INTERNET RESOURCE MANAGEMENT POLICIES IN LATIN AMERICA AND THE CARIBBEAN

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ABSTRACT

IP address distribution follows the hierarchical scheme described in RFC 1466. For Latin America and the Caribbean, IANA allocates IP address space to LACNIC for its allocation and assignment to National Internet Registries (NIRs), Internet Service Providers (ISPs), and end users. In addition, administration of Autonomous Number Systems and inverse resolution space are critical components for the efficient operation of the Internet on a global level. This document describes the policies and procedures relating to the allocation, assignment and administration of IPv4 address space, ASN, and delegation of inverse resolution space allocated to Latin America and the Caribbean. These policies must be followed by NIRs, ISPs, and end users.

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1. SCOPE

This document describes the Internet resource management system in Latin America and the Caribbean. In particular, it describes the rules and guidelines that apply to IPv4 address block distribution, ASN, and delegation of inverse resolution space allocated to Latin America and the Caribbean. In the case of IP addresses, the rules established in this document apply to all IPv4 address blocks allocated or assigned through LACNIC and those allocated and assigned by ARIN.

This document does not describe private Internet address space or multicast address space.

Neither does this document describe IPv6 address space management; this topic is dealt with in the document titled "IPv6 Address Allocation and Assignment Policies."

In this document a distinction is made between IP address **allocation** and **assignment**. IP addresses are **allocated** to NIRs and ISPs so they in turn may **assign** them to their end users.

2. IP ADDRESS SPACE AND THE INTERNET REGISTRY SYSTEM

2.1. Types of IP Addresses

For the purpose of this document, IP addresses are 32 bit binary numbers that are used as addresses in IPv4 protocols used in Internet. There are three types of IP addresses.

2.1.1. Public IP Addresses

Public IP addresses constitute the Internet address space. These addresses are allocated so that they are globally unique, according to the objectives that will later be described herein. The main objective of this address space is to allow communication using IPv4 on Internet. A secondary objective is to allow communication between interconnected private networks.

2.1.2. Private IP Addresses

Certain ranks of IP addresses have been reserved for the operation of private networks that use IP protocol. Any organization may use these IP addresses in their private networks without the need of requesting them from an Internet Registry. The main requirement established for the use of private IP addresses is that the hosts which use these IP addresses do not need to be reached through Internet. For a more detailed description of private IP address space, see RFC 1918.

2.1.3. Special and Reserved IP Addresses

These are ranks of IP addresses reserved for applications such as multicasting. These IP addresses are described in RFC 1112, and are beyond the scope of this document.

2.2. Objectives of Public IP Address Space Distribution

According to the provisions of RFC 2050, each allocation and assignment of public IP addresses shall guarantee that the following four conditions are met.

2.2.1. Exclusivity

Each public IP address must be unique worldwide. This is an absolute requirement that guarantees that each Internet host can be uniquely identified.

2.2.2. Preservation

Fair distribution of IP address space according to operational needs of end users operating networks and using this IP address space. In order to maximize the life span of public IP address space resources, IP addresses must be distributed according to end users' current needs; this avoids accumulation of unused IP addresses.

2.2.3. Routeability

Global hierarchical distribution of IP addresses, which allows scaling IP address routing. This scaling is necessary to ensure proper operation of Internet routing.

2.2.4. Registration

Submission of documentation on IP address space allocations and assignments. This documentation is necessary to ensure exclusivity and provide information for locating errors on all Internet levels.

The consecution of the above mentioned objectives is in the best interest of the Internet community. However, it must be noted that preservation and routeability are frequently conflictive objectives. These objectives may at times conflict with the interests of ISPs, NIRs, or end users. When this is the case, it is necessary to analyze each particular situation carefully in order to reach an adequate compromise between the parties involved in the conflict.

2.3. The Internet Registry System

The Internet registry system has been established with the aim of enforcing the objectives of exclusivity, preservation, routeability and information. This system consists of hierarchically organized Internet registries (IRs). Typically, IP address spaces are assigned to end users by ISPs or NIRs. These IP address spaces are previously assigned to NIRs and ISPs by Regional Internet Registries.

