Phase Change Memory

Michael Abraham (mabraham@micron.com)
NAND Solutions Group Architect
Micron Technology, Inc.
Phase Change Memory Is a Disruptive Memory Technology

- PCM is developing steadily
- Advantages
  - Low latency reads and writes
  - Capable of high throughput
  - Independent operations through multiple banks
  - High endurance
  - Scalable below 10nm
  - Bit/byte alterable with erase operation not needed
- Current disadvantages
  - Power being reduced through contained cell technology
  - Data retention through reflow requires in-system programming
PCM Product Transitions

<table>
<thead>
<tr>
<th>Feature</th>
<th>90nm</th>
<th>4Xnm</th>
<th>2Xnm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>32-128 Mb</td>
<td>1 Gb</td>
<td>8+ Gb</td>
</tr>
<tr>
<td>Interface</td>
<td>NOR</td>
<td>LP-DDR2</td>
<td>LP-DDR2</td>
</tr>
<tr>
<td>Array write speed</td>
<td>Up to 5MB/s</td>
<td>Up to 10 MB/s</td>
<td>&gt;&gt;10 MB/s</td>
</tr>
</tbody>
</table>

- PCM has started in low value markets and slowly being targeted to higher value spaces
- Expected to eventually move into storage and Storage Class Memory (SCM)
- To see PCM performance in storage, see this paper: http://www.cs.columbia.edu/~kar/pubsk/athanassouliADMS2012.pdf
About Michael Abraham

• Architect in the NAND Solutions Group at Micron

• Covers advanced NAND and PCM interfaces and system solutions

• IEEE Senior Member

• BS degree in Computer Engineering from Brigham Young University

©2007-2012 Micron Technology, Inc. All rights reserved. Products are warranted only to meet Micron’s production data sheet specifications. Information, products and/or specifications are subject to change without notice. All information is provided on an “AS IS” basis without warranties of any kind. Dates are estimates only. Drawings not to scale. Micron and the Micron logo are trademarks of Micron Technology, Inc. All other trademarks are the property of their respective owners.