PCI-SIG® IDF 2016 UPDATE

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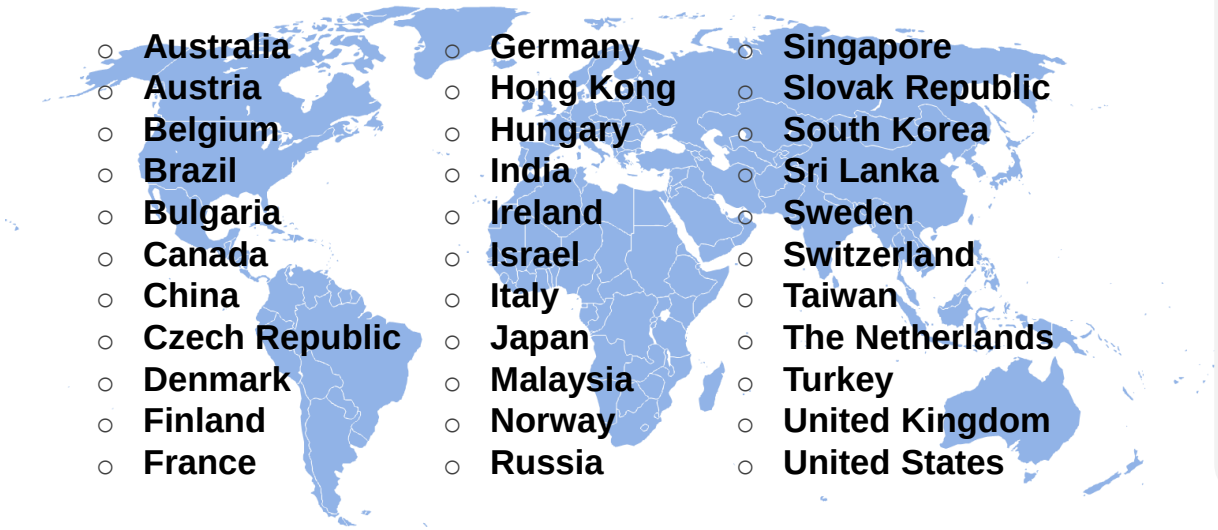
PCI-SIG® Snapshot

Organization that **defines the PCI Express I/O bus specifications and related form factors.**

- **730+** member companies located worldwide

Creating specifications and mechanisms to **support compliance** and **interoperability.**



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- Belgium
- Brazil
- Bulgaria
- Canada
- China
- Czech Republic
- Denmark
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- France
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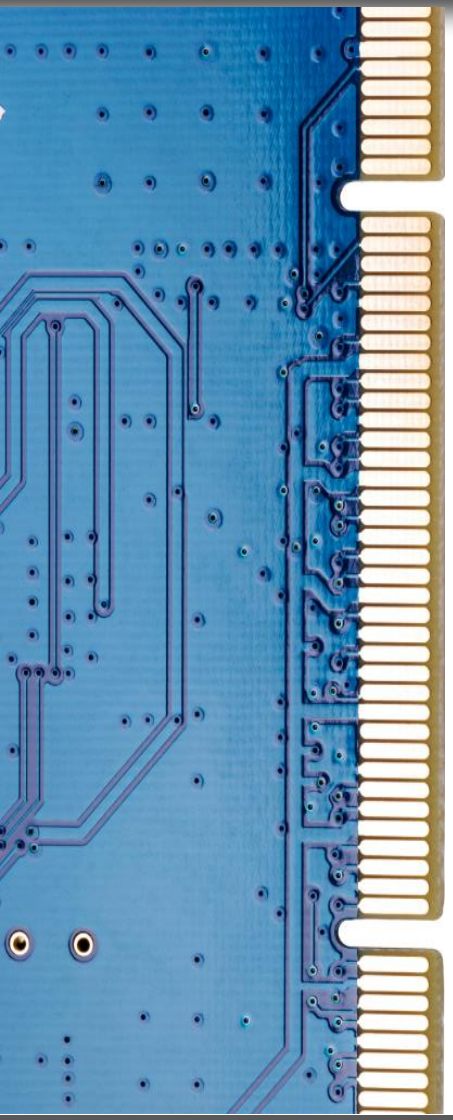
PCI-SIG® Key Messages



PCIe technology is:

- A low-cost, high-performance, robust interconnect available in a range of product segments including:
  - Mobile/IoT
  - Cloud computing – backbone for fast growing cloud ecosystem
  - Storage – interconnect of choice
  - Enterprise servers