Under this system, end users are organizations that operate networks that use IP address spaces. NIRs, as LACNIC, maintain IP address spaces to be allocated or assigned to end users or Internet Service Providers. Assigned IP address space is used to operate networks, whereas allocated IP address space is kept in Internet Registries for future assignment to end users.

2.3.1. IANA (Internet Assigned Number Authority)

This organization has jurisdiction on the entire universe of IP address space used on Internet. IANA is the organization responsible for allocating part of the global IP address space to Regional Registries according to their needs.

2.3.2. Regional Registries (RIR)

Regional Registries operate in large geopolitical areas, such as continents. Currently there are four established Regional Registries: ARIN (American Registry for Internet Numbers), serving the USA, Canada and South−Sahara Africa; RIPE NCC, serving Europe and part of Africa; APNIC, serving Asia and the Pacific; and LACNIC, serving Latin America and the Caribbean [Annex 1]. The number of Regional Registries is expected to remain small, as service areas shall remain of continental dimensions.

2.3.3. National Internet Registries (NIR)

National Internet Registries are established under the authority of RIRs. These Internet Registries have the same role and responsibilities as Regional Registries, but within their assigned geographic areas. These areas are of national scope.

2.3.4. Internet Service Providers (ISP)

Internet Service Providers mainly allocate IP address space to end users of the network services they provide. Their clients may be other ISPs. ISPs do not have geographical restrictions as do NIRs.

2.3.5. End Users

End users are organizations that deploy and use IP addresses.

3. IP ADDRESS BLOCK ALLOCATION POLICIES

3.1. Introduction

In this chapter we will describe how an Internet Registry (for future reference, this concept encompasses Internet Service Providers and National Internet Registries) can obtain IP address allocation and how the allocated space must be administered.

IP address space is allocated to Internet Registries (IR) using a slow−start model. Allocations are based on justifiable need, not only on the grounds of client prediction.

Due to the fact that the number of IP addresses is limited, many factors must be considered for the delegation of IP address space.

As mentioned earlier, LACNIC's allocations to IRs are based on RFC 2050's slow−start concept. The idea is to allocate IP address space to Internet Registries in the same proportion as they will assign the IP addresses among their users.

The size of an allocation to a particular IR is based on the rate with which it has previously assigned IP address space among its clients. The aim is to avoid the existence of large blocks that are not assigned to end users.

Due to technical restrictions and the possibility of overcharging the routing tables, certain policies must be implemented in order to ensure that the preservation and routeability objectives are fulfilled.

This chapter mentions prefix sizes and block sizes. Standard notation implies that longer prefixes reference blocks of smaller size. For example, when it is said that certain policy applies to blocks with a prefix longer than /20, this means that blocks smaller than 16 class C networks are being discussed.

3.2. Aspects to Consider in relation to IP Address Administration

This section describes a number of aspects on which relationships must be based, both between Internet Registries and their clients as well as between Internet Registries and LACNIC.

3.2.1. IP Addresses are Delegated

LACNIC shall allocate Internet resources within a delegation plan. This resource delegation plan shall be valid for one year. This delegation is renewable, and shall be subject to the conditions established at the time of renewal.

3.2.2. Slow−Start Policy

IP address blocks are allocated to IRs using a procedure called slow−start based on RFC 2050.

Internet Service Providers applying for portable (provider−independent) IP address blocks for the first time shall receive a minimal amount based on immediate requirement, with the exceptions established in Section 3.3.4 −" Direct Allocations".

After this initial allocation, allocated blocks may be increased based on the verification of block usage according to information provided to LACNIC. Thus, LACNIC shall be responsible for determining initial and subsequent allocations. Additional IP address allocations shall enable the IRs to operate for at least three months without requiring further allocations.

Initial allocations shall not be based on any current or future routing restrictions, but on actual and demonstrated use of IP addresses.

Likewise, the number of addresses projected by the applicant is useful for planning future requirements.

3.2.3. Allocated blocks

In order to ensure an efficient implementation and use of classless technologies (CIDR), LACNIC shall allocate IP address blocks based on the limits supported by this technology. To facilitate an efficient deployment of the CIDR, Internet Service Providers (ISPs) and End Users are encouraged to initially request IP address space from their

upstream providers. The upstream provider shall maintain control of the allocated blocks upon termination of their clients' contracts.

