



The Path to Private Cloud  
6 Things You Need to Know





“Virtualization isn’t just a set of technologies buried in infrastructure. It has important ramifications for the business use of IT, and for business itself. Virtualization changes how IT is acquired, managed and used, and challenges how software is supported and licensed. It will influence new forms of applications and has become an enabler of cloud computing.”

Gartner, Inc.,  
Hype Cycle for Virtualization,  
2012. Philip Dawson and  
Nathan Hill, July 2012.

## Executive Overview

With virtualization now widely deployed in the data center, many large organizations are looking to private cloud for the next wave of business and operational benefits. The initial business driver for virtualization was data center consolidation and IT cost savings. According to Gartner<sup>1</sup>, the second phase of virtualization, “will lead to increased infrastructure agility, inside and outside the data center. The focus on portability leads to improved SLAs, based on more-rapid provisioning, greater scalability, and high availability (HA) and disaster recovery (DR)....”

To realize the full benefits of virtualization and cloud, your network must be as dynamic and elastic as your virtual environment. With virtualization, there is no need to rack, stack and maintain physical servers. As new applications and services are needed, new virtual machines (VMs) can be rapidly and easily provisioned. But provisioning the VM itself is only one piece of the puzzle. Virtual servers and vApps need to be accessible over the network. In order for users and other systems to find and connect to the VM, an IP address and DNS hostname are needed. Virtual data centers and clouds rely heavily upon network infrastructure and core services for application access and connectivity.

IP Address Management (IPAM) provides key capabilities for managing, automating and securing virtual environments and cloud platforms – regardless of the hypervisors you choose to deploy. Wherever you are on your journey to private cloud, a fully automated, reliable and secure network infrastructure with support for multiple cloud-based hypervisors is essential.

In this paper, we look at six things you need to know about virtualization and cloud, and how a heterogeneous IPAM solution can provide a smarter path to private cloud. By implementing the right IPAM solution today, you can bring “cloud-like” agility to your virtual data center, as well as bridge the gap between your data center and private cloud. You will also be better prepared to take advantage of emerging technologies like software-defined networking (SDN) and machine-to-machine (M2M) that will make traditional IP address management practices obsolete.

<sup>1</sup> Gartner Inc., “Hype Cycle for Virtualization, 2012,” Philip Dawson and Nathan Hill, July 2012.



"Due to security and regulatory concerns, larger enterprises have been primarily operating in a trial mode of Private/ Hybrid Clouds. That will change in 2013. Consumers of IT are demanding greater value from IT services.... Organizations that do not pursue Private/ Hybrid Cloud in the near-term will run the risk of ballooning infrastructure costs and missed business expectations."

PwC Global Digital IQ Survey, "The 2013 Top Ten Technology Trends for Business."

## 1. Private cloud is real.

In a recent Gartner poll<sup>2</sup>, 78 percent of respondents said they will pursue a private cloud strategy by 2014. With private cloud, the cloud infrastructure is operated solely by or for a single organization. Hosted and managed internally or by a third-party, the private cloud brings all the benefits of cloud – on-demand capacity, scalability, elasticity and IT cost savings – but with the added security and privacy demanded by large, security-conscious organizations.

While we have been talking about private cloud for a long time, the technology has only recently reached critical mass with organizations moving from private cloud trials into full production. If the deployment of private clouds has been slower than anticipated, it is likely due to the fact that many enterprises have encountered significant management, security and compliance challenges:

**Security** – To mitigate security and compliance risks, organizations need visibility and control of all devices in the cloud and the ability to monitor who is accessing which virtual machines and cloud services and how resources in the cloud are being used.

**Heterogeneity** – Many organizations are building private clouds on open-source hypervisors like Xen and KVM, as well as VMware and Microsoft Hyper-V, creating a growing need for a unified approach to managing and provisioning heterogeneous virtual environments and clouds.

