Net Actuate
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Scaling Up Global Footprints:
A Guide for Start-Up Digital Infrastructure

All digital innovators with a global audience reach a stage of maturity when they begin taking a critical look at their infrastructure and network. Depending on business objectives and technical requirements, this will take various paths. In today's marketplace, AI-driven applications are opening up new possibilities and accelerating timeframes. Companies who optimize for performance and cost when scaling up will have a long-term competitive advantage.

— Mark Mahle, CEO, NetActuate

Introduction

In distributed environments—especially globally distributed environments—the network is an important part of the application. This means that network performance directly affects application performance in a much more complex way than just the round-trip latency between a server and an end-user. But most IaaS providers treat the network as an afterthought. They just focus on compute and storage, providing just enough networking to make the other components work.

If, for instance, a San Francisco-based start-up wants to scale up to serve Germany or Singapore while keeping the same level of performance, their options generally include the following:

◎ Commit to a Global Public Cloud

If you're an AWS shop, it's convenient to spin up another set of services in the geographies you need, and continue using your existing tooling and processes. But on the spectrum of infrastructure services, public cloud is one of the costlier options. These are most often treated pass-through costs, which will impact product pricing to the point where they're no longer competitive. Also, AWS global networking is okay performance-wise, but not great.

◎ Opt for More Cost-Effective Colocation Services

These give you bare bones space and power at a fraction of the cost, with some networking services such as direct internet access and cross-connects. It requires you to have the resources and skills to manage your infrastructure, but is a great option in terms of financials and flexibility.

◎ Refactor for the Edge

For technically flashy web services, using CDNs that offer edge compute can have great performance and security. However, a full as-a-service consumption means that you have to relinquish a lot of control over your infrastructure.

These three options lie at distant points on the spectrum of global IaaS architectures. Most growth startups should consider something in between, where they have the convenience and programmability of the public cloud, but the control, openness and lower costs of colocation.

NetActuate's Programmable Network

To offer the whole range of benefits—control, openness, programmability, and convenience—NetActuate has devised **Open Network Edge (ONE)**.

The Open Network Edge concept represents our globally distributed Infrastructure-as-a-Service solution built on top of open source tooling that offers networking, compute, and storage in a **declarative and composable manner**. Customers are free to choose their preferred infrastructure configurations, including:

- Standard commodity hardware, custom FPGAs, GPUs, SANs, network gear, and terrestrial systems. These are procured, configured and can be managed by NetActuate, or the customer, powered by NetActuate's Platform and API(s).
- Linux distros, including Debian, Ubuntu, CentOS, Fedora, and Gentoo and new declarative OSs like NixOS and Talos.
- BSD operating systems, including FreeBSD, OpenBSD, and NetBSD.
- Open source networking software, such as VyOS, or commercial solutions like Juniper VMX.
- Pre-packaged open source DevOps tooling such as Ansible and Terraform playbooks backed by a comp open SDK(s) and a REST API for integration.
- Powerful automated and programmable network scaling options (Anycast, ECMP load balancing), as well as security services (DDoS, Managed firewalls).

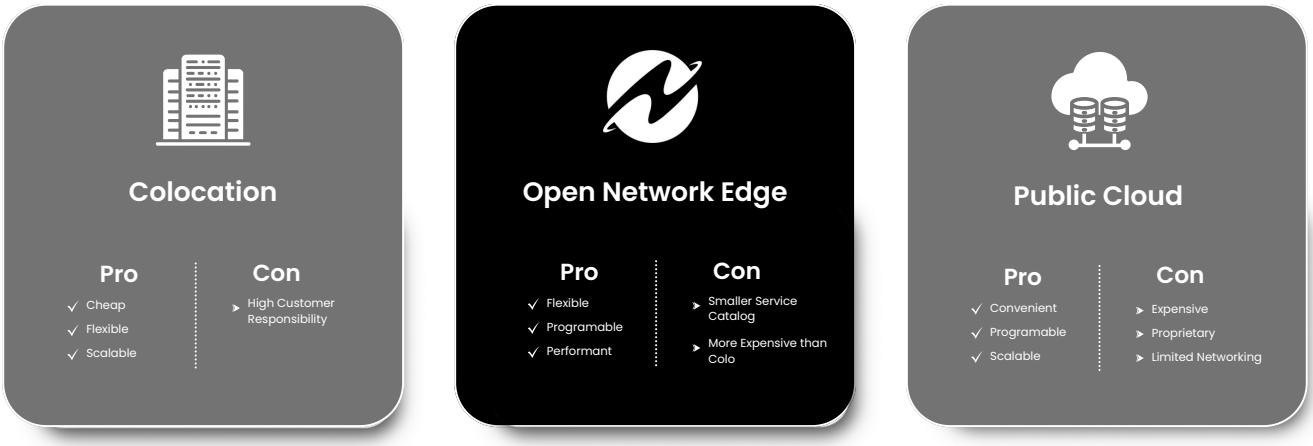
We've designed our Open Network Edge to work **alongside** your existing infrastructure, such that even those with a single-cloud strategy can cost-effectively improve their global presence and network performance with their favorite open source tools.

