



## LAB: Network Documentation with NetBox

Login credential is given in the LAB guide, please follow it to access the VM machine.

### Note

- We will perform the LAB on the same machine as it is, where SNMP-LibreNMS lab is done.
- Server Hostname will have an extension (netbox) in this LAB, example – `groupX-server-netbox.apnictraining.net`
- '\$' means a general user is having the CLI (command line interface)
- '#' means root user is having the CLI
- Do not attempt to perform the LAB with '#' root user unless it is explicitly mentioned.
- Read the instructions carefully before execute any commands.

### Lab target

- Setup NetBox service
- Explore Data Center Managemnet - DCIM
- Explore IP address management - IPAM

### Requirements

- HTTP server running Nginx or Apache. As like the previous LAB modules, here we will use Apache.
- Python version 3.6 or greater.
- Python extensions – setuptools, graphviz, libpq-dev, and xml2
- PostgreSQL database version 9.6 or greater. (According to the official document, till December 20, 2020, MySQL and other relational databases are not supported at NetBox.)
- Redis server version 4 or greater.

## Setup NetBox

### 1. Update the System Repository

```
$ sudo apt update && sudo apt upgrade
```

### 2. Install Required Packages

First we have to install necessary dependencies and Python modules for the project:

```
$ sudo apt-get install -y git gcc redis python3-setuptools graphviz python3 \
python3-pip python3-venv python3-dev build-essential \
libxml2-dev libxslt1-dev libffi-dev libpq-dev libssl-dev zlib1g-dev
```

### 3. Install and create Database

we are going to install PostgreSQL, and create the database. Here we will use, `netbox` as the username and `training` as the password.

```
$ sudo apt-get install -y postgresql libpq-dev
$ sudo -u postgres psql

psql (10.15 (Ubuntu 10.15-0ubuntu0.18.04.1))
Type "help" for help.

postgres=# CREATE DATABASE netbox;
CREATE DATABASE

postgres=# CREATE USER netbox WITH PASSWORD 'training';
CREATE ROLE

postgres=# GRANT ALL PRIVILEGES ON DATABASE netbox TO netbox;
GRANT

postgres=# \q
```

#### 4. Install and test Redis

```
$ sudo apt install -y redis-server
$ sudo systemctl start redis-server
$ sudo systemctl enable redis-server
$ sudo systemctl status redis-server
```

Check the service response

```
$ redis-cli ping
PONG
```

#### 5. Download NetBox

Clone the netbox repo at `/opt` directory.

```
$ cd /opt
$ sudo git clone -b master https://github.com/netbox-community/netbox.git

Cloning into 'netbox'...
remote: Enumerating objects: 136, done.
remote: Counting objects: 100% (136/136), done.
remote: Compressing objects: 100% (103/103), done.
remote: Total 58055 (delta 63), reused 65 (delta 33), pack-reused 57919
Receiving objects: 100% (58055/58055), 28.38 MiB | 573.00 KiB/s, done.
Resolving deltas: 100% (45302/45302), done.
```

Create NetBox system user.

```
$ sudo adduser --system --group netbox
$ sudo chown --recursive netbox /opt/netbox/netbox/media/
```

#### 6. Configure and install NetBox service

```
$ cd /opt/netbox/netbox/netbox/
$ sudo cp configuration.example.py configuration.py
```

We need our focus into 4 part here.

- ALLOWED\_HOSTS  
we have to put the server hostname or IP; we will use hostname, as we are hosting multiple HTTP service in a single host.
- DATABASE fillup the database name, password
- REDIS default configuration is enough here for the LAB
- SECRET\_KEY

```
$ sudo vim configuration.py

ALLOWED_HOSTS = ['groupX-server-netbox.apnictraining.net']

DATABASE = {
    'NAME': 'netbox',          # Database name
    'USER': 'netbox',          # Username that created
    'PASSWORD': 'training',    # Password we assigned
    'HOST': 'localhost',       # Database server
    'PORT': '',                # Default is leaving it blank
    'CONN_MAX_AGE': 300,       # Max database connection age
}

REDIS = {
    'tasks': {
        'HOST': 'localhost',
        'PORT': 6379,
        'PASSWORD': '',
        'DATABASE': 0,
        'SSL': False,
    },
    'caching': {
        'HOST': 'localhost',
        'PORT': 6379,
        'PASSWORD': '',
        'DATABASE': 1,
        'SSL': False,
    },
}

:x (save & exit)
```

We need to generate the secret key here, and then input to the file.

```
$ python3 /opt/netbox/netbox/generate_secret_key.py
kXw)2e07tO+Q(Eio^qcBF*&KgIYapnyC@HWAUj3vr96RfMz1Ll
```

Copy the key and paste it to the `SECRET_KEY` in the `configuration.py` file.

```
SECRET_KEY = 'kXw)2e07tO+Q(Eio^qcBF*&KgIYapnyC@HWAUj3vr96RfMz1Ll'
```

Now its time to make the run. We will execute the `upgrade.sh` script. That is going to do few task for us.

- It will create a Python virtual environment
- All the required Python packages/modules will be installed
- Database schema will be migrated

```
$ sudo /opt/netbox/upgrade.sh

Creating a new virtual environment at /opt/netbox/venv...
Installing Python system packages (pip3 install wheel)...
...
...

Finished.
Collecting static files (python3 netbox/manage.py collectstatic --no-input)...

961 static files copied to '/opt/netbox/netbox/static'.
Removing stale content types (python3 netbox/manage.py remove_stale_contenttypes --no-input)...
Removing expired user sessions (python3 netbox/manage.py clearsessions)...
Clearing cache data (python3 netbox/manage.py invalidate all)...
-----
WARNING: No existing virtual environment was detected. A new one has
been created. Update your systemd service files to reflect the new
Python and gunicorn executables. (If this is a new installation,
this warning can be ignored.)

netbox.service ExecStart:
    /opt/netbox/venv/bin/gunicorn

netbox-rq.service ExecStart:
    /opt/netbox/venv/bin/python

After modifying these files, reload the systemctl daemon:
> systemctl daemon-reload
-----
Upgrade complete! Don't forget to restart the NetBox services:
> sudo systemctl restart netbox netbox-rq

...
...
```

It will take few minutes to complete the task.

As NetBox doesn't create its user, we have to do it manually. Enter the python environment and use `apnic` as the user and `training` as the password.