PCIe architecture offers:

- Efficient I/O bandwidth per pin
- Flexible performance scaling with added lanes and varying frequencies
- Potential to decrease physical footprints

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PCIe® in Mobile/IoT

Offerings:

Faster Performance:

- 16GT/s data rates with PCIe 4.0
- Flexible lane width configurations and speed selection

Power Efficiency:

- L1 sub-states lowers power in idle mode (Near 0 link idle power)
- Half-swing/Quarter-swing cuts power consumption by using 400mV and 200mV, respectively
- High speed data transfer bursts with minimum idle power

Use Cases:

Chip-to-Chip (C2C) connection: Reduces power and real estate with extendible design features and power management capabilities

M.2: Scalable performance for power-constrained, mobile platforms

U.2: Server module for high-density SSD storage attach

PCIe cards: Adds high-bandwidth functionality for IoT applications such as HD video streaming apps, high frequency sensor data and automation controls.

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PCIe® in the Cloud

Offerings:

- **Scalable architecture:** Accommodates specific application needs via flexible lane and frequency offerings.
- **No system downtime:** Hot-Plug support for replacing modules
- **Increased performance:** Low latency between applications running in the servers and subsystems
- **Reduced TCO:** Eliminates idle power consumption = lower overhead costs

Use Case:

- **Microsoft Azure:** The ability to automatically alter the ratio of the CPU and GPU could be performed using a PCIe switch infrastructure. Source: The Next Platform
- **Apple and Facebook:** Use PCIe flash cards to accelerate database speed. Source: The Next Platform

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PCIe® in Storage

Offerings:

PCIe technology is the undisputed interconnect of choice for current and future storage applications

Faster data transfer:

- PCIe 4.0 specification will provide high performance 16GT/s data transfer

Better user experience:

- Client and enterprise storage applications using PCIe technology helps keep data closer to CPU

Footprint/Use Cases:

PCIe SSDs: Shipping the highest average capacity of all enterprise SSD interfaces

- Meets the need for faster computing power in servers
- Market growth 16.3 percent from Q4'15 to Q1'16* *Source*: TRENDFOCUS

PCIe switches:

- Used in hybrid storage systems where the server uses a PCIe-based network
- Plays at the rack-level, making it easier to plug-in PCIe-based SSDs/HHDs

