

Cilium project

Latest Buzz & Outlook



Thomas Graf
Isovalent

Purvi Desai
Google

Chandan Aggarwal
Microsoft

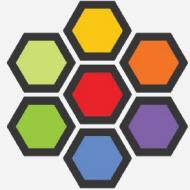
Richi Hartmann
Grafana Labs

Liz Rice
Isovalent

Bill Mulligan
Isovalent

Welcome to Cilium

Liz Rice, Isovalent



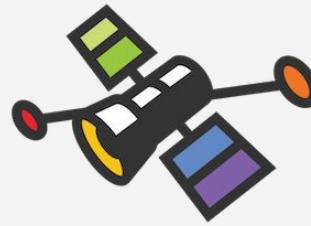
Cilium CNI

Scalable, Secure,
High Performance
CNI Plugin



Cilium Service Mesh

Sidecar-free Mesh &
Ingress



Hubble

Network
Observability



Tetragon

Security Observability &
Runtime Enforcement





Cilium CNI Overview

Efficient and Scalable Kubernetes CNI

- IPv4, IPv6, NAT46/64, SRv6, ...
- Overlays, BGP, Cloud Provider SDNs

High-performance Load Balancing

- Kubernetes Services
- North-South Load Balancer
- Kubernetes Ingress

Network Policies & Encryption

- Kubernetes Network Policy
- Cilium Network Policy (FQDN, L7, ...)
- Transparent Encryption
- Bandwidth Manager

Multi-Cluster & External Workloads

- Global Services, Service Discovery, Network Policy
- Integration of Metal & VMs
- Egress Gateway



Cilium Service Mesh

Option 1:

Sidecar-free



Option 2:

Istio Integration running with sidecars



Control plane of your choice



Ingress /
Services



Gateway
API



SPIFFE



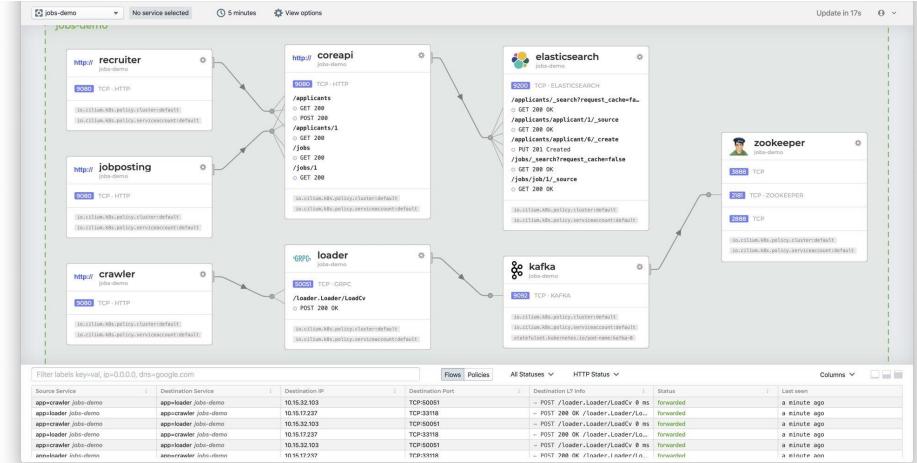
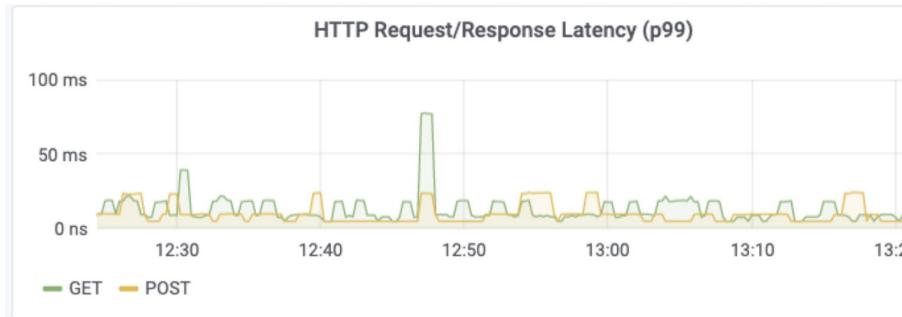
Istio

Observability Integrations





Hubble Observability



Metrics, Logs, & Service Map

- L3/L4
 - L7 (HTTP, DNS, Kafka, ...)
 - Network Policy
 - ...



The fluentd logo consists of a stylized blue bird icon above the word "fluentd" in a lowercase, sans-serif font.