Open Network Edge makes the network a first class citizen in DevOps and Infrastructure as Code (IaC) pipelines alongside compute and storage.

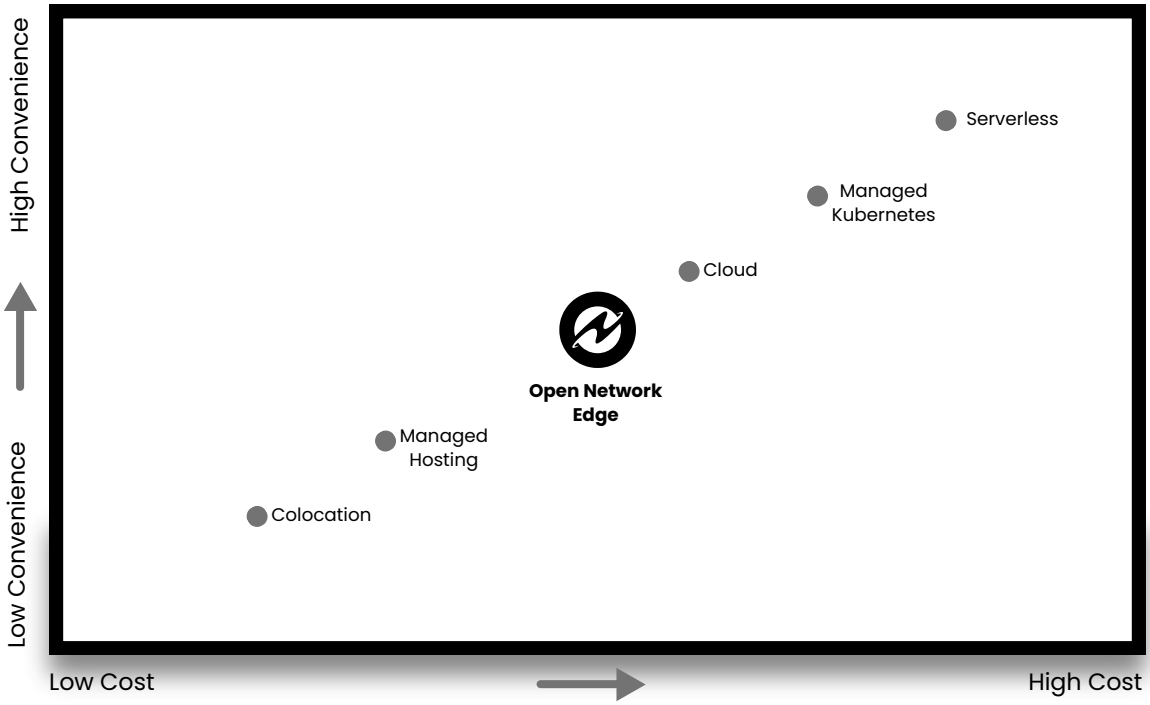
> Using declarative IaC and modern configuration management, ONE lets you manage and deploy the entire stack declaratively, from application, to backend, to global BGP Anycast and routing policies.

Most modern applications are distributed, which means that services work as individual components that call on each other across the network. User-exposed services have their front-ends and back-ends separated, with every request made to the back-end being sent via an API. Within a Kubernetes cluster, each service communicates further via APIs. Databases and storage services are hosted in the most resilient and perhaps cheapest environments, which may not be in the same location as the back-end of the application. In these common scenarios, having a high-performance Anycast-based network can considerably lower latency at each hop, therefore improving application performance.

Infrastructure Options for Global Expansion



Assuming your application only needs another instance deployed to run (i.e. no refactoring), let's compare these types of IaaS providers with respect to managing the networking aspect of a new geographical location.



Expanding Globally with Colocation

Colocation (colo) base offerings are straightforward—space, power, and cooling. Providers such as Deft and Digital Realty will sell rack spaces and provide a power outlet, where a customer can bring in their own hardware and plug them in.

With respect to networking, the colocation vendor will also often provide:

- "House" or "Blended" Internet Connectivity, known as direct internet access (DIA), which provides redundant connections to multiple ISPs, or optional 3rd party cross-connects to other carriers.

- For an additional cost, Direct Cloud Interconnects provide the physical connection infrastructure needed to connect directly to major cloud providers like AWS, Azure, and Google Cloud. While basic configuration may be included in the service, customers should note that complex routing decisions and architecture planning remain their responsibility.

