GCP Certification Series: 4.5 Managing networking resources.

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Managing Network

Tasks include:

- Adding a subnet to an existing VPC.
- Expanding a CIDR block subnet to have more IP addresses.
- Reserving static external or internal IP addresses.
- Working with management interfaces (e.g., Cloud Console, Cloud Shell, Cloud SDK).

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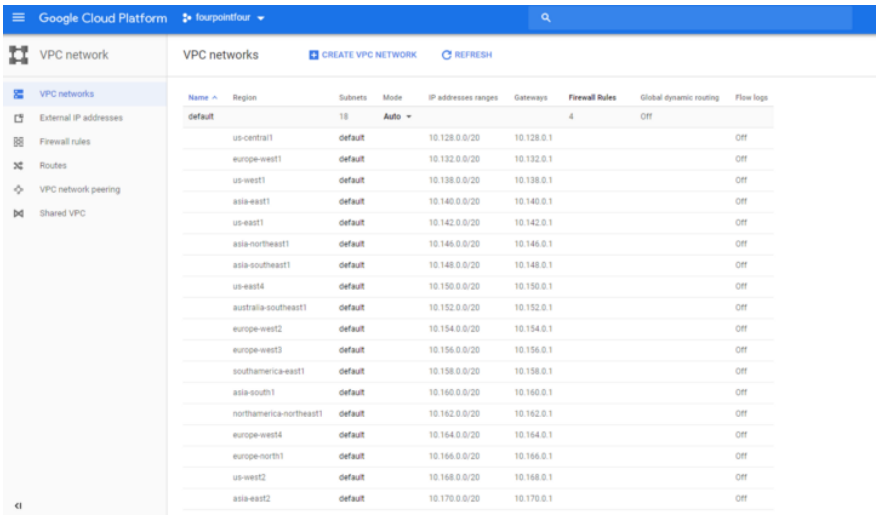
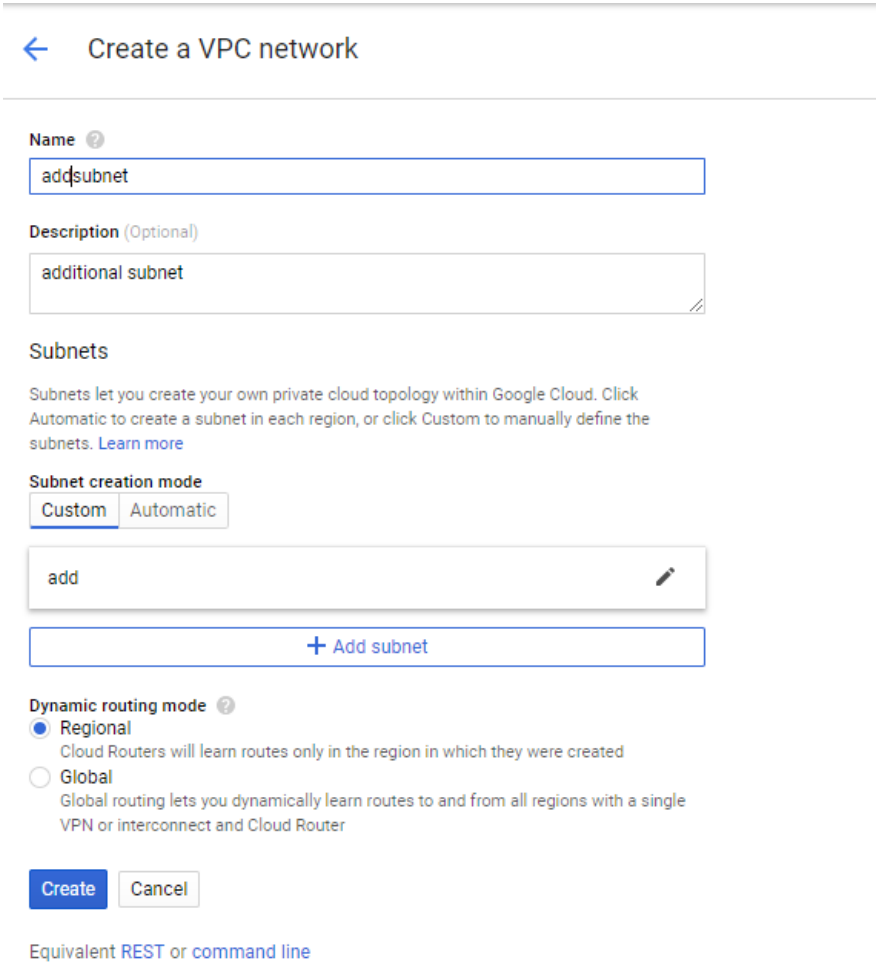
Adding a subnet to an existing VPC

