

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.



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

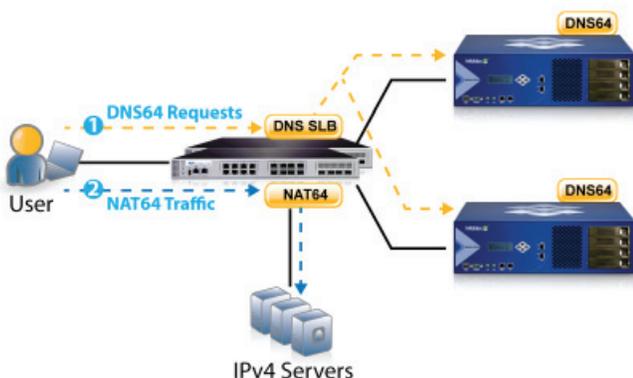
A10 Networks and Infoblox offer a comprehensive and jointly tested solution to provide a high-performance NAT64 gateway and a DNS64 service, a solution that has already been deployed by enterprises and service providers. The solution is enhanced by each company's extra features, which allow enhanced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

A10 Networks AX 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)



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.

To find out more please contact A10 Networks or Infoblox at:

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■ About Infoblox

Infoblox is an industry leading developer of network infrastructure automation and control solutions. Infoblox's unique technologies, including the Infoblox Grid™—a real-time, data distribution technology—increase network availability and control, while automating time-consuming manual tasks associated with network infrastructure services such as domain name resolution (DNS), IP address management (IPAM), network change and configuration management (NCCM) and network discovery, among others. Infoblox IPv6-ready solutions are used by over 4,750 organizations worldwide, including more than one third of the Fortune 500. The company is headquartered in Santa Clara, California, and operates in more than 30 countries.

■ About A10 Networks

A10 Networks' AX Series is the industry's best price/performance advanced traffic manager—helping enterprises and ISPs maximize application availability through a high-performance and scalable Application Delivery Platform.

A10 Networks was founded in 2004 with a mission to provide innovative networking and security solutions.

A10 Networks makes high-performance products that help organizations of all sizes accelerate, optimize and secure their applications. A10 Networks is a venture-funded, privately held, Silicon Valley-based technology company, with offices in the United States, United Kingdom, France, Germany, The Netherlands, Japan, China, Korea Taiwan, Hong Kong, Malaysia, and Singapore.