Networking your way in VCF9

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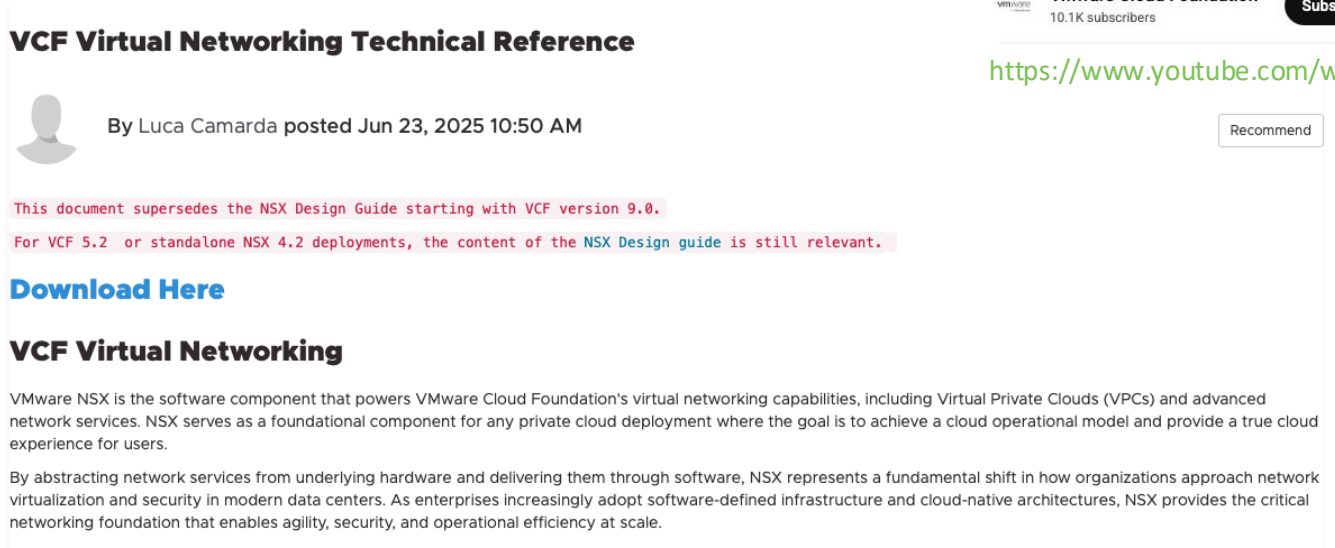
- vExpert en Broadcom knight

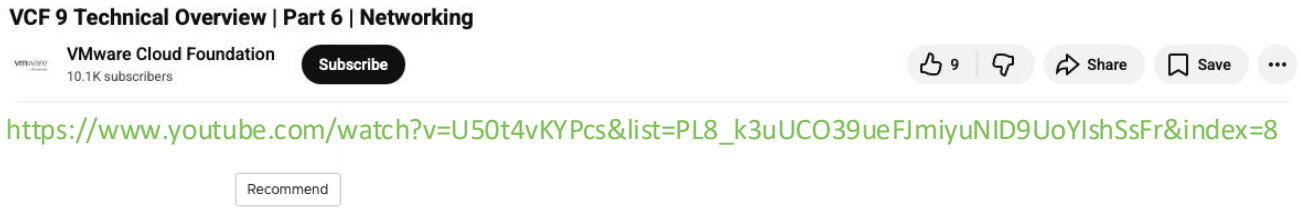
DISCLAIMER

Resources

VMware Cloud Foundation 9 Technical Overview
Modernize Infrastructure: Networking



https://community.broadcom.com/blogs/luca-camarda/2025/06/23/vcf-virtual-networking-technical-reference



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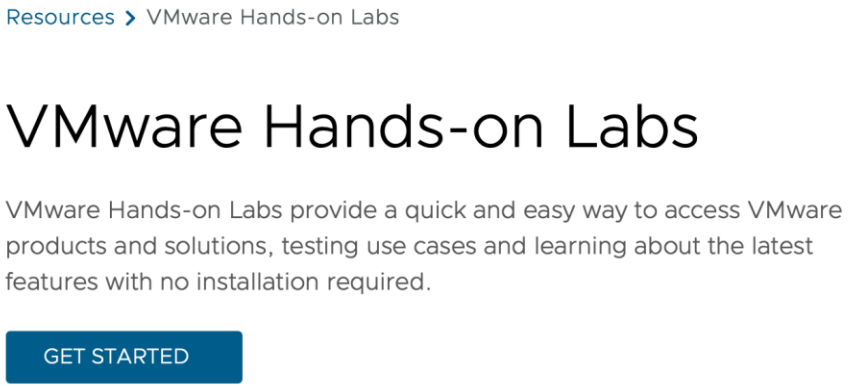


VCF Automation Governance & Consumption Models

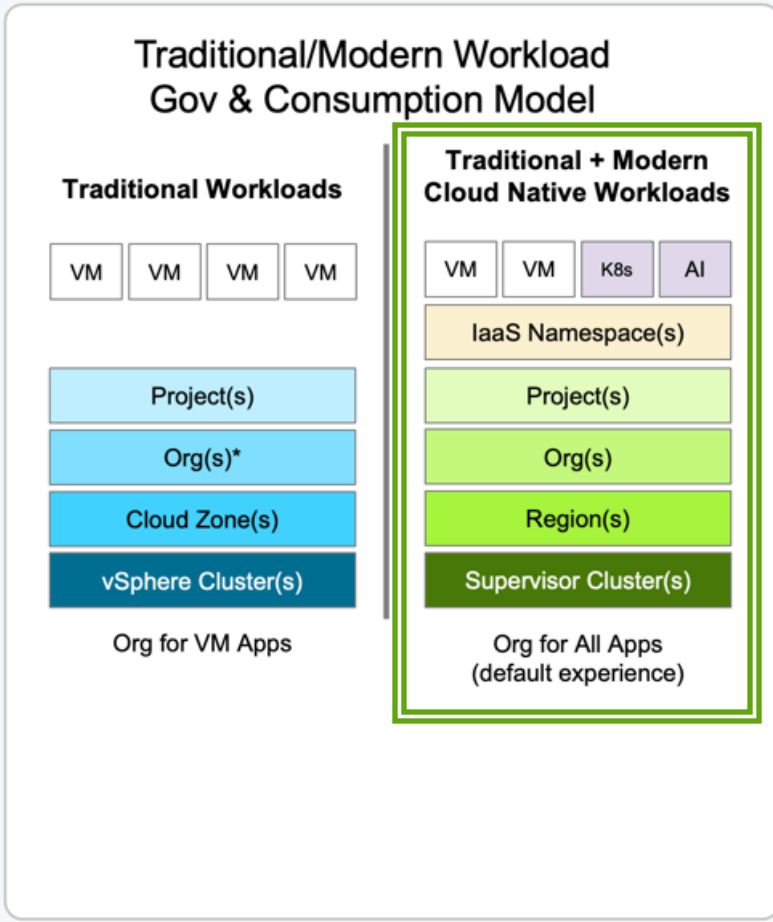
VCF Automation isn't just a simple VM provisioning tool

Enterprise/Service Provider Gov & Consumption Model

- No infrastructure isolation
- Infrastructure is divided by identity access management

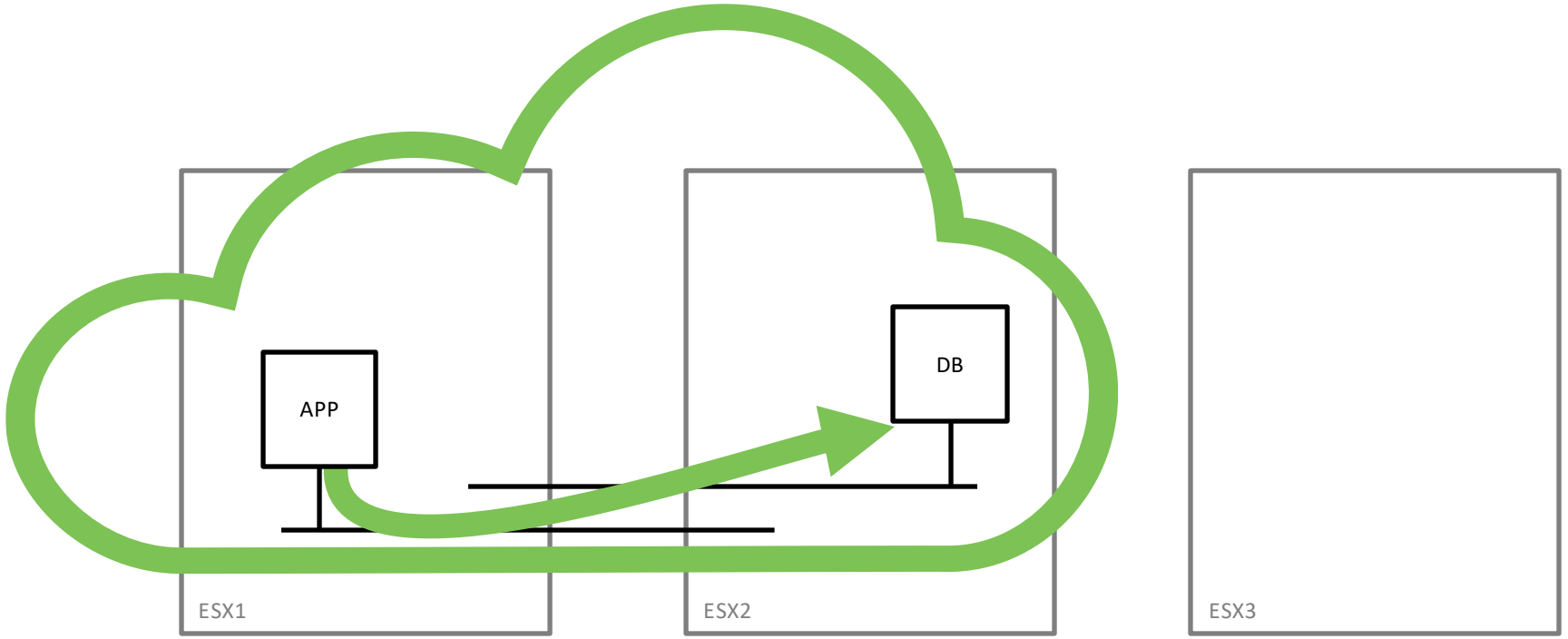
- Infrastructure isolation
- Isolated resource pool created in cluster (eg: GPU)
- Can set allocations
- No sharing of vCenter across Orgs
- Costing (chargeback)
- Dev/test/prod environments

