LISP as a solution for Internet scalability

Jerônimo Bezerra, Humberto Galiza, Luciano Porto Barreto, Luiz Cláudio Mendonça, Claudete Alves

[1]Ponto de Presença da Rede Nacional de Pesquisa (PoP-BA/RNP)
Av. Ademar de Barros, s/n, UFBA, Ondina – 40110-140 – Salvador – Ba – Brasil

[1]Laboratório de Sistemas Distribuídos – Departamento de Ciência da Computação – Universidade Federal da Bahia (LASID/DCC/UFBA)
Av. Ademar de Barros, s/n, UFBA, Ondina – 40110-140 – Salvador – Ba - Brasil

{jab,galiza,lportoba,mendonca,claudete}@ufba.br

Abstract. *The exponential growth of BGP routing tables and mobility issues are two major problems in the Internet today. This paper presents an overview of LISP and our initial experiences in joining the LISP+ALT network. We also present our goals on using LISP as a testbed for Internet research in mobility, scalability, management and security.*

The Internet Architecture Board (IAB) Workshop in October 2006 [MEYER, 2007] pointed out the need to deal with current and future problems related to routing scalability and addressing for the Internet. Besides the exhaustion of IPv4 addresses, a major problem is the exponential growth of BGP routing tables due to network configuration and practices such as site multihoming and traffic engeneering. Mobility is a leading issue as well, which requires low latency and needs to scale. Therefore, the way the Internet works today does not provide an adequate solution for mobile users and scalable routing.

BGP is the core routing protocol of the Internet. It manages a table of IP networks (prefixes) which defines how autonomous systems are connected in order to perform routing decisions. The lack of prefix aggregation is causing BGP tables to grow continuously. Several researchers and practitioners believe that this may dangerously affect the operation of the Internet in the near future. It is important to state that IPv6 does not solve the problem, since it is based on the same routing infrastructure as IPv4. Therefore, the problem will not simply go away with IPv6.

It is common knowledge nowadays that the source of these problems is mainly due to the fact that IP addresses are both used for location and identification. This so called "IP address overloading" lessens mobility and imposes several complications to the routing infrastructure. Hence, there is an emergent need to decouple identification and location in order to provide flexibility and mobility for Internet users and administrators.

LISP [MEY 2008] [FARINACCI,2010] is one such a solution which splits the addressing scheme into two namespaces: identifiers and locators. LISP basically inserts one level of indirection at the network stack to perform packet encapsulation and transparent routing. LISP employs a dynamic encapsulation scheme in which outside addresses refer to locators and inside addresses refer to user`s IDs. As such, LISP packets are transparently routed in the Internet and it requires a few changes in software and no specific

configuration at network hosts. Furthermore, LISP does not require huge modifications to the network infrastructure and it is interoperable with IPv4 and IPv6.

In Latin America, the number of announced IP prefixes is twice as big as the rest of the world [YANNUZZI,2009]. At the end of 2009, we conducted a study to verify the benefits of using LISP. This work showed a potential reduction up to 89% of the BGP routing table, mainly due to prefix aggregation. Afterwards, we contacted Lisp Working Group and joined the LISP+ALT network [FULLER,2009] at the beginning of 2010. To the best of our knowledge, there are only two institutions (UFBA in Brazil and LACNIC in Uruguay) in the LISP+ALT network in Latin America. We hope that other institutions get motivated to join this network as well. Finally, our main goal is to use the LISP+ALT network as a testbed to perform studies on the analysis of LISP implementations, internet scalability, mobility and security.

References

Farinacci, D., et al. (2010), Locator/ID Separation Protocol (LISP). Internet Draft.

Fuller, V., et al. (2009), LISP Alternative Topology (LISP-ALT). Internet Draft.

Meyer, D, et al. (2007), Report from the IAB Workshop on Routing and Addressing. RFC 4984, September 2007.

Meyer, D. (2008). The Locator Identifier Separation Protocol (LISP). The Internet Protocol Journal, vol. 11, No 1, 2008.

Yannuzzi, M. et at. (2009). Managing Interdomain Traffic in Latin America : A new perspective on LISP. IEEE Communications Magazine, vol. 47, p. 40-48, July 2009.

Biographies

Jerônimo Aguiar Bezerra obtained his Computer B.S. degree in 2009 and he is currently a MSc. student in Mechatronics at the Federal University of Bahia, where he works at the Point of Presence of RNP in Bahia.

Humberto Galiza obtained his Computer B.S. degree in 2009 from Federal University of Bahia and he is currently a graduate student in Complementary Applications on Military Sciences at the Brazilian Army Administration School – EsAEx.

Luciano Porto Barreto holds a Ph.D. degree in 2003 from the University of Rennes I (INRIA/IRISA) in France. He is currently a lecturer at the Computer Science Department of Federal University of Bahia.

Luiz Cláudio Mendonça obtained his Computer B.S. degree in 1982 from Federal University of Bahia, where, currently, is the Chief Executive Officer of Internet Data Center.

Claudete Alves holds a Computer M.Sc. degree in 1988 from Federal University of Paraíba and, actually, is coordinator of Point of Presence in Bahia of RNP.