Use Cases and Drivers

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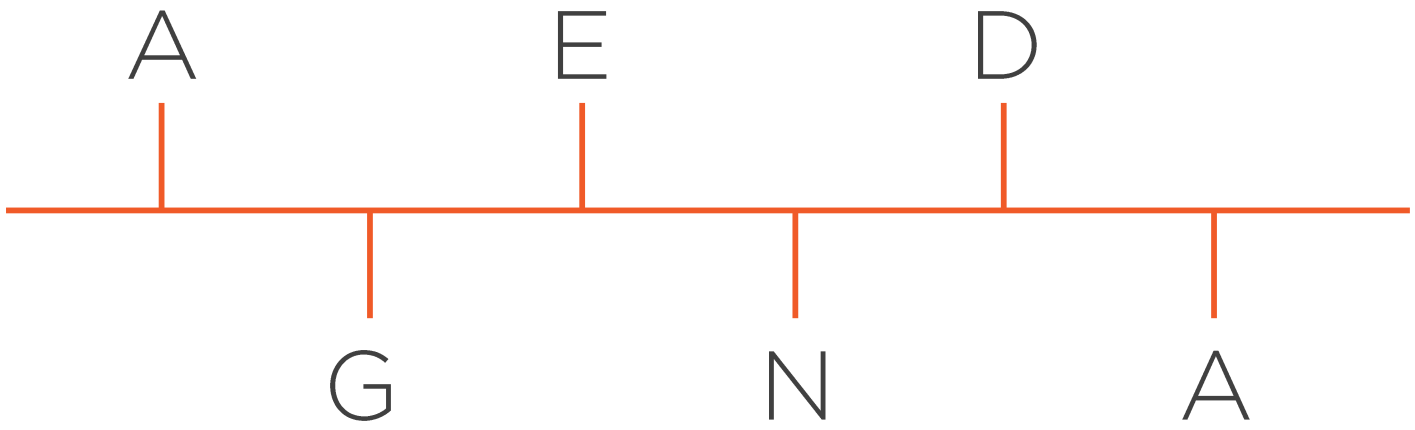
A
E
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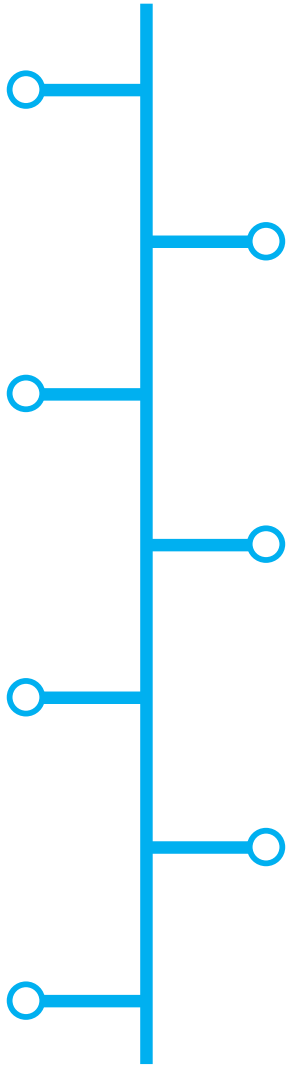
AGENDA

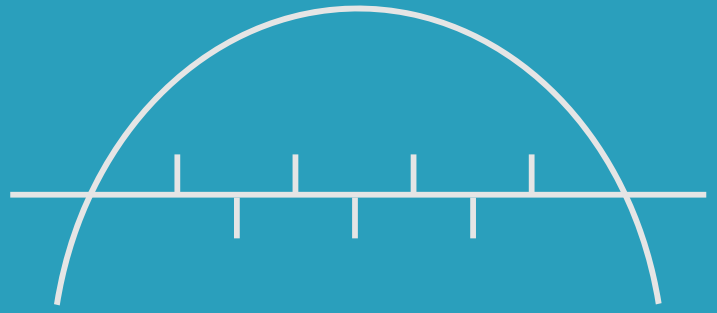


- Single-host networking
- Multi-host networking
- Working with existing networks

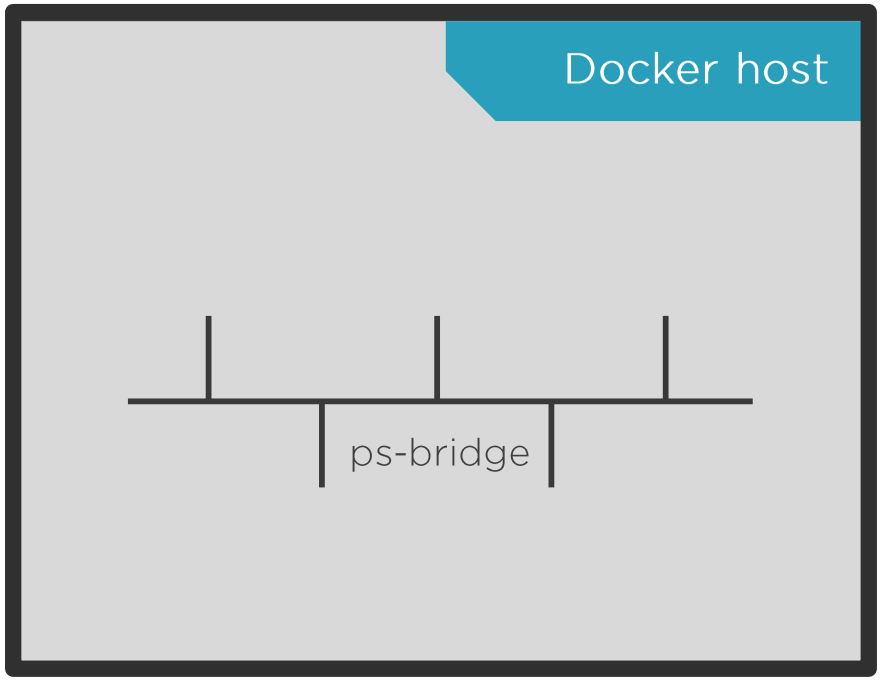
Single-host Networking

With the **bridge** driver (Linux)

≈ **nat** driver (Windows)

