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# Your Guide to the IPv4 Address Block Aftermarket

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# Introduction

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You may have heard by now that the Internet is “running out” of IP addresses. While you may not think it has any relevance to your particular situation, you might want to know the ramifications of how the different types of IP address blocks are administered and what happens when you either want to purchase new addresses or sell or rent your existing and unused addresses.

Like the domain aftermarket, the IP address aftermarket isn’t well known or well understood. In this eBook, you’ll learn how to transact business, figure out whether buying or renting is your best option, what the costs and benefits are and why it makes sense for your business.

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### INTRODUCTION TO THE IPV4 ADDRESS BLOCK AFTERMARKET

## Unused IP Addresses Are Like Unused Real Estate

If your company owns a block of IPv4 addresses and is interested in selling it, or if your company is looking to purchase additional addresses, now may be the best time to do so. The number of available IPv4 addresses (see sidebar) has been steadily dwindling, to the point now that they are no longer being assigned by many of the regional Internet registries (RIRs). The used address marketplace is a new corner of the Internet; this eBook will prepare you to do business in this arena.

For sellers, a good reason to sell is to make money and get some use out of an old and unused or underused corporate asset. If your company has acquired other businesses, particularly ones that have assets from the early Internet pioneers, chances are you might already have at least one address range that has this potential. Think of this as similar to how your company might decide to sell its unused real estate. “Many companies have millions of unused IP addresses,” said Vincentas Grinius of Heficed, an address leasing vendor. “They have been holding on to them for future growth or to save as a strategic asset.” Now might also be a good time to sell since the practice is becoming more accepted and prices are starting to level off, according to several brokers.

It is also a good time for buyers, as a way to extend the life of your enterprise IPv4 equipment for a few more years. This is particularly true for those businesses that have resisted a full IPv6 deployment or who can't easily upgrade their legacy endpoints that rely on the older protocols to operate or which use outdated and unsupported operating systems.

Until recently the used address marketplace hasn't had the best of reputations. One address broker said they used to be thought of as “something folks were ashamed of having in their possession.” But things have gotten more legitimate, and today the used address market is thriving and quite competitive. There are now dozens of block brokers and at least three block lessors (IPv4 Market Group, Prefix Broker and Heficed) who have solid business operations to help match up buyers and sellers.

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Many companies have millions  
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— Vincentas Grinius of Heficed.com, an  
address leasing vendor.

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## The Difference Between IPv4 and IPv6

When the Internet began, it used v4 of the Internet Protocols. During the 1990s, it became clear that this version wasn't sufficient to support its explosive growth, and thus began a transition to a new version called IPv6. But this version wasn't universally implemented, and many enterprises stuck with the legacy protocol for their operations. For example, IPv4 can be required to connect embedded systems such as network printers that don't support the newer protocols.

If you are still waiting to deploy IPv6 across your network infrastructure, you might need some additional reasons. IPv6 has three major advantages over the older IPv4 protocol. First is its greatly expanded address range. That is probably why many enterprises choose it. Second is security. It avoids Network Address Translation (NAT), has stateless or serverless address configuration, has a better protocol header to minimize processing time and other innovations. Deployed properly across your infrastructure, it could be a big win for your overall security profile. Finally, is performance and reliability. It can replace IP tunneling and can be faster than IPv4 about half the time in head-to-head tests.

## HISTORY OF ADDRESS TRANSFERS

# Almost Every IPv4 Address Has Been Assigned

Many analysts predicted the depletion of the IPv4 address pool back in the early 1990s. Back then, IP address ranges were managed by Network Solutions and manually assigned. One of the first to sound the alarm was Frank Solensky, who published in 1990 during the 18th IETF meeting his predictions for various run-out dates.

The basic “Goldilocks” issue is that for the average business looking to get online 250 addresses for a /24 block is too little, and 65,000 addresses for a /16 block is too many. A number of technical approaches were then proposed, including classless addressing (RFC 1918), NAT, eliminating assigning static addresses to dial-up users and changes to routing protocols. But the real solution was inventing IPv6 to increase the overall address space. During the early 1990s, the larger blocks were already being rationed, given that

many of these blocks were already previously assigned by Network Solutions.

While the IPv4 addresses were being depleted, three of the RIRs were created through RFC 1366, modified by RFC 1466 in 1993 and further refined a few years later in RFC 2050. There is more about the role of the RIRs in the Who’s Who section below.

