
aws
COMMUNITY DAY
AOTEAROA

Scaling Kubernetes On AWS by Solving IP Exhaustion

Bo Tu | 18th Sep, 2025

aws COMMUNITY DAY AOTEAROA

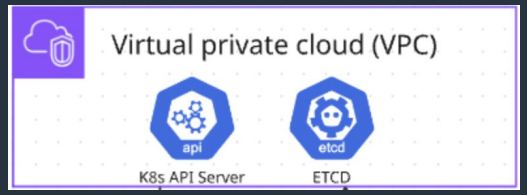
Bo Tu

- *9 years Senior Engineer @ Xero Platform team, using AWS with a focus on Kubernetes and CI/CD*
- *on-call*

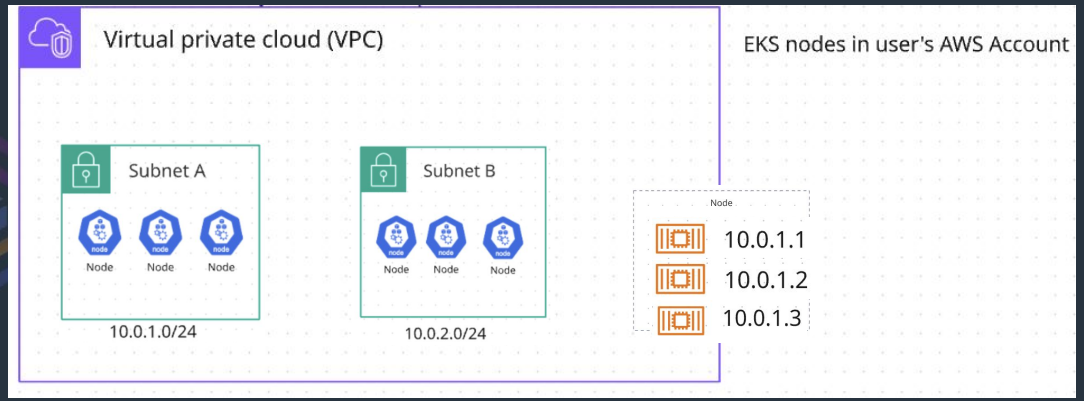
Agenda

- Quick recap of Networking for EKS
- Pain points : IP exhaustion
- Short-term solutions for immediate relief
- Alternative strategies

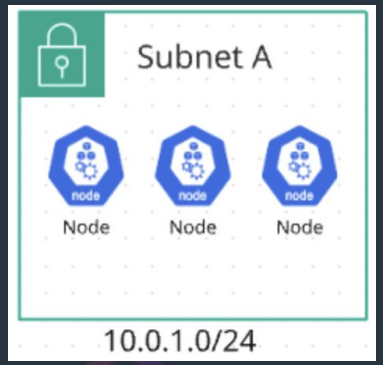
Quick recap of Networking for EKS



EKS ControlPlane in managed AWS Account

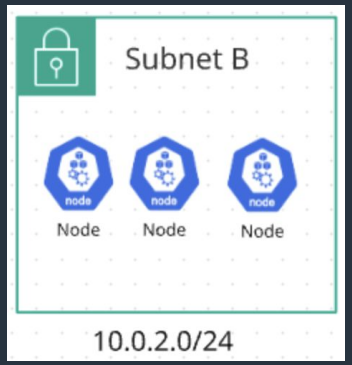


Pain points: IP exhaustion



2^8 - 3 = 251 IPs

251 x 2 = 502 IPs



Pod

Failed to create pod: failed to assign an IP address to container

https://ap-southeast-2.console.aws.amazon.com/vpcconsole/home?region=ap-southeast-2#SubnetDetails:subnetId=subnet-03a08be9e555fe530

Import favourites | xero-appserver/co... | CAT-6384 Update... | Application Server... | [Immortal-Engines... | LastPass - Sign In | Meet - Autobots T... | Meet - nri-prom is... | 12

aws Search [Option+S] Asia Pacific (Sydney) xero-ps-k8s-poc (0764-6238-4993) Xero-EKS/bo.tu