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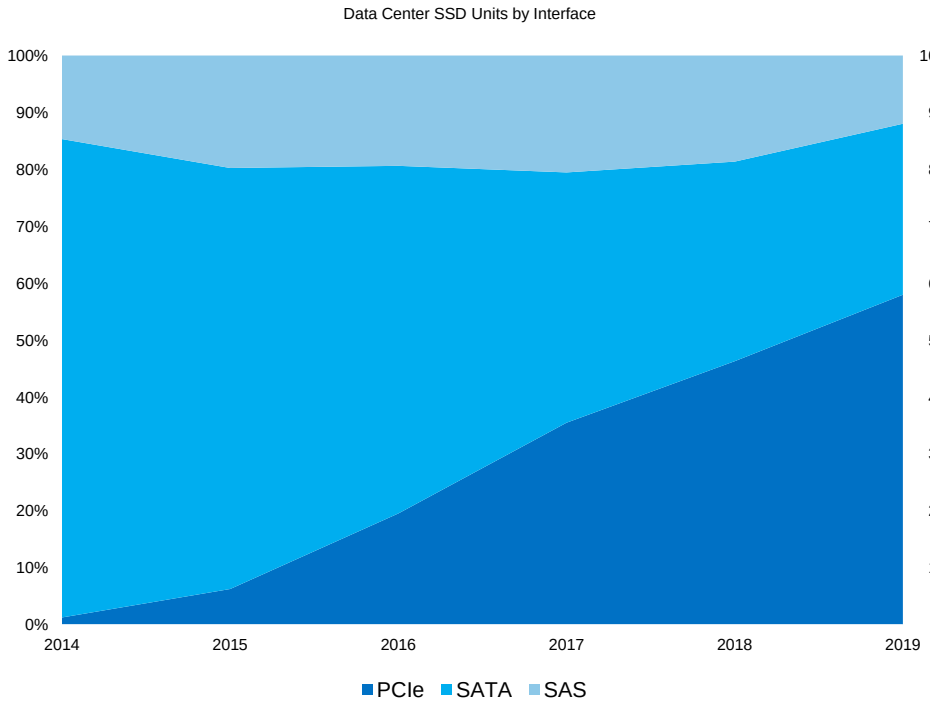
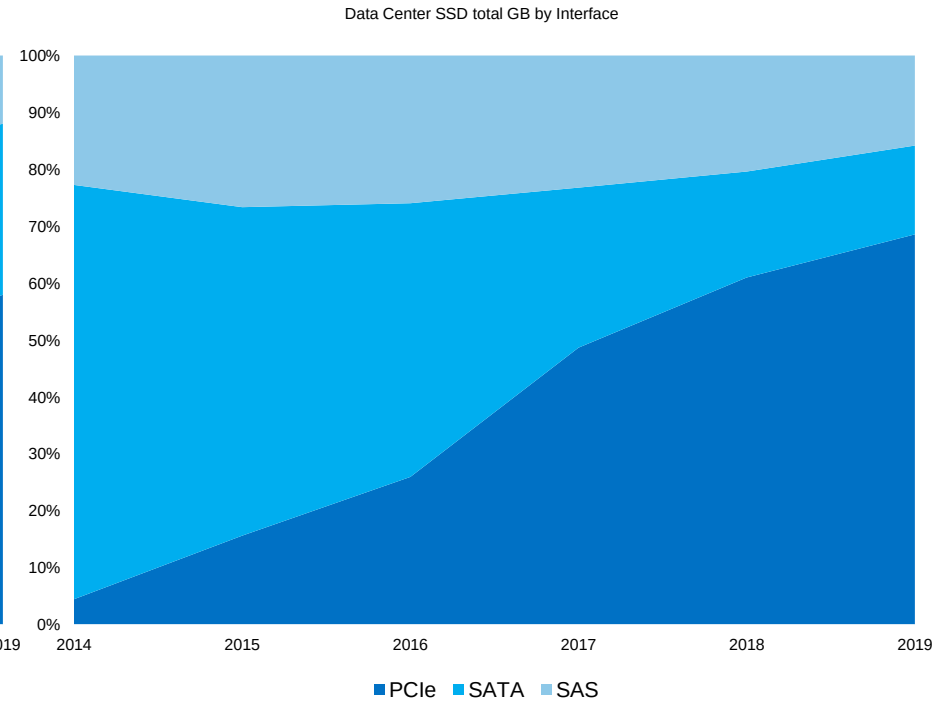
PCIe® in Storage

- Data explosion is driving SSD adoption
- PCIe technology is outpacing other interconnect technologies in both units and bandwidth/capacity
  - PCIe 4.0 architecture at 16GT/s provides unbeatable performance headroom with low power features for storage applications





Source: Forward Insights Q1'15

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PCIe® in Enterprise Server

Offerings:

Redundancy/failover:

- PCIe switches offer the right level of redundancy and failover in enterprise data centers

Ubiquity:

- PCIe is the interconnect of choice for the data center in enterprise processors and storage subsystems

I/O power reduction (up to 70%*):
Source: HPC Wire

- Dynamic software and hardware shut downs when no lane traffic is present

Use Case:

High-Frequency Trading (HFT) markets – i.e. Wall Street stock exchange – rely on PCIe-based architectures for low-latency, high-performance networking features to execute data transactions without any latency or downtime.*

