

# DCG TRANSFORMED

March 18, 2019

Kirk Skaugen

EVP & President, Data Center Group

# Agenda

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Data Center Market Landscape

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DCG Vision and Transformation

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Our Growth Strategy

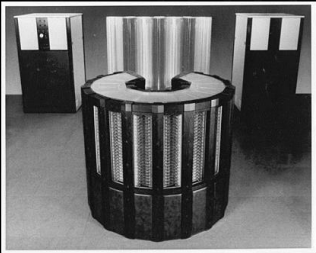
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# Compute Power Over 30 Years

1984-1985

Cray-2 Supercomputer



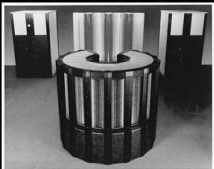
1.9 GFLOPS

Lenovo was founded



~35 Years Later

Cray-2 Supercomputer  
1.9 GFLOPS



Lenovo was founded



LRZ Supercomputer  
26,873,000 GFLOPS

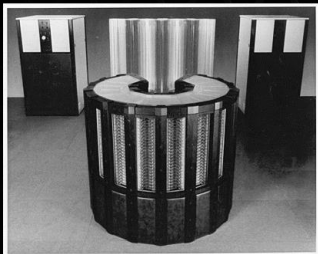


New Beijing Headquarters



Now

Cray-2 Supercomputer



1.9 GFLOPS

Moto Z3



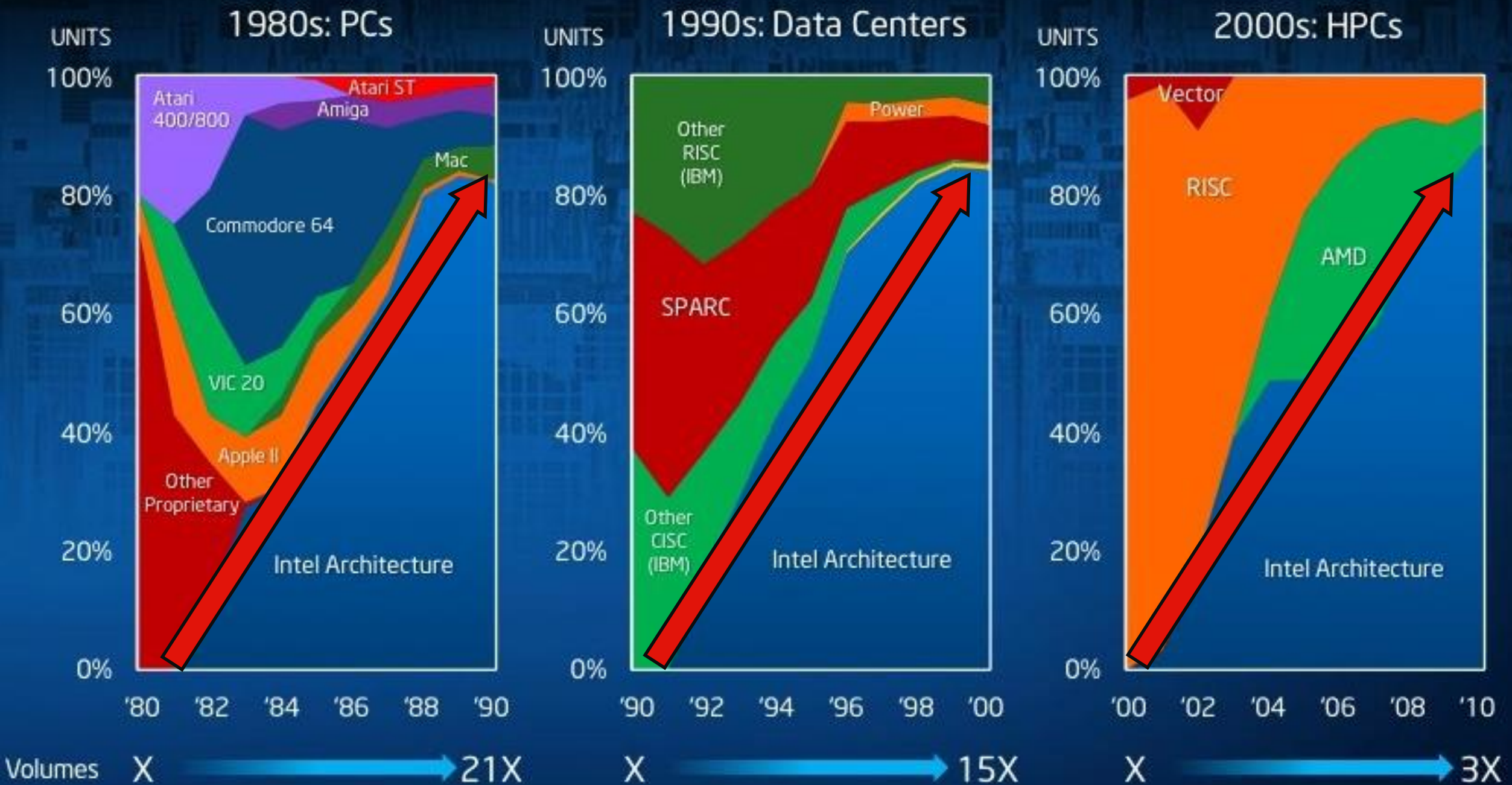
550 GFLOPS

# Consistent Data Center Themes

## Data Center M&A Activity

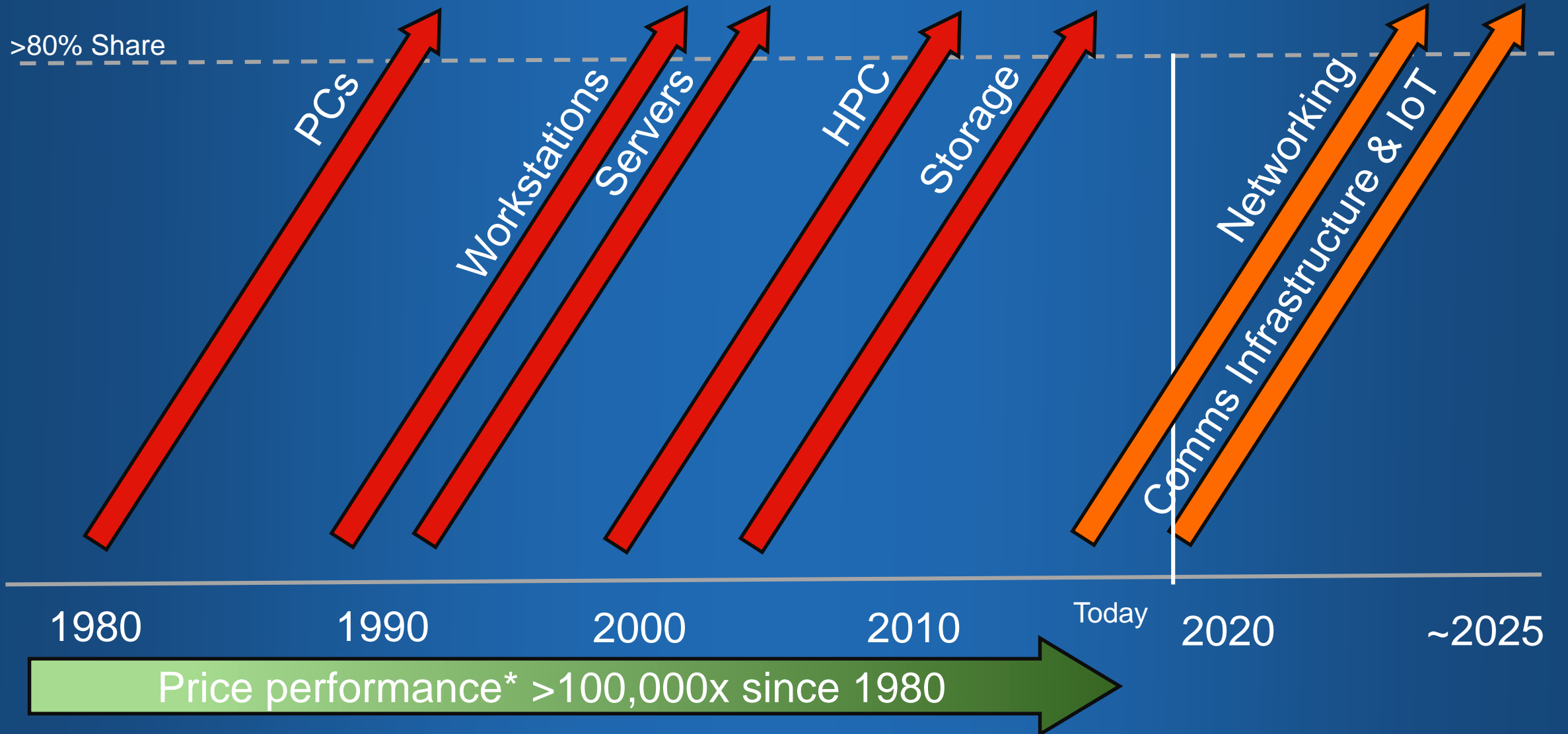
2017	2018	2019
1.AI / ML 2.IOT 3.Big Data 4.Cloud 5.Converged IT	1.AI / ML 2.IOT 3.Cloud 4.Big Data 5.Converged IT	1.AI / ML 2.Cloud 3.IOT 4.Converged IT 5.Big Data





