Linux and the Thin Client Management Market

August 2018

Cloud growth is propelling endpoint device expansion

- Worldwide cloud infrastructure growth is fully underway, as traditional datacenter infrastructure investment has remained flat.

- 60% of infrastructure spending will be public or private cloud by 2022, compared with 46% in 2017.

- Public and private cloud will grow at 9.8% and 9.7% CAGR respectively until 2022, which will drive significant investment in cloud-native devices and services; this trend is expected to continue.

- Businesses are moving to cloud-centric infrastructure to lessen hardware costs, reduce maintenance requirements, and access the latest cloud-native applications for workload optimization.

- **This global cloud infrastructure expansion is driving growth in underlying endpoint hardware and software that facilitates cloud access in reliable and secure ways.**
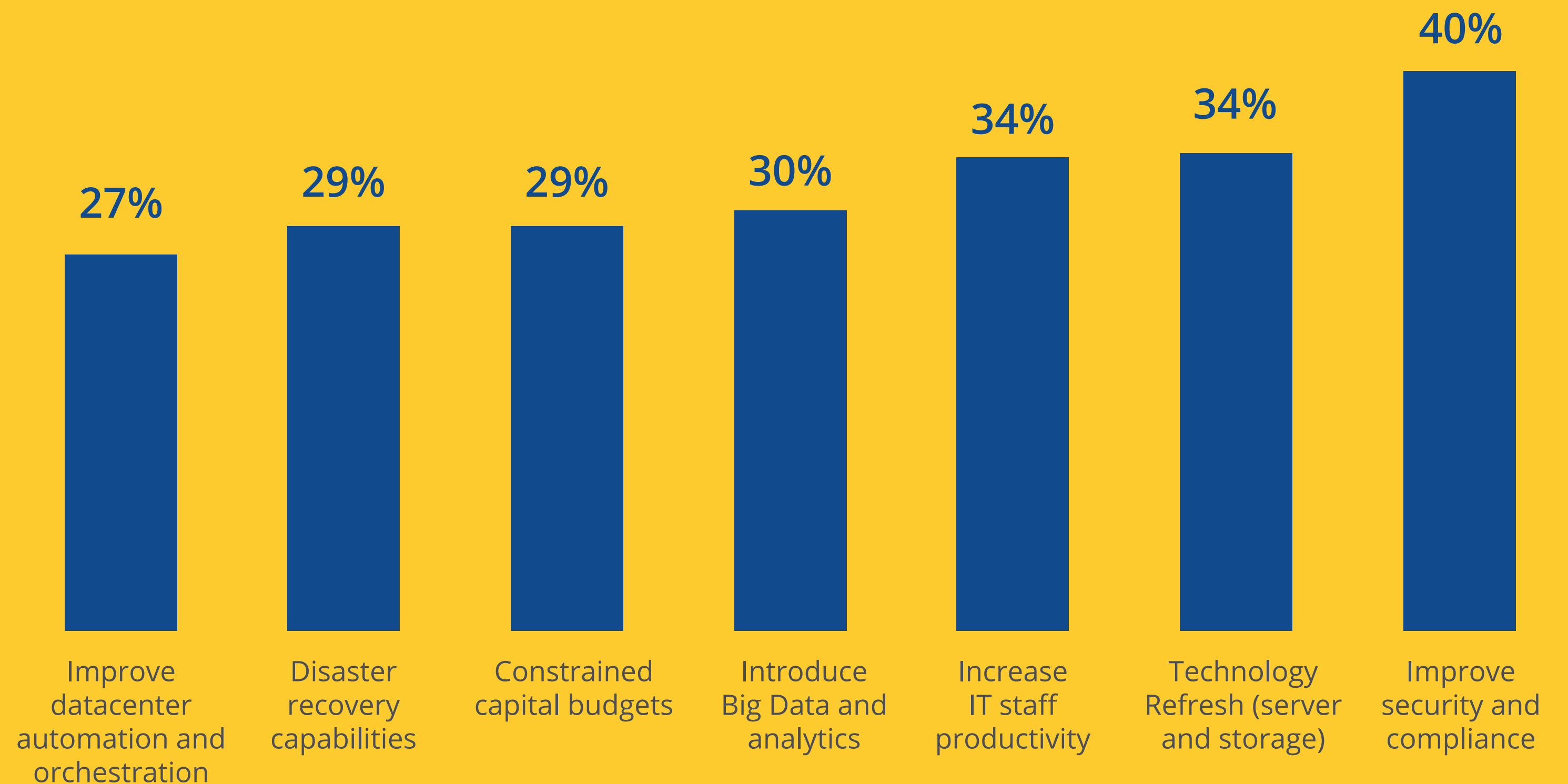
Worldwide cloud infrastructure forecast