Source: Dolphin

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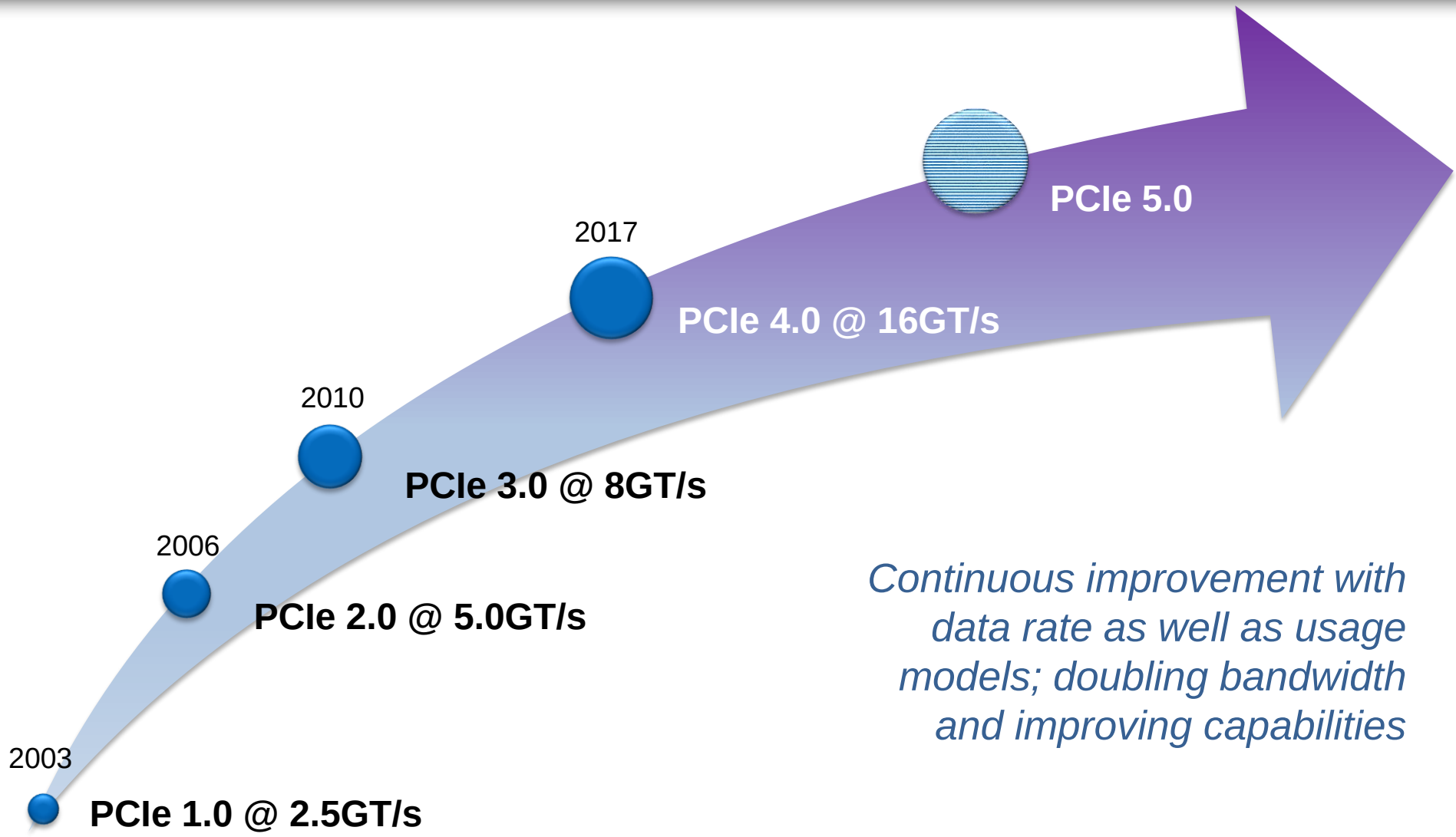
PCIe® Roadmap



Continuous improvement with data rate as well as usage models; doubling bandwidth and improving capabilities

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PCI-SIG® Members at IDF

Booth 113 (Part of IoT Community)
Demonstrating the latest COM Express module with the new COM Express 3.0 Type 7 pinout definition. The new Type 7 pinout does away with all graphics support and replaces it with up to four 10GbE ports and an additional eight PCIe ports, bringing the total PCIe support to up to 32 PCIe lanes.

Booth 901
Marvell will be participating at IDF in booth 901 and will feature a demonstration of the Marvell 88RC1348 RAID storage controller connected to eight SSDs in RAID configuration. The 88RC1348 is a RAID controller with 4 lanes of PCIe 3.0, 8 6Gbps SATA ports, and 10Gbps USB 3.1.

Booth 720
Preview ConnectX®-5, the first network adapter to support PCIe 4.0 technology. Mellanox will also be showcasing BlueField™ SoC (System on Chip) which supports both PCIe 3.0 and PCIe 4.0 technology and NVMe over fabrics for efficient sharing of PCIe-based NVMe SSDs over a network.

Booth 230
See Industry's first PCI Express 4.0 interoperability with Teledyne LeCroy – Synopsys DesignWare IP for PCI Express 4.0 and Teledyne LeCroy Z416 Protocol Analyzer/Exerciser. Synopsys' complete portfolio of PCI Express IP - optimized PHYs and controllers, verification IP, IP Prototyping Kits - reduces latency by 20% compared to competing solutions and supports lane margining.