# PROPRIETARY HW GIVES WAY TO STANDARD HIGH VOLUME

Conceptual view





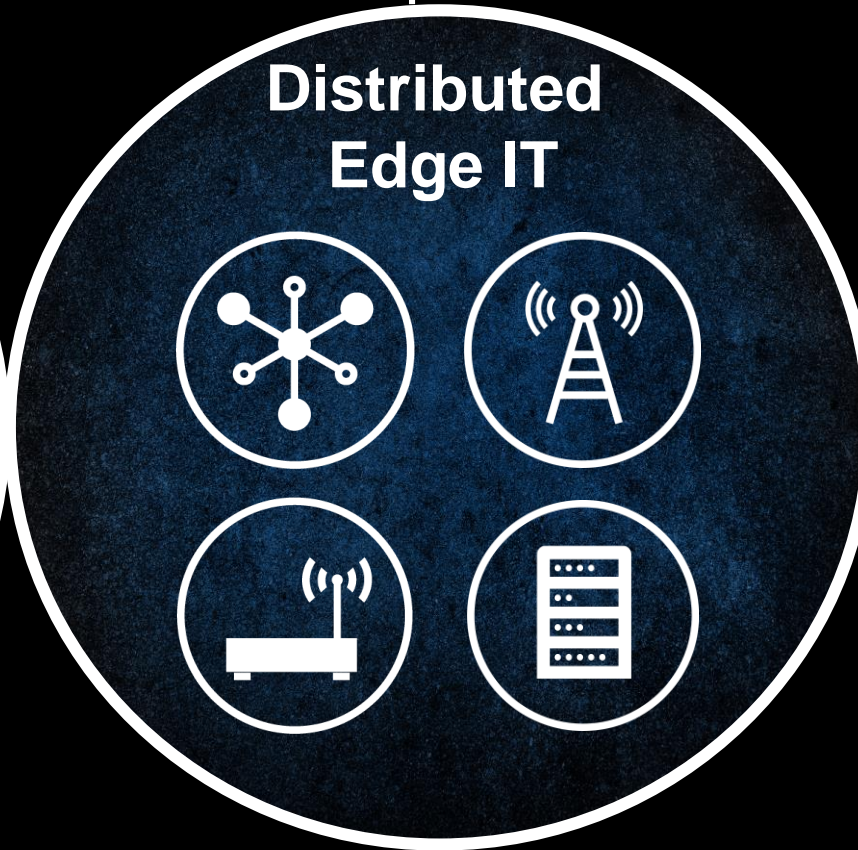
# Evolving Landscape

## Smart IoT

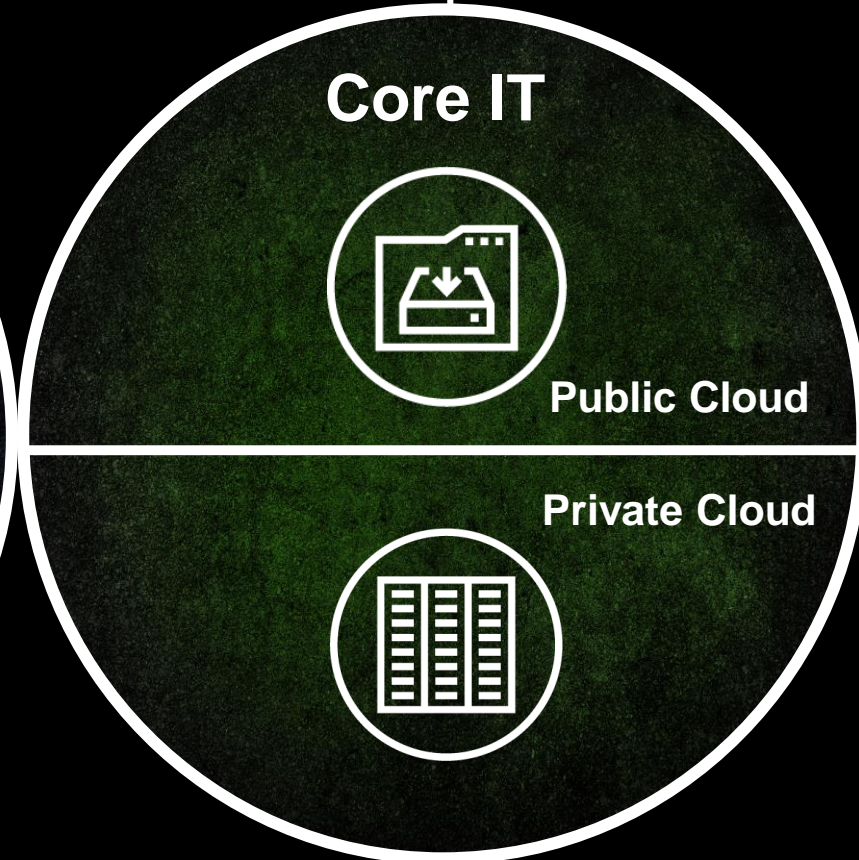


## --- Smart Infrastructure ---

### Distributed Edge IT



### Core IT





**DCG Vision:**  
Be the most trusted data center partner –  
empowering customers' **Intelligent Transformation**  
and solving humanity's greatest challenges.



New Culture

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New Product Branding

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New Dedicated Sales & Marketing

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New Dedicated Supply Chain & Quality

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New Customer-Centric Segments

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New Global Channel Programs

---

New Systems Integrator Relationships

---

New Leadership Team

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**LENOVO DCG**  
**TRANSFORMED**





# ThinkAgile

**Next Generation IT**  
for software-defined infrastructure

# ThinkSystem

**Server, Storage, & Networking Solutions**  
for the future-defined data center



# Lenovo DCG Portfolio **ThinkAgile**

## Software-Defined Infrastructure



# ThinkSystem

## Engineered Solutions & Software

AI   Big Data/Analytics   Blockchain   Cloud   Database   DevOps   HPC   Hyperscale   IoT/Edge   NFV   Virtualization



### Storage



### HPC/AI



### IoT / Edge



### Servers



### Hyperscale



### Networking



Services: Solution Design, Implementation, Support, TruScale

# Industry Leading Performance for x86 Servers

~2X industry workload world records vs. the nearest competitor\*

**Compute**

(SPEC CPU x 17)

**Data Analytics**

(STAC M3 x 36)

**Energy Efficiency**

(SPECpower\_s sj2008 x 5)

**High Performance Computing**

(SPEC MPI2007 x 8 & SPECOMP2012)

**JAVA Application**

(SPECjbb2015 x 30)

**SAP**

(SAP SD 2T & BWoH x 11)

