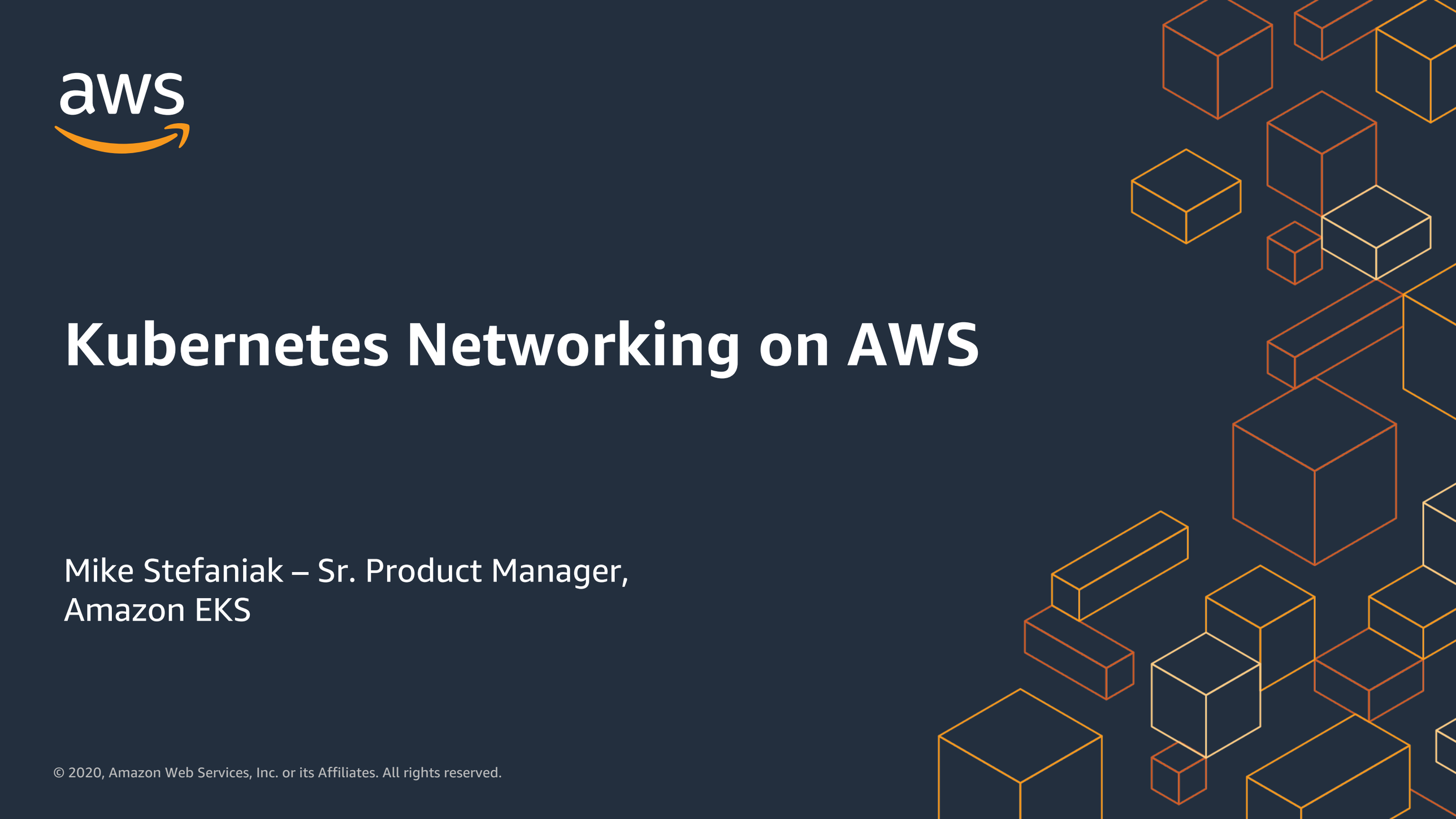

Kubernetes Networking on AWS

Mike Stefaniak – Sr. Product Manager,
Amazon EKS

Agenda

- Brief Kubernetes networking overview
- Amazon VPC CNI plugin architecture/features
- Demo (Security groups for pods)
- Roadmap

