



White Paper

Reviewing the Hyperconverged Market and Lenovo's Portfolio of Nutanix-Based Hyperconverged, Hybrid Cloud Solutions

Sponsored by: Lenovo

Eric Sheppard
September 2017

EXECUTIVE SUMMARY

Today's enterprise datacenter can be one of the most complex business environments with dozens (for smaller businesses), hundreds (for larger and midsize businesses), and even thousands (for hyperscale businesses) of servers that must be managed and monitored. At the hyperscale level, just being able to manage the cords can be a challenge – let alone keeping up with the growing need for more agility and scalability within the datacenter. Simply put, companies are aggressively looking for less complexity and more agility from their datacenter infrastructure. Hyperconverged/hybrid cloud solutions deliver simplicity in spades with their plug-and-play setup and their ability to deploy workloads faster than traditional servers, storage, and virtualization. Furthermore, extending the reach of hyperconverged/hybrid cloud building blocks as infrastructure that seamlessly links to the public cloud for backup and disaster recovery, the Nutanix-based Lenovo offering taps a virtually endless resource pool. Combining both hyperconverged infrastructure (HCI) and hybrid cloud, Lenovo is well positioned with its ThinkAgile portfolio of appliance and rack-scale offerings, both of which leverage Nutanix's market-leading Enterprise Cloud Platform software.

What Is Hyperconverged?

Hyperconverged systems are an emerging breed of solutions that natively collapse core storage, compute, storage networking, and virtualization functions into a single software solution or appliance. This is in contrast to traditional integrated platforms and systems in which autonomous compute, storage, networking, and virtualization systems are integrated at the factory by the vendor or by resellers. In addition to integrating storage and compute functions into a single node (or a cluster of nodes, each with compute and storage functions), all hyperconverged systems employ:

- A distributed file system or an object store that serves as the data organization, management, and access platform
- A hypervisor that provides workload adjacency, management, and containerization in addition to providing the hardware abstraction layer (Further, the hypervisor hosts essential management software needed to manage the platform and is also used to bootstrap the server hardware.)
- An (optional) Ethernet switch to provide scale-out and/or high-availability capabilities (However, switching and/or networking is used not to bridge the compute and storage layers but to provide high-availability and resiliency capabilities to the storage and computing stacks.)

The hyperconverged infrastructure market segment integrates a collection of technologies that span the functional areas of storage, computing, networking, hypervisor-based virtualization, containers, and infrastructure management. IDC believes the market for hyperconverged infrastructure has moved past its early market phase and is now being leveraged by a large number of organizations for a wide range of uses. In fact, global spending on HCI was more than \$2 billion in 2016 and is set to surpass \$7.6 billion by the end of 2021. This striking growth is happening because a large and growing number of companies are deploying HCI solutions to run a mix of workloads, including those that are deemed mission critical.

Hyperconverged solutions have become platforms for hybrid cloud environments. As such, there are multiple references to hybrid clouds throughout this document. IDC defines a hybrid cloud as an IT deployment model that combines traditional IT, private, and public cloud resources. They offer a wide choice of application environments with a seemingly limitless pool for compute, network, and storage resources. Hybrid cloud adoption is, in part, driven by the desire to seamlessly move applications to the optimal environment as needs of that application change.

Market Trends

Hyperconverged systems offer advantages including simplicity, lower administration costs, and reduced vendor involvement. This technology sits in the middle of a confluence of trends that will continue to provide the hyperconverged market with momentum, including:

- **Continued rapid growth of investment in the software-defined datacenter.** Hyperconverged infrastructure is positioned well to ride the current wave of software-defined infrastructure. IDC defines software-defined infrastructure as platforms that deliver the full suite of compute, storage, or networking services via a software stack that uses (but does not depend upon) industry-standard x86 hardware built with off-the-shelf components. The modular nature of hyperconverged will find significant traction with organizations choosing to walk the software-defined path.
- **Adoption in the public sector.** While hyperconverged systems are making an impact on many different private sector industries, including financial, retail, and transportation, it is within the public sector where the impact of hyperconverged may receive the strongest embrace. The benefits of hyperconverged systems play well within the state and local government and education (often called "SLED") market. Many hyperconverged vendors have also made inroads with large deals within the Department of Defense and universities. The appeal is obvious as government agencies and universities must handle a large variety of workloads while often dealing with very limited IT budgets.
- **Scale-out workloads will continue to be an IT driver.** In a recent IDC survey of 250 IT managers and executives, respondents indicated that they expect double-digit growth in scale-out workloads over the next 24 months. In essence, hyperconverged/hybrid cloud systems are modular systems built with scale-out workloads in mind.
- **The need for optimization for 3rd Platform workloads is growing.** 3rd Platform workloads such as Internet of Things, mobility, and cloud are driving an explosion of data. As a result, the need for new infrastructure hardware optimized for the 3rd Platform is growing rapidly. This growth in 3rd Platform workloads presents an opportunity for hardware vendors to provide technology that is specially designed to handle the rigors of big data, analytics, private/public cloud, and virtualization as well as emerging IT workloads and technologies such as DevOps and containers.

Use Cases

While the trends mentioned previously are driving companies to consider hyperconverged/hybrid cloud systems, the benefits to the line-of-business (LOB) users are even more pronounced and often serve as an even stronger catalyst for consideration and purchase of these systems (see Figure 1):

- **Simple deployment and rapid scalability.** Operational simplicity is one of the most common drivers of hyperconverged adoption, primarily because hyperconverged solutions eliminate low-value tasks related to infrastructure deployment and management. Hyperconverged eliminates the up-front design and integration work necessary for large infrastructure deployments and allows IT teams to quickly scale infrastructure resources without the need for complex forklift upgrades.
- **Simple and lower-cost remote office/branch office (ROBO) solutions.** Remote offices and branch offices, like retail stores, bank branches, or manufacturing plants, play a crucial role in company operations and often have specialized IT infrastructure needs and challenges. The locations, though geographically distributed, often must be managed with little to no specialized IT support. Hyperconverged systems are well suited for this market because they present IT managers with a lower-cost solution that can be managed by IT generalists rather than infrastructure specialists.
- **Highly available and redundant clusters that lower risks.** As enterprise-level applications such as ERP, CRM, email, collaboration, and other database-driven workloads grow in complexity, managing the risk of data loss and/or disaster becomes even more important. With legacy infrastructure, the data backup and disaster recovery process can be complicated and time consuming at best and completely ineffective at worst. Hyperconverged/hybrid cloud systems offer high availability and redundancy because of their multinode and multisite deployment capabilities.

