

IPv6 Presence in Latin-American ccTLDs.

Roque Gagliano Molla, Pablo Allietti, February 2006.

Abstract—During 2005 32 IPv6 prefixes have been allocated by the Regional Internet Registry (RIR): LACNIC (Latin-American and Caribbean Internet Addresses Registry). [1]

This work explore whether the DNS infrastructure of this region is prepared to address the deployment of IPv6.

The document contains a summary of the information collected across the different ccTLD (Country Code Top Level Domain) administrators of the Latin-American region, as well as comments on the status of the adoption of different services in each country—such as the availability of authoritative DNS and Whois servers and other registry services. We also provide some overall statistics for the region. The results of this work stands as December 2005.

I. INTRODUCTION

THE last twelve months have been very significant for the development of IPv6 around the globe. Key companies and government agencies announced either the adoption or plans of implementing IPv6. Particularly, important allocations have taken place in all the RIRs, where LACNIC has not been an exception. This can be seen in Figure 1.

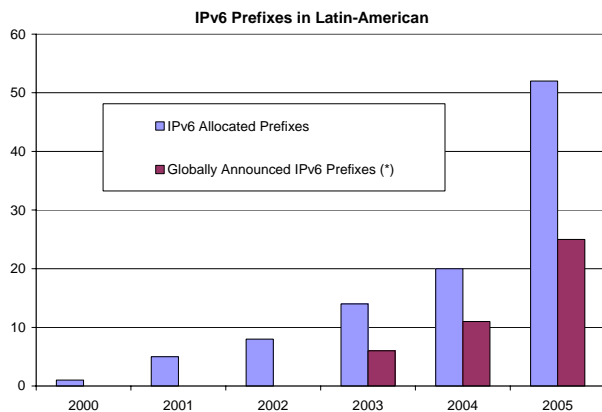


Fig 1: IPv6 prefixes (/32 and previous /35) allocated in the Latin-American region for the period 2000-2005. The plot also includes the Prefixes that are currently announced in the global IPv6 routing table. (*) Data only available from 2003. [1,3,4].

Although this is not the only basis for the boost of IPv6 allocations, LACNIC has had since 2003 several policy changes and cost exonerations. Some of these include:

- Micro-allocation policy for ccTLDs and NAPs since 2003.
- IPv6 Experimental allocation since 2003.

- Simpler initial IPv6 allocation policy for LIRs and NIRs since 2003.
- Two years of no charge for IPv6 allocations in the region, since 2002.

The Micro-allocation policy not only helps ccTLDs to qualify for Provider Independent (PI) prefixes more easily, but it is also designed to make these allocations /32. This secures their presence in the global IPv6 routing table.

The ccTLD community has also been active in the deployment of IPv6. On July 2004, ICANN announced the addition of IPv6 nameserver's addresses to the Internet's root DNS zone. Since then, several AAAA records have been added from countries around the world.

In this work we investigate the adoption of IPv6 in the different ccTLD of the Latin-American region. Initially we sent a survey to the administrative and technical contact people of the organizations. Later, we used public sources of information such as whois servers, looking glasses and statistical information from LACNIC and IANA.

II. SURVEY RESULTS

The survey results are shown in Table 1. The responses were very diverse with only a few surprises.

We can classify the different CC (Country Cods) in three categories, depending on their degree of adoption of IPv6.

Category A: BR, CU, VE & UY. These organizations currently offer a series of services with IPv6, similar to those existing with IPv4. All of them are present at the root DNS zone, and all of them allow registration of AAAA records under the respective country code (manually or automatically). The main concern for these organizations is to build a redundant and resilient infrastructure for these services.

Category B: CL, HN, PA & DO. In this case, the organizations demonstrated a solid plan for the implementation

Country	CC	Answered Survey?	IPv6 Prefix Allocated	Master in root file?	Authoritative server answers SOA?	Automatic AAAA registration?	Manual AAAA registration?	Whois server over IPv6?	Web Server over IPv6?
Argentina	AR	Yes	No	No	2001:620::5 (*)	No	No	No	No
Belize	BZ	No	No	No	No	n/a	n/a	n/a	n/a
Bolivia	BO	No	No	No	No	n/a	n/a	n/a	n/a
Brazil	BR	Yes	2001:12ff::/32	Yes	2001:12ff::10	Yes	Yes	Yes	Yes
Chile	CL	Yes	2001:1398::/32 (**)	No	2001:4f8:0:2::13 (*) (+)	Yes	No	No	No
Colombia	CO	Yes	No	No	No	No	No	No	No
Costa Rica	CR	No	No	No	No	n/a	n/a	n/a	n/a
Cuba	CU	No	2001:1340::/32	Yes	2001:1340:1:128::136 (+)	No	Yes	Yes	Yes
Ecuador	EC	Yes	No	No	No	No	No	No	No
El Salvador	SV	No	No	No	No	n/a	n/a	n/a	n/a
French Guyana	GF	No	No	No	No	n/a	n/a	n/a	n/a
Guatemala	GT	No	No	No	2001:610:240:0:53:cc:12:92 (*)	n/a	n/a	n/a	n/a
Guyana	GY	No	No	No	2001:610:240:0:53:cc:12:95 (*)	n/a	n/a	n/a	n/a
Haiti	HT	Yes	No	No	2001:660:3006:1::1:1 (*)	No	No	No	No
Honduras (***)	HN	Yes	No	No	2001:502:d399::1 (*)	No	No	No	No
Mexico	MX	Yes	No	No	No	Yes	No	No	No
Nicaragua	NI	No	No	No	No	n/a	n/a	n/a	n/a
Panama	PA	Yes	2001:1368::/32	No	No	No	No	No	No
Paraguay	PY	Yes	2001:1320::/32 (**)	No	2001:620::5 (*) (+)	No	No	No	No
Peru	PE	Yes	No	No	2001:610:240:0:53:cc:12:173 (*)	No	No	No	No
Dominic Republic	DO	Yes	2001:13e0::/32	No	No	No	No	No	No
Suriname	SR	No	No	No	No	n/a	n/a	n/a	n/a
Uruguay	UY	Yes	2001:1328::/32	Yes	2001:1328:6::5 (+)	No	Yes	Yes	Yes
Venezuela	VE	Yes	2001:1338::/32	Yes	2001:1338::2 (+)	Yes	No	Yes	Yes

Table 1: Survey results by country.

