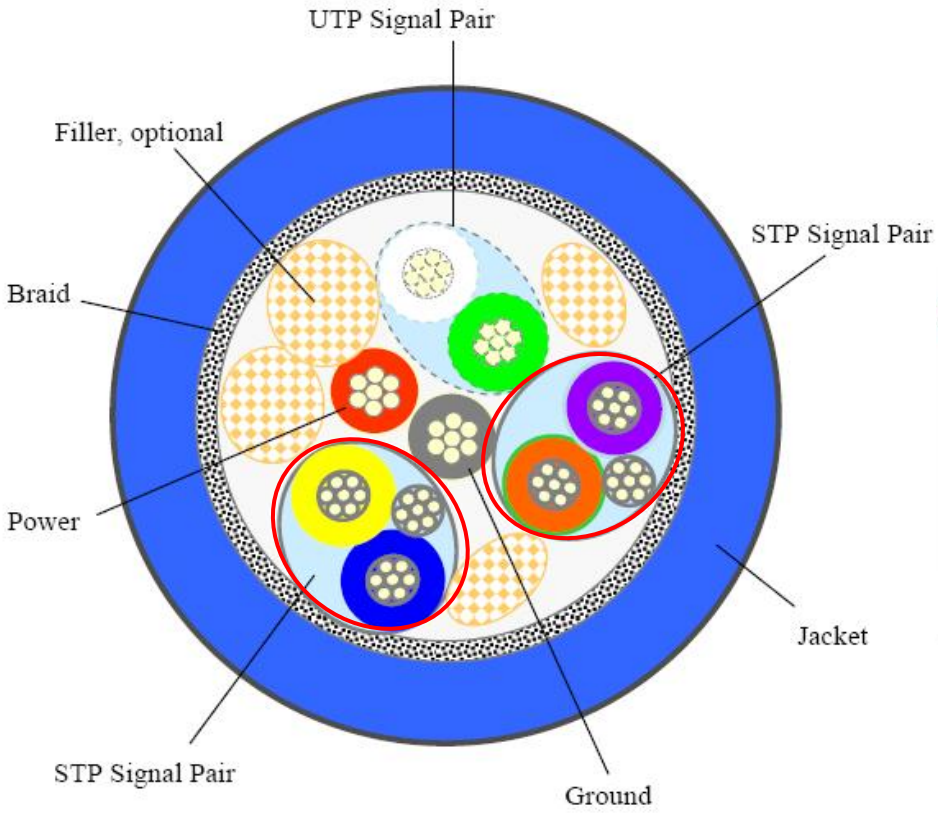


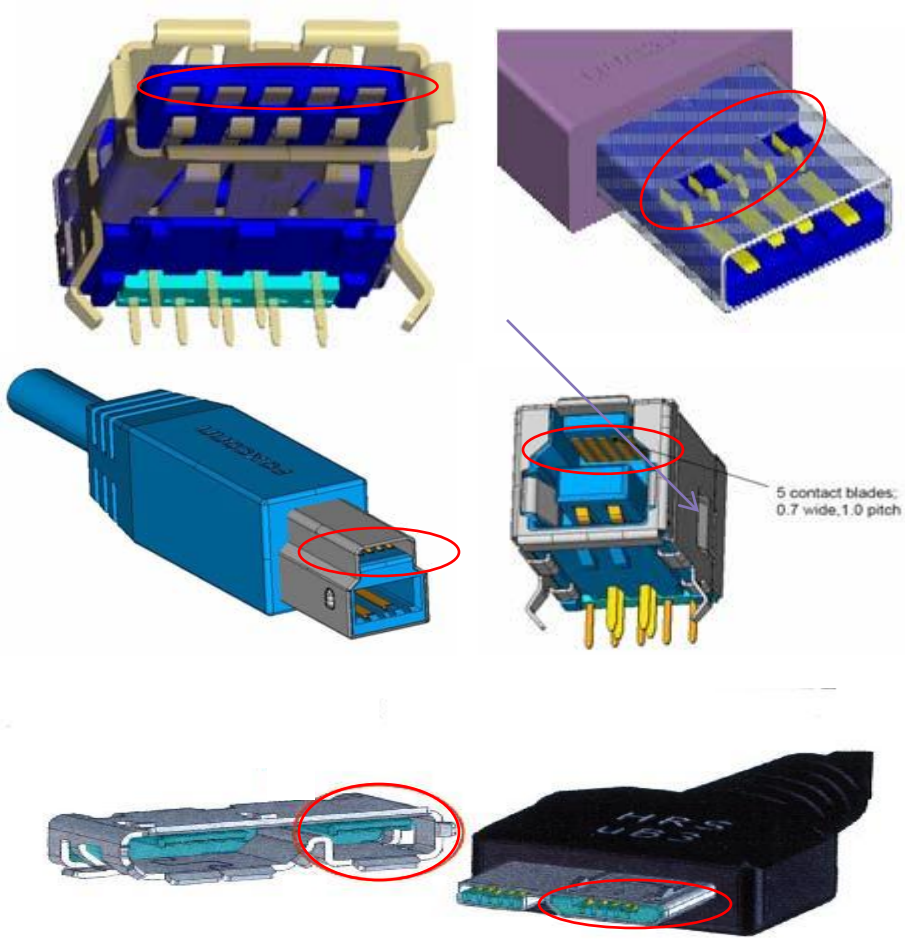


Cable & Connector

- USB3.0 Specific

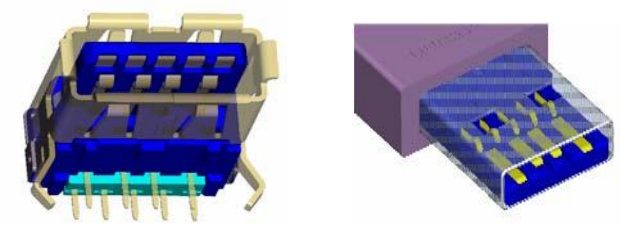
- Additional 2 pairs of shielded twisted pair signals in USB3.0 cable for super speed duplex operation
- Additional 5 pins (2 pair + GND) added to the existing USB connector (on the inside)
- Connectors are blue colored to distinguish from USB2.0 cables





