

# Legal Information

Today's presentations contain forward-looking statements. All statements made that are not historical facts are subject to a number of risks and uncertainties, and actual results may differ materially. Please refer to our most recent Earnings Release and our most recent Form 10-Q or 10-K filing for more information on the risk factors that could cause actual results to differ.

If we use any non-GAAP financial measures during the presentations, you will find on our website, [intc.com](http://intc.com), the required reconciliation to the most directly comparable GAAP financial measure.

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Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, reference [www.intel.com/software/products](http://www.intel.com/software/products).

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.

# Built to Scale: Introducing the Intel® Xeon® Processor E5 Family

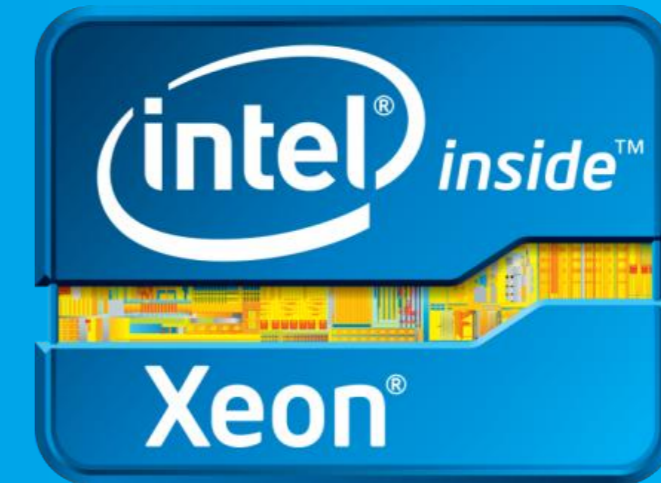


**Diane Bryant**

Vice President  
General Manager, Datacenter and Connected Systems Group



# The Heart of a Flexible, Efficient Data Center





**More Devices**

**More Data**

**More Options**

**More Users**

**More Connections**



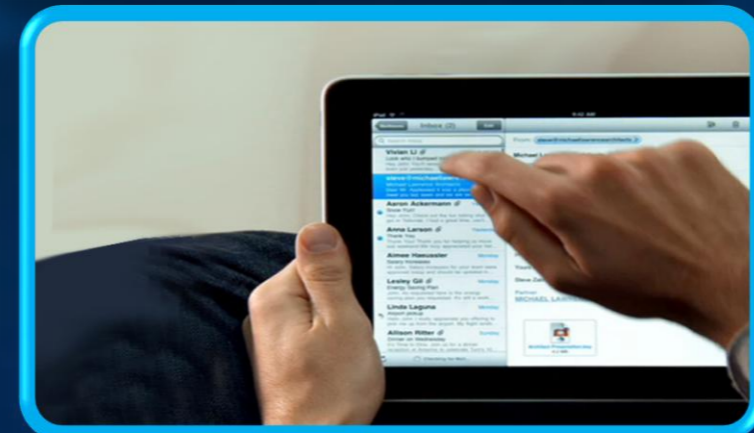
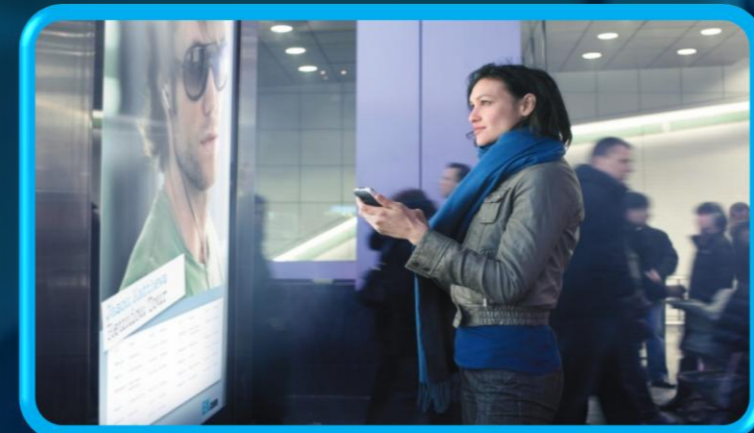
# Compelling User Experiences



IT: Support the Business



IT: Be the Business



# IT Must Scale!

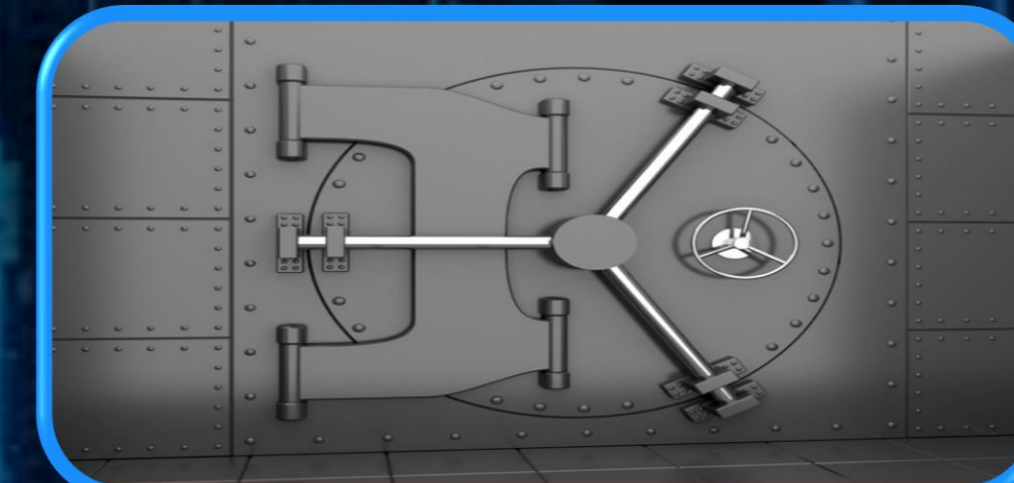
Responsive



Energy Efficient



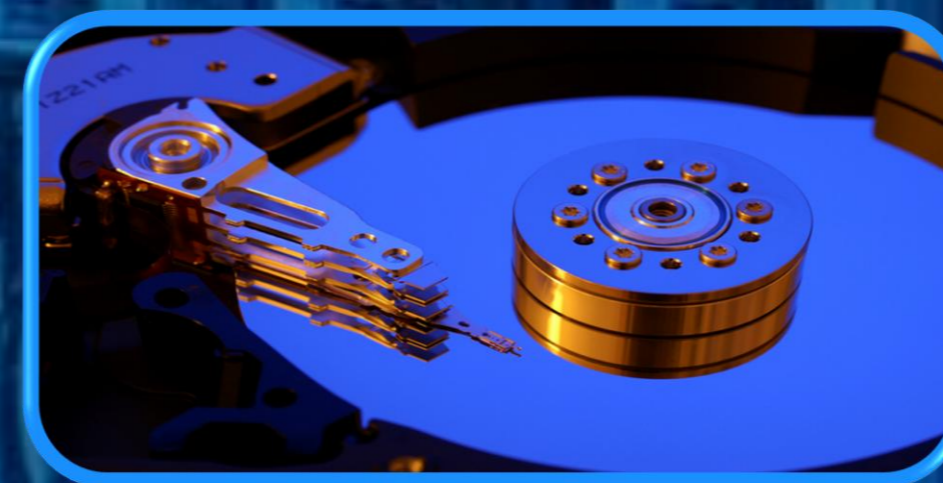
Security



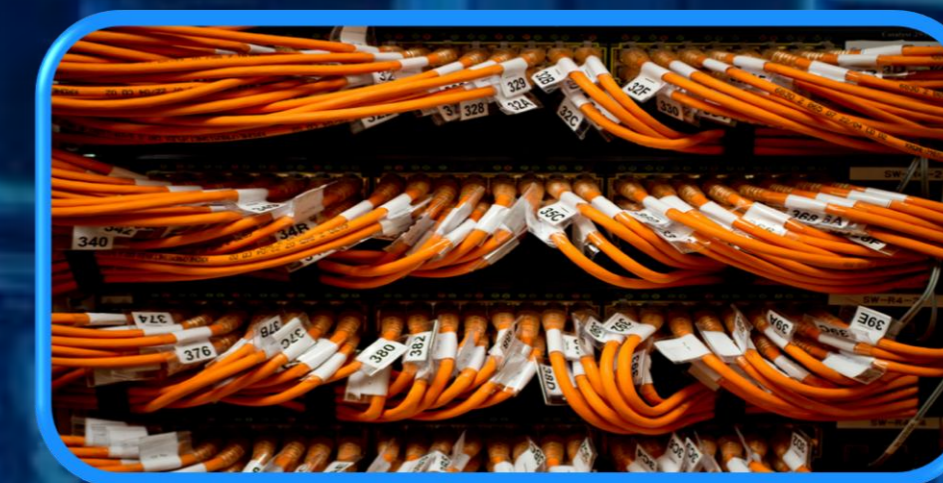
Self Service



Storage



Network







Mario Müller, March 2012

# CLOUD COMPUTING AND CONNECTED DRIVE – ACCESS OF BMW GROUP VEHICLES TO THE BMW DATACENTER.

**LAUNCH INTEL XEON PROCESSOR E5 FAMILY, SAN FRANCISCO.**

**BMW  
GROUP**



Rolls-Royce  
Motor Cars Limited

# SUSTAINABLE GROWTH THRU ATTRACTIVE PRODUCTS.



# A LOOK INSIDE BMW GROUP IT.

## WHO WE ARE?

2.700	IT Employees
> 300	Projects in parallel every year
2.100	Applications
9	Datacenter
50	IT Locations in 26 countries
95.000	Notebooks, Desktops
4.500	Engineering workstations
25.000	Production clients
3.800	Smartphones
48.000	Mobile phones
35.000	Landline phones