$ millions

● Traditional Datacenter
CAGR **0.0%**

● Public cloud
CAGR **9.8%**

● Private cloud
CAGR **9.7%**

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Security concerns are top of mind for organizations

- **40% of organizations cite security and compliance as a top priority for their organization in 2018.** The increased number of cyberattacks globally and the introduction of more stringent regulations such as General Data Protection Regulations (GDPR) in the EU has put this category at the top of the priority list.

- Achieving a successful IT security strategy requires tackling the challenges with both hardware and software. Organizations can reduce vulnerabilities by introducing preventative measures such as privacy access control software and limiting the amount of critical data stored on endpoint devices.

- **Endpoint devices remain one of the most frequent points of vulnerability in enterprise environments, making it key to find hardware and software solutions that protect endpoint devices from attack.**

Thinking now about your datacenter operations, what do you see as the key priorities for your IT organization in the next 12 months?

Priority	%
Improve datacenter automation and orchestration	27%
Disaster recovery capabilities	29%
Constrained capital budgets	29%
Introduce Big Data and analytics	30%
Increase IT staff productivity	34%
Technology Refresh (server and storage)	34%
Improve security and compliance	40%

Why do organizations opt for thin client solutions?

SECURITY

- Endpoints are one of the most frequent points of vulnerability.
- Data accessed by thin clients is hosted in the cloud, increasing security by preventing critical data from being stored on endpoint devices.
- Thin clients are often driven by a pared down Linux OS, leaving less likelihood for vulnerabilities than with other major OS variants.
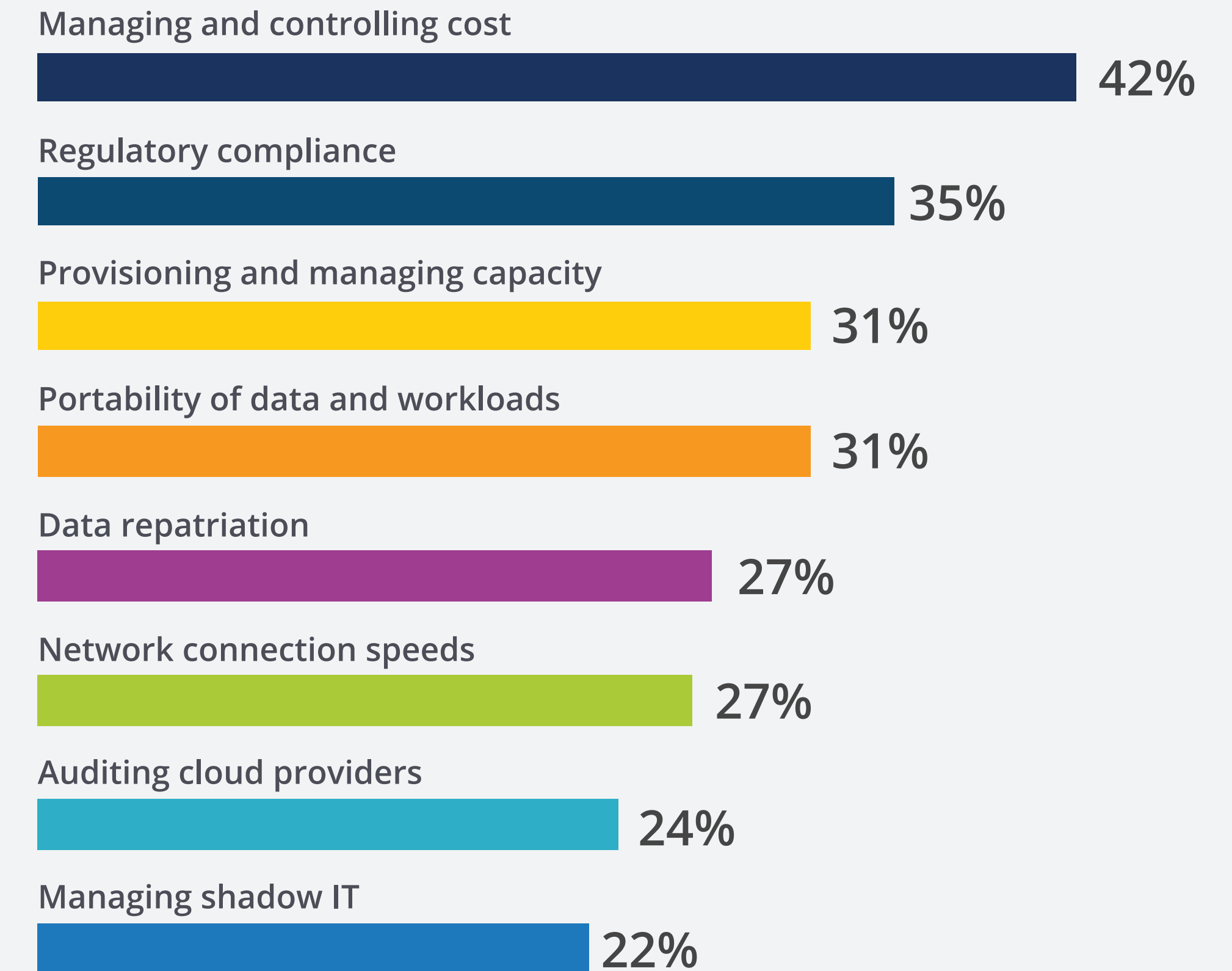
FLEXIBILITY

- Due to size and simplicity, thin clients are easy to deploy and maintain compared with traditional PCs.
- Thin clients can work well with DevOps initiatives due to their small size, configurability, and enablement of cloud-based storage and processing.

COST

- Managing cloud infrastructure costs (including endpoints) is the top European cloud priority in 2018.
- With an average 2017 price just above $320, thin client hardware costs much less than most PCs.
- Linux conversion software enables the repurposing and extension of the life of thin clients, PCs, and laptops.

Thinking about your current infrastructure, what are the most pressing multicloud data management priorities?

