



SATA Evolves

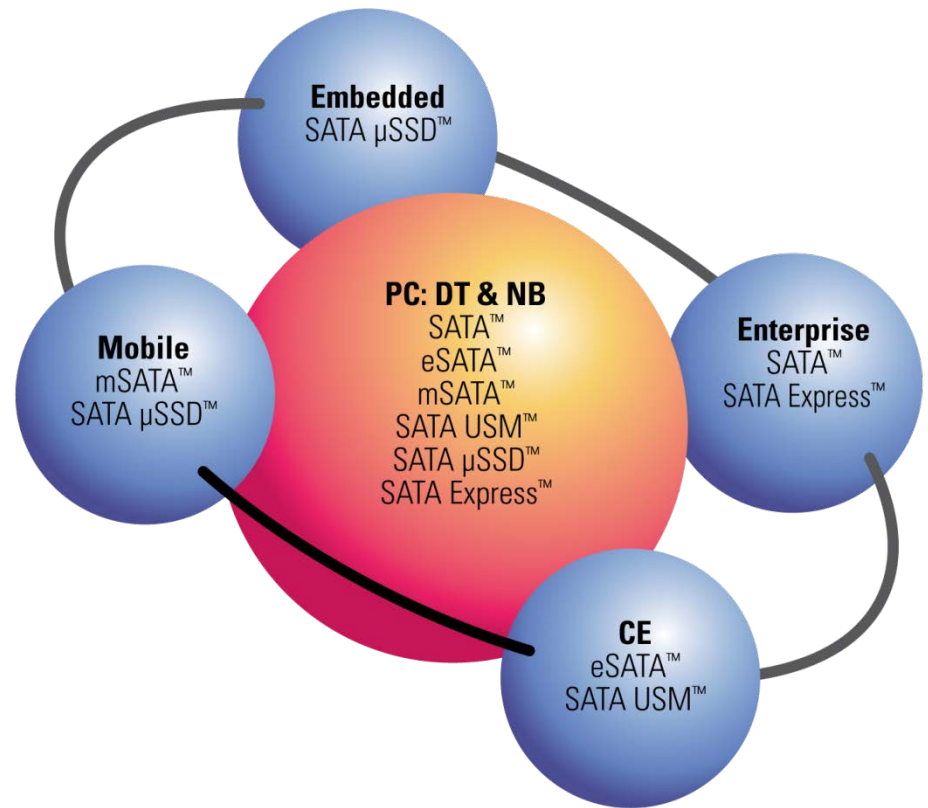
SATA Specification v3.2

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SATA is Everywhere

SATA is the de facto standard for PC storage

Since its introduction, SATA has evolved into new application spaces and now provides storage interface solutions for HDDs, ODDs, SSDs, and Hybrid Drives in client, mobile, enterprise, consumer electronics, and embedded storage markets



Storage Market Evolves

- SSDs continue to grow market share and increase in performance
 - Small form-factor SSD cards used as cache in PCs
 - Use of SSDs in enterprise environments expands
- Solid State Hybrid Drives reemerge & demonstrate almost HDD-like performance
- Reducing power consumption is more important than ever
 - Especially for “Always on, always connected” devices, such as Ultrathin notebooks
- **SATA has evolved to meet market needs**

SATA Specification v3.2

- SATA-IO recently announced the ratification of SATA specification v3.2
- This latest specification includes:
 - New, faster interface
 - Additional form-factors
 - Optimizations for Solid State Hybrid Drives
 - Power management enhancements
 - SATA improvements for enterprise applications

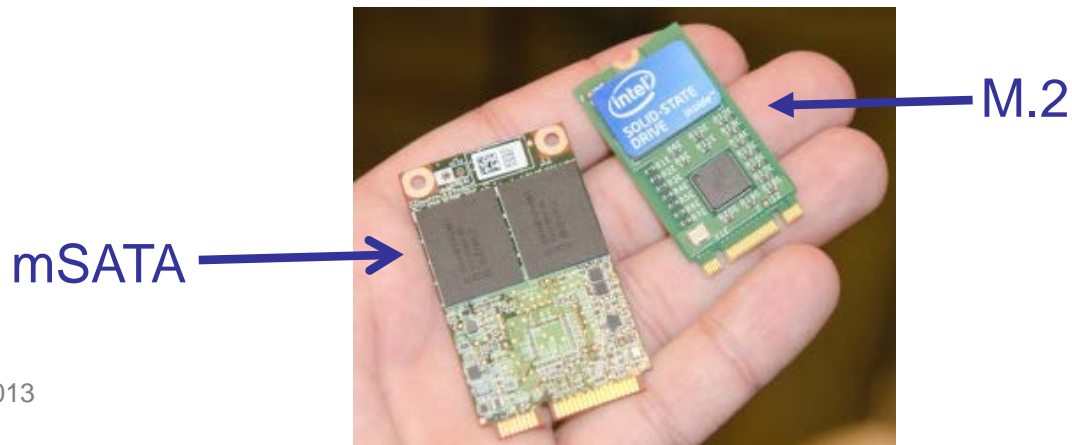
SATA Express

- Client storage with a PCIe interface, utilizing SATA Express connectors
- Provides up to 2GB/s (2 lanes of PCIe 3.0)
 - One lane or two lanes of PCIe
- Host connector supports both new PCIe and legacy SATA devices



M.2 (formerly known as NGFF)

- M.2 is a small form factor card that supports applications such as WiFi, WWAN, USB, PCIe & SATA, as defined in an upcoming PCI-SIG spec
 - An M.2 card with a SATA or PCIe interface will typically be an SSD, suitable for very thin devices such as Ultrathin notebooks or tablets
 - v3.2 specification standardizes the SATA M.2 connector pin layout



SATA microSSD

- The SATA microSSD standard enables developers to produce a single-chip SATA SSD for embedded storage applications



SATA Universal Storage Module

- SATA Universal Storage Module specification enables developers to incorporate connector slots into computers and consumer electronics
 - Slots accept powered storage modules with integrated SATA interfaces for expanding storage capacity
 - SATA v3.2 introduces USM Slim, which reduces the thickness of the module from 14.5mm to 9mm



SATA Power Management

- DevSleep provides another level of power management where the drive is almost completely shut down
 - Enables devices to be always on and always connected without unnecessarily reducing battery life
- Transitional Energy Reporting recognizes that there is an energy cost to moving between power management modes
 - Provides the host with detailed information about the SATA storage device, allowing the host to make more informed decisions on minimizing power consumption

SSHD Optimizations

- A Solid State Hybrid Drive (SSHD) is an HDD containing a Flash cache to enhance performance
- The Hybrid Information feature provides a mechanism wherein a host can tell the drive which data to cache, further enhancing performance
- In past generation SATA drives, reading and writing log data required the use of non-queued commands, impacting overall system performance
 - New feature in v3.2 allows such commands to be queued, minimizing the impact on performance
 - Especially beneficial for Hybrid Information feature

- When a drive in a RAID configuration fails due to excessive data errors, data on the failed drive can be reconstructed from the remaining drives
 - This function is called a Rebuild
- The Rebuild Assist function speeds up the rebuild process by quickly recognizing which data on the failed drive is unreadable, enabling quicker data reconstruction



For More Information...

- Individual features of SATA specification v3.2
- Download the v3.2 spec (free to SATA-IO members)
- Go to www.sata-io.org