 Grafana

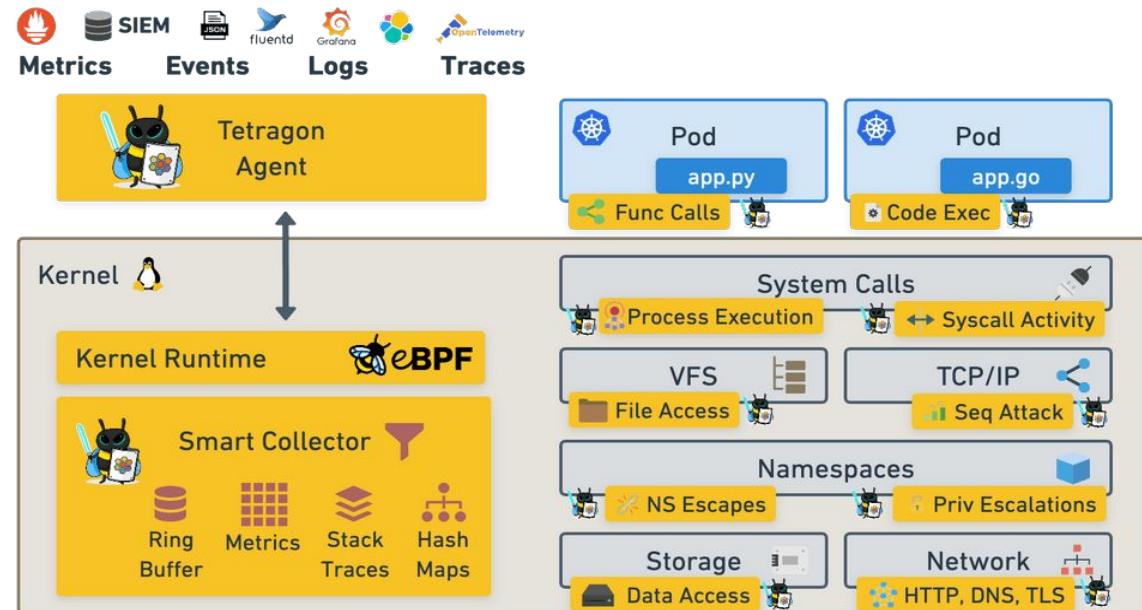


The OpenTelemetry logo consists of a stylized orange and blue icon followed by the text "OpenTelemetry" in a sans-serif font.



Tetragon

Security Observability &
Runtime Enforcement





eBPF-based:

- Networking
- Security
- Observability
- Service Mesh & Ingress

Foundation

CLOUD NATIVE COMPUTING FOUNDATION

Technology

eBPF envoy



What Makes a Good Multi-tenant Kubernetes Solution

[VIDEO 1](#) • [VIDEO 2](#)



Building High-Performance Cloud Native Pod Networks

[READ BLOG](#)



AWS picks Cilium for Networking & Security on EKS Anywhere

[READ BLOG](#)



Bell uses Cilium and eBPF for telco networking

[VIDEO 1](#) • [VIDEO 2](#)



Building a Secure and Maintainable PaaS

[WATCH VIDEO](#)



Cloud Native Networking with eBPF

[WATCH VIDEO](#)



Datadog is using Cilium in AWS (self-hosted k8s)

[WATCH VIDEO](#)



Managed Kubernetes: 1.5 Years of Cilium Usage at DigitalOcean

[WATCH VIDEO](#)



Scaling a Multi-Tenant Kubernetes Clusters in a Telco

[WATCH VIDEO](#)



Meltwater is using Cilium in AWS on self-hosted multi-tenant k8s clusters as the CNI plugin

[WATCH VIDEO](#)



Mobilabs uses Cilium as the CNI plugin on EKS for their internal cloud

[READ BLOG](#)



Nexxiot using Cilium as the CNI plugin on EKS for its IoT SaaS

[READ USER STORY](#)



PostFinance is using Cilium as their CNI for all mission critical, on premise k8s clusters

[CASE STUDY](#) • [VIDEO](#)



eBPF & Cilium at Sky

[WATCH VIDEO](#)



Skybet uses Cilium as their CNI

[READ BLOG](#)



Trip.com uses Cilium both on premise and in AWS

[BLOG 1](#) • [BLOG 2](#)



eBPF-based:

- Networking
- Security
- Observability
- Service Mesh & Ingress

Foundation

CLOUD NATIVE
COMPUTING FOUNDATION

Technology

eBPF envoy

Deploy on your preferred cloud



Sovereign
Cloud Stack

Tencent Cloud

openstack

CIVO

nine
cloud navigators

EQUINIX | METAL™

Alibaba Cloud

Scaleway

Google Cloud

DigitalOcean

DaoCloud

Azure

EXOSCALE

APPUIO
SWISS CONTAINER PLATFORM

HETZNER

Use your favorite Kubernetes distribution

Azure
Kubernetes Service

OPENSHIFT

Amazon EKS

RKE 2

Google
Kubernetes Engine

Gardener

kind

CRANE

kops

KUBEKEY

k8e

kubeadm

KUBERMATIC
KubeOne

KUBESPRAY

FLANT
Deckhouse
Kubernetes Platform

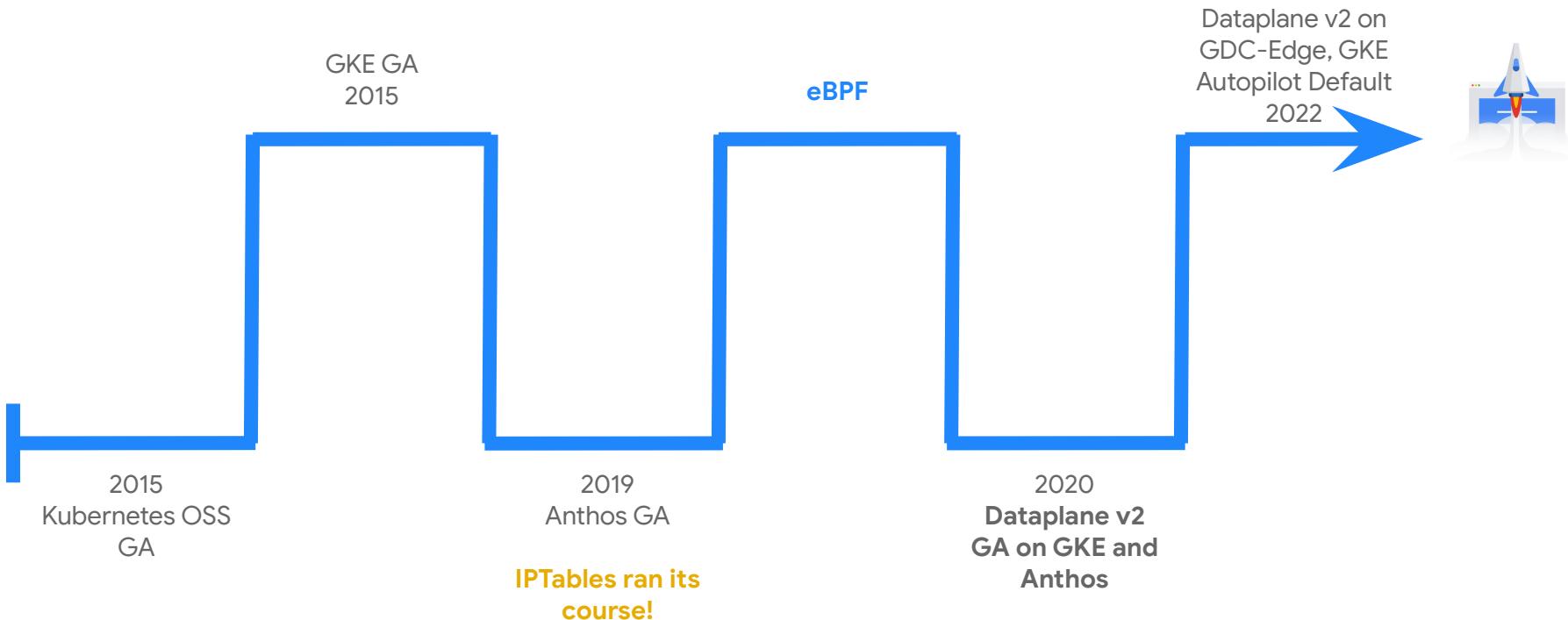
GKE Dataplane v2 and Cilium Update

Purvi Desai, Google
[@purvid](https://twitter.com/purvid)

Dataplane v2 and Cilium at Google : Agenda

1. Current State and Recap
2. Community Updates - Modularization
3. Community Updates - Kubernetes Conformance
4. Community Updates - Multi-Network

Quick Recap of GKE towards eBPF and Cilium



Benefits of Dataplane V2

Kubernetes Conformance	Consistent Experience	Customization	Upstream Contributions	Ease
<ul style="list-style-type: none">• Kubernetes Compliant• Opinionated and Managed Dataplane• Harnesses benefits of eBPF and Cilium	<ul style="list-style-type: none">• Consistent experience for GKE, Anthos, GDC• Deep integration with GCP for GKE• Flexibility on Anthos and GDC	<ul style="list-style-type: none">• Network Policy• Logs• Anthos Network Gateway• Flat IP• BGP-based LB	<ul style="list-style-type: none">• Egress NAT Gateway• Local Redirect Policy• Cilium Scalability and IPv6 Improvements• SCTP Support	<ul style="list-style-type: none">• No need to upgrade kernel• No need to update sidecars

Quick Recap of the Voice of Customers and Learnings

Love

Opinionated
and Managed
Service



Want

Freedom and
Ability to pick
from best of
both worlds



Power of 'AND'

Vibrant and open
ecosystem



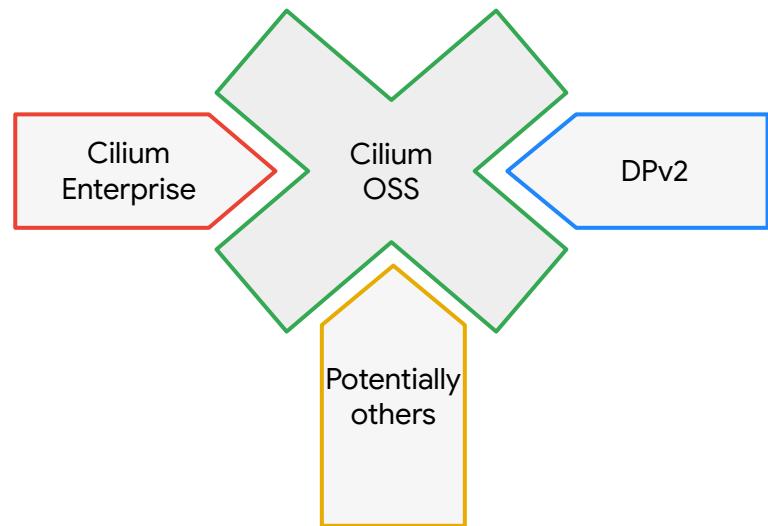
Modularization Community Update

Commitment to open source

- SCTP support upstreamed
- Cilium Endpoint Slices and Scalability

Modularity and Pluggability State

- Requirements RFC sent out



Our Northstar - **GKE/Anthos as vibrant and open ecosystem** of innovative networking
features

Kubernetes Conformance Community Update

Completed

- Network Policy - IPv6 Support Improvement
- Improved Istio support for wider range of kernels

In the Works

- Network Policy Port Range Support
- Host Port and Host IP Conformance

Our Northstar - **Tight Loop coordination between Cilium and Kubernetes** ensuring predictability for our users

Multi-Network Community Update

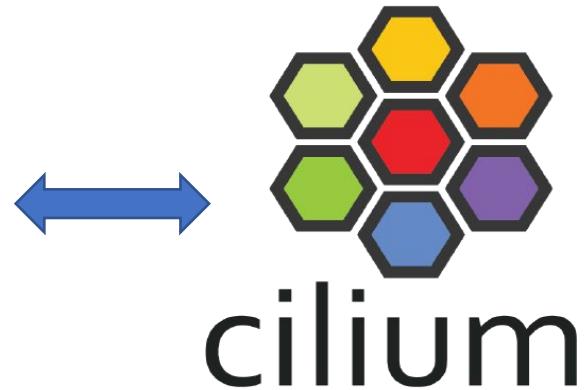
Approach	Benefits	Current State
Upstream Kubernetes-native Multi-Network approach through standardization	True cloud agnostic approach - aligned with enterprise Kubernetes adoption	SIG has narrowed down initial set of use case and requirement in NA contributor community meeting
Native Services for load balancing Network Policy support for security	Consistency of network services across interfaces (auto-scaling, policies, scheduling, IPAM, etc.)	Working group setup in CNCF SIG Networking. Kubernetes slack #sig-network-multi-network Cilium community weekly Meetings to co-design with Cilium Maintainers for implementation of this <u>Kubernetes KEP.</u>

