Pico Computing Products

- Small Form Factor FPGA Boards
  - CompactFlash, CardBus and ExpressCard/34
- PCIe FPGA Products
- Xilinx Virtex-4, Virtex-5, and Spartan FPGAs
- Scalable: Up to 77 FPGAs in one 4U SuperCluster.
HPC in a Laptop
E-12 CompactFlash FPGA Card

- Virtex-4 LX25 or FX12
- 128MB SDRAM
- 64MB FLASH
- PCMCIA Interface
- Reconfigurable Bus
- RS-232
- Tri-Mode Ethernet (FX12)
- Embedded Linux (FX12)
- GHS Integrity (FX12)
E-14 CardBus FPGA Card

- Virtex-4 FX20/FX40/FX60
- 256MB DDR2
- 64MB Flash
- CardBus Interface
- Reconfigurable Bus
- 16 GPIO
- Tri-Mode Ethernet
- RS-232
- Embedded Linux
- GHS Integrity
E-15 CardBus FPGA Card

- Virtex-4 FX20/FX40/FX60
- 256MB DDR2, 64MB Flash
- CardBus Interface
- Reconfigurable Bus
- Dual A/D 12bit @ 125MSPS
- Dual D/A 14bit @ 210MSPS
- Tri-Mode Ethernet, RS-232
- Embedded Linux
- GHS Integrity
- MATLAB Support
E-16 ExpressCard/34 FPGA Card

- ExpressCard/34
- Virtex-5 LX50
- 32MB PS RAM
- X1 PCIe Interface
- 18 Single Ended or 9 LVDS Lines
- Matlab/Simulink
PCIe Products
EX-160

- Up to 7 E-16 Cards
- Fits a x8 or x16 PCIe Slot
- Full x1 PCIe Lane to each E-16 Card
SC3 E-16 SuperCluster

- Up to 77 E-16 LX50 Cards
  (77 Virtex-5 LX50 FPGAs)
- 3.8 Million Logic Cells
- Intel Xeon Host CPU
- PCIe Backplane
- COTS Components
- 700 Watts
### SuperCluster Performance Matrix

<table>
<thead>
<tr>
<th>Key Recovery</th>
<th>Standard Core2Duo PC</th>
<th>EX-300</th>
<th>SC3 with 7 E-16</th>
<th>SC3 with 77 E-16</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FileVault</strong></td>
<td>41 Minutes</td>
<td>11 Seconds</td>
<td>24 Seconds</td>
<td>2 Seconds</td>
</tr>
<tr>
<td>(1 Million)</td>
<td>400/sec</td>
<td>96,000/sec</td>
<td>42,000/sec</td>
<td>462,000/sec</td>
</tr>
<tr>
<td><strong>WPA</strong></td>
<td>3 Hours</td>
<td>53 Seconds</td>
<td>2 Minutes</td>
<td>11 Seconds</td>
</tr>
<tr>
<td>(1 Million Word List)</td>
<td>90/sec</td>
<td>19,200/sec</td>
<td>8,400/sec</td>
<td>92,400/sec</td>
</tr>
<tr>
<td><strong>WEP</strong></td>
<td>42 days</td>
<td>63 Minutes</td>
<td>2.5 Hours</td>
<td>13 Minutes</td>
</tr>
<tr>
<td>(40 bit key)</td>
<td>300,000/sec</td>
<td>288,000,000/sec</td>
<td>126,000,000/sec</td>
<td>1,386,000,000/sec</td>
</tr>
<tr>
<td><strong>WinZip</strong></td>
<td>41 Minutes</td>
<td>11 Seconds</td>
<td>24 Seconds</td>
<td>2 Seconds</td>
</tr>
<tr>
<td></td>
<td>400/sec</td>
<td>96,000/sec</td>
<td>42,000/sec</td>
<td>462,000/sec</td>
</tr>
<tr>
<td><strong>Blue Tooth Pin</strong></td>
<td>2.4 Days</td>
<td>53 Seconds</td>
<td>2 Minutes</td>
<td>13 Seconds</td>
</tr>
<tr>
<td>(10 Digit Pin)</td>
<td>48,000/sec</td>
<td>160,000,000/sec</td>
<td>70,000,000/sec</td>
<td>770,000,000/sec</td>
</tr>
</tbody>
</table>
## SuperCluster Performance Matrix

<table>
<thead>
<tr>
<th>Algorithm</th>
<th>EX-300</th>
<th>1 E-16LX50</th>
<th>SC3 7 E-16LX50</th>
<th>SC3 with 77 E-16LX50</th>
</tr>
</thead>
<tbody>
<tr>
<td>WPA (Brute Force)</td>
<td>80X</td>
<td>5X</td>
<td>35X</td>
<td>385X</td>
</tr>
<tr>
<td>2D Gaussian Convolution</td>
<td>550X</td>
<td>50X</td>
<td>350X</td>
<td>3850X</td>
</tr>
<tr>
<td>Mersanne Twister</td>
<td>450X</td>
<td>30X</td>
<td>210X</td>
<td>2310X</td>
</tr>
</tbody>
</table>
EX-300

- Full Length Full Height PCIe Board
- 16 Spartan XC3S5000 FPGAs (Approximately 1.2 Million Logic Cells) available
- Center FPGA manages communication from Host to 16 Spartan XC3S5000s
- 32bit Bus to each XC3S5000 FPGA from Center FPGA
- FPGAs Loaded directly from Host
- x1 PCIe to Host
  - PLX 8311 Manages PCIe Interface
- One Standard PCIe 2x4 connector
- Power Consumption:
- Windows XP/Vista & Linux Compatible
EX-300 Block Diagram

<table>
<thead>
<tr>
<th>Spartan-3</th>
<th>System Gates</th>
<th>Logic Cells</th>
<th>18x18 Multipliers</th>
<th>Block RAM</th>
<th>Distributed RAM Bits</th>
<th>DCMs</th>
</tr>
</thead>
<tbody>
<tr>
<td>XC3S5000</td>
<td>5 Million</td>
<td>74,880</td>
<td>104</td>
<td>1,872K</td>
<td>520K</td>
<td>4</td>
</tr>
<tr>
<td>Total Resources</td>
<td>80 Million</td>
<td>1.19 Million</td>
<td>1,664</td>
<td>29952K</td>
<td>1,560K</td>
<td>64</td>
</tr>
</tbody>
</table>
HPC Product Road Map

“SPARTA II”

• PCIe x8 Spartan Board
• Sixteen (16) Spartan S5000
• Total of 1.19 Million logic cells
• Estimated Release Date: December 2008

“Dual V5”

• PCIe x16 Virtex-5
• Two Virtex-5 SX240T
• DDR2
• Estimated Release Date: January 2009