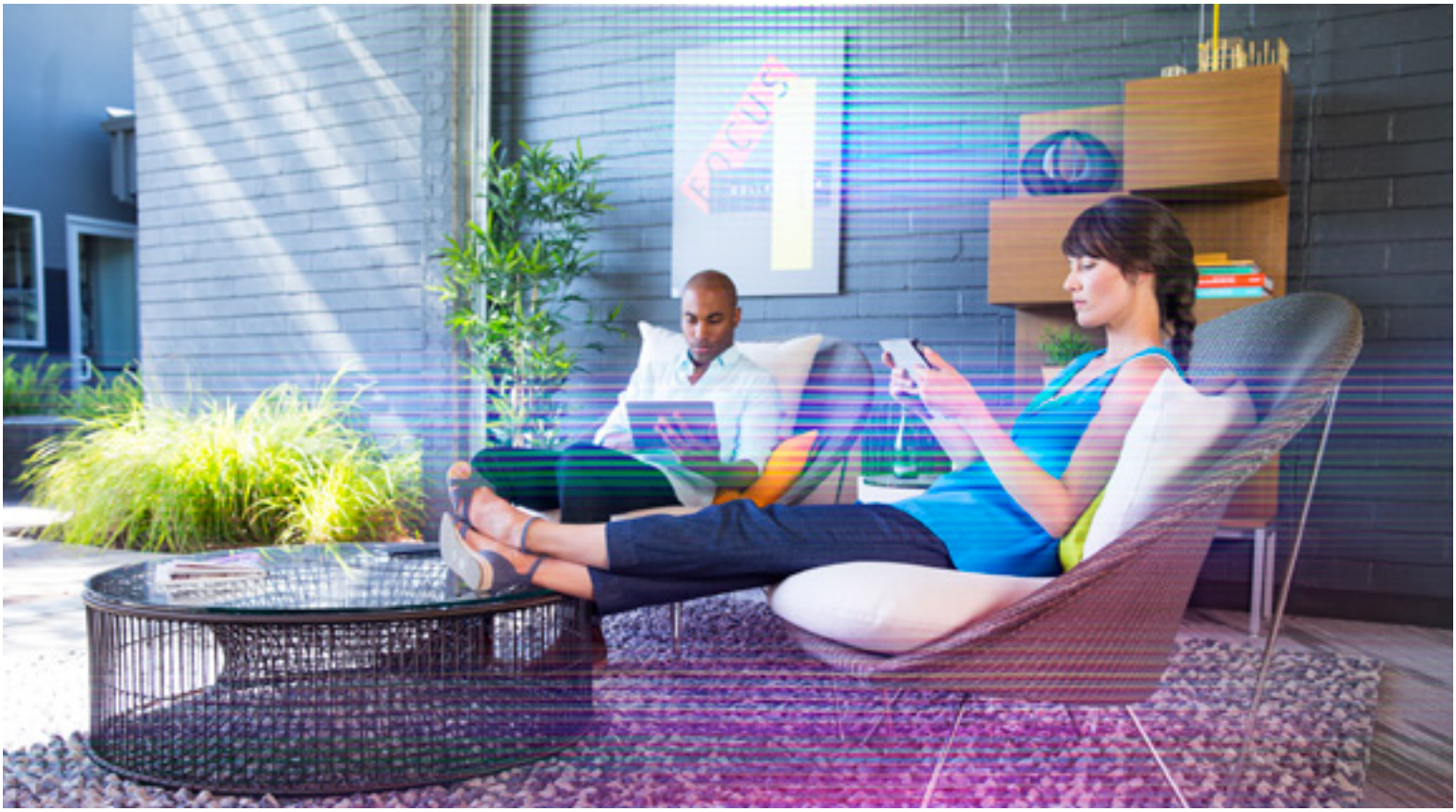

NetScaler Carrier-Grade Network Address Translation

Protect your investment in IPv4 infrastructure with carrier-grade network address translation. NetScaler combines industry-leading application delivery with high-performance and application-transparent carrier-grade network address translation, enabling telecommunications service providers to extend the life of their IPv4 networks, scale S/Gi-LAN to support rapidly-growing subscriber traffic, and consolidate application delivery control—all in a single, cost-effective platform.

NetScaler Carrier-Grade NAT Benefits

- Continue to offer IPv4-based services and applications, and support IPv4 subscribers with seamless transparency and high performance
- Simplify operations and reduce costs by combining CGNAT and load balancing in a single and proven application delivery controller
- Scale cost-effectively to accommodate relentless growth with the ability to handle up to 256 million sessions in a 2 RU platform

Even in environments where change is constant, some things remain the same. Such is the case with IPv4, which is not going away any time soon despite its global address space having been fully allocated. Network address translation, or NAT, is a proven technology. While NAT technology itself is nothing new, carriers continue to face two challenges when implementing CGNAT: cost and capabilities. Some CGNAT solutions require a dedicated system, which increases both CapEx and OpEx owing to the need to deploy and maintain separate hardware. A better approach is to integrate CGNAT into a high performing application delivery controller (ADC). But some ADC-based solutions require additional resources (CPU or memory upgrades, or more blades) to scale CGNAT performance, resulting in additional costs.

