SATA is the next generation storage interface for PCs and low-end Servers. The current Parallel ATA bus is not able to meet the increased bandwidth and performance demands of current and future PC designs. This standard replaces the 26 position ribbon connector with a small flexible signal cable. SATA can be directly connected (hot plugged) to motherboards and back planes similar to current SCSI applications eliminating the need for cable completely. Tyco Electronics offers a full line of SATA cable assemblies and connectors to meet the server, desktop and notebook SATA applications.
## Distinct markets

Different classes of disk drives

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mobile</th>
<th>Desktop</th>
<th>Enterprise</th>
</tr>
</thead>
<tbody>
<tr>
<td>rpm</td>
<td>3600, 4200, 5400 rpm</td>
<td>5400, 7200 rpm</td>
<td>10K, 15K rpm</td>
</tr>
<tr>
<td>Seek time</td>
<td>12 – 14 ms</td>
<td>8.9 – 9.5 ms</td>
<td>3.2 – 7.4 ms</td>
</tr>
<tr>
<td>Performance as file server*</td>
<td>N/A</td>
<td>79 – 136</td>
<td>146 - 366</td>
</tr>
<tr>
<td>Write cache</td>
<td>2 MB</td>
<td>2 – 8 MB</td>
<td>2 – 8 MB</td>
</tr>
<tr>
<td>Capacity</td>
<td>10 – 80 GB</td>
<td>40 – 250 GB</td>
<td>18, 36, 72, 144, 180 GB</td>
</tr>
<tr>
<td>Reliability</td>
<td>300 K hr MTBF</td>
<td>500 K hr MTBF</td>
<td>1.2 M hr MTBF</td>
</tr>
<tr>
<td>Power</td>
<td>2.5 W</td>
<td>10 W</td>
<td>15 W</td>
</tr>
<tr>
<td>Cost</td>
<td>$73 – $160</td>
<td>$75 – $240</td>
<td>$160 – $1400</td>
</tr>
<tr>
<td>Interfaces</td>
<td>ATA/66, AT A/100</td>
<td>ATA/100, AT A/133</td>
<td>Ultra 160 SCSI, Ultra 320 SCSI, FC</td>
</tr>
</tbody>
</table>

http://www.storagereview.com
## History of parallel ATA

<table>
<thead>
<tr>
<th>Generation</th>
<th>Standard</th>
<th>Year</th>
<th>Speed</th>
<th>Key features</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDE</td>
<td>Pre-standard</td>
<td>1986</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EIDE</td>
<td>ATA</td>
<td>1994</td>
<td></td>
<td>PIO modes 0-2, multiword DMA 0</td>
</tr>
<tr>
<td></td>
<td>ATA-2</td>
<td>1996</td>
<td>16 MB/sec</td>
<td>PIO modes 3-4, multiword DMA modes 1-2, LBAs</td>
</tr>
<tr>
<td></td>
<td>ATA-3</td>
<td>1997</td>
<td>16 MB/sec</td>
<td>SMART</td>
</tr>
<tr>
<td></td>
<td>ATA/ATAPI-4</td>
<td>1998</td>
<td>33 MB/sec</td>
<td>Ultra DMA modes 0-2, CRC, overlap, queuing, 80-wire</td>
</tr>
<tr>
<td>Ultra DMA</td>
<td>ATA/ATAPI-5</td>
<td>2000</td>
<td>66 MB/sec</td>
<td>Ultra DMA mode 3-4</td>
</tr>
<tr>
<td>66</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ultra DMA</td>
<td>ATA/ATAPI-6</td>
<td>2002</td>
<td>100 MB/sec</td>
<td>Ultra DMA mode 5, 48-bit LBA</td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ultra DMA</td>
<td>ATA/ATAPI-7</td>
<td>2003</td>
<td>133 MB/sec</td>
<td>Ultra DMA mode 6</td>
</tr>
<tr>
<td>133</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Serial ATA Drives
Both Desktop and Server

DRIVES

200MM
150MM
100MM
50MM

2.5MM 51MM 124MM 175MM 200MM

2003 2004 2005 2006 2007
## History of serial ATA

<table>
<thead>
<tr>
<th>Generation</th>
<th>Standard</th>
<th>Year</th>
<th>Speed</th>
<th>Key features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial ATA</td>
<td>ATA/ATAPI-7</td>
<td>2002</td>
<td>150 MB/sec</td>
<td></td>
</tr>
<tr>
<td>Serial ATA II</td>
<td>ATA/ATAPI-8</td>
<td>2004</td>
<td>300 MB/sec</td>
<td>Enhanced queuing</td>
</tr>
<tr>
<td>Serial ATA ?</td>
<td>ATA/ATAPI-9?</td>
<td>2007</td>
<td>600 MB/sec</td>
<td></td>
</tr>
</tbody>
</table>
ATA ROADMAP

02 03 04 05 06 07 08 09 10 11 12

ULTRA DMA 133
133MB/SEC

SERIAL ATA I
150MB/SEC

SERIAL ATA II
300 MB/SEC

SERIAL ATA ?
600 MB/SEC

PARALLEL

SERIAL
Appearance of Serial ATA Connectors

Device plug connector

Serial ATA signal connector (pin S1)

Serial ATA power connector (pin P1)

Host receptacle connector

Device connector sizes and locations

Serial

2.5"

signal

power

Legacy Power (vendor specific)

(5.25’ form factor also defined for devices like tape drives and DVDs)

in comparison…

Parallel

3.5"

Parallel ATA signals

4-pin power
Parallel ATA Vs. Serial ATA

- Parallel ATA uses a 40 pin ribbon cable
- Serial ATA uses a 7 pin connector and cable
Benefits of Serial ATA

The Serial ATA specification is designed to replace parallel ATA with a software-transparent interface for “inside the box” storage. It reduces voltage and pin count requirements and can be implemented with thin and easy to route cables.

