

## Addressing a growing problem An explosion of IP addresses

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*Given today's economic climate, businesses are, more than ever, looking to create additional value through the reduction of risk and by saving costs. For many, the economic downturn is seen as the best time to optimise the infrastructure that they already have in place, to look at ways to trim unnecessary expenditure and to use existing resources more effectively. As organisations are increasingly reliant on data networks that encompass an ever-growing range and number of internet protocol (IP) enabled devices and applications, they need to more effectively administer and manage these assets—they can no longer take the management of their IP networks for granted.*

- **IP Address Management (IPAM) is an essential service for managing an organisation's IP infrastructure, but is often neglected by IT departments**  
IPAM involves the allocation, classification and management of all IP addresses for securely controlling network access. However, many organisations use rudimentary manual methods, such as spreadsheets, that are costly and inefficient, and are often out of date and error prone.

- **The proliferation of IP-connected devices is leading to an overload of IP addresses that have to be managed**

Not only mobile IT devices and smart phones, but Voice over IP (VoIP), Radio Frequency Identification (RFID) and other devices used for industrial automation each have IP addresses associated with them that need to be managed. This can lead to the number of IP addresses in use growing exponentially.

- **Not only is the number of IP addresses in use by organisations growing, but each address is becoming more complex**

The IP address system most commonly in use today—IPv4—was put in place in 1977 and the number of available addresses is fast running out. Its successor—IPv6—provides a seemingly limitless stock of IP addresses as each address space is a 128-bit string, as opposed to the 32-bit space of IPv4. Although both systems will run in parallel for some time to come, the switchover to IPv6 will increase the complexity of manually administering and processing each IP address.

- **Technologies to automate the allocation, classification and tracking of all IP addresses in use are available and these can also be used to manage other closely related technologies, including Domain Name System (DNS), Dynamic Host Configuration Protocol (DHCP) and endpoint security solutions**

IPAM tools provide greater visibility into IP networks, as well as enhancing the accuracy and simplification of management tasks, allowing organisations increased control over costs and productivity, and providing greater control over the security of networks.

- **The benefits of IPAM are tangible, promising to slash costs from the bottom line and help achieve compliance objectives**

Organisations can use such technology to account for which IP addresses are in use and who is using them, which will boost their governance efforts.

### Conclusions

Organisations today are reliant on their IP infrastructure, and with more and more IP devices in use, that reliance is growing. By implementing IPAM tools, organisations of any size can reduce their dependence on the manual processes that impact the productivity of limited IT management resources and bring down costs by gaining better control of essential business assets.

**REPORT NOTE:**  
This report has been written independently by Quocirca Ltd to address certain issues found in today's organisations. The report draws on Quocirca's extensive knowledge of the technology and business arenas, and provides advice on the approach that organisations should take to create a more effective and efficient environment for future growth.

During the preparation of this report, Quocirca has spoken to a number of suppliers and customers involved in the areas covered. We are grateful for their time and insights. Quocirca would like to thank BlueCat Networks for its sponsorship of this report.

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## 1. Introduction



By the end of 2008, around 1.5 billion individuals around the world will have internet access. In November 2007, mobile phone users numbered 3.3 billion, with a growing proportion of those mobile devices enabled for internet access. Each device accessing the internet has its own Internet

Protocol (IP) address associated with it, allowing it to be uniquely identified.

In computing terms, a protocol is a set of rules governing the exchange or transmission of data between devices. IP is a protocol for sending data from one computational device to another on the internet, other public networks, or even internal private networks. Each IP address needs to be unique so that the network knows where to send packets of information. According to the Internet Engineering Task Force (IETF), the role of an IP address is as follows: “A name indicates what we seek; an address indicates where it is; a route indicates how to get there.”

As the use of computational devices is growing exponentially, the number of IP addresses required expands likewise. For a large organisation with tens of thousands of employees, this can mean that its IP address list could outstrip the largest of phone books. Even a small organisation can find itself managing hundreds, if not thousands, of IP addresses.

Because of this, the administration of huge pools of IP addresses has become a headache for many organisations, with poor management leading to the risk of unknown or unaccounted-for IP addresses connecting to the network. This could lead to poor visibility over which host computers and devices have inbound or outbound connectivity to the network, such as open links to former employees or business partners that could be compromised.

By automating the management of IP addresses, companies can improve their security posture whilst gaining greater control of network assets. Faced with the imperative of cost cutting in today’s challenging economic environment, organisations are tasked with optimising the infrastructure that they already have in place, looking at ways to trim unnecessary expenditure and utilise existing resources more effectively.

This paper aims to show how organisations can use IP Address Management (IPAM) tools to regain control of their IP networks and show the benefits that they can achieve in doing this.

