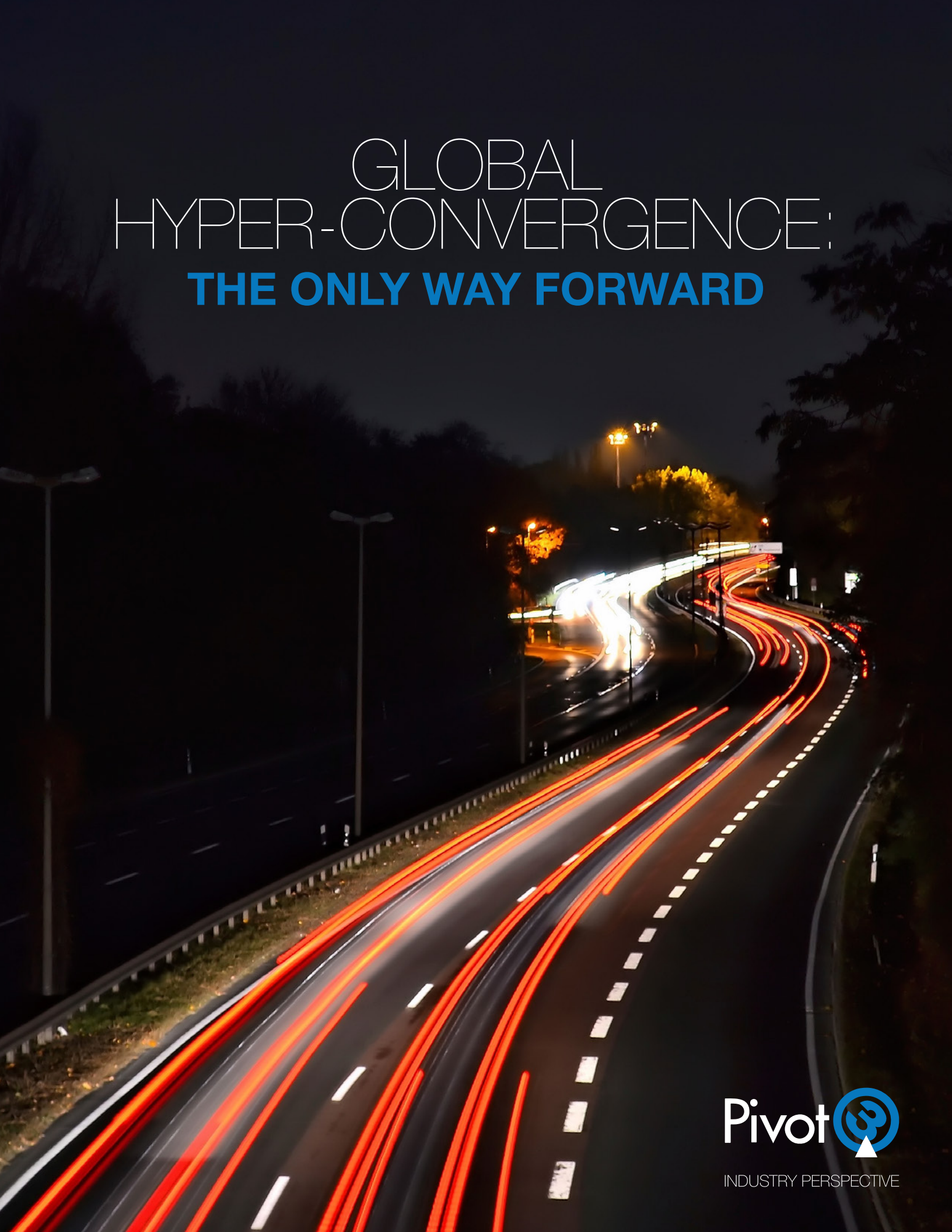
GLOBAL HYPER-CONVERGENCE:

THE ONLY WAY FORWARD



Pivot3

INDUSTRY PERSPECTIVE

Introduction

Although every information technology infrastructure is designed differently to meet different mission needs, each system shares common components. Networking, storage, and compute are the building blocks of any information system. But how these building blocks are managed to support mission-critical agency functions is changing rapidly. As your agency moves into the 21st century and operations become more application-centric, IT and government leaders require solutions that improve agility, optimize the end user experience, and meet the needs of a more dispersed workforce.