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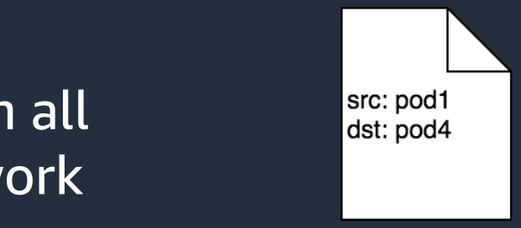
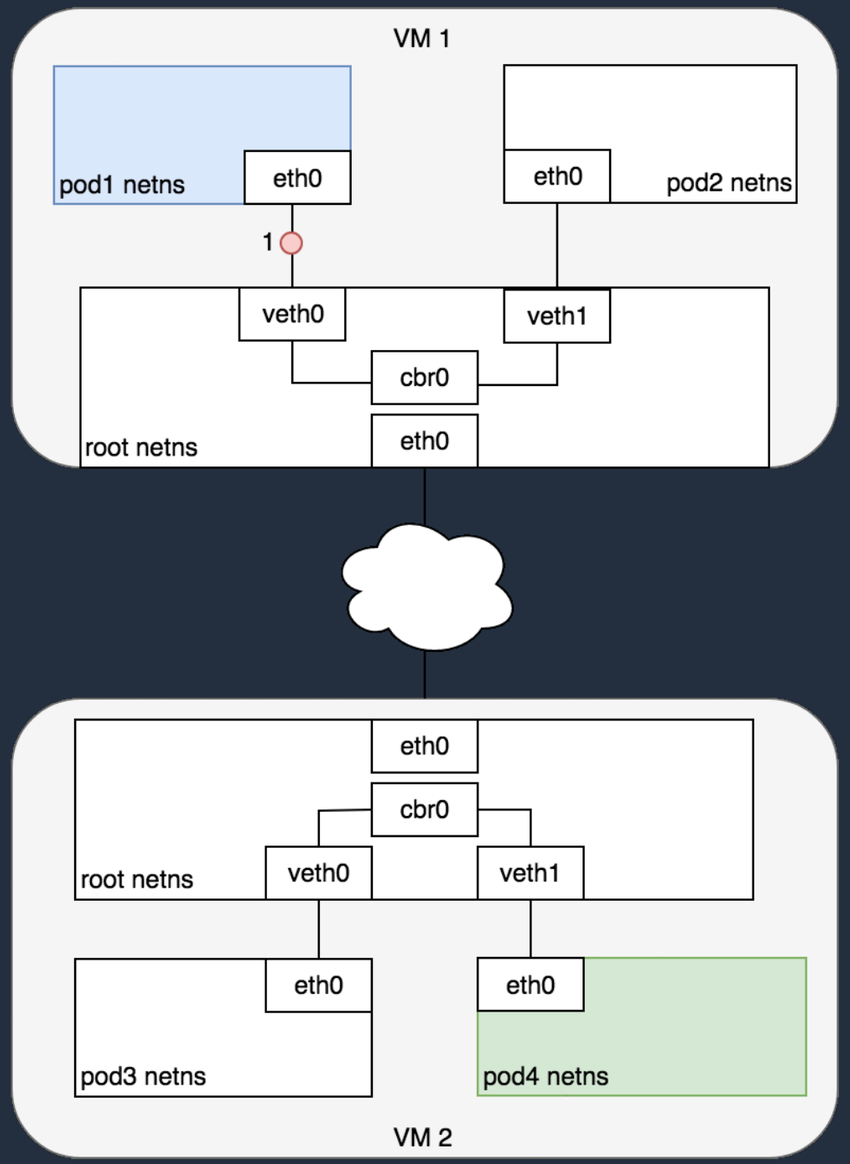
Networking in Kubernetes

Kubernetes Networking Model

1. All pods can communicate with all other Pods without using network address translation (NAT).
2. All nodes can communicate with all pods without NAT.
3. The IP that a pod sees itself as is the same IP that others see it as.

Kubernetes uses CNI (Container Networking Interface) as an interface between network providers and Kubernetes pod networking.





https://sookocheff.com/post/kubernetes/understanding-kubernetes-networking-model/

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Overlay networks

Pros

- Overlay based CNI plugins can run in cloud or on-premises
- Helps with IPv4 scarcity/fragmentation
- Pod density not tied to instance type

Cons

- Hard to debug
- No direct to endpoint communications
- Unable to rely on VPC firewalls
- Scaling challenges in large clusters
- Packet encapsulation requires node resources
- Increased network performance overhead