- **Low voltage requirement.** Serial ATA requires only 500 millivolts (mV) peak-peak to support new silicon processes and higher integration.
- **Lower pin count.** Reducing the pin count helps reduce board real estate requirements and enables more reliable connections on the board and the storage device.
- **Higher integration.** Unlike parallel ATA, Serial ATA does not require 5-volt tolerant transceivers that can pose a hindrance to higher integration which utilize today’s and future silicon processes.

**Improved Air Flow with Serial ATA Cable**

![Ribbon Cable vs Serial ATA Cable](image)
Serial Attached SCS/Serial ATA Compatibility

- Desktop PC Workstation Entry NAS
- Servers Near-attached Storage Mainstream NAS/SAN
- Large Enterprise

Drive Interface:
- PC Chipset
- Serial Attached SCSI HBA
- Serial Attached SCSI HBAs, RAID & Embedded ASICs (Dual Mode w/SATA)
- Serial Attached SCSI RAID
- FC RAID

Drive Types:
- SATA Drive: 5400 RPM, 7200 RPM
- Serial Attached SCSI Drive: 10K RPM, 15K RPM
- FC Drive

Serial attached scsi
Serial attached scsi
Dual-port Serial Attached SCSI
Custom Combo 22P R/A Plug SMT

Tyco Status for Plug
Custom Product
+ Prototype
+ Mass Pro

Standard 22P Plug
+ Prototype: Mid/Oct/03
+ Mass Pro: Not fixed yet
# Serial ATA Cable Assembly & Connector

## Cable Assembly

<table>
<thead>
<tr>
<th>Item</th>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1566721</td>
<td>SATA 7P, Standard Type, 0.5M / 1.0M</td>
</tr>
<tr>
<td>2</td>
<td>1566725</td>
<td>SATA 7P, R/A Type I, 0.22M</td>
</tr>
<tr>
<td>3</td>
<td>1566726</td>
<td>SATA 7P, R/A Type II, 0.22M</td>
</tr>
<tr>
<td>4</td>
<td>1566786</td>
<td>SATA 15P to ATX Power</td>
</tr>
<tr>
<td>5</td>
<td>1566722</td>
<td>ATX Power + 15P IDC + SATA 15P R/A</td>
</tr>
<tr>
<td>6</td>
<td>1566724</td>
<td>ATX Power to SATA 15P, IDC, Straight</td>
</tr>
<tr>
<td>7</td>
<td>1566610</td>
<td>SATA 7+15P to 7P + ATX Power</td>
</tr>
</tbody>
</table>

![Image of cable assembly examples]
## Connector

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1470640-1, -2, -3</td>
<td>7P Single Guide, DIP, Vertical plug</td>
</tr>
<tr>
<td>1470639-1, -2, -3</td>
<td>7P Single Guide, SMT, Vertical plug</td>
</tr>
<tr>
<td>1470635-1, -2, -3</td>
<td>7P Twin Guide, SMT, R/A, plug</td>
</tr>
<tr>
<td>1470740-1</td>
<td>7+15P, Female, SMT, Vertical plug receptacle</td>
</tr>
<tr>
<td>1470742-1, -2, -3</td>
<td>7+15P, Male, SMT, R/A, Offset, device plug</td>
</tr>
</tbody>
</table>
TYPICAL ELECTRICAL PROPERTIES

- Attenuation: 6dB Max.
- NEXT: -26dB Max.
- Differential Impedance: 100Ω±10%
- Common Mode Impedance: 25Ω ~ 40Ω
- Cable Pair Match Impedance: ±5Ω
- Mated Connector Impedance: 100Ω±15%
- Rise Time: 85 ps
- Intra Pair Skew: 10 ps Max.
The SATA/STA Collaboration

Serial ATA and Serial Attached SCSI are the newest generations of ATA and SCSI.

Leveraging industry standards, Serial ATA and Serial Attached SCSI allow customers unprecedented flexibility in choosing the right class of storage device to meet their requirements.

Serial ATA:
Originally conceived for desktops, Serial ATA’s new extended capabilities (SATA II) make it the likely choice in storage environments requiring configuration simplicity or optimal cost/capacity.

Serial Attached SCSI:
Conceived for mainstream servers and enterprise storage, Serial Attached SCSI is the likely choice in environments requiring best performance, scalability and reliability.
Similarly, SAS defines internal environments.

Backplanes support two physical links.

Cables mainly support one physical link. (for debug, two physical link cables might be useful)

HP proposing 4x internal connector for SAS-1.1
SAS plug and backplane receptacle connectors

SAS primary physical link

SAS secondary physical link (on backside)

SATA/Primary physical link

Power

Note: SATA backplane connector will not accept SAS drives

SAS backplane receptacle connector

SATA/SAS primary physical link

SAS secondary physical link