**Storage**

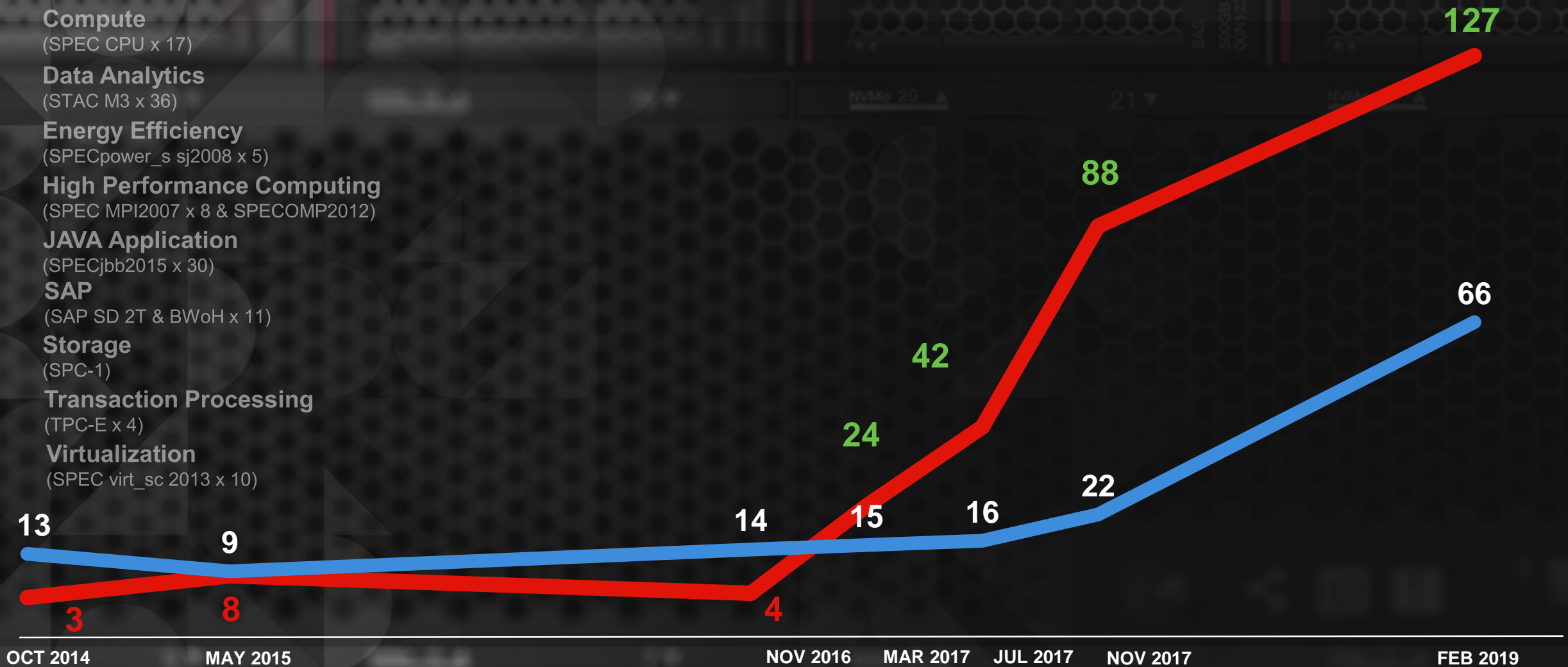
(SPC-1)

**Transaction Processing**

(TPC-E x 4)

**Virtualization**

(SPEC virt\_sc 2013 x 10)



— Lenovo

— Lead Competitor

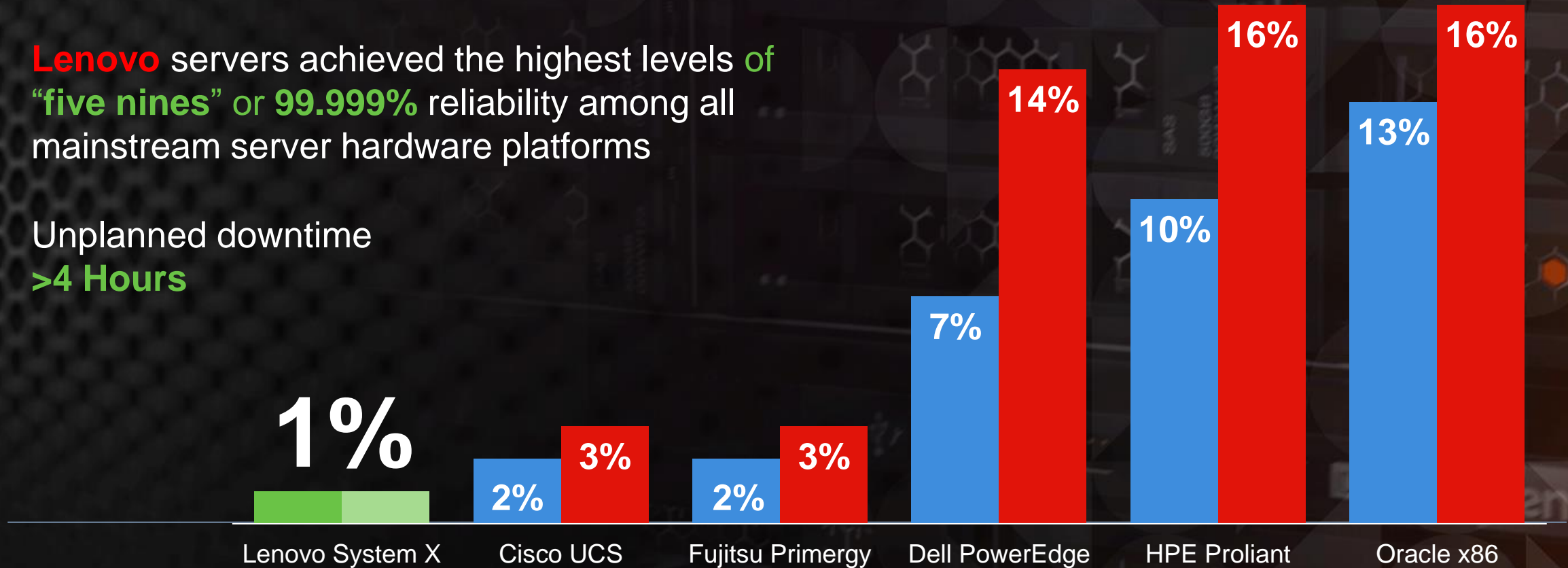


# #1 in X86 Server Reliability – 6 Years Running

>750 CXO / IT SURVEYED IN >20 COUNTRIES

Lenovo servers achieved the highest levels of “five nines” or 99.999% reliability among all mainstream server hardware platforms

Unplanned downtime  
>4 Hours





# Lenovo

**SAP runs its SAP HANA® platform on Lenovo. Let Lenovo run yours, too.**

Lenovo servers help SAP know more, faster.

SAP relies on Lenovo servers, optimized for SAP HANA, to run real-time analytics and develop next-generation cloud applications for its customers.

**Different analyzes better.**

Read more at [www.lenovo.com/datacenter](http://www.lenovo.com/datacenter)



**Different is better**

The Lenovo logo, featuring the word "Lenovo" in white on a red background.