The capabilities challenge involves the need to implement the different forms and related functions of NAT that might be needed to support different protocols and applications with total transparency. For example, UDP, TCP and ICMP all require a specific form of NAT to operate transparently end-to-end. Certain tunneling and signaling protocols, especially those that include IP addresses and/or TCP/UDP ports in packet payloads, require an application-level gateway (ALG) capability. An ALG functions like a proxy that makes the translations necessary for applications to operate seamlessly across public and private address realms, but unlike a proxy, does not require any changes to clients or servers.

Citrix® meets both of these challenges with a capable and high-performance CGNAT solution that is integrated into the NetScaler® application deliver controller. Integrating CGNAT with load-balancing in the industry-leading, high-performance NetScaler ADC enables carriers to consolidate equipment and eliminate the need for yet another single-purpose system. The cost-effectiveness of consolidation is especially important with S/Gi-LAN traffic growing from 50 percent to 100 percent annually.

While performance can be an issue with some ADCs that support CGNAT, rigorous testing has demonstrated NetScaler's ability to support up to 256 million sessions in a 2 RU platform. Test results also demonstrate NetScaler's ability to handle over a 1 million connections/second with a Layer 7 throughput of up to 150 Gbps. With integral support for high-performance CGNAT in a fully configurable ADC platform, NetScaler accommodates a carrier's need to achieve a minimum of three years of useful life from its investment.

NetScaler's CGNAT solution also includes broad support for the application-level gateways carriers need today, and its extensible design enables other ALGs to be added as necessary to satisfy changing market conditions. The breadth and depth of these ALGs enable carriers to satisfy the connectivity requirements of businesses and individual subscribers with a high quality of experience, and without restrictions.

Key Features

Standard-based Network Address and Port Translation

NetScaler's CGNAT offers standards-based private IPv4 to public IPv4 network address translation (NAT44) based on the latest RFCs, making it interoperable and transparent in both client-server and peer-to-peer (P2P) applications. CGNAT uses a pool of public IPv4 addresses to assign a global IPv4 address to each subscriber, and then maps each subscriber's private IPv4 addresses to and from its global address automatically and transparently as needed to traverse the Internet or other public IP network.

Controlled Openness to Inbound Connections

NetScaler can permit any external host to connect to any internal host ("behind" the CGNAT service) with an open or mapped internal address—a behavior known as Endpoint Independent Filtering (EIF). The Internet Engineering Task Force recommends EIF as the default filtering behavior for CGNAT.

Mapped Address Persistency

NetScaler can use the same external, public IP address for all sessions from the same internal hosts—a behavior known as Endpoint Independent Mapping (EIM). EIM offers transparency for P2P and VoIP applications by providing a persistent external IP address and port for all connections originating from the same internal host/port, thereby minimizing the potential for connectivity problems.

Support for Full Cone NAT

NetScaler provides support for Full Cone NAT when both EIF and EIM are enabled. Also known as Static, one-to-one and port forwarding NAT, this is the least restrictive form of NAT, making it a good choice for applications that do not require stringent security provisions.

Application Layer Gateways

NetScaler offers broad support for application layer gateways to ensure transparency for a full range of enterprise and consumer applications. ALG support is currently provided for UDP via RFC4787 TCP via RFC5382, ICMP via RFC5508, FTP and TFTP, and is planned for SIP, RTSP, PPTP and GRE.

Hairpinning

NetScaler supports hairpinning, which enables endpoints with private IP addresses to communicate with one another without the need to translate these to and from public IP addresses when both endpoints are behind the same CGNAT service. This makes it possible, for example, for subscriber clients to reach a carrier's servers, or for one subscriber VoIP device to call another subscriber VoIP device, directly with no address translation.

Connection Limiting

To ensure consistent performance across all subscribers and to help protect against DDoS attacks, NetScaler can restrict the number of sessions available for each commercial and consumer subscriber.

High-speed Logging

NetScaler continuously logs all NAT transactions to an external server, which is necessary to comply with government mandates for some applications. The CGNAT syslog messages can be sent via high-speed links to ensure that NetScaler performs accurate logging at the full rate of incoming connections.

Deterministic NAT

Deterministic NAT enables carriers to allocate a fixed block of ports and IP addresses that may be used dynamically to subscribers, which eliminates the need for extensive logging. In typical NAT environments, the requirement for logging is critical, and for carriers with CGNAT, the log files can become quite large, making log management a continuous and costly challenge.

Capabilities Summary	
Performance (MPX 24150)	• Up to 256 million concurrent sessions • Up to 150 Gbps Layer 7 throughput • Over 1 million connections/second
NAT Functionality	• N:M NAPT • Address restricted • Port restricted • Symmetric • Static mapping • Sticky NAT • Deterministic NAT • Session timeout
Transparency	• Full cone / Paired IP pooling • Hair-pinning • Mapping and filtering: ◦ End-point Independent ◦ Address dependent ◦ Address and port dependent
Application Layer Gateways	• FTP • TFTP • ICMP • SIP, RTSP, PPTP and GRE (planned for 2015)
RFC Compliance	• 4787 (UDP) • 5382 (TCP) • 5508 (ICMP) • 6888 (CGNAT)

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