Nodegrid Virtual Services Router

Unified Hybrid Cloud Gateway and Management Platform

The Nodegrid Virtual Services Router (VSR) helps customers deploy the trusted Nodegrid OS platform in public and private cloud environments. The VSR is a first-of-its-kind solution that unifies hybrid cloud management. Customers gain streamlined out-of-band access to data center, branch, edge, and cloud infrastructure. The VSR consolidates the management stack into one solution for visibility, extensive logging, and improved security that makes operational tasks simple.

Benefits

- **Improve Security** by deploying isolated management infrastructure covering public cloud, data center, and edge locations
- **Reduce CAPEX & OPEX** with a consolidated, extensible solution & automated management
- **Reduce downtime & trips** to remote locations with instant remote access
- **Minimize MTTR,** downtime, & expenses with secure, centralized remote device access & control
- **Increase site reliability** with open, industry-standard hardware & easy-to-use software

Top 3 Use Cases:

1. Bastion Host for secure VPC access in AWS and GCP
2. OOB Cloud Hub for Central Access to Isolated Management Infrastructure
3. Services Delivery Platform in Cloud

What is VSR?

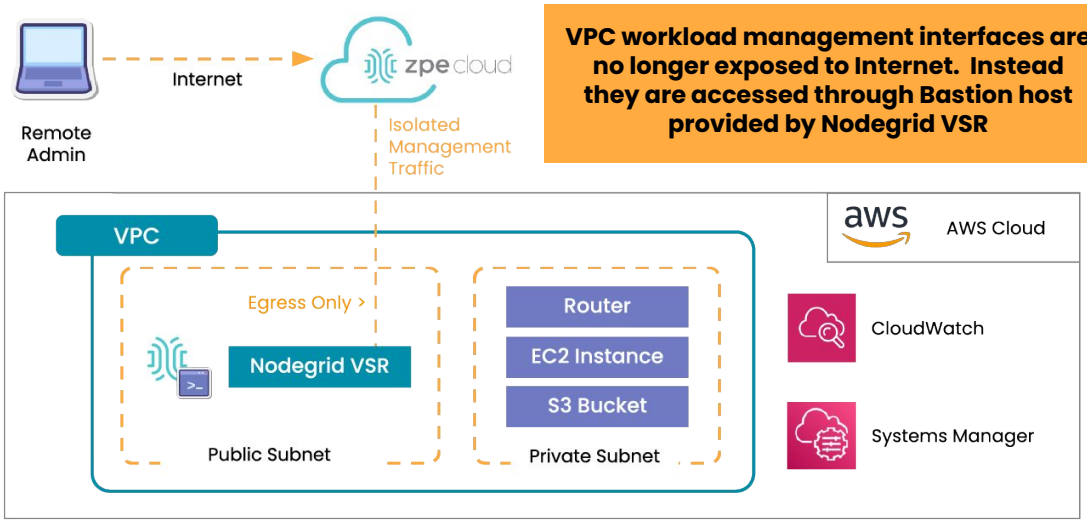
The Nodegrid Virtual Services Router (VSR) is based on Nodegrid OS, and offers the same level of security, networking capabilities, and management functions. This extends the Nodegrid platform from existing data center and edge deployments that use Nodegrid Serial Console switches or Nodegrid Service Router appliances, out to Amazon Web Services (AWS) and Google Cloud Platform (GCP).

Nodegrid on Hypervisor	**Nodegrid VSR** for AWS, GCP, ESXi
Nodegrid on Metal	**Nodegrid XSR** for Equinix Metal or other bare metals
Nodegrid Hardware	**Nodegrid Net SR, Gate SR, Bold SR, Hive SR, Link SR, Mini SR**

Customers can deploy the VSR stand-alone into AWS or GCP where it can serve as a bastion host for the deployed infrastructure. Bastion hosts dramatically help to improve security compared to default management access for deployed workloads, via direct SSH connections. The VSR allows admins to cleanly segment management traffic and production traffic. Users can only access workload management interfaces via the deployed VSR, with connections via the VSR's built-in VPN capabilities (IPsec, WireGuard, OpenVPN), which eliminates the need to deploy a VPN gateway. Or, customers can gain access via ZPE Cloud for added security, since this does not require admins to open ports to the public cloud infrastructure segment, instead restricting to outbound-only communications.

