Cloud Native & SD-WAN:

Improving K8s Application Experience Over SD-WAN

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Agenda

- Kubernetes and SD-WAN
- The Cloud Native SD-WAN project
  - Architecture
  - Example
  - Components
- Q&A

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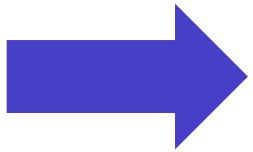

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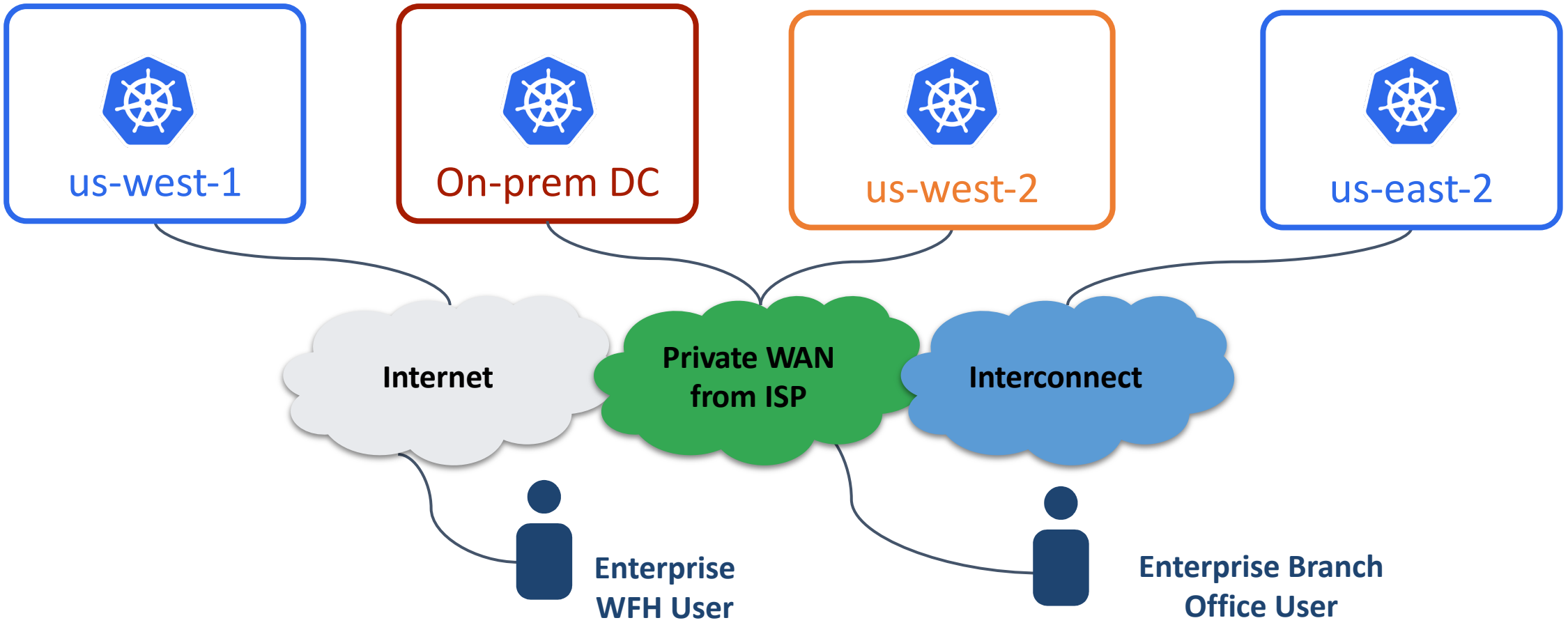
Kubernetes and WANs

Kubernetes has become a common layer to deploy apps.

But clusters may be deployed in many different environments across heterogeneous networks. The clusters may be homogeneous but the networks between them are not.



Challenges SD-WAN Solves

Challenges

- Applications/endpoints in many different networks
- Users/clients in many different networks
- Heterogenous connectivity between them

SD-WAN unifies an underlying set of networks as a single controllable and programmable WAN fabric. This creates:

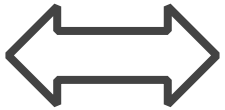
- Transport independence for clients and apps
- Application awareness for the network
- Centralized WAN control and optimization for NetOps
- Cross-network security and policy for SecOps
- Centralized network observability and monitoring for NetOps

Kubernetes and SD-WAN

Kubernetes Attributes

- App identity
- Zone/region
- Environment/provider
- Network
- Cluster
- App annotations
- IP:port
- App health

Policy



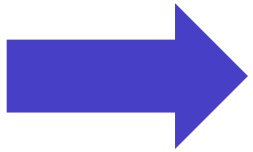
SD-WAN Attributes

- User/client/app identity
- User/client/app location
- Network path performance and health
- Network latency and bandwidth
- Network security policy

