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- Huawei Learning Website
  - http://learning.huawei.com/en
- Huawei e-Learning
  - https://ilearningx.huawei.com/portal/#/portal/ebg/51
- Huawei Certification
  - http://support.huawei.com/learning/NavigationAction!createNavi?navId=_31&lang=en
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Huawei Data Center Certification Training

HCIA-Data Center

Lab Guide for Data Center Engineers

ISSUE:2.0

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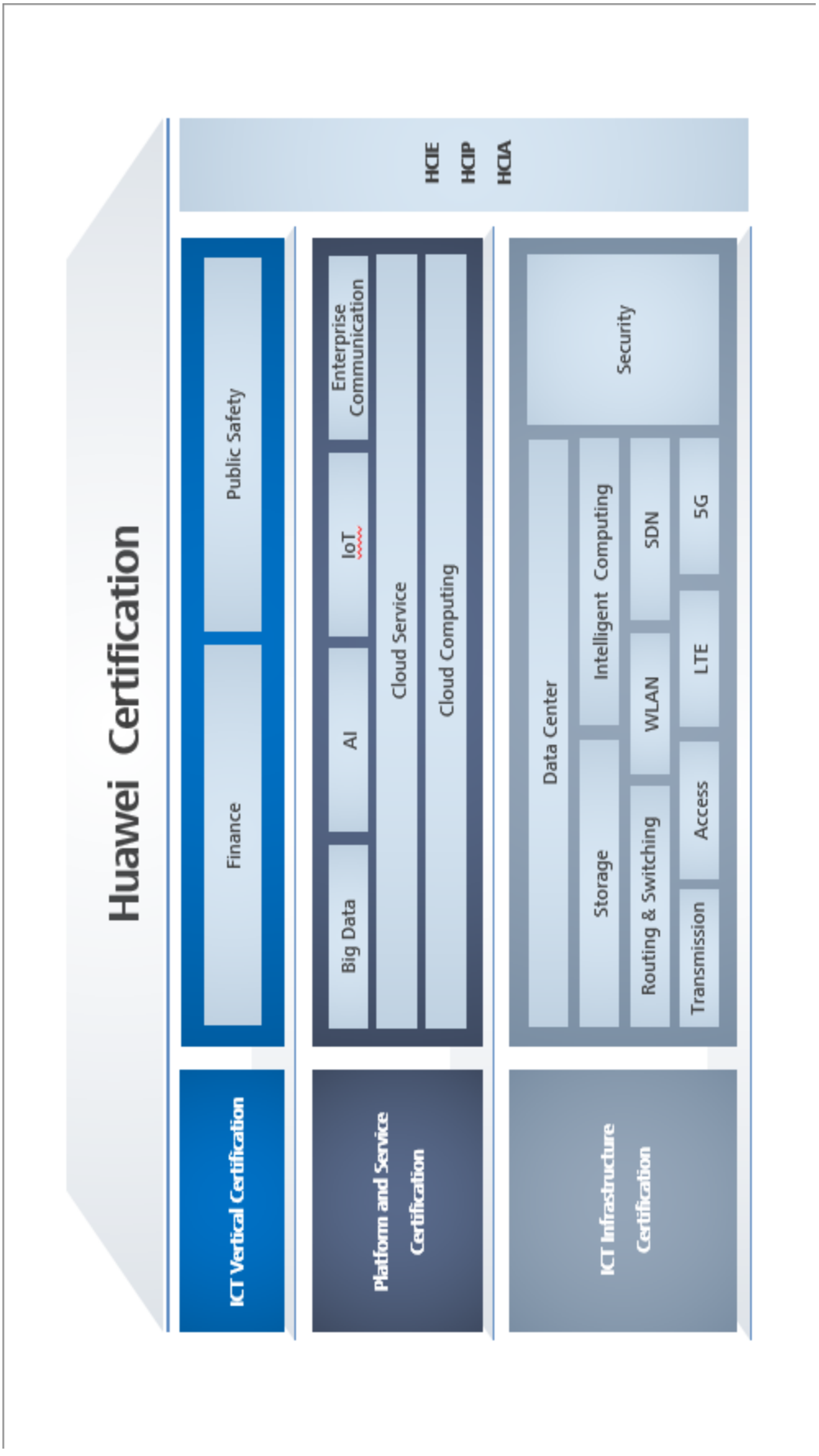
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About This Document

Overview

This document is applicable to the candidates who are preparing for the HCIA-Data Center exam and the readers who want to understand the Cloud data center basics, the data center SDN technologies and data center cloud relating technologies.

Description

This experiment guide introduces the following four experiments, covering basic configurations, and configurations and implementation of Layer 2 networking, security, Layer 3 networking, and the network management software eSight.

- Experiment 1: Layer 2 data center network configuration.
- This experiment involves basis operations and configurations on CloudEngine switches, helping you know the VLAN and link aggragation pinciples its basic functions.
- Experiment 2: Layer 3 data center network configuration.
- This experiment lets you know basic configuration about SDN underlay network, including OSPF and BGP EVPN.
- Experiment 3: Agie controller-DCN, SDN configuration.
- This experiment mainly introduces SDN network virtualization, helping you know SDN working principles and service models.
- Experiment 4: Huawei Cloud configuration and service automation.
- This experiment involves how to configure Huawei Cloud rescourses and apply for cloud services.

Background Knowledge Required

- The intended audience should know basic RS knowledge, Huawei switching devices, and basic server and storage knowledge.

Common Icons

Core Swith

Access Switch

Server

SDN controller

Experiment Environment Overview

Networking Introduction

This experiment environment is prepared for data center engineers who are preparing for the HCIA-Data Center exam.

Each suite of experiment environment includes 1 AC-DCN, 1 Huawei Cloud platform, 1 core switch, and 2 access swithces. Each suite of experiment environment is applicable to 3 to 9 candidates.

Device Introduction

he following table lists devices recommended for HCIA-Data Center experiments and the mappings between the device name, model, and software version.

Device name	Model	Software Version
Switch	CE6855-48S6Q-HI	V200R005C00SPC800
SDN controller	Agile Controller-DCN	V300R003C00SPC310
Cloud	Huawei Cloud Stack	6.3.1.1

Experiment Environment Preparation

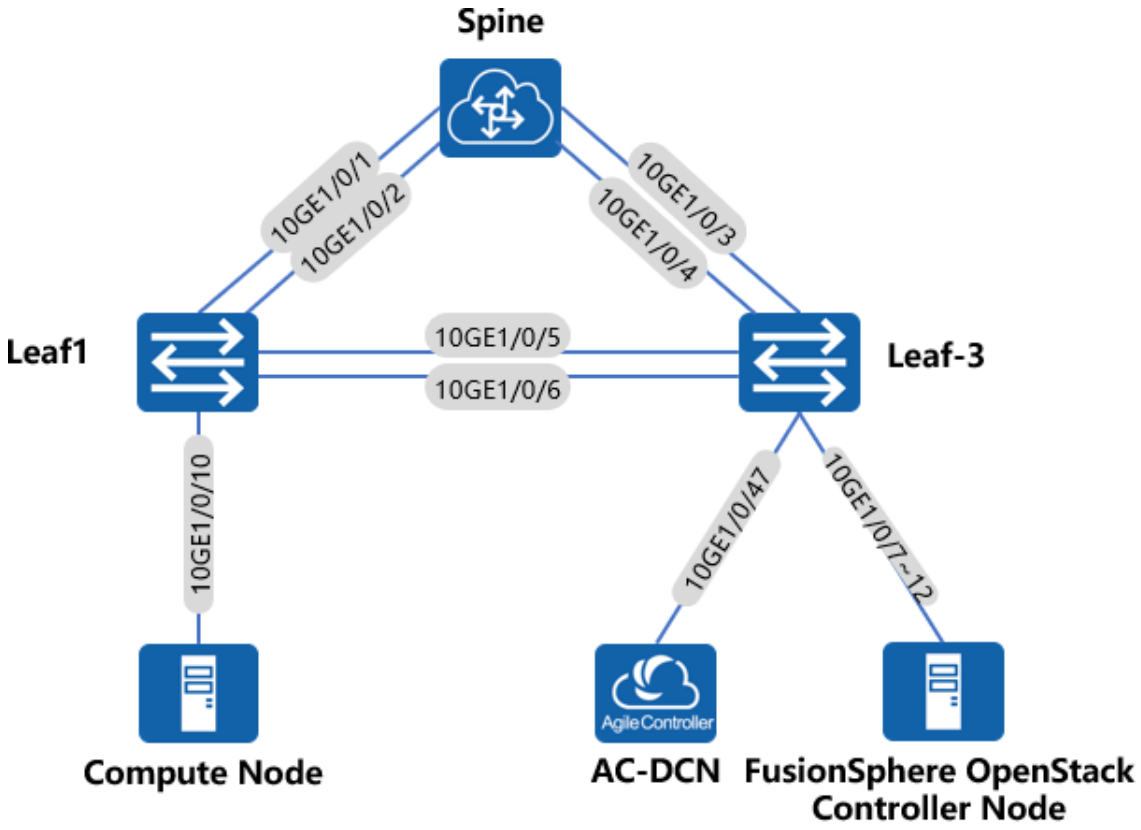
Checking Whether All Devices Are Available

Before starting the experiment, check whether all required devices are ready. The following table lists the required devices.

Device	Management IP	account
Jumper	/	Given by instructor
Agile Controller	10.10.0.10	admin/Huawei@123
Leaf1	172.18.100.5	Given by instructor
Leaf3	172.18.100.2	Given by instructor
Spine	172.18.100.3	Given by instructor
ServiceCenter	https://auth.hz.com/	bss_admin/Huawei12#$
OperationCenter	https://oc.hzdc.com:31943/	admin/Huawei12#$

Each group must check whether the devices in table are ready.

Experiment topology



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1 Lab Guide for DC Layer 2 Network

1.1 Introduction

1.1.1 About this lab

This chapter is about layer 2 DCN configuration for conection between cloud compute nodes and controller nodes.

1.1.2 Objectives

- Understand how to configure VLAN and Eth-Trunk.
- Understand the working priciples of layer 2 DCN.

1.1.3 Topoloy and Description

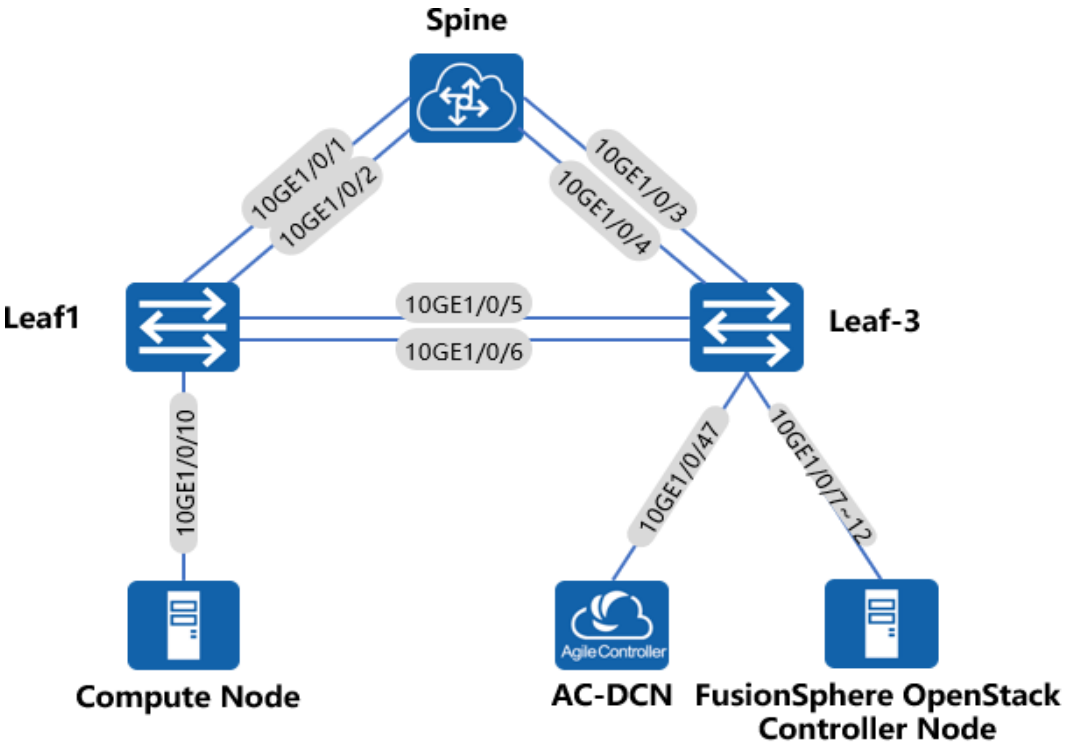


Table 1-1 DCN Topology

1.1.4 Network Planning

Data Center is a spcial scenario that contains computing, storage and networking devices. There should be VLANs planned for different services.

Figure 1-1 VLAN Planning

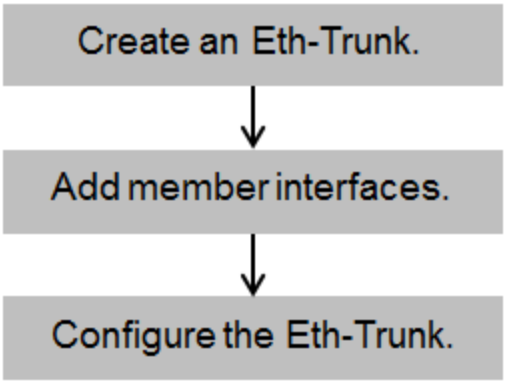
Switch	VLAN	Service
Leaf1, Leaf-3	4004	External_api
	4005	External_om
	4006	External_base
	4007	Internal_base (PXE)
	4008	Storage_data0
	4009	Storage_data1
	4010	SDN
	4033	Public_service
	4034	DMZ_service
	4035	DMZ_tenant
	4036	Heartbeat

1.2 Configuration

1.2.1 Roadmap

1. Configure Link Aggragation to ehance reliability.
2. Configure VLAN on Leaf1 and Leaf3, then configure Link to allow specific VLANs.

1.2.2 Eth-Trunk Configuration



Step 1 **Create an Eth-Trunk on Leaf1**

Create Eth-Trunk1 and Eth-Trunk2 on Leaf1 in lacp-static mode.

Link aggregation can work in manual load balancing mode, static LACP mode, or dynamic LACP mode.

In LACP mode, you must manually create an Eth-Trunk and add interfaces to the Eth-Trunk. LACP determines active interfaces by negotiating parameters in LACPDUs.

Eth-Trunks in dynamic LACP mode are used only when a Huawei device connects to a server. For other scenarios, configuring Eth-Trunks in static LACP mode is recommended to prevent potential loops.

Name Leaf1. Leaf3 and Spine are the same.

```
<Huawei>sys
[Huawei]sysname Leaf1
[Leaf1]
```

Create Eth-Trunk1

```
[Leaf1]interface Eth-Trunk 1
[Leaf1-Eth-Trunk1]trunkport 10 1/0/1 1/0/2
[Leaf1-Eth-Trunk1]mode lacp-static
[Leaf1-Eth-Trunk1]quit
```

Eth-Trunk2

```
[Leaf1]interface Eth-Trunk 2
[Leaf1-Eth-Trunk2]trunkport 10 1/0/5 1/0/6
[Leaf1-Eth-Trunk2]mode lacp-static
[Leaf1-Eth-Trunk2]quit
```

Step 2 **Create Eth-Trunk on Spine and Leaf3**

```
[Spine]interface Eth-Trunk 1
[Spine]-Eth-Trunk1]trunkport 10 1/0/1 1/0/2
[Spine]-Eth-Trunk1]mode lacp-static
[Spine-Eth-Trunk1]quit
[Spine]interface Eth-Trunk 2
[Spine]-Eth-Trunk1]trunkport 10 1/0/3 1/0/4
[Spine]-Eth-Trunk1]mode lacp-static
[Spine-Eth-Trunk1]quit
```

Leaf3

```
[Leaf3]interface Eth-Trunk 1
[Leaf3-Eth-Trunk1]trunkport 10 1/0/3 1/0/4
[Leaf3-Eth-Trunk1]mode lacp-static
[Leaf3-Eth-Trunk1]quit
[Leaf3]interface Eth-Trunk 2
[Leaf3-Eth-Trunk2]trunkport 10 1/0/5 1/0/6
[Leaf3-Eth-Trunk2]mode lacp-static
[Leaf3-Eth-Trunk2]quit
```

1.2.3 Eth-Trunk Configuration Verification

1.2.3.1 Check Eth-Trunk status

command display Eth-Trunk shows status about VLANs and relating interfaces.

```
[Spine]display eth-trunk
Eth-Trunk1's state information is:
Local:
LAG ID: 1                         Working Mode: Static
Preempt Delay: Disabled           Hash Arithmetic: profile default
System Priority: 32768            System ID: a0f4-79f8-a0a1
Least Active-linknumber: 1        Max Active-linknumber: 64
Operating Status: up              Number Of Up Ports In Trunk: 2
Timeout Period: Slow
--------------------------------------------------------------------------------
---
ActorPortName          Status   PortType PortPri PortNo PortKey PortState
Weight
10GE1/0/1              Selected 10GE     32768   1      321     10111100  1
10GE1/0/2              Selected 10GE     32768   3      321     10111100  1

Partner:
--------------------------------------------------------------------------------
---
ActorPortName          SysPri   SystemID        PortPri PortNo PortKey
PortState
10GE1/0/1              32768    a0f4-79f8-a0e1  32768   1      321
10111100
10GE1/0/2              32768    a0f4-79f8-a0e1  32768   2      321
10111100

Eth-Trunk2's state information is:
Local:
```

```
LAG ID: 2                       Working Mode: Static
Preempt Delay: Disabled         Hash Arithmetic: profile default
System Priority: 32768          System ID: a0f4-79f8-a0a1
Least Active-linknumber: 1      Max Active-linknumber: 64
Operating Status: up            Number Of Up Ports In Trunk: 1
Timeout Period: Slow
--------------------------------------------------------------------------------
ActorPortName          Status   PortType PortPri PortNo PortKey PortState
Weight
10GE1/0/3              Selected 10GE     32768   1      577     10111100  1
10GE1/0/4              Selected 10GE     32768   3      577     10111100  1

Partner:
--------------------------------------------------------------------------------
ActorPortName          SysPri   SystemID        PortPri PortNo PortKey
PortState
10GE1/0/3              32768    2c97-b1cd-a5e1  32768   1      321     10111100
10GE1/0/4              32768    2c97-b1cd-a5e1  32768   2      321
10111100
```

In the same way, check it on Leaf1 and Leaf3. Selected status means links are normal.

1.2.3.2 Reference Configuration

Spine

```
#
interface Eth-Trunk1
 undo portswitch
 mode lacp-static
#
interface Eth-Trunk2
 mode lacp-static
#
interface 10GE1/0/1
eth-trunk 1
device transceiver 10GBASE-COPPER
#
interface 10GE1/0/2
 eth-trunk 1
```

device transceiver 10GBASE-COPPER

#

interface 10GE1/0/3

eth-trunk 2

device transceiver 10GBASE-COPPER

#

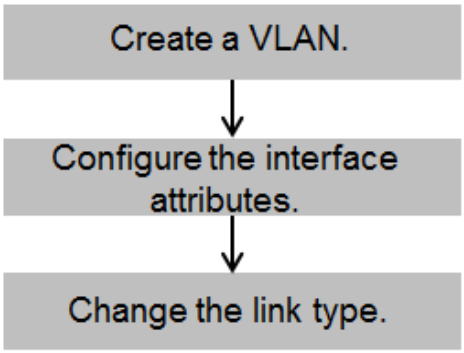
interface 10GE1/0/4

eth-trunk 2

device transceiver 10GBASE-COPPER

#

1.2.4 VLAN Configuration



Step 1 **Create VLANs**

Leaf1 is same as Leaf3.

```
<Leaf3>system-view immediately
[Leaf3]vlan batch  4004 to 4010 4033 to 4036 4060
```

vlan batch can create multiple VLANs in a single command.

Step 2 **Configure server accessing interface**

Leaf1 conects compute node. VLAN 4007 is server PXE network, so the traffic must be untag.

```
<Leaf1>system-view immediately
[Leaf1]interface 10GE 1/0/10
[Leaf1-10GE1/0/10]port link-type trunk
[Leaf1-10GE1/0/10]port trunk allow-pass vlan 4004 to 4009 4033 to 4036
[Leaf1-10GE1/0/10]port trunk pvid vlan 4007
[Leaf1-10GE1/0/10]quit
```

#Leaf3.

Interface 10GE 1/0/7-1/0/12 connect to FusionSphere OpenStack controller node.

