# FUTURE-READY DATA CENTER: CONVERGED VS. HYPERCONVERGED INFRASTRUCTURE

Debunking and differentiating business advantage on the path to
data center modernization.

Today's business environment is fast paced and highly innovative, thanks to startup organizations
that are advancing from zero to market leader before their competitors even see them coming.
This speed-to-market economy isn't showing any signs of slowing down. Technologies like
cloud, mobile and on-demand IT services are adding fuel the fire. They're helping companies
scale infrastructure with less capital expense and more operational efficiency. One doesn't need
to look any farther than mobile-enabled Uber to see how disruptive technology can create
competitive advantage.

Last-generation infrastructures aren't built with speed in mind. The hardware-focused
architecture is slow to adapt and costly to scale. More resources demand more hardware—which
can quickly lead to data center sprawl that adds complexity and cost. However, stakeholders
seeking a technology solution to regain business advantage are finding it in converged
infrastructure. It promises to extend data center resources farther and faster, so IT can respond
to the needs of the business on demand.

The promise of infrastructure convergence is simple: unite compute, storage and network
components with software-defined management tools. It helps data centers break free of silos
inherent in traditional architectures that do more to contain business innovation than they do
to drive it. Once deployed, the converged infrastructure components support mission-critical IT
initiatives like cloud, DevOps, big data and more.

Convergence is leveling the playing field for businesses of all sizes, by helping them modernize
their data centers toward the goal of becoming software-defined. Yet, with all the promise that

infrastructure convergence has to offer, there are some inherent deployment risks. Chief among those is selecting the right approach: converged or hyperconverged infrastructure adoption.

A right-sized infrastructure transformation can reward your business with cost savings and agile provisioning that enables faster delivery of critical IT resources to rapidly advance business initiatives.

There's industry support for adoption of a converged infrastructure approach. According to IDC, the converged systems global market reached $2.5 billion in the third quarter of 2015 and generated 1,261 petabytes of new storage capacity shipments in that same time.[1]

With all the excitement that converged IT infrastructure has to offer, the key to embracing full advantage is knowing how to invest in a solution that aligns with your business needs today—and tomorrow. This whitepaper explores the differences between converged and hyperconverged infrastructure approaches, including the operational and bottom-line considerations that can make or break your deployment.

## THE EVOLUTION OF THE DATA CENTER

Traditional IT models are designed to support yesterday's business models in which the company can move only as fast as IT departments can deliver resources. This monolithic data center approach is hardware driven and server-reliant. Each physical component is workload-specific, and new equipment is required to scale resources. Not only does this hardware-dependence result in a larger data center footprint, but the size of the data center can put limits on IT capacity.

**Hardware Limitations**

There are many challenges with a hardware-based infrastructure approach. Most notably, IT resources are stored in discrete silos, creating an inefficient use of resources. Some resources are under-utilized while others are over-extended. It's also a complex system that takes many panes of glass to manage. Vendor incompatibility also adds cost and complexity to the task and limits the value the investment can add to the business.

**Technology Impact**

Fast forward to the introduction of new technology innovation that has emerged as a means to help speed and simplify business workflow. Technology innovations like the cloud, mobile, IoT (Internet of Things) and social media have resulted in an explosion of data which must

be managed, analyzed, optimized, shared, stored and secured. This strains already over-extended hardware infrastructures. These rigid configurations simply can't scale to meet the increased capacity demand nor can they be provisioned fast enough to accelerate business for competitive gain.

**The Rise of Virtualization**

The introduction of virtualization into the data center simulates physical computer hardware, operating systems, storage devices and network components as virtualized resources. System resources can be provisioned across virtualized components. For example, a virtual machine can be configured to increase application workload in a particular area of the business. While this solves some infrastructure scalability challenges, it adds a layer of management complexity to the data center which still requires many panes of glass—and consumes many hours of IT staff administration time.

*Virtualization Advantages:*

- Fewer number of servers
- Smaller data center footprint
- Reduced data center energy consumption

*Ongoing Virtualization Challenges:*

- Singularity of purpose-built configurations
- Legacy and virtualized management complexity
- Increased IT management costs

## IMPACT OF SOFTWARE-DEFINED EVERYTHING

While virtualization solves some of the hardware challenges, it still results in a fragmented infrastructure with some virtualized resources mixed with legacy components. Consequently, there's an increase in management costs that cuts into the value it adds to the business. The idea of using software as fabric to tie components together for efficiency and agility has given rise to the concept of the software defined data center (SDDC). In this scenario, the entire infrastructure is virtualized, and resources are delivered as a service. Management is centralized, and provisioning is automated through software which results in single-pane-of-glass management that saves time and money. Because it leverages storage, network and server

virtualization, SDDC can bridge the gap between legacy and new technology deployments, and provide a flexible, future-ready infrastructure.

