

# IPv6

Are you ready for  
the new Internet?

# IPv6 Needs IP Address Management (IPAM)

IPv6 can not be easily tracked on a spreadsheet.

## Be Prepared

IPv6 is inevitable. Whether you slowly transition services and systems to a dual stack IPv4/IPv6 network or take the plunge with a pure IPv6 environment, your organization needs to prepare for IPv6 now. As available IPv4 addresses become depleted and the number of IPv6-only clients grows, deploying IPv6 means the difference between being seen on the new Internet or being conspicuously absent.

A successful implementation of IPv6 will require accurate knowledge of your IPv4 network in order to map IPv4 to IPv6 addresses. To perform this mapping, organizations need IP Address Management, DNS DHCP solutions. BlueCat Networks has the tools and experience to guarantee a smooth and successful transition to IPv6.

Our easy-to-use solutions allow you to quickly and easily discover your existing IPv4/IPv6 space, model your new IPv6 network and track pure IPv6 and dual-stacked IPv4/IPv6 systems. Our solutions also deliver the core DNS and DHCP services needed to provide IPv6 naming and addressing.

## Length of IPv6 Addresses

IPv6 addresses are 128-bits long and are represented in hexadecimal, a format that is unfamiliar to most people. Added to this is the fact that IPv6 networks and notation will not be as easy to manipulate, which can lead to assignment errors and management headaches.

**IPv6** 2001:fe0d:ba23:cd1f:dcb1:1010:9234:4088

IPv6 provides an extended IP address pool and flexibility in allocating addresses.

**IPv4** 192.121.10.1

The pool of IPv4 addresses is expected to be exhausted sometime within this year.

An IPAM solution will minimize the amount of data entry required. After the blocks and networks are configured, there is no longer any need to handle the actual IPv6 addresses.

## Multiple IPv6 Addresses Per Interface

Another IP address management consideration is the number of IPv6 addresses per interface. Not counting any multicast addresses, three to four IPv6 addresses are required per IPv6 interface:

- Global Unicast – unique public address
- Local unique private IP address – unique private Unicast address
- Local link address – never routed and kept on the shared network
- The loopback address – where ::1 is equivalent to IPv4 127.0.0.1

An IPAM solution will obtain an accurate and up-to-date picture of the state of your IPv6 (and IPv4) network at any time with IP discovery and reconciliation, keeping you current as devices are added and removed from the network.

In all cases, an IP Address Management solution will be required just to properly manage IPv6 addresses. But the need for IPAM starts even before assigning addresses to IPv6 clients – IPAM starts at the planning stage because you need to know the current IPv4 landscape.

To deploy IPv6, you will need an IP address management system capable of discovering your existing IPv4/IPv6 space, modeling out your IPv6 network, tracking IPv6 and dual-stacked IPv4/IPv6 systems, as well as the services, including DNS and DHCP, to provide the IPv6 naming and addressing infrastructure.

Today, IPv6-only traffic represents a relatively small amount of all Internet traffic, but the number of allocated IPv6 addresses is increasing rapidly. This represents a growing trend of new IPv6-enabled ISPs and cable providers who conduct their business using IPv6 exclusively, because they can no longer receive the appropriate IPv4 space they need to service their customers.

On February 3, 2011, the Internet Assigned Numbers Authority (IANA), the international body responsible for distributing IP addresses, completed its final allocation of IPv4 addresses to each of the five Regional Internet Registries. It may take anywhere from three to five months for the registries to distribute the last remaining IPv4 addresses to carriers. When IPv4 addresses are fully exhausted, many new applications and services will only support IPv6.

## Being Ready Means Revenue to Your Business

If you have a Web presence, or if your business extends to emerging markets, then you must consider IPv6 now for public services such as your Web Site. Many parts of the world have already started migration to IPv6, which is why your website is most likely inaccessible to them. Another reason to integrate IPv6 today is that IPv6-only applications are now available to the mass market. Microsoft DirectAccess and many industry-specific applications have adopted IPv6, and deploying them starts with having an adequate IPv6 infrastructure.

New IT projects such as Unified Communication, HD videoconferencing, mobility, network management services for large heterogeneous infrastructures, network automation and other applications that require more than one million new IP devices such as smart grids and sensor networks, provide an excellent opportunity to include IPv6 in your planning. Many new IT projects can benefit from IPv6 with features such as jumbo frames, IPSec integration, multicast improvements, mobile IP, simplified routing in addition to accommodating more IP addresses and to completely bypass NAT to enable better performance and seamless operation.

Don't wait until the last minute to start your IPv6 planning – the loss of connectivity could be costly for you.