This simplifies the security policies required to protect the infrastructure from external attacks.

Bastion Host for Public Cloud



VPC workload management interfaces are no longer exposed to Internet. Instead they are accessed through Bastion host provided by Nodegrid VSR

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Enterprises used to manage their data center and edge locations independent of their public cloud infrastructure. This brought complexity around compliance and security policy enforcement. The VSR unifies the management infrastructure, simplifying the required software stack and increasing security through streamlined policy requirements.

The VSR gives customers access to the isolated management infrastructure, which includes their data center, edge, and public cloud infrastructure. The overlay network is created via Nodegrid's built-in VPN and routing technologies, or via ZPE Cloud's SD-WAN. Gaining high availability and redundancy is as simple as deploying multiple VSRs in different regions.

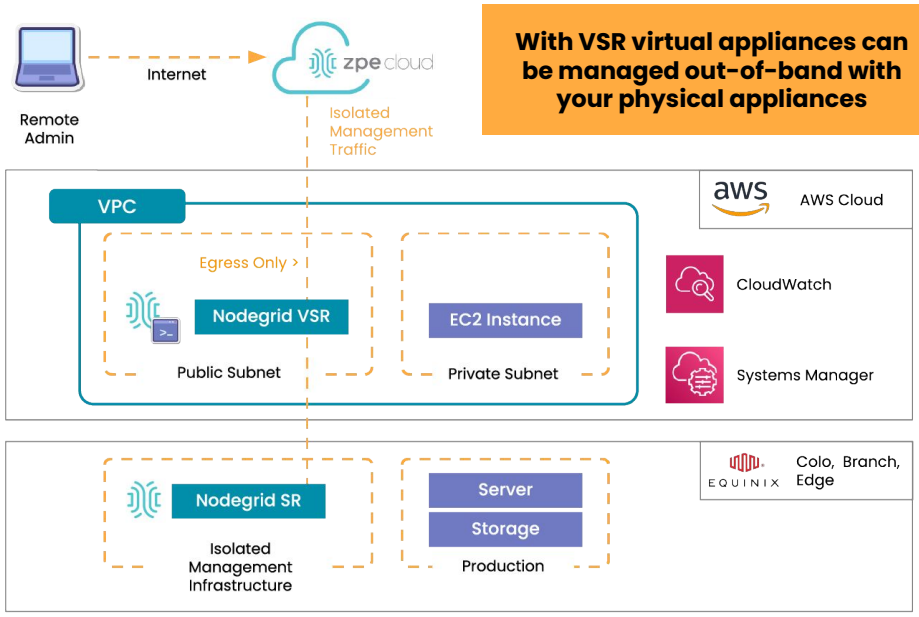
Features

- Unified Isolated Management Platform
- Nodegrid Cluster feature for a unified, vendor-neutral management solution
- Bastion host deployment: increase security for cloud infrastructure access
- Strong out-of-band management that combines data center, edge, and public cloud infrastructure
- Extensible applications with containers and virtualization
- ZPE Cloud centralized fleet management
- Modern x86-64bit Linux Kernel with latest patches
- Extended automation based on actionable data
- Overlay network via VPN or ZPE Cloud with integrated SD-WAN
- Gateway and multi-routing table capability (FRR)
- Encrypted data transit with SSL, IPsec, and WireGuard VPN technologies
- Built-in firewall and onramp to SASE/SSE
- Secure – selectable encrypted cryptographic protocols and cypher suite levels, configuration checksum™
- Automation/Orchestration - Puppet, Chef, Ansible, RESTful and gRPC APIs

Isolated Management Infrastructure (IMI)

(Hybrid Cloud)

With VSR virtual appliances can be managed out-of-band with your physical appliances

