Leading 5G Innovations

Building New Elastic, Agile and Open Networks

— ZXR10 V6000 vRouter

ZTE

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Over the recent years, more and more operators started the plans for network cloudification transformation and more and more enterprises choose cloud service to follow the ICT transformation tide.However, the overall network cloudification cannot be achieved without Network Function Virtualization (NFV) of basic network elements. As an industry-leading communications equipment provider, ZTE unveils the ZXR10 V6000 vRouter, a new virtual router product, to facilitate the development of the NFV industrial chain. Inheriting functions and features of traditional routers, it also has such capabilities as high flexibility, openness and elastic expansion endowed by NFV technology to help operators build elastic, agile, open and intelligent networks.

Product Features and Customer Benefits

Advanced architecture and elastic expansion

- The product adopts modular and highly reliable architecture. The data forwarding plane, control management plane and monitoring plane are isolated from each other and do not affect each other.
- The forwarding plane maximally supports the expansion of 254 virtual machines. It can implement dynamic capacity expansion/reduction according to network capacity demands, improve system performance on demand, increase resource utilization rates and save energy.
- Similar to ZTE's hardware routers, the vRouter also employs the self-developed mature, efficient and reliable software system ROSng, so that the vRouter has the same functions and management features as traditional routers.
- The product virtualizes the forwarding architecture provided by Super Service Processor (SSP) chip groups (including NP, TCAM and TM) on a hardware router to vSSP, and optimizes the architecture in common X86 scenarios. It shields the effects on the operating system brought by bottom-layer environment changes and enables the operating system to migrate seamlessly to an X86-based virtual router. At the same time, it retains the table entry fast query and precise QoS functions of a hardware router. It also optimizes the data forwarding function in X86 scenarios using DPDK and SR-IOV technologies, enabling the virtual router to implement efficient forwarding in complicated multi-service scenarios.

Diversified services and flexible & reliable deployment

- It provides the same service functions as traditional hardware routers, including unicast/multicast routing, MPLS, overall VPN technology, QoS and IPSec.
- It provides complete CGN functions and supports CGN redundancy protection to ensure private network IPv4 service provisioning and reliability.
- It supports BFD, VRRP, ECMP, link bundling and FRR to implement fast restoration from faults and provide service-level reliability.

Open capability and network cloudfication evolution

- It provides the service chain-based expansion function to perform flexible service orchestration together with the NFV management platform and orchestration system, creating flexible and diversified network value-added platforms and meeting the diversified service requirements of customers.

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- Based on standard ETSI NFV architecture, it can run on ZTE's TECS cloud operating system platform or third-party virtual platforms such as VMware, KVM and Red Hat meeting the customer's requirement for L3 decoupling of communication cloud resources.
- It supports OpenFlow/NetConf/VxLAN protocols and provides open northbound interfaces to implement synergy control of E2E network resources and boost network evolution towards SDN cloudification.

Simplified OAM and fast service provisioning

- Ultra-fast one-click loading and installation enables fast creation of vRouter instances and correct display of vRouter logical topology, implementing ultra-fast one-click instance deployment.
- The fully graphic network management system has such functions as intelligent configuration management and service/network element (NE) performance statistics, making network resources clearer, service quality more visible, fault processing simpler and OAM more efficient.
- Support for new services can be achieved by merely upgrading the vRouter software, which shortens the service deployment period and provides more innovative services rapidly on the network.

