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ZTM-based Multicluster
Implementing Seamless Connectivity and Service Governance

Introduction

Xiaohui Zhang

Senior Architect/Technical Evangelist at Flomesh

Senior programmer, CNCF Ambassador, LFAPAC Open Source Evangelist, Microsoft MVP. Years of practical experience in microservices and cloud-native, the main work involves microservices, containers, Kubernetes, DevOps, etc.

Agenda

- Discussion of Mutlicluster
- Multicluster Service API
- Introduce Zero Trust Mesh
- Mutlicluster Traffic Management with ZTM

Multicluster

Drivers of Multicluster

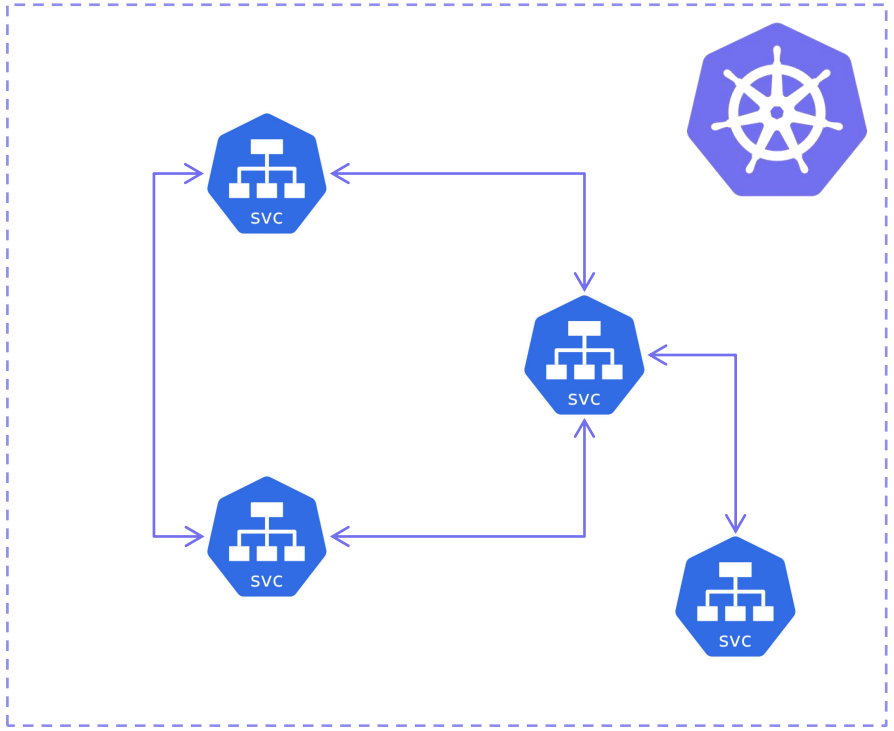
- Geographic distribution and latency optimization
- Scale and resource isolation
- Multi-cloud and hybrid cloud strategies
- Fault isolation and disaster recovery
- Seamless upgrades reduce risk

