Intel® Xeon Phi™ Product Family Performance
Theoretical Maximums
(Intel® Xeon® processor E5-2670 vs. Intel® Xeon Phi™ coprocessor 5110P & SE10P/X)

**Single Precision**
(GF/s)

- E5-2670: 666 (2x 2.6GHz, 8C, 115W)
- 5110P: 2,022 (60C, 1.053GHz, 225W)
- SE10P/X: 2,147 (61C, 1.1GHz, 300W)

Up to 3.2x
Higher is Better

**Double Precision**
(GF/s)

- E5-2670: 333 (2x 2.6GHz, 8C, 115W)
- 5110P: 1,011 (60C, 1.053GHz, 225W)
- SE10P/X: 1,074 (61C, 1.1GHz, 300W)

Up to 3.2x
Higher is Better

**Memory Bandwidth**
(GB/s)

- E5-2670: 102 (2x 2.6GHz, 8C, 115W)
- 5110P: 320 (60C, 1.053GHz, 225W)
- SE10P/X: 352 (61C, 1.1GHz, 300W)

Up to 3.45x
Higher is Better

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations, and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products.

Synthetic Benchmark Summary
Intel® Math Kernel Library (Intel® MKL)

**SGEMM (GF/s)**
- **Up to 2.9X**
- Higher is Better
- E5-2670 Baseline (2x 2.6GHz, 8C, 115W)
- 5110P (60C, 1.053GHz, 225W)
- SE10P (61C, 1.1GHz, 300W)

**DGEMM (GF/s)**
- **Up to 2.8X**
- Higher is Better
- E5-2670 Baseline (2x 2.6GHz, 8C, 115W)
- 5110P (60C, 1.053GHz, 225W)
- SE10P (61C, 1.1GHz, 300W)

**SMP LINPACK**
- **Up to 2.6X**
- Higher is Better
- E5-2670 Baseline (2x 2.6GHz, 8C, 115W)
- 5110P (60C, 1.053GHz, 225W)
- SE10P (61C, 1.1GHz, 300W)

**STREAM Triad (GB/s)**
- **Up to 2.2X**
- Higher is Better
- E5-2670 Baseline (2x 2.6GHz, 8C, 115W)
- 5110P (60C, 1.053GHz, 225W)
- SE10P (61C, 1.1GHz, 300W)

Coprocessor results: Benchmark run 100% on coprocessor, no help from Intel® Xeon® processor host (aka native)

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations, and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. Intel® MKL not used in STREAM triad benchmark.

Performance Per Watt (Performance/Coprocessor power)

Coprocessor results: Benchmark run 100% on coprocessor, no help from Intel® Xeon® processor host (aka native)

Notes
1. Intel® Xeon Phi™ coprocessor 5110P (ECC on)
   Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations, and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products.

### Segment

<table>
<thead>
<tr>
<th>Customer</th>
<th>Application</th>
<th>Performance Increase(^1) vs. 2S Xeon*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy</strong></td>
<td>Acceleware</td>
<td>8(^{th}) order isotropic variable velocity</td>
</tr>
<tr>
<td>Sinopec</td>
<td>Seismic Imaging</td>
<td></td>
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<tr>
<td>CNPC (China Oil &amp; Gas)</td>
<td>GeoEast Pre-Stack Time Migration (Seismic)</td>
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<td><strong>Financial Services</strong></td>
<td>Financial Services</td>
<td>BlackScholes SP Monte Carlo SP</td>
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<tr>
<td><strong>Physics</strong></td>
<td>Jefferson Labs</td>
<td>Lattice QCD</td>
</tr>
<tr>
<td><strong>Finite Element</strong></td>
<td>Sandia Labs</td>
<td>miniFE (Finite Element Solver)</td>
</tr>
<tr>
<td><strong>Solid State Physics</strong></td>
<td>ZIB (Zuse-Institut Berlin)</td>
<td>Ising 3D (Solid State Physics)</td>
</tr>
<tr>
<td><strong>Digital Content Creation/Video</strong></td>
<td>Intel Labs</td>
<td>Ray Tracing (incoherent rays)</td>
</tr>
<tr>
<td></td>
<td>NEC</td>
<td>Video Transcoding</td>
</tr>
<tr>
<td><strong>Astronomy</strong></td>
<td>CSIRO/ASKAP (Australia Astronomy)</td>
<td>tHogbom Clean (Astronomy image smear removal)</td>
</tr>
<tr>
<td></td>
<td>TUM (Technische Universität München)</td>
<td>SG++ (Astronomy Adaptive Sparse Grids/Data Mining)</td>
</tr>
<tr>
<td><strong>Fluid Dynamics</strong></td>
<td>AWE (Atomic Weapons Establishment - UK)</td>
<td>Cloverleaf (2D Structured Hydrodynamics)</td>
</tr>
</tbody>
</table>

