Alibaba Cloud
Virtual Private Cloud

User Guide

Issue: 20190219

Legal disclaimer

Alibaba Cloud reminds you to carefully read and fully understand the terms and conditions of this legal disclaimer before you read or use this document. If you have read or used this document, it shall be deemed as your total acceptance of this legal disclaimer.

1. You shall download and obtain this document from the Alibaba Cloud website or other Alibaba Cloud-authorized channels, and use this document for your own legal business activities only. The content of this document is considered confidential information of Alibaba Cloud. You shall strictly abide by the confidentiality obligations. No part of this document shall be disclosed or provided to any third party for use without the prior written consent of Alibaba Cloud.
2. No part of this document shall be excerpted, translated, reproduced, transmitted, or disseminated by any organization, company, or individual in any form or by any means without the prior written consent of Alibaba Cloud.
3. The content of this document may be changed due to product version upgrades , adjustments, or other reasons. Alibaba Cloud reserves the right to modify the content of this document without notice and the updated versions of this document will be occasionally released through Alibaba Cloud-authorized channels. You shall pay attention to the version changes of this document as they occur and download and obtain the most up-to-date version of this document from Alibaba Cloud-authorized channels.
4. This document serves only as a reference guide for your use of Alibaba Cloud products and services. Alibaba Cloud provides the document in the context that Alibaba Cloud products and services are provided on an "as is", "with all faults " and "as available" basis. Alibaba Cloud makes every effort to provide relevant operational guidance based on existing technologies. However, Alibaba Cloud hereby makes a clear statement that it in no way guarantees the accuracy, integrity , applicability, and reliability of the content of this document, either explicitly or implicitly. Alibaba Cloud shall not bear any liability for any errors or financial losses incurred by any organizations, companies, or individuals arising from their download, use, or trust in this document. Alibaba Cloud shall not, under any circumstances, bear responsibility for any indirect, consequential, exemplary, incidental, special, or punitive damages, including lost profits arising from the use

or trust in this document, even if Alibaba Cloud has been notified of the possibility of such a loss.

5. By law, all the content of the Alibaba Cloud website, including but not limited to works, products, images, archives, information, materials, website architecture, website graphic layout, and webpage design, are intellectual property of Alibaba Cloud and/or its affiliates. This intellectual property includes, but is not limited to, trademark rights, patent rights, copyrights, and trade secrets. No part of the Alibaba Cloud website, product programs, or content shall be used, modified , reproduced, publicly transmitted, changed, disseminated, distributed, or published without the prior written consent of Alibaba Cloud and/or its affiliates . The names owned by Alibaba Cloud shall not be used, published, or reproduced for marketing, advertising, promotion, or other purposes without the prior written consent of Alibaba Cloud. The names owned by Alibaba Cloud include, but are not limited to, "Alibaba Cloud", "Aliyun", "HiChina", and other brands of Alibaba Cloud and/or its affiliates, which appear separately or in combination, as well as the auxiliary signs and patterns of the preceding brands, or anything similar to the company names, trade names, trademarks, product or service names, domain names, patterns, logos, marks, signs, or special descriptions that third parties identify as Alibaba Cloud and/or its affiliates).
6. Please contact Alibaba Cloud directly if you discover any errors in this document.

Generic conventions

Table -1: Style conventions

Style	Description	Example
⛔	This warning information indicates a situation that will cause major system changes, faults, physical injuries, and other adverse results.	⛔ Danger: Resetting will result in the loss of user configuration data.
⚠	This warning information indicates a situation that may cause major system changes, faults, physical injuries, and other adverse results.	⚠ Warning: Restarting will cause business interruption. About 10 minutes are required to restore business.
📋	This indicates warning informatio n, supplementary instructions, and other content that the user must understand.	ⓘ Notice: Take the necessary precautions to save exported data containing sensitive information.
	This indicates supplemental instructions, best practices, tips, and other content that is good to know for the user.	📋 Note: You can use Ctrl + A to select all files.
>	Multi-level menu cascade.	Settings > Network > Set network type
Bold	It is used for buttons, menus , page names, and other UI elements.	Click OK.
`Courier font`	It is used for commands.	Run the `cd /d C:/windows` command to enter the Windows system folder.
`Italics`	It is used for parameters and variables.	`bae log list --instanceid` *`Instance_ID`*
[] or [a|b]	It indicates that it is a optional value, and only one item can be selected.	`ipconfig` *`[-all|-t]`*

Style	Description	Example
{} or {a|b}	It indicates that it is a required value, and only one item can be selected.	`swich` *{stand | slave}*

Contents

1 VPC and subnets

1.1 Create a default VPC and VSwitch

If there is no available VPC and VSwitch to use when creating a cloud resource with the VPC network, you can choose to use the default VPC and VSwitch. A default VPC and VSwitch are created along with the creation of the instance. This document takes ECS as an example to introduce how to create a default VPC and VSwitch.