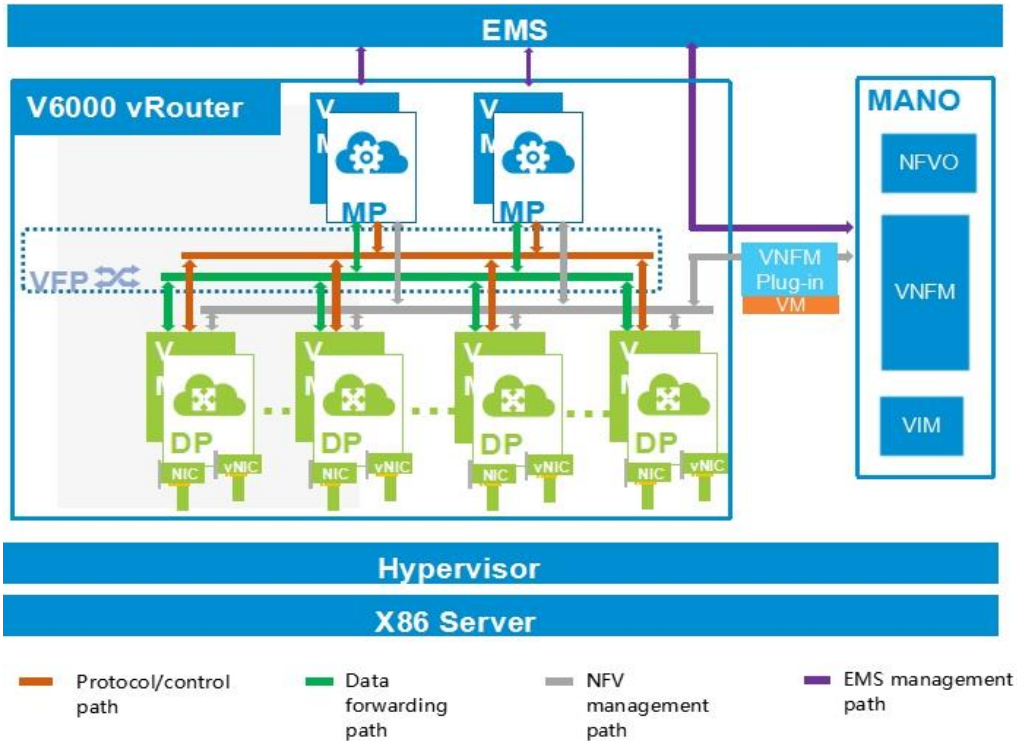
Product Architecture

ZXR10 V6000 vRouter is divided into Advanced edition and Standard edition according to the difference in deployment and capacity.

V6000 vRouter Advanced edition adopts distributed architecture. The forwarding plane and control plane are deployed on different VMs and the forwarding plane supports elastic scaling. V6000 vRouter Standard edition adopts integrated architecture.The forwarding plane and control plane are deployed on the same VM.

V6000 vRouter Advanced

In Advanced edition, the vRouter adopts modular and distributed architecture.The core product components include:



Management Plane (MP)

The MP is responsible for control and management of the vRouter system, including protocol & signaling processing and system management & maintenance. It also provides external interfaces for data packet forwarding.

Data Plane (DP)

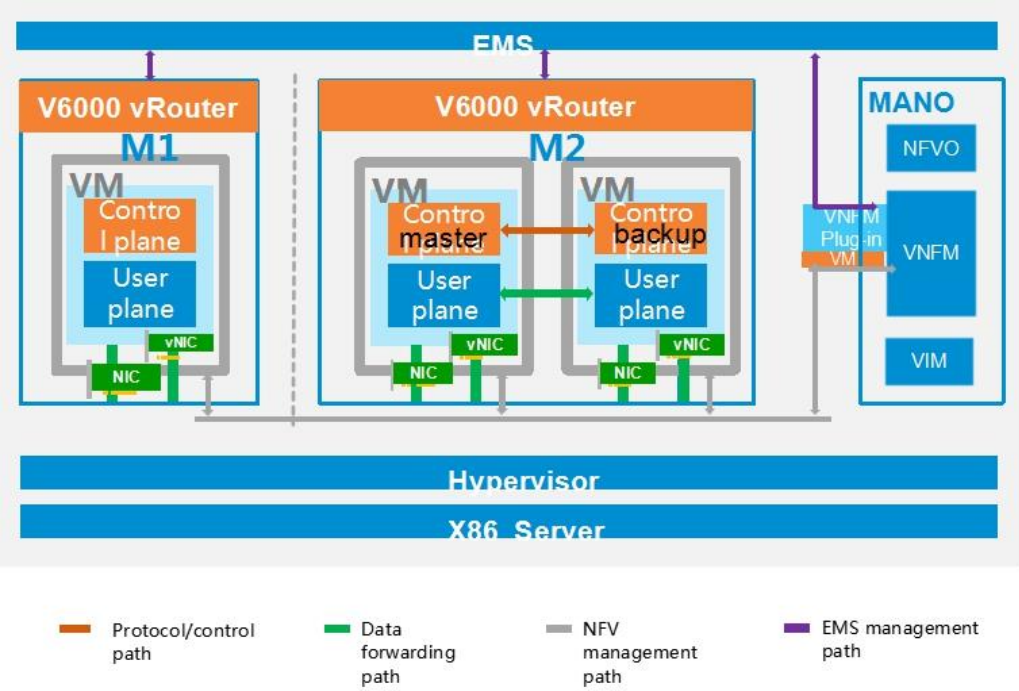
The DP provides external interfaces to implement fast processing and forwarding of various data packets and protocol packets.