**Agility** – With cloud, you may need to activate and deactivate 100s or even 1000s of workloads. A lack of automation at the network level has pushed IT to the breaking point. IT teams struggle to manually provision an ever-growing number of virtual machines. Insufficient automation not only hinders innovation, it also leads to a subpar return from virtualization investments and a risky transition to private cloud.

Private clouds place a heavy demand on the network services that are critical to business connectivity, availability and application access. They depend upon your ability to on-board devices so cloud resources can be consumed. Private cloud has refocused attention on the importance of a rock-solid network infrastructure to maintain cloud service continuity and agility.

Organizations now recognize that improvements in network automation are required before private clouds are ready for prime time. Leading IP Address Management (IPAM) vendors have stepped up to the challenge with solutions that offer a fresh approach to network and device management, spanning physical, virtual and cloud environments. By focusing on the underlying cloud network, you can ensure that your private cloud is able to maintain a reliable and consistent IT capability – and that your organization can realize the full benefits of the second wave of virtualization.

<sup>2</sup> Gartner, Inc., "Top Five Trends for Private Cloud Computing," February, 2012.



## 2. Xen and KVM – the cloud is open.

While VMware dominates the data center, clouds are much more heterogeneous. Many enterprises are choosing to build their clouds on second-source hypervisors including Microsoft Hyper-V, Xen and KVM. A poll by Gartner<sup>3</sup> asked customers how many hypervisors were currently deployed. Although the majority (87%) noted that VMware was the most important, 95% of respondents indicated that more than one hypervisor was currently in use within their organization.

Just as leading cloud service providers have standardized on open source hypervisors, many enterprises are also opting to build their private clouds on Xen and KVM. While VMware provides mature and sophisticated virtualization and cloud solutions, the cost structure of VMware has made these solutions cost-prohibitive for many organizations. The viability of other hypervisor alternatives also helps enterprises address concerns over a single-vendor virtualization strategy and vendor lock-in.

In order to provide full and flexible support for customers with multi-hypervisor environments, BlueCat has added support for all leading hypervisors. BlueCat is the only IPAM vendor that supports open source KVM and Xen, ensuring that we can deliver our solutions in any cloud environment. BlueCat DNS/DHCP virtual servers can be quickly and easily deployed in each virtual space, whether KVM, Xen, VMware or Microsoft Hyper-V, and centrally managed by a single authoritative IPAM solution for unified visibility and control.

BlueCat has also developed strategic alliances with leading organizations committed to virtualization including Citrix, IBM and CSC to develop and support cloud-ready network solutions. Our partnership with Citrix allows customers to host BlueCat DNS/DHCP servers inside the Netscaler SDX platform, while our partnership with IBM allows our IPAM solution to reside within IBM PureSystems. CSC relies on BlueCat's IPAM solution for their leveraged cloud as well as for a dedicated cloud designed, built and maintained by CSC for CSC's customers.

BlueCat's support for a broad range of hypervisors gives customers the freedom to select the best hypervisor for their application, while benefiting from heterogeneous IPAM automation.



Figure 1: The cloud is open: cloud network management requires a heterogeneous approach.

<sup>3</sup>Gartner, Inc. "Reconsidering Heterogeneous x86 Server Virtualization," Thomas J. Bittman, September 2012.



### 3. The cloud needs automation.

Virtualization makes it possible to stand up a new virtual server in minutes, but this is of no benefit if it still takes days for IT to manually look up an IP address for the virtual server, create a new DNS record and update core network services.

The challenge for most organizations is that the team that manages the network is almost never the same team that manages the virtual infrastructure. In order to connect a VM to the network, the virtualization team needs to open a change request with the network team to provision the IP and DNS information. This fundamental disconnect creates a manual step or hand-off in the end-to-end provisioning process that prevents you from instantaneously adding new services to your cloud. Within many organizations today, a provisioning request may take hours or even days to fulfill. In order to achieve true on-demand elasticity and reduce IT bottlenecks and provisioning errors, you need to automate network requests as part of the virtual provisioning process.

