



KubeCon



CloudNativeCon

North America 2025

10 Years of Cilium: Connecting, Securing, and Simplifying the Cloud Native Stack

Bill Mulligan, Isovalent @ Cisco
Neha Aggarwal, Microsoft
Satish Krishnan, UBS
Thomas Graf, Isovalent @ Cisco

#KubeCon #CloudNativeCon





Cilium

Scalable, Secure, Efficient
Networking L3-L7



Hubble

Network
Observability



Tetragon

Security Observability &
Runtime Enforcement



Networking



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High Performance
Networking (CNI) →



Layer 4 Load Balancer →



Cluster Mesh →



Bandwidth and Latency
Optimization →



Kube-proxy Replacement →



BGP →



Egress Gateway →



Service Mesh →



Gateway API →



Multicast →



Host Firewall →



Ingress →



Observability & Security



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Observability



Service Map →



Metrics & Tracing Export →



Identity-aware L3/L4/DNS
Network Flow Logs →



Advanced Network Protocol
Visibility →

Security



Transparent Encryption →



Network Policy →



Runtime Enforcement →

1.18 Networking & Service Mesh

- Increased IPv6 support for
 - Encapsulation, kube-proxy replacement, egress gateway, BGP
- Load balancing control plane redesign
- Multi-Pool IPAM enhancements
- BGP route aggregation
- Gateway API v1.3.0 support



1.18 Security & Observability



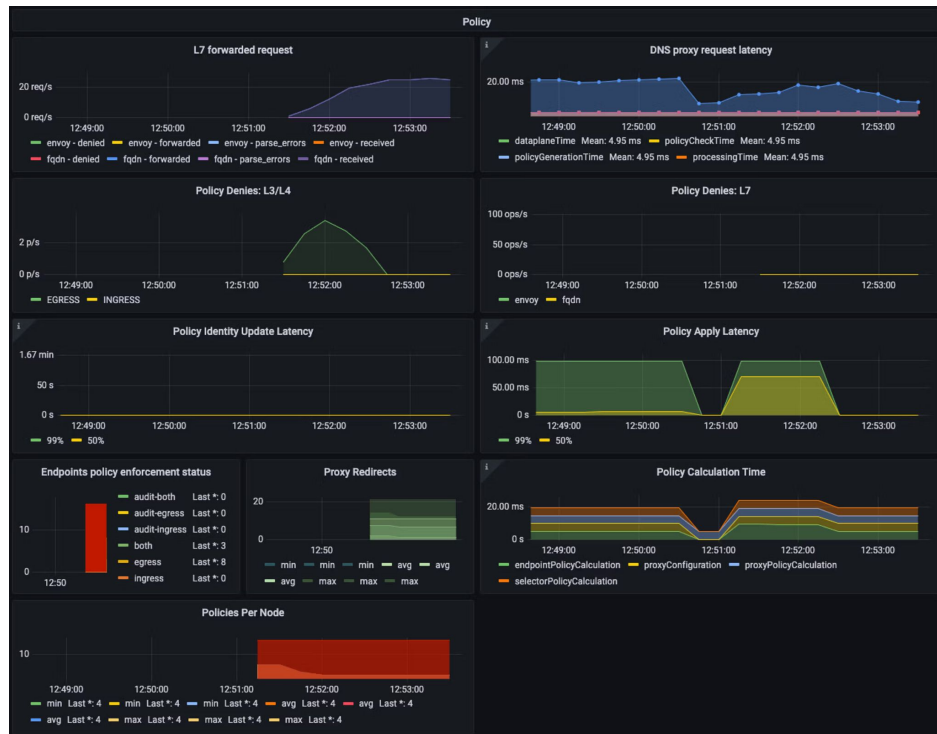
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- Cluster Mesh policy isolation
- Hubble log field support
- Overlay traffic decoding in Hubble
- Enhanced policy dashboard



1.18 Day 2 Operations & Scale

- Reduced policy latency 40%
- Cilium agent CPU usage down 43% under service churn
- 30% smaller arm64 image
- HA for API server communication
- Cilium now requires Linux kernel 5.10+ (or RHEL 8.6)