When you create a new project you will automatically create a default VPC with default subnets in all of the regions. The default VPC looks like



default VPC

To add a new subnet in default or custom VPC, you have to create a new VPC like below and add it to the region from the drop-down.



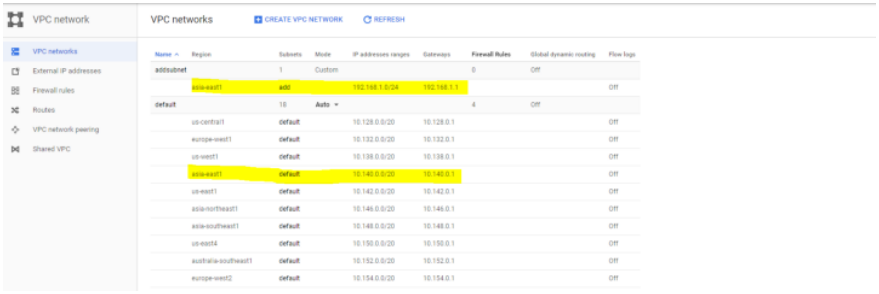
add subnet

> *In Shell*

gcloud compute—project=fourpointfour-222007 networks create add subnet—description=additional\ subnet—subnet-mode=custom

gcloud compute—project=fourpointfour-222007 networks subnets create add—network=addsubnet—region=asia-east1—range=192.168.1.0/24—enable-private-ip-google-access

After adding you can see in Dashboard



Added subnet

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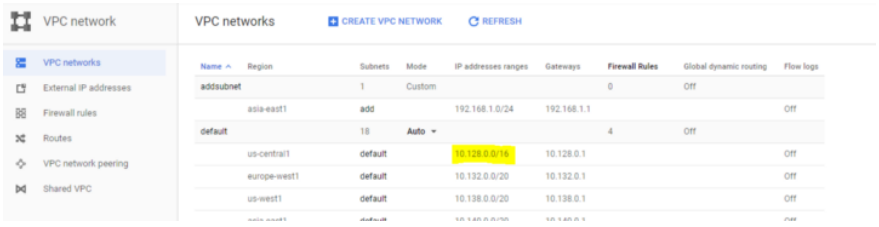
Expanding a CIDR block subnet to have more IP addresses

If you want to expand the network due to requirements then you can just edit the default CIDR block and make more IP address available.



