The Forrester Wave™: Hosted Private Cloud Solutions, Q4 2014

by Lauren E. Nelson, November 12, 2014

KEY TAKEAWAYS

Virtustream And Datapipe Lead The Pack

Forrester's research uncovered a market in which Virtustream and Datapipe lead the pack. CSC, HP, Dell, Blue Box, and Joyent follow close behind. CenturyLink, Rackspace, Verizon, AT&T, and Fujitsu offer competitive solutions, while VMware, Canopy, Orange Business Services, and VooServers lag.

A Hosted Private Cloud Or A Dedicated Public Cloud Environment?

The hosted private cloud market contains two categories of vendors: 1) those that see it as a hosted version of a private cloud environment and 2) those that see it more as a dedicated version of a public cloud environment. Building a custom private cloud environment using the expertise of a cloud partner requires a vastly different solution than a highly automated, highly scalable, and standardized service to quickly scale out.

Vendor Shortcomings: Hybrid Cloud Capabilities And Automation Capabilities

The hosted private cloud market is still young. Although reporting and network security services help differentiate vendors today, long term, customers will look to hosted private cloud providers to provide hybrid cloud management and fully automated services. Today most vendors allow provisioning of public cloud services through their portal but don't allow load balancing or movement of workloads.

Access The Forrester Wave Model For Deeper Insight

Use the detailed Forrester Wave model to view every piece of data used to score participating vendors and create a custom vendor shortlist. Access the report online and download the Excel tool using the link in the right-hand column under "Tools & Templates." Alter Forrester's weightings to tailor the Forrester Wave model to your specifications.

The Forrester Wave™: Hosted Private Cloud Solutions, Q4 2014

Virtustream And Datapipe Lead The Way, With CSC, HP, Dell, And Blue Box Close Behind

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WHY READ THIS REPORT

This emerging market Forrester Wave™ report focuses on hosted private cloud solutions. In our 25-criteria evaluation, we identified the 16 most significant providers — AT&T, Blue Box, Canopy, CenturyLink, Computer Sciences Corp. (CSC), Datapipe, Dell, Fujitsu, HP, Joyent, Orange Business Services, Rackspace, Verizon, Virtustream, VMware, and VooServers — in the category and researched, analyzed, and scored them. This report details our findings on how well each vendor fulfills enterprise customer requirements to help infrastructure and operations (I&O) pros select the right partner for their hosted private cloud solution.

Table Of Contents

Notes & Resources

Forrester conducted solution demos and customer reference calls in July and August 2014. Customer references are anonymous and confidential.

Related Research Documents

Vendor Landscape: Private Cloud Overview
September 10, 2014

Adoption Profile: Hosted Private Cloud, North America And Europe, Q3 2013
March 14, 2014

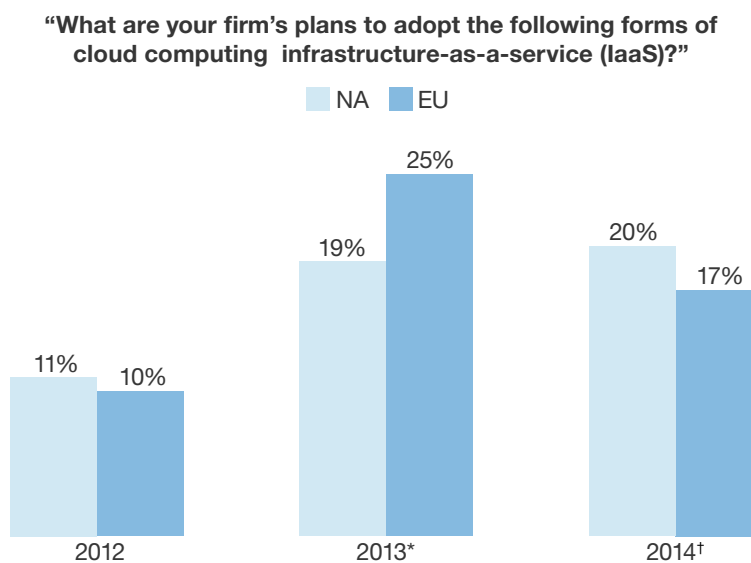The Forrester Wave™: Hosted Private Cloud, Q1 2013
January 17, 2013

MARKET STANDARDIZES ON PLATFORMS BUT VARIES ON KEY CHARACTERISTICS

In Q1 2013, Forrester published its first vendor evaluation on the hosted private cloud market.[1] At the time, the two major hosted private cloud use cases were public cloud extension and a supported alternative to building an internal private cloud environment. Since that time, a wealth of new players have entered the market, and reported North American and European enterprise hosted private cloud adoption has shown an increase from 11% in 2012 to 21% in 2013, and back to 19% in 2014 (see Figure 1).[2] Hosted private cloud continues to be more varied among service providers, while the cloud platforms that sit beneath these solutions have largely standardized.

Figure 1 Hosted Private Cloud Adoption Since 2012

**"What are your firm's plans to adopt the following forms of
cloud computing infrastructure-as-a-service (IaaS)?"**

Base: 401 North American and 141 European hardware decision-makers (1000+ employees)
*Base: 390 North American and 185 European hardware decision-makers (1000+ employees)
†Base: 600 North American and 436 European hardware decision-makers (1000+ employees)

 Source: Forrester's Forrsights Hardware Survey, Q3 2012
*Source: Forrester's Forrsights Hardware Survey, Q3 2013
†Source: Business Technographics Global Infrastructure Survey, 2014

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Continue To Expect Variability In The Hosted Private Cloud Market

What is hosted private cloud? Like almost every product in the cloud space, there's a lot of ambiguity about what you'll be getting if you sign on to use a hosted private cloud solution. Today, the National Institute of Standards and Technology (NIST) defines private cloud as:

Cloud infrastructure provisioned for exclusive use by a single organization comprising multiple consumers (e.g., business units). It may be owned, managed, and operated by the organization, a third party, or some combination of them, and it may exist on- or off-premises.[3]

