

VCF Networking – NSX 4.1

Edge DHCP 301 Tol

301 Tol

Version 1.0

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Chapter 1: Introduction

This document presents the DHCP capabilities within NSX with the following agenda:

- Presentation
- Requirements / Limitation
- Scale
- Configuration (UI/API)
- High-Availability
- Status
- Statistics
- DHCP Lease

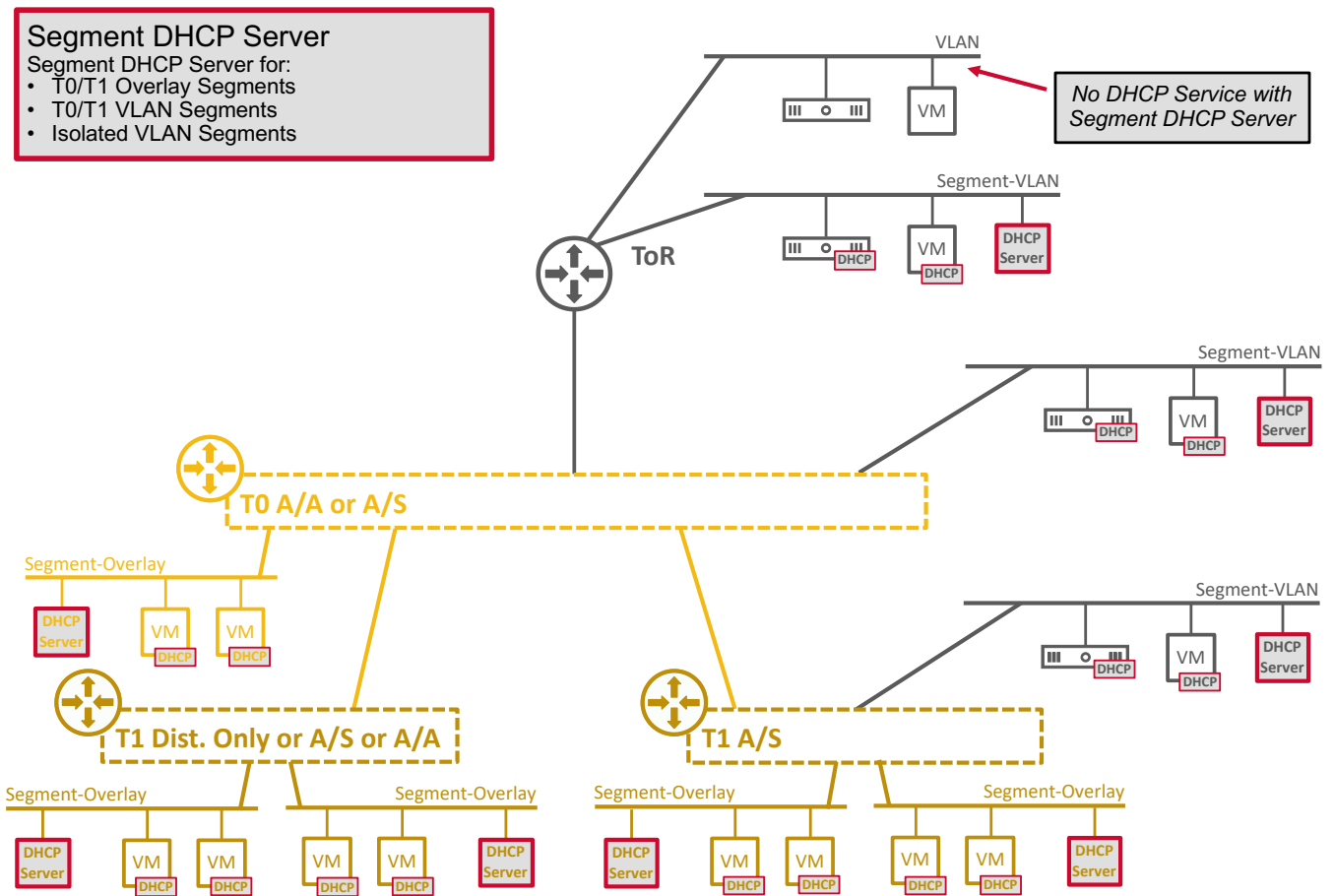
Chapter 2: NSX DHCP Service

2.1 DHCP Presentation

NSX offers the 3 types of DHCP Service:

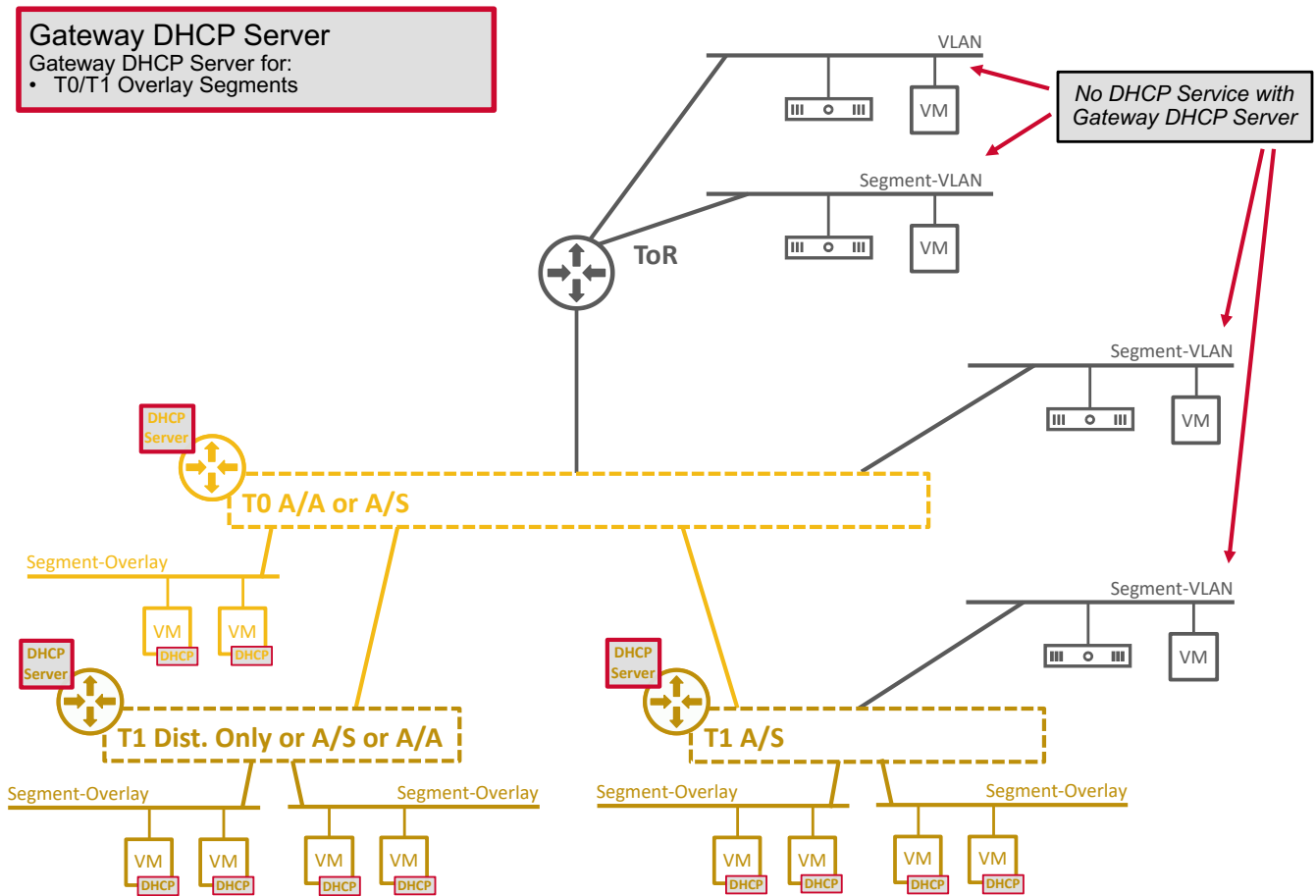
2.1.1 Segment DHCP Server

A dedicated DHCP Server is running on each Segment-Overlay or Segment-VLAN and offers DHCP Service to those.



2.1.2 Gateway DHCP Server

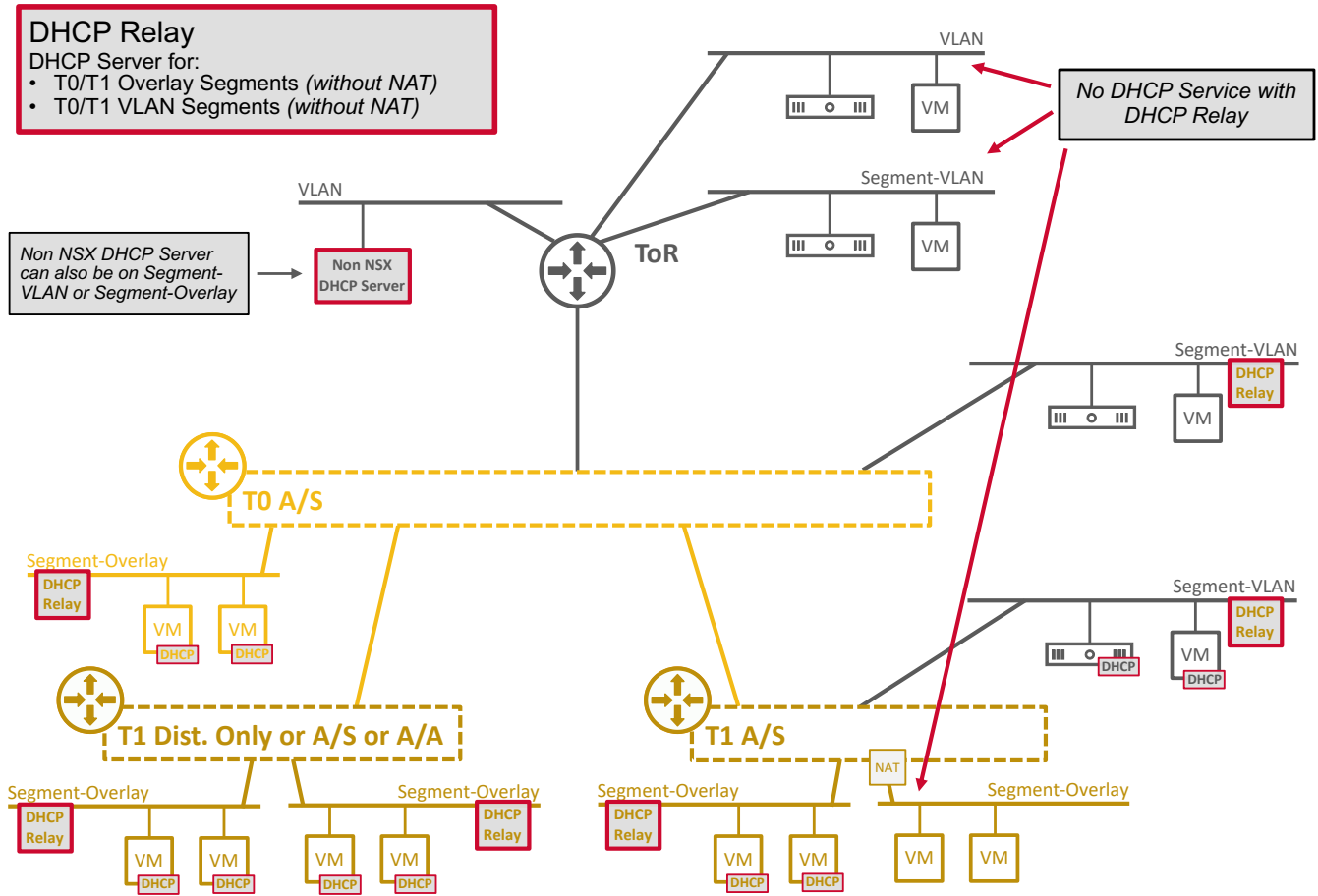
A dedicated DHCP Server is running on each T0 / T1 and offers DHCP Service to its Segments-Overlay.



2.1.3 DHCP Relay

The DHCP Server is not offered by NSX.

NSX relays the DHCP Requests to an External DHCP Server.



2.2 DHCP Requirements / Limitations

2.2.1 Segment DHCP Server

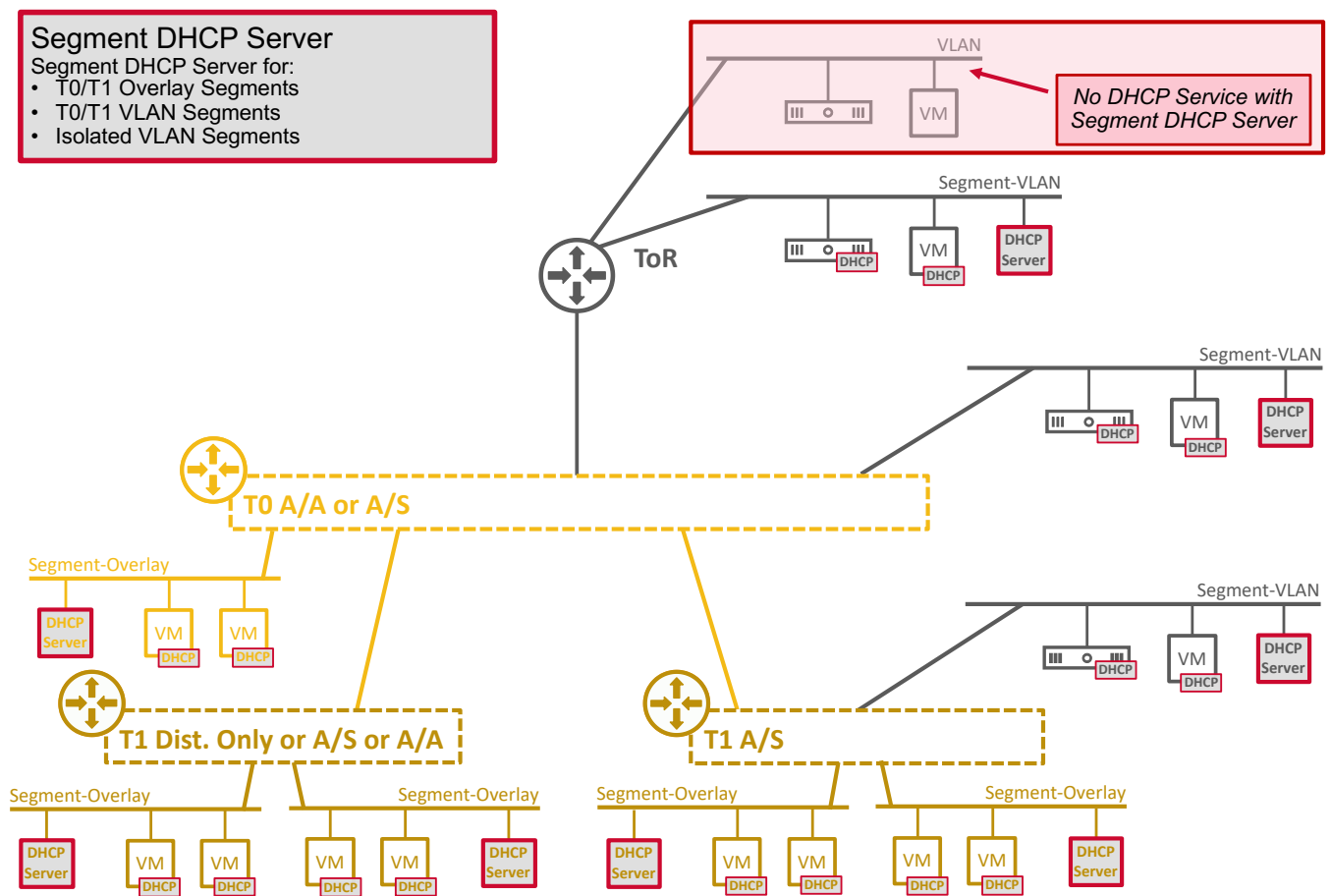
A dedicated DHCP Server is running on each Segment-Overlay or Segment-VLAN and offers DHCP Service to those. The requirements are:

- 1 IP address in each Segment (Overlay or VLAN) for the DHCP Server

The limitations are:

- No DHCP Service on “Physical VLAN” / “VDS VLAN PortGroup”

Note: DHCP Service available on NSX “Segment-VLAN”.