## WHO WE SUPPORT?

95.453 BMW Group Employees

Globale Supplier network with more than 1.200 supplier

25 Production and Assembly plants in 14 countries

Sales- and Financial Services subsidiaries in 43 countries

Research and development network in 5 countries



BMW Financial Services

MINI Financial Services



# EMPOWERING CONNECTEDDRIVE. CUSTOMER SERVICES.

## BMW Assist



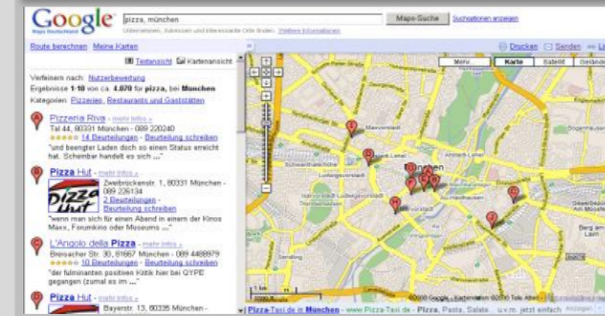
- Operator assisted services,
- eCall, Concierge Services,
- Remote Services, ...

## BMW Online



- BMW specific online content,
- news, weather, stock exchange, route download, ...

## Internet



- Direct Internet access.
- Fast performance due to server side re-rendering of content.

## BMW TeleServices



- Remote diagnostics and remote help over the air.

## BMW Tracking



- Tracking of stolen vehicles.

## Status 2012 :

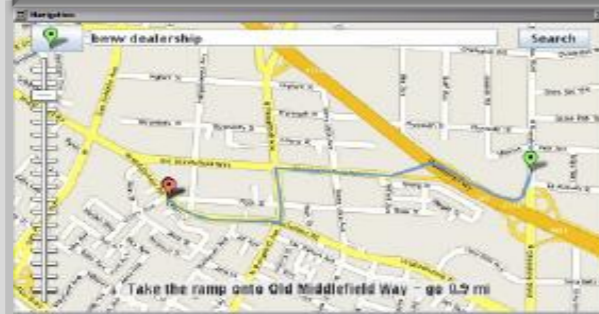
- ~1M vehicles connected worldwide
- >1M requests/day
- 600MB data volume/day

## Connected Navigation



- Google Maps, Google Earth, Google Panoramio, Google Suggest, ...

## IntelligentDrive



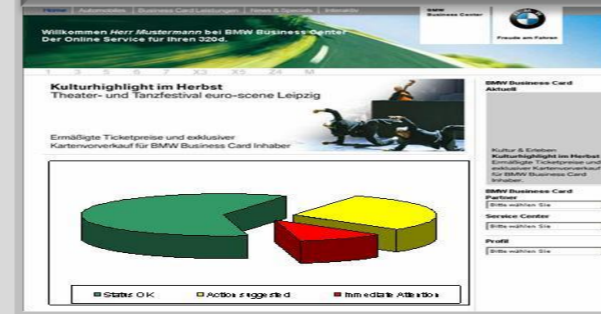
- RTTI over IP
- Extended Floating Car Data
- Hybrid / Offboard Navigation

## A4A



- Applications for Automotive, Remote HMI, ...

## Fleet Management



- Management solution, enabling reports for all vehicles of a fleet, e.g. fuel consumption, mileage.

## Assistants (CCU)



- Complex Connected Use-Cases, e.g. multimodal routing assistant, charging assistant, ...

## BMW Entertainment



- Personal Radio, Web Radio, ...

## Outlook 2018:

- > 10M vehicles connected worldwide
- > 100M Requests/day
- > 1TB data volume/day

**THANK YOU VERY MUCH.**



# On Track For Cloud 2015 Vision



# Solutions to Help You Scale

## Open, Industry Standards



## Intel Cloud Builders Partners

Reference Architectures Available for Intel® Xeon® Processor E5 Family



Additional Reference Architectures



\* Other names and brands may be claimed as the property of others

A man in a dark blue polo shirt stands in a server room, pointing at a digital overlay of himself that is semi-transparent and shows internal data patterns. The background consists of rows of server racks with glowing blue lights. A large blue banner is overlaid on the left side of the image, containing white text.

**IT Needs the Best Combination of Performance,  
Built-in Capabilities, and Cost-effectiveness**



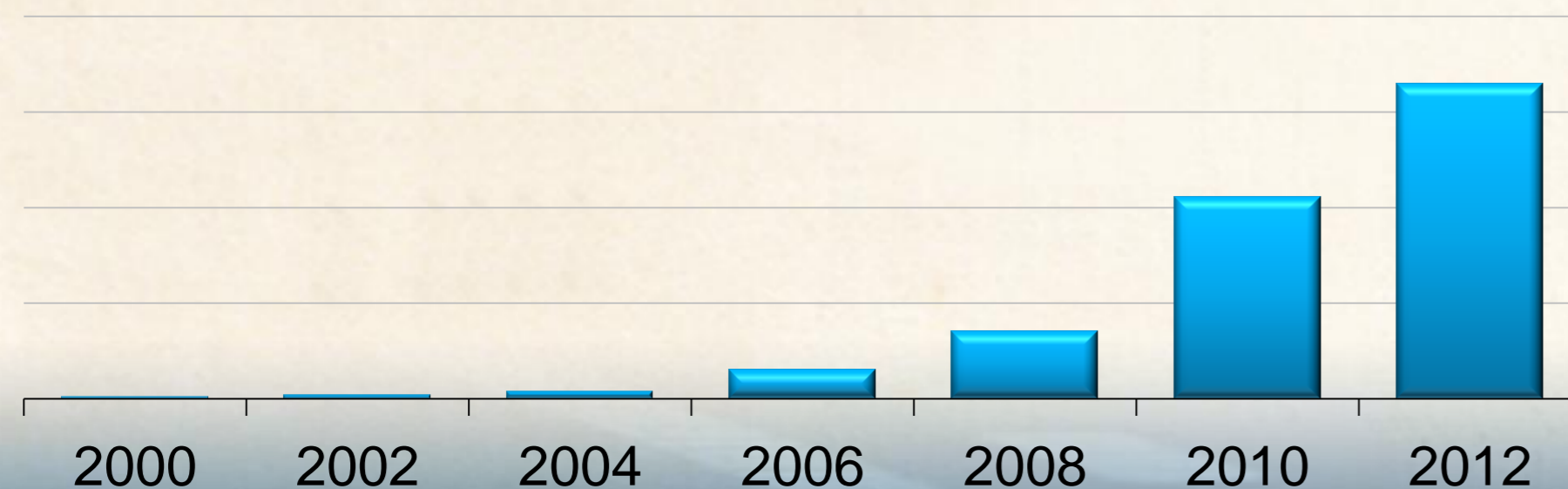


# THE DAILY NEWS

THE WORLD'S FAVORITE NEWSPAPER

## Intel Increases Performance!

>100X Improvement Since 2000<sup>1</sup>



# To Scale IT Must Address:

I/O Bottlenecks

Security Challenges

Energy Efficiency

Storage & Switching Constraints

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<sup>1</sup> Intel Internal Assessment and Estimates on an Integer Throughput benchmark from 2000 to 2012.  
For more information go to <http://www.intel.com/performance>