Hosted private cloud refers to a variation of this, where the solution lives off-premises in a hosted environment and assumes some level of dedication to a single organization. According to our Forrester Business Technographics® Global Infrastructure Survey, 2014, 19% of North American and European enterprises state that they have adopted a hosted private cloud solution.[4] Despite the relatively standard definition, there's a great deal of variation that continues in today's hosted private cloud arena. If you're exploring this deployment type, be ready for substantial variability, especially in the following basic areas:

- **Inconsistent management of solution layers.** With infrastructure-as-a-service (IaaS), according to NIST, the "consumer does not manage or control the underlying infrastructure but has control over operating systems, storage, and deployed applications."[5] But it's common for cloud providers — a traditional cloud provider or the cloud administrator in an internal private environment — to manage layers above the infrastructure layer. This varies greatly within the hosted private cloud market today (see Figure 2).[6]

- **Inconsistent tenancy of infrastructure components.** Supposedly, hosted private and virtual private clouds primarily differentiate themselves by complete isolation versus virtual separation of the underlying infrastructure components (e.g., compute is most common, followed by storage, then network). When evaluating providers, make sure you understand how resources are separated so that the security, compliance, and licensing implications are clear from the start.

- **Inconsistent nomenclature.** Today there are many names for the same or similar products. You're probably working through the long list of terms already. Forrester has thus far seen the following referred to as hosted private solutions: private cloud, dedicated public cloud, dedicated enterprise cloud, enterprise cloud, private-cloud-as-a-service, managed private cloud, and virtual private cloud. Many of these same terms translate to entirely different products for other vendors. Don't take the name at face value; you'll need to do some vetting.

- **Inconsistent customization.** Cloud by definition should be a standardized set of IT resources. Although public clouds standardize resources across all customers, this is not a safe assumption for hosted private. Some hosted private cloud providers center their business on creating private cloud environments built on custom hardware with custom contracts for their users, thus becoming more of a private cloud that is managed and hosted by a third party, rather than a standardized cloud service with segmentation between users. Pricing, contract length, and time-to-delivery are largely tied to the level of customization available for customers. Customers that view hosted private as an alternative to private cloud like additional customizations, whereas those focused on a more secure public cloud option should look to the more standardized offerings.

Figure 2 Breaking Down Variations Across The Hosted Private Cloud Market

	Based on a standard cloud platform?	Minimum contract term	Customization		Isolation		Highest layer managed	
			Infra.	Contract	Compute	Storage	Default	Optional
AT&T	vCloud Director/ vCloud Automation Center	1 year	Yes	Yes	Dedicated	Both	Hypervisor	OS, application
Blue Box	OpenStack	1 year	No	No	Dedicated	Both	Hypervisor	OS, application
Canopy	vCloud Automation Center, vCOPs	3 years	Yes	Yes	Dedicated	Both	OS	Application
CenturyLink	vCloud Director –> vSphere	1 year	No	No	Dedicated	Both	Hypervisor	OS, application
CSC	--	1 year/ 3 months	No	No	Dedicated	Both	Hypervisor	
Datapipe	Apache CloudStack	1 year	No	No	Both	Both	OS	Application
Dell	vCloud Director	1 year	No	No	Dedicated	Both	Hypervisor	OS
Fujitsu	--	1 year	Yes	Yes	Both	Multitenant	Hypervisor	
Joyent	--	None	No	No	Both	Both	OS	
HP	OpenStack	1 year	Yes	Yes	Both	Dedicated	OS	Application
Orange	BMC CLM	3 years	Yes	Yes	Dedicated	Dedicated	OS	Application
Rackspace	OpenStack	1 year	No	Yes	Dedicated	Both	Hypervisor	Application
Verizon	vCloud Director	1 year	Yes	Yes	Dedicated	Dedicated	Hypervisor	
Virtustream	--	None	No	No	Both	Both	Hypervisor	OS, application
VMware	vCloud Director	1 month	No	Yes	Both	Dedicated	Hypervisor	
VooServers	OnApp	1 month	No	No	Both	Both	Hypervisor	

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The Common Platforms That Run Today's Hosted Private Clouds

Beneath every hosted private cloud solution is IaaS cloud platform software.[7] This is the foundational layer that abstracts existing physical and virtual resources and presents them as an IaaS cloud environment. Core cloud platform capabilities include self-service request workflows, resource management, automated provisioning (through element automation tools), and basic resource usage reporting. Hosted private cloud providers can either develop/maintain their own unique cloud platform in addition to their cloud management capabilities and infrastructure resources, or they can choose to leverage an existing common cloud platform that is maintained and advanced by a third party or open source foundation. Customers can sometimes benefit from portability and interoperability between providers using the same platform, but this isn't always the case. Our evaluation included a mix of solutions based on custom cloud platforms and the following standardized common cloud platforms:

- **OpenStack.** OpenStack is an open source cloud platform with a massive ecosystem of vendors, many of whom offer OpenStack distribution and added services to facilitate adoption. The most current version, Juno, is the 10th release and consists of 11 components. To carry the OpenStack label and be listed within the OpenStack Marketplace, the foundation mandates that a solution be built on certain base components and be application programming interface (API)-compatible to enable interoperability between different distributions.[8] OpenStack launched the hosted private cloud portion of the Marketplace in August 2014.

- **VMware's vCloud Director.** VMware offers vCloud Director, a cloud platform solution exclusively for its service provider partners. This software started with a large ecosystem of VMware partners that has since decreased in size after VMware's direct entry into the public and hosted private cloud markets.[9] Although some solutions are still based on vCloud Director, many have abandoned it for other platforms.

- **Apache CloudStack.** CloudStack is an IaaS open source solution commonly used by vendors looking to get a cloud solution up and running quickly.[10] Upon download, CloudStack provides a single solution with core IaaS cloud platform capabilities, but does not provide more complex capabilities, such as template creation and service libraries.

- **OnApp.** Although lesser known by today's enterprise buyers, OnApp's cloud platform has a massive ecosystem of small hosting and managed services providers that are joined together through its OnApp Federation. These providers not only get to leverage a cloud platform layer atop their own resources, but Federation members can tap other service providers within the Federation for excess capacity and geographic reach. This means each provider does not need to have data centers around the world or even significant capacity to offer such values to their clients.