expanded CIDR block

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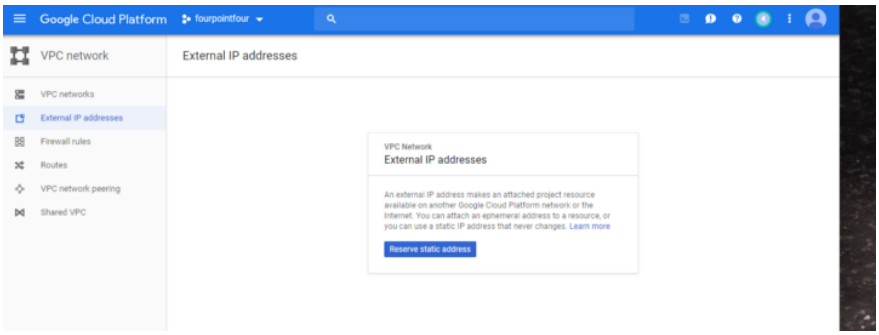
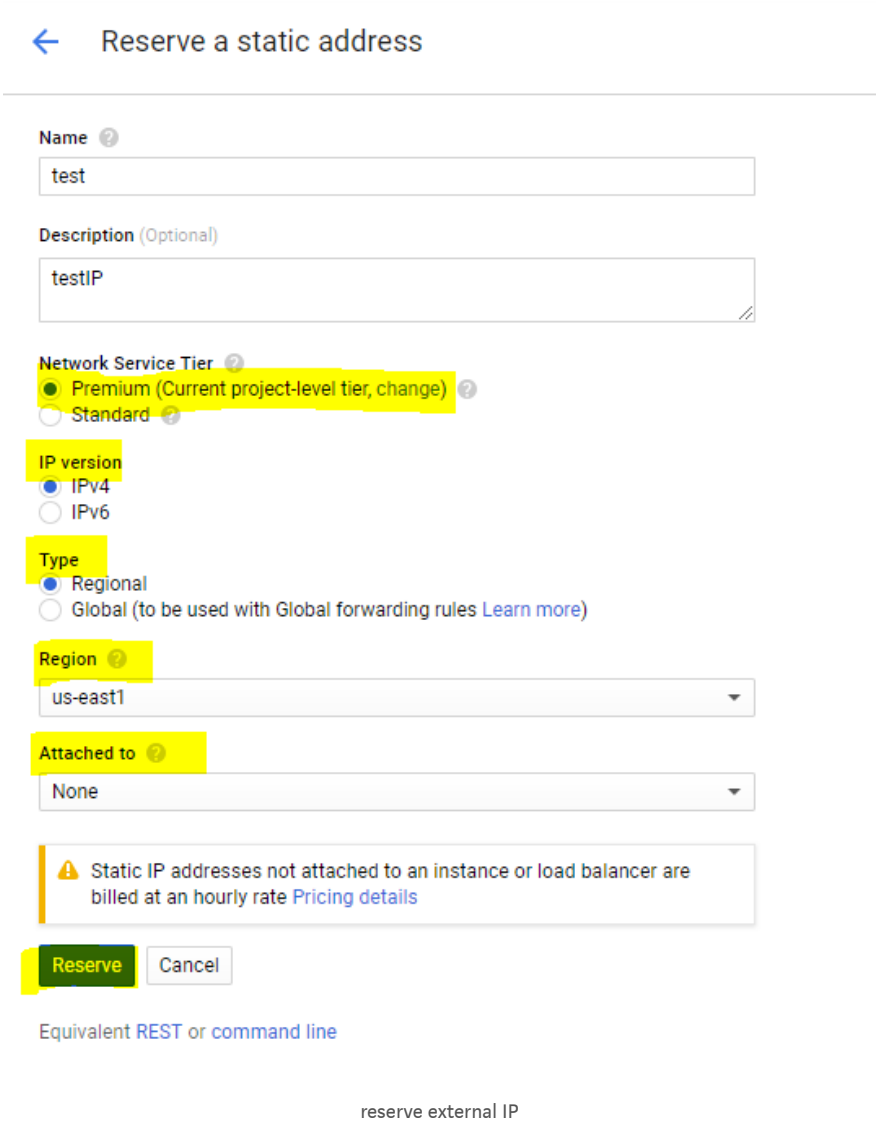
Reserving static external or internal IP addresses

To reserve static IP Address from GUI goto VPC Network and then External IP address, where you will see reserve static address page



reserve static address

click on reserve



reserve external IP

Network tier gives you the option to select peer level traffic optimization or edge level traffic optimization.

Ip versions can be selected for your convenience

IP for either regional or global transport

select region for IP

Attach the IP to VM or load balancer

Select Reserve, that's it!

> *IN Shell*

gcloud beta compute—project=fourpointfour-222007 addresses create test—description=testIP—region=us-central1—network-tier=PREMIUM

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For static internal IP address

Reserving a Static Internal IP Address

This page explains how to configure and manage static primary internal IP addresses for your resources, including:

- Reserving and assigning a static internal IP address
- Promoting an ephemeral internal IP address to a static internal IP address

To learn how to manage secondary internal IP addresses, read about Alias IP Ranges.

In Compute Engine, each VM instance can have multiple network interfaces. Each interface can have one external IP address, one primary internal IP address, and one or more secondary internal IP addresses. Forwarding rules can have external IP addresses for external load balancing or internal addresses for internal load balancing. To learn about IP addresses, read the IP Addresses documentation.