FIGURE 1

Use Cases for Hyperconverged/Hybrid Cloud



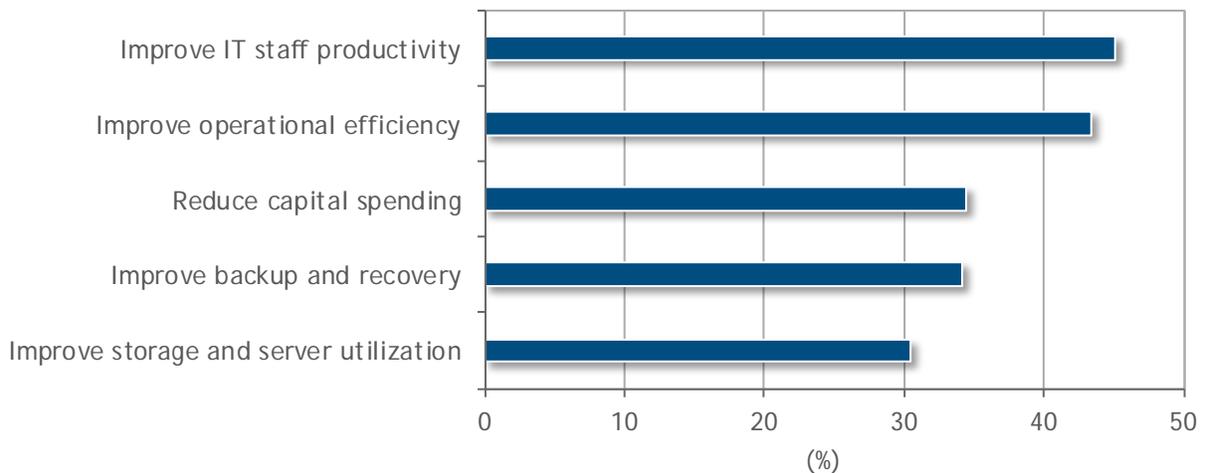
Source: IDC, 2016

Why Hyperconverged Versus Other Options?

Hyperconverged systems are part of the new thinking regarding datacenter infrastructure technology. Looking for ways to balance increased demand with fewer resources, CIOs are aggressively turning to new technologies like hyperconverged infrastructure to achieve new levels of operational simplicity within the datacenter. IDC surveys tell us that staff productivity and operation efficiency are the most common reasons IT departments deploy hyperconverged (see Figure 2).

FIGURE 2

Top Drivers of HCI Adoption



n = 302

Source: IDC's *HCI Survey*, November 2016

Hyperconverged/hybrid cloud solutions present today's CIOs with several key advantages over traditional IT infrastructure, including:

- **Lower capex.** Hyperconverged systems combine servers and storage hardware into one single solution, reducing the number of overall physical systems (both servers and storage) that must be purchased upon first deployment. Hyperconverged systems are often built with "industry standard" hardware, further reducing their initial purchase costs. Finally, customers can realize additional saving at the time of purchase because hyperconverged systems greatly reduce the costs and complexity around deployment and systems integration; most systems can be deployed in less than two hours with hyperconverged systems, as opposed to weeks and often months with traditional IT hardware.
- **IT productivity and improved efficiency of datacenter processes.** With traditional IT, staff productivity is stunted by the heavy daily environment management needs. With hyperconverged systems, IT staff are freed from the obligation of daily management of application-related tasks. A new virtual machine (VM), for example, can be provisioned in minutes with hyperconverged systems as opposed to hours with traditional IT hardware/software. In turn, IT staff can spend more time exploring new ways to support the business and innovate new tools/techniques.

- **Long-term opex savings.** Hyperconverged systems allow for system cluster management at the hypervisor level, allowing IT administrators to handle more virtual machines than with traditional shared storage solutions. This greatly minimizes the day-to-day maintenance needed for a hyperconverged system. It also reduces the need for employees with specialized storage skills. Also, some hyperconverged systems allow for the use of APIs, which reduces the amount of administrative work required to maintain the system. With some hyperconverged systems, the time needed to manage storage can shrink from one to two hours per day to one to two hours per month. As a result, companies can realize long-term operational savings.

Hyperconverged Competitive Dynamics

As noted previously, the hyperconverged landscape is rapidly expanding. A few overarching trends are shaping the competitive landscape for hyperconverged solutions:

- **Wave of bigger generalists.** For years, start-up companies had this market to themselves. Over the past two years, however, some of the biggest names in the technology market have introduced hyperconverged offerings by either internal development or strategic partnership.
- **Growth in hyperconverged software deployments.** The vendor landscape in this market has coalesced around two deployment strategies: appliance and software subscriptions. Software-only subscriptions promise customers more hardware flexibility, allowing customers to modify their systems for greater storage or enhanced performance. Appliance solutions simplify the deployment for the customer by pre-integrating and delivering the infrastructure as a turnkey implementation. Some vendors have the ability to offer both options to their customers.
- **Evolving strategic partnerships.** The hyperconverged market at its core is about bringing together traditional infrastructure (server, storage, networking, virtualization, etc.) into one single package. Some technology suppliers have joined forces to offer a complete hyperconverged solution. These partnerships tend to combine hardware, software, and support in one of two ways; a true OEM arrangement that fully integrates hardware and software in the factory or a certification exercise that provides VARs (or users) with a certification matrix to use when building out an HCI solution in a do-it-yourself (DIY) fashion. Both types of partnerships provide important value, though the latter may leave users with a reduced level of support.