### Notes:

1. 2S Xeon* vs. 1 Xeon Phi* (preproduction HW/SW & Application running 100% on coprocessor unless otherwise noted)
2. 2S Xeon* vs. 2S Xeon* + 2 Xeon Phi* (offload)
3. 8 node cluster, each node with 2S Xeon* (comparison is cluster performance with and without 1 Xeon Phi* per node) (Hetero)
5. 8 node cluster, each node with 2S Xeon* (comparison is cluster performance with Xeon only vs. Xeon Phi only (1 Xeon Phi* per node) (Native)

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products.

Source: Customer Measured results as of October 22, 2012  Configuration Details: Please reference slide speaker notes.

For more information go to [http://www.intel.com/performance](http://www.intel.com/performance)
Financial Services Workloads

Relative Performance
Normalized to 1.0 Baseline of a 2 socket Intel® Xeon® processor E5-2687

<table>
<thead>
<tr>
<th>Workload</th>
<th>Relative Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2S Intel® Xeon® Processor</td>
<td>1.00</td>
</tr>
<tr>
<td>BlackScholes Compute DP</td>
<td>3.45</td>
</tr>
<tr>
<td>BlackScholes Compute &amp; BW</td>
<td>3.74</td>
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<tr>
<td>Monte Carlo Simulation DP</td>
<td>4.48</td>
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<tr>
<td>BlackScholes Compute SP</td>
<td>5.32</td>
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<tr>
<td>BlackScholes Compute &amp; BW</td>
<td>7.52</td>
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<tr>
<td>Monte Carlo SP</td>
<td>10.75</td>
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</tbody>
</table>

Intel® Xeon Phi™ Coprocessor vs. 2S Intel® Xeon® processor (Intel® MKL)

Coprocessor results: Benchmark run 100% on coprocessor, no help from Intel® Xeon® processor host (aka native)

Notes
1. 2 X Intel® Xeon® Processor E5-2670 (2.6GHz, 8C, 115W)
2. Intel® Xeon Phi™ coprocessor SE10 (ECC on) with pre-production SW stack

Higher SP results are due to certain Single Precision transcendental functions in the Intel® Xeon Phi™ coprocessor which are not present in the Intel® Xeon® processor

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. Source: Intel Measured results as of October 22, 2012. Configuration Details: Please reference slide speaker notes. For more information go to http://www.intel.com/performance
Intel® Xeon Phi™ Coprocessor (5110P vs. SE10P)

Intel® Xeon Phi™ Coprocessor 5110P (60C, 1.053GHz, 8GB @ 5.0GT/s, 225W TDP) vs. Intel® Xeon Phi™ Coprocessor SE10P (61C, 1.1GHz, 8GB @ 5.5GT/s, 300W TDP)

Intel® Xeon Phi™ coprocessor SE10P delivers up to 11% higher performance vs. 5110P

Intel® Xeon Phi™ Coprocessor PCIe Transfer Capabilities

<table>
<thead>
<tr>
<th></th>
<th>SE10</th>
<th>5110P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(61 cores, 1.093GHz, 8GB, 5.5GT/s)</td>
<td>(60 cores, 1.053GHz, 8GB, 5.0GT/s)</td>
</tr>
<tr>
<td>Host to Device</td>
<td>6.88 GB/s</td>
<td>6.91 GB/s</td>
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<tr>
<td>(PCIe Download)</td>
<td></td>
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<tr>
<td>Device to Host</td>
<td>6.98 GB/s</td>
<td>6.95 GB/s</td>
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<tr>
<td>(PCIe Readback)</td>
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</table>

Notes:
1. Clocksource set to TSC, Power Management turned off
2. Using pragma transfers

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. Source: Intel Measured as of October 2012. Configuration Details: Please reference slide speaker notes. For more information go to [http://www.intel.com/performance](http://www.intel.com/performance)
Backup
Theoretical Maximum Configuration Details

Configuration Details:
As of October 16, 2012

Host Platform:
2-Socket Crown Pass Software Development Platform: 2x Intel® Xeon® processor E5-2670 (20 M cache, 2.6 GHz, 8.0 GT/s Intel QPI, 115 W TDP) Memory @ 1600MHz