Context

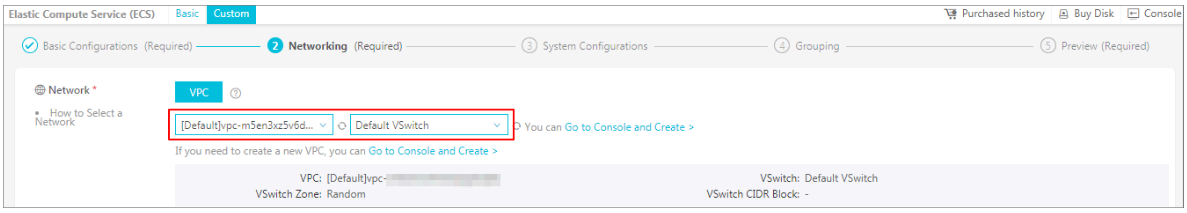
A region can only have one default VPC but many default VSwitches. Because VPC is a region-based resource while VSwitch is a zone-based resource. Each zone can have a default VSwitch. The properties of default VPC and VSwitch are as follows:

Default VPC	Default VSwitch
The default VPC in each region is unique.	The default VSwitch in each zone is unique.
The netmask for a default VPC is /16, such as 172.31.0.0/16, providing up to 65536 private IP addresses.	The netmask for a default VSwitch is /20 , such as 172.31.0.0/20, providing up to 4096 private IP addresses.
The default VPC does not take up the VPC quota.	The default VSwitch does not take up the VSwitch quota.
The default VPC is created by the system , and all VPCs created by you are non-default VPCs.	The default VSwitch is created by the system, and all VSwitches created by you are non-default VSwitches.
The operations and specifications for the default VPC and non-default VPCs are the same.	The operations and specifications for the default VSwitch and non-default VSwitches are the same.

Procedure

1. Log on to the ECS console.
2. In the left-side navigation pane, click Instances and then click Create Instance.
3. Select Advanced Purchase.
4. On the Basic Configurations page, configure ECS instance and click Next: Networking.

5. On the Networking page, select default VPC and the default VSwitch. Click Next: System Configurations.



Network *

- How to Select a Network

[Default]vpc-m5en3xz5v6d... | Default VSwitch | You can Go to Console and Create >

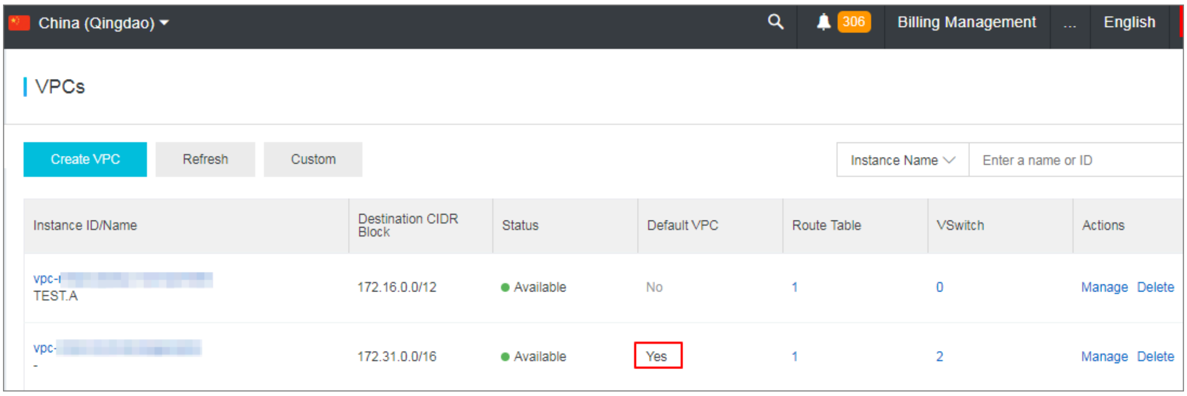
If you need to create a new VPC, you can Go to Console and Create >

VPC: [Default]vpc-[redacted]
VSwitch: Default VSwitch
VSwitch Zone: Random
VSwitch CIDR Block: -

6. Configure the login credential and instance name, and click Create Order.

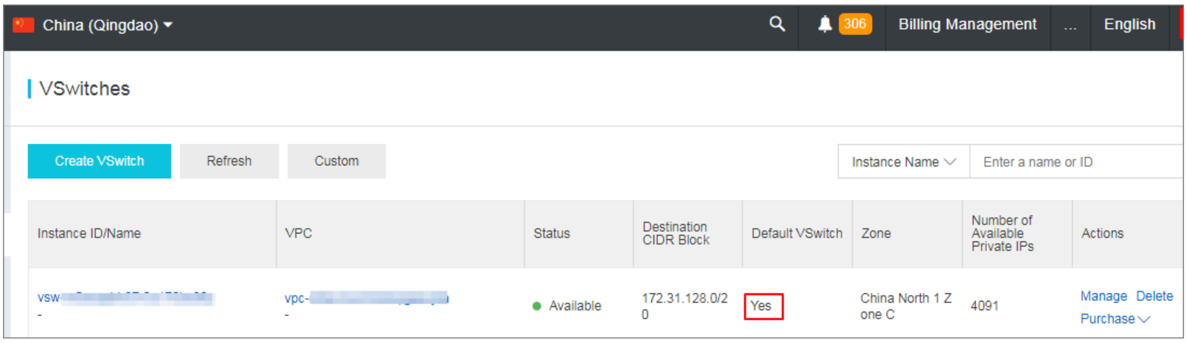
After the instance is created, a default VPC and a default VSwitch will be created in the region.