Interface 10GE 1/0/47 connects to AC-DCN server.

```
<Leaf3>system-view immediately
[Leaf3]interface range 10GE 1/0/7 to 10GE 1/0/12
[Leaf3-port-group]port link-type trunk
[Leaf3-port-group]port trunk pvid vlan 4007
[Leaf3-port-group]port trunk allow-pass vlan 4004 to 4009 4033 to 4036
[Leaf3-port-group]quit
[Leaf3]interface 10GE 1/0/47
[Leaf3-10GE1/0/47]port default vlan 4010
[Leaf3-10GE1/0/47]quit
```

Step 3 **Configure interconnect interfaces.**

Interconnect interfaces Eth-Trunk allow Fusionphere OpenStack traffic between compute node and controller node.

```
[Leaf-1]interface Eth-Trunk 2
[Leaf-1-Eth-Trunk2]port link-type trunk
[Leaf-1-Eth-Trunk2]port trunk allow-pass vlan 4004 to 4009 4033 to 4036
[Leaf-1-Eth-Trunk2]quit
```

#Leaf3

```
[Leaf-3-Eth-Trunk1]interface Eth-Trunk 2
[Leaf-3-Eth-Trunk2]port link-type trunk
[Leaf-3-Eth-Trunk2]port trunk allow-pass vlan 4004 to 4009 4033 to 4036
[Leaf-3-Eth-Trunk2]quit
```

1.2.5 VLAN Configuration Vefication

Check VLAN status.

```
[Leaf1]display vlan
The total number of vlans is : 11
--------------------------------------------------------------------------------
---
U: Up;         D: Down;         TG: Tagged;         UT: Untagged;
MP: Vlan-mapping;               ST: Vlan-stacking;
#: ProtocolTransparent-vlan;    *: Management-vlan;
MAC-LRN: MAC-address learning;  STAT: Statistic;
BC: Broadcast; MC: Multicast;   UC: Unknown-unicast;
FWD: Forward;  DSD: Discard;
--------------------------------------------------------------------------------
---

VID          Ports
--------------------------------------------------------------------------------
---
```

```
   1          UT:Eth-Trunk2(U)    40GE1/0/1(D)     40GE1/0/2(D)     40GE1/0/3(D)
                 40GE1/0/4(D)     40GE1/0/5(D)     40GE1/0/6(D)     10GE1/0/1(D)
                 10GE1/0/2(D)     10GE1/0/3(U)     10GE1/0/4(U)     10GE1/0/5(D)
                 10GE1/0/6(D)     10GE1/0/7(D)     10GE1/0/8(D)     10GE1/0/9(D)
                 10GE1/0/11(U)    10GE1/0/12(U)    10GE1/0/13(U)    10GE1/0/14(D)
                 10GE1/0/16(D)    10GE1/0/19(D)    10GE1/0/20(D)    10GE1/0/21(D)
                 10GE1/0/22(D)    10GE1/0/23(D)    10GE1/0/24(D)
              TG:10GE1/0/10(U)
4004          TG:Eth-Trunk2(U)    10GE1/0/10(U)
4005          TG:Eth-Trunk2(U)    10GE1/0/10(U)
4006          TG:Eth-Trunk2(U)    10GE1/0/10(U)
4007          UT:10GE1/0/10(U)
              TG:Eth-Trunk2(U)
4008          TG:Eth-Trunk2(U)    10GE1/0/10(U)
4009          TG:Eth-Trunk2(U)    10GE1/0/10(U)
4033          TG:Eth-Trunk2(U)    10GE1/0/10(U)
4034          TG:Eth-Trunk2(U)    10GE1/0/10(U)
4035          TG:Eth-Trunk2(U)    10GE1/0/10(U)
4036          TG:Eth-Trunk2(U)    10GE1/0/10(U)

VID  Type     Status  Property  MAC-LRN STAT    BC  MC  UC  Description
--------------------------------------------------------------------------------
---
   1 common   enable  default   enable  disable FWD FWD FWD VLAN 0001
4004 common   enable  default   enable  disable FWD FWD FWD VLAN 4004
4005 common   enable  default   enable  disable FWD FWD FWD VLAN 4005
4006 common   enable  default   enable  disable FWD FWD FWD VLAN 4006
4007 common   enable  default   enable  disable FWD FWD FWD VLAN 4007
4008 common   enable  default   enable  disable FWD FWD FWD VLAN 4008
4009 common   enable  default   enable  disable FWD FWD FWD VLAN 4009
4033 common   enable  default   enable  disable FWD FWD FWD VLAN 4033
4034 common   enable  default   enable  disable FWD FWD FWD VLAN 4034
4035 common   enable  default   enable  disable FWD FWD FWD VLAN 4035
4036 common   enable  default   enable  disable FWD FWD FWD VLAN 4036
```

VLANs are allowed on specific interfaces. VLAN 4007 is untag on 10GE 1/0/10.

1.3 Thinking Questions

1. What is the benefit of link aggregation?
2. Should the Eth-Trunk ID keep the same on 2 swithes?
3. If the LACP modes are mismatch in two sides, what would the stauts be?

2 Lab Guide for DC Layer 3 Network

2.1 Introduction

2.1.1 About this lab

This chapter is about layer 3 DCN configuration. You will learn to configure SDN underlay network.

2.1.2 Objectives

- Understand how to configure underlay network.
- Understand basic configuration of OSPF.
- Understand basic configuration of BGP.

2.1.3 Topoloy and Description

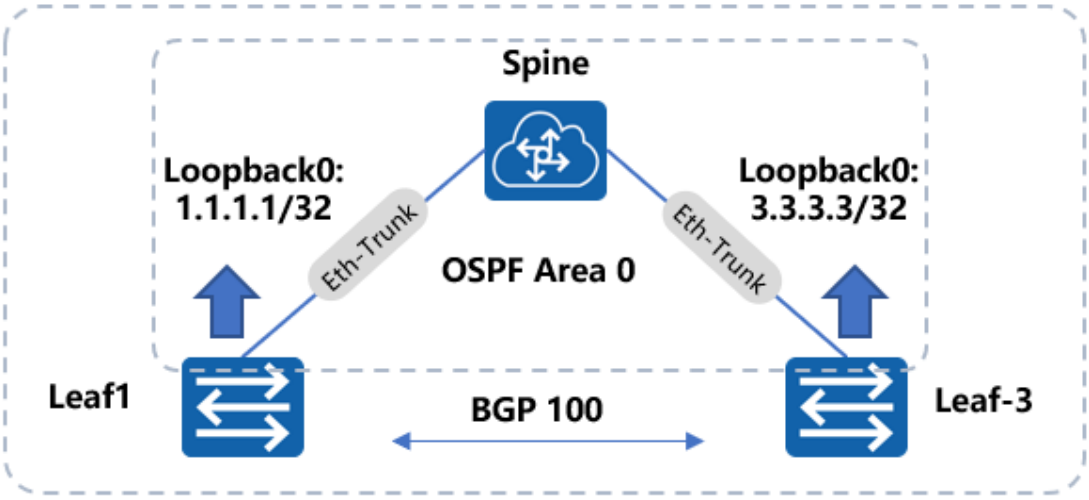


Table 2-1 数据中心三层网络实验拓扑图

2.1.4 Network Planning

Interface Loopback 0 on Leaf1 and Leaf3 functions as VXLAN tunnel endpoint. OSPF makes VXLAN tunnel reachable. BGP EVPN peer relationship is required between Leaf1 and Leaf3 as SDN underlay.

Figure 2-1 L3 interface

Switch	Interface	IP address
Leaf1	Eth-Trunk1	10.1.12.1/30
	Loopback0	1.1.1.1/32
	Meth0/0/0	172.18.100.7/24
Spine	Eth-Trunk1	10.1.12.2/30
	Eth-Trunk2	10.1.23.1/30
Leaf3	Eth-Trunk1	10.1.23.2/30
	Loopback0	3.3.3.3/32
	Meth0/0/0	172.18.100.2/24

2.2 Configuration

2.2.1 Roadmap

1. Configure IP addresses of all swithes.
2. Advertise subnets in OSPF area 0.
3. Establish BGP EVPN relationship and configure VTEP.

2.2.2 Configure IP Addresses

Base on the planning table, configure IP addresses on Leaf1.

```
[Leaf1]interface Eth-Trunk 1
[Leaf1-Eth-Trunk1]undo portswitch
[Leaf1-Eth-Trunk1]ip address 10.1.12.1 30
```

```
[Leaf1-Eth-Trunk1]quit
[Leaf1]interface LoopBack 0
[Leaf1-LoopBack0]ip address 1.1.1.1 32
[Leaf1-LoopBack0]quit
[Leaf1]interface MEth 0/0/0
[Leaf1-MEth0/0/0]ip address 172.18.100.7 24
[Leaf1-MEth0/0/0]quit
```

#Spine and Leaf3 are the similar.

2.2.3 IP Address configuration Verification

Step 1 **Display ip interfaces on Leaf1**

```
[Leaf1]display ip interface brief
*down: administratively down
!down: FIB overload down
^down: standby
(l): loopback
(s): spoofing
(d): Dampening Suppressed
The number of interface that is UP in Physical is 4
The number of interface that is DOWN in Physical is 0
The number of interface that is UP in Protocol is 4
The number of interface that is DOWN in Protocol is 0
Interface                   IP Address/Mask    Physical Protocol VPN
Eth-Trunk1                  10.1.12.1/30       up       up       --
LoopBack0                   1.1.1.1/32         up       up(s)    --
MEth0/0/0                   172.18.100.7/24    up       up       --
NULL0                       unassigned         up       up(s)    --
```

Step 2 **Ping test on Spine**

```
[Spine]ping 10.1.12.1
  PING 10.1.12.1: 56  data bytes, press CTRL_C to break
    Reply from 10.1.12.1: bytes=56 Sequence=1 ttl=254 time=1 ms
    Reply from 10.1.12.1: bytes=56 Sequence=2 ttl=254 time=1 ms
    Reply from 10.1.12.1: bytes=56 Sequence=3 ttl=254 time=1 ms
    Reply from 10.1.12.1: bytes=56 Sequence=4 ttl=254 time=1 ms
    Reply from 10.1.12.1: bytes=56 Sequence=5 ttl=254 time=1 ms

  --- 10.1.12.1 ping statistics ---
    5 packet(s) transmitted
    5 packet(s) received
    0.00% packet loss
    round-trip min/avg/max = 1/1/1 ms
 [Spine]ping 10.1.23.2
  PING 10.1.23.2: 56  data bytes, press CTRL_C to break
    Reply from 10.1.23.2: bytes=56 Sequence=1 ttl=254 time=2 ms
    Reply from 10.1.23.2: bytes=56 Sequence=2 ttl=254 time=1 ms
    Reply from 10.1.23.2: bytes=56 Sequence=3 ttl=254 time=1 ms
    Reply from 10.1.23.2: bytes=56 Sequence=4 ttl=254 time=2 ms
    Reply from 10.1.23.2: bytes=56 Sequence=5 ttl=254 time=1 ms
```

```
--- 10.1.23.2 ping statistics ---
  5 packet(s) transmitted
  5 packet(s) received
  0.00% packet loss
  round-trip min/avg/max = 1/1/2 ms
```

Reachable.

2.2.4 OSPF Configuration

#Leaf1

```
[Leaf1]ospf
[Leaf1-ospf-1]area 0
[Leaf1-ospf-1-area-0.0.0.0]network 10.1.12.0 0.0.0.3
[Leaf1-ospf-1-area-0.0.0.0]network 1.1.1.1 0.0.0.0
```

#Spine

```
[Spine]ospf
[Spine-ospf-1]area 0
[Spine-ospf-1-area-0.0.0.0]network 10.1.12.0 0.0.0.3
[Spine-ospf-1-area-0.0.0.0]network 10.1.23.0 0.0.0.3
```

#Leaf3

```
[Leaf3]ospf
[Leaf3-ospf-1]area 0
[Leaf3-ospf-1-area-0.0.0.0]network 10.1.23.0 0.0.0.3
[Leaf3-ospf-1-area-0.0.0.0]network 3.3.3.3 0.0.0.0
```

2.2.5 OSPF Configuration Verification

Step 1 **Check OSPF neighbor relationship.**

```
[Spine]display ospf peer brief
OSPF Process 1 with Router ID 172.18.100.8
                  Peer Statistic Information
Total number of peer(s): 2
 Peer(s) in full state: 2
--------------------------------------------------------------------------------
 Area Id          Interface                  Neighbor id          State
 0.0.0.0          Eth-Trunk1                 172.18.100.7         Full
 0.0.0.0          Eth-Trunk2                 192.168.146.1        Full
--------------------------------------------------------------------------------
```

Full mean successful neighbor relationship.

Step 2 **Ping test from Leaf1 to Leaf3.**

```
[Leaf1]ping -a 1.1.1.1 3.3.3.3
  PING 3.3.3.3: 56  data bytes, press CTRL_C to break
    Reply from 3.3.3.3: bytes=56 Sequence=1 ttl=253 time=2 ms
    Reply from 3.3.3.3: bytes=56 Sequence=2 ttl=253 time=2 ms
    Reply from 3.3.3.3: bytes=56 Sequence=3 ttl=253 time=1 ms
    Reply from 3.3.3.3: bytes=56 Sequence=4 ttl=253 time=2 ms
    Reply from 3.3.3.3: bytes=56 Sequence=5 ttl=253 time=1 ms

  --- 3.3.3.3 ping statistics ---
    5 packet(s) transmitted
    5 packet(s) received
    0.00% packet loss
    round-trip min/avg/max = 1/1/2 ms
```

2.2.6 BGP EVPN and VXLAN Configuration

Establish BGP EVPN peer relationship over Loopback intefaces on Leaf1 and Leaf3. AS number is 100. Configure distributed gateway, advertising IRB route in EVPN.

Step 1 **Configuration on Leaf1**

```
[Leaf1]evpn-overlay enable                                  #enable EVPN overlay
[Leaf1]bgp 100
[Leaf1-bgp]peer 3.3.3.3 as-number 100
[Leaf1-bgp]peer 3.3.3.3 connect-interface loopBack 0
[Leaf1-bgp]l2vpn-family evpn
[Leaf1-bgp-af-evpn]peer 3.3.3.3 enable                #evpn address family
[Leaf1-bgp-af-evpn]peer 3.3.3.3 advertise irb         #advertise IRB route
```

Step 2 **Configuration on Leaf3**

```
[Leaf3]evpn-overlay enable
[Leaf3]bgp 100
[Leaf3-bgp]peer 1.1.1.1 as-number 100
[Leaf3-bgp]peer 1.1.1.1 connect-interface loopBack 0
[Leaf3-bgp]l2vpn-family evpn
[Leaf3-bgp-af-evpn]peer 1.1.1.1 enable
Warning: This operation will reset the peer session. Continue? [Y/N]:y
[Leaf3-bgp-af-evpn]peer 1.1.1.1 advertise irb
```

Step 3 **Configure VXLAN tunnel**

#Leaf1 NVE configuration

```
[Leaf1]interface Nve 1
Info: Ensure that the IP addresses and MAC addresses of the NVE interfaces on
Devices are the same, as they are dual-active gateways
 using M-LAG.
[Leaf1-Nve1]source 1.1.1.1
```

#Leaf3

```
[Leaf3]interface Nve 1
[Leaf3-Nve1]source 3.3.3.3
```

2.2.7 BGP EVPN Configuration Verification

Check BGP EVPN peer relationship.

```
[Leaf1]display bgp evpn peer
 BGP local router ID        : 172.18.100.7
 Local AS number            : 100
 Total number of peers      : 1
 Peers in established state : 1

  Peer            V          AS  MsgRcvd  MsgSent  OutQ  Up/Down       State
PrefRcv
  3.3.3.3         4         100        9        9     0 00:04:20 Established
0
```

Peer established.

2.3 Thinking Questions

1. Why in the roadmap we configure BGP EVPN in the last?
2. What are the functions of LoopBack 0?

3 Lab Guide for Agile Controller-DCN

3.1 Introduction

3.1.1 About this lab

This chapter is about the opertions on SDN controller Agile Controller-DCN.

3.1.2 Objectives

- Understand how SDN controller take over devices.
- Understand NETCONF and SNMP configurations.
- Understand SDN service models

3.1.3 Topoloy and Description

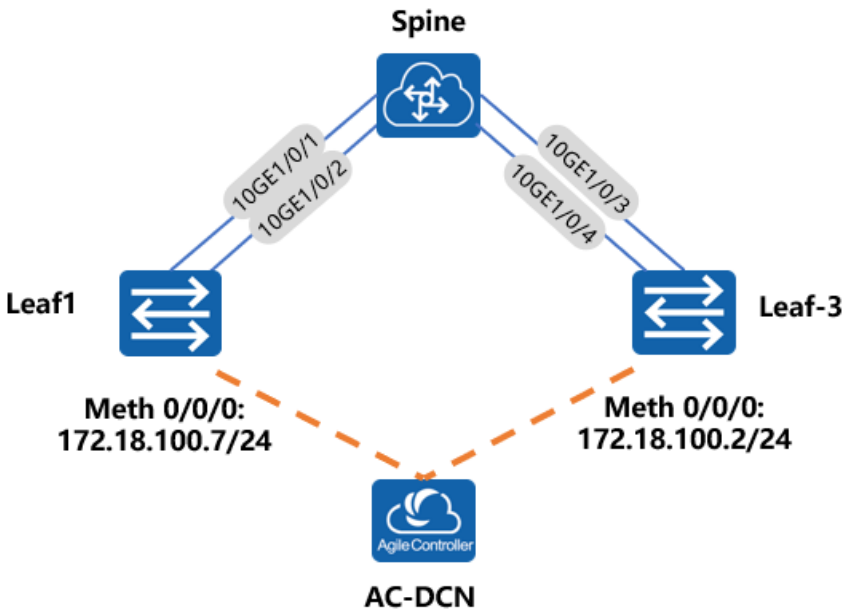


Table 3-1 SDN Topology

3.1.4 Network Planning

Before Agile Controller-DCN automaticly delivery network service, physical switches should be taken over by it. There are two southbound protocols required in this timing, SNMP and NETCONF. Parameters are shown as follows.

Figure 3-1 Southbound protocol parameters

Prameter	Value	Desciption
SNMP Username	admin	SNMP V3
SNMP Authentication protocol and Key	HMAC-SHA/Huawei12#$	
SNMP Encryption Algorithm and Key	AES_128/Huawei12#$	
NETCONF Username	netconf-admin	
NETCONF Password	Huawei12#$	

3.2 Configuration

3.2.1 Roadmap

1. Configure SNMP and NETCONF on swithes.
2. AC-DCN discover switches and delivery services.

3.2.2 SNMP Configuration

Step 1 **Configure SNMP User and user group on Leaf1.**

#SNMP user is admin and user group is dc-admin.

```
[Leaf1]snmp-agent usm-user v3 admin group dc-admin
```

Step 2 **Set SNMP authentication protocol to SHA，Encryption Algorithm to AES128.**

#Password is Huawei12#$.

```
[Leaf1]snmp-agent usm-user v3 admin authentication-mode sha
Please configure the authentication password (8-255)
```

```
Enter Password:
Confirm Password:
[Leaf1]snmp-agent usm-user v3 admin privacy-mode aes128
Please configure the privacy password (8-255)
Enter Password:
Confirm Password:
Warning: The privacy and authentication passwords are the same, which is
insecure. It is recommended that the privacy and authentication passwords be
different.
```

Step 3 **Configure AC-DCN specified MIB.**

#MIB view is iso-view. OID node is iso.

```
[Leaf1]snmp-agent mib-view included nt iso
[Leaf1]snmp-agent mib-view included rd iso
[Leaf1]snmp-agent mib-view included wt iso
[Leaf1]snmp-agent mib-view included iso-view iso
[Leaf1]snmp-agent group v3 dc-admin privacy read-view rd write-view wt
notify-view nt
```

3.2.3 NETCONF Configuration

Based on planning, NETCONF username is netconf-admin, password is Huawei12#$.

Step 1 **Create NETCONF user**

#NETCONF is based on AAA and SSH.

```
[Leaf1]aaa                              #AAA account
[Leaf1-aaa]local-user netconf-admin password cipher Huawei12#$
Info: A new user is added.
[Leaf1-aaa]local-user netconf-admin service-type ssh
Info: The user netconf's password has been changed to be irreversible.
[Leaf1-aaa]local-user netconf-admin level 3
[Leaf1-aaa]quit
[Leaf1]user-interface vty 0 4       #allow SSH users through VTY
[Leaf1-ui-vty0-4] authentication-mode aaa
Warning: The level of the user-interface(s) will be the default level of AAA
users, please check whether it is correct.
[Leaf1-ui-vty0-4] protocol inbound ssh
[Leaf1-ui-vty0-4]quit
```

Step 2 **Create local RSA key pair**

```
[Leaf1]rsa local-key-pair create
The key name will be:Leaf1_Host
The range of public key size is (2048 ~ 2048).
NOTE: Key pair generation will take a short while.
```

Step 3 **Configure SSH parameters**

```
[Leaf1]ssh user netconf authentication-type password
Info: Succeeded in adding a new SSH user.
[Leaf1]ssh user netconf service-type snetconf
[Leaf1]snetconf server enable
Info: Succeeded in starting the SNETCONF server on SSH port 22.
```

Default SSH port is 22. Configurations on Leaf3 are the same.