2.2.2 Gateway DHCP Server

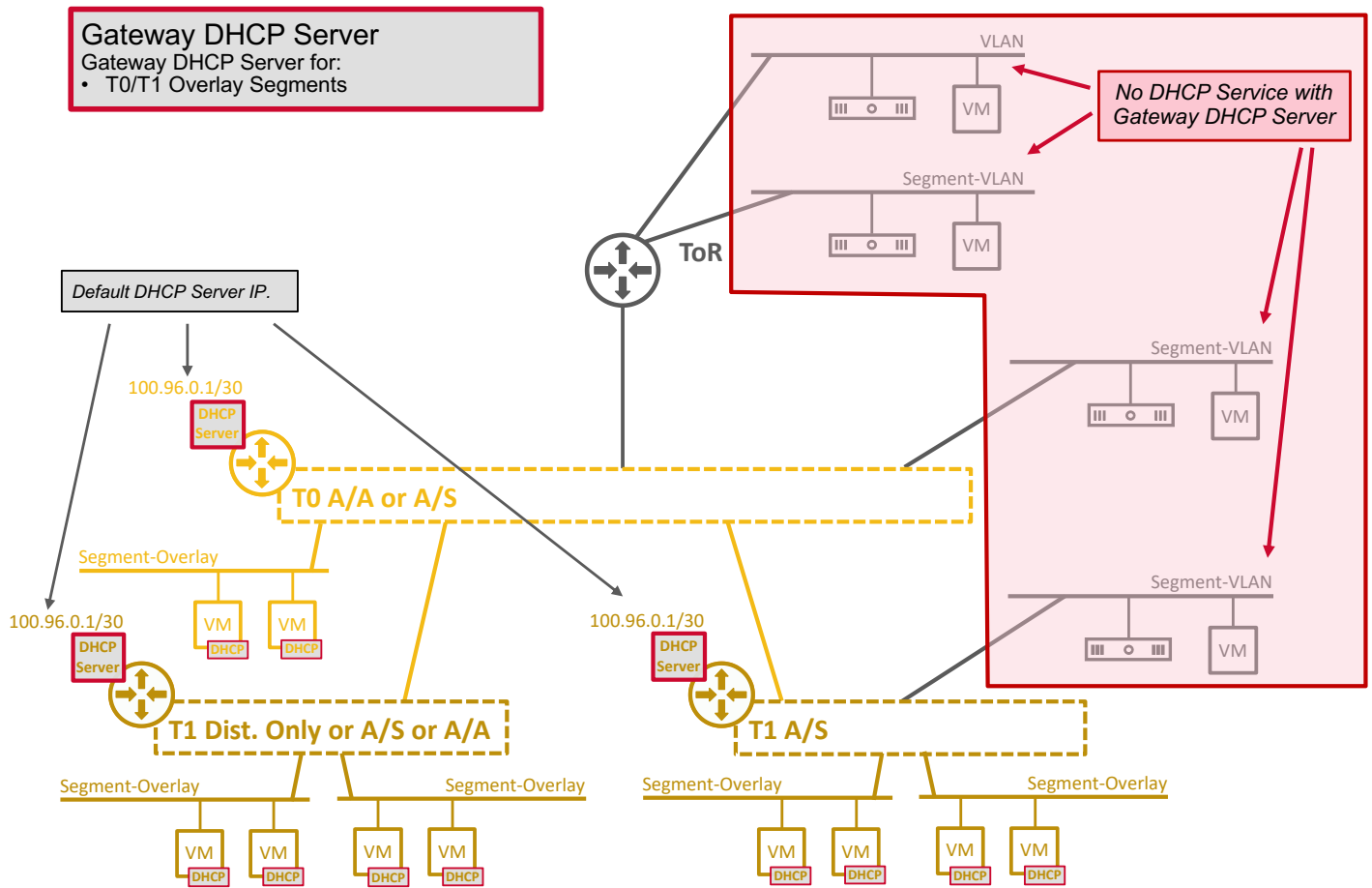
A dedicated DHCP Server is running on each T0 / T1 and offers DHCP Service to its Segments-Overlay.

The requirements are:

- 1 dedicated subnet for T0/T1 Gateway DHCP Server
 - by default the subnet 100.96.0.1/30 is used
 - it can be the same subnet for all T0/T1 Gateway DHCP Servers

The limitations are:

- No DHCP Service on VLAN (“Physical VLAN” / “VDS VLAN PortGroup” / “Segment-VLAN”)



2.2.3 DHCP Relay

NSX relays the DHCP Requests to an External DHCP Server.

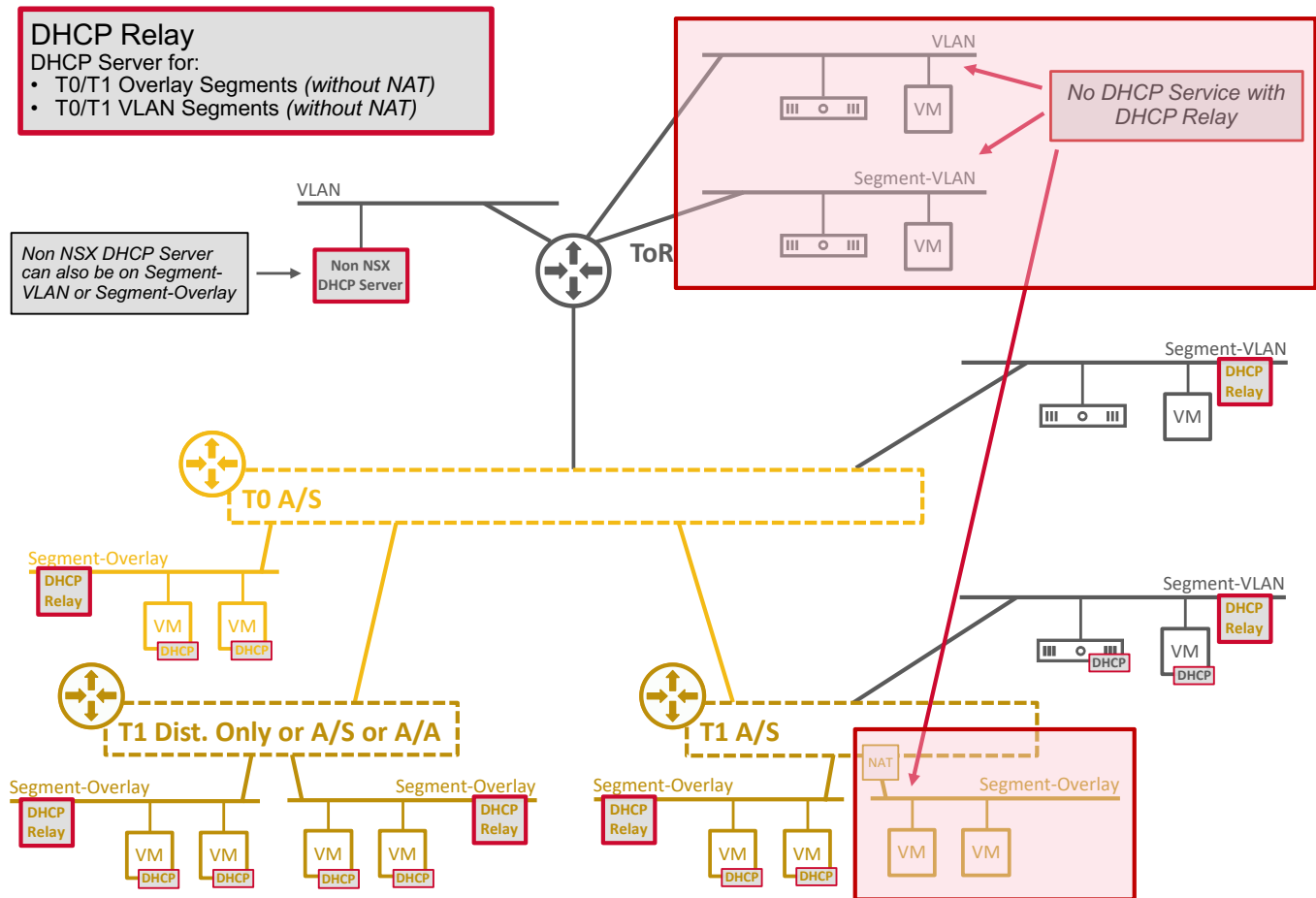
The requirements are:

- External DHCP Server on VLAN or Segment-VLAN or Segment-Overlay

The limitations are:

- No DHCP Service on Segments with NAT
- No DHCP Service on VLAN (“Physical VLAN” / “VDS VLAN PortGroup” / “Isolated Segment-VLAN”)

Note: DHCP Relay Service available on NSX “Segment-VLAN connected to T0/T1”.



2.3 DHCP Scale

DHCP scale is documented on <https://configmax.esp.vmware.com/> for each NSX release.

Below is NSX 4.1.2 DHCP scale:

NSX 4.1.2 Configuration Limits		
	Limits	Description
<div style="text-align: right;"> EXPORT ALL LIMITS TO PDF COLLAPSE ALL </div>		
Layer 3 Networking (DHCP)		
DHCP DHCP Relays	4,000	
DHCP DHCP Servers in DHCP Server Group	10	Used by DHCP relay.
DHCP Static Bindings per DHCP Server Instance	8,000	Assumes one virtual NIC per virtual machine.
DHCP DHCP Ranges / Pools per DHCP Server Instance	5	
DHCP System Wide Static Bindings	50,000	
Medium NSX Manager DHCP Server Instances	2,000	
Medium NSX Manager System Wide DHCP Pools	4,000	
Large NSX Manager DHCP Server Instances	10,000	
Large NSX Manager System Wide DHCP Pools	20,000	

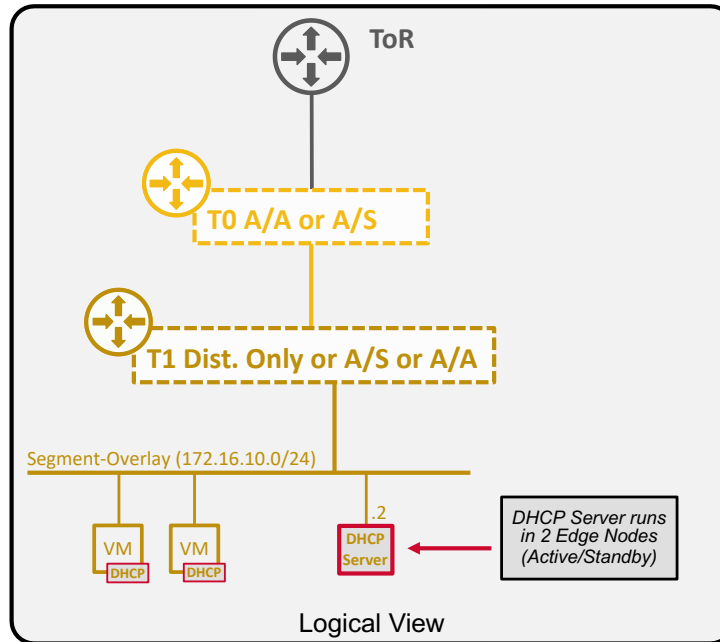
2.4 DHCP Configuration

2.4.1 DHCP Configuration (basic)

2.4.1.1 Segment DHCP Server

Let's use the following Segment DHCP Server as example:

Segment DHCP Server



2.4.1.1.1 UI - Segment DHCP Server Configuration (basic)

The UI configuration to configure Segment DHCP Server as represented in the figure above is done in 2 steps:

1. Create a DHCP Server Profile:

Note: The DHCP Server Profile is to select the Edge Cluster to use for the future Segment DHCP Servers using that profile. The same DHCP Server Profile can be used by different Segments (step2).

Under “Networking / Networking Profiles / DHCP”

- Name: Segment DHCP Profile Name
- Profile Type: DHCP Server
- Server IP Address: Blank (Server IP Address information is used only for Gateway DHCP Server. When not configured, NSX automatically will configure it to its default value = 100.96.0.1/30)
- Edge Cluster: Select Edge Cluster which will host the future DHCP Servers

The screenshot shows the 'Networking Profiles' configuration page for DHCP. The 'DHCP' tab is selected. A table lists the profile 'Segment-DHCP-Server1' with a profile type of 'DHCP Server'. The 'Server IP Address' field is empty, with a placeholder 'Enter CIDR' and a note 'CIDR e.g. IPv4 10.22.12.2/23 or IPv6 fc7e:f206:db42::1/48'. The 'Edge Cluster' is set to 'EdgeCluster'. The 'Auto Allocate Edges' toggle is turned on (Yes). The 'Standby Relocation' toggle is turned off (No). The 'Tags' section shows a 'Tag' and 'Scope' dropdown, with a note 'Max 30 allowed. Click (+) to add.' The 'SAVE' and 'CANCEL' buttons are at the bottom.

Name	Profile Type	Server IP Address	Where Used
Segment-DHCP-Server1	DHCP Server	Enter CIDR CIDR e.g. IPv4 10.22.12.2/23 or IPv6 fc7e:f206:db42::1/48	0

2. Update Segment with Segment DHCP Server information:

Under “Networking / Segments”, edit Segment and click on “Set DHCP Config”

- DHCP Type: Segment DHCP Server
- DHCP Profile: DHCP Profile you created in Step1
- DHCP Server Address: IP address in Segment subnet for the DHCP Server
- DHCP Range: Range of IP for the future DHCP Clients
- Lease Time (seconds): DHCP lease time (default = 86400 secs = 1 day)
- IPv4 Gateway: Gateway DHCP Clients will receive (hardcoded = T0/T1 Segment IP)
- DNS Servers: DNS Servers DHCP Clients will receive

The screenshot displays the NSX Segments configuration page. The 'web-seg' segment is selected, showing its configuration details. A red box highlights the 'SET DHCP CONFIG' button. A red arrow points to the 'Set DHCP Config' dialog box, which is open and shows the following configuration:

- Segment: web-seg
- DHCP Type: Segment DHCP Server
- DHCP Profile: Segment-DHCP-Server1
- IPv4 Server Settings:
 - DHCP Server Address: 172.16.10.2/24
 - DHCP Ranges: 172.16.10.101-172.16.10.110
 - Lease Time (seconds): 86400
- IPv6 Server Settings:
 - IPv4 Gateway: 172.16.10.1/24
 - DNS Servers: 192.168.110.10

Note: The configuration steps would be the same for Segments-VLAN.