#### Type password two times to confirm

```
$ source /opt/netbox/venv/bin/activate

(venv) $ cd /opt/netbox/netbox
(venv) $ python3 manage.py createsuperuser
Username: apnic
Email address: training@apnictraining.net
Password:
Password (again):

Superuser created successfully.
```

### 7. Setup the middleware - Gunicorn

For NetBox gunicorn is automatically installed with Django. Next, we are going to setup the service. We will keep the default settings for the LAB.

```
$ sudo cp /opt/netbox/contrib/gunicorn.py /opt/netbox/gunicorn.py
```

### 8. Startup configuration for NetBox

Copy the systemd files to the respective directory.

```
$ sudo cp -v /opt/netbox/contrib/*.service /etc/systemd/system/
$ sudo systemctl daemon-reload
```

Restart and check the NetBox services.

```
$ sudo systemctl start netbox
$ sudo systemctl start netbox-rq
$ sudo systemctl enable netbox
$ sudo systemctl enable netbox-rq
$ sudo systemctl status netbox netbox-rq
```

## 9. Configure the HTTP service

```
$ sudo apt install -y apache2
```

Skip `apache2` installation, if you have done LibreNMS LAB successfully.

To avoid the complexity we will use the default configuration file. But make sure you modify the `ServerName` portion, and put `#` before the `SSL` configuration lines and change the default port from `443` to `80`, as we are not using HTTPS in this LAB.

```
$ sudo cp /opt/netbox/contrib/apache.conf /etc/apache2/sites-available/netbox.conf
$ sudo vim /etc/apache2/sites-available/netbox.conf
```

```
<VirtualHost *:80>
    ProxyPreserveHost On
    ServerName groupX-server-netbox.apnictraining.net

    #    SSLEngine on
    #    SSLCertificateFile /etc/ssl/certs/netbox.crt
    #    SSLCertificateKeyFile /etc/ssl/private/netbox.key

    Alias /static /opt/netbox/netbox/static

    <Directory /opt/netbox/netbox/static>
        Options Indexes FollowSymLinks MultiViews
        AllowOverride None
        Require all granted
    </Directory>

    <Location /static>
        ProxyPass !
    </Location>

    RequestHeader set "X-Forwarded-Proto" expr=%{REQUEST_SCHEME}
    ProxyPass / http://127.0.0.1:8001/
    ProxyPassReverse / http://127.0.0.1:8001/
</VirtualHost>

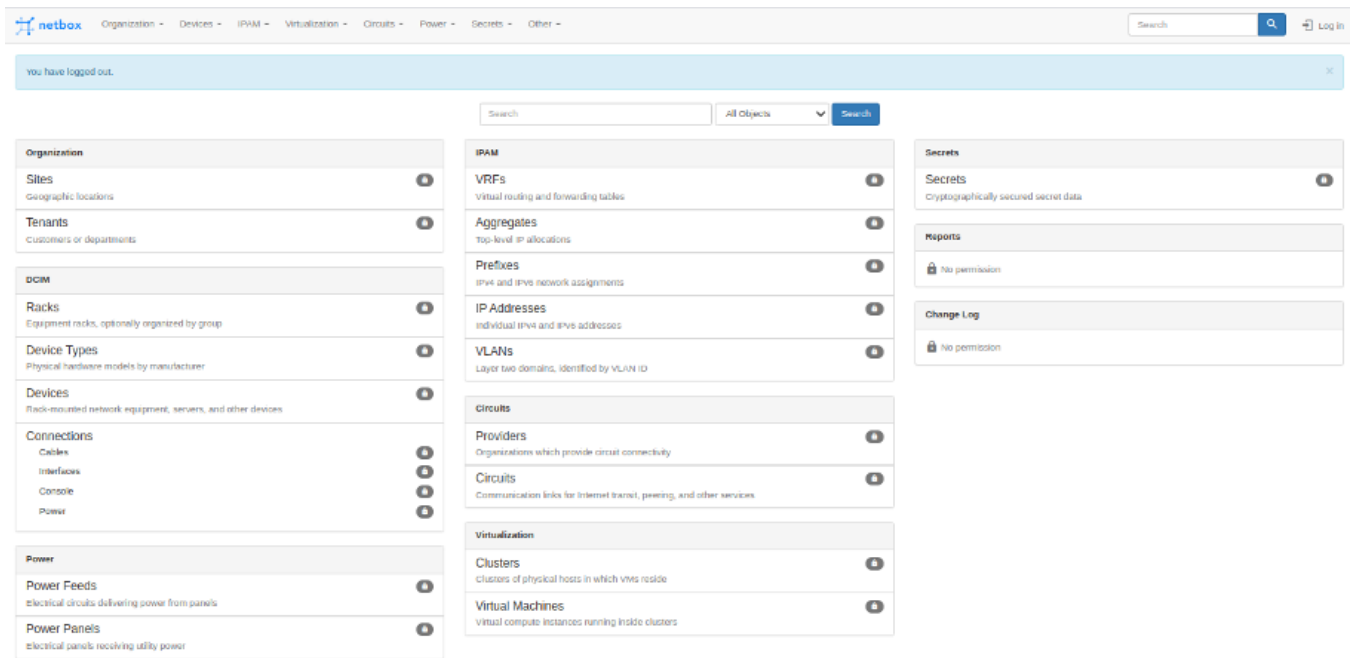
:x (save & exit)
```

Enable the `netbox` site, and restart the apache service.

```
$ sudo a2enmod ssl proxy proxy_http headers
$ sudo a2ensite netbox
$ sudo systemctl restart apache2
```

Next, hit the browser - `http://groupX-server-netbox.apnictraining.net`

You will get a page like below.

