VyOS Networks

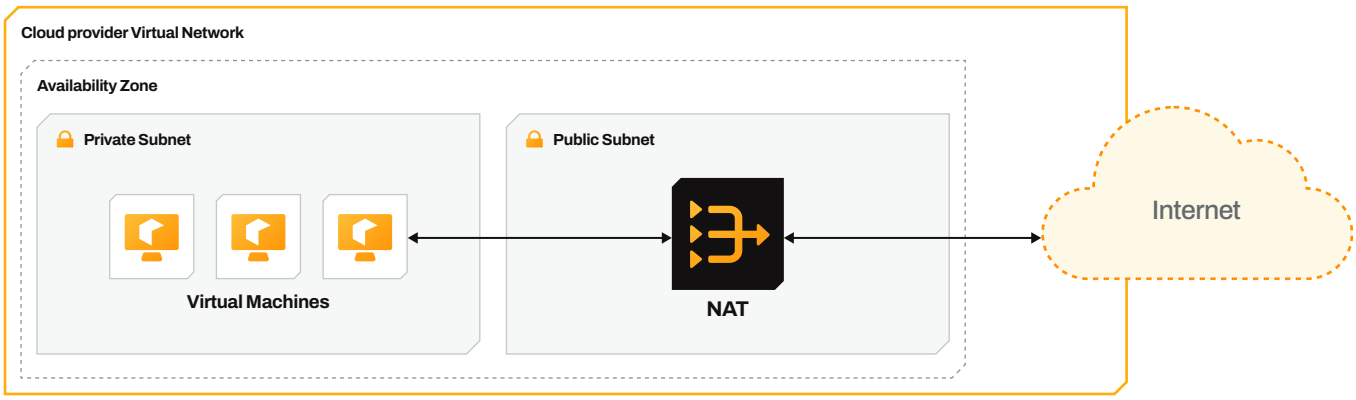
SOLUTION BRIEF

NAT GATEWAY AND NAT INSTANCE – ENABLING SECURE OUTBOUND CONNECTIVITY IN THE CLOUD

Overview

In modern cloud architectures, private workloads often require controlled outbound internet access, for software updates, API calls, or external communications, while remaining isolated from unsolicited inbound traffic. To meet this need, cloud providers offer two primary solutions: **NAT Gateways** and **NAT Instances**. Both enable **Network Address Translation (NAT)**, allowing private instances to initiate outbound traffic securely, but they differ significantly in **management model, scalability, flexibility, and cost-efficiency**.

Choosing the right approach depends on your **networking requirements, operational preferences, and security policies**.



NAT Gateway

A **NAT Gateway** is a fully managed, highly available cloud service that provides seamless outbound internet access for private subnets. Deployed in a public subnet, it routes traffic from private instances while blocking unsolicited inbound connections.

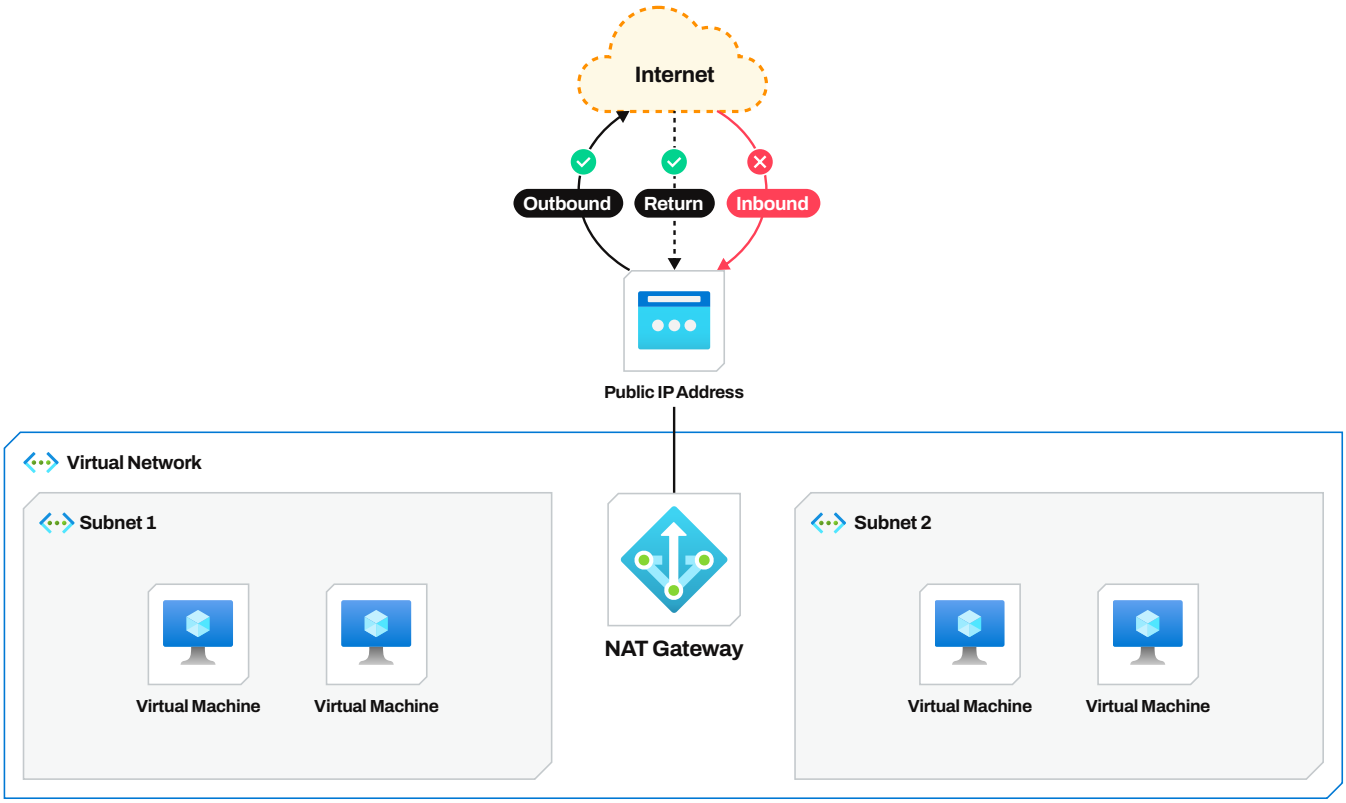
It's designed for **simplicity and scale**, eliminating the need for manual setup or maintenance.

