IT@Intel
Efficiency through IT Hardware, Software & Process

Breakthrough technologies, solutions, and processes have optimally served the acceleration of Intel's business

intel®

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Your costs and results may vary.

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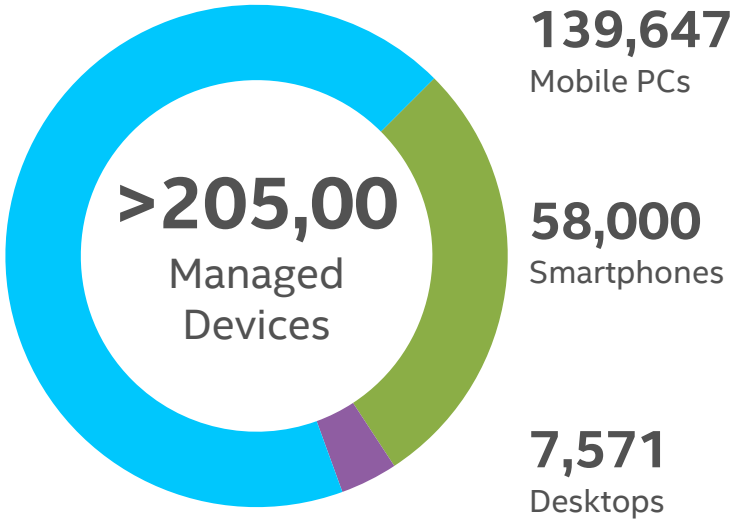
Intel IT Environment

5,051 Intel IT Employees at **22** Intel IT Sites support **~110K** Intel Employees at **147** Intel Sites in **56** Countries

IT Device Management



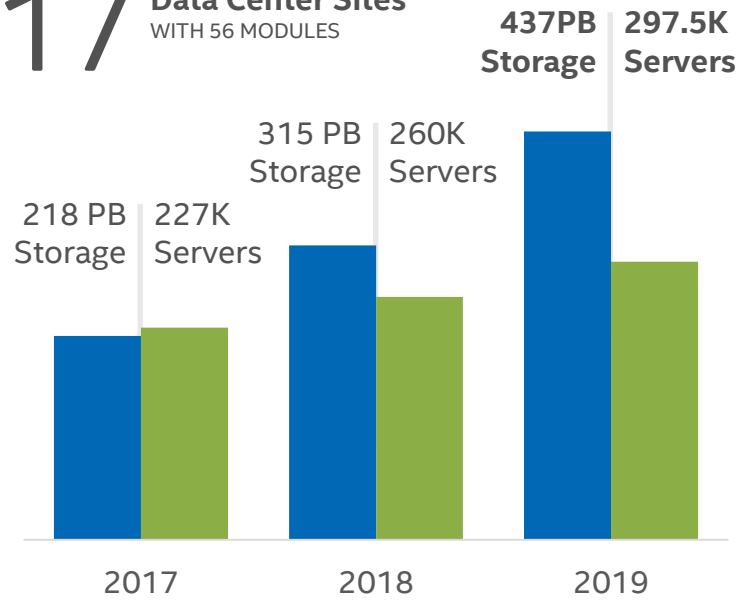
139,647 Mobile PCs

58,000 Smartphones

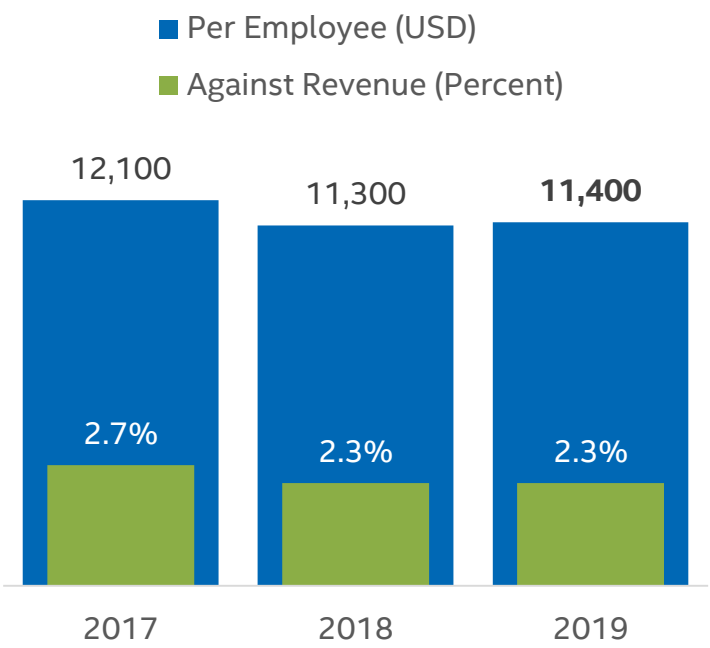
7,571 Desktops

IT Storage and Servers

17 **Data Center Sites** WITH 56 MODULES



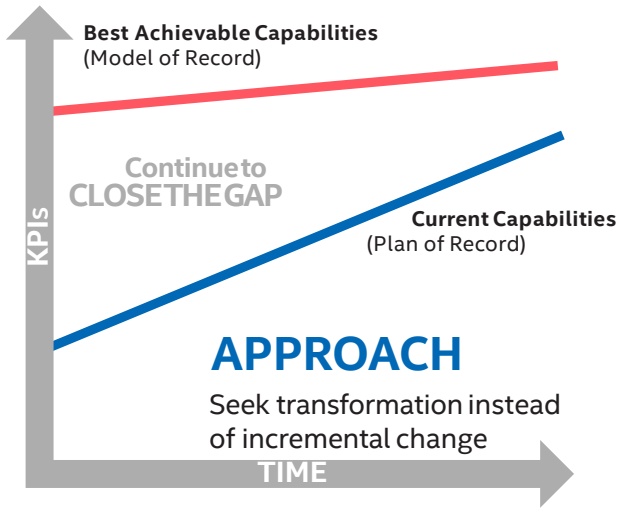
IT Spending[1]