Many government organizations find it increasingly challenging to manage these diverse components of traditional IT, particularly as the capabilities of cloud are added to the equation. Resource-constrained IT departments can't dedicate the time, employees, or money to constantly updating disparate systems or managing the performance issues that arise when those systems aren't integrated perfectly.

Hyper-converged infrastructures (HCI) provide a solution to these challenges by driving down costs and complexity. In fact, a Gartner report estimates that hyper-converged integrated systems will represent over 35% of total integrated system market revenue by 2019.

"Hyper-convergence is now universally recognized for its potential to deeply disrupt the IT infrastructure space," said Ron Nash, CEO of Pivot3, an innovator at the leading edge of hyper-converged technology. "More than ever, there is a huge focus on the growing role for hyper-convergence in the data center. Many vendors are recognizing this and are positioning themselves to be part of this important technology wave."

To learn more about how the public sector can confront growing IT complexity with hyper-convergence, we spoke with Nash and his team at Pivot3. They explained how a hyper-converged infrastructure — the scalable, efficient and resilient IT enterprise solution that Pivot3 provides — can mitigate the difficulties of advancing your agency's technology while also providing new benefits.

In this industry perspective, we explore those benefits and examine why Pivot3 is the ideal partner to create your optimal HCI environment.

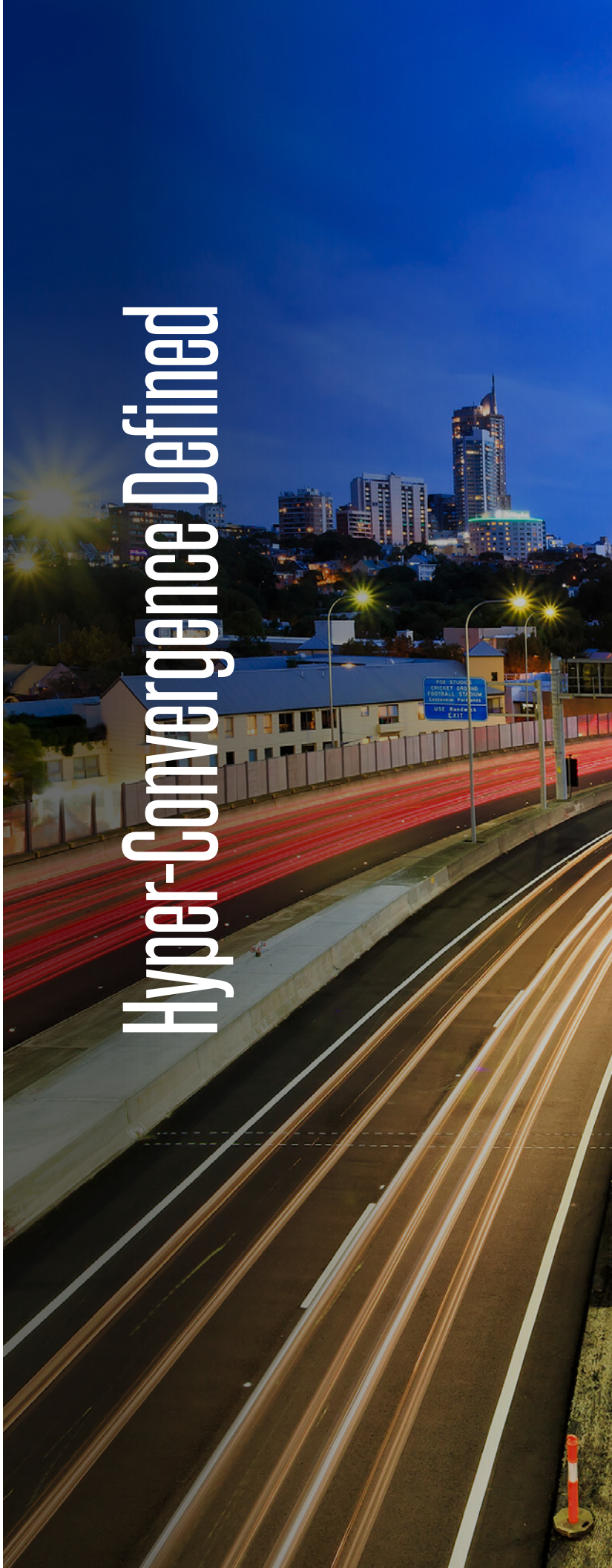
Hyper-Convergence Defined

Before we examined the advantages of this new IT approach, Pivot3 Federal Sales Engineer Matt Demas explained the basics of what hyper-convergence is and how it works. Put simply, "hyper-convergence is taking all the complexity of a data center and simplifying it into a box, where each functionality works as a building block," Demas said.