3.2.4 AC-DCN configuration

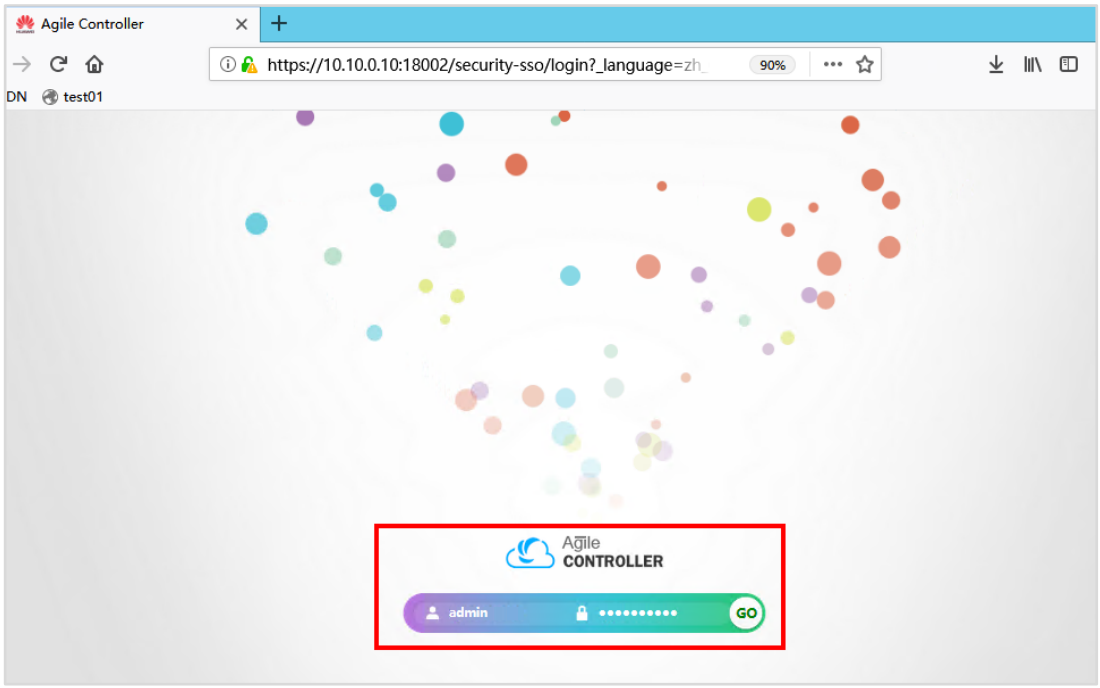
Make sure the reachability from devices to AC-DCN. Then login AC-DCN discover devices.

#172.18.100.7 is the management ip address of Leaf1. 10.10.0.10 is the IP addresses of AC-DCN.

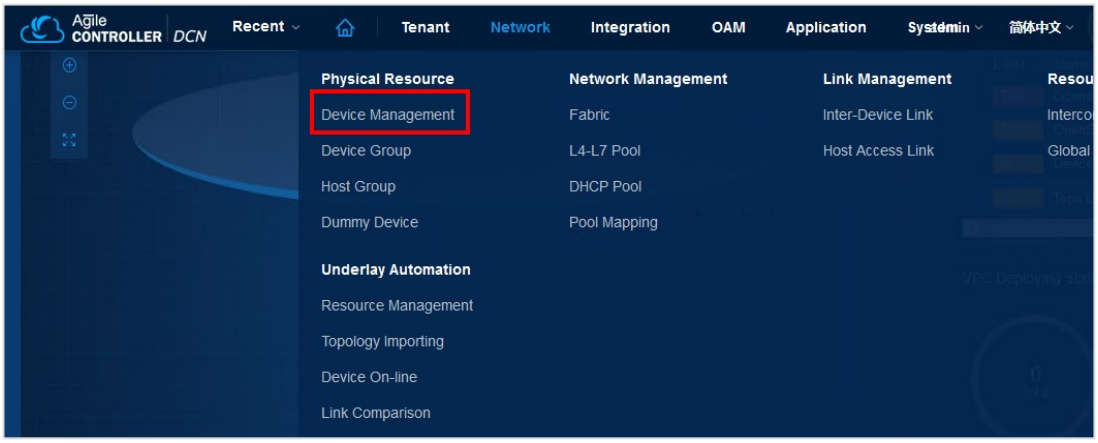
```
[Leaf1]ping -a 172.18.100.7 10.10.0.10
  PING 10.10.0.10: 56  data bytes, press CTRL_C to break
    Reply from 10.10.0.10: bytes=56 Sequence=1 ttl=63 time=1 ms
    Reply from 10.10.0.10: bytes=56 Sequence=2 ttl=63 time=1 ms
    Reply from 10.10.0.10: bytes=56 Sequence=3 ttl=63 time=1 ms
    Reply from 10.10.0.10: bytes=56 Sequence=4 ttl=63 time=1 ms
    Reply from 10.10.0.10: bytes=56 Sequence=5 ttl=63 time=1 ms

  --- 10.10.0.10 ping statistics ---
    5 packet(s) transmitted
    5 packet(s) received
    0.00% packet loss
    round-trip min/avg/max = 1/1/1 ms
```

Step 1 **AC-DCN take over devices.**

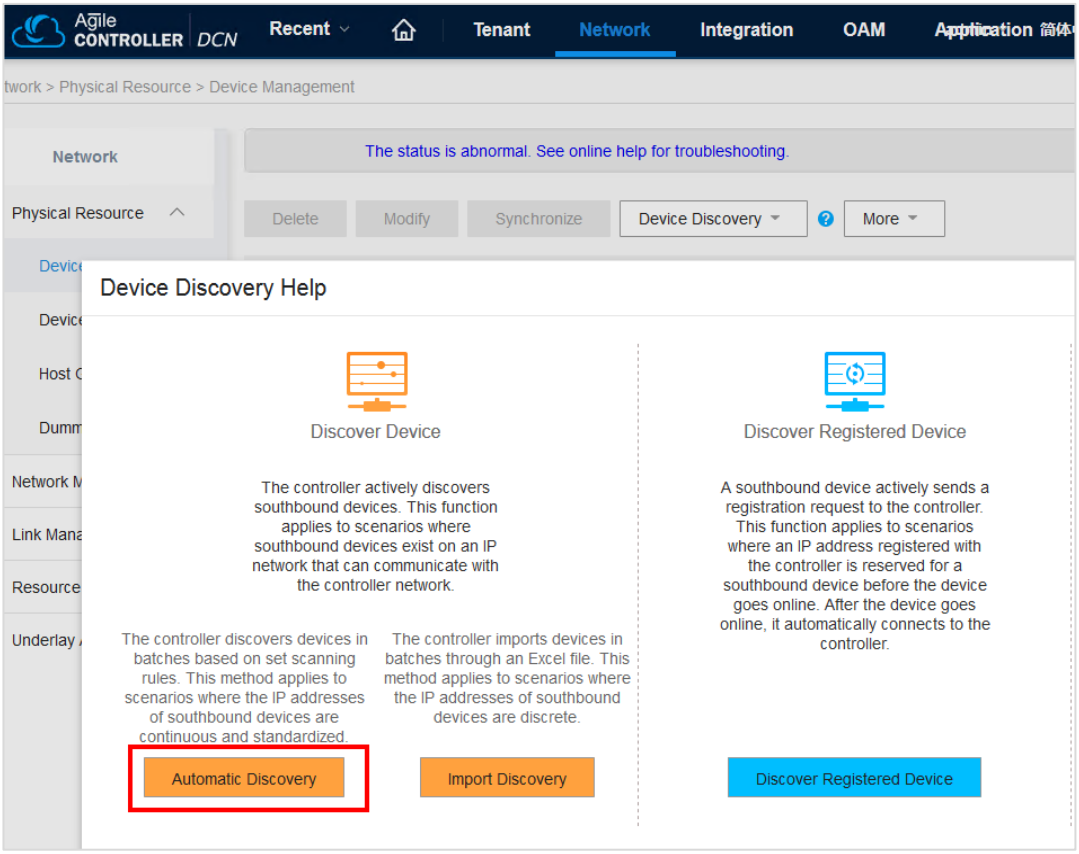
#login AC-DCN with username admin password Huawei@123.



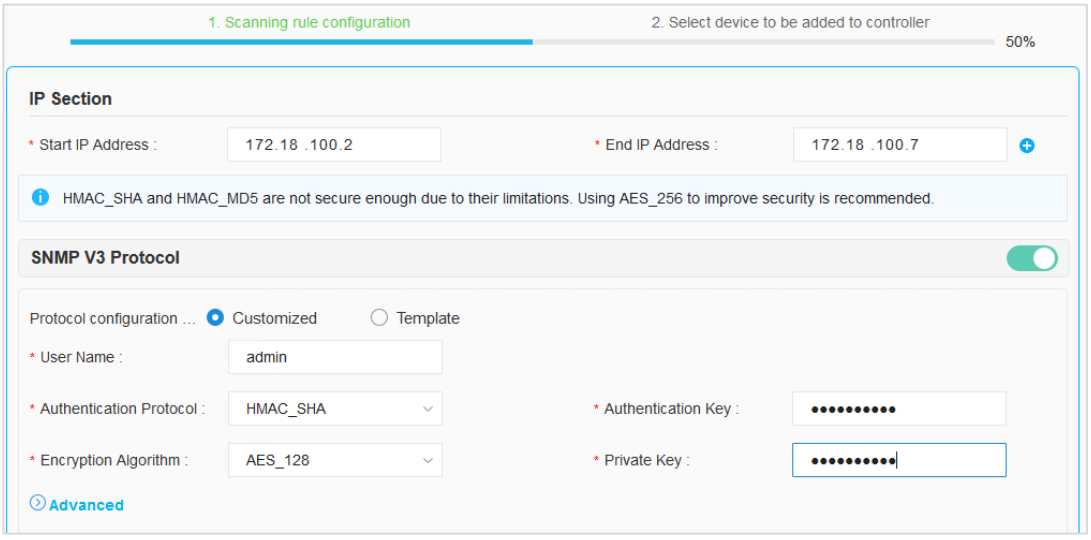
#点击网络-设备管理，跳转设备发现页面。



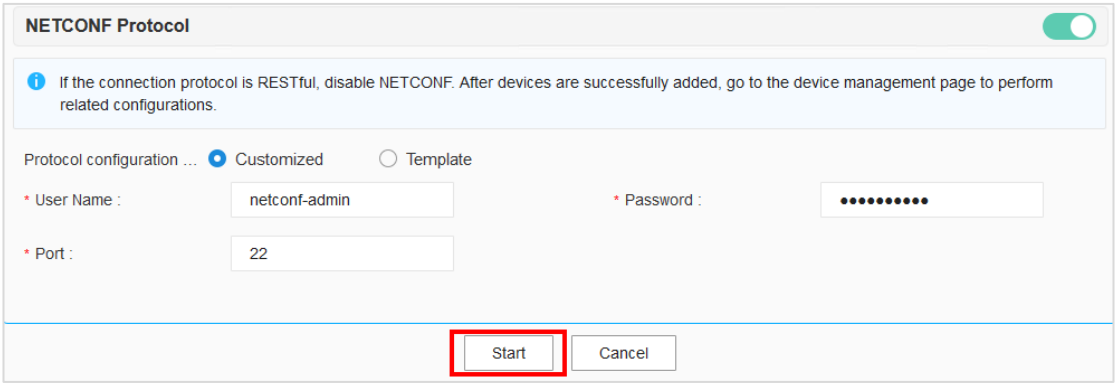
#Click Automatic discovery



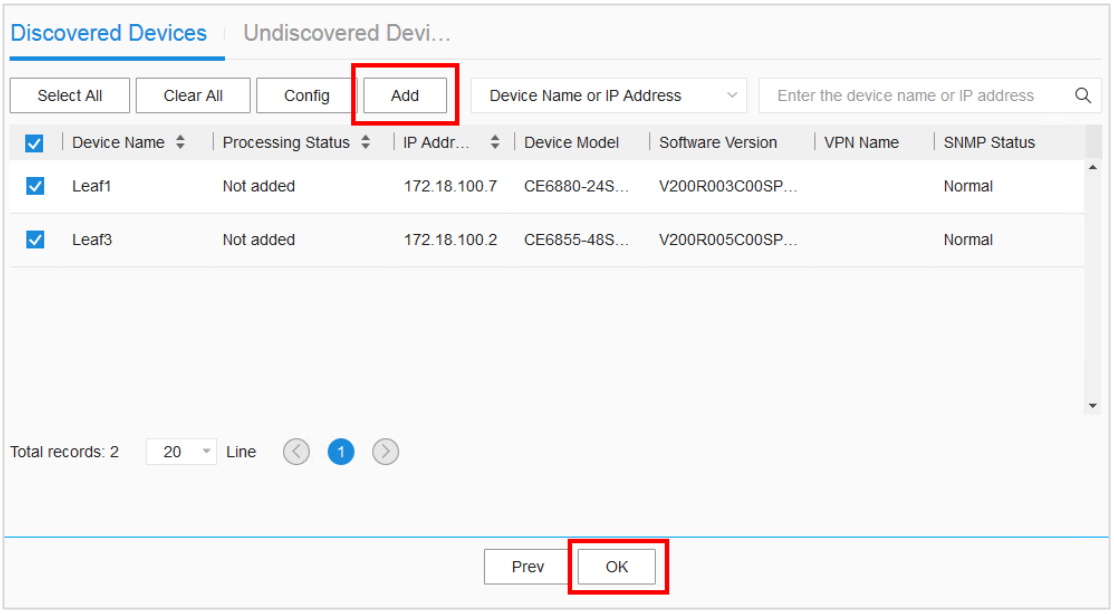
#Enter IP Section in devices management IP addresses, SNMP parameters.



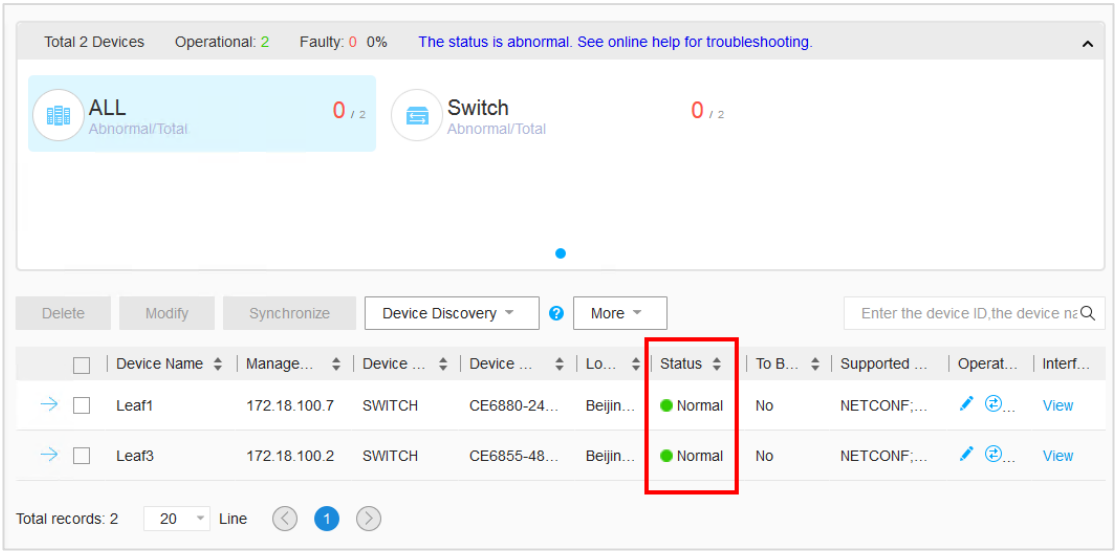
#Enter NETCONF parameters configured in underlay devices. Click Start.



#Devices discovered. Click Add and OK. If failed, please check IP connection and SNMP configuration.

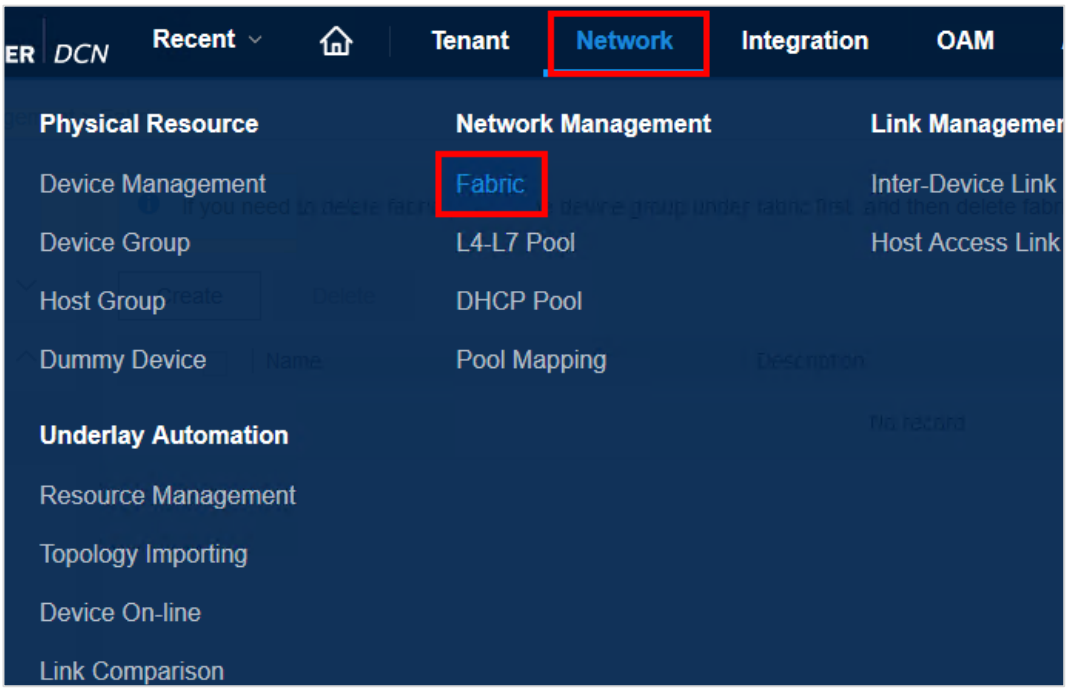


#Make sure devices are in Normal status. If not, please check NETCONF configuration.