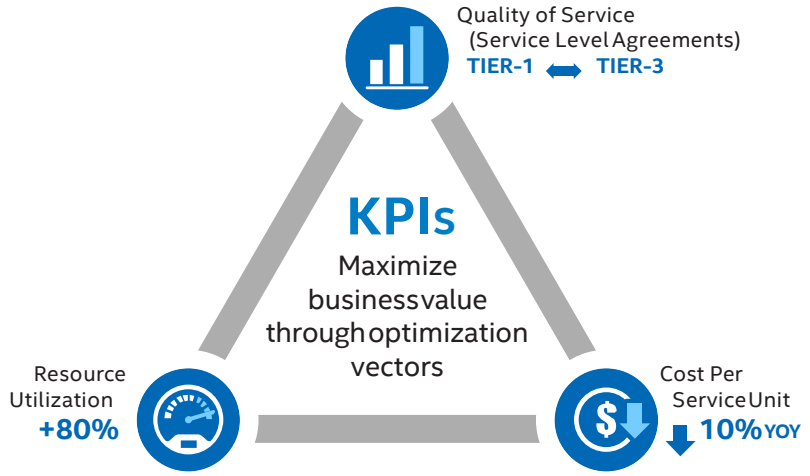


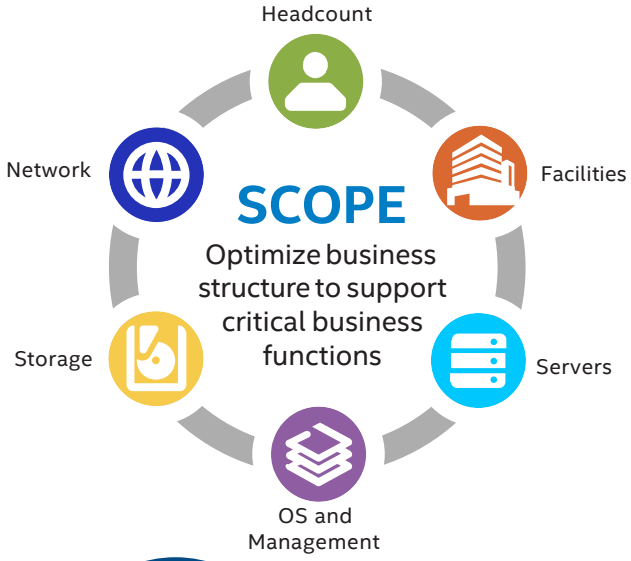
[1]Financials restated to include wholly owned subsidiaries that have since been integrated and exclude divested entities. Employee count represents an average of beginning and end of year.

Intel IT Data Center Transformation Strategy

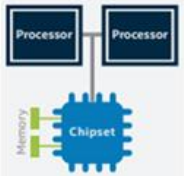
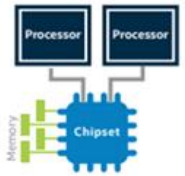
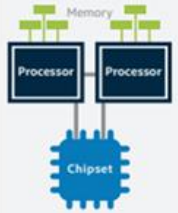
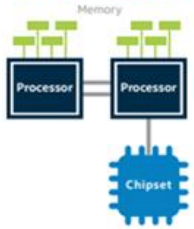
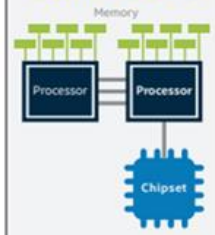
We operate our data center service like a factory by applying breakthrough technologies, solutions, and processes to achieve industry leadership.







CPU Comparison

	2004-2005	2006-2008	2009-2011	2012-2016				2017-2019
								
Introduction	2004-2005	2006-2008	2009-2011	2012	2013	2014	2016	2017-2019
Intel® Chipset	E7520	5400	5520	C600		C610		C620
Process Technology	90nm	65nm and 45nm	45nm and 32nm	32nm	22nm		14nm	
Cores per Socket	1	2 or 4	4 or 6	8	10	14	22	28
Cache	1 MB or 2 MB[1]	4 MB or 6 MB shared between 2 cores	8 MB or 12 MB shared	20 MB shared	30 MB shared	45 MB shared	55 MB shared	38.5 MB shared
Interconnect Speed	6.4 GB/s	21-25 GB/s	25.6 GB/s per Intel® QuickPath Interconnect	32 GB/s per Intel® QuickPath Interconnect		38.4 GB/s per Intel® QuickPath Interconnect		41.6 GB/s per Intel® UltraPath Interconnect
DIMMs	Up to 8	Up to 16	Up to 18	Up to 24				
Memory Type	DDR2-400 MHz	FB-DIMM/DDR2-667 MHz or FB-DIMM/DDR2-800 MHz	DDR3-800/1066/1333 MHz	DDR3-1333/1600 MHz	DDR3-1333/1600/1866 MHz	DDR4-1600/1866/2133 MHz	DDR4-2400 MHz	DDR4-2666/2933MHz
Memory Bandwidth	Up to 6.4 GB/s	21-25 GB/s	Up to 32 GB/s	Up to 51.2 GB/s	Up to 59.7 GB/s	Up to 68 GB/s	Up to 76.8 GB/s	Up to 128/140 GB/s
Maximum Memory	16 GB	64 GB or 128 GB[2]	144 GB or 288 GB[3]	Up to 768 GB[4]	Up to 1536 GB[5]			Up to 3072 GB[6]

[1] Data provided only for 1 MB cache. [2] 128 GB support with Intel® 5400 Chipset introduced in 2007. [3] 144 GB assumes 18 memory slots populated with 8-GB DIMMs; 288 GB assumes 18 memory slots populated with 16-GB DIMMs, and validated only with Intel® Xeon® processor 5600 series. [4] 768 GB assumes 24 memory slots populated with 32-GB DIMMs. [5] 1536 GB assumes 24 memory slots populated with 64-GB DIMMs. [6] 3072 GB assumes 24 memory slots populated with 128-GB DIMMs

Server Refresh Cadence Evaluation

- Refresh ratios vary based on server usage and performance.