2.4.1.1.2 API - Segment DHCP Server Configuration (basic)

The API for DHCP Server Profile creation is:

```
PATCH https://<NSX-Mgr>/policy/api/v1/infra/dhcp-server-configs/<Segment_DHCP_Server>
{
  "edge_cluster_path": [Edge_Cluster_Path],
  "resource_type": "DhcpServerConfig"
}
```

The API for Segment update with Segment DHCP Server information is:

```
PATCH https://<NSX-Mgr>/policy/api/v1/infra/segments/<Segment>
{
  "subnets": [
    {
      "gateway_address": [Segment_Gateway_IP],
      "dhcp_ranges": [
        [DHCP_Range]
      ],
      "dhcp_config": {
        "resource_type": "SegmentDhcpV4Config",
        "server_address": [Segment_DHCP_Server_IP],
        "lease_time": [DHCP_Lease_Time],
        "dns_servers": [
          [DNS_Server]
        ]
      }
    }
  ],
  "dhcp_config_path": [DHCP_Server_Profile_Path],
  "_revision": [Revision_Number]
}
```

To configure DHCP Server Profile via API as represented in the figure above:

1. Create a DHCP Server Profile:

```
PATCH https://<NSX-Mgr>/policy/api/v1/infra/dhcp-server-configs/Segment-DHCP-Server1
{
  "edge_cluster_path": "/infra/sites/default/enforcement-points/default/edge-clusters/[Edge_Cluster_UUID]",
  "resource_type": "DhcpServerConfig"
}
```

2. Update Segment with Segment DHCP Server information:

Collect the Segment Revision ID:

```
GET https://<NSX-Mgr>/policy/api/v1/infra/segments/web-seg
{
  <snip>
  "_revision": 0
}
```

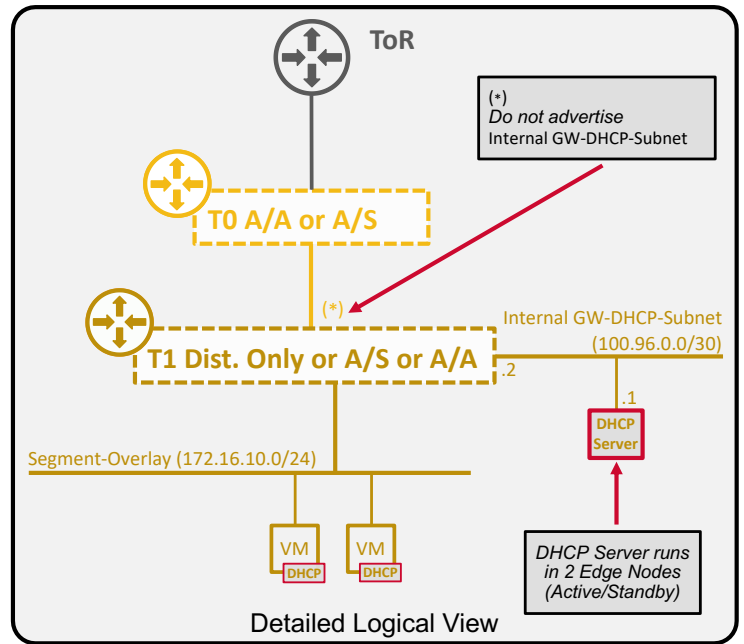
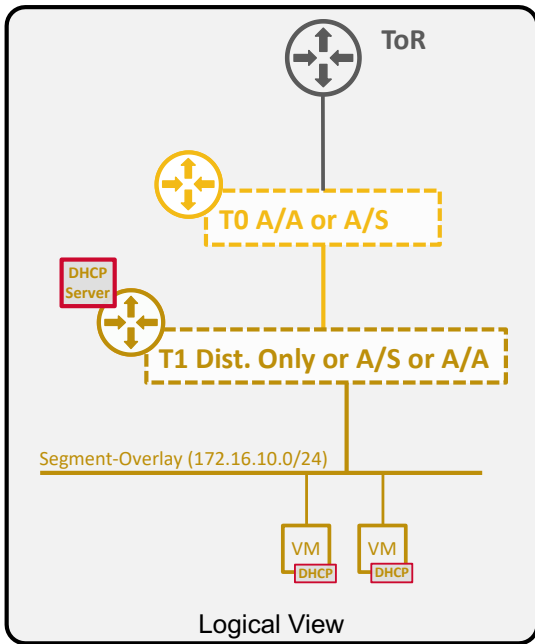
Update Segment with Segment DHCP Server + Revision ID:

```
PATCH https://<NSX-Mgr>/policy/api/v1/infra/segments/web-seg
{
  "subnets": [
    {
      "gateway_address": "172.16.10.1/24",
      "dhcp_ranges": [
        "172.16.10.101-172.16.10.110"
      ],
      "dhcp_config": {
        "resource_type": "SegmentDhcpV4Config",
        "server_address": "172.16.10.2/24",
        "lease_time": 86400,
        "dns_servers": [
          "192.168.110.10"
        ]
      }
    }
  ],
  "dhcp_config_path": "/infra/dhcp-server-configs/Segment-DHCP-Server1",
  "_revision": 0
}
```


2.4.1.2 Gateway DHCP Server

Let's use the following Gateway DHCP Server as example:

Gateway DHCP Server



2.4.1.2.1 UI - Gateway DHCP Server Configuration (basic)

The UI configuration to configure Gateway DHCP Server as represented in the figure above is done in 4 steps:

1. Create a DHCP Server Profile:

Note: The DHCP Server Profile is to select the Edge Cluster to use for the future Gateway DHCP Servers using that profile. The same DHCP Server Profile can be used in different T0/T1 Gateways (step2).

Under “Networking / Networking Profiles / DHCP”

- Name: Gateway DHCP Profile Name
- Profile Type: DHCP Server
- Server IP Address: Specify DHCP Server IP (*if not configured Server IP Address default value = 100.96.0.1/30*)
- Edge Cluster: Select Edge Cluster which will host the future DHCP Servers

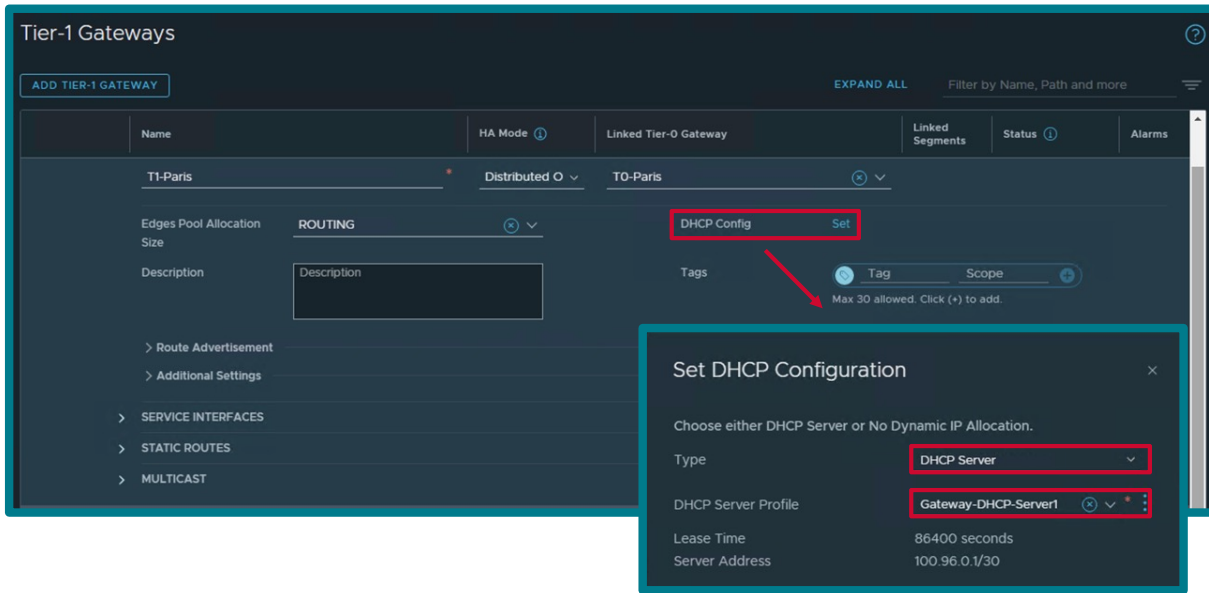
The screenshot displays the 'Networking Profiles' configuration page for DHCP. The 'DHCP' tab is selected. A table lists the profile 'Gateway-DHCP-Server1' with a profile type of 'DHCP Server'. The 'Server IP Address' field is set to 'Enter CIDR' with a 'Where Used' count of 1. The 'Edge Cluster' is set to 'EdgeCluster'. The 'Auto Allocate Edges' toggle is turned on (Yes). The 'Standby Relocation' toggle is turned off (No). The 'Tags' section shows a 'Tag' and 'Scope' dropdown, with a note 'Max 30 allowed. Click (+) to add.' The 'SAVE' and 'CANCEL' buttons are visible at the bottom.

Name	Profile Type	Server IP Address	Where Used
Gateway-DHCP-Server1	DHCP Server	Enter CIDR <small>CIDR e.g. IPv4 10.22.12.2/23 or IPv6 fc7e:f206:db42::1/48</small>	1

2. Update T0/T1 Gateway with DHCP Server Profile information:

Under “Networking / Tier-0 or Tier-1 Gateways”, edit Gateway and click on “DHCP Config Set”

- DHCP Type: Segment DHCP Server
- DHCP Profile: DHCP Profile you created in Step1

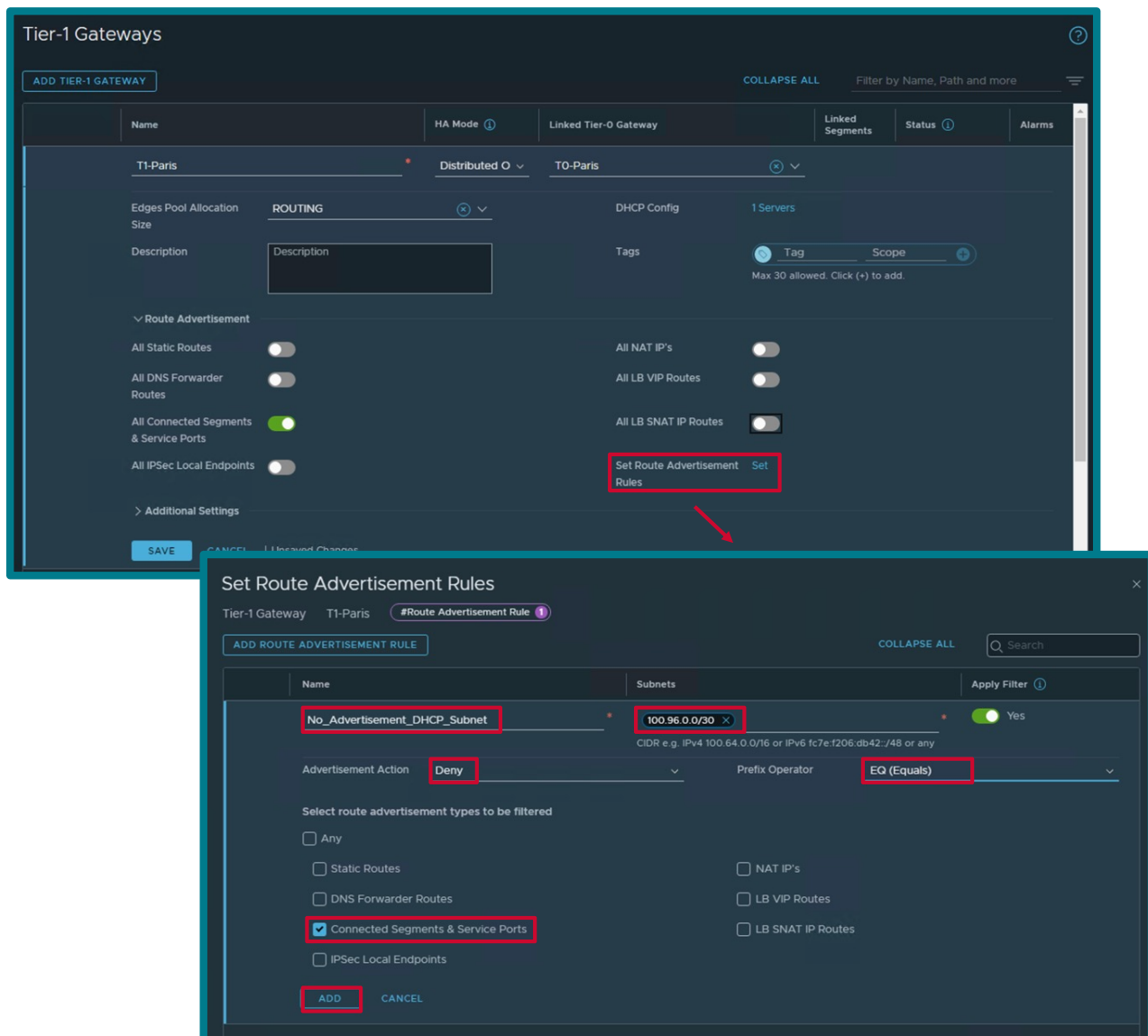


3. Update T0/T1 Gateway to deny route advertisement of DHCP Server subnet:

As represented in the Detailed Logical View above, a Segment-Overlay is created on the T0/T1 where is plugged the DHCP Server. When the T0/T1 is configured to advertise its Connected Segment, that internal subnet will also be advertised. The configuration below is to prevent the advertisement of that subnet to the other T0/T1 and network fabric.

Under “Networking / Tier-0 or Tier-1 Gateways”, click on Set Route Advertisement Rules

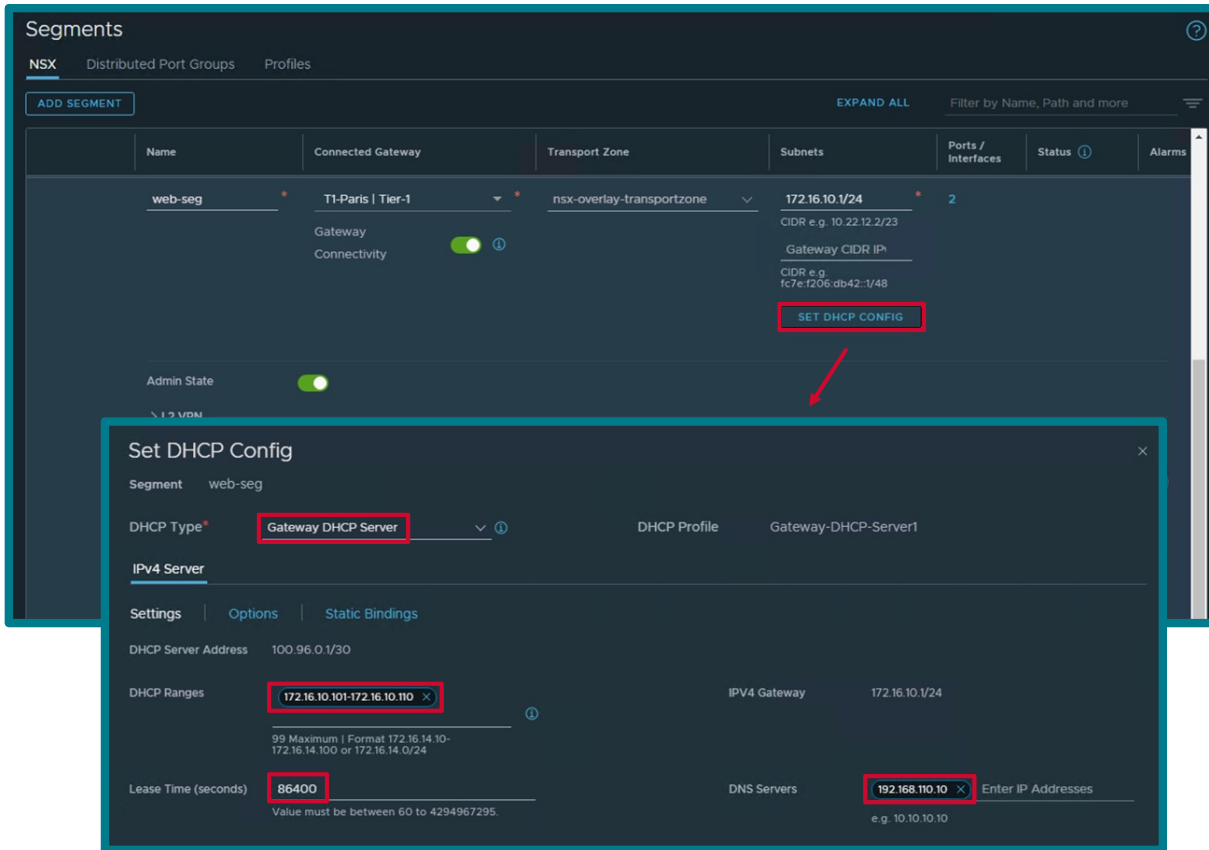
- Name: Rule name
- Subnet: Gateway DHCP Server subnet (100.96.0.0/30 by default)
- Action: Deny
- Prefix Operator: EQ (Equals)
- Select route advertisement types to be filtered: Connected Segments & Service Ports



4. Update Segment with Segment DHCP Server information:

Under “Networking / Segments”, edit Segment and click on “Set DHCP Config”

- DHCP Type: Gateway DHCP Server
- DHCP Range: Range of IP for the future DHCP Clients
- Lease Time (seconds): DHCP lease time (default = 86400 secs = 1 day)
- DNS Servers: DNS Servers DHCP Clients will receive



2.4.1.2.2 API - Gateway DHCP Server Configuration (basic)

The API for DHCP Server Profile creation is:

```
PATCH https://<NSX-Mgr>/policy/api/v1/infra/dhcp-server-configs/<Gateway_DHCP_Server>
{
  "edge_cluster_path": [Edge_Cluster_Path],
  "resource_type": "DhcpServerConfig"
}
```

The API for T0/T1 update with Gateway DHCP Server information is:

```
PATCH https://<NSX-Mgr>/policy/api/v1/infra/[tier-0s|tier-1s]/<tier-0|tier-1>
{
  "dhcp_config_paths": [
    [DHCP_Server_Profile_Path]
  ],
  "route_advertisement_rules": [
    {
      "name": [Route_Advertisement_Rule_Name],
      "subnets": [
        [Segment_DHCP_Server_Subnet]
      ],
      "route_advertisement_types": [
        "TIER1_CONNECTED"
      ],
      "prefix_operator": "EQ",
      "action": "DENY"
    }
  ],
  "_revision": [Revision_Number]
}
```