DevOps

NetOps

Agenda



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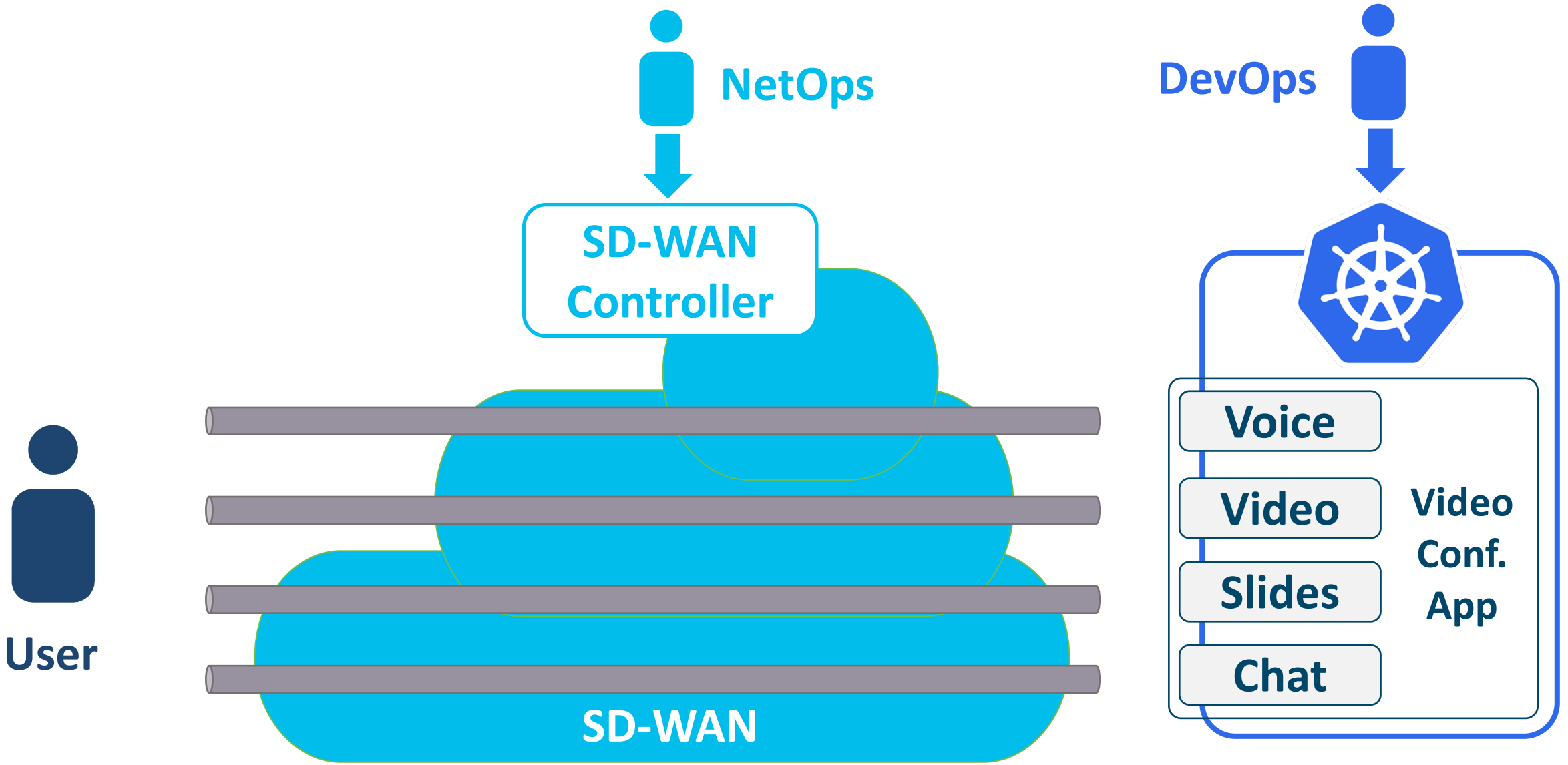
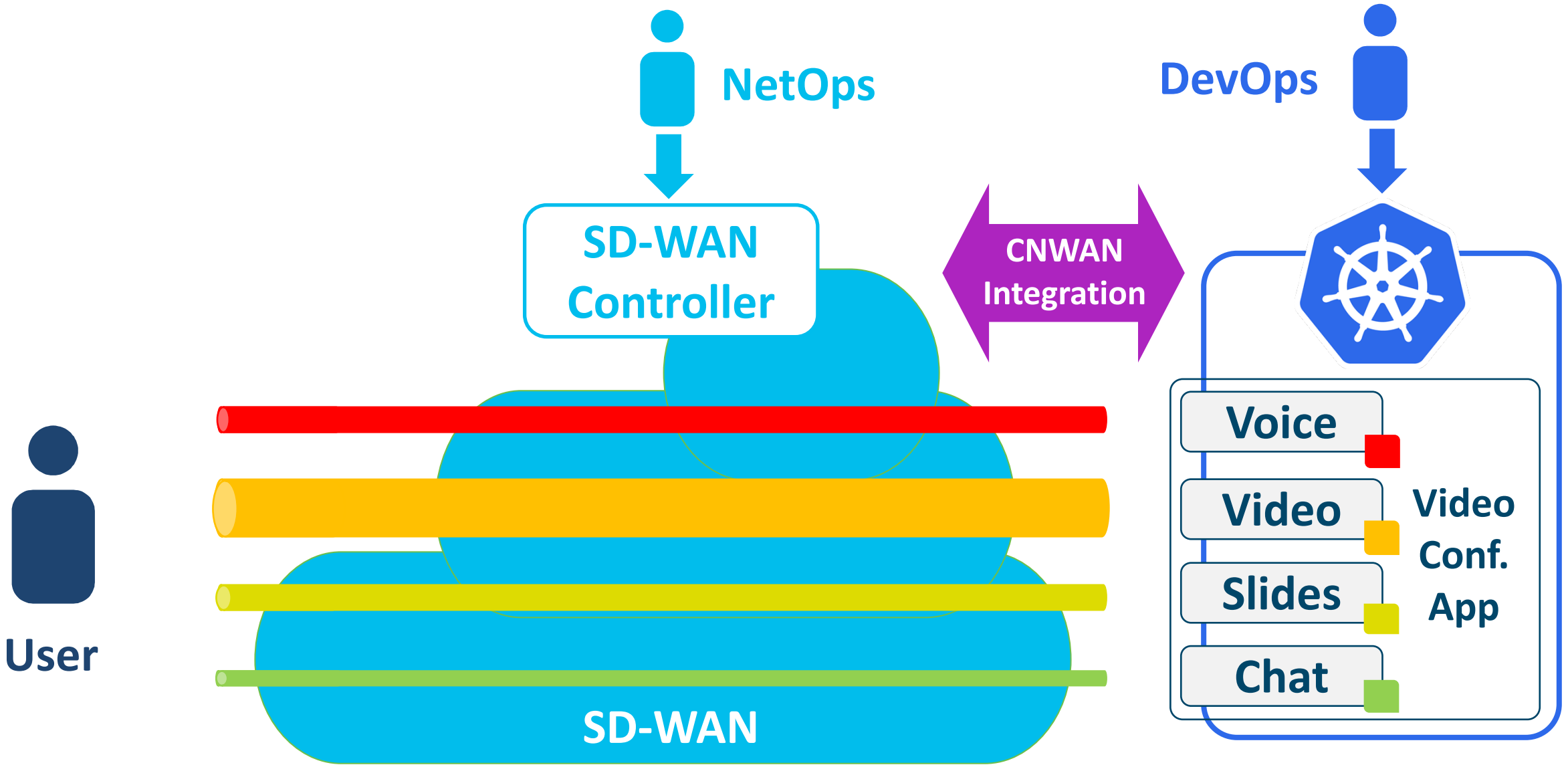
SD-WAN and K8s



