Two eBPF Systems, One Kubernetes Node

Running OpenTelemetry OBI and Cilium together

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CiliumCon at KubeCon + CloudNativeCon North America 2026

Agenda

01 OBI vs Cilium + Hubble

02 Coexistence problem

03 Attachment order

04 Demo

05 Benchmark

06 Production rollout

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OpenTelemetry eBPF Instrumentation (OBI)

One application request becomes traces and metrics

01 **Observe**

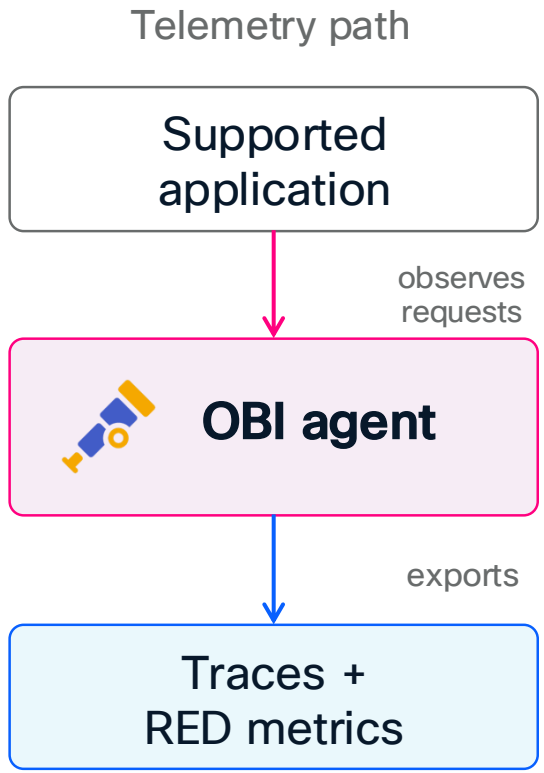
OBI uses eBPF to observe requests sent or received by applications.

02 **Create telemetry**

Client and server calls become spans. Metrics show rate, errors, and duration.

03 **Export**

OBI sends these signals to an OpenTelemetry-compatible backend.



No application code changes

OBI docs OBI on GitHub

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OBI 1.0: what stability means

v1.0.0

Released 30 October 2026

Configuration and deployment

Config v2 and documented deployment interfaces have compatibility guarantees.

Stable telemetry

Stable signals and attributes have compatibility guarantees for their names and meaning.

Support and feature maturity

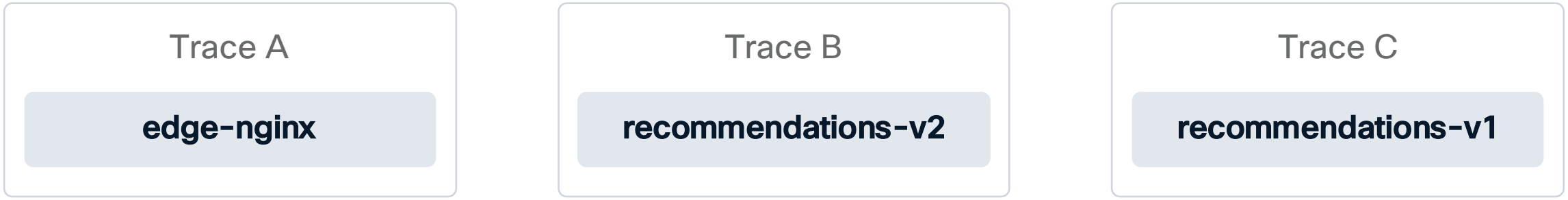
Coverage depends on the runtime and protocol. Runtime metrics remain experimental.

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Trace context connects service spans

Without shared context



With propagated context



One trace connects the operations across all three services.

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Signal ownership: OBI and Cilium + Hubble

OBI

Application requests

HTTP Route, latency, and status

Distributed tracing and RED metrics

Which request was slow? And why?

Cilium + Hubble

Network flows and policy

Workload identities and ports

Verdicts and drop reasons

Which connection was denied?