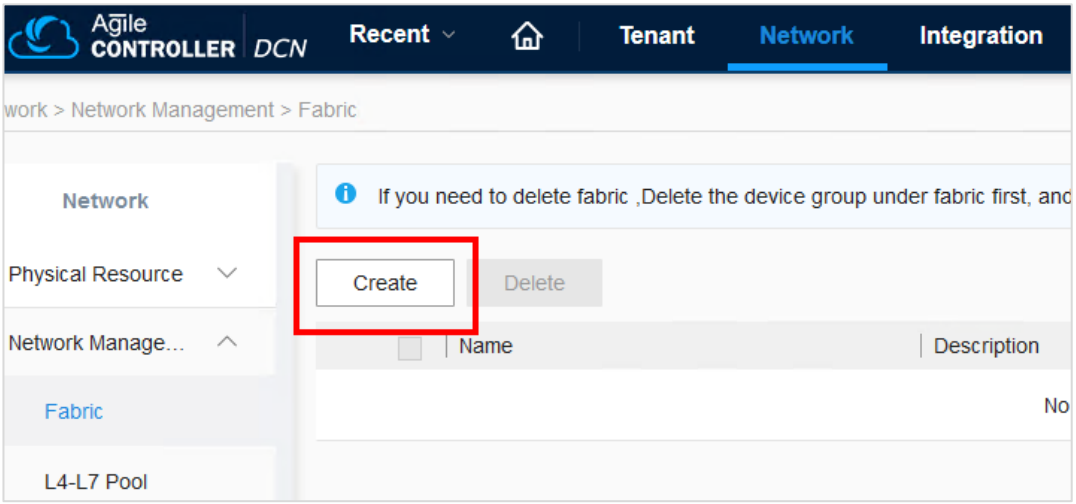


Step 2 **Fabric Creation**

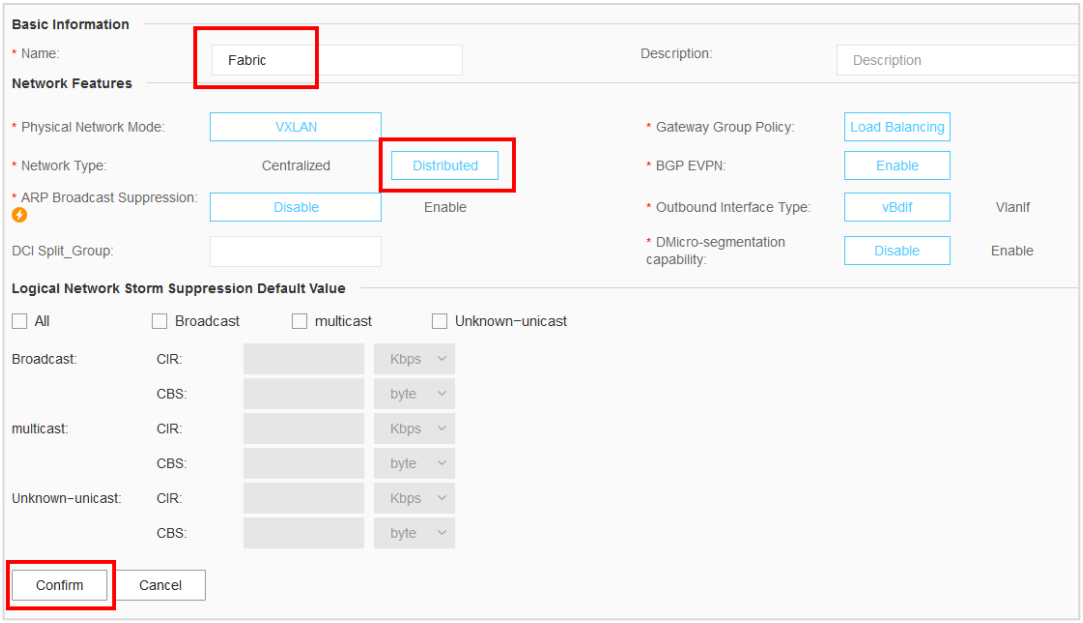
Click Network-Fabric.



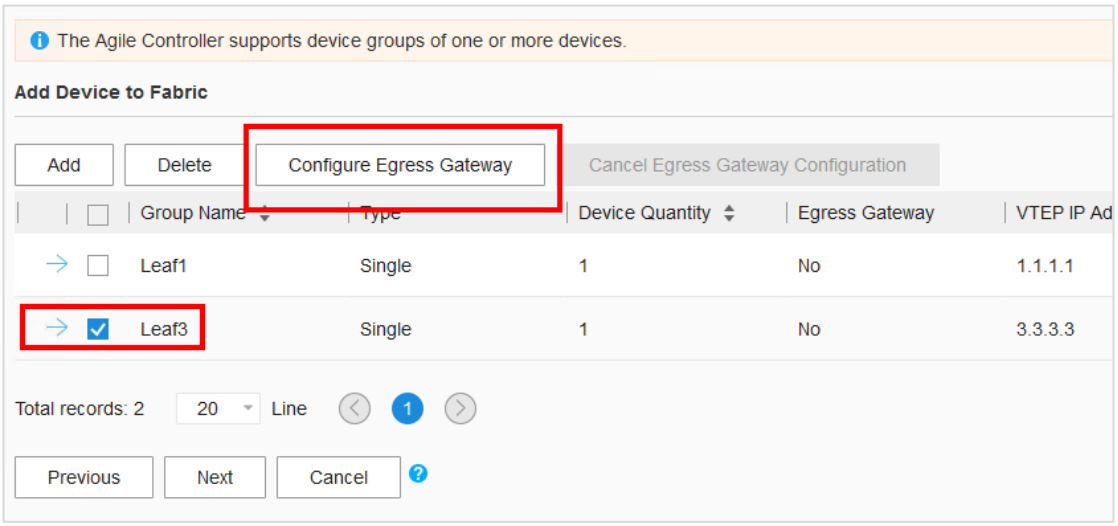
#Create Fabric and add devices. Network services will be delivered based on Fabric.



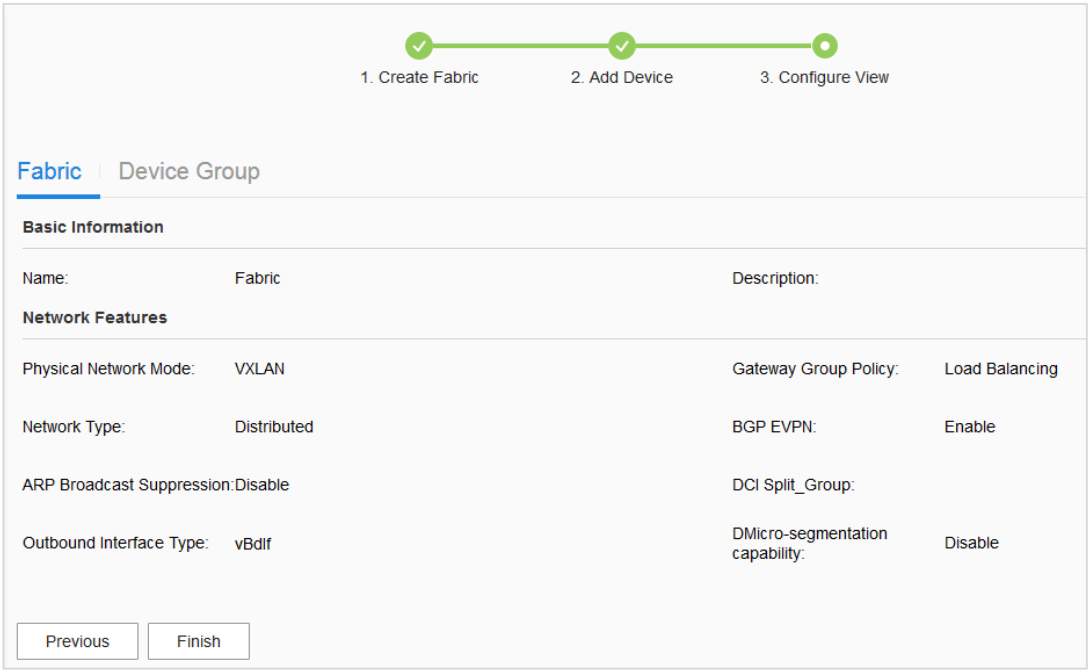
#Choose Fabric parameters which should be the same as underlay configuration. Choose Distributed here, for IRB routes are configured in BGP EVPN.



#Set Leaf3 as egress gateway. Click Next.

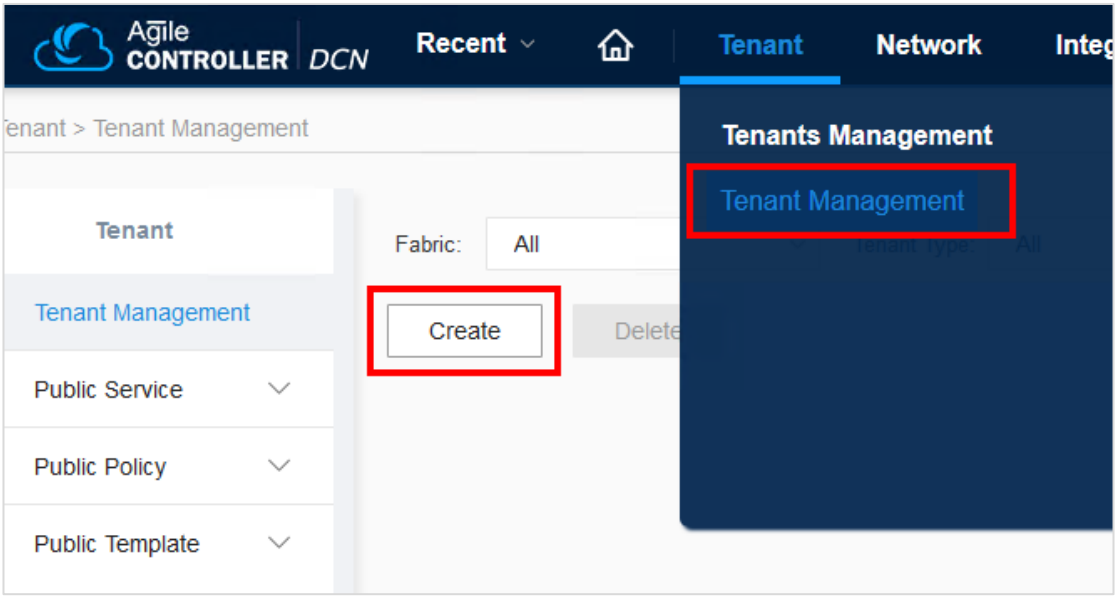


#Click Finish.

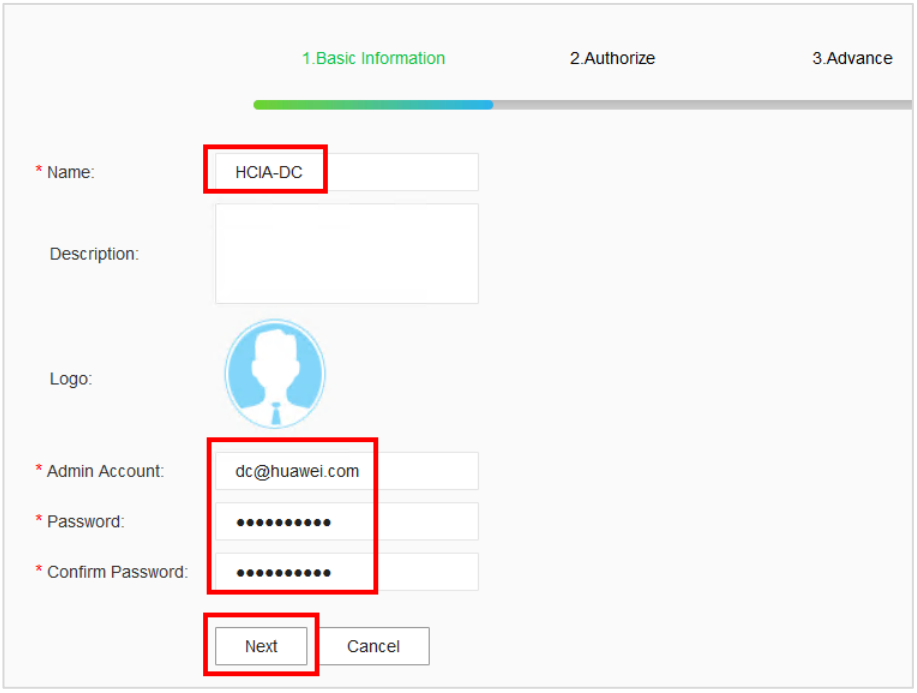


Step 3 **Tenant Creation**

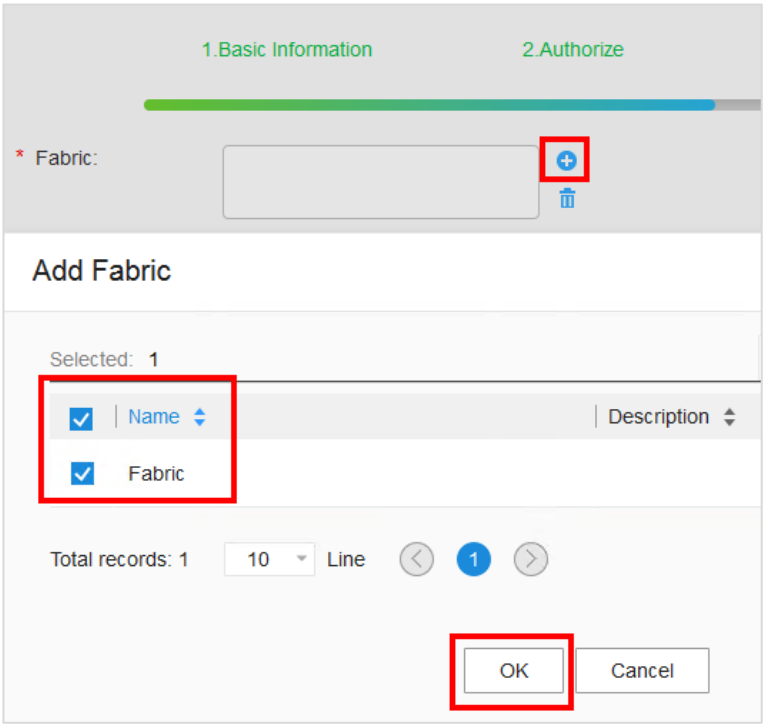
#Click Tenant Management, then click Create.



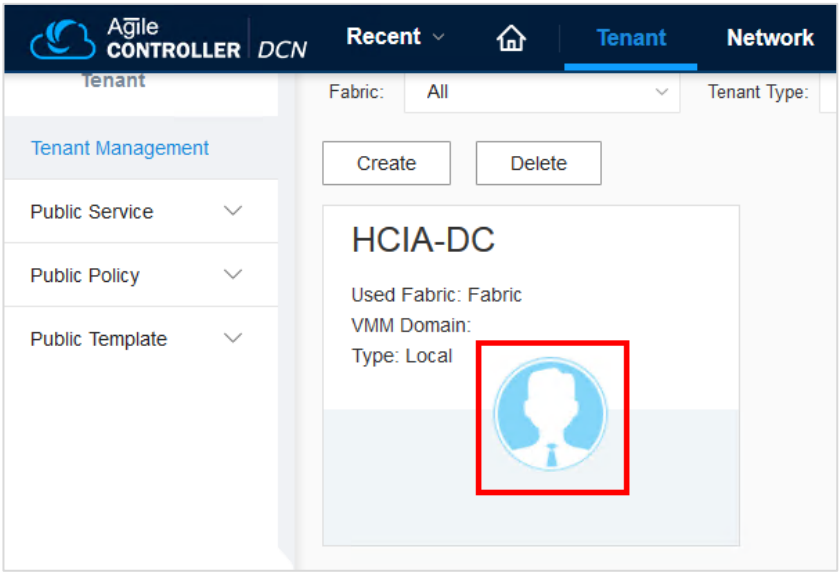
#Set Name in HCIA-DC. Enter your own account and password.



#Add Fabric into tenant.

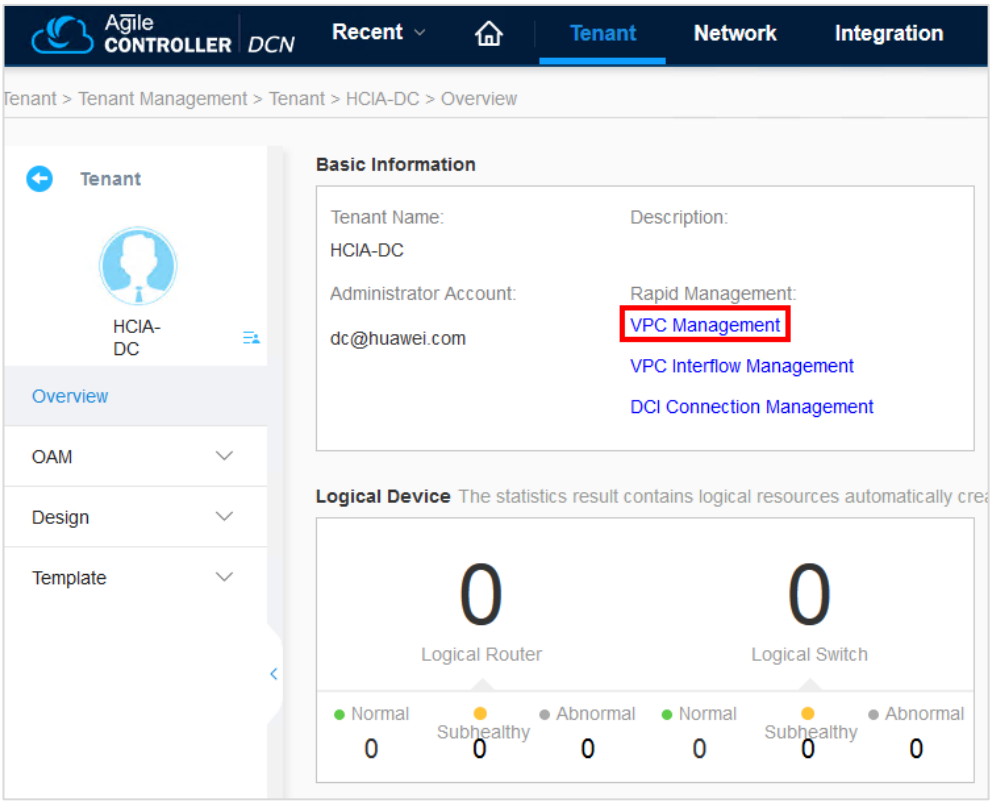


#Click OK until tenant created. Click the picture of tenant, start orchestration.

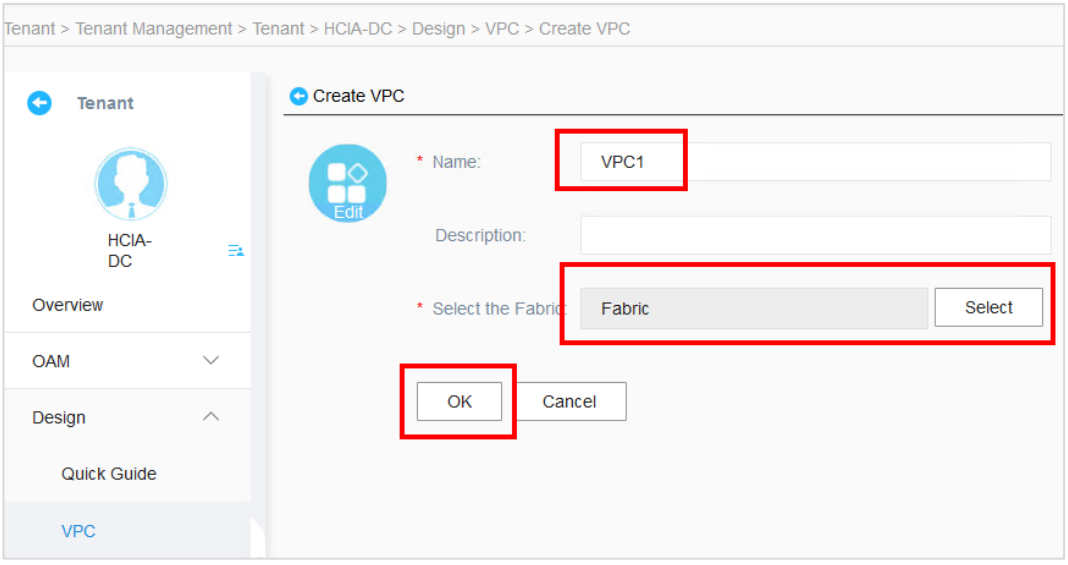


Step 4 **VPC Creation**

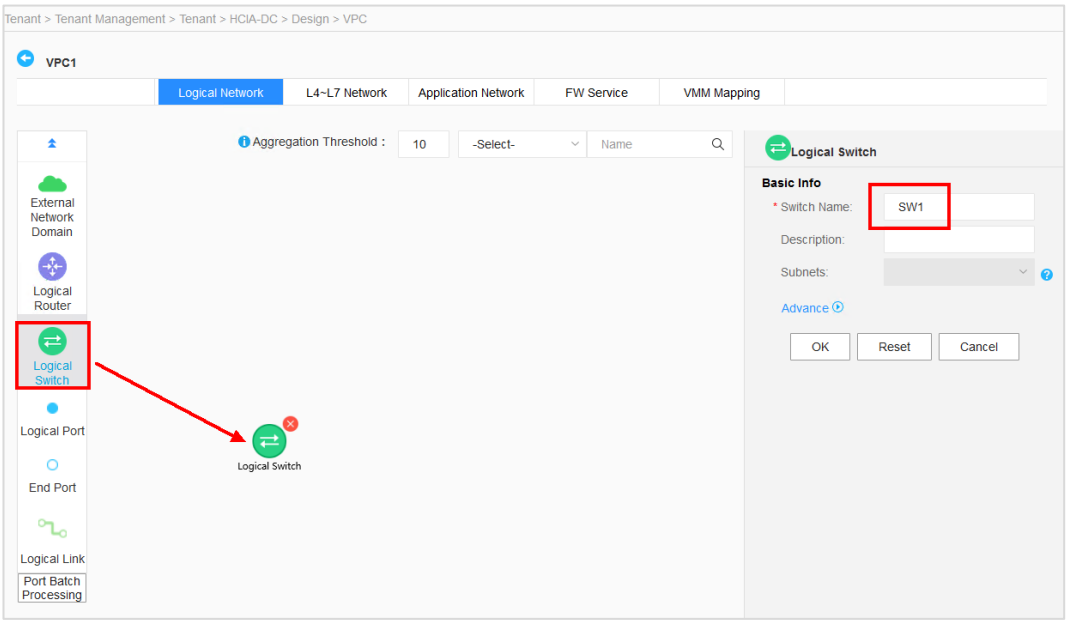
#Click VPC Management



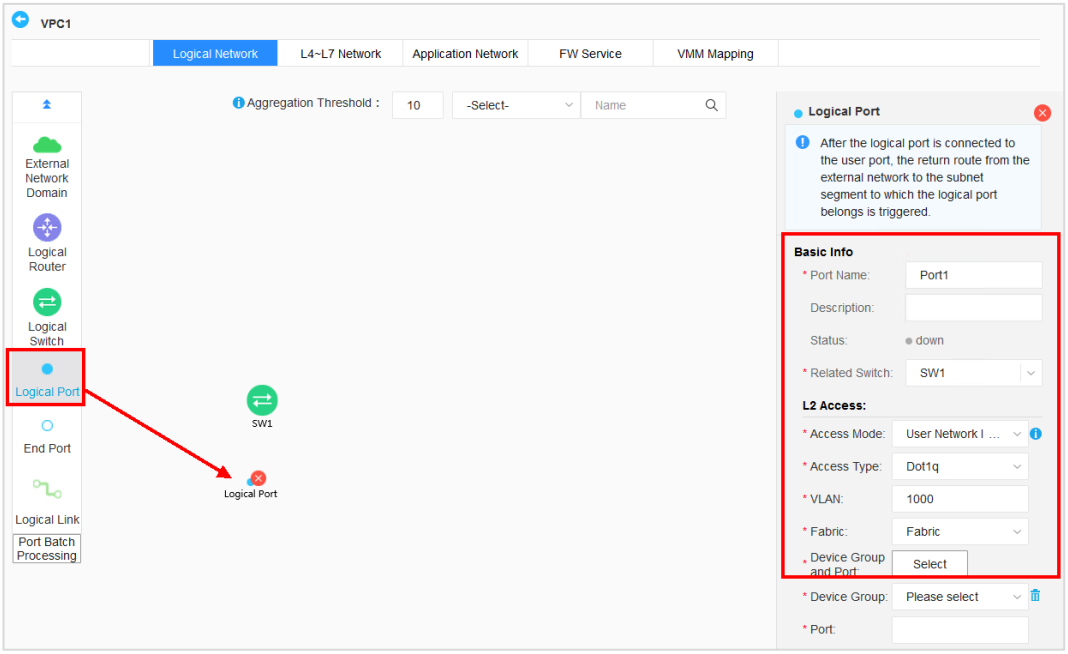
#Enter VPC Name in VPC1 and associtate a Fabric.