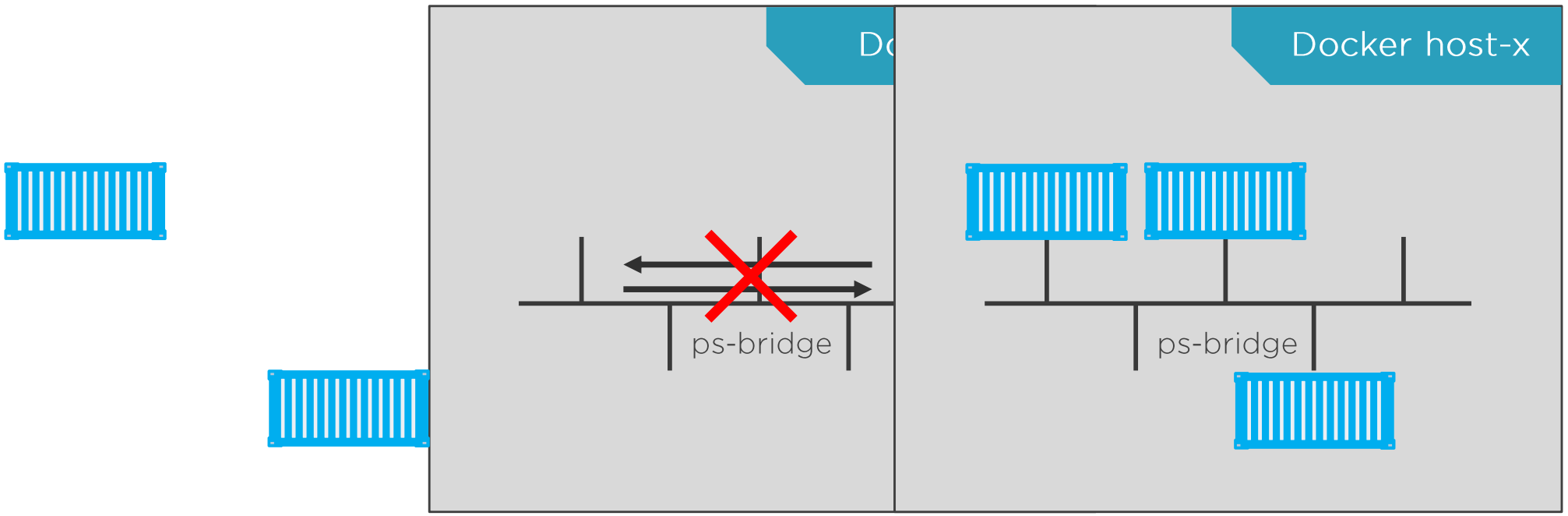


Single-host



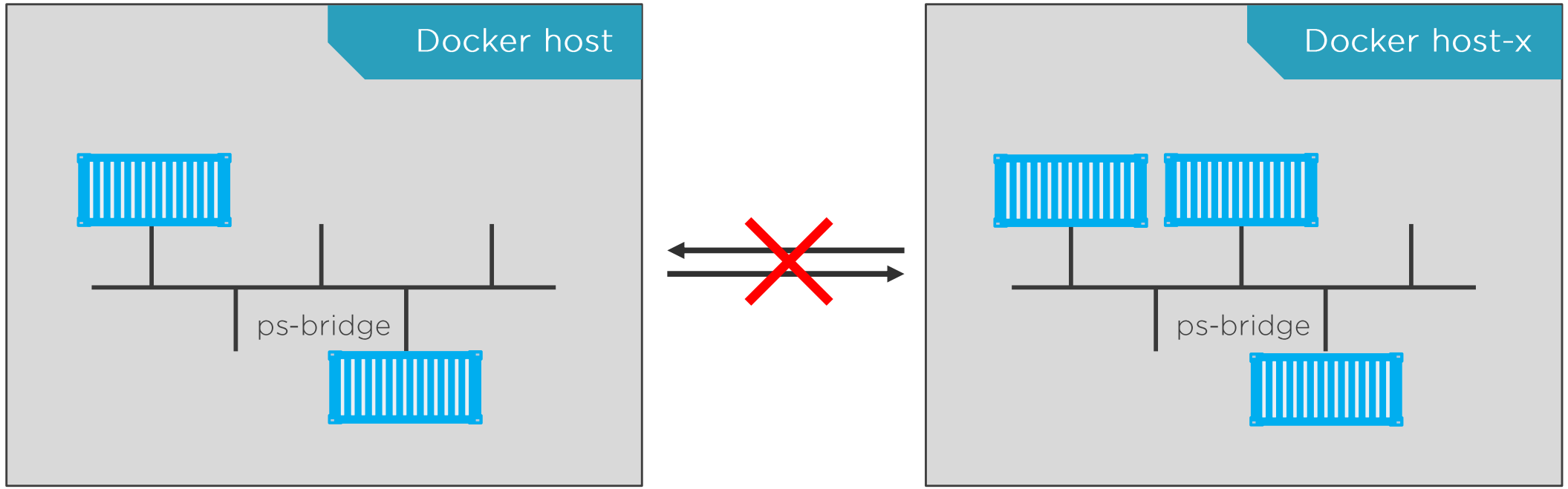
Linux bridge driver / Windows ≈**nat** driver

Single-host



Linux bridge driver / Windows ≈**nat** driver

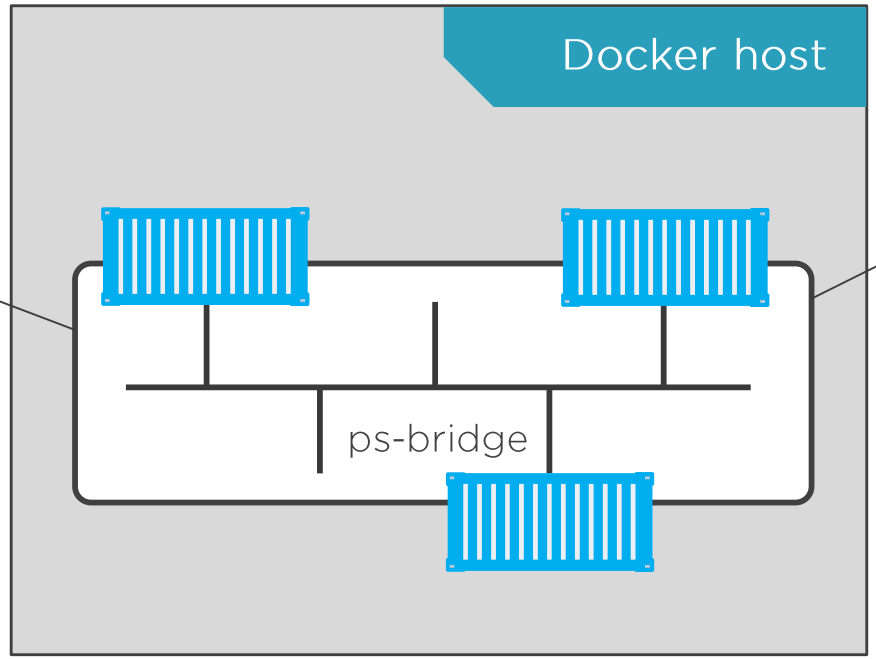
Single-host



Linux bridge driver / Windows ≈**nat** driver

Single-host

802.1d **bridge**
- a.k.a virtual switch
- a.k.a vswitch



Kernel feature on Linux
- mature/stable
- fast

Linux bridge driver / Windows ≈**nat** driver

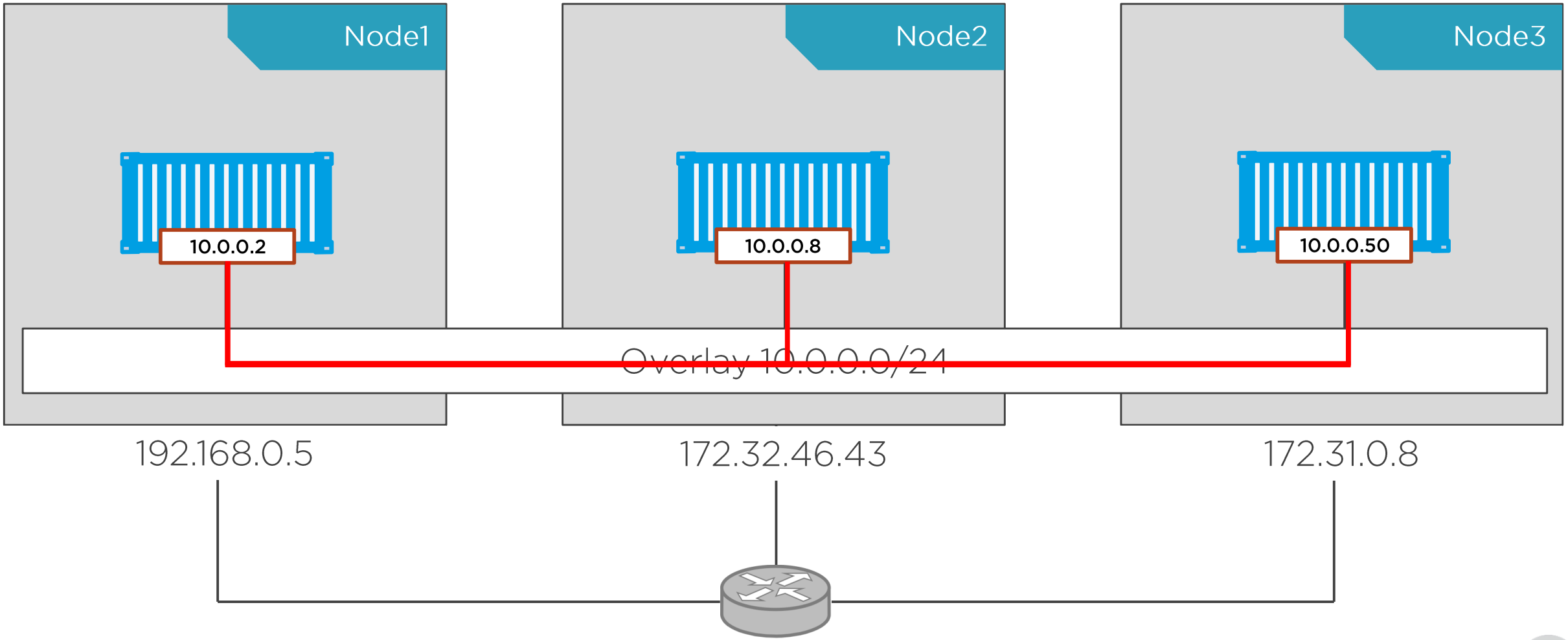
Coming up...