Managing and controlling cost **42%**

Regulatory compliance **35%**

Provisioning and managing capacity **31%**

Portability of data and workloads **31%**

Data repatriation **27%**

Network connection speeds **27%**

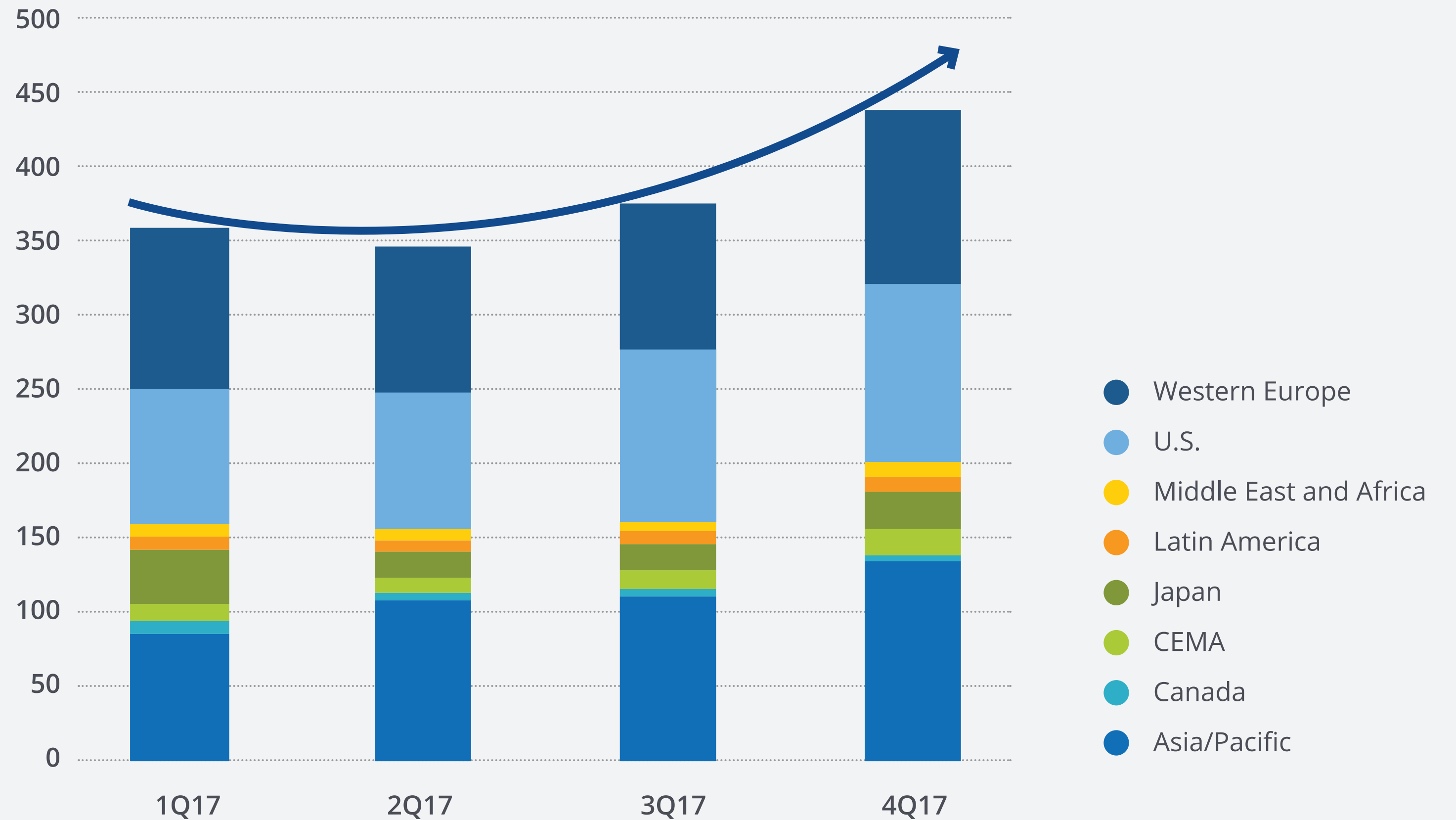Auditing cloud providers **24%**

Managing shadow IT **22%**

Thin clients are experiencing growth at a worldwide level

- **Worldwide thin client revenues grew 22% in 2017 to nearly $450 million, propelled by midmarket vendors issuing software innovations such as modular control over functionalities and automatic OS updates.**

- Organizations in the U.S., Asia/Pacific, and Europe frequently deploy thin clients to benefit from cost savings in managing and maintaining devices.

- Due to regulatory requirements, the healthcare, education, and financial services sectors are primary verticals for thin clients. Thin clients enable easy patching as well as access control.