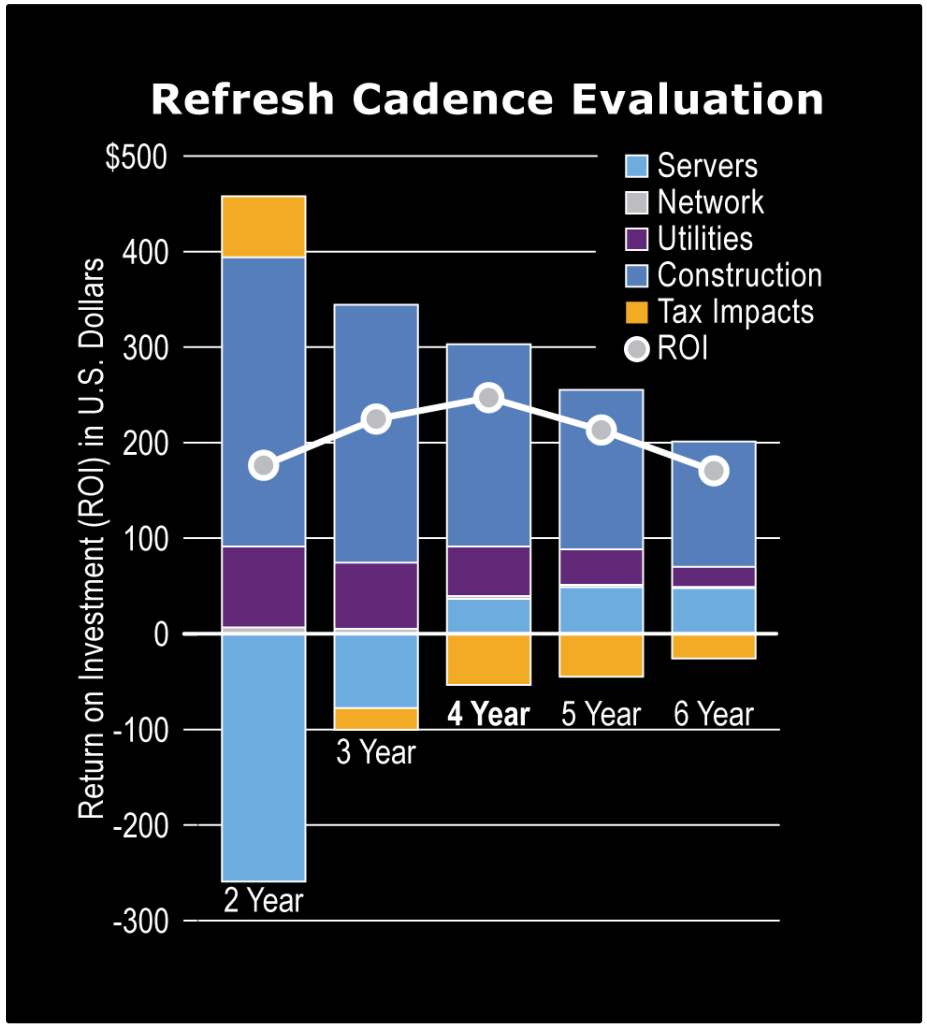
- Key cost factors:
  - Server costs and warranties
  - Data center construction
  - Power efficiencies
  - Reduced network switch costs
  - Tax impacts

Additional considerations:

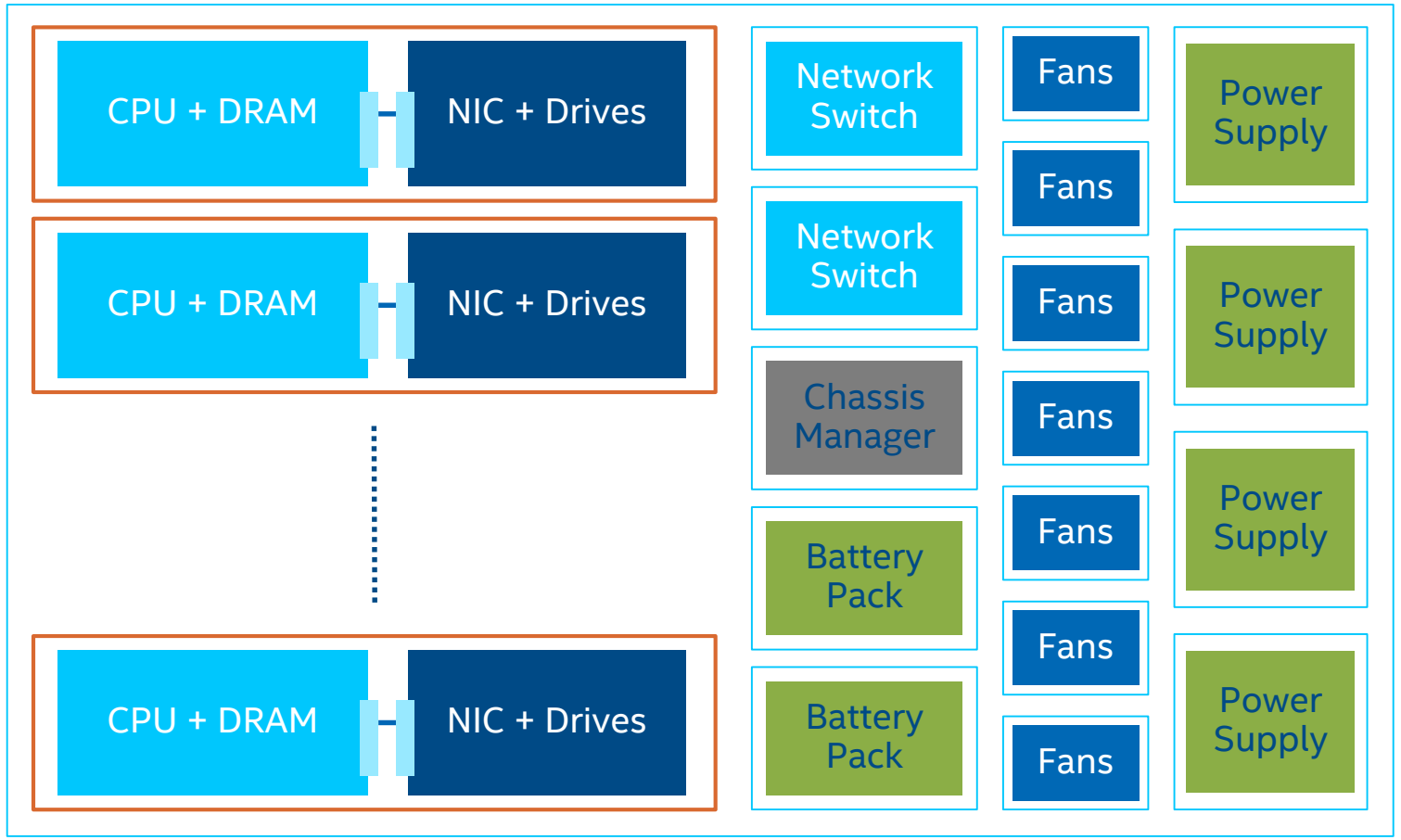
- Energy/tax rebate programs
- Green IT
- Productivity impacts

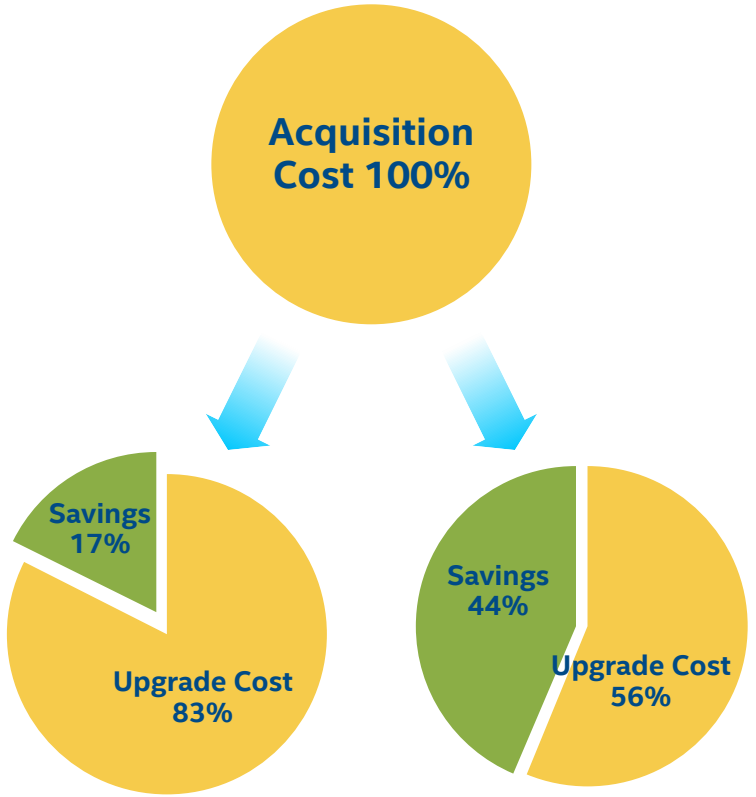
Internal cost evaluation is the primary driver in determining optimal refresh cadence:

4-Year Cadence at enterprise level



Disaggregated Server Innovation & Value





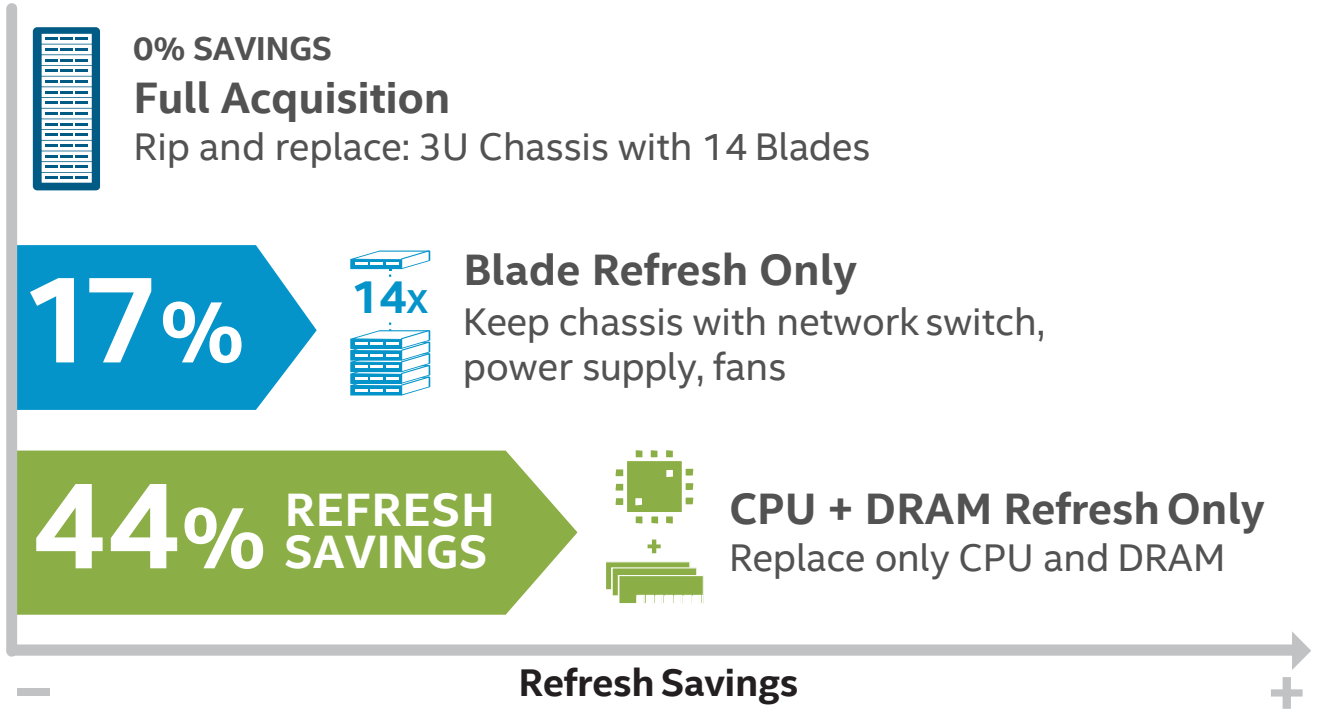
77% percent savings in technician time

82% savings in shipping/materials

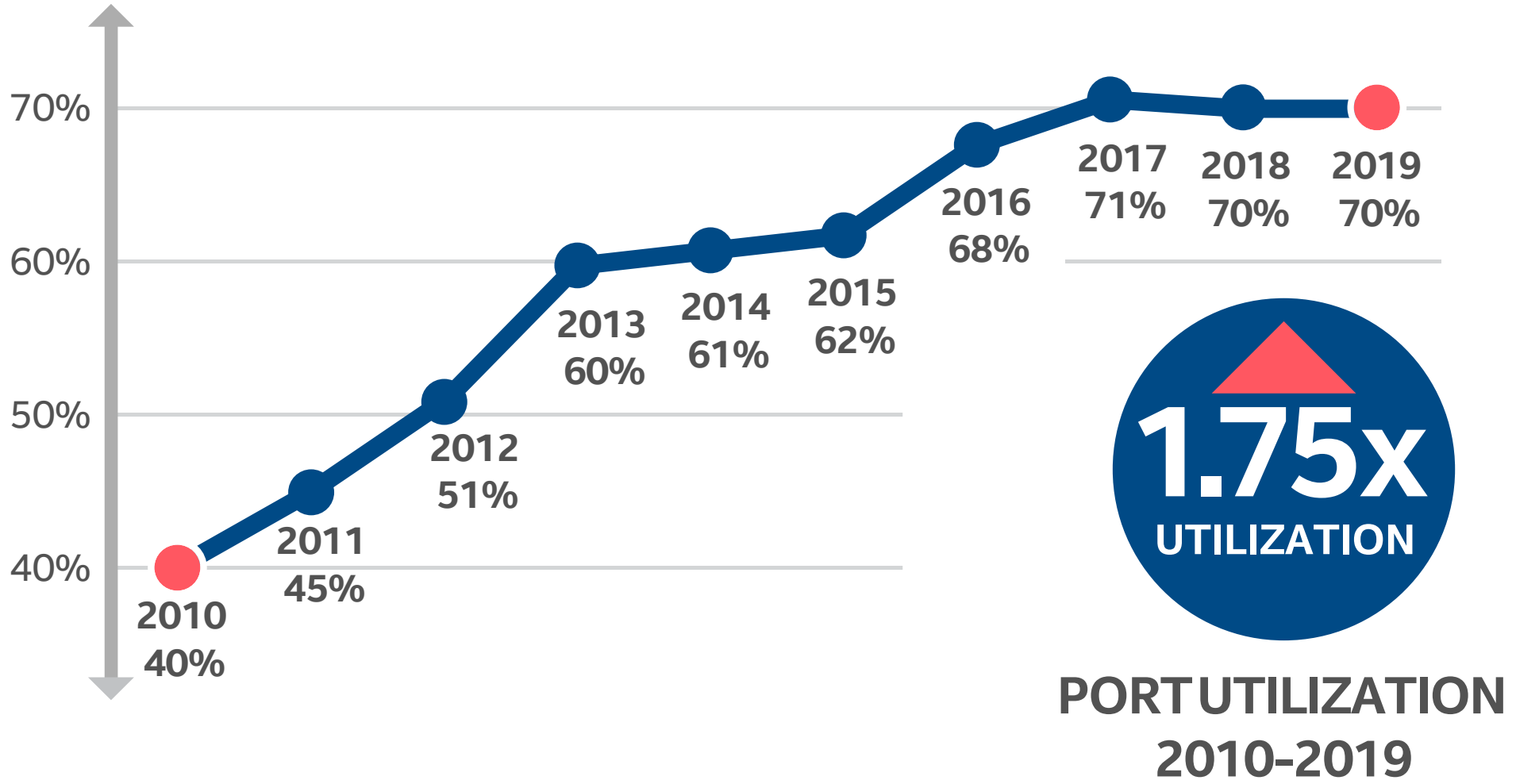
Refresh Savings Example

3U Chassis with 14 Blades

Our disaggregated server architecture has the potential to dramatically change how data centers around the world perform server refreshes.