Azure Cilium Integration

Chandan Aggarwal, Microsoft

Announcing : Azure CNI powered by Cilium

Public preview

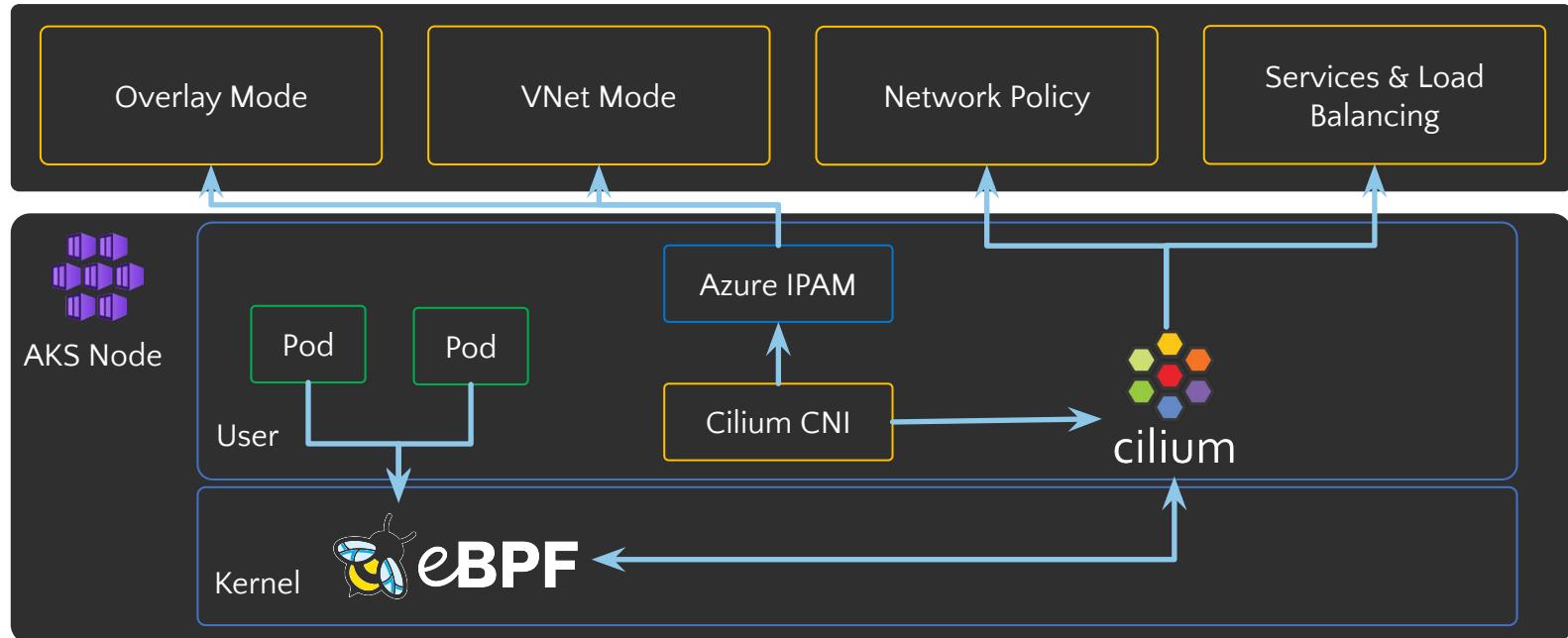


Native Integration
with Azure

 eBPF
Dataplane

Elastic
Scale

Architecture



Azure CNI powered by Cilium in AKS

PUT Managed Cluster REST API

```
"properties": {  
    "networkProfile": {  
        "networkPlugin":  
"azure",  
        "ebpfDataplane":  
"cilium"  
    }  
}
```

AZ CLI

```
az aks create  
--network-plugin=azure  
--enable-cilium-dataplane
```

NAMESPACE	NAME	READY	STATUS
kube-system	azure-cns-4lx62	1/1	Running
kube-system	azure-cns-fgb7h	1/1	Running
kube-system	azure-cns-xnqnj	1/1	Running
kube-system	cilium-h5l72	1/1	Running
kube-system	cilium-jtqln	1/1	Running
kube-system	cilium-kxj8b	1/1	Running
kube-system	cilium-operator-c69fd4946-5cc	1/1	Running
kube-system	cilium-operator-c69fd4946-5cc	1/1	Running
kube-system	cloud-node-manager-j46tl	1/1	Running
kube-system	cloud-node-manager-trxgl	1/1	Running
kube-system	cloud-node-manager-vc58j	1/1	Running
kube-system	coredns-autoscaler-8566b76d4d-p2qs5	1/1	Running
kube-system	coredns-b4854dd98-4w2mz	1/1	Running
kube-system	coredns-b4854dd98-lpmlp	1/1	Running
kube-system	csi-azuredisk-node-8ppxz	3/3	Running
kube-system	csi-azuredisk-node-s2ch9	3/3	Running
kube-system	csi-azuredisk-node-z2php	3/3	Running
kube-system	csi-azurefile-node-7fmdt	3/3	Running
kube-system	csi-azurefile-node-prtdt	3/3	Running
kube-system	csi-azurefile-node-tqjwx	3/3	Running
kube-system	konnectivity-agent-65c9445dc6-6v9ms	1/1	Running
kube-system	konnectivity-agent-65c9445dc6-jrwgb	1/1	Running
kube-system	metrics-server-668f55b87d-pcf6z	1/1	Running
kube-system	metrics-server-668f55b87d-r2vc6	1/1	Running

Azure IPAM
To Get Direct
Routeable IPs for Pods

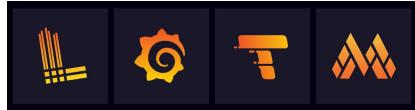
Cilium Running!!
Providing Cilium
Dataplane.

