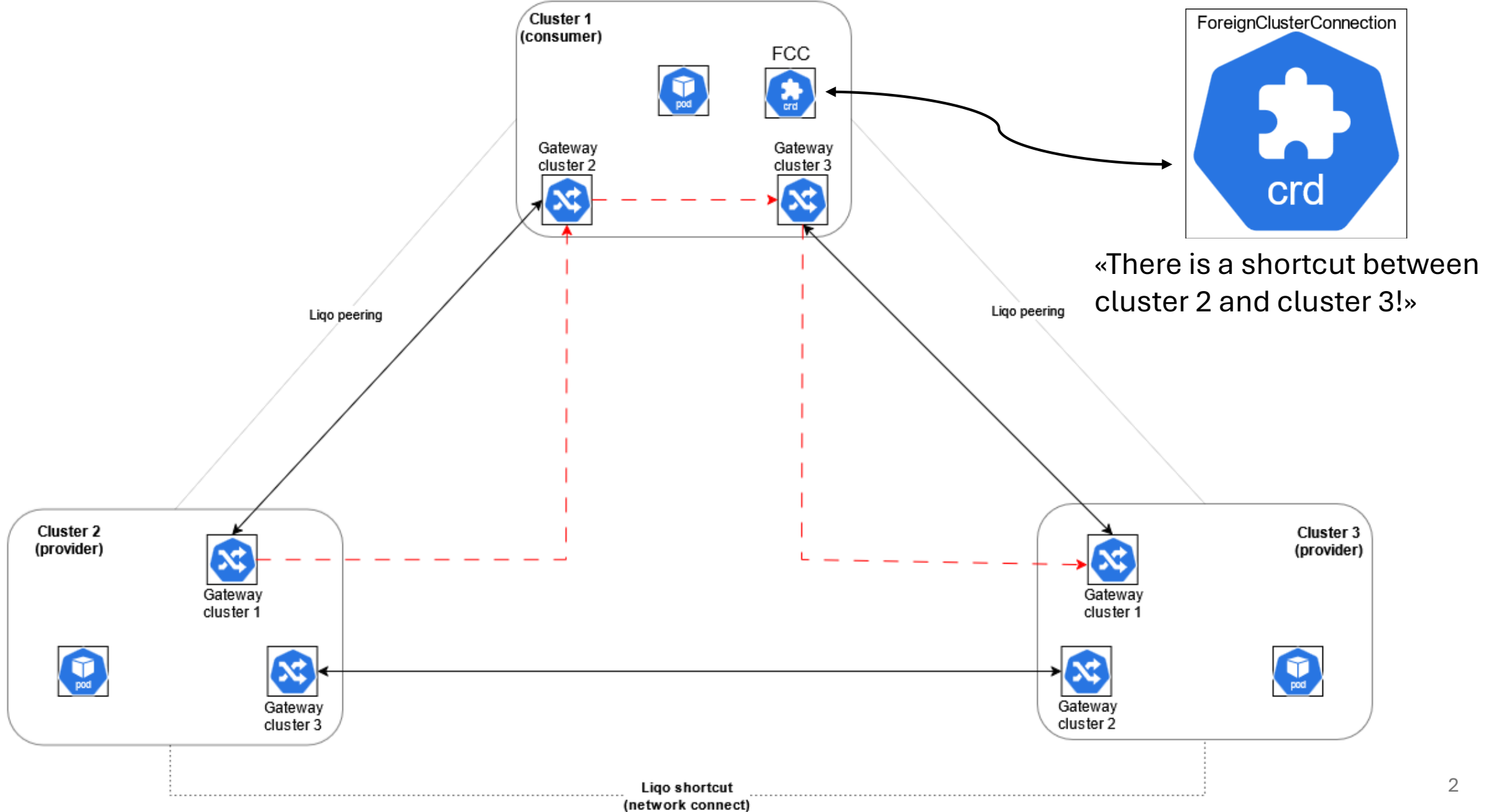


# Network optimizations for