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PHONE SUPPORT  
AVAILABILITY

INITIAL HARDWARE  
QUALITY

ON-SITE TECHNICAL  
EXPERTISE

PHONE SUPPORT  
TECHNICAL EXPERTISE

TOTAL COST  
OF OWNERSHIP

PERFORMANCE

MANAGEMENT  
CAPABILITIES

ONGOING HARDWARE  
RELIABILITY

ONLINE TECHNICAL  
SUPPORT

POST-PURCHASE  
CUSTOMER CARE

VIRTUALIZATION,  
EFFICIENCY, SCALABILITY

ON-SITE  
RESPONSE TIME

ONGOING SERVICES  
AND MAINTENANCE

# #1 IN CUSTOMER SATISFACTION

SOCIAL MEDIA  
SUPPORT

ONLINE PRODUCT  
INFORMATION

18 OF 22 ATTRIBUTES IN N. AMERICA  
22 OF 22 ATTRIBUTES IN EMEA & APAC

DELIVERY TIME &  
PRODUCT AVAILABILITY

SELF-SUPPORT /  
AUTOMATED SUPPORT

REPLACEMENT PARTS  
AVAILABILITY

PURCHASE PRICE /  
ACQUISITION COST

SALES  
RESPONSIVENESS

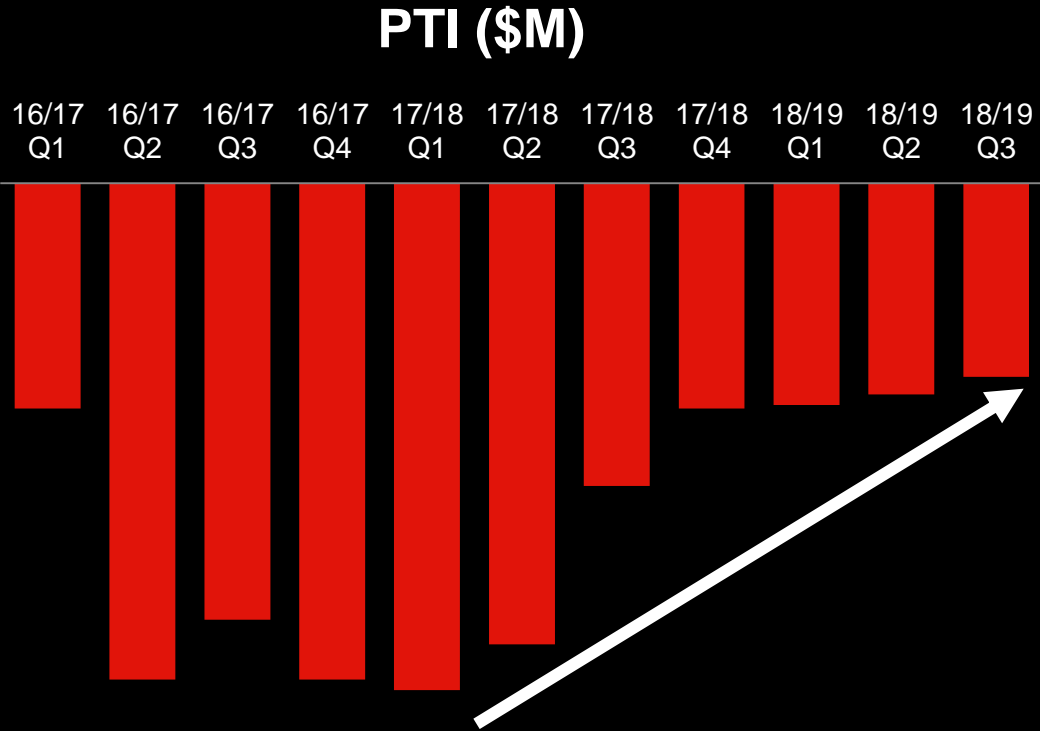
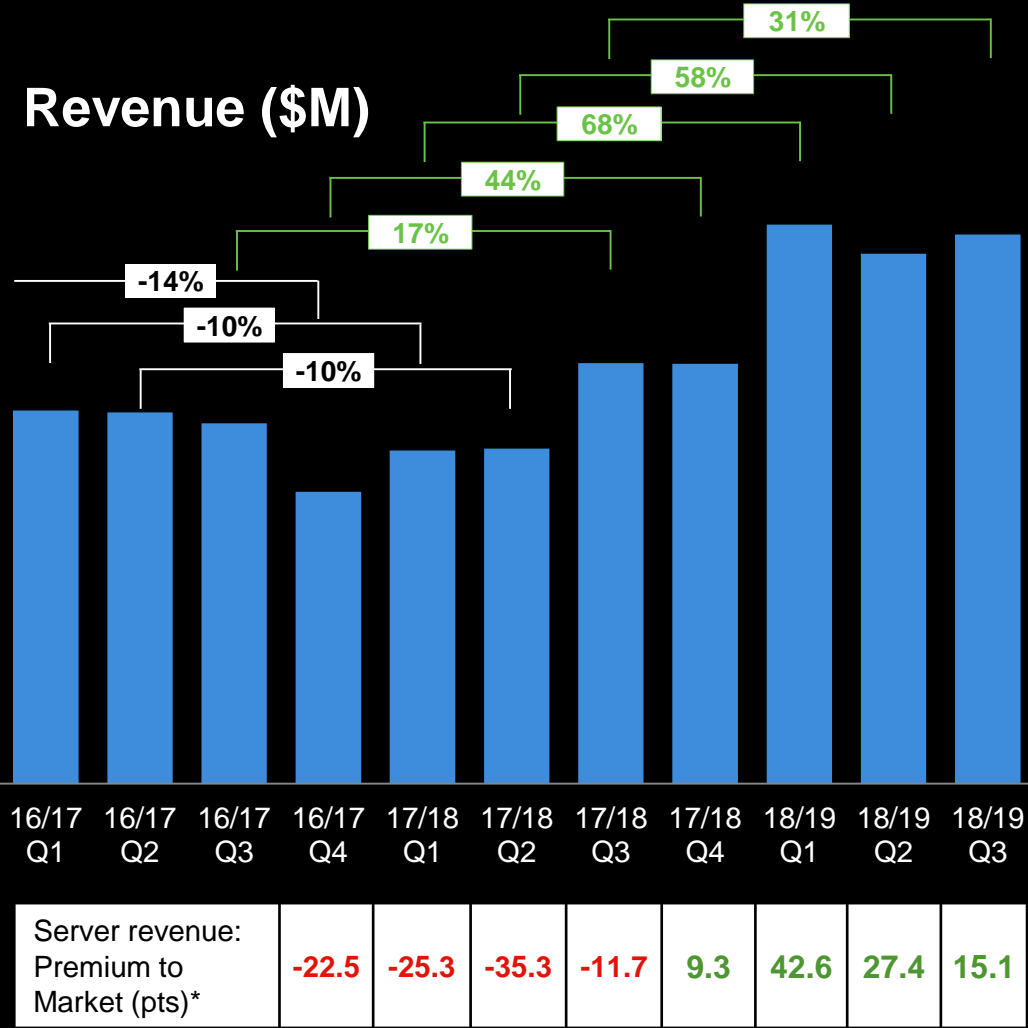
ONE-TIME SERVICES  
AND SETUP