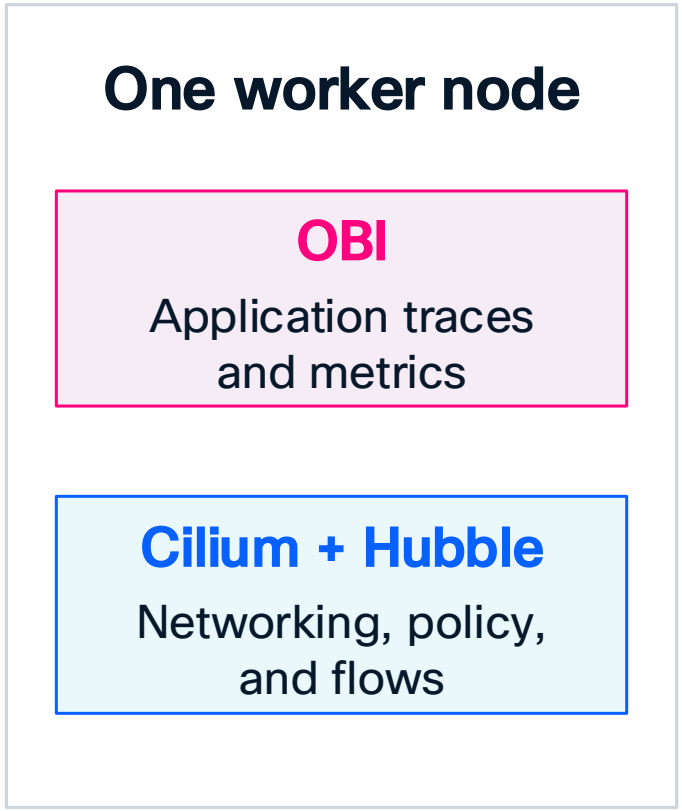
Correlate by time, workload, direction, and port

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The coexistence problem

OBI and Cilium on the same node



01 Traffic behavior

Do networking and policy still work?

02 Visibility

Do OBI and Hubble capture useful evidence?

03 Added cost

How much CPU, memory, and telemetry is added?

Both agents running is only the first check.

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Four places to follow one request

01	**Application**	OBI sees requests and creates spans
02	**Pod network**	A veth pair connects the pod to the node
03	**Kernel path**	Cilium routes traffic and enforces policy
04	**Shared TC**	Optional OBI TC flow collection can share this hook

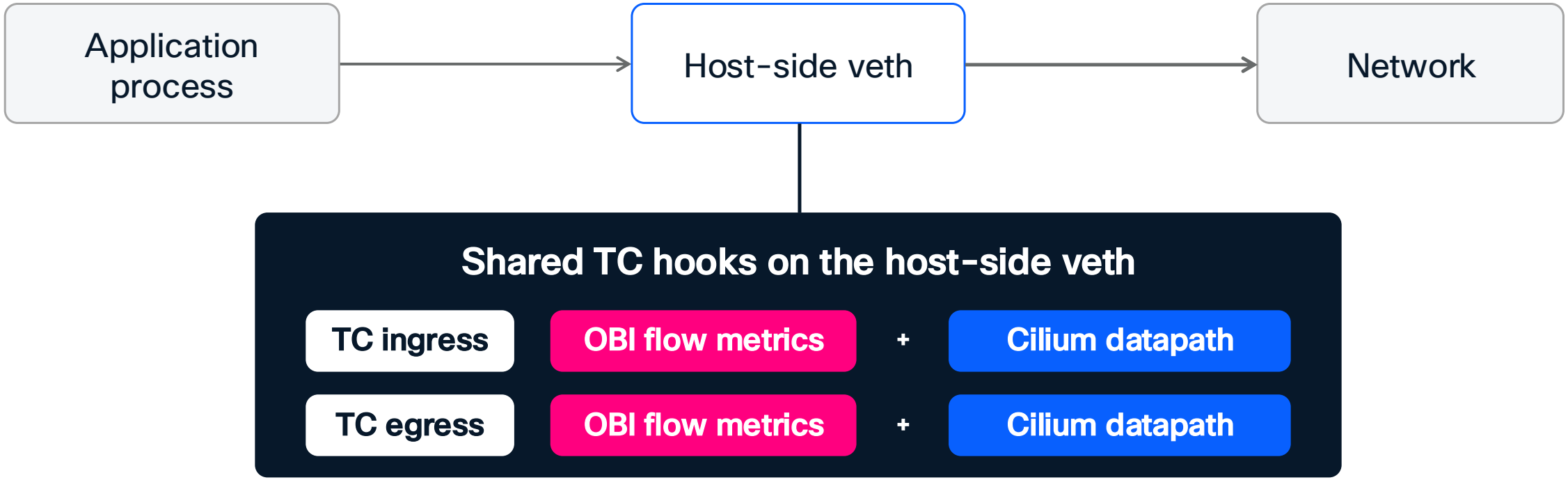
Shared TC applies to optional OBI network-flow collection