hub-and-spoke topologies

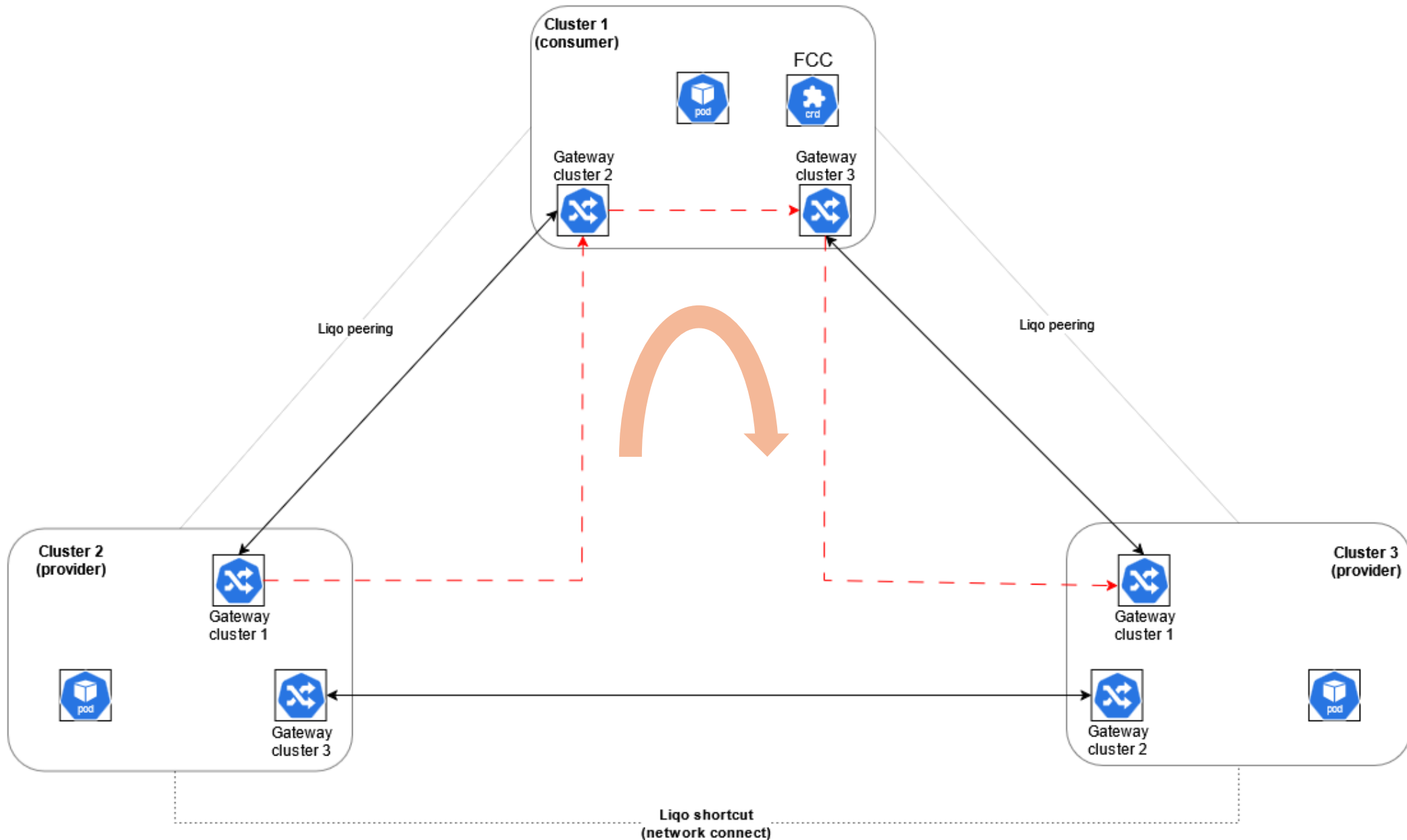
Part 2:

Making the traffic flow through the shortcut

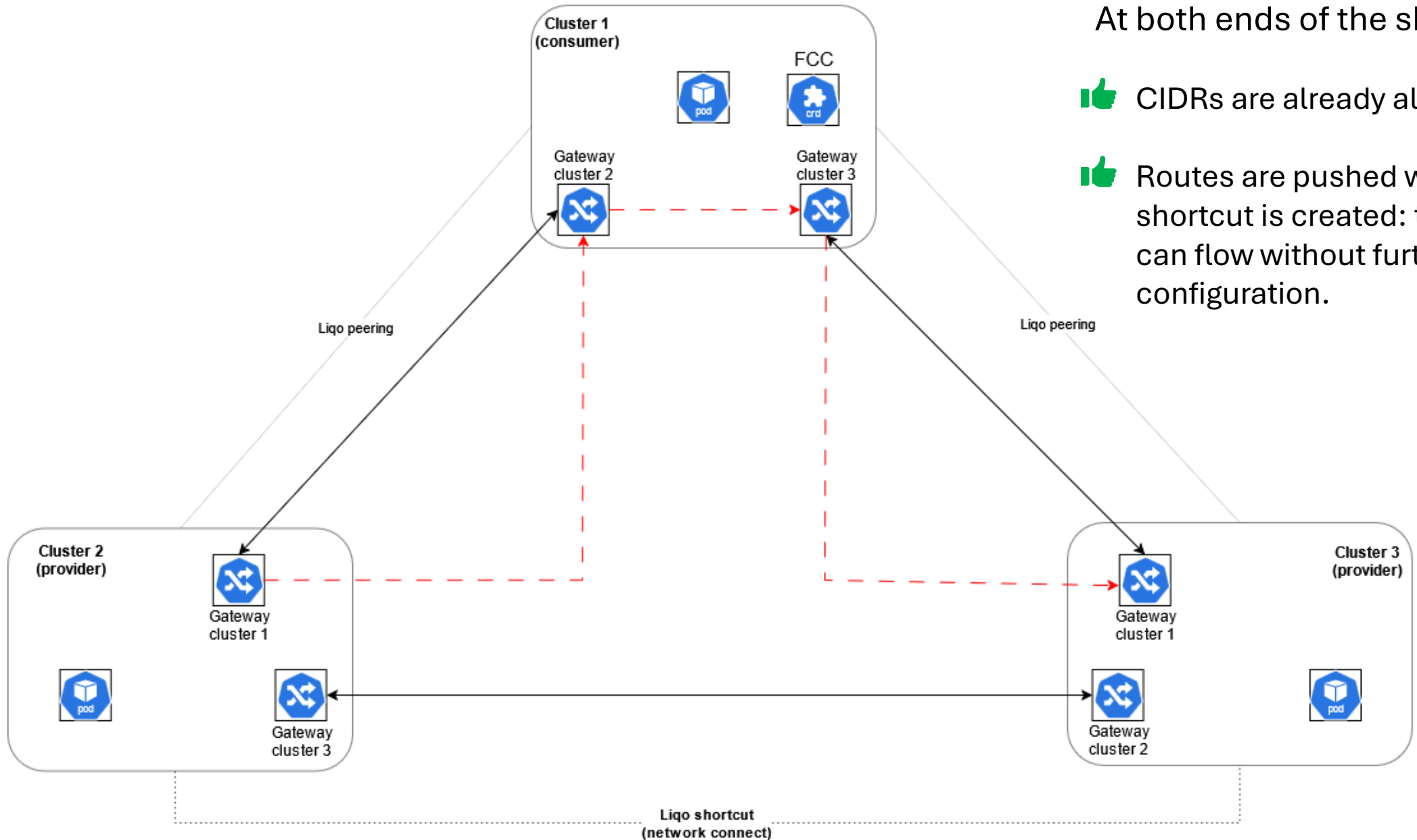
# Current state of the system



# Suboptimal traffic