Simply put: manual processes don't work. Spreadsheets, scripts and outdated IPAM tools lack the automation and scale needed to meet the current demands of mobility, virtualization and cloud, much less accommodate emerging technologies like software-defined networking (SDN) and machine-to-machine (M2M) that will put an even greater strain on your network infrastructure. IPAM must be automated and integrated with the virtualization platform of your choice.

Without effective IPAM automation, you will be unable to:

- Automate and accelerate new cloud service provisioning
- Gain visibility and control of all connected devices across your data center and cloud
- Avoid cloud service disruptions resulting from manual configuration errors
- Ensure that every change in your data center and cloud is audited for security and compliance
- Proactively identify and secure rogue networks and wireless hotspots that put business at risk

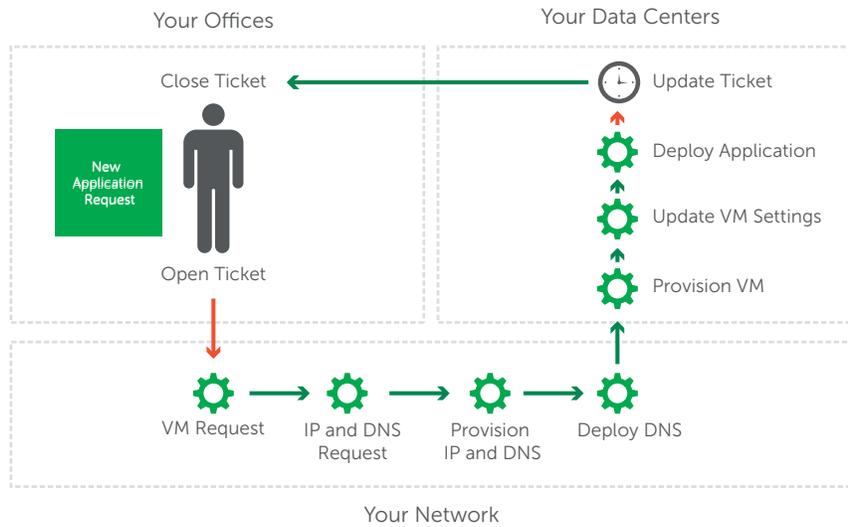


Figure 2: BlueCat IPAM Automation can accelerate SLAs for provisioning and connecting a new VM to the network, reducing the time required to complete a VM request from days to hours or even minutes.

One of the most common reasons private clouds fail is that the underlying network infrastructure is unable to accommodate an unforeseen spike in demand. The BlueCat IPAM platform gives you visibility into cloud network usage and the ability to automatically provision network access to adjust services capacity based on demand. IPAM also opens the door to more intelligent cloud automation and non-human, machine-initiated provisioning in which administrators set pre-determined conditions and policies, and automatically deploy new VMs as needed to meet elastic demand without requiring any IT intervention.



#### 4. The cloud is self-service.

To improve the user experience and quality of service from your private cloud, automation and provisioning must be integrated with a self-service portal to empower users to rapidly self-provision a new virtual machine or cloud service.

In a virtual environment or cloud, the lifecycle of any workload begins with someone making a request for a workload to be created. To reduce the burden on your IT team, these requests need to be made through a self-service portal that minimizes IT involvement and interactions. The user simply visits the online self-service portal, consults a catalog of available virtual and cloud services, selects the type of workload he or she wants to activate and submits the request.

Behind the scenes, a lot has to happen for the user request to be completed in a timely manner. As discussed earlier, private clouds are heavily dependent on the availability of IP addresses and core network services. DNS and IP services are critical for any virtual application hosted in the cloud. This is where IPAM automation comes in. The new service request automatically triggers a request to the IPAM solution to reserve an IP address for the workload and create a DNS entry. The IP address reservation and DNS entry are automatically pushed to the organization's DNS servers and to the self-service portal so that administrators and the user who requested the workload know that the VM is online, has a valid IP address, is reachable via a qualified domain name and is ready for use.