USB 3.0 Host Specification

- xHCI
- Intel
  - http://www.intel.com/technology/usb/xhcispec.htm
- Single Architecture
  - Including HS/FS/LS
  - Compare USB2.0
    - EHCI + UHCI/OHCI
- Software for PC
  - Microsoft Windows7 SP1
- Discrete chip
  - NEC Electronics



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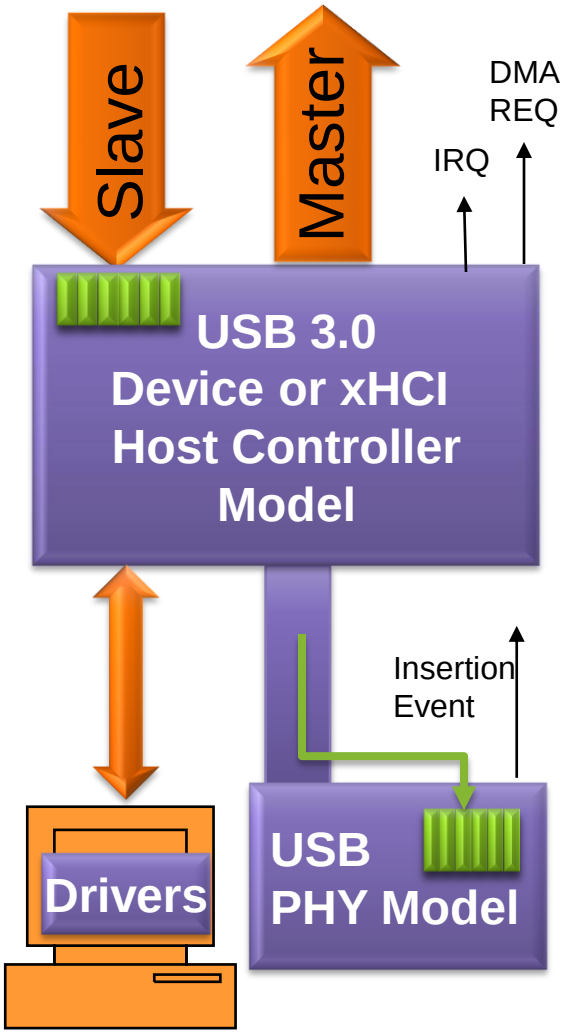
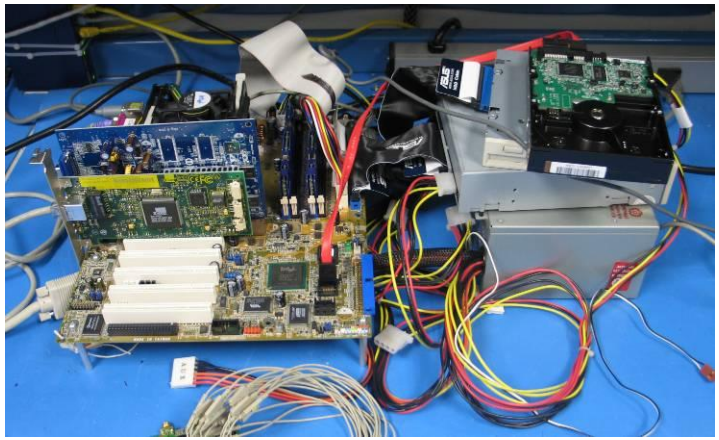
Virtual Platform for USB 3.0