path



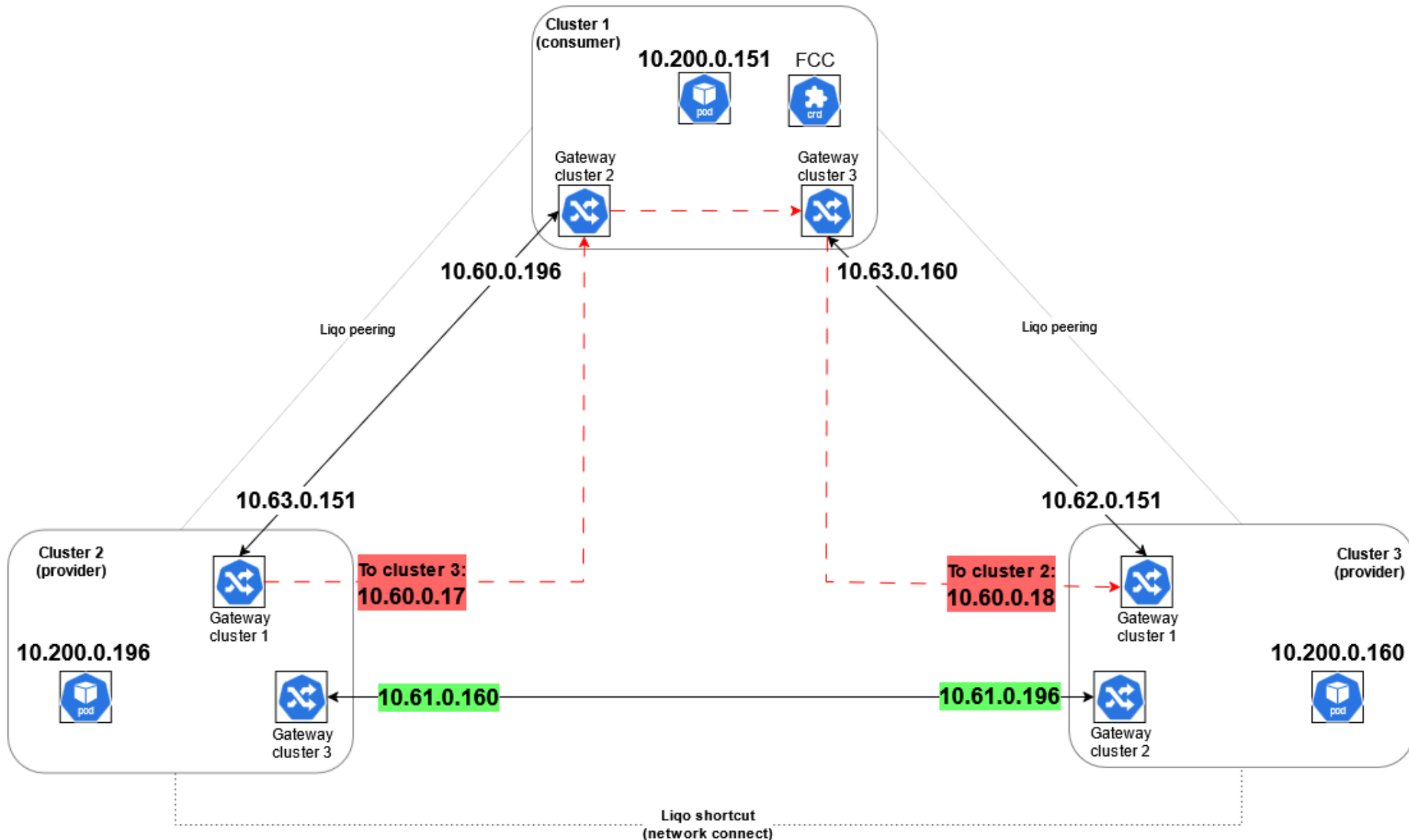
# A good starting point



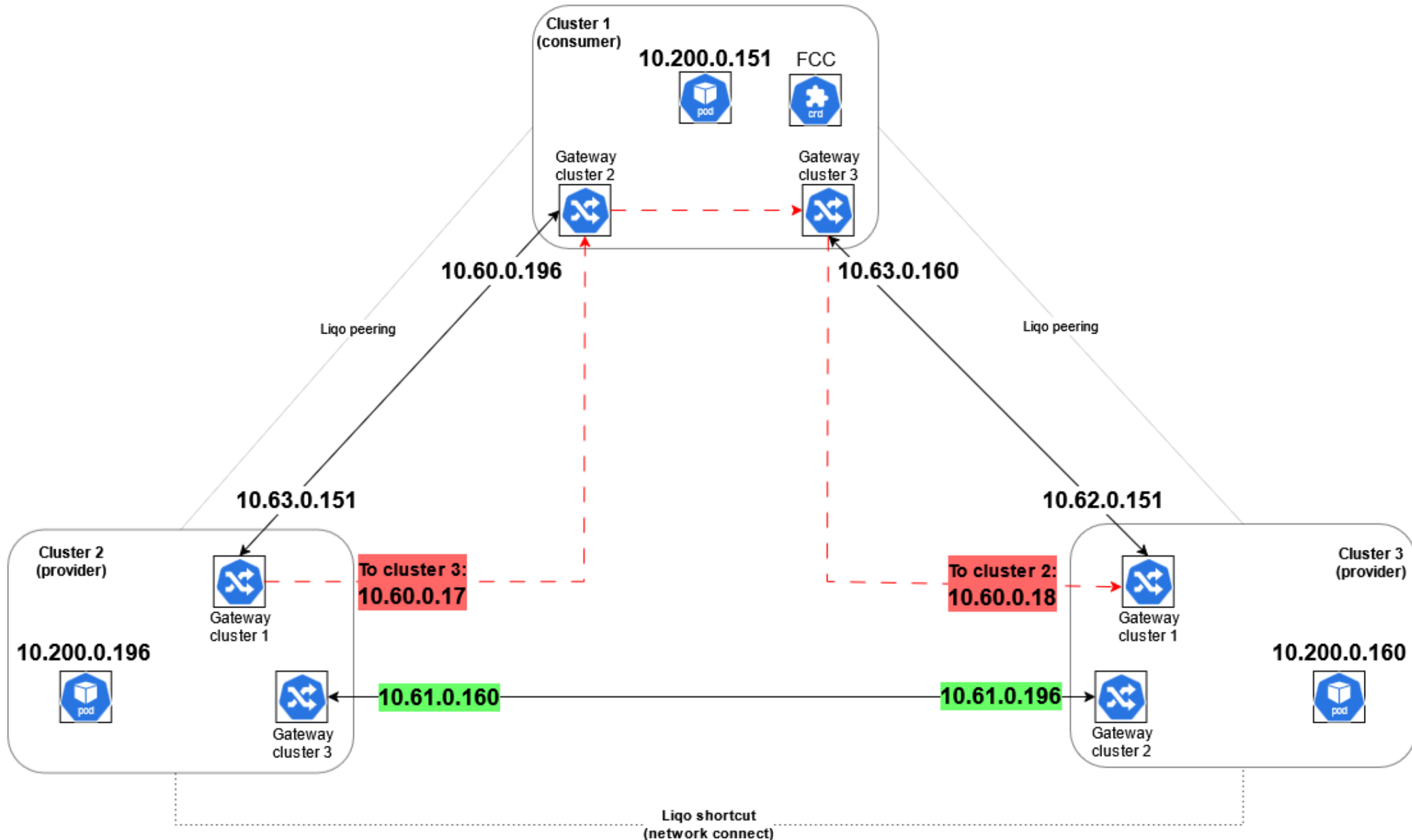
At both ends of the shortcut:

- 👍 CIDRs are already allocated
- 👍 Routes are pushed when shortcut is created: traffic can flow without further configuration.