HOSTED PRIVATE CLOUD EVALUATION OVERVIEW

To assess the state of the hosted private cloud market and see how the vendors stack up against each other, Forrester evaluated the strengths and weaknesses of top hosted private cloud vendors.

Our Evaluation Criteria Target Flexibility, Usability, And Hybrid Capabilities

After examining past research, user need assessments, and vendor and expert interviews, we developed a set of evaluation criteria that best reflects what Forrester enterprise clients tell us they value most from hosted private cloud solutions. We evaluated vendors against 25 criteria grouped into three high-level buckets:

- **Current offering.** Each vendor's position on the vertical axis of the Forrester Wave graphic indicates the strength of its current product offering. The key current offering criteria are self-service access, multi-data-center options, upfront configuration options, automation capabilities, customer experience, and security and monitoring capabilities. Combined, these criteria provide a detailed look at the current usability, customization options, complex configuration templates, provisioning times, environment expansion expectations, certifications, and out-of-the-box security features. Forrester used a combination of vendor evaluation responses, documentation, demos, and customer references to complete this section.

- **Strategy.** A vendor's position on the horizontal axis indicates the strength of its go-to-market strategy. Forrester evaluates strategy with planned enhancements, additional hosting options, third-party ecosystem, and cost. Forrester used a combination of vendor evaluation responses, documentation, vendor strategy survey responses, demos, and customer references to complete this section.

- **Market presence.** The size of the vendor's bubble on the chart indicates its market presence. Forrester evaluates market size with install base, revenue, and geographic presence. Forrester used vendor evaluation responses, documentation, and vendor strategy responses to complete this section.

Evaluated Vendors Meet Geographic, Management, and Dedication Requirements

Forrester included 16 vendors in the assessment: AT&T, Blue Box, Canopy, CenturyLink Technologies, Computer Sciences Corp., Datapipe, Dell, Fujitsu, HP, Joyent, Orange Business Services, Rackspace, Verizon, Virtustream, VMware, and VooServers. Each of these vendors (see Figure 3):

- **Had a generally available (GA) solution as of May 1, 2014.** Forrester used May 1, 2014, as the cutoff date for solutions included in this evaluation. Unlike software distributions, service offerings are ever-evolving. Although a solution may be generally available by a certain date, features may be added to that service. To control for this within the evaluation, Forrester used June 1, 2014, as the feature and product enhancement cutoff date.

- **Has cloud solution offering infrastructure services in a hosted facility.** This evaluation only evaluates offerings hosted in vendor data centers that meet the core requirements of a cloud service as defined by NIST.[11]

- **Has data center presence in at least two major geographic regions.** International presence is key for large enterprise clients searching for high-redundancy solutions and geographic diversity. Forrester only evaluated solutions that had presence in at least two of these three major regions: the US, Western Europe, and Asia Pacific (APAC).

- **Manages no higher than the OS layer by default.** As noted above, NIST specifies that in a true IaaS model, the provider only manages the infrastructure layer, with the end user taking responsibility for the OS and application layers. Typically in the hosted private cloud deployment model, providers also manage the OS layer as a value-add to their customers.

- **Has compute dedicated to customers by default.** As noted above, hosted private cloud carries many meanings with varying levels of resource isolation between other customers. At a minimum, Forrester required solutions to provide physically dedicated compute by default. Most solutions within this evaluation share storage and/or network resources despite "dedicated" claims.

Figure 3 Evaluated Vendors: Product Information And Selection Criteria

Vendor	Product	Release date
AT&T	AT&T Private Cloud	December 2013
Blue Box	Blue Box Cloud	April 2014
Canopy	Canopy Enterprise Private Cloud	May 2013
CenturyLink	CenturyLink Dedicated Cloud	April 2014
CSC	BizCloud VPE and BizCloud Dedicated	July 2012
Datapipe	Stratosphere	May 2014
Dell	Dell Cloud Dedicated (DCD)	February 2014
Fujitsu	Fujitsu Cloud IaaS Private Hosted	September 2012
Joyent	Hosted SmartDataCenter	November 2013
HP	HP Helion Managed Private Cloud	May 2014
Orange	Private Cloud Solutions	September 2013
Rackspace	Rackspace Private Cloud	June 2013
Verizon	Enterprise Cloud Private Edition	March 2012
Virtustream	xStream	March 2013
VMware	vCloud Air Dedicated Cloud	September 2013
VooServers	VooServers Private Cloud	October 2013

Vendor selection criteria

The hosted cloud solution is generally available by May 1, 2014
Cloud solution offering infrastructure services in a hosted facility
Data center presence in at least two major geographic regions
Manages no higher than the OS layer by default
Has compute dedicated to customers by default

## STILL EARLY DAYS AS VENDORS FLOOD THE HOSTED PRIVATE CLOUD MARKET

Simply put, hosted private cloud is an emerging market with a recent influx of new providers. Direct comparisons with the public and internal private cloud market quickly show that these offerings aren't quite finalized and neatly packaged. There is a clear division between vendors that see this market as a hosted version of private cloud and those that see it as a dedicated public cloud solution. In both scenarios, the management capabilities generally outpace customer demand for more scalable cloud-like features. However, this is likely to change within the next couple of years. The evaluation uncovered a market in which (see Figure 4):

- **Virtustream and Datapipe lead the pack.** Two privately held companies lead this evaluation with strong services supporting customer experience, top security and monitoring capabilities, and an intuitive self-service portal. Cloud-first provider Virtustream enhanced its service with a public cloud offering, strong user permissions, and more granular reporting capabilities. By securing additional custom resources in advance, Datapipe achieves the appearance of cloud-like resource expansion for custom environments. Cloud-like delivery times are unusual for highly customizable environments. This approach helps secure customers for early hosted private cloud implementations but may be increasingly difficult to sustain as enterprises start using their service as a cloud rather than as an ever-expanding environment.

