# Casa Systems Axyom™ Disaggregated Virtualized Broadband Network Gateway (vBNG) Router

Winning and keeping broadband services customers has never been tougher. Service providers face a range of competition in a business that requires rapid response but is still capital intensive. They need partners who are fast enough to get them ahead of their competition and committed to keeping there, which is why more and more, leading providers depend on Casa Systems.

Casa's Axyom™ Virtualized Broadband Network Gateway (vBNG) Router provides advanced subscriber management and routing capabilities in a virtualized solution that enables the elastic scaling and service agility today's dynamic Internet services environment requires. Built from the ground up as a cloud-native solution for both OpenStack and container-based cloud networks, Casa's Axyom vBNG Router delivers the performance, scaling, and flexibility needed to address the greater diversity of 5G broadband demands. Through a unique design that disaggregates network functions, streamlines packet flows, enables independent and dynamic scaling of control and data planes, the Axyom vBNG delivers superior throughput in both centralized and distributed architectures.

Figure 1
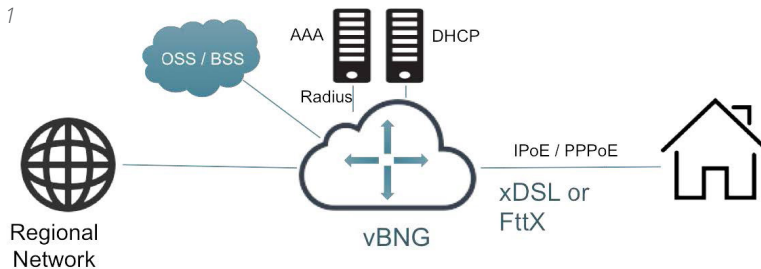
Customers who choose the Axyom vBNG Router can expect full BNG functionality, from a cloud-native virtualized solution.

- IPoE and PPPoE access methods providing IPv4 and IPv6 connectivity to the internet or BNG-MPLS VPNs.

- L2TP LAC and LNS for wholesale broadband connectivity.

- Dynamic template-based configuration of subscriber sessions.

- RADIUS-based authentication, authorization and accounting per session. Change-of-Authorization for dynamic services.

- Layer 2 / Layer 3 edge routing for IPv4 and IPv6 unicast and multicast.

- Hierarchical QoS for subscriber traffic with traffic shipping and rate limiting for traffic management.

- Routing VRF support for both unicast and multicast with MPLS.

- CLI, SNMP and NETCONF / YANG for management.

- Lawful intercept support per session.

Highlights

Built for the Cloud

The Axyom vBNG was built for the cloud, from the ground up, in Casa's Axyom microservices based virtualization framework and is deployable in OpenStack-based VM or container-based environments

Centralized / Distributed Data Planes with Automatic Scaling

The Axyom vBNG Router offers separation of control and data planes and is designed for redundancy and multi-dimensional scaling so service providers have assurance, service agility, and faster time to market

Disaggregation of Network Functions

Not only are control and data planes separated, but the data plane can also be distributed to remote silos giving service providers the ability to flexibly centralize or distribute functions as needed

Industry Leading Throughput

Up to 350 Gbps per server, dynamically scalable to terabits per second

Advanced Subscriber Management

Advanced Subscriber Management features including per subscriber Hierarchical QoS and policy-based routing.

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Axyom Virtual Broadband Network Gateway (vBNG)

The Axyom vBNG Router gives service providers key benefits in the race to attract and retain high speed data customers:
- Network simplification: reduced equipment requirements by replacing multiple legacy Broadband Remote Access Server (BRAS) and BNG chassis with Casa's vBNG
- Network flexibility: independent, dynamic scaling of control and data planes and, uniquely, the ability to distribute the data planes closer to the subscribers.
- Service agility: increased control over and ability to differentiate the user experience with elastic scaling, per-subscriber QoS, policy-based routing, captive portals, and DHCP relay.
- Automatic Scaling of Data Planes based on number of subscribers or throughput.
- ETSI MANO interface for VM Lifecycle Management using Casa VMC.

Control and Data Plane Separation

The Axyom vBNG software architecture separates control and data plane functions and decomposes those functions, as shown in Figure 2 below. This enables not only independent scaling, but also the flexibility to put the control plane and data plane where they make the most sense - on the same server in the data center / CO, different servers, or even in different locations (e.g., the data plane can be distributed closer to the end user). The API between the control and data plane works in any of these scenarios.

Figure 2

Cloud-Native, Decomposed Axyom vBNG Architecture
Control Plane and User Plane Separation
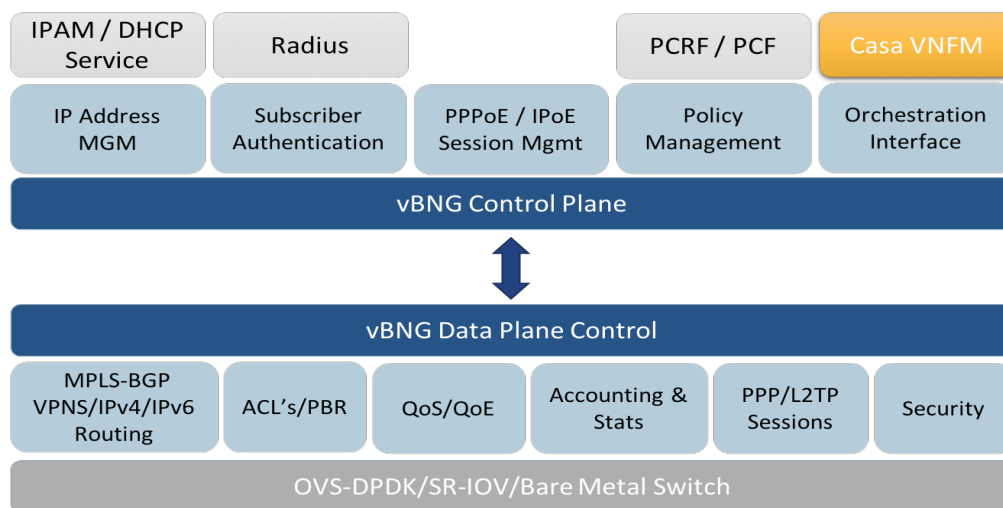
Distributed Data Planes with Centralized Control Plane

