IPV6 MIGRATION: NAT64 AND DNS64

Catalyst for IPv6 and IPv4 Network Connectivity

Increasing numbers of devices are connected to the Internet daily: not only computers, but cell phones, cars and many other types of devices as well. This creates a corresponding demand for Internet Protocol (IP) addresses. The well-publicized exhaustion of IPv4 addresses from the Internet Assigned Numbers Authority (IANA) in early 2011 was a result of this demand, and has led to a growing interest in IPv6 adoption. As IPv4 and IPv6 weren't designed to be compatible with one another by default, the networking community is working to enable communication between the protocols, providing connectivity between the "legacy" IPv4 network and the new IPv6 network.

IPv6 Migration with NAT64 and DNS64

Multiple methods for connectivity and migration have been proposed at industry standards meetings and other IPv6 conferences. One such approach is NAT64 with DNS64.

NAT64/DNS64 uses a protocol translation approach, versus an encapsulation approach, to connect IPv6 users to IPv4 services. This allows data only available via IPv4 to be retrieved and returned to an IPv6 client.

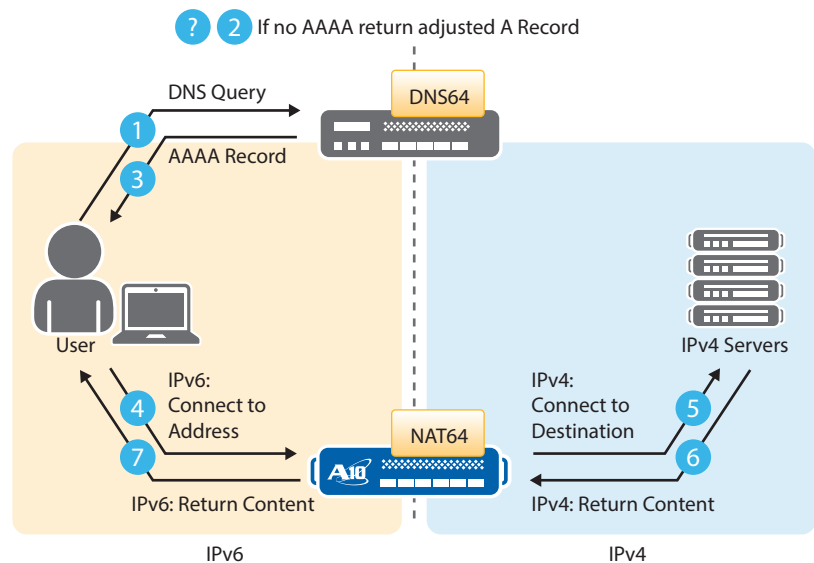NAT64 and DNS64 are separate mechanisms that can be deployed using different devices.

Figure 1: A10 NAT64 and Infoblox DNS64

NAT64 for Layer 3 IPv6-IPv4 Connectivity

DNS64 embeds an IPv4 address into the last 32 bits of a synthesized AAAA record, creating a standard 128-bit IPv6 address. The 96-bit prefix used to create the IPv6 address ensures the traffic is routed to the NAT64 gateway. Once received by the NAT64 gateway, the final 32 bits are used to create mappings that allow IPv6-only hosts to contact IPv4-only resources, thus enabling retrieval of content, and transmission back to the IPv6-only client.

To operate, the NAT64 gateway requires an IPv6 address, a dedicated IPv6 prefix (with 32 bits or more available for translation) and an IPv4 address to connect to the IPv4 hosts.

DNS64 Resolving Unknown Hosts on IPv6 Networks

As with A (address) records, AAAA (referred to as "quad-A") records provide resolution from a name to an IP address; however, A records are used exclusively with IPv4 and AAAA records are used exclusively with IPv6.

DNS64 allows the resolution of addresses from the IPv4 world by creating synthesized AAAA records for hosts where no AAAA record is available. This is done by pairing a configurable IPv6 prefix with the IPv4 address provided by an A-record lookup. The IPv4 address is embedded within the last 32 bits of the IPv6 address.