*Advantages of the Software Defined Data Center:*

- Enables IT as a Service
- Single-pane-of-glass management
- Virtualized resources that reduce hardware-reliance
- Automated provisioning of resources

# 10%

*The average percent of server utilization before virtualization.[2]*

## THE GOAL OF DATA CENTER MODERNIZATION

One of the requirements of data center modernization is scalable IT service delivery. This goal can only be achieved when the IT infrastructure is automated to provision resources on demand. According to Hyperconverged.org, the typical data center has between eight and twelve hardware and software products deployed from just as many different vendors.[3] The complexity that arises becomes that of management. Each solution exists separately and needs to be managed by resources trained specifically on that technology. And even in a best-case scenario, each component has the potential to be over- or under-provisioned. By converging compute, storage and networking, resources can be united for accurate and rapid provisioning.

# 79%

*The market growth for hyperconverged integrated systems within the next five years.[4]*

## DATA CENTER MODERNIZATION GOALS

For the business:
- Drive rapid innovation
- Reduce/maintain data center costs
- Increase competitive advantage
- Improve workforce productivity

For the data center:
- Simplify infrastructure complexity
- Reduce data center costs
- Protect and secure data
- Futureproof data center investments

## BUSINESS BENEFITS OF CONSOLIDATION

Consolidating data center assets makes convergence an attractive initiative for companies looking to simplify. Perhaps there's no more motivated organization to reduce costs than the White House. Case in point, the White House Office of Management and Budget (OMB) launched the Federal Data Center Consolidation Center Initiative (FDCCI). It was designed to reduce data center energy use and cut the cost of hardware, software and management so funds could be allocated towards more efficient computing technologies.

As such, the FDCCI initiative closed 3,125 out of 10,584 identified data centers. This move reportedly resulted in $2.8 billion in cost savings and avoidances from 2011– 2015, with another $8.2 billion projected for fiscal year 2019.[5]

Government agencies aren't the only ones cashing in on the potential reward of data center consolidation. A recent case study reveals that converged infrastructure is driving savings and efficiency for companies of all sizes. In fact, the report shows a 70 percent improvement in the speed to deployment of infrastructure along with a 78 percent savings on network hardware costs and 43 percent reduction in storage costs.[6]

*Additionally, the report reveals that:*

- Google is using artificial intelligence to improve data center efficiency by reducing energy consumption by 40 percent and reducing energy using by 15 percent.[7]
- 20TH Century Fox increased its network capacity by 33 percent by deploying a Hewlett Packard Enterprise hybrid infrastructure to accelerate its data processing, distribution and management. The results included a reduction in compute and storage provisioning from five weeks down to 15 minutes and a decrease in the data center footprint by 70 percent.[8]

## TYPES OF CONVERGENCE

**Converged Infrastructure: Pre-configured, Hardware-Driven**

Converged infrastructure relies on appliances that come pre-integrated and pre-defined for specific workloads. It simplifies data center complexity by providing a unified solution in which all the compute, storage, networking and server virtualization resources needed to power workloads are configured into a single, regression-tested platform guaranteed to work together. This reduces vendor incompatibility and data center sprawl, since each converged appliance delivers more compute power in less space. Additionally, the hardware is optimized for scale (typically scale-up) so it can be used to power large workloads with reliability and consistency.

*Barriers to Converged Infrastructure Adoption*

Some of the disadvantages of converged infrastructure are that the appliances are discrete and workload-specific, so they can't be configured for other workloads. A deployment such as this involves many-panes-of-glass management which requires IT staff time and doesn't deliver on the full promise of agility.

*Challenges of Converged Infrastructure*

- **Integration complexity:** Requires staff expertise for integration and management
- **Up-front cost:** Higher up-front capital investment in hardware
- **Operational risk:** Need to accurately forecast resource needs up front

*Use Case: Converged Infrastructure*

Companies looking to scale out a specific workload for a particular task might consider a converged infrastructure approach. Because converged resources are configured for that task, it's guaranteed to provide the compute, storage and network resources for the job at hand. A greenfield project, for example, that requires a unique set of compute resources is one example in which a converged infrastructure can offer value. Instead of pulling data center support away from mission-critical applications, a converged appliance can be deployed for that greenfield project.