- Enterprise desktop as a service (DaaS) and client virtualization are becoming commonplace to reduce management complexity and shift IT spend toward opex.
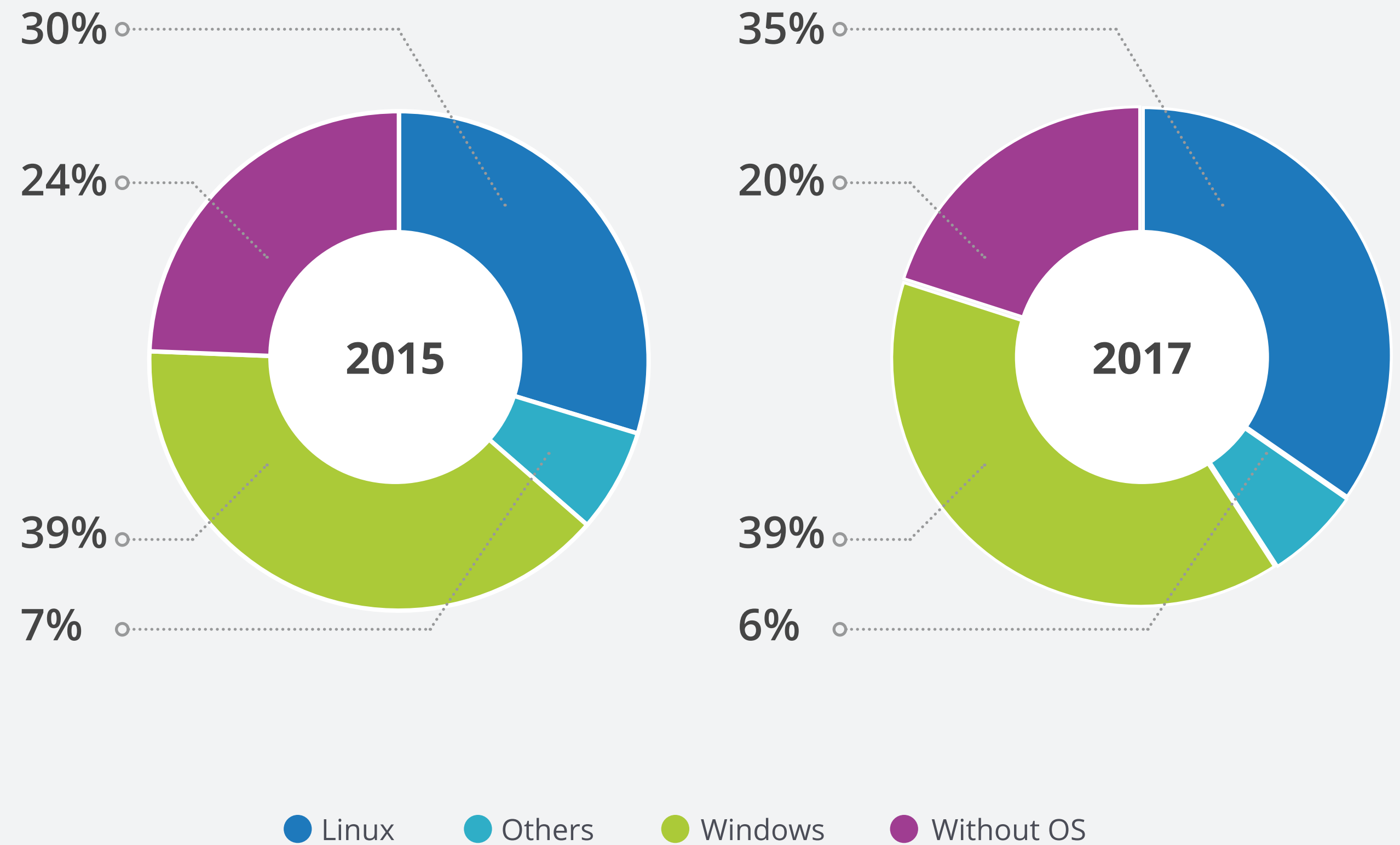
Worldwide endpoint device revenues

