Leading 5G Innovations

Building Flexible and Agile Virtualized Metro Edge Networks

——ZXR10 V6000 vBRAS Carrier-Class Virtual Broadband Multi-Service Gateway

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Building flexbile and agile virtualized metro edge networks

With rapid development of Internet service in recent years, network traffic is growing explosively, network scale is becoming increasingly complicated and operation and maintenance (OAM) costs are increasing. The BRAS at the metro edge is the ingress to implement various services. The close coupling architecture of control plane/forwarding plane cannot meet the requirements of continuously emerging new services and traffic. Therefore, it is urgent to build virtualized metro edge networks that have flexible resources and are easy to operate.

Future carrier networks must be simple, flexible and agile. The ZXR10 V6000 vBRAS carrier-class virtual broadband multi-service gateway is developed in compliance with the trend. It achieves control/forwarding separation and software /hardware decoupling with SDN & NFV technology, so as to implement control plane cloudification, fast and flexible service deployment, and centralized control of configuration and OAM. It overcomes the following shortages of traditional BRAS: uneven resource utilization rates at the service control layer, long service deployment period and high OAM workload caused by distributed configuration, and reduces operators' OPEX and CAPEX. Building a stable and reliable metro edge with elastic resources and rich services is an inevitable development trend of future carrier networks. The ZXR10 V6000 vBRAS can facilitate the intelligentization and virtualization transformation of metro edge networks.

Product Features and Customer Benefits

Advanced architecture meets carrier-class network operation requirements

ZTE vBRAS employs separated control plane/forwarding plane architecture. The control plane performs service control by software virtualization, overcoming the problem of insufficient resource on the control plane of the existing BRAS devices. The forwarding plane innovatively provides two forwarding pools: NP-based high-performance forwarding pool and universal X86-based pure virtual forwarding pool. The two forwarding pools can be deployed independently; they can also share the unified control plane to perform centralized management and collaborative optimization of services and resources.

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- One single instance on the control plane can provide the access capability for millions of users, and it supports dynamic elastic scaling according to network scale.
- The high-performance forwarding pool provides single-slot 400G forwarding capability and supports evolution to 1T. It carries high-bandwidth and high-QoS services to cope with the increasing bandwidth challenges of carrier-class networks.
- The universal X86-based virtual forwarding pool supports elastic capacity expansion. It can be used to carry high-concurrency, low-bandwidth and low-QoS services to share sessions and reduce the flow table overhead of the high-performance forwarding pool.

Smooth evolution protects customer investment

- The control plane is completely decoupled from the forwarding plane and can be deployed flexibly. It can be deployed directly on the existing metro backbone network without changing the existing network architecture. It also supports seamless evolution towards future DC-centric networks.
- The high-performance forwarding devices can be provided by upgrading BRAS/MSE/BNG devices on the existing network to reuse the existing NE resources and fully protect customer investment.

Full service transport covers all service types in MAN

- Completely virtualized BRAS services: supports IPoEv4/v6, PPPoEv4/v6, IPTV multicast, L2TP and IP Host services; covers home triple-play, personal WiFi and enterprise and Internet private line services.
- Hybrid SR services: supports MPLS L3/L2 VPN, IPSec VPN and GRE services; covers enterprise VPN services.
- The powerful CGN function and complete CGN protection solution guarantee private network IPv4 service provisioning and reliability.
- High-performance QoS capability boosts precision operation and traffic operation of fixed network broadband services.

Redundant backup highly improves service reliability

- Redundant backup is configured for all components on the control plane to perform seamless switchover when one component fails. Dual-instance backup can also be configured to enable seamless switchover to the standby control plane when one control plane instance fails, fully guaranteeing reliability of the control plane.
- The forwarding plane has natural redundancy and achieves service load balancing. It also supports multi-service hot standby. The service is automatically switched to the standby device when the active forwarding device fails, without the need for redialing. It is more flexible and efficient compared with hot standby deployment of traditional BRAS.

Extremely simplified OAM shortens new service provisioning period

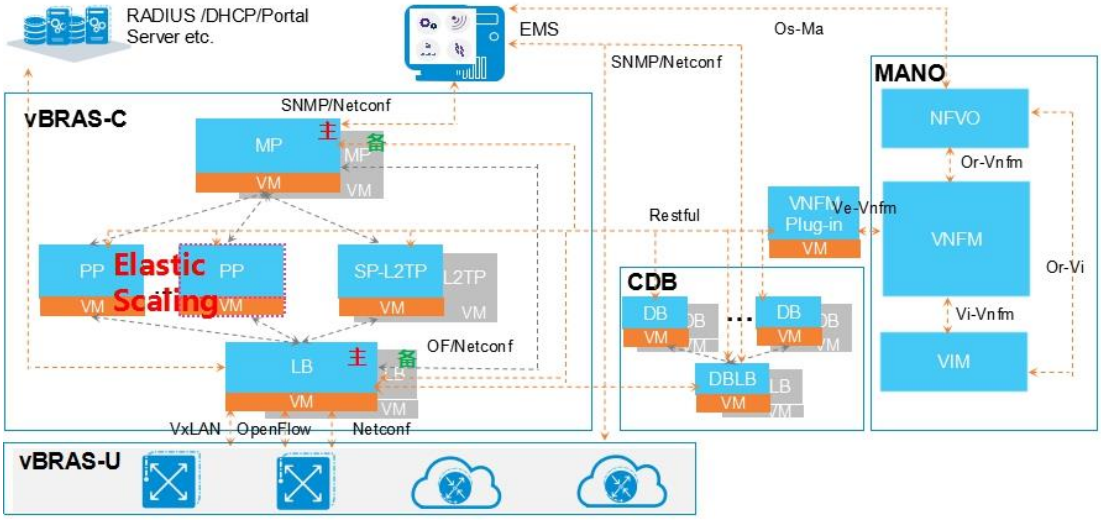
- The vBRAS implements centralized management and control of the control plane. Broadband services only need to be configured on the control plane before they are