(*) Potentially a Secondary Server with glue record in Root Zone.

(**) Prefix not Present in global IPv6 Routing Table.

(***) Service through a Third Party Company.

(+) More than one authoritative server answers SOA for ccTLD.

In this group, Honduras is the only ccTLD administrator that does not have an IPv6 prefix. In its case a third party company administrates their DNS infrastructure, and several steps have been taken to be added to the root zone in the near future.

Category C: AR, CO, EC, HT, MX, PY & PE. This group includes organizations that have answered the survey but did not showed a clear plan for the development of IPv6 for 2006.

One of the surprises of the survey was to come across Mexico in this group. The northern country not only has the highest number of IPv6 prefix allocations (12), but it also has an active community where the IPv6 Task Force Mexico has been working for several years. Today one can register AAAA records under .mx, but these are only visible on the IPv4 world. NIC Mexico has elaborated a plan to develop IPv6 services by 2008.

Argentina has the second largest number of allocations (6) and is the only country to have prefixes shorter than /32. The administrator for its ccTLD has announced that they will be working on a plan for the adoption of IPv6 during the second half of the current year.

Several organizations that are in this list (ex. PY) have third party secondary DNS servers that already have an AAAA glue record in the root zone. This might accelerate dramatically the adoption of IPv6 resolution for their respective country codes by avoiding the waiting process in IANA and even the necessity of IPv6 connectivity.

Category D: BZ, BO, CR, SV, GF, GY, NI & SR. This group of ccTLDs did not respond our survey and we were unable to verify any existing implementation of DNS resolution for IPv6.

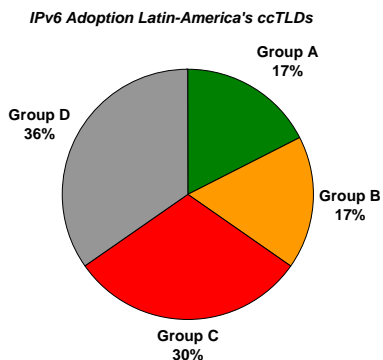


Fig 2: IPv6 Adoption in the Latin-American's ccTLDs discriminated by groups as described in Section I.

We asked in the survey which was the main difficulty, from the ccTLD perspective, in the adoption of IPv6. The most frequent answers were: the lack of interest from the community; the lack of economical or technical resources; and

finally, the lack of IPv6 access from local service providers, even if this is not a requirement for the implementation of IPv6 services.

With the actual flooding of prefix allocation in the region, it is clear that the interest exists. The problem could be a lack of communication bridges between these two important players. Therefore, several administrators mentioned the positive effect of hosting events such as the "IPv6TF LAC", "IPv6 Tour" or "Flip-6". Also, the knowledge for the implementation of IPv6 services already exists in the ccTLD community, this give the opportunity of cross-training between administrators of the groups A & B and those of the groups C & D.

III. CONCLUSION

A survey for the status of the adoption of IPv6 in the ccTLDs of the Latin-American region was performed. A classification of the different organizations was proposed, where we uncovered that 17 % of the ccTLDs have already adopted IPv6 and another 17% have a clear plan for implemented IPv6 during the present year.

The most important action for the adoption of IPv6 for the rest of the ccTLDs in the region is the subsequent improvement in the communication between not only the service providers that are getting the new IPv6 prefixes and the ccTLD administrators, but also inside the ccTLD community.

ACKNOWLEDGMENT

Special thanks to the ccTLDs administrators that answered our survey, and to Oscar Robles for helping us get in touch with some of them. Also, to Ricardo Patara (LACNIC) for his help recollecting the information.

REFERENCES

- [1] G. Valdes, LACNIC, Afrinic III Meeting, December 2005.
- [2] IPv6 Portal newsroom, <http://www.ipv6tf.org/news/newsroom.php>.
- [3] SIXXS Ghost Route Hunter, <http://www.sixxs.net/tools/grh>.
- [4] Lacnic official statistics, <ftp://ftp.lacnic.net/pub/stats/lacnic/delegated-lacnic-latest>.
- [5] ICANN Announcement, <http://www.icann.org/announcements/announcement-20jul04.htm>
- [6] <http://www.mx.ipv6tf.org/>, IPv6 Task Force México.

Roque Gagliano Molla (Roque.Gagliano@sprint.com) received his Electrical Engineering degree from the Universidad de la Republica, Montevideo Uruguay in 2001 and his Ms in Electrical Engineering form the University of Kansas in 2005. He is currently employed at Sprint Nextel Corp. in USA, where he performs as a Network Engineer. He is also an active contributor of several Latin-American forums and has lead several policy development groups for LACNIC.

Pablo Allietti (pablo@lacnic.net) Programmer and Network Administrator at LACNIC. He is active in several IETF Groups, LAC IPv6 TF and Linux Forums. Previously he was a Network Administrator at INIA, Montevideo.