This is as basic a setup as you are going to get without managing your own space and power requirements. It's great that you can do what you want, but you just have to build it from scratch and maintain it.

If you want to serve a geography with low latency from a colo environment, you must configure the following:

- Transit and Peering agreements with regional ISPs .

- BGP configuration and architecture, including the implementation of advanced BGP configurations like Anycast deployments.

- DNS architecture such as GeoDNS for geographic traffic management, and Global Server Load Balancing (GSLB).

If you are using virtualized or containerized environments, you also have to consider the associated networking components, such as KVM networking, or container networking interfaces and service meshes for Kubernetes deployments.

Expanding Globally with Public Cloud

Major cloud providers such as AWS and Azure have a global footprint of data centers, as well as CDN services and their own managed Wide Area network (WAN). This means that your incumbent cloud provider is very likely to meet your global expansion requirements. Couple the incumbency and wide talent pool advantages with the abstracted networking services and it's easy to understand the appeal.

Cloud offers all the networking services described above that are not available with the colocation providers. To use those, you need to speak the cloud provider's language, such as Azure Vnet and Virtual WAN compared to AWS VPC and Transit Gateway. For services such as managed Kubernetes—like EKS and AKS—the APIs are different to the vanilla Kubernetes ones and are heavily integrated with the rest of the provider's portfolio. This is also applicable to other managed services such as serverless functions or managed database services.

This means you are building your products with proprietary blocks, requiring a change in syntax and architecture to migrate or expand to a different IaaS.
Generous credits for VC and incubator startups make it easy to write a proof-of-concept. But these often expire by the time you gather the first few customers, meaning that fully-fledged prices with an architecture built with less regard for efficiency often become pass-through costs to the customer.

Expanding Globally with NetActuate's Open Network Edge

In a nutshell, cloud is expensive, colo is hard. The Open Network Edge doesn't sacrifice cost or ease-of-use. We achieve this via:

- Globally distributed points of presence that support managed hosting, virtualization, and containerization.
- A global Anycast network.
- Choice of open source tooling, including operating systems.
- Declarable and programmable CI/CD practices, which include tooling such as Ansible and Terraform.
- Infrastructure agnostic ethos with regard to underlying hardware and CPU architectures.
- A partnership approach for managing the infrastructure.

Compared to public cloud providers, which offer neatly packaged consumption mechanisms and highly integrated services, NetActuate only operates the underlying infrastructure and provides you with your choice of tooling. However, this gives us a cost advantage as we can add, remove, and right-size services leading to lower TCO.

The Open Network Edge is also geographically scalable over our 40 locations. Autoscaling groups in our VM compute platform handle both vertical scaling in one location and horizontal scalability across multiple PoPs and geographies that address performance issues associated with global services. By supporting a mixture of colocation, dedicated compute (bare metal or virtual machines, k8s), and managed services, NetActuate customers can build in as much scalability required for their applications.

Using technologies like NetActuate's BGP Anycast platform is the only true way to establish 100% availability, allowing for performance and high availability as well as implementing true multi-site and multi-region disaster recovery meeting the needs of the most stringent business continuity planning (BCP) requirements.

Our engineering and partnership-first approach lets us work with customers directly to build options into their existing stack and open source tools for management, performance, scalability, and security.

How ONE Actually Works for DevOps Teams

We provide tailored Ansible and Terraform playbooks to seamlessly manage and automate network infrastructure alongside their compute resources. These playbooks are based on open NetActuate SDK(s) available in every major language, which in turn are powered by the NetActuate REST API, allowing for unlimited flexibility for integrating with our stack.

NetActuate's Ansible playbooks configure networks with a declarative approach. These playbooks are used for provisioning VLANs, updating routing tables, configuring firewalls, and managing BGP sessions. For example, a typical use case involves dynamically adjusting BGP advertisements to optimize traffic flow during peak loads or under DDoS mitigation scenarios. With NetActuate's Ansible modules, these changes can be scripted and tested in a staging environment and rolled out as a "canary" release.

NetActuate extends Terraform's capabilities by offering custom providers and modules designed to interact with the global network infrastructure. These modules allow customers to define their network topology—spanning data centers, cloud providers, and edge locations—within Terraform configurations. For example, customers can provision virtual network circuits, allocate regional bandwidth, and establish interconnections between cloud providers directly through Terraform. Or, a script can provision additional PoPs to handle regional spikes.

NetActuate's Anycast network can be automated as part of DevOps pipelines. Anycast routing—where the same IP address is announced from multiple geographically distributed locations—can be configured and provisioned via tailored Ansible playbooks and Terraform modules that handle BGP sessions, manage traffic engineering policies, and adjust route advertisements dynamically.

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Get Started Today

Transform your network with NetActuate. Visit NetActuate.com or contact us now to explore how our Open Network Edge and Anycast solutions can empower your business.

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