Traditional/Modern Workload Gov & Consumption Model



Self-Service IaaS/Catalog Gov & Consumption Model

VCF 9 - Virtual Private Cloud (VPC) Model



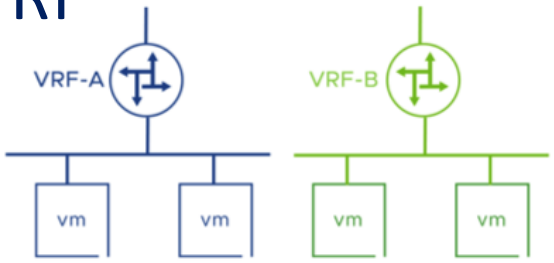
VCF 9 – VPC Model

- Public cloud als model
- RABC en Tenant scheiding
- Simpel

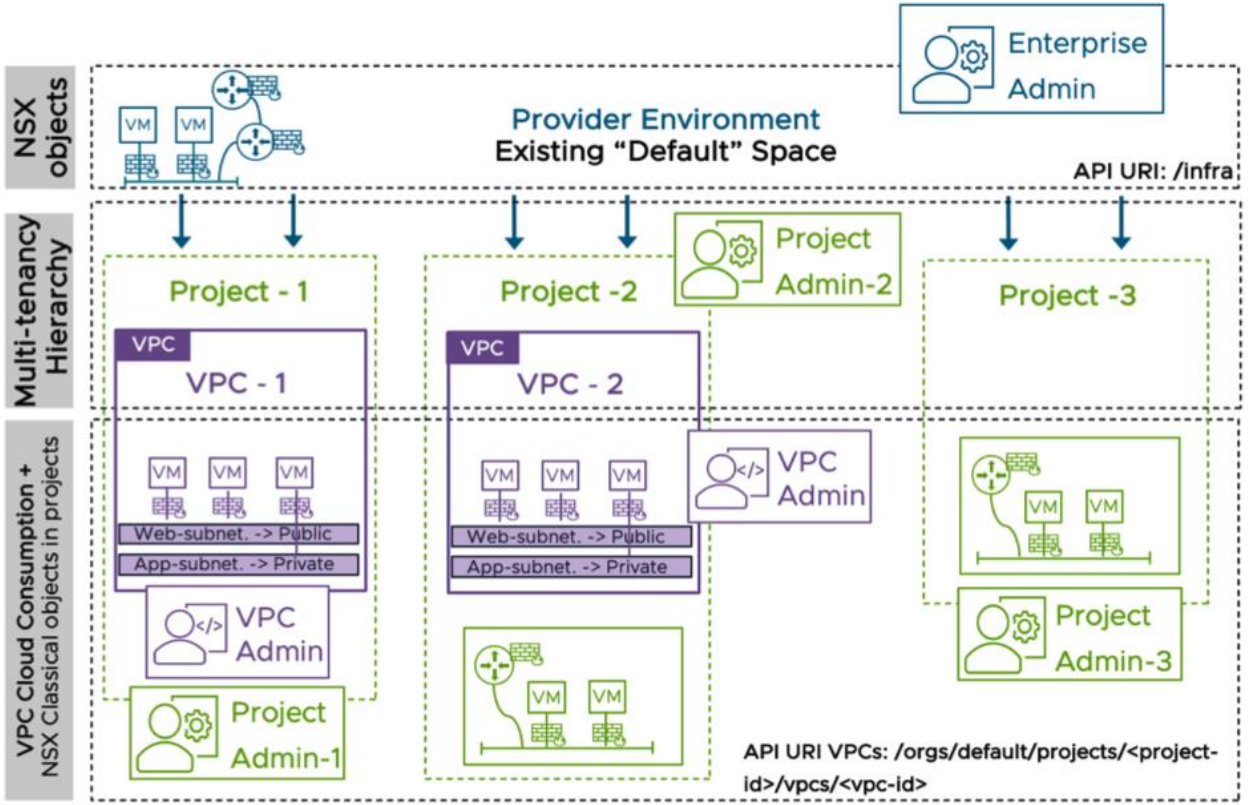
VCP en Multi Tenant niet nieuw

- Distributed Firewall

- VRF

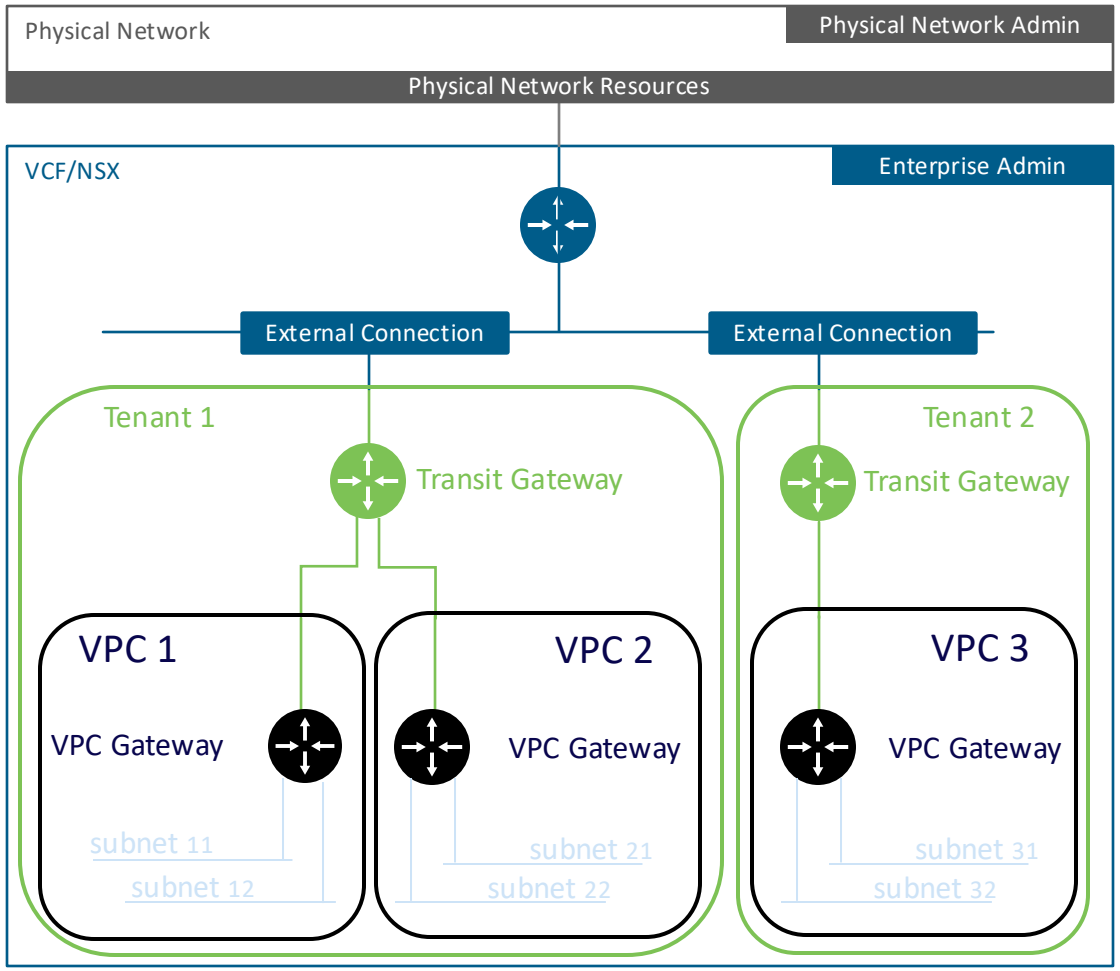


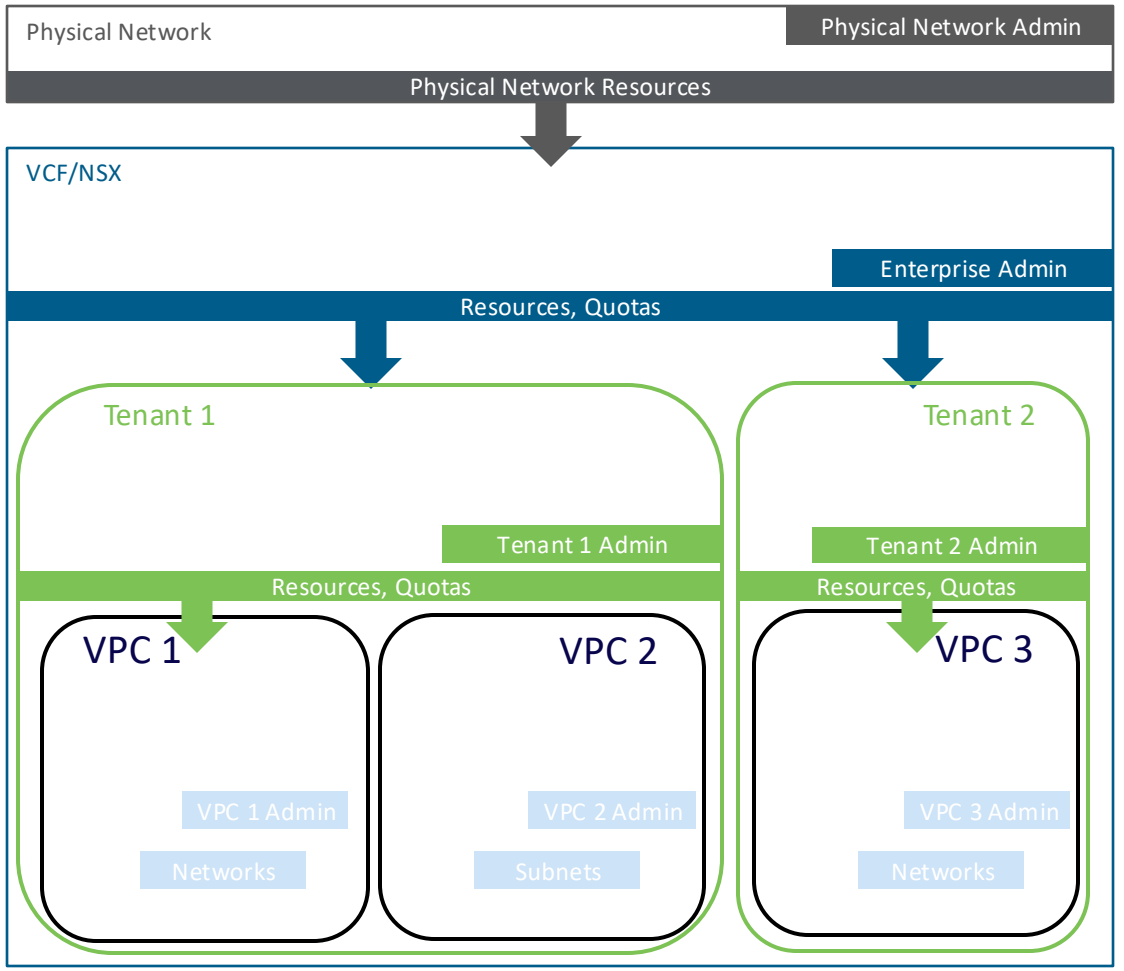
- NSX 4.1.1
  - Projects
  - VPC



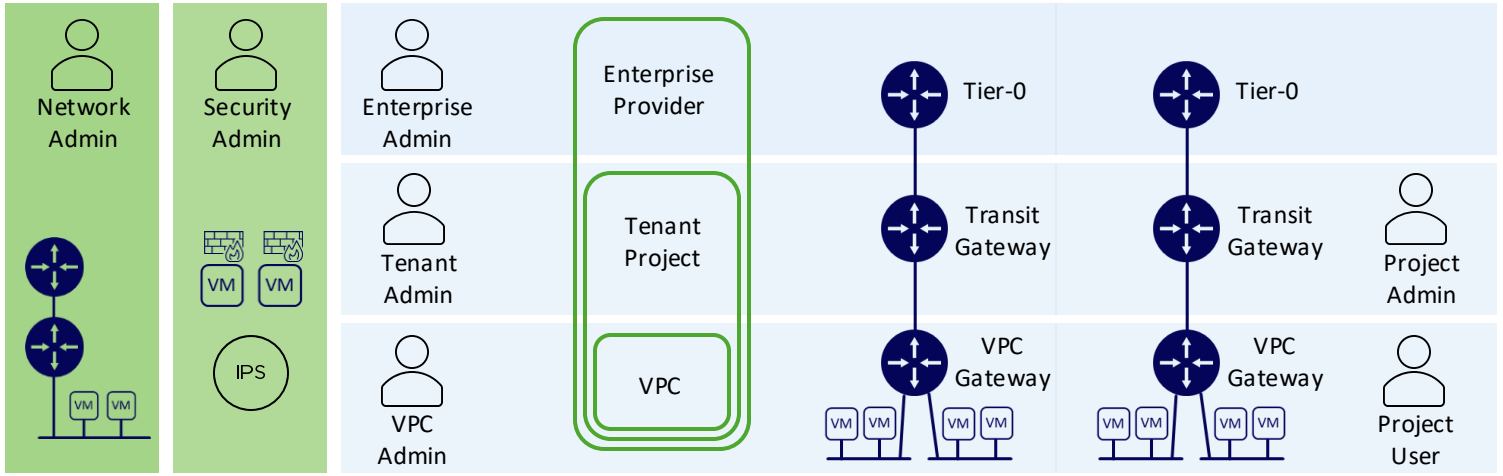
Introduction

Virtual Private Cloud (VPC)



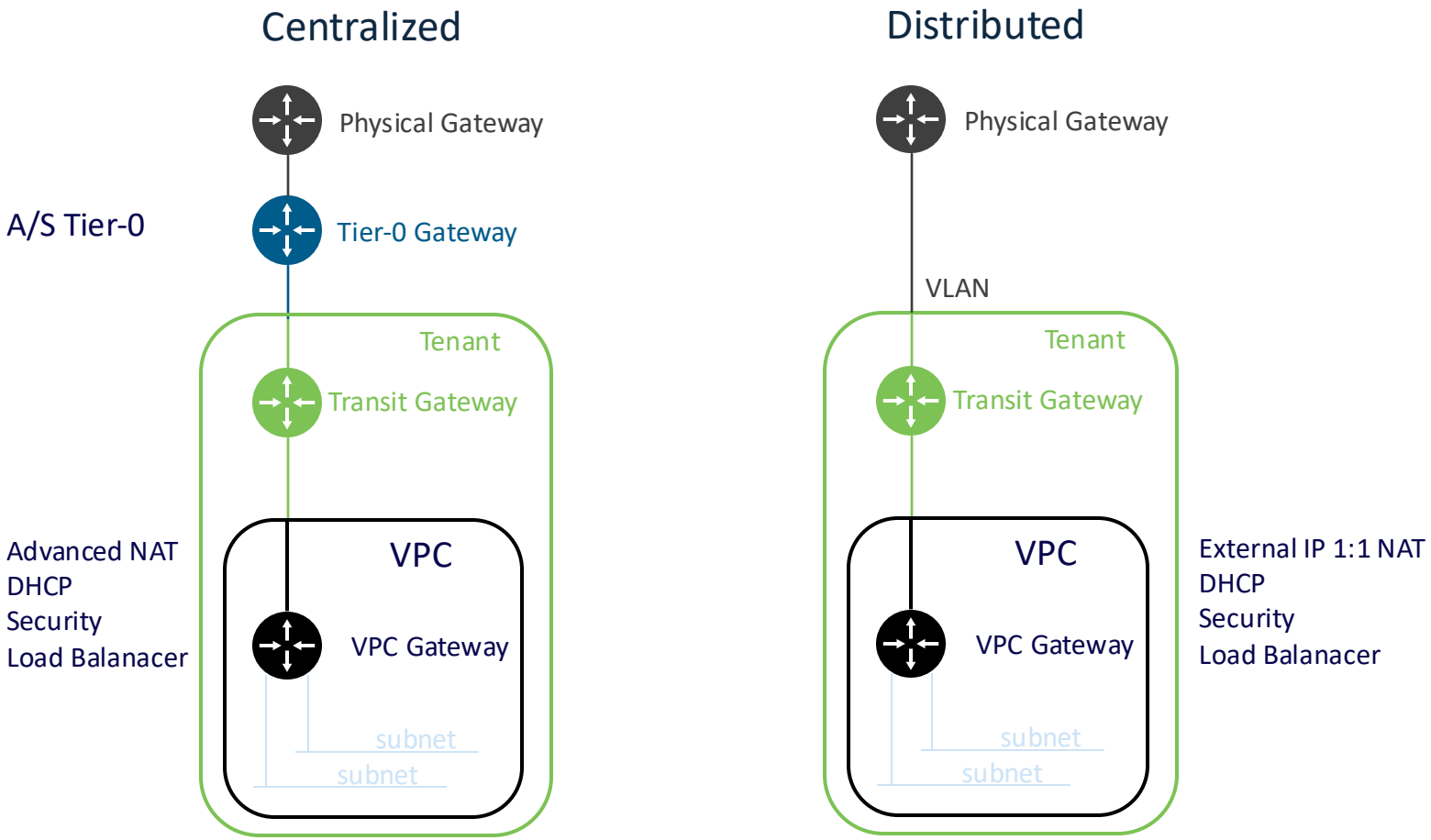


NSX en VCF Roles



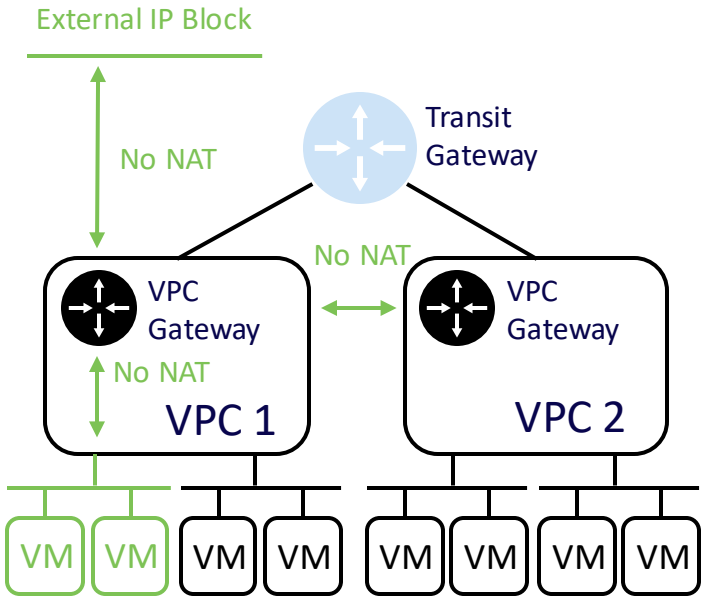
User or Role	Responibilities	Tools and interfaces
Enterprise/Provider/Cloud admin	• VCF bring-up • VCF Lifecycle-management • Create Provider Gateway (Tier-0) • Define Tenants and assign resources	• **VCF Operations** • VCF Automation • vCenter and NSX UI/API
Tenant/Project admin	• Create VCF Automation constructs (Project, Namespaces) • Configure Transit Gateway • Create NSX VPC	• **VCF Automation** • vCenter and NSX UI/API
VPC Admin/Project User	• Deploy Workloads and Services • Create VPC objects (Subnets, Firewall rules, Load-balancers, NAT)	• **VCF Automation** • vCenter and NSX UI/API
Network Admin	• Create Provider Gateway (Tier-0) • Create IP-allocations • Create logical Network topologies	• NSX UI/API
Security Admin	• Manage Gateways and Distributed firewall policies • Manage tagging and grouping • Manage IDS rules	• NSX UI/API