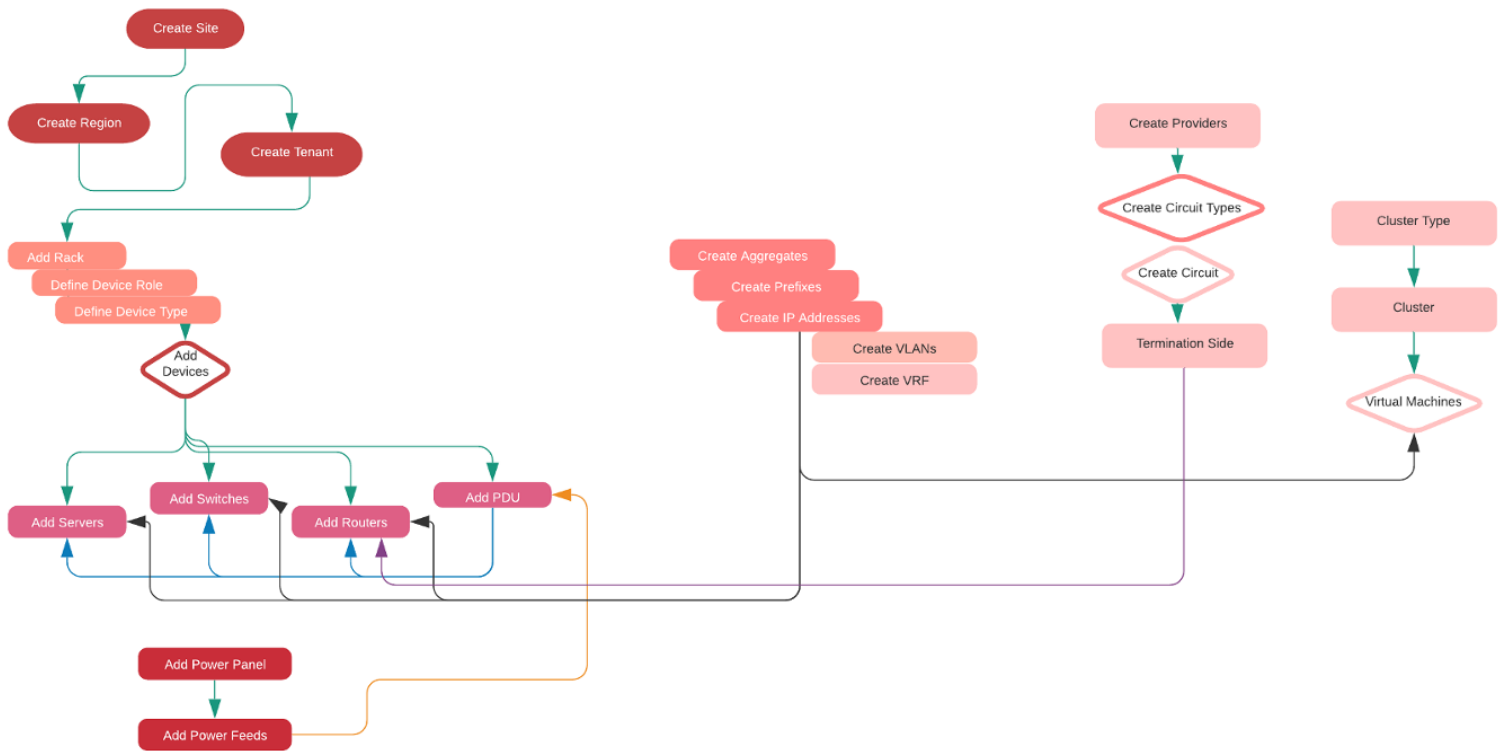


Login to the system, with the username `apnic` and password `training`

## Data Center Management

We will cover the fundamental part of NetBox from the flow diagram.

### NetBox Workflow



### 10. Explore the NetBox service - DCIM

We will practice the following steps to work on NetBox, assuming we are configuring Network-Documenation for a Data Center.

- Create the first site
- Create the first region
- Connect the region with the site
- Create the tenant to define the department
- Connect the tenant with the site
- Add new Rack
- Define device role
- Define device type
- Add devices
- Add power-panels
- Add power-feeds
- Add power distribution unit (PDU)
- Addup few component to the server

**Create the first site:**

Go to the homepage and click `Sites` under the `Organization` tab.

New page will comeup, click on the `+Add` button and fillup the gap.

Add a new site

Site

Name

First APNIC Lab

Full name of the site

Slug

first-apnic-lab

URL-friendly unique shorthand

Status

Active

Region

Facility

Facility

Data center provider and facility (e.g. Equinix NY7)

ASN

ASN

BGP autonomous system number

Time zone

Australia/Brisbane

Description

APNIC Data Center

Short description (will appear in sites list)

**Create the first region:**

Next, we have to create the region to complete the first part of the `Organization` tab.

To do that, again go to the homepage and click `Regions` under the `Organization` tab.

New page will comeup, click on the `+Add` button and fillup the gap.

## Add a new region

Region

Parent

-----

Name

APNIC-HQ

Slug

apnic-hq

URL-friendly unique shorthand

Description

Description

Create

Create and Add Another

Cancel

### Connect the region with the site:

Now we need connect **Regions** to **Sites**. Go to **Sites** from the **Organization** tab, Select the **First APNIC Lab** and click on **Edit Selected**.

A new window come up. Next, right side of the window there are few options, select **APNIC-HQ** from the drop down menu at **Region** field, and click on **Apply**

Name	Status	Facility	Region	Tenant	ASN	Description
First APNIC Lab	Active	—	—	—	—	APNIC Data Center

Attributes

Status

-----

Region

-----

APNIC-HQ

Tenant

☐ Set null

ASN

ASN

☐ Set null

Description

None

☐ Set null

Time zone

-----

☐ Set null

Add tags

-----

Remove tags

-----

Apply

Cancel

Now it should look like this.

## Sites

<input type="checkbox"/> Name	Status	Facility	Region	Tenant	ASN	Description
<input type="checkbox"/> First APNIC Lab	Active	—	APNIC-HQ	—	—	APNIC Data Center

### Create a tenant:

Lets create a tenant to define the department.

Go to the home page, and navigate **Tenants** option from the **Organization** block. Click it, new window will popup, click on the **+Add** button to add a new one. Fillup the gap and click on **Create** button.



## Add a new tenant



**Tenant**

**Name**

DC Management

**Slug**

dc-management

↻

URL-friendly unique shorthand

**Group**

-----

**Description**

Data Center Management Team

### Connect the tenant with the site:

Go to **Sites** from the **Organization** tab, Select the **First APNIC Lab** and click on **Edit Selected**.

Next, right side of the window there are few options, select **DC Management** from the drop down menu at **Tenant** field, and click on **Apply**

Name	Status	Facility	Region	Tenant	ASN	Description
First APNIC Lab	Active	—	APNIC-HQ	—	—	APNIC Data Center

**Attributes**

**Status**

-----

**Region**

-----

☐ Set null

**Tenant**

-----

DC Management

☐ Set null

**Description**

None

☐ Set null

**Time zone**

-----

☐ Set null

**Add tags**

-----

**Remove tags**

-----

Apply

Cancel

Now it should look like this.

## Sites

<input type="checkbox"/> Name	Status	Facility	Region	Tenant	ASN	Description
<input type="checkbox"/> First APNIC Lab	Active	—	APNIC-HQ	DC Management	—	APNIC Data Center

### Add new RACK:

To add a new rack, go to the home page, and navigate **Racks** option from the **DCIM** block. Click it, new window will popup, click on the **+Add** button to add a new one. Fillup the gap, use **First APNIC Lab** as site, use **APNIC-HQ** for region, **DC Management** for tenant, from the drop down option respectively; use the name of the rack as **APNICHQ/Rack01** and click on **Create** button.

Add a new rack?

Rack

Region

APNIC-HQ

x

▼

Site

First APNIC Lab

x

▼

Name

APNICHQ/Rack01

Organizational rack name

Facility ID

Facility ID

The unique rack ID assigned by the facility

Group

-----

▼

Status

Active

x

▼

Role

-----

▼

Serial number

R2020233333

Asset tag

AHQ/R01

A unique tag used to identify this rack

Tenancy

Tenant group

-----

▼

Tenant

DC Management

x

▼

Dimensions

Type

4-post cabinet

x

▼

Width

23 inches

x

▼

Rail-to-rail width

Height (U)

42

Height in rack units

Outer dimensions

Outer width

Outer depth

-----

▼

☐ Descending units

Units are numbered top-to-bottom

The output will be like this.

