

# Tungsten Fabric TAC Induction Proposal

This page is in draft and is not ready for TAC consumption.

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## Tungsten Fabric Project Data

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### Project Data

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This document describes Tungsten Fabric (TF), an open source software-defined networking (SDN) product. Tungsten Fabric has been continuously developed since 2012 and is deployed in production at some of the world's largest enterprises and carriers.

Originally called "OpenContrail", Tungsten Fabric was rebranded in March of 2018 as it transitioned into a fully-fledged Linux Foundation project. Now managed by the Linux Foundation, Tungsten is working diligently to expand and diversify its committer base and to finish its induction process into the Linux Foundation Networking (LFN) fund.

Tungsten Fabric's primary claim to fame is that it is diligently multi-cloud and multi-stack. Today it supports:

- \* Multiple compute types: baremetal, VMs and containers
- \* Multiple cloud stack types: VMware, OpenStack, Kubernetes (via CNI), OpenShift
- \* Multiple performance modes: kernel native, DPDK accelerated, and several different SmartNICs
- \* Multiple overlay models: MPLS tunnels or direct, non-overlay mode (no tunneling)

TF fits seamlessly into LF-N mission to foster open source innovation in the networking space.

You can find out more about Tungsten at our websites:

- \* Tungsten's new website: <https://tungsten.io>
- \* Tungsten's original OpenContrail website: <http://opencontrail.org>

### Project Vitals

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Basic information about the candidate project.

- \* Project name: Tungsten Fabric
- \* Project creation date: Initiated March 2012 and Open Sourced August 2013
- \* Project license: Apache 2.0
- \* Project release schedule: Two major releases per year, plus incremental patch releases

- \* History of at least two years or age of project:

OpenContrail 4.0  
OpenContrail 4.1  
OpenContrail 5.0  
TungstenFabric 5.0.1

Project Age is 6 years old

- \* Planned future release schedule:

TungstenFabric 5.1 - Q4 2018  
TungstenFabric 6.0 - Q2 2019

- \* Statement of alignment with LFN Charter/Mission:

Tungsten Fabric (TF) seeks to be one of many potential next generation open source software-defined networking solutions that can be used as part of a "stack". TF already plays nice with some LFN projects such as DPDK. It also works closely with related LF open networking projects such as Akraio Edge Stack, OPNFV, and ONAP. TF seeks to continue to increase coordination and interoperability with related open source networking projects over time.

### Community Historical Trends

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History of the candidate project's community.

For each release or year for at least the last two years or the lifespan of the project, provide the following.

\* Contribution statistics

- \* Number of commits: approx 32K commits
- \* Number of non-trivial (generated code, version bump, >5k LoC): 105
- \* Merged by uploader: 33
- \* Merged by committer from same organization as uploader: 60
- \* Merged without substantial code review: 83 (best guess)
- \* The work that was done for this is here:

\* <https://tinyurl.com/tf-commits-5k-loc>

\* If the candidate project has sub-projects, group these by sub-project  
Sub-projects have been designated for purposes of LFN admission, but frankly it wasn't considered important to divide into sub-projects prior to the effort to enter the Linux Foundation.

\* Number of commits per-organization

Project does not track organization affiliation per commit, significant number of commits are from generic domain accounts. For the last two years we had commits from 31 different unique domains:

[akhilf-mba.jnpr.net](#) 2  
[aricent.com](#) 2  
[att.com](#) 18  
[cloudvps.com](#) 9  
[cloudwatt.com](#) 64  
[codilime.com](#) 192  
[d4devops.org](#) 176  
[dmitra.com](#) 2  
[ebay.com](#) 2  
[enovance.com](#) 1  
[gmail.com](#) 656  
[hotmail.com](#) 62  
[icloud.com](#) 6  
[intel.com](#) 4  
[juniper.net](#) 17382  
[lenovo.com](#) 8  
[mail.ru](#) 3  
[millnert.se](#) 11  
[mirantis.com](#) 34  
[netronome.com](#) 14  
[nexius.com](#) 3  
[orange.com](#) 2  
[pytloun.cz](#) 3  
[redhat.com](#) 2  
[semihalf.com](#) 71  
[erro.com](#) 2  
[sproute.com](#) 3  
[symantec.com](#) 28  
[syntaxhighlighted.com](#) 15  
[techtrueup.com](#) 3  
[workday.com](#) 4  
[yandex.ru](#) 1

\* Contributor statistics

- \* Number of contributors: 248
- \* Number of contributors per-organization:

Still working to determine this number. [vmb]

Community Current Status

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Snapshot of the candidate project's community.