automatically distributed to the forwarding plane, which substantially simplifies the configuration workload.

- In the whole system, only the control plane needs to interconnect with all service platforms and they appear as a logical structure to the outside. Expansion of the forwarding plane does not increase any workload of interconnection with the service system.
- When the deployment of a new service involves software upgrade, only the control plane needs to be upgraded, substantially shortening new service deployment period.

Product Architecture

The ZXR10 V6000 vBRAS implements elastic network scaling and flexbile control by control/forwarding separation and software /hardware decoupling with SDN & NFV technology. The ZXR10 V6000 vBRAS includes the following core components:



vBRAS-C

Running on an x86 SERVER, The vBRAS control plane (vBRAS-C) is responsible for BRAS service logic implementation and flow table distribution. The key modules include:

- MP (Management Plane): system version management, configuration distribution, OAM (including alarm and logs), user address management, session management, etc.
- PP (Protocol Processor): responsible for BRAS user access protocol processing, keep-alive and policy control .
- LB (Load Balancer): responsible for dynamic load sharing between PPs; provides interfaces with vBRAS-U and interfaces with background server (RADIUS/DHCP/Proxy Server).

- SP-L2TP (Service Processor for L2TP): responsible for L2TP service and protocol processing.

vBRAS-U

The vBRAS forwarding plane (vBRAS-U) is responsible for data flow forwarding and multicast flow replication of BRAS users and user policy (such as QoS and ACL) execution.

Interfaces between vBRAS-C and vBRAS-U

- C/U protocol interface: transmits PPPoE and IPoE protocol packets by VxLAN.
- C/U control interface: the vBRAS-C sends service flow table entries to the vBRAS-U or the vBRAS-U reports service events to the vBRAS-C by Openflow.
- C/U management interface: the vBRAS-C distributes configuration to the vBRAS-U by Netconf.

CDB

CDB (Cloud Database) is responsible for user session table storage. It is only used when cross-DC hot-standby for vBRAS-C is deployed or concurrent sessions of one vBRAS-C instance > 1M. CDB consists of DB and DBLB modules:

- DB (Database) is data storage node used for data storage.
- DBLB (Database Load Balancer) is responsible for group management of DB and providing interfaces for CDB.

EMS

The EMS of vBRAS can simultaneously manage the control plane and the forwarding plane and completes BRAS service configuration, management and maintenance, including vBRAS configuration, log, alarm and statistics.

VNFM-Plugin

The vBRAS-C is connected with the VNFM of MANO by this plugin.

MANO

Network Function Virtualization (NFV) Management and Orchestration (MANO) is responsible for resource management of NFVI, resource allocation of VNF and service orchestration between VNFs, including:

- NFVO: service orchestration and auto service deployment;
- VNFM: VNF creation, life cycle management and elastic capacity expansion;
- VIM: NFV infrastructure management.

The corresponding product types are as follows:

Component	vBRAS-C	vBRAS-U	VNFM plugin	CDB	EMS	NFVO and VNFM in MANO	Hypervisor and VIM
Product	ZXR10 V6000 vBRAS	ZXR10 M6000-S ZXR10 V6000 vRouter	ZXR10 V6000 vIPDirector standard plug-in	ZXR10 V6000 vIPDirector CDB	NetNumen U31	ZTE CloudStudio	ZTE TECS

Technical Specifications

The ZXR10 V6000 vBRAS provides two software suites. The description and server requirements are as follows:

Table 1. V6000 vBRAS product specification

Software suite	Description
vBRAS-Popular	Maximally 512K concurrent sessions Including 2 MPs, 5 PPs and 2 LBs
vBRAS -Elite	Maximally 1M concurrent sessions Including 2 MPs, 10 PPs and 2 LBs
vBRAS -Premium	Maximally 10M concurrent sessions Including 2 MPs, 22 PPs and 2 LBs

Table 2. V6000 vBRAS server requirements

CPU	Memory	Hard disk	Network card
CPU frequency: ≥2.4GHz	≥128G	Each≥600G (2 for redundancy are recommended)	4 or 6*10GE+4*GE (XGE network card is required to support SR-IOV. Network cards with Intel 82599 chip are recommended)

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ZTE CORPORATION
NO.55, Hi-tech Road South, ShenZhen, P. R. China
Postcode: 518057
Web: www.zte.com.cn
Tel: +86-755-26770000
Fax: +86-755-26771999