



# ICT MARKET INSIGHTS

## Server Market Continues to Evolve: Part 1: Cloud, Virtualization & Containerization

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# Server Market Continues to Evolve

## Part 1: Cloud, Virtualization, and Containerization

This IPR Research Note reflects the synthesis of various IPR-researched and modeled data that were deemed relevant to the assessment of recent topical market and vendor trends driving the evolution of technology adoption and related Server market deployments.

**Source: IPR research, analysis, modeling, market estimates, and vendor estimates as of August 1, 2018**

### ICT MARKET INSIGHTS

Over the 2014-2017 period, the Server market experienced significant growth in overall shipments and end-user spending; installed base of Public and Private Cloud deployments; hypervisor-based virtualized Server deployments; open source software-based infrastructure adoption and share gain; and more recently, container-based virtualized Server deployments. By the end of the short period the Server industry structure and vendor ecosystem were notably disrupted by startups in several key areas, in what appeared to be more like a revolution than an evolution.

After completing our research, analysis, and estimates, IPR took a retrospective look at the Server market and vendor dynamics in each of the key areas above, as well as other related ones. We evaluated the trends in the estimates along with the strategic maneuvering of the various players within the ICT-Server ecosystem over the period, both established ones and startups, to further assess what substantial ongoing impacts the profound and disruptive changes in the industry structure will likely have as other new related technologies emerge to cause disruption in the Server or other ICT markets.

Interestingly, the magnitudes of the observed trends and disruptions over the period were largely unexpected, as although the technology evolution may have been anticipated in most cases, the disruptive nature of the



revolutionary startups and exponential interaction of several technologies on the ecosystem was not!!

## Cloud

Worldwide Server installed base levels reached about 57 million units in 2017, following Server shipment growth of about 7% y/y. The increase in the Server installed base over the past few years has been driven by Cloud Service Providers, Telcos, Enterprises, and Governments seeking to implement widespread digital transformation solutions, moving to hybrid and multi-cloud strategies for Cloud adoption, implementing SDN/NFV infrastructure, deploying next generation workloads, and implementing specialized edge-fog computing servers along with related security hardware to support IoT deployment infrastructure requirements.

Together, the Cloud Service Provider (CSP) and Enterprise Private Cloud (EPC) Server installed base increased to 23 million in 2017, equivalent to 40% of the total worldwide Server installed base. From 2014-2017, the CAGR of the total Cloud Server installed base exhibited growth over 20%. At the same time, the total Enterprise Server installed base declined each year, resulting in a CAGR of about -8%.

In 2017, CSPs continued to drive overall Server shipment and installed base growth, with hyperscale leaders Amazon, Google, Facebook, Alibaba, and Tencent continuing to ramp their capex spending to fund Cloud data center updates, regional expansions, AI compute infrastructure deployments, and monetization of Cloud Digital Services such as Digital Advertising, eCommerce, and Digital Media/Video. Further, the capex spending binge appears to have continued into 2018, leading to accelerating y/y growth in 1Q18 with Amazon, Google, Microsoft, and Facebook collectively reporting total capex growth above 115%.

## Virtualization (Hypervisor-based)

Servers running hypervisor-based virtualization software increased to approximately 19 million in 2017, equivalent to 33-34% of the worldwide



Server installed base. The significant increase in hybrid Cloud adoption, accelerating demand for hyper-converged integrated systems (HCIS), and the ramp in growth of software-defined data center (SDDC) infrastructure have combined to fuel the Server virtualization market over the past several years.

In Figure-1 below, we show our current estimates for Server installed base by Cloud deployment and Virtualization type. The data illustrates that the percentage of Servers running hypervisor-based virtualization software varies significantly by Cloud deployment type. Enterprise Private Cloud Servers show the highest level of adoption at about 84%, while CSP Servers show significantly lower adoption of about 39%, with Enterprise Non-Cloud Servers remaining relatively low at 25%.