The workload is instantaneously and automatically IP addressed, named and provisioned without any manual intervention from anyone within your IT team. The same efficiencies can be seen for workload deactivations: the user requests that a workload be deactivated via the self-service portal, the request triggers the IPAM solution to automatically delete the DNS record and put the retired workload's IP address or addresses back into the pool for reuse – all without any manual IT intervention.



In addition to eliminating repetitive tasks that can bog down IT staff, automation and self-service makes your cloud network more reliable by connecting your existing IT tools to the centralized DNS and IPAM data needed to validate network changes. The ability to ensure that all core services changes associated with the service request including DNS are queued, validated and completed dramatically reduces the risk of manual network configuration errors that can disrupt cloud services.

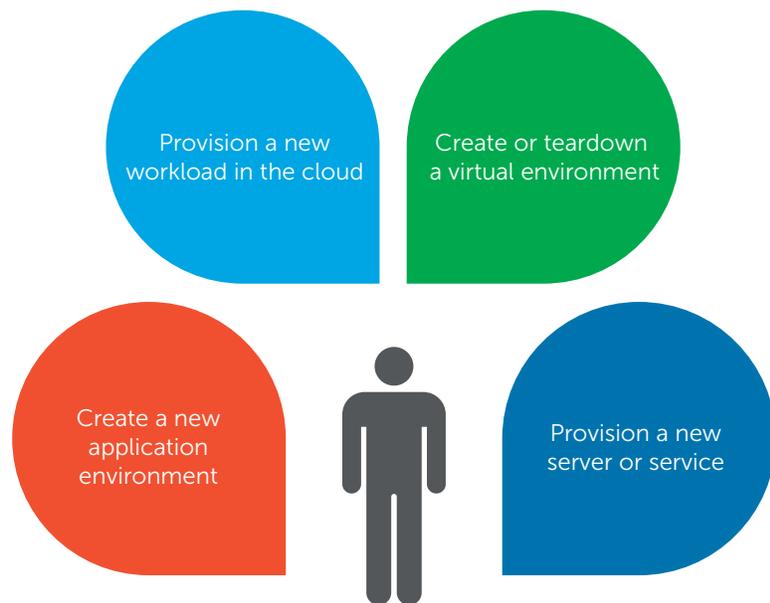


Figure 3: IPAM automation and self-service increases virtual and cloud agility by eliminating the need for users to submit change requests to central IT or the helpdesk for routine network changes.

BlueCat's Automation Manager is an automation and self-service solution that allows you to instantaneously complete critical network requests such as provisioning new virtual machine or cloud service by automating end-to-end IPAM processes and workflow. With BlueCat Automation Manager, you can dramatically reduce turnaround times for completing requests, eliminate manual IT effort that impedes innovation, and empower users with the speed and agility your users expect from private cloud.



## 5. The IP is the key.

Virtualization brings new security and compliance challenges. Organizations lack visibility into how their virtual infrastructure and cloud services are using networks and IP address space. These network “blind spots” put your business at risk.

As a central control point, IPAM provides an authoritative source for information about the cloud network. This rich source of network intelligence is essential for policy enforcement and to monitor which cloud applications are being accessed and by whom.

BlueCat’s IPAM platform allows you to capture the network intelligence you need to answer the “who, what, where and when” questions and quickly make informed management and security decisions. This intelligence extends across wired and wireless networks, physical, virtual and cloud environments, and mobile end points. It encompasses DHCP scopes, IP address utilization, application access, DNS host records, zones, subzones and devices to provide a comprehensive span of control.