# Introducing the Intel® Xeon® Processor E5 Family

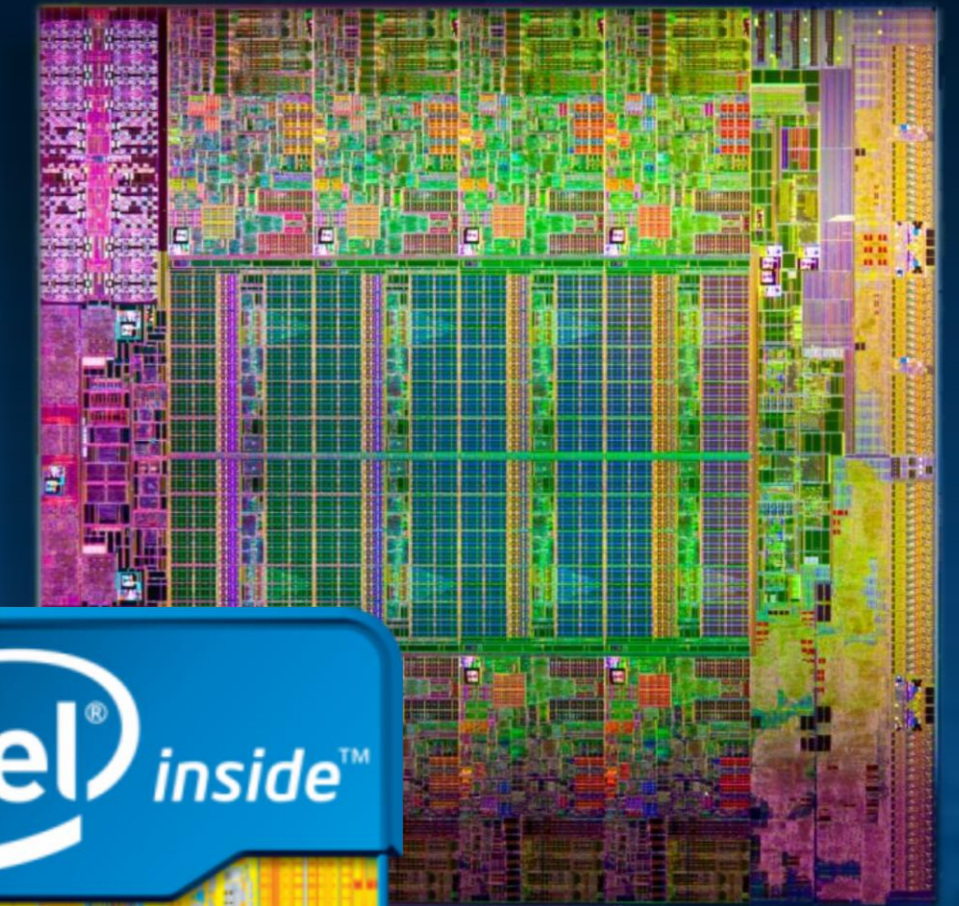
The Heart of a  
Flexible, Efficient  
Data Center Built  
to Scale

80% Performance Gain<sup>1</sup>

Breakthrough I/O Innovation

Trusted Security

Best Data Center Performance per Watt<sup>2</sup>



"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.

1: Performance comparison using best submitted/published 2-socket server results on the SPECfp\*\_rate\_base2006 benchmark as of 6 March 2012. Configuration details in backup

2: Performance comparison using SPEC\_Power results published as of March 6<sup>th</sup>, 2012. See back up for configuration details.

For more information go to [intel.com/performance](http://intel.com/performance)"



# Performance for Everything You Do

## Best for Virtualization



VMmark\* 2



SPECvirt\_sc\*2010

## Best for Enterprise Infrastructure



SPECpower\*\_ssj2008,  
SAP\* Server Power 2-Tier



SAP-SD\* 2-Tier,  
TPC\* Benchmark E

## Best for the Web



SPECjbb\*2005



SPECjEnterprise\*2010

## Best for Technical Computing



SPECcompl\*\_base2001



SPECapc\* for  
3ds Max\* 2011

15 New Dual  
Socket x86  
Records on  
E5-2600!



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Source: Best available submissions and publications as of 6 March 2012. Please see slide speaker notes for source details.

For more information go to <http://www.intel.com/content/www/us/en/benchmarks/server/xeon-e5-2600-summary.html>

\* Other names and brands may be claimed as the property of others

# Intel® Advanced Vector Extensions



*"The new Xeon processor E5-2600 with Intel® AVX allowed us to enable full stereo dual stream video processing in real time at high frame rates required for surgery."*

— Alex Chanin, President and CEO, Visionsense

*"Facial recognition solutions must process huge amounts of digital photo uploads accurately and at manageable costs. Using the Intel® Xeon® processor E5 family with Intel® AVX, we were able to reach a photo processing throughput unmatched by any world-class facial recognition solution."*