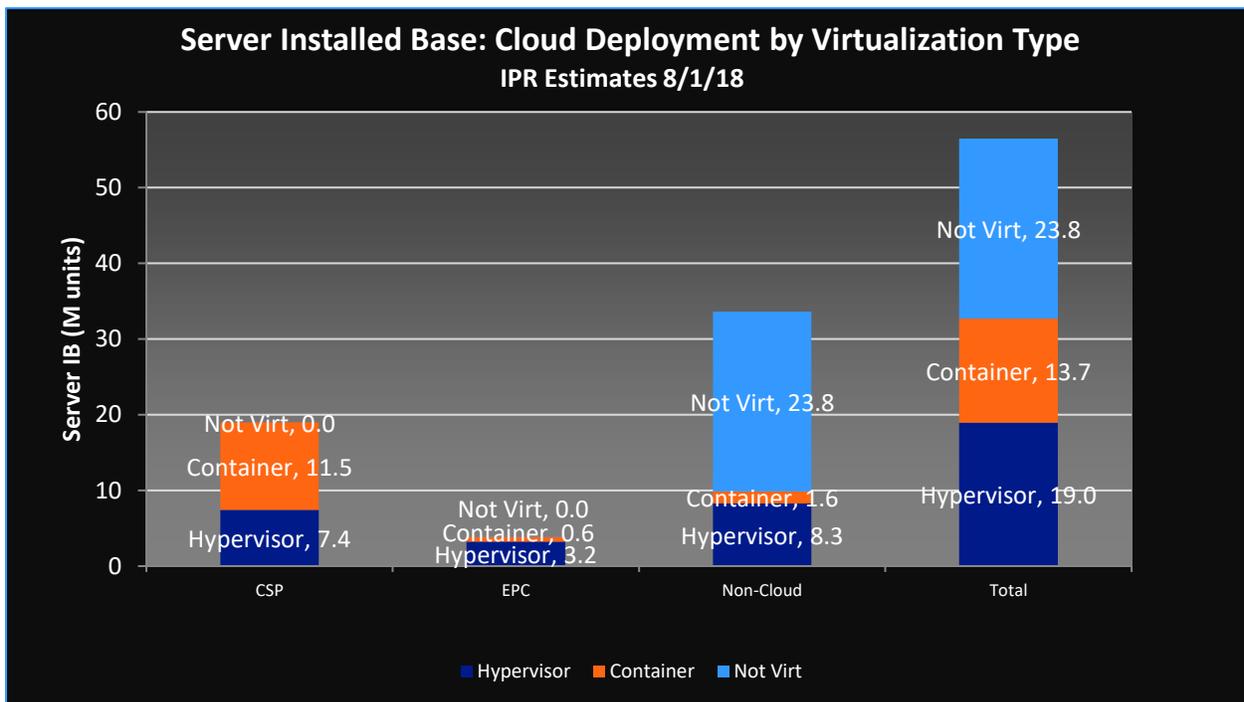


Figure-1

In Figure-2 below, we provide a drill-down of the Server installed base running hypervisor-based Virtualization software by major Vendor, for each Cloud deployment.

VMware (vSphere ESX/ESXi) continues to dominate the overall Enterprise Server hypervisor-based virtualization landscape with a market share in the 69-74% range, but challengers like Microsoft (Hyper-V), with market share in the 18-23% range, and open source solutions from Citrix (Xen) and Red Hat (KVM), which provide competitive features for consolidation and virtual infrastructure management, holding market share in the 4-9% range.

Meanwhile, the CSP Server hypervisor-based virtualization software market shares are diametrically opposed to those of the Enterprise Server market. The dominant market share is held by open source solutions (AWS mainly uses Xen, Google uses KVM), with share in the 92-95% range. The VMware share for CSP Servers is in the 2-5% range, while the Microsoft share is in the 1-3% range.