The API for Segment update with Gateway DHCP Server information is:

```
PATCH https://<NSX-Mgr>/policy/api/v1/infra/segments/<Segment>
{
  "subnets": [
    {
      "gateway_address": [Segment_Gateway_IP],
      "dhcp_ranges": [
        [DHCP_Range]
      ],
      "dhcp_config": {
        "resource_type": "SegmentDhcpV4Config",
        "lease_time": [DHCP_Lease_Time],
        "dns_servers": [
          [DNS_Server]
        ]
      }
    }
  ],
  "_revision": [Revision_Number]
}
```

To configure DHCP Server Profile via API as represented in the figure above:

1. Create a DHCP Server Profile:

```
PATCH https://<NSX-Mgr>/policy/api/v1/infra/dhcp-server-configs/Segment-DHCP-Server1
{
  "edge_cluster_path": "/infra/sites/default/enforcement-
points/default/edge-clusters/[Edge_Cluster_UUID]",
  "resource_type": "DhcpServerConfig"
}
```

2. and 3. Update T1 with Gateway DHCP Server information and deny route advertisement of DHCP Server subnet:

Collect the T1 Revision ID:

```
GET https://<NSX-Mgr>/policy/api/v1/infra/tier-1s/T1-Paris
{
  <snip>
  "_revision": 0
}
```

Update Gateway with Gateway DHCP Server + deny route advertisement of DHCP Server subnet:

```
PATCH https://<NSX-Mgr>/policy/api/v1/infra/tier-1s/T1-Paris
{
  "dhcp_config_paths": [
    "/infra/dhcp-server-configs/Gateway-DHCP-Server1"
  ],
  "route_advertisement_rules": [
    {
      "name": "No_Advertisement_DHCP_Subnet",
      "subnets": [
        "100.96.0.0/30"
      ],
      "route_advertisement_types": [
        "TIER1_CONNECTED"
      ],
      "prefix_operator": "EQ",
      "action": "DENY"
    }
  ],
  "_revision": 0
}
```

4. Update Segment with Segment DHCP Server information:

Collect the Segment Revision ID:

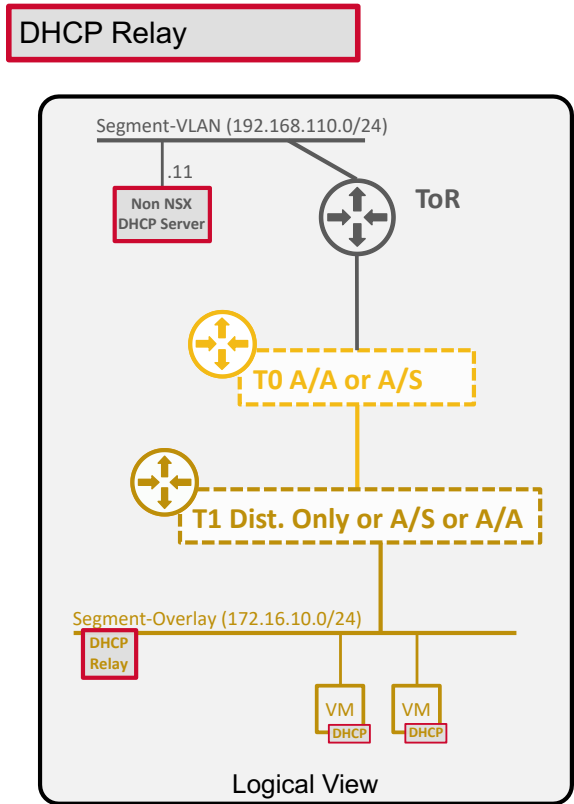
```
GET https://<NSX-Mgr>/policy/api/v1/infra/segments/web-seg
{
  <snip>
  "_revision": 0
}
```

Update Segment with Segment DHCP Server:

```
PATCH https://<NSX-Mgr>/policy/api/v1/infra/segments/web-seg
{
  "subnets": [
    {
      "gateway_address": "172.16.10.1/24",
      "dhcp_ranges": [
        "172.16.10.101-172.16.10.110"
      ],
      "dhcp_config": {
        "resource_type": "SegmentDhcpV4Config",
        "lease_time": 86400,
        "dns_servers": [
          "192.168.110.10"
        ]
      }
    }
  ],
  "_revision": 0
}
```


2.4.1.3 DHCP Relay

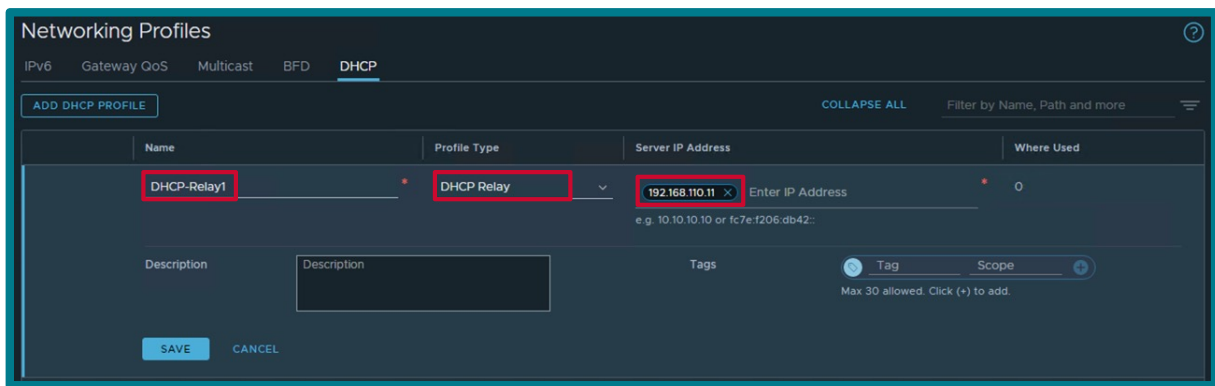
Let's use the following DHCP Relay as example:



2.4.1.3.1 UI - DHCP Relay Configuration (basic)

The UI configuration to configure DHCP Relay as represented in the figure above is done in 2 steps + 1 optional step:

1. Create a DHCP Relay Profile:
 - Under “Networking / Networking Profiles / DHCP”
 - Name: DHCP Relay Profile Name
 - Profile Type: DHCP Relay
 - Server IP Address: External DHCP Server IP



2. Update Segment with Segment DHCP Relay information:

Under “Networking / Segments”, edit Segment and click on “Set DHCP Config”

- DHCP Type: DHCP Relay
- DHCP Profile: DHCP Profile you created in Step1

The screenshot displays the NSX Segments configuration interface. The main window shows a table of segments with columns for Name, Connected Gateway, Transport Zone, Subnets, Ports / Interfaces, Status, and Alarms. The 'web-seg' segment is selected, showing its configuration details. A red box highlights the 'SET DHCP CONFIG' button. A red arrow points from this button to a modal dialog titled 'Set DHCP Config'.

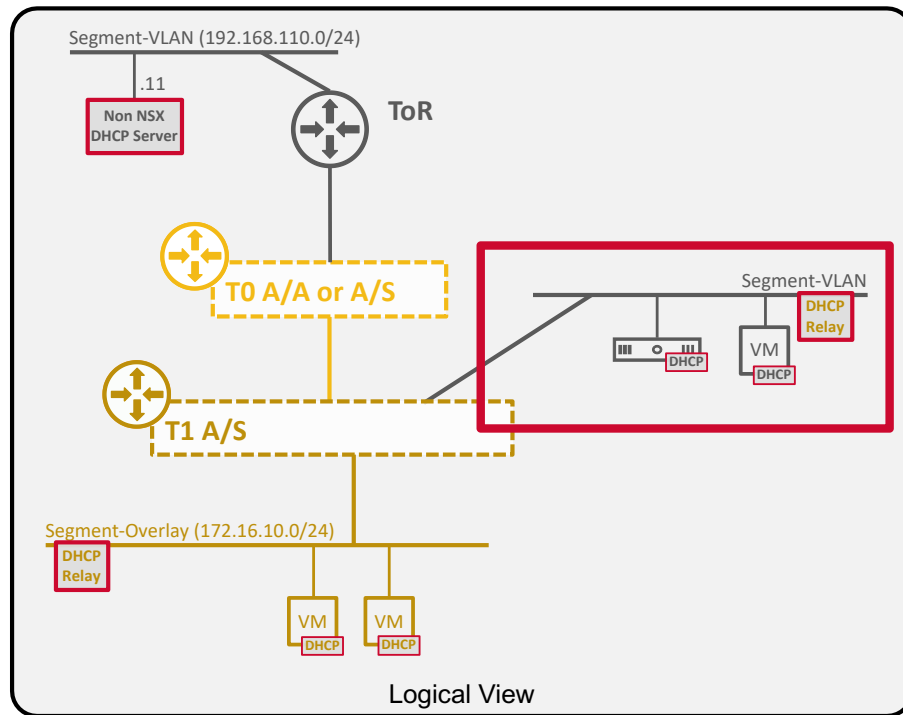
The 'Set DHCP Config' dialog shows the following configuration:

- Segment: web-seg
- DHCP Type: DHCP Relay
- DHCP Profile: DHCP-Relay1
- servers: 192.168.110.11

A note at the bottom of the dialog states: "IPv4 Server & IPv6 server settings are not required here for DHCP Relay".

Note: In the case of Segment-VLAN connected to T0/T1

DHCP Relay



the step2 (selection of the DHCP Relay Profile for the Segment) is not done in the Segment, but in the T1 Service Interface:

The screenshot shows the NSX Manager interface. The main window displays the configuration for a Tier-1 Gateway named 'T1-Paris'. The configuration includes:

- Edge Cluster: EdgeCluster
- Auto Allocate Edges: Yes
- Edges Pool Allocation Size: ROUTING
- HA Mode: Active Standby
- Linked Tier-0 Gateway: TO-Paris
- Fail Over: Non Preemptive
- Standby Relocation: No
- DHCP Config: Set

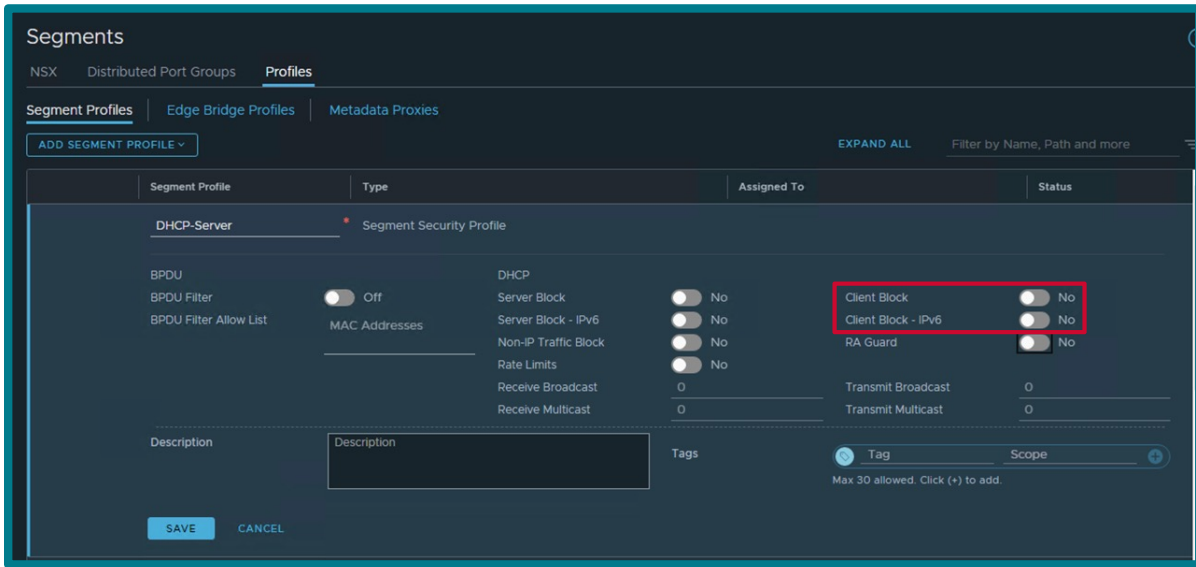
 The 'SERVICE INTERFACES' section is expanded, and the 'Service Interfaces' item is highlighted with a red box and an arrow. A 'Set Interfaces' dialog is open, showing the configuration for the 'Segment-VLAN101' interface:

- Name: Segment-VLAN101
- IP Address / Mask: 172.16.101.1/24
- Connected To(Segment): Segment-VLAN101
- ND Profile: default
- MTU: 1500
- URPF Mode: Strict
- DHCP Relay: DHCP-Relay1
- Description: Description

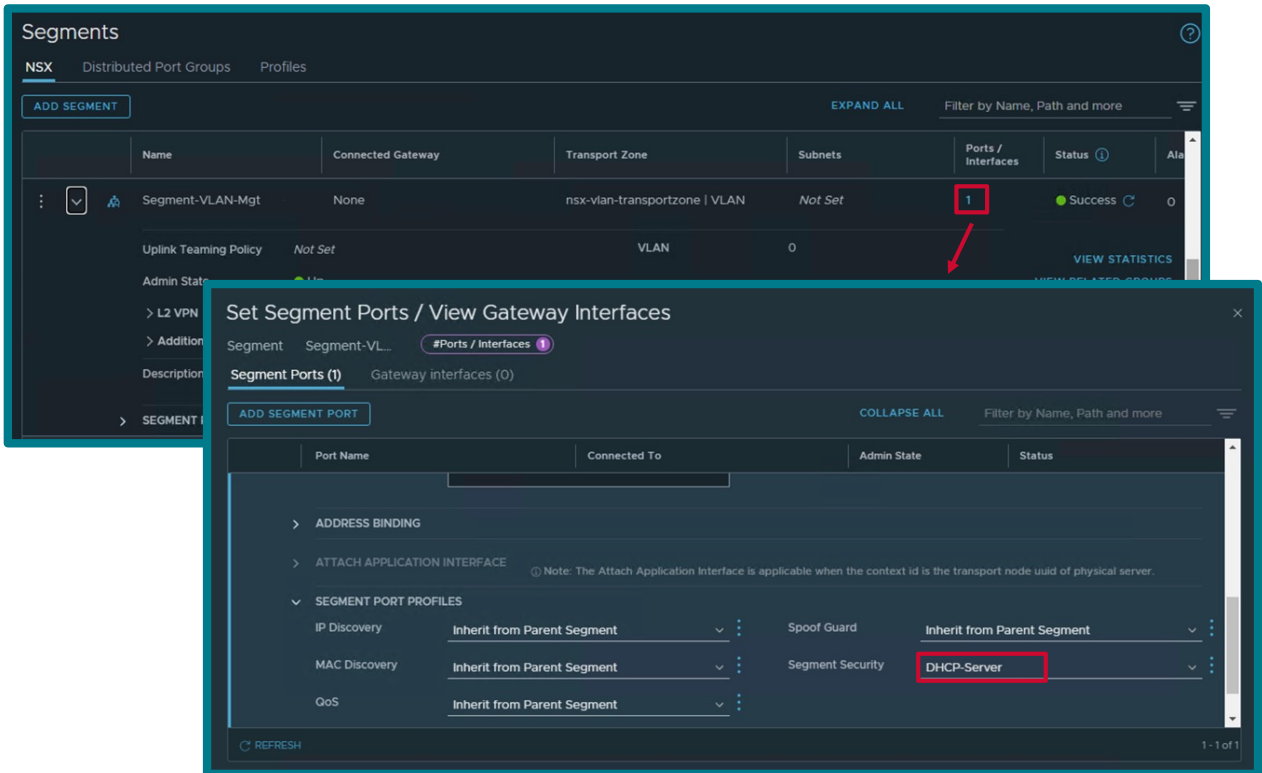
- 3. (Optional) If the External DHCP Server is a VM connected to a Segment (VLAN or Overlay), configure “External DHCP Server VM” Segment-Port with the following Segment Security Profile “Client Block = No”.

Note: DHCP Servers VMs must be configured with a Security Profile allowing DHCP Server responses. However in the case of Clients DHCP requests coming to DHCP Server via DHCP Relay, NSX release has a bug (3347686) and currently DHCP Servers VMs must be configured with a Security Profile allowing DHCP Clients requests.

