5x9 vBBRAS System

Virtual Form Broadband Edge

Manage your network production with efficient simplicity

Highlights

5x9 vBBRAS is a turnkey broadband edge solution based on virtual form factor. Developed from scratch and highly optimized, it enables operators to seamlessly move network edge from dedicated hardware to cloud with maximal efficiency and flexibility.

Key Features

- No need to fuss over implementation. 5x9 vBBRAS comes with every element you need for fast and easy broadband edge deployment and production. Just plug it in and you're ready to play.

- We like to keep things clean and simple. That's why 5x9 vBBRAS has an extremely simplified system design that ensures performance, stability and fast feature delivery.

- Keeping your network production efficient shouldn't take a village. 5x9 vBBRAS includes provisioning, management, redundancy, scalability, and elasticity tools.

- Streamline your day-to-day work. Our innovative built-in feature approach enables effortless everyday system operation and automated workload distribution.

- Not sure you can run it? 5x9 vBBRAS has high compatibility with all major virtualization platforms, and it's designed to work on COTS x86 hardware.

- Our Virtual Machines have more than enough muscle. A single forwarder supports over 20 Gbps of traffic for 500 bytes packet size, 16k users and 150 CPS.

- Get a performance of over 200 Gbps per mid-range compute node for 500 bytes packet size

- Forget about forwarding plane challenges. 5x9 vBBRAS provides an easy answer with automated horizontal vBF scaling.

- We treat you as a partner. Really. Our products drive clearly visible CapEx and OpEx savings via fair licensing and SLA policies.

What makes 5x9 vBBRAS stand out?

Most broadband edge solutions add virtual form factor as just one of their functionalities. But not 5x9 vBBRAS. We've developed our solution exclusively with virtual in mind - not as an add-on.

Made from scratch and highly optimized, 5x9 vBBRAS is a turnkey broadband edge solution based on virtual form factor.

We designed 5x9 vBBRAS with operators in mind, allowing them to focus their operations in one solution and standardize their hardware.

Maximize your efficiency and flexibility by moving your network edge from dedicated hardware to the cloud

Product Overview

Our years in the telco industry have shown us the value of reducing network complexity and investments – both capital and operating. So we designed our 5x9 vBBRAS system with the goal to deliver these two major SDN/NFV promises.

5x9 vBBRAS consists of five essential elements: Virtual BBRAS Controller (vBC), Virtual BBRAS Forwarder (vBF), Virtual DashBoard (vDB), Radius (R) and Radius DataBase (RDB). The first three elements (vBC, vBF, and vDB) are mandatory for vBBRAS system implementation, while the last two (Radius and RDB) are operator-dependent and optional.

But before you delve deeper into these five functions, let's answer your biggest question – what makes us different from our competitors? Why should you keep on reading about vBBRAS, instead of switching to the next available solution?

Because we know simplicity is what adds real value to your system. The less you have to work to keep your system running, the more time you have to excel on other fronts.

So we doubled down on the simplicity of the design, and added a unique vDB component that fully automates your system provisioning and management.

This vDB component takes care of all intelligent system tasks like control plane handling, dynamic system and customer addressing, routing, workload distribution, redundancy, scalability and elasticity, minimizing the effort you usually have to invest to keep everything up and running.

Innovative 5x9 System Features

Automatic Scalability
Tailor thresholds to your capacities

Scaling should be effortless. Just define your thresholds, and 5x9 vBBRAS handles the rest.
When your traffic or user number hits this threshold, a new forwarder gets into action automatically.

Automated Forwarding Plane Elasticity
Adjust elastically to the flow

No need for additional configuration. No need to turn a forwarder off or on again. Our forwarders adjust elastically to the flow, and they automatically configure themselves according to any parameter you outlined during system setup. It also allows you to adjust to demounts on the spot.

Open/Closed for Business
Clear out users in your own time

Dynamically shut down a forwarder, without compromising user sessions. Lock users out of an instance, leaving them to clear out within 24 hours or any time you choose. This allows you to take one instance out of the game for upgrades and tinkering, without anyone noticing.

Smart Stop
Guarantee smooth sessions

If you need to make a quick intervention, you can disconnect all your users from a forwarder imperceptibly and distribute them effectively to other instances. Combined with Closed for Business, it ensures continuous sessions for your users and some breathing space for your maintenance and diagnostics.

Adaptive PADO Delay
Disperse user sessions efficiently

An increase in forwarders often leads to an unbalanced distribution of user sessions. To avoid this, 5x9 vBBRAS monitors various parameters and balances the delay between forwarders to ensure the least loaded forwarder gets to the user first.

Max subscribers per vBF
Control the number of users

You know your capacities. 5x9 vBBRAS allows you to define the number of users on each forwarder. Set thresholds to avoid clutter and clots that could lead to meltdowns.

PPPOE Session Affinity & Stickiness
Connect sessions to the forwarder you want.

Control the session affinity of each forwarder and stick any session right where you want it.