# Rack APNICHQ/Rack01

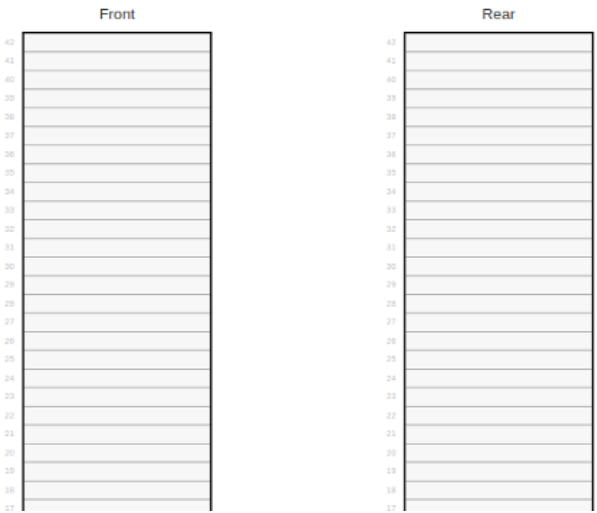
Created Dec. 23, 2020 · Updated 3 minutes ago

[Previous Rack](#) [Next Rack](#) [+ Clone](#) [Edit](#) [Delete](#)

Rack [Change Log](#)

[Show Images](#)

Rack	
Site	APNIC-HQ / First APNIC Lab
Group	None
Facility ID	—
Tenant	DC Management
Status	Active
Role	None
Serial Number	R2020233333
Asset Tag	AHQ/R01
Devices	0
Space Utilization	0%
Power Utilization	0%
Dimensions	
Type	4-post cabinet
Width	19 inches



## Define device role:

Before adding new device, we have to create few necessary definition for devices.

To create device role, navigate **Device Roles** option from the drop down menu **Devices** . Click it, new window will popup, click on the **+Add** button to add a new one. Add router, server, etc with assigning the color code.

**Note:** make sure you uncheck the option **VM Role**

it should look like this.

## Device Roles

[Configure](#) [+ Add](#) [Import](#) [Export](#)

<input type="checkbox"/>	Name	Devices	VMs	Color	VM Role	Description	
<input type="checkbox"/>	Core Router	0	0	<div></div>	✗	—	<a href="#">Refresh</a> <a href="#">Edit</a> <a href="#">Delete</a>
<input type="checkbox"/>	Core Switch	0	0	<div></div>	✗	—	<a href="#">Refresh</a> <a href="#">Edit</a> <a href="#">Delete</a>
<input type="checkbox"/>	Distribution Router	0	0	<div></div>	✗	—	<a href="#">Refresh</a> <a href="#">Edit</a> <a href="#">Delete</a>
<input type="checkbox"/>	Distribution Switch	0	0	<div></div>	✗	—	<a href="#">Refresh</a> <a href="#">Edit</a> <a href="#">Delete</a>
<input type="checkbox"/>	NAS	0	0	<div></div>	✗	—	<a href="#">Refresh</a> <a href="#">Edit</a> <a href="#">Delete</a>
<input type="checkbox"/>	Power Strip	0	0	<div></div>	✗	—	<a href="#">Refresh</a> <a href="#">Edit</a> <a href="#">Delete</a>
<input type="checkbox"/>	Server	0	0	<div></div>	✗	—	<a href="#">Refresh</a> <a href="#">Edit</a> <a href="#">Delete</a>

[Delete Selected](#)

50 per page  
Showing 1-7 of 7

## Define device type:

Need to create the **Manufacturers** first, before creating device types.

From the **Devices** drop down menu, select **Manufacturers** and then click **+Add** from the new window.

Create **Cisco** and **Dell** , by fill in the gap, and it will look like below.

## Add a new manufacturer ?

**Manufacturer**

**Name**

Dell

**Slug**

dell

URL-friendly unique shorthand

**Description**

Description






Create

Create and Add Another

Cancel

## Manufacturers

[Configure](#) [+ Add](#) [Import](#) [Export](#)

<input type="checkbox"/>	Name	Device Types	Inventory Items	Platforms	Description	Slug	
<input type="checkbox"/>	Cisco	0	0	0	—	cisco	  
<input type="checkbox"/>	Dell	0	0	0	—	dell	  

Delete Selected

50 per page  
Showing 1-2 of 2

Next, from the **Devices** drop down menu, select **Device Types** and then click **+Add** from the new window.

Fill the gap with sample specification of Dell. Assuming the server is Dell PowerEdge 420, which is 2U rack.

**Note:** As this is 2U rack server, it will cover from **Front** to **Rear**, and that is why option **Full Depth** should be checked. But for the Cisco switch, **Full Depth** option should be unchecked.

## Add a new device type ?

**Device Type**

**Manufacturer**

Dell

**Model**

PowerEdge 420

**Slug**

poweredge-420

URL-friendly unique shorthand

**Part number**

D32494020022

Discrete part number (optional)

**Height (U)**

2

☒ Is full depth  
Device consumes both front and rear rack faces

**Parent/child status**

Parent

Parent devices house child devices in device bays. Leave blank if this device type is neither a parent nor a child.

## Add a new device type



Device Type	
Manufacturer	<input type="text" value="Cisco"/>
Model	<input type="text" value="Nexus 3550"/>
Slug	<input type="text" value="nexus-3550"/>
URL-friendly unique shorthand	
Part number	<input type="text" value="C129485677650"/>
Discrete part number (optional)	
Height (U)	<input type="text" value="1"/>
<input type="checkbox"/> Is full depth	
Device consumes both front and rear rack faces	
Parent/child status	<input type="text" value="Parent"/>
Parent devices house child devices in device bays. Leave blank if this device type is neither a parent nor a child.	

### Add devices:

Finally, we are adding devices now.

Select **Devices** option from the drop down menu **Devices** . New window will popup, click on the **+Add** button to add a new one. Add switch and server, and select all the option from the drop down menu accordingly, keep in mind to check, **Hardware** , **Location** **Tenancy** .

## Add a new device



Device	
Name	<input type="text" value="SRV02"/>
Device role	<input type="text" value="Server"/>

Hardware	
Manufacturer	<input type="text" value="Dell"/>
Device type	<input type="text" value="PowerEdge 420"/>
Serial number	<input type="text" value="D1234567788"/>
Chassis serial number	
Asset tag	<input type="text" value="SRV02"/>
A unique tag used to identify this device	

Location	
Region	APNIC-HQ
Site	First APNIC Lab
Rack group	
Rack	APNICHQ/Rack01
Rack face	Front
Position	U40
The lowest-numbered unit occupied by the device	

Management	
Status	Active
Platform	
Primary IPv4	
Primary IPv6	

#### Add power-panels:

Add two different Power Panels to ensure redundant power supply from two separate main power grid. Its the main power source.

e.g: APNIC-DC-Power and APNIC-DC-Power-Sec.