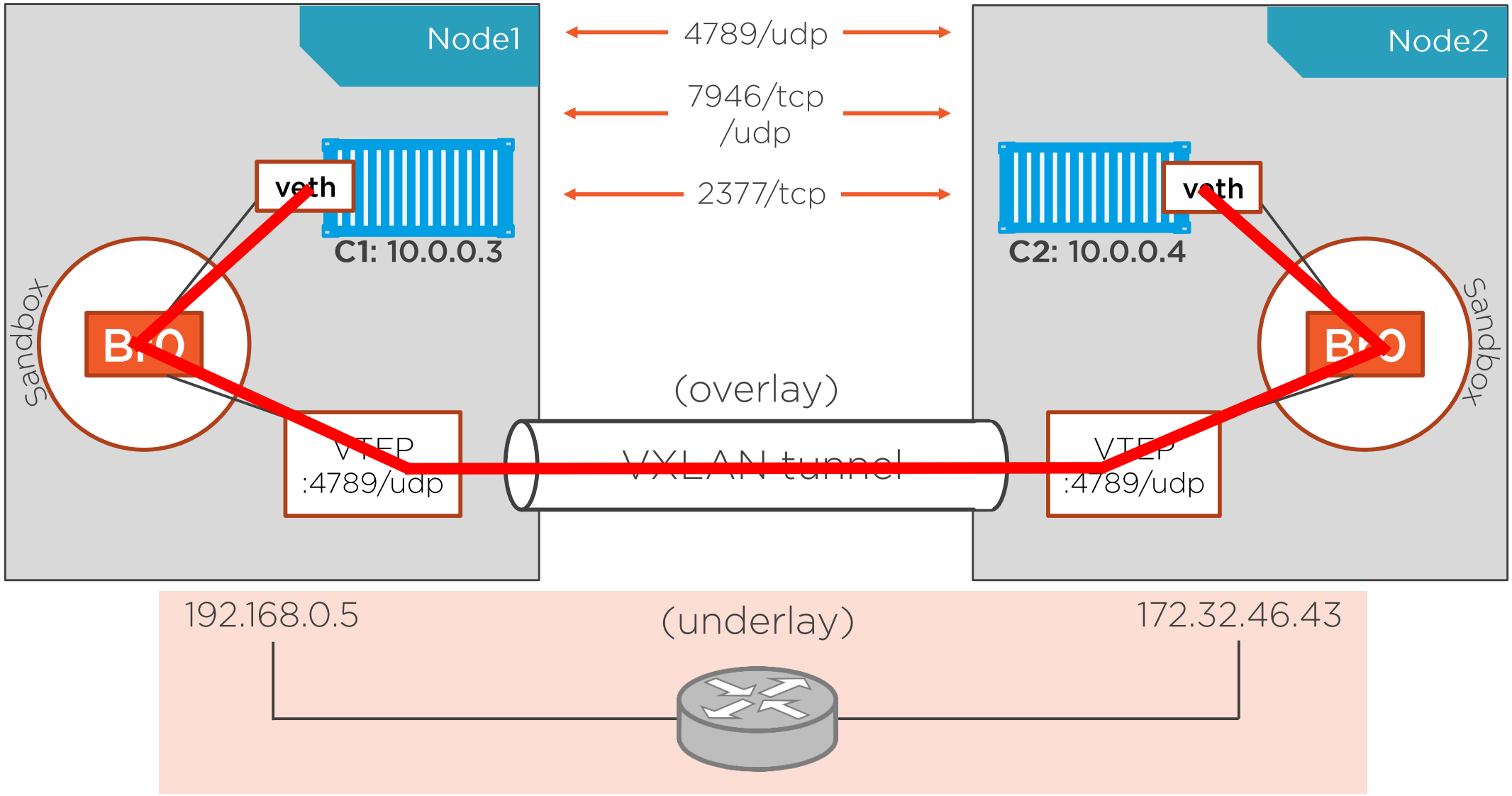
Multi-host overlay networking

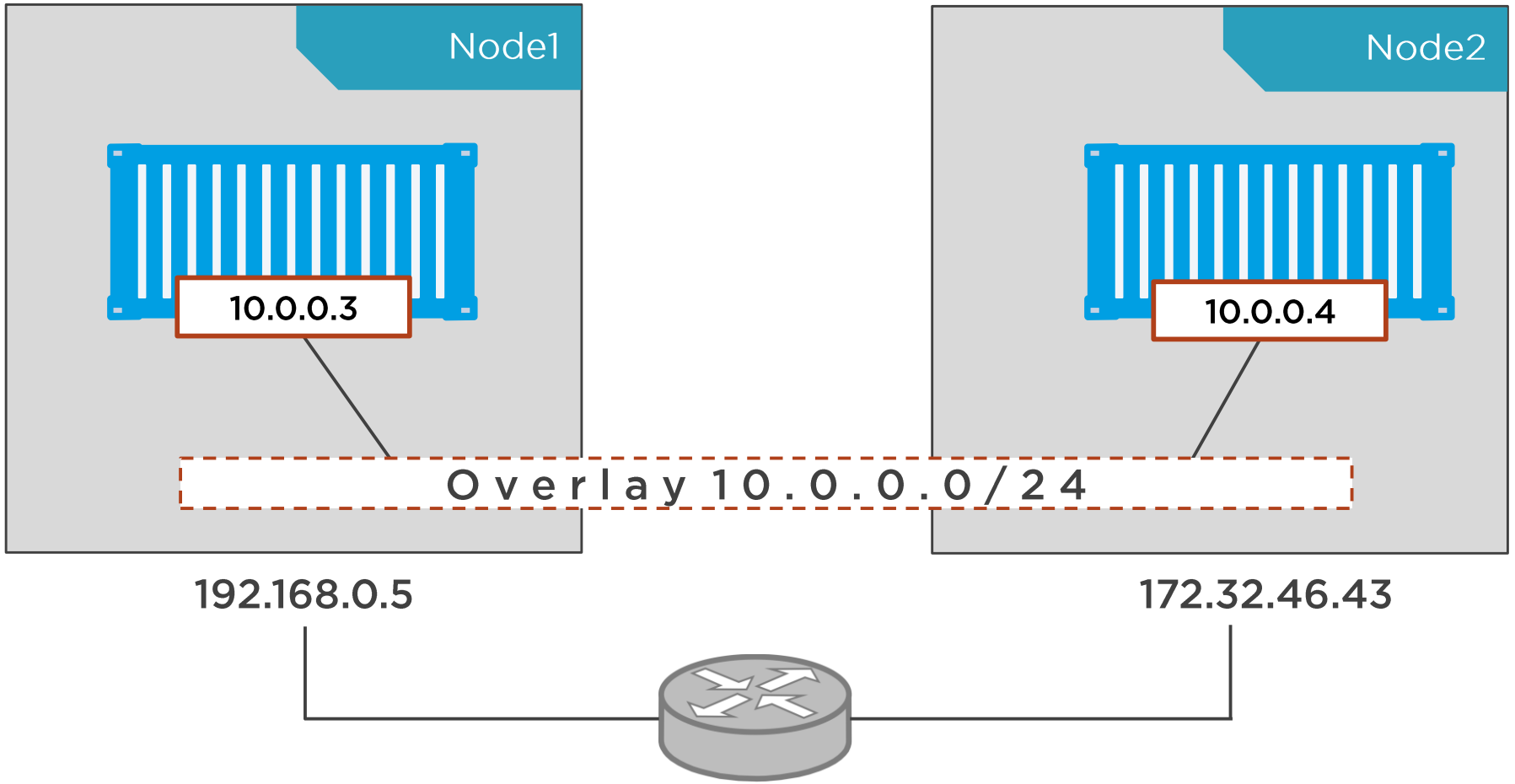
Multi-host Networking

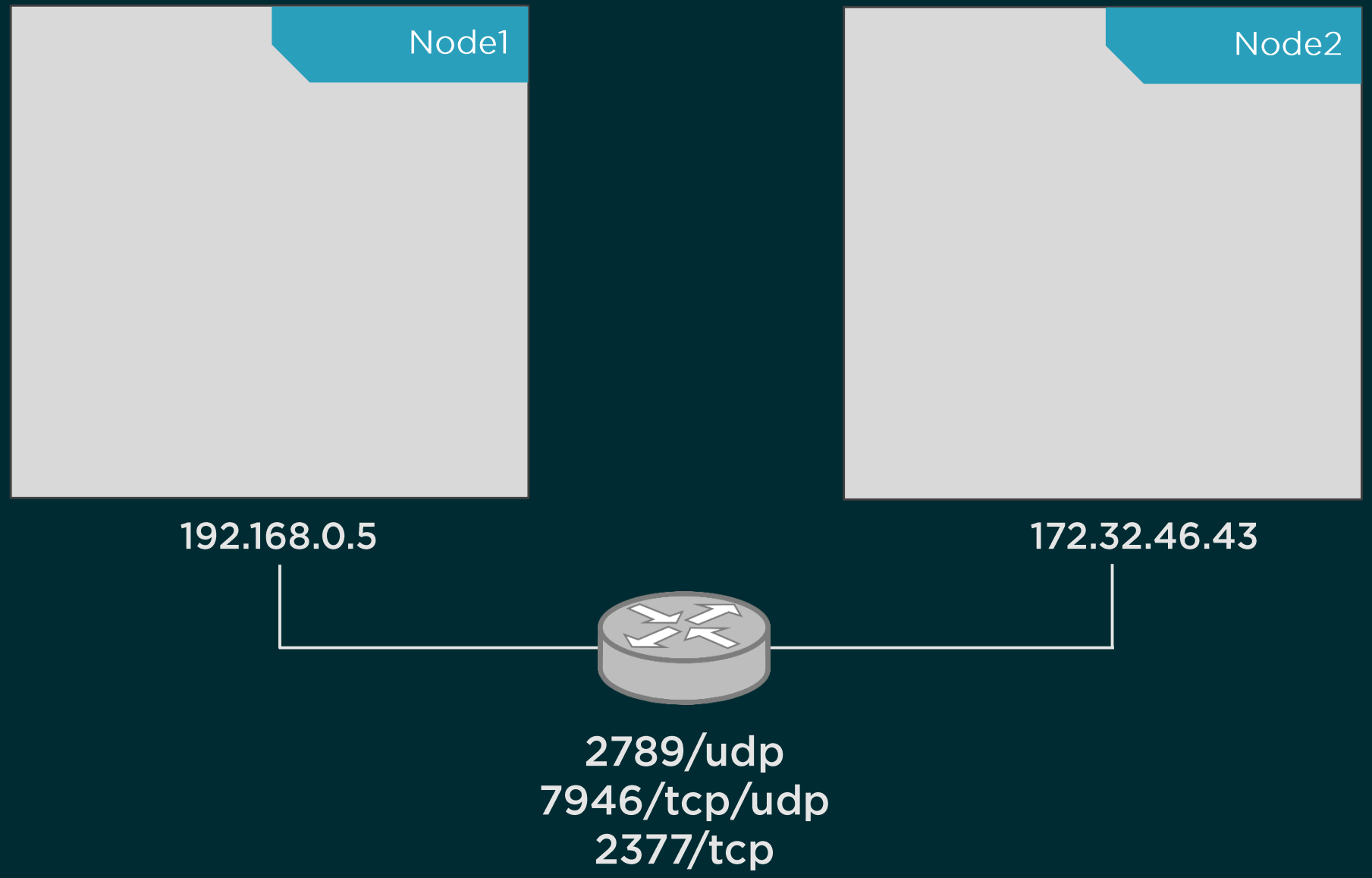
with the Docker **overlay** driver

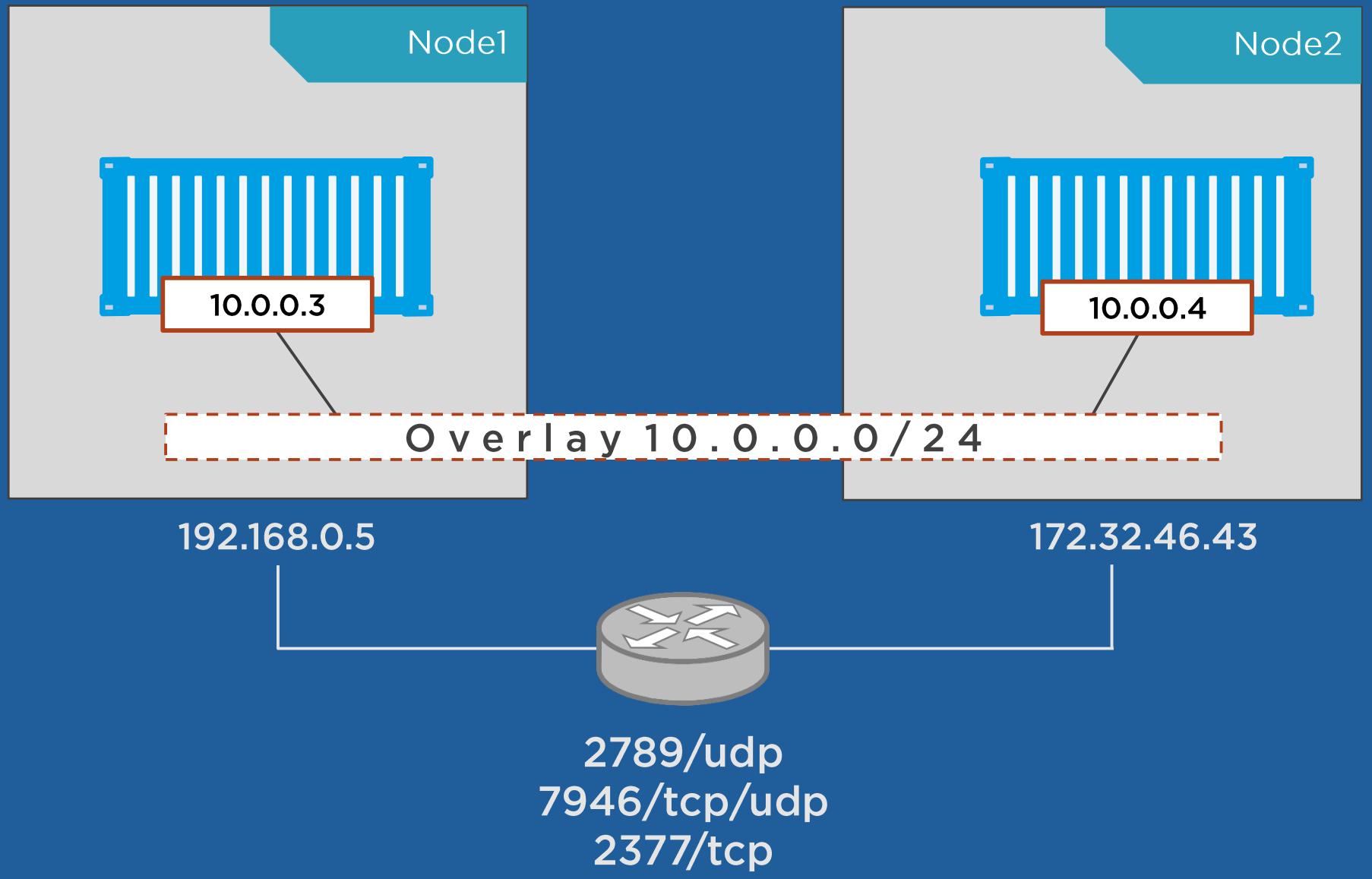
Multi-host Overlay




Node1
Node2
4789/udp
7946/tcp
/udp
2377/tcp
veth
veth
C1: 10.0.0.3
C2: 10.0.0.4
sandbox
sandbox
(overlay)
VXLAN tunnel
VTEP
:4789/udp
VTEP
:4789/udp
192.168.0.5
(underlay)
172.32.46.43


Node1
10.0.0.3
Node2
10.0.0.4
Overlay 10.0.0.0/24
192.168.0.5
172.32.46.43


Node1
Node2
192.168.0.5
172.32.46.43
2789/udp
7946/tcp/udp
2377/tcp


Node1
Node2
10.0.0.3
10.0.0.4
Overlay 10.0.0.0/24
192.168.0.5
172.32.46.43
2789/udp
7946/tcp/udp
2377/tcp

Coming up...