— Yaniv Taigman, CTO of face.com

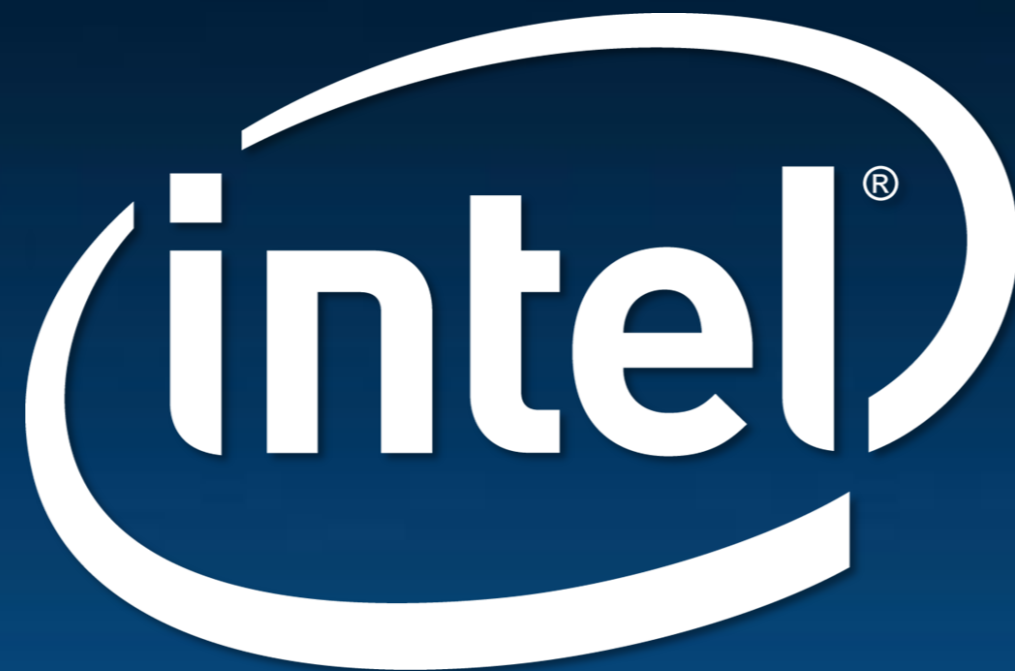





**DREAMWORKS**  
— ANIMATION SKG® —



# Processing an Animated Film



A History of  
Collaboration



**A Future with  
Intel Xeon Processor  
E5 Family**





# MADAGASCAR 3

EUROPE'S  
MOST WANTED

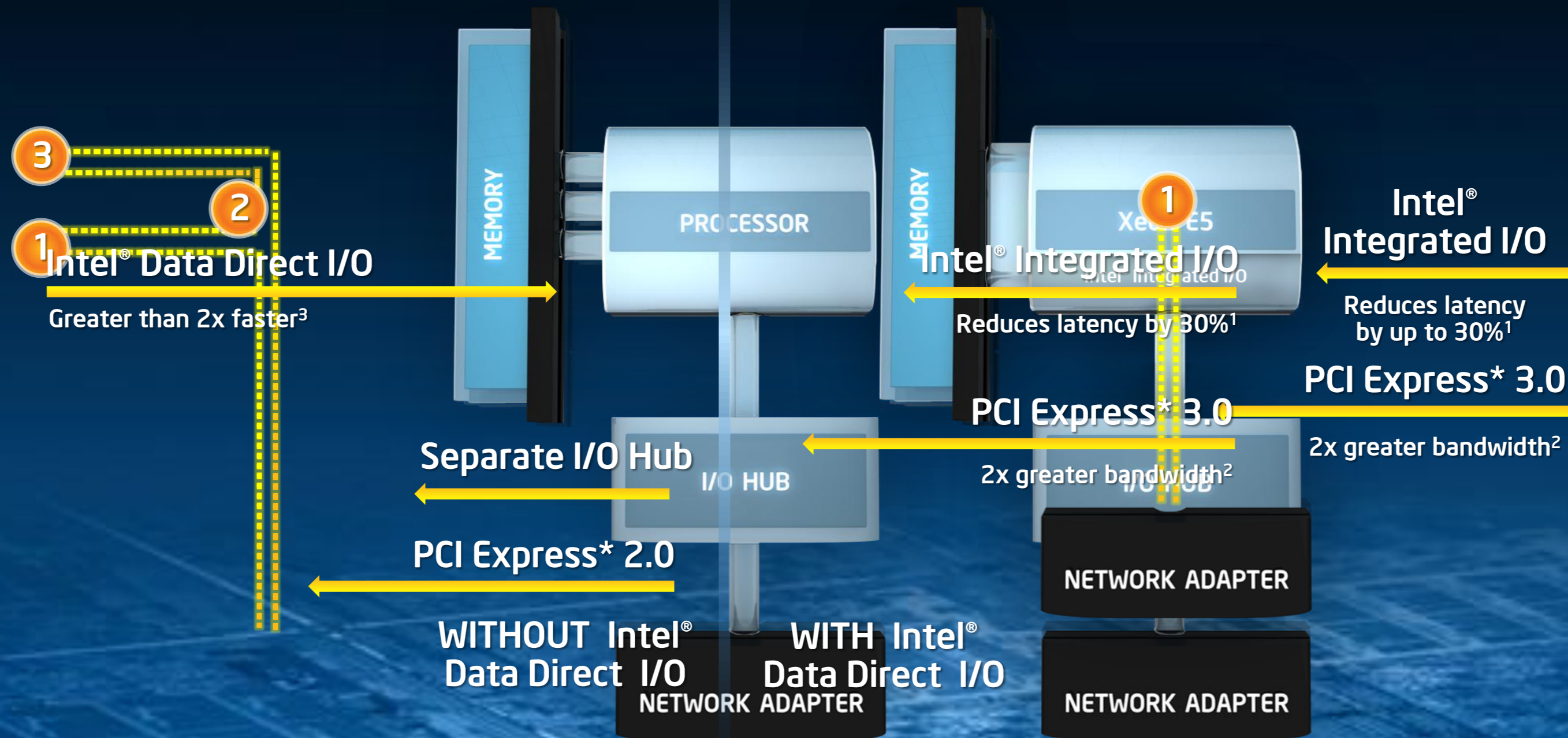
In Theatres June 8



**DREAMWORKS**  
— ANIMATION SKG® —

# Improve I/O bandwidth up to 3X<sup>4</sup> with Intel® Integrated I/O

## Previous Generation Intel® Integrated I/O



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<sup>1</sup> Source: Intel internal measurements of average time for an I/O device read to local system memory under idle conditions comparing Intel® Xeon® processor E5-2600 product family (230 ns) vs. Intel® Xeon® processor 5500 series (340 ns). See notes in backup for configuration details.

<sup>2</sup> Source: [www.PcIsig.Com/news\\_room/november\\_18\\_2010\\_press\\_release](http://www.PcIsig.Com/news_room/november_18_2010_press_release)

<sup>3</sup> Up to 2.3x I/O performance is 1S with a Xeon processor 5600 series vs. 1S Xeon Processor E5-2600 data for L2 forwarding test using 8x10GbE ports. See notes in backup for configuration details.

<sup>4</sup> Intel internal measurements of maximum achievable I/O R/W bandwidth (512B transactions, 50% reads, 50% writes) comparing Intel® Xeon® processor E5-2680 based platform with 64 lanes of PCIe\* 3.0 (66 GB/s) vs. Intel® Xeon® processor X5670 based platform with 32 lanes of PCIe\* 2.0 (18 GB/s).



# Trusted Security



## Intel® Trusted Execution Technology

Cybercrime annual cost >\$100B, as much as \$1T by 2020<sup>1</sup>

Aggregate security product spend >\$200B between 2010 and 2015<sup>2</sup>

## Intel® Advanced Encryption Standard New Instructions

HTTPS AES requests have increased by 60% in the last 11 quarters<sup>3</sup>



<sup>1</sup> Source: [www.symantec.com/about/news/release/article.jsp?prid=20110907\\_02](http://www.symantec.com/about/news/release/article.jsp?prid=20110907_02); [www.staysafeonline.org/blog/new-mcafee-report-reflects-past-present-and-future-cybercrime](http://www.staysafeonline.org/blog/new-mcafee-report-reflects-past-present-and-future-cybercrime)

<sup>2</sup> Source: IDC Market Analysis Perspective: Worldwide Security Products, 2011

<sup>3</sup> Source: Akamai Second Quarter 2011 'State of the Internet' Report. See details and report at: [http://www.akamai.com/html/about/press/releases/2011/press\\_102411.html](http://www.akamai.com/html/about/press/releases/2011/press_102411.html)



# Trusted Security



*"Intel® TXT as part of our Xeon-based servers provides added levels of security and a hardware root of trust that enhances our compliance monitoring capabilities."*

Hai Zhu, PhD, Manager, DuPont Central Research & Development



*"We need a way to scale our encryption capabilities to handle more data, from more customers, without affecting end-user performance. Using Intel AES-NI, we can scale our services and protect information while sustaining high performance."*

Janakan Rajendran, CIO, GNAX Health



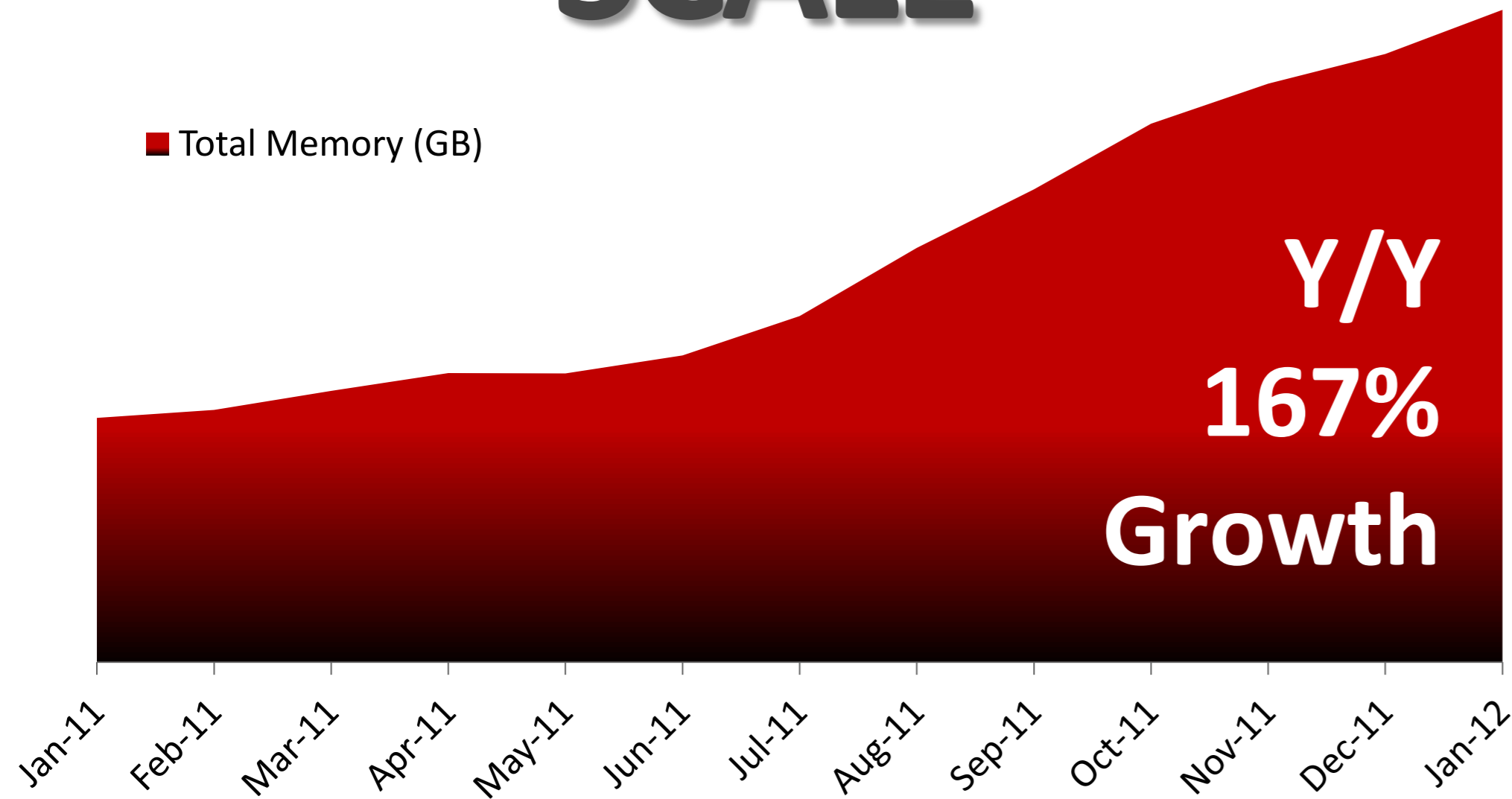
# CLOUD BUILDING

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Scaling and Securing The Dynamic Cloud

