Infoblox
CONTROL YOUR NETWORK

Eight Things You Need to Know Before Creating an IPv6 Addressing Plan

SOLUTION NOTE

The astronomically larger address space available in IPv6 gives network administrators a new flexibility in defining address plans that are both logical and practical. But in order to create an effective IPv6 addressing plan, network administrators will benefit from a set of new best practices that more efficiently manage the unprecedented abundance of bits available in an IPv6 address allocation. Here are eight concepts or fundamentals that should be considered.

Planning with Abundance – Because of the virtually inexhaustible supply of IPv6 address space, subnets are no longer sized according to how many hosts are expected per segment or broadcast domain. Instead, the standard IPv6 address plan uses a one-size-fits-all subnet (the /64, as noted below) and a large enough primary allocation from your ISP or RIR to provide sufficient subnets. Efficiency in IPv6 addressing becomes about readability and consistency rather than address conservation.

Standard Subnet Size – In IPv6 addressing, a /64 (1.8×10^{19} host addresses) is the standard subnet size for addressing interfaces. Allocating and deploying smaller subnets--i.e. more than 64 bits--is not recommended (with the exception of point-to-point links noted below).

Point-to-point Links – The exception to the /64 standard are subnets used for point-to-point links. Current best practice (RFC6164) dictates that these links should use a /127 (though the use of a /126 subnet or a /64 exist in some real-world deployments). For address plan consistency, every point-to-point link can be allocated a /64 but configured with a single /127 from that allocation. /128 loopback addresses can all be assigned from the first /64 of the /48 reserved for infrastructure. (Alternatively, all point-to-point subnets could be allocated from one /64 per routing area).

Standard Site Allocation – The standard per-site allocation provided to an organization is typically a /48. If you have more than one site you'll need a larger allocation--e.g., /44 for up to 16 sites, /40 for up to 256 sites, /36 for up to 4,096 sites, and a /32 for up to 65,536 sites.

PI vs. PA – IPv6 allocations from IP transit providers or ISPs are referred to as Provider Aggregatable (or PA) allocations. These allocations are usually tied to the duration of the contract for IPv6 connectivity. Alternatively, IPv6 allocations from the Regional Internet Registries (or RIRs) are Provider Independent (or PI) allocations and are considered permanent. Both types are globally registered and globally routable. In general, multi-homed networks connected to multiple ISPs or transit providers require PI allocations.

Making your Address Plan Readable – Groups of IPv6 subnet assignments broken out from the primary allocation are often restricted to multiples of four bits –e.g., /36, /44, /48, /52, /56, /60. While this method reduces the overall granularity available to the address plan, it improves network prefix readability (see inset). With each group of subnets aligning with a hexadecimal digit (or nibble) in the network prefix, the resulting readability can make geographic and functional significance more immediately decipherable. This can improve operational efficiencies.

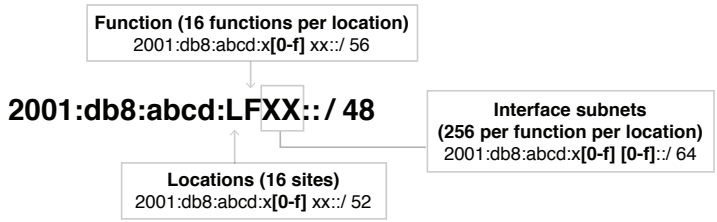
Subnet bits a multiple of four	**Subnet bits not a multiple of four**
Prefix: 2001:db8:abcd::/48 Range: 2001:db8:abcd:0000:0000:0000:0000:0000 to 2001:db8:abcd:ffff:ffff:ffff:ffff:ffff	Prefix: 2001:db8:abcd::/49 Range: 2001:db8:abcd:0000:0000:0000:0000:0000 to 2001:db8:abcd:7fff:ffff:ffff:ffff:ffff

Infoblox
CONTROL YOUR NETWORK

Eight Things You Need to Know Before Creating an IPv6 Addressing Plan

SOLUTION NOTE

Location and Function Assignments – The abundance of addresses in an IPv6 allocation provides the opportunity to efficiently assign groups of networks based on geographical and functional requirements (see inset for an example). Such assignments allow for potentially more efficient and effective routing and firewall policies. Further, it is possible to encode existing IPv4 addresses into IPv6 addresses if consistency is desired between address families during the initial stages of IPv6 adoption (though it is generally recommended that this technique be used only temporarily as it may interfere with the ultimate efficiency and scalability of the IPv6 address plan).



Host Address Assignment – Three primary mechanisms exist for addressing hosts with IPv6. They are Stateless Address Auto Configuration (SLAAC), Dynamic Host Control Protocol for IPv6 (DHCPv6), and static addressing. In most production deployments, compliance and security requirements may make the use of SLAAC undesirable and compel the use of DHCPv6 for hosts (network infrastructure and servers will most likely use static assignments).

About Infoblox

Infoblox delivers critical network services that protect Domain Name System (DNS) infrastructure, automate cloud deployments, and increase the reliability of enterprise and service provider networks around the world. As the industry leader in DNS, DHCP, and IP address management, the category known as DDI, Infoblox (www.infoblox.com) reduces the risk and complexity of networking.

Corporate Headquarters: +1.408.986.4000 1.866.463.6256 (toll-free, U.S. and Canada) info@infoblox.com www.infoblox.com