# Traffic routes are managed using CIDRs + remapping



# With remapping, every cluster has its own “point of view”



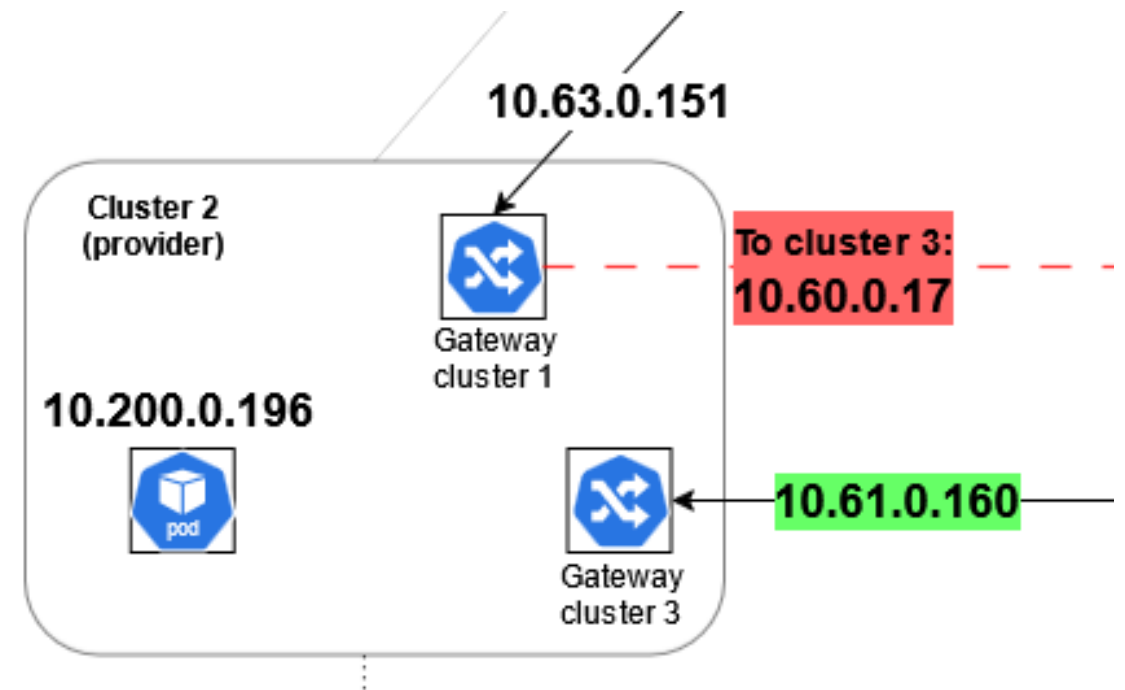
# Focus on cluster 2: the *endpointslices*

EndpointSlices in cluster 2:

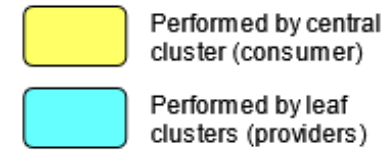
liqo-demo	nginx-6d8b6	IPv4	80	10.200.0.196
liqo-demo	nginx-sqvhb	IPv4	80	10.63.0.151, 10.60.0.17

Endpoints:

Endpointslices are important because it's where Services get the addresses of the pods!



# Endpointslices reflection



EndpointSlice in central cluster needs to be reflected to leaf clusters

This happens in the Virtual Kubelet

Endpoints are created with the addresses **seen by central cluster** (= remapped in case of overlapping CIDRs)

ShadowEndpointSlice is created and populated with endpoints (only those not already in the remote cluster)

ShadowEndpointSlice is reflected to providers

EndpointSlice is deployed with endpoints meaningful for the receiving cluster

Endpoints are remapped using the Configuration of the cluster (done in case of overlapping CIDRs)

Provider receives the ShadowEndpointSlice with a label of the originating cluster

This happens in the liqo controller manager



# The idea: remap the address and flag it

Involved clusters

1

This field represent  
how the main cluster  
sees the other end  
PodCIDR

```
Spec:
  Foreign Cluster A: cluster2
  Foreign Cluster B: cluster3
  Networking:
    Client Gateway Type: networking.liqo.io/v1beta1/wggatewayclienttemplates
    Client Template Name: wireguard-client
    Client Template Namespace: liqo
    Mtu: 1450
    Server Gateway Type: networking.liqo.io/v1beta1/wggatewayservertemplates
    Server Service Port: 51840
    Server Service Type: NodePort
    Server Template Name: wireguard-server
    Server Template Namespace: liqo
    Timeout Seconds: 120
    Wait: true
  Status:
    Foreign Cluster A Networking:
      Pod CIDR: 10.63.0.0/16
      Remapped Pod CIDR: 10.61.0.0/16
    Foreign Cluster B Networking:
      Pod CIDR: 10.60.0.0/16
      Remapped Pod CIDR: 10.61.0.0/16
    Is Connected: true
    Last Updated: 2025-07-06T20:16:16Z
```