Location

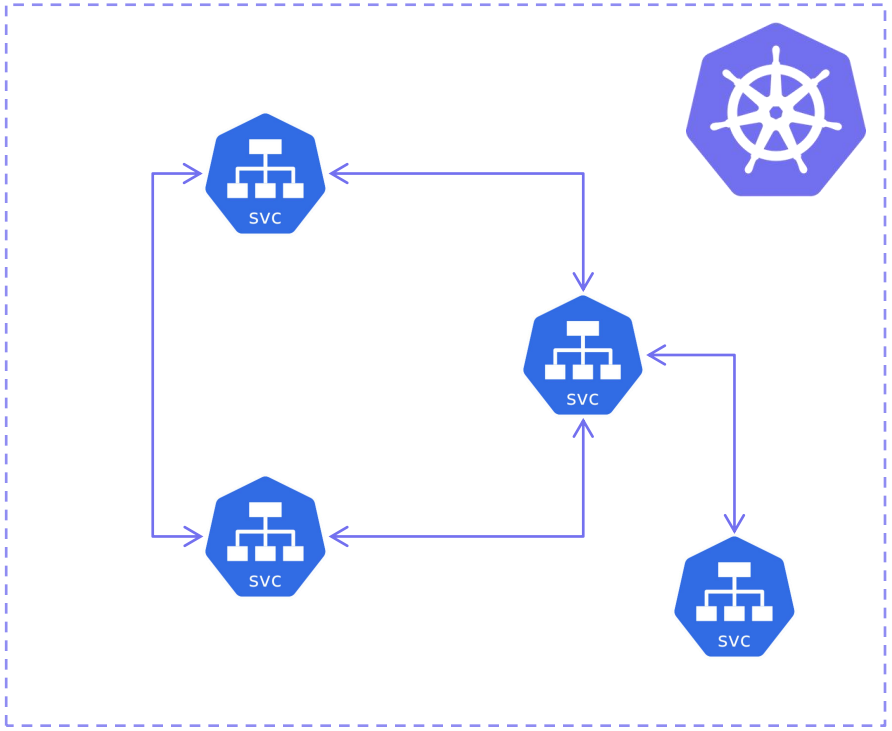
Isolation

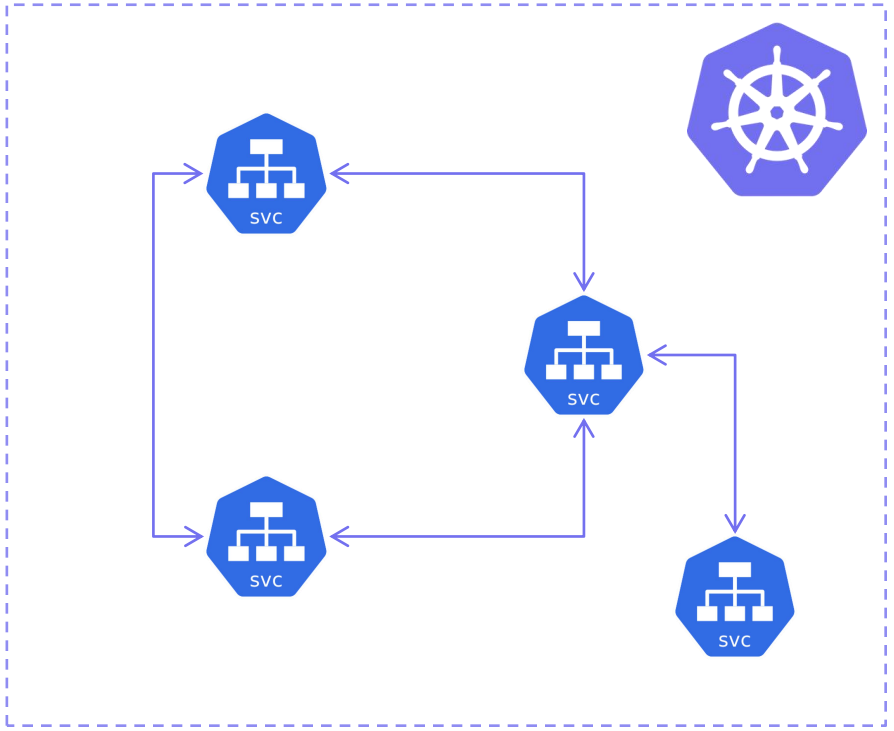
Reliability

Single Cluster



Old Multi Cluster





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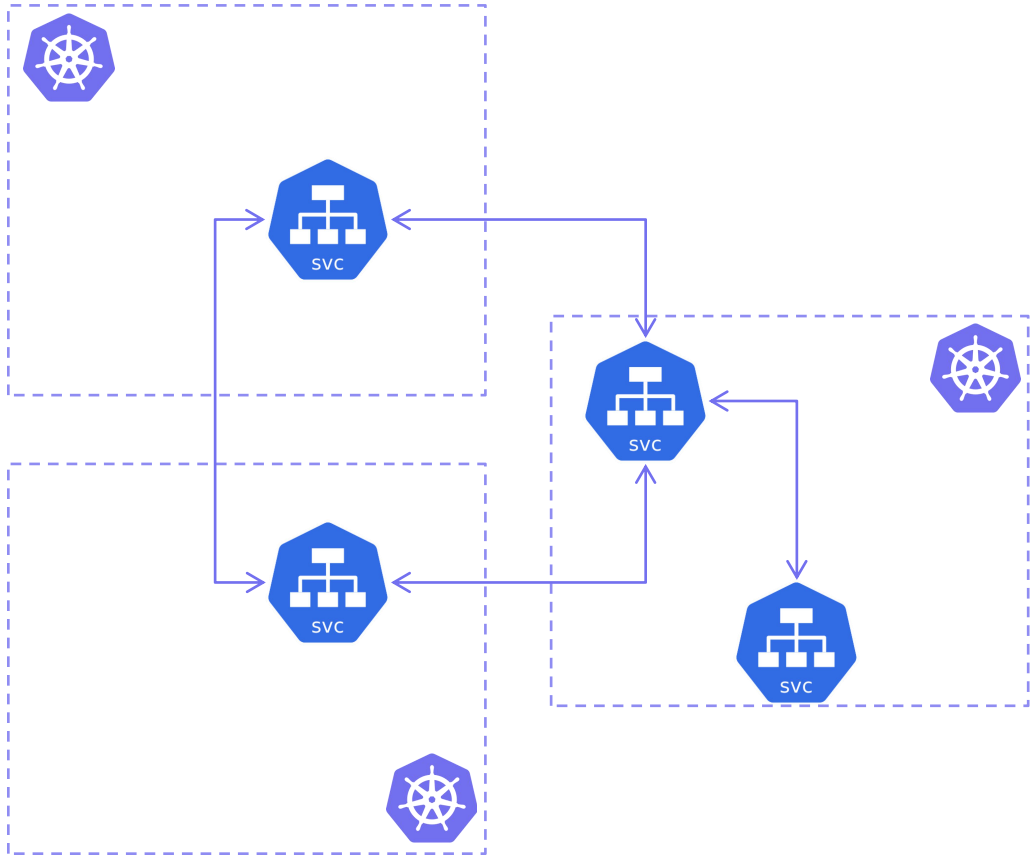
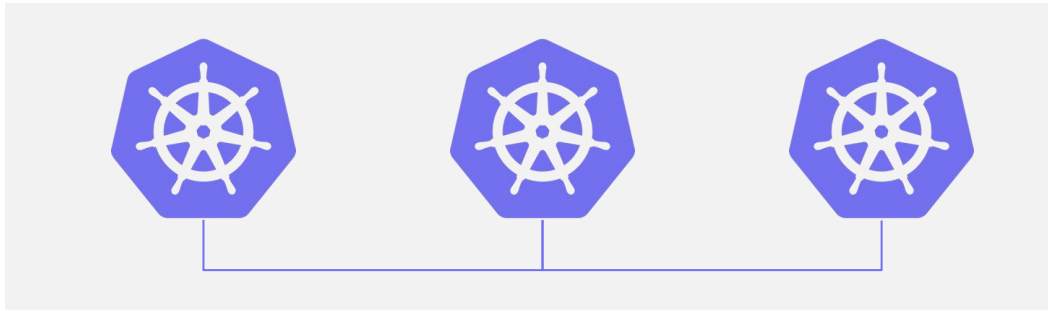
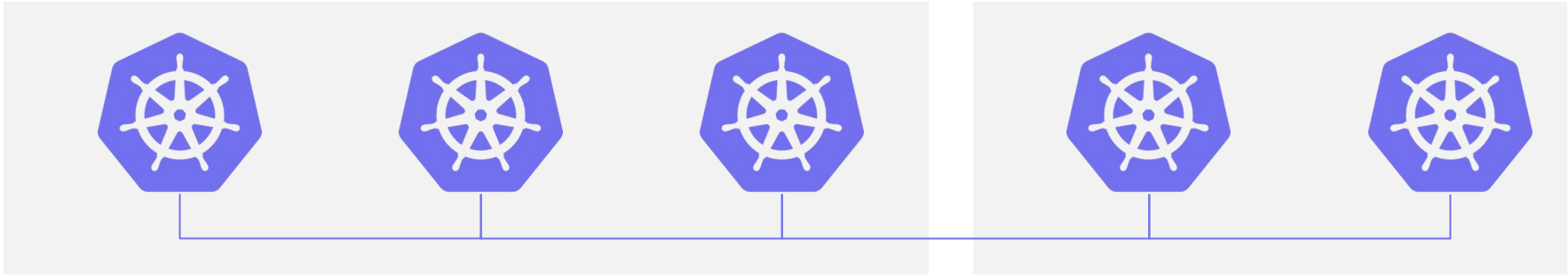