Your security team, for example, can leverage the intelligence provided by IPAM to view the relationship between a device, its user, location and IP activity in order to track and rapidly quarantine a device that may be noncompliant or represent a security breach. The ability to view the security posture of all devices on the network provides instant control over network access, application access and device quarantining. Your network team can use network intelligence to monitor IP address usage and reclaim valuable network space for efficient reuse.

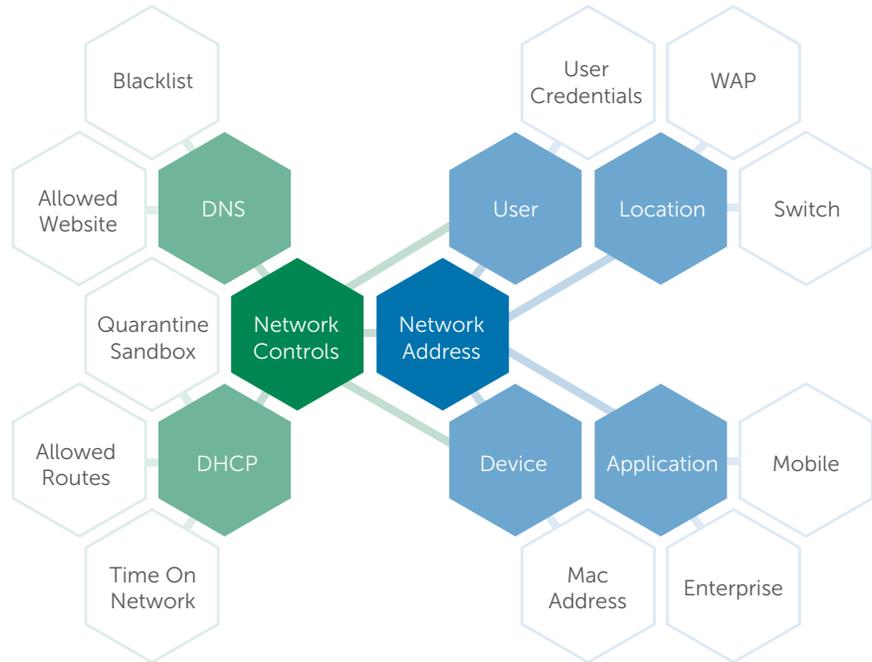


Figure 4: IP Address Management (IPAM) provides a central control point for cloud networks, delivering greater visibility and security.

BlueCat enables you to manage every connected device on the cloud network. By providing deep insight into the relationship between devices, users and IP addresses, you can improve private cloud security and ensure reliable, always-on access to cloud-based applications.



## 6. SDN and M2M are next.

“Cloud, virtualization, M2M and BYOD will crush traditional IP management.”

Andre Kindness, Principal Analyst,  
Infrastructure & Operations,  
Forrester Research, Inc.

Virtualization, cloud and mobile devices have transformed the network. The next wave of disruptive technologies will include software-defined networking (SDN) and the explosion of machine-to-machine (M2M) devices.

Within the next few years, software-defined networking (SDN) will make networks more dynamic, scalable and simpler to manage. With SDN, lower level networking functionality is abstracted into virtual services, allowing administrators to more easily manage network services without having to manually configure routers, switches and other hardware devices. Tomorrow's SDNs will require automated IPAM solutions to provide real-time visibility into the network as it changes. IPAM will also bring control and policy enforcement to SDNs by allowing administrators to monitor and block specific devices and network traffic through DNS.