External connectivity Types



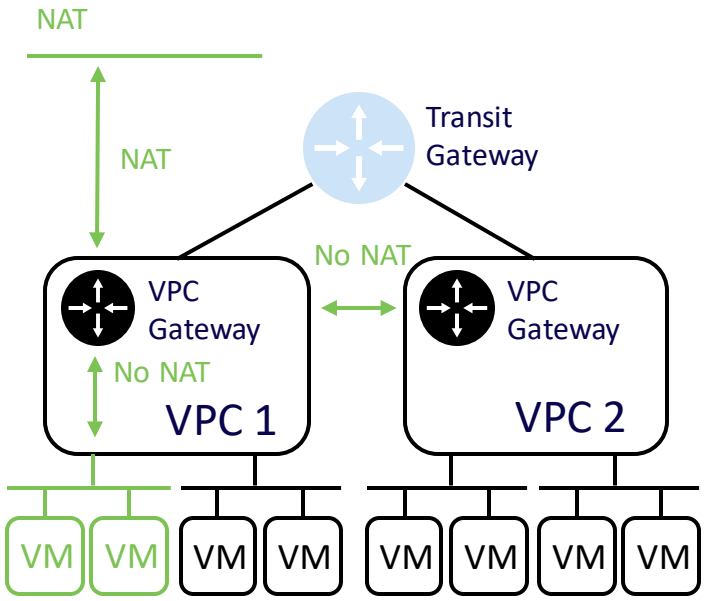
VPC Subnets

Public Subnet



Within VPC No NAT
Across VPC No NAT
External (N/S) No NAT

Private Transit Gateway Subnet



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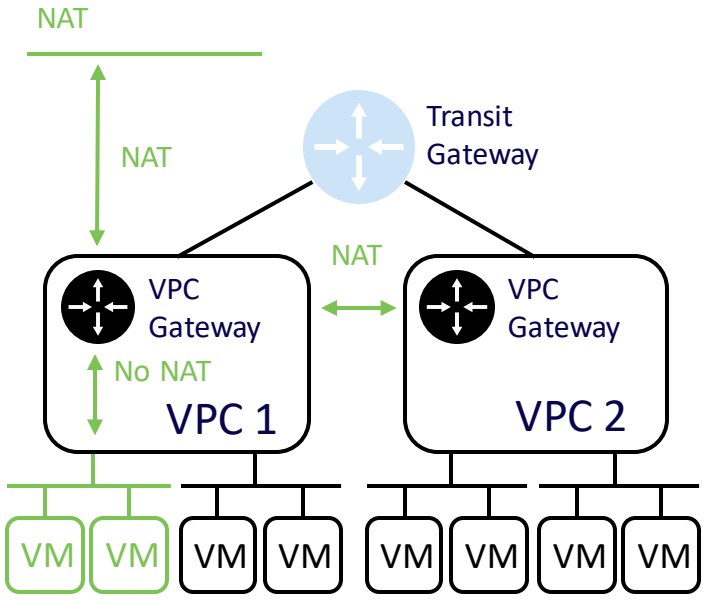
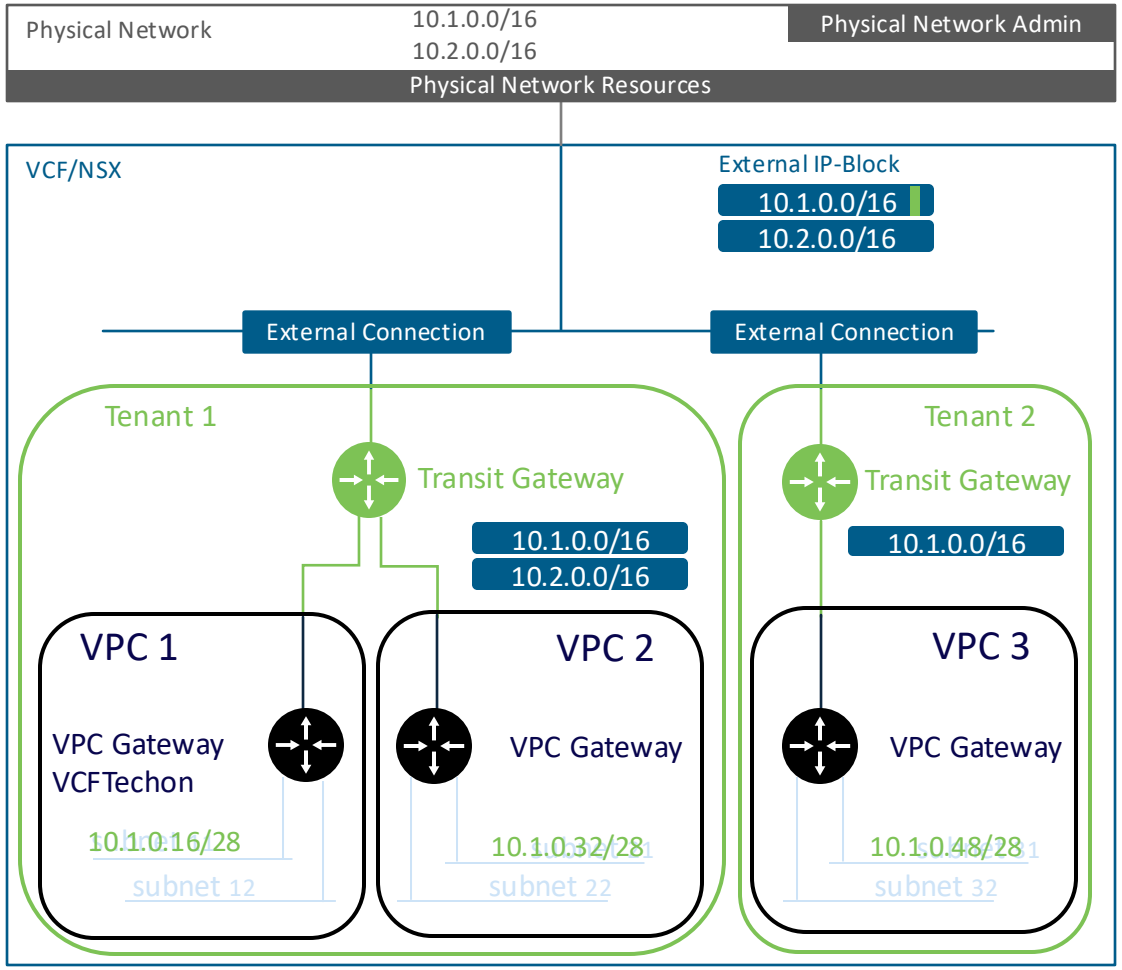
Private VPC Subnet