3.2.4. Avoid Block Fragmentation

IP addresses under CIDR technology are allocated to IRs in blocks. It is recommended that the publication of these blocks on the routing tables remain intact. More specifically, ISPs shall treat IP address suballocation to their clients as a loan for the duration of the connectivity. Upon termination of the Internet connectivity contract, e.g., if a customer moves to another ISP, the client shall return the IP addresses currently in use and renumber them with the new IP addresses of the new provider. New requests for addresses shall be conditioned to the completion of this task. The IR shall allow sufficient time for the renumbering process to be completed before these IP addresses are reused with another client.

3.2.5 Documentation

Internet Registries shall use the group of IP addresses they have been allocated in an efficient manner. To this end, IRs shall document the justification for each IP address suballocation. At the request of LACNIC, the corresponding IR shall make this information available. LACNIC shall not make complementary allocations to those Internet Registries that do not have the use of the blocks already allocated properly documented. In these cases, current allocations may also be reviewed.

According to what is established in RFC 2050, the documentation LACNIC may require includes:

* Engineering plans.
* Subnetting and aggregation plan.
* Description of network topology.
* Description of network routing plans.
* Receipts documenting investments (equipment).
* Other relevant documents.

3.2.6 Use of Classless Technology (CIDR)

Due to the requirement to increase the efficiency of the use of IP address space, all assignments are made under the assumption that organizations use variable length subnet masks (VLSMs) and classless technology (CIDR) within their networks. Any request for address space based on the use of classless technology shall require a detailed justification. The use of classfull technologies is generally unacceptable due to the limited availability of free IP address space.

3.2.7 Static Addressing

Due to restrictions on the availability of IP addresses, LACNIC shall in no way endorse the use of static IP address assignments for dial−up users (e.g., one address per customer). It is understood that the use of static addressing may simplify some

administrative aspects. However, the current rate of consumption of IP addresses does not allow the assignment of static addresses for administrative reasons. Because of this, organizations that are considering the use of static IP address assignment are encouraged to investigate and implement dynamic assignment technologies.

3.2.8 Web Hosting

The development of the http 1.1 protocol has eliminated the need of assigning an IP address for each web domain in case of multiple websites on the same server. LACNIC promotes the development of web page hosting based on name usage, as opposed to IP addresses.

Therefore, this last case shall not be accepted as justification for using IP addresses. LACNIC shall consider exceptions where applications require the use of web hosting based on IP addresses, which must be duly described and justified.

3.2.9 Non−Guaranteed Routeability

Portable (provider−independent) IP addresses issued by LACNIC or NIRs are not guaranteed to be globally routable.

These problems shall be solved by those possessing the IP addresses involved, together with their connectivity provider or providers.

In those cases deemed necessary, LACNIC shall provide the necessary guidance.

3.2.10 Validity of IP Address Allocation

IP address allocations are valid as long as the objectives of exclusivity, conservation, routeability, and information continue to be met. LACNIC may invalidate any IP address allocation if it is determined that the requirements for IP address space no longer exist or any of the objectives stated in this document have ceased to be satisfied.

There are a number of practices that might be considered grounds for losing the allocations received. These are:

* Not using the allocated IP address space during a period of one month following registration.
* Not updating the inverse resolution registry of IP address space.
* Not updating the suballocation information on LACNIC’s Whois database.
* Not satisfying contractual obligations towards LACNIC.
* Not applying correctly LACNIC’s policies on suballocations and administration of resources received from LACNIC.

In the event of IP address space invalidation, reasonable effort shall be made by LACNIC to inform the community that the IP addresses have been returned and are once again available IP address blocks.

3.2.11 Submission of Application Templates

IRs request IP address space from LACNIC through address application templates for IRs or End Users. Any application deemed as lacking information or insufficiently detailed shall be returned to the applicant for its completion.

3.2.12 Suballocation Supervision

3.2.12.1 Suballocation Window

ISPs may suballocate to their clients blocks smaller than 16 class C networks, i.e., blocks with prefixes longer than /20, following the policy defined by LACNIC in this document. In some cases, suballocations shall be consulted with LACNIC or with the corresponding NIR in order to ensure optimization of the use of IP address space and the correct application of LACNIC policies.