Grafana integration

Richi Hartmann, Grafana Labs



Grafana



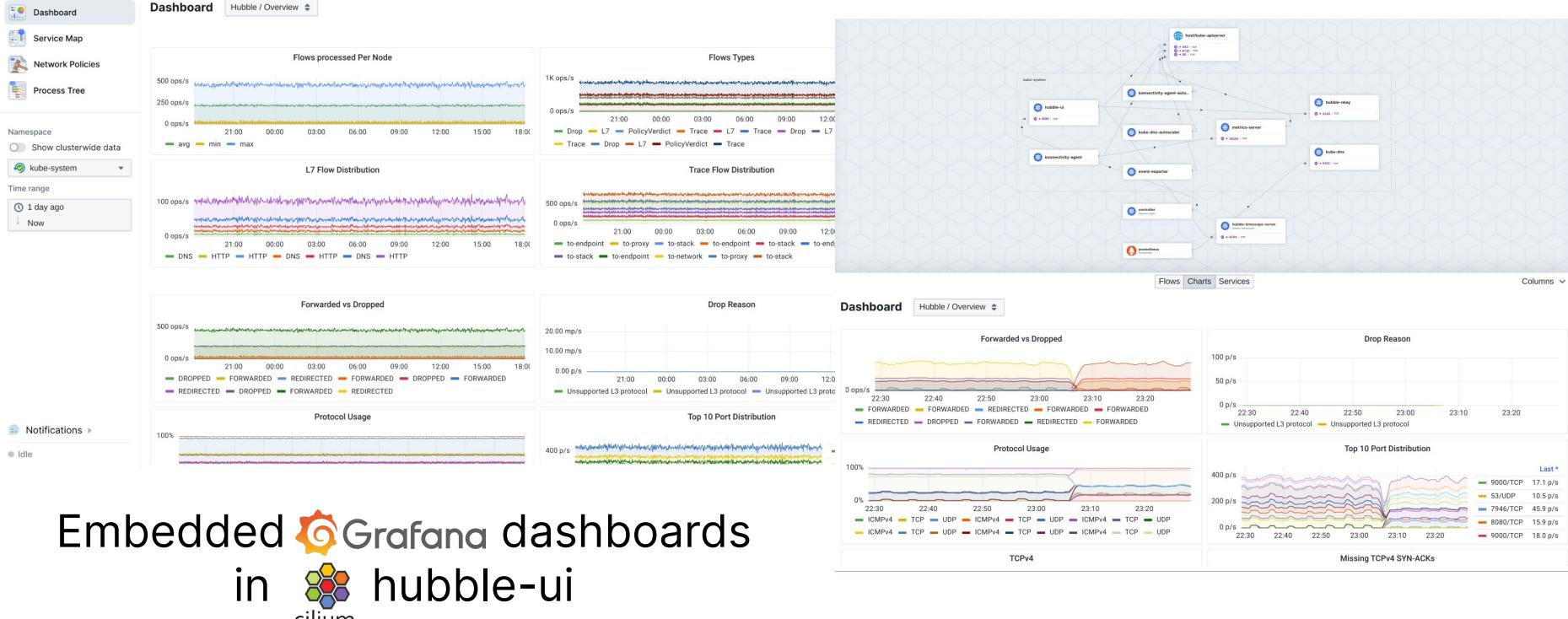
cilium



New Strategic Partnership to provide
eBPF -based Observability & Monitoring

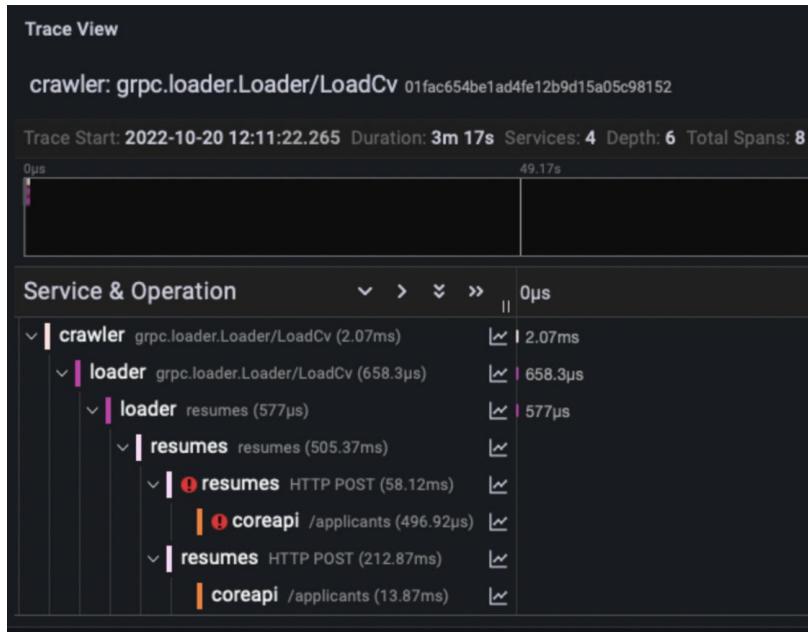


eBPF-based Network Observability

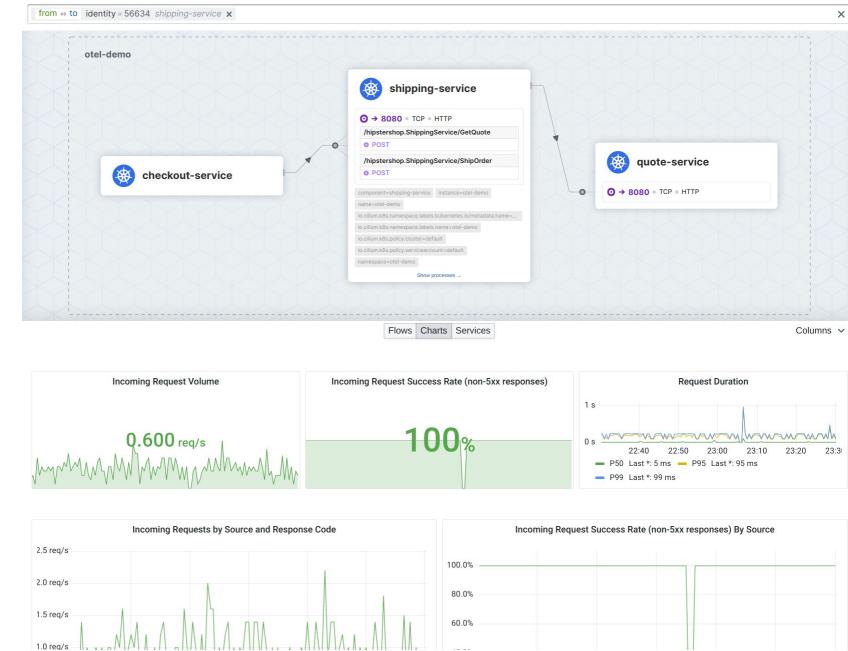


Embedded  Grafana dashboards
in  hubble-ui

Distributed tracing, enhanced by eBPF



 **Grafana Tempo**



Golden Signal Dashboards

Cilium Community

Bill Mulligan, Isovalent

eBPF Summit

eBPF Summit 2022

eBPF, a road to invisible network: S&P Global's Network Transformation Journey

Sep/28 - Sep/29/2022

Guruprasad Ramamoorthy

eBPF Summit 2022

Large scale cloud native networking & security with Cilium/eBPF: 4 years experiences from Trip.com

Sep/28 - Sep/29/2022

Arthur @Arthurchiao (Yanan Zhao)

eBPF Summit 2022

eBPF and Cilium at Google

Sep/28 - Sep/29/2022

Purvi Desai

eBPF Summit 2022

Multi-cluster networking with Cilium at Form3

Sep/28 - Sep/29/2022

Adelina Simion

Cilium User Stories

How Nexxiot runs integrated IoT hardware, software, and analytics with Cilium

Challenge

Nexxiot is a TradeTech pioneer with a mission to enable easier, safer, and cleaner global transportation for all stakeholders. They deploy track and trace IoT devices which work more than six years without power supply and allow clients to monitor the location, status and conditions of their assets and cargo in real-time, anywhere in the world. As an ISO/IEC 9001 and ISO/IEC 27001 certified company, they needed to keep their clients' private asset data secure while managing service for hundreds of thousands of devices in the field.

Solution