- **CSC, HP, Dell, Blue Box, and Joyent follow closely behind.** This diverse assortment of providers generally divides into traditional and cloud-first providers. CSC, HP, and Dell bring their existing hosting experience and massive ecosystems together to offer solutions in this space. HP's offering provides an intuitive user interface (UI) that sits atop a large mix of its existing management software running atop its OpenStack distribution. Both CSC and Dell have recently bolstered their offerings with acquisitions of standalone cloud management solutions. Blue Box is a new, small entrant that provides a highly standardized OpenStack-based solution. Joyent, who did not participate in this evaluation, is a public-cloud-focused provider extending its services into the hosted private cloud space.

- **CenturyLink, Rackspace, Verizon, AT&T, and Fujitsu offer competitive solutions.** This next group is composed of existing hosting providers looking to extend their services (hosting, managed services, or telco) into the cloud space. CenturyLink, Rackspace, and Verizon are all in the midst of significant product changes that are on target for next year. Each of these providers is no stranger to the cloud world but is still working on refining how best to target this space. AT&T focused its service on large customized multinational contracts, while Fujitsu looks to expand its cloud presence outside of the APAC region with a significant global data center (DC) footprint.

- **VMware, Canopy, Orange Business Services, and VooServers lack key features.** This last group, although diverse in company size and hosting experience, is largely composed of new entrants to the market. VMware entered the hosting business in late 2013 and has focused

on core IaaS services while building integrations with its other solutions to fast-track existing customers. Without leveraging its vCloud Automation Center (vCAC) alongside its vCloud Air Dedicated, customers only experience basic cloud platform capabilities without the full management and monitoring features. Canopy is transitioning more custom-built private clouds to a standardized offering that can be delivered more quickly to more customers. Currently Canopy customers experience slow resource delivery, long contracts, and limited storage options. Orange Business Services, like AT&T, targets large customized multinational contracts and, as such, requires long contracts and resource procurement times. VooServers leverages an existing cloud platform to launch its customers into a more scalable model but generally serves a smaller market with specific regional demands from a local partner.

This evaluation of the hosted private cloud market is intended to be a starting point only. We encourage clients to view detailed product evaluations and adapt criteria weightings to fit their individual needs through the Forrester Wave Excel-based vendor comparison tool.

Figure 4 Forrester Wave™: Hosted Private Cloud, Q4 '14
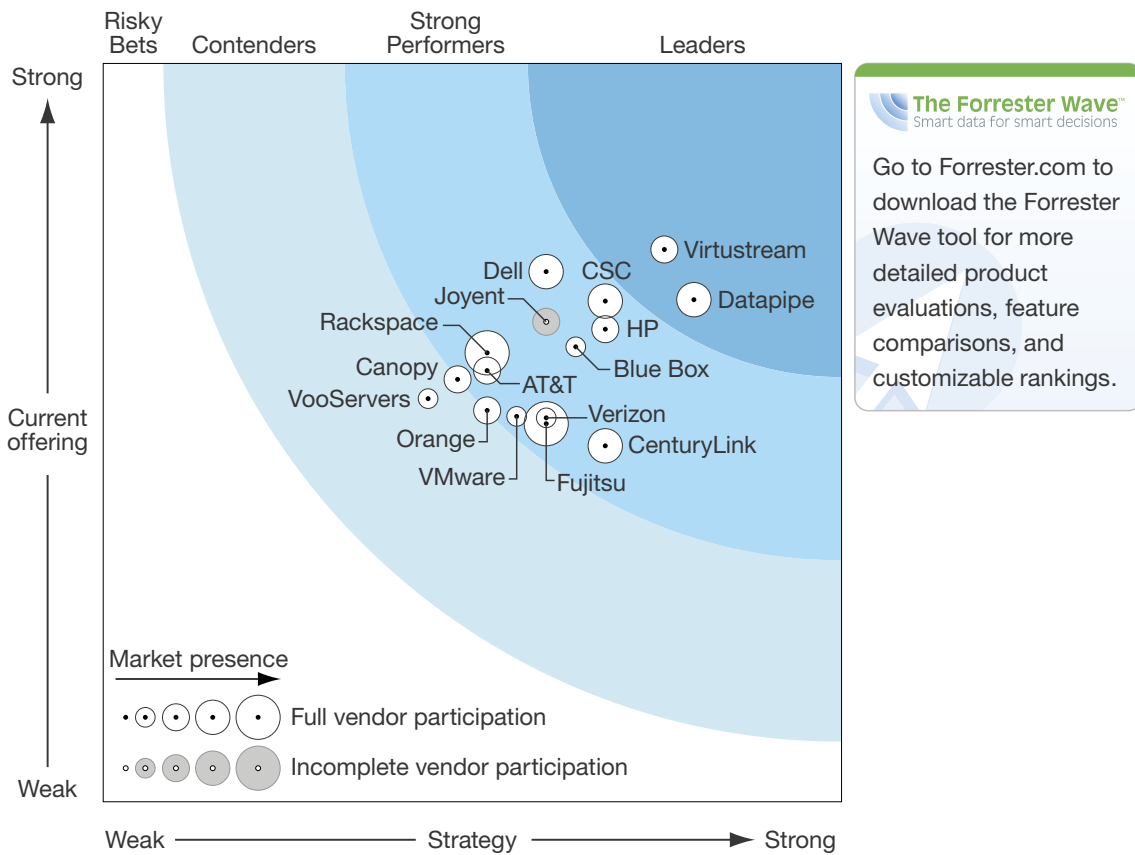
Figure 4 Forrester Wave™: Hosted Private Cloud, Q4 '14 (Cont.)