An allocation window is defined by LACNIC as the suballocation of blocks with prefixes shorter than or equal to /23 (larger blocks). These suballocations shall be consulted with LACNIC or the corresponding IR. In these cases, communication between the ISPs and LACNIC or the corresponding NIR shall include the same information and justifications required in this document for end users.

3.2.12.2 NIR Suballocation

NIRs are exempt from complying with item 3.2.12.1. Instead, they shall be subject to more severe audit programs according to the provisions of the contracts between LACNIC and NIRs.

These audits shall be carried out at least once a year and, if necessary, with greater frequency.

3.2.13. Submission of Suballocation Information

Allocations are based on the requirement of three months of Internet Registries, in addition to other information considered relevant by LACNIC such as that described in item 3.2.5 − "Documentation". Thus, initial allocations may be relatively small. The justification for requiring new allocations must be based on the information transmitted by the corresponding Internet Registry to LACNIC's WHOIS database.

Suballocation information shall be sent to LACNIC within a period of seven days following the allocation, so that the WHOIS database may be updated in due time.

Submission of suballocation information is also necessary for the following reasons:

* To ensure that an IR has exhausted, or is about to exhaust, the allocated IP address space, thereby justifying the allocation of new additional space.
* To provide the Internet community with information as to which organization is using the IP address space and to provide a point of contact in case of operational,

security, or other problems.
* To assist in the study of IP address allocation within the region.

3.2.14 Security and Confidentiality

LACNIC shall maintain systems and practices that ensure and protect the confidentiality of all information entrusted to LACNIC in the documentation submitted to justify allocation or assignment of IP addresses.

3.2.15 Equal Processing of All Applications

LACNIC shall process every application strictly in the order they are received, regardless of geographical factors, demographic factors, language, etc. Under no circumstance shall LACNIC grant special treatment or make exceptions to the norm established for application processing. To this end, LACNIC shall use an application numbering system that will allow their proper administration.

3.2.16 Micro Allocations

LACNIC shall micro allocate blocks with prefixes longer than the standard (smaller blocks) in special cases listed in Section 3.3 − "Initial IP Address Space Allocation Policies".

3.2.17 Merger, Acquisition, or Sale of ISPs or End Users

LACNIC's policies do not recognize the non−authorized transference of IP address space and shall consider such transferences invalid.

Should an ISP or end user change owner due to a merger, sale, or acquisition, the new entity shall register these changes with LACNIC. If the name of the company is modified, legal documentation validating this change of name shall be submitted.

The information that may be requested includes, but is not limited to, the following:

1.A copy of the legal document validating the transference of assets.
2.A detailed inventory of all assets used by the applicant for maintaining the IP address space in use.
3.A list of the applying party's clients that use portions of the allocated space.

3.3 Initial IP Address Space Allocation Policies

LACNIC shall allocate IP addresses to organizations covered by the following cases:

* Allocation to multi−homed Internet Service Providers.
* Allocation to Internet Service Providers that are not multi−homed.
* Micro allocations.
* Direct allocations to Internet Service Providers.
* End user assignment.

This section contains a detailed description of the policies LACNIC shall apply for initial allocation of portable (provider−independent) IP addresses in each of these cases.

Due to the limited number of IP addresses available on the Internet, many factors must be considered for determining IP address space allocation. Therefore, IP address space is allocated to ISPs following a slow−start model. Allocations are based on current justifiable need, not on prediction of number of clients, market research, etc.

3.3.1 Initial Allocation to Multi−Homed Internet Service Providers

LACNIC shall apply a policy whereby a multi−homed ISP that has efficiently used a /22 block is allocated a /20 block.

An ISP is multi−homed if it receives full−time connectivity from more than one Provider and has one or more routing prefixes publicized by at least two of its connectivity providers.