#### Add a new power panel

Power Panel	
Region	APNIC-HQ
Site	First APNIC Lab
Rack group	
Name	APNIC-DC-Power
Tags	

Create
Create and Add Another
Cancel

#### Add power-feeds:

Every rack should have two different power feeds from two separate power panels, assuming two separate online UPS in place.

e.g: APNICDC/UPS-A/R01 and APNICDC/UPS-B/R01; for second one, change the Power-Panel to `APNIC-DC-Power-Sec` and assign name as `APNICDC/UPS-B/R01`.

Add a new power feed

?

Power Panel

Region

APNIC-HQ

×

▼

Site

First APNIC Lab

×

▼

Power panel

APNIC-DC-Power

×

▼

Power Feed

Rack

NMM-Lab-Devices

×

▼

Name

APNICDC/UPS-A/R01

Status

Active

×

▼

Add PDU

PDU = Power distribution unit

Before creating a new PDU device, create **Manufacturer** as **XYZ** , device role **Power Strip** , and device type **PDU01** , then Go to the **Devices** and click on **+add** .

Give the PDU a name **Rack01/PDU01** , **Asset Tag** as **R01/PDU01** , and carefully choose all the options accordingly.

Device

Name

Rack01/PDU01

Device role

Power Strip

×

▼

Hardware

Manufacturer

XYZ

×

▼

Device type

PDU01

×

▼

Serial number

Serial number

Chassis serial number

Asset tag

R01/PDU01

A unique tag used to identify this device

Location

Region

APNIC-HQ

x

▼

Site

First APNIC Lab

x

▼

Rack group

-----

▼

Rack

APNICHQ/Rack01

x

▼

Rack face

Front

▼

Position

U35

x

▼

The lowest-numbered unit occupied by the device

Next, create `power ports` as the power inlets and `power outlets` as power outlet, of the PDU, from the `Add New Components` option.

Power port

Device

Rack01/PDU01

Name

PDU/P01

Label

R01/PDU01/P01

Physical label

Type

NEMA 1-15P

▼

Physical port type

Maximum draw

1

Maximum power draw (watts)

Allocated draw

Allocated draw

Allocated power draw (watts)

Description

Power Inlet

Tags

-----



Power Outlet

Device

Rack01/PDU01

Name

Plug[1-8]

Alphanumeric ranges are supported for bulk creation. Mixed cases and types within a single range are not supported. Examples:

- [gc,xe]-0/0/[0-9]
- e[0-3][a-d,f]

Label

Plug[1-8]

Alphanumeric ranges are supported. (Must match the number of names being created.)

Type

NEMA 1-15R

Power port

PDU/P01 (R01/PDU01/P01)

Feed leg

A

Description

PDU Outlet

Tags

Create

Create and Add More

Cancel

The power outlet should look like this.

Device

Power Ports 1

Power Outlets 8

















































Status

LLDP Neighbors

Configuration

Config Context

Change Log

Power Outlets									Configure
<input type="checkbox"/>	Name	Label	Type	Power port	Feed leg	Description	Cable	Connection	
<input type="checkbox"/>	 Plug1	Plug1	NEMA 1-15R	PDU/P01 (R01/PDU01/P01)	A	—	—	—	    
<input type="checkbox"/>	 Plug2	Plug2	NEMA 1-15R	PDU/P01 (R01/PDU01/P01)	A	—	—	—	    
<input type="checkbox"/>	 Plug3	Plug3	NEMA 1-15R	PDU/P01 (R01/PDU01/P01)	A	—	—	—	    
<input type="checkbox"/>	 Plug4	Plug4	NEMA 1-15R	PDU/P01 (R01/PDU01/P01)	A	—	—	—	    
<input type="checkbox"/>	 Plug5	Plug5	NEMA 1-15R	PDU/P01 (R01/PDU01/P01)	A	—	—	—	    
<input type="checkbox"/>	 Plug6	Plug6	NEMA 1-15R	PDU/P01 (R01/PDU01/P01)	A	—	—	—	    
<input type="checkbox"/>	 Plug7	Plug7	NEMA 1-15R	PDU/P01 (R01/PDU01/P01)	A	—	—	—	    
<input type="checkbox"/>	 Plug8	Plug8	NEMA 1-15R	PDU/P01 (R01/PDU01/P01)	A	—	—	—	    
<div><div>Rename</div><div>Edit</div><div>Disconnect</div><div>Delete</div></div>									<div>+ Add power outlets</div>

Now create another PDU for the rack01 to get power feed from the different power supply.

Let us connect the PDU01 and PDU02 inlet to the power feed. Follow the options from the screenshots. You need to click on green colored connection icon and select `Power Feed`.

Connect Rack01/PDU01 PDU/P01 (R01/PDU01/P01) to Power Feed

A Side

Region

APNIC-HQ

Site

First APNIC Lab

Rack

APNICHQ/Rack01

Device

Rack01/PDU01

Type

Power port

Name

PDU/P01 (R01/PDU01/P01)

B Side

Region

APNIC-HQ

Site

First APNIC Lab

Rack Group

-----

Power Panel

APNIC-DC-Power

Type

Power feed

Name

APNICDC/UPS-A/R01

Cable

Status

Connected

Type

Power

Label

R01/PDU01/PP

Color

Amber

Length

10

Meters

Tags

-----

Device Power Ports 1 Power Outlets 6 Status LLDP Neighbors Configuration Config Context Change Log

Power Ports								Configure
<input type="checkbox"/>	Name	Label	Type	Maximum draw	Allocated draw	Description	Cable	Connection
<input type="checkbox"/>	Rack01/PDU02/Port02	R01/PDU02/P01	NEMA 1-15P	1	—	—	—	—
<div>Renew Edit Disconnect Delete</div>								

Power Outlet  
Power Feed

Connect Rack01/PDU02 Rack01/PDU02/Port02 (R01/PDU02/P01) to Power Feed

A Side

Region

APNIC-HQ

Site

First APNIC Lab

Rack

APNICHQ/Rack01

Device

Rack01/PDU02

Type

Power port

Name

Rack01/PDU02/Port02 (R01/PDU02/P01)

B Side

Region

APNIC-HQ

Site

First APNIC Lab

Rack Group

-----

Power Panel

APNIC-DC-Power-Sec

Type

Power feed

Name

APNICDC/UPS-B/R01

Cable

Status

Connected

Type

Power

Label

R01/PDU02/PPSec

Color

Dark orange

Length

10

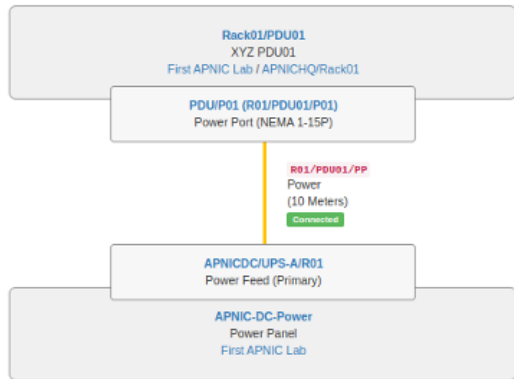
Meters

Tags

-----

Let us check the connection from PDU to power feed.

