IT: Period of Transformation

**Computer-Centric**
Focused on Productivity through automation

**Network-Centric**
Focused on Cost Reduction through connectivity

**Human-Centric**
Focused on Rapid Service Delivery through cloud & devices
New Services in Action

MyMagic+
Visitor experience transformed through connected wristbands linked to analytics

Smart Traffic
Safety improved through ability to locate car in city of >10M in ~300ms

1. Source: Bocom

* Other names and brands may be claimed as the property of others.
But It’s Still Early

Big Data

6%

OFENTERPRISES
MAKINGDECISIONS
WITHBIGDATA
ANALYTICS

Cloud

9%

OFENTERPRISE
WORKLOADS
RESIDEINPUBLIC
CLOUD

HPC

12%

OFU.S.
MANUFACTURING
FIRMSUSEHPC
CLUSTERS

1: Intel enterprise customer IT spending survey Q1 2013
2: IDG Enterprise 2012 Cloud Computing key trends and future effects
DATACENTER
Demands a New Level of
SCALE
Efficient, On-demand, Resilient
Yet Today’s Infrastructure is Strained

**Network**
2-3 weeks to provision new services
66% CAGR in mobile data traffic

**Storage**
40% data growth CAGR, 90% unstructured

**Server**
Average utilization <50% despite virtualization
Intel’s Strategy:
RE-ARCHITECTING THE DATA CENTER
Intel’s Strength:
Transformation from Proprietary to Standards

Supercomputing Example

Top 500* (1997 - 2012)

1500X Performance
4X Power Increase
100X Reduction in cost per FLOP

Driven by Moore’s Law & Architecture Innovation

Top 500 MSS

2013 80%
1997 3%

Source: Intel Analysis / Top500
Software Defined Infrastructure

Changes the Game

Network

Storage

Server

From Static to Dynamic. From Manual to Automated.
Re-architect the Network
**Software Defined Network (SDN)**

- **MANUAL** → **AUTOMATED**
- **FIXED** → **FLEXIBLE**
- **HARDWARE DEFINED** → **SOFTWARE DEFINED**

Traditional Network

Idea for service

Manually configure devices

IT scopes

Set up network services

Balance user demands

Service running

Time to Provision New Service: 2-3 Weeks\(^1\)

With SDN

Idea for service

Self service configuration

Service running

Time to Provision New Service: Minutes\(^1\)

1: Source: Intel IT internal estimate
New Services at the Edge of the Network

Today’s Base Stations

- Limited programmability.
- Latency constrained.

Tomorrow’s Base Stations

- Intelligence at the edge.
- Faster, personalized services.
Re-architect Storage

Software Defined Storage

Traditional Storage

- Shared Capacity
- High performance
- High data protection

Tomorrow’s Storage

Storage as a Service

- Wide range of optimized solutions
- Application driven
- Greater efficiency

SAN

Access

- Frequent
- Infrequent

Capacity

- Hot
- Warm
- Cold

TB to ZB
Re-architect Storage
**Software Defined Storage**

- **Next Gen NVM**
  - Intel Atom
- **Accelerators**
  - Intel Xeon
- **Storage SoCs**
- **Storage Software**
  - Cache Acceleration Software
  - Enterprise Edition for Lustre

**Intelligence for Efficiency and Resiliency**

**Tiered for Capacity and Availability**

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The Power of Solutions: Big Data Example

Sort 1TB of Data:

>4 Hours

Sort 1TB of Data:

7 MINUTES

Intel® Xeon® E5-2690 processor
Intel® SSD 520 series
Intel® 10GbE adapters
Intel® Distribution for Apache Hadoop®

Other names and brands may be claimed as the property of others
Re-architecting the Server at the Rack Level

Today:

Applications constrained to resources “in the box”

App  App  App

Memory  I/O  Compute

Tomorrow:

Composable Resources

Pooled Compute
Pooled Memory
Pooled I/O

Application-driven allocation of resources for greater efficiency

App

App
Diversity of Datacenter Workloads

- E-Commerce
- Dedicated Hosting
- Enterprise Applications
- Graphics Rendering
- High Performance Computing
- Cloud RAN
- Content Delivery and Gaming
- Big Data
- Small Cell
- Edge Routing
- Storage De-dupe
- Low End Networking
- Cold Storage
- Low End Networking
- Cloud RAN
- Content Delivery and Gaming
- Big Data
Intel Covering the Full Solution Space

Greater Efficiency through App Optimization & Arch Consistency
Low Power Product Direction

2011
- Xeon E3 Sandy Bridge
  - 32nm
  - As low as 20W

2012
- Xeon E3 Ivy Bridge
  - 22nm
  - As low as 17W

2013
- Xeon E3 Haswell
  - 22nm
  - As low as 13W

2014+
- 14nm “Broadwell”
- 14nm “Broadwell” SoC

Centerton
- 32nm
- As low as 6W

Avoton Rangeley
- 22nm

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- Most Energy Efficient Transistors
- Architecture Consistency
- Software Compatibility
- Workload Optimized Silicon
- Technology Portfolio
- Global Ecosystem
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