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Problem Solved.

Cost-Effective Virtualization Starts with 10GbE

Solve the problem of increased bandwidth requirements as data centers move to highly virtualized platforms, with 10GbE Intel® Ethernet.

intel inside™ XEON®

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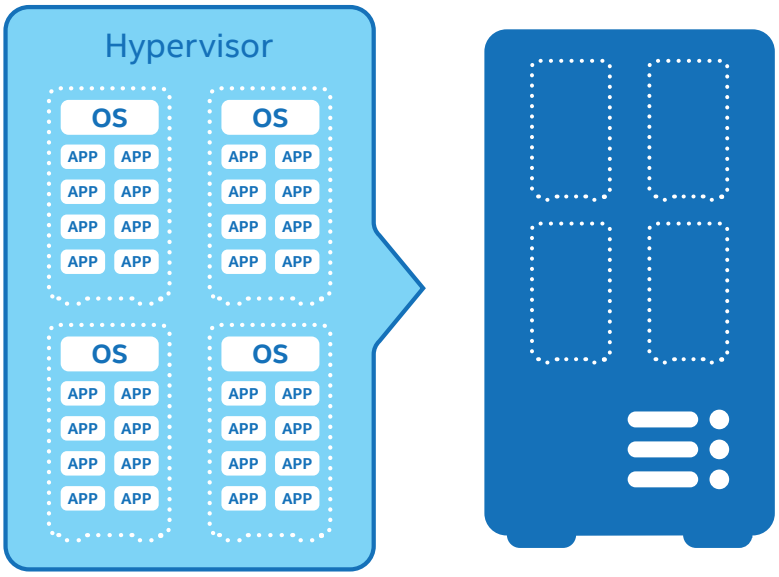
Prior to virtualization, most servers were dedicated to a single application. While this was enough to meet basic business needs a decade ago, organizations are now embracing modern tools like social, mobile, analytics, and cloud computing. Legacy Gigabit infrastructures don't provide the flexibility and scalability needed to support these tools.

The solution is a highly virtualized platform and 10GbE networking. This combination delivers the performance, and many other benefits, that organizations are looking for right now to maintain their competitive edge. In fact, a recent survey shows that more than half of IT professionals say they need 10GbE to support virtualization and private cloud deployments.[1] This is your opportunity to solve your customers' growing virtualization needs with a 10GbE solution.

Virtualization: A High-Level Overview

For customers that haven't been formally introduced to the concept of virtualization, it will help to provide a high-level overview. A bare metal server will typically run a single dedicated operating system (OS) and multiple applications. In contrast, servers that have been virtualized will run a single hypervisor that controls multiple virtual machines (VM), which are simulated server environments. Each VM has exactly one OS and supports multiple applications.



A virtualized server with a single hypervisor and multiple VMs.
Each VM runs its own single OS and multiple apps.

The primary benefit of virtualization is that customers can run multiple VMs per physical server. For example, the typical modern configuration based on the Intel® Xeon® processor E5-2600 v3 product family and a 10GbE network can support up to 95 VMs.[2] That's 95 separate instances, each running their own OS and applications, on a single physical server.

Making the Case for Virtualization

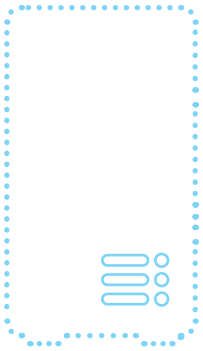
The benefits described below are just a few of many ways that virtualization can expand data center capabilities and lead to rewarding business outcomes.

Consolidation

Traditional bare metal servers with a single OS are typically built with extra capacity to handle growth and peaks. Virtualization, however, enables servers to make full use of that capacity so nothing goes to waste. IT managers can dynamically assign greater or fewer resources as workloads fluctuate. They can also run a different OS per VM in instances where one business unit may need to run Windows*-only applications while another business unit needs to run Linux*-only applications.

Faster Provisioning
Intel IT constructed their own private cloud based on a highly virtualized foundation and discovered that virtualization enabled them to dramatically reduce the time to provision new infrastructure and services to their business units:

Before virtualization of servers: **90** days

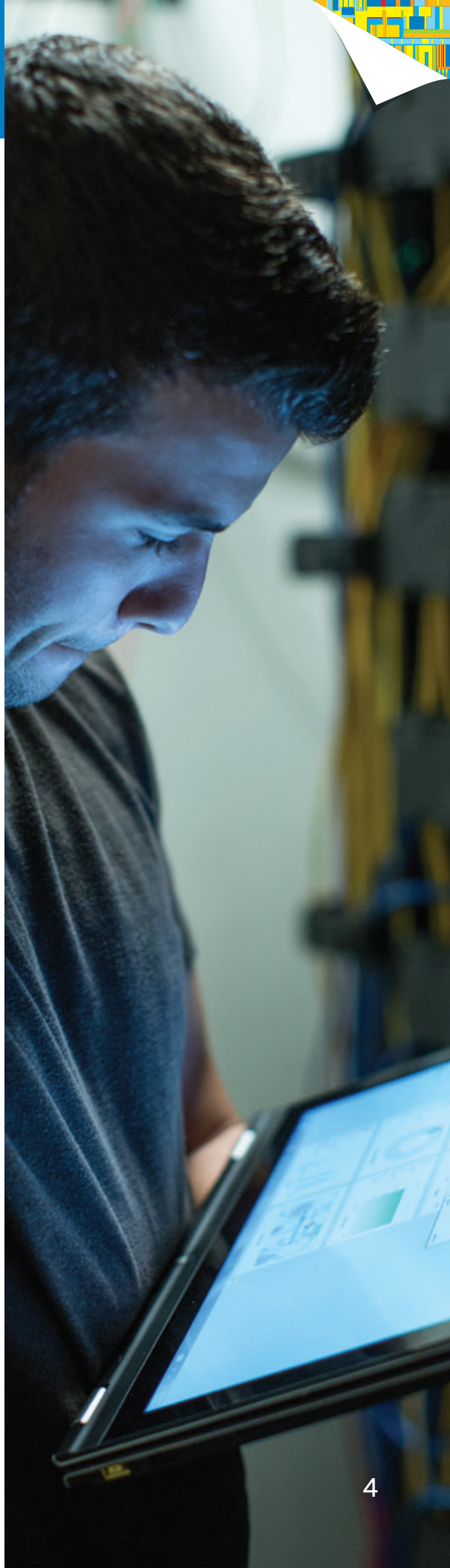


After virtualization of servers: **14** days

Result:
84% reduced time to provision[3]

Virtualization enables customers to react to changing external conditions and implement new ideas with greater business agility. And the efficiency gains become even more dramatic after deploying a private cloud: Intel IT was able to further reduce their time to provision down to 45 minutes with a private cloud infrastructure.[3]

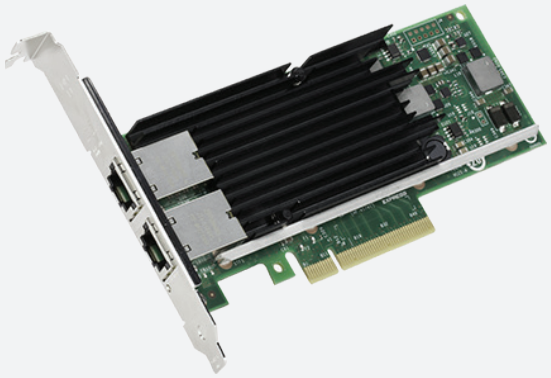
Support for the Cloud
Virtualization is the underpinning for successful private and hybrid cloud deployments. As customers look to the cloud to maintain their competitive edge and fuel new business intelligence tools such as analytics, they will need guidance to help them develop a strong, virtualized foundation. This creates an even greater opportunity to provide infrastructure upgrades, software packages, and managed services.



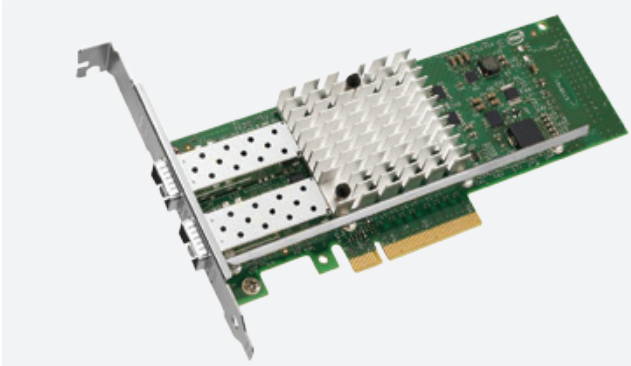
To clarify, virtualization is a prerequisite to cloud computing in general. Virtualization abstracts compute resources in the form of VMs, and the cloud determines how to allocate and deliver those resources. Virtualization empowers cloud users to manage their data, move their data in and out of the cloud, and run cloud-based applications more efficiently.

The Need for 10GbE Speed

More VMs running on each physical server will increase network traffic, so highly virtualized platforms will require higher levels of bandwidth to stay responsive and efficient. For this reason, legacy Gigabit infrastructures fall short of delivering the performance necessary to support virtualization, and may lead to I/O bottlenecks. 10GbE Intel® Ethernet Converged Network Adapters are the missing puzzle piece to a successful virtualization formula.