**LENOVO DCG RETAINS #1 POSITION IN CUSTOMER SATISFACTION  
FOR THE 9TH CONSECUTIVE TBR STUDY SINCE JANUARY 2015**

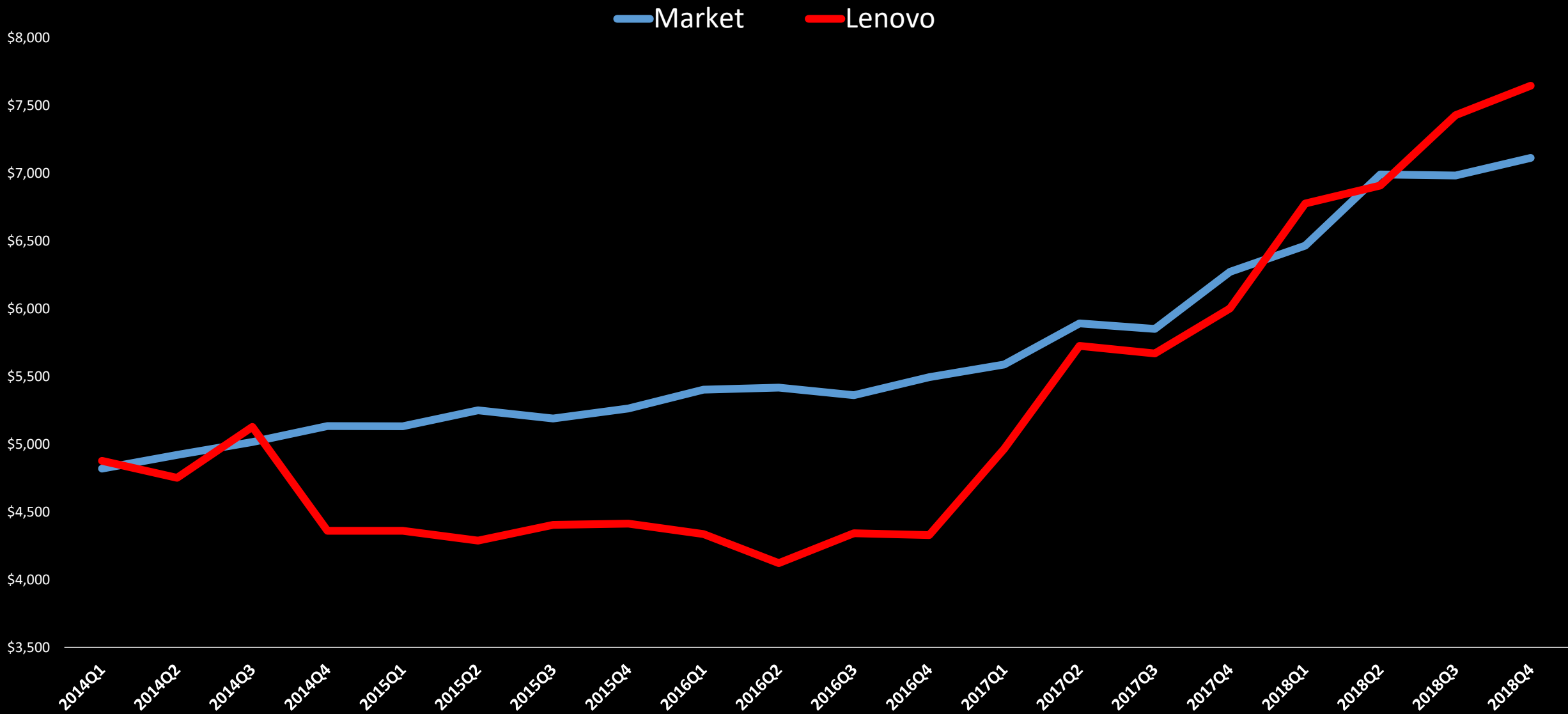




# DCG Business Turnaround

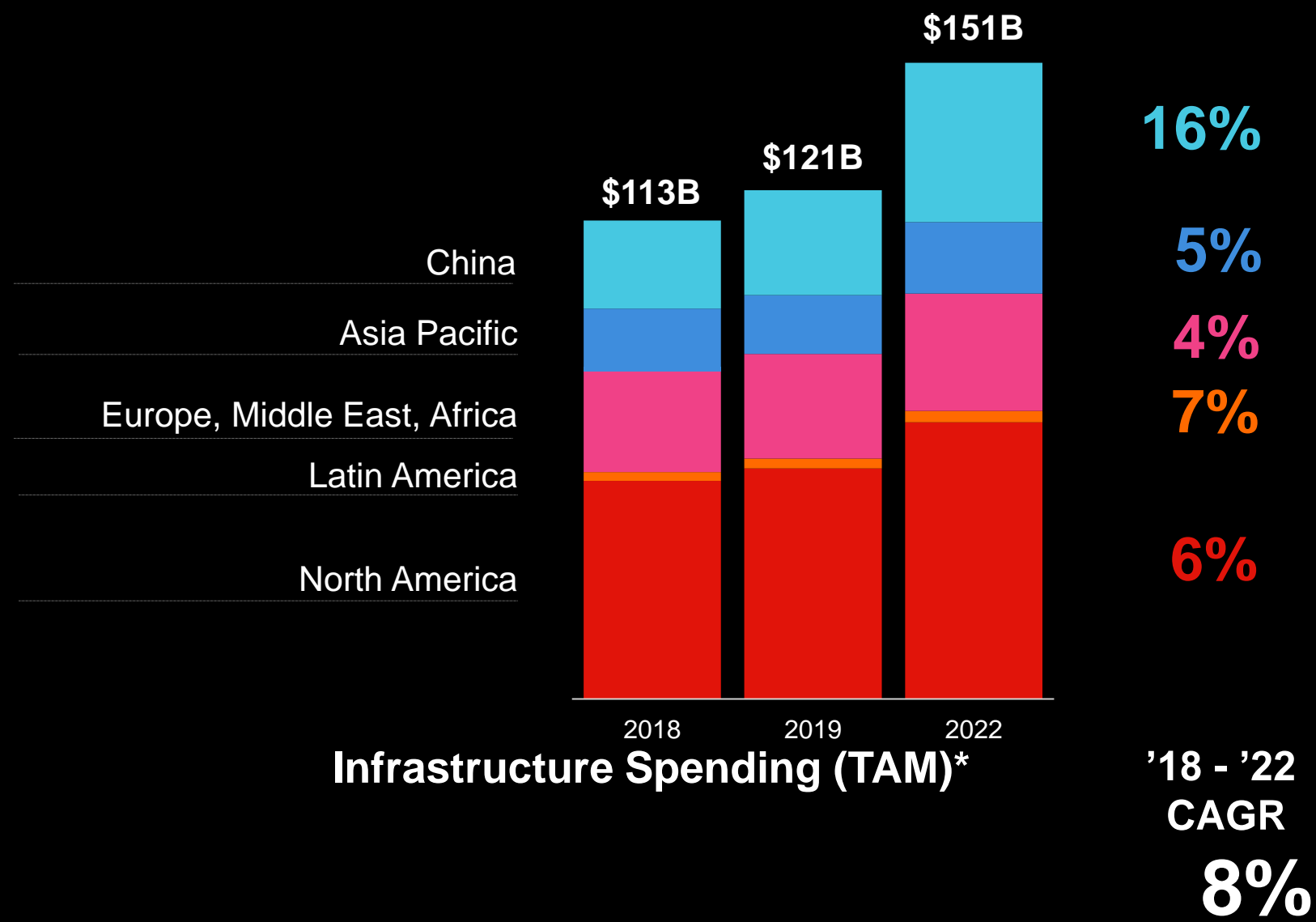


# x86 server AUR\* trends

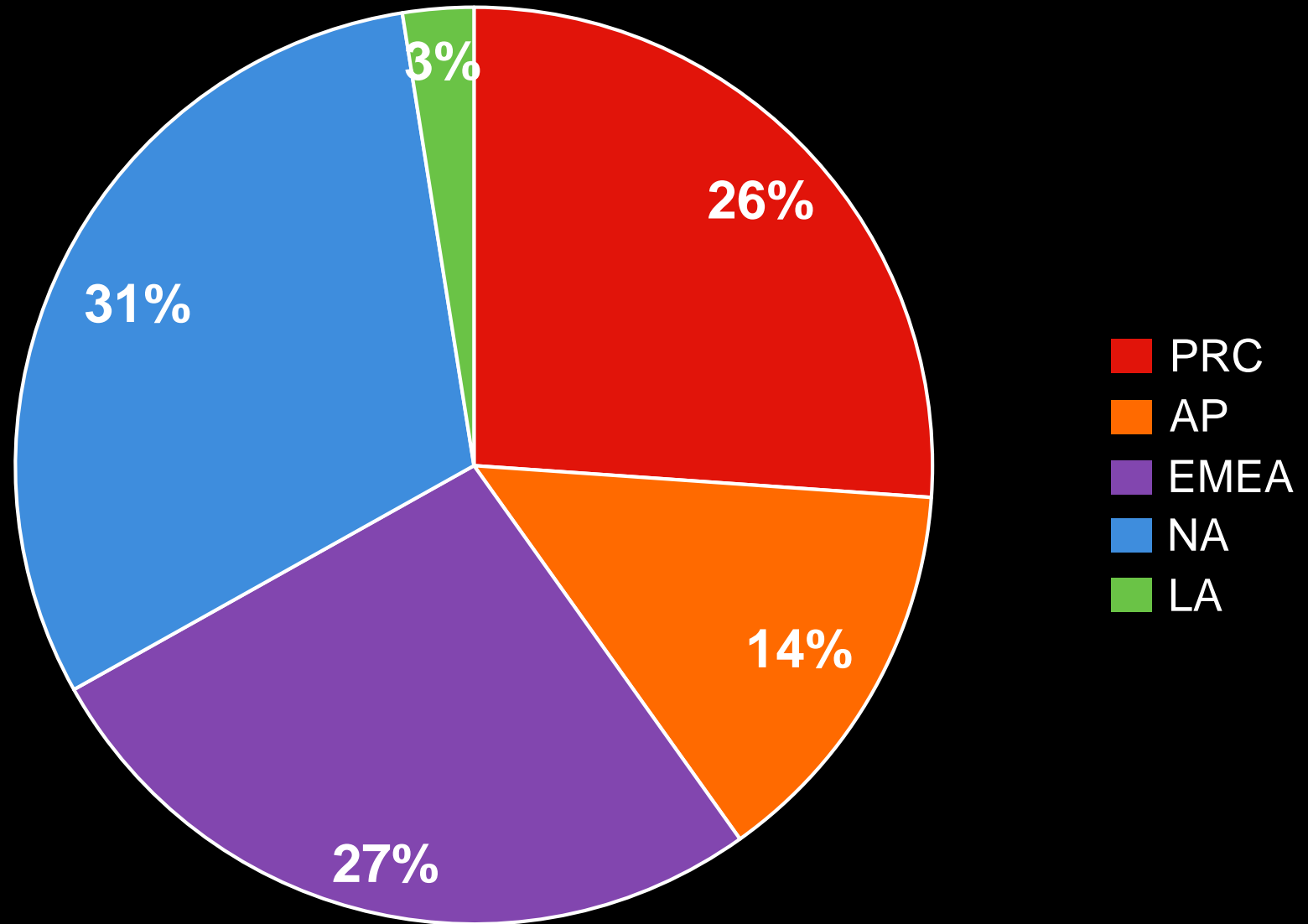




# Smart Infrastructure Market Outlook – by Geo

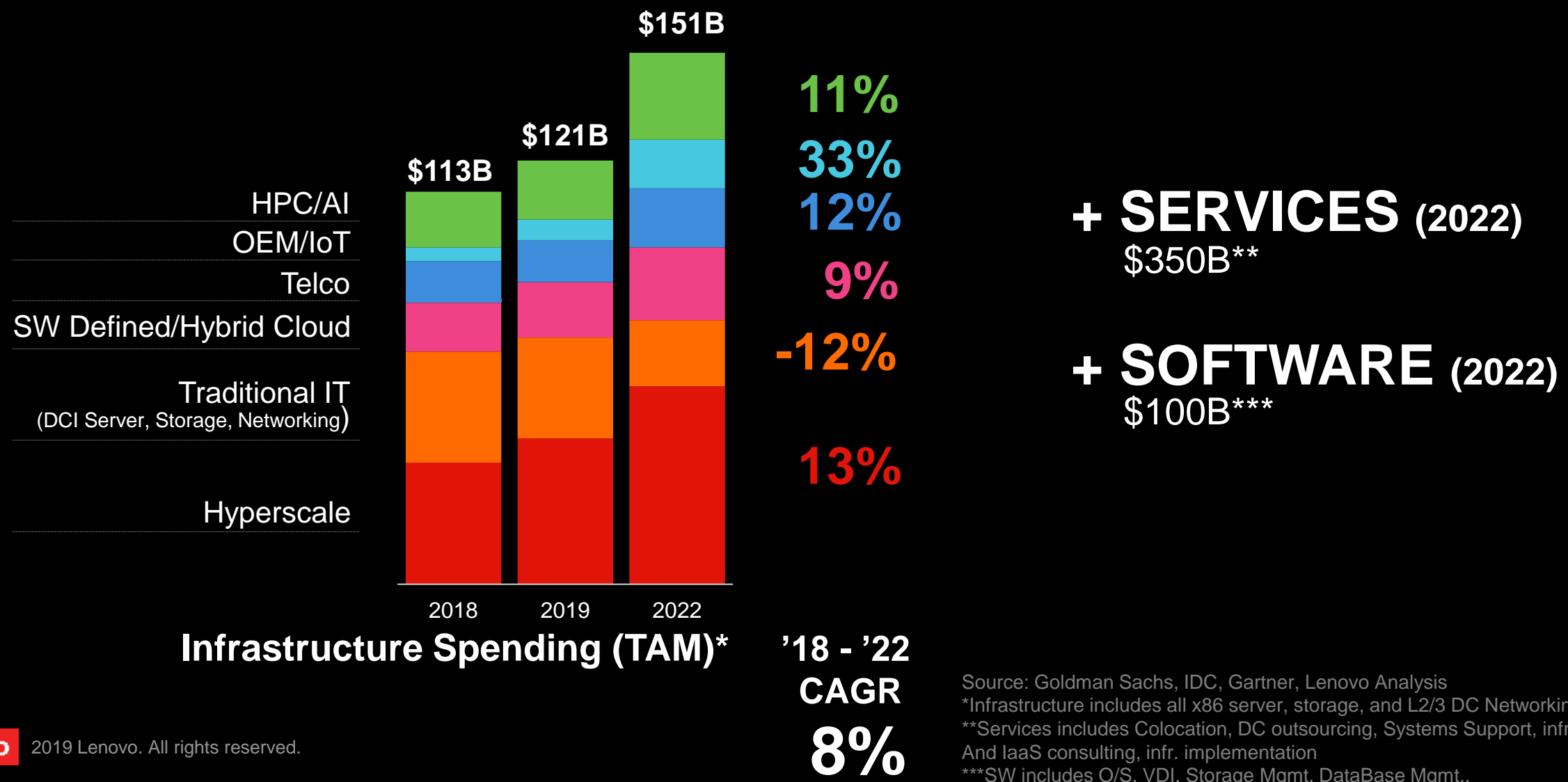


# DCG Revenue Mix by Geo\*





# Smart Infrastructure Market Outlook – by Segment

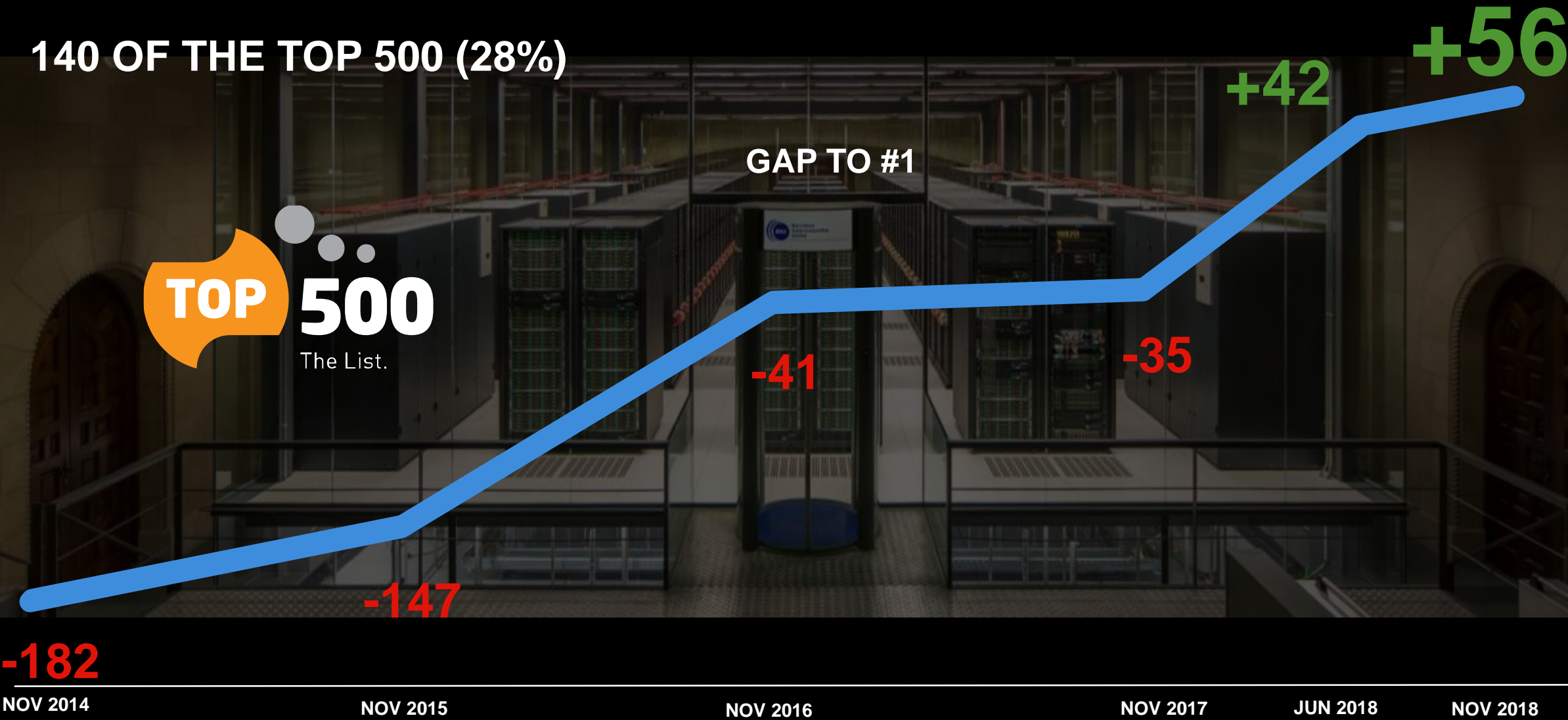


# #1 Provider Of Supercomputers In The World

140 OF THE TOP 500 (28%)

**TOP 500**  
The List.

GAP TO #1





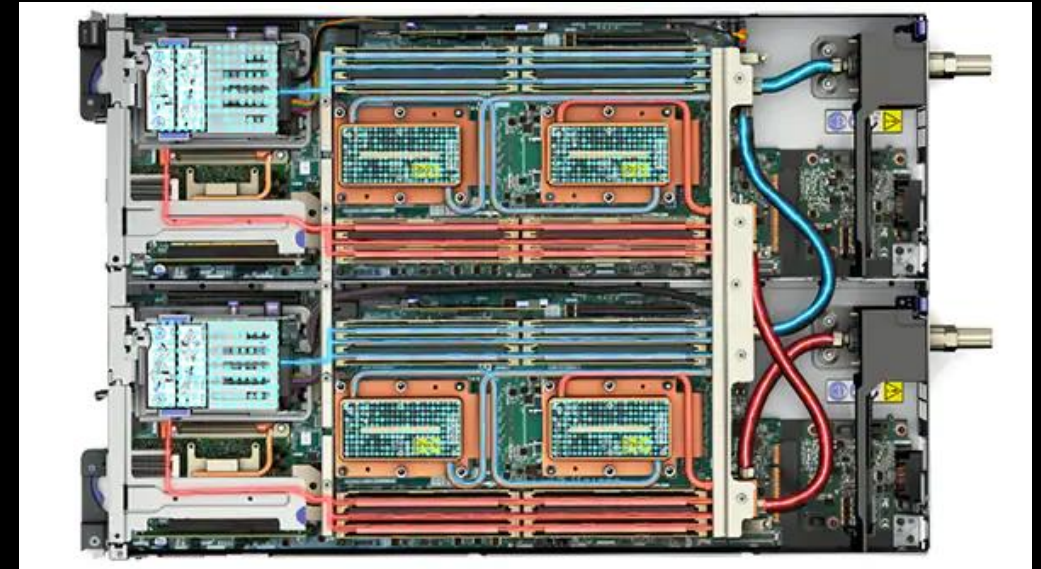