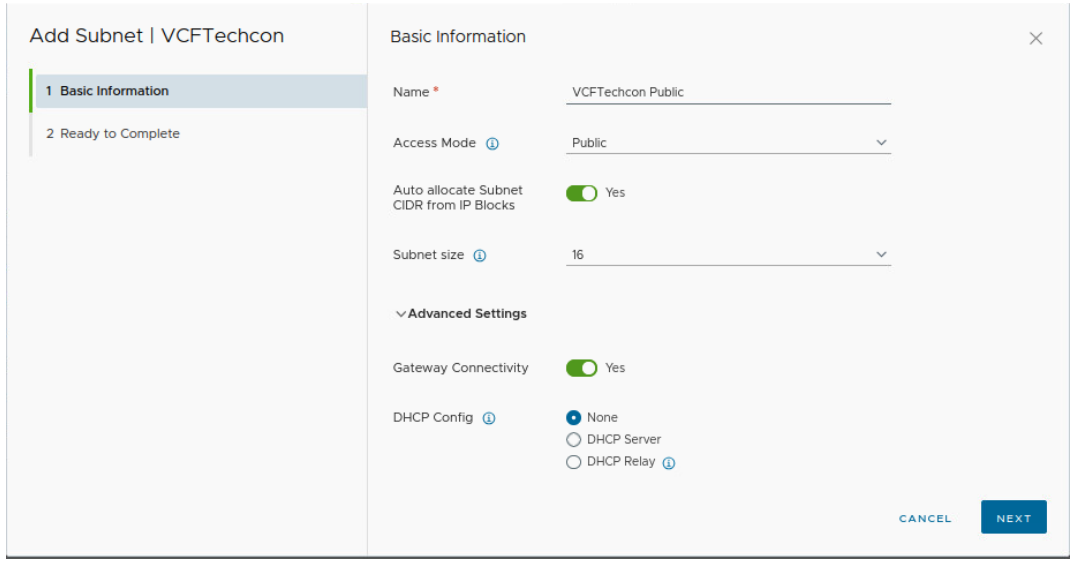


Within VPC No NAT
Across VPC NAT
External (N/S) NAT

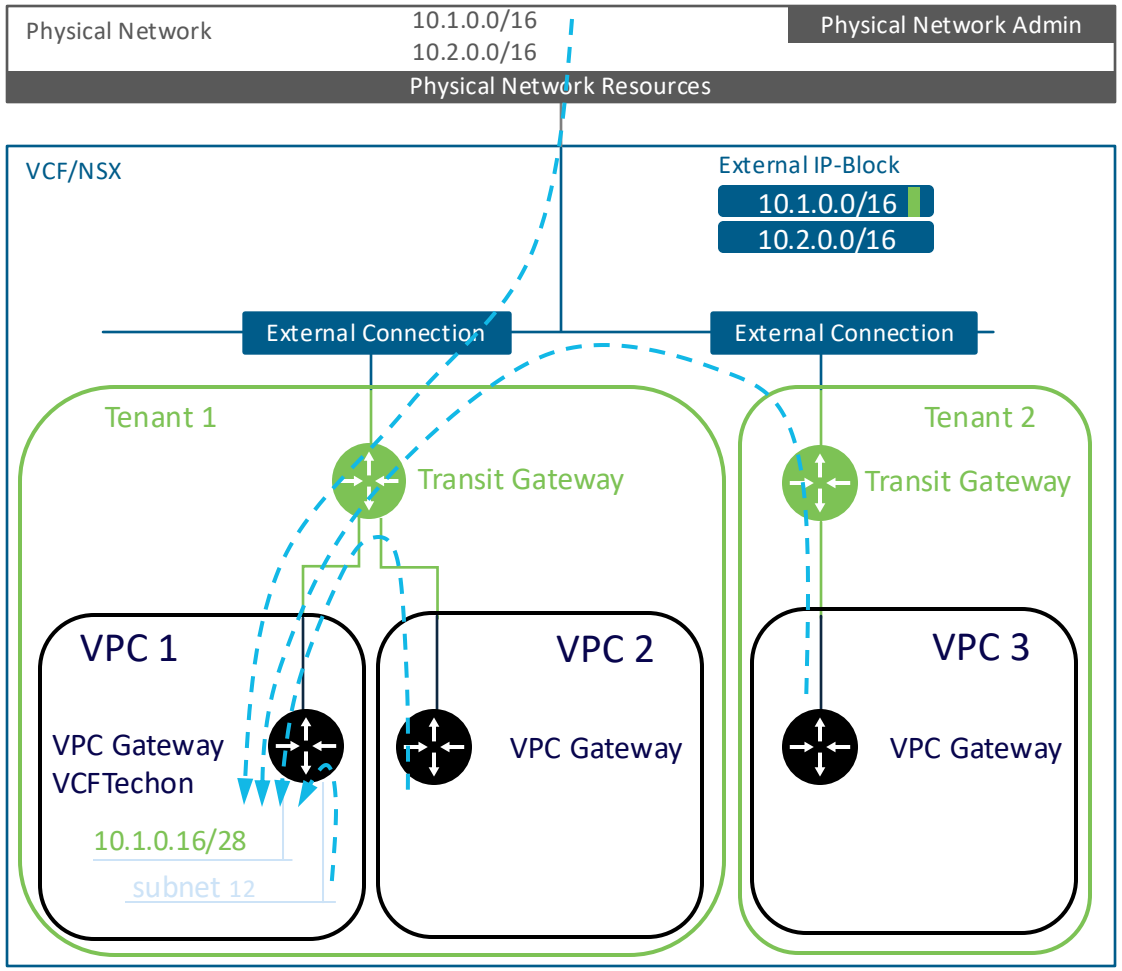
VPC - Public Subnet

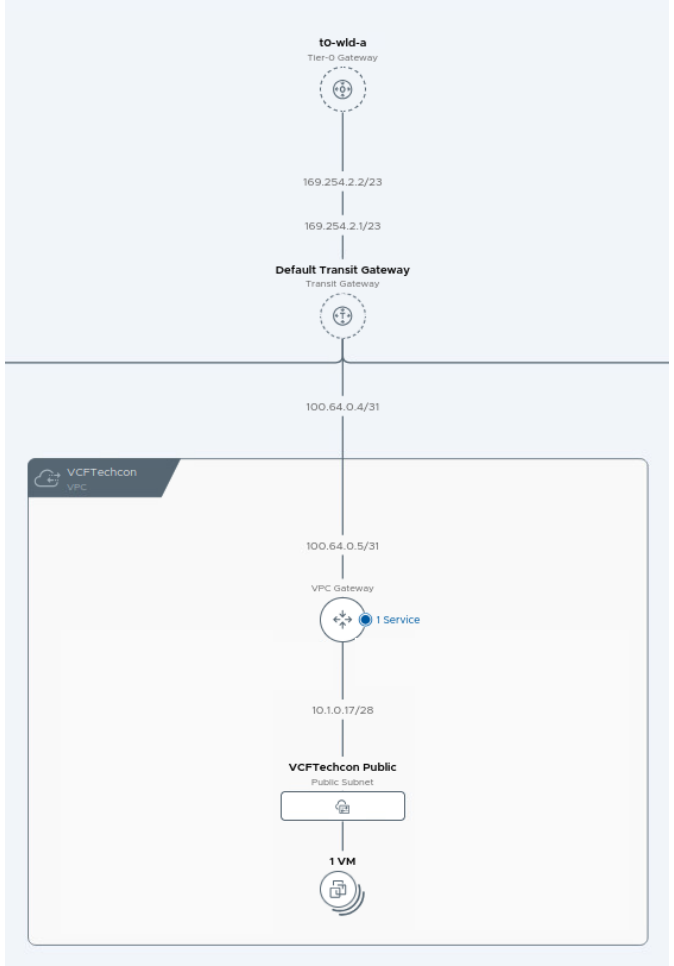


And Quota's

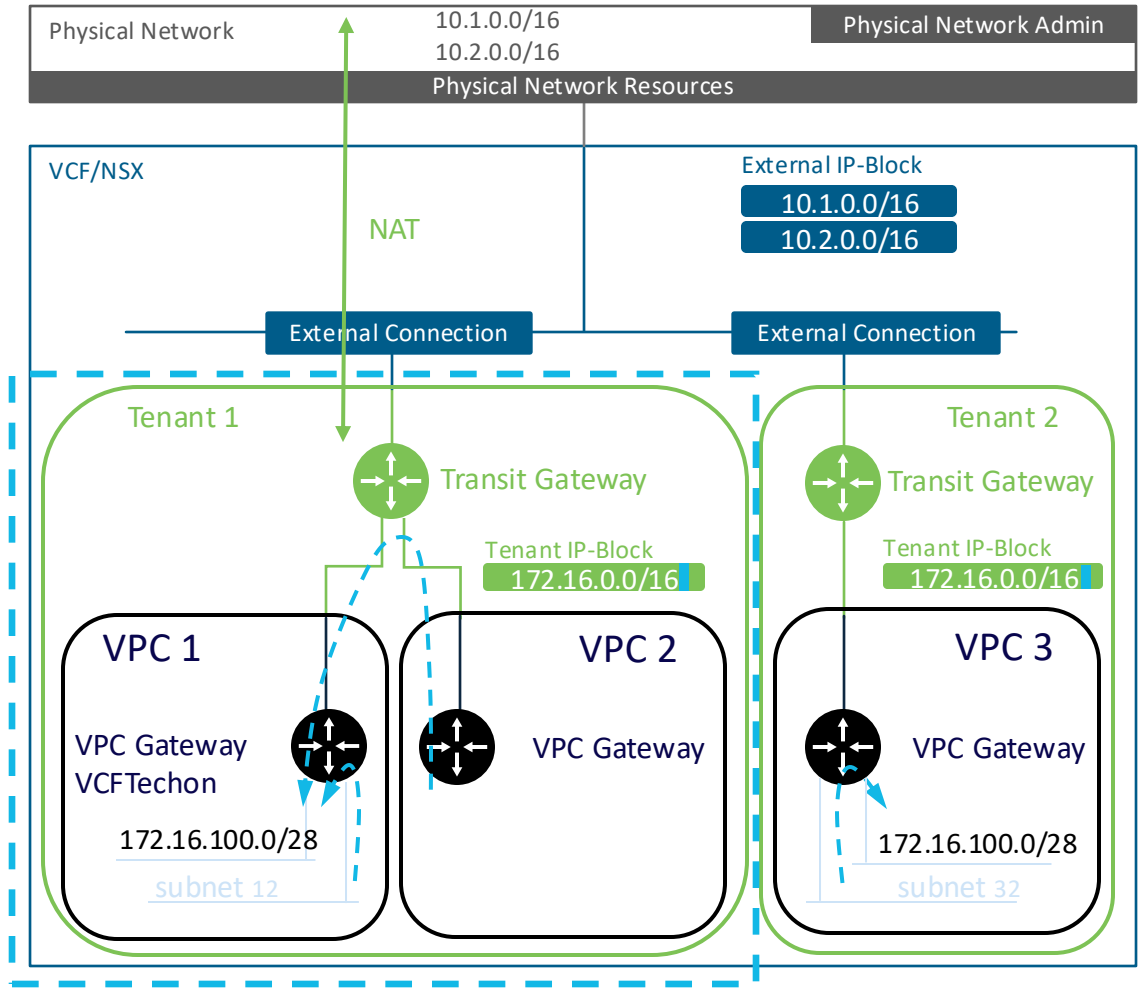


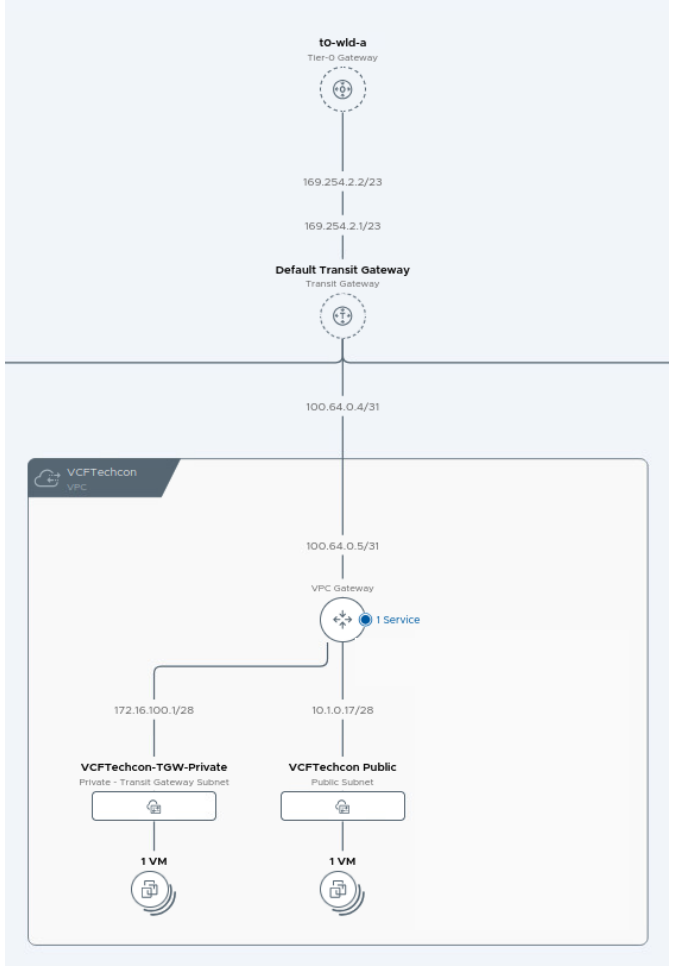
VPC - Public Subnet



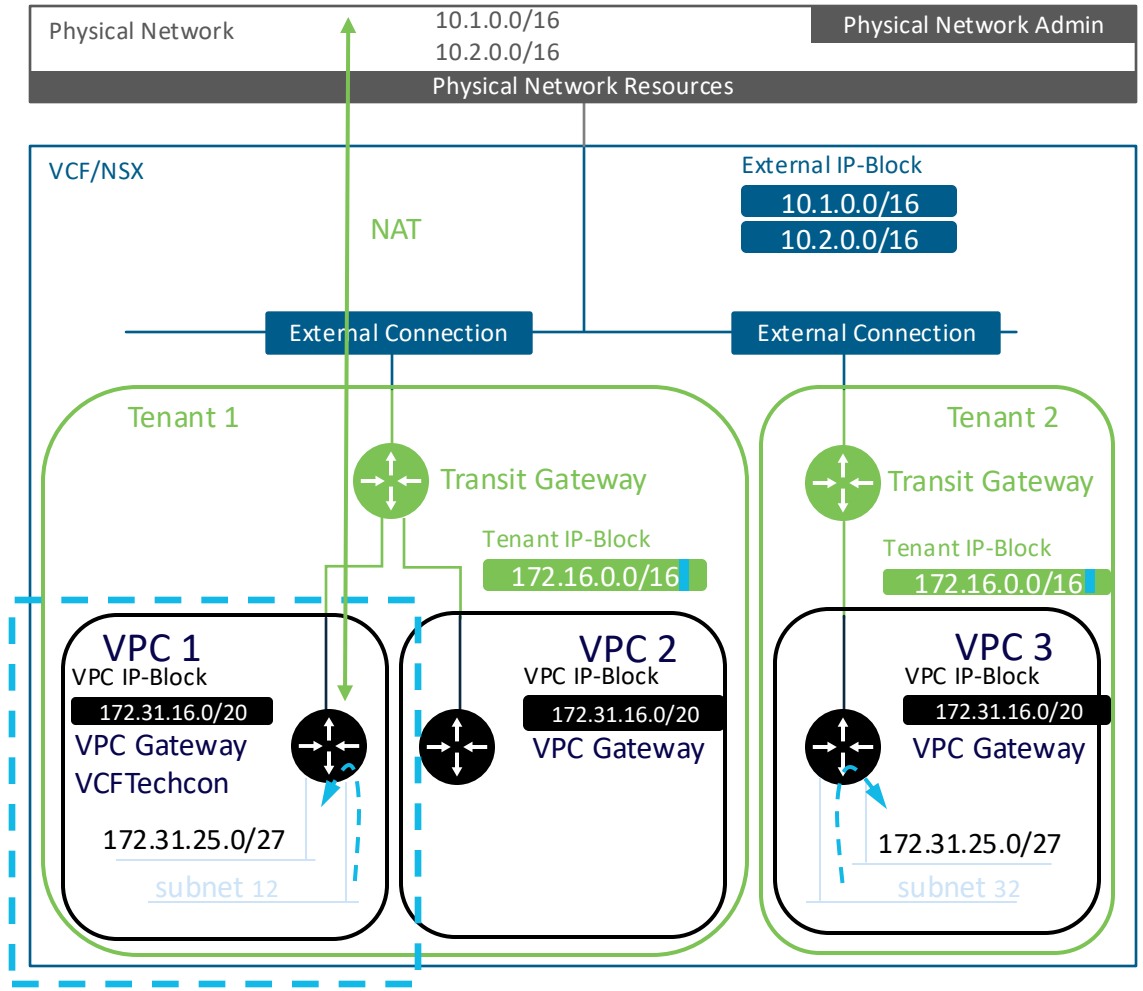


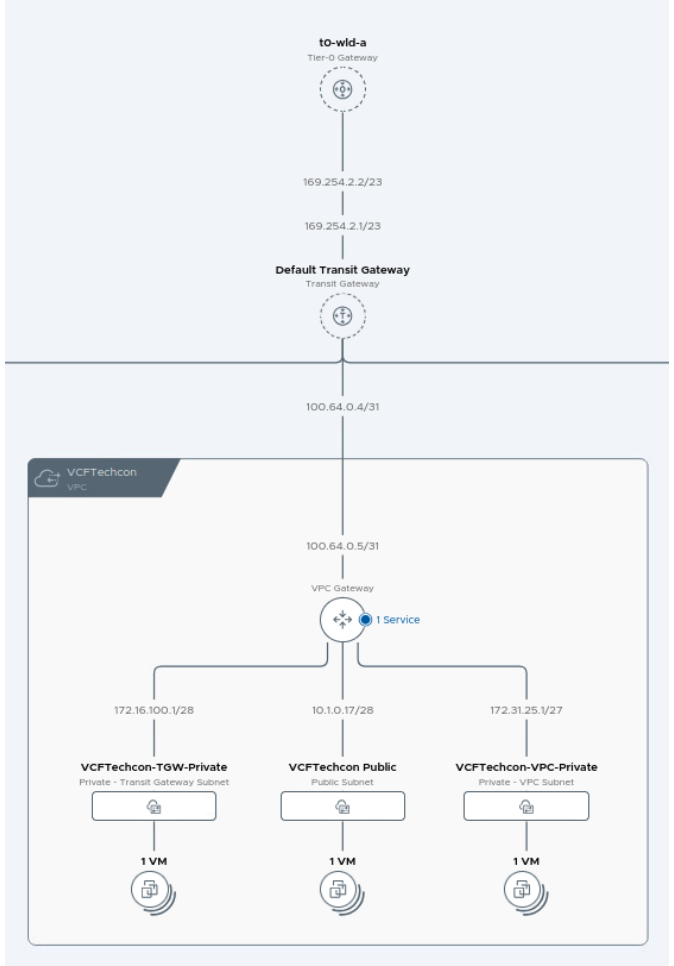
VPC – Transit Gateway Private Subnet



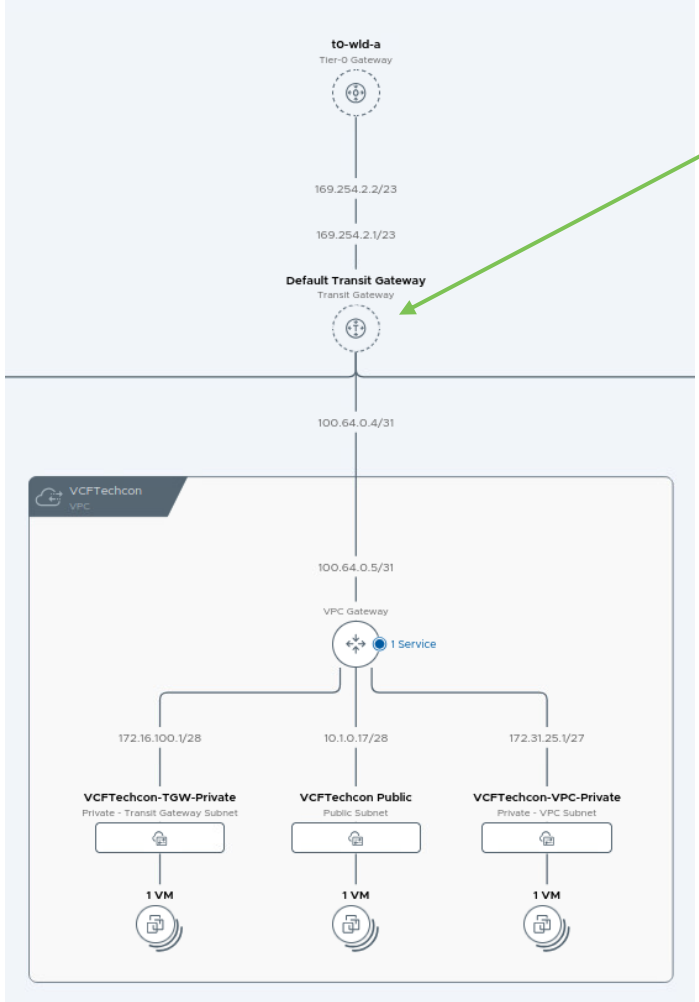


VPC – VPC Private Subnet





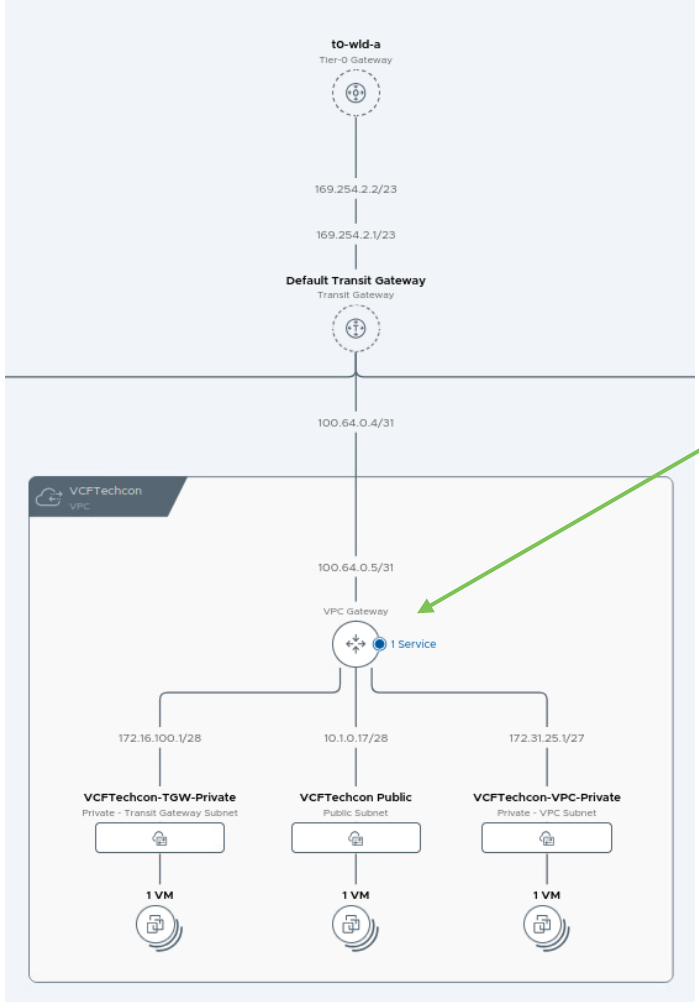
TGW routing




```
edge-wld01-01a> get gateways
Thu Oct 23 2025 UTC 18:05:21.511
Gateway
UUID                                   VRF    Gateway-ID   Name                                 Type
3c36d4a2-32d9-41b0-b85d-2467ae5c7bc8   0      11           SR-t1-wld-a                          SERVIC
ce88b569-5aaa-42ae-a73b-4edbc5283743   1      13           SR-VRF-Default Transit Gateway       VRF_SE
f251a955-0046-4ea0-bc37-1349353de6c7   2      14           SR-kube-system_99ff0881-6962-452     SERVIC
                                                           5-9353-c38c22a04726
767428fe-1854-4a7e-a341-36b6305f0057   3      16           SR-vmware-system-supervisor-serv     SERVIC
                                                           ices-vpc_edfba51d-1574-4346-bf03

edge-wld01-01a> vrf 1
edge-wld01-01a(tier0_vrf_sr[1])> get route static
Thu Oct 23 2025 UTC 18:13:37.550

Flags: t0c - Tier0-Connected, t0s - Tier0-Static, b - BGP, o - OSPF
t0n - Tier0-NAT, t1s - Tier1-Static, t1c - Tier1-Connected,
t1n: Tier1-NAT, t1l: Tier1-LB VIP, t1ls: Tier1-LB SNAT,
t1d: Tier1-DNS FORWARDER, t1ipsec: Tier1-IPSec, isr: Inter-SR, isrs: Inter-SR-static
ivs: Inter-VRF-Static, tgws: Transit-Gateway-Static, > - selected route, * - FIB route

Total number of routes: 13

ivs> * 0.0.0.0/0 [1/0] via 169.254.2.2, inter-vrf-290, 08:03:24
t1n> * 10.1.0.0/32 [3/0] via 100.64.0.1, downlink-296, 08:03:20
t1n> * 10.1.0.1/32 [3/0] via 100.64.0.3, downlink-285, 08:03:20
t1l> * 10.1.0.2/32 [3/0] via 100.64.0.1, downlink-296, 08:03:20
t1l> * 10.1.0.3/32 [3/0] via 100.64.0.1, downlink-296, 08:03:20
t1l> * 10.1.0.4/32 [3/0] via 100.64.0.1, downlink-296, 08:03:20
t1l> * 10.1.0.5/32 [3/0] via 100.64.0.1, downlink-296, 08:03:20
t1l> * 10.1.0.6/32 [3/0] via 100.64.0.1, downlink-296, 08:03:20
t1n> * 10.1.0.7/32 [3/0] via 100.64.0.5, downlink-341, 01:00:21
t1n> * 10.1.0.8/32 [3/0] via 100.64.0.5, downlink-341, 00:22:31
t1n> * 10.1.0.9/32 [3/0] via 100.64.0.5, downlink-341, 00:22:16
t1c> * 10.1.0.16/28 [3/0] via 100.64.0.5, downlink-341, 00:57:20
t1c> * 172.16.100.0/28 [3/0] via 100.64.0.5, downlink-341, 00:55:00
edge-wld01-01a(tier0_vrf_sr[1])>
```

```
Logical Router
UUID                                   VRF    LR-ID  Name                                 Type
22b4d0ed-d89f-46c6-bc03-b5fcd6fe75bf   6      1      DR-VRF-Default Transit Gateway       VRF_DISTRIBU
Interfaces (IPv6 DAD Status A-DAD_Success, F-DAD_Duplicate, T-DAD_Tentative, U-DAD_Unavailable)
    Interface     : 1f1f014c-76a2-5638-9864-6c4f1b848e13
    Ifuid         : 341
    Name          : default-VCFTechcon-t0_lrp
    Fwd-mode      : IPV4_ONLY
    Internal name : downlink-341
    Mode          : lif
    Port-type     : downlink
    IP/Mask       : 100.64.0.4/31;fceb:c5d1:9ffb:5400::1/64(NA);fe80::50:56ff:fe56:4452/64(NA)
    MAC           : 02:50:56:56:44:52
    VNI           : 71680
    Access-VLAN   : untagged
    LS port       : 31c04648-8f90-40f3-b305-883110da193e
```

