

Why Develop an IPv6 Transition Strategy?

Government mandates, e-business and Internet growth requirements, and impending IPv4 address exhaustion concerns are prompting enterprises to begin implementing IP Version 6 (IPv6), the next-generation Internet protocol. Because IPv6 is not backward compatible with IPv4, and because its deployment and operation are different from that of IPv4, development and implementation of an IPv6 transition strategy is imperative. Many techniques exist to ease the transition to IPv6, and the network-based IPv6 transition techniques can be divided generally into three categories: dual-stack IPv4 and IPv6, IPv6 tunneling, and IPv6 translation. Each approach has its features, benefits, and limitations; they are not all equivalent in terms of cost, complexity, or capabilities. Most likely, a combination of these techniques will provide the best solution. This document highlights the role that the Locator/ID Separation Protocol (LISP) being developed by Cisco and the IETF can play in IPv6 transition strategies.

How LISP Helps IPv6 Transitions

Incorporating LISP into an IPv6 transition strategy can simplify the initial rollout of IPv6 by taking advantage of the LISP mechanisms to encapsulate IPv6 host packets within IPv4 headers (or IPv4 host packets within IPv6 headers). For example, you can build IPv6 islands and connect them with existing IPv4 Internet connectivity. In addition, when LISP interworking infrastructure (proxy ingress tunnel routers [PITRs] and proxy egress tunnel routers [PETRs]) is included, a LISP-enabled IPv6 site can connect with non-LISP IPv6 sites, again using existing IPv4 Internet connectivity. Often, these approaches can be implemented using existing hardware, reducing capital expenditures (CapEx).

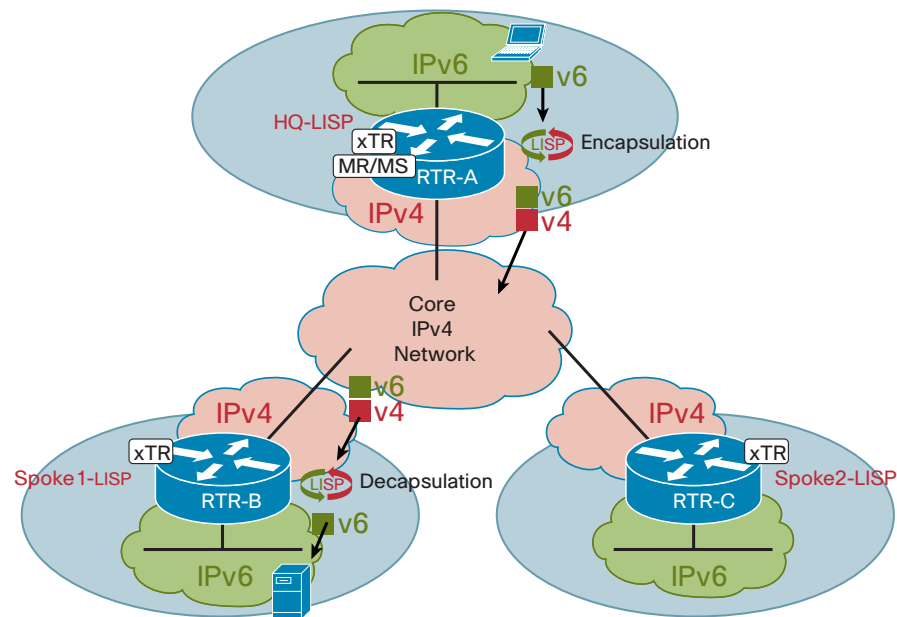
To illustrate how LISP can be effective in an IPv6 transition strategy, two common use cases are highlighted here: IPv6 islands connected over an IPv4 core, and deployment of an IPv6 web presence.

Scenario 1: IPv6 Islands Connected over an IPv4 Core

One way to gain basic IPv6 experience with limited CapEx and operating expenses (OpEx) and few changes to the existing infrastructures is to create IPv6 islands within the corporate network and connect them using LISP over the existing IPv4 core. This implementation can be accomplished rapidly and easily with LISP without changes to the underlying network. This cost-effective solution is illustrated in Figure 1.

In this example, IPv6 islands are added at each site by configuring dual-stack routers to provide the connectivity between the existing IPv4 topology and the new IPv6 prefixes. These routers also perform the required LISP functions, which are all run completely internally to the enterprise.

Figure 1. IPv6 Islands Connected over an IPv4 Core: Packet Flow



The headquarters LISP (HQ-LISP) router is configured to provide LISP mapping services and LISP encapsulation services. The Spoke1- and Spoke2-LISP routers (RTR-B and RTR-C) need to provide only LISP encapsulation services. IPv6 packets sourced from the HQ-LISP endpoint identifier (EID) and destined for the Spoke1-LISP EID, for example, are LISP-encapsulated by RTR-A using IPv4 to traverse the IPv4 core connecting these IPv6 islands.