Figure 1-1: Default VPC



Instance ID/Name	Destination CIDR Block	Status	Default VPC	Route Table	VSwitch	Actions
vpc-[redacted] TEST.A	172.16.0.0/12	● Available	No	1	0	Manage Delete
vpc-[redacted] -	172.31.0.0/16	● Available	Yes	1	2	Manage Delete

Figure 1-2: Default VSwitch



Instance ID/Name	VPC	Status	Destination CIDR Block	Default VSwitch	Zone	Number of Available Private IPs	Actions
vsw-[redacted] -	vpc-[redacted] -	● Available	172.31.128.0/20	Yes	China North 1 Zone C	4091	Manage Delete Purchase

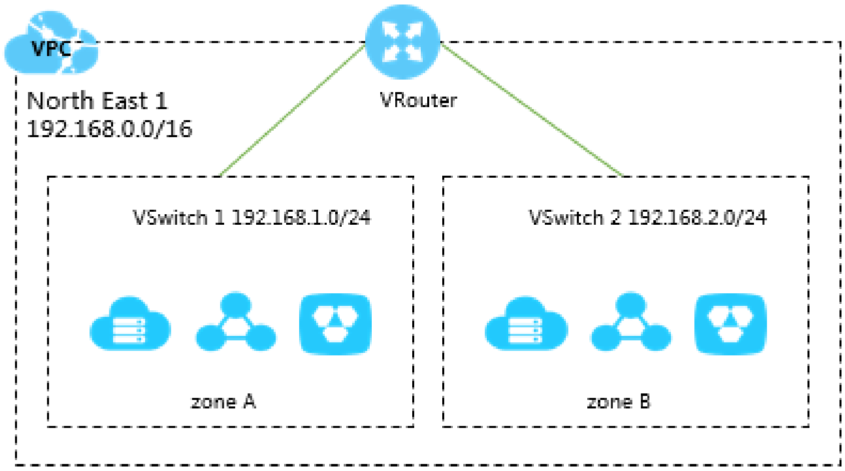
1.2 Manage a VPC

Virtual Private Cloud (VPC) is a private network dedicated to you in Alibaba Cloud. You have full control over your VPC, such as specifying its IP address range, and configuring route tables and network gateways. You can also use Alibaba Cloud resources such as ECS, RDS, and SLB in your own VPC.

VPC components

VRouter and VSwitch are two basic components of VPC:

- *VRouter* connects VSwitches in a VPC and serves as the gateway connecting the VPC with other networks. A VRouter is automatically created after a VPC is created. Each VRouter associates with a route table. For more information, see *Routing*.
- *VSwitch* is a basic network module in a VPC, used to connect different cloud product instances. After creating a VPC, you can further segment your virtual private network to one or more subnets by creating VSwitches. You can deploy different applications to different VSwitches that are located in different zones to improve the service availability. VSwitches in different zones of a VPC can communicate with each other through the intranet by default. For more information, see *Manage VSwitches*.



IP address range (CIDR block)

When creating a VPC, you must specify the IP address range for the VPC in the form of a Classless Inter-Domain Routing (CIDR) block. Use the following standard private CIDR blocks or their subsets as the IP address range. The IP address range is related to your network design. For more information, see *Plan and design VPC*.

If you want to use a subset of a standard CIDR block as the IP address range, you must use the *CreateVpc* API to create a VPC.

CIDR block	Number of available private IPs
192.168.0.0/16	65,532
172.16.0.0/12	1,048,572
10.0.0.0/8	16,777,212

Create a VPC and a VSwitch

To deploy cloud resources in a VPC, you must create at least a VSwitch. To create a VPC and a VSwitch, complete these steps:

1. Log on to the *VPC console*.
2. Select the region of the VPC.

   The VPC and the cloud resources to deploy must locate in the same region.
3. Click Create VPC, configure the VPC according to the following information and click OK.

Configuration	Description
VPC configurations	
Name	Enter a name for the VPC. The name can contain 2 to 128 characters. It must begin with English or Chinese characters and can contain numbers, hyphens (-) and underlines (_).

Configuration	Description
Destination CIDR Block	Select a CIDR block for the VPC. Limitations on the VPC CIDR blocks are as follows: · You can use the standard CIDR blocks: 192.168.0.0/16, 172.16.0.0/12, and 10.0.0.0/8, or their subsets as the IP address range of the VPC. If you want to use a subnet of a standard CIDR block as the IP address range, you must use the CreateVpc API to create a VPC. · If you want to connect a VPC to another VPC, or to a local network to build a hybrid cloud, it is recommended that you use the subset of the standard CIDR blocks, and make sure that the network mask is no longer than /16. · If you only have one VPC and it does not need to communicate with your local network, you can use any of the standard CIDR blocks or their subsets. ! Notice: After the VPC is created, you cannot change its CIDR block.
VSwitch configurations	
Name	Enter a name for the VSwitch. The name can contain 2 to 128 characters. It must begin with English letters or Chinese characters and can contain numbers, hyphens (-) and underlines (_).
Zones	Select the zone of the VSwitch. In a VPC, VSwitches in different zones can communicate with each other through the intranet.