By February 2011, the last remaining common blocks of IPv4 addresses were fully allocated to the RIRs. In an article in the Internet Protocol Journal, Raúl Echeberría, Chairman of the NRO, the umbrella organization of the five RIRs, was quoted as saying, “It’s only a matter of time before the RIRs and ISPs must start denying requests for IPv4 address space.” Today almost every block has been assigned to some entity. RIPE, one of the RIRs, made its last /22 block assignment in November 2019.

## Frank Solensky’s Predicted Depletion Dates

Assigned Class “B” network numbers .....	<b>Mar. 11, 1994</b>
NIC “connected class B network numbers. ....	<b>Apr. 26, 1996</b>
NSFnet address space* .....	<b>Oct. 19, 1997</b>
Assigned Class “A—B network numbers .....	<b>Feb. 17, 1998</b>
NIC “connected Class A-B network numbers .....	<b>Mar. 27, 2000</b>
BBN snapshots* .....	<b>May. 04, 2002</b>

\*all types: may be earlier if network class address consumption is not equal



THE RISE OF THE USED ADDRESS MARKETPLACE

## Address Transfer Challenges

Perhaps the origin event for the used address market was when Microsoft purchased Nortel and its inventory of more than 600,000 individual IPv4 addresses for US\$7.5M in 2011. Since then, tens of millions of addresses have been transferred per year.

But this wasn't a perfect system by any means: block ownership questions weren't easily resolved

within a single registry, organization records were full of stale data or listed businesses that were no longer operating entities, and spammers could pollute address blocks clouding any resale opportunities. Also, many address blocks pre-date the establishment of RIRs, what they call "legacy resources." How the RIRs deal with these assignments is a challenge, particularly as

businesses are no longer around and tracing the lineage from the original Network Solutions assignment to a current stakeholder can involve some detective work. The question is, who should do the detecting? That isn't a simple question to answer, as you'll see.

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Millions of IP addresses are transferred each year — through a process that is not without challenges.

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### Since their creation, there are now five RIRs:

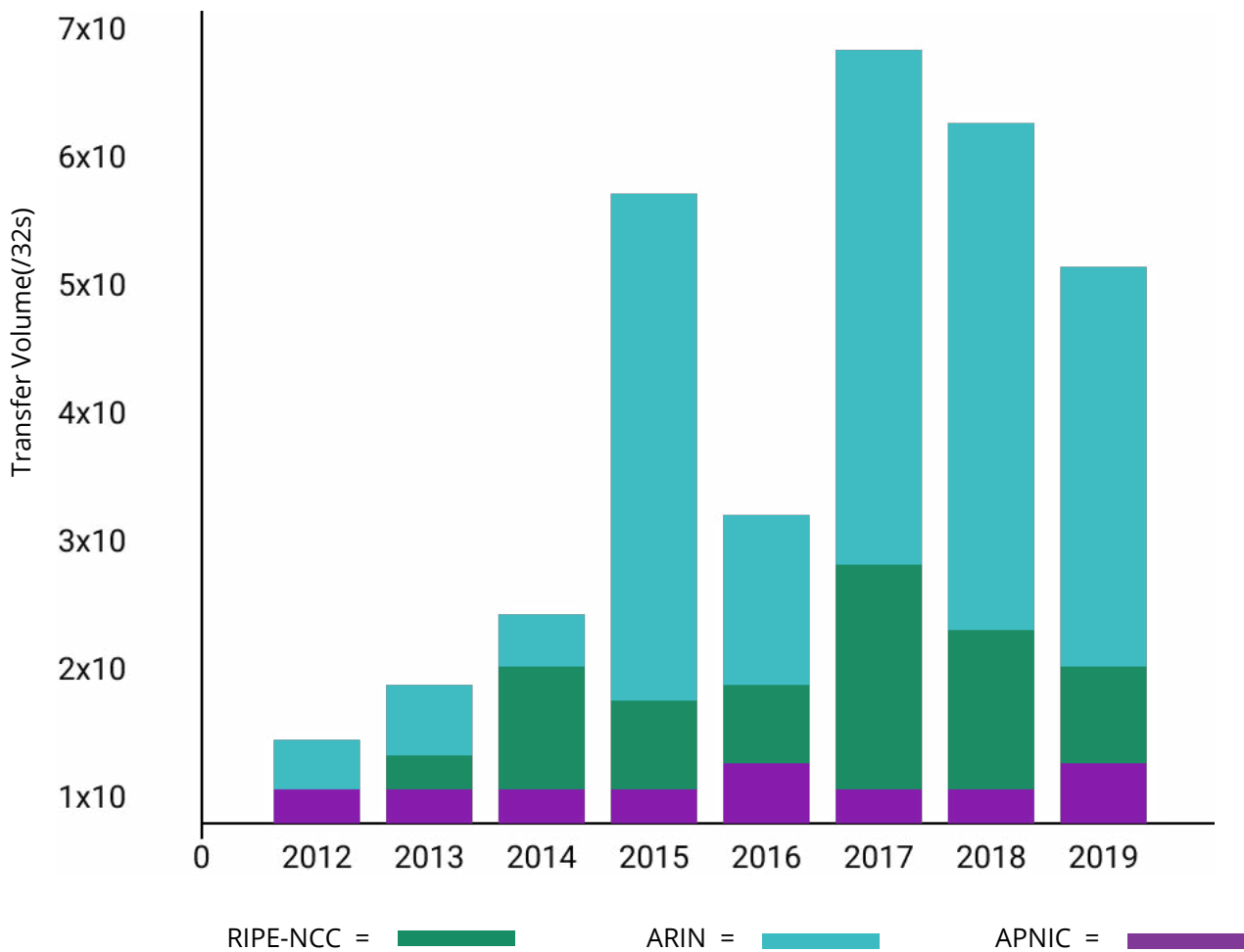
- AFRINIC serving Africa
- APNIC serving parts of Asia and the Pacific region
- ARIN serving North America and parts of the Caribbean
- LACNIC serving Latin America and parts of the Caribbean
- RIPE NCC serving Europe, parts of central Asia and the Middle East.

