



# IP ADDRESS MANAGEMENT: TOWARDS MORE PRODUCTIVE AND SUSTAINABLE NETWORKS

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How IP address management solutions can help administrate complex networks and improve performance while unlocking a new revenue stream

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# SUMMARY

Internet Protocol (IP) addresses perform a crucial role in today's internet connecting businesses and consumers. Without IP addresses, global communications and online services would not be possible.

Due to the explosion of IP-connected devices and interconnected technologies, companies manage an increasingly large number of IP addresses. Undeniably, the more addresses a company has, the more complex the management of this resource becomes.

Another significant issue is that while the demand for new IP addresses and management solutions grows, the number of available assets declines. IPv4 address scarcity poses a significant challenge that companies need to address if they want to scale their operations in the years to come.

Luckily, the today's market offers professional management solutions that enable reusing the assets while optimizing the networks' administration. A robust IP address management (IPAM) solution is one of the essential tools that enables companies to control the assets that are already available.

## Questions covered in this white paper:

- Why do business networks need effective solutions to manage their IP addresses?
- How can IP address management solutions aid in a more productive network administration?
- What other solutions on the market can contribute to the more efficient and sustainable use of IP addresses?

# COMPLEX NETWORKS CALL FOR EFFICIENT MANAGEMENT

The number of Internet of Things (IoT) devices is believed to reach 25.44 billion by 2030<sup>[1]</sup> which, undoubtedly, increases the complexity of networks for companies and organizations.

Companies often need to manage several Domain Name System (DNS) and Dynamic Host Configuration Protocol (DHCP) servers in different branches. Consequently, it becomes difficult to efficiently monitor IP addresses – unique device identifiers.

## NUMBER OF IOT DEVICES FROM 2019 TO 2030



Number of IoT connected devices worldwide from 2019 to 2030, in billions (data by Statista, 2022)

According to the Data Bridge Market Research report, the combined **DNS, DHCP and IPAM solutions – or DDI – are believed to reach 4.95 billion US dollars in revenue by 2027.**<sup>[2]</sup>

The report suggests that companies are already adopting available IPAM solutions to monitor their growing networks. The expectation is that the integration of IPAM can help optimize the administration tasks and increase network administrators' productivity.

Furthermore, IPAM supports automatic management of IP resources to increase network scalability and efficiency. IPAM can also help increase the network's security by enabling administrators to track all IP addresses and devices associated with them.

While most IPAM platforms are used inside a company's network for internal IP address management, some IPAM solutions take a different approach: They handle external IP resources for leasing purposes.



IPAM helps not only to efficiently manage owned resources but also to manage repurposed resources. In the long run, comprehensive use of IPAM capabilities might ensure more sustainable use of companies' networks.

# WHAT IS AN IP ADDRESS?

An IP address is a unique numeric or alphanumeric identifier for a device on the network.

**There are four types of IP addresses:**



**Private IP addresses** identify devices within the local network (e.g., computers, printers, tablets). All the machines on the internal network are assigned a unique address to connect to the same network – for example, **192.168.1.10**.

**Public IP addresses** function as a route to the internet, and users from anywhere on the global network can get access to the public IP addresses. Servers and websites on the internet use public addresses. For example, Google’s DNS server address is 8.8.8.8, and the IP address of google.com is 172.217.22.14.

While public and private addresses define the location, static and dynamic IP addresses specify the permanency of IP addresses. **Dynamic IP addresses** change regularly and are more suitable for regular internet users in consumer equipment, while static IP addresses are likely to benefit businesses.

**Static addresses** do not change and are commonly used for servers or other equipment. By ensuring more stability, static IP addresses ensure better communication between the devices on the network.

## HOW DO IP ADDRESSES HELP FIND SERVICES, WEBSITES AND COMPANIES?

Internet users can find every website on the internet using an IP address. For example, when the user enters **172.217.22.14** into the browser’s search tab, the browser loads **google.com**. However, it is impossible for users to memorize all the IP addresses for all the websites they want to visit.