Why Lenovo? Lenovo/Nutanix Differentiation Factors

Lenovo and Nutanix have partnered together since 2015 to codevelop best-in-breed Lenovo-branded hyperconverged/hybrid cloud appliances. These appliances combine Lenovo and Nutanix intellectual property (IP) and offer a suite of fully integrated hyperconverged solutions that allow organizations to drive the agility and scalability of public clouds within their own datacenter environments. Seamless support is also provided as a critical part of these solutions. Lenovo's Nutanix-based hyperconverged/hybrid cloud portfolio is a part of the Lenovo's broader ThinkAgile family of integrated solutions. The ThinkAgile brand represents software-defined solutions that focus on providing simplicity, agility, and a transformative end-to-end experience. For example, ThinkAgile solutions are fully integrated with many steps automated in manufacturing for a more predictable, error-free customer experience that can drive faster time to market. They also come with Lenovo ThinkAgile Advantage services and support. The hyperconverged/hybrid cloud appliances featuring Intel Xeon CPUs in Lenovo's ThinkAgile portfolio include:

- **ThinkAgile HX1000 Series:** The 1U 1-node Lenovo HX1000 Series appliance is engineered for light to medium workloads (business applications and VDI) and optimized for remote office/branch office environments.
- **ThinkAgile HX2000 Series:** Lenovo HX2000 Series appliances are available in 1U 1-node and 2U 4-node form factors and are engineered with small and medium-sized businesses (SMBs) in mind.
- **ThinkAgile HX3000 Series:** Lenovo HX3000 Series appliances are available in 1U 1-node, 2U 1-node, and 2U 4-node form factors. All HX3000 Series models are engineered for compute-heavy workloads (enterprise applications and VDI) and offer rack-dense and GPU models.
- **ThinkAgile HX5000 Series:** The 2U 1-node Lenovo HX5000 Series appliances are engineered for storage-heavy workloads (big data and enterprise applications) and offer a high-capacity model.
- **ThinkAgile HX7000 Series:** The 2U 1-node Lenovo HX7000 Series appliance is engineered for high-performance workloads (enterprise applications and databases) and optimized for I/O-intensive operation.

These HX appliances offer end users a couple of potentially powerful points of differentiation:

- **Added value of Lenovo XClarity.** Lenovo's new centralized resource management software allows IT managers to automate a number of lower-level tasks, including hardware discovery, hardware inventory status, and firmware updates. This capability, along with a dashboard-driven interface, allows IT staff to spend less time running/managing their IT and more time innovating and improving their business.
- **Versatile hypervisor support.** As the amount of data these hyperconverged systems handle continues to grow, the role of the hypervisor becomes increasingly important. The new line of Lenovo-branded hyperconverged appliances integrate seamlessly with the KVM-based AHV, which is built into the Nutanix software at no additional charge. The ability to leverage AHV, which is included within the Acropolis operating system, presents end users with the flexibility to forgo more expensive hypervisors if they choose. Lenovo hyperconverged appliances also integrate with VMware ESXi and Microsoft Hyper-V hypervisors with the Nutanix software stack.
- **Support from Lenovo ThinkAgile Advantage.** Lenovo ThinkAgile Advantage provides full end-to-end life-cycle management, from deployment onward, and facilitates quick problem determination and minimized downtime. This single point of support from Lenovo allows

customers to have immediate access to a Level 2 Lenovo support technician to avoid the hassle of ongoing management and support.

