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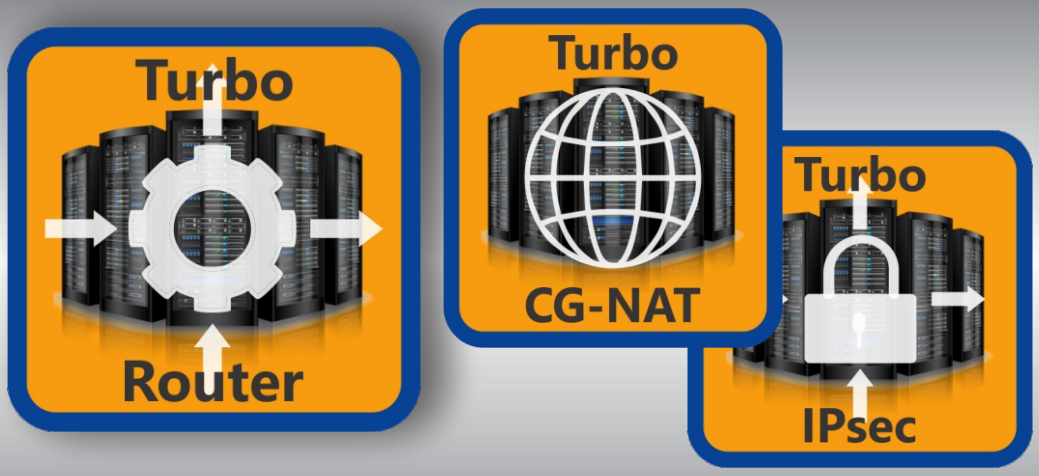

Virtual Router
IDC
ANALYZE THE FUTURE
2018 Innovator

6WIND Turbo Router™

vRouter for Commercial-off-the-Shelf (COTS) Servers and Virtual Machines

6WIND Turbo Router is a software router that provides scalable, cost-effective IP routing, IPsec VPNs and CG-NAT solutions. Built with 6WIND's 20 year high performance software pedigree, Turbo Router has been replacing Cisco and Juniper hardware routers through a simple software download on x86 servers and virtual machines (VMs).

vRouter Architecture

6WIND Turbo Router is divided up into a control plane and a data plane. The control plane is comprised of the Linux operating system as well as routing applications. The control plane runs independently of the data plane component and runs on at least one core. 6WIND's high performance is accomplished by running the data plane packet processing on dedicated cores. In addition, 6WIND's vRouters have native multi-queue support to distribute the load across multiple CPU cores. This combination allows performance to scale linearly with the number of cores assigned to the vRouter.

Advanced Management and Monitoring with APIs

6WIND's vRouters provide 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.

Performance

Routing[1]

- *Forwarding: 16 Mpps per Core*
- *VLAN: 13.5 Mpps per Core*
- *Filtering: 6.2 Mpps per Core*
- *Over 1M Routes*
- *Multiple Full Internet Tables*
- *1/10/25/40/50/100GE Support*

IPsec[1]

- *IPsec: 14 Gbps per Core*
- *50,000+ Established Tunnels*
- *Up to 1,000 Tunnels per Second*

CG-NAT[2]

- *30M Simultaneous Connections per 32G of RAM (scales with memory)*
- *200,000 Connections per Second per Core*
- *10 Gbps per Core*

Replace Hardware with Software: vRouter Use Cases

Border Router: *Multi-homing with BGP - provide multiple links to a single service provider or multiple service providers for redundancy, reliability and path diversity.*

VPN Concentrator and Site-to-Site VPN: *Secure point-to point connections between multiple data centers and sites.*

CG-NAT: *Carrier-Grade NAT, also known as Large Scale NAT (LSN), shares an outside address among multiple inside local (private) IP addresses for IPv4 preservation and IPv6 migration projects.*

uCPE: *Deploy as a VNF (Virtual Network Function) on multiple architectures with APIs for built-in monitoring and third-party orchestrators.*

Turbo Router Network Licenses
1G, 2G, 5G, 10G, 25G, 40G, 100G, 200G

Features

Routing
- BGP4, BGP4+
- OSPFv2, OSPFv3
- RIPv1, RIPv2, RIPng
- Static Routes
- Path Monitoring for Static Routes
- ECMP
- PBR
- MPLS
- BGP L3VPN
- BFD
- NHRP[3]
- VXLAN EVPN
- BGP RPKI[3]

L2 and Encapsulations
- GRE, mGRE[3]
- VLAN (802.1Q, QinQ)
- VXLAN
- LAG (802.3ad, LACP)
- Ethernet Bridge

IP Networking
- IPv4 and IPv6
- Segment Routing v6[3]
- IPv6 Autoconfiguration
- VRF
- IPv4 and IPv6 Tunneling
- NAT
- Multicast[3]

Management / Monitoring
- SSHv2
- 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

QoS
- Rate Limiting per Interface
- Rate Limiting per VRF
- Class-based QoS
  - Classification: ToS / IP / DSCP / CoS
  - Shaping and Policing
  - Scheduling: PQ, PB-DWRR

Operations
- Installation: PXE, USB, ISO, QCOW2, OVA
- Update / Rollback Support
- Provisioning: cloud-init, Ansible, ZTP[3]
- Licensing: Online licensing system for feature and capacity enablement

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Turbo IPsec Application Licenses:
1K, 2K, 5K, 10K, 25K, 50K Tunnels

Features

IPsec
- IKE v1/v2 Pre-shared Keys or X509 Certificates
- MOBIKE
- Encryption: 3DES, AES-CBC/GCM (128, 192, 256)
- Hash: MD-5, SHA-1, SHA-2 (256, 384, 512) AES-XCBC (128)
- Key Management: RSA, DH MODP groups 1 (768 bits), 2 (1024 bits), 5 (1536 bits) and 14 (2048 bits), DH PFS
- EAP/Radius, EAP-MSCHAPv2
- Extended Sequence Numbers (ESN), Large Anti-replay Windows
- High Performance (AES-NI, QAT)
- Tunnel, Transport or BEET mode
- SVTI, DVTI
- DMVPN[3]
- OpenVPN[3]

High Availability
- IKE/IPsec Syncronization

Turbo CG-NAT Application Licenses:
1, 2, 5, 10, 20, 30 Million Simultaneous Connections

Features

CG-NAT Modes
- NAT44
- NAT64[3]
- Static NAT[3]

Port Assignment
- Random or Parity
- Port Block Allocation (PBA) or Detailed Logging Per Session[3]
- Per user/per CPE Session Limiter
- Deterministic[3]

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

System Requirements
Intel Xeon or Atom processor with 1, 2 or 4 sockets (Advantech, Dell, HP, Lanner, Super Micro)

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

Memory: 2GB minimum, 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)[3]

Server Hardware Recommendations
https://www.6wind.com/server-hardware-suggestions/

[1] Test Platform: Intel® Xeon® Gold 6152 @ 2.1GHz. IPsec tests use AES 128-GCM.
[2] Test Platform: Dual Intel® Xeon® Platinum 8170 @ 2.1GHz with 2x26 cores.
[3] Near-term Roadmap