## 2. An introduction to IPAM

IPAM is the allocation, classification and tracking of all IP addresses in use by a given organisation, and can also be used to manage other closely related technologies. These include domain name system (DNS) servers, which are used to locate and translate domain names into IP addresses, serving as the glue that connects a network infrastructure with business applications, and dynamic host configuration protocol (DHCP) servers. DHCP is used for assigning addresses on the fly to devices such as printers, laptops and other mobile IP-connected devices and for associating where the device is in the network. IPAM, DNS and DHCP are often neglected by IT management, but they provide crucial services with regard to the availability, accessibility, performance and security of network applications.

With their centralised architecture and management capabilities, IPAM systems can be used more efficiently to manage not only IP addresses, but also naming conventions used in the organisation and the DNS and DHCP servers in order to provide highly available DNS and DHCP network services. If DNS and DHCP servers are not correctly managed, a failure of the DNS server would lead to domain names not being mapped to IP addresses and network clients not mapping to servers. For example, email systems require DNS in order to determine where the mail is to be sent. If the DNS service fails, this will result in loss of email services as well.

## 3. Why should we care about IPAM now?

Until recently, the need for effective management of IP addresses was mostly confined to larger organisations with thousands, or tens of thousands, of network users that had to be provisioned, leaving IT resources struggling to ensure that the IP address was managed correctly and efficiently. However, one key factor that is making efficient management of IP address allocation a pressing concern for all businesses today, even small ones, is the proliferation of IP-connected devices, in particular mobile phones. By some estimates, around 250 million of all mobile phones that will be shipped in 2009 will be IP-enabled smart phones that offer internet connectivity along with a host of other services, and Yahoo! estimates that more users will access the internet via mobile devices than fixed computers by 2016.

Many of these will be used to access a given organisation’s internal network for business purposes, such as for checking work schedules or remotely clocking in to work.

As well as mobile devices, a host of other devices in use in organisations, such as physical access control systems, building automation systems, cash registers and many industrial devices, are increasingly being IP-enabled and made accessible over the network. Voice over IP (VoIP) phones are also coming into greater use in businesses, owing to the reduced cost of communications that they offer by routing calls over IP networks, and usage is set to increase dramatically.

Another technology that is increasing the number of IP addresses that need to be managed is Radio Frequency Identification (RFID), which offers opportunities for streamlining supply chains, security tracking and other monitoring. Finally there is also an increased use of virtualisation, which reduces resource and hardware usage, but expands the number of IP addresses for each virtual machine in use.

#### 4. For many, IPAM is a growing management headache

Given the rise not just in computer usage, but in the growing number of devices and applications that need to be provisioned with an IP address in order to connect to networks, the number of IP addresses in use is spiralling and it is now common for most computer users to have multiple IP addresses associated with them. Even in a small company with just a hundred employees, the use of technologies such as VoIP and mobile devices can mean that they now have hundreds of IP addresses to manage.

However, many organisations attempt to manage allocation of these IP addresses by using spreadsheets or databases, which can be too easily or accidentally modified or contain errors. Management by spreadsheet is error prone. According to studies cited by the European Spreadsheet Risks Interest Group, 90% of spreadsheets contain errors. But the problem is only going to get worse because the current IP address system—IPv4—that was put in place in 1977 is running out of available addresses. IPv4 uses a 32-bit string for each address, giving just under 4.3 billion possible unique address combinations. However, the clock is ticking. By October 2007, it was estimated that 83% of all available IPv4 addresses had been allocated and, in September 2008, the China Internet Network Information Centre estimated that it had only 830 days' worth of IPv4 resources left.

One solution often used to tackle address space limitations is network address translation (NAT). NAT is the translation of an IP address used in one network to one used in another. It allows an organisation to map its local network addresses to one or more external IP addresses. This reduces the need for a large number of publicly known IP addresses by creating a separation between publicly known and privately known addresses. NAT is a useful way to insulate internal networks and has extended the use of IPv4 addresses

but it cannot put off the imperative to move to IPv6 indefinitely.

To address this problem, IPv6 was developed in 1996, potentially providing 340 trillion, trillion, trillion IP addresses, which will be allocated in far larger blocks than IPv4. The reason why IPv6 can provide so many unique address combinations is that the range of numbers available to define each address is substantially larger with 128 bits than with 32. IPv6 addresses also use the base-16 hexadecimal numbering system that combines the use of numbers and letters, rather than just numbers as in IPv4. This makes it even more of a management headache if IP address allocation is handled manually, especially given the potential for human error.