In order to receive an initial allocation of IP address blocks from LACNIC, Internet Service Providers shall meet the following requirements:

1. Be multi−homed organizations that have efficiently used a minimum /22 block (adjoining or non−adjoining). To justify future allocations, the organization must provide LACNIC the appropriate documentation, including allocation history. Organizations that have the minimal allocation requested and are planning to become multi−homed within a period of one month may also submit applications. In this case, copies of the validating contracts or documents shall also be required.
2. Provide information on suballocations by prefixes shorter than or equal to /29 (i.e., blocks larger than or equal to 8 IP addresses) on LACINIC's WHOIS.
3. Provide documentation justifying the allocation of initial address space. (Complete the IP Address Application Template for ISPs.) This must include detailed information showing how /20 shall be used within the following three, six and twelve−month periods.
4. Agree to renumber /22 block within a period of 12 months and return the space to its original provider. This point is essential for obtaining the requested /20 block. The allocated /20 block must be used to renumber the original /22 block.

3.3.2 Initial Allocation to Internet Service Providers that Are Not Multi−Homed

Those organizations seeking an initial allocation from LACNIC that do not meet the requirements described in Section 3.3.1 shall comply with the following policies:

1. Have efficiently used the entirety of a /21 block previously allocated by their upstream provider. The allocation of this /21 block does not have to be adjoining address spaces.
2. Provide documentation justifying the initial address space (Complete the IP Address Application Template for ISPs). This must include detailed information showing how /20 shall be used within the following three, six and twelve−month periods.
3. Provide information on suballocations by prefixes shorter than or equal to /29 on LACNIC's WHOIS.
4. Agree to renumber /21 block within a period of 12 months and return the space to its

original provider. This point is essential for obtaining the requested /20 block. The allocated /20 block must be used to renumber the original /21 block.

3.3.3 Micro Allocations

Micro allocation is the name given to those allocations that imply blocks smaller than /20 but always larger than or equal to /24.

LACNIC can grant this type of allocation in case of projects and infrastructure for networks that are key or critical for the region, such as IXPs (Internet Exchange Points), NAPs (Network Access Points), RIRs, ccTLDs, among others.

In the case of IXPs or NAPs, in order to be able to apply for this type of allocation, organizations shall meet the following requirements:

1. Duly document the following aspects:
1.1 Prove by means of their bylaws their capacity of IXP or NAP. The organization shall have at least three members and an open policy in relation to the association of new members.
1.2 Submit a company structure organizational diagram.
1.3 Document the numbering plan to be implemented.
2. Provide a usage plan for the following three and six months.

The rest of the applications shall be studied based on the analysis of the documentation justifying the critical and/or key aspects of the project.

Organizations receiving micro allocations are not authorized to suballocate these addresses.

3.3.4 Direct Allocations

According to the specifications of RFC2050, LACNIC applies a slow−start policy for IP address allocation. According to the provisions of Sections 3.3.1 and 3.3.2, the initial allocation for an IR is a /20 block.

Despite this, LACNIC acknowledges that there may exist circumstances under which there is justifiable need for an initial allocation where infrastructure and service investment levels would demand minimal allocation.

LACNIC shall be able to grant this type of allocation to those organizations that meet the following requirements:

1. The organization is currently multi−homed or will be multi−homed in the near future (contracts or letters of intention signed with their access providers).
2. Submit a detailed description of network topology.
3. Submit a portfolio with a detailed description of the services the organization will offer.
4. Submit a detailed plan of deployment of IP address space usage for three, six, and

twelve months.
5. Submit a copy of receipts or purchase orders for the equipment that will support the previously described services.

It should be noted that this type of allocation shall be handled as exceptions and are not covered by the response times guaranteed for normal IP address application processes. For these allocations LACNIC may, at any time, request additional information to help justify a minimal allocation.

3.3.5 Policies for Initial IP Address Assignment to End Users

LACNIC shall assign IP address blocks to end users requiring IP address space for internal use, for the operation of their networks, but not for sub−delegation outside their organization.

Generally, end users receive IP address space from their upstream providers, not directly from LACNIC. Portable (provider−independent) addresses obtained directly from LACNIC or other Regional Registries are not guaranteed to be globally routable. For this reason, end users should contact their Internet Service Providers to ensure their connectivity within the network.

End users not connected to an ISP and/or not planning to be connected to the Internet are advised to use private IP addresses. The description of these addresses may be found in RFC 1918.

When assigning IP addresses to end users, LACNIC follows the guidelines of the assignment policies and procedures established in RFC 2050. These policies and procedures were developed to satisfy the needs of the growing Internet community in relation to preserving the limited IP address space and allowing the continuity and existence of Internet routing technologies. The minimum IP address block allocated by LACNIC is /20. Should the need for IP address space be lower than /20, end users should contact their corresponding Internet Service Providers.