MultiCluster Mode

MutliCluster in Single DC

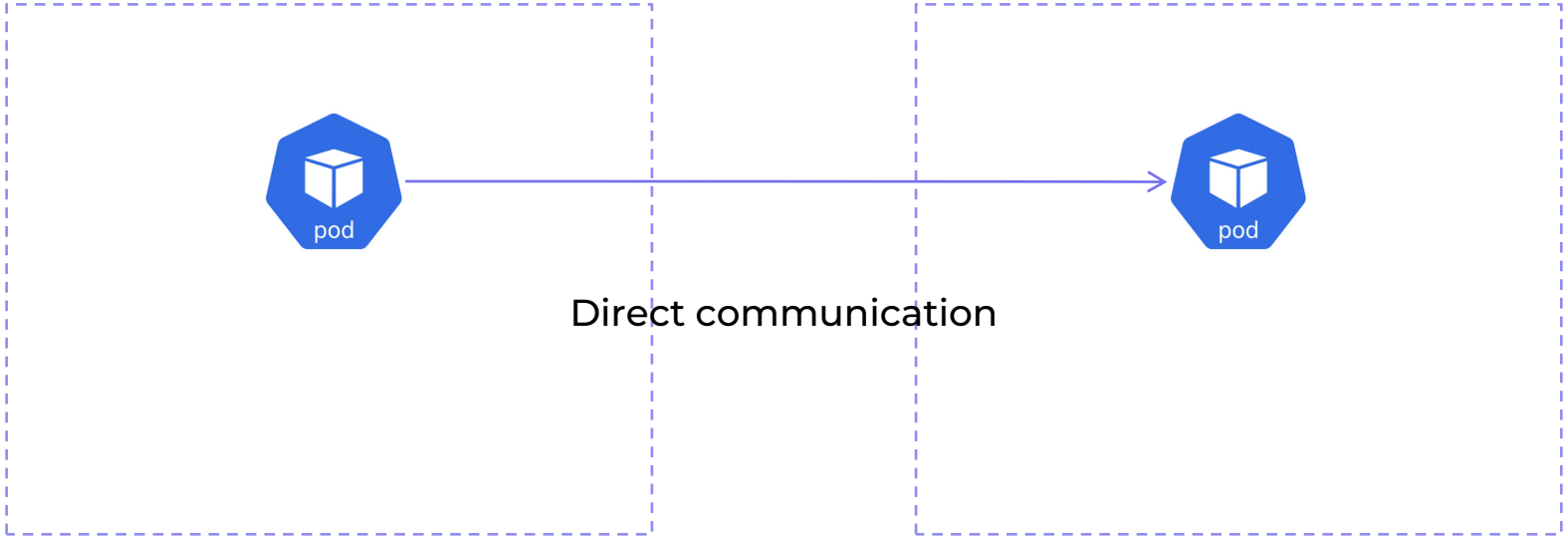


MutliCluster in Multi DCs



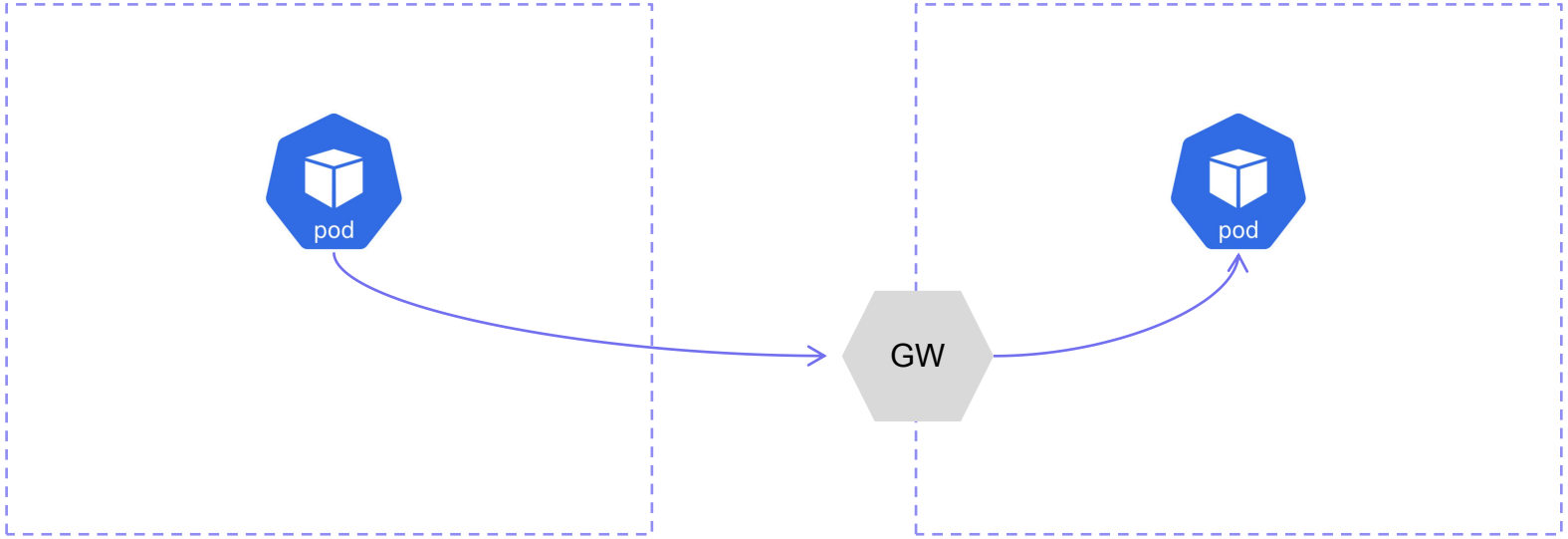
Flat Network: Pod-to-Pod Multicluster

- Each pod has a unique IP address across clusters.
- All clusters have different CIDR range.



Hierarchical network: Gateway-based Multicluster

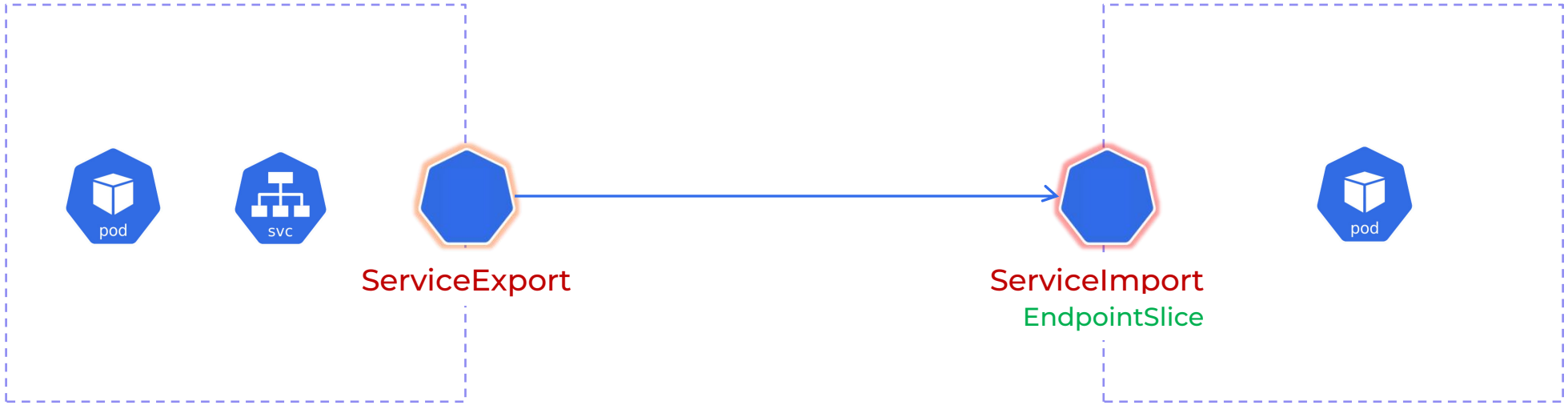
- Handle traffic through multicluster gateways.
- Gateways are IP-reachable.
- Introduce slight latency, but noticeable.



