



# Managing Large Scale, Carrier-Grade NAT with BIG-IP Devices

F5® BIG-IP® devices have been managing IP Network Address Translation (NAT) for years across multiple heterogeneous networking environments. Only recently has the need for core IP NAT ballooned to a scale that can only be handled by a device built to manage millions of concurrent IP connections. F5 products and solutions enable service providers to build a strong foundation that maximizes the use of resources and increases service management while remaining agile enough to support both existing and future network architectures and new user devices.

## Large Scale NAT and NAPT

For years, the practice of using Network Address Translation (NAT) to transform application data and user traffic from assigned public IP addresses to flexible, internal, private IP addresses has been the de facto standard for enterprises and service providers alike. Often used today as a security tool by enterprise customers, service providers are using NAT to the extreme to manage IPv4 depletion for millions of mobile users throughout the carrier networks. Large Scale NAT (LSN)—also referred to as carrier-grade NAT—is becoming the service provider standard for managing the massive growth high bandwidth applications and multiple devices per user.

LSN is an architecture that typically includes multiple layers of IP translation and can manage millions of unique IPv4 addresses across multiple networks as well as help in the transition to IPv6 on either side of the network. For example, a device might enter the network with one private IP address requesting a service on a public IP address. As the mobile connection traverses the network, it might be modified from one private IP address to another private IP address as it's moved from one segmented network to the next. A true LSN solution needs to manage millions of connections and IP address translations from mobile devices all the way to the service network and then back again.

F5 offers unique solutions for service providers implementing LSN. Acting as the strategic point of control for F5's entire Service Delivery Network (SDN)—an architecture designed to manage service delivery to users and devices—BIG-IP solutions can NAT millions of IP addresses between multiple private and public network addresses spaces. BIG-IP products and solutions can manage an LSN environment using a 1:1 IP address relationship—one IP address on the "outside" maps to one IP address on the "inside"—or by implementing the large scale Network Address Port Translation (NAPT) topology. With NAPT, connection requests are translated into a unique IP address and port pairing, allowing each unique IP address to carry up to 65,536 connections. Like traditional NAT, BIG-IP devices can manage and proxy millions of address and port pairs for NAPT deployments.

## Key features

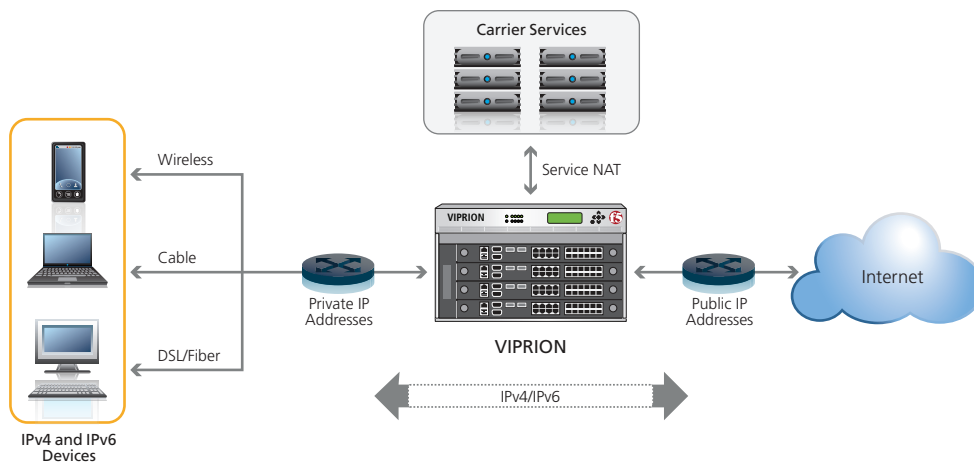
- **Multiple NAT Support**—Supports NAT444, NAT64, LSN, and NAPT
- **Single-Point Integration**—Integrates with other F5 SDN services, such as TCP Express™ and OneConnect™
- **BIG-IP NAT Services**—Scales to support millions of users, connections, and services
- **Transparent IPv6 Proxy**—Routes and translates between IPv4 and IPv6 addresses and devices
- **Service Provider-Grade Support**—Provides professional services and support 24x7, worldwide

## Key benefits

- **Simplified NAT Management**—Enables single-point NAT management for multiple networks on one device
- **Lower Cost**—Extends IP distribution for existing IPv4 deployments, preventing costly application and infrastructure changes
- **Improved NAT Deployment**—Enables deployment of multiple levels of NAT solutions on a single platform
- **Service Provider Scalability**—Scales to handle millions of subscribers from multiple network device types
- **Unequaled Support**—Keeps service operations online, whether using BIG-IP devices for internal infrastructure or managed hosted solutions

When deploying a NAT solution on the F5 VIPRION® service provider-grade chassis, bi-directional and multi-layer NAT can be accomplished on a single BIG-IP device. VIPRION manages the incoming service request and initial network address translation from the mobile device and also manages the secondary address translation as the request is delivered to the service network. As a service provider transitions to IPv6, the translation from IPv4 addresses can happen at the same time as a traditional NAT, enabling the service provider to continue subdividing the IPv4 address space as they migrate their user and service network to IPv6. This can scale to millions of NAT and NAPT requests on a single platform, allowing a service provider to save on CapEx by consolidating hardware and OpEx by reducing the points in the network where application traffic has to hop between devices.

BIG-IP products and solutions natively support LSN and NAPT for any IP-based networking topology. NAT functionality is built into the F5 SDN. This integration enables any BIG-IP solutions to take advantage of NAT and manage application traffic requests and delivery from millions of mobile devices throughout the service provider network.



BIG-IP devices seamlessly route between multiple public and private networks supporting both IPv4 and IPv6.

## Learn more

For more information about BIG-IP NAT solutions, please see the following resources or use the search function on [F5.com](http://F5.com).

### Product pages

[BIG-IP Local Traffic Manager](#)

[BIG-IP IPv6 Gateway Module](#)

### Datasheets

[BIG-IP Modules](#)

[VIPRION](#)

### White papers

[Load Balancing 101:](#)

[Nuts and Bolts](#)

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