SD-WAN and K8s Integration



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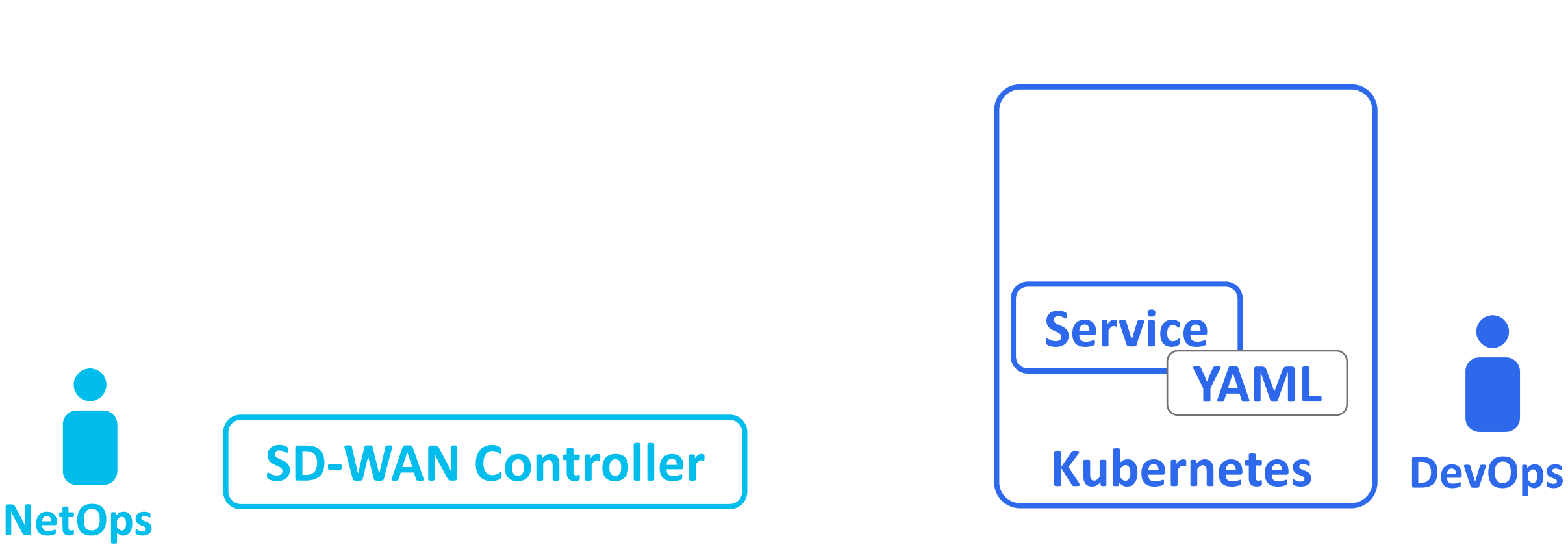
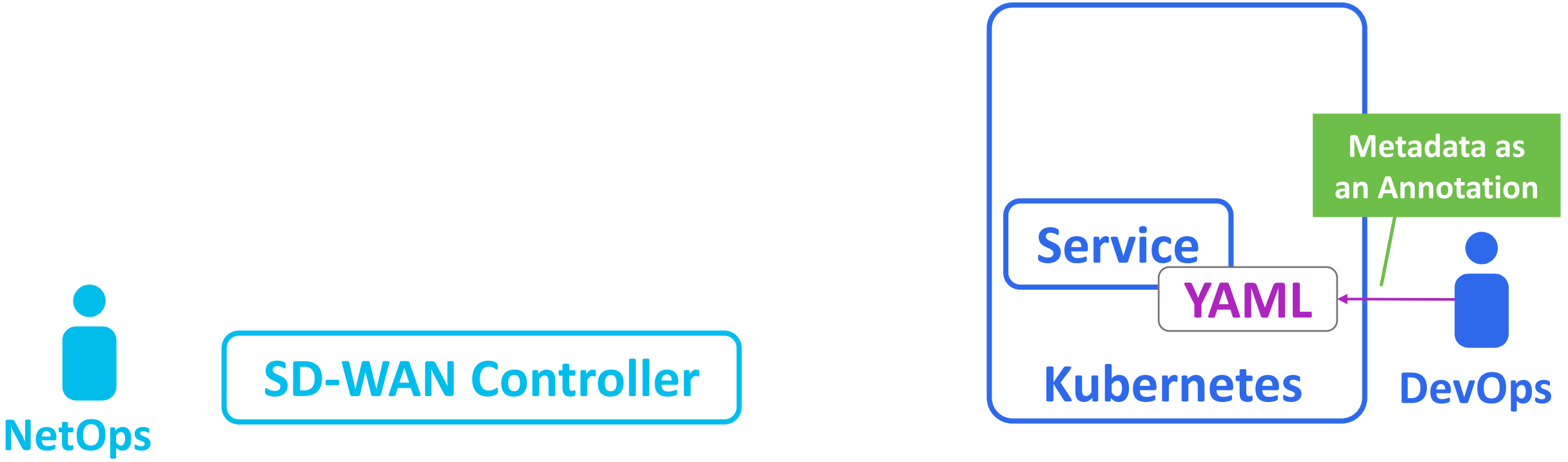
CNWAN Architecture



CNWAN Architecture



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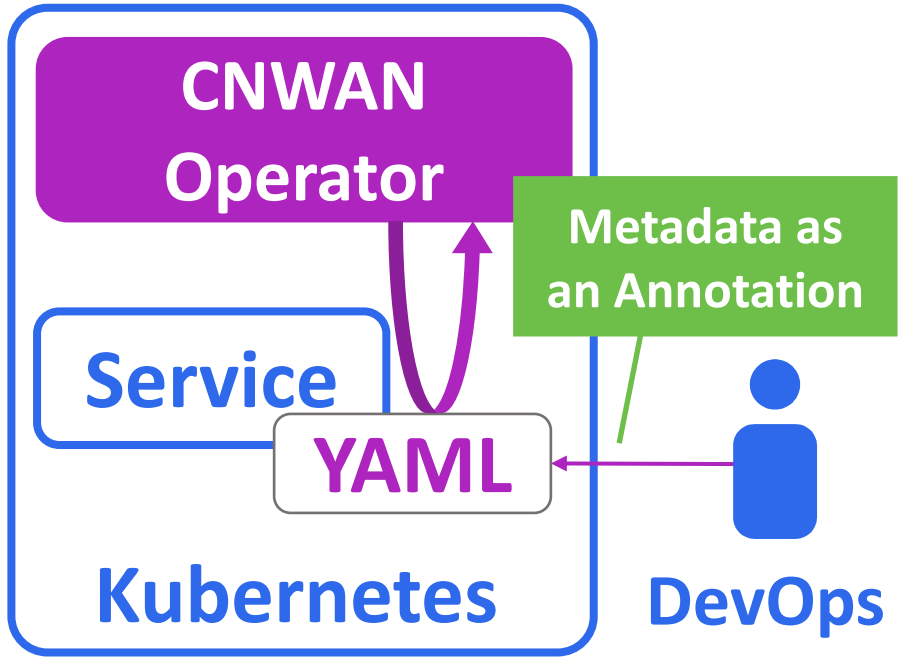