Multicluster Service API

Multicluster Service API

MCS API is the bridge of multiclsuter service discovery.



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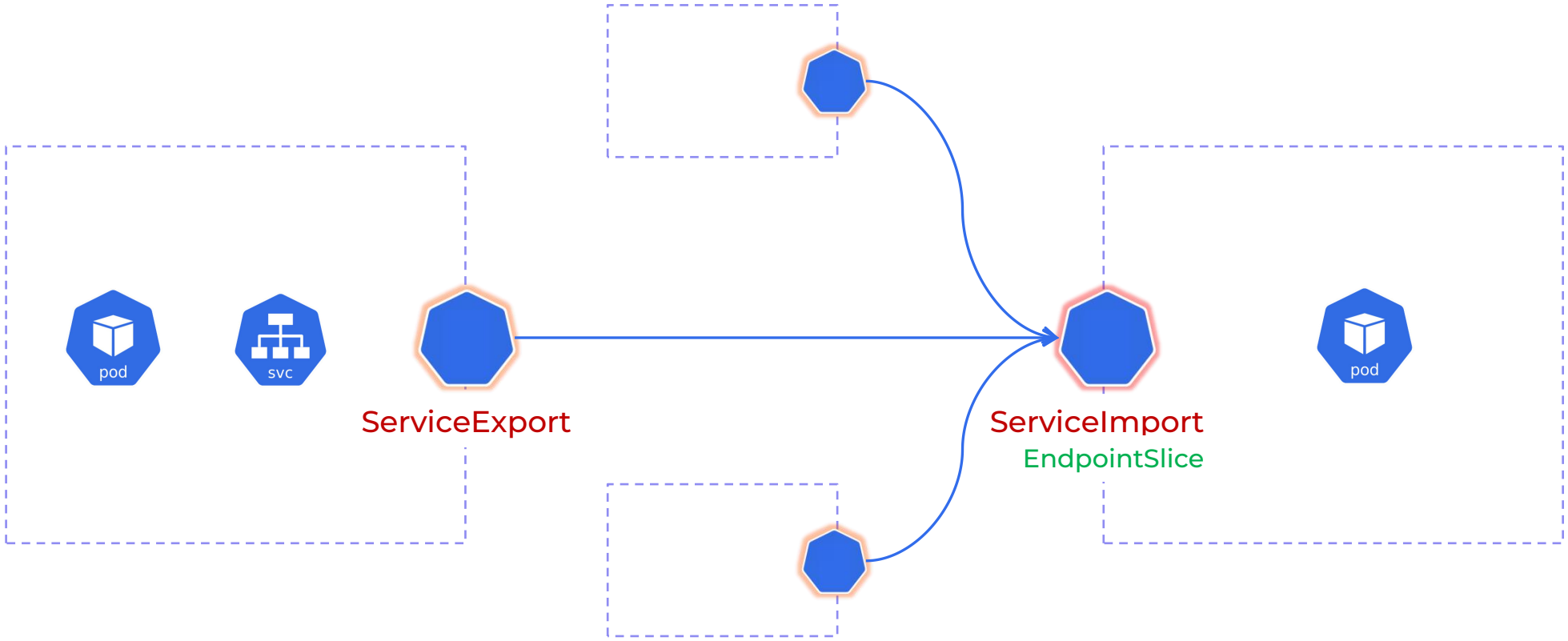


Zero Trust Mesh

ZTM: Zero Trust Mesh

- Open source network infrastructure software
- For running a decentralized network
- Built upon HTTP/2 tunnels
- Run on any sort of IP networks such as LANs, containerized networks and the Internet, etc.

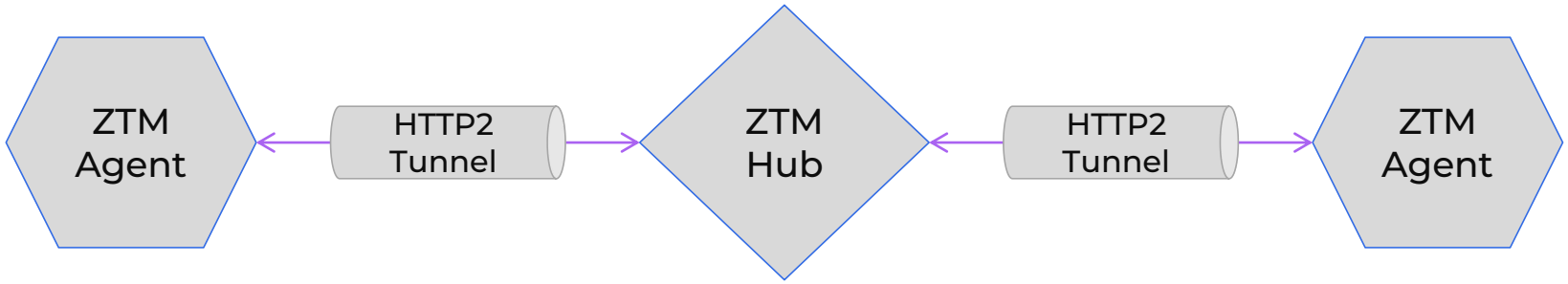
https://github.com/flomesh-io/ztm

Core Capabilities

- Network connectivity across Internet gateways and firewalls
- TLS-encrypted communication channels
- Certificate-based authentication and access control
- Decentralized application publishing and deployment
- Decentralized file discovery and data sharing