Casa vBNG disaggregated architecture allows the data planes to be distributed to remote central offices closer to the subscriber location. The control plane is centralized at a data center or regional central office. The system operates as one logical BNG instance while still provided the benefits of low latency and fast access to content enabled by distributed data plane processing. Casa supports full redundant control and planes for 5-9s service enablement to business and residential subscribers. Figure below shows the network topology for the distributed architecture.

Figure 3
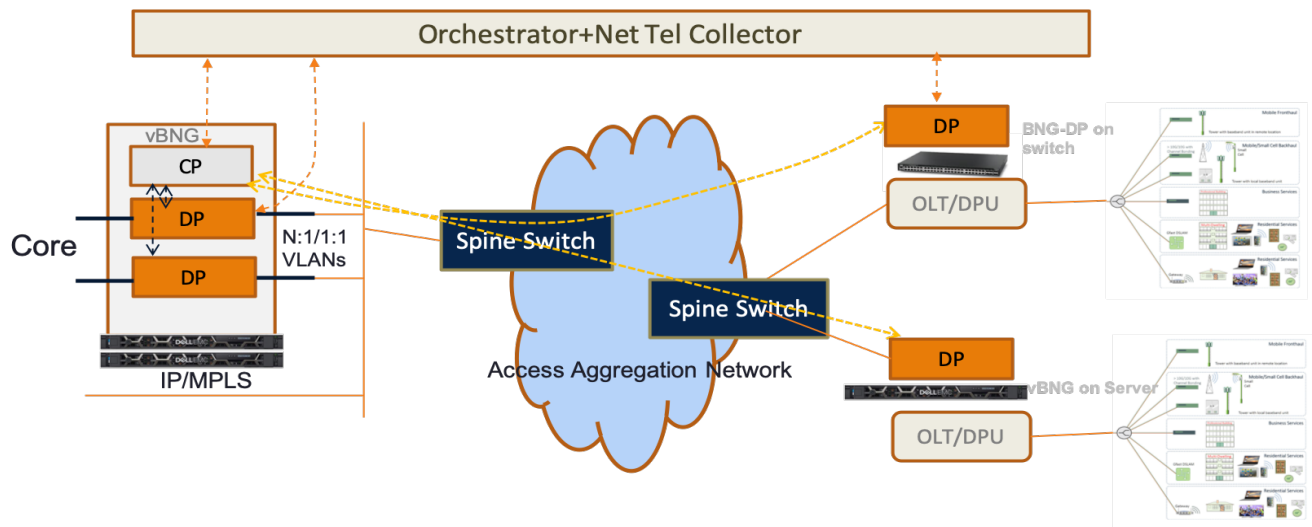
Axyom Virtual Management Controller

Like all of Casa's Axyom solutions, the vBNG benefits from the Axyom Virtual Management Controller (VMC) provides simplified VNF onboarding and life-cycle management, with ETSI compliant interface to the NFVO (NFV Orchestrator). The VMC also provides service assurance enablement, the capacity to process numerous system and application-level KPIs, and auto-scaling of VNFs to meet application level or infrastructure KPI thresholds.

Features

Access Methods	• IPoE / PPPoE sessions • L2TP LAC and LNS for wholesale model • Combination of all access methods on same interface • Configuration through dynamic profiles
Authentication and Authorization of Subscriber Sessions	• Authentication/Authorization/Accounting via RADIUS and Gx interface • IPoE/DHCP (Relay and local server) • IPv4 and IPv6 support • Walled Garden • PPPoE Sessions • RADIUS Change of Authorization (COA)
Traffic Management	• Per subscriber QoS • Traffic policing/shaping/rate limiting • H-QoS • HTTP redirect • RR and WFQ scheduling • Unicast Reverse Path Forwarding • ACLs per subscriber
L2/L3/MPLS	• 802.ad (QinQ) for 1:1 and N:1 VLAN classifications • Layer 3 routing/OSPF / BGP / RIP / IS-IS / Policy-based routing • MPLS (L2 and L3 MPLS VPNs); LAG/LACP • PIM-SM / IGMP MLDv2
Management	Element Management function interfaces with OSS/BSS for provisioning, fault and performance management: • CLI, SNMP, NETCONF/YANG • VNFM: Casa VMC • Lawful Intercept trigger from RADIUS, CLI or SNMPv3
Scaling and Throughput	• Independent scaling of control and data planes • Data plane scalable to Tbps • Control plane scalable from 256,000 to 5 million
Redundancy and High Availability	• Control Plane 1+1 Active / Standby • Data Plane N+M Active / Standby

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