6WIND Turbo CG-NAT is a scalable, cost-effective CG-NAT solution and is part of the 6WIND vRouter family. It is a ready-to-use software network appliance that can be deployed standalone on bare metal commercial-off-the-shelf (COTS) servers or as a virtual machine.

Carrier Grade NAT (CG-NAT), also known as Large Scale NAT (LSN), helps with IPv4 resource conservation by sharing an outside IP address among multiple inside, local (private) IP addresses. 6WIND provides a high performance software alternative to hardware-based CG-NAT solutions for Network Operators and Enterprises who are looking to increase flexibility and lower costs while accelerating time-to-market.

Leveraging COTS Platforms for Improved TCO
When comparing 6WIND Turbo CG-NAT on COTS servers versus purpose-built hardware routers, cost benefits can be realized in multiple ways. Comparing CAPEX, the cost of 6WIND Turbo CG-NAT on a COTS server is more than 50% less than any purpose-built hardware with similar performance characteristics. By adding virtualization, customers further reduce CAPEX since they can combine 6WIND Turbo CG-NAT with additional services, such as load balancers, firewalls, etc. on the same COTS server, increasing productivity and generating new revenue streams.

OPEX savings are realized by minimizing installation efforts, sparing requirements and service commissioning efforts. In an OpenStack environment, adding additional router applications is a matter of spinning up VMs. Turbo Router eliminates downtime needed to install, connect and cable cumbersome traditional purpose-built hardware products.

Product Description and Architecture
The 6WIND Turbo CG-NAT software is divided up into a control plane and a data plane. The control plane is comprised of the Linux operating system as well as applications for routing, etc. The control plane operates independently of the data plane component and runs on at least one core.

The tremendous boost in performance is accomplished by running the data plane packet processing software on dedicated cores. The data plane software comprises DPDK, a set of poll mode drivers that provide efficient data I/O processing. In addition, 6WIND technology has native multi-queue support to distribute the load across multiple CPU cores. This combination allows performance to scale linearly by 10 Gbps per core. Internal testing confirms 6WIND Turbo Router scales linearly from 10 Gbps to over 160 Gbps with each added core.

6WIND Turbo CG-NAT can be loaded directly onto bare metal servers as a pure router deployment option. This standalone appliance is suitable as a direct replacement for traditional, dedicated hardware routers small and large.

NFV Ready
In NFV or virtual environments 6WIND Turbo CG-NAT is instantiated as a regular virtual machine and supports standard Virtio vNIC (b1). 6WIND Turbo CG-NAT also supports SR-IOV or PCI passthrough, a technology that bypasses the hypervisor in order to increase forwarding performance (b2). The third option (b3) combines the performance of SR-IOV and all the rich features of the hypervisor (live migration, switching, hardware independence, etc.) by installing 6WIND Virtual Accelerator™, which is hypervisor scaling software. The added advantage of using 6WIND Virtual Accelerator is that all virtual machines benefit from the increase in hypervisor performance.

Advanced Management, Logging and Monitoring with APIs
Turbo CG-NAT provides both traditional, CLI-based management and management based on YANG and NETCONF APIs for integration with higher level orchestrators and management frameworks. For monitoring, the traditional SNMP and syslog mechanisms are supported, plus data plane telemetry through sFlow, and graphical analytics with time series data base. Advanced logging through syslog can be integrated with logging platforms.

CG-NAT Performance

- 30 Million simultaneous connections per 32G of RAM (scales with memory)
- 200,000 connections per second per core, scalable
- 10 Gbps per core, scalable

Bare Metal or Virtual Platforms
TCO Savings > 50% over Hardware
NFV Ready

1Test Platform: Dual Intel® Xeon® Platinum 8170 @ 2.10 Ghz, 2x26 cores. Test performed by 6WIND in controlled environment.
6WIND Turbo CG-NAT Options
Choice of throughput and connections:
- 1/2/5/10/25/40/100/200 Gbps
- 1/2/5/10/20/30 Million simultaneous connections

System Requirements
x86 with 1, 2, or 4 sockets (Advantech, Dell, HP, Lanner, Super Micro)

CPU:
- Intel Xeon and Atom

Core count: Minimum one for control, one for data plane; fully customizable

Memory: 2GB min, configurable, depends on capacity

NIC:
- Intel 1G 82575, 82576, 82580, I210, I211, I350, I354
- Intel 10G/40G 82598, 82599, X520, X540, XL710
- Mellanox 10G/25G/40G/50G/100G, CX4, CX5
- Broadcom NetExtreme E-Series
- Virtio, SR-IOV, PCI passthrough, VMXNET3, ENA

Deployment / Hypervisor: Bare metal, KVM, VMware ESXi, OpenStack NFV, AWS, Containers (Kubernetes/docker)²

Features
CG-NAT Modes
- NAT44
- NAT64²

Port Assignment
- Random or parity
- Port Block Allocation (PBA)
- Per user/per CPE session limiter
- Deterministic²

IP Pool Management
- Paired pooling
- IP pool resize

Logging
- Port batching
- Syslog

ALG support
- ICMP, FTP, TFTP, RTSP, PPTP, SIP, H323

Hairpinning

Endpoint-Independent Mapping and Filtering

Address and Port-Dependent Mapping and Filtering

Routing
- BGP4, BGP4+
- OSPFv2, OSPFv3
- RIPv1, RIPv2, RIPng
- Static Routes
- ECMP
- Path monitoring for static routes
- PBR
- MPLS
- BGP L3VPN
- BFD
- VXLAN EVPN²
- BGP RPKI²
- NHRP²

QoS
- Rate limiting per interface
- Rate limiting per VRF
- Class-based QoS
- Classification: ToS/IP/DSCP/CoS
- Shaping and policing
- Scheduling: PQ, PB-DWRR

L2 and Encapsulations
- GRE, mGRE²
- VLAN (802.1Q, QinQ)
- VXLAN
- LAG (802.3ad, LACP)

IP Networking
- IPv4 and IPv6
- Segment Routing v6²
- IPv6 autoconfiguration²
- VRF
- IPv4 and IPv6 Tunneling
- Multicast²

Management / Monitoring
- SSHv2, Telnet
- CLI
- NETCONF/YANG
- SNMP
- KPIs/Telemetry (YANG-based)
- RBAC with AAA
- Syslog
- 802.1ab LLDP
- sFlow

High Availability
- VRRP

Security
- ACLs (stateless & stateful)
- uRPF
- CP Protection
- BGP FlowSpec

IP Services
- DHCP Server/Client/Relay
- DNS Client/Proxy
- NTP

Operations
- Installation: PXE, USB, ISO, QCOW2, OVA
- Update/Rollback Support
- Provisioning: cloud-init, Ansible

²Near-term Roadmap