- **Integration with Prism.** By tightly integrating with Nutanix's Prism management, Lenovo has developed a series of important innovations for its ThinkAgile HX and SXN offerings. These include:
 - **Lenovo's ThinkAgile Network Orchestrator** provides automated network provisioning and dynamic synchronization between the virtual machine layer and the physical switch. ThinkAgile Network Orchestrator is a software on Lenovo's CNOS Ethernet switches that fully integrates with Prism management software so that any changes to the virtual machines impacting the virtual networks will trigger an API call to the physical Lenovo switches which then dynamically (and automatically) reconfigure VLAN settings to accommodate the required changes. Many operations leave unused VLANs configured to reduce ongoing opex and downtime, which can impact security and performance. With ThinkAgile Network Orchestrator, that is not needed. The result is that ThinkAgile Network Orchestrator eliminates human error, reduces the need for scheduled maintenance windows, reduces maintenance/administration time, increases security, improves performance, and enhances overall operational efficiency through reduced dependency on network administrators.
 - **Lenovo ThinkAgile XClarity Integrator for Nutanix**¹ integrates Lenovo XClarity directly into Nutanix Prism management software to provide an administrator with the ability to monitor and manage both the physical and virtual resources from a single pane of glass. Lenovo ThinkAgile XClarity Integrator for Nutanix also automates ThinkAgile HX node discovery and pre-authentication for faster operational insights and a more seamless user experience. Lenovo's proactive platform alerts leverage Lenovo intellectual property and algorithms – above and beyond OS events – to predict failures before they occur. These platform alerts are captured and displayed by the Lenovo ThinkAgile XClarity Integrator for Nutanix application. The customer also gets simplified hardware asset tracking, overall health status, and event management and alerting.

Lenovo customers can leverage ThinkAgile HX Series to create a cluster of fully integrated hyperconverged/hybrid cloud appliances, or the customers can consider Lenovo's complete rack-scale hyperconverged/hybrid cloud solution, ThinkAgile SX for Nutanix (SXN), which leverages the ThinkAgile HX Series as a core building block. All ThinkAgile SXN solutions are integrated, validated, and configured in Lenovo's factories, with over half of onsite steps automated in manufacturing for a faster time to value. Specifically, Lenovo's ThinkAgile SX for Nutanix includes the following elements:

- **ThinkAgile HX Series** hyperconverged/hybrid cloud appliances and software including Nutanix Acropolis OS and Prism Manager for virtual machine and cluster management (Pro or Ultimate)
- **Lenovo ThinkSystem RackSwitch** top-of-rack switches running Cloud Networking Operating System (CNOS) that include ThinkAgile Network Orchestrator
- **Lenovo XClarity** for hardware resource management, monitoring, and alerting (XClarity leverages Lenovo algorithms and IP to capture and display proactive platform alerts, which help customers identify failures before they occur and take actions to move workloads as needed.)

¹ Available in a future release

- **Lenovo ThinkAgile Advantage** for full life-cycle management with a Lenovo single point of support
- **ThinkAgile SXN** systems, which are designed to scale from one to many racks and are highly configurable in supporting a flexible quantity and type of ThinkAgile HX nodes for supporting diverse workloads on a single rack

The partnership between Lenovo and Nutanix also presents some compelling characteristics that set it apart from other partnerships within the hyperconverged market:

- **Deeper-level partnership.** Partnering within the hyperconverged market is nothing new. In fact, Lenovo and Nutanix have other partnership agreements. However, this is an OEM contractual agreement and thus goes beyond simple resale and packaging. These two companies work closely at every level, including engineering, go to market, and sales and support.
- **Dedicated Lenovo sales and support.** For customers, the possible benefits of this partnership include the seamless level of support offered for these products. Lenovo will handle the sales with its larger multinational salesforce in over 160 countries. Further, with Lenovo ThinkAgile Advantage for full life-cycle support, Lenovo will provide a single point of support, 24 x 7 for faster problem resolution.
- **Lenovo's large partner network.** Lenovo has a large network of VARs and business partners, allowing these integrated appliances and systems to extend their reach into vertical markets and specialized submarkets. Also Lenovo's customers will be able to deploy a Nutanix-based hyperconverged/hybrid cloud solution without giving up their preferred Lenovo support contract.
- **Long-standing reputations.** This partnership will merge one of the leading hyperconverged/hybrid cloud software solutions and one of the largest suppliers of x86 servers in the world. Further, these solutions are built on Lenovo's ThinkSystem servers, which have a long history of deployments within datacenters where quality, reliability, and security are high priorities. This should provide customers with a deeper sense of confidence about the potential quality of the products. The track records of both companies should help alleviate any trepidation among customers regarding longer-term investment.