THE RISE OF THE USED ADDRESS MARKETPLACE

# Address Transfer Challenges



### IPv4 Address Transfer Volumes



## WHO'S WHO IN THE MARKET

## Learning the Players in the IP Aftermarket

Over time, each RIR has played an increasing role in address block transfers. Unfortunately, each RIR has somewhat slightly different transfer policies. Note that some RIRs have more precision and transparency about their process, along with higher thresholds than others to prove existing ownership of an address block. Proving ownership is the sticking point, and that means understanding what WHOIS does.

WHOIS is the primary domain and block ownership query tool and refers to the command of the same name. The problem is that WHOIS is far from perfect. First, its responses differ depending on the data being queried, the RIR in charge of that block and whether the block owner has provided accurate and up-to-date information or deliberately hidden these details.

But another part of the problem is that the Internet community has made changes to the display of information from WHOIS queries. This is because of privacy concerns (from various changes to regulations around the world) and from spammers abusing WHOIS to drive legit business owners into hiding their details.

Before learning about transferring an address block, you need to know about address block brokers. Like your familiar real estate broker, they act as intermediaries for any transaction and represent both buyer and seller, or owner and renter. There are now dozens of brokers who will represent you and understanding their role and what you need to provide them will determine whether your transfer will go smoothly. Three RIRs have listings of brokers on their websites. They all have different collections of brokers and types of listed contact information:

- APNIC has 22 listings, with contact names, phone and Skype numbers.
- APNIC serving parts of Asia and the Pacific region
- RIPE has 76 listings, with links to their contact webpages.
- ARIN has 29 listings, with contact names and phones and date the broker registered with ARIN

Each takes pains to indicate that they are not providing any recommendation, just awareness of their businesses. RIPE says its listing, for example, is of brokers who have agreed to conduct their business in an honorable way. However, no one checks up on the brokers after they have been listed to see if they actually live up to this promise.

If you are starting out in the used marketplace, you should examine these various RIR web pages carefully. Just having these lists of brokers is nice, but if you are going to sell or buy a used block you may find it frustrating trying to find the right broker for your situation. The biggest issue is that there are no hard-and-fast rules for buying, selling and leasing used addresses. Part of the problem is that there is no overall supervision or agreement on what constitutes the quality of an asset. As you can see from the five-step process cited below, there are uncertainties and potential problems at every step.