LACNIC shall assign IP addresses to end users that are efficiently using a /21 block. Each one of these organizations shall be assigned a /20 block. In order to receive an initial assignment from LACNIC, singlehomed End Users shall:

1. Provide detailed information showing how the /20 shall be used within the following three, six and twelve−month periods, as shown in the table included in Annex 2 [Report for the Assignment of IP Address Space].
2. Agree to renumber /21 block within a period of 12 months and return the space to its original provider. This point is essential for obtaining the requested /20 block. The allocated /20 block must be used to renumber the previously assigned /21 block.
3. Submit subnetting plans for a period not shorter than one year, including subnet masks and host numbers on each subnet. Use of VLSM is required.
4. Submit a detailed description of network topology.
5. Prepare a detailed description of network routing plans, including the routing protocols to be used as well as any existing restrictions.

Usage rate is a key factor that must be justified. Usage rate is the percentage of IP addresses that the organization will utilize within a specified period of time. The rate established according to RFC 2050 and adopted by LACNIC is:

25% of immediate usage rate.
50% of one−year usage rate.

A larger usage rate may be required based on individual requirements. Should the organization presenting the application fail to comply with these parameters, addresses shall be withdrawn and a reasonable period shall be negotiated for their renumbering.

3.3.6. Policies for Initial IP Address Assignment to Multi−homed End Users

LACNIC shall assign IP address blocks, with prefix from /24 through /21, to end users requiring IP address space for internal use, for the operation of their networks, but not for sub−delegation outside their organization and which are multi−homed.

It is understood as a multi−homed, those organizations that has at least two permanent Internet connection with at least two different and independent provider. It is understood as an independent provider, that one that does not depend on the other to reach the Internet.

LACNIC shall micro assign IPv4 address to end users that fulfill the following requirements:

1. Be a multi−homed end user. Shall request as well those end user which will be multi−homed in the time−frame of one month. In this case, copy of contract or documents that validate it will be requested.
2. Agree to renumber all IP blocks assigned by its provider in the time−frame of 3 months and return these address to the original provider.
3. Provide plans of sub networking with forecast utilization for at least one year, including net masks and number of hosts. The use of VLSM is required.
4. Provide detailed description of the network topology.
5. Provide detailed description of routing plans including routing protocols and any limitation that shall exist.

The minimum address space to be micro assigned will be /24 and the maximum /21. Assignments of bigger prefix should be requested under the previous policy. Additional assignments under existent policies.

3.4 Additional IP Address Space Allocation Policies

This policy is presented with the aim of assisting Internet Registries in the process of applying for additional IP address space. The most important factor in the evaluation of additional IP address space applications is the revision of the current IP address space of the organization presenting an application. In order to receive additional space, an organization presenting an application must have used at least 80% of the IP address space previously assigned by the corresponding RIR or NIR. This includes the space

reallocated to its clients. Therefore, it is important that Irs demand that their clients follow the efficient usage practices described in these policies.

The steps that must be completed for the allocation of new IP address blocks are the following:

1.The first step of the process is to verify the usage of at least 80% of previous allocations. This usage percentage shall be based solely on those networks publicized with IP addresses connected to the Internet. For Irs that have allocated IP addresses to their clients, the available method to prove this usage is through the records kept in LACNIC's WHOIS database. Until the usage of at least 80% of the previously allocated block is verified, the application shall not continue to be considered. Use of 80% of previously allocated addresses also covers those addresses dedicated to internal use and dial−up clients of the company. In this case, usage may be justified through the report included in Annex 3 [Additional Report for IP Address Space Allocation].

The application process for additional space shall continue once the usage of at least 80% of the previously assigned space has been verified.

2. Organizations shall prove they are using LACNIC policies in suballocating space to their clients, particularly in relation to:

* Issuing prefixes longer than /24, wherever possible.
* Verifying that suballocation of blocks within the allocation window were previously submitted to LACNIC for approval.

3. Organizations shall demand that their clients adhere to the following criteria:

* The information on suballocations smaller than /29 must be available through WHOIS and they must comply with the 80% space usage requirement before assigning additional space to their clients.
* LACNIC policies for the Internet community are generally communicated to and followed by their clients.