\* Committer statistics

- \* Number of committers: 139
- \* Number of committers per-organization:

Juniper - 99  
Codilime - 21  
Progmatic - 3  
AT&T - 2  
Cloudops - 1  
SDNEssentials - 1  
RedHat - 1  
Generic domain - 12

\* Number of active committers:

Currently the project does not track commiter activity however  
approx 100 committers are active

\* Number of active committers per-organization:

Juniper - 178  
Unknown - 19  
Aricent - 1  
AT&T - 3  
CloudVPS - 1  
CloudWatt - 4  
Codilime - 23  
Intel - 2  
IPnett AB - 1  
Lenovo - 2  
Mellanox - 1  
Mirantis - 4  
Netronome - 1  
NTT (i3) - 1  
Red Hat - 8  
Reliance Jio - 1  
Ril - 1  
SemiHalf - 6  
Serro - 1  
Sproute - 1  
SUSE - 1  
Symantec - 2  
Syseleven - 2  
TechTrueUp - 1  
Ukraine Consulting Shop - 1  
Workday - 1

\* Contributor approval process

\* Contributor eligibility: Signed ICLA or CCLA to contribute to the project.

\* Process to become a contributor:

Submit a signed ICLA or have CCLA admin add.

\* Process to remove a contributor:

No process exists to remove a contributor.

\* Committer approval process

Governance details are available at:

<https://wiki.tungsten.io/display/TUN/Governance>

\* Committer eligibility: active technical contributor to a project.

\* Process to become a committer: vote by existing committers or TSC designation.

\* Process to remove a committer: vote by existing committer or TSC decision.

Project governance structure

\* Summary of project governance structure:

- Technical Steering Committee (TSC): Provide overall project governance.
- Technical Committee (TC): Standing sub-committee of the TSC. Responsible for technical aspects of the project, including identifying and approving project use cases and technical definition of product features such as hardware support, creating technical processes for developers and projects, setting release and quality criteria, defining release cycle and other technical matters.
- Architecture Review Board (ARB): Standing sub-committee of the TSC. Formed of project architects and responsible to ensure the project conforms to a coherent architecture and maintains its stability, scalability, and performance. Defines project architecture and reviews all specs and code (as needed) to ensure compliance to project goals and architecture. In 2019 the TSC will reconsider the ARB as currently defined and potentially make several changes around term limits, corporate diversity, and selection criteria, but not around ARB responsibilities.
- Community Committee (CC): Standing sub-committee of the TSC. Responsible for non-technical aspects of the project, including initiating budget proposals, controlling any budget delegated by LFN directly to the project, drafting community policy and other governance materials, marketing and other outreach activities, and other non-technical matters.

\* Summary of how project governance was established and can be modified

Project governance was drafted by the TSC and established by community vote. Project governance can be modified by a super majority TSC vote.

\* Links to all public project governance documentation

<https://github.com/tungstenfabric/docs/tree/master/Governance>

Information below is fully contained in  
<https://wiki.tungsten.io/display/TUN/Governance>

\* List of all community roles and details of how they are filled/emptied

Technical contributor, community contributor, committer, PTL, ARB member, committee member.

Specific role designation is listed in governance document above.

\* List of community roles that are elected

Committer, PTL, committee member, committee chair.

\* List of community roles that are appointed

Active community contributor is selected by majority TSC vote. Active technical contributor can be designated by majority TSC vote. But no roles in the project are strictly appointed.

\* Original ARB founding required some creativity due to the shortage of non-Juniper contributors. After a community discussion (face to face plus teleconference bridge) we agreed that Juniper should have a majority initially while we sought new technical contributors. As a result, we decided that Juniper would appoint 5 and the community would vote for 2. Joseph Gasparakis and Paul Carver were elected by the community via mailing list vote.

Official ARB elections begin in 2019 and should eventually result in a wider diversity of representation. According to the current governance, to ensure architectural consistency, no more than 60% of the ARB may come up for election at any one time. The 2019 TF TSC will be reconsidering the ARB as currently defined and potentially making several changes around term limits, corporate diversity, and selection criteria.

