

# The Reality of the Cloud

## Intel Corporation

Sept 2010



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# A Fully Realized Cloud

## Federated

Data and services seamlessly and securely span clouds



## Automated

Dynamically allocates resources to manage service level and optimize power

## Client Aware

Secure access and optimal experience across the client continuum



Desktops

Laptops

Netbooks

Personal  
Devices

Smart phones

Smart TVs

Embedded



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# Requirements of a Cloud Architecture

## Simplified

Simplify data center operations to reduce cables, complexity and cost

## Efficient

Optimizing technologies to decrease energy, human and physical asset consumption

## Secure

Reduce the risk, increase the compliance and manage hybrid usage models



*Optimizing energy consumption, simplifying and securing your Data Center infrastructure necessary to evolve to next generation datacenters*



# An Explosion of Internet Growth

Today

2015

## More Users

Only 25% of the world is Internet connected today<sup>1</sup>



New technologies will connect over 1 billion additional users to the cloud<sup>2</sup>

## More Devices

~80% of Internet connected devices are computers and phones<sup>3</sup>



Cars, TVs, households, etc. to increase connected devices 2.5x to >10 billion globally<sup>3</sup>

## More Content

2.5B photos on Facebook<sup>4</sup>  
30B videos viewed/mos<sup>5</sup>  
Google indexes >1T pages<sup>6</sup>



8X network, 16X storage and 20x compute capacity needed<sup>7</sup>

*Internet and device expansion drives new requirements for Data Centers*



# Data Center Complexity Growing



*Drives need for the Enterprise Data Center to evolve: Cloud is next step*



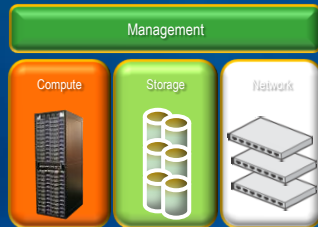


# Business Value of Cloud Computing



## Cloud Computing

- An evolution in IT consumption and delivery made available self service via the Internet with a flexible, pay as you go business model
- Requires a highly scalable and efficient Cloud Architecture



## Cloud Architecture

- Data resides in shared, dynamically scalable resource pools
- Based on virtualization and/or scale-out application environments

Multiple stakeholders have varied expectations of cloud...

- CEO wants IT to support business growth
- CIO wants IT to impact business value
- CFO wants effective IT asset utilization
- Shareholders want IT to support business flexibility

***Cloud Computing provides a services delivery framework***



# Considering Cloud Deployment

## *Private Clouds*



**Behind the Firewall**

- ✓ Security
- ✓ Compliance and Governance
- ✓ Interoperability

*Virtual Private  
and Hybrid  
clouds*



*Cloud Brokers*

## *Public Clouds*



**Multi-tenant**

- ✓ Rapid Deployment
- ✓ Reduced Capital Expenditure
- ✓ External vendor expertise



# What is Holding Back the Cloud Today?

## Technology Maturation

Security  
Lack of automation  
More power efficiency  
Standards

## Acceptance of Risk

IP protection  
Interoperability and lock in  
Compliance and audit  
Guaranteed quality of service



*A Cultural Shift And Technology Advancement Is Needed*



# Efficient

## Intel® Xeon® 5600

### Building on Xeon® 5500 Leadership Capabilities

#### Lower Power CPUs

Better performance/Watt  
Lower power consumption

130W

95W

80W

60W (6C)

40W (4C)

#### Intelligent Power Technology

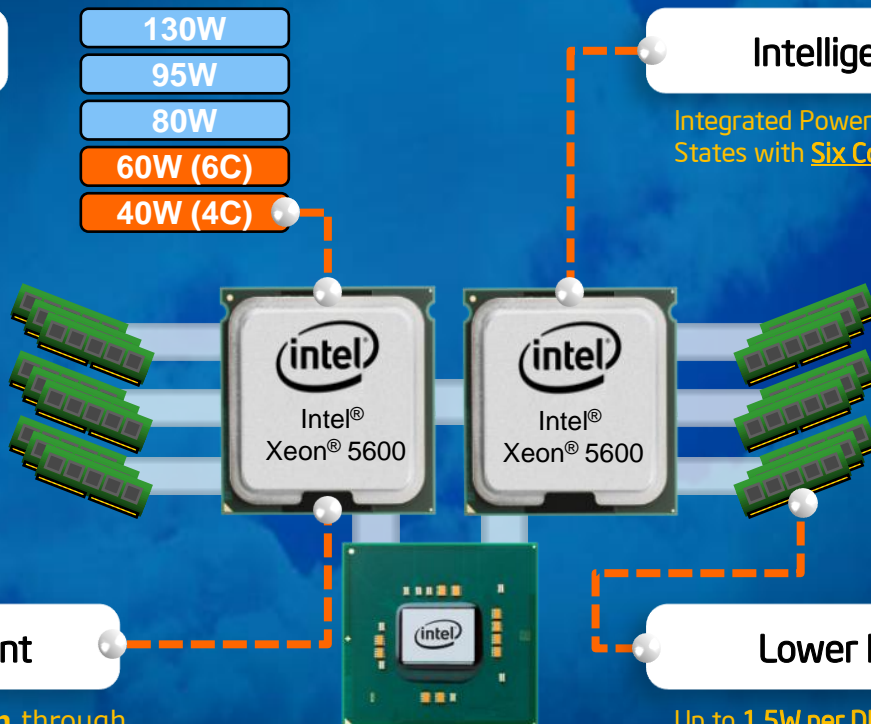
Integrated Power Gates and Automated Low Power States with Six Cores