In traditional IT architectures, networking, storage and compute capabilities are built and maintained separately, using different software and hardware, even as these capabilities interact with one another to support common functions. Each component is assigned its own element manager, resulting in more network complexity and multi-vendor solutions. Ultimately, IT infrastructures become encumbered with limited configurations and redundant components that prevent systems from performing their full capabilities.

In a hyper-converged infrastructure, compute, storage, networking and virtualization resources are integrated into a single commodity server and made available throughout an entire IT enterprise. Managers can run all IT workloads through a single vendor, on one easy-to-use management platform.

But just because these functions are consolidated does not mean that they must all be used in the same way and to the same scale. Because a hyper-converged architecture is software-centric, each of these capabilities remains modular and IT professionals can update or scale them as needed without sacrificing performance or availability.



The Problems with Traditional IT Infrastructures

For government agencies, the need for hyper-converged solutions is clear: Traditional IT architectures are becoming increasingly untenable, given budget constraints, the rapid increase in dynamic technologies, and the performance issues that arise when integrating new web-scale technologies with traditional IT architectures.

The most obvious concern for most public-sector organizations is cost. Buying separate components to execute compute, networking, and storage functions is more time- and labor-intensive, and procurement officials can't leverage economies of scale in their pricing requests. Once deployed, these separate solutions accrue even more costs, as IT professionals must be trained and paid to manage multiple solutions.

Yet even if cost were not an issue, the traditional approach to IT remains unsustainable. The rapid rate of technological evolution is only increasing with time, and legacy systems cannot keep pace because they are siloed and complex to manage. Furthermore, replacing or updating those systems on a one-off basis will only provide temporary, incomplete solutions to agencies' technology gaps and increase – rather than reduce – IT complexity.

This piecemeal approach to update IT architectures can also cause other organizational problems. "A lot of [technology] implementations are extremely complex," Pivot3 Vice President of Global VDI Sales Mike Dunbar explained. "When you set up separate storage, compute, and networking, there's a lot of fine-tuning that has to happen, which can lead to significant performance issues."

Demas gave an example of how a minor error could trigger a chain reaction to bigger, more noticeable issues. "You'll have major booting issues just because of a small networking tweak that went wrong somewhere in the setup or because the storage wasn't configured 100 percent properly," he said.

Hyper-converged infrastructures help agencies overcome these budget and technology barriers, while also adding unique value to enterprise IT.

Simplicity

The most striking attribute of the hyper-converged infrastructure is its simplicity. "Hyper-convergence removes the complexities of traditional enterprise architecture so you don't have to deal with separate compute capabilities, separate storage and separate network," Dunbar said.

From a technology standpoint, the benefit of consolidating separate components into an integrated, single solution is obvious. Each technology becomes easier to deploy, manage and update in tandem with other IT capabilities. "The great piece about that is, because [Pivot3 solutions are] so easy to set up and deploy, deployment can be done in a matter of days instead of a matter of months," said Dunbar.

This simplicity also reduces IT staff workload. "What our setup also does is help alleviate the overhead of knowledge transfer to each individual," Demas added. "A lot of contractors and government officials have to learn six or seven different types of infrastructures and wear multiple hats. With hyper-convergence, you shrink the knowledge transfer. We show you how easy it is to use and you don't have to worry about knowing the difference between a server and storage, and you don't have to have two different people there."

Ultimately, hyper-convergence allows IT professionals to spend less time integrating disparate solutions and more time focusing on their mission. "[Agencies] can repurpose their IT staff to do other things, like application development or [managing the] help desk," Demas said.

Scalability

The scalability of hyper-converged architectures also provides real value to government IT organizations. Once a solution is deployed, it can be extended across the enterprise with ease. As workload increases, compute, networking, and storage demands can quickly be met without heavy lifting.