Coprocessor Details:
Intel® Xeon Phi™ coprocessor 5110P: 60 cores, 1.053 GHz, 8 GB Memory@5.0 GT/s, 225 W TDP
Intel® Xeon Phi™ coprocessor SE10: 61 cores, 1.1 GHz, 8 GB Memory@5.5 GT/s, 300 W TDP

Theoretical values calculations:
SP Xeon: 16 Flops/clock * 8 cores/socket * 2 sockets * 2.6 GHz = 665.6 GF/s
SP Xeon Phi SE10: 32 Flops/clock * 61 cores * 1.1 GHz = 2147.2 GF/s
SP Xeon Phi 5110P: 32 Flops/clock * 60 cores * 1.053 GHz = 2021.76 GF/s

DP Xeon: 8 Flops/clock * 8 cores/socket * 2 sockets * 2.6 GHz = 332.8 GF/s
DP Xeon Phi SE10: 16 Flops/clock * 61 cores * 1.1 GHz = 1073.6 GF/s
DP Xeon Phi 5110P: 16 Flops/clock * 60 cores * 1.053 GHz = 1010.88 GF/s

Mem BW Xeon: 8 bytes/channel * 4 channels * 2 sockets * 1.6 GHz = 102.4 GB/s
Mem BW Xeon Phi SE10: 4 bytes/channel * 16 channels * 5.5 GT/s = 352 GB/s
Mem BW Xeon Phi 5110P: 4 bytes/channel * 16 channels * 5.0 GT/s = 320 GB/s
Synthetic Benchmark Configuration Details

Configuration Details:
As of October 26, 2012

Intel® Xeon® Processor Platform:
2-Socket Canoe Pass Software Development Platform: 2x Intel Xeon processor E5-2670 (20 M cache, 2.6 GHz, 8.0 GT/s Intel QPI, 115W TDP) 64 GB Memory @ 1600 MHz, RHEL 6.3, Turbo on, HT off, EIST Enabled, Power: Performance mode

Platform Hosting the Coprocessor:
2-Socket Crown Pass Software Development Platform: 2x Intel Xeon processor E5-2670 (20 M cache, 2.6 GHz, 8.0 GT/s Intel QPI, 115 W TDP) 32 GB Memory @ 1600 MHz, RHEL 6.0

Coprocessor Details:
Intel® Xeon Phi™ coprocessor 5110P: 60 cores, 1.053 GHz, 8 GB Memory@5.0 GT/s, 225 W TDP (B1 step)
Intel® Xeon Phi™ coprocessor SE10P: 61 cores, 1.1 GHz, 8 GB Memory@5.5 GT/s, 300 W TDP (B1 step)

Software Stack:
“Gold” Release Candidate Software Stack:
MPSS 2.1.4346-16 (Flash: 2.1.01.0375; Coprocessor OS: 2.6.34.11-g65c0cd9; Driver: 4346-16)
Intel Cluster Studio XE 2013 Update 1 (Compiler: Composer_XE_2013.1.117; Intel® MKL: 11.0.1)

SGEMM/DGEMM/SMP LINPACK
Intel Xeon: Source: TR1325
Intel Xeon Phi: Source: TR2028C

STREAM* Triad
2x Intel Xeon processor E5-2670 (20 M cache, 2.6 GHz, 8.0 GT/s Intel QPI, 115 W) 64 GB Memory @ 1600 MHz, Score 78.5 GB/s. Source: Intel TR#1241
Intel Xeon Phi coprocessor: 64 MB matrix size, 2 MB pages enabled, ECC on/off (Oct 26, 2012, Gold RC SW stack) (Source: Intel TR #2012B)
Performance Per Watt Configuration Details

Platform Hosting the Coprocessor:
2-Socket Crown Pass Software Development Platform: 2x Intel® Xeon® processor E5-2670 (20 M cache, 2.6 GHz, 8.0 GT/s Intel QPI, 115 W TDP) 32 GB Memory @ 1600 MHz, RHEL 6.2 (measured in a non-production open chassis)

Coprocessor Details:
Intel® Xeon Phi™ coprocessor 5110P: 60 cores, 1.053 GHz, 8 GB Memory@5.0 GT/s, 225 W TDP (B1-Step)