Few configuration changes are needed to implement this scenario: addition of IPv6 subnets and a few lines of LISP configuration, accomplished in just a few minutes, was sufficient to fully connect the IPv6 islands. This LISP solution can be extended

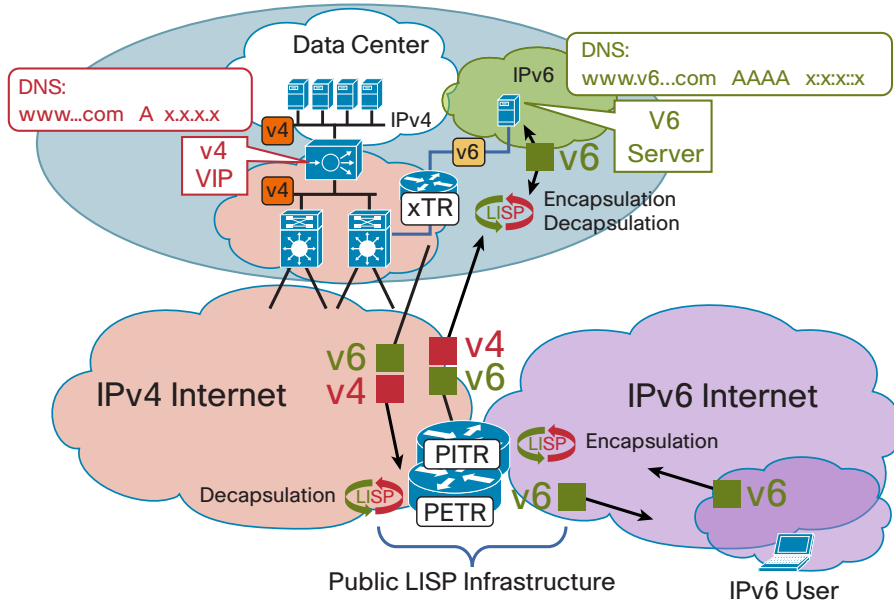
to other private LISP deployments. The comprehensive set of Cisco IOS® Software features (access control lists [ACLs], Network Address Translation [NAT], quality of service [QoS], Cisco IOS NetFlow, encryption, etc.) can also be added if desired, to further extend this solution.

Scenario 2: Deployment of an IPv6 Internet Web Presence

Another compelling use case is the enterprise that needs to establish an IPv6 Internet web presence quickly and without disrupting existing IPv4 services. Using LISP and the public LISP mapping services, enterprises can establish an IPv6 web presence using existing IPv4 WAN connectivity, and with few modifications to the current data center infrastructure. This cost-effective solution is illustrated in Figure 2.

In this example, LISP is used to connect non-LISP IPv6 Internet users to corporate web services. Again, this solution can be achieved with little configuration, and implemented within a few hours.

Figure 2. LISP Solutions and Services



As shown in the figure, IPv6 is deployed on only one internal subnet, as well as on a web sever (alternatively, server load-balancer or web-proxy IPv4 and IPv6 translation methods can be used), and by using LISP to carry IPv6 user traffic over the existing IPv4 core network. Adding LISP capabilities to existing data center platforms is available today. The LISP xTR feature is deployed to carry the IPv6 subnet and perform the LISP functions (xTR refers generically to a LISP router that functions both as an ITR and an ETR; the term xTR is used when the direction of data flow is not part of the context description). Also, in this case, public LISP mapping services (including a map server and PETR and Pitr services, also available today) are incorporated for non-LISP to LISP interworking.

Why Cisco?

Cisco offers innovative products and solutions together with a wide range of services programs to accelerate customer success. These are delivered through a combination of people, processes, tools, and partners, resulting in high levels of customer satisfaction. LISP is a Cisco® innovation that is being promoted as an open standard. Through its participation in standards bodies such as the IETF LISP Working Group, Cisco is committed to the development of the LISP architecture.

For More Information

Full details on these IPv6 transition strategies using LISP can be found in an IPv6 transition white paper located on the download page of the LISP website located at lisp4.cisco.com or lisp6.cisco.com.

For more information about LISP, including information about the protocol itself, LISP deployment, LISP component descriptions, and LISP interworking, please visit www.cisco.com/go/lisp or lisp4.cisco.com and lisp6.cisco.com.

For general LISP solution questions including deployment guidance, contact your local Cisco account representative or send an email to lisp-support@cisco.com.