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Cilium @ Microsoft

Neha Aggarwal, Microsoft

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Azure CNI powered by Cilium



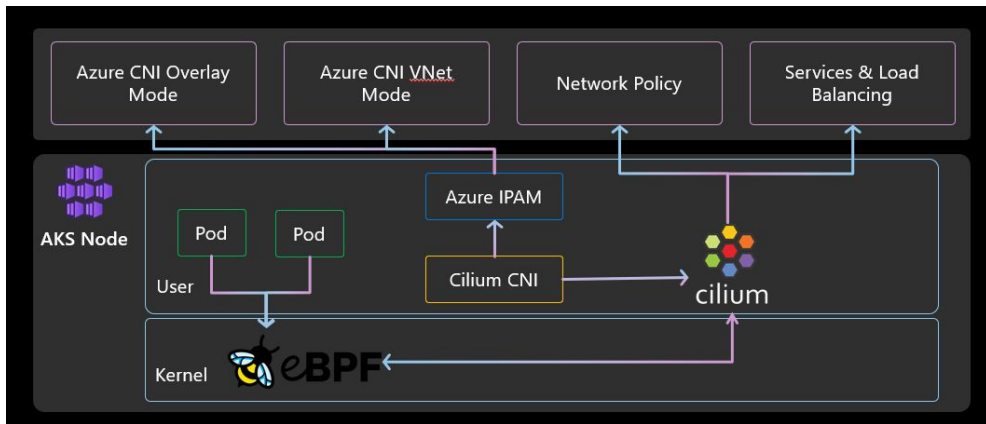
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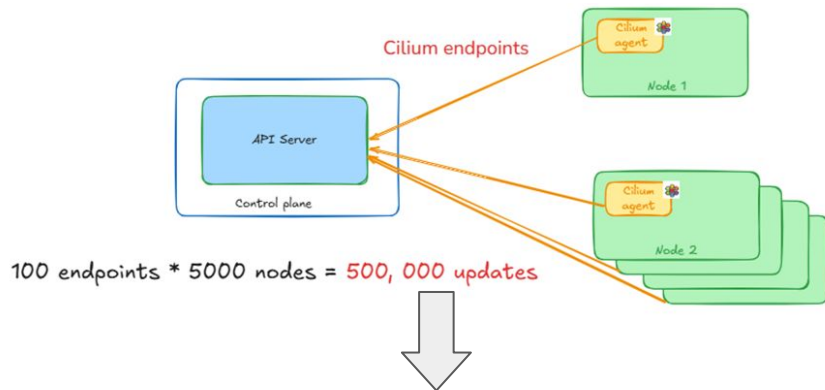
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- Azure CNI powered by Cilium
 - Azure Native Integration
 - Delegated IPAM
- Supports extensive features
 - Hubble Observability
 - Security Policies L3-L7
 - Wireguard Encryption
 - eBPFHostRouting

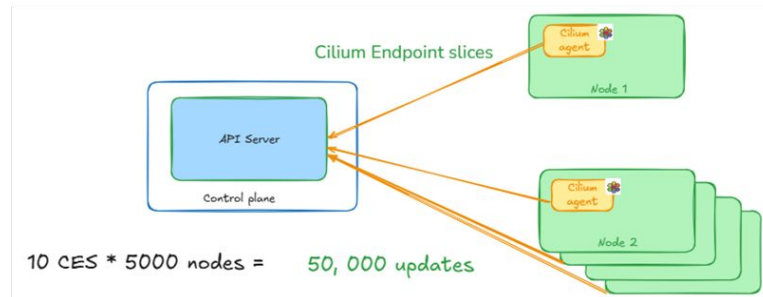


Control plane Scale

- Cilium Endpoint slices.
- Remove Cilium Endpoint Creation
<https://github.com/cilium/cilium/pull/38388>
- 3x improved scale
- Watch [CiliumCon Talk on CES Deep dive](#)



Batch Cilium Endpoints -> Cilium Endpoint slices



Hubble Scale

- Hubble Network Metrics Filtering

<https://github.com/cilium/design-cfps/blob/main/hubble/CFP-37472-flowlog-aggregation.md>

- Hubble Network Flow Aggregation

<https://github.com/cilium/design-cfps/blob/main/hubble/CFP-37472-flowlog-aggregation.md>

```
apiVersion: v1
kind: ConfigMap
metadata:
  name: hubble-metrics-config
  namespace: kube-system
data:
  hubblemetrics.yaml: |
    hubbleMetrics:
      metrics:
        - name: flow
          contextOptions:
            - name: sourceEgressContext
              values:
                - pod
            - name: destinationIngressContext
              values:
                - pod
          includeFilters:
            - []
          excludeFilters:
            - source_pod: ["namespace1/"]
            - destination_pod: ["kube-system/"]
        - name: dns
          contextOptions:
            - name: labelsContext
              values:
                - source_namespace
                - source_pod
            - name: destinationIngressContext
              values:
                - pod
          includeFilters:
            - source_pod: ["namespace1/"]
```