Automated forwarding plane IP addressing
Use IP addresses efficiently

5×9 vBBRAS also reduces the need for IPs through auto-addressing. When an instance closes, IP addresses are distributed economically to functioning ones, avoiding IP waste.

Need something customized?

Maybe you're looking at 5x9 vBBRAS, thinking it would be perfect if only it had just one extra feature. Well, we can add it. Name any adjustment you'd like, and we'll find a way to implement it. 5x9 vBBRAS was developed from scratch and completely in-house, allowing us to mold its features to our client's needs.

Architecture & Key Components

Excellent compatibility

5x9 vBBRAS was designed to work on COTS x86 hardware and all major virtualization platforms. We ensured this through multiple Virtual Machines that are either connected via an internal (virtual) or external (hardware-based) L2 switch to the operator network.

Redundant & non-redundant installation

How many VMs do you need? For a minimal non-redundant installation with existing Radius and RDB instances, you need three virtual machines for vDB, vBC and vBF deployment. To put it simply: each of the three elements runs on a single instance.

On the other hand, a minimal redundant installation with external operator Radius and RDB instances requires at least two instances of each element. That adds up to six VMs for redundant vDB, vBC and vBF deployment.

Continuous system operation

Redundant system deployment ensures seamless operation, no matter what. Even during a single server HW failure within the virtualization system, 5x9 vBBRAS makes sure everything runs smoothly.

Automated provisioning and management by the vDB and vBC elements ensure fully restored system operations after hardware failure or a failed VM boot.

Forwarding & control plane challenge management

There's a whole range of forwarding plane challenges that 5x9 vBBRAS settles easily. High traffic demands or terminating a high number of broadband customers don't need to cause you headaches anymore. vBF horizontal scaling simplifies and automates the answer to forwarding plane challenges.

On the other hand, system challenges related to the control plane are also easily addressed by expanding the vBC's CPU and memory

1. Virtual BBRAS Forwarder (vBF)
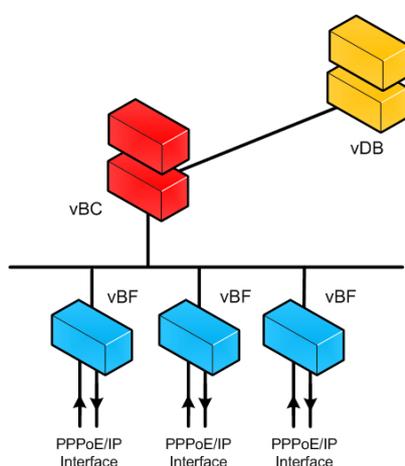
As the name suggests, this first vBBRAS system component is dedicated to all tasks related to the forwarding plane. It terminates PPPoE and IPoE user sessions, forwards Ethernet and IP traffic, and generates low-level user statistics for the vBC and vDB components.

With 5x9 vBBRAS, forwarders are activated, scaled and configured automatically, according to any parameter you define during system setup.

High performance

To give you a better look at our numbers, a single vBF instance (in other words, a single VM) performance is over 20Gbps half-duplex traffic forwarding for 500 bytes packet size, 16k simultaneous PPPoE/IPoE user sessions termination and 150 PPPoE/IPoE user session creation/deletion per second (cps – connections per second).

Efficient L2 & L3 interfaces

A vBF virtual machine has at least two Ethernet interfaces. One L2 interface is facing Ethernet/MPLS Aggregation network for PPPoE/IPoE user traffic termination. The other is an L3 interface towards IP Core network for IP traffic forwarding. Our vBF instances support multiple simultaneous L2 and L3 interfaces to ensure their maximum efficiency.

2. Virtual BBRAS Controller (vBC)

The Virtual BBRAS Controller is dedicated to controlling plane tasks. It manages and provisions the system together with the vDB component.

It covers internal system component and external user addressing, system routing, redundancy, scalability, and elasticity.

Smart load distribution

The vBC also distributes the load on the system's forwarding plane. This load distribution is managed on the fly with configurable PADO-delay, max subs, and Open for Business vBF dynamic parameters, crafting an automated and seamless approach unique to 5x9 solutions.

There's a whole range of system forwarding plane load distribution possibilities. Even more, they're so easily achieved on vBF bandwidth, vBF terminating user number, vBF VM CPU load, or vBF VM memory consumption basis.

Fully automated system addressing

The vBC handles all System IP addresses and performs the subnetting of continuous or discontinuous IP pool with the goal to automate the addressing of a new vBF instance.

3. Virtual DashBoard (vDB)

The majority of vBBRAS's system intelligence resides in the Virtual DashBoard. It's a fully user-friendly application with web frontend programming and underlying SDN capabilities.

Effective system intelligence

The vDB is dedicated to system configuration, management, and load/health overview. Its system intelligence takes care of:
- Starting and completing the configuration of a new forwarder in case of
  - VM failure (due to HW failure, redundancy mechanism) or
  - increased capacity demand (automated elasticity mechanism)
- Coordination with the virtualization platform for elasticity/redundancy assurance
- Automated workload distribution between numerous running vBF instances

Clear system overview

The vDB is also responsible for system performance and data log collection, processing, visualization and data export to external NSM systems via SNMP.