Static internal IPs provide the ability to reserve internal IP addresses from the private RFC 1918 IP range configured in the subnet, then assign those reserved internal addresses to resources as needed. Reserving an internal IP address takes that address out of the dynamic allocation pool and prevents it from being used for automatic allocations. Reserving static internal IP addresses requires specific IAM permissions so that only authorized users can reserve a static internal IP address.

With the ability to reserve static internal IP addresses, you can always use the same IP address for the same resource even if you have to delete and recreate the resource.

This document does not explain how to reserve and manage external IP addresses. Read Reserving a Static External IP Address to learn more.

Before you begin

- If you want to use the command-line examples in this guide:

1. Install or update to the latest version of the gcloud command-line tool.
2. Set a default region and zone.

- If you want to use the API examples in this guide, set up API access.
- Read the IP Addresses.

Permissions

To reserve and manage static internal IP addresses, you need to be granted the `compute.networkAdmin` role. To learn more about roles, read Compute Engine IAM Roles.

Restrictions

- You cannot change the internal IP address of an existing resource. For example, you cannot assign a new static internal IP address to a running VM instance. You can, however, promote the ephemeral

internal IP address of a resource to a static internal IP so that the address remains reserved even after the resource is deleted.

- You can only reserve up to 200 static internal IP addresses per region by default.
- Only one resource at a time can use a static internal IP address.
- There is no way to tell whether an IP address is static or ephemeral after it has been assigned to a resource, except to compare the IP address against the list of static internal IP addresses reserved to that project. Use the `addresses list` sub-command to see a list of static external IP addresses available to the project.
- Reserving a static internal IP address is only supported for VPC networks. It is not supported for legacy mode networks.
- Deleting a resource does not automatically release a static internal IP address. You must manually release static internal IP addresses when you no longer require them.

How to reserve a static internal IP address

You can reserve a static internal IP address before creating the associated resource, or you can create the resource with an ephemeral internal IP address and then promote that ephemeral IP address to a static internal IP address.

In order to use a static internal IP address, you must have a VPC network in place for your project. Read Using VPC Networks to learn how to create your VPC network.

Reserve a specific address and then associate it with a specific resource

In this scenario, you separately reserve a static internal IP address and then assign it to a resource. In summary:

1. Create a subnet from your VPC network.
2. Reserve an internal IP address from the subnet IP range. This step creates an internal IP address resource containing that specific internal IP address.

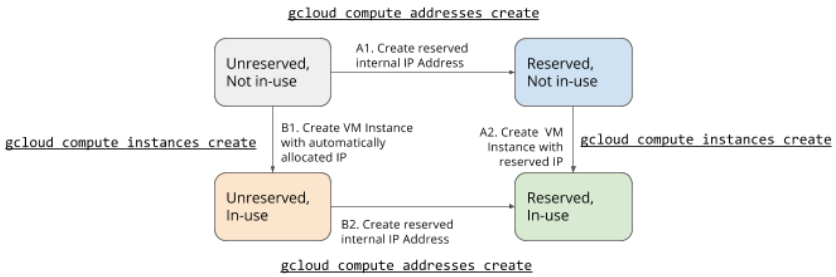
3. Create your resource and use the reserved internal IP address by associating it with a VM instance or an internal load balancer at creation time.

Specify an ephemeral internal IP address for a resource and then promote the address

In this scenario, you promote an ephemeral internal IP address that is still attached to a resource to a static internal IP address.

1. Create a VM instance or an internal load balancer with either an automatically allocated ephemeral IP address or a specifically chosen IP address.
2. Create a subnet.
3. Promote the internal IP address to a static internal IP address.

The two methods are outlined in the diagram below.



Reserving a new static internal IP address

Before you can reserve a new static internal IP address, you must create a VPC network with a subnet.

To reserve a new static internal IP address, either automatically allocated or an unused address from an existing subnet, you can use, the console, the `gcloud compute addresses create` command or the `addresses.insert` method in the Compute Engine API.

CONSOLE

Using the `gcloud` tool, run the `compute addresses create` command:

```
gcloud compute addresses create [ADDRESS_NAME]
[[ADDRESS_NAME]..] \
    --region [REGION] --subnet [SUBNETWORK] \
    --addresses [IP_ADDRESS]
```

where:

- `[ADDRESS_NAME]` is desired names of one or more addresses to create.
- `[REGION]` is the region for this request.
- `[SUBNETWORK]` is the subnet for this internal IP address.
- `[IP_ADDRESS]` is the IP address to reserve, which must be within the subnet's IP range. If unspecified, one will be automatically allocated from the subnet.