# Being Ready Has Real Financial Benefits

While you may not be ready to deploy IPv6, you need to start planning your migration to IPv6. IPv6 is not a matter of “if” but “when”, so your organization needs to understand the benefits of IPv6 and be ready to deploy as soon as you need it.

There are many advantages to getting IPv6-ready now:

- Staying ahead of the competition. You don't want to miss out on business opportunities from IPv6 enabled customers and end-users. As IPv6 traffic grows, ensuring that your website and other public services are IPv6 enabled will be critical to ensure that you capture as much of your target audience as possible.
- Removing the obstacle of lack of IPv4 addresses by using IPv6 addresses. New applications may warrant the need for many more IP addresses or the removal of NAT (Network Address Translation). As you add more IPv4 addresses to your current network today, the greater the IPv6 migration effort you'll be facing later. Start planning for IPv6 with your existing projects.

- Remove cost barriers. IPv6 is inevitable.

Delaying IPv6 will be more costly later because it requires:

- Even denser deployment of IPv4 NAT which results in more resources used against your public IPs that can result in resource starvation
- Using network middleware to convert/translate IPv4/IPv6 traffic
- Diagnosing network problems through NATs and gateways is significantly more complicated
- Automated configuration changes require complicated rules when NATs and Gateways are in the data path

You should start by identifying existing bottlenecks caused by NAT and gateways to see if IPv6 can remove performance obstacles and complexities.

- **Planning well in advance.** Have your plan ready now.

- US government agencies must support IPv6 for all public-facing services including Web, email, DNS and ISP services by September 30, 2012, as announced September 28, 2010 from the Executive Office of the President (Office of Management and Budget – OMB)
- The Australian Government Information Management Office mandated all Australian Government agencies to be IPv6 capable by end of 2012

**Start planning now** – many organizations have already started.

To plan and to eventually deploy IPv6, you will need an IP address management system capable of managing IPv6 addresses without errors.

## To Start the Planning – IPv6 Needs IP Address Management (IPAM)

Before deployment, you will need to discover your IPv4 and IPv6 network assets, plan and model your IPv6 addressing scheme and map your IPv6 network onto existing IPv4 resources.

IPAM provides a disciplined approach to these easy steps in preparing for IPv6:

- Discover and take inventory of your resources for IPv4 and IPv6
- Plan and model the deployment – from the discovery stage, you can plan and model how your IPv6 network should be deployed
- Map your existing IPv4 network to your IPv6 space – visualize how you can integrate your current IPv4 network and devices into your proposed IPv6 space
- Then implement – whenever you're ready.

Steps	Actions
Discover	<ul style="list-style-type: none"> <li>■ Document existing IPv4 network and equipment</li> <li>■ Understand existing (if any) IPv6 capabilities</li> </ul>
Plan and Model	<ul style="list-style-type: none"> <li>■ Determine what IPv6 capabilities are going to be used?</li> <li>■ Understand what equipment may need to be updated</li> <li>■ Model IPv6 space to determine optimal design</li> <li>■ Understand devices to be updated and how</li> </ul>
Map	<ul style="list-style-type: none"> <li>■ Map existing IPv4 space to proposed IPv6 space</li> <li>■ Document updates to existing devices</li> <li>■ Document which devices will need to be added/replaced</li> </ul>
Implement	<ul style="list-style-type: none"> <li>■ Deploy IPv6 capable DNS and DHCP</li> <li>■ Deploy IPv6 capable network equipment</li> </ul>

“Dual-stack” implementations are becoming the de facto standard for integrating IPv6 with existing networks. These networks require simultaneous support of IPv4 and IPv6 links, DNS, DHCP and other key information with your entire IP space. Proteus is the ideal platform for supporting “dual-stack” networks.

Proteus includes the following IPv6 benefits:

- End-to-end IPv6 Address Management including routing prefixes for global Unicast, subnet IDs and interface IDs
- A disciplined approach in modeling your IPv6 network. Proteus gives your administrators a best practice approach while insulating you from the complexity of defining and allocating IPv6 blocks, networks and addresses
- IPv6 DNS Management – including AAAA and the IP6.ARPA reverse space
- IPv6 DHCP Management – stateless option support (through discovery)
- IPv6 Network discovery to inventory your IPv4 and IPv6 networks
- Parallel management with IPv4 networks allows simultaneous management of “dual-stack” devices (devices that support IPv4 and IPv6) including mapping IPv4 devices to their IPv6 address(es) and vice versa
- Proteus Blueprint – a data transformation tool that imports data from different systems including CSV files and allows you to manipulate and massage your existing IPv4 and IPv6 data before importing it into Proteus.