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Amazon VPC CNI Plugin

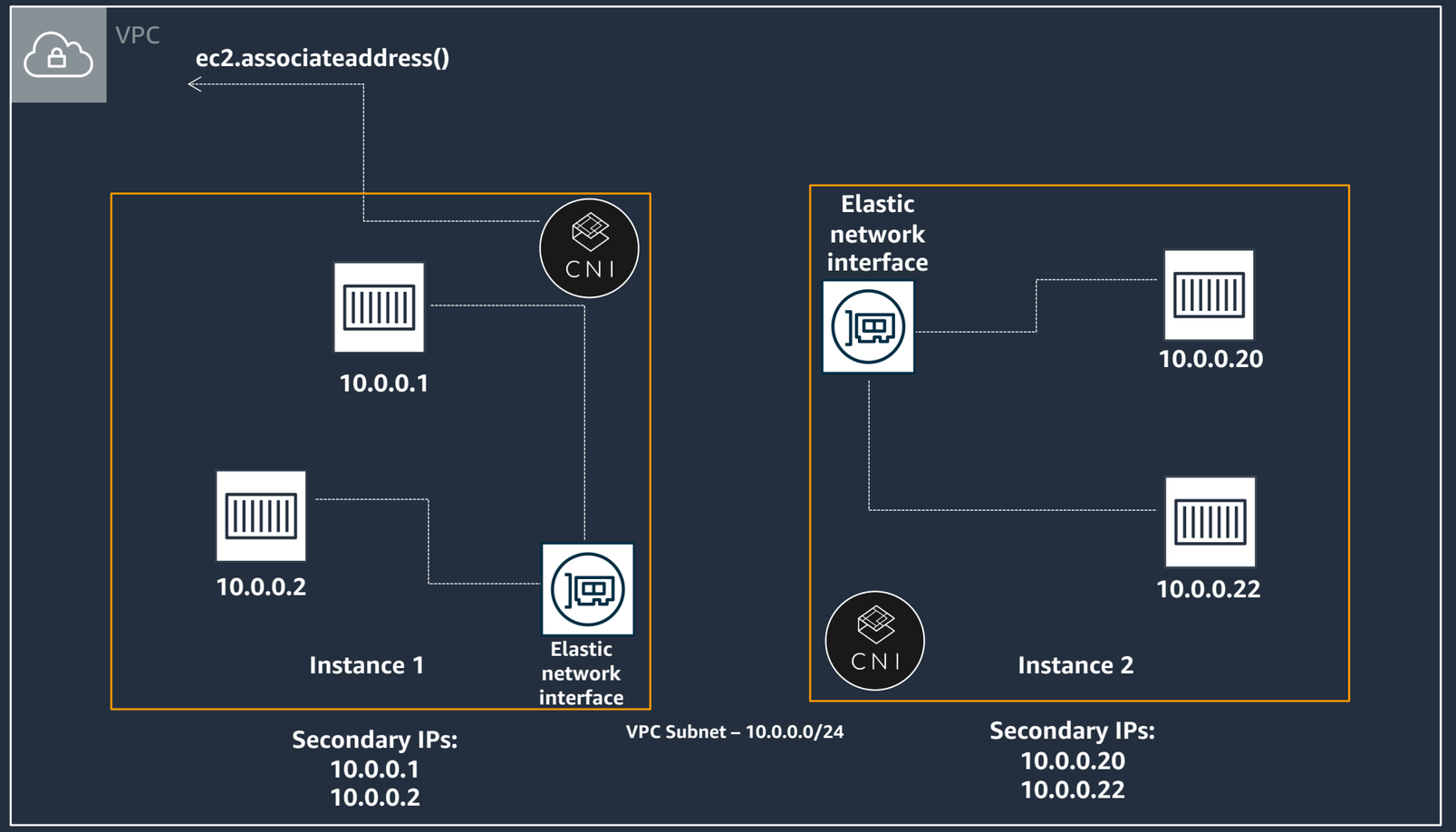
Native VPC networking performance

Pods have the same VPC address inside the pod as on the VPC

Simple, secure, scalable networking

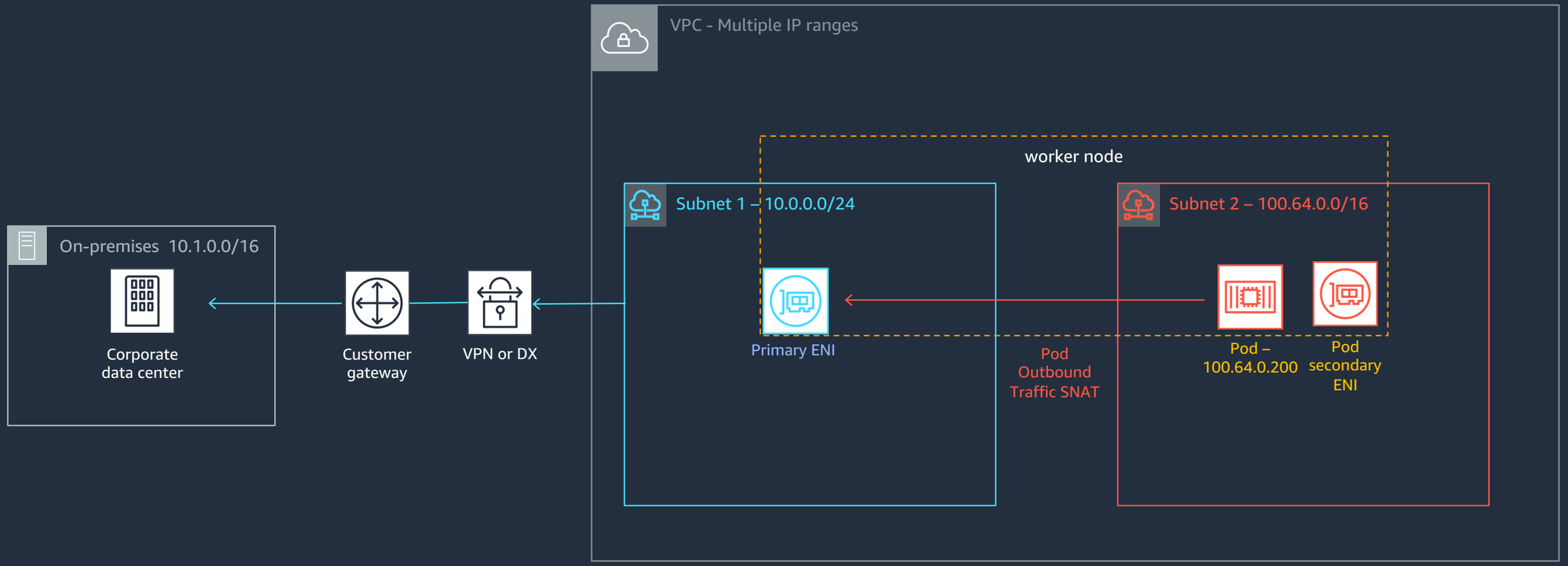
Open source and on GitHub

Amazon VPC CNI Plugin



https://github.com/aws/amazon-vpc-cni-k8s

Support for advanced networking architectures

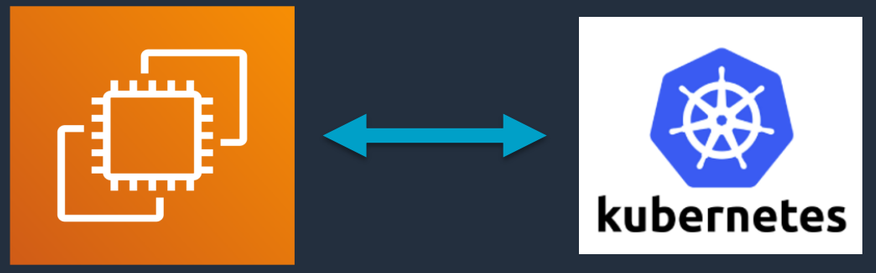


https://docs.aws.amazon.com/eks/latest/userguide/cni-custom-network.html

Coming soon: Security groups for pods