Under “Networking / Segments / Profiles”, use or create a specific Segment Security Profile with “Client Block” disabled



And under “Networking / Segments / Port”, attach that profile to the DHCP Server VM Segment Port



2.4.1.3.2 API - DHCP Relay Configuration (basic)

The API for DHCP Relay Profile creation is:

```
PATCH https://<NSX-Mgr>/policy/api/v1/infra/dhcp-relay-configs/<DHCP_Relay>
{
  "server_addresses": [
    "192.168.110.11"
  ],
  "resource_type": "DhcpRelayConfig"
}
```

The API for Segment update with Gateway DHCP Server information is:

```
PATCH https://<NSX-Mgr>/policy/api/v1/infra/segments/<Segment>
{
  "dhcp_config_path": [DHCP_Relay_Profile_Path],
  "_revision": [Revision_Number]
}
```

Note: In the case of Segment-VLAN connected to T0/T1

```
PATCH https://<NSX-Mgr>/policy/api/v1/infra/[tier-0s|tier-1s]/<tier-0|tier-1>/locale-
services/default/interfaces/<Interface_VLAN>
{
  "dhcp_relay_path": [DHCP_Relay_Profile_Path],
  "_revision": [Revision_Number]
}
```

To configure DHCP Server Profile via API as represented in the figure above:

1. Create a DHCP Server Profile:

```
PATCH https://<NSX-Mgr>/policy/api/v1/infra/dhcp-relay-configs/DHCP-Relay1
{
  "server_addresses": [
    "192.168.110.11"
  ],
  "resource_type": "DhcpRelayConfig",
}
```

2. Update Segment with DHCP Relay Profile information:

Collect the Segment Revision ID:

```
GET https://<NSX-Mgr>/policy/api/v1/infra/segments/web-seg
{
  <snip>
  "_revision": 0
}
```

Update Segment with Segment DHCP Server:

```
PATCH https://<NSX-Mgr>/policy/api/v1/infra/segments/web-seg
{
  "dhcp_config_path": "/infra/dhcp-relay-configs/DHCP-Relay1",
  "_revision": 0
}
```

Note: In the case of Segment-VLAN connected to T0/T1

2. Update T1 with DHCP Relay Profile information:

Collect the T1 Revision ID:

```
GET https://<NSX-Mgr>/policy/api/v1/infra/tier-1s/T1-Paris/locale-
services/default/interfaces/Segment-VLAN101
{
  <snip>
  "_revision": 0
}
```

Update Gateway with Gateway DHCP Server + deny route advertisement of DHCP Server subnet:

```
PATCH https://<NSX-Mgr>/policy/api/v1/infra/tier-1s/T1-Paris/locale-
services/default/interfaces/Segment-VLAN101
{
  "dhcp_relay_path": "/infra/dhcp-relay-configs/DHCP-Relay1",
  "_revision": 0
}
```

3. (Optional) If the External DHCP Server is a VM connected to a Segment (VLAN or Overlay):

Create a specific Segment Security Profile with “Client Block” disabled:

```
PATCH https://<NSX-Mgr>/policy/api/v1/infra/segment-security-profiles/DHCP-Server
{
  "dhcp_server_block_enabled": false,
  "dhcp_client_block_enabled": false,
  "dhcp_server_block_v6_enabled": false,
  "dhcp_client_block_v6_enabled": false,
  "resource_type": "SegmentSecurityProfile"
}
```

Find the NSX Segment-Port for the VM DHCP-Server:

Note: In the example below, the vCenter VM name of the External DHCP Server is “DHCP-Server”.

GET `https://<NSX-Mgr>/policy/api/v1/infra/segments/Management/ports`

```
{
  "results": [
    {
      <snip>
      "id": "default:ffab824c-5e1a-4d1f-9c0f-cf0bd1db484a",
      "display_name": "DHCP-Server.vmx@a2809943-3c6d-48b0-9fa8-99215f4a001c",
      <snip>
    }
  ]
}
```

Attach that profile to the DHCP Server VM Segment Port

PATCH `https://<NSX-Mgr>/policy/api/v1/infra/segments/Management/ports/default:ffab824c-5e1a-4d1f-9c0f-cf0bd1db484a/port-security-profile-binding-maps/port_security_binding_map_1`

```
{
  "segment_security_profile_path": "/infra/segment-security-profiles/DHCP-Server"
}
```

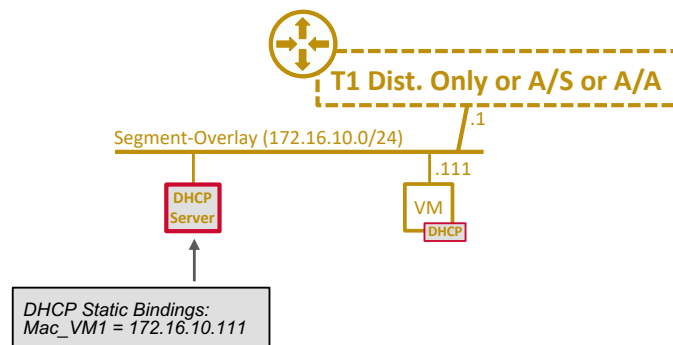
2.4.2 DHCP Configuration (advanced)

2.4.2.1 DHCP Static Bindings

The DHCP Static Bindings option is to configure a specific IP for a specific DHCP Client Mac address on the NSX DHCP Server.

This option is available on Segment DHCP Server and Gateway DHCP Server.

Note: With DHCP Relay, that configuration must be done on the External DHCP Server. This collateral does not cover the configuration of the External DHCP Server.



For such use case:

- The UI configuration is:

Under “Networking / Segments”, edit Segment and click on “Edit DHCP Config”, “Static Bindings”, and “Add IPv4 Static Binding”

- Name: VM/Server Name (information – doesn’t need to be the vCenter VM name)
- Mac Address: DHCP Client Mac address
- IP Address: IP Address DHCP Client will receive (must be an IP outside of DHCP Range)
- Gateway: Gateway IP DHCP Client will receive
- Host Name: Hostname DHCP Client will receive
- DNS Servers: DNS Servers DHCP Client will receive

The screenshot shows the 'Set DHCP Config' window for segment 'web-seg'. The 'Static Bindings' tab is active, displaying a table with one entry:

Name	MAC Address	IP Address	Gateway Address	Host Name
VM1	00:50:56:8c:ed:7 <small>e.g. 00:A0:C9:14:C3:29</small>	172.16.10.111 <small>e.g. 10.10.10.10</small>	172.16.10.1 <small>e.g. 10.10.10.10</small>	vm1.corp.local

Below the table, there are fields for 'Lease Time (seconds)' (86400), 'Description', 'Tags', and 'DHCP Options'. The 'ADD' button is highlighted in red.

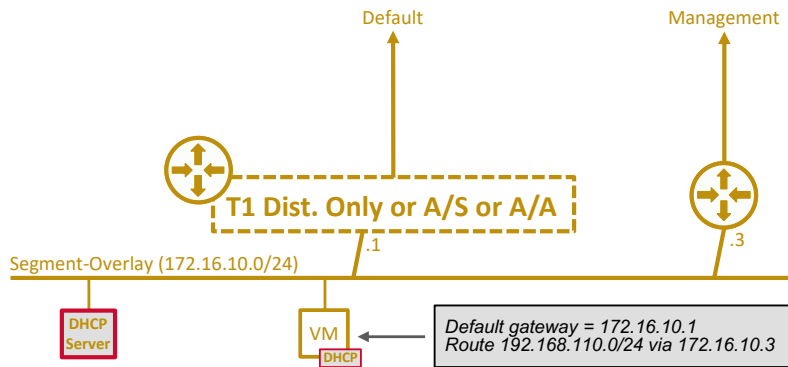
- The API configuration is:

PATCH <https://<NSX-Mgr>/policy/api/v1/infra/segments/<Segment>/dhcp-static-binding-configs/VM1>

```
{
  "gateway_address": "172.16.30.1",
  "host_name": "vm1.corp.local",
  "ip_address": "172.16.30.111",
  "mac_address": "00:50:56:8c:ed:72",
  "resource_type": "DhcpV4StaticBindingConfig"
}
```

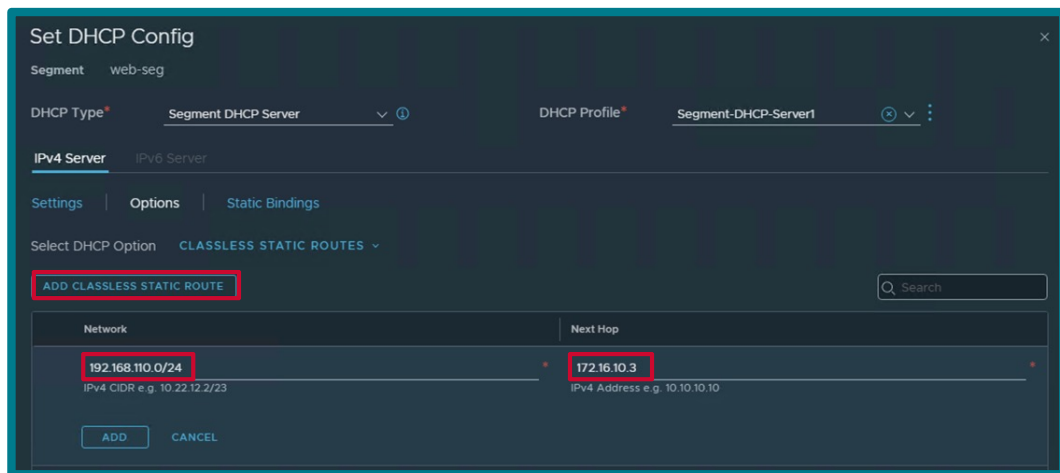

2.4.2.2 DHCP Classless Static Routes

The DHCP Classless Static Routes option is to configure a specific static route (in addition to the default gateway) on the DHCP Client.



For such use case:

- The UI configuration is:
 - Under “Networking / Segments”, edit Segment and click on “Edit DHCP Config”, “Options”, and “Add Classless Static Route”
 - Network: Destination subnet to reach via the static route next hop
 - Next Hop: Next Hop Router to reach destination subnet



2. The API configuration is:

Collect the Segment DHCP configuration + Revision ID:

GET `https://<NSX-Mgr>/policy/api/v1/infra/segments/web-seg`

```
{
  <snip>
  "subnets": [
    {
      "gateway_address": "172.16.10.1/24",
      "dhcp_ranges": [
        "172.16.10.101-172.16.10.110"
      ],
      "dhcp_config": {
        "resource_type": "SegmentDhcpV4Config",
        "server_address": "172.16.10.2/24",
        "lease_time": 86400,
        "dns_servers": [
          "192.168.110.10"
        ]
      }
    }
  ],
  <snip>
  "dhcp_config_path": "/infra/dhcp-server-configs/Segment-DHCP-Server1",
  <snip>
  "_revision": 1
}
```

Update Segment with Segment DHCP Classless Static Routes:

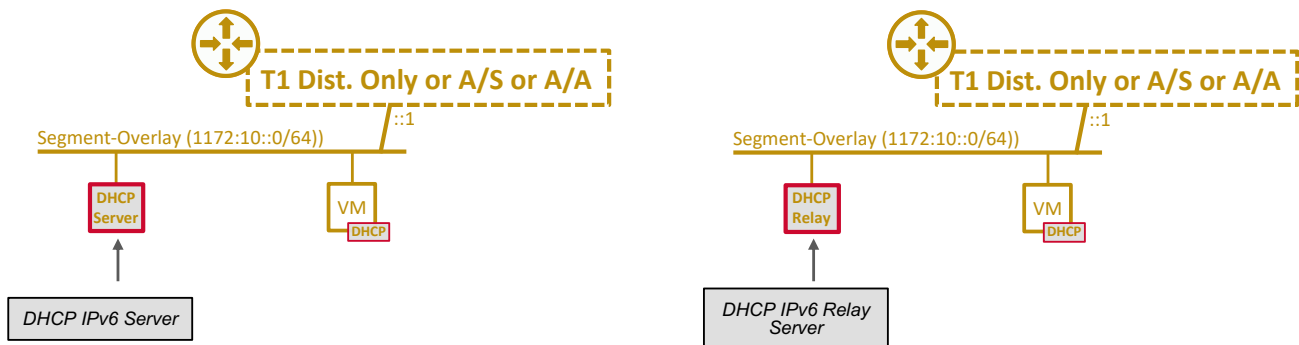
PATCH <https://<NSX-Mgr>/policy/api/v1/infra/segments/web-seg>

```
{
  "subnets": [
    {
      "gateway_address": "172.16.10.1/24",
      "dhcp_ranges": [
        "172.16.10.101-172.16.10.110"
      ],
      "dhcp_config": {
        "options": {
          "option121": {
            "static_routes": [
              {
                "network": "192.168.110.0/24",
                "next_hop": "172.16.10.3"
              }
            ]
          }
        },
        "resource_type": "SegmentDhcpV4Config",
        "server_address": "172.16.10.2/24",
        "lease_time": 86400,
        "dns_servers": [
          "192.168.110.10"
        ]
      }
    }
  ],
  "dhcp_config_path": "/infra/dhcp-server-configs/Segment-DHCP-Server1",
  "_revision": 1
}
```

2.4.2.3 DHCP IPv6

DHCPv6 is supported on Segment DHCP Server and DHCP Relay.

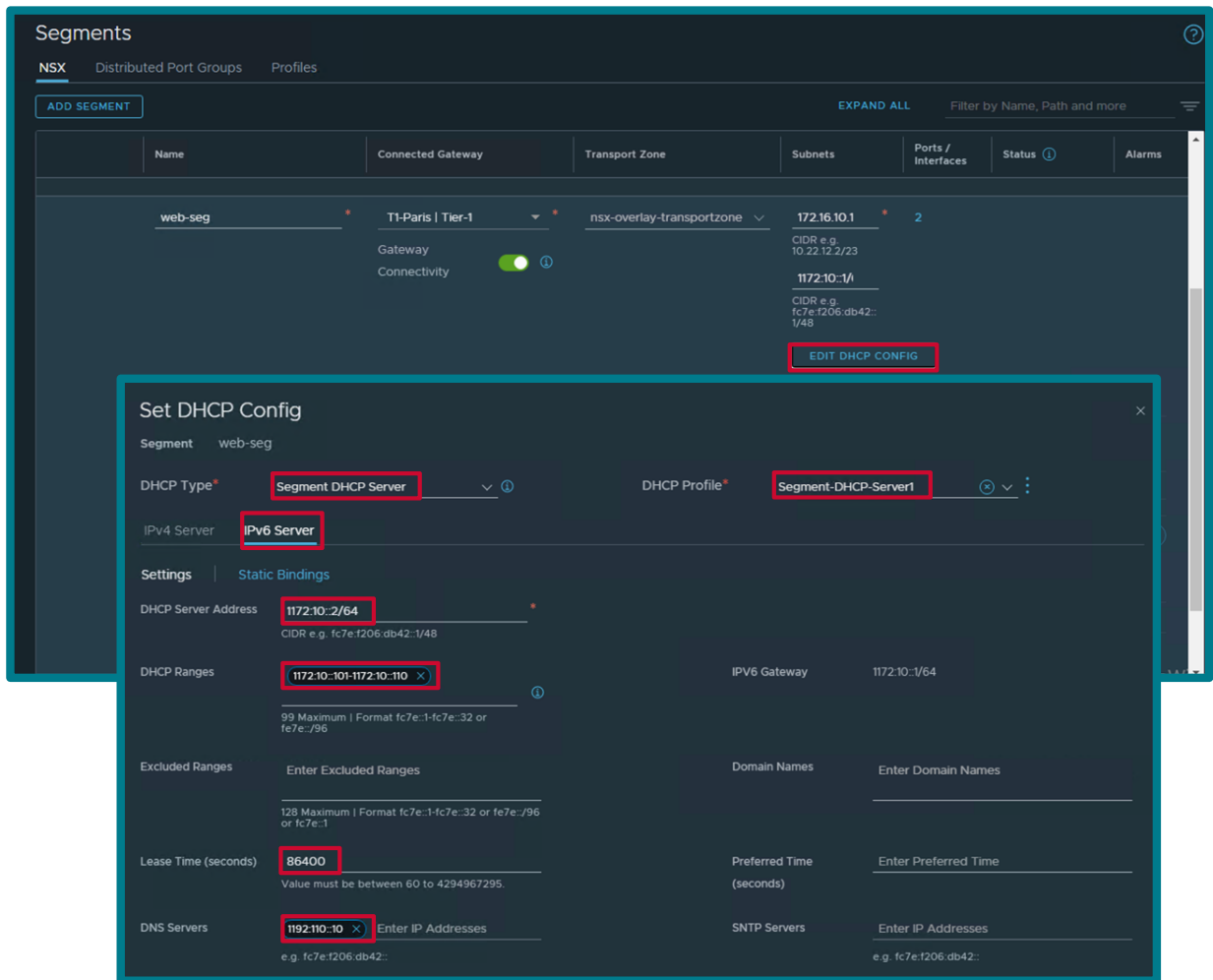
DHCPv6 is not supported on Gateway DHCP Server.