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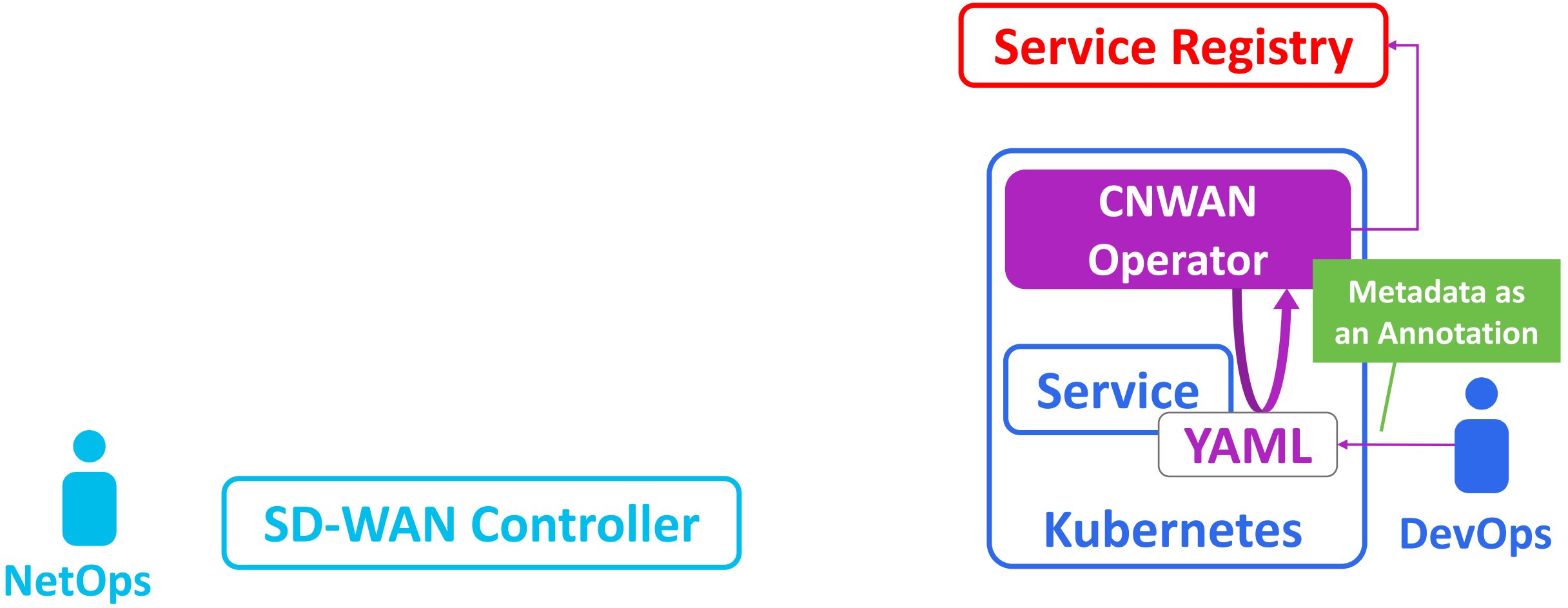

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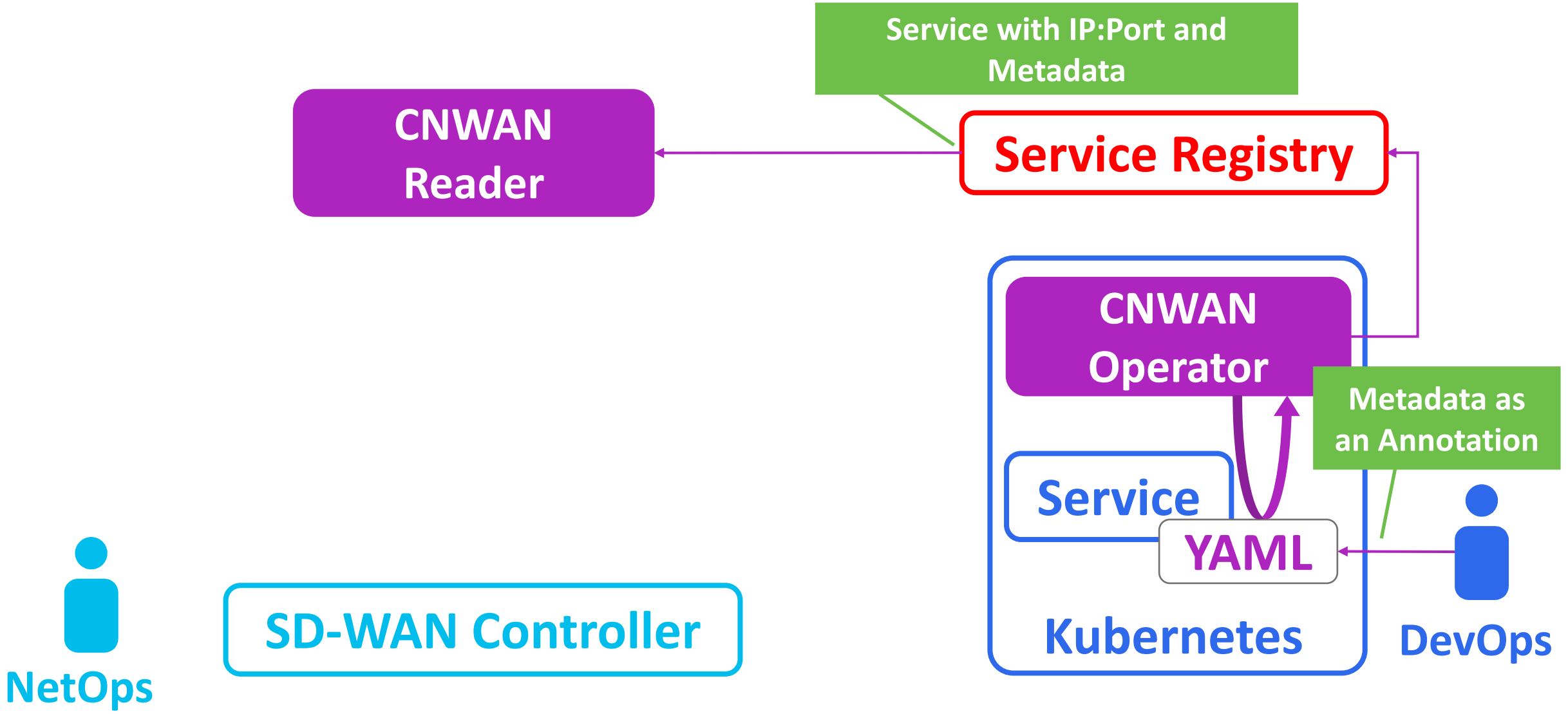