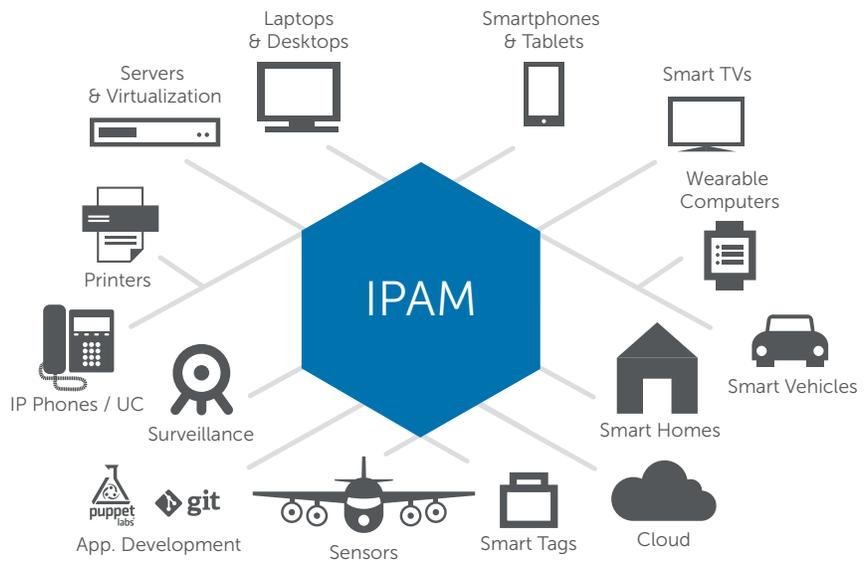


Figure 5: SDN and M2M and will put an even greater strain on the network. Organizations will require an intelligent and automated network infrastructure to connect devices into the cloud network and view, control and secure all connected devices.



In addition to SDN, the machine-to-machine movement will create vast networks of sensors and data collection devices – everything from sensor grids to RFID tags to thermostats to wireless heart monitors and wearable tech will be connected to the network. According to McKinsey Global Institute analysis<sup>4</sup>, over the past five years, there has been a 300% increase in connected machine-to-machine devices and in the near future, there are “1 trillion Things that could be connected to the Internet across industries...” If you are already finding it difficult to manage virtualization and cloud due to a lack of network automation, then you are completely unprepared for M2M.

The sheer volume and scale of M2M – by some estimates there will be 50 billion connected devices by 2020 – will make the transition to IPv6 inevitable, as the already scarce supply of IPv4 addresses will be insufficient.

M2M simply isn't possible without IPv6 and IPv6 isn't possible without IPAM automation: IPv6 is too complex to manage manually with spreadsheets and traditional IPAM tools. Machine-to-machine will also rely on SDN to deliver the scale, on-demand capacity and dynamism required to connect enormous number of devices.

These emerging cloud-based, network-dependent initiatives will make traditional IPAM and manual provisioning obsolete. The automated, scalable and future-ready infrastructure you put in place today for private cloud will mean you will be better prepared to take advantage of SDN and M2M.

<sup>4</sup>McKinsey Global Institute, “Disruptive technologies: Advances that will transform life, business, and the global economy,” May 2013.



## BlueCat starts the cloud.

BlueCat is committed to cloud. By automating and accelerating the workload lifecycle, BlueCat makes managing virtual environments and clouds more agile and efficient. The BlueCat IPAM platform delivers:

- Network intelligence to plan and simplify the migration of networks and applications to the cloud
- A unified view of IP address assets for both internal data centers and private clouds
- Complete integration with IT self-service and cloud automation portals
- Role-based access control with built-in security and compliance auditing

BlueCat offers a number of capabilities to help you realize the benefits of virtualization and cloud, including:

**Connector for VMware** – BlueCat provides an automated solution for assigning IP addresses and updating DNS information directly from within VMware management solutions. Each request for a new VM calls the BlueCat IPAM solution and automatically provisions the correct IP address and DNS name. Administrators can immediately create and deploy IP addresses and DNS hosts for provisioning VMware resources including virtual machines and vApps – all from within the familiar VMware interface.

**Automation and Self-Service** – BlueCat’s automation and self-service solution integrates with your virtual infrastructure, asset management, ticketing, MDM and NCCM systems to automate end-to-end processes, workflow and human interactions. Your users can provision new services via self-service, while the risk of cloud service outages caused by IP address shortages and conflicts is reduced.

