

B4N Carrier Grade NAT

NFV-based CG-NAT solution for Service Providers

WHAT IS B4N CG-NAT?

B4N CG-NAT is an NFV-based solution designed to provide high performance and transparent address and protocol translation. B4N CG-NAT helps Service Providers to mitigate IPv4 address exhaustion by using address and port translation in large scale and provides native integration within existent operators' infrastructure.

B4N CG-NAT is a fully virtualized and SDN ready solution that utilizes commodity x86 servers and provides carrier grade performance by using Intel® Data Plane Development Kit libraries.

CG-NAT solution provides maximum **500Gbps** throughput performance and fully compliant with **ETSI NFV ISG architecture**

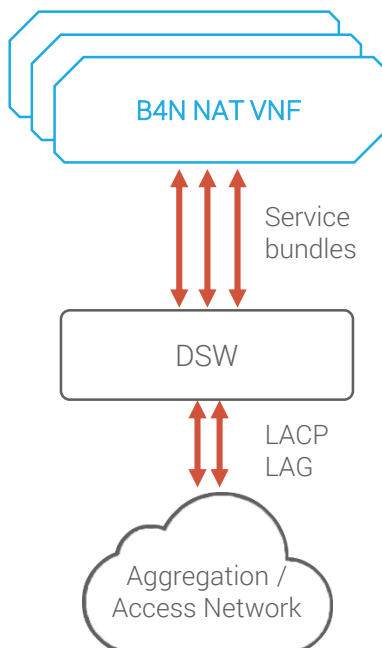


Figure 1: B4N CG-NAT Architecture

IPV4 ADDRESS EXHAUSTION

Based on Internet Assigned Numbers Authority (IANA) information, the top-level exhaustion occurred on 31 January 2011. Three of five Regional Internet Registries (RIR) have exhausted allocation of all the blocks they have:

15 April 2011 for the Asia-Pacific

14 September 2012 for Europe

10 June 2014 for Latin America and the Caribbean

The anticipated shortage has been the driving factor in creating and adopting several new technologies, including Carrier Grade Network Address Translation (CG-NAT). The CG-NAT is a middlebox device embedded in the SP network, permitting the sharing of small pools of public addresses among many end sites.

There are certain number of specialized hardware-based CG-NAT appliances exist on the market. However, these platforms have significant shortcomings and bottlenecks:

- High price because of using expensive specialized hardware platforms;
- Scalability issues, low flexibility and inefficient use of resources;
- Vendor lock-in that causes (sometimes) using proprietary protocols and third party systems' integration issues.

Having a hard-wired network with boxes dedicated to single functions is not the optimal way to achieve dynamic service offerings. Network design must be more agile and able to respond on-demand to the dynamic needs of the traffic and services running over it. ETSI NFV Working Group addresses this points and defines the requirements and architecture for NFV.

SOLUTION ARCHITECTURE

B4N CG-NAT consists of the following components:

- B4N NAT VNF's
- Distributed Switches (DSW)

B4N NAT VNF is a set of virtual machines that converts L5-L7 information according to specified ALG algorithms accelerated by Intel® DPDK.

Distributed switches (DSW) provide connection to Aggregation network, L2-L4 header modifications, traffic load balancing between B4N NAT VNF's and collect statistic information.

There are three CG-NAT configuration options exist – up to 10, 50 or 500Gbps throughput. 10 and 50Gbps configurations can be easy scalable up to 500Gbps by adding new x86 servers and NAT VNF virtual machines.

FEATURES

B4N CG-NAT provides comprehensive list of features required for deployment in Service Provider networks.

- **Application Layer Gateways**

Allows customized NAT traversal services to support address and port translation for certain protocols like **PPTP, SMTP, DNS, FTP, ICMP** etc.

- **Port Control Protocol**

Mechanism to control the forwarding of incoming packets by NAT device and a mechanism to reduce application keep-alive traffic

- **Endpoint Independent Mapping (EIM)**

Ensures the assignment of the same external IPAddr:port for all connections from a given host if they use the same internal port. This is analogous to a full-cone NAT.

- **Endpoint Independent Filtering (EIF)**

Controls which external hosts can connect to an internal host

- **Address and Port-Dependent Mapping**

NAT reuses the port mapping for subsequent packets sent from the same internal IPAddr:port to the same external IPAddr: port while the mapping is still active

- **Address and Port-Dependent Filtering**

CG-NAT filters out packets not destined to the internal address X:x and packets from Y:y destined for the internal endpoint X:x if X:x has not sent packets to Y:y previously

- **Hairpinning**

Enables two endpoints behind the NAT to communicate with each other by allowing packets arrived from the private network to be translated and then looping back to private net.

- **Port Preservation**

CG-NAT attempts to preserve the port number used internally when assigning a mapping to an external IP address and port (e.g., x1=x1', x2=x2')

- **Port Block Allocation**

Allows allocating ports for customers on block basis and can significantly reduce the number of logs, making it easier to track subscribers. PBA only needs to store logs twice for each block of ports

- **Paired Address Pooling**

Using the same external IP address mapping for all sessions associated with the same internal IP address. This improves transparency of CG-NAT for specific types of applications like P2P

- **User quotas**

Ensure that public IP port usage is fairly distributed between customers

- **Logging**

B4N CG-NAT supports both block allocated ports logging and detailed sessions logging

BENEFITS



SCALABILITY

Simple extend capacity and performance by adding new B4N NAT VNFs and Distributed Switches, while maintaining existent network architecture



COMMODITY HARDWARE

Using commodity x86 servers instead of dedicated hardware devices



UNIFIED MANAGEMENT

Single point of management through powerful WEB-interface



AUTOMATION

B4N CG-NAT provides set of tools for automate service management



CONFORMANCE WITH REFERENCE ARCHITECTURE

Fully compliant with MANO Framework. B4N CG-NAT includes VNF-manager that can be integrated with Customer orchestration and management system.



SDN READY

B4N CG-NAT designed to be easy integrated with Customer SDN infrastructure

B4N CG-NAT SPECIFICATIONS

	CONF.10	CONF.50	CONF.500	DISTRIBUTED
Max Throughput	10 Gbps	50 Gbps	500 Gbps	Unlimited
Connections per Second	200K per 10Gbps			Depends on OpenFlow switches performance, but not less than BOXED
Two-way sessions	10M per 10Gbps			
Resiliency	N+1. Active-Active, Active-Standby			
Supported protocols	NAT44 PCP			
Interfaces	REST API NETCONF			
Management	WEB CLI			
Supported hypervisors	LXC (Linux Containers) KVM VMware			
Logging	Local or external SYSLOG Server			

ORDERING INFORMATION

Part Number	Description
ALG10G	Service Node 10G license (Application Layer Gateway)
CTLORC2	Controller+Orchestrator bundle (2 OF-switches)
CTLORC2HA	High Availability license
CTLNATRTR2	Static Routing + NAT bundle
VSW8P	DPDK Enabled Virtual Switch L2/L3/L4 license
CTLPORT1	1 OF Port License

ABOUT BRAIN4NET

Brain4Net SDN/NFV software solution helps Service Providers and large Enterprises to adapt modern network technologies such SDN and NFV with existent network infrastructure. We develop a platform that turns benefits of SDN/NFV synergy and addresses performance and availability challenges that are the major stop factors of slow SDN adoption

CONTACT INFORMATION:

One Broadway, 14th Floor, Cambridge, MA 02142, US

Tel.: +1.617. 639.4001

Email: need@brain4net.com

Web: <http://brain4net.com/>



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