# Lenovo: the recognized leader in liquid cooling technology

Holistic approach to liquid cooling

Energy usage optimization

Maximizing performance



MORRISVILLE



STUTTGART



BEIJING



TAIPEI



# ARTIFICIAL INTELLIGENCE INNOVATION CENTERS



LiCO



“

Datacenters are the most important computers in the world today, and in the future – as the workloads continue to change triggered by artificial intelligence, machine learning, data analytics and data sciences – **future datacenters of all kinds will be built like high performance computers.**

– Jensen Huang, Founder, President & CEO, Nvidia

The Lenovo logo, consisting of the word "Lenovo" in white sans-serif font inside a red rectangular box.

**Lenovo**

The NetApp logo, featuring a blue square icon with a white stylized 'N' followed by the word "NetApp" in white sans-serif font with a registered trademark symbol.

**NetApp®**

**TWO GLOBAL POWERHOUSES JOIN FORCES**



# 10 NEW STORAGE PLATFORMS

ThinkSystem DM Series

ThinkSystem DE Series



**Lenovo**  
**xClarity™**

Global Support with Lenovo End-to-End Services





聚力前行 再创辉煌

“联想拓”发布会

Lenovo  
NetApp



“

**Lenovo is a proven leader, and their ODM+ capabilities are truly unique in the industry.** We chose to partner with them to deliver our ARM-based server platform in order to address the unique design, cost and performance requirements our cloud customers need.