### Cable Trace for Power Port PDU/P01 (R01/PDU01/P01)



Related Paths		
Origin	Destination	Segments
None found		

Trace completed

Total segments: 1  
Total length: 10 Meters

## Addup few component to the server

Let us add few components for the device, first we add few components for server-01, Selecting `SRV01` from the `Devices` tab, choose `Power Ports` from the `Add Components` drop down menu. Power ports are named like - `Rack01/SRV01/Port01`.

To add **Interfaces** , again click **Add Components** and give it a name **Eth0** with **1GE** from **Types** .

Power port	
Device	SRV01
Name	<input type="text" value="Rack01/SRV01/Port01"/>
Label	<input type="text" value="R01/SRV01/P01"/> <small>Physical label</small>
Type	<input type="text" value="NEMA 1-15P"/> <small>Physical port type</small>
Maximum draw	<input type="text" value="1"/> <small>Maximum power draw (watts)</small>
Allocated draw	<input type="text" value="Allocated draw"/> <small>Allocated power draw (watts)</small>
Description	<input type="text" value="Description"/>
Tags	<input type="text" value=""/>

Interface

Device

SRV01

Name

Eth01

Alphanumeric ranges are supported for bulk creation. Mixed cases and types within a single range are not supported. Examples:

- [ge,xe]-0/0/[0-9]
- e[0-3][a-d,f]

Label

Eth01

Alphanumeric ranges are supported. (Must match the number of names being created.)

Type

1000BASE-T (1Gb)

Enabled

☒

Parent LAG

MTU

1500

MAC Address

MAC Address

Description

None

Management only

☐

This interface is used only for out-of-band management

Mode

Tags

Create

Create and Add More

Cancel

Add one more power port.

Now connect those two Power Ports with the PDU unit 01 and 02 accordingly, use the option `power_outlet` to make the connection and check the status. Power cable tagging can be done following `Rack/Server/Power_port/PDU_number/Port_number`



Device

Interfaces 1

Power Ports 2

Status

LLDP Neighbors

Configuration

Config Context

Change Log

Power Ports								Configure
<input type="checkbox"/>	Name	Label	Type	Maximum draw	Allocated draw	Description	Cable	Connection
<input type="checkbox"/>	Rack01/SRV01/Port01	R01/SRV01/P01	NEMA 1-15P	1	—	—	R01/SRV01/P01/PDU01/P01	Rack01/PDU01 > Plug1 (Plug1)
<input type="checkbox"/>	Rack01/SRV01/Port02	R01/SRV01/P02	NEMA 1-15P	1	—	—	—	—

Rename

Edit

Disconnect

Delete

Power Outlet

Power Feed

Power port

Connect SRV01 Rack01/SRV01/Port02 (R01/SRV01/P02) to Power Outlet

A Side

Region

APNIC-HQ

Site

First APNIC Lab

Rack

APNICHQ/Rack01

Device

SRV01

Type

Power port

Name

Rack01/SRV01/Port02 (R01/SRV01/P02)

B Side

Region

APNIC-HQ

Site

First APNIC Lab

Rack

APNICHQ/Rack01

Device

Rack01/PDU02

Type

Power outlet

Name

Plug1

Cable

Status

Connected

Type

Power

Label

R01/SRV01/P02/PDU02/P01

Color

Red

Length

3

Meters

Tags

Next, let us add few ports to the switch, that we have created. It will be time consuming to add 24 or 48 ports, to simplify the LAB we will add 8 ports only to the Cisco Nexus 3550 switch, dont forget to add two power port for switch, and connect from two separate PDU as well.

Go to `SWC01` from the `Devices` tab, and click on `Add Components` to add `Interfaces`. Naming can be done `e01`, `e02`, `e03`, select `1000BASE-T (1GE)` from the `Type` option. After creating all the 8 ports it should look like -

netbox

Organization ▾ Devices ▾ IPAM ▾ Virtualization ▾ Circuits ▾ Power ▾ Secrets ▾ Other ▾

Search 🔍

apnic ▾

Devices / First APNIC Lab / SWC01

Search devices 🔍

+ Add Components ▾

+ Clone

Edit

Delete

SWC01

Created Dec. 23, 2020 · Updated 1 day, 13 hours ago

Device

Interfaces 1

Status

LLDP Neighbors

Configuration

Config Context

Change Log

Interfaces

Filter

Configure

<input type="checkbox"/>	Name	Label	Enabled	Type	LAG	MTU	Mode	Description	Cable	Connection	IP Addresses
<input type="checkbox"/>	e01	e01	✓	1000BASE-T (1GE)	—	—	—	—	—	—	<div>+ ⌵ ⌵ ⌵ ⌵ ⌵</div>
<input type="checkbox"/>	e02	e02	✓	1000BASE-T (1GE)	—	—	—	—	—	—	<div>+ ⌵ ⌵ ⌵ ⌵ ⌵</div>
<input type="checkbox"/>	e03	e03	✓	1000BASE-T (1GE)	—	—	—	—	—	—	<div>+ ⌵ ⌵ ⌵ ⌵ ⌵</div>
<input type="checkbox"/>	e04	e04	✓	1000BASE-T (1GE)	—	—	—	—	—	—	<div>+ ⌵ ⌵ ⌵ ⌵ ⌵</div>
<input type="checkbox"/>	e05	e05	✓	1000BASE-T (1GE)	—	—	—	—	—	—	<div>+ ⌵ ⌵ ⌵ ⌵ ⌵</div>
<input type="checkbox"/>	e06	e06	✓	1000BASE-T (1GE)	—	—	—	—	—	—	<div>+ ⌵ ⌵ ⌵ ⌵ ⌵</div>
<input type="checkbox"/>	e07	e07	✓	1000BASE-T (1GE)	—	—	—	—	—	—	<div>+ ⌵ ⌵ ⌵ ⌵ ⌵</div>
<input type="checkbox"/>	e08	e08	✓	1000BASE-T (1GE)	—	—	—	—	—	—	<div>+ ⌵ ⌵ ⌵ ⌵ ⌵</div>

⌵ Rename ⌵ Edit ⌵ Disconnect ⌵ Delete

+ Add interfaces

Let us connect the server ethernet port to the switch port. click on the connect icon, choose `interface`, a window will popup, `A Side` is the server side, and `B Side` is the destination side, for us here it is the switch that we have in our rack-01. Choose `swc01` the `Device` option, and then chose one port below to the `Interface`.