The Domain Name System simplifies access to websites and services by translating human-readable domain names into machine-readable IP addresses. If the DNS system does not work, internet users cannot access any internet pages or online services.

If DNS is integrated into IPAM, network administrators can edit and update DNS records. Efficient adjustments guarantee smooth transfer of services if IP addresses change.

# WHAT IS IPAM AND WHY IS IT IMPORTANT?

IPAM is a suite of tools built for the **planning, tracking and monitoring** of the network's IP address space.

**IPAM can be integrated with DNS and DHCP systems to enable the comprehensive management of companies' networks**

DDI – the integrated solution of DNS, DHCP and IPAM – is a powerful tool that helps manage the organization's resources.

The core benefits of a DDI solution include:

- **Centralized maintenance of the IP address space**
- **Improved efficiency and security**
- **Increased reliability and error-free operation**

## CENTRALIZED MAINTENANCE OF THE IP ADDRESS SPACE

Managing IP addresses via a single interface might simplify the work for network administrators within any organization. They can more efficiently track IP address assignments, hardware associated with the IP addresses in question, their status and current users.

Moreover, a centralized repository reduces the complexity of IP address management. IPAM administrators can gather information about all the networks and manage private and public IP addresses in one place.

## IMPROVED EFFICIENCY AND SECURITY

Centralized data visibility allows network operators to analyze and inspect IP resources in real-time. The centralized approach helps determine possible IP conflicts or other misconfigurations and promptly troubleshoot them. IPAM data may also help identify potential data breaches or misuse of devices and maintain the integrity of the network infrastructure.

## INCREASED RELIABILITY AND ERROR-FREE OPERATION

Enterprises continue developing their networks and adding different devices. All of this means that they end up needing to manage more resources. Unfortunately, that might increase the risk of misconfigurations and IP conflicts.

Consequently, these issues might have a negative impact on the network's connectivity and the network administrators' productivity. Automated network tasks, like server configuration and data collection, might help reduce the number of errors resulting from manual configurations and reduce the troubleshooting time.

## RISKS AND LIMITATIONS OF MANUAL MANAGEMENT

Some companies still use Excel spreadsheets to manage their IP networks manually. Of course, spreadsheets are a viable solution only for companies that do not have many IP addresses to handle. Naturally, the management becomes more complicated if the network grows.

From a technical perspective, spreadsheets may be plagued with errors, and they are time-consuming. Manual tracking and updating of IP records within spreadsheets may lead to inconsistencies that, in turn, could result in IP conflicts. Eventually, network administrators might lose time troubleshooting the problems and trying to reduce network downtime.

Spreadsheets might also be challenging to use if several administrators are simultaneously updating the IP address information. It could be cumbersome to track the changes everyone makes. Without timely updates, the data may become outdated and irrelevant.

Most importantly, spreadsheets lack overall visibility into DNS and DHCP configurations and IP address utilization. Therefore, network administrations might spend more time tracking IP address assignments. Such manual tracking and updating may lead to more errors and IP conflicts which, in turn, may increase network downtime.

# IPAM MODELING AND PLANNING

Large companies and organizations may choose to implement IPAM to efficiently distribute their resources and budgets. Let's take a look at the steps that companies may need to consider if they decide to plan and organize IPAM themselves.

## IPAM DEPLOYMENT TOPOLOGY

IPAM modeling and planning starts with choosing a **deployment topology**. Here are a few options:

- **Distributed topology**
- **Centralized topology**
- **Hybrid topology**

An enterprise can choose **distributed topology** and have one or several IPAM servers in different departments. Alternatively, it can implement a **centralized topology** and have one server in the company. **Hybrid topology** is a combination of the two: The company can have one central IPAM server and dedicated servers at each branch.