The DHCPv6 configuration on DHCP Relay is the same as for DHCPv4.

The DHCPv6 configuration on Segment DHCP Server:

- The UI configuration is:
 - Under “Networking / Segments”, edit Segment and click on “Edit DHCP Config”, “IPv6 Server”
 - DHCP Type: Segment DHCP Server
 - DHCP Profile: DHCP Profile you created in Step1
 - DHCP Server Address: IPv6 address in Segment subnet for the DHCP Server
 - DHCP Range: Range of IPv6 for the future DHCP Clients
 - Lease Time (seconds): DHCP lease time (default = 86400 secs = 1 day)
 - DNS Servers: DNS Servers IPv6 DHCP Clients will receive
 - *IPv6 Gateway: Gateway DHCP Clients will receive (hardcoded = T0/T1 Segment IP)*



3. The API configuration is:

Collect the Segment Revision ID:

```
GET https://<NSX-Mgr>/policy/api/v1/infra/segments/web-seg
{
  <snip>
  "_revision": 0
}
```

Update Segment with Segment DHCP Server + Revision ID:

```
PATCH https://<NSX-Mgr>/policy/api/v1/infra/segments/web-seg
{
  "subnets": [
    {
      "gateway_address": "1172:10::1/64",
      "dhcp_ranges": [
        "1172:10::101-1172:10::110"
      ],
      "dhcp_config": {
        "resource_type": "SegmentDhcpV6Config",
        "server_address": "1172:10::2/64",
        "lease_time": 86400,
        "dns_servers": [
          "1192:110::10"
        ]
      },
      "network": "1172:10::/64"
    }
  ],
  "dhcp_config_path": "/infra/dhcp-server-configs/Segment-DHCP-Server1",
  "_revision": 0
}
```

2.4.2.4 DHCP in Projects

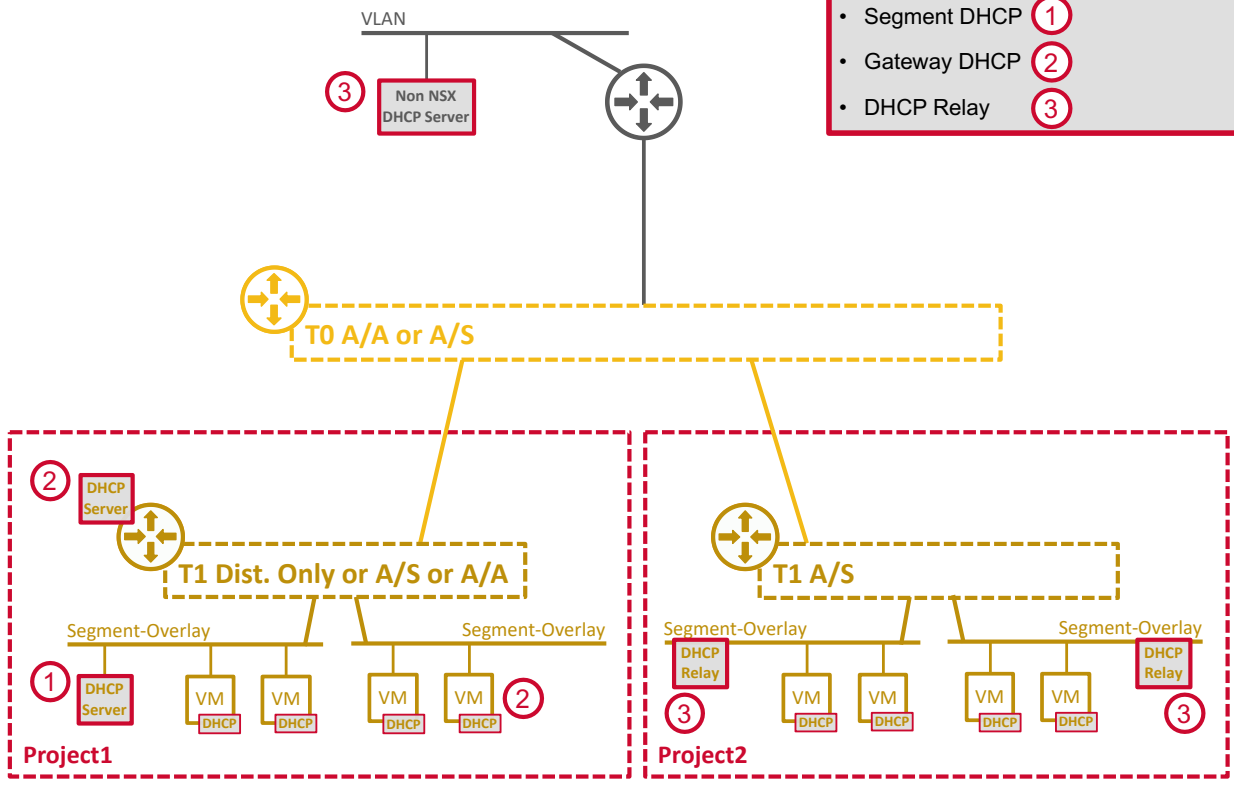
NSX offers the ability to create Projects.

Inside NSX Projects, DHCP Service can be offered.

The same DHCP capabilities described in the chapter 2.1 DHCP Presentation are available in Projects.

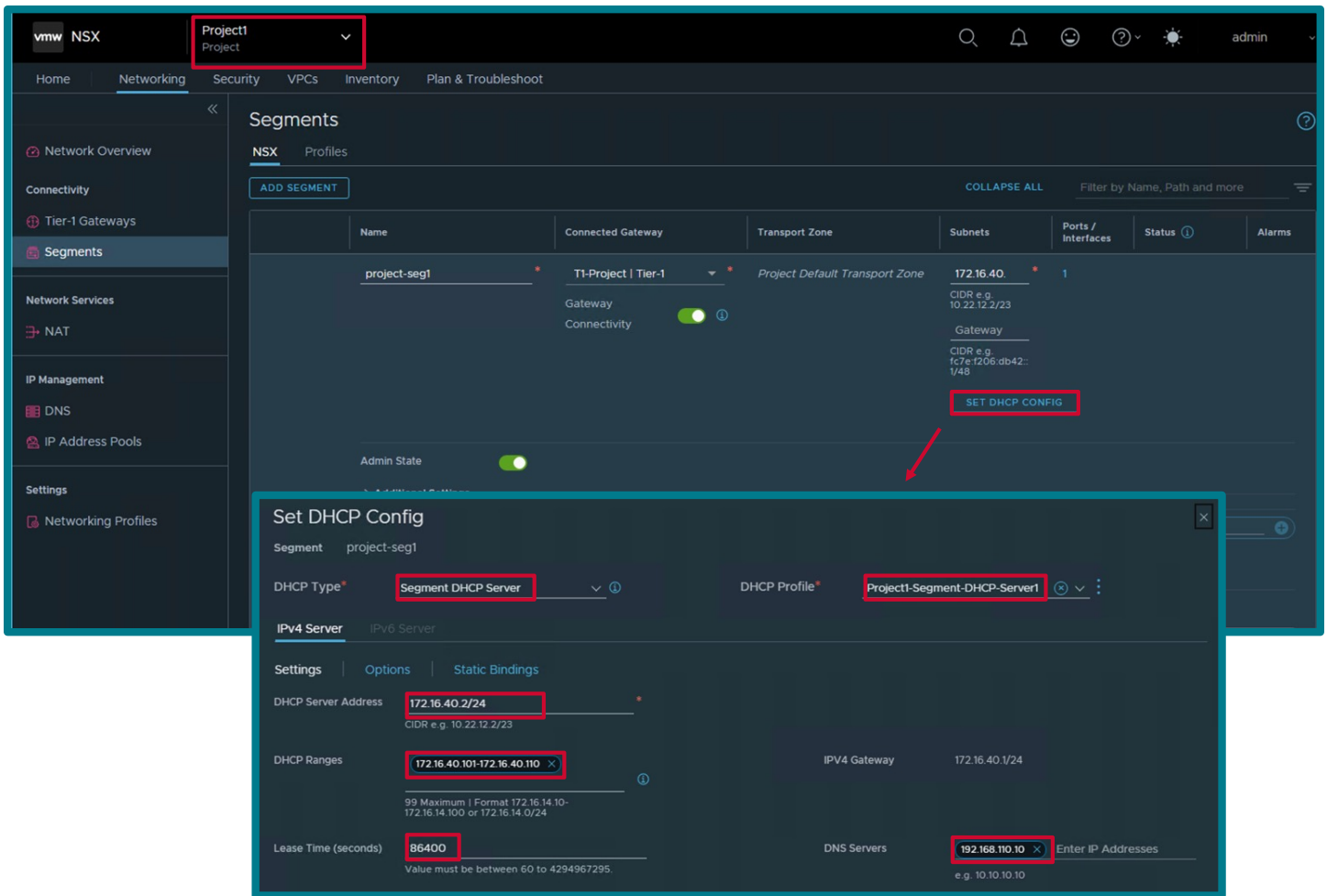
Examples of DHCP Service in Projects

- Segment DHCP (1)
- Gateway DHCP (2)
- DHCP Relay (3)



For such use case, the configuration is the same but under Project.

- For instance, the UI configuration of a Segment DHCP:



- For instance, the API configuration of a Segment DHCP:

```

PATCH https://<NSX-  
Mgr>/policy/api/v1/orgs/default/projects/Project1/infra/segments/project-seg1
{
  "subnets": [
    {
      "gateway_address": "172.16.40.1/24",
      "dhcp_ranges": [
        "172.16.40.101-172.16.40.110"
      ],
      "dhcp_config": {
        "resource_type": "SegmentDhcpV4Config",
        "server_address": "172.16.40.2/24",
        "lease_time": 86400,
        "dns_servers": [
          "192.168.110.10"
        ]
      }
    }
  ],
  "dhcp_config_path": "/orgs/default/projects/Project1/infra/dhcp-server-  
configs/Project1-Segment-DHCP-Server1",
  "_revision": 0
}

```

2.4.2.5 DHCP in VPC

As discussed in the previous chapter, NSX offers the ability to create projects.

Inside projects, NSX offers the ability to create VPC.

And VPC offers two DHCP modes for the workloads deployed on VPC subnets:

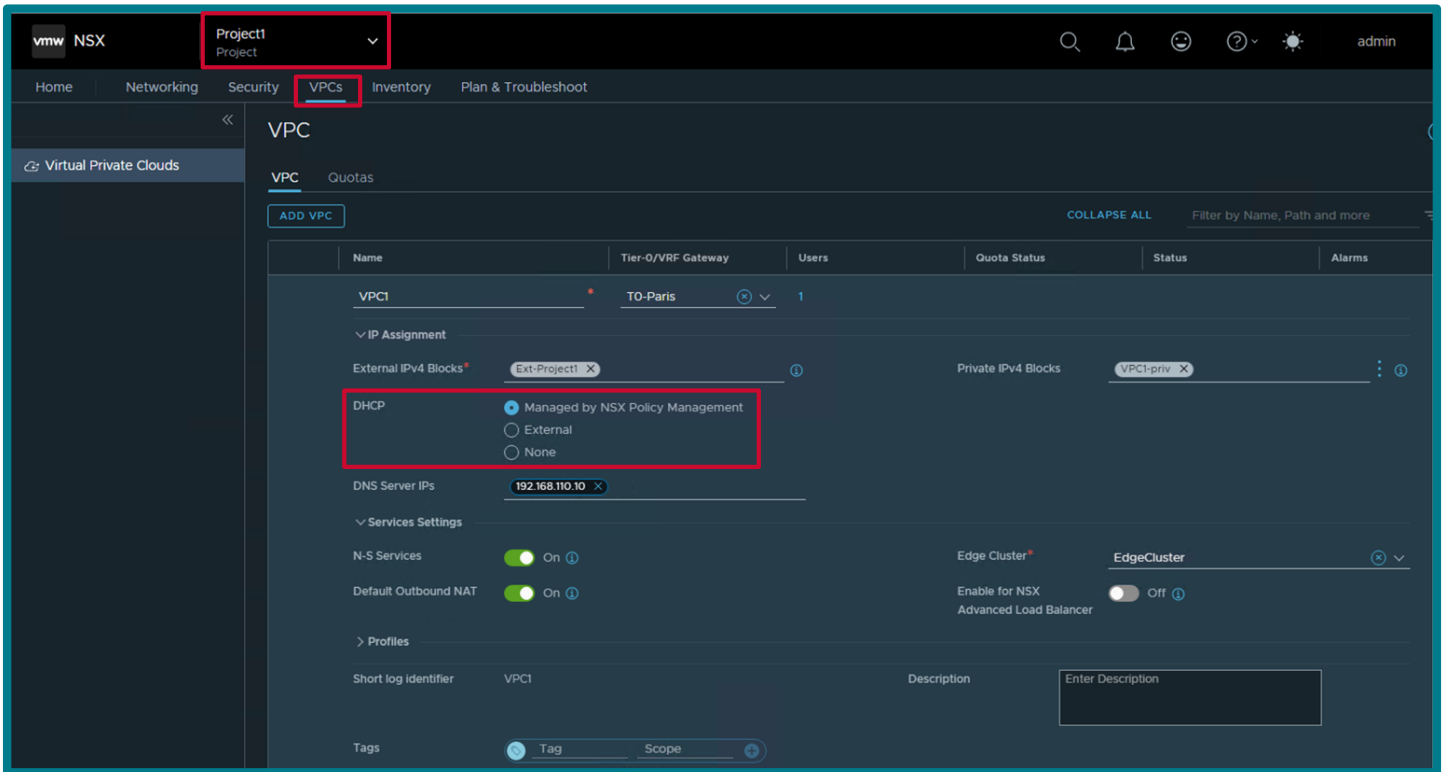
1. Segment DHCP (default)
2. DHCP Relay

2.4.2.5.1 Segment DHCP in VPC

Segment DHCP is the default DHCP in VPC.

For such use case:

- The UI configuration of Segment DHCP in VPC:
Under “Projects / VPC”
 - DHCP: Managed by NSX Policy Management



- The API configuration of Segment DHCP in VPC:

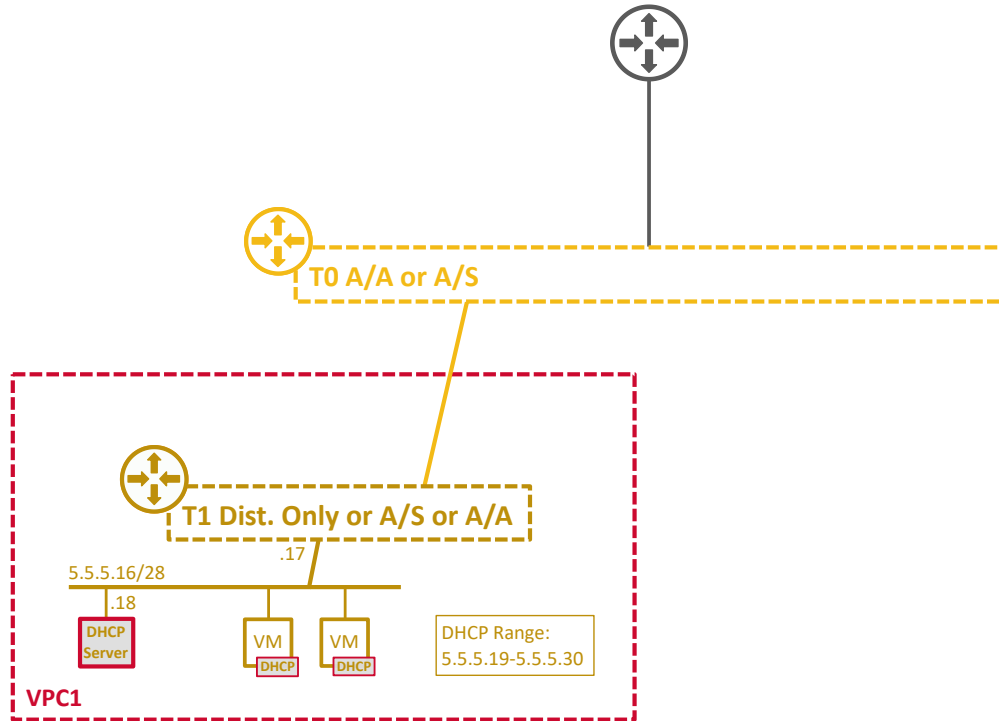
```
PATCH https://<NSX-Mgr>/policy/api/v1/orgs/default/projects/Project1/vpcs/VPC1
{
  <snip>
  "dhcp_config": {
    "enable_dhcp": true,
    "dns_client_config": {
      "dns_server_ips": [
        "192.168.110.10"
      ]
    }
  },
  <snip>
}
```

With this VPC configuration, the VPC subnets automatically get Segment DHCP configured.