From the `Cable` box, select `CAT6` from the `Type`, use `Label` like we discuss at our presentation slides, `APNICHQ/R01/SRV01/APNICHQ/R01/SWC01/e01` (Format: `Source_Device_ID/Destination_Device_ID-Port_Number/Name`).

Interfaces											Filter	Configure
<input type="checkbox"/>	Name	Label	Enabled	Type	LAG	MTU	Mode	Description	Cable	Connection	IP Addresses	
<input type="checkbox"/>	Eth01	Eth01	✓	1000BASE-T (1GE)	—	1500	—	—	—	—		

- Interface
- Front Port
- Rear Port
- Circuit Termination

## Connect SRV01 Eth01 (Eth01) to Interface

A Side

Region

APNIC-HQ

Site

First APNIC Lab

Rack

APNICHQ/Rack01

Device

SRV01

Type

Interface

Name

Eth01 (Eth01)

B Side

Region

APNIC-HQ

Site

First APNIC Lab

Rack

APNICHQ/Rack01

Device

SWC01

Type

Interface

Name

-----

e01

e02

e03

e04

e05

e06

e07

Cable

Status

Connected

Type

-----

Label

Label

Cable

Status

Connected

Type

CAT6

Label

APNICHQ/R01/SRV01/APNICHQ/R01/SWC01/e01

Color

Blue

Length

1

Meters

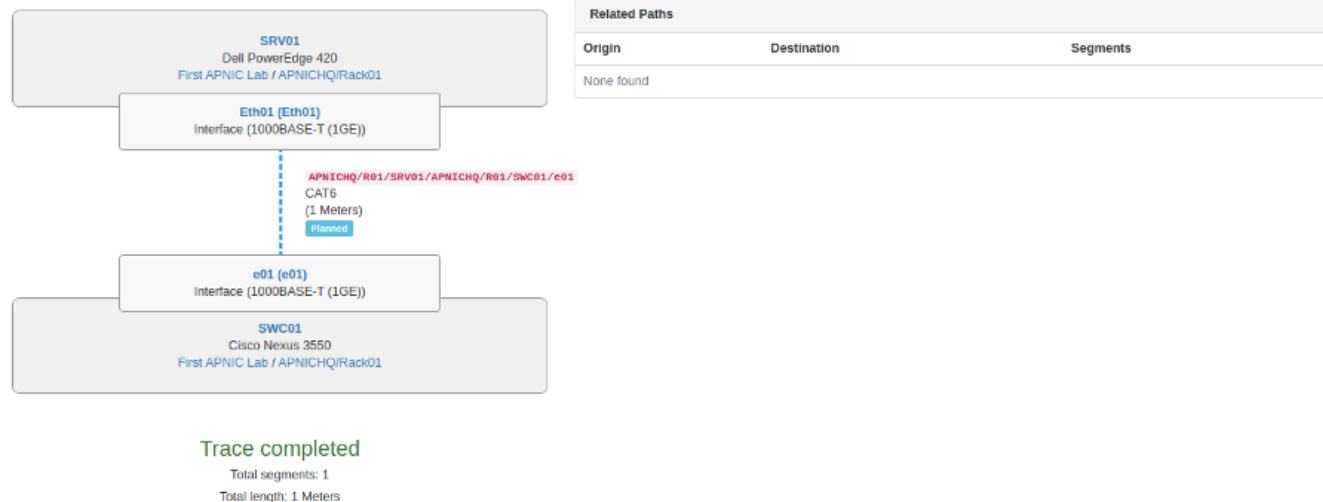
Tags

-----

[Connect](#)
[Cancel](#)

Now it should look like below, to check this status, click on the [Trace](#) icon from the SRV01 [Interface](#) details.

## Cable Trace for Interface Eth01 (Eth01)



So, till now, we have created a server and switch; gave them redundant power supply and network interface, and placed them inside the rack.

## IP Address Management

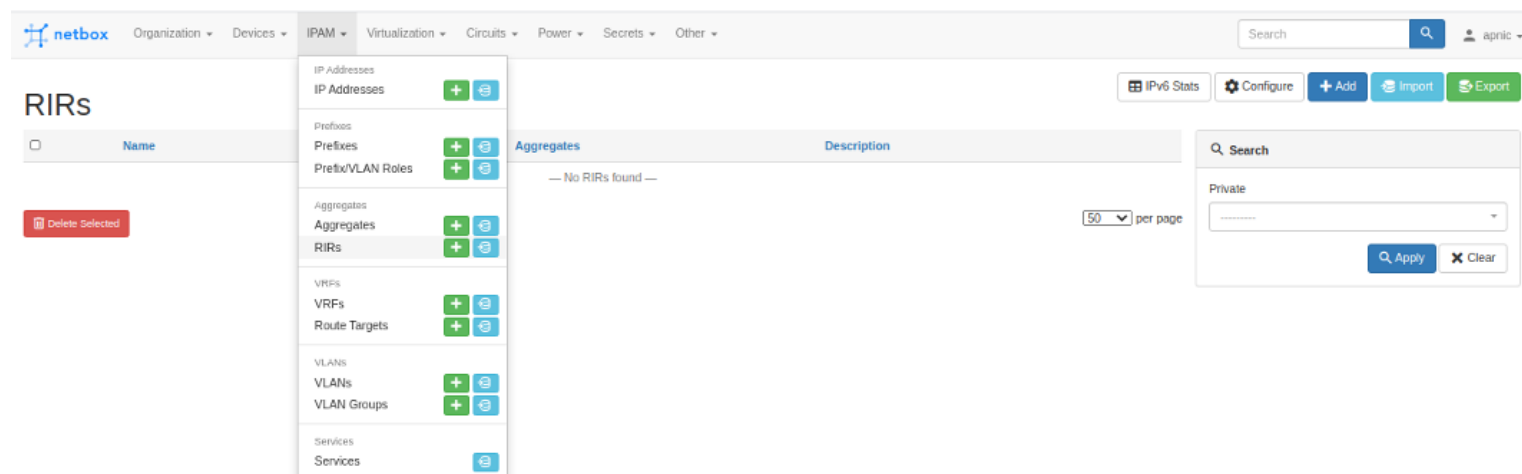
### 11. Explore the NetBox service - IPAM

Now we will work on IPAM, and then go back to DCIM to see the full picture.