Finally, something that should be obvious but isn't: The only entities that can play in the used address aftermarket are businesses. If you own a block as an individual, you will first have to transfer ownership to a business to proceed.

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Proving ownership is the sticking point, and that means understanding what WHOIS does.

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## BUYING OR RENTING AN ADDRESS BLOCK

## 5 Steps to Transfer an IP Address With a Block Broker

This brings us to the modern era (say after 2012) and the IP block broker marketplace. The goal was to try to make it easier for these transfers, and at the same time improve trust among all parties. That is where the block brokers come into play. While it is certainly possible to transfer a block without a broker, you will probably want to use them for doing your transfer business. The broker's service (either for selling or leasing a block) is somewhat similar and involves these basic steps:

- 1) You need to register your business with the broker, which will involve answering a few basic questions and creating a login ID so you can interact with them via their various web-based forms and forums and email.
- 2) Next, if you are a seller, you sign a mutual non-disclosure agreement (NDA) and then list your block that you want to sell. Some brokers have a variety of sales methods, including open and closed auctions and the ability to "buy now." If you are a buyer, you can start browsing the blocks that are available on the open auctions and participate in the auction. If you have ever bought or sold any physical object via an online auction, this should be familiar.
- 3) Once a buyer has been selected for the particular block, the auction is closed. Then funds are requested and placed into escrow.
- 4) The broker's support team arranges for the transfer with the relevant RIR(s). As a buyer, you will then pay the fees directly to the RIR(s) for the transfer. Each RIR has a different way to calculate fees, ranging from free for RIPE to thousands of dollars, depending on the size of the block.
- 5) Finally, the transaction closes and the block control is transferred to the buyer or lessor, and the funds released from escrow, minus any commission from the broker. Here is where things get interesting. The commissions aren't transparent: you have to get far enough down the process before you will find out what they are, and the brokers do this deliberately so you can't shop around for lower fees. Still, there is a place for brokers, since "nothing is more frustrating than trying to get paid in a country of which you

don't know the legal system nor have local representation. Using an escrow makes things easier for all parties involved," says Eric Bais of Prefix Broker.

One other caveat for block leases: the lessor and lessee have a more intimate and longer-term relationship than if you are buying and selling the block outright, because ultimately the "landlord" business is still responsible for the reputation of the folks who are using your IP addresses. This means that renting out your space also carries a certain risk to the lessor: just like rentals in the physical space, the owner (or landlord) is responsible for their property. If you have a bad tenant who trashes your space, your reputation will suffer. This places a bigger burden of trust on the broker to ensure a tenant will behave properly.

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Proving ownership is the sticking point, and that means understanding what WHOIS does.

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RIR	TRANSFER FEE AMOUNT
ARIN	\$300.00USD
RIPE	\$0.00USD
APNIC	20% of the annual fee for the # of IPv4 addresses being transferred
LACNIC	Initial payment of \$200 USD + Smaller than a /19-\$1000 USD /19 and larger - \$1500 USD
AFRINIC	Smaller than a /22- \$0 USD /22 to /20 - \$1750 USD /20 to /18 - \$2000 USD

## HOW A TYPICAL TRANSACTION WORKS

## Things to Know Before You Transfer

Here are some things to watch out for as you begin your own transfer journey:

### Lease or Buy

Choosing whether to buy or lease a block can be tricky, and will depend on how many addresses you need and for what purpose. You need to make this very basic decision before doing anything else, and oftentimes you don't have as much data as you might like. Unfortunately, there aren't any generally accepted practices or guides to making a tradeoff between buying and leasing.

### Cost

Determining your budget is closely tied to your timeframe. If you are a buyer, do you need the block for a few years or a few months? Can you eventually migrate the endpoints using these addresses to IPv6? If you are a seller, are you looking to dispose of the block and make a quick addition to boost your current year's balance sheet, or do you want to invest in a steady rental income over time? As a renter, you are also betting on a particular price curve over the terms of the lease which may or may not materialize. Now imagine that you are having this conversation with your CFO, who may or may not understand the various subtleties of the used address marketplace.

### Size

Part of the choice of whether to rent or buy should be based on the size of the block involved. Some brokers specialize in larger blocks, some won't sell or lease anything less than a /24 for example. "If you are selling a large block (say a /16 or larger) you would need to use a broker who can be an effective intermediary with the larger buyers," said Geoff Huston, who has worked at the Australian RIR. Again, if your broker lists prior transactions this helps to make a more informed decision. Not all brokers have this pricing transparency, and many brokers are more circumspect about pricing.