To date, the switch from IPv4 to IPv6 has been a low priority—especially since not all technology manufacturers have embraced IPv6 until recently. However, that will change fast as it enjoys more widespread support and as governments worldwide start to push for a migration to IPv6. The EU set a target in May 2008 of getting 25% of EU industry, public sector organisations and households to use IPv6 by 2010, saying that the explosion in use of electronic devices will lead to a thousand-fold increase in the number of IP addresses. It is considering making IPv6 a condition of acceptance in public sector procurement contracts. The US government mandated the use of IPv6 by all its contractors in mid-2008 and many other governments, including the Japanese and Chinese, are actively encouraging the rollout of public IPv6 networks.

*Table: The key drivers for IPAM*

**Exploding use of mobile devices for accessing networks**

**Fast expanding use of IP-enabled devices and applications, including RFID tags and virtual devices**

**Conversion to IPv6—the requirement to manage much larger addresses**

**Need for reconciling IP usage with corporate policies and governance requirements**

**Increased productivity of workflow and processes associated with manual IPAM**

**Auditing of and reporting on all IP usage on the network for greater visibility and control**

## 5. Automating the IPAM process

To facilitate provisioning and management of IP addresses to all applications, devices and users that need them, organisations are increasingly turning to the use of automated IPAM technology. IPAM tools integrate processes surrounding IP address management to provide greater visibility into IP networks, enhanced data accuracy and simplified management of all tasks. This enables IT administrators to more effectively track actual IP usage on the organisation's network, performing essential tasks such as uncovering the use of IP addresses that have not been authorised by the organisation and that could otherwise be used to allow rogue devices or users to access sensitive network resources.

IPAM can help reduce costs and squeeze more productive value from existing resources—an aim of any organisation in a downturn, as discussed earlier. A key concern is to reduce costs and increase productivity by automating the remaining manual processes—and many organisations will find that the annual cost of labour alone for manually administering and managing IP address allocation exceeds the cost of purchasing a more appropriate tool.

In terms of productivity, IPAM technologies provide organisations with simplified management procedures. This not only cuts down on the manual processes involved in allocating and managing the IP infrastructure, but also allows tasks to be delegated to more junior administrators, freeing up costlier, more senior resources to focus on more advanced tasks and improving the productivity of IT overall.

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### *Checklist: Essential elements of IPAM*

**Ability to manage a device profile for every IP address and accurately track the status of each address**

**Centralised management capabilities for assigning and managing address information**

**Integrated graphical user interface to allow administrators to more easily search, audit and check for errors**

**Integration with security controls and tools, such as endpoint and network access control tools, and a built-in firewall**

**Scalability to multiple networks, domains and divisions so that all sub-networks are brought under control**

**Support for existing DNS and DHCP servers and directories**

**Coverage for all devices in use in the organisation**

**Platform-neutral—broad operating system and**

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**platform support**

**Delegation features, so a senior administrator can assign responsibility for particular domains or sub-nets to junior administrators**

**Reporting and auditing capabilities**

**High level of fault tolerance**

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## 6. The benefits of IPAM

IPAM tools enable the integration and automation of business processes that are used to manage the IP infrastructure, allowing organisations to cut the management costs, increase productivity and better control resource allocation. By knowing which IP addresses are in use in the organisation and who is using them, conflicts and network outages can be reduced, critical assets tracked, and security issues brought under better control. For example, organisations will be in a position to eliminate users and devices with unauthorised IP addresses that can access network resources, leading to more efficient resource utilisation.

Owing to the centralised control that IPAM provides, organisations can benefit from greater visibility that can help boost governance and regulatory compliance efforts, as the audit trail that is generated allows them to better prove how resources are being accessed and by whom.

Because IPAM can help organisations to not only reduce the cost of IT administration and business operations, but also reduce risk throughout the organisation, they are suitable candidates for organisations looking to cut costs in a depressed economy. In such times, achieving superior, efficient and cheaper operations is a prime goal.

Another benefit in a struggling economy is that rapidly planned mergers and acquisitions occur—as is being seen in the financial sector, where failing banks are being acquired by their competitors. In such situations, disparate networks need to be consolidated quickly. IPAM technologies have a role to play in such situations, allowing organisations to reduce the costs of integrating the IP infrastructures through providing streamlined administration of processes involved in consolidating networks.

## **7. Conclusion**

IPAM technology automates the essential tasks involved in the administration and management of IP networks. Today, many of the processes involved are performed manually, increasing the risk of error, and are a drain on cost containment and productivity. Poor management of IP resources increases the risk of unknown or non-compliant devices connecting to the network, leaving an organisation less able to control who is accessing what resources on the network.

The problems involved in using manual processes to manage network infrastructure will only be exacerbated as networks grow in size and complexity. As more and more smart devices are IP-enabled to allow them to access networks, this will vastly expand the number and range of IP addresses that must be provisioned and controlled. Administrative tasks are also set to grow in complexity as IP addresses grow in size and number with the worldwide conversion of networks from IPv4 to IPv6, vastly increasing the number of IP addresses available for use.