It's internal portal also provides a simple but, at the same time, detailed system health, and load overview. Some of the information the vDB collects and displays are:
- System health check – redundancy status, load distribution, system capacity, system and user addressing, etc.
- System performance – total subscribers, subscribers per vBF, total terminating BW, terminating BW per vBF
- CPU load, Mem and Disk usage of each virtualized system component (vBF, vBC, R and RDB).

4. Radius (R) and Radius Database (RDB)

The majority of operators are already using a Radius server and Radius Database, we know. But the 5x9 turnkey system solution includes them both. And they're optional - it's completely up to you if you want to implement them or not.

Not sure if you'd need the R and RDB components? Let's list the advantages.

Including R and RDB accelerate your production deployment in greenfield scenarios, and extremely rapid system deployment for your Trial and Lab setups.

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Proven Open Source solutions

We based R and RDB on unmodified, fully-tested, and stable Open Source solutions in VM image form.

Radius is based on FreeRadius, the most widely deployed Radius server in the world. Meanwhile, the Radius Database is based on the most popular database software in the Linux/Open Source world – MySQL.

Straightforward system management

We've developed both optional components with our main goal – simplicity – in mind.

That's why both R and RDB are integrated with a vDB component to maximize their visibility and system management simplicity.

Technical specifications

This is what 5X9 vBBRAS is made of, plain and simple. We're constantly working to make your experience even better. If you have any questions regarding our specs or some future feature, send us a line at info@5x9networks.com.

Protocols
- PPPoE (RFC 1332, 1334, 1661, 2516, 5072)
- Ethernet
- 802.1q
- 802.1ad (QinQ)
- LACP (IEEE 802.3ad)
- MPLS (RFC 3031)
- EVPN (RFC 7209), MPLS-based (RFC 7432) and VxLAN-based (RFC 8365)
- L2TP LAC (RFC 2661)

Subscriber Management
- RADIUS authentication and accounting (RFC 2865, 2866)
- PAP/CHAP (RFC 1334, RFC 1994)
- v4 and v6 PPPoE termination (single and dual stack)
- v4 and v6 IPoE termination (single and dual stack)
- IPv4 support (RFC 791, 1812)
- IPv6 support (RFC 2460, 8200)
- PPPoE Intermediate Agent string
- Session rate limit
- MRU (Max Receive Unit)
- Local and Radius IP address assignment
- Framed-IP and Framed-Route via Radius (RFC 2865)
- Session timeout
- CoA (RFC 3576) for ACL, QoS and disconnect
- hQoS (multi-level, 8 classes, policing and shaping, classification and marking), multiple scheduling algorithms (RFC 2697, 2698, 4115)
- L3VPN (RFC 4364)
- 6PE (RFC 4798)
- 6VPE (RFC 4659)
- CGN (Carrier Grade NAT) with support for ICMP, FTP, SIP and PPTP ALGs

IP Routing
- RIP v1, v2 (RFC 1058, 2080, 2082, 2453)
- OSPF v2, v3 (RFC 2328, 2370, 5340)
- OSPF segment routing (RFC 8665)
- IS-IS (ISO 10589:2002, RFC 1195, 5308)
- IS-IS segment routing (RFC 8667)
- BGP (RFC 1771, 1965, 1997, 1998, 2439, 2545, 2976, 2842, 2858, 2918, 3065, 3107, 3682, 3765, 4271, 4360, 4364, 4456, 4486, 4659, 4684, 4760, 4893, 5004, 5082, 5291, 5492, 5575, 5925, 6286, 6608, 6810, 6811, 6938, 7196, 7300, 7313, 7606, 7607, 7611, 7911, 7999, 8092, 8195, 8203, 8212, 8277, 8654, 9003, 9072)
- LDP (RFC 5036, 5561, 6720, 7552)
- BFD (RFC 5880, 5881, 5883)
- ECMP
- Path MTU Discovery (RFC 1191)

Security
- uRFP (Unicast Reverse Path Forwarding)
- DAD (Duplicate Address Detection)
- ACL (Access List)

Management
- Zero-touch provisioning via vDashBoard (vDB)
- User statistics
- System element statistics
- System statistics
- NTP (RFC 5905)
- Lawful Intercept
- SNMPv1/v2/v3
- SNMP traps
- TACACS+ for vDB authentication and accounting
- ISSU (In Service Software Upgrade)
- REST
- NetConf/Yang

Innovative 5x9 System Features:
- vBF adaptive PADO delay
- vBF adaptive DHCP offer delay
- vBF open for new PPPoE/IPoE sessions
- Max subscribers per vBF
- Multiple vBF L2 and L3 interfaces
- Smart vBF stop
- Automated forwarding plane elasticity
- Automated forwarding plane IP addressing
- PPPoE/IPoE session to vBF instance affinity

Simplify your maintenance, diagnostics, and life with 5x9 vBBRAS. Request a demo and see how.