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Summary

PCI-SIG continues its solid reputation of delivering **low cost, high-performance, low-power specifications** for **multiple applications** and **markets**

- PCI Express architecture was designed from the beginning with low power features, reducing active and idle power consumption
- PCI Express technology is the interconnect of choice for the growing storage market
- PCI Express is the backbone for fast growing cloud ecosystem

Learn more by visiting: www.pcisig.com

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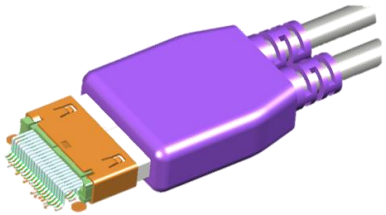
Back-up

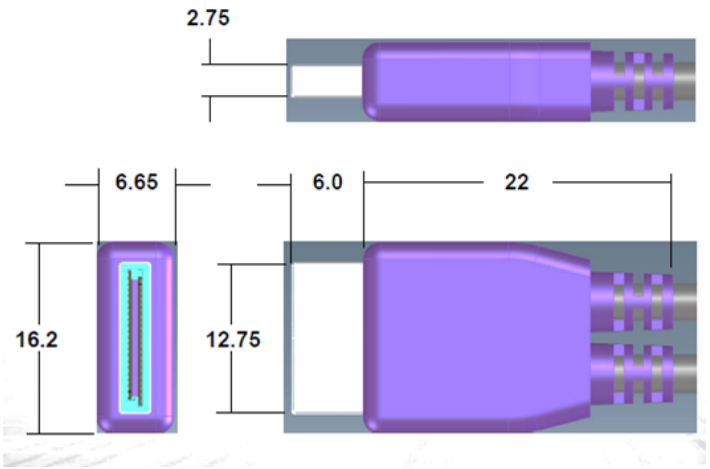
OCuLink: PCIe "Outside-the-Box"

Defining small, low-cost cable form factors

- Optimized for client and mobile market segments
- Internal and external cabling to support PCIe expansion and faster data rate transfer in graphics cards, SSDs and motherboard components
- Bit rate starting at 8G, future-proofed to scale further
- Developing copper and optical cables
- Independent reference clock with SSC technology
- One external and one internal connector support up to four PCIe lanes
  - All cables support 8GT/s, providing up to 32 Gbps in each direction within a four lane configuration



All dimensions in mm



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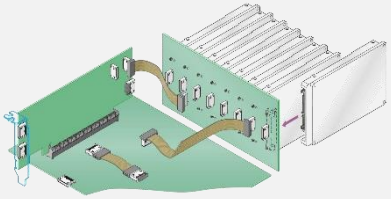
OCuLink Usage Models

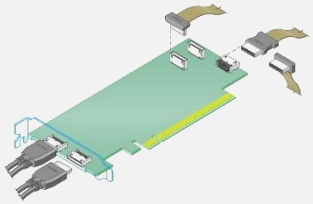
- **Internal Usage**
  PCIe-attached storage

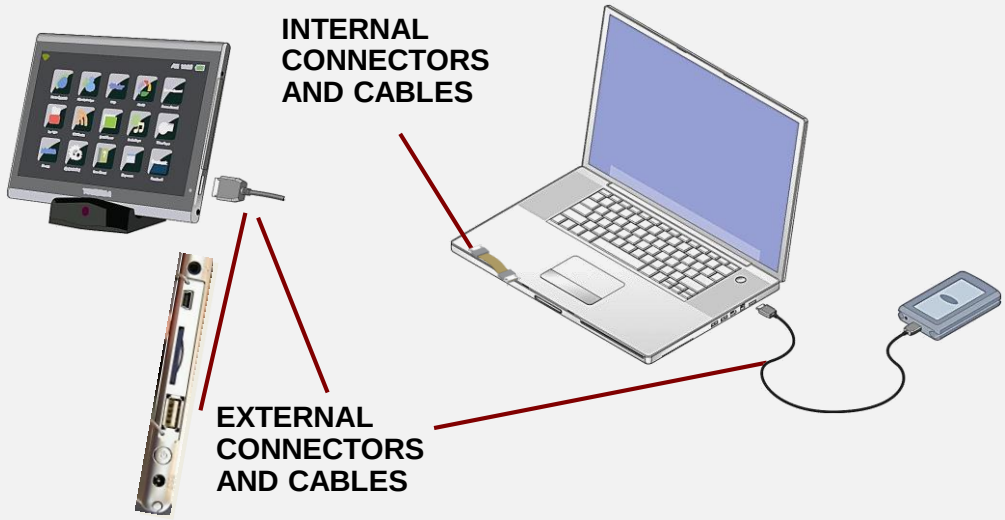
- **External Usage**
  PCIe I/O expansion
  External PCIe-attached storage

STORAGE SYSTEMS



PCIe ADD-IN CARD





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