IPAM products add a layer of intelligence to the tasks of administering and managing IP address allocation and work in combination with related technologies such as DNS and DHCP services to add a vital layer of control and security to network operations. This increases visibility into the core business processes involved, enabling costs to be controlled through automation of those processes and boosting security through greater control of network access.

Since its inception, IPAM technologies have matured beyond simple management of DNS and DHCP services to become mainstream tools for organisations to reduce costs and risks in order to help drive better business value from networks.

As the global IP infrastructure continues to expand, the use of such tools are no longer exclusive to large enterprises. Even small and medium-sized businesses can have large volumes of IP addresses to administer and manage. By implementing IPAM tools, organisations of all sizes can reduce their reliance on manual processes that undermine the productivity of scarce IT resources and better control costs by gaining control of essential network assets.

## About BlueCat Networks

BlueCat Networks, the IPAM Intelligence Company™, is a privately held profitable and rapidly growing leading provider of enterprise-class IP Address Management (IPAM) platforms and secure DNS/DHCP network administration appliances. Today, many thousands of BlueCat's award-winning Proteus™ IPAM platforms and Adonis™ family of DNS/DHCP appliances have been successfully deployed to meet the rising IP management demands of small/medium enterprises, government, military, financial services, insurance, educational, retail and manufacturing organisations in over 32 countries. Over 300 of the global Fortune 1000 firms—including government classified and unclassified networks—rely on BlueCat to secure their networks.

BlueCat differentiates itself from the competition with its ongoing commitment to developing the most advanced IP Address Management solutions that deliver a benchmark-setting network experience for customers that is based on efficiency, reliability, and workflow. We listen to our customers to design and deliver the solution they need, while our professional services team is available to deliver expert onsite service for the completion of a successful deployment. Our exceptional dedication to client care makes BlueCat the industry leader of choice. With over 120 full-time staff, BlueCat provides world-class, end-to-end DNS/DHCP and IPAM solutions.

BlueCat has headquarters in Toronto, Ontario, Canada and regional offices established in 8 cities as well as in Germany and the UK. BlueCat's handpicked strategic partners further extend its global footprint throughout Europe, the Middle East and Asia Pacific.

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## About Quocirca

Quocirca is a primary research and analysis company specialising in the business impact of information technology and communications (ITC). With world-wide, native language reach, Quocirca provides in-depth insights into the views of buyers and influencers in large, mid-sized and small organisations. Its analyst team is made up of real-world practitioners with firsthand experience of ITC delivery who continuously research and track the industry in the following key areas:

- Business process evolution and enablement
- Enterprise solutions and integration
- Business intelligence and reporting
- Communications, collaboration and mobility
- Infrastructure and IT systems management
- Systems security and end-point management
- Utility computing and delivery of IT as a service
- Sustainability and environmental issues
- IT delivery channels and practices
- IT investment activity, behaviour and planning
- Public sector technology adoption and issues
- Integrated print management

Through researching perceptions, Quocirca uncovers the real hurdles to technology adoption—the personal and political aspects of an organisation’s environment and the pressures of the need for demonstrable business value in any implementation. This capability to uncover and report back on the end-user perceptions in the market enables Quocirca to advise on the realities of technology adoption, not the promises.

Quocirca research is always pragmatic, business orientated and conducted in the context of the bigger picture. ITC has the ability to transform businesses and the processes that drive them, but often fails to do so. Quocirca’s mission is to help organisations improve their success rate in process enablement through better levels of understanding and the adoption of the correct technologies at the correct time.

Quocirca has a pro-active primary research programme, regularly surveying users, purchasers and resellers of ITC products and services on emerging, evolving and maturing technologies. Over time, Quocirca has built a picture of long term investment trends, providing invaluable information for the whole of the ITC community.

Quocirca works with global and local providers of ITC products and services to help them deliver on the promise that ITC holds for business. Quocirca’s clients include Oracle, Microsoft, HP, IBM, T-Mobile, Xerox, Vodafone, EMC, Symantec and Cisco, along with other large and medium sized vendors, service providers and more specialist firms.

Sponsorship of specific studies by such organisations allows much of Quocirca’s research to be placed into the public domain at no cost. Quocirca’s reach is great—through a network of media partners, Quocirca publishes its research to a possible audience measured in the millions.

Quocirca’s independent culture and the real-world experience of Quocirca’s analysts ensure that our research and analysis is always objective, accurate, actionable and challenging.

Quocirca reports are freely available to everyone and may be requested via [www.quocirca.com](http://www.quocirca.com).

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