Virtual Forwarding Plane (VFP)

The VFP provides internal control and forwarding channels of the system.

● V6000 vRouter Standard

In Standard edition, the vRouter adopts integrated architecture.It provides two software package: M1 and M2. M1 package does not support control plane redundancy and occupies one VM in deployment. M2 package supports control plane 1:1 redundancy and occupies two VMs in deployment . The forwarding plane can work in both 1+1 load sharing mode and 1:1 active/standby mode.



The following systems and platforms collaborate with V6000 vRouter.

MANO

The management and orchestration (MANO) of NFV is responsible for management of resources provided by NFVI, VNF resource allocation and inter-VNF service orchestration. It includes:

- NFVO: responsible for service orchestration and automated service deployment;
- VNFM: responsible for VNF creation, lifecycle management and elastic expansion;
- VIM: responsible for NFV infrastructure management.

VNFM-Plugin

ZXR10 V6000 vRouter is connected with the VNFM of MANO by this plugin.

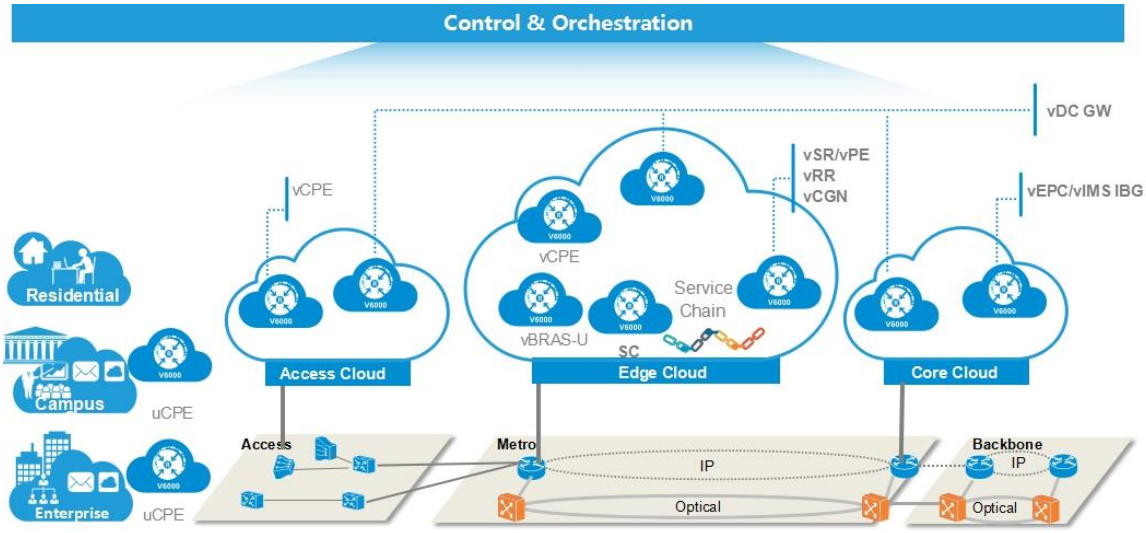
EMS

The element management system (EMS) completes configuration, management and maintenance of the vRouter, including configuration, log, alarm and statistics.

Application Scenarios

ZXR10 V6000 vRouter completely inherits the functions and features of traditional routers. It has rich applications in DC-centric new-generation networks:

- **vDC soft gateway:** Deployed in vDC, it can replace the traditional hardware router to act as an egress gateway. It supports complete VxLAN functions and can collaborate with DSN controllers to provide flexible vDC solutions.
- **vCGN:** It provides complete CGN functions and protection solutions. It can be deployed separately as a vCGN or provides the Service Functions (SFs) in the service chain scenario.
- **vRR:** It provides BGP RR function and supports multi-neighbor and large route processing. It can be deployed a separate vRR.
- **vPE/vCE/vSR:** It supports MPLS L2/L3VPN and private line access and provides pure software PE/CE/SR virtualization solutions.
- **Internet Border Gateway (IBG) of vEPC/vIMS:** It provides routing and CGN functions. It collaborates with vEPC and vIMS to provide pure virtualization solutions for core networks.
- **vCPE:**It can not only be deployed as a virtual CPE in the DC cloud, but also as a pure virtualized thick uCPE deployed on the side of the enterprise, providing secure access gateways for enterprise headquarters/branch interconnection and Internet access. t cooperates with ZTE resource orchestrator, service portal, management system, SDN controller and NFV management system to form end-to-end cloud network integrated solutions, providing network/service on demand solutions oriented towards new enterprise private line interconnection.
- **Public/private cloud gateway**:It can act as a VPC gateway of a tenant enterprise in the public cloud or as a private cloud gateway to provide flexible and secure access features for the enterprise network to extend to the cloud, meeting the requirements of enterprise customers for low-cost, secure and intelligent access to enterprise cloud resources.
- **Service chain (SC):** In the service chain scenario, the vRouter acts as the Service Classifier (SC) to implement flexible traffic classification. It provides related SFs by service chain concatenation to provide value-added services for customers.
- **vBRAS-U:** It collaborates with the V6000 vBRAS as the X86 forwarding plane of vBRAS and provides vBRAS solution which adopts separated control plane/forwarding plane architecture.