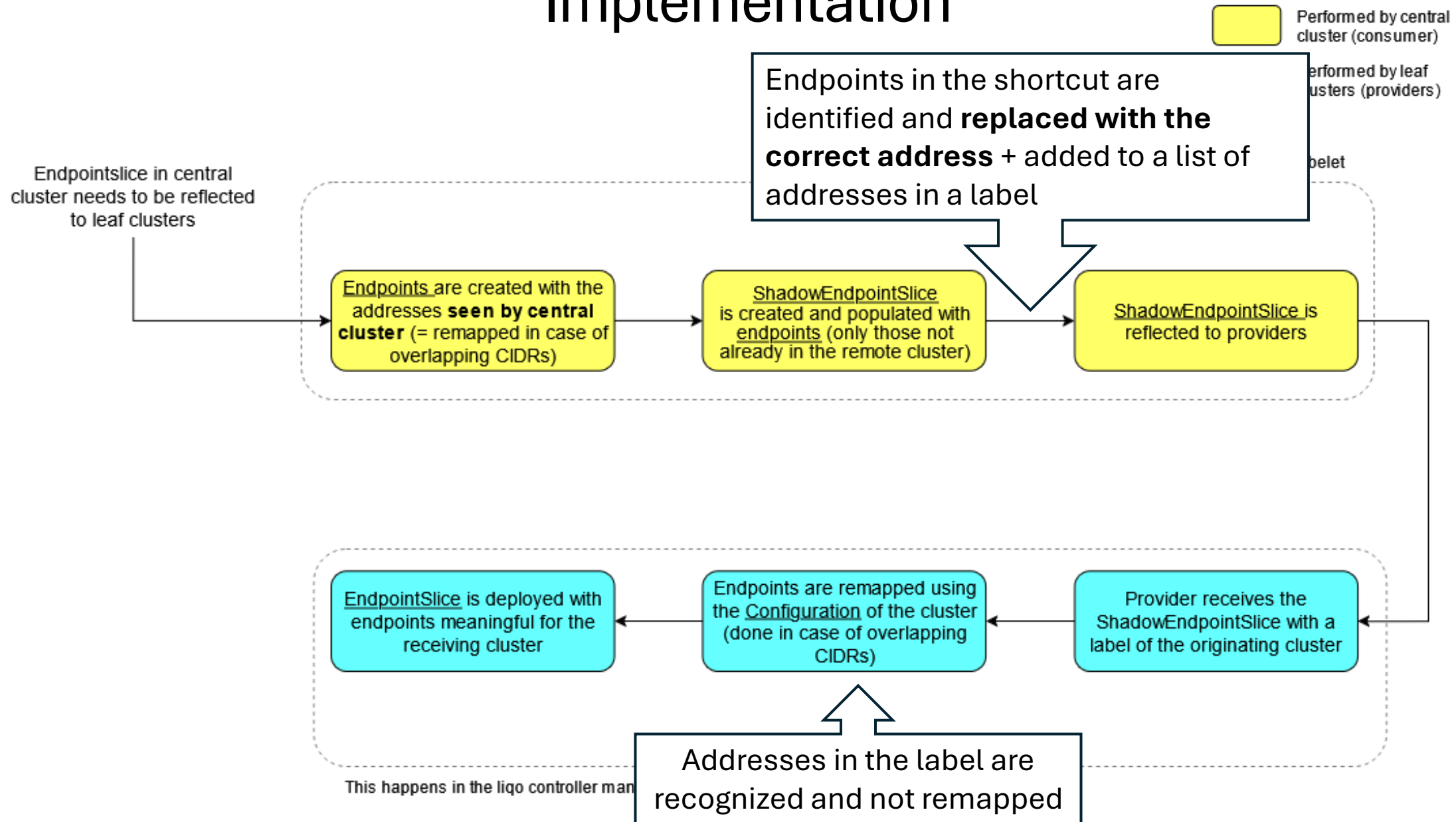
2

These are the CIDRs used  
by the shortcut

# Changing the way addresses are reflected

- ① Central cluster can now identify the addresses at the other end of a shortcut
- ② Central cluster can now remap correctly the addresses (it already knows the host part)

# Implementation



# For suggestions and further details:

- <https://github.com/Gabbe64/liqo>
- DM me @**Gabriele Santi** on the Liqo Slack channel