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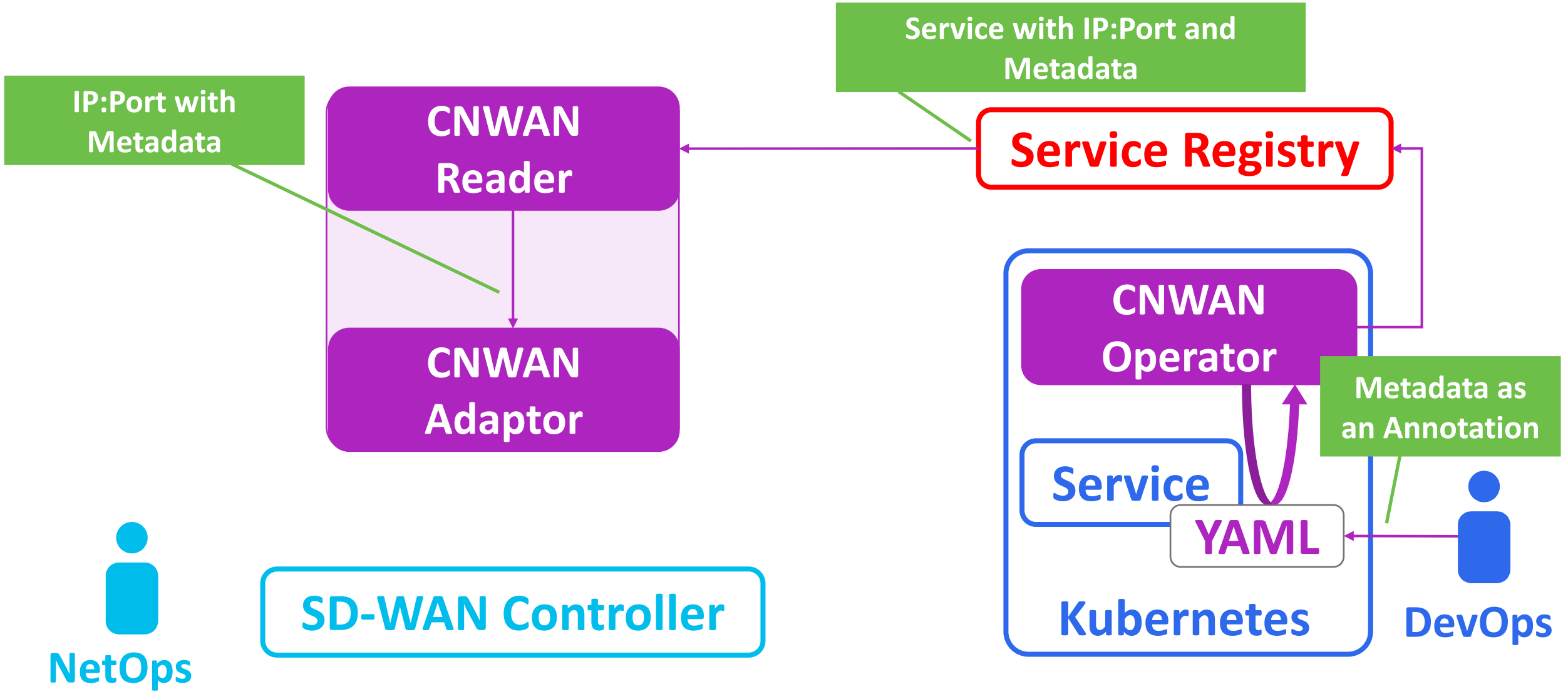

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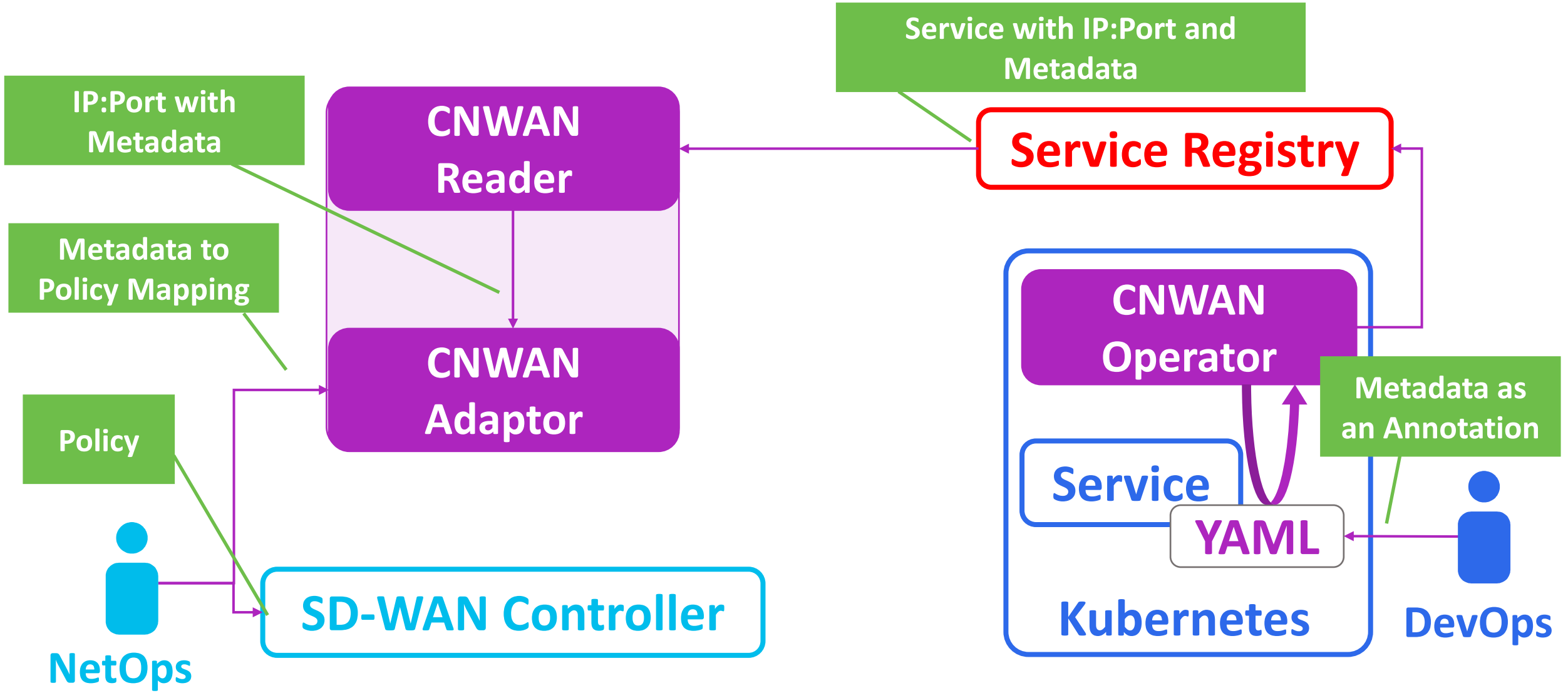