S3

VPC > Subnets > subnet-03a08be9e555fe530

VPC dashboard

EC2 Global View

Filter by VPC

Virtual private cloud

- Your VPCs
- Subnets
- Route tables
- Internet gateways
- Egress-only internet gateways

subnet-03a08be9e555fe530 / Application1-SubnetAppZoneServicesA

Actions

Details

Subnet ID
subnet-03a08be9e555fe530

IPv4 CIDR
10.129.224.0/24

Availability Zone
apse2-az3 (ap-southeast-2a)

Network ACL
acl-062fb714d6750334f

Auto-assign customer-owned IPv4 address

Subnet ARN
arn:aws:ec2:ap-southeast-2:076462384993:subnet/subnet-03a08be9e555fe530

Available IPv4 addresses
9

Network border group
ap-southeast-2

Default subnet
No

State
Available

IPv6 CIDR
–

VPC
vpc-0bee5a0e9a54147f4 | poc-ipv6

Auto-assign public IPv4 address
No

Outpost ID

Block Public Access
Off

IPv6 CIDR association ID
–

Route table
rtb-09c0f39b1b36a1780 | Application1-rtAppZoneServicesTier

Auto-assign IPv6 address
No

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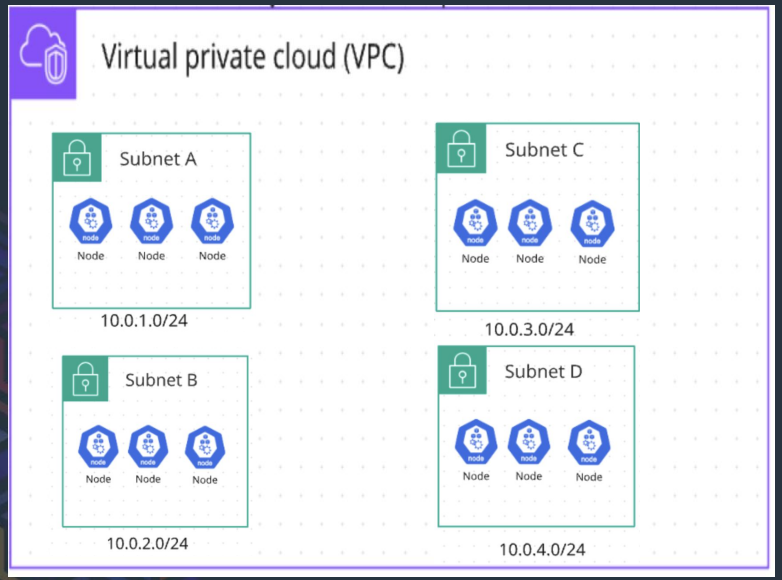
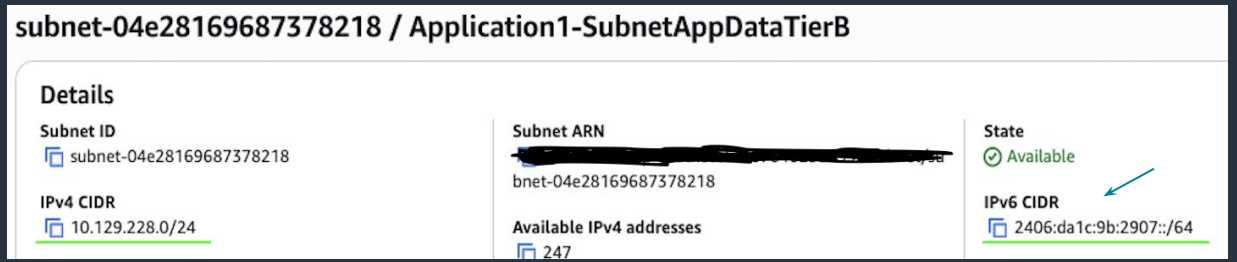
```
external-dns-6.5.3.tgz                                  test3.sh
go                                                      test5
good                                                    test6
good.yaml                                               test88
gpu.yaml                                                test99
helm                                                    testdev.txt
immortal-engines-test.yaml                              tmp1
immortal-engines.yaml                                   token
ingress.yaml                                            uat
Install-Package                                         uat-dev
inventory.yaml                                          uat-dev.yaml
ip-2a.txt                                               uat-pod.yaml
ip-2b.txt                                               us-east-2
ip-2c.txt                                               usb
kiam-server-debug.log                                   usw2svc
bash-3.2$ k get deploy
NAME               READY     UP-TO-DATE   AVAILABLE   AGE
nginx-deployment   220/220   220          220         40h
bash-3.2$
```