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Optional OBI network collection shares TC

When OBI network capture uses TC, both agents can attach here.



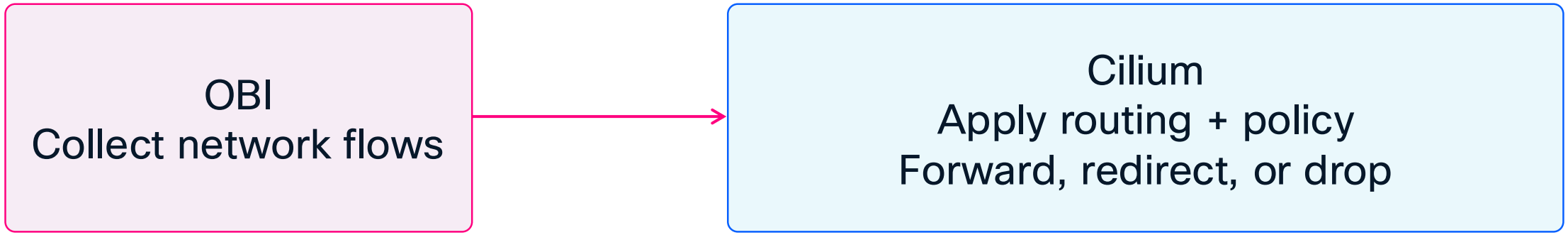
Ingress and egress refer to the host-side interface.

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TC ordering protects flow visibility

With optional OBI network capture using TC



OBI observes the packet before Cilium can change its path or drop it.

ORDER IS CORRECTNESS

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Attachment order

TCX orders the optional shared chain

With optional OBI network capture using TC



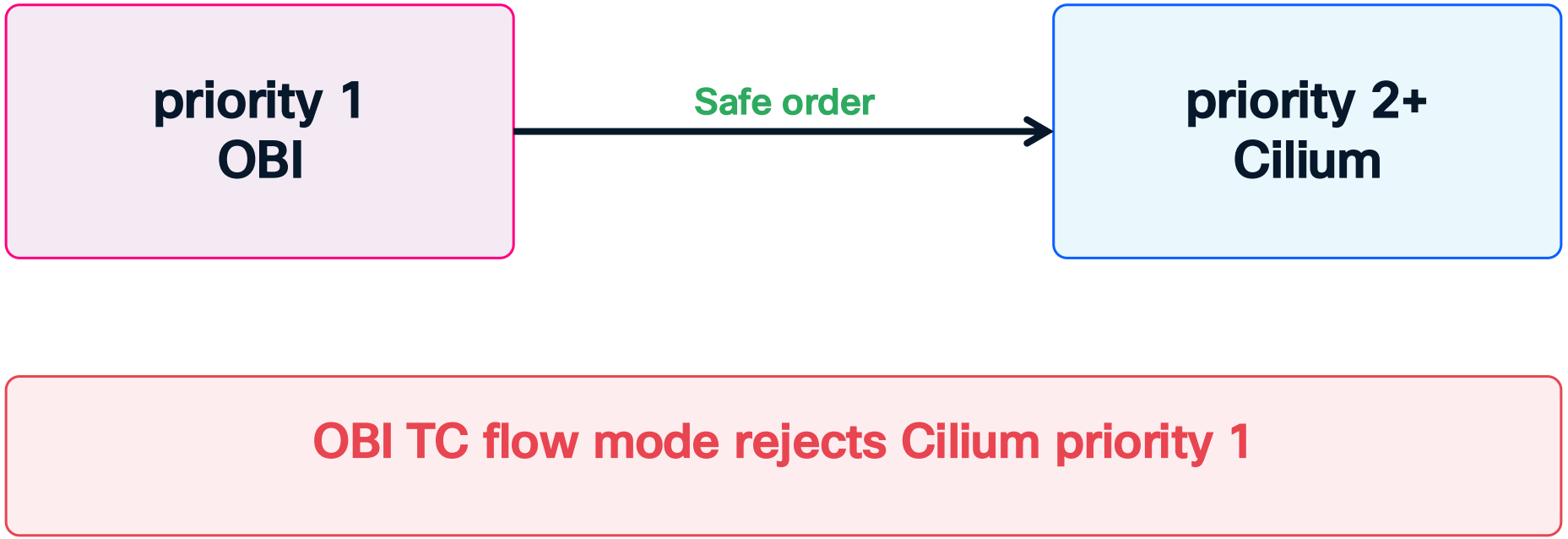
- TCX keeps both programs in one ordered list.
- Confirm TCX in the agent logs on the running node.
- Test the request and check that its telemetry arrives.