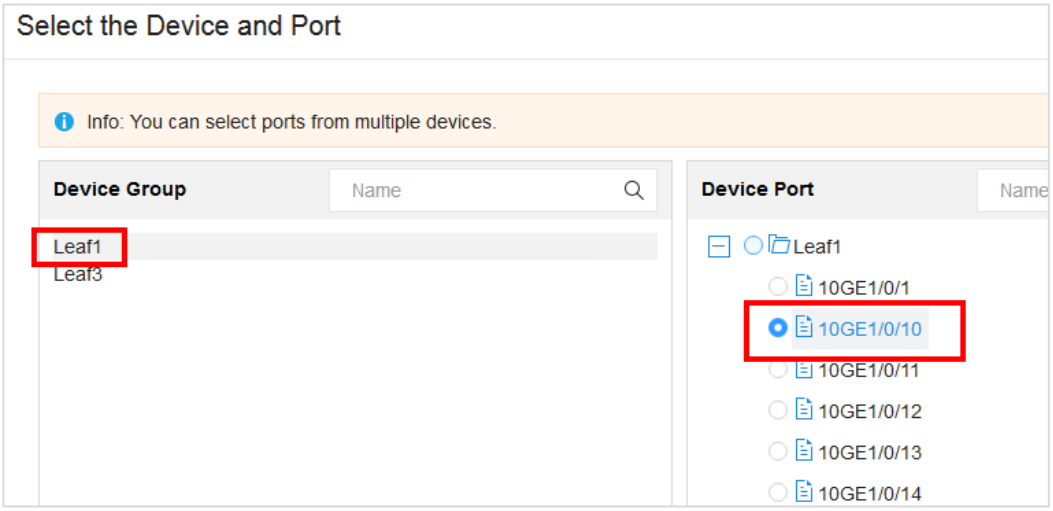
#Drag Logical Switch into blank area to create it. Enter Switch Name and other parameters in right bar.



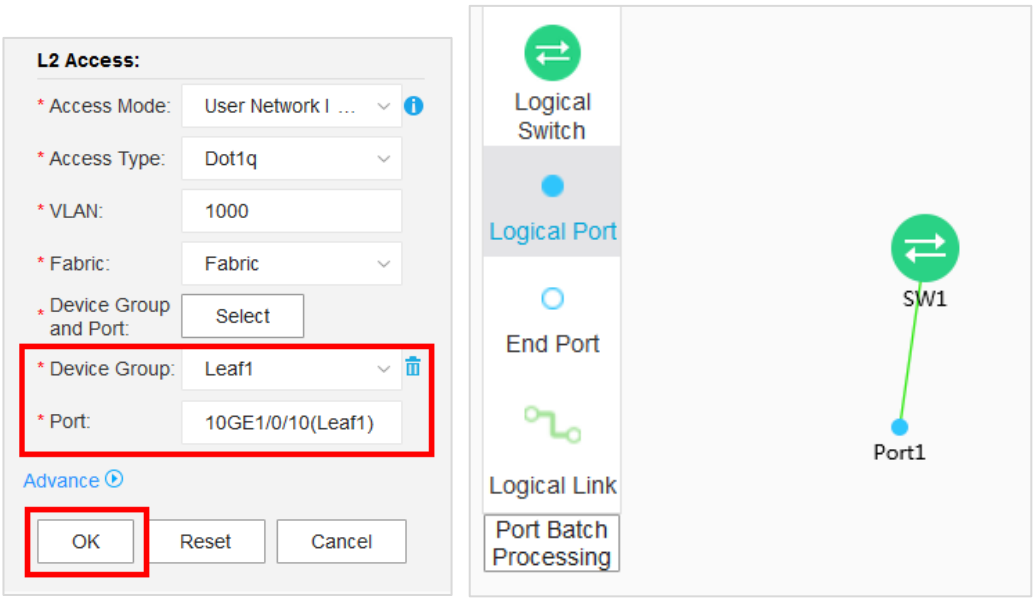
#Drag Logical Port into blank area. Enter its parameters in right bar based on planning.



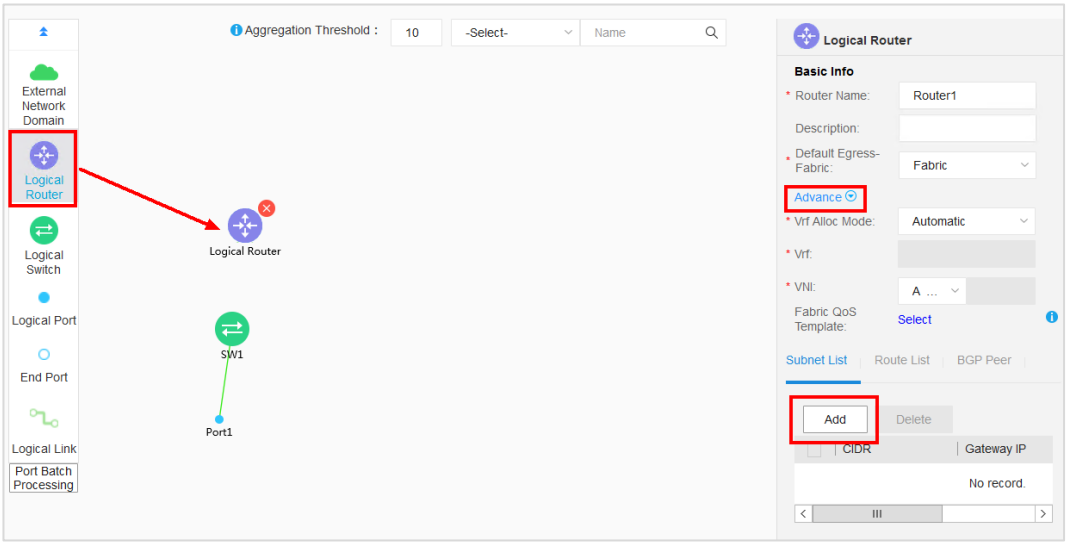
#Simulate user traffic accessing from interface 10GE 1/0/10 with VLAN 1000.



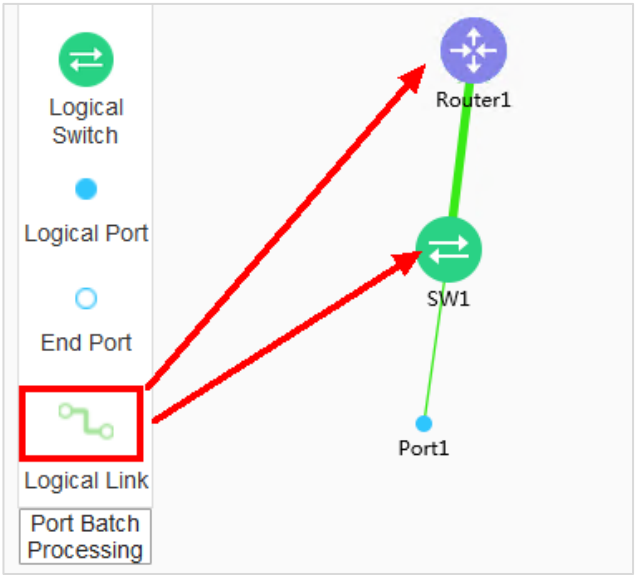
#Click Ok, then the logical port connects logcal switch.



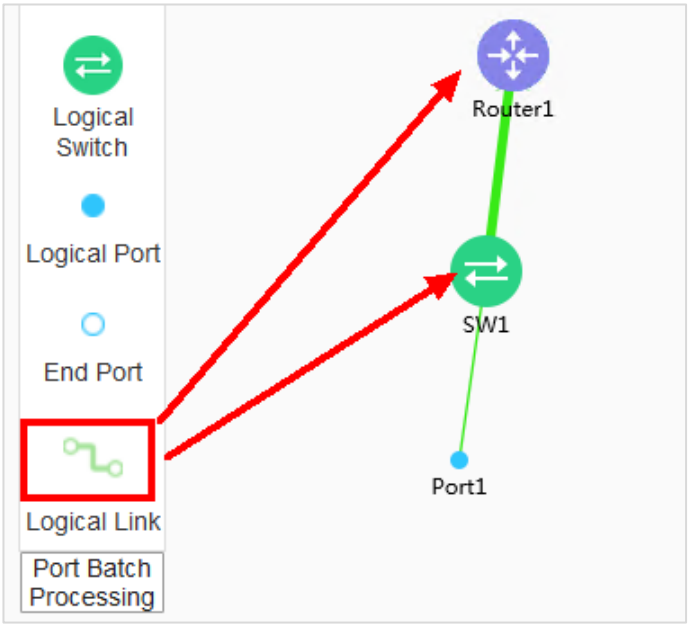
#Drag Logial Router into blank area. Set router parameters like Name, subnet and vrf.



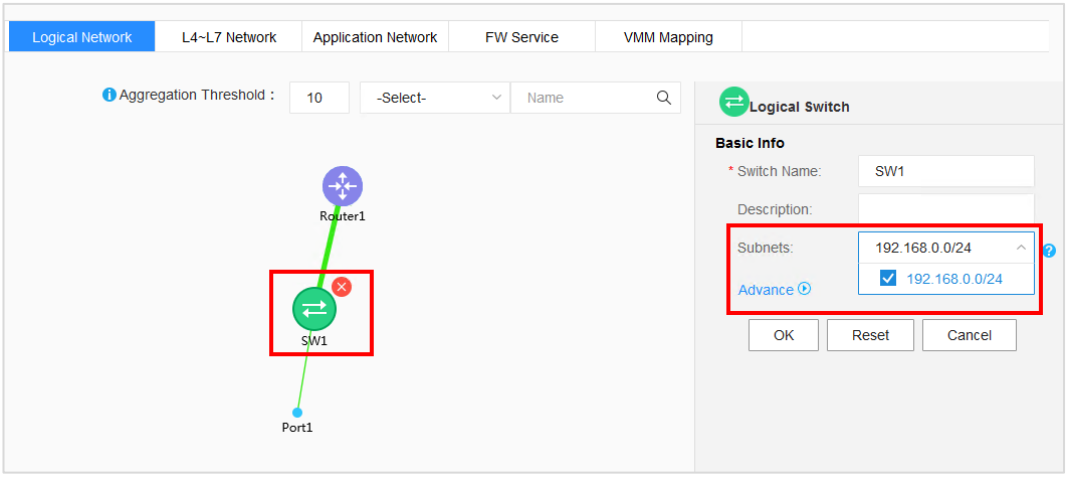
#Add a subnet 192.168.0.0/24 and gateway 192.168.0.1.



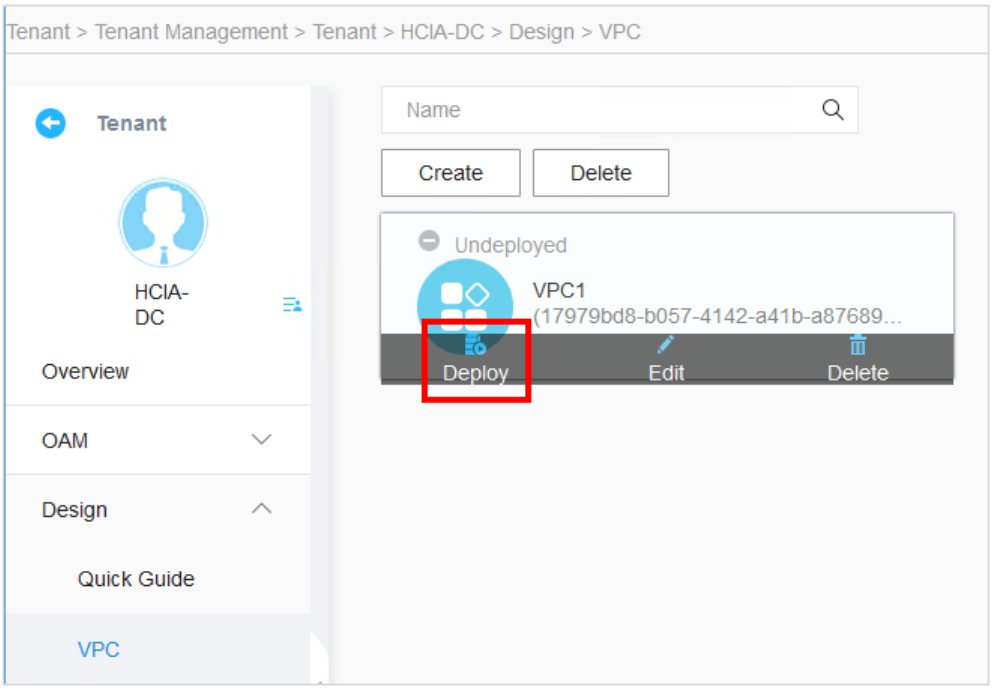
#Create Logical Link after router creation. Connect router and switch.



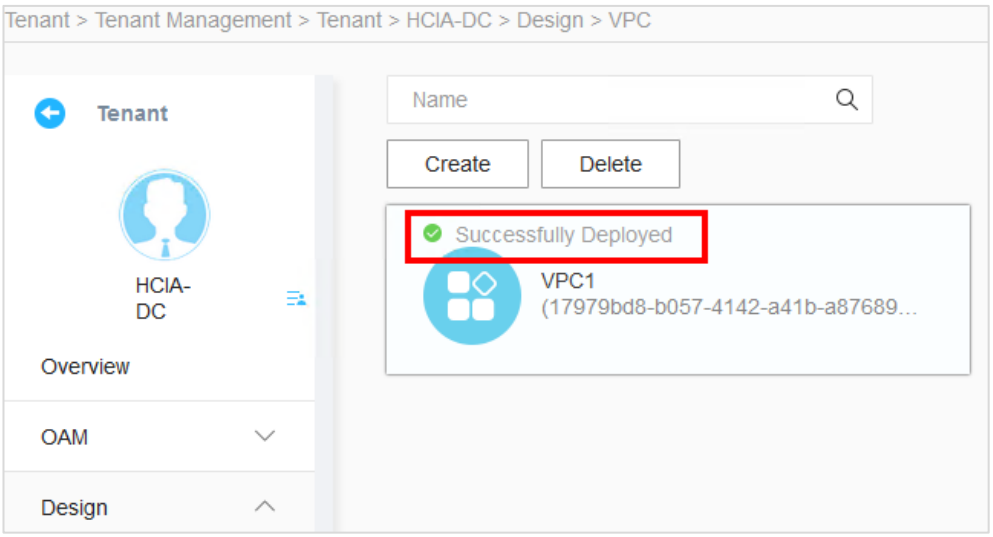
#Click Logical Switch, choose a subnet created in Logical router.



#Back to previous page. Click Deploy to deploy VPC service.



#Deployed successfully.



Now user subnet 192.168.0.0/24 can access VXLAN Fabric from Leaf1 interface 10G1/0/10 with VLAN 1000. Gateway is located in Leaf1.

3.2.5 AC-DCN Network Service Verification

Login Leaf1 to check the changed configuration last time. (deliverd by AC-DCN)

```
[Leaf1]display  configuration commit changes last 1
Building configuration
  #
+ ip vpn-instance Router1_0000001
+  ipv4-family
+   route-distinguisher 1:10002
+   vpn-target 0:10002 export-extcommunity
+   vpn-target 0:10002 export-extcommunity evpn
+   vpn-target 0:10002 import-extcommunity
+   vpn-target 0:10002 import-extcommunity evpn
+  description HCIA-DC_Router1
+  vxlan vni 10002
  #
+ bridge-domain 1
+  vxlan vni 10001
+  evpn
+   route-distinguisher 1:10001
+   vpn-target 0:10001 export-extcommunity
+   vpn-target 0:10002 export-extcommunity
+   vpn-target 0:10001 import-extcommunity
  #
+ interface Vbdif1
+  ip binding vpn-instance Router1_0000001
+  ip address 192.168.0.1 255.255.255.0
+  mac-address 0000-5e00-0102
+  vxlan anycast-gateway enable
+  arp collect host enable
  #
+ interface 10GE1/0/10.1 mode l2
+  encapsulation dot1q vid 1000
```

```
+  bridge-domain 1
   #
   interface Nve1
+  vni 10001 head-end peer-list protocol bgp
   #
   bgp 100
+  ipv4-family vpn-instance Router1_0000001
+   default-route imported
+   import-route direct
+   import-route static
+   maximum load-balancing 32
+   advertise l2vpn evpn
   #
```

3.3 Thinking Questions

1. Why should we configure BGP EVPN and VXLAN in previous chapter?
2. If we did not configure BGP EVPN and VXLAN, can we deploy VPC successfully?
3. Why should we create a Fabric?
4. What are the roles of logical port, logical switch and logical router?

4 Lab Guide for Huawei Cloud

4.1 Introduction

4.1.1 About this lab

This chapter is about deploying Huawei Cloud Cloud services. FusionSphere OpenStack connects Agile Controller-DCN. Apply for networking and computing services on ManageOne.

4.1.2 Objectives

- Understand Huawei Cloud architecture
- Understand how to connect AC-DCN to FusionSphere OpenStack.
- Understand how to apply for services on ManageOne.

4.1.3 External Network Planning

Agile Controller-DCN creates a external gateway, which will be called by OpenStack, mapping to Service OM external network for VPC creation.