\* List of people in all community roles and their organization affiliation

- TSC is defined (in governance document) as TC CC plus one representative of ARB (currently Michael Henkel)
- Technical Committee:  
[https://github.com/tungstenfabric/docs/blob/master/Governance/TechnicalCommittee/TC\\_Members](https://github.com/tungstenfabric/docs/blob/master/Governance/TechnicalCommittee/TC_Members)
- Community Committee:  
[https://github.com/tungstenfabric/docs/blob/master/Governance/CommunityCommittee/CC\\_Members](https://github.com/tungstenfabric/docs/blob/master/Governance/CommunityCommittee/CC_Members)
- Architecture Review Board:  
[https://github.com/tungstenfabric/docs/blob/master/Governance/ArchitectureReviewBoard/ARB\\_Members](https://github.com/tungstenfabric/docs/blob/master/Governance/ArchitectureReviewBoard/ARB_Members)
- TSC list: Joseph Gasparakis (Intel), Paul Carver (AT&T), Valentine Sinitsyn (Yandex), Vacant (Vacant), Sukhdev Kapur (Juniper)
- CC list: Liza Fung (AT&T), Vacant (Vacant), Ian Rae (Cloud Ops), Jim St. Leger (Intel), Doug Marschke (SDN Essentials)
- PTLs: Sukhdev Kapur (Juniper), Paul Carver (AT&T), Edward Ting (Lenovo)
- ARB: Joseph Gasparakis (Intel), Paul Carver (AT&T), Sukhdev Kapur (Juniper), Anantharamu Suryanarayana (Juniper), Nachi Ueno (Juniper), Sachidanand Vaidya (Juniper), Michael Henkel (Juniper)

\* User community

\* Summary of project user community

Current user community consists of a significant number of companies. Active project contributors are Juniper, Codilime, Pragmatic, Intel, Lenovo, Mellanox, Netronome, Yandex, SDNessentials, CloudOps.

## Project Functionality

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Details about the functionality of the candidate project.

\* Summary of candidate project functionality

Tungsten Fabric is an SDN and Security Fabric, its focus is stability (production), scalability (1K nodes, up to 8K can be supported), performance (sufficient for high performance VNFs at 10 gigabit using software only, hardware accelerated to 40 gigabit/s). It supports key telco and enterprise features including multi-pop, routing, VNF injection, Service Chaining, LoadBalancing, Router and Switch integration, Intent based Security Policy enforcement to L4 extensible to L7 with VNFs. Project goals enforce a uniform architecture and prioritize production ready code over features.

\* Summary of candidate project technology components and purposes

- Tungsten Fabric is normally an overlay SDN and Security fabric with native BGP speaker. It supports multi-site deployments and can integrate into Containers via CNI (Kube, Mesos, etc) and OpenStack via Neutron plugin or ML2 driver.
- Configuration Node  $\tilde{\mathcal{C}}^{\mathcal{A}}$  manages system configuration DB and provides a UI.
- Analytics Node  $\tilde{\mathcal{C}}^{\mathcal{A}}$  collects system wide stats and provides both raw and derived statistics.
- Control Plane is responsible for managing the dynamic cluster state and external peering.
- Vrouter and Vrouter Agent  $\tilde{\mathcal{C}}^{\mathcal{A}}$  On Each Server there is a Vrouter Agent talking to control plane and programming local forwarding plane. Vrouter serves as the local forward plane, interfaces to Containers or KVM, segregates the network between tenants and provides for security policy enforcement, supported modes of operation is kernel, DPDK accelerated, SR-IOV, SmartNic forwarding integration Netronome, Mellanox (in prog), Cavium (in prog).
- Hardware interface is to Gateway Router for EVPN termination, VXLAN tunnels to OVSDB compliant switches are also supported. Software operates in overlay mode default MPLS over UDP, but is capable of VXLAN or non-overlay operation.

\* Summary of where candidate project complements functionality already provided by project(s) within LFN

TF interoperates with a wide variety of opensource projects such as DPDK, FIDO, OpenStack, Kubernetes and others. In the LFN specific ecosystem TF is complementary to ONAP and OPNFV as alternative SDN provider and has a FIDO port in progress driven by community members.