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Traditional TC attachment needs a priority contract

Lower numeric priority runs first.



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Attachment demo: TC priority changes the outcome

Legacy TC: one priority change, different OBI outcome

Actual outputs from two fresh kind runs, replayed for presentation

Priority 1: OBI guard stops startup

CILIUM

```
TCX: false  |  TC priority: 1
```

HOST VETH INGRESS, TC READBACK

```
filter protocol all pref 1 bpf chain 0 handle 0x1
cil_from_container-lxc469d2a5dd0b8 direct-action
not_in_hw id 17035 name cil_from_contai tag
9b5571acabfdad3a jited
```

OBI LOG

```
Cilium compatibility error: detected Cilium TC with
priority 1 - Cilium may clobber OBI
```

OBI ready: 0/1

nginx request: HTTP 200

Priority 2: both TC programs attach

CILIUM

```
TCX: false  |  TC priority: 2
```

HOST VETH INGRESS, TC READBACK

```
filter protocol all pref 1 bpf chain 0 handle 0xb330
tc/ingress_flow_parse direct-action not_in_hw id 17612
name obi_ingress_flo tag bffdda4af6cbbc55 jited
filter protocol all pref 2 bpf chain 0 handle 0x1
cil_from_container-lxc0e34d868fade direct-action
not_in_hw id 17543 name cil_from_contai tag
9b5571acabfdad3a jited
```

OBI AND HTTP REQUEST

```
OBI ready: 1/1
nginx request: HTTP 200
HTTP(subType=0) 200 GET /(/)
```

Scope: OBI v0.13.0 with optional `network.source: tc`. This is not an app-only OBI startup failure.