Short-term solution for immediate relief

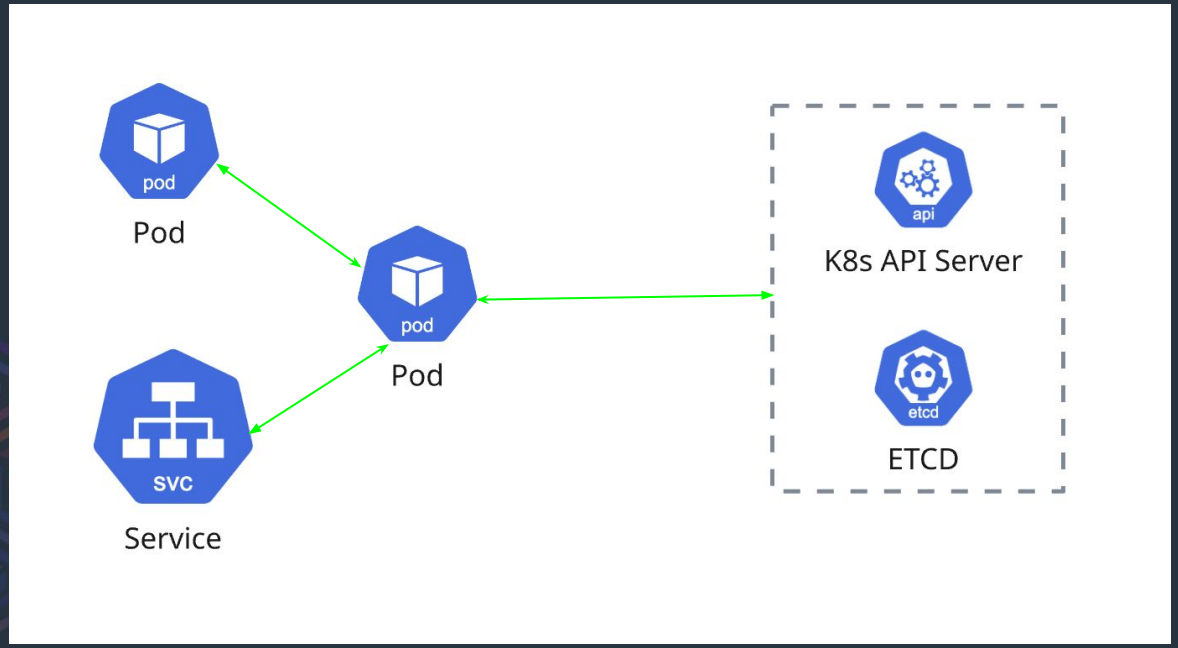


- Easy to implement
- Update workloads' security groups
- Update VPC peering / routing rules to include the new subnets
- Only delays the issue

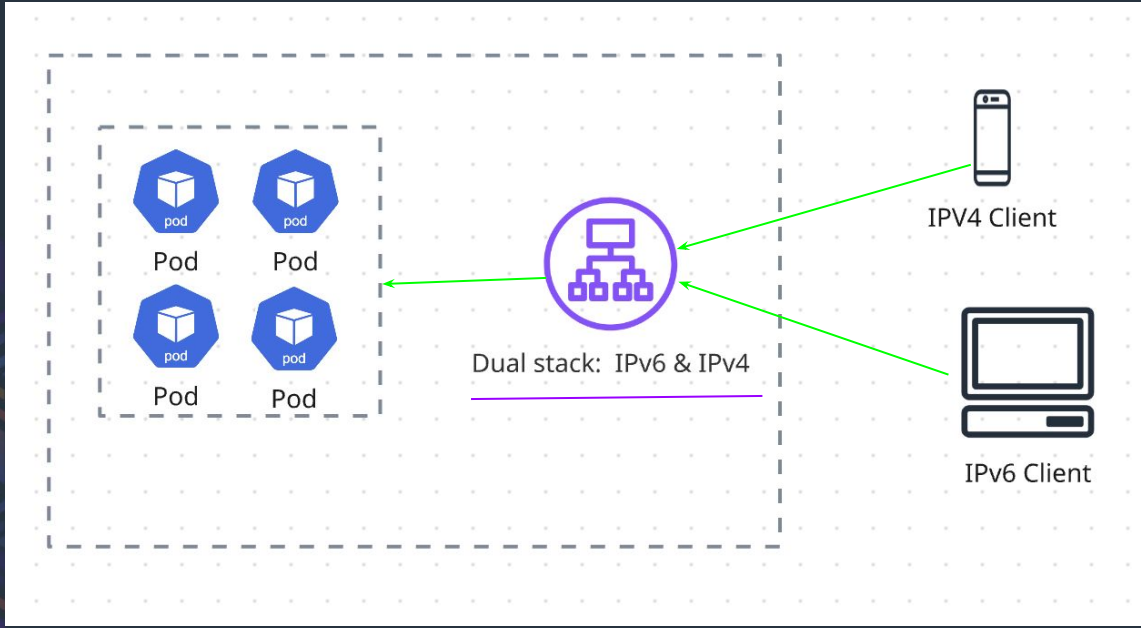
Alternative solutions - IPv6 EKS cluster