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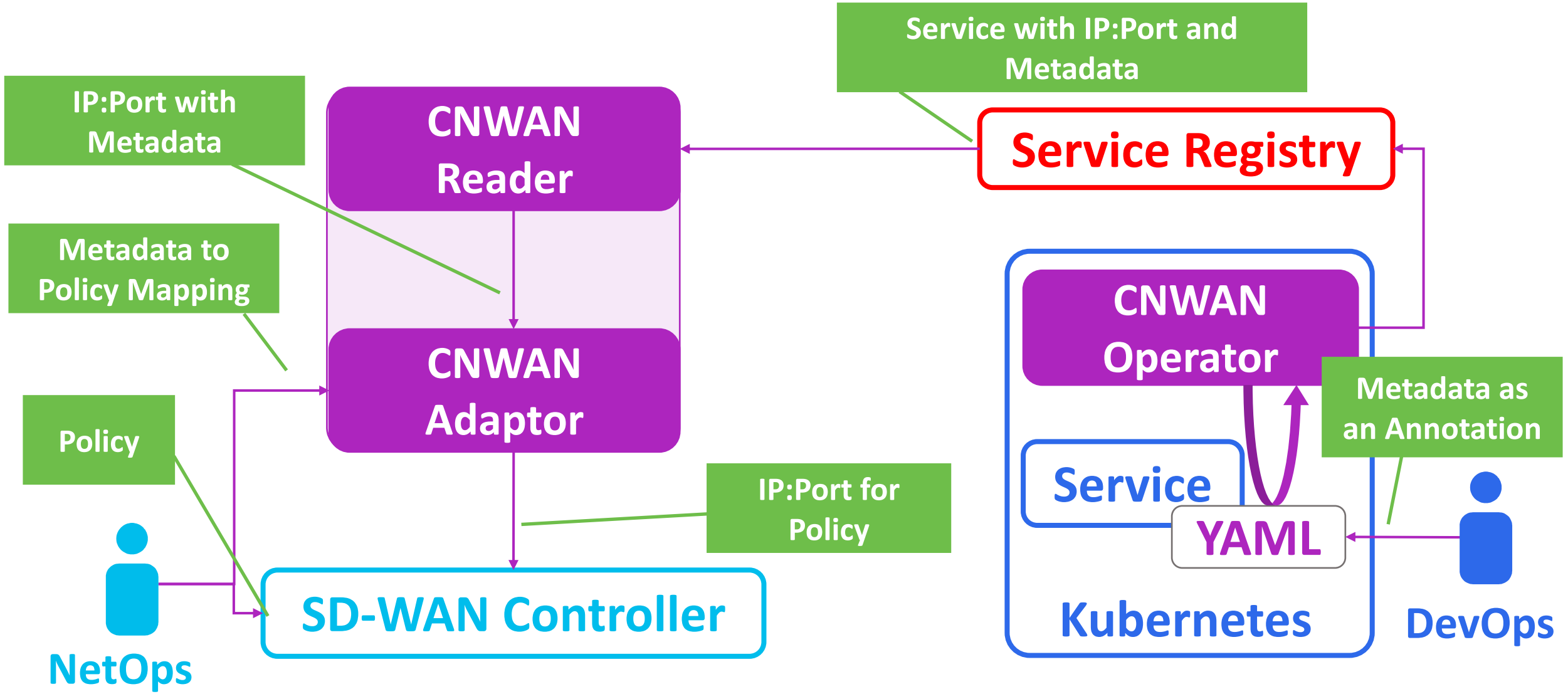

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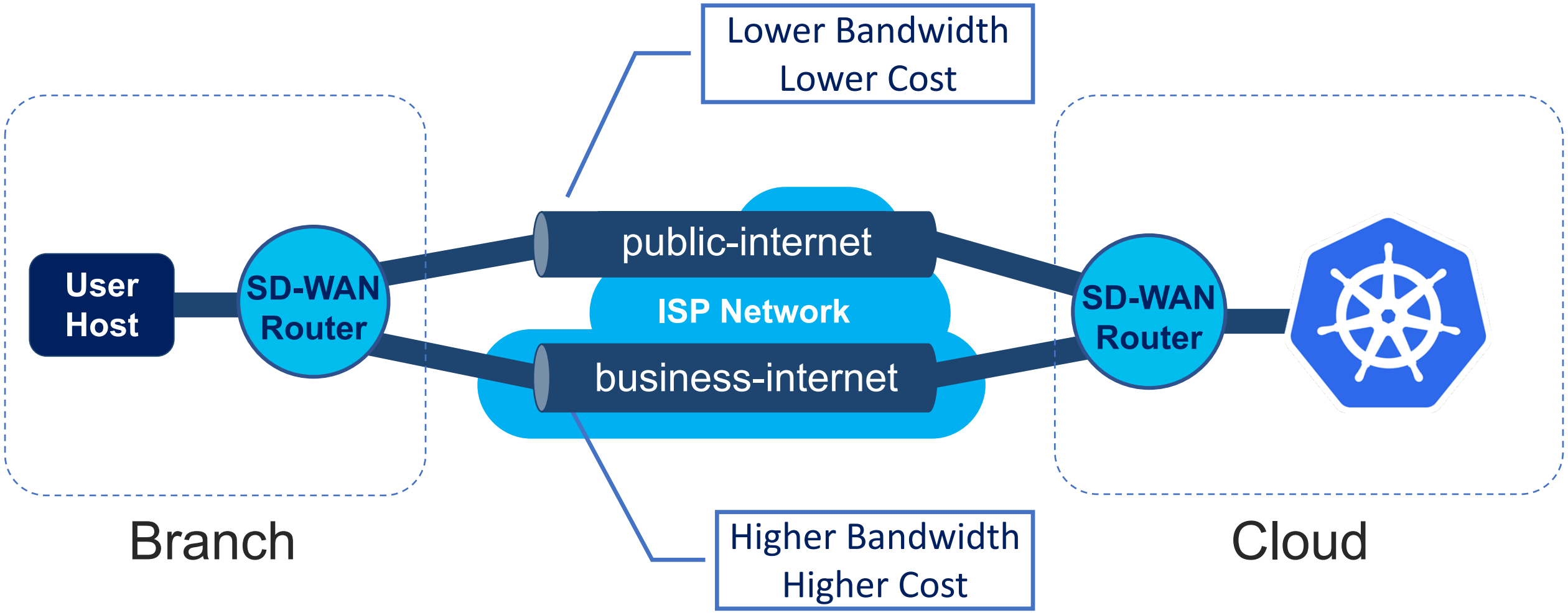
Putting it all together