Joining existing networks with the **MACVLAN** driver

Participating in Existing Networks

With the Linux MACVLAN driver

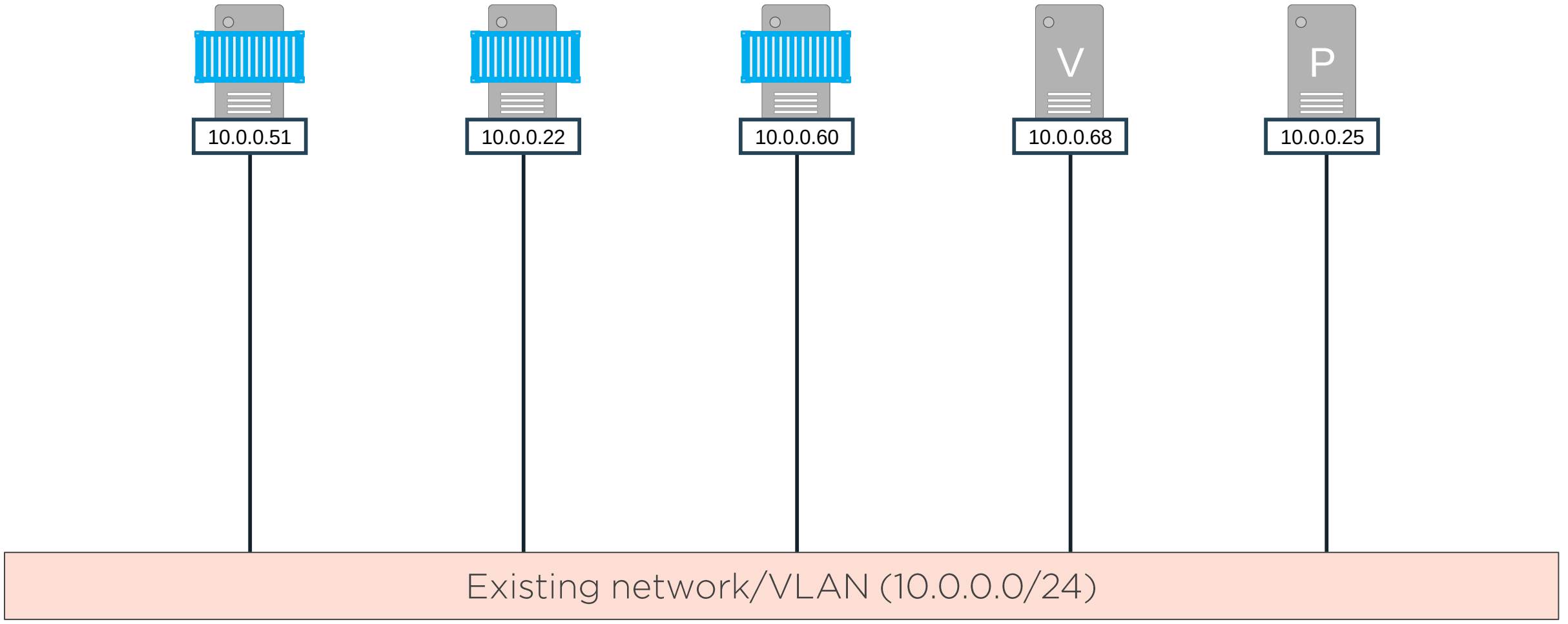
Similar(ish) to "l2bridge" on Windows

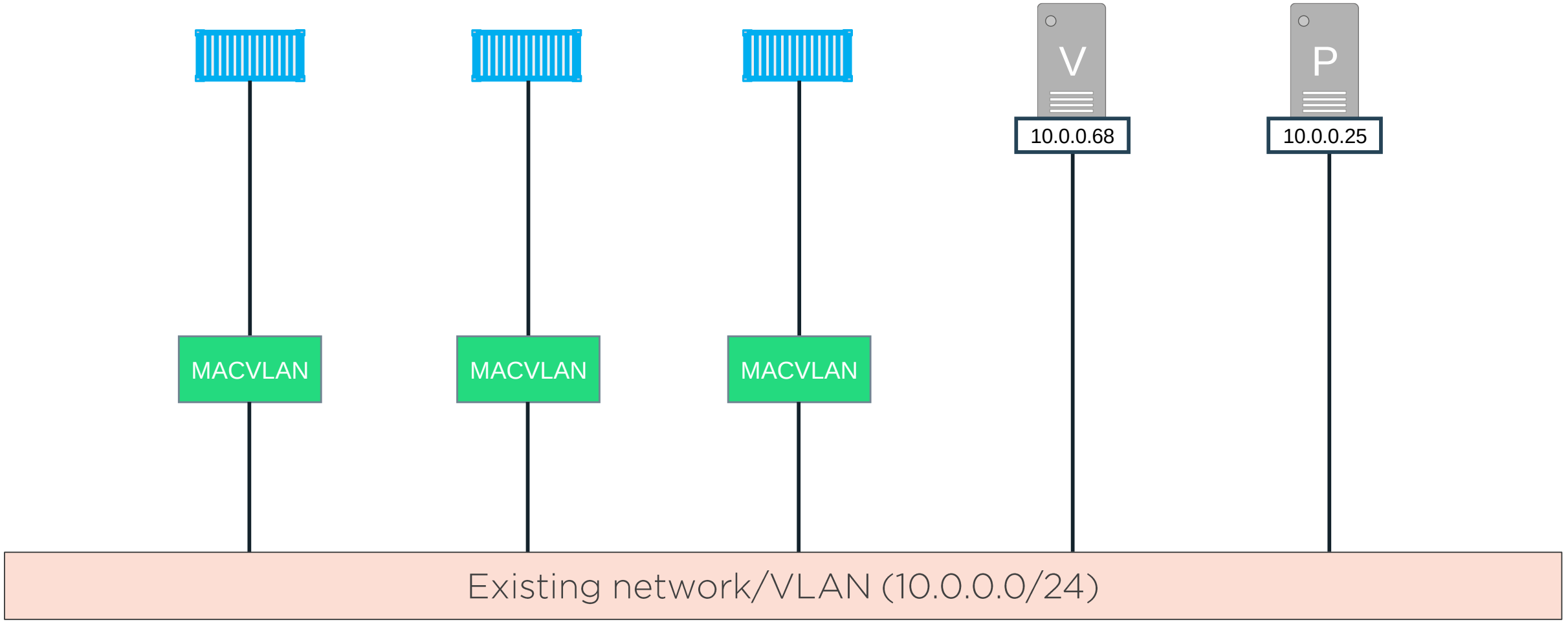
Linux MACVLAN

- Every container gets its own IP
- Every container gets its own MAC

Windows l2bridge

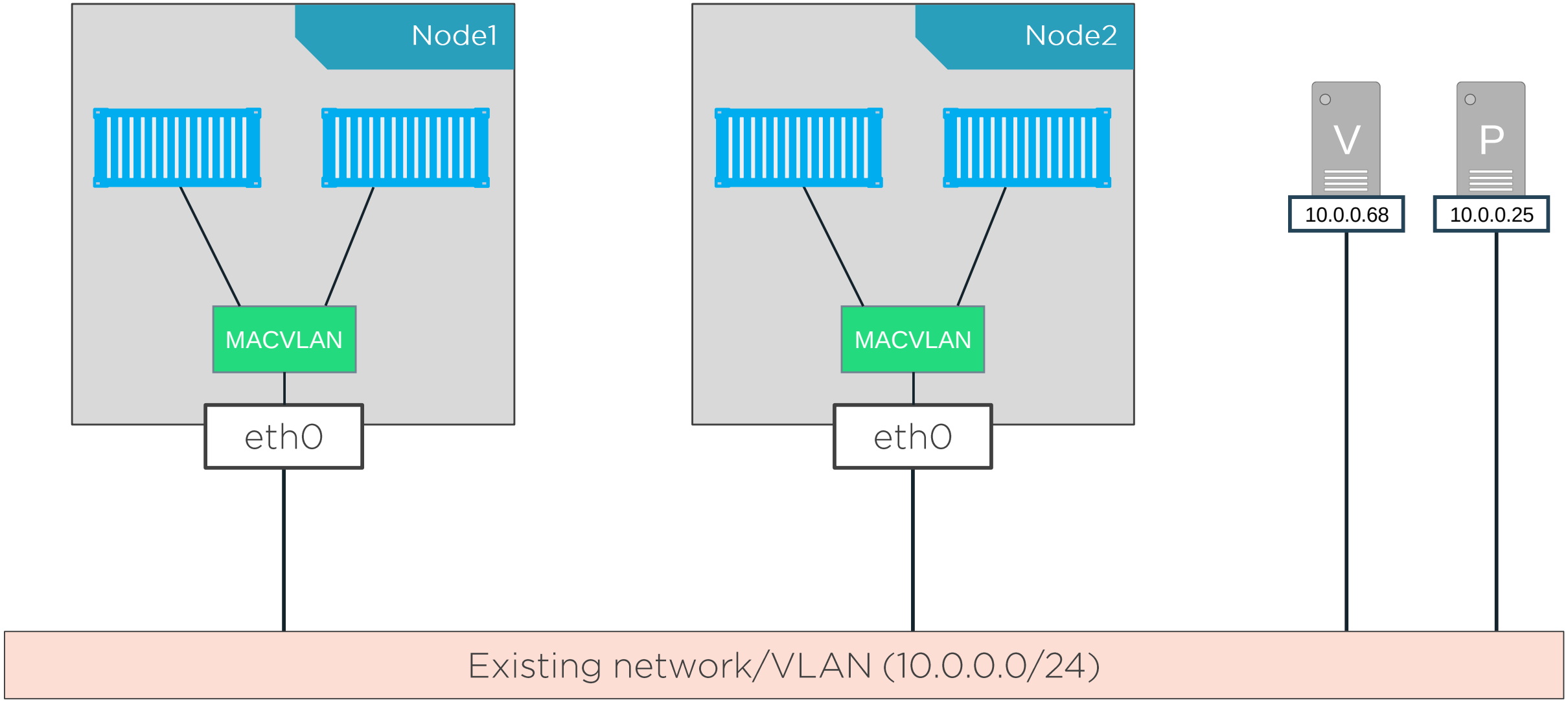
- Every container gets its own IP
- All containers share a common MAC

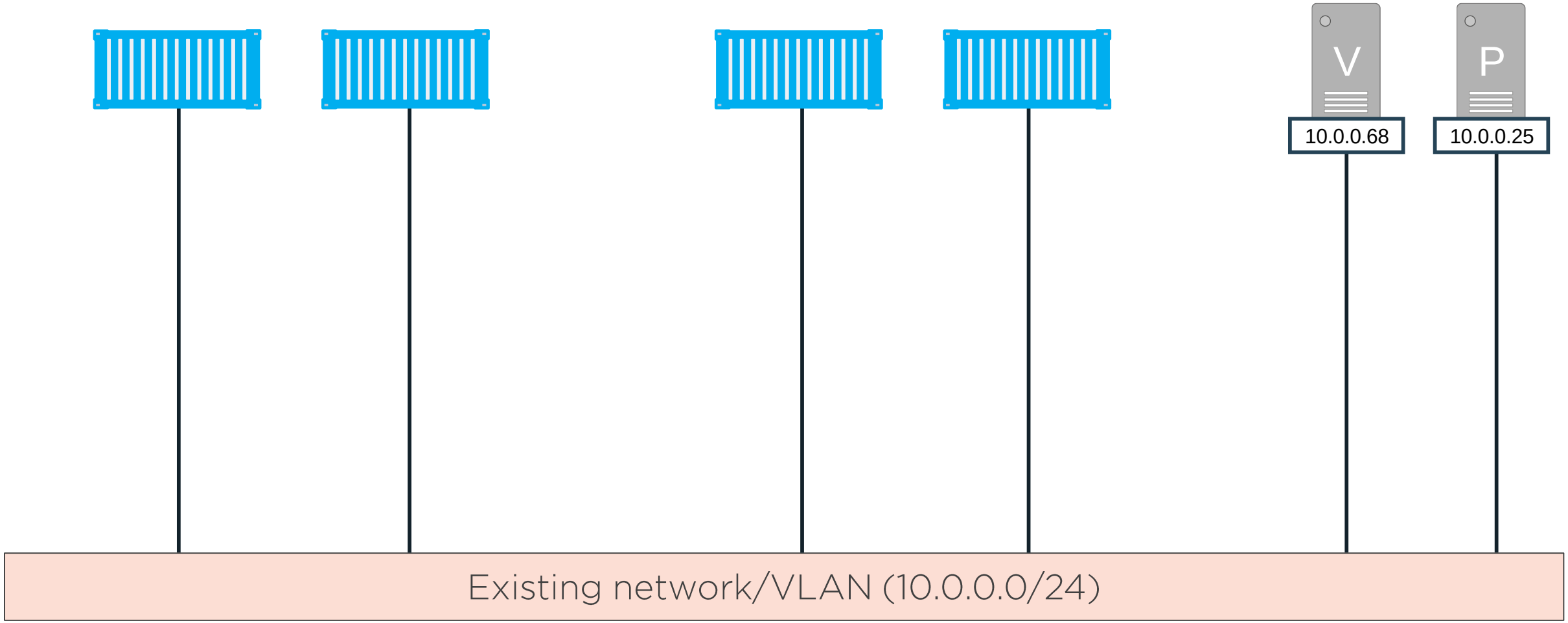

10.0.0.51
10.0.0.22
10.0.0.60
V
10.0.0.68
P
10.0.0.25
Existing network/VLAN (10.0.0.0/24)