Nexxiot needed highly-reliable, secure, performant, and cost efficient Kubernetes clusters. Their operations team looked for projects with simple day two operations and built in automation. They turned to Cilium as the CNI to lock down their clusters and enable resilient networking with reliable day two operations.



Challenges:	Auditing, Automation, Compliance, Security
Industry:	Logistics
Location:	Switzerland
Cloud Type:	Public
Published:	July 25, 2022

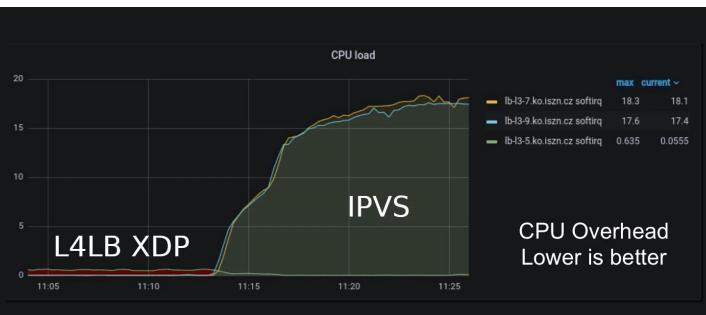
PROJECTS USED



Read the latest user story from [@DatadogEng](#) on how Cilium allows them to scale their service to 10+ trillion data points a day



Cilium User Story Securing and Scaling to 10+ Trillion Data Points a Day



"As the universal default Kubernetes CNI, Cilium can be used on multiple clouds, allowing network policies to be enforced across clouds where they are needed"

CNCF @CloudNativeFdn · Oct 12

With @ciliumproject, Datadog is now able to scale up to 10,000,000,000,000+ data points per day across more than 18,500 customers.

Want to hear more about this #cloudnative case study. Check it out on our case study page (+ tons more)! [cnfc.io/case-studies/d...](#)

Cilium User Story: Securing 100,000+ RPS in a Multi-Tenant Environment



Cilium User Story

Securing 100,000+ RPS in a Multi-Tenant Environment

"Cilium is backed by the Community, backed by Enterprises, backed by the cloud providers, and is the top choice for Kubernetes networking"

October 13th, 2022
Author: Bill Mulligan, Isoviant

This User Story comes from a company in the publishing industry



Zero Trust Networking with Cilium

Challenge

Utmost handles sensitive personal data and needed SOC 2 Type II attestation, ISO 27001 certification, and zero trust networking to demonstrate their commitment to security and data privacy as core values of their business.