Software Stack:
“Pre-Gold” Release Candidate Software Stack:
MPSS 2.1.4346-16  (Flash: 2.1.01.0375; Coprocessor OS: 2.6.34.11-g65c0cd9; Driver: 4346-16)
Intel® Cluster Studio XE 2013 Update 1 (Compiler: Composer_XE_2013.1.117; Intel® MKL: 11.0.1), TSC = on, Power Mgmt = disabled

SGEMM/DGEMM/SMP LINPACK (both Intel Xeon and Intel Xeon Phi)
Source: TR2028C

1 Intel® Xeon Phi™ coprocessor Score/power (measured)

<table>
<thead>
<tr>
<th></th>
<th>Score</th>
<th>Power (coprocessor power only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGEMM</td>
<td>1700 GF/S</td>
<td>199 W</td>
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<tr>
<td>DGEMM</td>
<td>833 GF/s</td>
<td>195 W</td>
</tr>
<tr>
<td>SMP Linpack</td>
<td>723 GF/s</td>
<td>232 W</td>
</tr>
</tbody>
</table>
Application Benchmark Configuration Data

**Source 8th Order isotropic variable velocity model:**

*Acceleware Configuration Details:*
- **Host:** Two Intel® Xeon® processor E5-2690 (8C, 2.9GHz, 130W)
- **Coprocessor:** B0 ES2 61C, 1.091GHz, 8GB @ 5.5GT/s)
- **Application:** 8th order isotropic variable velocity model
- **Score:** 43.5 seconds (Xeon); 19.5 seconds (Xeon Phi)

**Lattice QCD:**

*Jefferson Labs Configuration Details:*
- **Host:** Two Intel® Xeon® processor E5-2680 (8C, 2.7GHz, 130W)
- **Coprocessor:** ES2 B1, 61 core, 1.091GHz, 8GB @ 5.5GT/s
- **Application:** 32x24x40x96 volumes Compressed Gauges
- **Score:** 120GB/s (Xeon only); 335GB/s (Xeon Phi)

**Financial Services:**

*Monte Carlo & Black Scholes (SP):*
- **Host:** Two Intel® Xeon® processor E5-2670 (8C, 2.6GHz, 115W)
- **Coprocessor:** ES2 B1, 61 core, 1.091GHz, 8GB @ 5.5GT/s
- **Application:** Black Scholes Compute (Single Precision)
- **Score:** 4.7866 Bop/sec (Xeon only); 33.699 Bop/sec (Xeon Phi)
- **Time:** 134.24 GFLOP/s (2S Xeon only); 228.46 GFLOP/s (1 Xeon Phi)

**CSIRO/ASKAP:**

*tHogbom Clean*
- **Host:** Two Intel® Xeon® processor E5-2670 (8C, 2.6GHz, 115W), 64GB memory, default BIOS settings
- **Coprocessor:** ES2 B0, 61 core, 1.091GHz, 8GB @ 5.5GT/s (Early Gold SW release…4663-11…not production)
- **Application:** tHogbom Clean
- **Time:** 182 Cleaning iterations/sec (2S Xeon only); 413.2 Cleaning iterations/sec (1 Xeon Phi)

**TUM (Technische Universität München):**

*SG++ (adaptive Sparse Grids, used for data mining in scientific problems)*
- **Host:** Two Intel® Xeon® processor E5-2670 (8C, 2.6GHz, 115W), 64GB memory, default BIOS settings
- **Coprocessor:** ES2 B0, 61 core, 1.091GHz, 8GB @ 5.5GT/s (Beta MPSS 3653, Composer XE 2013.1.115)
- **Application:** SG++
- **Time:** 134.24 GFLOP/s (2S Xeon only); 228.46 GFLOP/s (1 Xeon Phi)

**ZIB (Zuse-Institut Berlin):**

*Ising 3D (Solid State Physics, simulate atoms, computes spin behavior in a 128x128x128 grid)*
- **Host:** Two Intel® Xeon® processor E5-2670 (8C, 2.6GHz, 115W), 64GB memory, default BIOS settings
- **Coprocessor:** ES2 B0, 61 core, 1.091GHz, 8GB @ 5.5GT/s
- **Application:** Ising 3D
- **Time:** 0.0431 ns/update (2S Xeon only); 0.0124 ns/update (1 Xeon Phi)