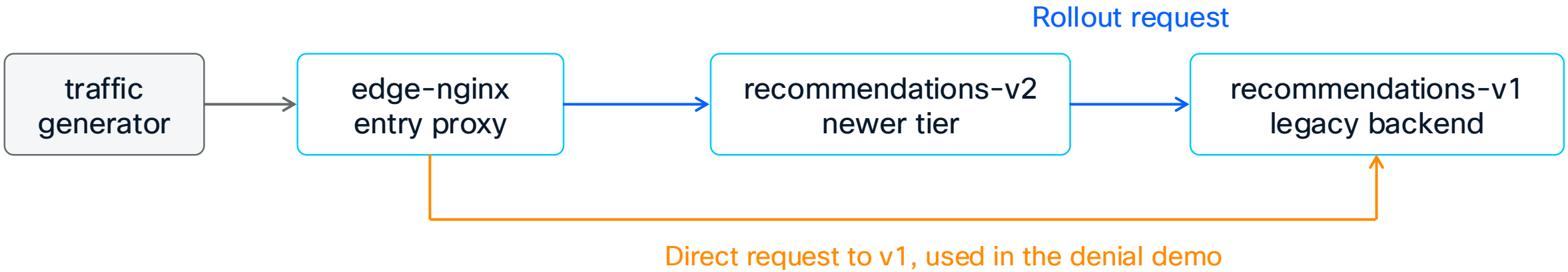
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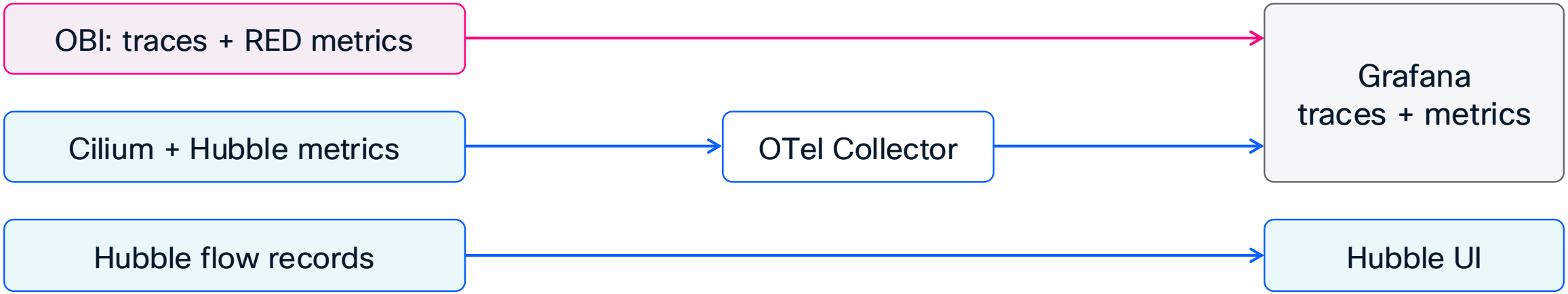
Demo
One request, two views

github.com/ajimenez1503/cilium-obi-demo

Demo traffic and telemetry paths



OBI observes all three services. Hubble observes their traffic.



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Coexistence proof

Demo 1: coexistence verification

LIVE CAPTURE / 26 SEP 2026

Read back attachment mode, OBI readiness, and telemetry endpoints

```
$ ./demo/verify.sh
Cilium runtime status
Attach Mode:            TCX
Hubble:                 Ok   Current/Max Flows: 4095/4095 (100.00%), Flows/s: 29.39   Metrics: Ok
Cilium configuration readback
enable-tcx: true
OBI images and readiness
ghcr.io/open-telemetry/opentelemetry-ebpf-instrumentation/ebpf-instrument:v0.13.0 ready=2 desired=2
attachment errors: none
Cilium metrics bridge
cilium-metrics-collector 1/1 available
cilium-agent metrics endpoint: 9962
hubble metrics endpoint: 9965
Coexistence checks passed
```

