



Use Cases

Edge for 5G and IOT

- > Declaratively manage small footprint **Provider Access Edge** computing stacks with a consistent, uniform user experience from the infrastructure up to the services
- > **Enable AI/ML** and low latency AR/VR capabilities at the Edge within a single policy framework
- > Deploy typical VNF applications like vEPC, vIMS, and vCPE for virtualization of Mobile, Residential, and Enterprise Service Provider infrastructure and services

Hybrid and Multi-Cloud

- > Secure and synchronize data with unified policy across clouds

Public and Private Cloud

- > Automate strong multi-tenancy and policy enforcement for NetOps and SecOps
- > Extend existing container orchestration platforms for secure multisite connectivity
- > Secure overlay networks, ingress load balancing and encryption for VMs and containers in sync with application platforms like Kubernetes
- > Secure overlay networks to any virtual, container or server-based workload orchestrated in sync with your IaaS and PaaS layer

Tungsten Fabric is an open source network and security orchestrator which provides secure connectivity for cloud native environments. Tungsten Fabric enables developers as well as network and security operations staff to deploy zero-trust micro-segmentation within a DevOps workflow to reduce the friction in application deployment. It ensures performance and security for deployments of tens of thousands of nodes at Tier 1 service providers, major research centers and enterprises with global operations; some of these use one or more public clouds, some use their own infrastructure, and some use all of these together.

With Tungsten Fabric, security and network engineers can build secure microservices that can be deployed to a variety of container orchestrator platforms, allowing them to work directly within the DevOps workflow. This ensures applications and infrastructure alike are secure against sophisticated attacks, while increasing development velocity and site reliability. Tungsten Fabric analytics provide flow-level visibility while port mirroring provides application-level visibility. Together these features enable network and security operations staff, streamlining troubleshooting and mean time to resolution (MTTR).

Tungsten Fabric integrates with the following infrastructure and container orchestration platforms:

Platform	Tungsten Fabric Support
Kubernetes	Native support via CNI
OpenStack	Native support via legacy Neutron plugin and new ML2 plugin
RedHat OpenShift	Native support via Kubernetes CNI
VMware vSphere	Supported but without internal authentication; recommended only for private cloud environments

Tungsten Fabric has the following connections with popular public cloud providers:

Cloud Provider	Tungsten Fabric
Amazon Web Services (AWS)	TF runs on top of AWS; native support of VPC as a dataplane exists in some commercial distributions
Google Cloud	TF runs on top of Google Cloud, but does not support VPC
Microsoft Azure	TF runs on top of Azure; native support of VPC as a dataplane exists in some commercial distributions

The Tungsten Fabric project is supported by 100 active developers from 31 companies, with commercial offerings from Juniper, CloudOps, Mirantis and others. The community is engaging with related projects such as Akraio (LF Edge), ONAP, Network Service Mesh (CNCF), and others to ensure its applicability to a variety of environments.

Get going with Tungsten Fabric and Kubernetes on AWS in less than 15 minutes with the Carbide Quick Start. Join our community to learn more, or download the software at tungsten.io/start/.