**Sinopec:**

*RTM*
- **Host:** Two Intel® Xeon® processor E5-2680 (8C, 2.7GHz, 130W), 32GB memory, default BIOS settings
- **Coprocessor:** 2x ES2 B1, 61 core, 1.091GHz, 8GB @ 5.5GT/s
- **Application:** Split Step Fourier PsDM algorithm (Pre-stack depth migration)
- **Score:** 1342 seconds (2S Xeon only); 528.6 seconds (2S Xeon + 2 Xeon Phi)

**AWE (Atomic Weapons Establishment – United Kingdom):**

*Cloverleaf (2D structured Hydrodynamics – a fluid Dynamics mini-app)*
- **Host:** Two Intel® Xeon® processor E5-2670 (8C, 2.6GHz, 115W), 64GB memory, default BIOS settings
- **Coprocessor:** ES2 B1, 61 core, 1.091GHz, 8GB @ 5.5GT/s (MPSS 3552, Composer XE 2013.1.117)
- **Application:** Cloverleaf
- **Time:** 50.22 sec (2S Xeon only); 28.31 sec (1 Xeon Phi)
Application Benchmark Configuration Data (cont.)

Source MiniFE Solver:
Sandia Labs Configuration Details:
Host: Two Intel® Xeon® processor E5-2670 (8C, 2.6GHz, 115W)
Coprocessor: ES1 B0, 61 core, 1.091GHz, 8GB @ 5.5GT/s
Cluster with 8 nodes and FDR fabric; Beta SW Stack
Application: miniFE Solver 390x390x390 Double Precision
Score: 2.34 seconds (Xeon only); 1.15 seconds (Xeon + Xeon Phi) (8 nodes, symmetric)
Score: 2.34 seconds (Xeon only); 1.77 seconds (8 Xeon Phi only) (native)

Intel Labs:
Ray Tracing
Host: Two Intel® Xeon® processor E5-2680 (8C, 2.7GHz, 130W), 32GB memory, default BIOS settings
Coprocessor: ES2 B0, 61 core, 1.091GHz, 8GB @ 5.5GT/s
Application: Ray Tracing Benchmark, Ambient Occlusion (4 Million Triangles, 1024 x 1024 resolution, total 17,825,792 rays per frame)
Score: 61.61 Million Rays/sec (2S Xeon only); 115.85 Million Rays/sec (Xeon Phi)

NEC: (Source NEC: See 326604-001us.pdf @ http://software.intel.com/en-us/articles/sdp-case-studies )
Video Transcoding:
Host: Two Intel® Xeon® processor E5-26xx
Coprocessor: 2 x SE10P, 61 core, 1.091GHz, 8GB @ 5.5GT/s
Application: conversion of Standard Definition video to High Definition Video
Score: 10 frames per second (2S Xeon only, optimized code); 30 frames per second (2S Xeon + 2 Xeon Phi)

CNPC BGP Geoeast PSTM:
Seismic
Host: Two Intel® Xeon® processor E5-2687 (8C, 3.1GHz, 150W), 64GB memory, default BIOS settings
Coprocessor: ES2 B0, 61 core, 1.091GHz, 8GB @ 5.5GT/s
Application: CNPC BDP Geoeast PSTM
Time: 1100 sec (2S Xeon only); 311 sec (2S Xeon + 2 Xeon Phi)
Financial Services Workload Configuration Data

Configuration Details:
As of October 22, 2012

Platform Hosting the Coprocessor (& platform for 2S Intel® Xeon® processor baseline):
2-socket Crown Pass Software Development Platform: 2x Intel Xeon processor E5-2670 (20 M cache, 2.6 GHz, 8.0 GT/s Intel QPI, 115 W TDP) 32GB Memory @ 1600 MHz, RHEL 6.0

Coprocessor Details:
Intel® Xeon Phi™ coprocessor SE10: 61 cores, 1.1 GHz, 8 GB Memory@5.5 GT/s, 300 W TDP (active cooling solution) (B1 step)

Software Stack:
“Gold” Release Candidate Software Stack:
MPSS 2.1.4346-17 (Flash: 2.1.01.0375; Coprocessor OS: 2.6.34.11-g65c0cd9; Driver: 4346-16)
Intel® Cluster Studio XE 2013 Update 1 (Compiler: Composer_XE_2013.1.117; Intel® MKL: 11.0.1)