4. When reviewing applications for additional IP addresses, LACNIC shall also review whether the space designated for its return was actually returned in due time as described in this document.

5. Keep the registry of inverse resolution of administered IP address space updated. The inverse resolution registry shall also agree with the 80% usage.

6. For allocating additional blocks, LACNIC shall verify that the organization presenting the application is in compliance with contractual obligations.

7. The final step is to determine the appropriate allocation. In order to determine the size of the allocation, detailed information must be provided showing how the IP address space shall be used within the following three, six and twelve−month periods. The policy for determining the size of additional space allocations is based on the efficient usage of

space within a time frame of three−months.

4. DELEGATION OF INVERSE RESOLUTION

4.1 Introduction

In most connections through the Internet, machine names are used instead of their IP addresses. It is obvious that names are easier to remember than numbers. However, Internet connections between computers connected to this network shall be made using IP addresses. Therefore, before the connection begins, the computer's name must be translated to its IP address. This process is known as direct DNS Resolution, i.e., converting names into IP addresses.

Frequently it is also necessary to perform the inverse operation, known as Inverse Resolution.

This conversion attempts to find the name associated to a computer's IP address.

Inverse resolution is only possible with the use of a pseudo−domain, "in.addr−arpa", abbreviation historically used for Arpanet Inverse Address.

DNS delegation of this pseudo−domain is responsibility of Internet Registries, as they are responsible for allocating IP addresses.

4.2 DNS Server Registration

All allocated IP address space must have an associated DNS server, which shall be responsible for inverse resolution. In the case of the area covered by LACNIC [Annex 1], these servers must be registered with LACNIC, which in turn is responsible for the inverse resolution of blocks administered by this organization.

LACNIC may use information obtained through inverse resolution as an indicator of the usage of allocated IP address blocks.

DNS server registration of the IP address space administered by LACNIC shall vary according to the size of the allocated space.

Blocks allocated by LACNIC with prefixes shorter than or equal to /16 shall have the DNS servers responsible for inverse resolution registered at LACNIC. Information shall be entered in relation to /16 blocks.
Suballocations of segments with longer prefixes within these blocks, shall have their DNS servers registered at the organizations that received the blocks with prefixes shorter than or equal to /16 directly from LACNIC.

Blocks allocated by LACNIC with prefixes longer than /16 shall register at LACNIC the DNS servers responsible for the inverse resolution of all blocks with the prefix /24 that account for the total IP address space allocated by LACNIC. Thus, suballocations with prefixes of up to /24 within these blocks must have their DNS servers registered at

LACNIC.

Example:

1. ISP−A receives from LACNIC a /15 block (200.0.0.0/15). It must report to LACNIC which DNS servers shall be responsible for the inverse resolution of each one of the /16 blocks that make up the allocated block, i.e., blocks 200.0.0.0/16 and 200.1.0.0/16. The DNS servers of suballocations of longer prefixes made within this block shall be registered at the DNS servers of ISP−A, which in turn are registered at LACNIC's DNS servers as responsible for the inverse resolution of blocks 200.0.0.0/16 and 200.1.0.0/16.

2. ISP−B receives from LACNIC a /20 block (200.2.0.0/20). It must report to LACNIC which DNS servers shall be responsible for the inverse resolution of blocks 200.2.0.0 to 200.2.15.0. If ISP−B suballocates a block with a prefix longer than /21 and shorter than or equal to /24, it must register at LACNIC's servers the new DNS servers responsible for the inverse resolution of the suballocated block.

Thus, within LACNIC's IP address administration system, it shall not be possible to register DNS servers for suballocations made in blocks with prefixes shorter than or equal to /16 that have been directly allocated by LACNIC. The organization receiving the allocation shall maintain the registry of the DNS servers responsible for the inverse resolution of suballocations made within that block.

This shall also be reflected on the WHOIS server database. In other words, for suballocations within blocks with prefixes shorter than or equal to /16 directly allocated by LACNIC, the DNS servers responsible for the inverse resolution of those suballocations shall not be visible through WHOIS. This is because these servers are not registered at LACNIC.

Should it be necessary to identify the DNS servers of suballocations made within these blocks, the use of DNS consulting tools is recommended.