AI Scale



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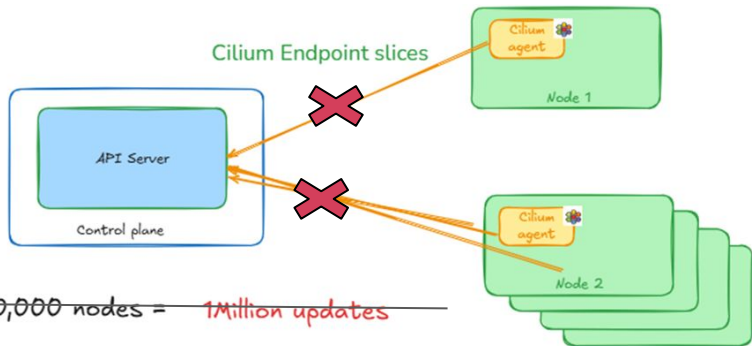
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AI workloads demands hyper scale > **100K+ nodes.**

Mitigated by **Cilium Lite!**

- No Cilium endpoints, cilium identity
- No Cilium CRD Watchers
- Basic Pod-Pod & Service Connectivity
- Basic Hubble Observability, no metadata



Missing full capabilities!

Minimized APIServer loads



Future



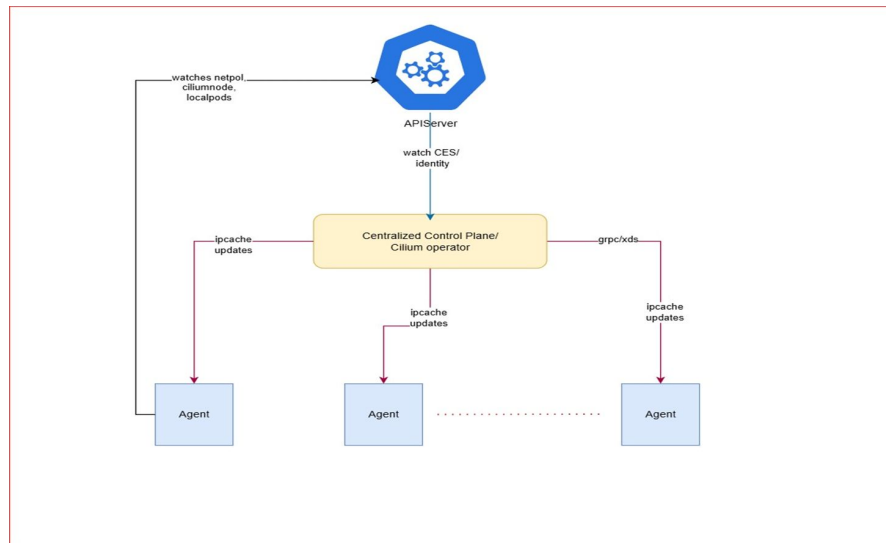
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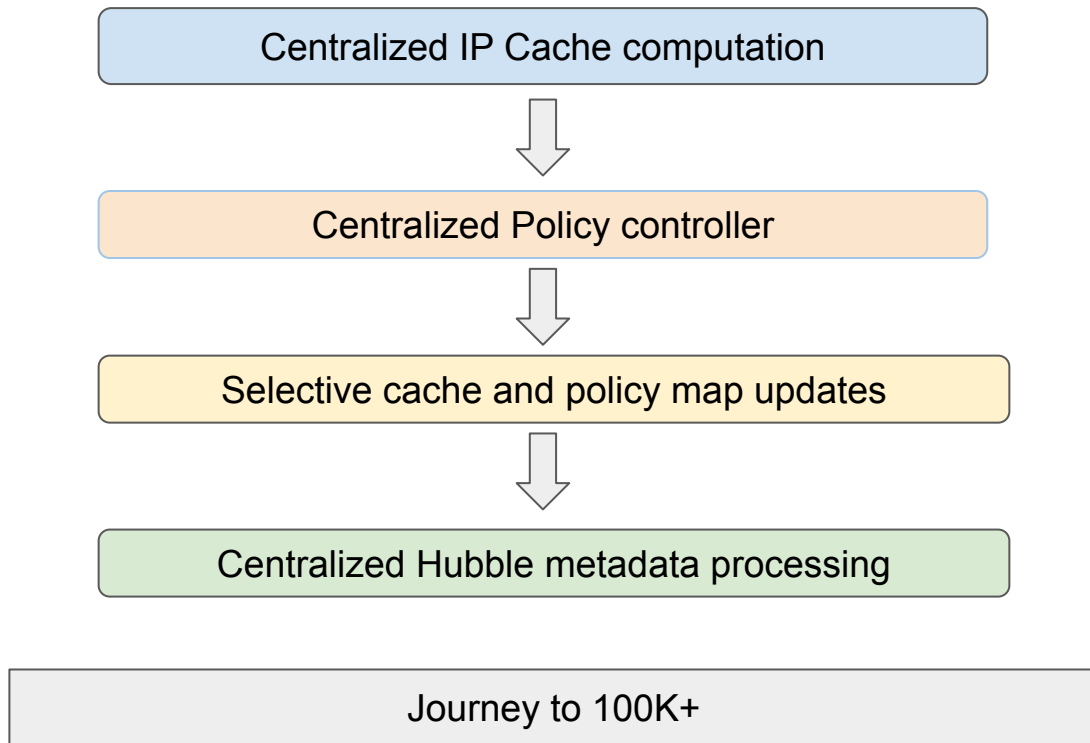
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- **Centralized Cilium Control Plane.**
- Computes state centrally and forwards to each agent.
- Reduces API Server load drastically.
 - 1M watch updates reduced to couple handful.
- Makes Agent thin! Eliminates duplicate computations.