**Market-leading Virtualization Support** – With the broadest support for multiple hypervisors, BlueCat IPAM solutions automate and accelerate the provisioning of every workload including VMware, Microsoft Hyper-V, Xen and KVM.

**Multi-tenant Management** – Within your private cloud, various departments, business units and subsidiaries may have very different IT needs, business models, SLAs and regulatory requirements. BlueCat provides the flexibility for tenants to run as distinct entities by providing a dedicated DNS service per tenant. Multi-tenant management provides secure, delegated access and control of everyday DDI and provisioning functions to minimize tenants’ reliance on central IT or the helpdesk.



**Network discovery and reconciliation** – Reconcile IP address utilization and reclaim unused IP address space for on-demand capacity and scalability. A low and high watermark for IP address utilization can be set and the BlueCat IPAM solution will automatically notify you and adapt when it is crossed. Administrators can access real-time IP usage statistics to ensure that the virtual environment is never at risk of running out of IP addresses.

By providing insight into how virtualization is using network space, BlueCat brings intelligence and agility to your virtual data center or private cloud.

### BlueCat Virtualization and Cloud Benefits

#### To Virtualization Admins

#### To Network Admins

Removes the need to go back to the network team for additional IP space or to request DNS/DHCP provisioning for new VMs

Ensures that all the IPs used by VMware are in-sync with IPAM

Works within the VMware UI so no retraining is required

Centralizes auditing of network and IP address usage for all devices (physical and virtual)

Allows VM Team to take advantage of second wave of virtualization benefits (on-demand capacity, elasticity, cloud bursting and scalability)

Visibility into the IP lifecycle associated with all VMs in the virtual environment (from creation to change and deletion)

Enables cloud on-boarding and workload portability through the ability to transparently move IP address assets from the data center to the cloud and back

Ensures optimal usage and recycling of IP addresses assigned to the virtual environment, including increasingly scarce IPv4 address space



## Summing Up

Cloud is all about immediacy. Business users expect to be able to rapidly self-provision a new cloud service or virtual machine. With BlueCat's heterogeneous IPAM solution, critical network configuration tasks required by virtual data centers and private clouds can be fully automated to deliver the speed and agility users expect from the cloud. Whether you need to provision 100 or 1000 servers, BlueCat provide a flexible, simple and scalable solution for building private clouds and delivering reliable cloud services. With the ability to continuously scale your network infrastructure to meet elastic demands, BlueCat makes it faster and easier to leverage your existing virtualization investments to move to a self-service private cloud.

By implementing BlueCat's automated solution for virtualization and cloud, your organization will also be much better prepared to take advantage of the next wave of network-dependent initiatives including SDN and M2M. With unified mobile security, address management, automation and self-service, together with the broadest available support for multiple hypervisors including VMware, Microsoft Hyper-V, Xen and KVM, the BlueCat IPAM platform provides an intelligent, reliable and secure network foundation for all of your current and future IT initiatives



At BlueCat, we believe the explosive growth of connected devices requires a more intelligent network to ensure reliable, secure, always-on application access and connectivity. BlueCat IP Address Management (IPAM) solutions provide a smarter way to connect mobile devices, applications, virtual environments and clouds. With unified mobile security, address management, automation and self-service, BlueCat offers a rich source of network intelligence that can be put into action to protect your network, reduce IT costs and ensure reliable service delivery.

Enterprises and government agencies worldwide trust BlueCat to manage millions of devices and solve real business and IT challenges – from secure, risk-free BYOD to virtualization and cloud automation. Our innovative solutions and expertise enable organizations to build a network infrastructure that is more scalable, reliable and secure, as well as simplify the transition to next-generation technologies including IPv6, DNSSEC, M2M and SDN.

[www.bluecatnetworks.com](http://www.bluecatnetworks.com)