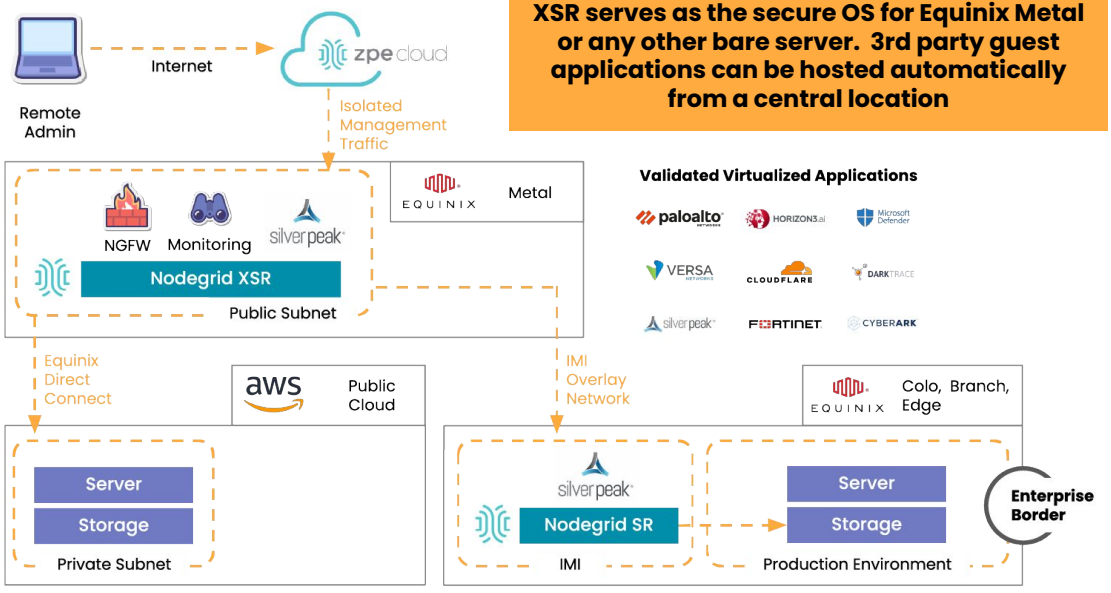


Nodegrid also streamlines deployment and management of workloads. It features built-in virtualization and networking capabilities, which are ideal for deploying and managing additional workloads independent of the underlying infrastructure.

Pre-validated partner solutions cover a wide range of applications, making deployment and operations straightforward and repeatable at scale.

Services Delivery Platform

XSR serves as the secure OS for Equinix Metal or any other bare server. 3rd party guest applications can be hosted automatically from a central location



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Technical Specifications

Cloud Deployment

- AWS EC2 instances of type c5 and m5
- GCP Compute of type e2 standard
- Instance requires TPM access

Networking

- IPv4 & IPv6 (stateful + auto-configuration)
- DHCP server / client / relay (IPv4, IPv6)
- Multi-Tenancy (VRF)
- IPv4 & IPv6 tunneling
- Network address translation (NAT)
- Multi-cast
- VLAN

Routing

- Static, BGP ,OSFP,RIPv1, RIPv2 ,VXLAN

Firewall

- Built-in L3/L4 stateful firewall

IP Services

- QoS
- DHCP (Client & Server)
- NTP, global time zone, cellular tower time synchronization

Connectivity

- HTTPS, SSHv2, ZPE Cloud

Device View Options

Tree, Table, Geo Map, Node, & WEB Interface with search

Data Logging & Notifications

- Local port buffering: 20 MB per port
- Local, NFS, syslog, offline data logging
- Timestamp & rotation for data logging
- Event destination: email, syslog, local, syslog, email, ZPE Cloud, Splunk & more
- Notification: syslog, email, ZPE Cloud, Splunk & more

System Management

- Extensible, automated control based on actionable real-time data
- Web GUI management portal, web console, Command Line Interface (CLI), Linux root shell, SNMP, RESTful API
- Zero Touch Provisioning (ZTP) via LAN/DHCP, WAN/ZPE Cloud, USB for configuration & firmware updates
- Multiple & customizable user levels of access
- Auto-discovery via network scan & custom probes
- SNMPv1,v2 & SNMPv3-v1 IPv4/IPv6 with MD5, SHA-224, SHA-256, SHA-384, SHA-512, DES, AES-192, AES-256
- Orchestration integration & automation: Puppet, Chef, Ansible, RESTful, ZPE Cloud & Nodegrid Cluster Feature / Manager