Future Proposals



What's next

- Contribute.
- Join #sig-scalability group



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10 years Cilium

Thomas Graf, Isovalent

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Commit 7fa3c60

[Browse files](#)

 tgraf committed on Dec 16, 2015

Initial commit

 `main` ·  `v1.19.0-pre.2` ... `0.10.1`

0 parents commit 7fa3c60 

 **2 files changed** +226 -0 lines changed

 Search within code



▼ `.gitignore` 

+24 ■■■■■ ...

... @@ -0,0 +1,24 @@

1 + # Compiled Object files, Static and Dynamic libs (Shared Objects)

2 + *.o

3 + *.a

4 + *.so

5 +

6 + # Folders



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Cilium Founding Team



25 Years Linux Birthday Party, Linux Foundation Event



Early Cilium Presentation, iovisor Summit

From Left to Right:

- Thomas Graf
- Daniel Borkmann
- Madhu Challa
- Andre Martins

1st Cilium Design Summit

*The moment we
realized that
observability
matters*



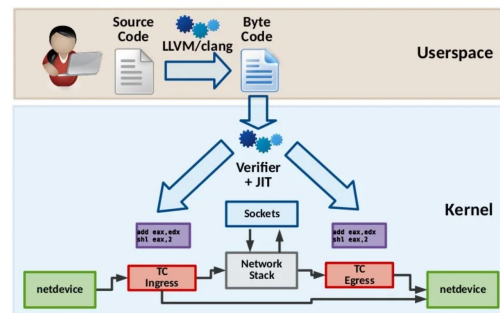
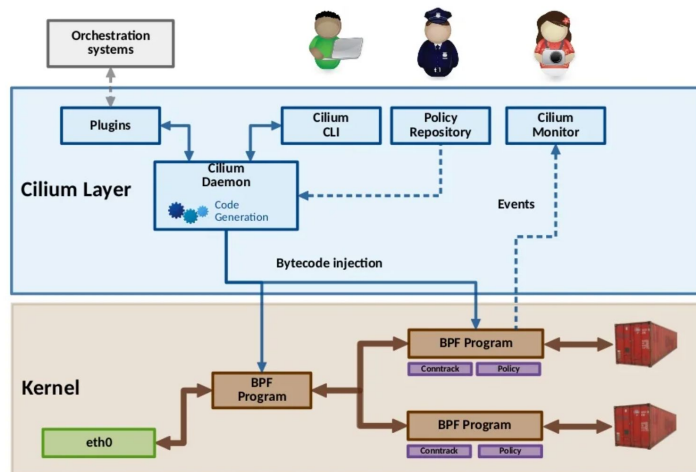
Cilium Design Summit, Diavolezza, Switzerland

First Conference Talks



- *IPv6 Only*
- *Built for Containers*
- *Scalable & Flat L3*
- *Identity-based security*

BPF - Berkley Packet Filter





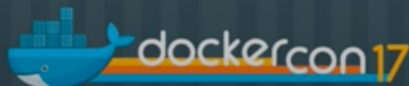
DockerCon 2017



```
"17-perser": "http",
"17-rules": [
  { "expr": "Method(\"GET\") && Path(\"/v1/\")" },
  { "expr": "Method(\"POST\") && Path(\"/v1/request-landing\")" }
]]
}}
}}
}
$ cilium policy import sw_policy_http.real.json
$ # The rebels return...
$ docker exec -i xwing ping -c 2 deathstar
PING deathstar (10.15.25.58): 56 data bytes
64 bytes from 10.15.25.58: seq=0 ttl=64 time=0.081 ms
64 bytes from 10.15.25.58: seq=1 ttl=64 time=0.088 ms

--- deathstar ping statistics ---
2 packets transmitted, 2 packets received, 0% packet loss
round-trip min/avg/max = 0.081/0.084/0.088 ms
$ docker exec -i xwing curl -s -XPUT http://deathstar/v1/exhaust-port
HTTP/1.1 403 Forbidden
Content-Type: text/plain; charset=utf-8
X-Content-Type-Options: nosniff
Date: Fri, 14 Apr 2017 14:05:20 GMT
Content-Length: 14

Access denied
$ # Oh no! The shields are up.
$ # End of demo.
$
$
```