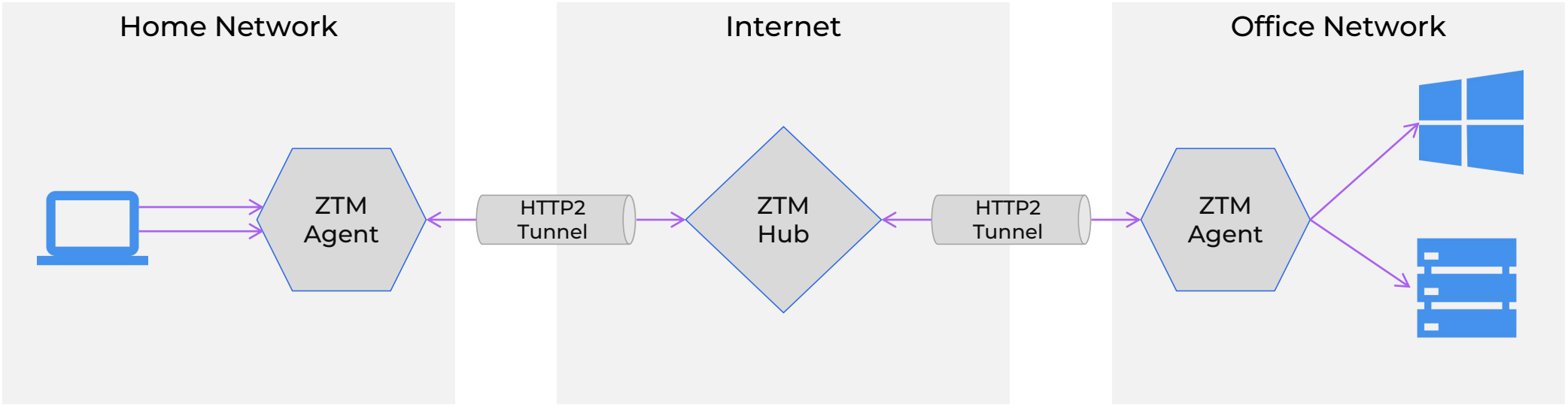
ZTM Architecture

- ZTM Agent: Deployed on devices connecting to the Zero Trust Network, it initiates encrypted tunnels to securely forward traffic to the ZTM Hub.
- ZTM Hub: A distributed access point cluster that establishes encrypted tunnels with Agents, enabling secure, multi-point access and high availability.



ZTM App: zt-tunnel

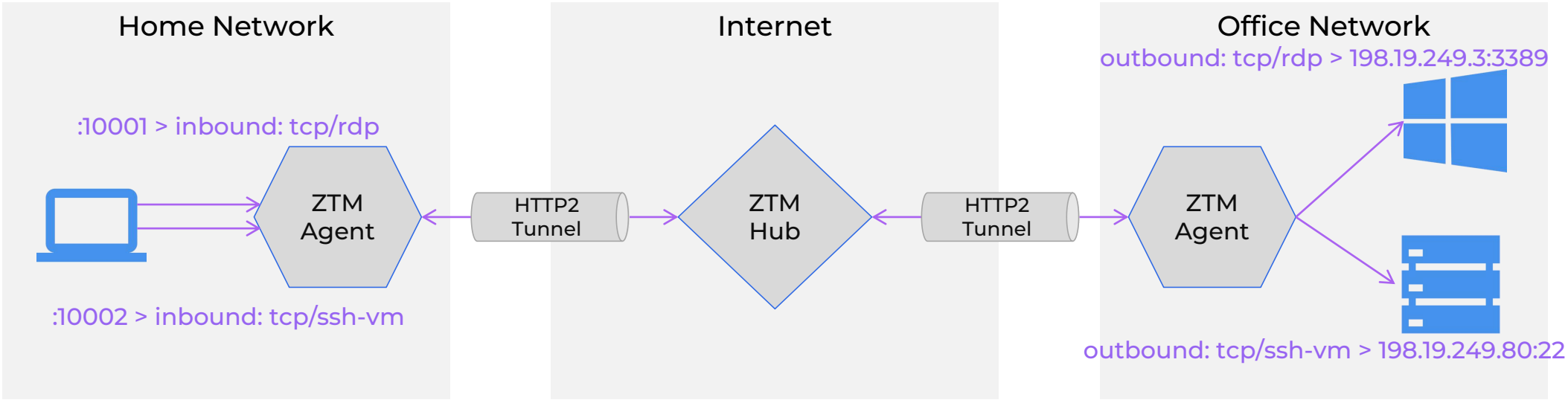
The zero-trust tunnel eliminates physical distance limitations, allowing you to access your devices from anywhere.



ZTM App: zt-tunnel

Concepts:

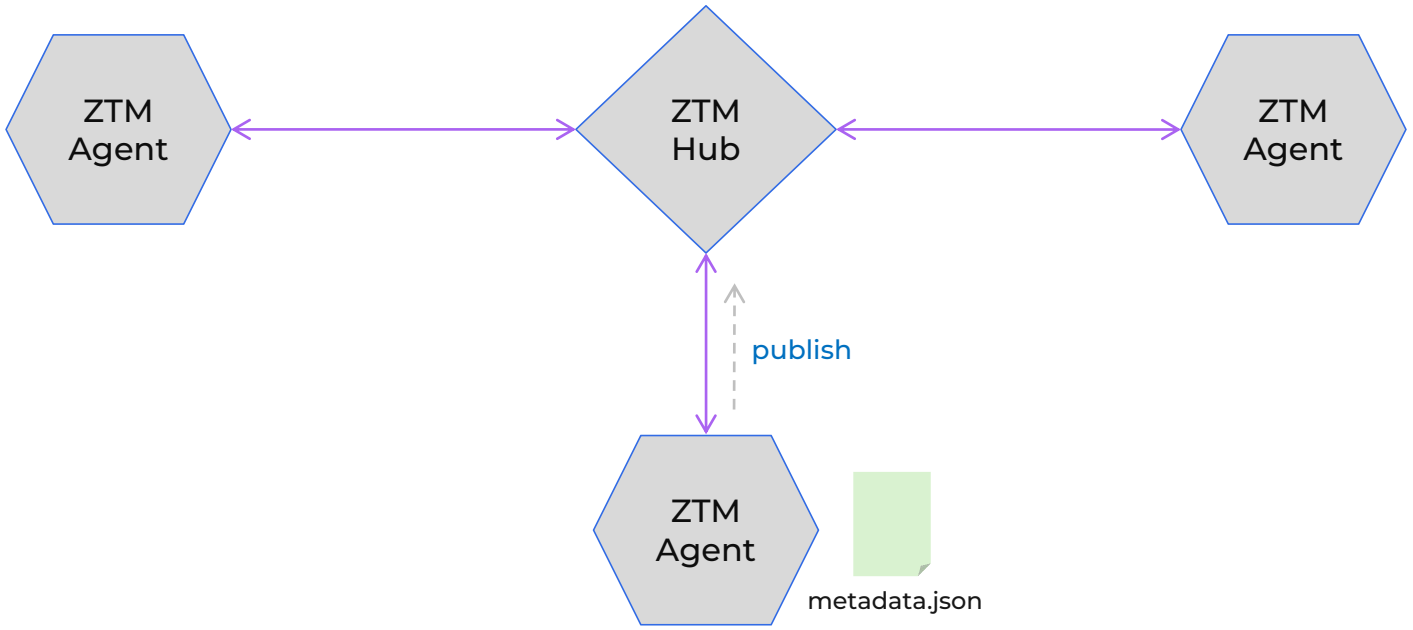
- outbound: tunnel's exit
- inbound: tunnel's entrance



ZTM FS: Distributed File System

Sync file to all agents in mesh network.