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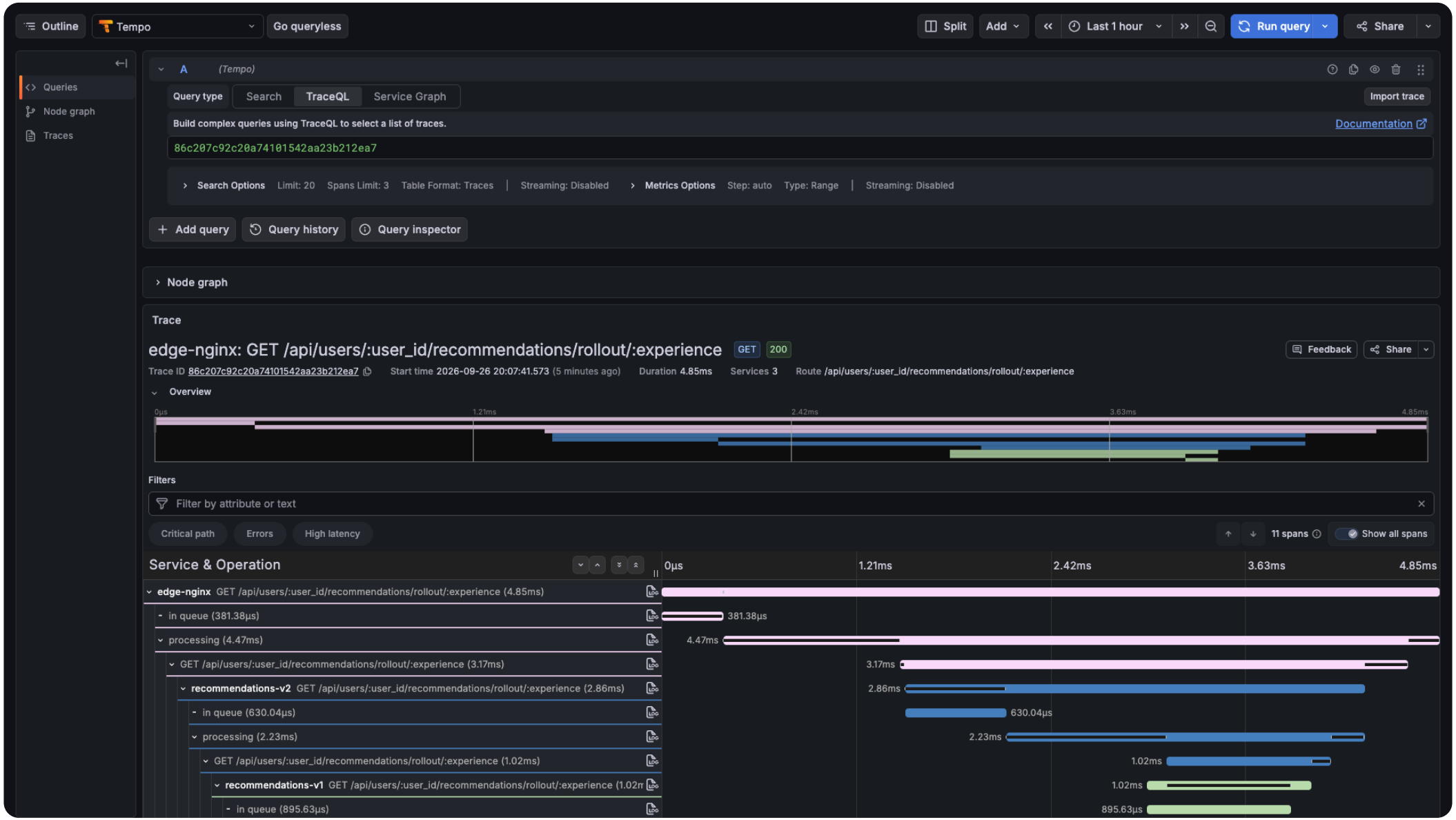
Signal correlation



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OBI Distributed Tracing



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Cilium Policy denial

The policy allows v2 to call v1. It blocks direct edge-nginx calls to v1.