## IPAM ORGANIZATION STRATEGY

**IPAM organization strategy** is another important aspect of IPAM modeling and planning. Companies can choose what domains each IPAM server will manage. Also, they can first deploy just a few servers and gradually increase the number depending on their needs.

## IPAM SERVERS' ROLES

**Determining the roles of IPAM servers** is another crucial step. If several IPAM servers are deployed, administrators might want to configure unique roles for IPAM servers.

For example, one server manages the IP addressing of the entire company, while another one is responsible only for the DNS zone or DHCP scopes.

Role management in IPAM is flexible so that companies can update different roles when adding more domains or servers.

It is also important to determine how many IP address ranges the organization needs to manage. If more IP addresses are added, it is likely that more IPAM servers will be needed.

## IPAM SERVERS' ARRANGEMENT

To ensure optimal management of companies' networks, server arrangements must be considered. It is essential to evaluate physical locations to ensure efficient monitoring of the physical infrastructure.

## TRAINING & ROLE ASSIGNMENT

**Lastly, IPAM administrators must receive proper training to learn the ropes of seamless network management.**

Network administrators should also understand their roles and responsibilities for efficient operation. Only then can companies assign permissions and tasks to IPAM administrators and users depending on the IPAM's built-in local user groups.

# IP ADDRESS MANAGEMENT IN THE IP LEASE MARKET

As growing networks increase the demand for new IP resources, more efficient resource management tools grow in demand as well.

In the wake of the global depletion of IPv4 addresses, the market must adapt and bring new solutions to the table. It is critical to find innovative ways to reuse the available assets without compromising the efficient operations of businesses' networks.

## IPAM SERVERS' ARRANGEMENT

An exponential rise in IoT devices has substantially decreased the number of available IPv4 resources. New and growing businesses also demand new IP addresses to expand their networks and operations.

Unfortunately, the supply for the scarce resource can no longer meet the demand. However, IPv4 leasing is one of the options that can alleviate the global IPv4 depletion.

IP leasing enables a more sustainable and cost-efficient acquisition of new resources. **IP lease prices may vary from \$0.37 to \$0.90 per IPv4 address per month.**<sup>[3]</sup> In contrast, **the purchase price for one IPv4 address can go up to \$60.**<sup>[4]</sup> Therefore, if a company needs many IP addresses, it often chooses IP leasing to save money.

### IPv4 LEASE PRICES PER IP FROM SUBNETS /16 – /24 IN 2021

SUBNET MONTH	January	March	April	May	June	July	August
/16	\$0.59	\$0.59	\$0.59	\$0.59	\$0.59	N/A	N/A
/17	\$0.59	\$0.59	\$0.56	\$0.53	\$0.37	\$0.37	\$0.37
/18	\$0.60	\$0.60	\$0.65	\$0.74	\$0.62	\$0.54	\$0.62
/19	\$0.60	\$0.60	\$0.61	\$0.73	\$0.60	\$0.59	\$0.60
/20	\$0.62	\$0.60	\$0.62	\$0.74	\$0.60	\$0.59	\$0.60
/21	\$0.63	\$0.65	\$0.70	\$0.77	\$0.61	\$0.60	\$0.61
/22	\$0.66	\$0.69	\$0.90	\$0.83	\$0.83	\$0.66	\$0.75
/23	\$0.68	\$0.71	\$0.80	\$0.88	\$0.81	\$0.76	\$0.75
/24	\$0.67	\$0.72	\$0.79	\$0.89	\$0.81	\$0.78	\$0.81

Moreover, it is much faster for companies to acquire IP resources by leasing rather than purchasing. Simply put, leasing is a simpler process that takes only several days. In contrast, buying is a complex procedure that can take up to several weeks.