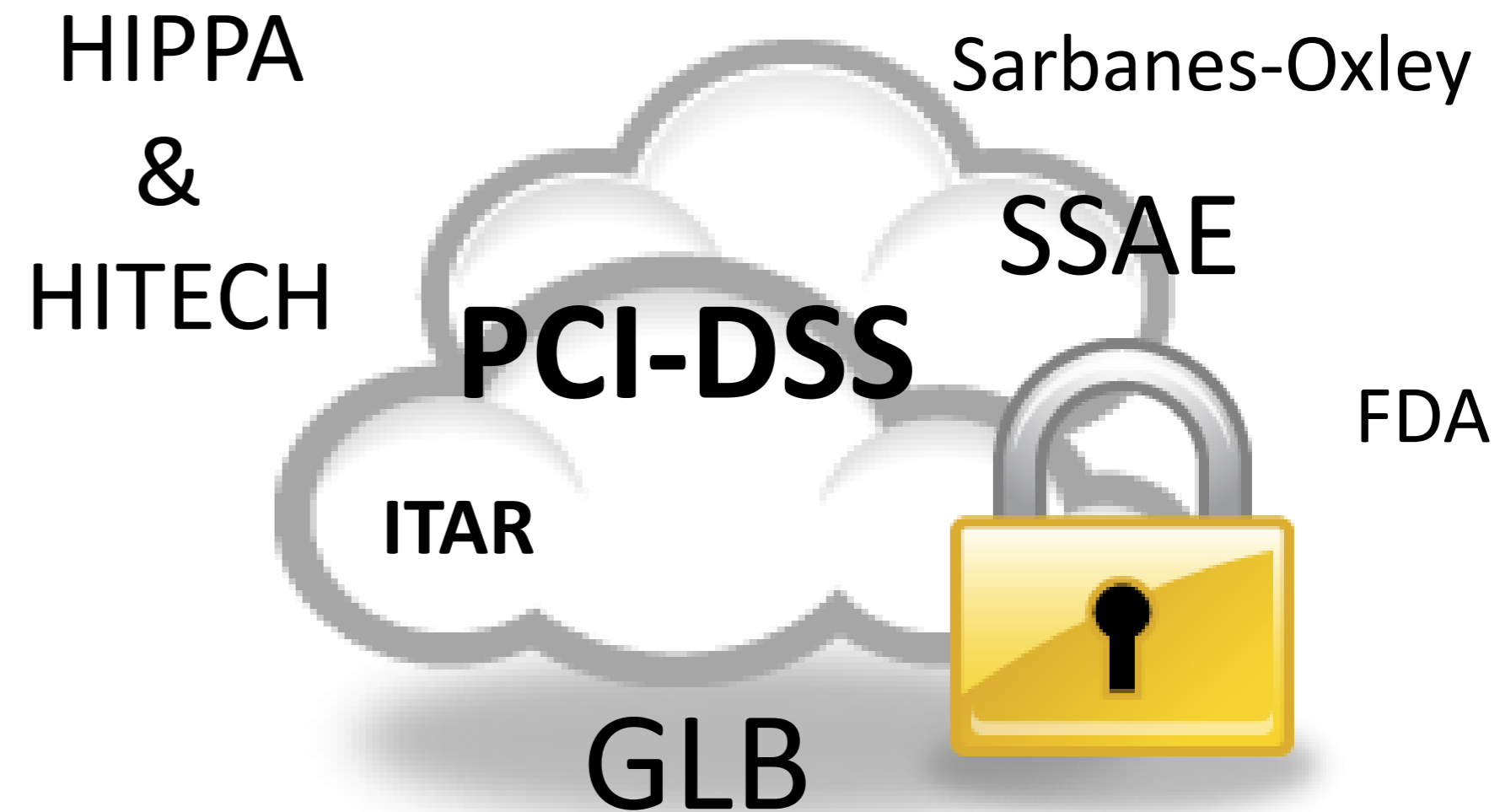


# SCALE



*And Continuing to Accelerate...*

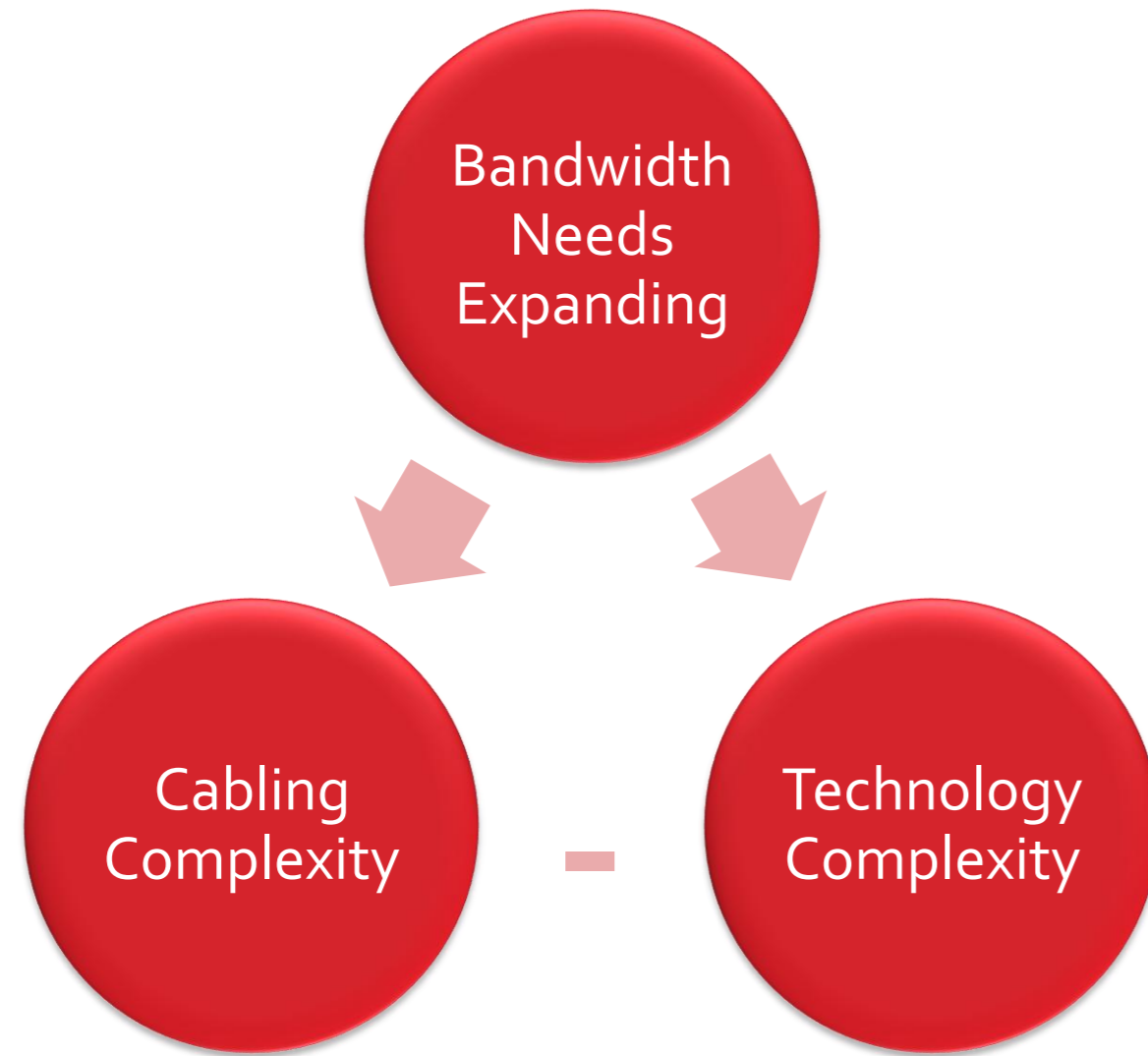
# SECURE



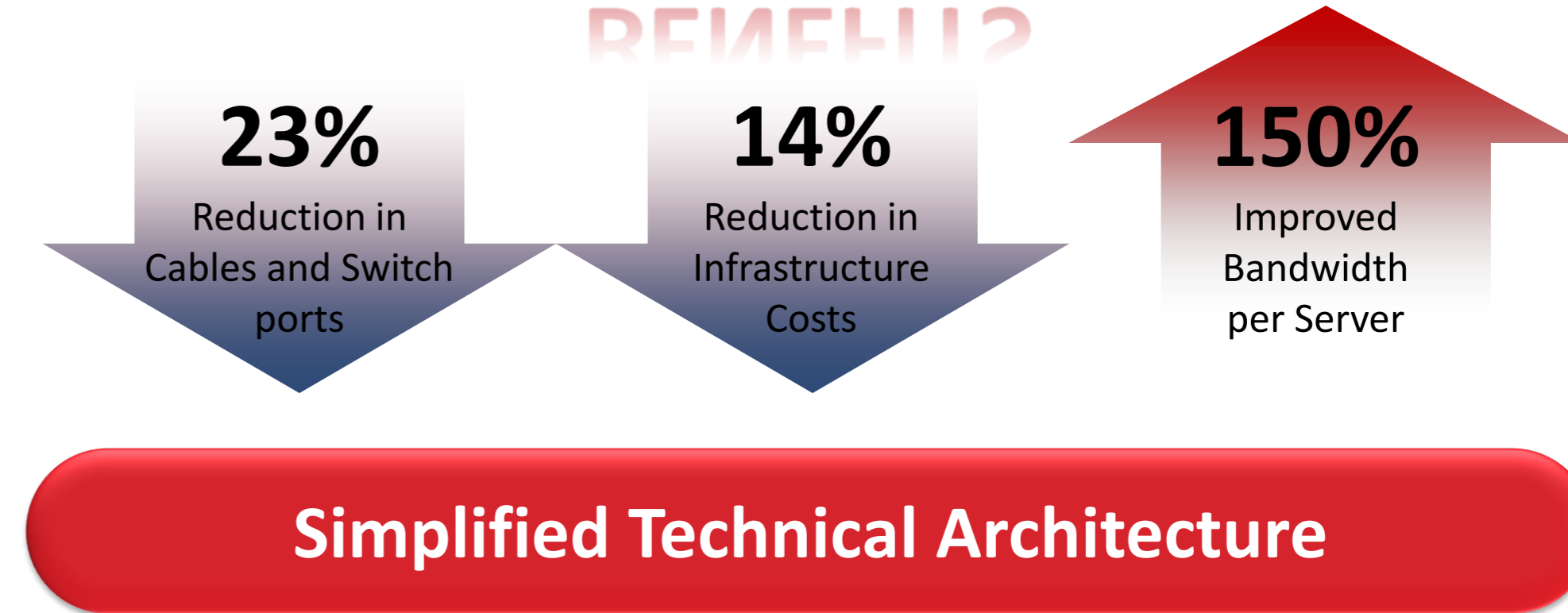
*And Continuing to Regulate...*

# Unified Data Transit with 10Gb Ethernet

## CHALLENGES



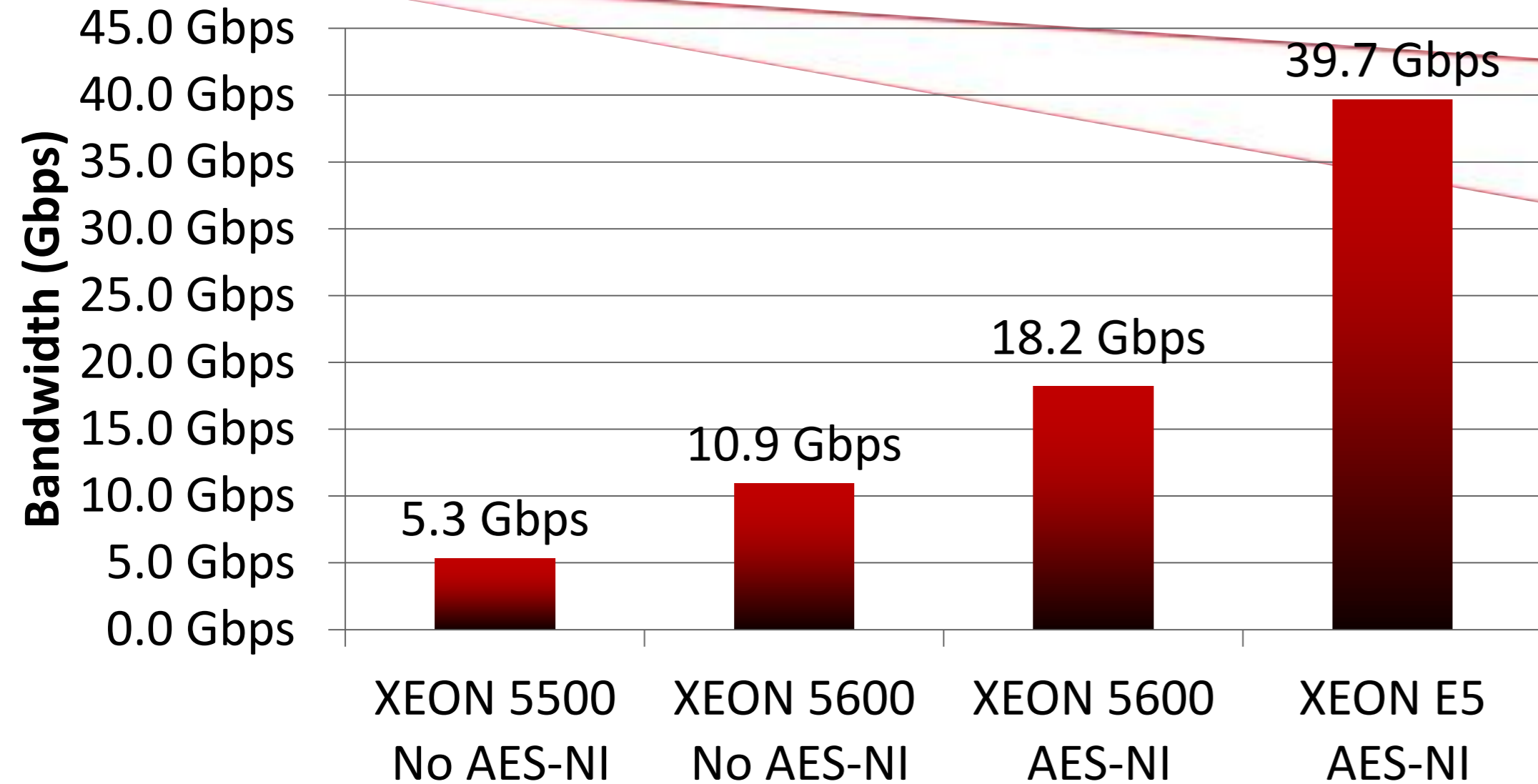
## BENEFITS





# Secure: Encryption with Intel® AES-NI

## AES -256 Bit Encryption Rates Using OpenSSL

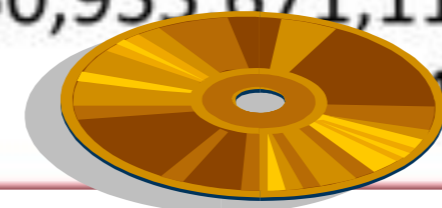


**118% ENCRYPTION PERFORMANCE INCREASE WITH E5!**

Level Set: 256 Bit Encryption  
 If a device existed that could perform  $2^{56}$   
 (72 quadrillion) operations each second.