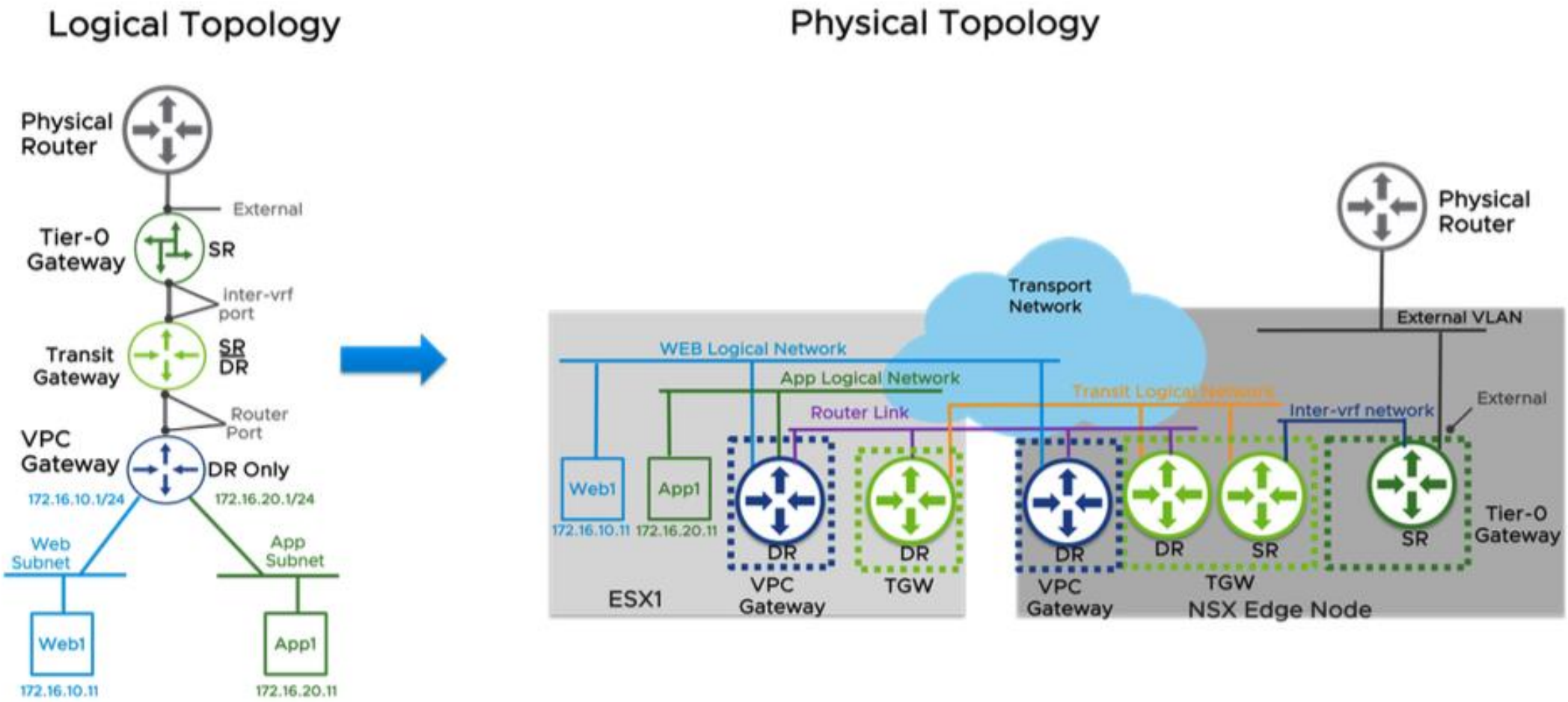
VPC routing



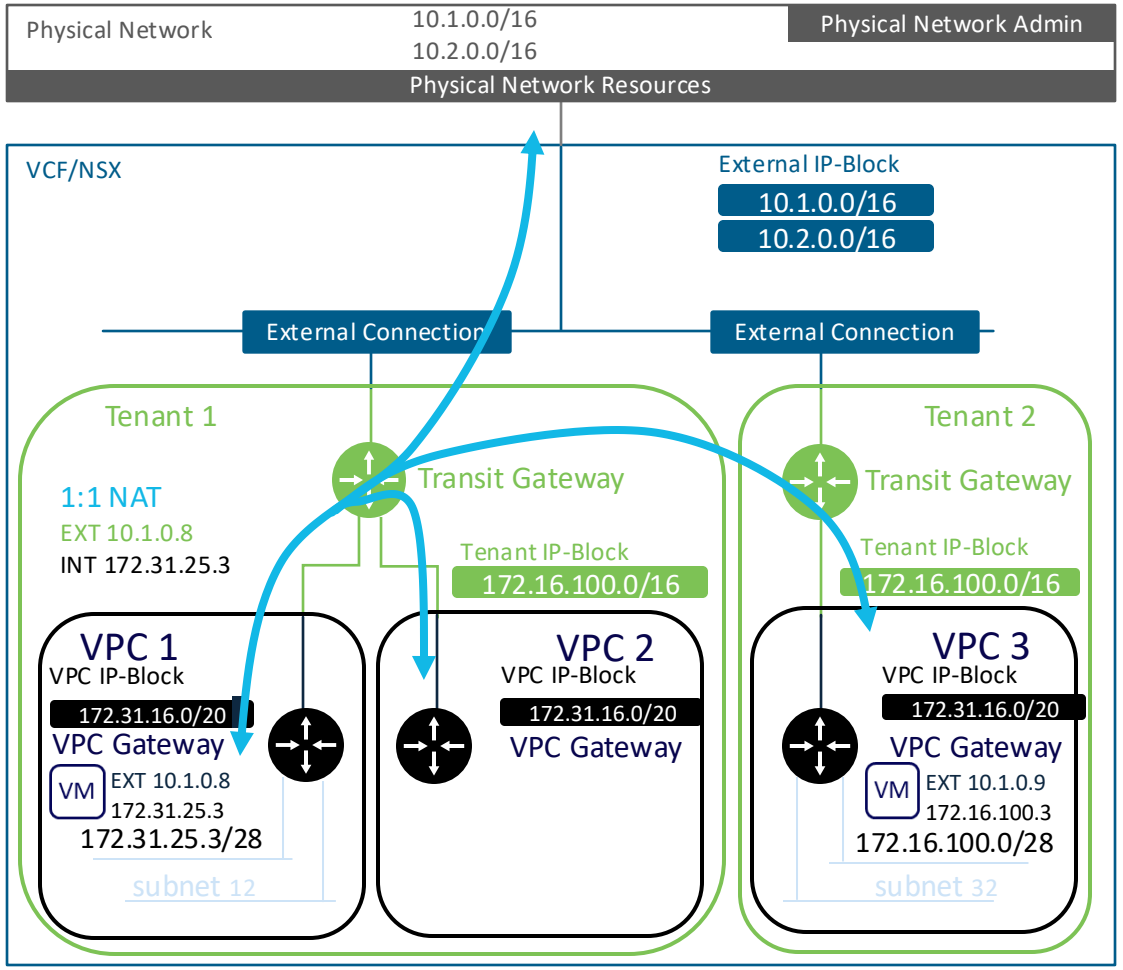

```
edge-wld01-01a> get gateways
Thu Oct 23 2025 UTC 18:05:21.511
Gateway
UUID                                   VRF    Gateway-ID   Name                              Type
3c36d4a2-32d9-41b0-b85d-2467ae5c7bc8   0      11           SR-t1-wld-a                       SERVIC
ce88b569-5aaa-42ae-a73b-4edbc5283743   1      13           SR-VRF-Default Transit Gateway    VRF_SE
f251a955-0046-4ea0-bc57-1349353de6c7   2      14           SR-kube-system_99ff0881-6962-452  SERVIC
                                                           5-9353-c38c22a04726
767428fe-1854-4a7e-a341-36b6305f0057   3      16           SR-vmware-system-supervisor-serv  SERVIC
                                                           ices-vpc_edfba51d-1574-4346-bf03
                                                           -65cdae69d3e2
7a858c6a-cb1f-4e1f-982e-a2f6de28ca5b   4      4            SR-t0-wld-a                       SERVIC
22b4d0ed-d89f-46c6-bc03-b5fcd6fe75bf   6      1            DR-VRF-Default Transit Gateway    VRF_DI
9cb70895-c2a1-4ab2-b07b-b2d2394771af   7      3            DR-t0-wld-a                       DISTRI
86befd84-7262-412e-a643-5ce3020ac843   8      2            DR-kube-system_99ff0881-6962-452  DISTRI
                                                           5-9353-c38c22a04726
736a80e3-23f6-5a2d-81d6-bbefb2786666   9      0                                              TUNNEL
aebe92cc-7970-48ec-909b-2b4f78308b1e   10     1026         SR-VCFTechcon                     SERVIC
2d58da6d-4821-4542-8b92-88ea2a1ab023   11     1025         DR-VCFTechcon                     DISTRI

edge-wld01-01a> vrf 10
```

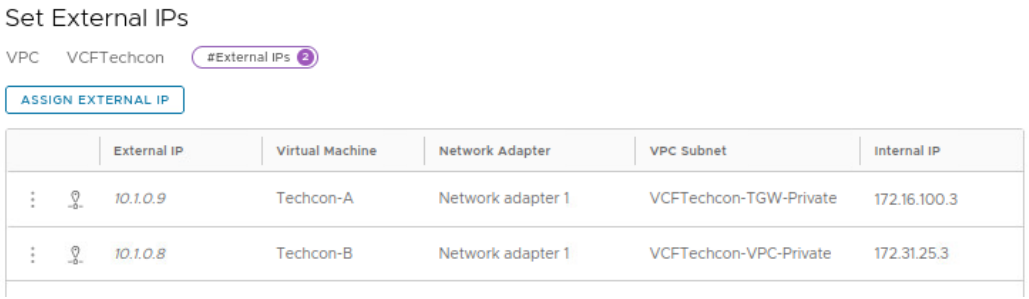
```
edge-wld01-01a(tier1_sr[10])> get forwarding
Thu Oct 23 2025 UTC 18:07:13.779
Logical Router
UUID                                   VRF    LR-ID  Name                              Type
aebe92cc-7970-48ec-909b-2b4f78308b1e   10     1026   SR-VCFTechcon                     SERVICE_ROUT
IPv4 Forwarding Table
IP Prefix          Gateway IP                        Type        UUID
0.0.0.0/0          100.64.0.4                        route       05467a9e-5935-4270-ab0f-47
10.1.0.7/32                                          route       f3d95f34-7286-4a52-ba79-6c
10.1.0.16/28                                         route       68c46375-6f86-4032-a87d-e4
10.1.0.17/32                                         route       bba0382b-954c-57b2-be55-75
100.64.0.4/31                                        route       05467a9e-5935-4270-ab0f-47
127.0.0.1/32                                         route       f3d95f34-7286-4a52-ba79-6c
169.254.0.0/28                                       route       087230b0-4e2f-44fc-8fb1-4c
169.254.0.1/32                                       route       bba0382b-954c-57b2-be55-75
172.16.100.0/28                                      route       fff99918-3cca-47d2-a0c9-00
172.16.100.1/32                                      route       bba0382b-954c-57b2-be55-75
172.31.25.0/27                                       route       068a39b8-23bb-4dfe-a162-30
172.31.25.1/32                                       route       bba0382b-954c-57b2-be55-75
IPv6 Forwarding Table
IP Prefix                                  Gateway IP                        Type

::/0                                       fceb:c5d1:9ffb:5400::1            route

::1/128                                                                      route

fceb:c5d1:9ffb:5400::/64                                                     route

edge-wld01-01a(tier1_sr[10])>
```