For example, to reserve an automatically allocated internal IP address from a subnet:

```
gcloud compute addresses create example-address-1 \
    --region us-central1 --subnet subnet-1
```

To reserve a specific internal IP address from a subnet:

```
gcloud compute addresses create example-address-1 \
    --region us-central1 --subnet subnet-1 --addresses
10.128.0.12
```

You can create multiple addresses by passing in more than one address name. However, all the addresses will be reserved in the same subnet. For example:

```
gcloud compute addresses create example-address-1 example-
address-2 \
```

```
    --region us-central1 --subnet subnet-1 \
    --addresses 10.128.0.12,10.128.0.13
```

Promoting an in-use ephemeral internal IP address to a static address

If you have ephemeral IP addresses that are currently in use, you can promote these addresses to static internal IP addresses so the addresses remain with your project until you actively remove them.

Before you reserve an existing IP address, you will need the value of the IP address you want to promote. Make a `describe` request to the resource to get the IP address. For example, if promoting an IP address currently in use by a VM instance, use:

```
gcloud compute instances describe [INSTANCE_NAME] --zone
[ZONE] | grep "networkIP"
```

The `gcloud` tool returns the `networkIP` value, which is the internal IP being used by the resource. For example:

```
networkIP: 10.240.0.2
```

Next, promote the address.

CONSOLE

To promote one or more existing IP address, use the `compute addresses create` command and provide the `--addresses` flag with the explicit internal IPs to promote:

```
gcloud compute addresses create [ADDRESS_NAME_1]
[[ADDRESS_NAME_2]..] \
    --addresses [IP_ADDRESS_1],[[IP_ADDRESS_2],..] \
```

```
    --region [REGION] \
    --subnet [SUBNETWORK]
```

where:

- `[ADDRESS_NAME]` are the desired names of the address. Declare the names in the same order you will declare the IP addresses. In this case, would correspond with `[IP_ADDRESS_1]` and `[ADDRESS_NAME_2]` would correspond with `[IP_ADDRESS_2]` .
- `[IP_ADDRESS],[[IP_ADDRESS_2],...]` are the IP addresses to promote. For example, `10.128.1.9` .
- `[REGION]` is the region to reserve this address.
- `[SUBNETWORK]` is the subnetwork for this request.

For example:

```
gcloud compute addresses create example-address-1 example-
address-2 \
    --addresses 10.128.4.90,10.128.0.232 \
    --region us-central1 \
    --subnet subnet-1
```

Creating a VM instance with a static internal IP address

You can assign a reserved static internal IP address when you create a new VM.

CONSOLE

1. First, reserve a static internal IP address. The following example reserves an address called `my-vm-ip-address` in the us-central1 region. Since the command omits the `--addresses` flag, Compute Engine reserves a random IP address

- `gcloud compute addresses create my-vm-ip-address \ --region us-central1 --subnet my-subnet`

1. Next, use that address when you create your instance. For example:

```
gcloud compute instances create my-instance \
--image-family [IMAGE_FAMILY] \
--image-project [IMAGE_PROJECT] \
--private-network-ip my-vm-ip-address \
--subnet my-subnet
```

Creating an internal load balancer with a static internal IP address

To create an internal load balancer that uses a static internal IP address, follow the instructions for Setting Up Internal Load Balancing but when configuring the load balancer, provide a reserved IP address instead.

1. First, reserve a new static internal IP address. For example, the following example reserves an address called `my-ilb-ip-address` in the us-central1 region. Since the command omits the `--addresses` flag, Compute Engine reserves a random IP address:

```
gcloud compute addresses create my-ilb-ip-address \
--region us-central1 --subnet my-subnet
```

1. Next, when creating a forwarding rule, include the `--address` flag. For example:

```
gcloud compute forwarding-rules create my-int-lb-forwarding-rule \
--address my-ilb-ip-address \
--load-balancing-scheme internal \
--backend-service my-int-lb \
--ports 80 \
--region us-central1 \
--subnet my-subnet
```

Using a static internal IP address for a secondary network interface

When you create a VM instance with multiple network interfaces, you can use a reserved static internal IP address for both primary and

secondary network interfaces.