$ millions

Legend:
- Western Europe
- U.S.
- Middle East and Africa
- Latin America
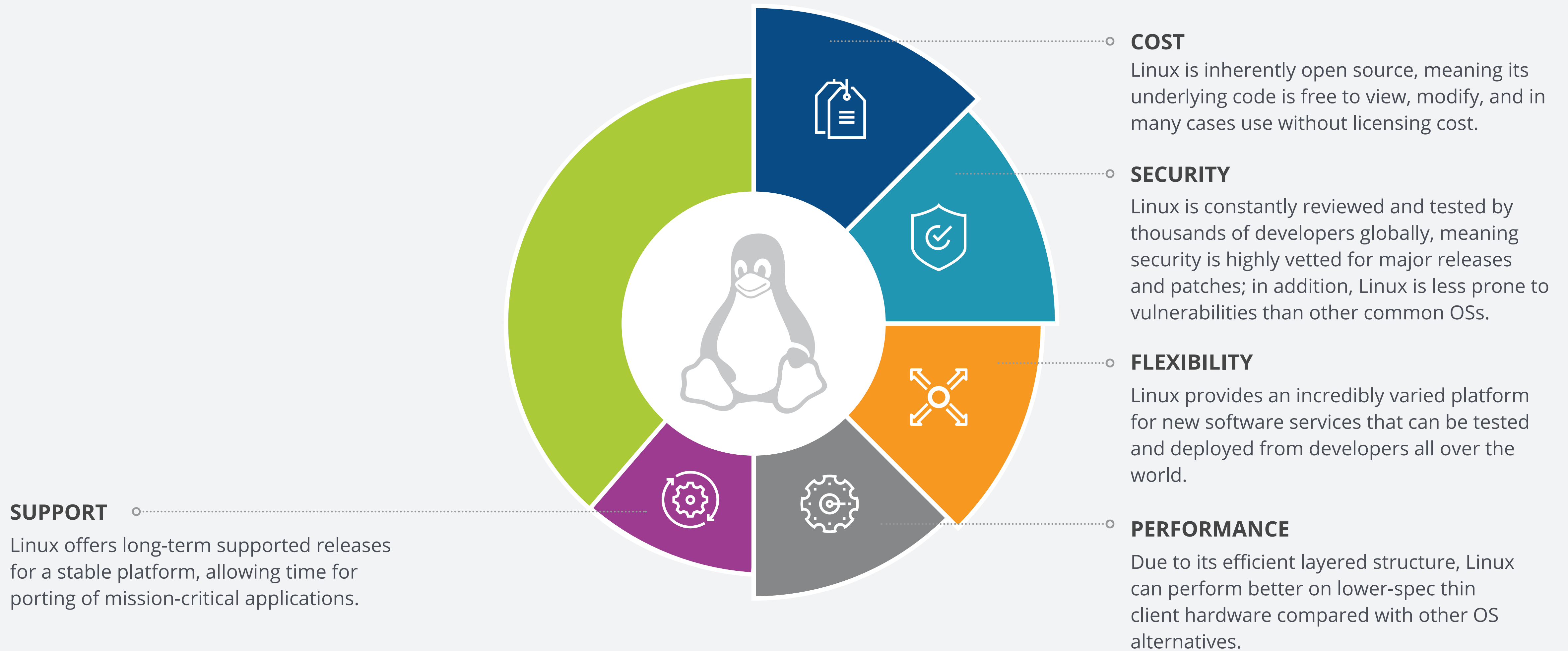- Japan
- CEMA
- Canada
- Asia/Pacific

Linux is the only endpoint OS growing at a global level

- **Shipments of Linux-based endpoint devices have grown at 8% from 2015 to 2017 at a Worldwide level, representing the only endpoint OS segment to experience shipment growth over this period. This does not include software re-purposing licenses sold, which likely would have added to the Linux market share.**

- Linux offers a number of customization, security, and performance benefits compared with many OS alternatives.

- Linux distributions for endpoint devices can be customized to provide direct updates and patches extensively tested for stability by qualified endpoint developers, resulting in greater confidence for up-to-date performance optimization and security.

- The growing demand for Linux-based endpoint devices could lead to the biggest thin client vendors shifting more of their device offerings to Linux.

- The top 3 vendors for Linux OS thin client hardware represented 56% of 2017 global shipments in this category, up from 53% in 2015.