Another example is that of transitioning to a cloud-enabled infrastructure. Converged appliances, like the HPE ConvergedSystem 700 or the Dell VCE Vblock for example, can provide integrated server, storage, networking, and management components along with built-in support for VMware and Microsoft virtualization. These types of converged appliances are purpose-built for cloud adoption, simplifying the task of virtualizing workloads for the cloud.

**Hyperconverged Infrastructure: Software-Defined, Flexible**

While converged infrastructures are primarily hardware oriented, scale-up platforms with centralized management, hyperconverged infrastructures are modular solutions enabled by software-defined components. Unlike convergence, compute, storage and network resources are integrated into a single appliance. A software layer is added as a means to provide centralized automation, management, and control. The result is a tightly integrated package of resources to be configured and deployed for any workload that calls for them. This further enables IT to rapidly provision resources when the business requires it.

The trend towards hyperconvergence is picking up speed. Gartner estimates that hyperconverged integrated systems will be mainstream in five years.[4] It sees the rise of hyperconvergence as a driver to more dynamic, fabric-based infrastructures capable of
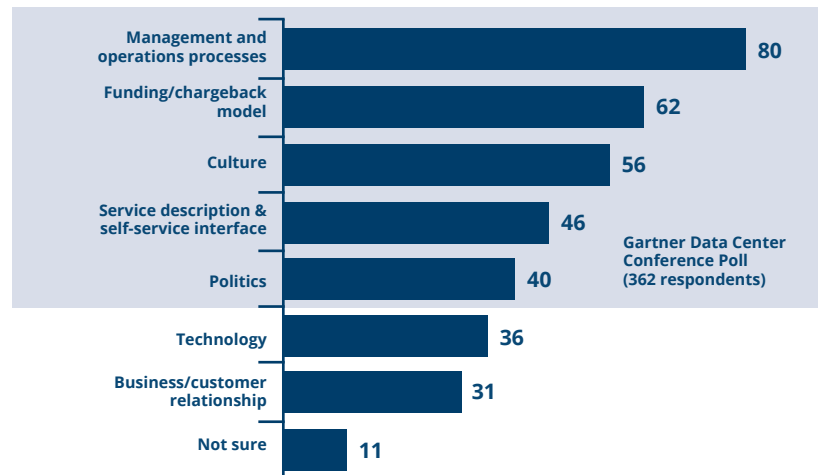
supporting continuous application delivery, but delivering modular blocks of infrastructure that can be added as business scales without the need take on significant capital expense.

*Barriers to hyperconverged adoption*

The benefits of hyperconverged infrastructure are clear, as is the trend towards adoption. However, not all companies are on board with this data center innovation. One barrier comes in the form of scalability. Currently, hyperconverged hasn't been proven to provide the full scalability that converged infrastructure can provide. Secondly, there's a barrier in the form of cultural resistance to change or fear of making a mistake. The technology is trending towards becoming a mainstream, accepted infrastructure approach, but it hasn't yet reached wide-scale adoption that some businesses might prefer before making the leap.

## WHAT ARE THE THREE BIGGEST CHALLENGES IN CREATING AN IT AS A SERVICE OFFERING?

| Challenge | Value |
|---|---|
| Management and operations processes | 80 |
| Funding/chargeback model | 62 |
| Culture | 56 |
| Service description & self-service interface | 46 |
| Politics | 40 |
| Technology | 36 |
| Business/customer relationship | 31 |
| Not sure | 11 |

Gartner Data Center Conference Poll (362 respondents)

*Who Benefits from Hyperconvergence?*

- **Business consumers:** Can reap the reward of IT service delivery on demand
- **Developers:** Can gain a scalable, reliable platform to support application development and testing
- **Enterprise operations:** Can see economic benefits in the form of increased operational output with a reduction in operational costs

*Hyperconvergence Use Case: Managing Remote Offices*

The very fluid nature of this infrastructure innovation has immediate benefits for enterprise

companies that have multiple remote offices or branch offices. Remote offices need access to technology infrastructure to support communication, collaboration, and workforce unification. More often than not, these satellite office locations have little or no on-site infrastructure support. Trying to replicate central office IT systems in a remote location is difficult and can put data at risk if not done correctly.