\* Summary of where candidate project overlaps functionality already provided by project(s) within LFN

TF overlap with ODL on some of the usecase it addresses, however there is a significant divergence and the projects interoperate in the number of customers where TF is used as DC overlay SDN and ODL is used to manage the hardware or WAN elements.

## Project Tooling

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Details about the tooling used by the candidate project.

\* Bug tracker

\* Links to bug trackers used by the candidate project.

<https://bugs.launchpad.net/opencontrail>

<https://bugs.launchpad.net/juniperopenstack/>

<https://jira.tungsten.io/secure/Dashboard.jspa> (pending LFN IT support)

\* Integrated with any other relevant projects?

Currently no, this may change as we migrate to Jira.

\* To what extent are external/private bug trackers used?

Downstream distros use private bug trackers, upstream blueprints and bugs are on the open system.

\* Chat tooling

\* Links to chat tooling used by the project.

Slack: [tungstenfabric.slack.com](https://tungstenfabric.slack.com).

\* Overview of chat tooling used by the candidate project.

Slack is used for all chats.

\* To what extent is external/private chat tooling used?

The community uses an open slack community.

In addition downstream distro providers have private slack communities.

\* Code repositories

\* Links to code repositories used by the candidate project.

Currently code repositories are mirrored from Gerrit at <https://review.opencontrail.org/> to the Juniper namespace at GitHub:

<https://github.com/Juniper/contrail->

Pending an availability of LFN IT support, a migration of Gerrit to

<http://gerrit.tungsten.io/> is planned. After that migration, code

repositories will be mirrored to <https://github.com/tungstenfabric>

A few repositories already exist at the TF GitHub and will be migrated to Gerrit pending LFN IT support availability

\* Overview of code repositories used by the candidate project.

A large number of repositories exist the important repositories are:

- contrail-controller: all TF controller code
- contrail-vrouter: dataplane
- contrail-sandesh: analytics IDL
- contrail-analytics: analytics
- contrail-third-party: all external dependencies
- contrail-common: all common code

In the development of the plan to transition to LF we are looking at ways to cleanup, rename, and simplify a number of these repositories. The plan is being developed between Juniper and Linux Foundation IT staff. Once we have something more complete we can update this document.

\* To what extent are external/private code repositories used?

All repos are hosted on GitHub.

\* Code review

\* Links to code review systems used by the candidate project.

The Gerrit server is located on <https://review.opencontrail.org/>.  
The new gerrit server at <http://gerrit.tungsten.io/> is currently empty due to temporary lack of LFN IT support to complete migration

\* Overview of code review norms, practices, conventions, rules.

TF copied OpenStack conventions, all code is subject to code review, any contributor can submit the code once CLA is registered.  
Only committers can commit the code to the repo.

\* To what extent are external/private code review systems used?

TF community uses a publicly facing review system for all commits, current system is hosted by Juniper, however transition to LF infrastructure is in progress.

\* Continuous Integration tooling

\* Links to CI jobs.

TF uses Gerrit and Zuul for its CI. Codilime team has built a preliminary UI for Zuul, UI url is contained here <http://logs.opencontrail.org:8000/>

\* Links to CI job definitions, infrastructure configuration.

<https://github.com/Juniper/contrail-zuul-jobs>  
<https://github.com/Juniper/contrail-project-config>

CI source can be found in <https://github.com/Juniper/contrail-infra>

\* Overview of CI related to the candidate project.

TF team copied the OpenStack CI infrastructure and uses Zuul V.3 for its CI engine.

\* To what extent are external/private CI systems used?

Current community CI instance is hosted on Juniper Lab openstack cloud, this is in the process of being migrated to LF OpenStack cloud.

\* Documentation

\* Links to documentation for the candidate project.

- <https://github.com/tungstenfabric/docs>

- Summary deck [https://drive.google.com/open?id=10ZPdjk\\_kWbydKqfwKcWB2JSL2BHIUcJ](https://drive.google.com/open?id=10ZPdjk_kWbydKqfwKcWB2JSL2BHIUcJ)

- Architecture Doc <http://www.opencontrail.org/opencontrail-architecture-documentation/>

- Tech video from last tech summit  
[https://drive.google.com/open?id=1p9krEw-qm1YpzceArRbD-pR\\_xgJFsExp](https://drive.google.com/open?id=1p9krEw-qm1YpzceArRbD-pR_xgJFsExp)

\* Mailing lists

\* Links to mailing lists used by the project and their archives.