CHALLENGES/OPPORTUNITIES

The hyperconverged/hybrid cloud market has grown at a rapid pace in recent years. This growth increasingly puts these solutions into demanding environments with an increased density of primary workloads, which requires solutions that can handle resource contention without impacting performance. It also drives demand for solutions that can scale to multi-rack environments without commensurate increases in management burdens. This puts pressure on technology suppliers like Lenovo to broaden their hyperconverged/hybrid cloud portfolio so that it can address a diverse set of use cases. Today's portfolio of hyperconverged/hybrid cloud solutions must be compelling for traditional configurations of relatively small cluster sizes (running a limited number of workloads) while also including full rack-scale configurations that provide robust quality of service (QoS) capabilities and increased levels of automation.

Lenovo's current portfolio of hyperconverged/hybrid cloud solutions offers just such a range of products and capabilities and aligns with the next phase of market growth where appliance-based hyperconverged/private cloud solutions and rack-scale hyperconverged/private cloud solutions are viewed as complementary technologies.

Lenovo must lead with the message that it is much more than a server company and that it provides a full spectrum of enterprise datacenter products, including switches, storage, and workstations. This "one-stop shopping" aspect is attractive to many potential customers and may be a major point of differentiation for Lenovo's HCI appliances and solutions. In fact, according to a recent IDC survey of current and potential hyperconverged customers, nearly 80% of companies felt that it was important for their HCI vendor to be able to offer a complete product portfolio outside of hyperconverged/hybrid cloud solutions. Specific to hyperconverged/hybrid cloud solutions, Lenovo's SXN rack-scale solutions should be considered when comparing traditional, non-rack-scale hyperconverged/hybrid cloud solutions. Lenovo must work this message throughout its marketing and selling of these products to truly set them apart from many of the other HCI solutions.

CONCLUSION

As mentioned previously, companies are aggressively seeking less complexity and more agility from their servers. Hyperconverged/hybrid cloud solutions deliver simplicity with their plug-and-play setup and their ability to deploy workloads faster than traditional servers. Any solution that provides the desired level of simplicity while meeting the rigors of datacenter performance demands will find purchase among end users. However, only solutions that truly differentiate themselves will be positioned to become leaders within this market.

The ThinkAgile solutions from the deeply integrated partnership between Lenovo and Nutanix address many of the shortcomings of traditional infrastructure mentioned previously. Also, this partnership leverages Nutanix's reputation as one of the leaders in HCI software and Lenovo's platforms, with their IBM System x heritage, innovative factory automation, and unique industry-first features to provide end users with an additional sense of confidence about the potential quality of the appliances. Further, this level of partner integration is a new and exciting shift in the HCI market, providing customers with rare advantages regarding support and maintenance. Indeed, the Lenovo ThinkAgile solutions are well positioned to make an impact on the HCI market.

About IDC

International Data Corporation (IDC) is the premier global provider of market intelligence, advisory services, and events for the information technology, telecommunications and consumer technology markets. IDC helps IT professionals, business executives, and the investment community make fact-based decisions on technology purchases and business strategy. More than 1,100 IDC analysts provide global, regional, and local expertise on technology and industry opportunities and trends in over 110 countries worldwide. For 50 years, IDC has provided strategic insights to help our clients achieve their key business objectives. IDC is a subsidiary of IDG, the world's leading technology media, research, and events company.

Global Headquarters

5 Speen Street
Framingham, MA 01701
USA
508.872.8200
Twitter: @IDC
idc-community.com
www.idc.com

Copyright Notice

External Publication of IDC Information and Data – Any IDC information that is to be used in advertising, press releases, or promotional materials requires prior written approval from the appropriate IDC Vice President or Country Manager. A draft of the proposed document should accompany any such request. IDC reserves the right to deny approval of external usage for any reason.

Copyright 2017 IDC. Reproduction without written permission is completely forbidden.