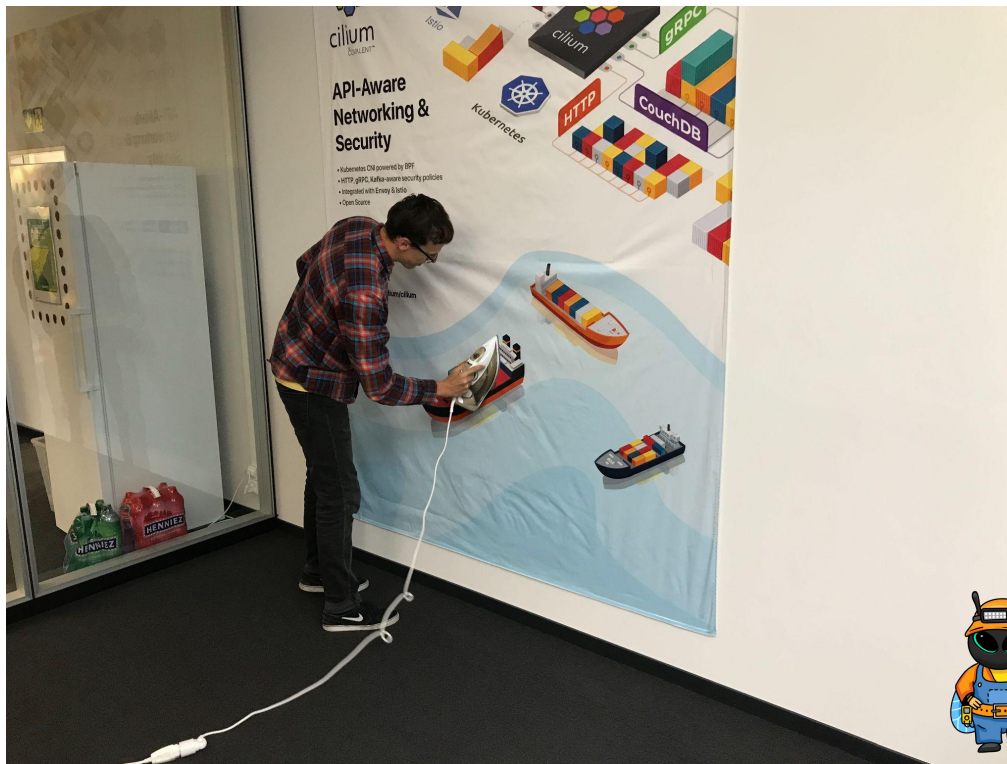
Batman Visits

Dan, Cynthia, Thomas



From Left To Right: Thomas, Batman, Cynthia Thomas

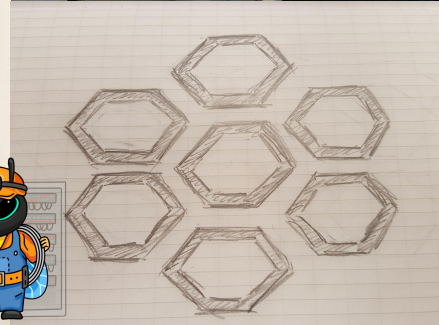
Getting an Office



Martynas Pumputis (author kube-proxy replacement) performing engineering tasks



Happy Birthday
Andre Martins
(Cilium Maintainer)



New Logo
Design

The team grows...



... and goes skiing



Cilium Graduates at the CNCF



Liz Rice | Published: October 11, 2023 | Updated: October 13, 2023



Cisco Completes Acquisition of Cloud Native Networking & Security Leader Isovalent



Thomas Graf | Published: December 21, 2023 | Updated: April 13, 2024



Kicking off [#KubeCon](#) with the 2nd Cilium Developer Summit. Many great discussions on the future of the project and thanks to Google for hosting



Introducing eBPF Host Routing: High performance AI networking with Azure CNI powered by Cilium



Sam_Foo MICROSOFT

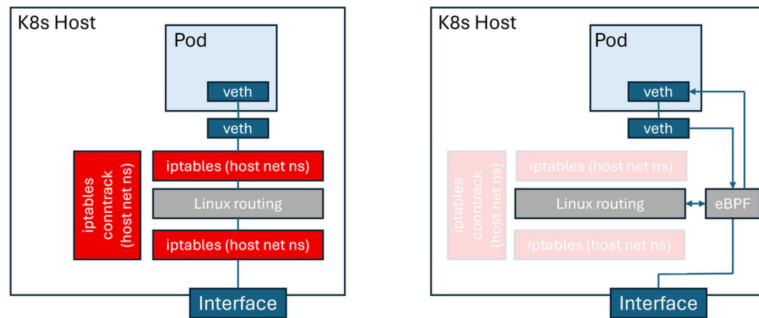
Nov 07, 2025

AI-driven applications demand low-latency workloads for optimal user experience. To meet this need, services are moving to containerized environments, with Kubernetes as the standard. Kubernetes networking relies on the Container Network Interface (CNI) for pod connectivity and routing. Traditional CNI implementations use iptables for packet processing, adding latency and reducing throughput.