**IPv4 leasing is beneficial for companies in various industries, including:**

- Telcos/ISPs
- Hosting
- Voice over Internet Protocol (VoIP)
- Business Intelligence
- Managed Service Providers (MSP)

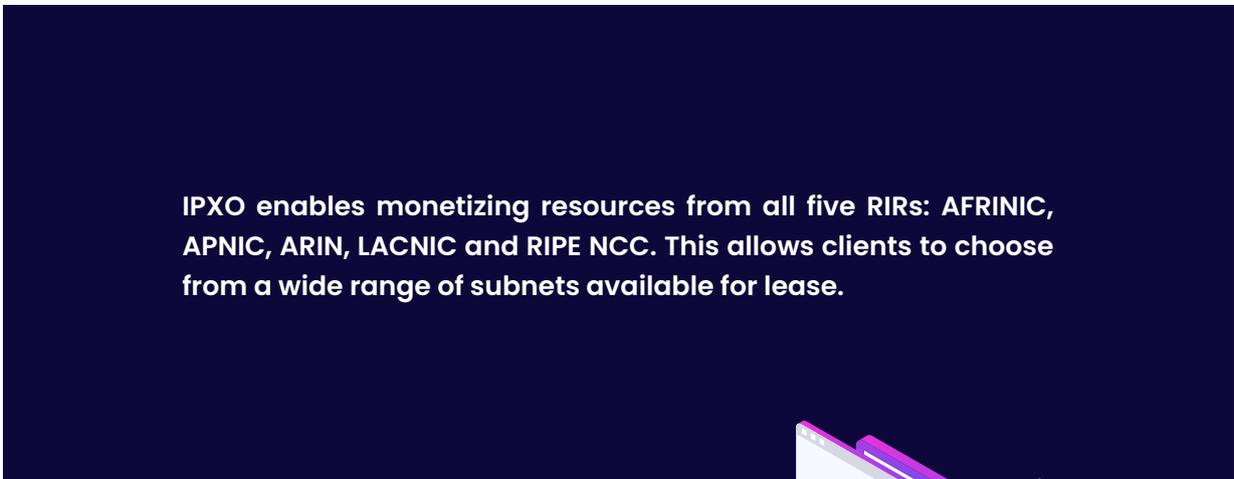
Smaller companies usually make do with a smaller IP address space, while large companies may need a huge number of resources to offer different services. Nonetheless, every business requires IP addresses.

 <p><b>Telcos/ISPs</b></p> <p>All IPv4 resources are already allocated and you need IPs to meet the scale of your customers. Offering millions of IPs, we can help you scale your business.</p>	 <p><b>Hosting and Infrastructure</b></p> <p>The most valued strategic asset for any hosting company is an IPv4 address. More IPs mean more customers, and we can help with the latter. Scale with IPXO.</p>	 <p><b>SaaS</b></p> <p>Whether big or small, developing SaaS requires IP addresses to support and scale networks and infrastructure. Expand your reach with more IPv4 resources.</p>
 <p><b>Cybersecurity</b></p> <p>While more hardware and infrastructure can be made and sold, IP resources are finite because of the shortage. To grow your business further, lease unused IPs.</p>	 <p><b>Business Intelligence</b></p> <p>Strategic decisions need to be made quickly, and you should not let the underlying technology slow you down. IPXO ensures IPv4 availability for your business.</p>	 <p><b>VoIP</b></p> <p>The VOIP industry is growing fast, and we are prepared to provide our VOIP partners with the IPs that support their infrastructures and help them grow further.</p>
 <p><b>MSPs</b></p> <p>Whether you're managing IT infrastructures or outsourcing managed hardware to clients, we can provide you with the IP assets you need to support your services.</p>	 <p><b>CDN</b></p> <p>Content delivery networks utilize a vast amount of IP addresses in order to deliver content from multiple geolocations, all of which you can find within IPXO.</p>	 <p><b>IoT</b></p> <p>IoT affects nearly every other industry out there and as such is one of the core industries we support and work with. One thing IoT always needs is more IP addresses.</p>

# IPXO MARKETPLACE AND SUSTAINABLE IP ADDRESS MANAGEMENT

The **Internet Protocol Exchange Organization – IPXO** – is an IPv4 lease and monetization platform. The aims of this platform are to alleviate the shortage of IPv4 addresses and help manage the available resources more sustainably.