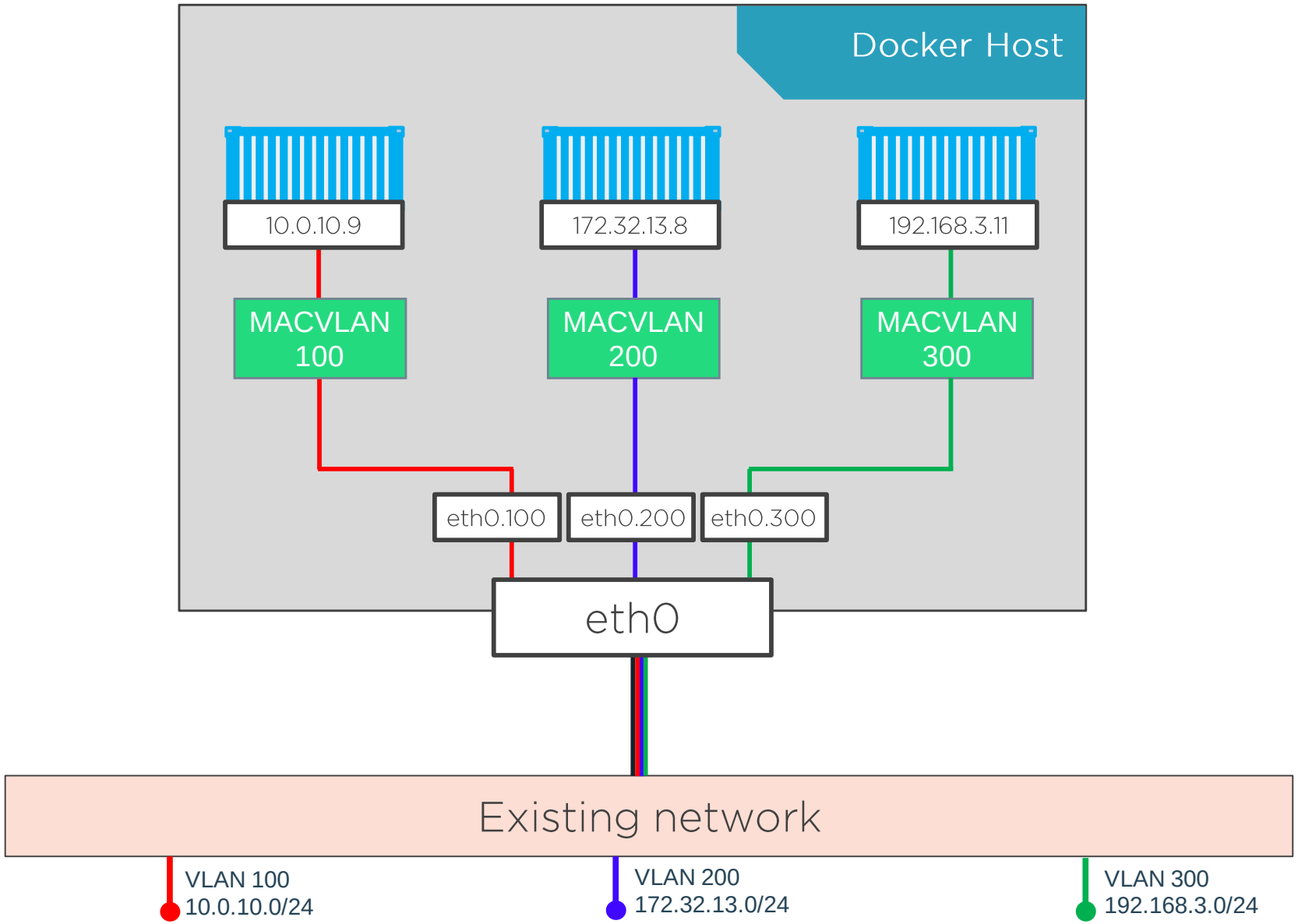

V
P
10.0.0.68
10.0.0.25
MACVLAN
MACVLAN
MACVLAN
Existing network/VLAN (10.0.0.0/24)

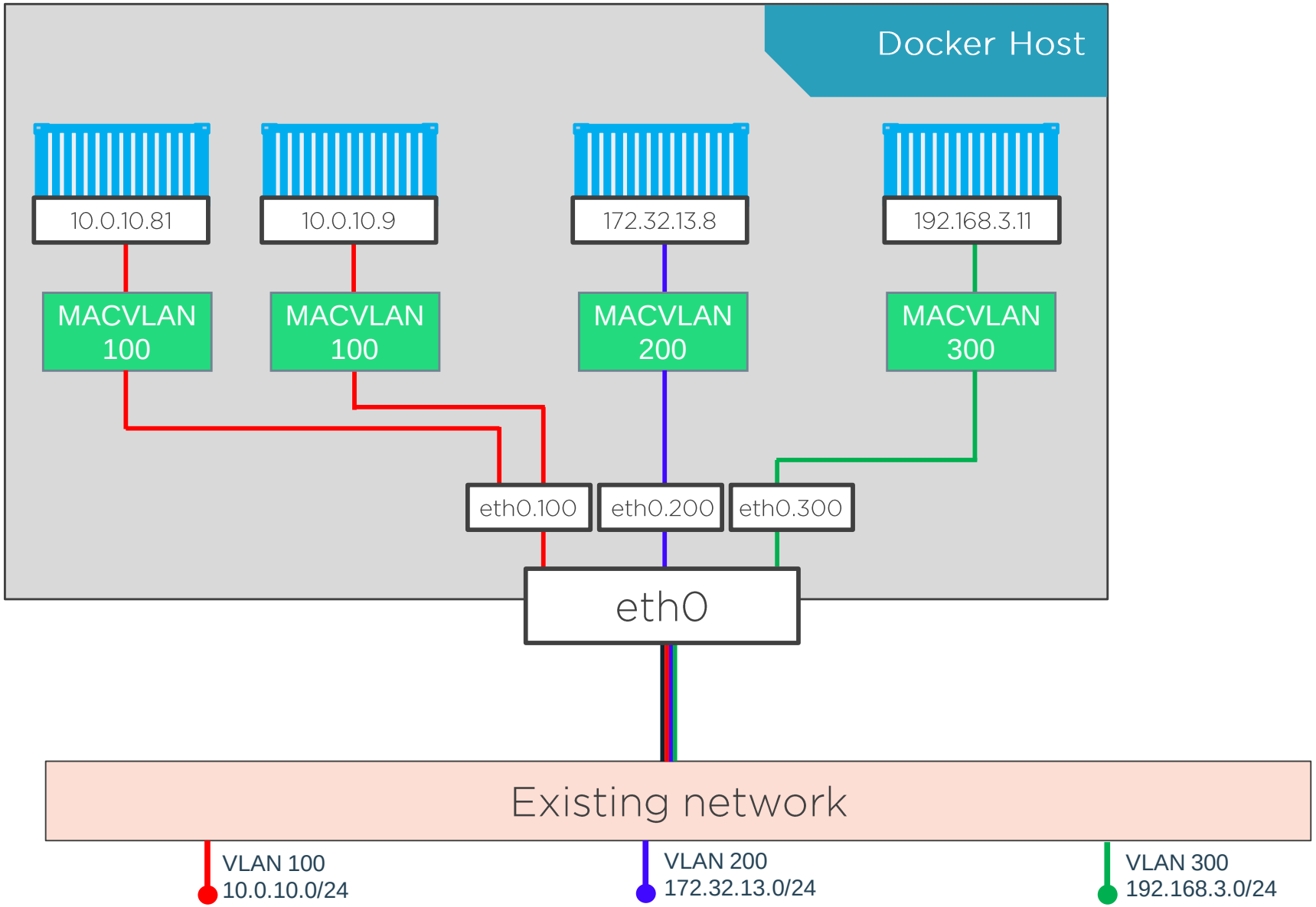
Coming up...

Coming up...


Node1
Node2
MACVLAN
MACVLAN
eth0
eth0
V
P
10.0.0.68
10.0.0.25
Existing network/VLAN (10.0.0.0/24)


V
P
10.0.0.68
10.0.0.25
Existing network/VLAN (10.0.0.0/24)


Docker Host
10.0.10.9
172.32.13.8
192.168.3.11
MACVLAN 100
MACVLAN 200
MACVLAN 300
eth0.100
eth0.200
eth0.300
eth0
Existing network
VLAN 100
10.0.10.0/24
VLAN 200
172.32.13.0/24
VLAN 300
192.168.3.0/24


Docker Host
10.0.10.81
10.0.10.9
172.32.13.8
192.168.3.11
MACVLAN 100
MACVLAN 100
MACVLAN 200
MACVLAN 300
eth0.100
eth0.200
eth0.300
eth0
Existing network
VLAN 100
10.0.10.0/24
VLAN 200
172.32.13.0/24
VLAN 300
192.168.3.0/24

Demo...

MACVLAN requires PROMISCUOUS MODE!