Hyperconverged infrastructure can mitigate the risk and complexity of scaling infrastructure resources to remote locations. A single hyperconverged platform, for instance, can be used to consolidate offices servers and storage and support unified management across all sites. Additionally, the modular style of hyperconverged scalability lets the branch office operate with affordable appliances initially and scale up as needs change.

## HYPERCONVERGED MISCONCEPTIONS

Hyperconverged can be a big change for IT administrators versed in more traditional infrastructure deployments. With specific IT resources focused on tasks like storage, networks or server administration – the idea of marrying these disciplines can make some IT professionals ill-at-ease. One primary concern is job security. What am I going to do without a storage infrastructure to manage? The answer is simple: hyperconvergence lets IT staff move away from the task of managing components and spend more time developing and writing IT policies to drive business value.

*Scalability: Moving at Flash Speed*

Another misconception of hyperconvergence is one that surrounds scalability. Advances in storage virtualization from vendors like VMware, Hewlett Packard Enterprise, and Dell/EMC deliver robust storage scalability while Flash technology has enabled hyperconverged appliances to offer a variety of storage solutions. As the cost of Flash comes down, it's now possible to build out a high-performance device with more affordability.

*Flexibility: Fixed versus Fluid Resource Pools*

Converged appliances are less flexible in their ability to adapt to workloads other than what was pre-defined. Compute demand must be forecasted when the investment is made. However, hyperconverged appliances don't require an up-front estimate. In fact, it's possible to build out a hyperconverged solution using different storage tiers and customize an approach based on exact performance requirements.

*Cost: Up Front or Over Time?*

With all the power and functionality that can be gained from hyperconvergence, some might think that it's more expensive to deploy than a converged infrastructure approach. But in fact, it could cost up to ten times more to implement converged infrastructure because it's a single

pool of compute resources that carries a higher up-front capital expense. Investment needs to be made in compute and storage hardware. Hyperconvergence, however, due to its software-defined architecture, enables IT to buy what it needs – when it's needed – and spread the cost out over time. From a CFO's perspective, the hyperconverged solution can deliver value back to the business more quickly, and cost can be more of an operating expense carried over time.

## MEASURE OF SUCCESS: AUTOMATION AND ORCHESTRATION

No IT investment is made lightly, and all investments need to be cost justified to deliver short- and long-term value. Hyperconverged infrastructure is no exception. From a high level, one of the biggest enterprise gains is the fact that it can transform an inflexible infrastructure into a fluid pool of resources that can be delivered in a more automated and orchestrated manner. The data center to be more proactive instead of reactive because, in effect, the infrastructure is in place to respond to requests for IT resources – before the requests are made. This saves time and money and mitigates service delivery delays, as well as, missed market or sales opportunity. Consider the time it takes to provision a physical machine. With traditional IT, that could take hours or weeks, whereas hyperconverged infrastructure can make that same task possible in five to fifteen minutes.

*Five Key Questions to Ask Before Investing*

1. What is my budget?

2. What are my scalability requirements?

3. Am I ready to move towards a software-defined infrastructure?

4. Do I need my solution to integrate within a legacy environment or can it stand alone?

5.  Do I have enough IT staff expertise to manage this solution?

*Converged versus Hyperconverged*

|  | Converged | Hyperconverged |
|---|---|---|
| Cost | Pay up front | Pay as you go |
| Management | Complex | Simple |
| Scalability | Highly scalable / Scale-up | Highly scalable / Modular |
| Resources | Single pool | Fluid pools |
| Configuration | Hardware-defined | Software-defined |
| Time to value | Moderate | Fast |

## CONCLUSION

There's a trend towards data center modernization driven by advances in new technologies like cloud, big data, mobile, and IoT. Today's traditional infrastructures are too rigid to keep pace with these demands – and too complex to be managed effectively for either cost or efficiency. A move towards a hyperconverged infrastructure provides infrastructure scalability that can be added on a modular basis over time to help extend data center capacity. What's more, it can help transition the data center away from silos and towards a software-defined architecture that enables it to adopt new technologies faster, thus future proofing any investment made in the technology today.

While the scalability of hyperconverged is not as extensive today as it is for a converged infrastructure, advances in storage technology are expected to change that in the short term. Within the next 24 to 36 months, it's believed that hyperconverged infrastructure will have the potential to exceed converged infrastructure in its ability to scale resources. Either way, there are gains to be made with either a converged or hyperconverged technology approach. The best choice for any business is the one that satisfies infrastructure needs today, yet positions the company for competitive advantage tomorrow as well.

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*Because we go further.*

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