<https://lists.tungsten.io/>

\* Overview of mailing lists used by the candidate project.

Main lists are dev and announce. But a number of specialized lists exist.

\* To what extent are external/private mailing lists used?

LF foundation listserver is used. All lists are public.

\* Meeting calendars

\* Link to docs about meetings related to the candidate project.

<https://github.com/tungstenfabric/docs/blob/master/README.md>

\* Overview of meetings held by the candidate project.

Main meetings are TC committee, Community Committee, Infra, Marketing, Docs, SmartNICs.

\* To what extent are meetings public, and clearly publicly documented?

All meetings are public, meetings are listed on community calendar

<https://tungsten.io/community>.

\* Meeting minutes

\* Link to archives for meeting minutes taken by the candidate project.

Meeting minutes are in the individual meeting invites.

Older meeting minutes are in Google Docs, newer meeting minutes are on the Tungsten Fabric wiki. The wiki contains links to the older Google Docs. The meetings are listed on the front page of <https://wiki.tungsten.io> and those links provide access to both meeting logistics and minutes.

\* To what extent are public minutes for meetings taken and shared?

TC and Infra meetings maintain minutes, CC have notes and also are recorded.

## Integrations

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Details about technical integrations implemented by the candidate project.

\* Summarize any existing or planned integrations with other projects.

Integrated with DPDK, OpenStack, and Kubernetes. Future integration planned for [FD.io](https://fd.io).

\* Summarize any CI/CD integrations with other projects.

networking-opencontrail projects is currently running and passing Neutron's Tempest tests.

\* Summarize any other work that may enable integrations in the future.

3rd party CI integration is supported via Zuul and gerrit hooks

\* Continuous Delivery pipelines

No separate CD pipeline exists. The build products are Docker images, generated by the same system that performs the CI testing.

The current Zuul configuration is in a public Git repo and contains primarily Ansible playbooks. These playbooks "deliver" the Docker images to Docker Hub.

TF is in the process of moving its CI/CD from Juniper to LF. As this will involve transitioning away from Zuul (which LF cannot support) to another system, this will render any reply to this section immediately out-of-date. Therefore TF defers further answers to this question until such a time as CI/CD is settled in its new LF home (hopefully early 2019).

\* Configuration management tooling

Assuming that configuration management means deployment automation:

<https://github.com/Juniper/contrail-ansible-deployer>

<https://github.com/Juniper/contrail-helm-deployer>

\* Documentation about cross-project integration



Upstream docs are under development, meanwhile downstream docs  
<https://github.com/Juniper/contrail-docs/tree/master/doc> can be used.

\* APIs for cross-project integration

Neutron API, CNI API.

## Vocabulary Reference

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Explanations of domain-specific vocabulary.

.. todo:: Look into using special rst to make these definitions into tooltips  
.. todo:: Consider extracting this to a stand-alone file so can reuse elsewhere

### \* Active

\* In this context, typically related to the activity level of a project or person.

\* As a person: "Foo Committer on Bar Project has not sent any patches or done any code review for Bar in the last 12 months. Bar's Project Lead reached out to Foo Committer to discuss transitioning to an Emeritus Committer."

\* As a project: "Bar Project has not had any non-trivial code changes merged in the last 12 months. The LFN TAC reached out to Bar Project to discuss transitioning to the LFN Archived lifecycle state."

\* The LFN norm for "active" is about 12 months.

### \* Committer

\* Person with permission to cause commits to be merged into a project's source control repositories.

### \* Contributor

\* Person who has contributed to a project. "Contributions" are broadly defined. Examples include things like code, documentation, and bug tracker changes.

### \* Diverse

\* In this context, typically related to the number of different organizations involved in a project.

### \* Downstream

\* In this context, typically means the products based on a project. Community collaborates on upstream project, which is downstreamed by a company into a product.

\* Alternatively, could relate to a relationship between two "upstream" open source projects (not by-company products) where one consumes (is downstream of) the other.

\* As a verb: "to copy something from the open source project to a product based on it".

\* As a dependency relationship: "Linux is a downstream of C".

### \* Upstream

\* In this context, typically means the main open source project a community collaborates on. The code, tooling and people that comprise a project.

\* As a verb: "to add something to the main open source project".

\* As a dependency relationship: "C is an upstream of Linux".