#### CPU Power Management

Reduced power consumption through more efficient Turbo Boost and memory power management

#### Lower Power DDR3 Memory

Up to 1.5W per DIMM reduction in memory power<sup>1</sup>



## Intel® Xeon® 5600 delivers greater platform Energy Efficiency

Lower power CPU TDP options for Xeon® 5600

<sup>1</sup> DDR3L supported for Xeon® 5600 only. System level power testing using Samsung 1.35V DIMMs as compared to Samsung 1.5V DIMMs reduced power by 0.52W per DIMM at active idle, and 1.42W per DIMM under 100% load. Source: Intel internal measurements Feb 2010 using server side java benchmark across a load line. Power measurement at the wall using same system configuration; memory was the only variable changed. See backup for system configuration.



# Efficient

## Intel® Xeon® Processor L5640

*Maximize Perf/Watt for Optimized Deployments*

**Dense  
Servers  
and Blades**

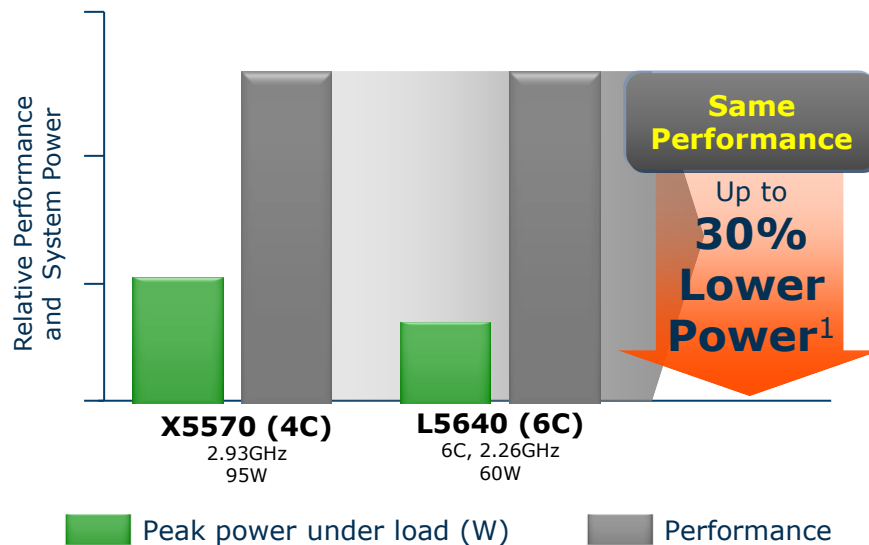


**High Density  
Datacenters  
& Containers**



### Xeon® 5570 vs. Xeon® L5640

*Power and Performance Comparison*



***Same performance as a Xeon® X5570 SKU,  
but up to 30% lower system power***

<sup>1</sup> Source: Internal Intel estimates comparing Xeon® X5670 vs. X5570 SKUs using SPECpower. See backup for system configurations

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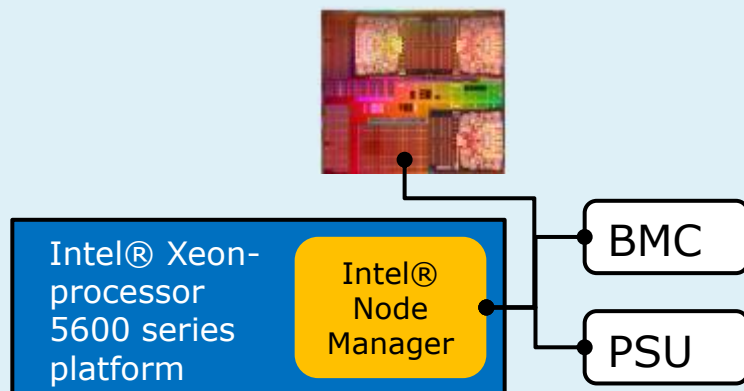