Info in the Reference Guide



VPC – External IP or 1:1 NAT

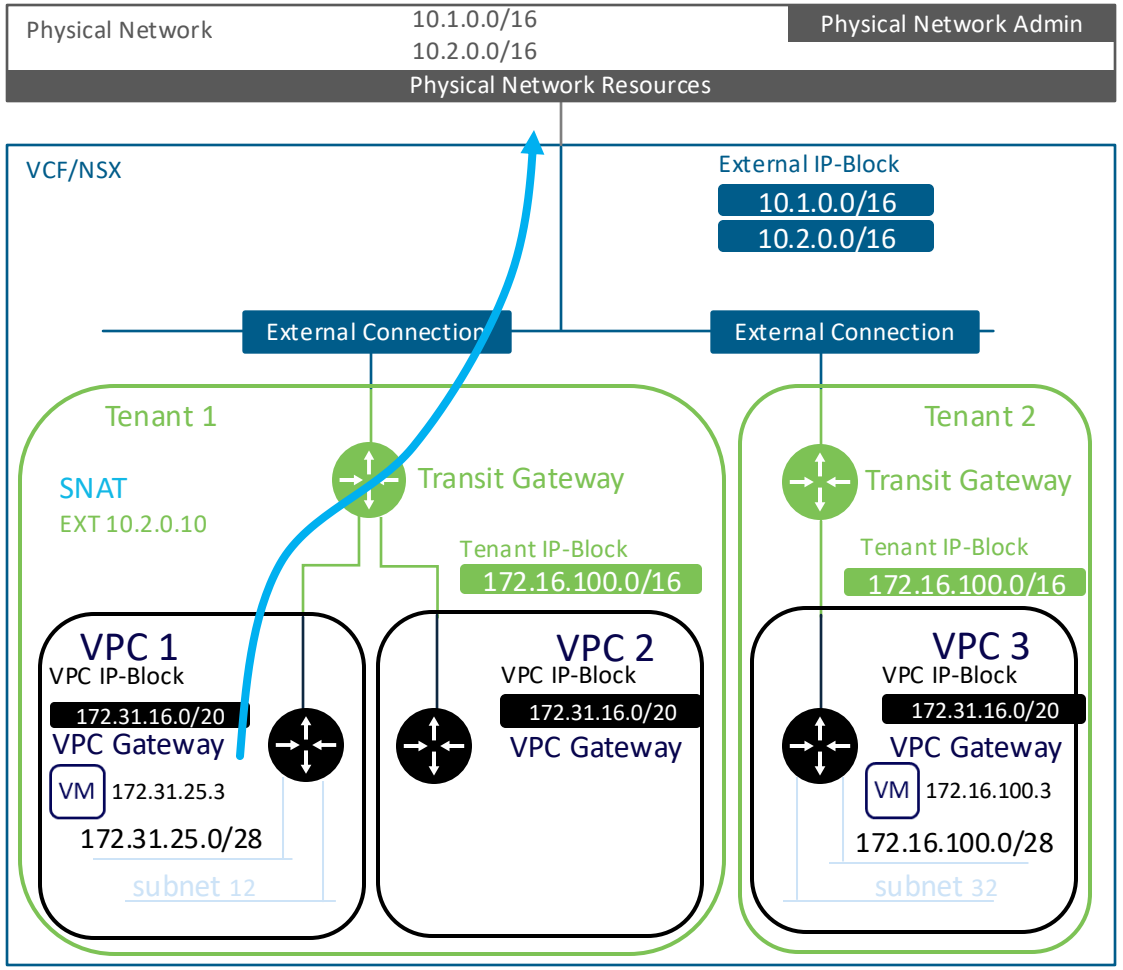




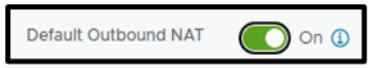
Uses 1 IP-address per VM

1:1 NAT
EXT 10.1.0.9
INT 172.16.100.3

VPC – Outbound NAT



Default Outbound NAT on VPC Level

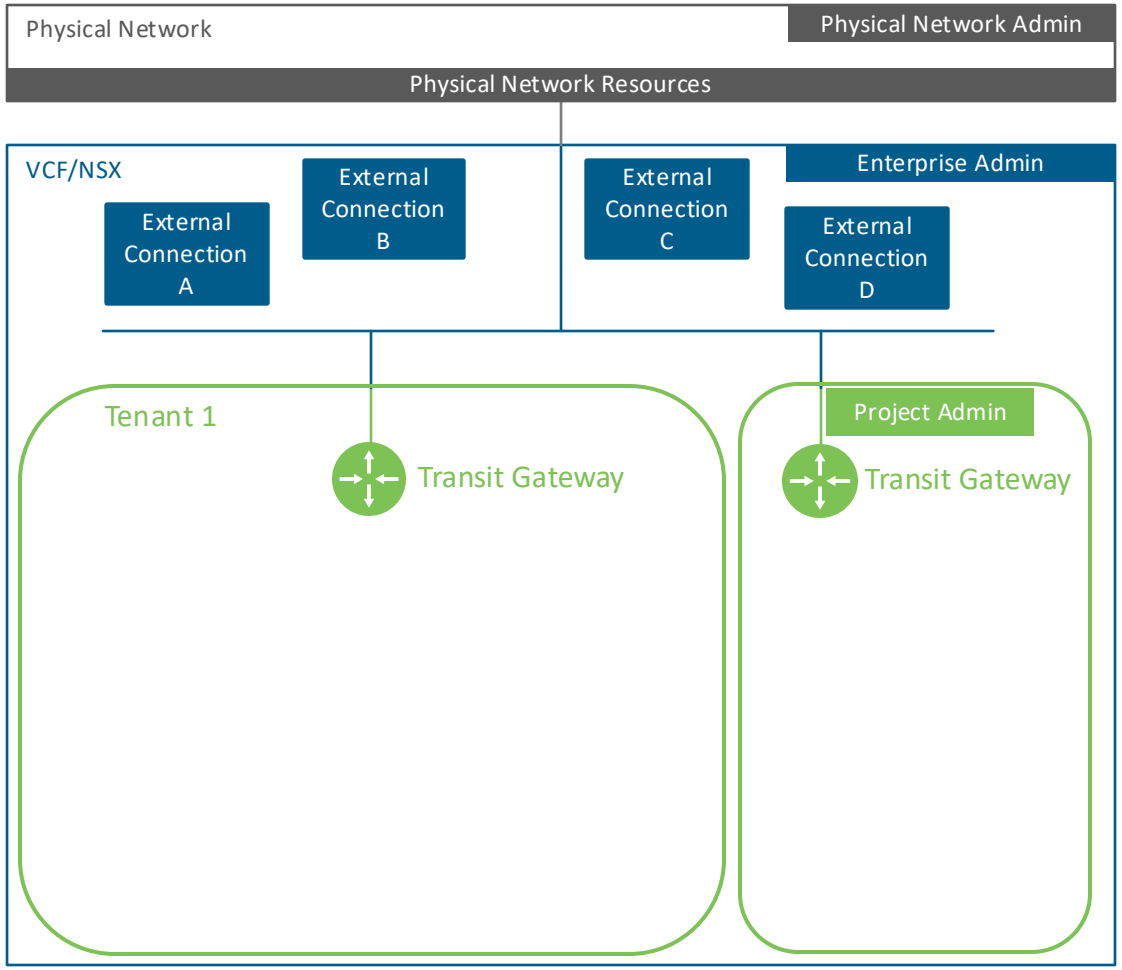


Requires A/S Transit Gateway

Uses 1 IP-address per VPC

SNAT
EXT 10.2.0.11

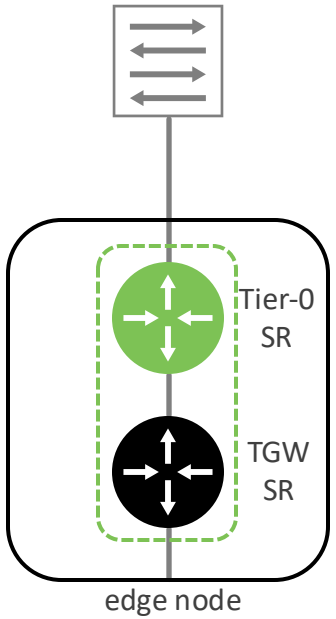
VCF - Transit Gateway



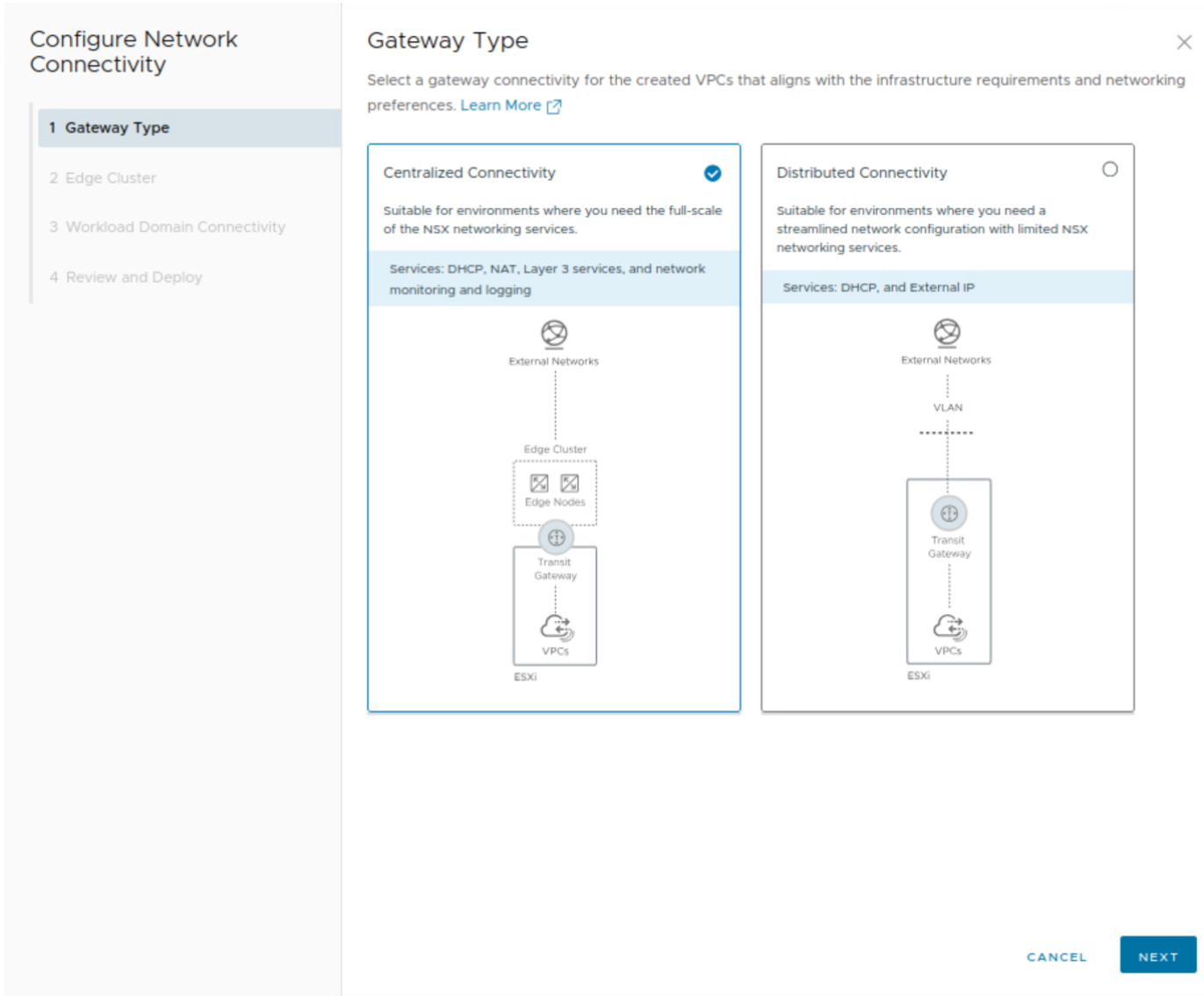
Centralized — Active/Standby
Active/Active

Distributed

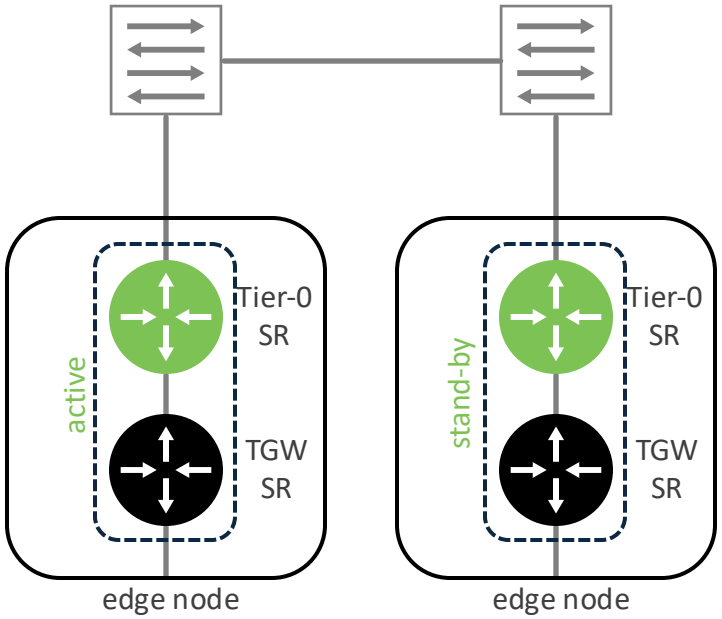
VCF - Transit Gateway centralized



VRF of the Tier-0 SR



VCF - Transit Gateway centralized A/S



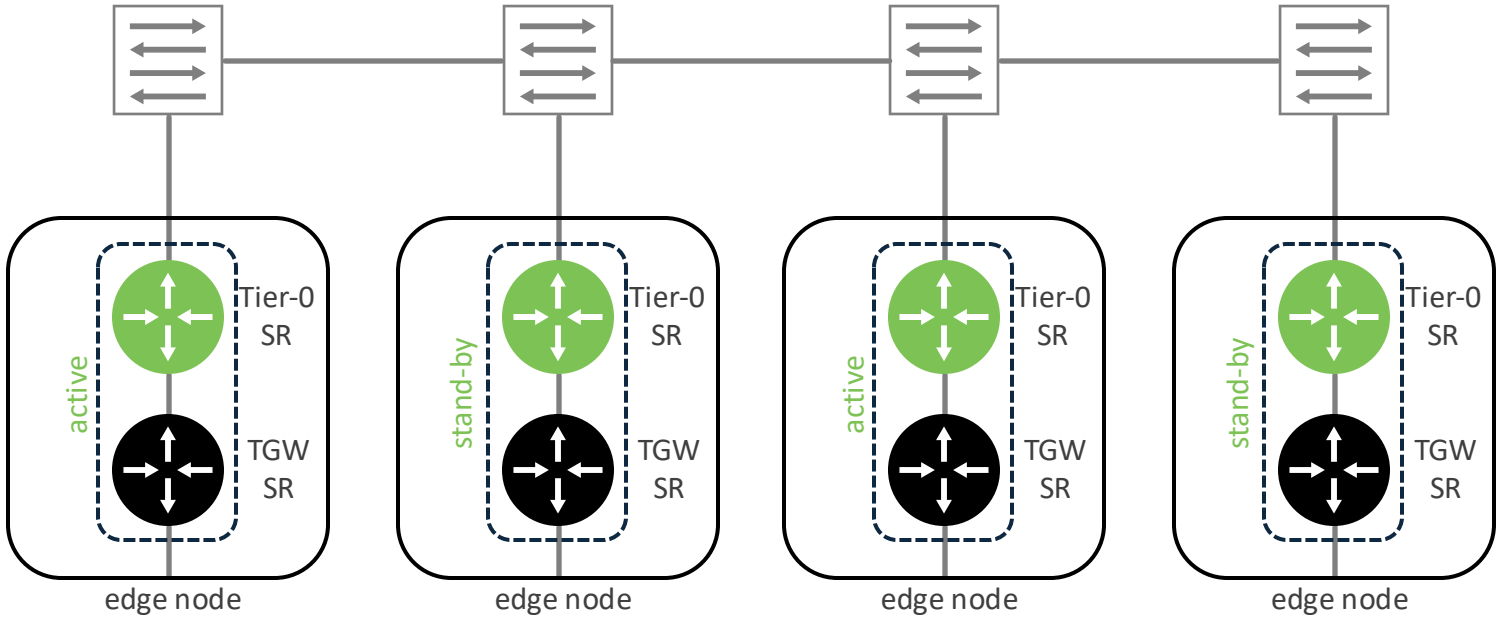
Capabilities for Centralized TGW Active/Stand-by:

- External IP (1:1 NAT)
- VPC Default Outbound NAT
- NAT (SNAT/DNAT)
- N/S Firewall
- E/W Firewall
- AVI Load Balancer
- DHCP

Active/Stand-by Centralized TGW is required for:

- Supervisor cluster (VKS)
- VCF Automation modern experience

VCF - Transit Gateway centralized A/A



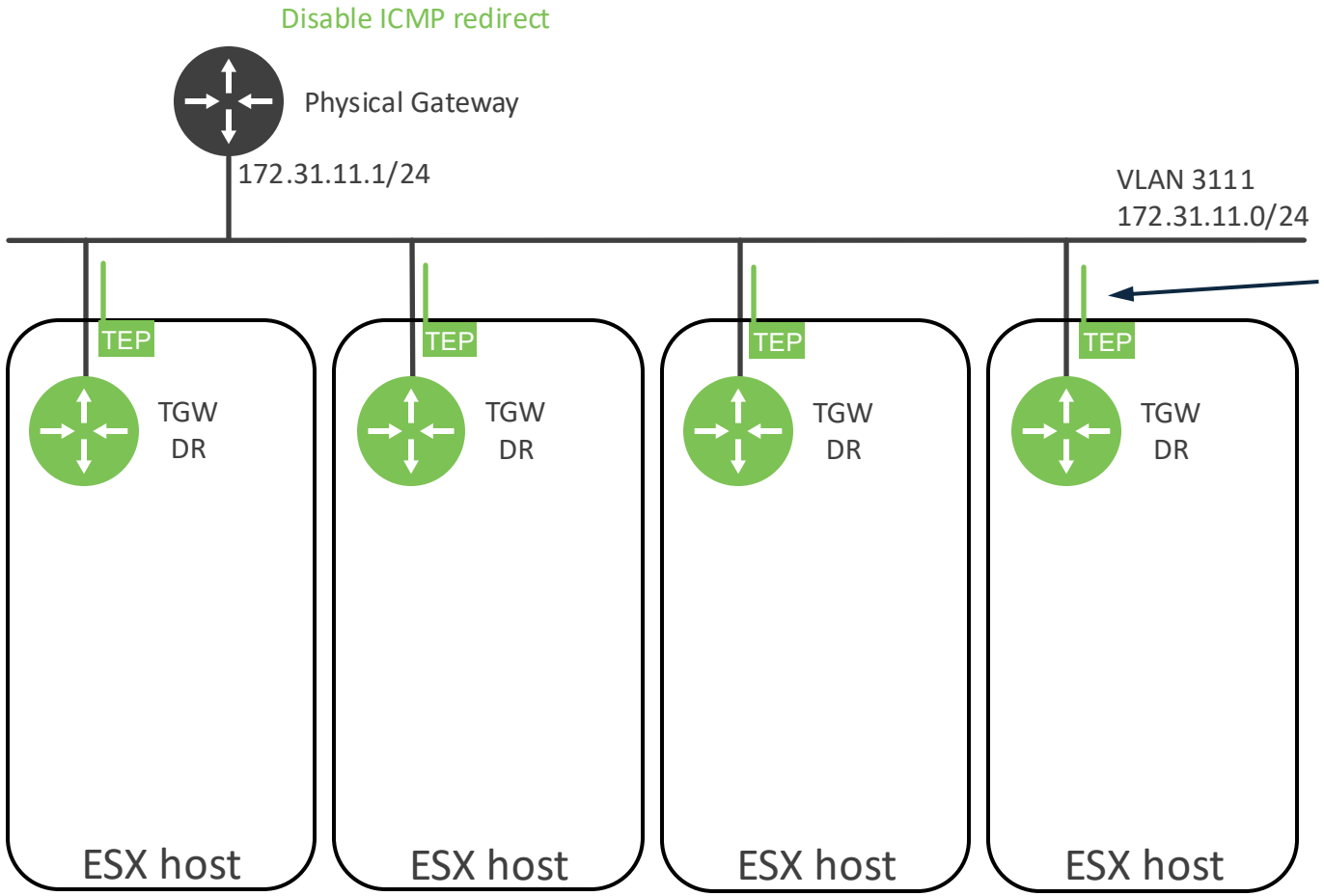
Capabilities for Centralized TGW Active/Active:

- External IP (1:1 NAT)
- NAT (SNAT/DNAT)
- E/W Firewall
- DHCP
- AVI Load Balancer

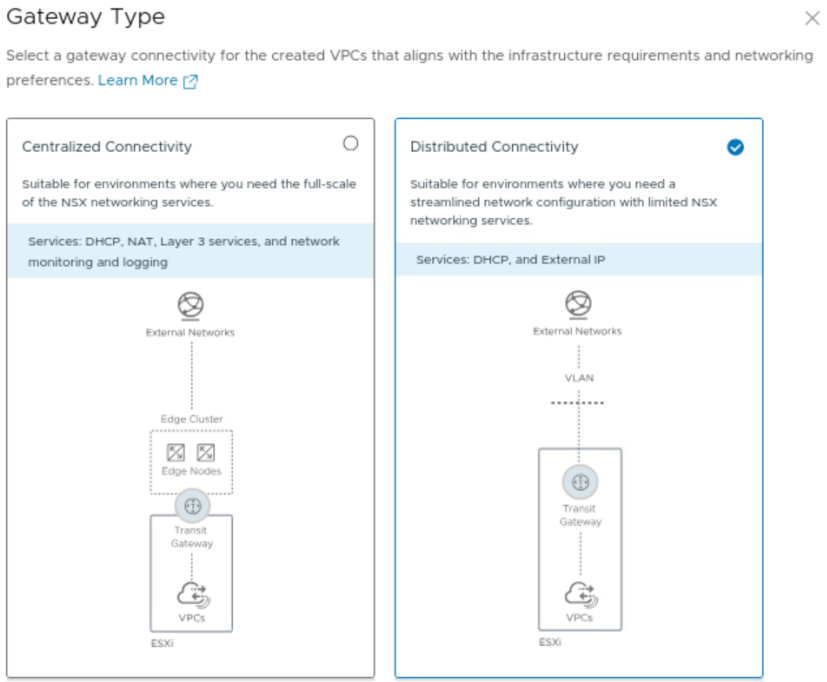
Cannot run

- VPC Default Outbound NAT
- N/S Firewall

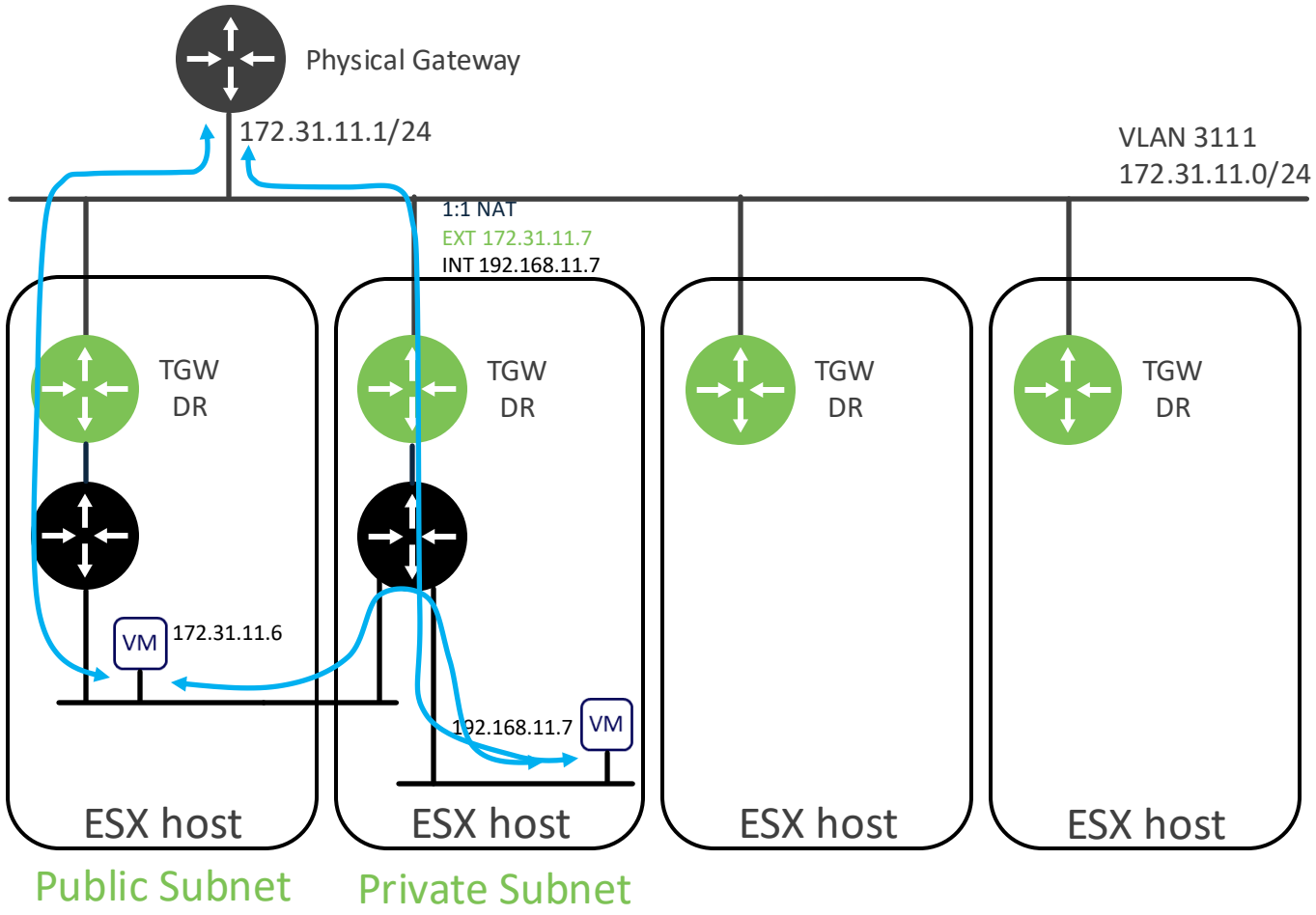
VCF - Transit Gateway distributed



The uplink where the TEP is located will be used and must be connected to external VLAN e.g. 3111



VCF - Transit Gateway distributed



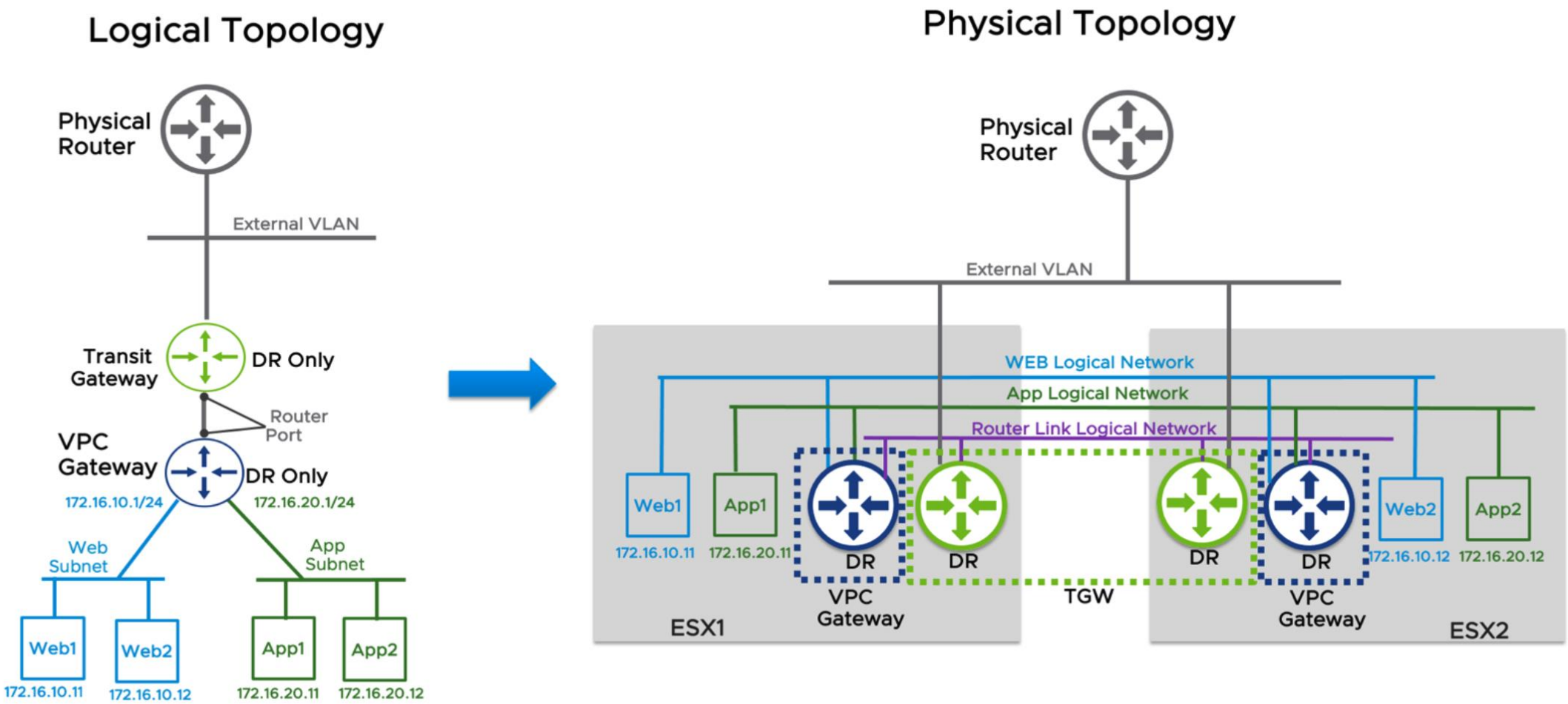
VPC with Distributed TGW allows the following capabilities:

- External IP (1:1 NAT)
- E/W Firewall
- Distributed DHCP
- AVI Load Balancer
  (no client IP transparency support)

Does not allow the following capabilities:

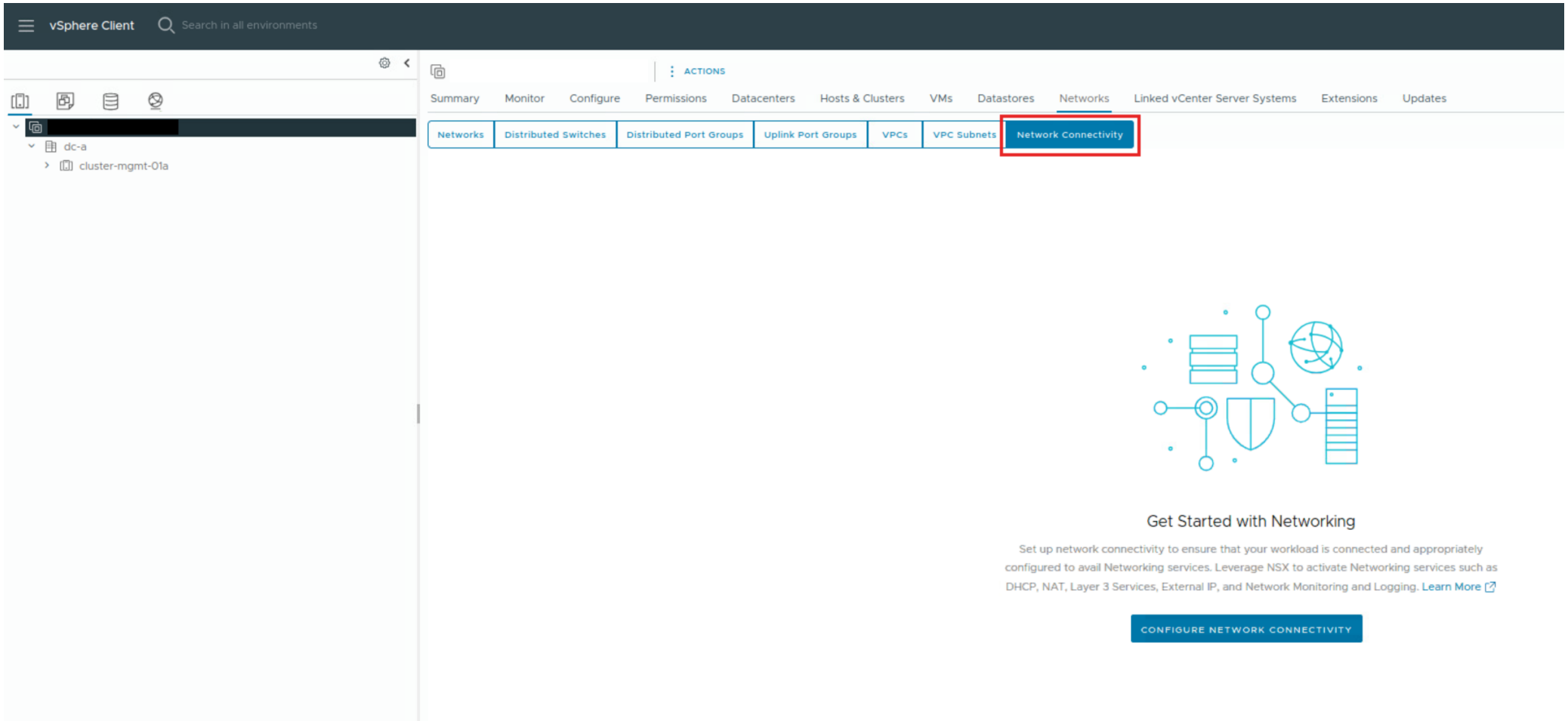
- VPC Default Outbound NAT
- NAT (SNAT/DNAT)
- N/S Firewall