Alternative solutions - IPv6 EKS cluster



Alternative solutions - IPv6 EKS cluster



https://ap-southeast-2.console.aws.amazon.com/eks/clusters/ipv6-poc-automode?region=ap-southeast-2&selectedTab=cluster-networking-tab

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S3

Amazon Elastic Kubernetes Service > Clusters > ipv6-poc-automode

Amazon Elastic Kubernetes Service

- Dashboard New
- Clusters
- Settings
  - Dashboard settings New
  - Console settings
- Amazon EKS Anywhere
  - Enterprise Subscriptions
- Related services
  - Amazon ECR
  - AWS Batch

Documentation

ipv6-poc-automode

Delete cluster | Upgrade version | Monitor cluster

End of standard support for Kubernetes version 1.32 is March 23, 2026. Upgrade

Cluster info Info

Status	Kubernetes version Info	Support period	Provider
Active	1.32	Standard support until March 23, 2026	EKS

Cluster health	Upgrade insights	Node health issues
0	4	0

Overview | Resources | Compute | Networking | Add-ons 1 | Access | Observability | Update history | Tags

Networking

Manage

VPC Info | Subnets | Cluster security group Info | API server endpoint access Info

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bo.tu — bash — 155×10

~ — bash

```
bash-3.2$
```

Challenges for EKS IPv6

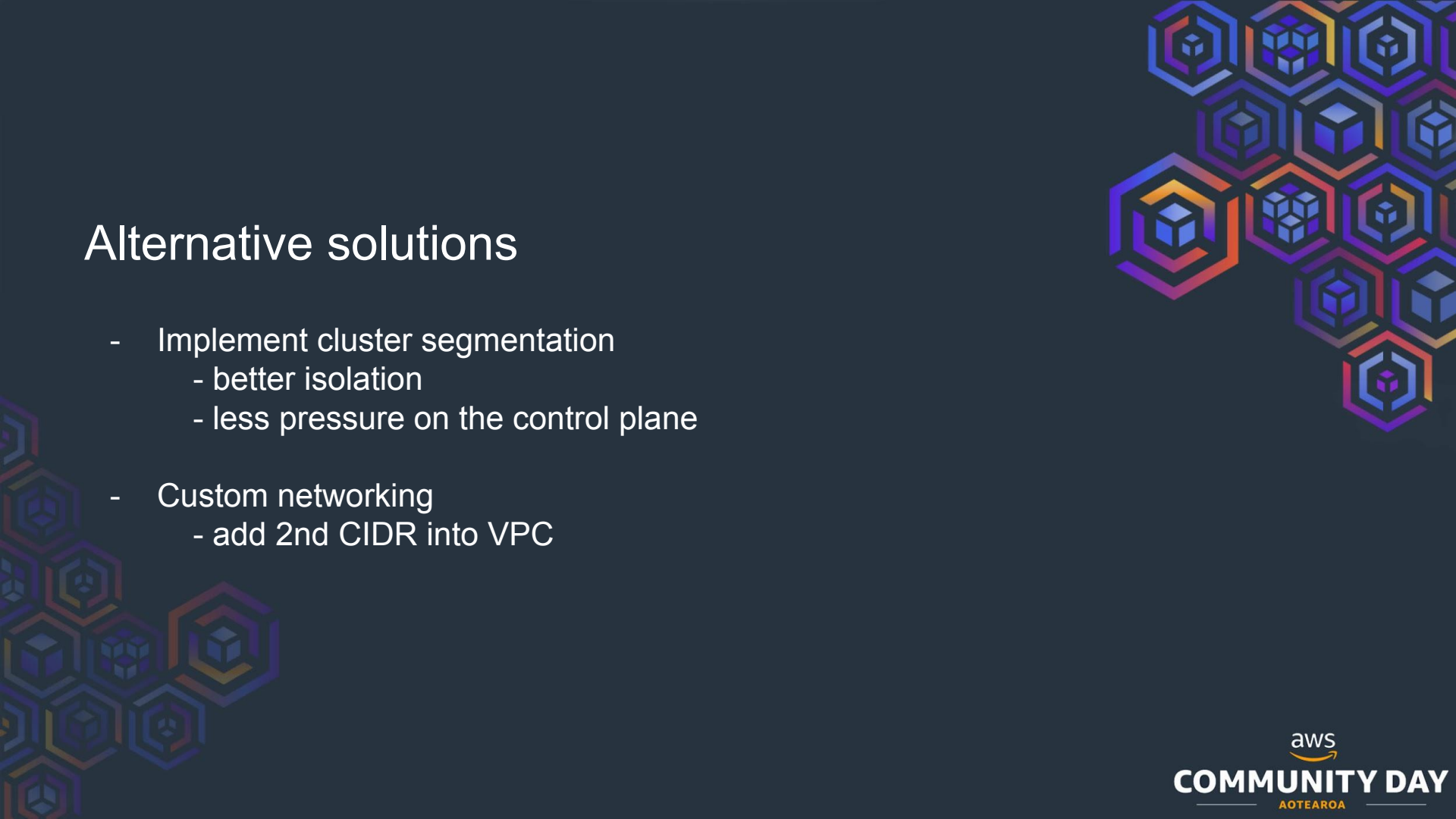
- Migration from IPv4 to IPv6 Clusters
  - IPv6 is only supported for new EKS cluster
  - Upgrading from IPv4 to IPv6 is not supported