This condition does not exist for allocations with prefixes longer than /16 made by LACNIC. In this case, suballocations of prefixes of up to /24 made within blocks allocated by LACNIC and having prefixes longer than /16 may have a DNS server delegated through LACNIC's IP address administration system.

LACNIC's IP address administration system does not accept the delegation of DNS servers for blocks with prefixes longer than /24. For these cases the adoption of BCP 20 is recommended.

To summarize:

Prefix of the block allocated by LACNIC	DNS server for suballocations made by LACNIC must be registered at:
/16 or shorter.	ISP that received the block
/17 or longer.	LAC

5. Autonomous System Number Allocation (ASN)

An Autonomous System (AS) is a group of IP address networks managed by one or more network operators having a unique, clear routing policy.

Each Autonomous System (AS) has an associated number that is used as an identifier of the Autonomous System for exchanging external routing information. Exterior routing protocols, such as BGP, are used for exchanging routing information among Autonomous Systems.
The term "Autonomous System" is frequently misinterpreted as merely a convenient way to group networks that are under the same management. However, if there is more than one routing policy in the group, more than one AS is necessary. On the other hand, if the group of networks has the same policy as the other groups, they fall within the same AS regardless of management structure. Thus, by definition, all networks that make up an Autonomous System share the same routing policy.

In order to simplify global routing tables, a new Autonomous System Number (ASN) should only be issued when a new routing policy is necessary. Sharing the same ASN among a group of networks that are not under the same management will require additional coordination among network administrators and, in some cases, will require redesigning the network to a certain degree. However, this is probably the only way to implement the desired routing policy.

LACNIC shall assign Autonomous System Numbers to those organizations that meet the following requirements:

1. The organization must be multi−homed with two or more independent Autonomous Systems at the time of application, or planning to become multi−homed within a period of no more than two weeks as of the moment of application. An organization is considered multi−homed if it receives Internet connectivity without restrictions from more than one Internet Service Provider.

2. The organization must submit detailed documentation describing the applicant’s routing policy, which must be unique and different to that applied by the ASN to which it is connected. This documentation must include the exterior routing protocol to be used, IP addresses that will conform the AS and a detailed explanation of the reasons why its routing policy differs from that of its providers.

It is the obligation of the organization receiving an Autonomous System Number from LACNIC to maintain updated records of postal addresses and points of contact.

In LACNIC’s WHOIS system it is possible to represent up to three different points of contact, namely:

owner−c, which represents the administrative contact of the organization to which the ASN was assigned;

routing−c, contact that, through the IP and ASN administration system, may register the

routing policies adopted by the Autonomous System;

abuse−c, security contact (Abuse Contact).

6. ANNEXES

ANNEX 1. List of countries covered by LACNIC

ARGENTINA
ARUBA
BELIZE
BOLIVIA
BRAZIL
CHILE
COLOMBIA
COSTA RICA
CUBA
DOMINICAN REPUBLIC
ECUADOR
EL SALVADOR
FALKLAND ISLANDS (MALVINAS)
FRENCH GUYANA
GUATEMALA
GUYANA
HAITI
HONDURAS
MEXICO
DUTCH ANTILLES
NICARAGUA
PANAMA
PARAGUAY
PERU
SOUTH GEORGIA AND THE SOUTH SANDWICH ISLANDS
SURINAM
TRINIDAD AND TOBAGO
URUGUAY
VENEZUELA

ANNEX 2. Report for the Assignment of IP Address Space

Prefix	Subnet Mask	Size	Current	6Months	12Months	Description
200.10.193.0	255.255.255.192	64	28	34	50	Purchases
200.10.193.64	255.255.255.224	32	10	12	25	Customers
200.10.193.96	255.255.255.224	32	8	13	27	North Office
200.10.193.128	255.255.255.128	128	57	100	114	Corporate
200.10.194.0	255.255.255.0	256	132	170	210	Sales
200.10.195.0	255.255.254.0	512	317	350	380	Assembly
		1024	552	679	806	Totals

ANNEX 3. Additional Report for IP Address Space Allocation
City Allocated IP Addresses Number of Ports Number of Dial−Up
City Allocated IP Addresses Number of Internal Hosts Purpose

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