Use Cases

- Maintain security in multi-tenant clusters by running applications with different network security requirements on shared compute resources.
- Control network access from pods to AWS services outside your cluster.
- Keep existing security group rules and compliance programs when migrating applications from EC2 instances to Amazon EKS, without needing to re-implement rules as Kubernetes network policies.



Amazon EC2

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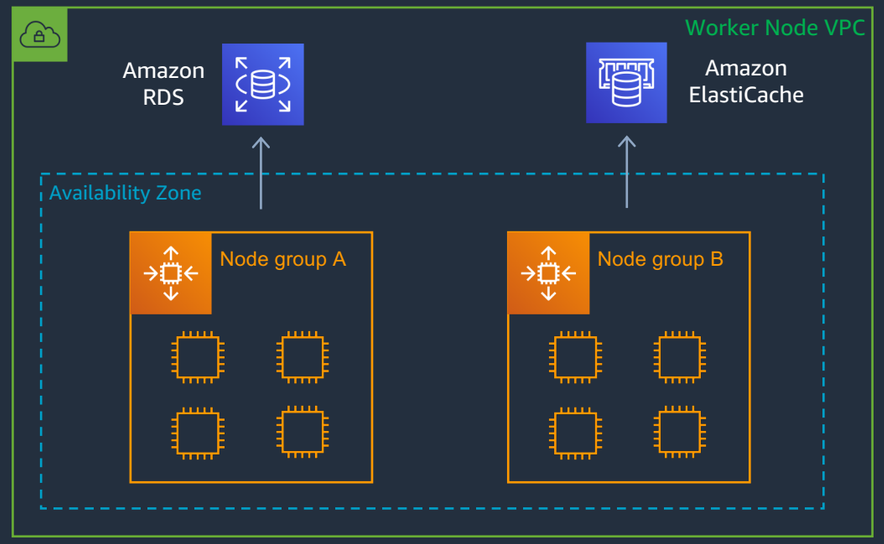
Simplified architecture