**At These Rates Dual Socket System Can 256 Bit Encrypt..**

**A DVD**



**0.9 Seconds**

**The Library Of Congress**



**13.4 Hours**

**ALL THE DATA IN AND OUT OF ANY OF OUR DATA CENTERS**

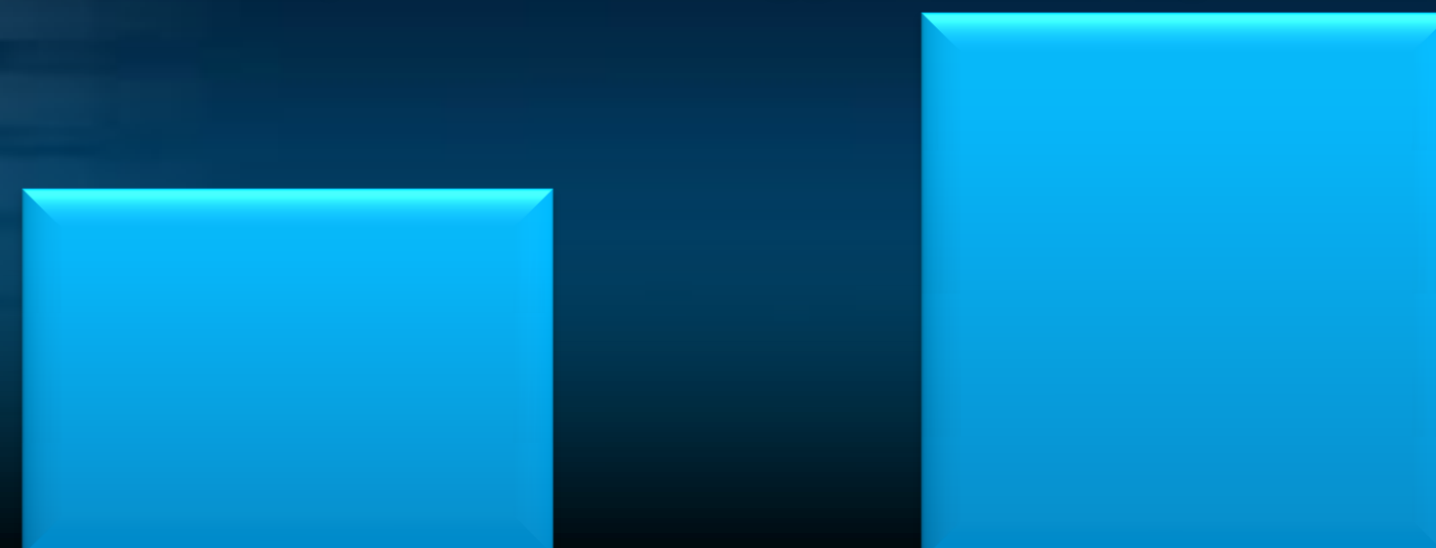


***expedient***  
***COMMUNICATIONS***

# Xeon® Processor Energy Efficiency

Up to 50%<sup>1</sup>  
Improved Energy Efficiency

SPECpower\_ssj\*2008 results



X5675

E5-2660

**Best Data Center Performance per Watt<sup>1</sup>**

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<sup>1</sup> Performance comparison using best SPECpower\_ssj\*2008 results submitted/published as of March 6th, 2012. See [www.spec.org](http://www.spec.org) or [www.fujitsu.com](http://www.fujitsu.com) for further configuration details. For more information go to [intel.com/performance](http://intel.com/performance). \* Other names and brands may be claimed as the property of others



# Smart Data Center Management

## *Intel® Node Manager and Intel® Data Center Manager*



**Monitor**  
Power and  
Temperature



**Limit**  
Maximum  
Power



**Optimize**  
Workload  
Placement



**Survive**  
Power &  
Thermal Events

*"Energy efficiency is a top priority of our customers. We listened and developed the world's first complete server portfolio to adopt a standards-based power management solution. With the innovations in Dell OpenManage Power Center and Intel Node Manager, customers can control and optimize energy usage at the server, rack, row and room level from a single interface."*

Sally Stevens - Vice President of Server Platform Marketing



# For Everything Your Datacenter Does

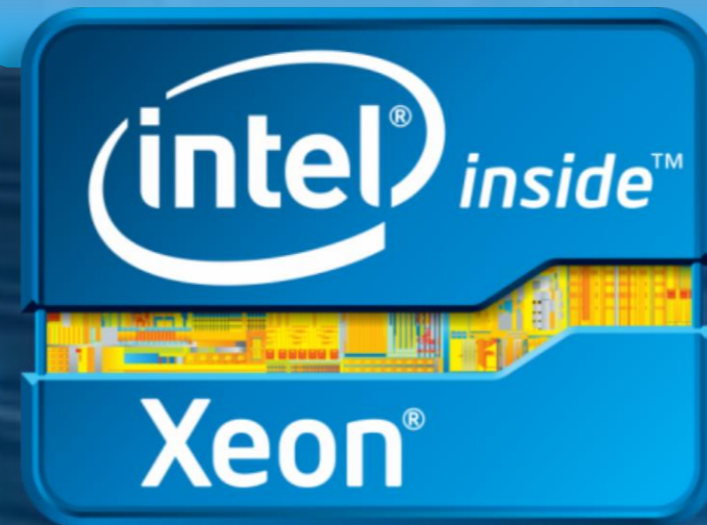
Server



Storage



Network



# Broadest Intel® Xeon® Product Line

~2X!

The partner system designs of the Xeon® processor 5500 series

## Server



## Storage

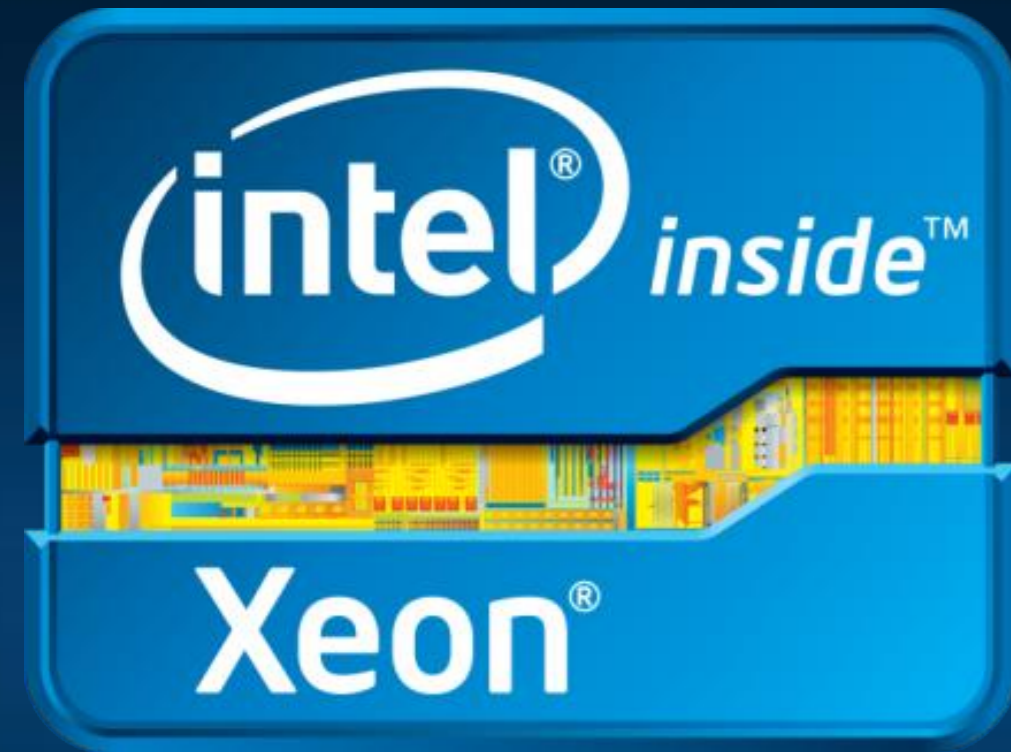


## Network



\* Other names and brands may be claimed as the property of others

# The Intel® Xeon® Processor E5 Family



80% Performance Gain<sup>1</sup>

Breakthrough I/O Innovation

Trusted Security

Best Data Center Performance per Watt<sup>2</sup>

The Heart of a  
Flexible, Efficient  
Data Center that's  
Built to Scale

Learn More at:  
[www.intel.com/datacenter](http://www.intel.com/datacenter)



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1: Performance comparison using best submitted/published 2-socket server results on the SPECfp\*\_rate\_base2006 benchmark as of 6 March 2012. Configuration details in backup

2: Performance comparison using SPEC\_Power results published as of March 6<sup>th</sup>, 2012. See back up for configuration details.

For more information go to [intel.com/performance](http://intel.com/performance)"

# Built to Scale: Introducing the Intel® Xeon® Processor E5 Family





# Legal Information – Configuration Details

80% performance: Source: Performance comparison using best submitted/published 2-socket server results on the SPECfp\*\_rate\_base2006 benchmark as of 6 March 2012. Baseline score of 271 published by Itautec on the Servidor Itautec MX203\* and Servidor Itautec MX223\* platforms based on the prior generation Intel® Xeon® processor X5690. New score of 492 submitted for publication by Dell on the PowerEdge T620 platform and Fujitsu on the PRIMERGY RX300 S7\* platform based on the Intel® Xeon® processor E5-2690. For additional details, please visit <http://www.spec.org>. Intel does not control or audit the design or implementation of third party benchmark data or Web sites referenced in this document. Intel encourages all of its customers to visit the referenced Web sites or others where similar performance benchmark data are reported and confirm whether the referenced benchmark data are accurate and reflect performance of systems available for purchase.

(30% I/O Latency) Source: Intel internal measurements of average time for an I/O device read to local system memory under idle conditions comparing Intel® Xeon® processor E5-2600 product family (230 ns) vs. Intel® Xeon® processor 5500 series (340 ns). Baseline Configuration: Green City system with two Intel® Xeon® processor E5520 (2.26GHz, 4C), 12GB memory @ 1333, C-States Disabled, Turbo Disabled, SMT Disabled. New Configuration: Meridian system with two Intel® Xeon processor E5-2665 (2.4GHz, 8C), 32GB memory @1600 MHz, C-States Enabled, Turbo Enabled. The measurements were taken with a LeCroy\* PCIe\* protocol analyzer using Intel internal Rubicon (PCIe\* 2.0) and Florin (PCIe\* 3.0) test cards running under Windows\* 2008 R2 w/SP1.