	Forrester's Weighting	AT&T	Blue Box	Canopy	CenturyLink	CSC	Datapipe	Dell	Fujitsu	HP	Orange	Rackspace	Verizon	Virtustream	VMware	VooServers
CURRENT OFFERING	50%	2.92	3.08	2.86	2.41	3.39	3.40	3.59	2.56	3.20	2.65	3.04	2.60	3.74	2.61	2.73
Self-service access	35%	3.35	3.65	3.55	2.05	3.35	3.20	3.25	2.35	3.15	3.20	3.15	2.50	3.85	2.15	2.70
Multi-data-center options	10%	1.80	1.80	3.00	1.60	2.40	3.00	3.00	3.00	2.40	2.40	2.40	2.40	2.40	3.00	1.00
Automation capabilities	15%	1.00	2.00	2.00	1.00	4.00	3.00	4.00	1.00	3.00	1.00	3.00	1.00	3.00	2.00	3.00
Upfront infrastructure configuration options	10%	4.20	3.00	3.00	4.20	4.20	3.60	5.00	2.80	4.20	3.00	3.60	4.20	3.60	3.40	3.40
Customer experience	20%	3.25	3.35	2.35	3.05	3.30	3.60	3.00	3.30	2.45	2.20	2.95	3.05	4.45	3.10	3.70
Security and monitoring capabilities	10%	4.00	3.50	2.50	3.50	3.00	4.50	4.50	3.50	5.00	4.00	3.00	3.00	4.50	3.00	1.50
STRATEGY	50%	2.60	3.20	2.40	3.40	3.40	4.00	3.00	3.00	3.40	2.60	2.60	3.00	3.80	2.80	2.20
Planned enhancements	60%	2.00	3.00	2.00	3.00	3.00	4.00	3.00	3.00	3.00	2.00	2.00	3.00	4.00	3.00	2.00
Additional hosting options	20%	5.00	3.00	4.00	5.00	5.00	5.00	3.00	4.00	5.00	5.00	3.00	4.00	5.00	2.00	2.00
Third-party ecosystem	20%	2.00	4.00	2.00	3.00	3.00	3.00	3.00	2.00	3.00	2.00	4.00	2.00	2.00	3.00	3.00
Cost	0%	1.00	3.00	1.50	2.00	4.00	4.00	2.00	3.50	3.50	1.00	3.00	1.00	4.50	1.50	5.00
MARKET PRESENCE	0%	2.38	1.40	2.03	3.83	3.73	3.33	3.75	4.48	2.88	2.90	4.28	1.98	2.10	1.75	1.40
Installed base	50%	2.00	1.00	1.00	4.00	5.00	4.00	4.00	5.00	3.00	2.00	4.00	2.00	3.00	2.00	1.00
Revenue	30%	1.25	1.00	1.75	2.75	0.75	1.75	2.50	3.25	1.25	3.00	4.25	1.25	0.00	0.50	1.00
Global presence	20%	5.00	3.00	5.00	5.00	5.00	4.00	5.00	5.00	5.00	5.00	5.00	3.00	3.00	3.00	3.00

All scores are based on a scale of 0 (weak) to 5 (strong).

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VENDOR PROFILES

Leaders

- **Virtustream.** In Forrester's last evaluation, Virtustream was a Strong Performer but got hit hard in scoring due to its lack of a public cloud service to pair with its hosted private cloud. Since that time, Virtustream has not only added a public cloud but has bolstered its self-service capabilities and security and monitoring. In this evaluation, Virtustream's xStream dedicated offering is one of only two Leaders. The solution has many strengths, including its in-depth permissions, strong

service-level agreements (SLAs), long list of certifications, additional hosting options, in-depth user permissions, thorough reporting and monitoring (recently bolstered through its ViewTrust Technology acquisition), contract flexibility, planned enhancements, and low pricing. Today its two weaknesses are its multi-data-center load balancing options, third-party ecosystem, and global data center footprint (US- and UK-centric as of this writing).[12] Overall, Virtustream presents a strong solution for customers looking to use a dedicated cloud service that includes full cloud management capabilities while supporting hybrid deployment of resources.

- **Datapipe.** Managed hosting provider Datapipe aims to deliver choice, governance, usability, compliance, and interoperability for traditional and cloud-based environments through a single management portal. Not only does Datapipe offer its own public cloud solution, but it also offers managed services for applications running on Amazon Web Services (AWS). Datapipe Stratosphere Hosted Private Cloud has a long list of planned enhancements to provide integrations with existing systems and build out advanced data analytics. To provide infrastructure customization for customers while still delivering cloud-like delivery, Datapipe keeps additional capacity available on-site for incremental growth in physical capacity. Datapipe's Stratosphere Hosted Private Cloud has a solid portal, diverse control options, strong SLAs, advanced networking monitoring services, and low prices. It also provided strong customer references and showed breadth in its certifications and additional hosting options. Its two key weaknesses are reporting/metering and contract flexibility.

Strong Performers

- **Computer Sciences Corp. (CSC).** Since the last evaluation, CSC has transitioned from vCloud Director to its own private cloud platform, which is used for both of its offerings: CSC BizCloud and CSC BizCloud VPE. From a high level, CSC brings two similar hosted private cloud solutions to market: BizCloud Virtual Private Edition (VPE) and BizCloud Dedicated Private. Core differences between solutions are minimum contract length and level of isolation/ dedication of infrastructure. For management, CSC customers can choose from its standard cloud management portal, CSC Agility Store, or its more advanced solution, CSC Agility Platform (from its ServiceMesh acquisition). Customers can leverage Agility Platform to manage a long list of other internal and external cloud platforms. CSC BizCloud's strengths include networking options, support capabilities, user permissions, a range of additional hosting options, a large installed base of enterprise clients, and its global presence (15 DCs across eight countries). Areas for improvement identified in this evaluation are control options, third-party ecosystem, automation capabilities, and planned enhancements. BizCloud and BizCloud VPE can also be deployed in customer DCs, but this was not evaluated in this report.

- **HP.** HP Helion Managed Private Cloud ties together a long list of its products: Cloud Service Automation (CSA), Operations Orchestration (OO), Server Automation (SA), Network Automation (NA), CloudSystem Chargeback, Service Manager, Data Protector, Analytics,

Executive Scorecard, Virtual Performance View, Operations Manager, DDMI, and Site Scope.[13] Despite this broad and potentially confusing collection of products, HP's self-service portal cleanly ties these solutions together with a common portal framework for each core component. This solution leverages aspects of OpenStack's APIs but not to the extent that would allow it to be listed as an OpenStack Hosted Private Cloud Marketplace solution.[14] HP leverages its large DC footprint, long list of certifications (including FedRAMP and FISMA Moderate), strong SLAs, and breadth of additional hosting options to enhance its private cloud offering. HP also comes to the table with strong automation capabilities, a range of networking options, and developed network monitoring and security services. Today HP's weaknesses include public-to-private integration, storage options, customer validation/satisfaction (only a single customer reference completed), and contract flexibility.