Demas explained, "As the government grows, unfortunately IT departments aren't growing along with it. They're just shrinking." However, hyper-converged solutions do not require more staff to grow IT capabilities. Instead, virtualized solutions are simply extended to new users without requiring new hardware or software.

Cost Efficiency

This scalability provides significant budgetary benefits, both upfront and across the lifecycle of your hyper-converged architecture. "Flexibility is a key benefit of hyper-convergence. You can add more as you grow instead of having to make a sizable upfront investment. You'll still be able to maintain and service your legacy equipment with our hyper-converged system so you're not throwing out everything and starting with a brand new infrastructure. So you grow into a hyper-converged solution with Pivot3 at your own pace," said Dunbar.

When you do require more capacity, you can quickly convert your needs to functionality without going through an additional procurement process. "That's one of the huge benefits of hyper-convergence for government: It allows you to better manage your budget as it gives you better performance because it takes away all the complexities of the traditional compute environment," Demas explained.

"You save money in the long run, rather than buying the traditional [storage-area network], traditional servers for compute, and all the networking pieces that go along with it, then paying for all the implementations," Dunbar added. "Plus, [IT staff] are saving a significant amount of time – not to mention that you need fewer IT specialists to manage separate silos in the data center. In the end, there's just more money in the budget."

Usability

While the IT organization reaps these benefits, end users also gain from hyper-convergence. For one, cost savings can be converted into user benefits. "You're able to go do other things for those end users, where you traditionally had to spend that money on IT," said Demas.

Additionally, hyper-convergence enables users to access virtualized capabilities from any location, as long as they can virtually connect to the network. "Look at the government. A user in [the Defense Department] might have to carry two, three, sometimes even four different laptops, because they have one for unclassified [work], two for classified and another one for development," said Demas. "By using a hyper-converged infrastructure, they can alleviate that need and just use one laptop."

Soldiers and civilians can also use a variety of devices in the field, without sacrificing this usability or security. Pivot3's recent partnership with Tracewell Systems – a hardware systems provider for military and aerospace – gives

defense customers high performance compute power that can be deployed on a variety of military platforms ranging from airborne and surface, to sub-surface.

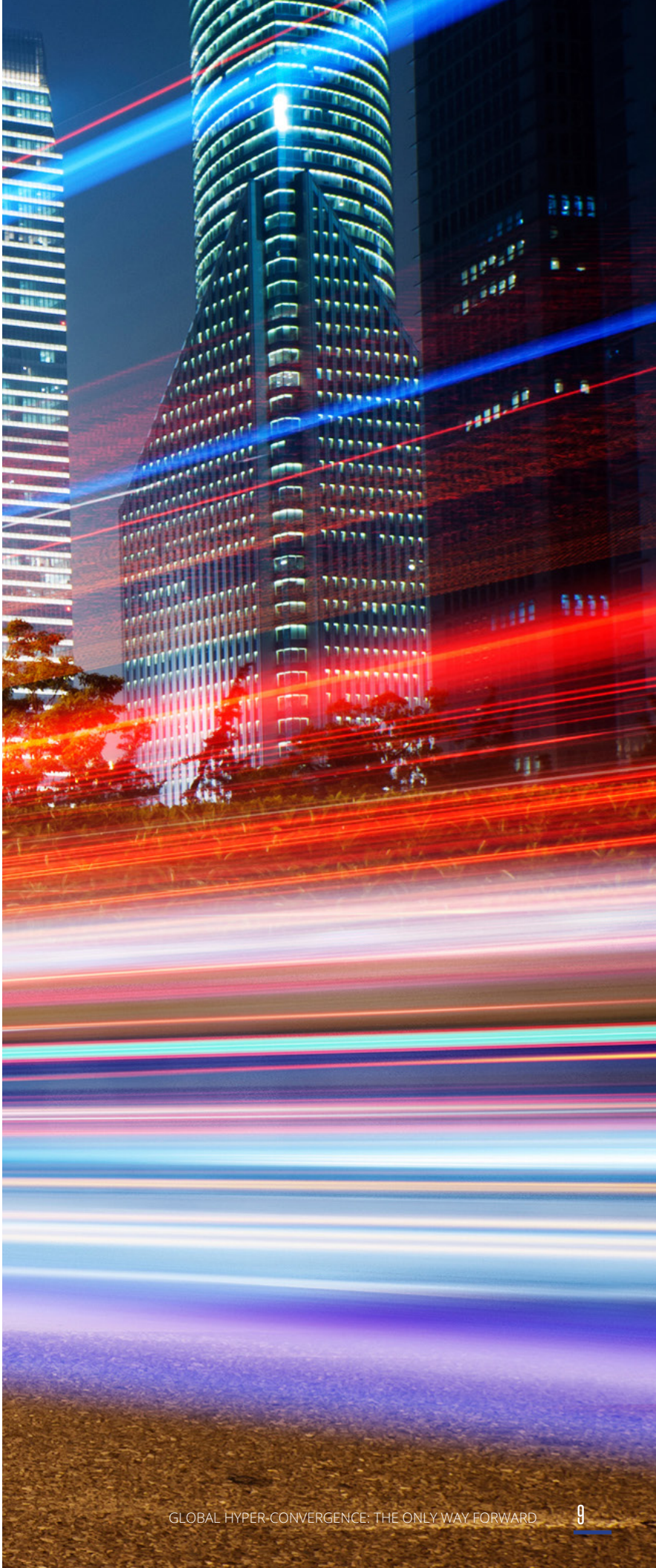
"Our partnership with Tracewell is the next step in our strategy to lead the HCI market for industry specific solutions," said CEO Nash. "By integrating Pivot3's HCI technology, Tracewell can maximize the performance of its dense, ruggedized solutions designed for space-constrained and computationally intensive military environments. The high storage efficiency of Pivot3 HCI, combined with low compute overhead allows for maximum resources to be available to run advanced algorithms and perform complex operations on large databases."