Solution

They implemented Cilium as their CNI for network policies to default deny all traffic and created automated pipelines for their developers to create new policies. They also implemented Hubble for visibility and auditing of their network.

Impact

Utmost has implemented zero trust networking while still being able to keep pace with their development. They currently handle over 4,000 flows per second and can audit their infrastructure.



Challenges:	Auditing, Automation, Compliance, Security
Industry:	Extended Workforce Management
Location:	Ireland
Cloud Type:	Public
Published:	August 31, 2022

PROJECTS USED



Getting started with Cilium



cilium.io/get-started



docs.cilium.io



cilium.io/slack

The graphic features a white rounded rectangle with a thin gray border. Inside, there's a light gray dotted grid background. In the top-left corner is a small cluster of colored hexagons (green, orange, purple). In the center is a circular profile picture of a smiling man with dark hair and a blue shirt. To the right of the profile picture is a green phone receiver icon. To the left of the profile picture is a small red square icon. At the bottom center is a white button with a black border containing the text "Book your seat".

Weekly Interactive Cilium Introduction and Live Q&A

With Thomas Graf, Cilium Co-Creator

[Book your seat](#)

The graphic features a white rounded rectangle with a thin gray border. Inside, there's a light gray dotted grid background. In the top-right corner is a large green icon representing a document with horizontal lines. To the left of this icon is a blue arrow pointing right, and to the right is a yellow pencil icon. At the bottom center are two white buttons with black borders: one labeled "Documentation" and another labeled "Tutorials".

Documentation & Tutorials

Quickly get started with Cilium. Read the documentation or use our interactive tutorial in a live environment.

[Documentation](#)

[Tutorials](#)

Getting help - and giving it



- Community assistance
- Feature-specific channels e.g. #service-mesh, #tetragon...



- Issues



Training and Support

- cilium.io/enterprise

Feature ideas

 cilium.io/slack

 github.com/cilium

- New Issue: Feature requests
- CFP template

 docs.cilium.io/en/latest/community/roadmap

Code contributions



Developer documentation



cilium.io/slack



github.com/cilium

good-first-issue



Weekly developer call & SIGs

- github.com/cilium/cilium#community

Helping promote Cilium

Subscribe to bi-weekly eCHO News

eCHO news in your bi-weekly wrap up of all things eBPF and Cilium. If you want to keep up on the latest in cloud native networking, observability, and security this is your source

Email address...

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is available

Explore Archive



eCHO News is curated
by Bill Mulligan

Bill Mulligan is working to grow the
Cilium community

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an article?

Send it to the slack, submit form
or email bill@isovalent.com

Send on Slack

Submit form

Cilium
2,072 Tweets

eBPF Summit 2022

Cilium
@ciliumproject

eBPF-based Networking, Security, and Observability

Open Source | cilium.io | ebpf.io | github.com/cilium/cilium

Newsletter cilium.io/newsletter

 cilium.io Joined March 2017

668 Following 10.3K Followers

Tweets **Tweets & replies** **Media** **Likes**

Pinned Tweet

 **Cilium** @ciliumproject · Jul 20
Cilium 1.12 – Release Announcement 🚀

Yet another massive release! 🚀

Integrated Ingress Controller, Cilium Service Mesh, Multi-Cluster Service Affinity, Stable Egress Gateway, NAT46 for Services, IPv6 for BGP, AKS BYOCNI, BBR, and more...

Telling the Cilium Story

Creating an abstract, putting a presentation together, or writing a blog post doesn't come naturally to everyone. If you are eager to tell your Cilium story and need help, we're here for you.

Not a native speaker and/or not confident about your writing skills? No worries. Bring the story and we'll help you tell it in an engaging way.

Name

Email

Cilium Slack Username

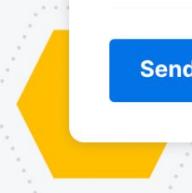
How are you using Cilium?

Message

What do you need help with?

<input type="checkbox"/> Reviewing an abstract	<input type="checkbox"/> Writing a blog post
<input type="checkbox"/> Polish a presentation	<input type="checkbox"/> Getting a Retweet
<input type="checkbox"/> Finding a speaker for an event or livestream	<input type="checkbox"/> Submitting to eCHO News
<input type="checkbox"/> Request swag	<input type="checkbox"/> Other

Send Story



Help the community

Add to the Users doc

- [cilium/USERS.md](#)

Contact me to do a User Story

- bill@cilium.io or Cilium slack

Fill out the User Survey

- <https://isogo.to/cilium-survey22>



Read the latest user story from [@DatadogEng](#) on how Cilium allows them to scale their service to 10+ trillion data points a day

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Want to hear more about this #cloudnative case study? Check it out on our case study page (+ tons more)! cncf.io/case-studies/d...

Cilium - what's next?

Thomas Graf, Isovalent



All major  cloud providers have now picked  for **Networking & Security** in their Kubernetes platforms



Google Cloud



Cilium 1.13 is planned for EOY

Highlights

- Gateway API Support
- L7 Load-Balancing with Kubernetes Services + Annotations
- mTLS Authentication (Proxy-free, supports any protocol)
- SPIFFE Integration
- Lots of Grafana Integration
- Big TCP Support
- veth Replacement
- ...