To assign a static internal IP address to a second network interface, do the following:

1. First, reserve a static internal IP address. For example, the following example reserves an address called `my-second-ip-address` in the us-central1 region. Since the command omits the `--addresses` flag, Compute Engine reserves a random IP address:

- ```
  gcloud compute addresses create my-second-ip-address \
  --region us-central1 --subnet subnet-b
  ```

1. Use the address as the IP address for the secondary interface when you create a VM instance. For example:

- ```
  gcloud compute instances create my-instance \
  --image-family [IMAGE_FAMILY] \
  --image-project [IMAGE_PROJECT] \
  --network-interface subnet=subnet-a,no-address \
  --network-interface \
  subnet=subnet-b,private-network-ip=my-second-ip-address,no-address
  ```

Using a static internal IP with Shared VPC

You can create a reserved static internal IP in a shared subnet of a Shared VPC network. The IP address object itself is created in the same service project as the resource that will use it, even though its value comes from the range of available IPs in the selected shared subnet of the Shared VPC network. Refer to these pages for more information about this use case:

- The IP addresses section of the **Shared VPC Overview** page
- Reserving a static internal IP on the **Provisioning Shared VPC** page

Deleting a static internal IP address

You can delete a static internal IP address if you no longer need it. You can delete an address whether or not it is currently being used by

another resource. If the address is being used by a resource, it remains attached to the resource until the resource is deleted, in which case, the address is returned to the pool of available addresses for other projects.

GCLOUD

Using the `gcloud` tool, run the `compute addresses delete` command:

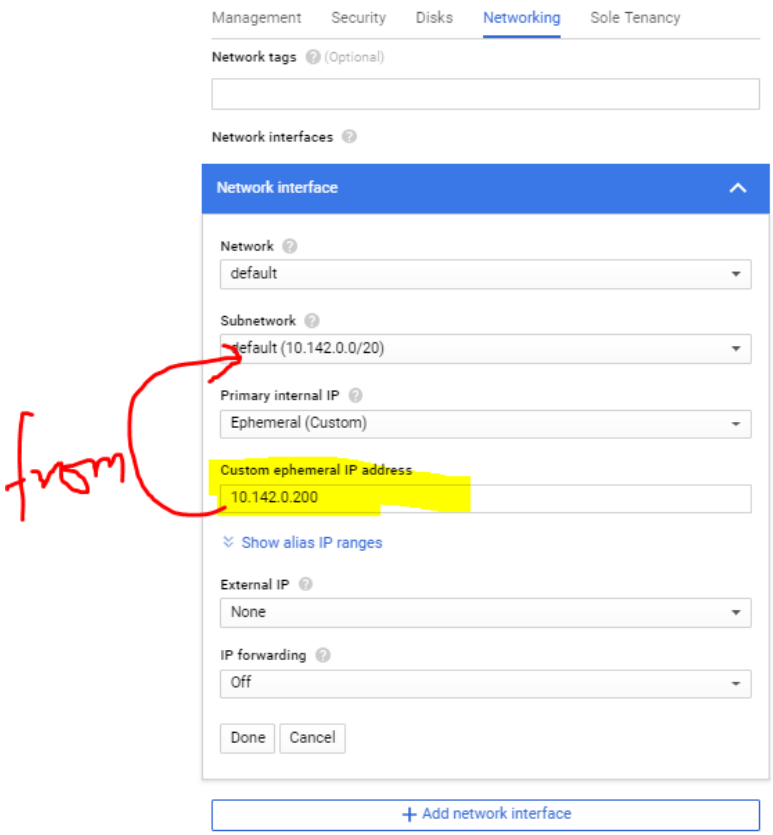
```
gcloud compute addresses delete [ADDRESS_NAME] \
    --region [REGION]
```

where:

- `[ADDRESS_NAME]` is the name of the address to delete.
- `[REGION]` is the region the address belongs to.

For example:

```
gcloud compute addresses delete example-address-to-delete \
    --region us-west1
```



In this way, we can manage the network and IP's.