A Brief History of Tungsten Fabric

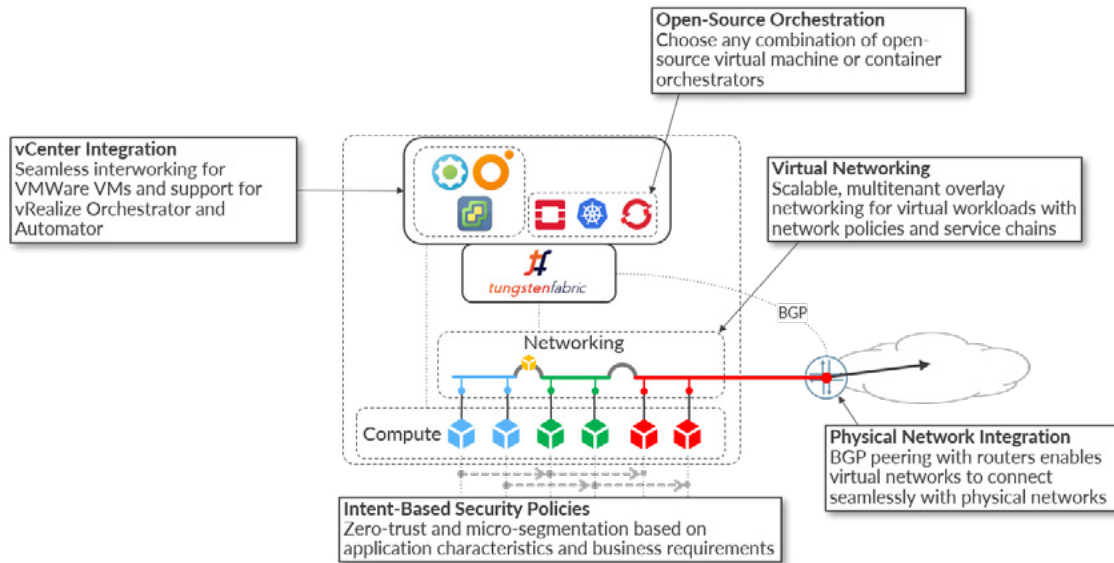
Tungsten Fabric has its roots in Contrail, a product acquired by Juniper Networks in 2012. Juniper open-sourced much of the technology as “OpenContrail” in 2012. In 2018, Juniper moved the project to the Linux Foundation to diversify the community of upstream developers and users, and the project was rebranded as Tungsten Fabric. Today, several community members offer Tungsten Fabric-based solutions, support, and extensions.

Get going in 15 minutes with Tungsten Fabric: tungsten.io/start

Deployment Architecture



Tungsten Fabric manages and implements physical and virtual networking and security for cloud environments. Since the same controller and forwarding components are used in every implementation, Tungsten Fabric provides a consistent interface for managing connectivity and policy in all the environments it supports, and is able to provide seamless and secure connectivity between workloads managed by different orchestrators, whether virtual machines or containers, and to destinations in external networks.



To learn more about how Tungsten Fabric brings together network services across a range of use cases, read the [Architecture Whitepaper](https://tungsten.io/platform/) available at <https://tungsten.io/platform/>.

Key Features

- > Permissive Apache 2.0 license
- > Overlay L3 routing and L2 bridging in multitenant environments (public, private, across WANs)
- > Secure multi-tenant domains via micro-segmentation
- > High availability: Active/active redundancy for all control and management components
- > REST APIs for configuration, operation, and analytics provide seamless integration with Kubernetes, OpenStack, OpenShift, and VMware vSphere as well as custom options
- > Web interface and dashboard: Visualize status and network state for efficient troubleshooting
- > OpenStack integration for VNF lifecycle management
- > Analytics and visualization: Analytics are designed for large-scale ingestion and querying of structured and unstructured data via Cassandra
- > Port mirroring: Application-level visibility for network/security operations and troubleshooting

Specifications

Minimum System Recommendations and Operating Environment

- > Hardware: 64-bit dual x86 processor, minimum memory 12 GB RAM
- > Storage: 30 GB Serial Advanced Technology Advancement (SATA), Serial Attached SCSI (SAS), or solid-state drive (SSD); Volume storage: 2 disks with 2 TB SATA
- > Network: 1 GB interface card (1)
- > OS: Linux OS (CentOS, RHEL, Ubuntu)

Minimum Recommendations for Kubernetes-Based Cloud Environments

Min reqs for a master node:

- > CentOS 7.4
- > Kernel: 3.10.0-862.14.4
- > CPU: 8 vCPU
- > RAM: 32GB
- > Root Drive: 60GB

For a worker node:

- > CentOS 7.4
- > Kernel: 3.10.0-862.14.4
- > CPU: 8 vCPU
- > RAM: 16GB
- > Root Drive: 40GB

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