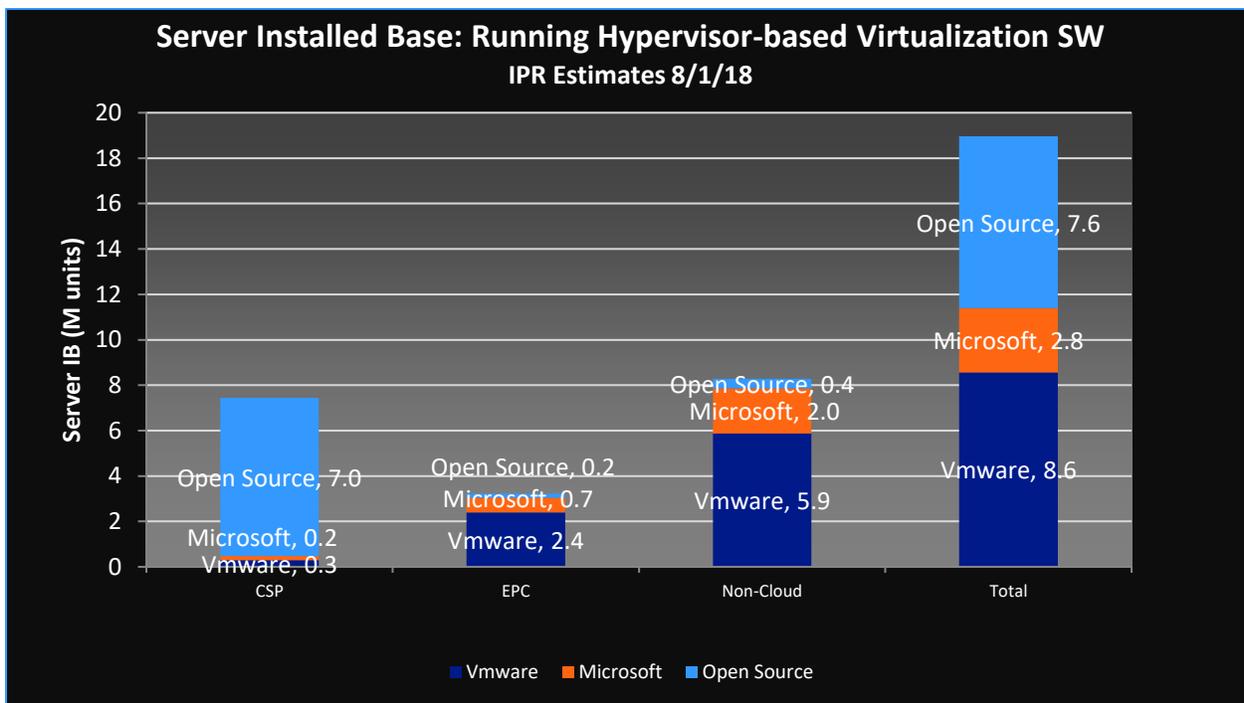


Figure-2

Over the past couple of years, there have been several signals indicating that the traditional Server hypervisor-based virtualization market may have already peaked, as the growth in adoption of containers and Container-as-a Service (CaaS) offerings to virtualize Servers has accelerated. For the time



being, however, most containerized infrastructure deployments will likely be on virtual machines, so Servers running hypervisor-based virtualization will likely continue to be a prominent technology in many Enterprise data centers for years to come.

## Containerization (Operating-System Level Virtualization)

The pace of both Enterprise and CSP container adoption has accelerated in a rapid manner over the past three years, after Docker released its initial product in June 2014. Meanwhile, Google has been deploying open source KVM hypervisor-based containers for more than 14 years. Container-based Server virtualization has proven to be a better way of developing and deploying new applications than virtual machine technology, particularly within the Infrastructure-as-a-Service (IaaS) space.

The major benefits of container-based virtualization technologies cited by end-users include ease/speed of managing deployments, lower perceived overhead than VMs, greater density than VMs on the same host, increased developer efficiency, support of microservices architectures, and enablement of applications to run on multiple cloud platforms. The continued rise of DevOps and evolution of microservices, coupled with the progress achieved in container orchestration (e.g., Kubernetes) and automation infrastructure technologies, will likely support continued significant Enterprise and CSP container adoption over the next several years.

As shown in Figure-1 above, Servers deploying container-based virtualization software increased significantly in 2017 to approximately 14 million, equivalent to 24-25% of the worldwide Server installed base. In the CSP space, the container-based Server virtualization percentage is now in the 59-61% range, while the percentage has skyrocketed to constitute about 15-17% of the total EPC Server market.

By 2017, driven in large part by the ecosystem disruption caused by the rapid adoption by CSPs and Enterprises of open source software and related infrastructure technologies for Cloud, Virtualization, and Containerization deployments usually developed by innovative startup players, the open source market share of Servers increased almost 20 percentage points to 38-40%, from 18-20% in 2014.



## Patterns of Disruption

IPR believes that there are meaningful parallels to be drawn by studying the dynamics of the Server market technology deployment evolution in conjunction with the strategic maneuvering of innovative players in the ecosystem to try to identify if there are observable patterns of disruption. Similar innovative disruption gambits and patterns will likely pertain to other ICT areas of emerging technology and ecosystem evolution such as SDDC/SDN infrastructure and software, AI infrastructure and software, IoT Platforms, Edge-Fog Computing, etc. We plan to expand our research in these areas, perform relevant analytics, and conduct advanced modeling to identify, characterize, and assess any likely parallels in a Part 2 volume related to Server Market Evolution that will follow this research note in the future.

### IPR Research Notes

IPR Research Notes, ICT Market Insights are generally brief, and often preliminary, studies concerning topical ICT ecosystem drivers or markets. IPR's research notes provide data, information, and analysis spotlighting new, unexpected, or unexplained observed trends that appear to contribute new insights which can lead to differences in thinking, decision-making, or actions.

### About IPR

IPR is a specialized analytic consulting firm who has consistently been trusted as a strategic partner in the technology market intelligence and competitive intelligence ecosystem for 40 years. Our core focus is on custom consulting engagements for technology clients that focus on ICT markets, technology, competitors and suppliers, end-user demand drivers, innovation, and market disruption. We have provided meaningful, actionable insights for most of the leaders of the digital economy by engaging with them to solve complex business performance measurement and strategic planning problems. More than 50 consultants and analysts deliver market insights, opportunity estimates and forecasts, competitive insights, and analytical counsel to our top 500 ICT client organizations in North America, China, Korea, and around the globe. We were founded in 1978 and are headquartered in Waltham, MA in the metro Boston area. Learn more: [www.iprcorp.com](http://www.iprcorp.com)

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