Worldwide endpoint device OS shipment share

2015

- 30%
- 24%
- 39%
- 7%

2017

- 35%
- 20%
- 39%
- 6%

● Linux ● Others ● Windows ● Without OS

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Why is Linux a smart choice for endpoint device OS solutions?

COST

Linux is inherently open source, meaning its underlying code is free to view, modify, and in many cases use without licensing cost.

SECURITY

Linux is constantly reviewed and tested by thousands of developers globally, meaning security is highly vetted for major releases and patches; in addition, Linux is less prone to vulnerabilities than other common OSs.

FLEXIBILITY

Linux provides an incredibly varied platform for new software services that can be tested and deployed from developers all over the world.

PERFORMANCE

Due to its efficient layered structure, Linux can perform better on lower-spec thin client hardware compared with other OS alternatives.

SUPPORT

Linux offers long-term supported releases for a stable platform, allowing time for porting of mission-critical applications.

New Linux initiatives from major global providers

Microsoft Linux

- The world's biggest OS provider will officially provide its own open source Linux platform.
- Developers for the open source Windows Subsystem for Linux (WSL) can contribute to the Windows Store.
- Users can now run a supported Linux Virtual Machine on Windows.
- Microsoft acquired GitHub in May 2018 to play a greater role in the open source community.

January 2018

"As open source software and operating systems become more mainstream in the industry, **Linux distributions are becoming increasingly robust and widely adopted by enterprises.**"

Stephen Turnbull,
Director of Marketing

AMD

"**Increased security and lower licensing costs are two of the primary drivers for Linux growth among** thin client hardware shipments."

Matthew Gray, Director
Cloud Client Software

DELL EMC

"The ability to customize distributions for optimizing performance and security capability, as well as the ongoing growth of cloud computing and IoT devices, have propelled an **increasing number of major providers to formalize major Linux strategies.**"

Alec Gefrides, Transactional Retail, IoTG,
Intel Corp

intel

Intel "Clear Linux"

- Intel's Clear Linux Project is specifically built for cloud and IoT use cases.
- Is designed for use in conjunction with Intel processors for optimized performance in endpoint devices.

May 2018

"**From edge to cloud, Linux is a driving force for innovation.**
Intel is a leading contributor to many open operating systems and is also investing in Clear Linux, a composable and purpose-built OS which utilizes modern development processes to deliver performance and security ideal for a wide range of uses."