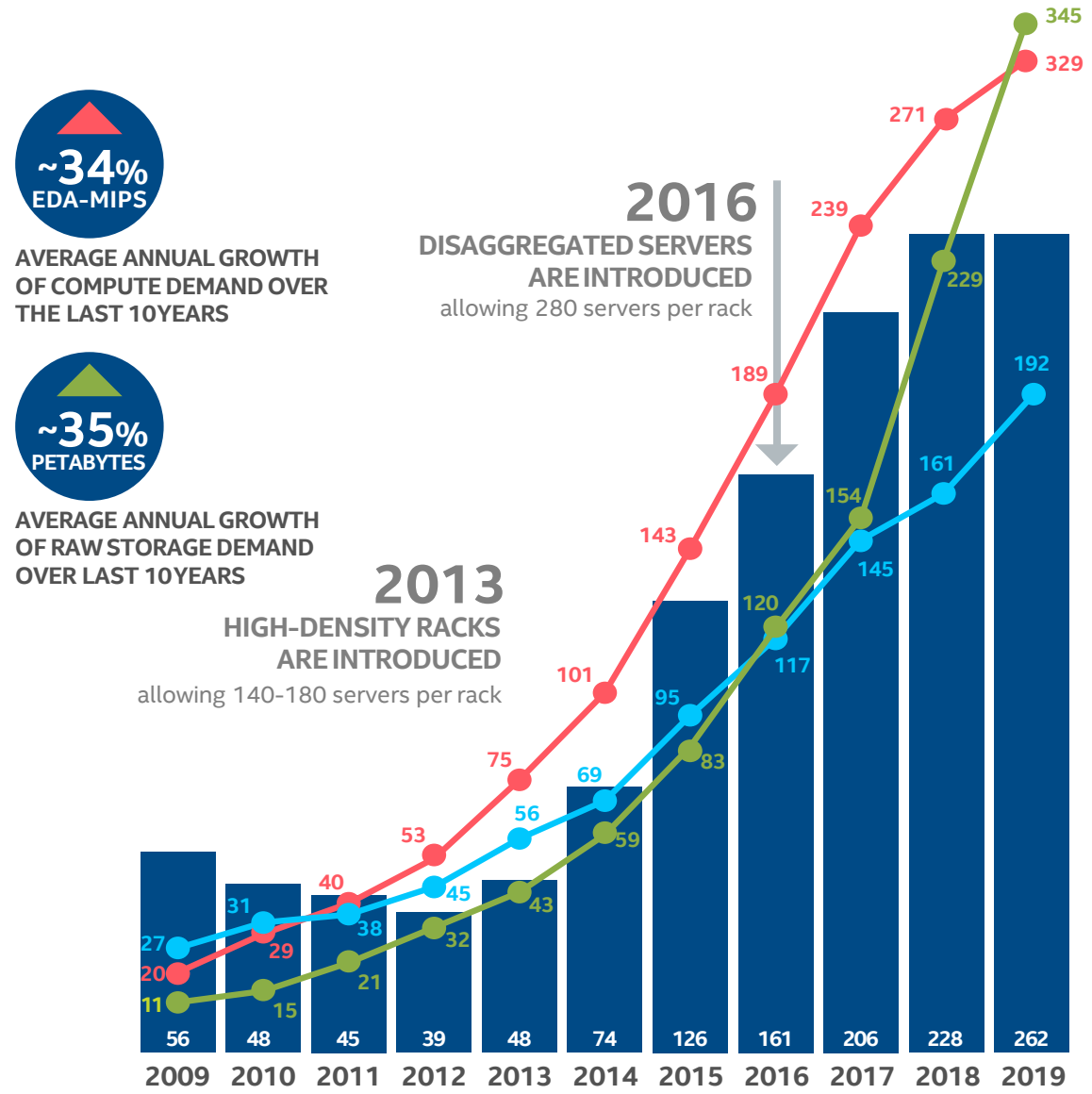


Effective 10 GbE Port Utilization



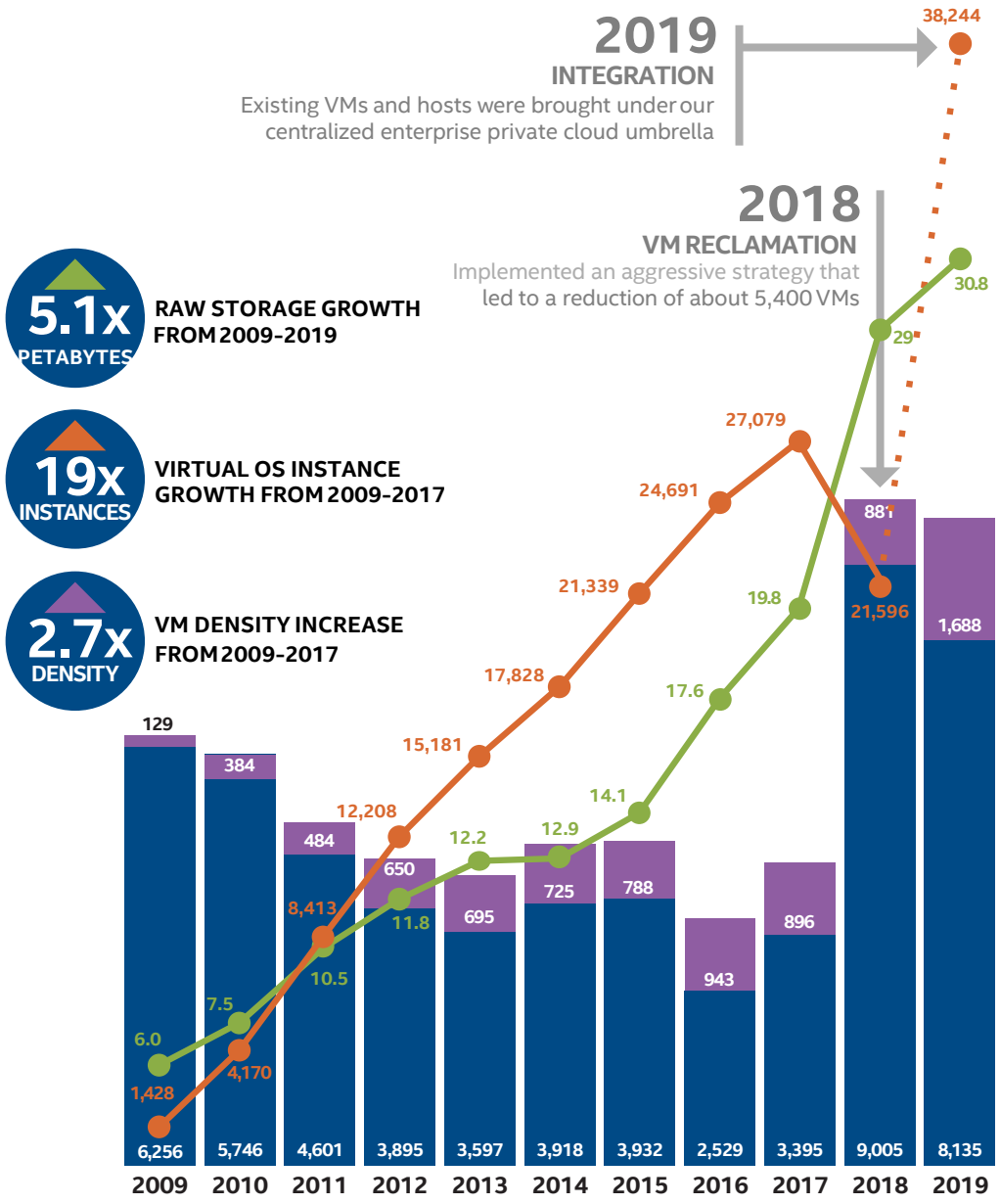
Design: Compute and Storage Demand

Despite continuing growth in compute and storage demand, our Design data centers are using powerful Intel® technology to meet demand.