$ ztm publish file /path/metadata.json



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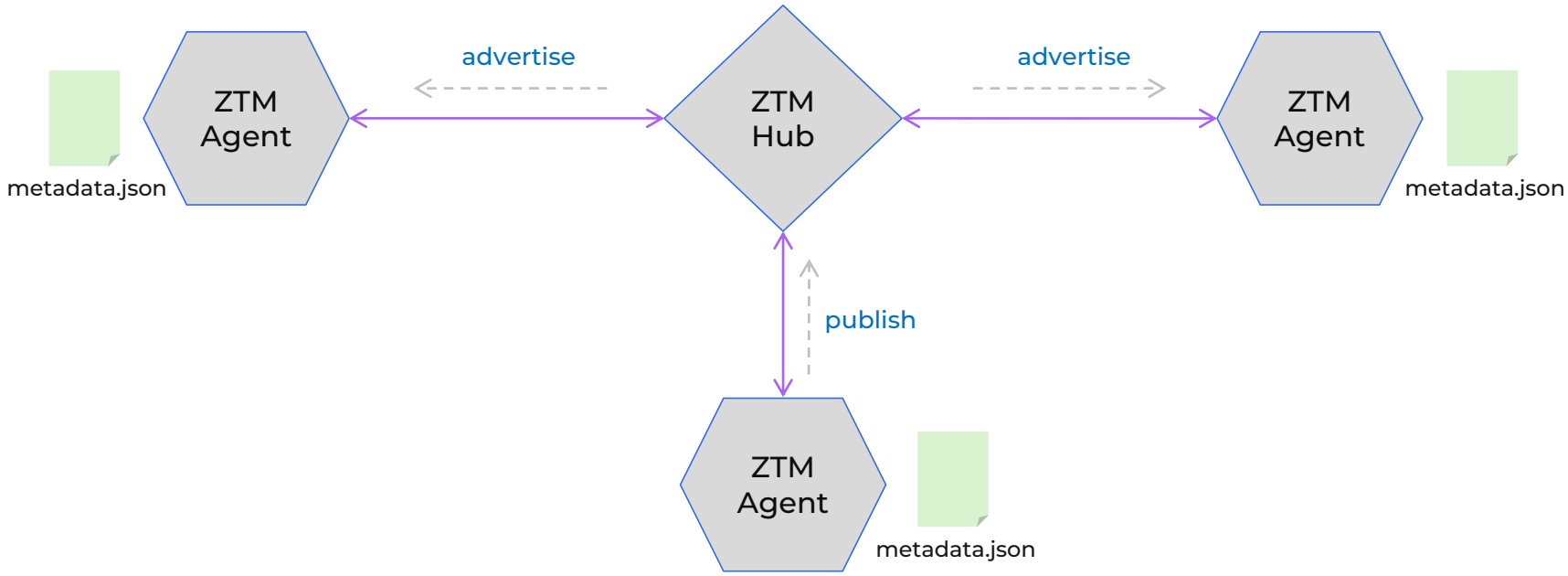
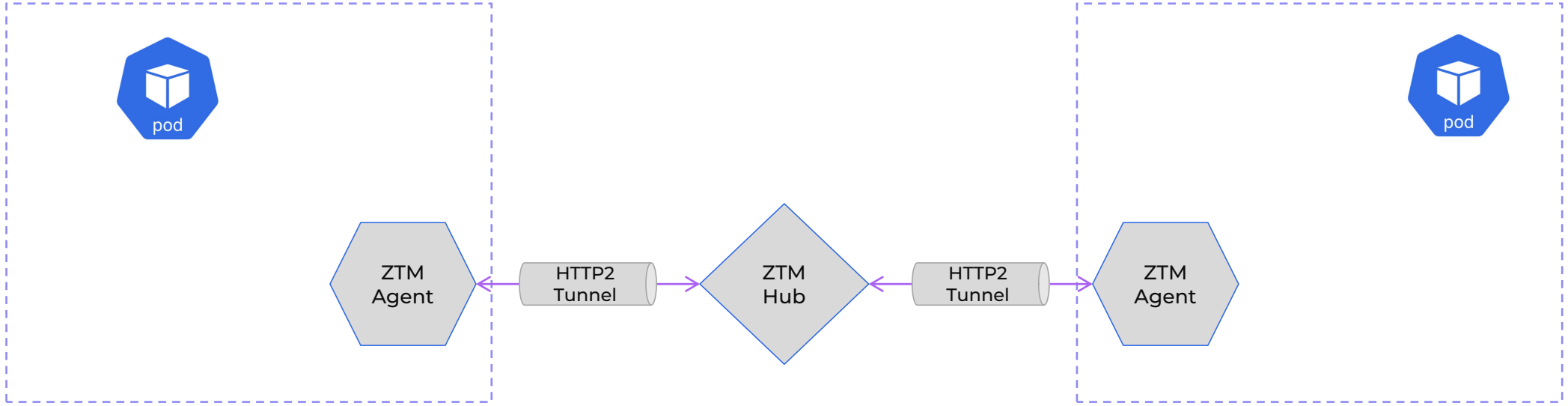


ZTM-based Multicluster

zt-tunnel in Multicluster

Connectivity

- Secure HTTP2 tunnel
- IP-reachable (Cluster/Pod) NOT necessary



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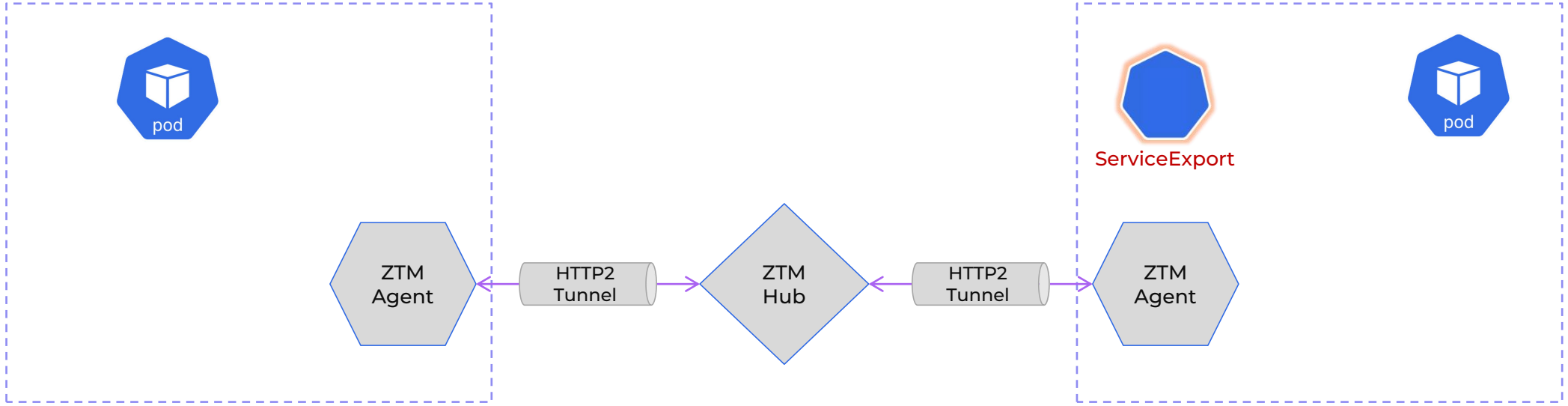
Multicluster service discovery