Key Advantages:

- **Fully managed service:** No OS or software configuration required.
- **Automatic scaling:** Dynamically handles high volumes of traffic.
- **High availability:** Built-in redundancy across availability zones.
- **Native integration:** Works seamlessly with cloud monitoring, billing, and networking tools.

Use Case:

Ideal for **production environments** where operational simplicity, uptime, and scalability are critical, and where fine-grained packet control is not required.



NAT Instance

A **NAT Instance** is a user-managed virtual machine configured to perform NAT functions.

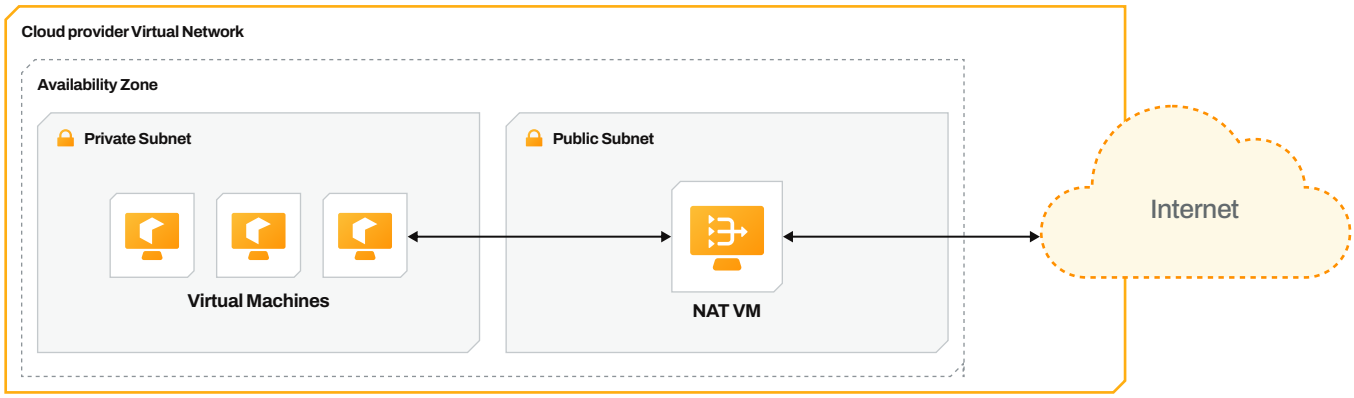
Unlike NAT Gateways, NAT Instances provide **complete control** over routing, firewall policies, and OS-level behavior, at the cost of manual management and scaling responsibility.

Key Advantages:

- **Full control:** Configure routing tables, firewall rules, and OS parameters.
- **Custom software support:** Run additional tools such as **deep packet inspection (DPI)**, monitoring agents, or logging systems.
- **Cost optimization:** Can be more economical for sustained or predictable high-traffic workloads.
- **Flexible resource selection:** Choose instance types, sizes, and capabilities that fit specific needs.

Use Case:

Best suited for **custom or security-sensitive environments** where advanced traffic policies, detailed visibility, or integration with network services is required.



VyOS as a NAT Instance

VyOS enhances the NAT Instance approach by combining **enterprise-grade routing and firewall capabilities** within an open-source, automation-friendly network operating system.

It provides a robust alternative to generic Linux-based NAT instances, with advanced configuration flexibility and consistent behavior across cloud and on-prem environments.

Key Advantages:

Enterprise-grade networking

Advanced NAT, firewall, QoS, and VPN in a single platform.

Configuration as code

All configurations are text-based and automatable via CLI, API, or Ansible — ideal for Infrastructure-as-Code pipelines.

Customizable and lightweight

Optimized cloud images with minimal overhead.

Persistent configuration

Settings survive reboots and are easily version-controlled.

Consistent user experience

Unified CLI and operational model across hybrid or multi-cloud deployments.

Active community and support

Backed by a vibrant open-source ecosystem and commercial support options.

Use Case:

Perfect for **cloud-native or hybrid deployments** requiring full control, automation, and integration into existing CI/CD or network-as-code workflows.

Conclusion

Both **NAT Gateways** and **NAT Instances** are essential tools for enabling secure outbound connectivity in private cloud networks.

Organizations prioritizing **simplicity and scalability** should choose a **NAT Gateway**, while those needing **control, customization, and deeper network visibility** will benefit from **NAT Instances**.

When powered by **VyOS**, NAT Instances evolve into a **flexible, automatable, and enterprise-grade solution**, bridging the gap between cloud-native automation and advanced network functionality.

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