■ **Dell.** Dell's hosted private cloud environment bundles its Dell Cloud Dedicated (DCD) solution with its Dell Cloud Manager (DCM) portal.[15] Dell Cloud Manager (formerly Enstratius) is a standalone heterogeneous cloud management portal that can sit atop internal or external cloud platforms to manage resources across environments. Its inclusion as part of Dell's hosted private cloud portfolio adds greater private-to-public integration and a more intuitive self-service portal. Although Dell no longer offers a public cloud solution, you can use DCM to connect to a range of preintegrated cloud platforms, including AWS. Today Dell's strengths include automation capabilities, control options, SLAs, and a large global DC footprint. Relative to other evaluated solutions, Dell has limited additional hosting options, support capabilities (not email- or portal-based support), certifications, and user permissions.

■ **Blue Box.** Blue Box Cloud leverages the OpenStack cloud platform, embraces other open source solutions (e.g., Puppet, Chef, Cloud Foundry), and avoids customization wherever possible. This solution only became generally available early in 2014 and as of this evaluation had just 12 customers; however, its referenced users were satisfied and considered the solution to be strong. In fact, Blue Box was the only vendor in the evaluation to provide three customer references, two of whom provided direct access to the service for their developers. Blue Box's key strengths include control options, strong user interface, support options, and a solid third-party ecosystem due to its OpenStack-based approach. As a small cloud-first vendor, it's little surprise that its limitations include SLAs, breadth of storage options, and global presence.

■ **Joyent.** Despite taking its focus away from hosted private cloud environments toward its other solutions, Joyent still fares well in this evaluation.[16] The company built its hosted private cloud environment with the same SmartOS technology used in its public cloud. Its architecture is designed to maximize resource efficiency and performance. For its hosted private model, Joyent adds a doubled security hull with its SmartOS technology to ensure isolation between tenants while providing fully dedicated and physically isolated compute resources.[17] Since the last evaluation, Joyent has added object storage and granular user permissions, including user image libraries, HIPAA compliancy, and lower prices. Joyent was the only nonparticipating vendor in this evaluation.

- **CenturyLink.** Change is afoot at CenturyLink: It's finally getting out in front of its Qwest and Savvis acquisitions and using its more recent acquisition, Tier3, to bolster its software and build out a complete cloud portfolio. This evaluation catches CenturyLink in the middle of a total rework of its cloud solution, switching from vCloud Director to Tier3's vSphere-based cloud platform. CenturyLink's Dedicated Cloud (formerly Savvis Symphony Dedicated Compute) is focused on delivering dedicated security, high availability, and end-to-end managed services. Key differentiators include network options, support capabilities, and additional hosting options with one of the larger install bases and a diverse global data center footprint. CenturyLink's user permissions, control options, contract flexibility, and automation capabilities were lacking.

- **Rackspace.** Rackspace continues its investment in the OpenStack project with its hosted private cloud solution, Rackspace Private Cloud.[18] During the last evaluation, Rackspace combined two separate offerings for customers seeking hosted private cloud. Rackspace has since replaced them with a single offering that continues to wrap in additional OpenStack components as they mature, which serves as both a strength and weakness for Rackspace. Thus far, it's successfully been able to deliver an intuitive portal, diverse control options, granular user permissions, strong support capabilities, numerous certifications, and large global DC footprint. However, Rackspace is dependent on OpenStack rapidly maturing in order to address its core weaknesses — reporting and metering, automation, multi-data-center portability — and the strength of its SLAs across various infrastructure layers.

- **Verizon.** Evaluating Verizon's solution was challenging because its hosted private cloud offering, Enterprise Cloud Private Edition, is undergoing significant changes, including a full portal revamp. Mid-evaluation, in August 2014, Verizon released Verizon Cloud and its new Verizon Cloud Console for management of all client cloud resources. However, this evaluation scores Verizon on its capabilities as of June 1, 2014, to ensure consistency across the evaluation, so many of these features are not represented in Verizon's scores. Within this evaluation, Verizon's strengths include diverse network options, strong support capabilities, a broad range of certifications, and full breadth of additional hosting options — all of which hold true in its new Verizon Cloud solution. Its weaknesses include a self-service portal, limited control options and automation capabilities, lack of public-to-private integration and network monitoring/security, and high prices. Its new offering provides access to its third-party ecosystem in Marketplace, increases storage options, and replaces its cloud portal with a more intuitive one. On the other hand, Verizon takes a significant step backward, moving from a one-year minimum contract to a four-year minimum contract for its hosted private cloud service.

- **AT&T.** AT&T Private Cloud, based on VMware's vCAC, delivers custom-designed hosted private cloud environments. Although customization attracts complex, large global contracts, this means a slower contract process and delivery of infrastructure resources to clients. AT&T's key differentiators include its user permissions, network options, certifications and audits (including FedRAMP), breadth of additional hosting options, and data center footprint. Today

this service is available in 37 DCs across 11 countries, which is the largest footprint within this evaluation.[19] Alternatively, AT&T is relatively expensive, lacks response time guarantees of support services, and its SLAs only cover server and OS availability rather than complete infrastructure resources.

- **Fujitsu.** Japanese multinational provider Fujitsu is the second-largest IT service provider in this evaluation, with DCs across 30 unique cities and 15 countries. Fujitsu's cloud strategy focuses on global presence and connectivity for customers with a diverse portfolio of hosting and managed service options. Although Fujitsu continues to be a dominant cloud provider in the Asia Pacific region, it's looking to extend its footprint to include a greater percentage of multinational companies.[20] Today the strengths of Fujitsu Cloud IaaS Private Hosted include customer validation and satisfaction, a wealth of additional hosting options, large install base, and significant global DC presence. Relative to other evaluated solutions, Fujitsu has limited control options, automated capabilities, and storage options; less developed public-to-private integration options; and a less intuitive self-service portal.