The IPXO Marketplace is a unique solution for companies that need IP addresses and IP holders who have unused resources. Companies that have additional IP addresses can monetize them via the IPXO platform to unlock a new revenue stream. Simultaneously, companies that are looking to expand their IP address pools can lease IPs at low upfront costs.



The highly scalable platform currently has more than 2 million IPv4 addresses that have been added to the Marketplace by IP holders aiming to monetize them.



Currently, IPXO manages IPv4 addresses. Since IPv6 offers significantly more addresses than IPv4 – 340 undecillion, to be exact – new solutions might be needed to support efficient management of the latest version of the Internet Protocol. Therefore, IPXO developers will be looking into extending the IPAM functionality to support IPv6 in the future.

## WHAT IS IPXO IPAM?

Originally, IPAM tools were meant to help network administrators store IP addresses without overlapping them. There were no other solutions that offered subnetting or IP splitting features either. As a result of the growing demand for an IPAM solution that could offer more than just IP address tracking, IPXO developed a tool that simplifies the management of IP addresses.

The aim was to create a platform with a straightforward interface that would allow network admins to type in an IP address, add information for IP filtering and enable automatic scripts to read the data. The IPXO Development team also wanted to ensure that the system was fast and written in a simple programming language to simplify operations.

IPXO IPAM is an IP address management solution currently used as an internal platform for the management of external IP addresses. An external/public IP address helps users connect or receive connections to or from the internet from an internal network. IPXO network administrators use IPAM for the management of users' external IP addresses that they add to the IPXO Marketplace for lease.



**IPAM is the cornerstone of our business.**

- Edgaras Skorupskas,  
Developer at IPXO



The current IPXO IPAM platform cannot be transformed into a commercial service due to system limitations. Therefore, the IPXO team is working on extending the functionality of the solution to offer the application as a service. We plan that, in the future, companies will be able to easily integrate the solution into their own systems to manage their internal resources more efficiently.

The IPXO Development team will continue improving and updating the platform to make it more versatile, flexible, fast and user-friendly.

# CONCLUSION

In the digital age, businesses aim to grow and develop their networks. As companies use increasingly more devices, the number of IP addresses that need to be managed increases too. Fortunately, centralized and automated platforms can help ensure efficient and error-free IP resource administration.

The manual management of IP addresses is no longer a viable option for large companies that aim for smooth business operations. That said, professional IPAM solutions are becoming increasingly more popular among companies of all sizes. That is because all companies need to efficiently manage their IP resources while ensuring the productivity of their networks.

Commercial IPAM solutions available on the market can help manage internal networks while maintaining a more sustainable use of resources. IPXO IPAM contributes to the more efficient use of IP addresses with a different approach.

IPXO IPAM is an internal platform built to manage external resources. The solution supports the IPXO Marketplace by assisting in the more efficient management of a scarce and highly desirable resource.

IPXO enables small and medium-sized companies to lease IPv4 addresses and scale their businesses quickly and cost-effectively. Simultaneously, IPXO enables companies to monetize unused IPv4 assets and unlock a recurring revenue stream.

**IPXO IPAM supports the IPXO Marketplace by assisting in the more efficient management of a scarce and highly desirable resource**

# REFERENCES

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# ABOUT IPXO

**IPXO is a fully automated IP address lease and management platform built to help lease and monetize unused IP resources while alleviating the global IPv4 shortage problem.**

IPXO provides clients with a full automation stack that ensures accessibility and innovative solutions for companies in 75+ industries. We combine 10+ years of experience in the industry and innovative thinking to build a sustainable internet that supports the growth of any business.



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