- Compatible with the MCS API*



zt-tunnel in Multicluster

Multicluster service discovery

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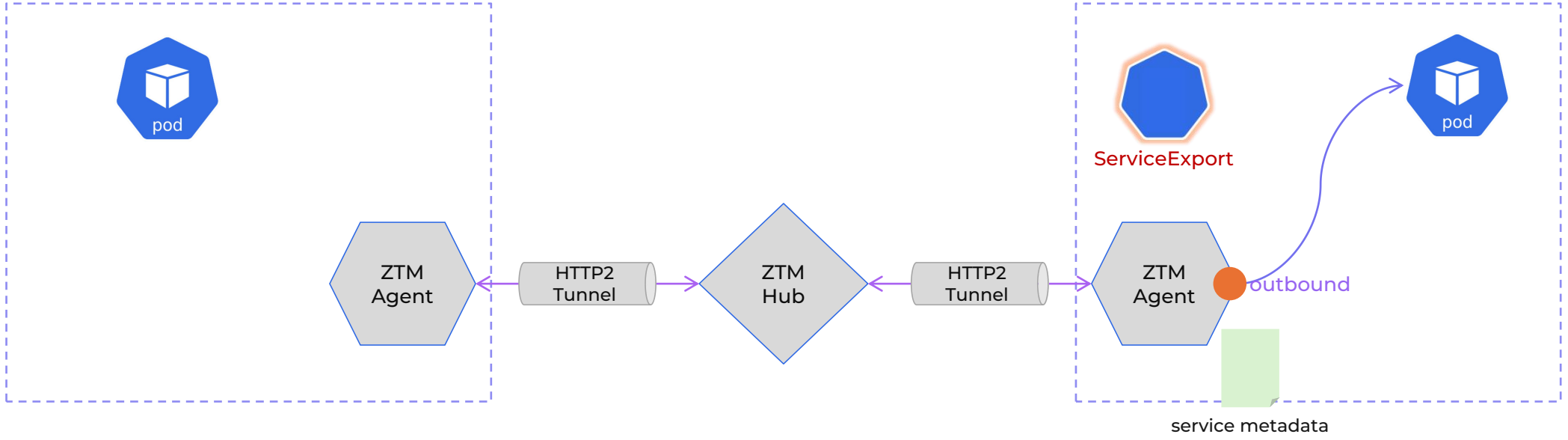

zt-tunnel in Multicluster

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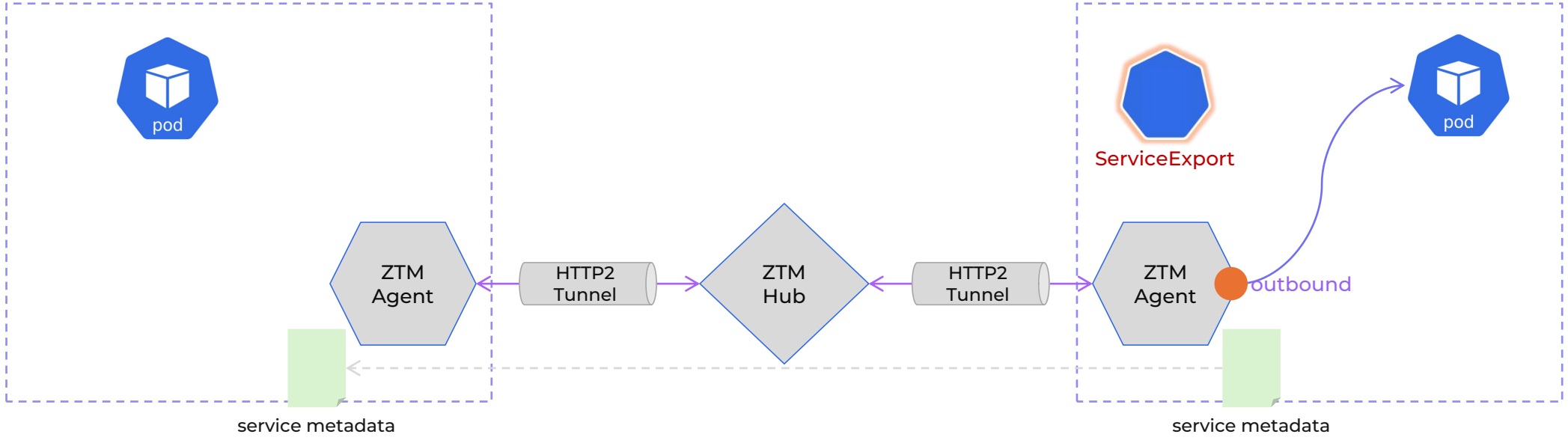