Azure CNI powered by Cilium natively integrates Azure Kubernetes service (AKS) data plane with Azure CNI networking modes for superior performance, hardware offload support, and enterprise-grade reliability. Azure CNI powered by Cilium delivers up to 30% higher throughput in both benchmark and real-world customer tests compared to a bring-your-own Cilium setup on AKS.

Traditional CNI implementations use iptables for packet processing, adding latency and reducing throughput.

Azure CNI powered by Cilium



Comparison of host routing using the Linux kernel stack vs eBPF

Adopters

Here are some of the organizations we know are using Cilium.

If you're using Cilium and aren't on this list, [please submit a pull request!](#)



What Makes a Good Multi-tenant Kubernetes Solution

[CASE STUDY](#) · [TALK 1](#) ·
[TALK 2](#) · [TALK 3](#) · [TALK 4](#)



Alibaba Cloud uses Cilium as the CNI for their managed Kubernetes offering

[CASE STUDY](#) · [BLOG 1](#) ·
[BLOG 2](#)



Ascend uses Cilium as their one CNI across multiple cloud providers

[READ CASE STUDY](#)



AWS picks Cilium for Networking & Security on EKS Anywhere

[READ BLOG](#)



Microsoft chooses Cilium



Bell uses Cilium and eBPF

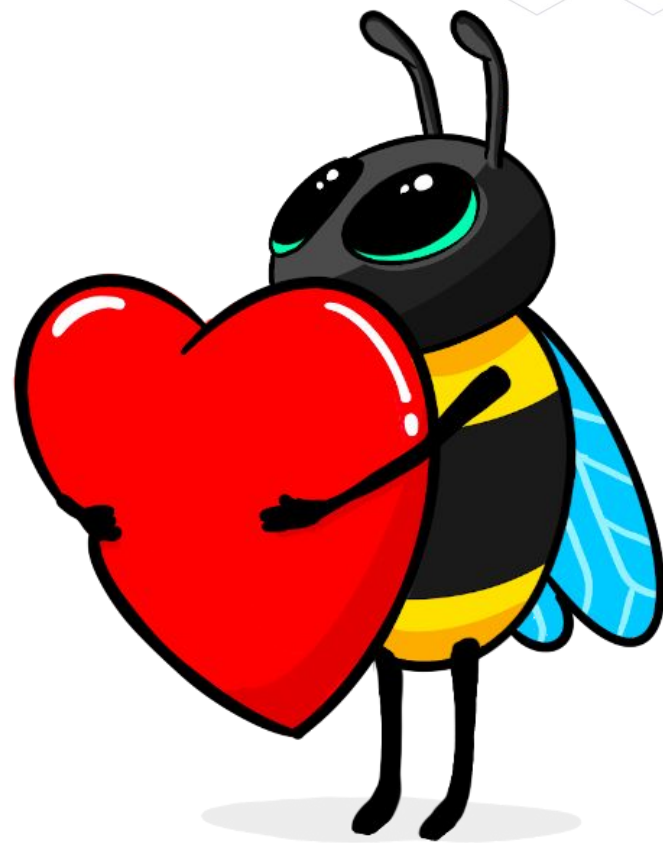


Bloomberg leverages Cilium



BMC uses Cilium as a CNI

**Thank
You!**





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Community Updates

Bill Mulligan, Isovalent

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Community Growth



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 PUBLIC

Edit PinsUnwatch 306Fork 3.4kStarred 22.8k

main691 Branches787 TagsGo to fileAdd fileCode

 cilium-renovate[bot]

chore(deps): update renovate dependencies to v...

8144a62 · 16 hours ago · 39,967 Commits

.devcontainer	images: update cilium-{runtime,builder}	4 days ago
.github	chore(deps): update renovate dependencies to v42.2.0	16 hours ago
.nvim	.nvim: Add debugging configurations for go test	last year
.vscode	.vscode: Add launch config for control plane tests	last year
Documentation	policy: Remove support for FromRequires and ToRequires	3 days ago
api/v1	Use separate tables for prefixToIdentity and IPToEndpoint...	4 days ago
bpf	datapath: policy: switch ICMP options to runtime configs	3 days ago
bugtool	bgp: enhance BGP peers command with capability display	3 months ago
cilium-cli	chore(deps): update go to v1.25.4	4 days ago
cilium-dbg	bgp: Rename bgpv1 package to bgp	last week
cilium-health	build: Add flag to control goexperiments	4 months ago
clustermesh-apiserver	clustermesh: move MCS-API config to types package	4 days ago
contrib	contrib: update suggested command to fix testdata diver...	2 days ago
daemon	daemon: extract ctmap GC initialization	2 days ago
examples	doc: remove kiam in lrp	2 months ago
hack	api: drop year from copyright notice	3 years ago
hubble-relay	build: Add flag to control goexperiments	4 months ago
hubble	feat(hubble): Implement backend support for VRRP/IGMP ...	last month
images	images: update cilium-{runtime,builder}	4 days ago
install/kubernetes	pkg/ztunnel: certificate authority server	3 days ago
operator	Add validation for HTTPRoute head modifier	3 days ago
pkg	daemon: extract ctmap GC initialization	2 days ago
plugins	plugins/cilium-cni: Busy wait for a bootstrapping agent	2 weeks ago