- Create Aggregates
- Create Prefixes
- Create IP address

#### Create Aggregates:

First, select **RIRs** from the **IPAM** tab, and create new one with **APNIC**



The screenshot shows the NetBox IPAM interface. The left sidebar has a dropdown menu for IPAM with options: IP Addresses, Prefixes, Prefix/VLAN Roles, Aggregates, RIRs, VRFs, Route Targets, VLANs, and Services. The main content area shows the 'Aggregates' table with columns 'Aggregates' and 'Description'. Below the table, it says '— No RIRs found —'. On the right, there is a search box with a 'Private' dropdown and 'Apply' and 'Clear' buttons. At the bottom right, there is a '50 per page' dropdown.

Add a new RIR

RIR

Name

APNIC

Slug

apnic

URL-friendly unique shorthand

☐ Private

IP space managed by this RIR is considered private

Description

Description

Create

Create and Add Another

Cancel

It will take you to a new window, where you have to create Aggregate IPs. Here we assume the IP Prefix is 10.0.0.0/8 .

Add a new aggregate

Aggregate

Prefix

10.0.0/8

IPv4 or IPv6 network

RIR

APNIC

Date added

2020-12-25

Description

APNIC Data Center LAB IPs

Tenancy

Tenant group

Tenant

DC Management

Tags

Tags

Create

Create and Add Another

Cancel

Create Prefixes

Select Prefixes from the IPAM tab to add new prefixes. we will use 10.20.0.0/16 as our prefix for the Data Center.



Add a new prefix?

Prefix

Prefix

10.20.0.0/16

IPv4 or IPv6 network with mask

Status

Active

x ▾

Operational status of this prefix

VRF

----- ▾

Role

----- ▾

Description

Data Center IPs

☐ Is a pool

All IP addresses within this prefix are considered usable

So the prefix window will showup, there you can see different sub-tab; go to the `Child Prefixes` , and create a new one `10.20.20.0/24` for `Media Service Solution`

Add a new prefix?

Prefix

Prefix

10.20.20.0/24

IPv4 or IPv6 network with mask

Status

Active

x ▾

Operational status of this prefix

VRF

----- ▾

Role

----- ▾

Description

Media Service Solution IPs

☐ Is a pool

All IP addresses within this prefix are considered usable

You will see the window like this.

netbox

Organization ▾Devices ▾IPAM ▾Virtualization ▾Circuits ▾Power ▾Secrets ▾Other ▾

Search

apnic ▾

Prefixes / 10.20.0.0/16

Search prefixes

+ Add Child Prefix

+ Clone

Edit

Delete

10.20.0.0/16 - Prefixes

Created Dec. 25, 2020 · Updated 3 minutes ago

Prefix

Child Prefixes 1

IP Addresses 0

Change Log

Show available

Hide available

Child Prefixes										
<input type="checkbox"/>	Prefix	Status	Children	VRF	Utilization	Tenant	Site	VLAN	Role	Description
	10.20.0.0/20	Available	—	Global	—	—	—	—	—	—
	10.20.16.0/22	Available	—	Global	—	—	—	—	—	—
<input type="checkbox"/>	• 10.20.20.0/24	Active	0	Global	0%	DC Management	First APNIC Lab	—	—	Media Service Solution IPs
	10.20.21.0/24	Available	—	Global	—	—	—	—	—	—
	10.20.22.0/23	Available	—	Global	—	—	—	—	—	—
	10.20.24.0/21	Available	—	Global	—	—	—	—	—	—
	10.20.32.0/19	Available	—	Global	—	—	—	—	—	—
	10.20.64.0/18	Available	—	Global	—	—	—	—	—	—
	10.20.128.0/17	Available	—	Global	—	—	—	—	—	—

Edit Selected

Delete Selected

50 per page  
Showing 1-9 of 9

Click on the child-prefix that we just now defined from the go to the `IP Addresses` sub-tab. And create a IP for the first server as `10.20.20.10/30` .

Add a new IP address

New IP

Bulk Create

IP Address

Address

10.20.20.10/30

IPv4 or IPv6 address (with mask)

Status

Active

The operational status of this IP

Role

The functional role of this IP

VRF

DNS Name

DNS Name

Hostname or FQDN (not case-sensitive)

Description

Rack01/Server01

You will get a window like below to see the status.

10.20.20.10/30

+ Clone Edit Delete

Created Dec. 25, 2020 - Updated 0 minutes ago

IP Address Change Log

IP Address

Family

IPv4

VRF

Global

Tenant

DC Management

Status

Active

Role

None

DNS Name

—

Description

Rack01/Server01

Assignment

—

NAT (inside)

None

NAT (outside)

None

Tags

No tags assigned

Parent Prefixes							
Prefix	Status	Tenant	Site	VLAN	Role	Description	
10.20.0.0/16	Active	DC Management	First APNIC Lab	—	—	Data Center IPs	
10.20.20.0/24	Active	DC Management	First APNIC Lab	—	—	Media Service Solution IPs	

Related IP Addresses

None

50 per page

Now, lets us go back to the DCIM module, and assign an IP to the server 01 interface.

To do that, select srv01 from the `Devices` lists, go to the sub-tab `Interfaces` and click on the `green + sign` , to add the IP address. It will take you to a new page, provide all the info accordingly.

Devices / First APNIC Lab / SRV01

Search devices

+ Add Components + Clone Edit Delete

Created Dec. 23, 2020 - Updated 7 hours, 32 minutes ago

Device Interfaces 1 Power Ports 2 Status LLDP Neighbors Configuration Config Context Change Log

Interfaces

Filter

Configure

<input type="checkbox"/>	Name	Label	Enabled	Type	LAG	MTU	Mode	Description	Cable	Connection	IP Addresses	
<input type="checkbox"/>	Eth01	Eth01	✓	1000BASE-T (1GE)	—	1500	—	—	APNICHQ/R01/SRV01/APNICHQ/R01/SWC01/e01	SWC01 > e01 (e01)		<div>+ [icon] [icon] [icon] [icon] [icon]</div>

Rename Edit Disconnect Delete

Add IP address

Add a new IP address?

New IPAssign IP

IP Address

Address

10.20.20.2/32

IPv4 or IPv6 address (with mask)

Status

Active

The operational status of this IP

Role

The functional role of this IP

VRF

DNS Name

DNS Name

Hostname or FQDN (not case-sensitive)

Description

Web Service IP

Interface Assignment

DeviceVirtual Machine

Device

SRV01

Interface

Eth01 (Eth01)

☒ Make this the primary IP for the device/VM

So, as of now our one server is connected with a switch, and both the devices ar connected with the power source.

Exercise:

- Create another server
- Create NAS
- Connect server and NAS with switch
- Create Router, and connect with switch as gateway.
- Create the Circuits, and connect with Rotuer.

End of Lab