zt-tunnel in Multicluster

Multicluster service discovery

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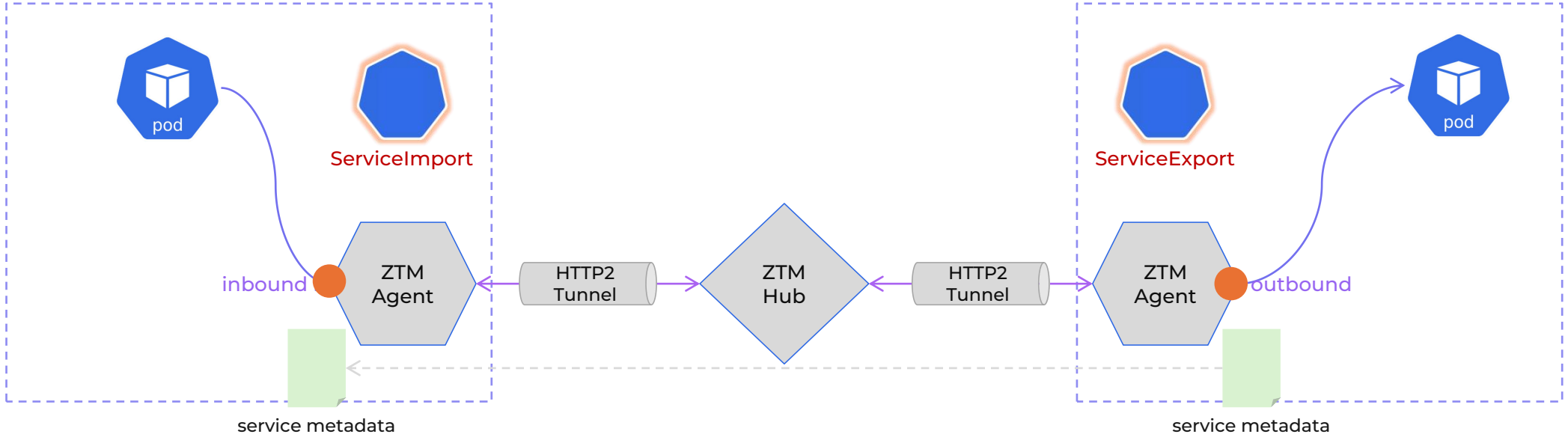
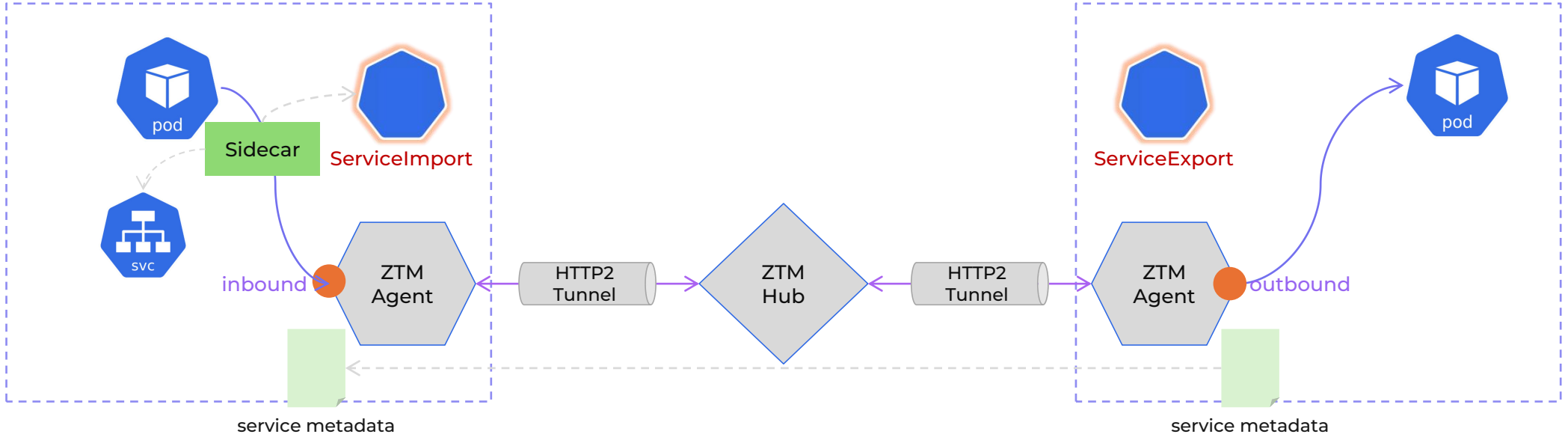


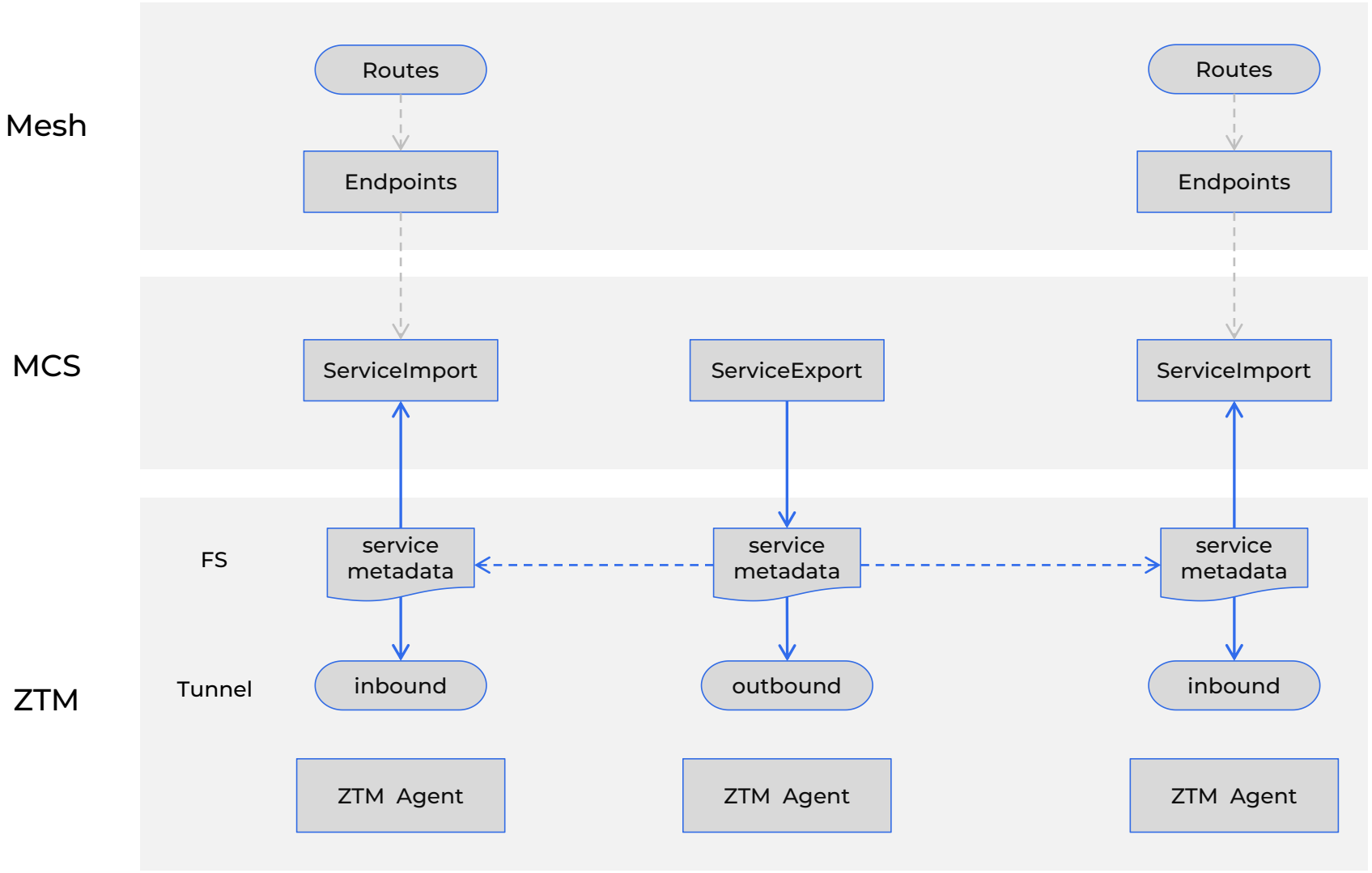
zt-tunnel in Multicluster

Multicluster service discovery

- Compatible with the MCS API*
- Interoperable with service mesh



Interoperate with service mesh



DEMO

https://github.com/cybwan/fsm-start-demo/tree/ztm

- Flomesh Service Mesh (FSM)
- Flomesh MCS API (L7-based)

Future

- ZTM Hub cluster support
- Official MCS API support
- Standlone ZTM controller

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