Traffic sent to any addresses in the IPv6 prefix is then routed to the NAT64 device, which connects to the mapped IPv4 destination on behalf of the IPv6 client and relays data between the IPv4 and IPv6 connections.

NAT64/DNS64 Usage Considerations

As with any technology, care has to be taken to avoid potential issues; some examples include:

- DNS64 server must be the IPv6-only clients' DNS resolver (or in the resolution path)
- Routes to the NAT64 server must be in place
- Hard-coded IPv4 addresses ("IPv4 literals") will not work, as DNS resolution is not required
- DNSSEC validation may be broken

Implementing NAT64 and DNS64

A10 Networks and Infoblox offer a comprehensive and jointly tested solution to provide a high-performance NAT64 gateway and a DNS64 service, a solution that has already been deployed by enterprises and service providers. The solution is enhanced by each company's extra features, which allow enhanced security, operation with a reduced number of appliances, and scalability.

A10 Networks® Thunder® Series' key NAT64 and DNS64 enhancements include:

- NAT64 support to allow IPv6-only clients to communicate with IPv4-only resources
- NAT64/DNS64 infrastructure health checks to ensure availability
- DNS Server Load Balancing
- DNS application firewall
- Additional IPv6 migration and IPv4 preservation technologies Infoblox DNS server provides full DNS64 capabilities:
- DNS64 support: "synthesized" AAAA records to direct traffic to the NAT64 gateway
- Single-box IPv6 and/or IPv4 DNS server
- Intuitive GUI versus BIND
- Centralized DNS management with Grid Master
- Scalability: one Infoblox Grid Master may have 250 DNS Grid Members (DNS Servers)
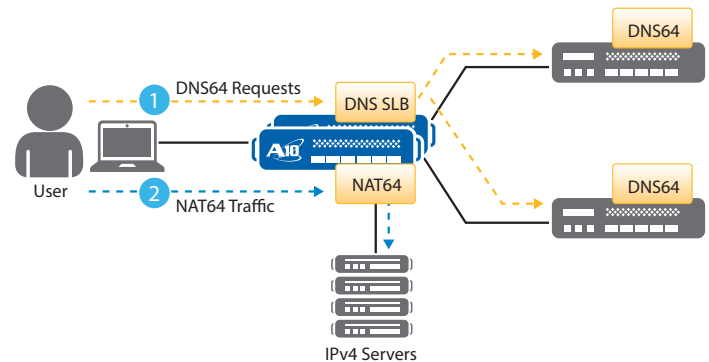

Figure 2: A10 NAT64 and DNS SLB with Infoblox DNS64

A10 and Infoblox Optimized Deployments

The Infoblox and A10 partnership provides a complete solution to enable IPv6 migration while ensuring users can still retrieve IPv4-only

content and connect to other IPv4 resources as needed. By choosing A10 and Infoblox, customers are assured of a tested and certified solution from proven technology leaders.

A10 Networks and Infoblox provide new, reliable and innovative functionality that provides a competitive advantage to companies, ensuring new services can be available and no opportunities are missed as IPv6 becomes standard.

About Infoblox

Infoblox (NYSE:BLOX), headquartered in Santa Clara, California, delivers network control solutions, the fundamental technology that connects end users, devices, and networks. These solutions enable more than 7,000 enterprises and service providers around the world to transform, secure, and scale complex networks. Infoblox (www.infoblox.com) helps take the burden of complex network control out of human hands, reduce costs, and increase security, accuracy, and uptime.

About A10 Networks

A10 Networks is a leader in application networking, providing a range of high-performance application networking solutions that help organizations ensure that their data center applications and networks remain highly available, accelerated and secure. Founded in 2004, A10 Networks is based in San Jose, California, and serves customers globally with offices worldwide. For more information, visit: **www.a10networks.com**

To learn more about the A10 Thunder Application Service Gateways and how it can enhance your business, contact A10 Networks at: **www.a10networks.com/contact** or call to talk to an A10 sales representative.