"And they'll have the exact same speed of their applications anywhere in the world where there they can get [virtual private network] access," Demas added. Hyper-converged infrastructure allows users to access the full capabilities of their IT infrastructure, no matter where they are located.

What's more, this usability isn't limited to the defense sector. Demas described a customer who had 40 to 50 high-end graphic users commuting weekly from Boston to Dallas in order to use a graphics solution that required high-performance local computing. "We were able to develop a solution for them using our hyper-converged appliances where they were able to web host those high-end graphic users and work remotely in Boston," he said.

Ultimately, Pivot3 was able to save the customer about $40,000 per month after cutting travel and lodging costs. Within three months, those savings covered the costs of their investment in hyper-convergence and, perhaps most importantly, the organization's end users were happier and could get their work done quicker.

Given the company's partnership with Amulet Hotkey, a leading provider of high-performance PCoIP workstations and graphics solutions, Pivot3 will also be able to extend its reach. "This technology alliance will allow Pivot3 and Amulet Hotkey to collectively enter new markets with their unique offering," said Nash. "By layering our software onto Amulet Hotkey's blade-based solutions, we are able to bring mission critical virtualized graphics to a scale-up-scale-out platform that can support many types of powers users from a single unified platform."



Why Pivot3?

The advantages hyper-converged infrastructures provide to organizations and end users are significant, but they can only truly be realized if the solutions provider can guarantee constant high availability, resiliency and high performance. Yet not all providers are created equal, with many vendors unable to maintain high performance levels, industry-leading storage capacity and fault tolerance.

Pivot3 was originally founded in 2002 to support storage-heavy video surveillance. However, the scope of the company's technology and capabilities has significantly grown. Fast forward to the present and Pivot3 has 22 patents in software-defined storage, RAID, and hyper-converged infrastructure technologies that it uses to support 16,000 appliances across 1,600 customers.

What's the secret behind this rise to success? The Pivot3 global hyper-convergence solutions' efficiency and resiliency set the company apart from all other hyper-converged infrastructure providers.

Efficiency

The most notable differentiator for Pivot3 is its use of patented Scalar Erasure Coding to provide high storage efficiency. Most hyper-converged infrastructure solutions use brute force data replication and are only locally hyper-converged within a single appliance for the purpose of making copies of data.