(PCIe 3.0 2X Bandwidth) Source: 8 GT/s and 128b/130b encoding in PCIe\* 3.0 specification enables double the interconnect bandwidth over the PCIe\* 2.0 specification. Source: [http://www.pcisig.com/news\\_room/November\\_18\\_2010\\_Press\\_Release/](http://www.pcisig.com/news_room/November_18_2010_Press_Release/)

(DDIO) 1 Up to 2.3x I/O performance is 1S with a Xeon processor 5600 series vs. 1S Xeon Processor E5-2600 data for L2 forwarding test using 8x10GbE ports. Configuration details: 64B L2 Forwarding Benchmark, Rose City CRB, 8x2GB DDR3-1333MHz, 1xSNB-EP 8C B0, 2.8GHz (2.7GHz + turbo), Green City Platform, 6x2GB DDR3-1333MHz, Xeon 5680

3X I/O improvement Source: Intel internal measurements of maximum achievable I/O R/W bandwidth (512B transactions, 50% reads, 50% writes) comparing Intel® Xeon® processor E5-2680 based platform with 64 lanes of PCIe\* 3.0 (66 GB/s) vs. Intel® Xeon® processor X5670 based platform with 32 lanes of PCIe\* 2.0 (18 GB/s). Baseline Configuration: Green City system with two Intel® Xeon® processor X5670 (2.93 GHz, 6C), 24GB memory @ 1333, 4 x8 Intel internal PCIe\* 2.0 test cards. New Configuration: Rose City system with two Intel® Xeon processor E5-2680 (2.7GHz, 8C), 64GB memory @1600 MHz, 2 x16 Intel internal PCIe\* 3.0 test cards on each node (all traffic sent to local nodes).

Energy Efficient Performance) Source: Performance comparison using best submitted/published 2-socket single-node server results on the SPECpower\_ssj\*2008 benchmark as of 6 March 2012. Baseline score of 3,329 ssj\*\_ops/watt published by Hewlett-Packard on the ProLiant DL360 G7\* platform based on the prior generation Intel® Xeon® processor X5675. Score of 5,093 ssj\*\_ops/watt submitted for publication by Fujitsu on the PRIMERGY RX300 S7\* platform based on the Intel® Xeon® processor E5-2660. For additional details, please visit [www.spec.org](http://www.spec.org). Intel does not control or audit the design or implementation of third party benchmark data or Web sites referenced in this document. Intel encourages all of its customers to visit the referenced Web sites or others where similar performance benchmark data are reported and confirm whether the referenced benchmark data are accurate and reflect performance of systems available for purchase. [www.spec.org](http://www.spec.org).



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Intel does not control or audit the design or implementation of third party benchmarks or Web sites referenced in this document. Intel encourages all of its customers to visit the referenced Web sites or others where similar performance benchmarks are reported and confirm whether the referenced benchmarks are accurate and reflect performance of systems available for purchase.

Relative performance is calculated by assigning a baseline value of 1.0 to one benchmark result, and then dividing the actual benchmark result for the baseline platform into each of the specific benchmark results of each of the other platforms, and assigning them a relative performance number that correlates with the performance improvements reported.

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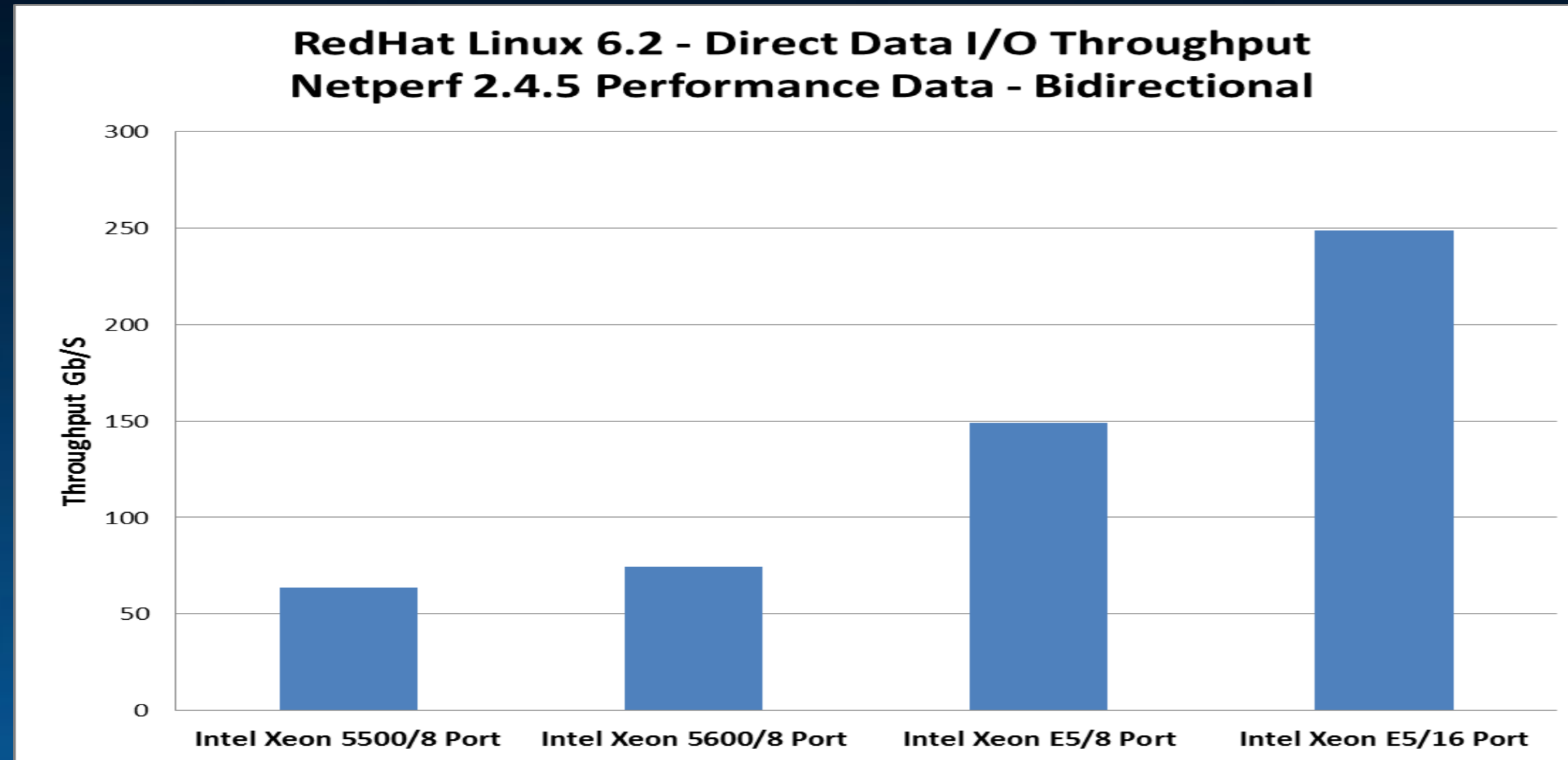
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# Red Hat 6.2 - Direct Data I/O Performance Bidirectional Data



#### Test Configuration

Netperf version 2.4.5  
RedHat Enterprise Linux 6.2  
Buffer Sizes= 8KB  
Interrupts Affinity - Socket  
Process Affinity - Socket  
Services Disabled - LLDPAD, IPTABLES, IP6TABLES, SELINUX, IRQBALANCE

#### SUT: GreenCity SDV

Intel® Xeon® Processor W5590 (8M Cache, 3.33 GHz, 6.40 GT/s Intel® QPI)  
12GB DDR3 RAM @ 1333MHz  
Intel® 5520 Chipset

#### SUT: GreenCity SDV

Intel® Xeon® Processor X5680 (8M Cache, 3.33 GHz, 6.40 GT/s Intel® QPI)  
12GB DDR3 RAM @ 1333MHz  
Intel® 5520 Chipset

#### SUT: CanoePass SDV

Intel® Xeon® Processor E5 (8M Cache, 2.7 GHz, 8 GT/s Intel® QPI)  
48GB DDR3 RAM @ 1333MHz  
Intel® Patsburg Chipset

#### Clients

Intel Server System SR1600UR  
2 Intel® Dual Core Xeon® processors 5570 @2.93GHz  
8 GB RAM  
Intel® Ethernet Server Adapter X520  
RedHat Linux 6.1

#### Network Configuration

Cisco Nexus 5020  
Clients connected @ 10000Mbps