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If you are selling a large block (...) you would need to use a broker who can be an effective intermediary with the larger buyers.

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IPv4.Global is one broker that does list their own prior auction sale data, for example. Another broker, IPv4MarketGroup, has assembled this overall pricing chart from March 2019. There is no way to independently verify this information, but at least these examples show you how the market has evolved over the past decade.



More Detailed Information:

<https://ipv4marketgroup.com/>

## HOW A TYPICAL TRANSACTION WORKS

### Things to Know Before You Transfer

#### Choosing a Broker

You'll also want to ensure that the broker you eventually pick is recognized by the RIR that is responsible for your block. Keep in mind there is no guarantee that any of these brokers are reputable and will actually deliver the goods, or even if the RIR listings and contacts for the broker are still accurate. There is no easy way to vet their operations or even agree on overall metrics to be used as part of the vetting process. Unless you know them personally, or know someone who does, chances are the names of the brokers on the RIR lists will require additional research to decide whom you should use to sell your block. One way is that you can look to see their registration date with ARIN, if your block is controlled by them.

Another possible vetting strategy is to inquire how they are involved in the various Internet governance committees in your region, or at least examine their posted attendee lists. The hypothesis that broker reps who attend IETF, RIR and network operator meetings such as NANOG are more reliable than those that have never been to any of these meetings. (For example, PrefixBroker.com claims on its website that they helped author the RIPE transfer rules.)

IPv4MarketGroup has a list of questions to ask a potential broker, including if they will only represent one side of the transaction (most handle both buyer and seller) and if they have appropriate legal and insurance coverage. This list can be a useful starting point.

#### Considerations and Conditions

You need to think about how you'll vet the other party in your transaction. By what process do you as a seller get to know your buyer, and vice-versa? Sellers might want to consider longer-term contracts for rentals (such as three years) for stability and also to minimize the movement of their tenants. "I would be somewhat worried if the broker did not undertake some diligence steps directly to validate the credentials of the seller," said Huston.


The final part of the transfer process is in understanding the condition of the actual address block itself. There is no guarantee that a used block isn't tainted with spammers or used for other less-than-legal activities. "There are no established standards of conduct, little transparency, and even less accountability," wrote Marc Lindsey back in 2018 for a blog post on CircleID. "Many participants in the market struggle to define, from a legal perspective, what is being bought and sold." He also has several suggestions on vetting the other party in the transaction that are worth reviewing.

Most of the brokers will state that they examine prior ownership of their blocks to ensure it is spam-free and to eliminate the potential of being used for other shady dealings. The trick is understanding what tools they use to convince you of this claim. For example, some brokers require you to check the blacklists (such as those maintained at Cisco Talos, Hetrixtools.com and IP-score.com) on your own to ensure that your block isn't listed there. IPv4 Market Group offers a blacklist cleaning service that examines 90 blacklists. IPv4.Global checks 20 different blacklists as part of its services. Actual charges can vary from being included in the transfer commission price to an additional fee of \$2000.

However, identifying whether a block is on a blacklist and removing it from a list are two different matters. If it is listed, you will have to work on removal from the blacklists before you can lease it. Says Huston, "once an address is blacklisted it's exceptionally hard to get it unlisted." None of the brokers will give you a firm price on cleansing a block, which will depend on how many blacklists it appears.

# Summary

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IP address transfers can require serious legwork and time to complete, with the entire process often taking several months from start to finish. If you have a legacy block, you may need that time to gather and get your ownership documents in order, navigate the legal and other corporate approvals and execute the transactions. In many cases, however, the effort is worth it. Businesses that are sitting on unused IPv4 blocks could benefit greatly from the increased cash flow of a successful transfer. And if you like the challenge of doing the research, you could be a hero at your company for taking this task on.

## About Us

Network Solutions is the expert in domains. In 1993, Network Solutions was the sole company registering the .com, .net, .org and .edu extensions. Since then, we've been an active part of the evolution of the internet and our Customer Service team is here to help you succeed online.

For tools to keep your business moving, access our [Resource Center here](#).

Whether you're looking for assistance, insight, resources or answers, we'll be glad to provide the solutions you need.