## Extending Efficiency Through Power Management Technologies

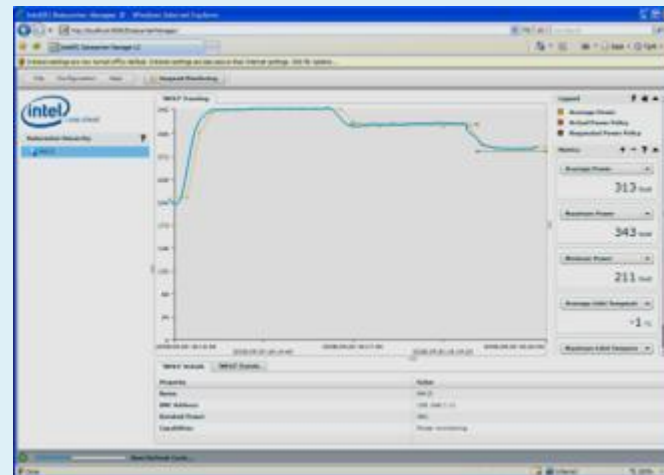
### Intel® Intelligent Power Node Manager

- Monitors and reports system power
- Caps system power to policy
- Dynamically adjusts P & T-states



### Intel® Dynamic Power Data Center Manager

- Scales Intel Node Manager functions to rack level
- Aggregates data and reports trends
- Dynamically adjusts power caps



# Efficient

## World Class Power Management Solutions

*Broad Industry Support and Growing Adoption For Intel® Node Manager*

### End Users



### OEM, ODM & Console Providers



**Secure**

# New Features with Intel® Xeon® Processor 5600

## Advanced Encryption Standard New Instructions (AES-NI)

**ORACLE®**

**Microsoft®**

**McAfee®**



Enables broad usage of  
encryption throughout the  
enterprise

**Ready for Today**

## Intel® Trusted Execution Technology (TXT)

**vmware®**

**Parallels®**

**HyTruist**



Prevents the insertion of malicious  
software prior to VMM launch

**Prepared for Tomorrow**





# Secure

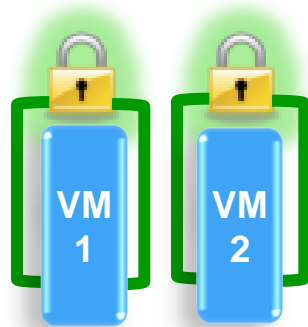
## Intel® Virtualization & Security Technologies