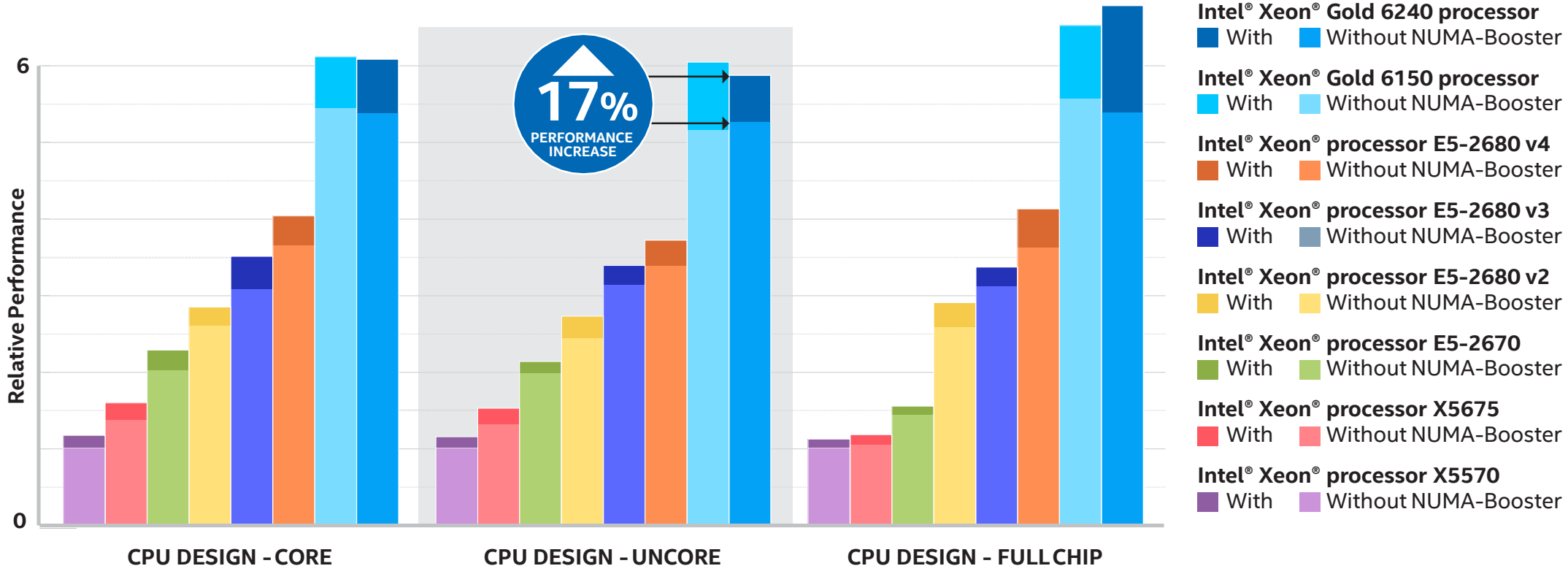


Office and Enterprise: Compute and Storage Demand

A high rate of virtualization combined with Intel® architecture has enabled us to meet growing Office and Enterprise compute and storage demand while significantly decreasing the number of required virtualization host servers.