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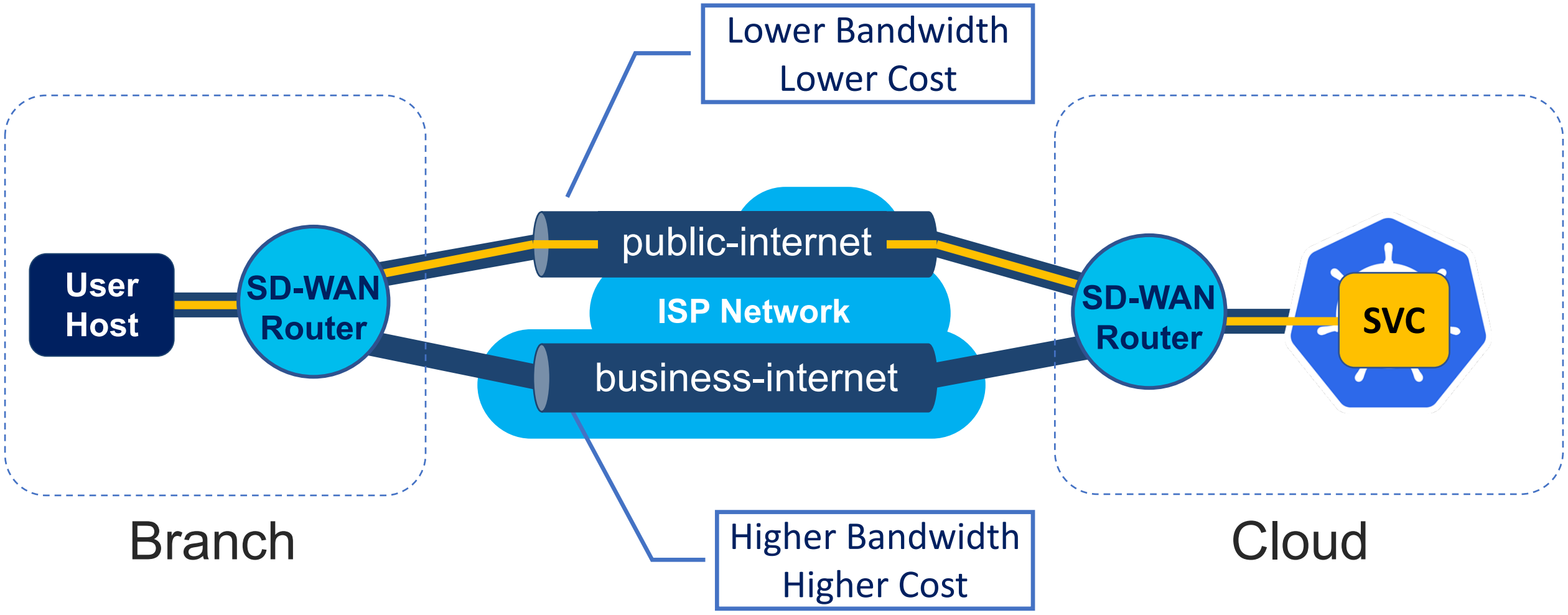

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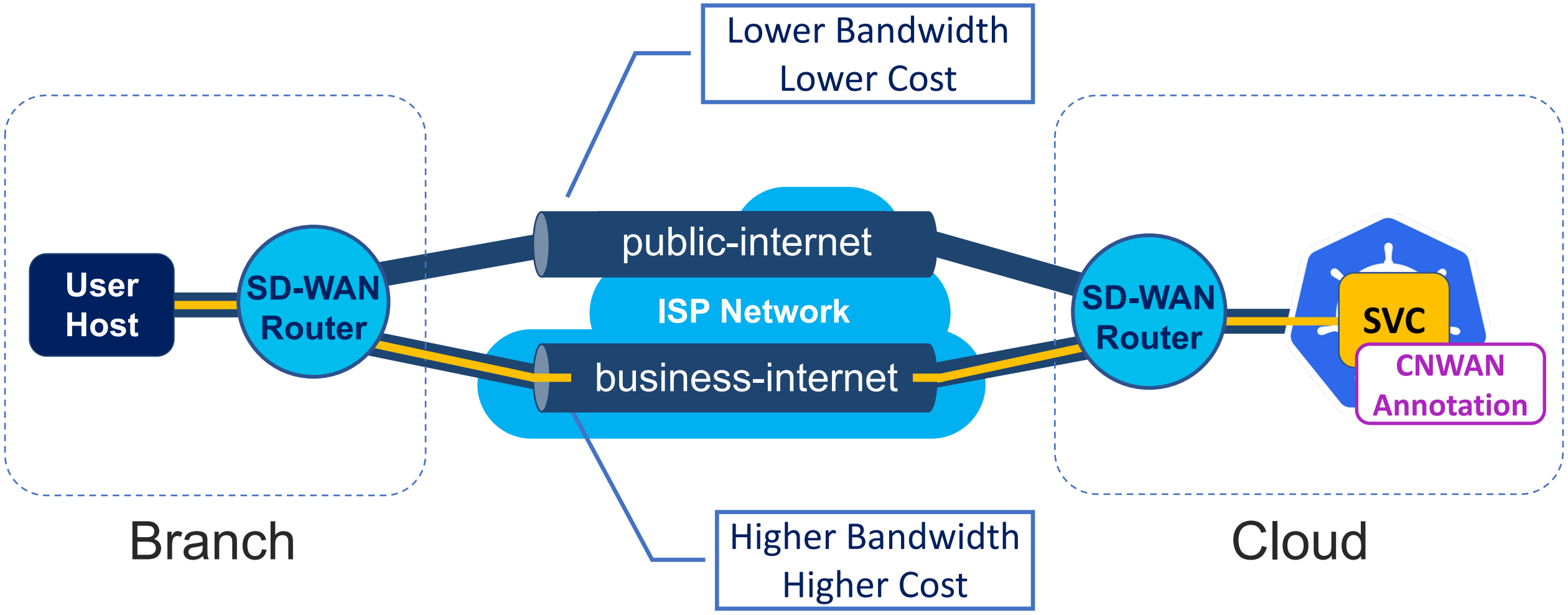

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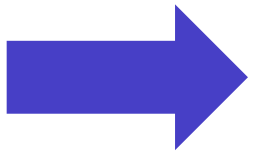
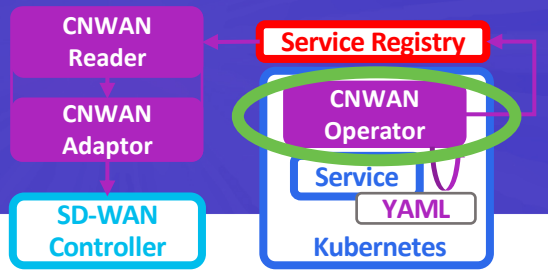


CNWAN Operator



KubeCon CloudNativeCon North America 2020 Virtual

Written in Golang (using kubebuilder)

Monitors Services in K8s looking for CNWAN Annotations

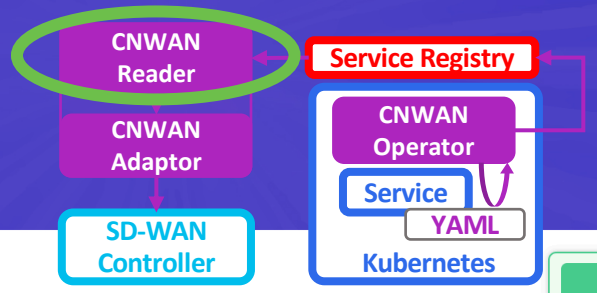
Registers Services and Annotations in a supported Service Registry:
- Google Cloud Service Directory
- DNS (ongoing)
- AWS Cloud Map (ongoing)