Configuration	Description
CIDR Block	Enter the CIDR block of the VSwitch. Note the following when specifying the VSwitch CIDR block: · The CIDR block of the VSwitch can be the same as that of the VPC to which it belongs, or a subset of the VPC CIDR block. For example, if the CIDR block of the VPC is 192.168.0.0/16, the CIDR block of the VSwitch in the VPC can be 192.168.0.0/16, 192.168.0.0/17, …, till 192.168.0.0/29. Note: If the CIDR block of the VSwitch is the same as that of the VPC to which it belongs, you can only create one VSwitch in the VPC. · The size of the subnet mask for the VSwitch can be /16 to /29, which can provide 8 to 65536 IP addresses. · The first and last three IP addresses are reserved by the system. Take the IP address range 192.168.1.0/24 as an example, IP addresses 192.168.1.0, 192.168.1.253, 192.168.1.254, and 192.168.1.255 are reserved by the system. · Make sure the CIDR block does not conflict with that of the VSwitch in another VPC or the local data center that the VSwitch connects to. Notice: After the VSwitch is created, you cannot change its CIDR block.

Delete a VPC

Make sure that you have deleted all switches in the VPC. After the VPC is deleted, the associated VRouters and route tables are also deleted.

To delete a VPC, complete these steps:

1. On the VPC console, select the region of the VPC.

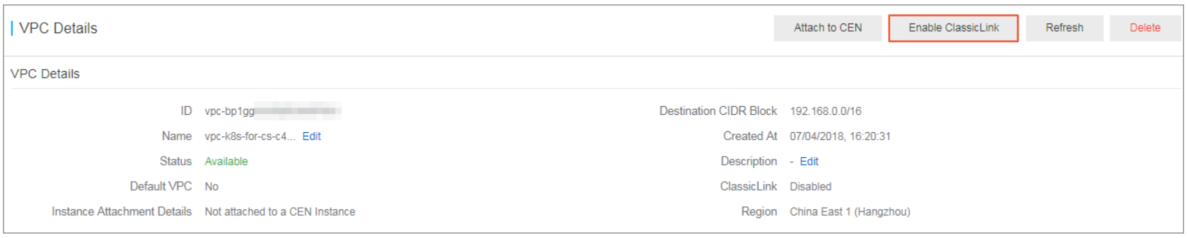
2. Locate the target VPC and click Delete.
3. In the displayed dialog box, click OK.

Enable ClassicLink

With ClassicLink, ECS instances in the classic network can communicate with the cloud resource in the connected VPC. For more information, see *ClassicLink overview*.

To enable the ClassicLink function, complete these steps:

1. On the VPC console, select the region of the VPC.
2. Click the ID of the target VPC.
3. On theVPC Detailspage, clickEnable the ClassicLink.



VPC Details

ID	vpc-bp1gg[redacted]	Destination CIDR Block	192.168.0.0/16
Name	vpc-k8s-for-cs-c4... Edit	Created At	07/04/2018, 16:20:31
Status	Available	Description	- Edit
Default VPC	No	ClassicLink	Disabled
Instance Attachment Details	Not attached to a CEN Instance	Region	China East 1 (Hangzhou)

4. Click OK.
5. Create a ClassicLink connection.

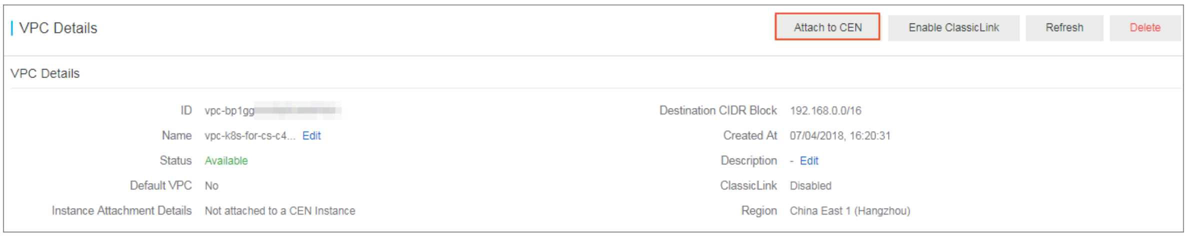
   For more information, see *Build a ClassicLink connection*.

Attach to a CEN instance

You can attach a VPC to a CEN instance, so that the VPC can communicate with other VPCs in the CEN instance or local data centers. For more information, see *What is Cloud Enterprise Network?*.

To quickly attach a VPC to a CEN instance in the same account, complete these steps:

1. On the VPC console, select the region of the VPC.
2. Click the ID of the target VPC.
3. On the VPC Details page, click Attach to CEN.