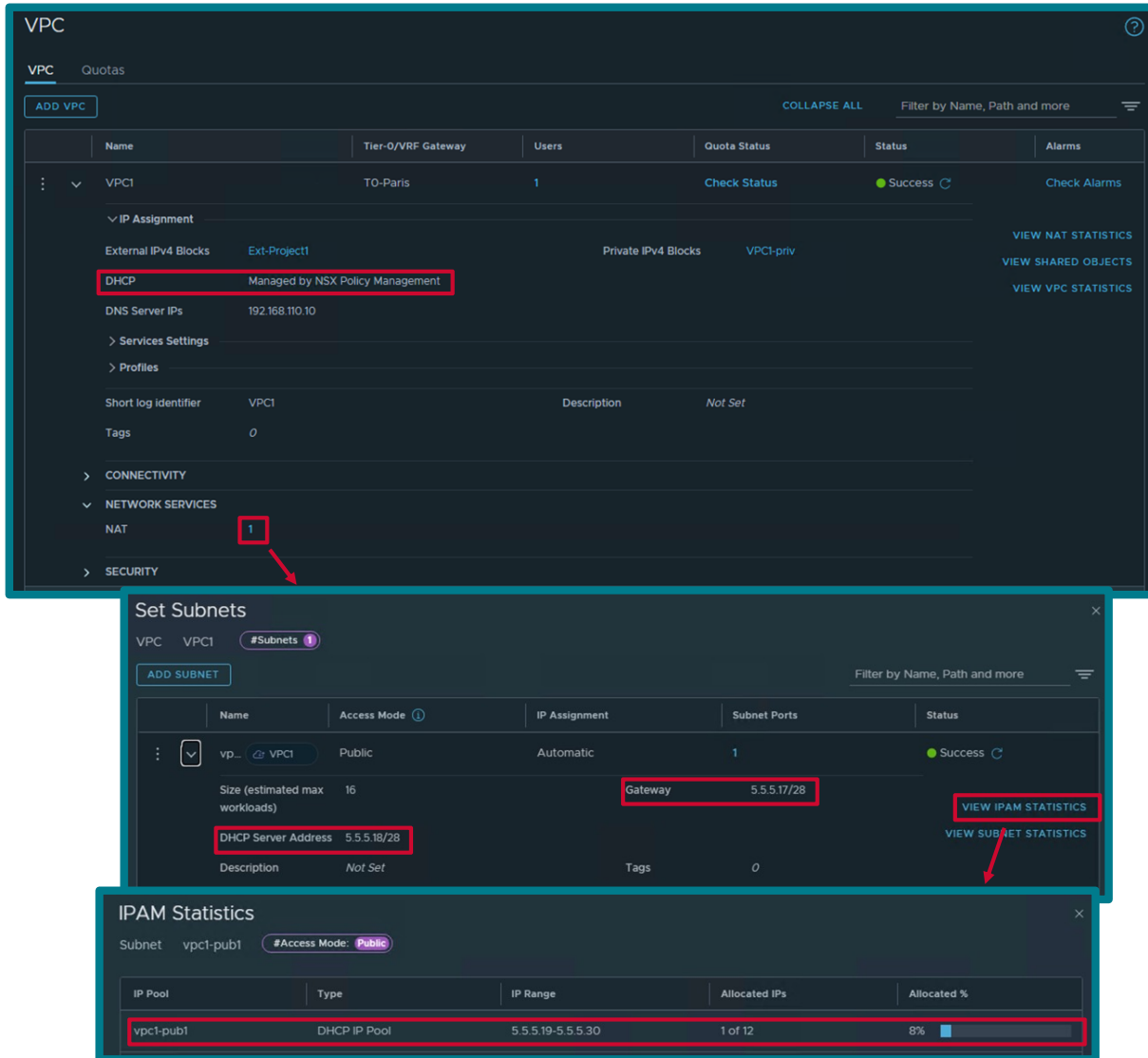
The whole VPC allocated subnet is reserved for DHCP Clients minus:

- the first subnet IP: used by the T1, as default gateway for the subnet
- the second subnet IP: used by the DHCP Server

VPC – DHCP Managed by NSX Policy Management



VPC user can see that information in UI:



Or also via API:

```
GET https://<NSX-
Mgr>/policy/api/v1/orgs/default/projects/Project1/vpcs/VPC1/subnets/vpc1-
pub1/status
{
  "results": [
    {
      "gateway_address" : "5.5.5.17/28",
      "network_address" : "5.5.5.16/28",
      "dhcp_server_address" : "5.5.5.18/28",
      "dhcp_ranges" : "5.5.5.19-5.5.5.30",
      "ip_address_type" : "IPV4"
    }
  ]
}
```

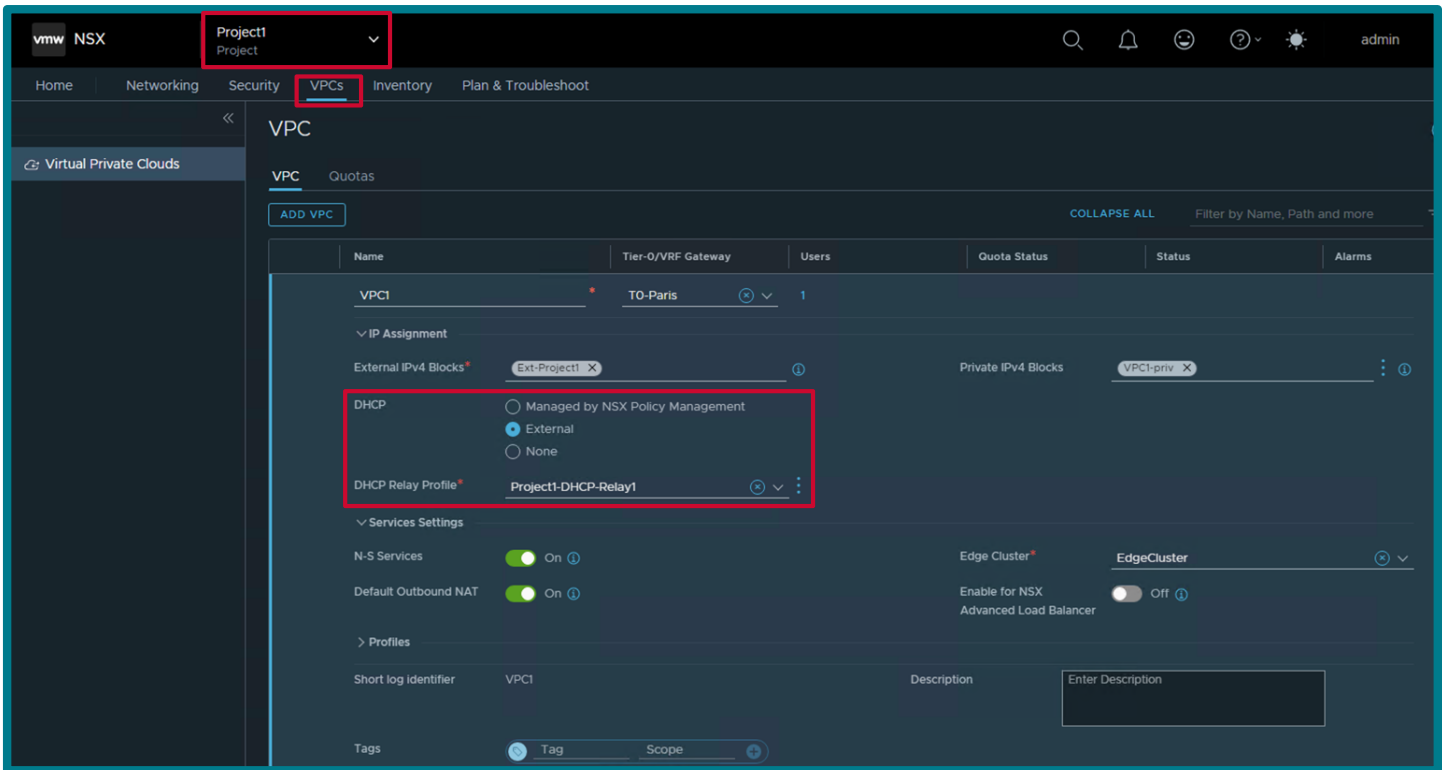
```
GET https://<NSX-
Mgr>/policy/api/v1/orgs/default/projects/Project1/vpcs/VPC1/subnets/vpc1-pub1/dhcp-
server-config/stats
{
  "dhcp_server_id" : "158b0a10-0371-4685-a497-c3ca7cec3be2",
  "timestamp" : 1712270287289,
  "discovers" : 1,
  "offers" : 1,
  "requests" : 1,
  "acks" : 1,
  "nacks" : 0,
  "declines" : 0,
  "releases" : 0,
  "informs" : 0,
  "errors" : 0,
  "ip_pool_stats" : [
    {
      "dhcp_ip_pool_id" :
"/orgs/default/projects/Project1/vpcs/VPC1/subnets/vpc1-pub1",
      "pool_size" : 12,
      "allocated_number" : 1,
      "allocated_percentage" : 8
    }
  ]
}
```

2.4.2.5.2 DHCP Relay in VPC

DHCP Relay can be configured in VPC, for workload to receive their IP address via an External DHCP server.

For such use case:

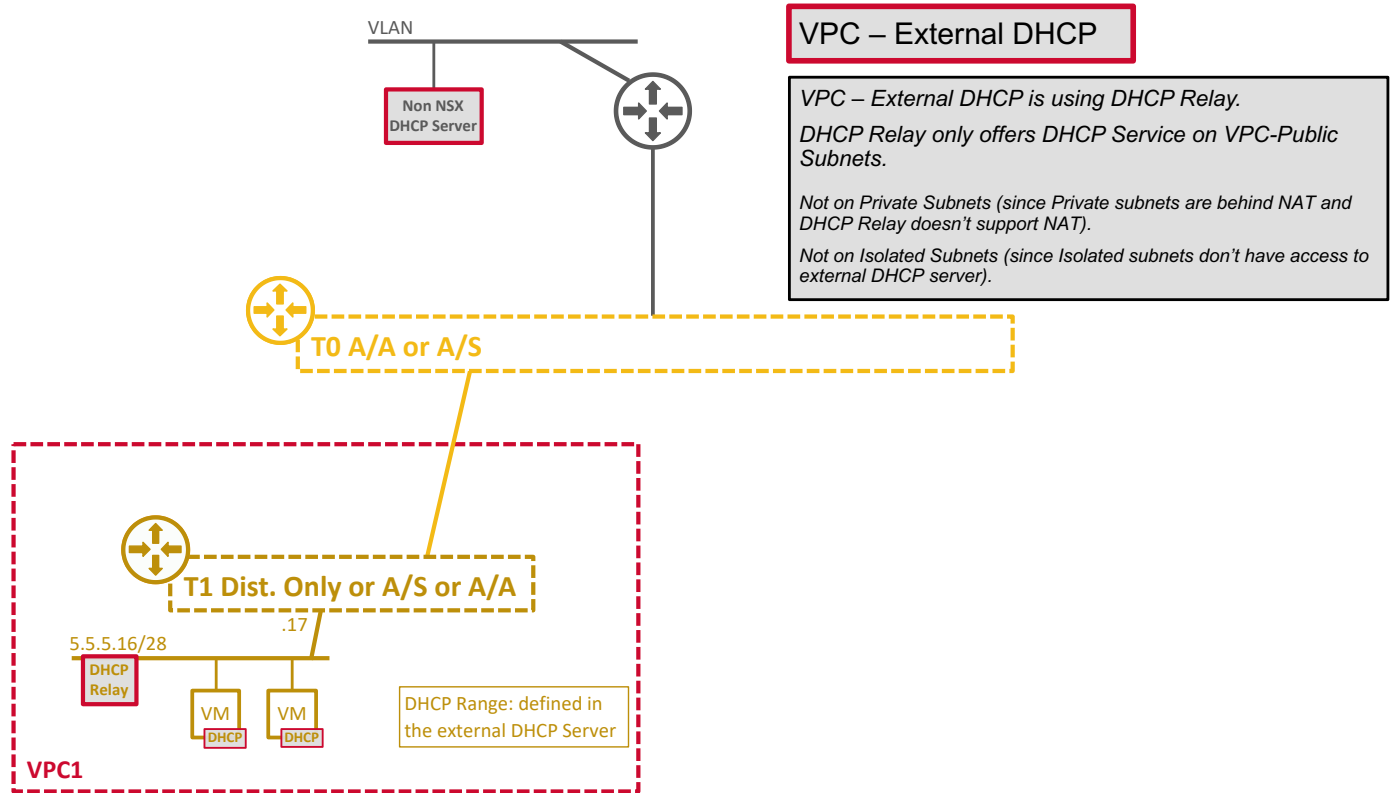
- The UI configuration of DHCP Relay in VPC:
 - Under “Projects / VPC”
 - DHCP: External
 - DHCP Relay Profile: [Project DHCP Profile]



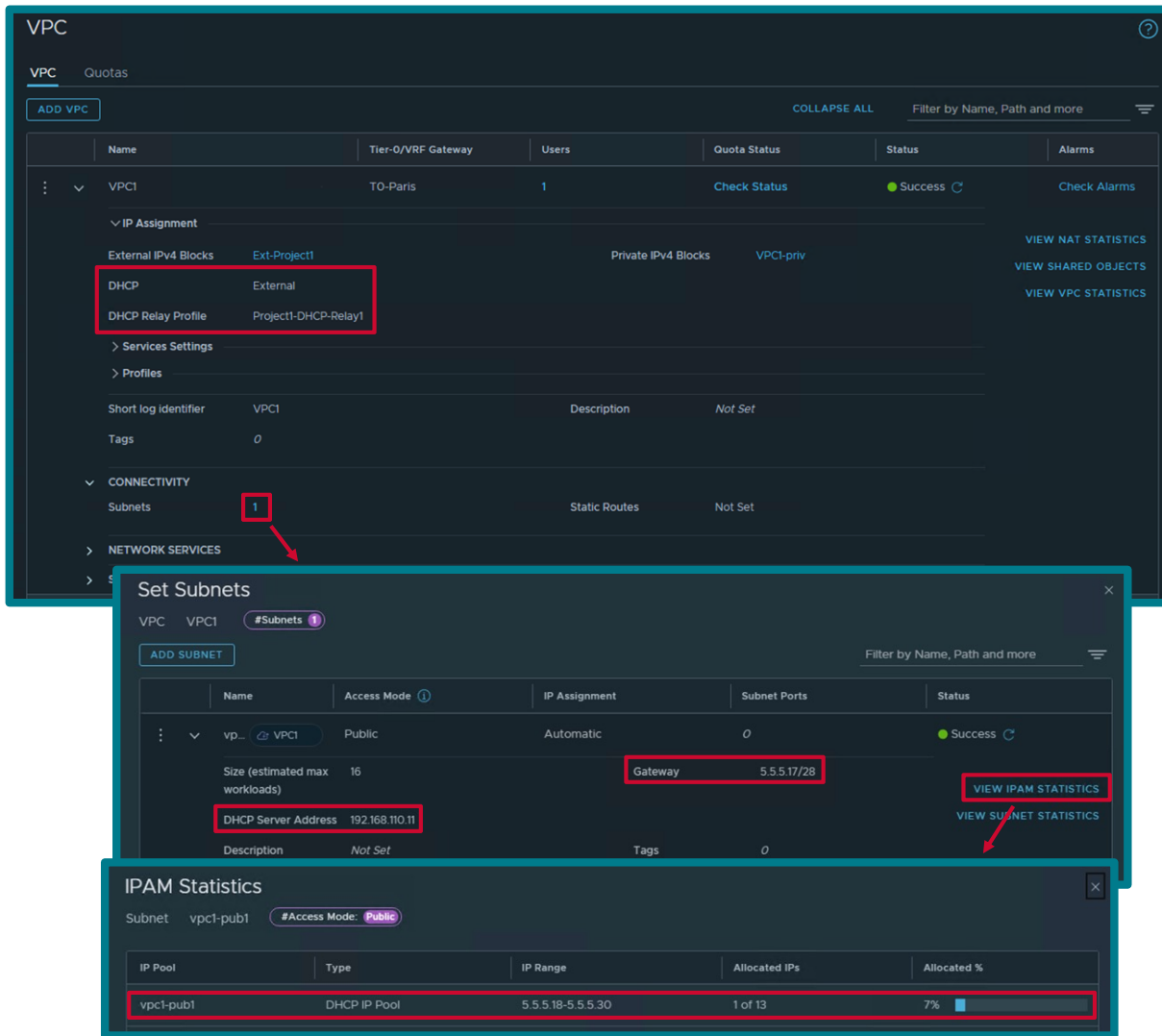
- The API configuration of Segment DHCP in VPC:

```
PATCH https://<NSX-Mgr>/policy/api/v1/orgs/default/projects/Project1/vpcs/VPC1
{
  <snip>
  "dhcp_config": {
    "enable_dhcp": true,
    "dhcp_relay_config_path": "/orgs/default/projects/Project1/infra/dhcp-
    relay-configs/Project1-DHCP-Relay1"
  },
  <snip>
}
```