Figure 4-1 External Network

Portal	Parameter	Value
Agile Controller-DCN	External gateway	None
Service OM	External network	None(Location)

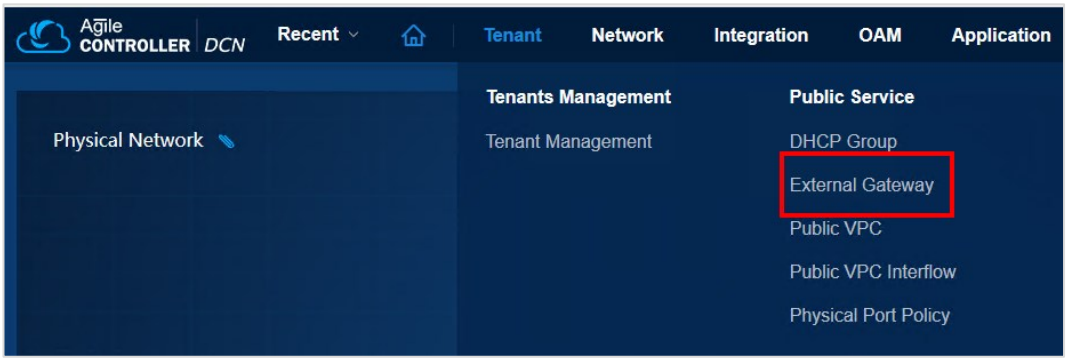
4.2 Configuration

4.2.1 Roadmap

1. Create external gateway on AC-DCN.
2. Create external network on Service OM.
3. Create a Tenat on ManageOne ServiceCenter.
4. Tenant administrator apply for cloud services.

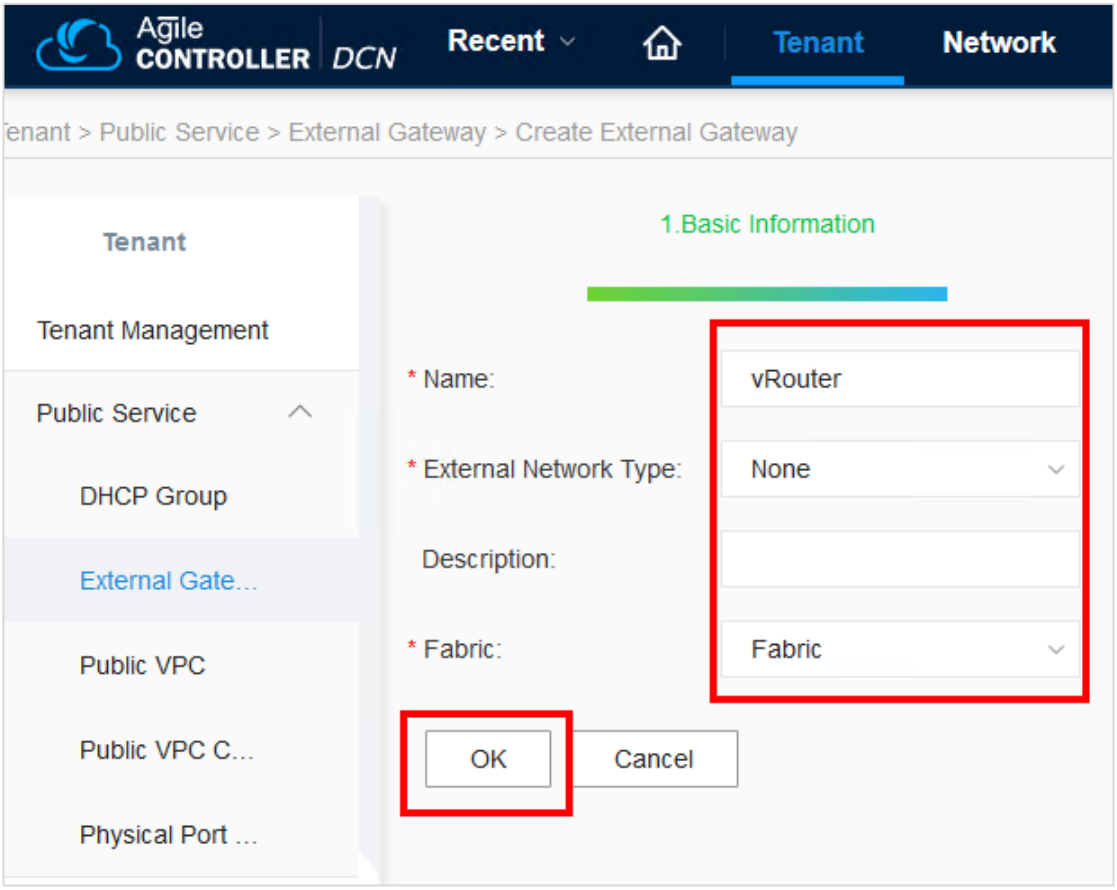
4.2.2 AC-DCN External Gateway Creation

Step 1 **Login AC-DCN, click External Gateway.**



Step 2 **External gateway creation**

#Create external gateway in None Type.

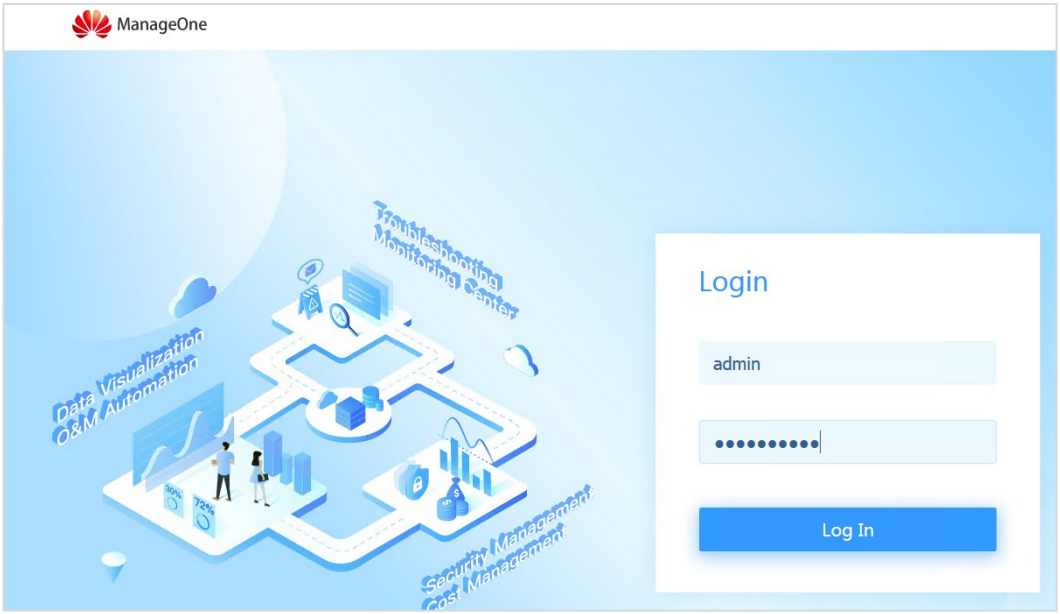


#创建成功。

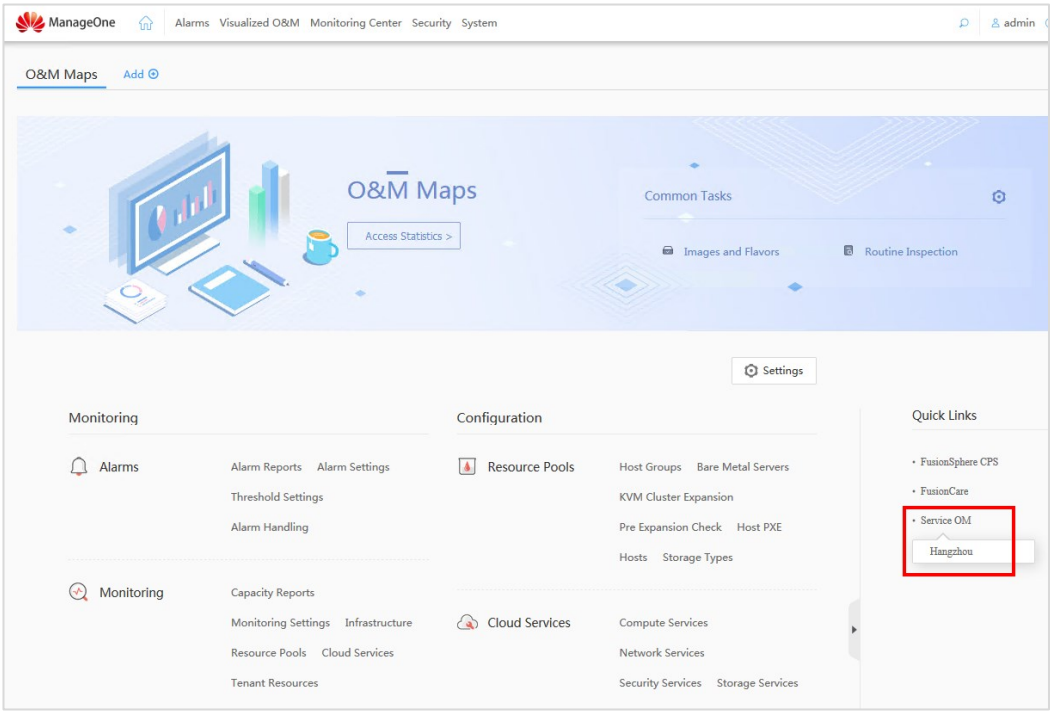
4.2.3 Service OM External Network Creation

Step 1 **Login Service OM**

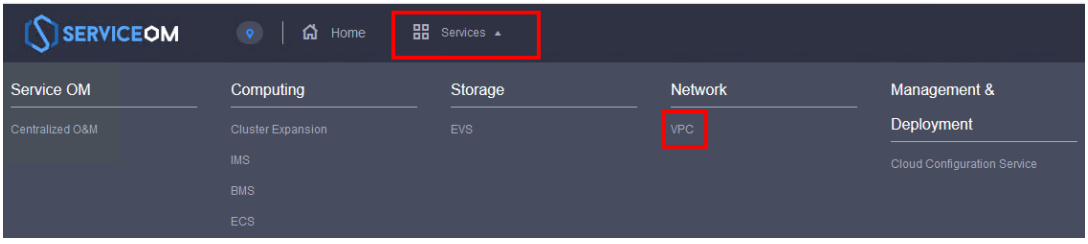
#Login ManageOne OperationCenter



#Click Quick Links jump to Service OM.

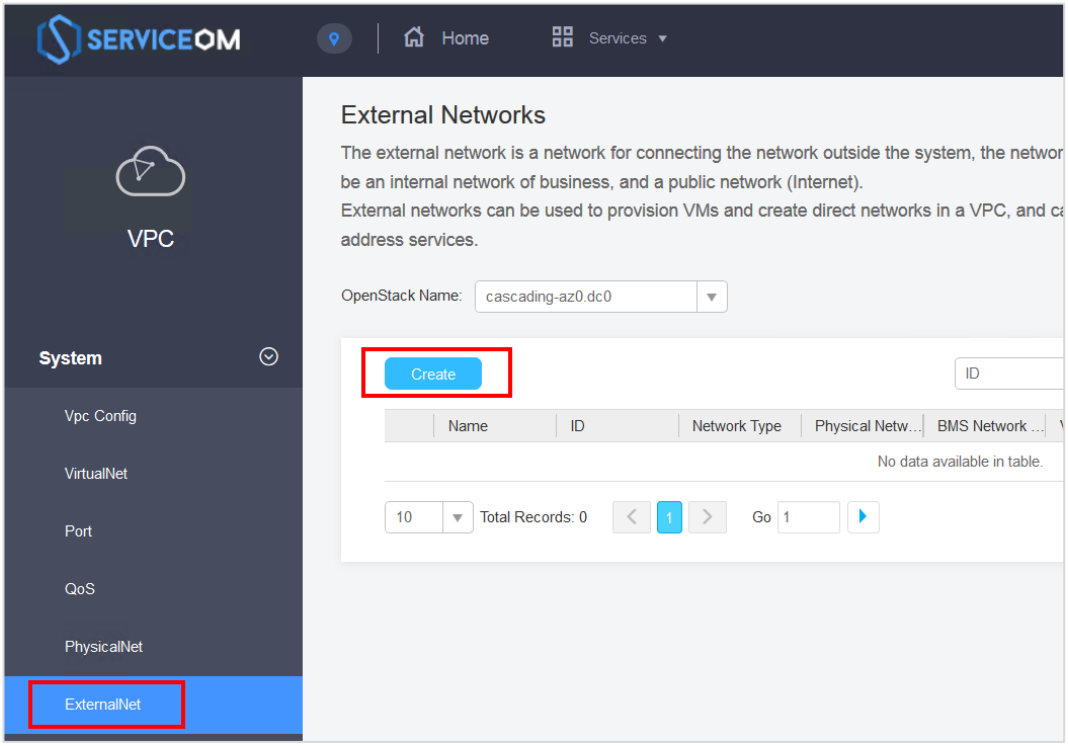


#Click VPC

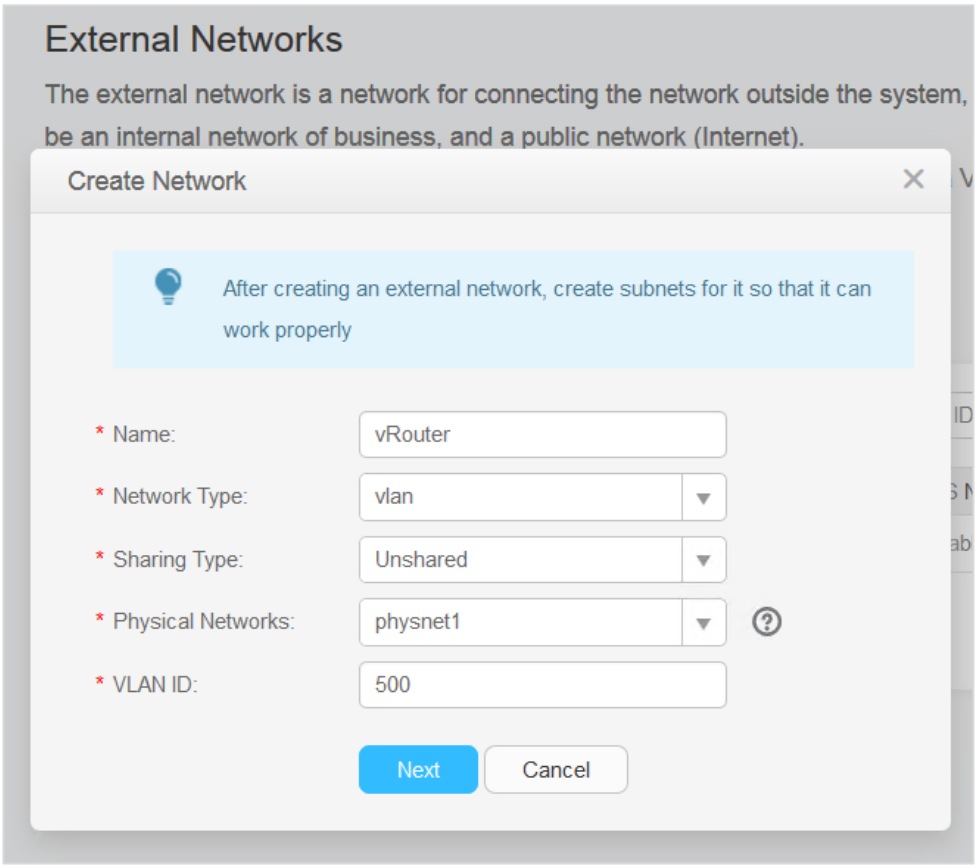


Step 2 **External Network Creation**

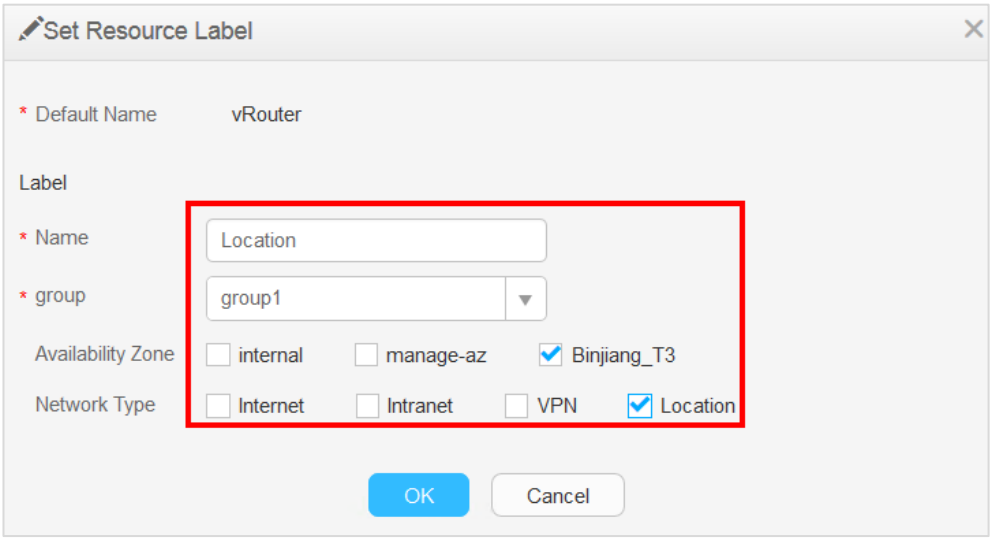
#Click ExternalNet, then click Create.



#Enter parameters which should be relating to external gateway configuration on Agile Controller-DCN. Keep names the same.



#Set resource label. Choose group1 and availability zone Binjiang_T3. Set the location network type.



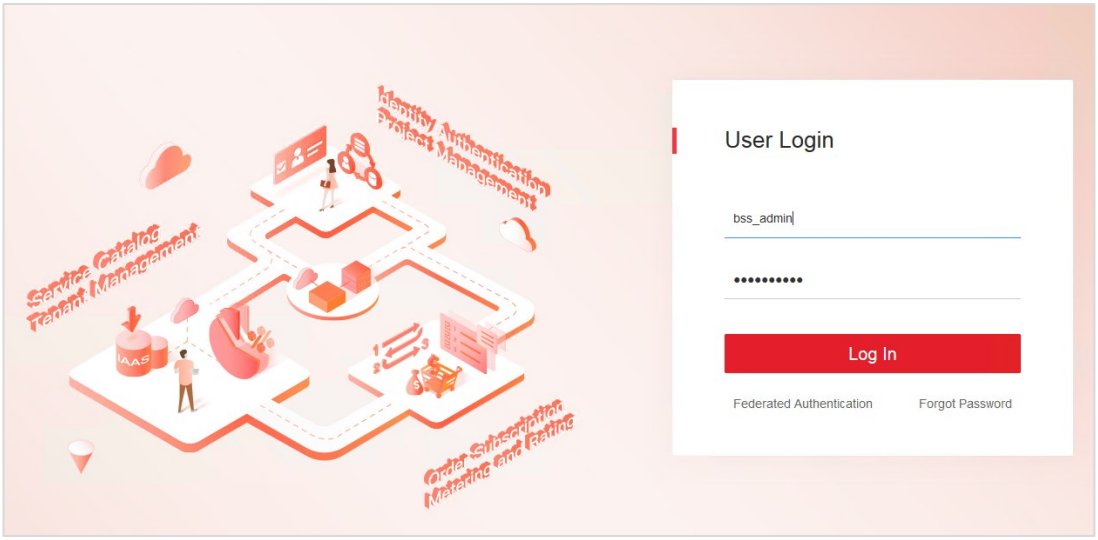
4.2.4 ManageOne ServiceCenter Configuration

Create a Tenant and apply for cloud services on ManageOne ServiceCenter.