System Management (Continued)

- File sharing via FTP, NFS, SSHFS, Windows Sharing, web file browser, ZPE Cloud
- Remote Procedure Call (RPC, gRPC)
- NetFlow, LLDP

Automation

- API support, via RESTful and gRPC APIs
- Native library support for Python, Ansible, and Salt

Security

- Hardened device with BIOS protection, TPM 2.0, UEFI secure boot, signed OS, geofencing
- X.509 SSH certificate support, 4096-bit encryption keys
- Selectable cryptographic protocols for SSH OpenSSL3 & HTTPS (TLSv1.3, TLSv1.2, TLSv1.1)
- Selectable cypher suite levels: high, medium, low, custom
- IPsec, WireGuard, OpenSSL VPN with support for multi-sites
- Local, AD/LDAP, RADIUS, TACACS+, Kerberos authentication
- SAML2 SSO, Duo, Okta, Ping Identity, ADFS
- Two-factor authentication with RSA & TOTP MFA
- Local, backup-user authentication support
- User-access lists per port
- Group/role-based authorization: AD/LDAP, RADIUS, TACACS+, Kerberos
- Fine-grain & role-based access control
- Firewall: IP packet & security filtering, IP forwarding support
- MD5 / SHA system configuration checksum
- System event logging to file, syslog, email, ZPE Cloud, Splunk & more
- Custom security settings
- Strong password enforcement, Fail2ban

Operating System

- Built-in x86-64bit Nodegrid OS (Linux Flavor)

Central Access and Management

- ZPE Cloud, Cluster

Managed Devices

- Network devices, PDU, and IPMI devices
- Console Servers, incl. Nodegrid, Opengear, Lantronix and more

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Licensing Information

The Virtual Services Router appliance requires at minimum a valid Cluster license or a VSR license to operate. The Cluster license will, without a valid VSR license, limit the performance of the VSR to a Tier 1 instance.

Multiple licenses can be combined to gain higher performance or resource availability.

Tier	CPU	RAM	AWS Equivalent	GCP Equivalent
1	2vCPU	4GiB	c5.large	e2.median
2	4vCPU	8GiB	c5.xlarge	Custom
3	4vCPU	16GiB	m5.xlarge	e2-standard-4
4	8vCPU	32GiB	m5.2xlarge	e2-standard-8
5	16vCPU	64GiB	m5.4xlarge	e2-standard-16

Ordering Information

Cluster License - 1 Year - Subscription

SKU	Description	Tier
NGM-FL-CLUS-GSUB-001	ZPE Nodegrid Feature License Clustering - 1 YEAR - Subscription - 1 Node	Tier 1
NGM-FL-CLUS-GSUB-025	ZPE Nodegrid Feature License Clustering - 1 YEAR - Subscription - 25 Nodes	Tier 1
NGM-FL-CLUS-GSUB-050	ZPE Nodegrid Feature License Clustering - 1 YEAR - Subscription - 50 Nodes	Tier 1
NGM-FL-CLUS-GSUB-100	ZPE Nodegrid Feature License Clustering - 1 YEAR - Subscription - 100 Nodes	Tier 1

Cluster License - 2 Year - Subscription

SKU	Description	Tier
NGM-FL-CLUS-GSUB-2Y-001	ZPE Nodegrid Feature License Clustering - 2 YEAR - Subscription - 1 Node	Tier 1
NGM-FL-CLUS-GSUB-2Y-025	ZPE Nodegrid Feature License Clustering - 2 YEAR - Subscription - 25 Nodes	Tier 1
NGM-FL-CLUS-GSUB-2Y-050	ZPE Nodegrid Feature License Clustering - 2 YEAR - Subscription - 50 Nodes	Tier 1
NGM-FL-CLUS-GSUB-2Y-100	ZPE Nodegrid Feature License Clustering - 2 YEAR - Subscription - 100 Nodes	Tier 1