– Renee James, CEO and Chairman, Ampere



# Software Defined Infrastructure

Composable  
Cloud



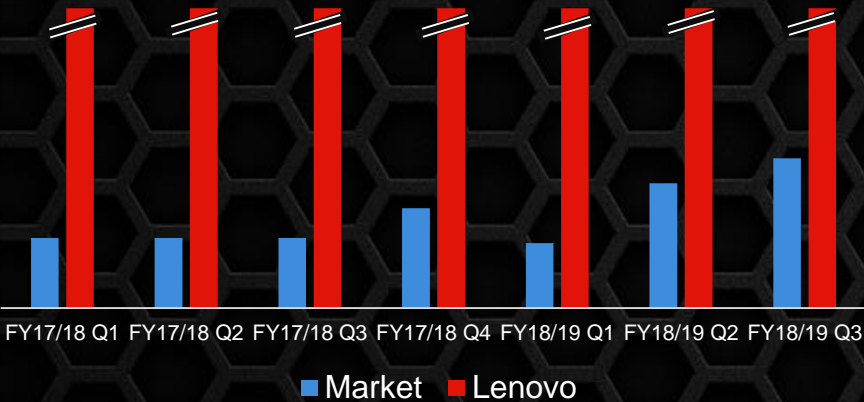
Pre-integrated  
Solutions



Reference  
Architectures



SDI YtY Growth vs. Market\*  
>2X for 7 Consecutive Quarters

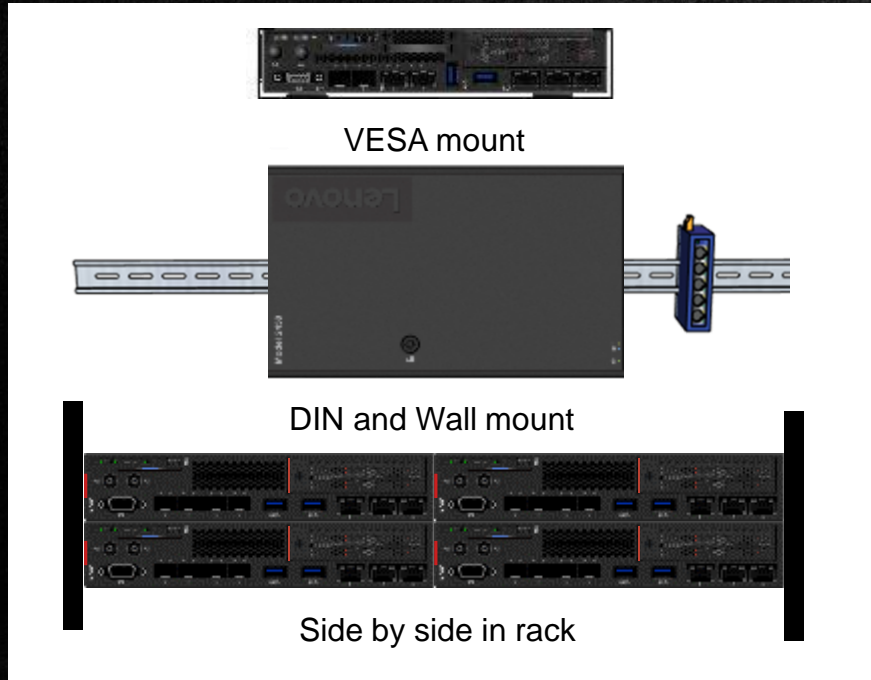


**\$20B** 2022 Opportunity Size

**19%** Industry CAGR ('18-'22)

# Internet of Things

## ThinkSystem SE530 – First of Many Differentiated Edge Server Offerings



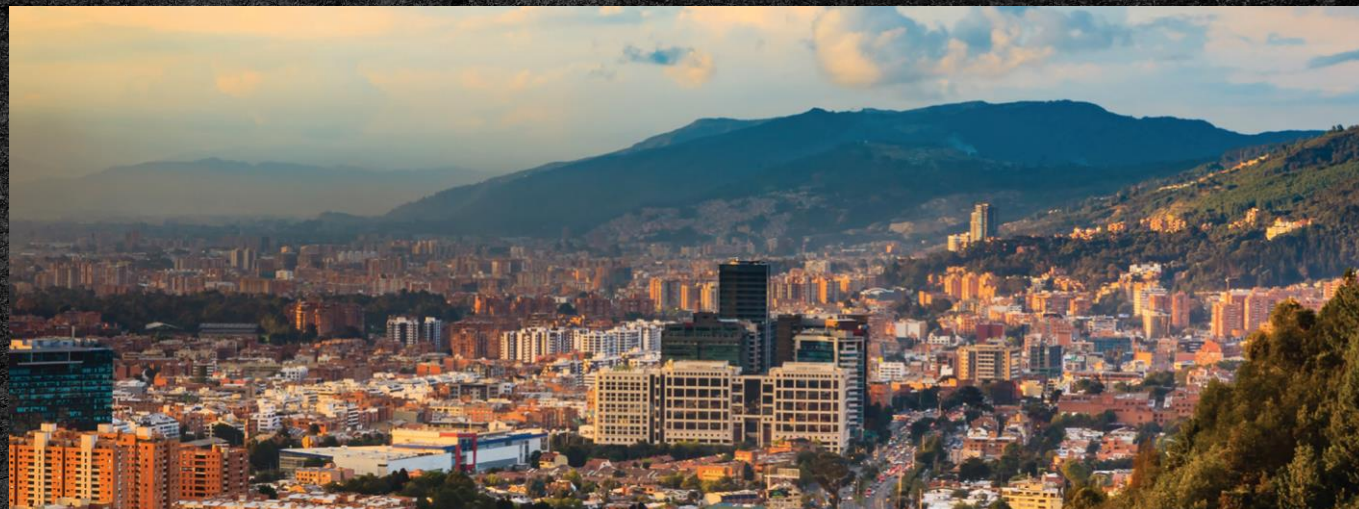


# CITY OF BOGOTÁ

Pivot3 and Lenovo provide modern, centralized Safe City infrastructure

*“With this new scalable edge computing solution, the city’s security team can view any camera, regardless of brand across the city from a single location, which will greatly simplify operations.”*

*—Rafael Padilla,  
Systems Integrator, City  
of Bogotá Safe City  
Project*



The City of Bogotá selected the Pivot3-Lenovo Safe City solution to simplify the management of 5,000 surveillance cameras across 18 boroughs, increasing its situational awareness and the ability to monitor and respond to incidents.

Lenovo

Pivot3



# DELHAIZE

*“The Scale Computing HC3 software, in combination with Lenovo servers and switches, delivered the stability, support and simplicity we needed. The solution outclassed competition on total cost of ownership and simplicity.”*

**—Rolf Vanden Eynde**  
*Head of Infrastructure  
Innovation Planning  
Delhaize (Part of the Ahold  
Delhaize Group)*



HC3 Edge solution on Lenovo replaced thousands of traditional server deployments

**Lenovo**





# Telecom

## Between 2017-2020

- **75%** CSPs will pursue NFV
- **\$120B** Cumulative Opportunity
- **20%** segment CAGR

## DCG is Investing

- Custom, telco-hardened hardware platforms
- Multi-Access Edge computing solutions
- NFV IP and solutions
- Growing partner ecosystem
- Multiple active engagements





# Lenovo Accelerates O-RAN for 5G

Virtualized and Cloudified  
Base Station on  
Commodity Edge Servers

Video  
Conferencing

Mobile  
Communications



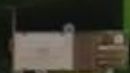
Indoor  
Positioning



Online Gaming



FPGA-based Accelerators  
to Optimize Performance  
and Energy Efficiency



Remote  
Radio Unit



IN PARTNERSHIP WITH

O-RAN



中国移动  
China Mobile

Bai Cells





# Lenovo TruScale Infrastructure Services



Minimal Upfront Costs



On-Prem Security & Control



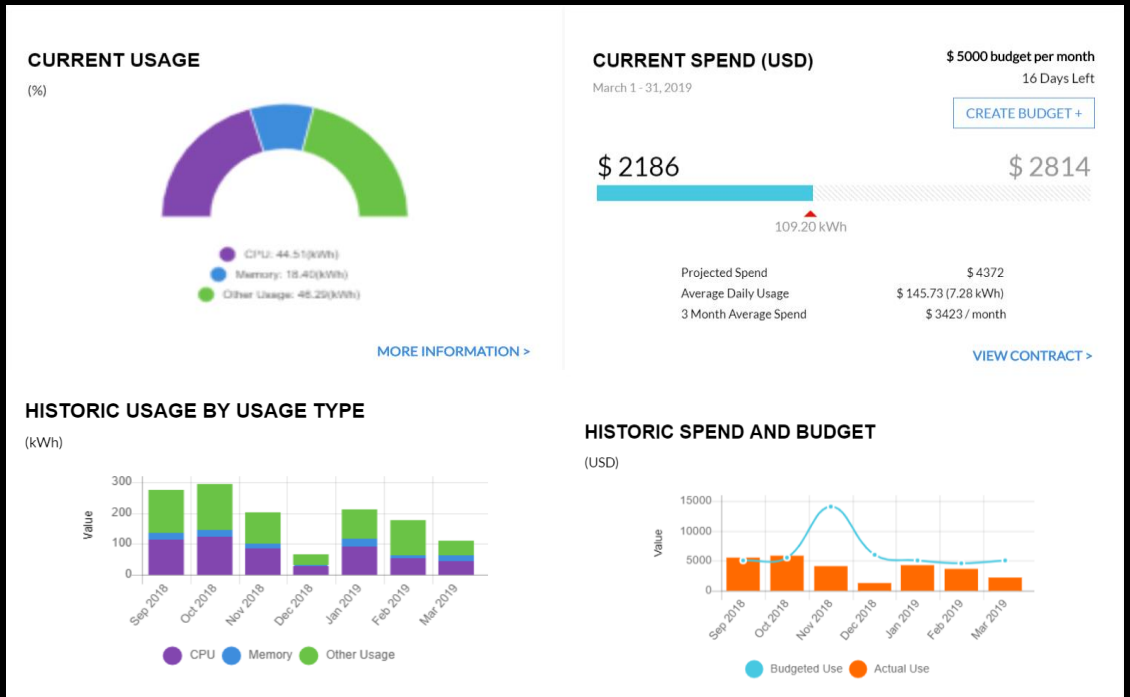
Reduced Risk



Flexibility & Scalability



Full Maintenance, Support & Management



## ORGANIZATION'S PREFERENCE FOR FUNDING IT INFRASTRUCTURE SYSTEMS AND/OR SOFTWARE

PREFERENCE FOR CAPITAL EXPENDITURES (CAPEX)

39%

EQUAL PREFERENCE FOR OPEX AND CAPEX

31%

PREFERENCE FOR OPERATING EXPENDITURES (OPEX)

30%

# Summary

- DCG has transformed
- Strong leadership team
- Sustained track record of exceeding market growth
- Innovation engine alive and well
- Investing for the future

The background is a complex digital-themed composition. It features a dark blue and purple color palette. On the left, there is a hexagonal grid pattern. The right side is dominated by a network of glowing blue lines connecting white dots, forming a mesh-like structure. Binary code (0s and 1s) is scattered throughout the scene, appearing as if floating or embedded within the geometric forms. The overall effect is one of high-tech and digital connectivity.

# DCG's goal is to grow 2X market



thanks.