- Most public cloud providers don't allow it

Final point...

- Plan your IP addressing carefully
  (check docs.docker.com for the latest info)

Coming up...

Joining existing networks with the **IPVLAN** driver

Participating in Existing Networks

Similar to Linux MACVLAN

- But doesn't give containers their own MAC addresses

Similar to Windows l2bridge

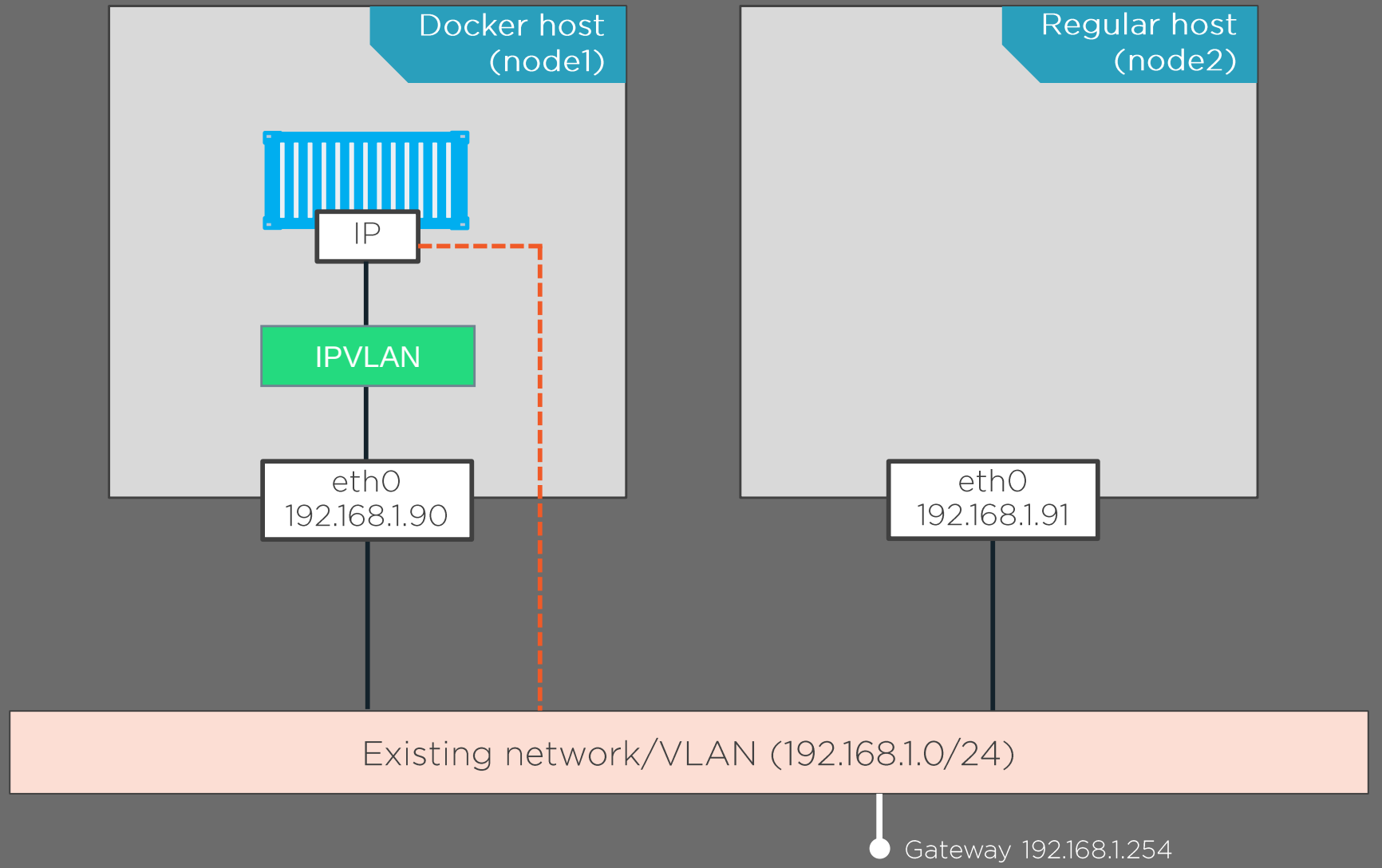
With the Linux IPVLAN driver

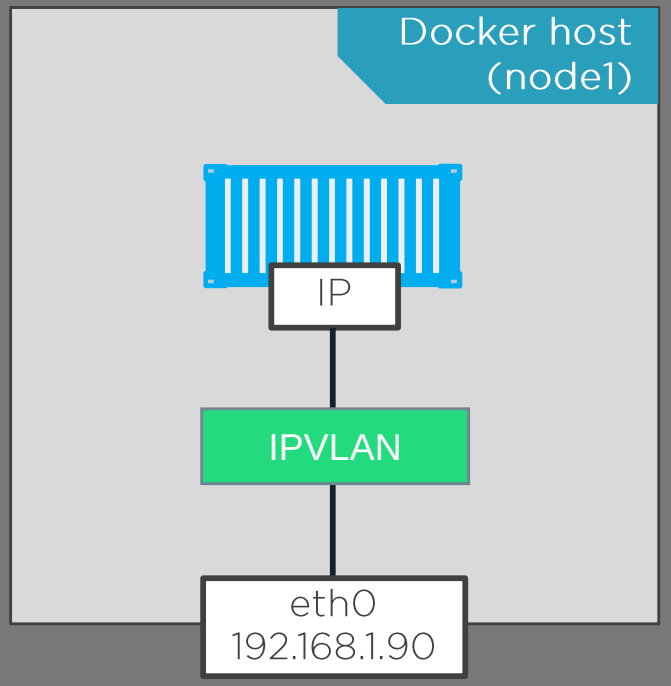
More cloud-friendly than MACVLAN (YMMV)

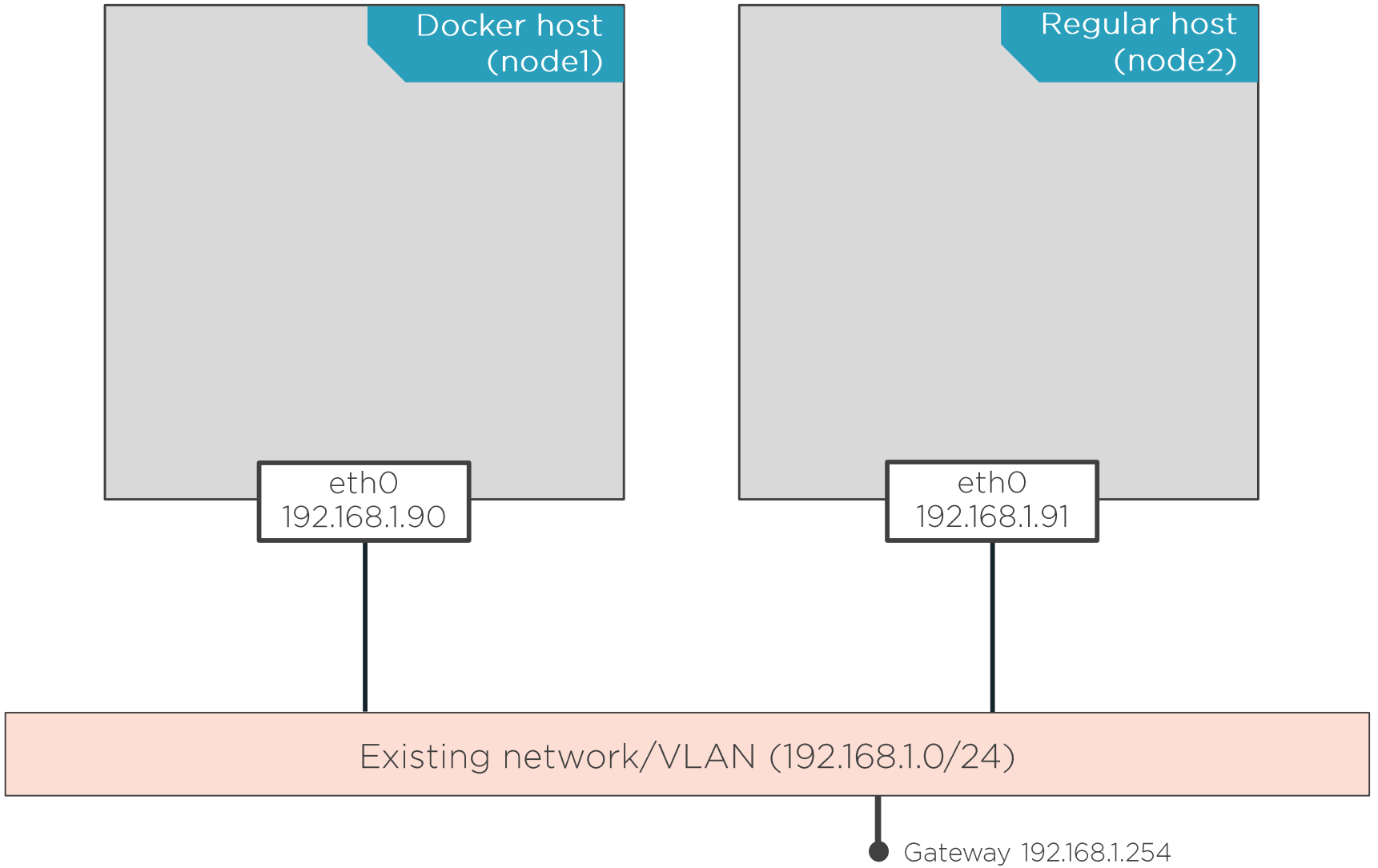
Special considerations when working with DHCP