Design: Register Transfer Logic Performance with NUMA-Booster



System with 2x Intel® Xeon® processor X5570, 72 GB DDR3-1333 RAM, 1x 900 GB 10K RPM SAS hard drive, with Linux 2.6 OS, running Intel silicon design simulation workload.
System with 2x Intel® Xeon® processor X5675, 96 GB DDR3-1333 RAM, 1x 900 GB 10K RPM SAS hard drive, with Linux 2.6 OS, running Intel silicon design simulation workload.
System with 2x Intel® Xeon® processor E5-2670, 128 GB DDR3-1333 RAM, 1x 900 GB 10K RPM SAS hard drive, with Linux 2.6 OS, running Intel silicon design simulation workload.
System with 2x Intel® Xeon® processor E5-2680 v2, 256 GB DDR3-1600 RAM, 1x 900 GB 10K RPM SAS hard drive, with Linux 2.6 OS, running Intel silicon design simulation workload.
System with 2x Intel® Xeon® processor E5-2680 v3, 256 GB DDR4-2133 RAM, 1x 900 GB 10K RPM SAS hard drive, with Linux 3.0 OS, running Intel silicon design simulation workload.
System with 2x Intel® Xeon® processor E5-2680 v4, 256 GB DDR4-2400 RAM, 1x 1.2 TB 10K RPM SAS hard drive, with Linux 3.0 OS, running Intel silicon design simulation workload.
System with 2x Intel® Xeon® Gold 6150 processor, 768 GB DDR4-2666 RAM, 2x 1.2TB 10K RPM SAS hard drive, with Linux 3.0 OS, running Intel silicon design simulation workload.
System with 2x Intel® Xeon® Gold 6240 processor, 768 GB DDR4-2933 RAM, 2x 1.2TB 10K RPM SAS hard drive, with Linux 3.0 OS, running Intel silicon design simulation workload.

Intel® DCM

REAL-TIME
POWER, THERMAL, HEALTH
Monitoring & analytics

IMPROVES UPTIME
By health monitoring & prediction

CROSS-PLATFORM
SUPPORT
Easy to integrate or install

AGGREGATED DATA
To physical groups
(e.g. room/row/rack) & logical groups

BETTER DATA CENTER
Capacity planning

INCREASED EFFICIENCY
By identifying under
utilized devices

Summary

Data Center Transformation Strategy

Hardware Refresh On Time

Effective Resource Utilization

Adopting Software Capabilities

Learn More

By applying breakthrough technologies, solutions, and processes, we have optimally served the acceleration of Intel's business.

Read our paper "IT@Intel: Data Center Strategy Leading Intel's Business Transformation" for additional details.

WHITE PAPER
Data Center
July 2020

IT@Intel: Data Center Strategy Leading Intel's Business Transformation

By applying breakthrough technologies, solutions, and processes, we have optimally served the acceleration of Intel's business

Executive Summary

Intel IT runs Intel data center services like a factory, affecting change in a disciplined manner and applying breakthrough technologies, solutions, and processes. This enables us to optimally meet Intel's business requirements while providing our internal customers with effective data center infrastructure capabilities and innovative business services.

Building on previous investments and techniques, our data center strategy has generated savings exceeding USD 3.8 billion from 2010 to 2019.

Over the next three years, we plan to extend the data center strategy to continue our data center infrastructure transformation. We will accomplish this by using disruptive server, storage, network, infrastructure software, and data center facility technologies. These can lead to unprecedented quality-of-service levels and reduction in total cost of ownership (TCO) for business applications. And they will enable us to continue to improve IT operational efficiency and be environmentally responsible.

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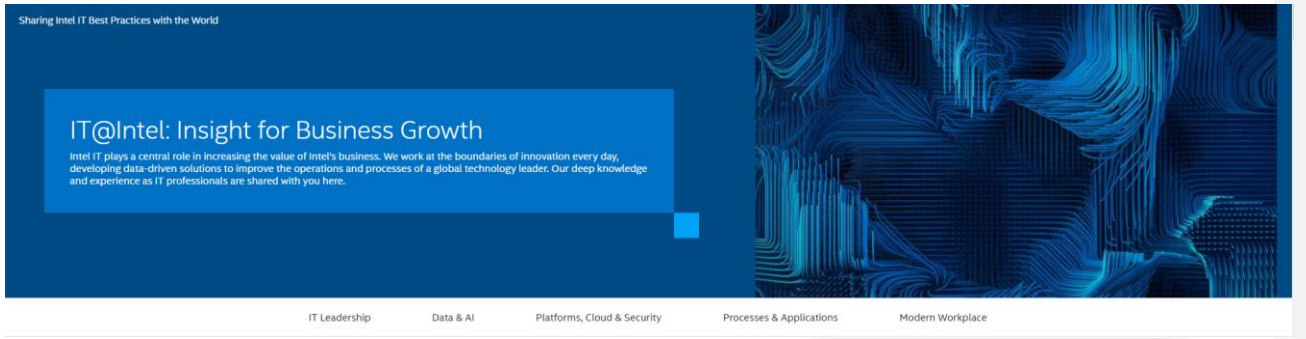
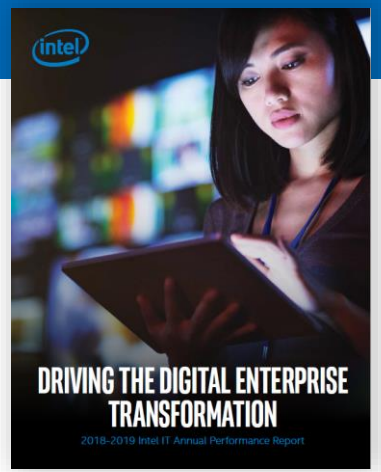
Table of Contents

Background 2
Defining a Model of Record 4
Results: Building on the Past, Building for the Future 8
Summary of Best Practices 17
Plans for 2020 and Beyond 17
Conclusion 20

IT@Intel:
Sharing Intel IT Best Practices with the World





Learn more about Intel IT's initiatives at: www.intel.com/IT →

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