About

eBPF-based Networking, Security, and Observability

[cilium.io](#)

kubernetessecuritynetworkingmonitoringkernelcontainerscncfk8sebpfxdp troubleshootingobservabilitycni loadbalancingbpfkubernetes-networking

ReadmeApache-2.0 licenseCode of conductContributingSecurity policyActivityCustom properties

22.8k stars306 watching3.4k forksReport repository

Releases 361

1.18.3 Latest2 weeks ago+ 360 releases

Used by 316

Contributors 1,011

+ 997 contributors

Cilium Developer Summit



Schedule

2-3:30 sessions

Session 1 - CFP - [41634](#): Datapath Plugins. Jordan Rife

Session 2 - Cilium Scale with Network Policies. Tamilmani Manoharan

3:30-4 break (Coffee!)

4-5:30 sessions

Session 3 - Multi Network support in Cilium. Tamilmani Manoharan

Session 4 - [netkit](#) queue binding in Cilium. Daniel Borkmann

5:30-6:30 snacks

6:30-8:00 sessions

Session 5 - [Code Ownership](#). Joe Stringer

Session 6 - eBPF inline mode for FQDN network policies - Hemanth Malla

Session 7 - Fostering Cilium community. Tamilmani Manoharan



Monday, November 10

Schedule



CiliumCon
NORTH AMERICA

9:00am
EST

CiliumCon | Welcome + Opening Remarks - Bill Mulligan & Hemanth Malla, Program Committee Co-Chairs

BUILDING B | LEVEL 3 | B309

9:10am
EST

Rewiring Cilium: Operator-Driven Scale and Security With CiliumEndpointSlice - Shreya Jayaraman & Tamilmani Manoharan, Microsoft

BUILDING B | LEVEL 3 | B309

9:45am
EST

Can We Really Parse DNS in eBPF? Improving Cilium ToFQDN With In-kernel Policy Updates - Hemanth Malla, Microsoft

BUILDING B | LEVEL 3 | B309

CANCELLED Operating Cilium Mesh With Confidence: From Zero To Production in 90 Days - Andrew Timmes, SeatGeek

BUILDING B | LEVEL 3 | B309

10:15am
EST

Sponsored Keynote: Breaking News from the Cilium News Network - Liz Rice, Isovalent at Cisco

BUILDING B | LEVEL 3 | B309

10:40am
EST

IPv6 First, Not Just Ready: Kubernetes Without IPv4 Using Cilium at ESnet - Kapil Agrawal, ESnet

BUILDING B | LEVEL 3 | B309

11:15am
EST

Containing Wildfires in a Sprawling Multi-Cluster Network: The Network's Immune System - Anmol Krishan Sachdeva & Paras Mangain, Google

BUILDING B | LEVEL 3 | B309

11:45am
EST

⚡ Lightning Talk: Taming the BPF LRU: Eliminating TCP Resets in Cilium - Gyu Tae Bae, NAVER Corp.

BUILDING B | LEVEL 3 | B309

12:00pm
EST

CiliumCon | Closing Remarks - Bill Mulligan & Hemanth Malla, Program Committee Co-Chairs

BUILDING B | LEVEL 3 | B309

KubeCon Schedule



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TikTok's IPv6 Journey To Cilium: Pitfalls and Lessons Learned - Giri Kuncoro & Joseph Pallamidessi, TikTok

From Squire To Network Knight: Defending the Kubernetes Castle the Cloud Native Way - Donia Chaiehloudj, Isovalent at Cisco

How UW Madison Monitors 25+ Clusters With Cilium and Prometheus Agent on a Student-Sized Budget - Cory Sherman, University of Wisconsin & Ryan Etten, Red Hat

10 Years of Cilium: Connecting, Securing, and Simplifying the Cloud Native Stack - Bill Mulligan & Paul Arah, Isovalent @ Cisco; Neha Aggarwal, Microsoft; Satish Krishnan, UBS

QEMU in the Fast Lane: Accelerating KubeVirt Networking With eBPF - Daniel Borkmann & Anton Protopopov, Isovalent at Cisco