- Critical components for IPv6
  - NGINX Ingress CLB → NLB?
  - Kiam deprecation

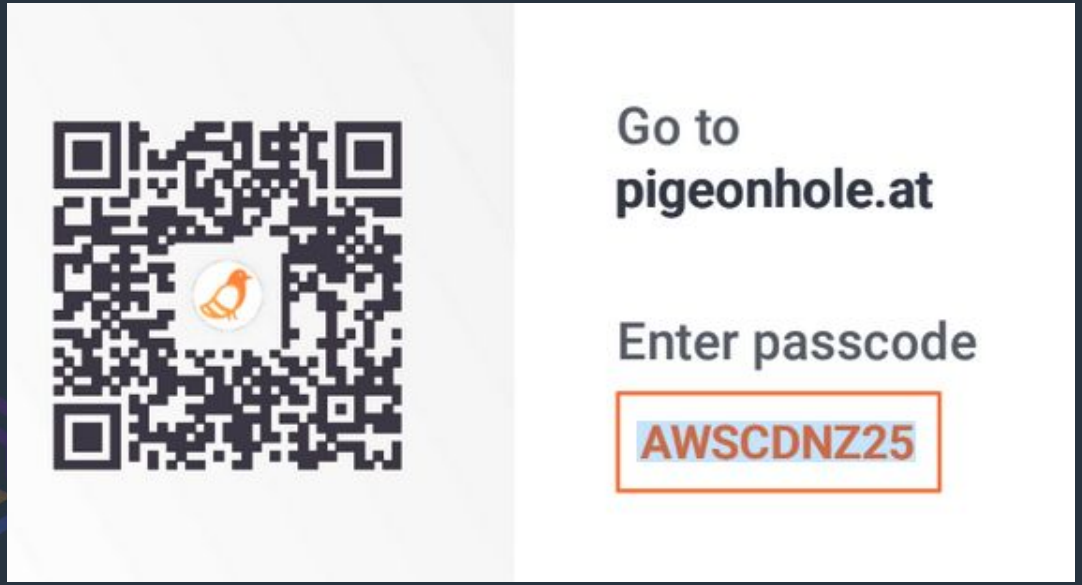
Alternative solutions

- Implement cluster segmentation
  - better isolation
  - less pressure on the control plane

- Custom networking
  - add 2nd CIDR into VPC



Thanks



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