VPC Details

ID	vpc-bp1gg[redacted]	Destination CIDR Block	192.168.0.0/16
Name	vpc-k8s-for-cs-c4... Edit	Created At	07/04/2018, 16:20:31
Status	Available	Description	- Edit
Default VPC	No	ClassicLink	Disabled
Instance Attachment Details	Not attached to a CEN Instance	Region	China East 1 (Hangzhou)

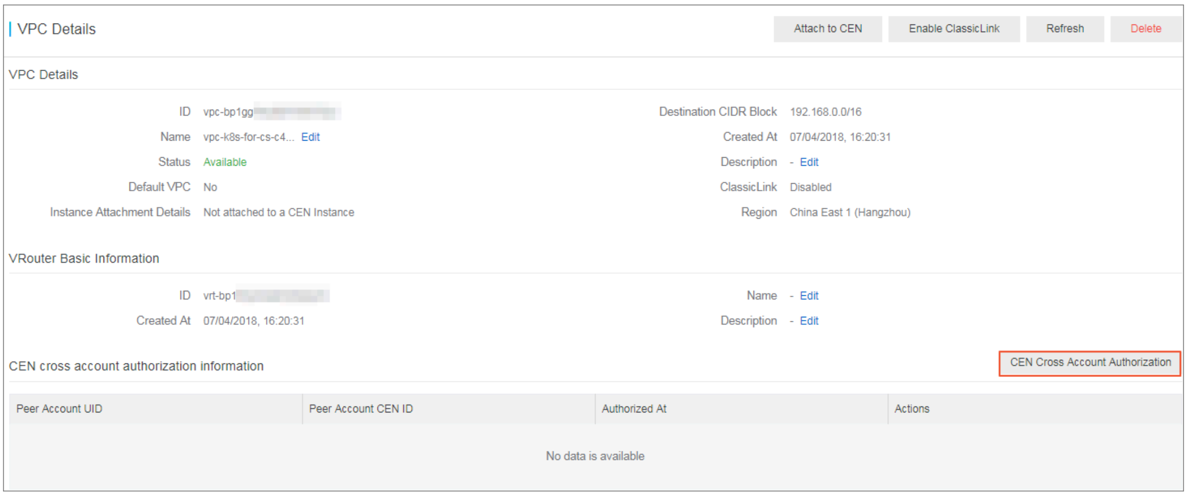
4. Select a CEN instance and click OK.

Authorize CEN

If you want the VPC to be attached to a CEN instance in a different account, authorize the CEN instance to attach it.

To authorize a CEN instance in a different account to attach your VPC, complete these steps:

1. On the VPC console, select the region of the VPC.
2. Click the ID of the target VPC to attach.
3. On the VPC Details page, click CEN Cross Account Authorization.



VPC Details

ID vpc-bp1gg[redacted]

Name vpc-k8s-for-cs-c4... Edit

Status Available

Default VPC No

Instance Attachment Details Not attached to a CEN Instance

Destination CIDR Block 192.168.0.0/16

Created At 07/04/2018, 16:20:31

Description - Edit

ClassicLink Disabled

Region China East 1 (Hangzhou)

VRouter Basic Information

ID vrt-bp1[redacted]

Created At 07/04/2018, 16:20:31

Name - Edit

Description - Edit

CEN cross account authorization information

Peer Account UID	Peer Account CEN ID	Authorized At	Actions
No data is available			

4. In the Attach to CEN dialog box, enter the ID of the account that the CEN instance belongs to and the ID of the CEN Instance, and then click OK.

Related APIs

CreateVpc

DeleteVpc

DescribeVpcs

ModifyVpcAttribute

1.3 Manage VSwitches

A VSwitch is a basic network module in a VPC network, used to connect different cloud product instances in the VPC.

After creating a VPC, you can further segment your virtual private network to one or more subnets by creating VSwitches. The VSwitches within a VPC are interconnected by default. You can deploy different applications to the VSwitches that are located in different zones to improve the service availability.

Note:

A VSwitch does not support multicast or broadcast. You can achieve multicast proxy by using the multicast agent tool provided by Alibaba Cloud. For more information, see *Configure multicast for Linux kernel*.

Create VSwitch

To create a VSwitch, complete these steps:

1. Log on to the *VPC console*.
2. Select the region of the VPC to which the VSwitch belongs.
3. In the left-side navigation pane, click VSwitches.
4. Click Create VSwitch, configure the VSwitch according to the following information and click OK.

Configuration	Description
VPC	Select the VPC to which the VSwitch belongs.
CIDR Block	Display the CIDR block of the VPC.
Name	Enter the name of the VSwitch. The name can contain 2 to 128 characters. It must begin with English letters or Chinese characters and can contain numbers, hyphens, and underlines.
Zones	Select the zone of the VSwitch. In a VPC, VSwitches in different zones can communicate with each other through the intranet.
Zone Resource	Display the cloud resources that can be used in the selected zone.