- **VMware.** VMware targets its existing customers with its vCloud Air Dedicated Cloud service (formerly vCloud Hybrid Service Dedicated), which was generally available in September 2013. As a standalone service, VMware's vCloud Air (vCAir) offering is missing many of the key management functions that a hosted private cloud service should deliver, making its customers dependent on a solution that isn't included in the pricing or core service. Although the platform itself uses vCloud Director to deliver the majority of its functionality, its in-depth management tools, complex multi-VM templates, and hybrid cloud templates require the use of its vCAC and vCloud Operations Center (vCOPs), which are sold separately.[21] VMware's free vCloud Connector solution does provide basic multi-VM templates through vApps. Without vCAC and vCOPs within the core service, VMware's weaknesses relative to other evaluated solutions include portal usability, user permissions, reporting and metering, private-to-public integration, storage options, support capabilities, network monitoring and security, the additional hosting options available, and high prices. vCAir Dedicated's strengths are its network options and certifications.

- **Canopy.** Canopy is a joint venture between Atos, which owns the majority stake, EMC, and VMware, who have combined their strengths to deliver preintegrated and service-supported solutions like Canopy's Enterprise Private Cloud (EPC).[22] This solution uses VMware's vCAC solution atop prebuilt VCE infrastructure, supported by managed services from Atos. Canopy launched EPC in late 2013 and is still establishing itself as a standardized deliverable. EPC currently has limited storage options, a shortlist of additional hosting options, and few established customers that are using the full automation capabilities available. Canopy sells its solution in both a capex and opex model where infrastructure resources are either purchased in advance or leased within a minimum three-year contract. Forrester only evaluated EPC as a hosted private cloud offering, but EPC is also available as an on-premises managed private cloud solution. Canopy did not complete a live demo of its solution.

- **Orange Business Services.** Orange Private Cloud leverages the BMC Cloud Lifecycle Manager (CLM) private cloud suite atop its own infrastructure. Its focus is to deliver custom private cloud environments to meet complex customer requirements. If your hosted private cloud vision is a custom cloud that meets the complexity of your organization, Orange is one of the vendors you should consider. However, enterprises looking for low costs, fast onboarding, and fast deployment times likely won't choose Orange. Orange combines its strengths as a global integrator of telecommunication services and its customer base of large multinational enterprises with BMC's highly customizable private cloud suite to fine-tune a hosted private cloud offering that caters to very specific infrastructure, compliance, and integration requirements. Because so much customization is required up front to build out its solution, Orange didn't complete a live demo. Orange Private Cloud's strengths include reporting and metering, support capabilities, SLAs, network monitoring, additional hosting, and a global DC footprint. Its weaknesses are automation and high pricing. Orange failed to complete any customer references for its evaluation.

Contender

- **VooServers.** VooServers is a small, specialized UK hosting provider that entered the cloud market by joining the OnApp Federation. VooServers Private Cloud is based on OnApp's cloud platform atop dedicated VooServers resources. Although this service only had 17 customers during Q2 2014, this number is growing, and VooServers had at least 21 customers as of the end of Q3 2014. VooServers' strengths include an intuitive portal, low prices, diverse network options, contract flexibility, and high customer satisfaction. Its weaknesses include public-to-private integration, reporting and monitoring, storage options, list of certifications, install base, and additional hosting options. Many OnApp-based cloud providers allow customers to leverage resources across their expansive ecosystem. OnApp is looking to enable this federation-based scaling option in the upcoming year.

SUPPLEMENTAL MATERIAL

Online Resource

The online version of Figure 4 is an Excel-based vendor comparison tool that provides detailed product evaluations and customizable rankings.

Survey Methodology

In Forrester's Business Technographics® Global Infrastructure Survey, 2014, Forrester conducted a mixed methodology phone and online survey fielded in June and July 2014 of 3,190 business and technology decision-makers located in Australia, Brazil, Canada, China, France, Germany, India, New Zealand, UK and US from companies with two or more employees.

Forrester's Forrsights Hardware Survey, Q3 2013, was fielded to 2,306 IT executives and technology decision-makers located in Canada, France, Germany, the UK, and the US from SMB and enterprise companies with two or more employees. This survey is part of Forrester's Forrsights for Business Technology and was fielded from June 2013 to August 2013. ResearchNow fielded this survey online on behalf of Forrester. Survey respondent incentives include points redeemable for gift certificates. We have provided exact sample sizes in this report on a question-by-question basis.

Forrester's Forrsights Hardware Survey, Q3 2012, was fielded to 2,330 IT executives and technology decision-makers located in Canada, France, Germany, the UK, and the US from small and medium-size business (SMB) and enterprise companies with two or more employees. This survey is part of Forrester's Forrsights For Business Technology and was fielded from June 2012 to August 2012. LinkedIn Research Network fielded this survey online on behalf of Forrester. Survey respondent incentives include gift certificates and research reports. We have provided exact sample sizes in this report on a question-by-question basis.

Forrester's Business Technographics provides demand-side insight into the priorities, investments, and customer journeys of business and technology decision-makers and the workforce across the globe. Forrester collects data insights from qualified respondents in 10 countries spanning the Americas, Europe, and Asia. Business Technographics uses only superior data sources and advanced data-cleaning techniques to ensure the highest data quality.

We have illustrated only a portion of the survey results in this document. To inquire about receiving full data results for an additional fee, please contact data@forrester.com or your Forrester account manager.

Data Sources Used In This Forrester Wave

Forrester used a combination of four data sources to assess the strengths and weaknesses of each solution:

- **Recorded script-based demos.** Vendors spent one hour demonstrating various key functionality using a script-based testing methodology. If the vendor could not complete a section, it was then asked to verbally indicate this and move on to other sections. We evaluated each product using the same script, creating a level playing field by evaluating every product on the same criteria.

- **Vendor criteria fulfillment questionnaire.** Forrester surveyed vendors on their capabilities as they relate to the evaluation criteria. Once we analyzed the completed vendor surveys, we conducted vendor calls or documentation where necessary to gather details of vendor qualifications.

- **Vendor strategy surveys.** Forrester surveyed vendors on strategy and planned enhancements as they relate to the evaluation criteria. Once we analyzed the completed vendor surveys, we conducted vendor calls or documentation where necessary to gather details of vendor qualifications.