Gateway API

Pull Request:
[cilium/cilium#21749](https://github.com/cilium/cilium/pull/21749)

```
apiVersion: gateway.networking.k8s.io/v1beta1
kind: Gateway
metadata:
  name: my-gateway
spec:
  gatewayClassName: cilium
  listeners:
  - protocol: HTTP
    port: 80
    name: web-gw
  allowedRoutes:
    namespaces:
      from: Same
```

```
apiVersion: gateway.networking.k8s.io/v1beta1
kind: HTTPRoute
metadata:
  name: http-app-1
spec:
  parentRefs:
  - name: my-gateway
    namespace: default
  rules:
  - matches:
    - path:
        type: PathPrefix
        value: /details
  backendRefs:
  - name: details
    port: 9080
```



L7 LB with Service + Annotations

Pull Request:
[cilium/cilium#21244](#)

```
apiVersion: v1
kind: Service
metadata:
  name: backend
  annotations:
    io.cilium/lb-protocol: "grpc"
    io.cilium/lb-mode: "weighted-least-request"
spec:
  type: ClusterIP
  ports:
  - port: 80
  selector:
    name: backend
```

Simple way to
enable gRPC
weighted-least-request
load-balancing

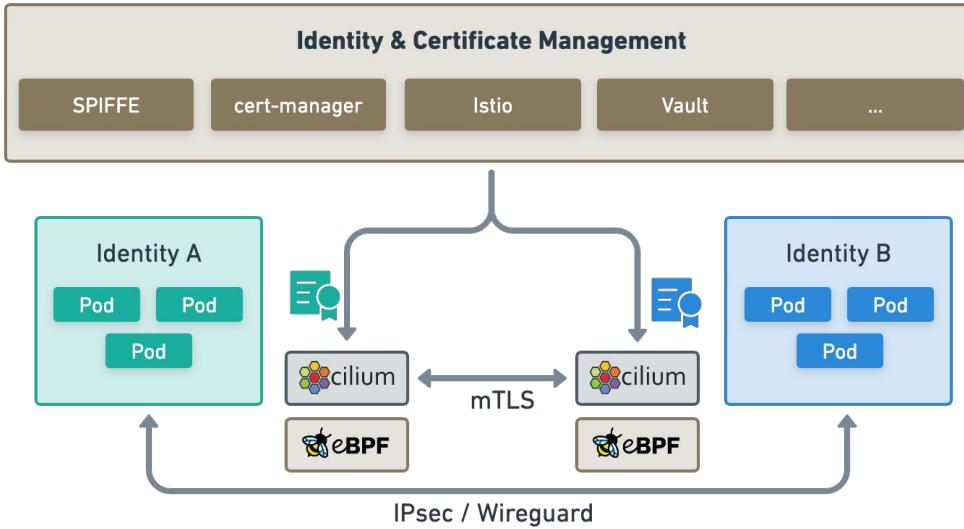


Service + Annotations + Multi-Cluster

```
apiVersion: v1
kind: Service
metadata:
  name: backend
  annotations:
    io.cilium/global-service: "true"
    io.cilium/lb-protocol: "grpc"
    io.cilium/lb-mode: "weighted-least-request"
spec:
  type: ClusterIP
  ports:
  - port: 80
  selector:
    name: backend
```

Compatible with
multi-cluster
load-balancing

Cilium Next-Gen Mutual Authentication



- User space mTLS authentication
- Proxy-free in-kernel datapath
- Keeps secrets out of L7 proxies
- Works for any protocol (UDP, SCTP, ...)
- IPsec/Wireguard can use TLS negotiated service-specific keys

More information: <https://isovalent.com/blog/post/2022-05-03-servicemesh-security>



NetworkPolicy - mTLS Policy

```
apiVersion: "cilium.io/v2"
kind: CiliumNetworkPolicy
metadata:
  name: "frontend-backend"
spec:
  endpointSelector:
    matchLabels:
      role: backend
  ingress:
  - fromEndpoints:
    - matchLabels:
        role: frontend
  auth:
    required: strict
```

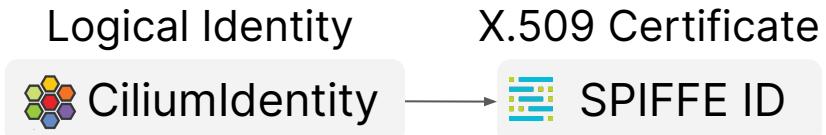
Require authentication for connections
to backends



SPIFFE Integration

```
apiVersion: "cilium.io/v2"
kind: CiliumNetworkPolicy
metadata:
  name: "spiffe-rule"
spec:
  endpointSelector:
    matchLabels:
      spiffe://mycluster/app1: ""
  ingress:
  - fromEndpoints:
    - matchLabels:
      - spiffe://mycluster/app2: ""
```

Tracking CFP / PR:
<https://github.com/cilium/cilium/issues/4016>

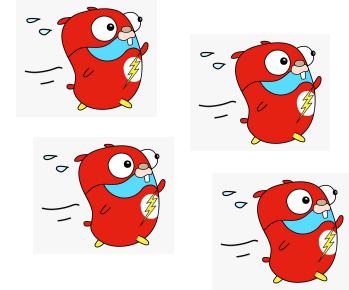


Big TCP Support



Support 100Gbit/s for a single
connection/socket

veth Replacement



- veth (virtual ethernet) is the primary way containers connect to the host
- This new replacement will allow containers to network as fast as if the process was running on the host itself 😱

Grafana Dashboards in Hubble





We are applying for
Graduation!

<https://github.com/cncf/toc/pull/952>

Feedback and ideas

cilium.io

github.com/cilium

isogo.to/cilium-survey22



See you on Slack!