Cluster License - 3 Year - Subscription

SKU	Description	Tier
NGM-FL-CLUS-GSUB-3Y-001	ZPE Nodegrid Feature License Clustering - 3 YEAR - Subscription - 1 Node	Tier 1
NGM-FL-CLUS-GSUB-3Y-025	ZPE Nodegrid Feature License Clustering - 3 YEAR - Subscription - 25 Nodes	Tier 1
NGM-FL-CLUS-GSUB-3Y-050	ZPE Nodegrid Feature License Clustering - 3 YEAR - Subscription - 50 Nodes	Tier 1
NGM-FL-CLUS-GSUB-3Y-100	ZPE Nodegrid Feature License Clustering - 3 YEAR - Subscription - 100 Nodes	Tier 1

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Ordering Information

Nodegrid VSR License - 1 Year - Subscription

SKU	Description	Tier
ZPE-VSR-24-1Y	License Subscription - VSR - Virtual Services Router with 2 vCPU, 4GB memory - 1 YEAR	Tier 1
ZPE-VSR-48-1Y	License Subscription - VSR - Virtual Services Router with 4 vCPU, 8GB memory - 1 YEAR	Tier 2
ZPE-VSR-416-1Y	License Subscription - VSR - Virtual Services Router with 4 vCPU, 16GB memory - 1 YEAR	Tier 3
ZPE-VSR-832-1Y	License Subscription - VSR - Virtual Services Router with 8 vCPU, 32GB memory - 1 YEAR	Tier 4
ZPE-VSR-1664-1Y	License Subscription - VSR - Virtual Services Router with 16 vCPU, 64B memory - 1 YEAR	Tier 5

Nodegrid VSR License - 2 Year - Subscription

SKU	Description	Tier
ZPE-VSR-24-2Y	License Subscription - VSR - Virtual Services Router with 2 vCPU, 4GB memory - 2 YEARS	Tier 1
ZPE-VSR-48-2Y	License Subscription - VSR - Virtual Services Router with 4 vCPU, 8GB memory - 2 YEARS	Tier 2
ZPE-VSR-416-2Y	License Subscription - VSR - Virtual Services Router with 4 vCPU, 16GB memory - 2 YEARS	Tier 3
ZPE-VSR-832-2Y	License Subscription - VSR - Virtual Services Router with 8 vCPU, 32GB memory - 2 YEARS	Tier 4
ZPE-VSR-1664-2Y	License Subscription - VSR - Virtual Services Router with 16 vCPU, 64B memory - 2 YEARS	Tier 5

Nodegrid VSR License - 3 Year - Subscription

SKU	Description	Tier
ZPE-VSR-24-3Y	License Subscription - VSR - Virtual Services Router with 2 vCPU, 4GB memory - 3 YEARS	Tier 1
ZPE-VSR-48-3Y	License Subscription - VSR - Virtual Services Router with 4 vCPU, 8GB memory - 3 YEARS	Tier 2
ZPE-VSR-416-3Y	License Subscription - VSR - Virtual Services Router with 4 vCPU, 16GB memory - 3 YEARS	Tier 3
ZPE-VSR-832-3Y	License Subscription - VSR - Virtual Services Router with 8 vCPU, 32GB memory - 3 YEARS	Tier 4
ZPE-VSR-1664-3Y	License Subscription - VSR - Virtual Services Router with 16 vCPU, 64B memory - 3 YEARS	Tier 5

Nodegrid VSR License - 5 Year - Subscription

SKU	Description	Tier
ZPE-VSR-24-5Y	License Subscription - VSR - Virtual Services Router with 2 vCPU, 4GB memory - 5 YEARS	Tier 1
ZPE-VSR-48-5Y	License Subscription - VSR - Virtual Services Router with 4 vCPU, 8GB memory - 5 YEARS	Tier 2
ZPE-VSR-416-5Y	License Subscription - VSR - Virtual Services Router with 4 vCPU, 16GB memory - 5 YEARS	Tier 3
ZPE-VSR-832-5Y	License Subscription - VSR - Virtual Services Router with 8 vCPU, 32GB memory - 5 YEARS	Tier 4
ZPE-VSR-1664-5Y	License Subscription - VSR - Virtual Services Router with 16 vCPU, 64B memory - 5 YEARS	Tier 5

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