Imad Sousou,
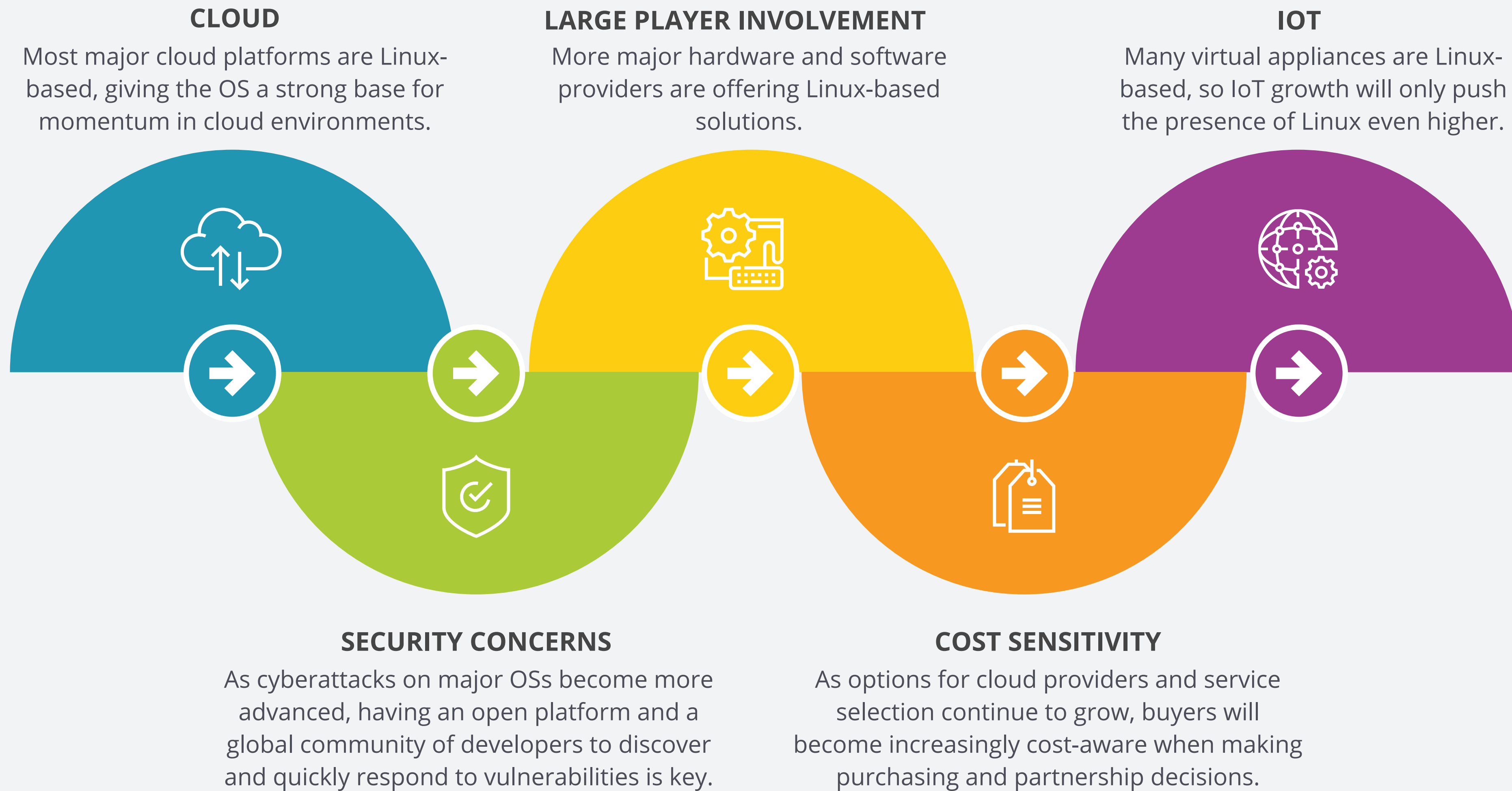Corporate VP and GM

intel

Linux at the center of Amazon Cloud

- Amazon Linux 2 has been made a long-term support (LTS) release, guaranteeing its patch updates and support until 2023.
- Coded to optimize performance when running intensive workloads on Amazon Web Services cloud platform.

January 2018

What trends will continue to propel this Linux momentum?

CLOUD
Most major cloud platforms are Linux-based, giving the OS a strong base for momentum in cloud environments.

LARGE PLAYER INVOLVEMENT
More major hardware and software providers are offering Linux-based solutions.

IOT
Many virtual appliances are Linux-based, so IoT growth will only push the presence of Linux even higher.

SECURITY CONCERNS
As cyberattacks on major OSs become more advanced, having an open platform and a global community of developers to discover and quickly respond to vulnerabilities is key.

COST SENSITIVITY
As options for cloud providers and service selection continue to grow, buyers will become increasingly cost-aware when making purchasing and partnership decisions.

Essential guidance for buyers

LINUX IS A GROWTH SEGMENT →
The Linux community is rapidly growing among enterprises and SMBs alike — as this continues, the number of open source software options, security, and culture of acceptance will continue to improve.

CULTURE CHANGE →
Organizations in all industries are aiming to become more agile — Linux can foster a collaborative and innovative culture between lines of businesses, helping to establish an agile workplace.

COST SAVINGS →
The cost savings from utilizing Linux on thin clients and other endpoint devices could be significant, due to significantly lower licensing fees as well as lower maintenance costs.

ENTERPRISE MOMENTUM →
Keep an eye on major providers such as Microsoft becoming involved in the Linux space, which will make enterprises more comfortable with deploying Linux-based solutions and continue to push overall adoption.