*Establishing the Foundation for More Secure IT Services*

### Isolate

#### **Intel® VT & Intel® TXT**

protects VM isolation and provides a more secure platform launch

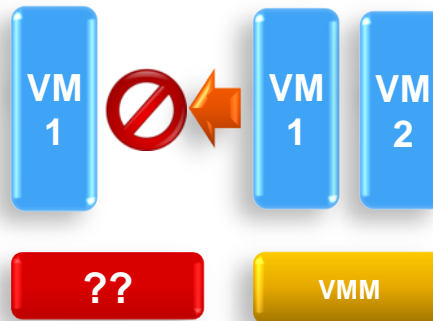


**Intel® TXT** ensures platform launch with known configuration

### Enforce

#### **Intel® TXT**

establishes "trusted" status to enable migration based on security policy



### Encrypt

#### **Intel® AES-NI**

delivers built-in encryption acceleration for better data protection



*Simplified*

# Data Center Convergence



Compute



Network



Storage

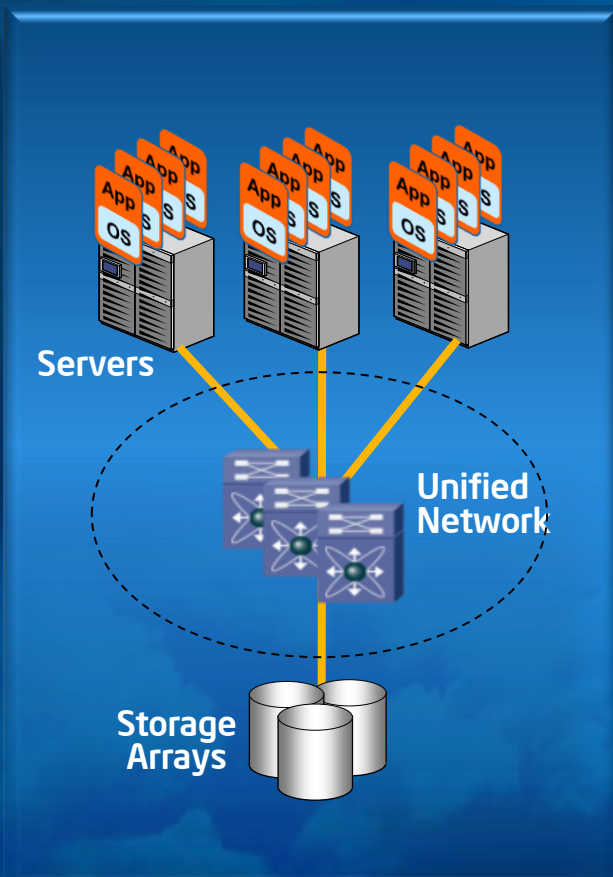


*The Cornerstone of Next Generation Intelligent Data Centers*



# *Simplified*

## Network with Intel® Ethernet



- Consolidate multiple ports & increase BW
- Reduce I/O overhead for virtualized servers using standards based SR-IOV
- Unify storage and LAN fabric

*10GbE is the foundation for a Simpler & Unified Network*





# *Simplified*

## Common Server & Storage Foundation

Intel® Xeon® processor changing the economics of storage

- Better storage economics and investment protection
- Unparalleled flexibility to tailor to business requirements
- Modular designs make upgrading to future technologies simple and non disruptive
- Choice!

Storage systems built with industry-standard hardware and software. Customers select the best hardware and software to meet their requirements.



***Reduced TCO, Increased Value and Agility***



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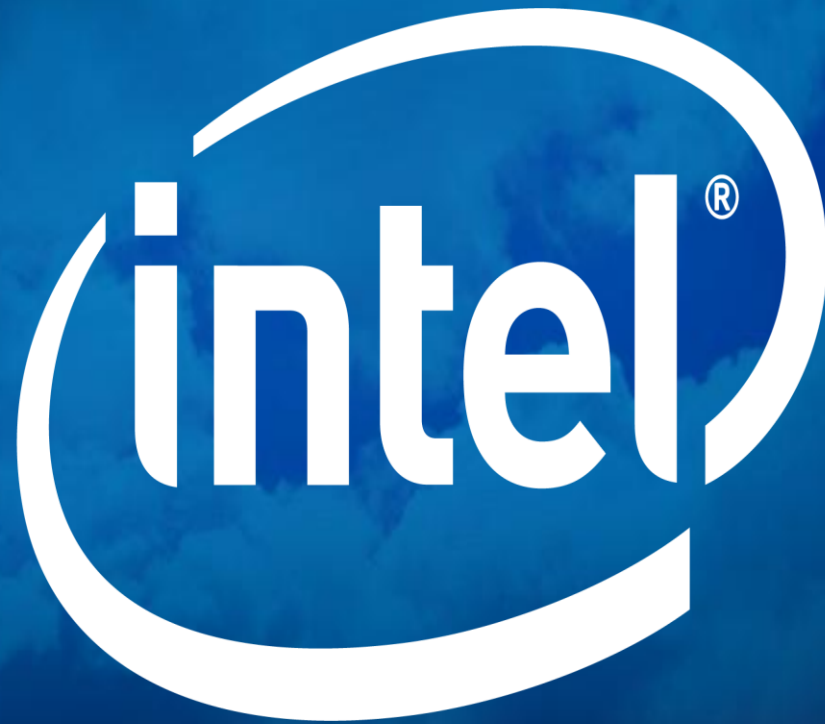
## Secure

Reduce the risk, increase the compliance and manage hybrid usage models



*Optimizing energy consumption, simplifying and securing your Data Center infrastructure necessary to evolve to next generation datacenters*





*Simplified*

# Standardizing Enterprise Storage Architectures

Integrated capabilities



Xeon® c5500/c3500

Computation and I/O



Xeon® 5600 series

Storage as a workload



Xeon® 5600 series

Next Generation BI



Nehalem-EX

*Xeon® Processor Capabilities Help Extract the Value of your Data*





# *Simplified*

## Driving Convergence

**Modular,  
Standards Based  
Solutions**



**Proprietary  
Solutions**



### **Scalable Architecture**

Performance, Memory, and I/O with integrated storage features



### **Industry Standard Components**

Volume economics achieved through industry-standard hardware



### **Unified Network**

10 Gb Ethernet and FCOE for Storage and Network



### **Advanced Storage Services**

Powerful, scalable platforms to support advanced storage efficiency features

**Efficiently Keep Pace with Storage Demands  
While Reducing Costs**



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