Without pod security groups



kubectl taint nodes nodename dedicated=groupA:NoSchedule

kubectl label nodes nodename dedicated=groupA

kubectl taint nodes nodename dedicated=groupB:NoSchedule

kubectl label nodes nodename dedicated=groupB

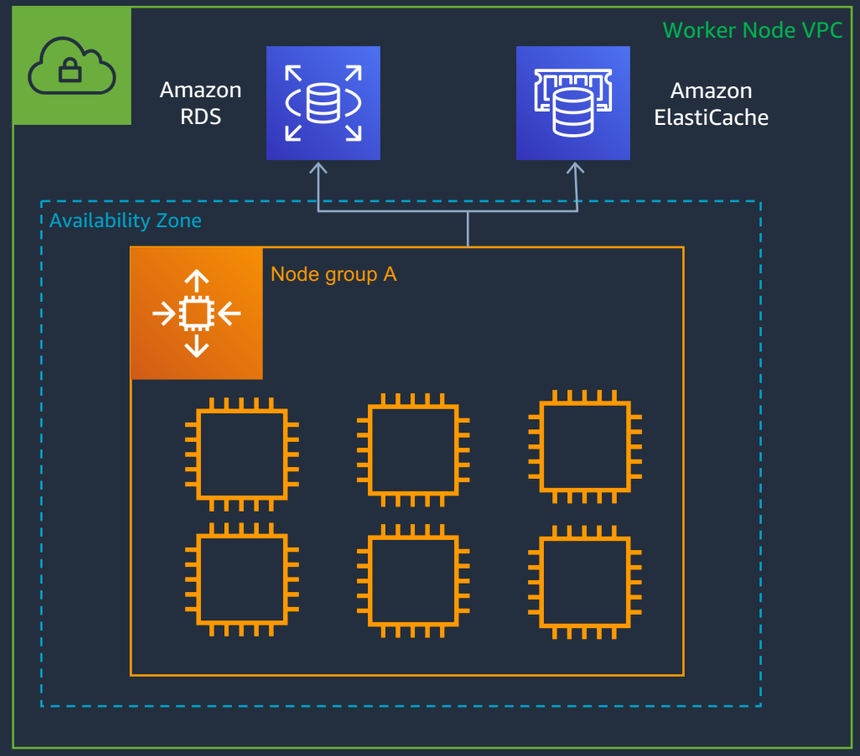
application A manifest

```
...
containers:
  - name: applicationA
    image: applicationA
tolerations:
  - key: "dedicated"
    operator: "Equal"
    value: "groupA"
    effect: "NoSchedule"
nodeSelector:
    dedicated: groupA
...
```

application B manifest

```
...
containers:
  - name: applicationB
    image: applicationB
tolerations:
  - key: "dedicated"
    operator: "Equal"
    value: "groupB"
    effect: "NoSchedule"
nodeSelector:
    dedicated: groupB
...
```

With pod security groups



application A manifest

```
...
containers:
  - name: applicationA
    image: applicationA
...
```

application B manifest

```
...
containers:
  - name: applicationB
    image: applicationB
...
```

Show me how it works!

Networking Roadmap

https://github.com/aws/containers-roadmap/projects/1

- Simplified CNI custom networking #867
- NLB IP targeting mode (Fargate) #981
- ALB ingress grouping #847
- Increased pod density #138
- Migrate L-IPAM daemon to VPC Resource Controller #866
- IPv6 support #835

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Where to learn more

Amazon EKS Documentation: Networking

Amazon VPC CNI Plugin

VPC CNI Plugin Proposal

Blog: De-mystifying cluster networking for Amazon EKS

Blog: Routable VPC IPv4 address conservation

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Thank you!

Leave any questions/suggestions in the chat or visit our virtual booth during KubeCon EU 2020!

Twitter/GitHub: @mikestef9