Installation via:
- kubectl (scripts provided)
- OperatorHub (ongoing)
- Helm (ongoing)

```yaml
apiVersion: v1
kind: Service
metadata:
  name: streamer
  annotations:
    cnwan.io/traffic-profile: "video"
spec:
  type: LoadBalancer
  selector:
    app: streamer
  ports:
  - port: 8080
    targetPort: 8080
    protocol: TCP
    name: http
```

https://github.com/CloudNativeSDWAN/cnwan-operator

CNWAN Reader



Written in Golang

Gets Service info from a supported Service Registry:
- Google Cloud Service Directory
- DNS (ongoing)
- AWS Cloud Map (ongoing)

Via a supported messaging mechanism:
- gRPC Polling
- Kafka Pub/Sub (ongoing)

Writes observed Service events (e.g. new service with certain annotation) to `/cnwan/events` API of configured Adaptor

POST `/events` Last observed events

Parameters | Try it out

No parameters

Request body required | application/json

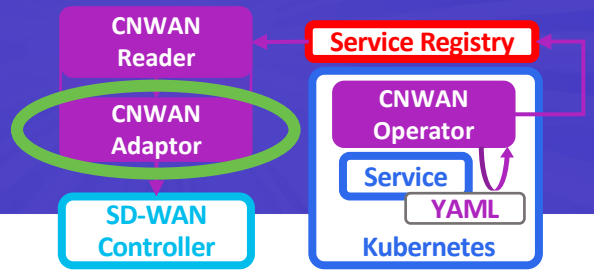
List of observed events

Example Value | Schema

```
[
  {
    "event": "create",
    "service": {
      "name": "streaming",
      "address": "10.20.11.18",
      "port": 8080,
      "metadata": [
        {
          "key": "traffic-profile",
          "value": "video"
        }
      ]
    }
  }
```

https://github.com/CloudNativeSDWAN/cnwan-reader

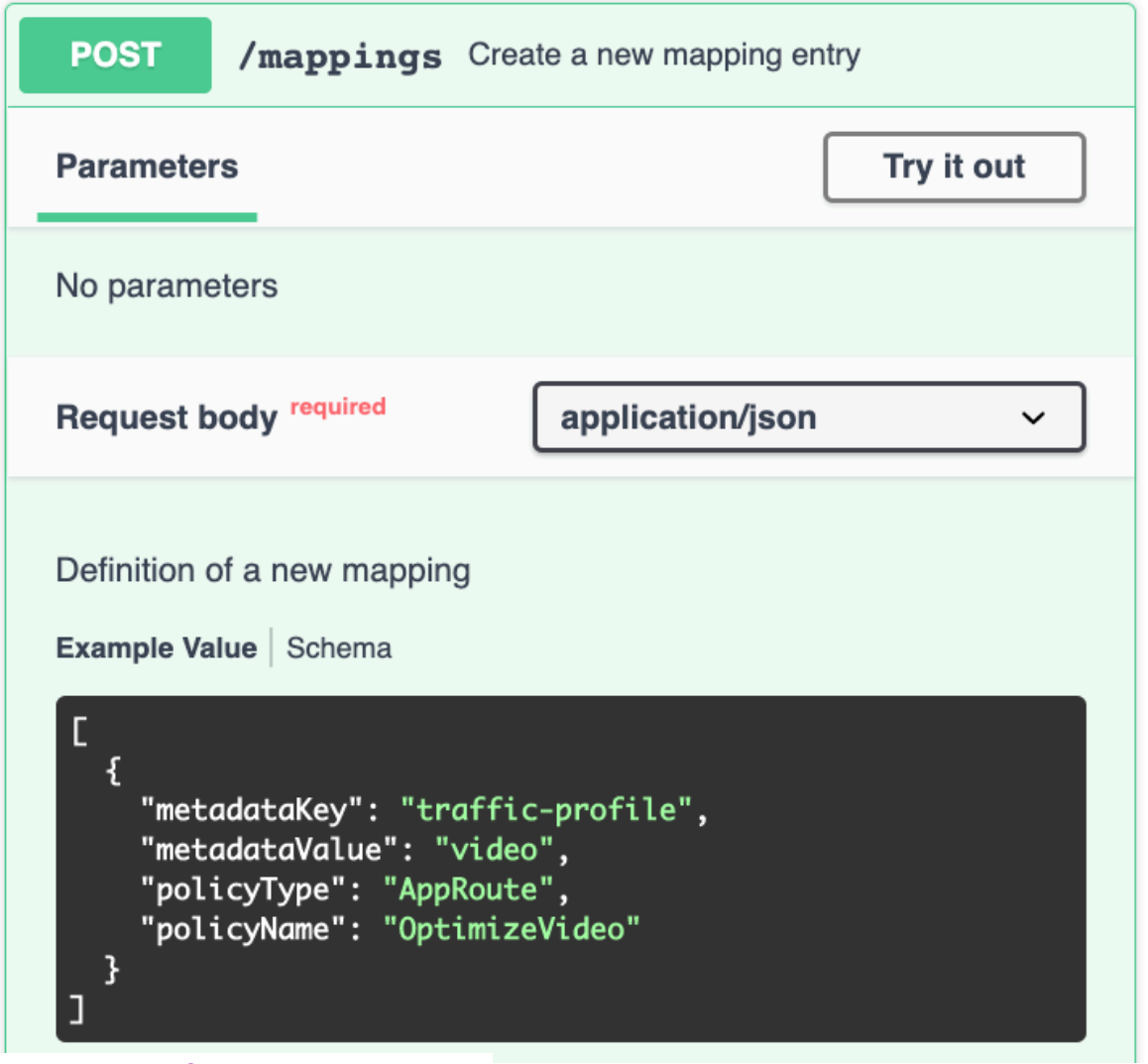
CNWAN Adaptor



Specific per SD-WAN Controller
- Adaptors implement `/cnwan/events` API

Viptela SD-WAN Adaptor
- Written in Python (using Viptela SDK)
- Offers Metadata-to-Policy `/mappings` API
- Populates Viptela mapped policies with the IP address and port of K8s services

Meraki SD-WAN Adaptor (ongoing)



https://github.com/CloudNativeSDWAN/cnwan-adaptor

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Q&A

Open Questions:

- Can this model apply not only to WAN but also to LAN?
- Should Kubernetes have semantics in general for traffic profiles?

github.com/CloudNativeSDWAN

contact@cnwan.io


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