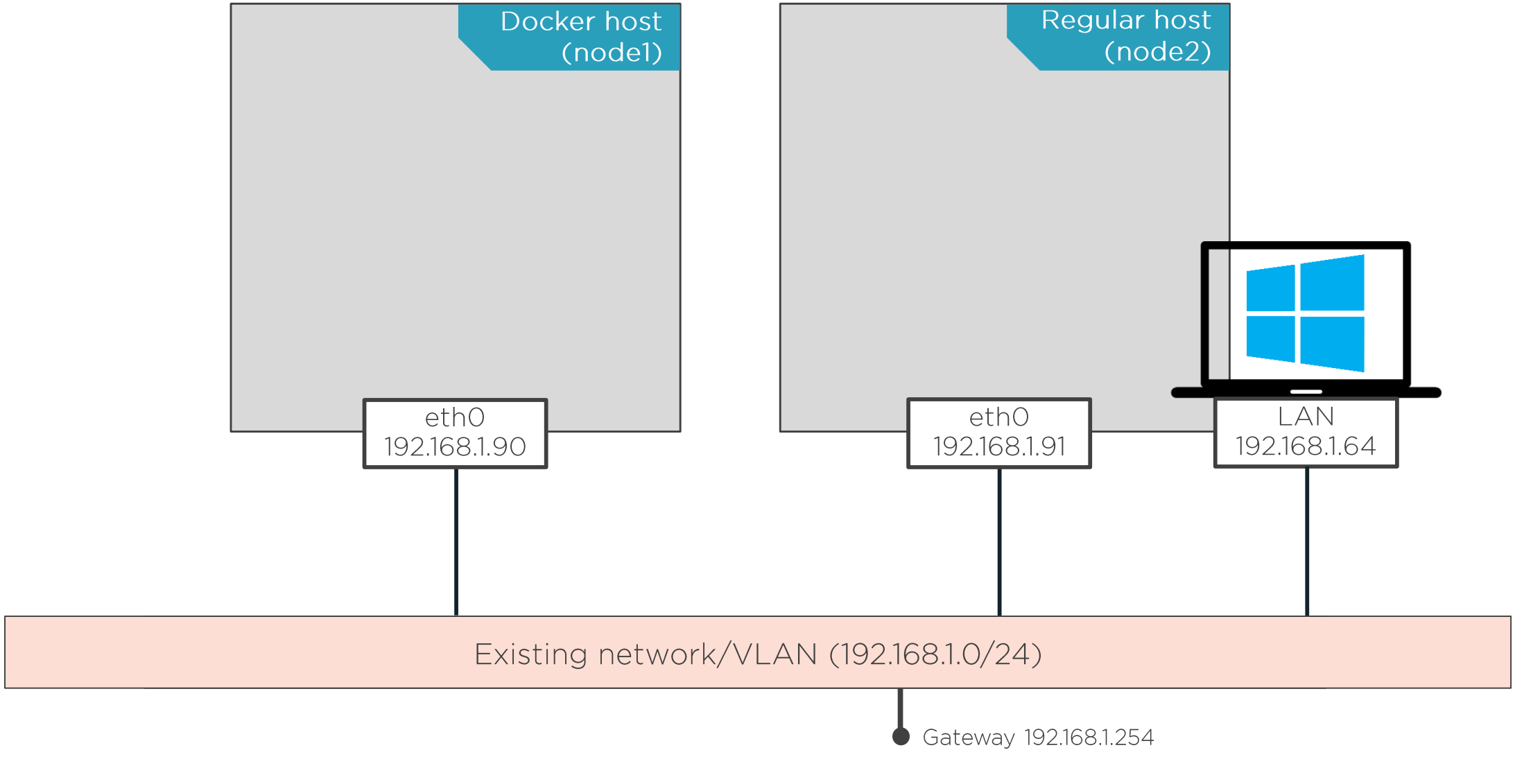
Containers cannot ping their host

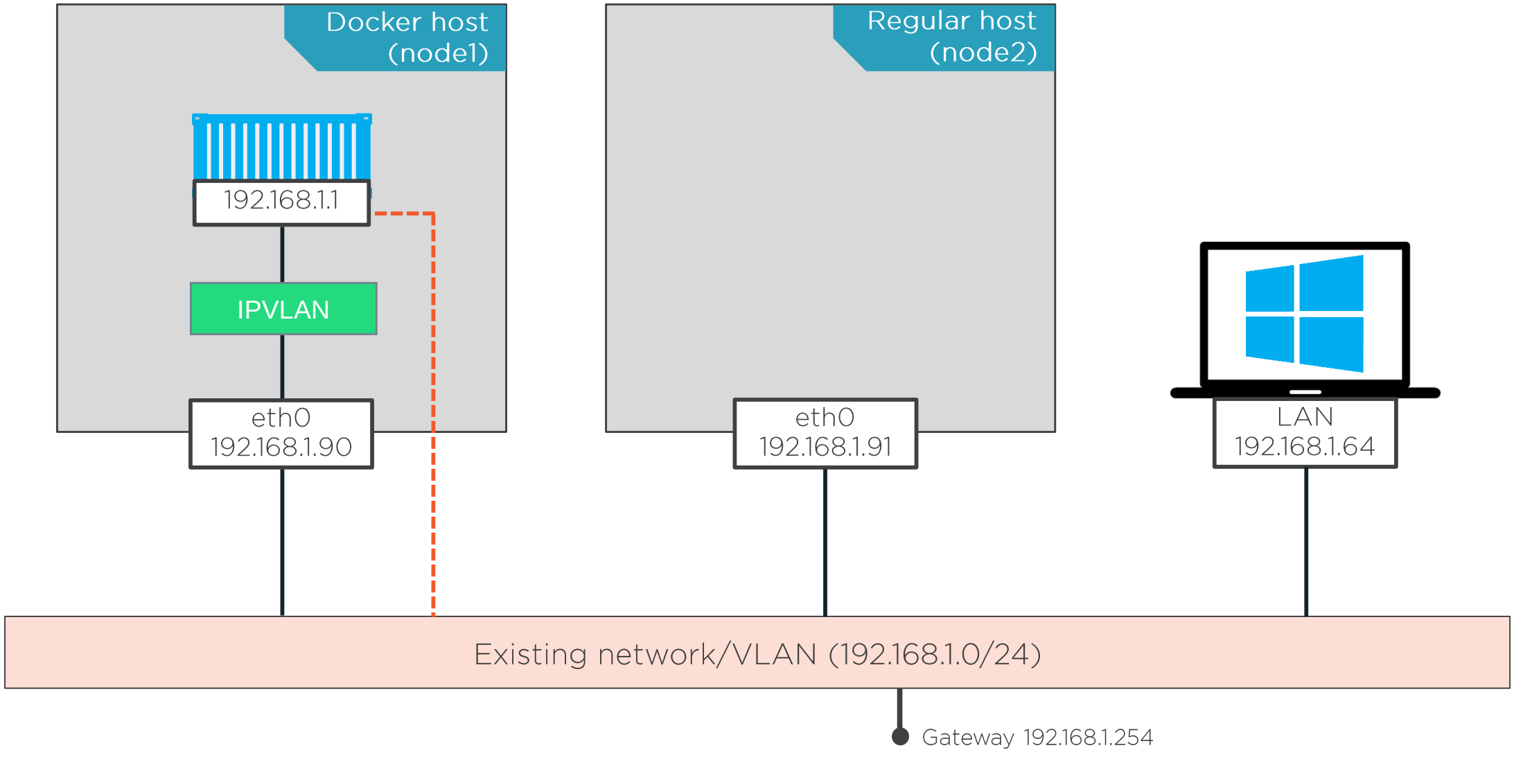
Demo...


Docker host
(node1)
IP
IPVLAN
eth0
192.168.1.90
Regular host
(node2)
eth0
192.168.1.91
Existing network/VLAN (192.168.1.0/24)
Gateway 192.168.1.254


Docker host
(node1)
IP
IPVLAN
eth0
192.168.1.90


Docker host
(node1)
Regular host
(node2)
eth0
192.168.1.90
eth0
192.168.1.91
Existing network/VLAN (192.168.1.0/24)
Gateway 192.168.1.254


Docker host
(node1)
Regular host
(node2)
eth0
192.168.1.90
eth0
192.168.1.91
LAN
192.168.1.64
Existing network/VLAN (192.168.1.0/24)
Gateway 192.168.1.254


Docker host
(node1)
192.168.1.1
IPVLAN
eth0
192.168.1.90
Regular host
(node2)
eth0
192.168.1.91
LAN
192.168.1.64
Existing network/VLAN (192.168.1.0/24)
Gateway 192.168.1.254

IPVLAN: Quick Summary

Similar to MACVLAN, but...

- Doesn't require **promiscuous mode**
- Doesn't give every container a MAC

Might be an issue with some cloud platforms

Needs hints about the underlay

Get your IPAM right!

Newer than **overlay, bridge, MACVLAN...**

Coming up...

Network services