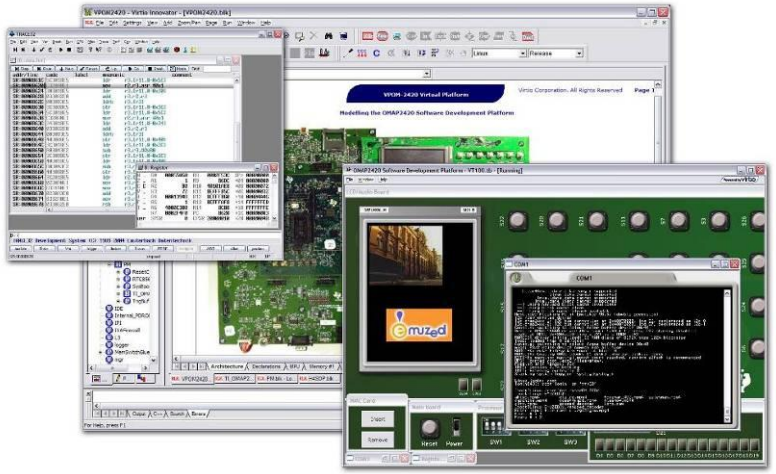
Virtual Platform and Drivers



- Digital Controller
- "Programmer's View Model"
  - Register & functionally accurate
  - AHB TLM interfaces (master & slave)
  - UTMI+ interface not modeled
- Parameters support IP configuration options
- "USB Real-World I/O" (Host + Client)
  - Allows virtual platform to act as "physical" USB host / client to host OS
- PHY - Only control registers modeled, no data path
- Drivers
  - Reference source drivers developed in Virtual Platform and FPGA
  - Adapted for Mass Storage on Linux
  - Portable to other operating systems

It’s Like Hardware – Only Better!





Early Availability	**Available before chips come back from the fab and before boards have been built and debugged**
Enhanced Debugging	**Full visibility and control of multi-core platform with non intrusive access to all components**
Easy to Deploy	**No physical boards - minimal user ramp up time and logistical efforts to distribute and maintain**

Virtual Platforms

Enabling Software-Driven Product Development

What Is A Virtual Platform?

- *Functional model of a complete hardware device*
- *Binary compatible, runs unmodified software*
- *High simulation performance, booting up an OS in seconds*

Why Deploying Virtual Platforms?

- *Pre-silicon software development, reducing project schedules by 9-12 months*
- *Reducing risk through continuous hardware/software integration*
- *Expand verification scenarios by adding real software use cases*

Key Requirements

- *Early availability*
- *Software binary compatibility with real RTL*
- *Must behave like the real device: user interfaces, debugger connections, real-world I/O access*

USB 3.0 Device Demonstration

USB3.0 Demonstration 2- Description

- Interoperability with 3rd party PHY
- MPEG Full HD Video buffers from the Device(Mass Storage) are sent to the host and the Host driver will display it on the PC screen
- USB 3.0 Device in PC
  - 1080p, 30 frames per second HD video
  - Mimicing USB Mass Storage
  - USB 3.0 Device controller send through TI PHY chip
- USB 3.0 HOST in PC
  - USB 3.0 HOST controller send through TI PHY chip
- PHY – TI TUSB1310
  - Configured for USB3.0
  - 5.0Gbps Signalling
- Host and Device connected through real USB3.0 cable to Lecroy CATC Analyzer
  - Analyzer displays Superspeed USB 3.0 activity
- URL:http://focus.tij.co.jp/jp/pr/docs/preldetail.tsp?prelId=scj_09_041&contentId=55191

Future of USB 3.0

USB3.0 SS vs SATA 6G

	USB3.0 SS	SATA 6G
Speed	5G bps	6G bps
Application	◎	△ Storage only
Cable length	○ (3m)	△ (1m)
Isochronous	○	○
Set-to-set connection	○	? (eSATA) △(Cable)
Hot plug & unplug	○	○
Multi drop	○ (Hub)	△ (Port multiplier/option)
Cost	◎	○
Bootable Device	△ (×Windows)	○

USB3.0 Application other than Storage

- Good for NotePC
- External Video Graphic Adapter
  - Multi screen for NotePC
  - Maintenance for embedded system
- USB SS -> PCI/PCIe converter
  - Extending PCI/PCIe up to 3m
  - Virtual Machine support
- Ethernet to USB
  - Extending USB

USB3.0 Application other than Storage

- External Video Graphic Adapter
  - Multi screen for Note PCs
  - External monitor for for embedded system
    - Easy to expand, good for maintainance
  - DisplayLink provides a solution now
    - It is too slow
    - Not good for multimedia
    - Not good for gaming
    - Will be solved using USB3.0

USB3.0 Application other than Storage

- USB SS -> PCI/PCIe converter
  - PLX NET2280
    - Slow!!
  - Using SS of USB3.0
    - PCI and PCIe
  - Good for extending PCI/PCIe for Note PC and Factory Automation
  - USB may be able similar capability to IOV of PCIe
    - Virtual Machine(ex VMWare) supports like IOV via USB2 today

USB3.0 Application other than Storage

- Extending USB via ether net
- IOGear GUIP201
  - 100G Ether and USB2.0 solution
  - If using USB3.0 SS…

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