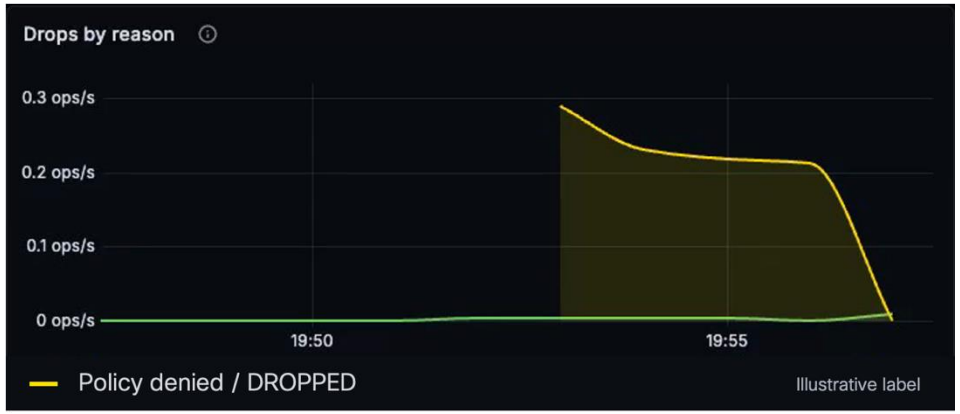
Demo 3: policy denial

LIVE CAPTURE / 26 SEP 2026

The application symptom and the network verdict describe the same failure

```
$ kubectl apply -f demo/policy-deny.yaml
ciliumnetworkpolicy.cilium.io/recommendations-v1-only-from-v2 created
$ curl --max-time 6 /api/users/42/recommendations/v1/homepage-hero

HTTP 000 / request timed out
$ hubble observe --verdict DROPPED
Sep 26 17:57:07.419: obi-nginx-example/edge-nginx-7b7c95dcc7-2xw4q:41828 (ID:6580) <> obi-nginx-
example/recommendations-v1-845444657b-x2qf5:8081 (ID:3636) policy-verdict:none INGRESS DENIED (TCP Flags: SYN)
Sep 26 17:57:07.419: obi-nginx-example/edge-nginx-7b7c95dcc7-2xw4q:41828 (ID:6580) <> obi-nginx-
example/recommendations-v1-845444657b-x2qf5:8081 (ID:3636) Policy denied DROPPED (TCP Flags: SYN)
Sep 26 17:57:08.123: obi-nginx-example/edge-nginx-7b7c95dcc7-2xw4q:53692 (ID:6580) <> obi-nginx-
example/recommendations-v1-845444657b-x2qf5:8081 (ID:3636) policy-verdict:none INGRESS DENIED (TCP Flags: SYN)
Sep 26 17:57:08.123: obi-nginx-example/edge-nginx-7b7c95dcc7-2xw4q:53692 (ID:6580) <> obi-nginx-
example/recommendations-v1-845444657b-x2qf5:8081 (ID:3636) Policy denied DROPPED (TCP Flags: SYN)
```



Grafana: aggregate drop spike

Hubble: Policy denied / DROPPED

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Measure the combined system

Benchmark scenarios and controls

Scenario	Cilium & Hubble	OBI
A Planned	Off	Off
B Measured	Flows (L3/L4)	Off
C Planned	Flows (L3/L4)	RED metrics only No traces or TCP propagation
D Measured	Flows (L3/L4)	RED metrics + traces TCP context propagation
E Planned	Flows (L3/L4) + L7 via Envoy	RED metrics + traces TCP context propagation

Same Cilium cluster, route, load, placement and backend

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B versus D: measured rehearsal results

Same cluster, route and load. B ran before D.

Metric	B: OBI off	D: OBI on	Change
Throughput (median)	19.77 req/s	19.73 req/s	−0.2%
p95 latency (median)	1,018 ms	1,020 ms	+2 ms
Failed requests	0 / 1,000	0 / 1,000	No change
OBI CPU (median)	0	0.013 cores	Added
OBI working set (median)	0	253 MiB	Added

D exported 7,210 spans.

Minimal p95 increase in this rehearsal: +2 ms (about +0.2%)

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Beyond latency: checks before a wider rollout

01	**CPU**	How much extra CPU do apps and agents use?
02	**Memory**	How much memory do agents and kernel BPF data use?
03	**Missing data**	Are Hubble events or exported signals being lost?
04	**Data volume**	How much telemetry do you send and store?