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Tcal Specifications

Table 1. Product Specifications

V6000 vRouter Advanced:

Module	Performance	Hardware demand per VM			
		CPU main frequency	Number of vCPUs	Memory	Hard disk
MP	RIBv4:2M RIBv6:1M	≥2.4GHz	4	8G	40G
	RIBv4:4M RIBv6:2M	≥2.4GHz	8	16G	40G
DP	Forwarding Performance:10Gbps	≥2.4GHz	4	16G	40G
	Forwarding Performance:20Gbps	≥2.4GHz	8	16G	40G
	Forwarding Performance:40Gbps	≥2.4GHz	12	16G	40G

V6000 vRouter Standard:

Software Package	Forwarding performance	Number of VMs	Hardware demand per VM			
			CPU main frequency	Number of vCPUs	Memory	Hard disk
M1	10Gbps	1	≥2.4GHz	4	16G	40G
	20Gbps	1	≥2.4GHz	8	16G	40G
	40Gbps	1	≥2.4GHz	12	16G	40G
M2	Forwarding 1:1 mode: 10Gbps Forwarding 1+1 mode: 20Gbps	2	≥2.4GHz	4	16G	40G

	Forwarding 1:1 mode: 20Gbps Forwarding 1+1 mode: 40Gbps	2	≥2.4GHz	8	16G	40G
	Forwarding 1:1 mode: 40Gbps Forwarding 1+1 mode: 80Gbps	2	≥2.4GHz	12	16G	40G

Table 2. Service Features

Service features		ZXR10 V6000 vRouter
L2 services	Ethernet	Static MAC, Dynamic MAC, SuperVLAN, Smart Group, VLAN and QinQ
IP routing services	IPv4 unicast	ARP/ARP Proxy, Static Route, policy-based routing (PBR), RIPv1/v2, OSPFv2, IS-ISv4, BGP-4 and ECMP
	IPv4 multicast	Static Multicast, IGMP v1/v2/v3, PIM-DM/SM/SSM, Policy Based Route (PBR) for Multicast, Graceful Restart for PIM
	IPv6 unicast	Static Routing for IPv6, DNS Client v4/v6, Policy Based Routing for IPv6 (PBRv6), RIPng, OSPFv3, IS-ISv6, BGP-4+ and ECMPv6
	IPv6 multicast	Static Multicast, MLDv1/v2, PIM-DM/SM/SSM
MPLS & Traffic Engineering	MPLS Basic	LDP, LDP FRR and Load-Sharing
	MPLS VPN	VPLS, H-VPLS, VPWS, Inter-AS MPLS L2VPN, Inter-AS MPLS L3VPN option A/B/C, VRF Policy Routing and 6PE/6vPE
	MPLS-TE	OSPF TE, IS-IS TE, RSVP-TE, Inter-AS/Area TE
CGN		NAT44, NAT LOG and NAT ALG

Tunneling	GRE, IPSec, 6in4 and 6to4
High availability (HA)	NSF for IGP/BGP/LDP/RSVP/PIM, NSR for IGP/BGP/LDP, IP FRR, LDP FRR, VPN FRR, PW Redundancy, BFD and VRRP
Security features	ACL, uRPF, MAC address filtering, TCP Control, port mirroring/traffic mirroring, SSHv2, broadcast storm suppression and MD5 protocol encryption
SDN features	OpenFlow, VxLAN, Netconf and Restful
NMS	NetNumen U31, CLI, Telnet, SNMP based GUI, RMON and Syslog

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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