## BlueCat Networks' IP Address Management (IPAM) Solution: Proteus – The Tool for IPv6

Proteus is the industry leading IP Address Management (IPAM) platform. It is a highly intuitive, business-oriented tool that allows you to manage your IPv4 and IPv6 address spaces. Our integrated approach to DNS, DHCP and IPAM uses a multi-core system that links changes to the entire IP space. When you change an IPv6 address associated with an AAAA DNS record, the change is updated in both DNS and in the IPv6 space, removing the need to update multiple areas.

To deploy IPv6, you will need an IP address management system capable of discovering your existing IPv4 and IPv6 space, modeling out your IPv6 network, tracking pure IPv6 and “dual-stacked” IPv4/IPv6 systems, as well as the services needed for the IPv6 naming and addressing infrastructure (DNS and DHCP).

Phase	Feature	Description
<b>Discover</b>	IPv4 and IPv6 Discovery	<ul style="list-style-type: none"> <li>■ Automated tool to build out block and network structure based on discovery results</li> <li>■ Uses non-intrusive firewall-friendly SNMP discovery</li> <li>■ Will discover mixed environments running both IPv4 and IPv6 routers can be IPv4 or IPv6 enabled</li> <li>■ By MAC address</li> </ul>
<b>Plan and Model</b>	Create and Add IPv6 Blocks	<ul style="list-style-type: none"> <li>■ Creation of IPv6 Block for Unique Local Address Space (/8 to /128)</li> <li>■ Creation of IPv6 Block for Global Unicast Address Space (/3 to /128)</li> <li>■ By MAC address</li> </ul>
	Create, Auto-create IPv6 and Add Networks	<ul style="list-style-type: none"> <li>■ Ability to create /64 to /128 networks</li> <li>■ Ability to automatically create networks that do not exist within Proteus when creating IPv6 hosts from DNS</li> <li>■ Conformance to CIDR boundaries</li> </ul>
	Get Next Available IPv6 Network by Prefix	<ul style="list-style-type: none"> <li>■ Proteus can automatically allocate an IPv6 address based on a network prefix</li> </ul>
	Migration of IPv6	<ul style="list-style-type: none"> <li>■ Allows you to import foreign data in XML format. If the data is not ready for XML, Proteus Blueprint can convert various data structures to XML. Proteus Blueprint also allows administrators to massage the data before converting to XML.</li> </ul>
	API Support	<p>The Proteus API supports:</p> <ul style="list-style-type: none"> <li>■ Adding and getting IPv6 blocks and networks</li> <li>■ Adding, getting, assigning, reassigning and clearing IPv6 addresses</li> </ul>
<b>Map</b>	Map IPv4 Devices to IPv6 Address	<ul style="list-style-type: none"> <li>■ Based on a MAC address and host name (DNS name) or an IPAM specified device, Proteus identifies the association of IPv4 and IPv6 addresses to a device</li> </ul>
<b>Implement</b>	IPv6 DNS Management	<ul style="list-style-type: none"> <li>■ Support for AAAA and the IP6. ARPA reverse space</li> <li>■ Dynamic DNS (DDNS) support</li> <li>■ DNSSEC support</li> </ul>
	IP Reconciliation	<ul style="list-style-type: none"> <li>■ Leverage discovery to reconcile actual IP usage on the network with your IPAM system to ensure up-to-date and accurate IP and network information</li> <li>■ Reclaim unused IP space and discover new or unknown systems</li> </ul>
<b>Manage</b>	IPv6 Address Management	<ul style="list-style-type: none"> <li>■ Stateless auto-configuration support (through discovery)</li> <li>■ Object tagging allows you to group your data so that it fits your business model, based on user-defined fields to provide a meta-data system for objects within the system in virtually any way you can imagine</li> <li>■ Ability to track dynamic DHCP leases and dynamic DNS data provides you with the ability to aggregate information in the system for troubleshooting purposes</li> </ul>

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## Being Ready Has Real Financial Benefits

### About BlueCat Networks

BlueCat Networks is the Leader in IP Address Management (IPAM), DNS, DNSSEC and DHCP Core Services including the centralized management of Microsoft Windows® DNS/DHCP services. Available in software (VMware), hardware (appliance) and Managed Service (Proteus Cloud Services) deployment options, BlueCat Networks has been implemented by a large number of Global Fortune 1000 companies and many classified and unclassified government agencies. With the exponential growth in IP addresses, BlueCat Networks solves critical network management issues by centrally managing, controlling, tracking and auditing IPv4, IPv6, DNS and DNSSEC networks. BlueCat Networks' award-winning solutions provide unparalleled network uptime and scale for medium to large organizations.

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