4.2.4.1 Tenant Creation

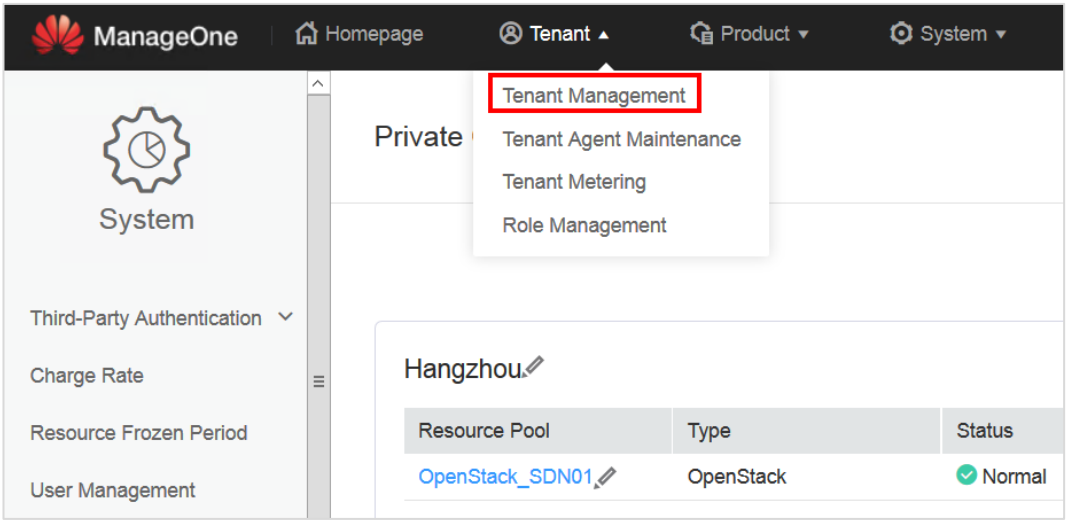
Step 1 **Login ManageOne ServiceCenter**

#login with account bss_admin

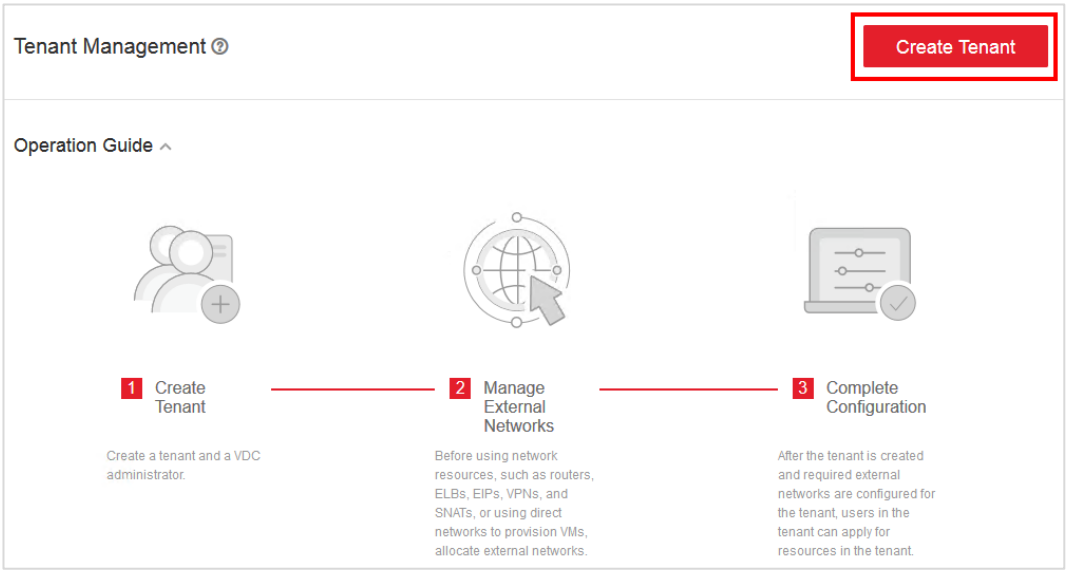


Step 2 **Creat a Tenant**

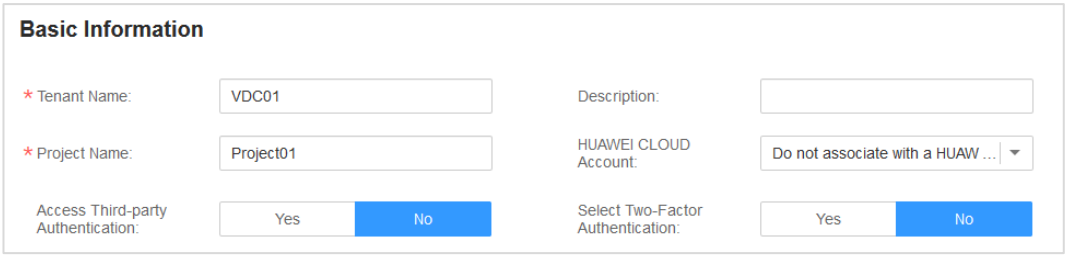
#Click Tenant Management



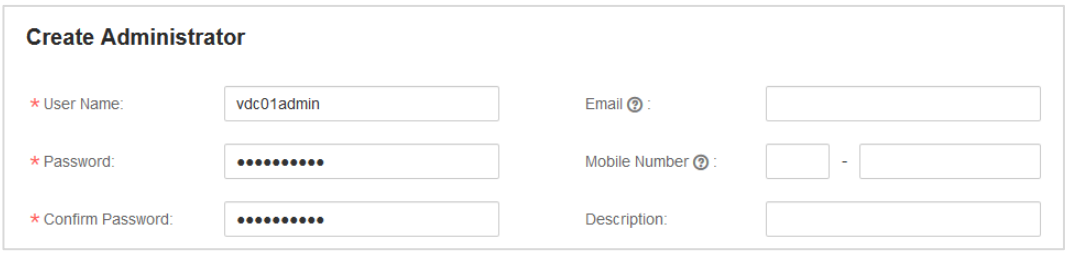
#Click Create Tenant



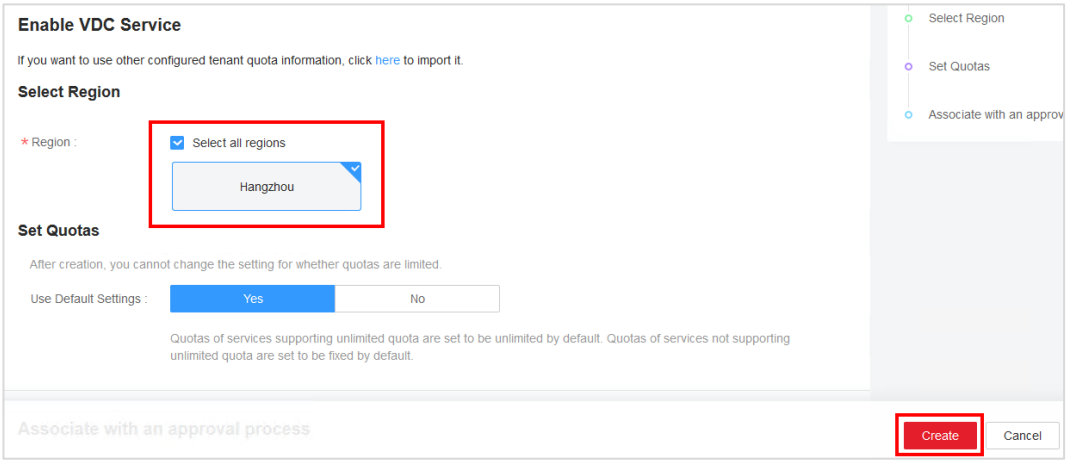
#Enter basic tenant information.



#Create tenant administrator. Username is vdc01admin, password is Huawei@123.

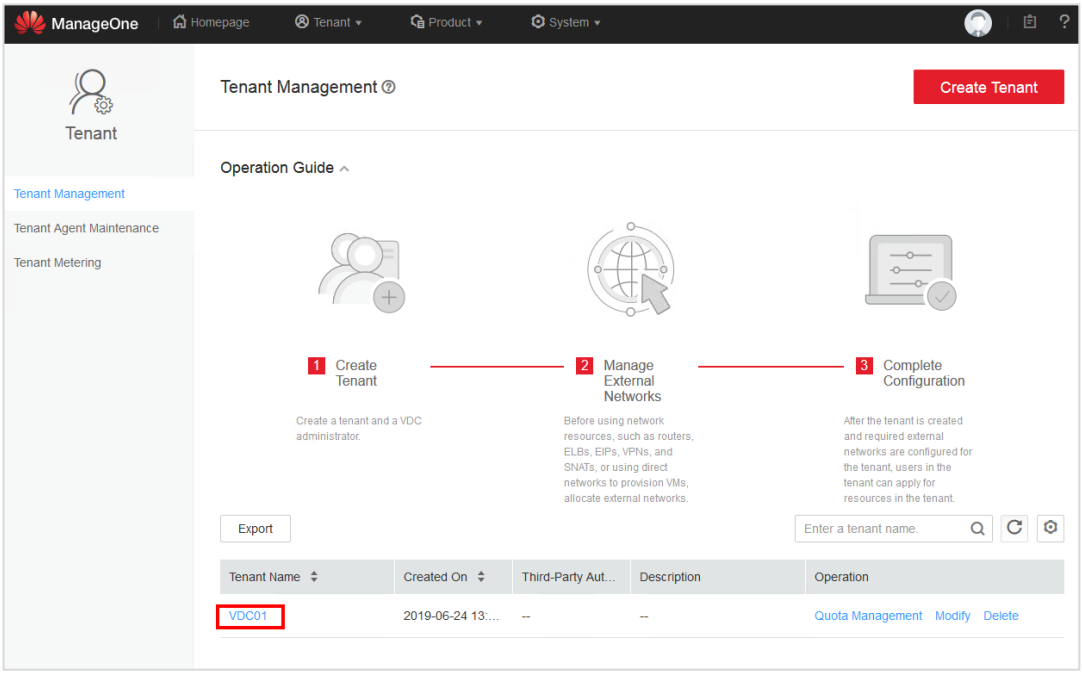


#Enable VPC, select a region. Click Create.

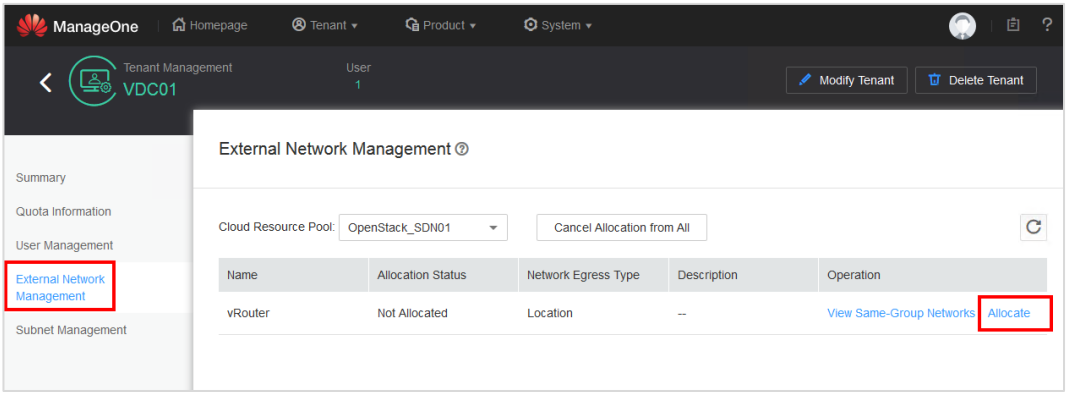


Step 3 **Assgin external network to tenant.**

#Click the tenant name.



#Click External Network Management. Click Allocate.



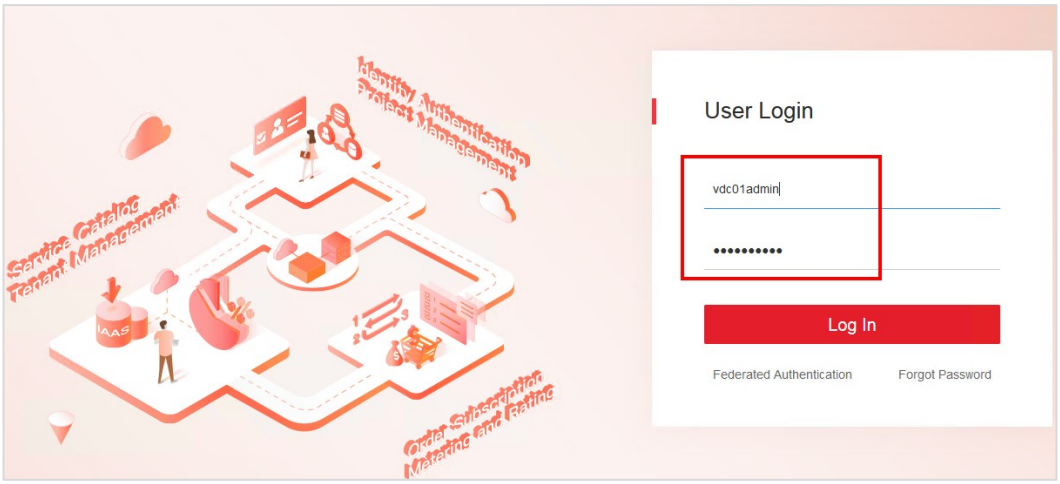
Tenant Creation is done.

4.2.4.2 Cloud Service Application

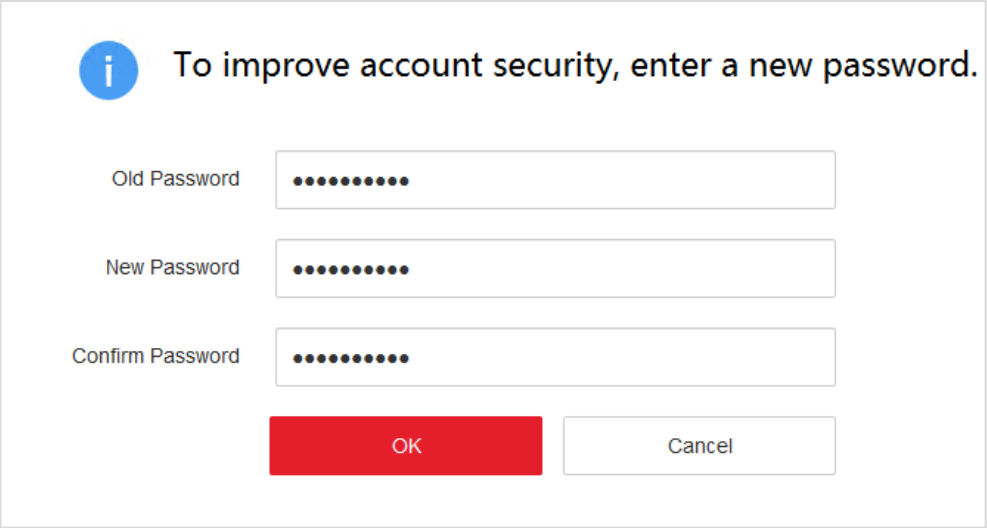
Use tenant account login ManageOne and create a tenant network 192.168.10.0/24. Apply for a ECS within the network.

Step 1 **Login ServiceCenter**

#use username vdc01admin and password Huawei@123, that created previously.

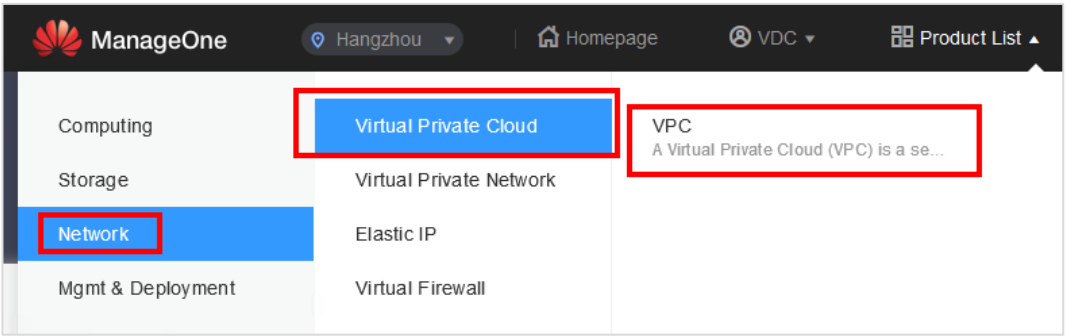


#Modify login password into Huawei12#$.

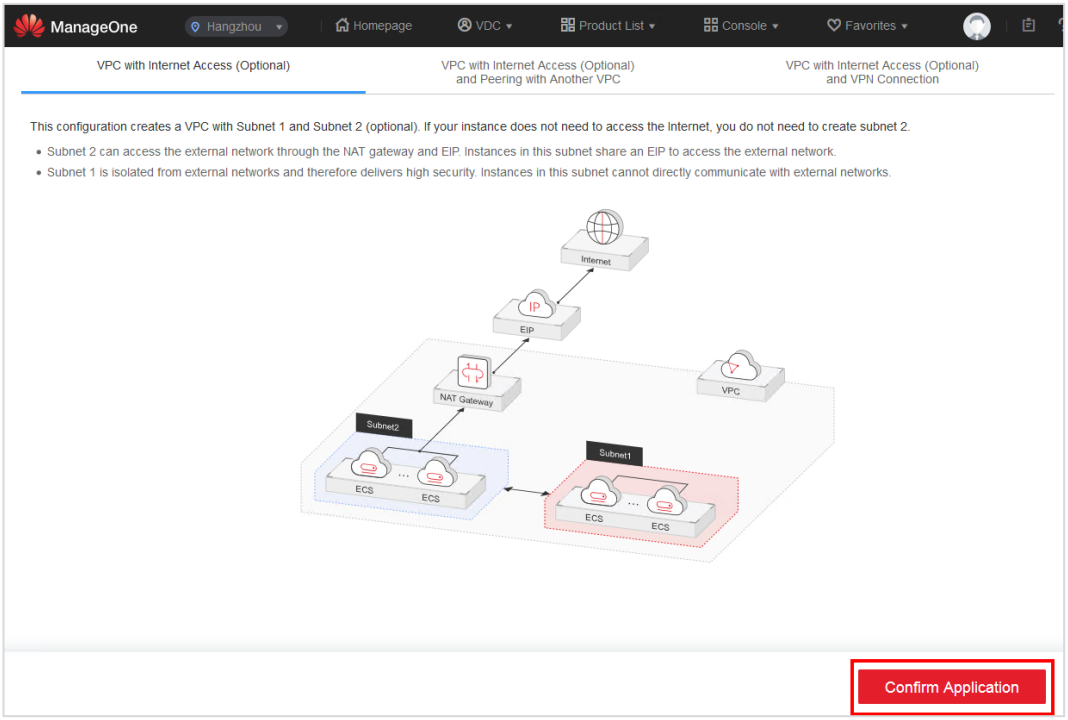


Step 2 **Netwok Service Creation**

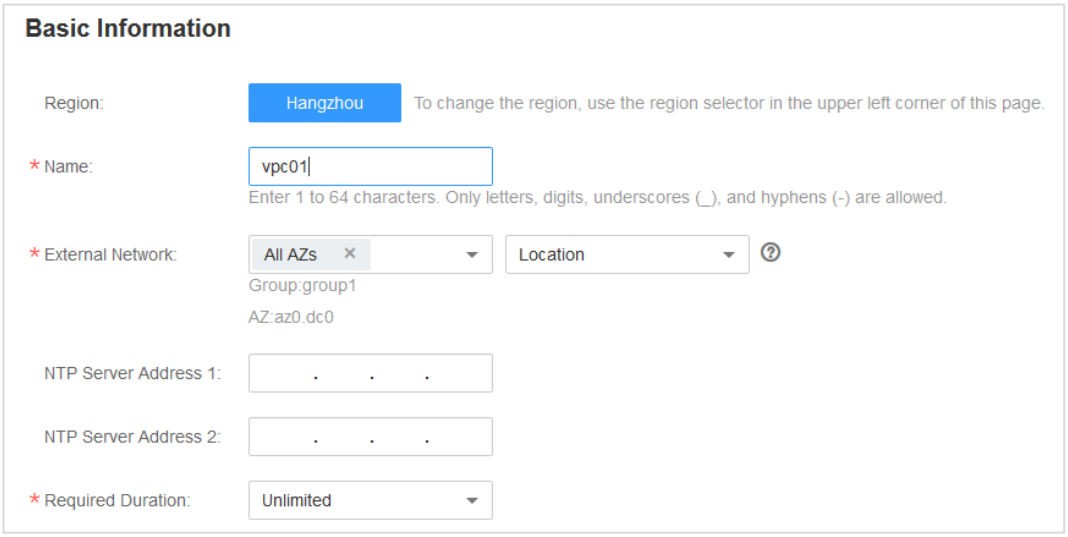
#Click Nework - VPC.



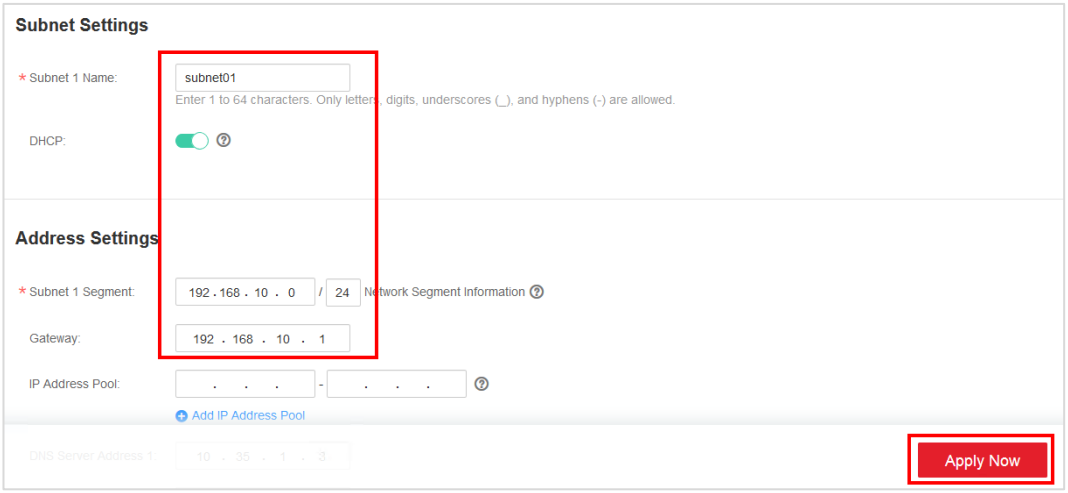
#Confirm Application.