New Case Studies



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Simplifying the Networking and Security Stack With Cilium, Hubble, and Tetragon

*Liyi Huang, Isovalent at Cisco;
Kaixi Fan, Bytedance*



Keynote: Who Owns Your Pod? Observing and Blocking Unwanted Behavior at eBay With eBPF

*Jianlin Lv, eBay & Liyi Huang,
Isovalent at Cisco*



ESnet (Energy Sciences Network)

Transforming Scientific Computing Infrastructure for IPv6 with Cilium at ESnet

100s
of VM deployments
consolidated into 2 multi-tenant clusters

October 30, 2025

[READ CASE STUDY](#)

Cybozu

Delivering High Performance Workflows with Cybozu and Cilium

4+ Years
Running Cilium in production

October 23, 2025

[READ CASE STUDY](#)

Nutanix

Refactoring Nutanix Kubernetes Platform for a Consistent Experience with Cilium

Simplified deployment and Day 2 operations

September 18, 2025

[READ CASE STUDY](#)

ECCO

Transforming Networking with Cilium at Ecco

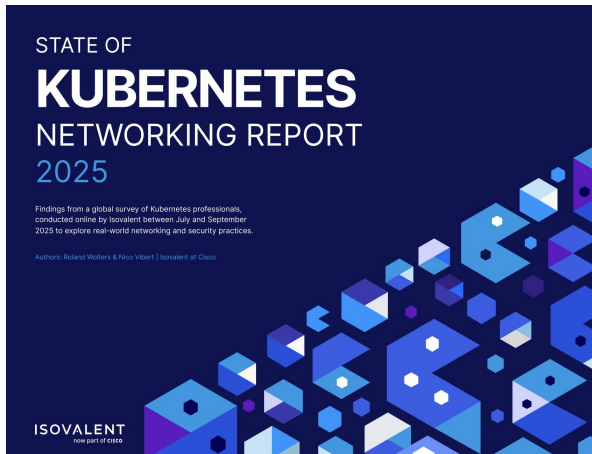
50%
reduction in networking and storage costs

June 18, 2025

[READ CASE STUDY](#)



State of K8s Networking



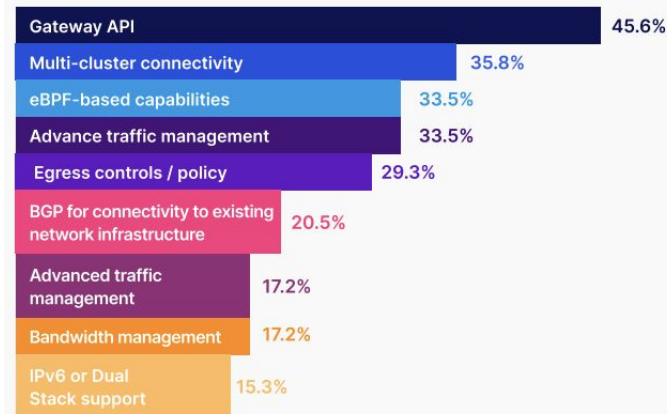
Which CNI(s) are in use in your environment?
(Select all that apply)



Which Kubernetes network proxy mode do you use for internal service load-balancing (kube-proxy)?
(Select all that apply)



Which networking capabilities are you PLANNING on adding to your environment in the next 12 months?
(Select all that apply)



Coming soon™



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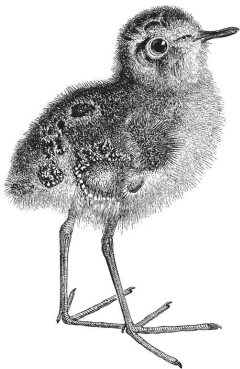
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O'REILLY

Cilium Up and Running

Cloud Native Networking, Security,
and Observability



Early
Release
RAW &
UNEDITED

Compliments of
ISOVALENT
now part of CISCO

Nico Vibert, Filip Nikolic
& James Laverack



Unlocking the Kernel
[OFFICIAL DOCUMENTARY]
150K views · 1 year ago



eBPF for the Infrastructure Platform

How Modern Applications Leverage
Kernel-Level Programmability

November 2025

In partnership with
THE LINUX FOUNDATION Research

Developer Meetings



Cilium Weekly Developer Meeting
Every Wednesday, 08:00 US-Pacific

SIG Scalability Meeting
Fourth Thursday of the month, 08:00 PT

SIG Policy Meeting
Second Tuesday of every month, 08:00 PT

SIG Community Meeting
Monthly on the first and third Thursday at 8am PT



Monthly Tetragon community meetings, 2nd Mondays,
6:00 pm Europe/Paris time

Learn More
cilium.io
[@cilium.io](https://github.com/cilium)



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