Intel® Ethernet Converged Network Adapter X540
10GBASE-T uses common CAT6/6A cabling for easy, cost-effective migration to 10GbE to prepare for virtualization deployment.



Intel® Ethernet Converged Network Adapter X520
For more advanced and higher throughput virtualization uses, 10GbE SFP+ connectivity provides ultimate flexibility and scalability.

Not only does 10GbE deliver the much-needed bandwidth to support virtualization, but it enables customers to reduce their switch ports and cabling by consolidating multiple Gigabit connections into a single 10GbE connection. This simpler setup also affords less chance for error and greater savings to your customers' bottom line.

Accelerating VM Migration

10GbE also supports faster VM migration across physical servers. VM migration is simply the practice of moving an actively running VM to a new physical server without interrupting operation of the VM or impacting the experience for the end-user. Fast VM migration is important for ensuring uptime and meeting quality of service or service level agreement requirements. Demonstrations have shown that VM migration can perform up to 10 times faster on a 10GbE network compared to a legacy Gigabit infrastructure.[4]

Support for Virtualization Built-In

To further enhance virtualization, 10GbE Intel® Ethernet Converged Network Adapters feature built-in hardware optimizations and Intel® Virtualization Technology for Connectivity (Intel® VT-c), which helps reduce data bottlenecks and improve overall server performance. Other key components of Intel® Virtualization Technology include the following:

- **Virtual Machine Device Queues (VMDq)** offload the hypervisor's virtual switch from the tedious task of sorting incoming packets belonging to each of the multiple VMs.

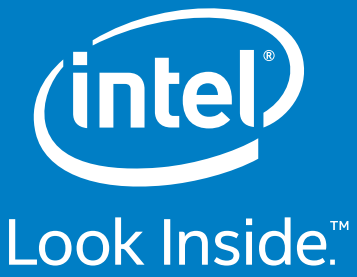
- **PCI-SIG Single Root I/O Virtualization (SR-IOV)** enables IT administrators to isolate and assign virtual ports to VMs directly. Direct assignment, supported by Intel® VT-d technology, offloads the hypervisor from the burden of address recalculations, providing an extra boost in performance.

Create Future Opportunities with 10GbE

Where there's thunder, there's lightning. Customers are looking to embrace virtualization and 10GbE is sure to follow. 10GbE Intel® Ethernet empowers data centers to handle the increased bandwidth requirements of highly virtualized platforms, while saving your customers from the increased cost of server complexity. 10GbE also opens up the path to the cloud, and leads to even more opportunities down the road to offer infrastructure upgrades and managed services.

Help your customers plan & deploy a 10GbE solution today. Intel® Ethernet. It just works.

Learn more at www.intel.com/go/10gbe



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Intel® technologies may require enabled hardware, specific software, or services activation. Performance varies depending on system configuration. No computer system can be absolutely secure. Check with your system manufacturer or retailer or learn more at www.intel.com.

1. "Market Pulse: 10GbE Adoption" survey conducted by IDG Research Services on behalf of Intel, March 2014. 10GbE Survey Methodology: The goal of this research was to determine the extent to which organizations are have deployed, or plan to deploy, 10 Gigabit Ethernet (10GbE), as well as the adoption drivers, specific products/vendors in use, and potential benefits organizations have experienced or expect as a result of deploying 10GbE. Survey Duration: March 3-13, 2014. Audience Profile: InfoWorld and NetworkWorld readership. Qualifier: Have deployed or plan to deploy 10GbE. Respondent Characteristics: 183 qualified respondents; Titles: 63% IT/Network Management, 29% IT/Network Staff; Company Size: 26% 10,000+ employees, 26% less than 500 employees.

2. "Intel® Xeon® Processor E5-2600 v3 Product Family Virtualization Benchmark Performance." Intel, 2014. Configuration: HP ProLiant* DL360 Gen9 with two Intel® Xeon® processor E5-2699 v3, SPECvirt_sc2013 1614 @ 95 VMs. For more information, visit:
http://www.intel.com/content/www/us/en/benchmarks/server/xeon-e5-2600-v3/xeon-e5-2600-v3-specvirt-sc2013.html

3. "Best Practices for Building an Enterprise Private Cloud." Intel, 2011.
http://www.intel.com/content/dam/www/public/us/en/documents/white-papers/enterprise-private-cloud-paper.pdf

4. "VMware vSphere® vMotion® Architecture, Performance and Best Practices in VMware vSphere® 5." VMware, 2011.
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