With this VPC configuration, the VPC subnet automatically gets DHCP Relay configured:



VPC user can see that information in UI:



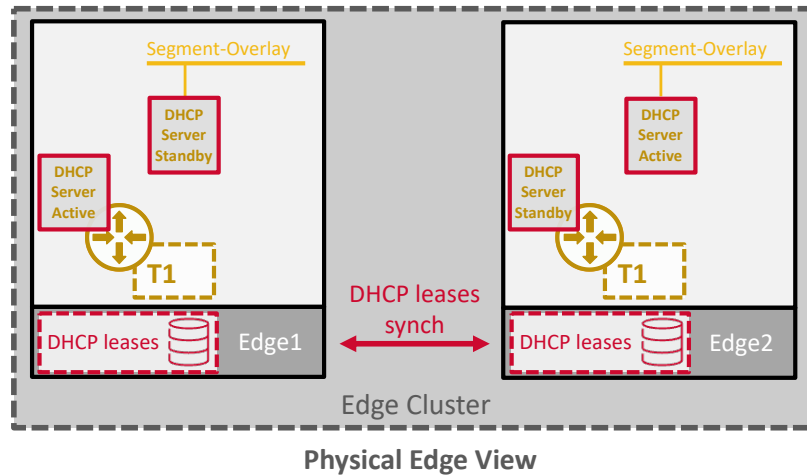
Or also via API:

```
GET https://<NSX-
Mgr>/policy/api/v1/orgs/default/projects/Project1/vpcs/VPC1/subnets/vpc1-
pub1/status
{
  "results": [
    {
      "gateway_address": "5.5.5.17/28",
      "network_address": "5.5.5.16/28",
      "dhcp_server_address": "192.168.110.11",
      "dhcp_ranges": "5.5.5.18-5.5.5.30",
      "ip_address_type": "IPV4"
    }
  ]
}
```

```
GET https://<NSX-
Mgr>/policy/api/v1/orgs/default/projects/Project1/vpcs/VPC1/subnets/vpc1-pub1/dhcp-
server-config/stats
{
  "ip_pool_stats": [
    {
      "dhcp_ip_pool_id":
"/orgs/default/projects/Project1/vpcs/VPC1/subnets/vpc1-pub1",
      "pool_size": 13,
      "allocated_number": 1,
      "allocated_percentage": 7
    }
  ]
}
```

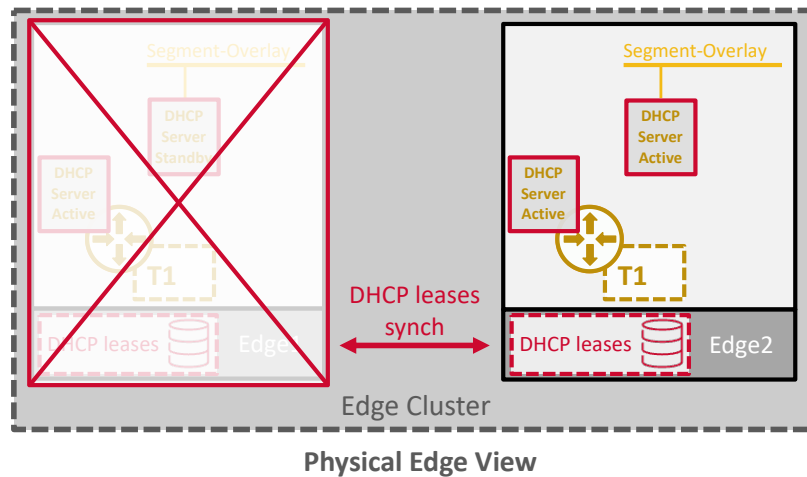

2.5 DHCP High-Availability

The Edge Node hosting the DHCP Server Active, synchronizes the DHCP leases with the other Edge Node hosting the DHCP Server Standby:



DHCP service availability is based on Edge Node high availability.

So when an Edge Node hosting some DHCP Server Active fails, the other Edge Node(s) hosting the DHCP Server Standby will transition to Active.



And since the new Edge Node (Edge2) is aware of the previously DHCP leases, it will be able to fulfill its DHCP service for old and new DHCP clients.

2.6 DHCP Status

There is no DHCP status on DHCP Relay. This needs to be checked on the External DHCP Server.

The DHCP Server (Segment DHCP Server and Gateway DHCP Server) status is available on API or the Edge CLI.

From API:

- **Find the DHCP Server Status for the Segment or T0/T1**

```
GET https://<NSX-Mgr>/policy/api/v1/infra/dhcp-server-configs/<DHCP-Profile>/status?connectivity_path=<Segment-Policy-Path|T0-Policy-Path|T1-Policy-Path>
```

For instance, in the example below I'm looking for the status of the DHCP Server on the Segment named "web-seg":

```
GET https://<NSX-Mgr>/policy/api/v1/infra/dhcp-server-configs/Segment-DHCP-Server1/status?connectivity_path=/infra/segments/web-seg
```

```
{
  "active_node": "/infra/sites/default/enforcement-points/default/edge-clusters/9d4c32ae-25f4-47ac-a98e-74c4832869b0/edge-nodes/0",
  "stand_by_node": "/infra/sites/default/enforcement-points/default/edge-clusters/9d4c32ae-25f4-47ac-a98e-74c4832869b0/edge-nodes/1",
  "service_status": "UP"
}
```

- **Optionally find the Edge Node hosting the DHCP Server Active**

```
GET https://<NSX-Mgr>/policy/api/v1/infra/sites/default/enforcement-points/default/edge-clusters/9d4c32ae-25f4-47ac-a98e-74c4832869b0/edge-nodes/0
```

```
{
  <snip>
  "id": "0",
  "display_name": "edgenode-01a",
  <snip>
}
```

From Edge Node SSH:

- **Find the DHCP Server ID for the Segment or T0/T1**

In the example below I'm looking for the DHCP Server on the Segment named "web-seg".

```
edgenode-01a> get dhcp servers | awk 'c-->0;$0~s{if(b)for(c=b+1;c>1;c--)print r[(NR-c+1)%b];print;c=a}b{r[NR%b]=$0}' b=6 a=0 s="web-seg"
```

ID: c9fb9c93-b5a7-4313-99ea-ac5f47cab11

IPV6_SERVER_PREFIX:

IPV6: fe80::50:56ff:fe98:7dd7

PREFIX_LENGTH: 128

MSG_TIMESTAMP: 2024-03-27 23:28:25.329000 (timestamp: 1711582105329)

NAME: dhcp-server-T1-Paris-web-seg

Collect the ID of the DHCP Server

Note: In the case of Gateway DHCP Server, look for the T0/T1 name.

- **Then with that DHCP Server ID information, find the status of the DHCP Server on that Edge:**

```
edgenode-01a> get logical-service state c9fb9c93-b5a7-4313-99ea-ac5f47cab11
```

Mon Apr 01 2024 UTC 23:09:21.218

ID: c9fb9c93-b5a7-4313-99ea-ac5f47cab11

NODE_ID: f58d582e-109a-4e0c-86b8-3a4d13546753

NODE_RANK: 0

PEER_ID: e5532402-5aa7-408c-817c-b3e8da7d2850

PEER_MGMT_IP:

IPV4: 192.168.110.42

PEER_RANK: 1

PEER_THUMBPRINT:

76:58:C5:A9:F5:E2:C8:6F:07:0B:C4:5A:60:2C:9A:42:FD:1B:CE:E9:DB:E1:66:0C:82:92:5C:C1:77:19:9C:2F

STATE: ACTIVE

Note: From this output, you know the Edge hosting the DHCP Server Standby is on the Edge with the Management IP 192.168.110.42.

2.7 DHCP Statistics

There are no DHCP statistics on DHCP Relay. Those need to be checked on the External DHCP Server.

The DHCP Server (Segment DHCP Server and Gateway DHCP Server) statistics is available on API or the Edge CLI.

Note: In VPC, DHCP Server Statistics are available in UI. See chapter 2.4.2.5.1 Segment DHCP in VPC.

From API:

- **Find the DHCP Server Statistics for the Segment or T0/T1**

```
GET https://<NSX-Mgr>/policy/api/v1/infra/dhcp-server-configs/<DHCP-Profile>/stats?connectivity_path=<Segment-Policy-Path|T0-Policy-Path|T1-Policy-Path>
```

For instance, in the example below I'm looking for the statistics of the DHCP Server on the Segment named "web-seg":

```
GET https://<NSX-Mgr>/policy/api/v1/infra/dhcp-server-configs/Segment-DHCP-Server1/stats?connectivity_path=/infra/segments/web-seg
```

```
{
  "dhcp_server_id": "c9fb9c93-b5a7-4313-99ea-ac5f47cab11",
  "timestamp": 1712073195735,
  "discovers": 1,
  "offers": 1,
  "requests": 14,
  "acks": 14,
  "nacks": 0,
  "declines": 0,
  "releases": 1,
  "informs": 0,
  "errors": 0,
  "ip_pool_stats": [
    {
      "dhcp_ip_pool_id": "/infra/segments/web-seg",
      "pool_size": 10,
      "allocated_number": 1,
      "allocated_percentage": 10
    }
  ]
}
```

From Edge Node SSH:

- **Find the DHCP Server ID for the Segment or T0/T1**

In the example below I'm looking for the DHCP Server on the Segment named "web-seg".

```
edgenode-01a> get dhcp servers | awk 'c-->0;$0~s{if(b)for(c=b+1;c>1;c--)print r[(NR-c+1)%b];print;c=a}b{r[NR%b]=$0}' b=6 a=0 s="web-seg"
```

ID: c9fb9c93-b5a7-4313-99ea-ac5f47cab11

IPV6_SERVER_PREFIX:

IPV6: fe80::50:56ff:fe98:7dd7

PREFIX_LENGTH: 128

MSG_TIMESTAMP: 2024-03-27 23:28:25.329000 (timestamp: 1711582105329)

NAME: dhcp-server-T1-Paris-web-seg

Collect the ID of the DHCP Server

Note: In the case of Gateway DHCP Server, look for the T0/T1 name.

- **Then with that DHCP Server ID information, find the statistics of the DHCP Server on that Edge:**

```
edgenode-01a> get dhcp server c9fb9c93-b5a7-4313-99ea-ac5f47cab11 stats
```

Tue Apr 02 2024 UTC 15:44:14.856

ACKS: 14

DECLINES: 0

DHCP_SERVER_ID: c9fb9c93-b5a7-4313-99ea-ac5f47cab11

DISCOVERS: 1

ERRORS: 0

INFORMS: 0

NACKS: 0

OFFERS: 1

POOL_USAGE:

ALLOCATED_NUM: 1

DHCP_IP_POOL_ID: 77dfbecf-72f8-4313-909d-9ba8548b9681

POOL_SIZE: 10

RELEASES: 1

REQUESTS: 14

TIMESTAMP: 2024-04-02 15:51:16.41

Note: Statistics are not synched between the Edges hosting the DHCP Server Active and DHCP Server Standby. Only the DHCP leases are synched.

2.8 DHCP Leases

There are no DHCP leases information on DHCP Relay. Those need to be checked on the External DHCP Server. The DHCP Server (Segment DHCP Server and Gateway DHCP Server) leases are available on API or the Edge CLI.

From API:

- Find the DHCP Server Statistics for the Segment or T0/T1

```
GET https://<NSX-Mgr>/policy/api/v1/infra/dhcp-server-configs/<DHCP-Profile>/leases?segment_path==<Segment-Policy-Path>&connectivity_path=<Segment-Policy-Path|T0-Policy-Path|T1-Policy-Path>
```

For instance, in the example below I'm looking for the leases of the DHCP Server on the Segment named "web-seg":

```
GET https://<NSX-Mgr>/policy/api/v1/infra/dhcp-server-configs/Segment-DHCP-Server1/leases?segment_path=/infra/segments/web-seg&connectivity_path=/infra/segments/web-seg
```

```
{
  "connectivity_path": "/infra/segments/web-seg",
  "result_count": 1,
  "dhcp_server_id": "c9fb9c93-b5a7-4313-99ea-ac5f47cab11",
  "timestamp": 1712077076152,
  "leases": [
    {
      "mac_address": "00:50:56:8c:ed:72",
      "ip_address": "172.16.10.101",
      "subnet": "172.16.10.0",
      "start_time": "2024-04-02 15:31:48 +0000",
      "lease_time": "86400",
      "expire_time": "2024-04-03 15:31:48 +0000"
    }
  ]
}
```

From Edge Node SSH:

- Find the DHCP Server ID for the Segment or T0/T1

In the example below I'm looking for the DHCP Server on the Segment named "web-seg".

```
edgenode-01a> get dhcp servers | awk 'c-->0;$0~s{if(b)for(c=b+1;c>1;c--)print r[(NR-c+1)%b];print;c=a}b{r[NR%b]=$0}' b=6 a=0 s="web-seg"
```

```
ID: c9fb9c93-b5a7-4313-99ea-ac5f47cab11
```

```
IPV6_SERVER_PREFIX:
```

```
IPV6: fe80::50:56ff:fe98:7dd7
```

```
PREFIX_LENGTH: 128
```

```
MSG_TIMESTAMP: 2024-03-27 23:28:25.329000 (timestamp: 1711582105329)
```

```
NAME: dhcp-server-T1-Paris-web-seg
```

Collect the ID of the DHCP Server

Note: In the case of Gateway DHCP Server, look for the T0/T1 name.

- **Then with that DHCP Server ID information, find the leases of the DHCP Server on that Edge:**

```
edgenode-01a> get dhcp lease c9fb9c93-b5a7-4313-99ea-ac5f47cab11
Tue Apr 02 2024 UTC 16:47:19.829
  DHCP_ID: c9fb9c93-b5a7-4313-99ea-ac5f47cab11
  DHCP_SUBNET_MAC: c9fb9c93-b5a7-4313-99ea-
ac5f47cab11_172.16.10.101_00:50:56:8c:ed:72
  EXPIRE_TIME: 2024-04-03 15:31:48.002000 (timestamp: 1712158308002)
  IP:
    IPV4: 172.16.10.101
  LEASE_TIME: 86400
  MAC:
    MAC: 00:50:56:8c:ed:72
  START_TIME: 2024-04-02 15:31:48.002000 (timestamp: 1712071908002)
  SUBNET: 172.16.10.0
```

Note: The VM with the Mac 00:50:56:8c:ed:72 received the DHCP IP 172.16.10.101.

Revision History

Document Number	Date	Updates	Comments
1.0	04/04/2024	Initial Document	