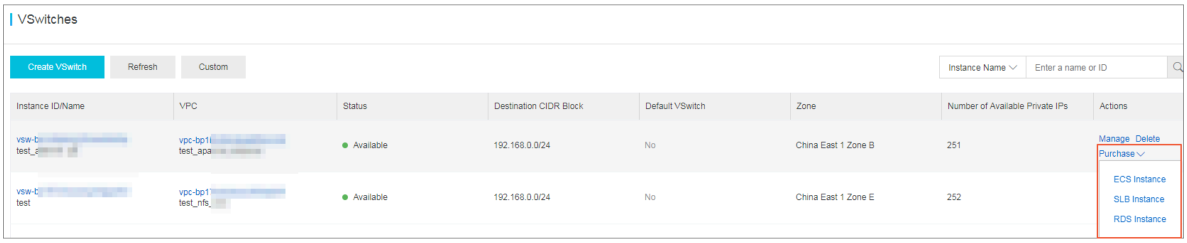
Configuration	Description
CIDR	Enter the CIDR block of the VSwitch. Note the following when specifying the VSwitch CIDR block: · The CIDR block of the VSwitch can be the same as that of the VPC to which it belongs, or a subset of the VPC CIDR block. For example, if the CIDR block of the VPC is 192.168.0.0/16, the CIDR block of the VSwitch in the VPC can be 192.168.0.0/16, 192.168.0.0/17, …, till 192.168.0.0/29. Note: If the CIDR block of the VSwitch is the same as that of the VPC to which it belongs, you can only create one VSwitch in the VPC. · The size of the subnet mask for the VSwitch can be /16 to /29, which can provide 8 to 65536 IP addresses. · The first and last three IP addresses are reserved by the system. Take the IP address range 192.168.1.0/24 as an example, IP addresses 192.168.1.0, 192.168.1.253, 192.168.1.254, and 192.168.1.255 are reserved by the system. · Make sure the CIDR block does not conflict with that of the VSwitch in another VPC or the local data center that the VSwitch connects to.
Number of Available Private IPs	Display the number of available private IPs of the VSwitch.
Description	Enter a description of the VSwitch. The name can contain 2 to 256 characters, but cannot begin with`http://` and `https://`.

Create cloud resources in a VSwitch

To create cloud resources in a VSwitch, complete these steps:

1. Log on to the VPC console.

2. Select the region of the VPC.
3. In the left-side navigation pane, click VSwitches.
4. Locate the target VSwitch, click Purchase and select the cloud resources to create.



VSwitches

Instance ID/Name	VPC	Status	Destination CIDR Block	Default VSwitch	Zone	Number of Available Private IPs	Actions
vsw-b[redacted] test_a[redacted]	vpc-bp1i[redacted] test_apa[redacted]	● Available	192.168.0.0/24	No	China East 1 Zone B	251	Manage Delete Purchase ECS Instance SLB Instance RDS Instance
vsw-b[redacted] test	vpc-bp1[redacted] test_nfs_[redacted]	● Available	192.168.0.0/24	No	China East 1 Zone E	252	

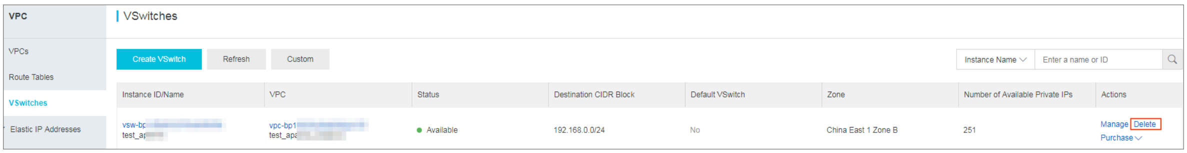
5. Complete the configuration.

Delete a VSwitch

> **Note:**
>
> Before deleting a VSwitch, make sure that:
>
> - You have deleted all cloud resources in the VSwitch, such as ECS, SLB, and RDS.
> - If the VSwitch has configured an SNAT entry, VPN Gateway, or HAVIP, delete these associated resources.

To delete a VSwitch, complete these steps:

1. Log on to the VPC console.
2. Select the region of the VPC.
3. In the left-side navigation pane, click VSwitches.
4. Locate the target VSwitch, and click Delete.



VSwitches

Instance ID/Name	VPC	Status	Destination CIDR Block	Default VSwitch	Zone	Number of Available Private IPs	Actions
vsw-bp[redacted] test_ap[redacted]	vpc-bp1[redacted] test_apa[redacted]	● Available	192.168.0.0/24	No	China East 1 Zone B	251	Manage Delete Purchase

5. In the displayed dialog, click OK.

Related APIs

CreateVSwitch

DeleteVSwitch

DescribeVSwitches

ModifyVSwitchAttribute

1.4 Instructions for using the multicast tool for Linux kernel mode

The Linux multicast tool is used in the VPC network and the classic network of Alibaba Cloud. A Linux kernel module and a command line are included in the client and server of the multicast tool. The kernel module is used to convert between multicast packets and unicast packets to adapt to the current network environment. The command line is used to configure multicast groups.