Local HCI is expensive and inefficient, forcing you to choose between available storage and data protection. Every copy of the data takes up 50 percent of remaining storage space. That means that by the time you've made the standard two backup copies and factored in your industry standard 10 percent reserve space, you're left with only 23 percent of useable storage capacity.

With Pivot3's Global Hyper-Converged Infrastructure, there is no need for replication or de-duplication schemes. "Our system runs effectively on as little as 7 percent overhead, freeing up valuable compute resources for running foreground applications," explained Dunbar. "Other HCI vendors use over 50 percent of overall compute and don't achieve the same storage efficiency."

In the Pivot3 system, all hard drives within a cluster act as a SAN that also has computing power. Data is distributed evenly across the entire system, allowing any program running on one appliance within the cluster to access resources across all the appliances in the cluster. This allows high-order data protection that leaves almost all the storage space available.

This efficiency only increases with scale. Demas explained that when a system is operating with only three connection points, Pivot3 must keep 33 percent of their storage for a potential failover, which is a backup operational mode in which the functions of a system component are assumed by secondary system components.

"So in the event that we lose a connection point or node, we have to set aside 33 percent of that storage. But as we grow, that number becomes significantly less, because you've already allocated a full node of storage for failover," he continued. "So, when we go up to as high as 10 nodes in a cluster, or what we call a protection group, we actually can use 94 percent of all the disk space on the drives."

Resiliency

Even as organizations gain operational efficiencies with Pivot3, they do not sacrifice security. In fact, IT infrastructures become more resilient. "We're able to carve up those [storage] racks and dedicate specific physical disks for each of our individual customers and their customers," explained Demas.

That segmentation is key. "We keep customer data completely separated and isolated from the other organizations, so that in the event there's a leakage or a problem, their data's completely separated," Demas said. "It doesn't cross-contaminate into another organization's information."

Moreover, Pivot3's vSTAC OS automatically balances computing needs across its platform to eliminate hot spots and stranded "local only" storage. If a CPU doesn't have enough power in one box to do something, it can access processing power across all the boxes because it operates in a true global hyper-converged architecture. As a result, Pivot3 provides 99.9999 percent availability and can support up to five simultaneous drive failures with no data loss or performance degradation.

Conclusion

Pivot3's extreme reliability and efficiency sets it apart as the most scalable and highest-performing hyper-converged infrastructure provider.

"Delivering highly fault tolerant and efficient storage without sacrificing compute performance is the most challenging aspect of hyper-converged infrastructure because it requires deep, specialized expertise and long-term dedication to arrive at the necessary level of optimization," said Bill Galloway, Founder and CTO of Pivot3. "Our solutions and latest hyper-convergence and SDS patents are truly about addressing this issue. We were the first to create a virtual SAN that also has the ability to run applications very effectively. This points to the technological differentiation and maturity of Pivot3's products and the focus on low total cost of ownership (TCO) that we bring to customers."

These attributes compound the benefits of any hyper-converged solution, which provides greater flexibility to the IT organization while simultaneously enhancing the user experience and decreasing the complexity of legacy IT silos. Those advantages ultimately lead to cost savings for an agency, plus more time to dedicate to true mission fulfillment.

Ultimately, by providing a single architecture for any enterprise IT workload, Pivot3 allows you to focus on implementing solutions with real benefits, rather than applying ad hoc products with narrow features. For government organizations seeking to confront tightened budgets while keeping pace with the rapid rate of technological innovation, hyper-convergence is the only way forward.

About Pivot3

Pivot3, the inventors of software-defined storage and pioneers in hyper-converged infrastructure (HCI), offers a broad portfolio of Enterprise HCI platforms for high performance workloads in data intensive environments such as virtual desktop infrastructure, surveillance, disaster recovery, and server virtualization.

Founded in 2002, and delivering the first-to-market HCI solution in 2008, Pivot3 offers industry-leading storage efficiency, increased compute performance and system resiliency in a homogenous, scalable appliance model to over 1,600 customers in 53 countries.

About GovLoop

GovLoop's mission is to "connect government to improve government." We aim to inspire public sector professionals by serving as the knowledge network for government. GovLoop connects more than 200,000 members, fostering cross-government collaboration, solving common problems and advancing government careers. GovLoop is headquartered in Washington, D.C. with a team of dedicated professionals who share a commitment to connect and improve government.

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