VCF - Transit Gateway distributed

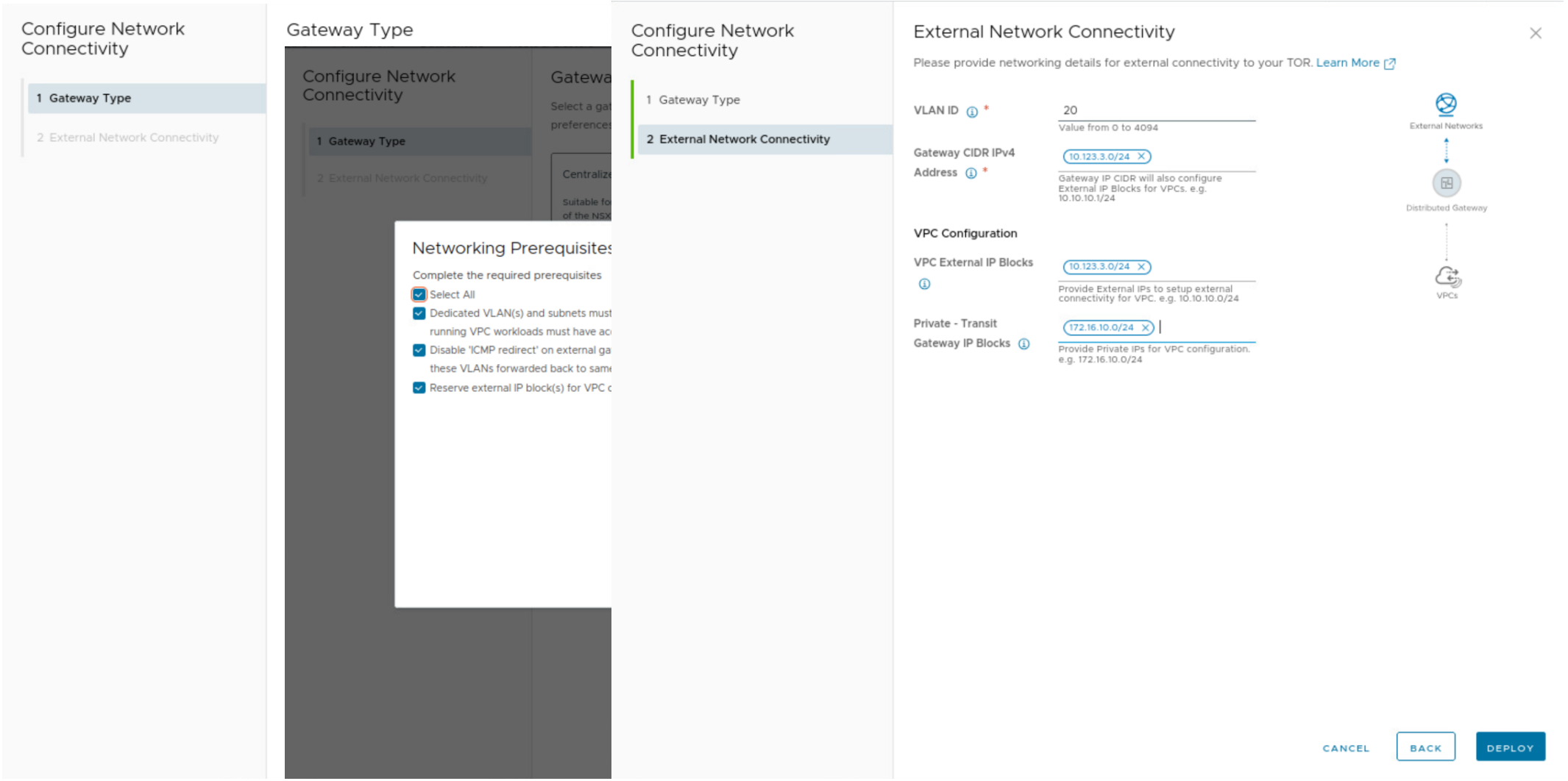


Transit Gateway distributed

- Enabled from vCenter



Transit Gateway distributed



Transit Gateway capabilities

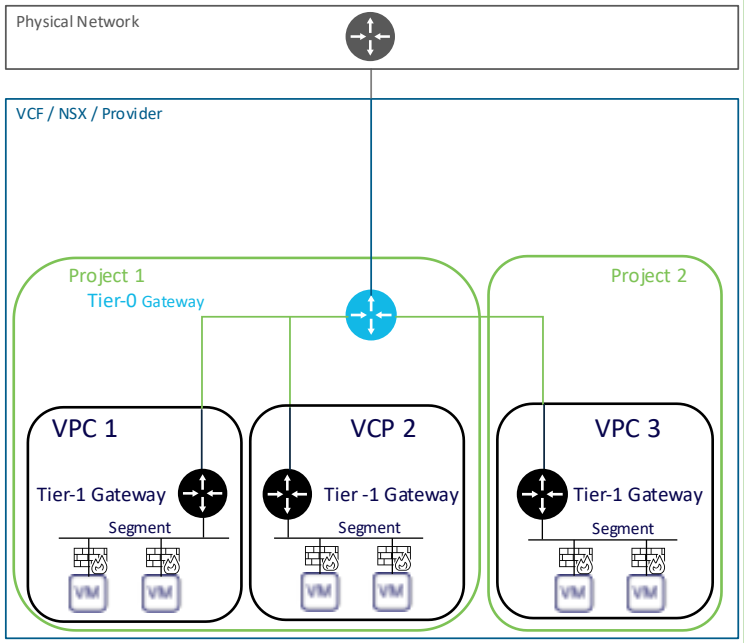
Centralized Active/Standby	Centralized Active/Active	Distributed
External IP (1:1 NAT)	External IP (1:1 NAT)	External IP (1:1 NAT)
NAT (SNAT/DNAT)	NAT (SNAT/DNAT)	Not available
VPC Default Outbound NAT	Not available	Not available
DHCP	DHCP	Distributed DHCP
E/W Firewall	E/W Firewall	E/W Firewall
N/S Firewall	Not available	Not available
AVI Load Balancer	AVI Load Balancer	AVI Load Balancer (no client IP transparency support)
A/S Centralized TGW is required for: Supervisor cluster (VKS) VCF Automation modern experience		

Current VPC limitations in VCF 9.0

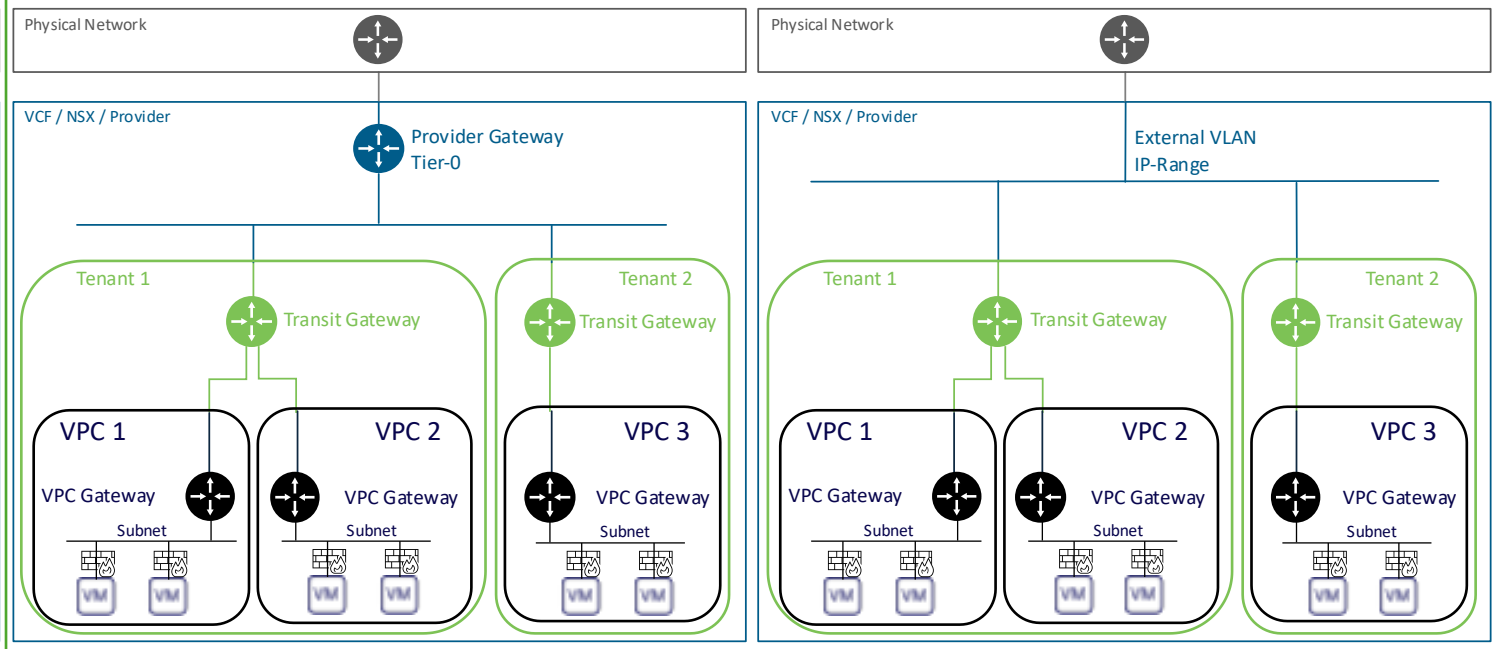
- Bridging to VLAN (no access to physical infrastructure)
- Multicast routing
- IPv6 routing
- Federation

VPC – Networking models

Segment Networking model



VCF Networking models



Central Transit Gateway

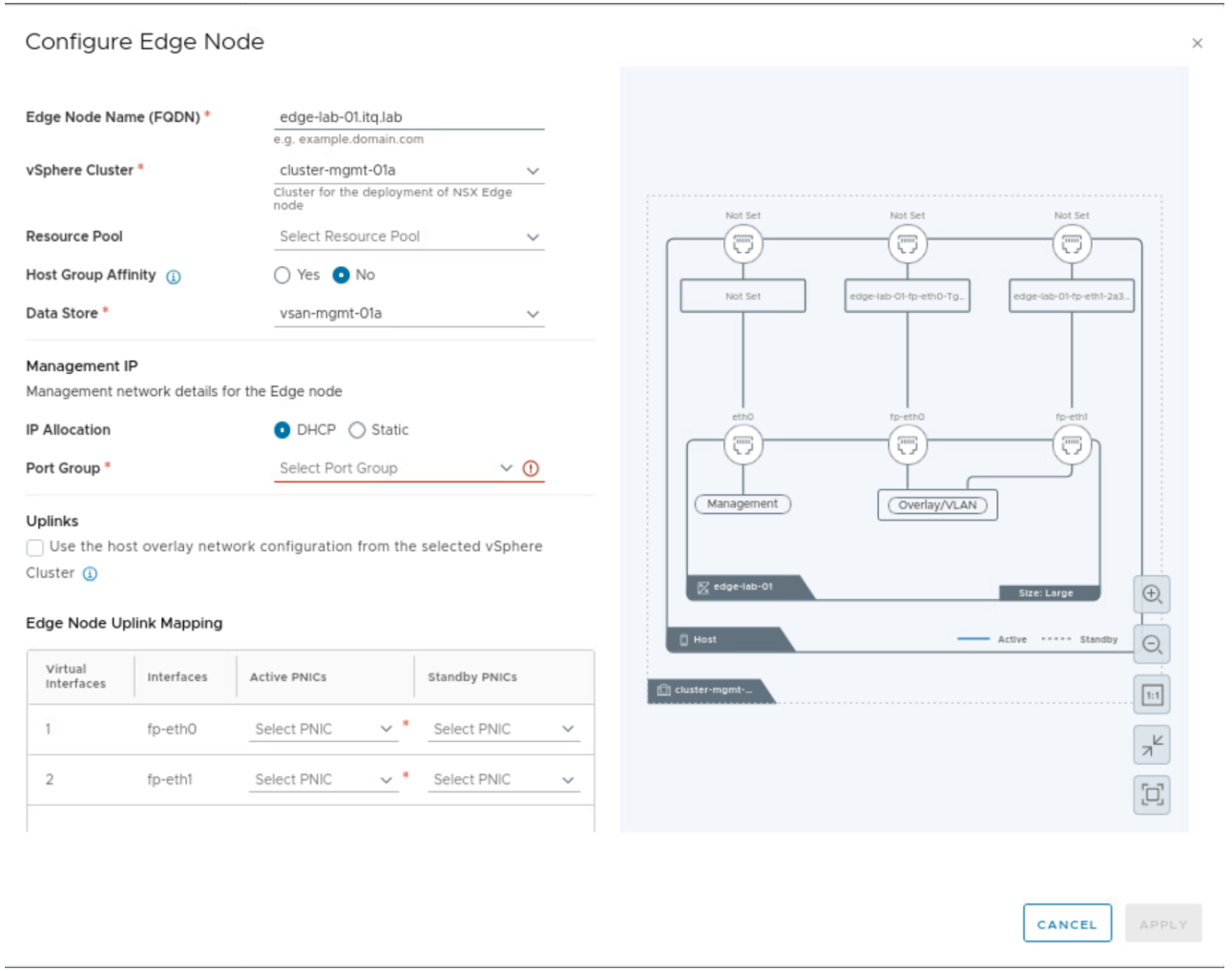
Distributed Transit Gateway

NSX Networking Models compared

Networking Model	NSX Objects	Capabilities
Segment Network model	• Tier-0 Gateways • Tier-1 Gateways • Segments • East-West Distributed Firewall • North-South Gateway Firewall • Nat Rules	• NSX Federation • Centralized management model • Self-service via NSX multi-tenancy (Projects) • VPNs on Tier-0 and Tier-1 Gateways • VCF Automation can discover NSX Segments (Cloud users can only connect workloads)
VPC Network Model	• Provider Gateways (Tier-0) • Transit Gateways • VPC's • Subnets • East-West Distributed Firewall • North-South Gateway Firewall • External Ips • Nat Rules	• Embedded IPAM • vCenter UI intergration • Self-service or Centralized management model • VPNs of Tier-0 only • Cloud users can create VPC and Subnets and connect workloads via VCF Automation

VCF – Config Edge Nodes

- Deploy Edge nodes from vCenter



Vragen?