Prepare the environment

The multicast tool depends on the `kernel-devel` and `rpm-build` packages. Run the following command to check if `kernel-devel` and `rpm-build` are installed:

```
#rpm -qa | grep kernel-devel-`uname -r
#rpm -qa | grep rpm-build
```

If not, run the following command to install:

```
#yum install kernel-devel-`uname -r` -y
#yum install rpm-build -y
```

Install the multicast agent tool

To install the multicast agent tool, follow these steps:

1. Download the multicast agent tool.

   Download address: *https://github.com/aliyun/multicast_proxy*

   Select the *`multicast_kernel`* folder.

2. Run the following command to check the kernel version.

   ```
   uname -r
   ```

   Note: If the kernel version is greater than or equal to 4.0, you need to run the following command in the code directory to install a patch:

   ```
   patch -p1 &lt; multicast_kernel/patch/kernel_v4.0.patch
   ```

3. Run the following command to generate the installation package.

   ```
   sh tmcc_client_auto_rpm.sh;sh tmcc_server_auto_rpm.sh
   ```

4. Run the following command to install the agent tool.

   ```
   rpm -Uvh multi_server-1.1-1.x86_64.rpm
   rpm -Uvh multi_client-1.1-1.x86_64.rpm
   ```

5. Run the following command to enable automatic startup of `multis` and `multic` at boot.

   Note:

   The services are automatically stopped in case of shutdown.

   ```

   chkconfig multis on --level 2345
   chkconfig multis off --level 016

   chkconfig multic on --level 2345
   chkconfig multic off --level 016
   ```

Start and stop the agent service

- Start the agent service

  The multicast tool starts the client and the server through the service. The starting process includes loading the kernel module and loading configurations from the configuration files. In this tutorial, JSON format is used to store configuration files.

  Note:

> Configuration files are not required for first-time start up. Configuration files generated during running are automatically saved.

- Server (root permission)

  Run `service multis start`
- Client (root permission)

  Run `service multic start`

- Stop the agent service

  The stopping process includes saving the configurations and uninstalling the corresponding kernel module. The configurations are saved as the configuration file for next-time startup by default, that is, the configurations are automatically restored by default when the agent is restarted. If you do not want to save the configurations, clear them by using the command line before stopping the service.

  - Server (root permission)

    Run `service multis stop`
  - Client (root permission)

    Run `service multic stop`
- Restart the agent service
  - Server (root permission)

    Run `service multis restart`
  - Client (root permission)

    Run `service multic restart`

Configure the multicast agent by using the script

You can also use the provided script to configure multicast. Click *Here* to obtain the script.

> Note:
> We recommend that you use an automated script to configure multicast. Read the readme before running the script.

Server configuration

You must configure multicast groups on the server and add multicast members to the groups. Each server supports 10 multicast groups. Each multicast group supports 128 server multicast members. The command line is installed under the `/usr/local/sbin` directory by default.

Use the `multis_admin` command to configure the server and run `multis_admin -help` to view detailed description.

```
multis_admin -- This command can be used to configure multicast server
.
Usage:
multis_admin -A -m {multi_ip} -j {ip1,ip2,ip3...}
multis_admin -A -m {multi_ip} -q {ip1,ip2,ip3...}
multis_admin -D -m {multi_ip}
multis_admin -C
multis_admin -P -m {multi_ip}
multis_admin -L -m {multi_ip}
multis_admin -S
multis_admin -H
Options:
-A/-- Add add multicast group
-D/--delete del multicast group
-C/--clear clear multicast group
-P/--stats packets statistic
-S/--show show multicast group
-L/--list list multicast group member
-H/--help help info
-j/--join vm join multicast group
-q/--quit vm quit multicast group
-m/--multiip multicast ip
```

Client configuration

You must configure the information of the multicast groups that the client is added to . A client server can belong to 10 different multicast groups at most.

Configure the client with the `multic_admin` command, and run `multic_admin-help` to view detailed instructions.

```
multic_admin -- This command can be used to configure multicast client
.
Usage:
multic_admin -A -i {ip} -p {port} -m {multi_ip}
multic_admin -D -i {ip} -p {port}
multic_admin -C
multic_admin -P -i {ip} -p {port}
multic_admin -L
multic_admin -H
Options:
-A/--add add multicast server ip and port
-D/--delete del multicast server ip and port
-C/--clear clear multicast server information
-P/--stats recv packets statistic
```

```
-L/--list list all multicast server ip and port
-H/--help help info
-i/--ip multicast server ip, the ip of multicast provider
-P/-- Port UDP port, the multicast Port
-m/--multi_ip multicast ip
```

2 Routes

2.1 Route table

A route table consists of one or more route entries. Each route entry specifies the destination for the specified traffic. In addition to the default route table, you can create custom route tables for a VPC to route traffic through subnets.

System route table and custom route table

After creating a VPC, Alibaba Cloud automatically creates a route table to control the VPC routing. All VSwitches in the VPC use this route table by default. You cannot create a default route table, nor delete the default route table, but you can create a custom route table and associate it with a VSwitch to control the subnet routing.