Results measured by Shuo Li

<table>
<thead>
<tr>
<th>Test Case</th>
<th>2S Intel® Xeon® processor</th>
<th>Intel® Xeon Phi™ coprocessor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monte Carlo Simulation SP (native)</td>
<td>45,501</td>
<td>489,354 opt/sec</td>
</tr>
<tr>
<td>Monte Carlo Simulation DP</td>
<td>21,817</td>
<td>97,846 opt/sec</td>
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<tr>
<td>Black Scholes Compute SP</td>
<td>4.8023</td>
<td>33.689 Bop/sec</td>
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<tr>
<td>Black Scholes Compute DP</td>
<td>2.2957</td>
<td>5.851 Bop/sec</td>
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<tr>
<td>Black Scholes Compute &amp; Bandwidth SP</td>
<td>3.8684</td>
<td>20.571 Bop/sec</td>
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<tr>
<td>Black Scholes Compute &amp; Bandwidth DP</td>
<td>1.2471</td>
<td>4.665 Bop/sec</td>
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</table>
5110P vs. SE10P Configuration Data

Configuration Details:
As of October 26, 2012

Host Platform:
2-Socket Crown Pass Software Development Platform: 2x Intel® Xeon® processor E5-2670 (20 M cache, 2.6 GHz, 8.0 GT/s Intel QPI, 115W TDP) 32 GB Memory @ 1600MHz, RHEL 6.0

Coprocessor Details:
Intel® Xeon Phi™ coprocessor 5110P: 60 cores, 1.053 GHz, 8 GB Memory@5.0 GT/s, 225 W TDP (B1 step)
Intel® Xeon Phi™ coprocessor SE10: 61 cores, 1.1 GHz, 8 GB Memory@5.5 GT/s, 300 W TDP (B1 step)

Software Stack:
“Gold” Release Candidate Software Stack:
MPSS 2.1.4346-16 (Flash: 2.1.01.0375; Coprocessor OS: 2.6.34.11-g65c0cd9; Driver: 4346-16)
Intel® Cluster Studio XE 2013 Update 1 (Compiler: Composer_XE_2013.1.117; Intel® MKL: 11.0.1)

SGEMM/DGEMM/SMP Linpack
Source: TR2028C

<table>
<thead>
<tr>
<th>Matrix Size</th>
<th>5110P</th>
<th>SE10</th>
</tr>
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<tbody>
<tr>
<td>SGEMM</td>
<td>11264 x 11264</td>
<td>15360 x 15360</td>
</tr>
<tr>
<td>DGEMM</td>
<td>7680 x 7680</td>
<td>7680 x 7680</td>
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<tr>
<td>SMP Linpack</td>
<td>28672 x 28672</td>
<td>28672 x 28672</td>
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</table>

<table>
<thead>
<tr>
<th>Score</th>
<th>5110P</th>
<th>SE10</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGEMM</td>
<td>1729.94 GF/s</td>
<td>1860.87 GF/s</td>
</tr>
<tr>
<td>DGEMM</td>
<td>833.17 GF/s</td>
<td>883.27 GF/s</td>
</tr>
<tr>
<td>SMP Linpack</td>
<td>722.88 GF/s</td>
<td>803.3 GF/s</td>
</tr>
<tr>
<td>STREAM Triad</td>
<td>159 GB/s</td>
<td>174 GB/s</td>
</tr>
</tbody>
</table>

STREAM* Triad
Intel® Xeon Phi™ coprocessor: 64 M matrix size, 2 MB pages enabled, ECC on (Oct 26, 2012) (Source TR 2012B) 5110P = 159 GB/s, SE10 P (174 GB/s)
PCIe Transfer Bandwidth

Configuration Details:
As of October 26, 1012

Platform Hosting the Coprocessor:
2 Socket Crown Pass Software Development Platform: 2x Intel Xeon processor E5-2670 (20M cache, 2.6GHz, 8.0GT/s Intel QPI, 115W TDP) 32GB Memory @ 1600MHz, RHEL 6.0

Coprocessor Details:
Intel® Xeon Phi™ coprocessor 5110P: 60cores, 1.053GHz, 8GB Memory@5.0GT/s, 225W TDP (B1 step)
Intel® Xeon Phi™ coprocessor SE10P: 61cores, 1.1GHz, 8GB Memory@5.5GT/s, 300W TDP (B1 step)

Software Stack:
“Gold” Software Stack:
MPSS 2.1.4346-16 (Flash: 2.1.01.0375; Coprocessor OS: 2.6.34.11-g65c0cd9; Driver: 4346-16)
 Intel Cluster Studio XE 2013 Update 1 (Compiler: Composer_XE_2013.1.117; Intel® MKL: 11.0.1)

Xeon Phi: Source: TR2028C
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Notice revision #20110804
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