- **Customer reference calls.** To validate product and vendor qualifications, Forrester also conducted reference calls with three of each vendor's current customers. Due to market immaturity, many vendors struggled with securing three customer references. Forrester indicates the number of references completed in the text of each vendor's detailed tab within the Forrester Wave spreadsheet.

The Forrester Wave Methodology

We conduct primary research to develop a list of vendors that meet our criteria to be evaluated in this market. From that initial pool of vendors, we then narrow our final list. We choose these vendors based on: 1) product fit; 2) customer success; and 3) Forrester client demand. We eliminate vendors that have limited customer references and products that don't fit the scope of our evaluation.

After examining past research, user need assessments, and vendor and expert interviews, we develop the initial evaluation criteria. To evaluate the vendors and their products against our set of criteria, we gather details of product qualifications through a combination of lab evaluations, questionnaires, demos, and/or discussions with client references. We send evaluations to the vendors for their review, and we adjust the evaluations to provide the most accurate view of vendor offerings and strategies.

We set default weightings to reflect our analysis of the needs of large user companies — and/or other scenarios as outlined in the Forrester Wave document — and then score the vendors based on a clearly defined scale. These default weightings are intended only as a starting point, and we encourage readers to adapt the weightings to fit their individual needs through the Excel-based tool. The final scores generate the graphical depiction of the market based on current offering, strategy, and market presence. Forrester intends to update vendor evaluations regularly as product capabilities and vendor strategies evolve. For more information on the methodology that every Forrester Wave follows, go to http://www.forrester.com/marketing/policies/forrester-wave-methodology.html.

Integrity Policy

All of Forrester's research, including Forrester Waves, is conducted according to our Integrity Policy. For more information, go to http://www.forrester.com/marketing/policies/integrity-policy.html.

ENDNOTES

[1] Forrester's initial hosted private cloud Forrester Wave report featured eight vendors and focused on their offerings that were generally available as of September 1, 2012. For more information, please see the January 17, 2013, "The Forrester Wave™: Hosted Private Cloud, Q1 2013" report.

[2] Adoption numbers heading into 2014 have stayed stagnant with 19% of NA and EU enterprises adopting hosted private cloud in 2014; Forrester believes this is not because of waning interest in hosted private cloud, but due to a confluence of factors, including the earlier misidentification of hosting platforms as "hosted private cloud" by survey respondents, as well as a decrease in "cloudwashing" by vendors and technology management professionals. Source: Forrester's Business Technographics® Global Infrastructure Survey, 2014.

[3] Source: "Cloud Computing Synopsis and Recommendations," National Institute of Standards and Technology, May 2012 (http://csrc.nist.gov/publications/nistpubs/800-146/sp800-146.pdf).

[4] Source: Forrester's Business Technographics® Global Infrastructure Survey, 2014.

[5] Source: "The NIST Definition of Cloud Computing," National Institute of Standards and Technology, September 2011 (http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf).

[6] What's the value-add? For an internal environment, this could mean persuading users to stay away from rogue public cloud usage. For an external solution, this could be a highly requested feature that differentiates from another market solution. In the hosted private cloud space, this translates into difficult direct comparisons between solutions in terms of cost scenarios and SLAs.

[7] Every private cloud deployment requires a software management layer for admin, security, and resource provisioning functions, often referred to as IaaS (infrastructure-as-a-service). An intuitive interface combined with a robust toolset and smooth interoperability with the rest of the tech stack will make your private cloud deployment a success. For more information on available offerings in the IaaS marketplace today, please see the upcoming Forrester report "Vendor Landscape: Private Cloud Software."

[8] For each deployment model, it seems that the required base components that the solution must be based on differ. For more information, please see the May 23, 2014, "Quick Take: OpenStack Summit, Q2 2014" report.

[9] VMware reported an increase in revenue generated by vCloud Director in recent years.

[10] There are four major platforms for running a hosted private cloud in the market today, although Forrester expects that OpenStack will become a new de facto standard by the end of 2014. For more information, please see the March 21, 2014, "State Of Cloud Platform Standards: Q1 2014" report.

[11] Source: "The NIST Definition of Cloud Computing," National Institute of Standards and Technology, September 2011 (http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf).

[12] Its APAC data center is available through partners only.

[13] HP Helion Managed Private Cloud is one of two HP private cloud offerings. Its other offering, HP Helion Managed Virtual Private Cloud, was not evaluated in this report.

[14] Vendors that meet the OpenStack Foundation requirements for being an OpenStack solution are listed on its OpenStack Marketplace page. HP Helion Community Edition is listed among distributions, but its hosted private cloud is not listed within this marketplace. Source: OpenStack (http://www.openstack.org/marketplace/hosted-private-clouds/).

[15] Although DCD can be sold separately (it typically isn't), this evaluation scores the combined solution. Pricing assumes both products in use, and customers typically leverage both.

[16] Where it has even removed the product from a standard view on its website.

[17] Joyent uses a unique double-hulled security structure to isolate tenants within dedicated resources. Its SmartOS invokes the use of Solaris-style zones in virtualization, where one OS supports the operation of many VMs instead of each VM having its own OS. Each host has one OS, not a whole set of them, with more efficient multi-tenant operations. Joyent uses a ZFS file system to allow only verified movement of files. This approach ensures data movement in the cloud, which is file-system supervised. Since this approach is less common, it is foreign to many malware writers. If an intruder gets beyond the perimeter into the Joyent cloud, he lands in an unrecognizable OS that acts differently. Source: Joyent (https://www.joyent.com/technology/smartos).

[18] Source: OpenStack (http://www.openstack.org/marketplace/hosted-private-clouds/).

[19] For the purposes of this report, we are counting Hong Kong as a separate country from China.

[20] Seven percent of enterprise business and technology decision-makers reported adoption among Asia Pacific companies. Source: Forrester's Business Technographics® Global Infrastructure Survey, 2014.

[21] In May 2013, VMware made a significant announcement that it was entering the external cloud market with two variations of its vCloud Hybrid Service, which has since been renamed vCloud Air.

[22] EPC is one of two hosted private cloud solutions offered by Canopy. Its other solution, Canopy Cloud Infrastructure Services (CIS), was not evaluated in this report.

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