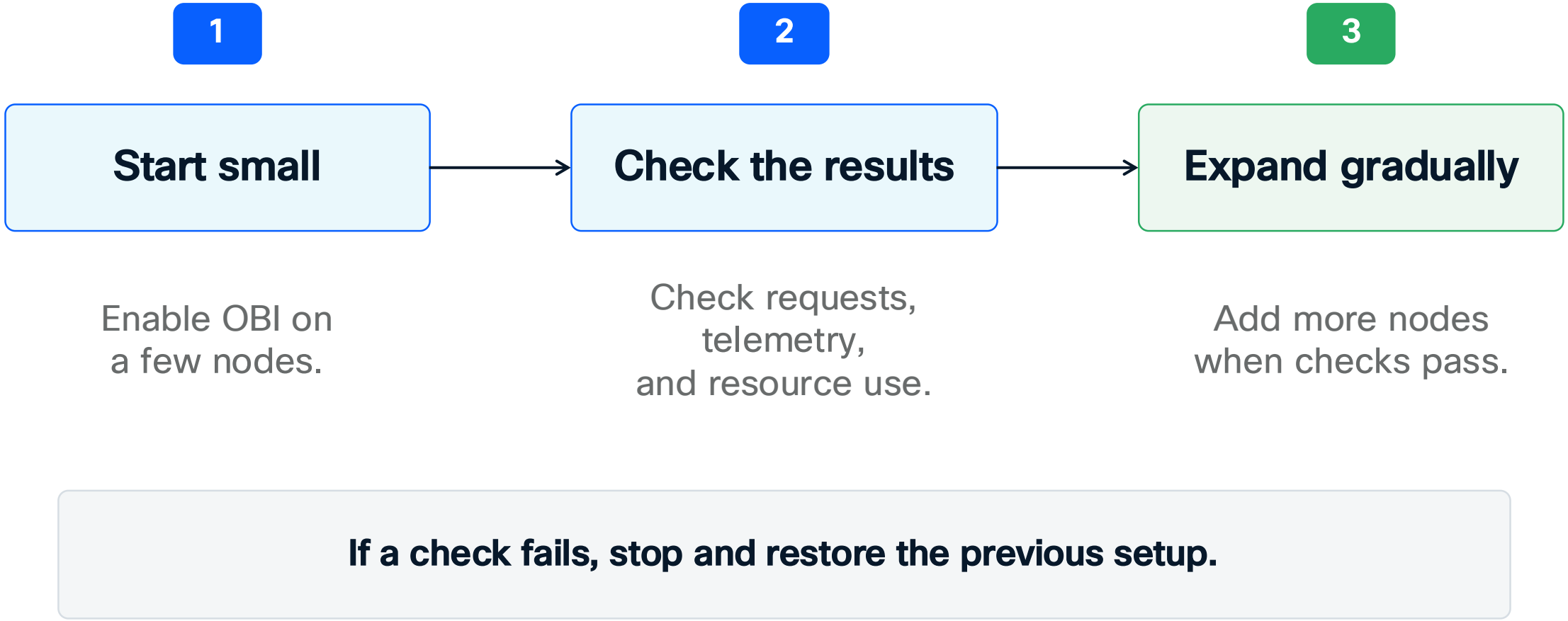
Set acceptable limits, then compare OBI off with OBI on.

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Production rollout

How to roll out OBI gradually



If a check fails, stop and restore the previous setup.

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Three rules for running both

01	**Verify traffic + order**	Check allowed and denied traffic. Verify TCX or legacy priorities.
02	**Correlate the signals**	Match time, workloads, direction, and port. Use OBI traces with Hubble flow evidence.
03	**Measure before rollout**	Compare CPU, memory, missing telemetry, and data volume before expanding.

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Questions?

Demo, dashboards, benchmark, and slides

github.com/ajimenez1503/cilium-obi-demo


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Appendix

Appendix: pinned TCX configuration

OBI v1.0.0 · Config v2

```
# Helm values
contextPropagation:
  enabled: true

# config.data.extensions.obi.capture
engine:
  propagation:
    context_propagation: all
  traffic:
    control_backend: tcx
```

Cilium v1.20.2

```
bpf:
  enableTCX: true
  datapathMode: veth

hubble:
  enabled: true
  relay:
    enabled: true
  ui:
    enabled: true
```

Backend selection does not prove an attachment. Inspect the running node.

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Appendix: legacy-safe and legacy-unsafe variants

Safe

```
OBI:
  traffic_control_backend: tc

Cilium:
  enableTCX: false
  extraConfig:
    bpf-filter-priority: "2"
```

Unsafe

```
OBI:
  traffic_control_backend: tc

Cilium:
  enableTCX: false
  bpf-filter-priority: 1
```

Do not change legacy priority live on an existing production cluster.

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Appendix: live verification commands

```
# Cilium state
kubectl -n kube-system exec ds/cilium -c cilium-agent -- \
  cilium-dbg status --verbose

kubectl -n kube-system get cm cilium-config -o \
  jsonpath='{.data.enable-tcx}'

# OBI startup decision
kubectl -n obi-nginx-example logs \
  ds/obi-opentelemetry-ebpf-instrumentation --all-pods=true

# Flow proof
hubble observe --namespace obi-nginx-example --follow
```

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Fast failure diagnosis

OBI TC mode refuses startup	mixed TCX and legacy, or both priority 1
Propagation disabled	tracefs mount missing on affected kernels
Traffic healthy, traces missing	coverage, loss, exporter, or queue problem
Hubble lost events rise	event volume or consumer capacity problem
Series count accelerates	route or workload label cardinality

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