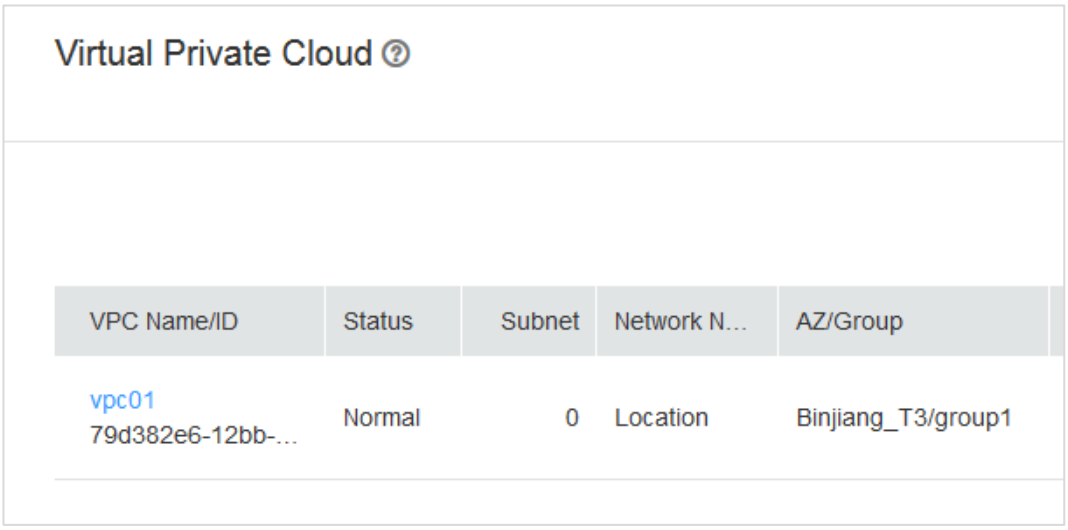
#Modify Name in vpc01. External Network is what we created on Service OM.



#Enter network information. Click Apply Now.

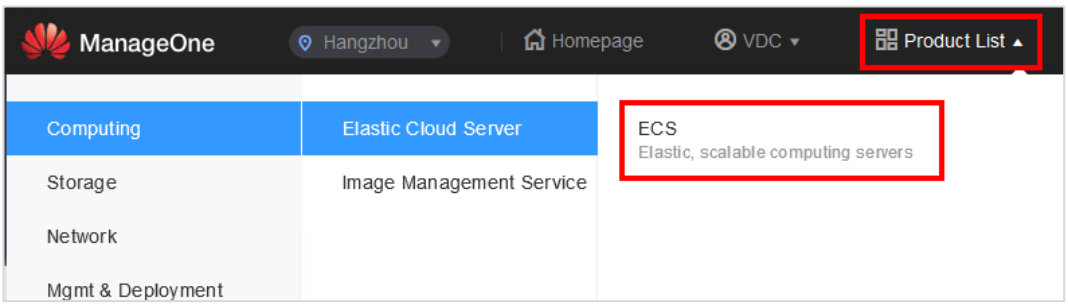


#VPC created successfully.

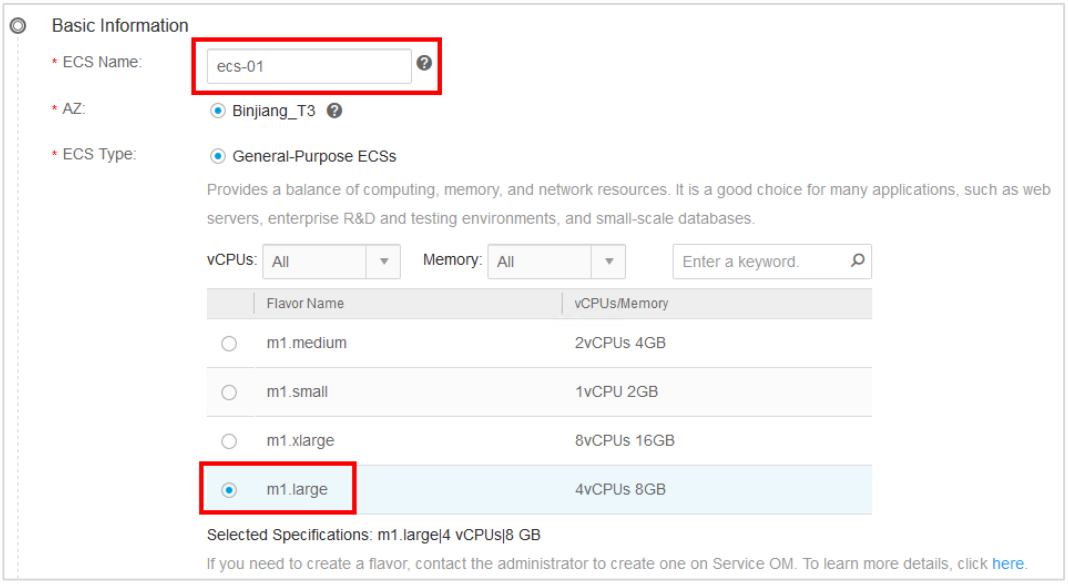


Step 3 **ECS application.**

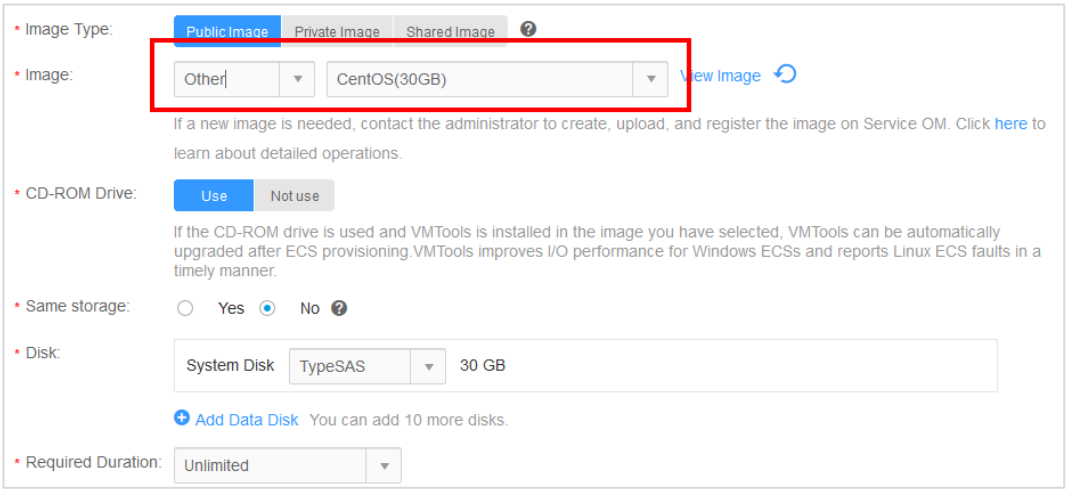
#Click Product List-ECS.



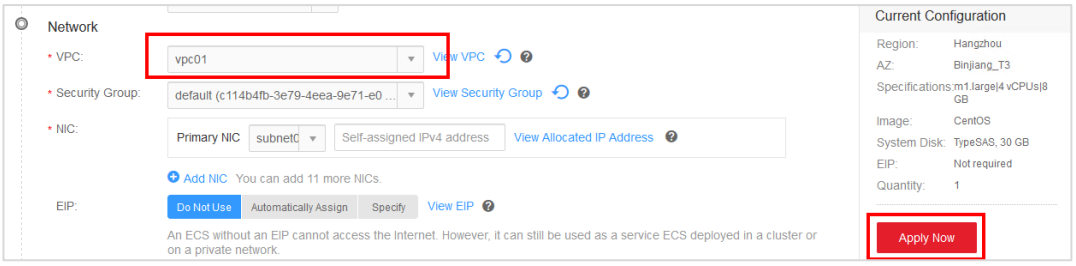
#Enter ECS Name ecs-01, select a specification.



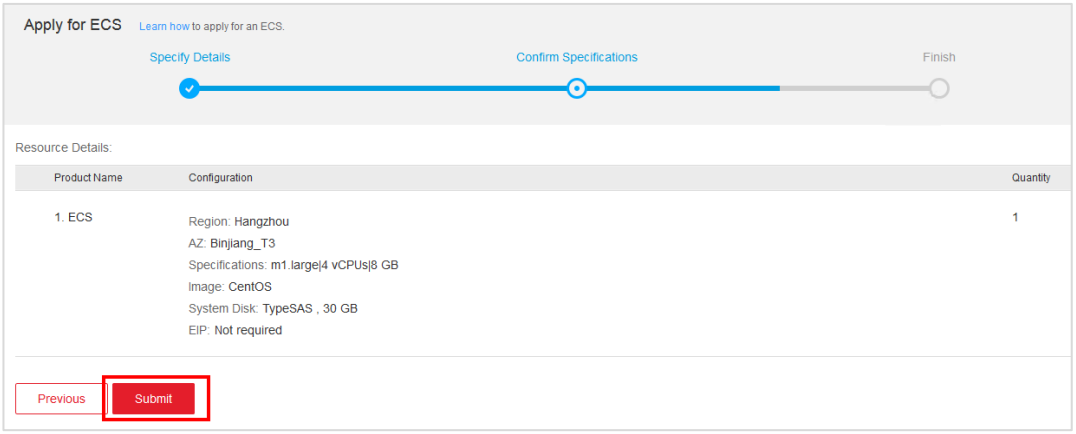
#Select a image, CentOS.



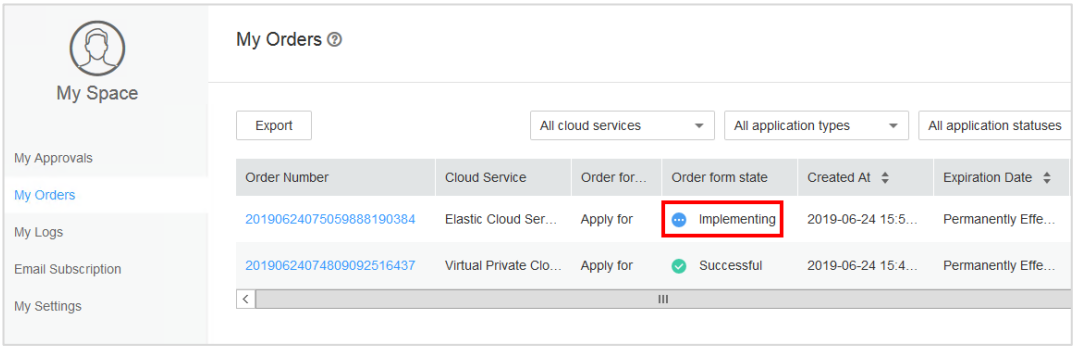
#Select VPC network, vpc01. Click Apply Now.



#Submit



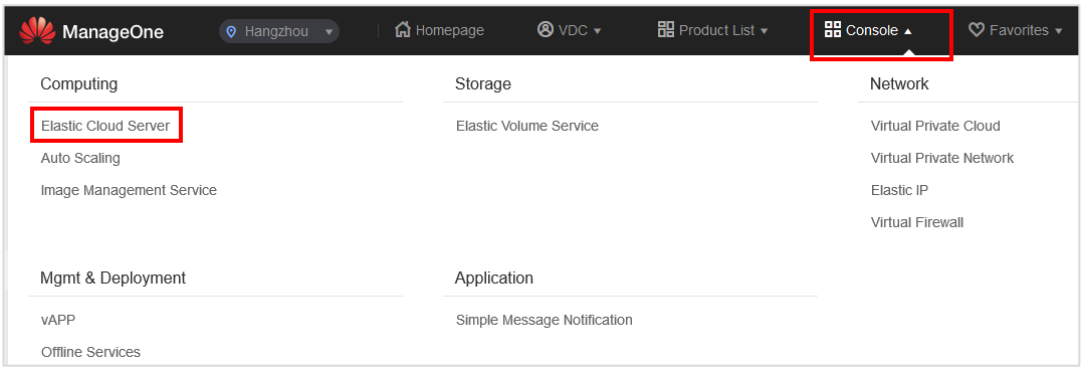
#Cloud platform will choose a host to create this VM.



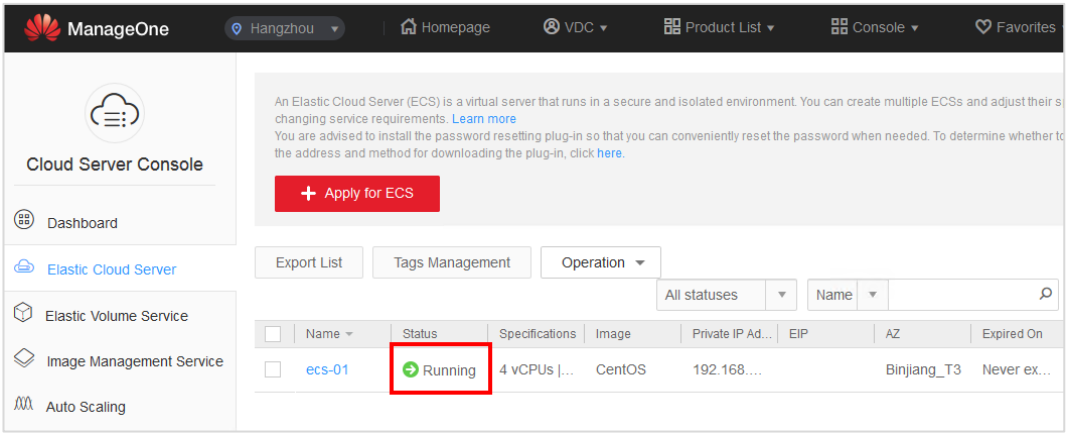
4.2.5 Verification

Step 1 **ECS**

#Click Console-ECS.

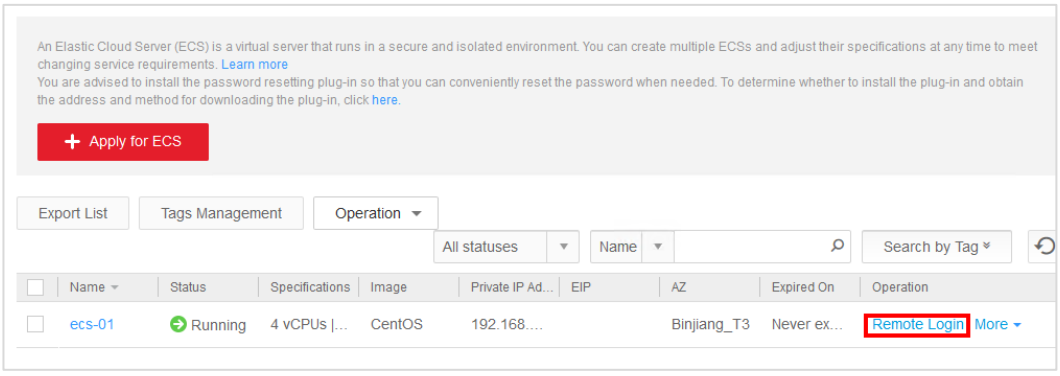


#ECS is running.

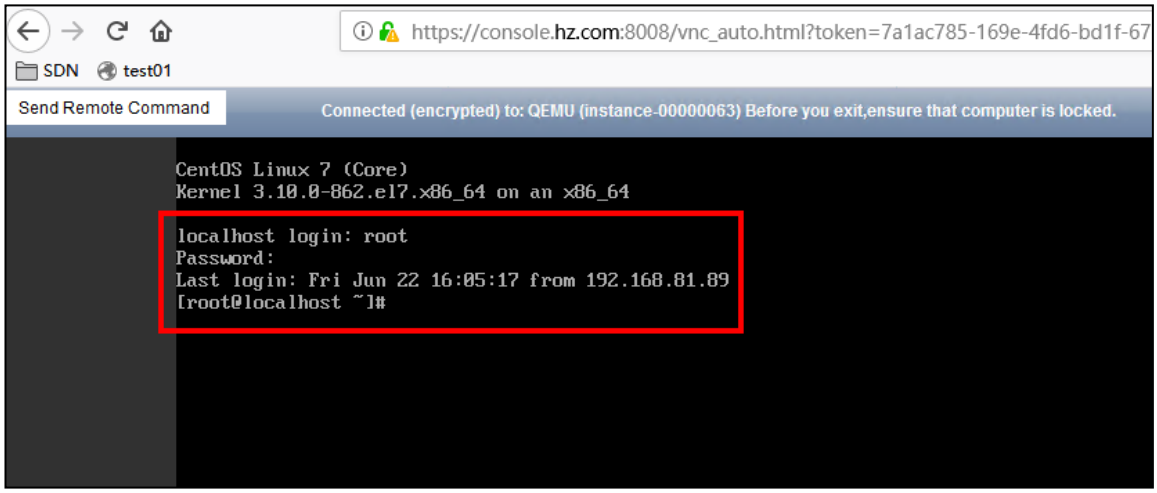


Step 2 **Network Verification**

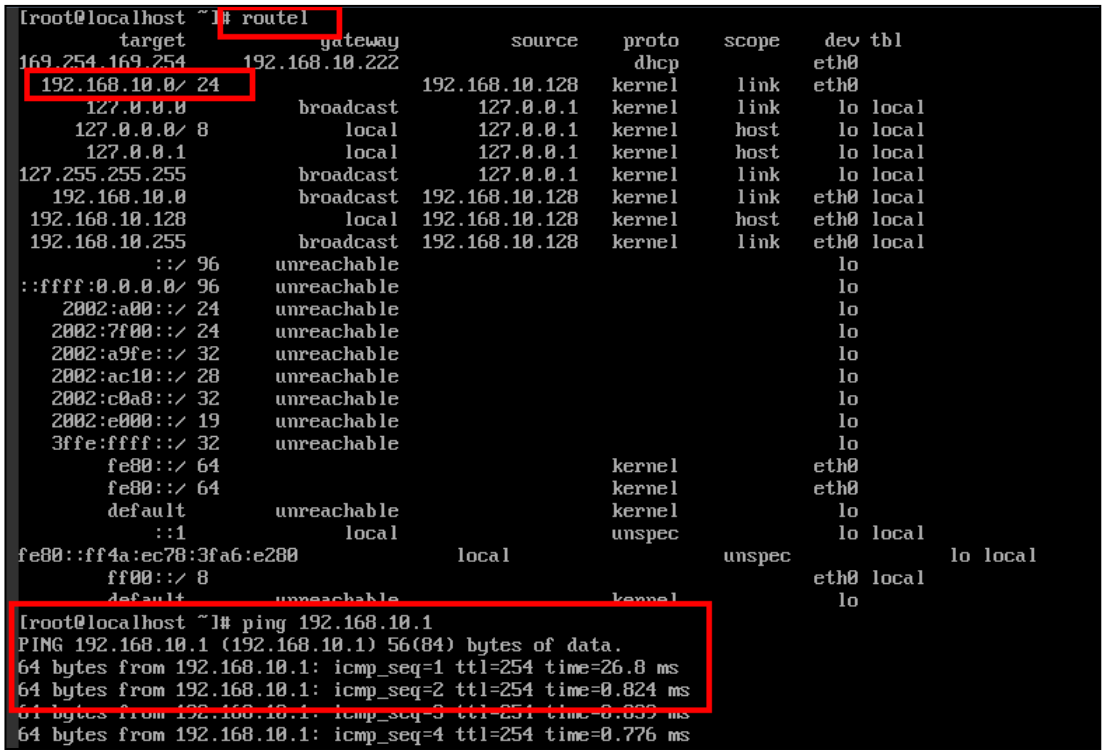
#Click Remote Login.



#Enter username root and password Huawei@123.



#routel shows the routing table. Ping gateway.



Gateway reachable.

4.3 Thinking Questions

1. Can we have different names for AC-DCN external gateway and Service OM external network?

2. What are the roles of ManageOne ServiceCenter and OperationCenter?

3. Where locates the gateway 192.168.10.1?

Recommendations

- Huawei Learning Website
  - http://learning.huawei.com/en
- Huawei e-Learning
  - https://ilearningx.huawei.com/portal/#/portal/ebg/51
- Huawei Certification
  - http://support.huawei.com/learning/NavigationAction!createNavi?navId=_31&lang=en
- Find Training
  - http://support.huawei.com/learning/NavigationAction!createNavi?navId=_trainingsearch&lang=en

More Information

- Huawei learning APP

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