Note the following when you manage route tables:

- A VPC can have up to 10 route tables, including the system route table.
- One VSwitch can only associate with one route table. The routing of a VSwitch (subnet) is managed by the route table associated with the VSwitch.
- After a VSwitch is created, the VSwitch is associated with the system route table by default.
- If you want to replace the custom route table associated with a VSwitch with the system route table, unbind the custom route table directly. Then, the VSwtich is automatically associated with the system route table. If you want to replace the custom route table associated with a VSwitch with another custom route table, unbind the custom route table and then associate it with the custom route table that you want to use.
- Currently, customized route tables are available in most regions apart from China (Beijing), China (Hangzhou), and China (Shenzhen) regions.

Create a custom route table

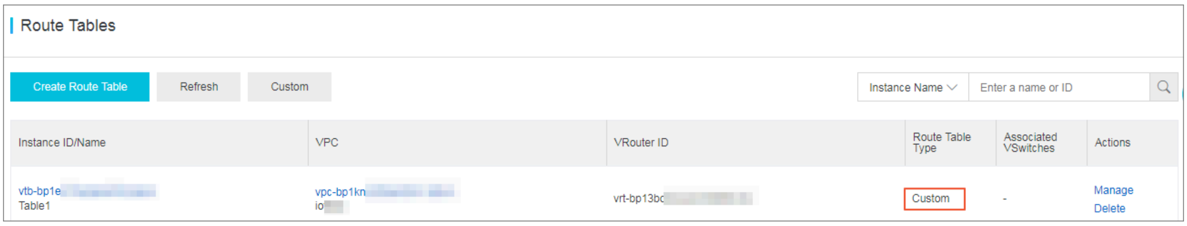
To create a custom route table, complete these steps:

1. Log on to the *VPC console*.
2. In the left-side navigation pane, click Route Tables.
3. On the Route Tables page, click Create Route Table.

4. Configure the route table according to the following information, and then click OK.

Configuration	Description
Name	Enter a name for the route table. The name can contain 2 to 128 characters. It must begin with English or Chinese characters and can contain numbers, hyphens (-) and underscores (_).
VPC	Select the VPC that the route table belongs to.
Description	Enter a description for the route table. The description can contain 2 to 256 characters, but cannot begin with `http://` and `https://`.

You can view and manage custom route tables on the Route Tables page.



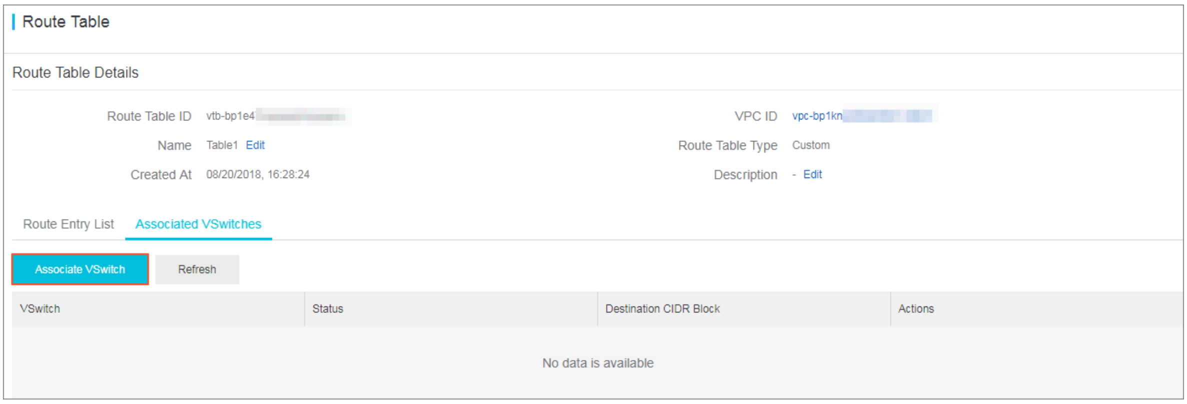
Instance ID/Name	VPC	VRouter ID	Route Table Type	Associated VSwitches	Actions
vtb-bp1e[redacted] Table1	vpc-bp1kn[redacted] io[redacted]	vrt-bp13bc[redacted]	Custom	-	Manage Delete

Associate a custom route table with a VSwitch

You can associate a custom route table with a VSwitch to control the traffic through it . A VSwitch can only associate with one route table, including the system route table.

To associate a custom route table with a VSwitch, complete these steps:

1. Log on to the *VPC console*.
2. In the left-side navigation pane, click Route Tables.
3. On the Route Tables page, locate the target custom route table.
4. Click the Associated VSwitches tab, and then click Associate VSwitch.



Route Table ID vtb-bp1e4[redacted]

Name Table1 Edit

Created At 08/20/2018, 16:28:24

VPC ID vpc-bp1kn[redacted]

Route Table Type Custom

Description - Edit

VSwitch	Status	Destination CIDR Block	Actions

No data is available

5. In the displayed dialog box, select the VSwitch to bind, and then click OK.
6. Click the Route Entry List tab, add custom route entries.

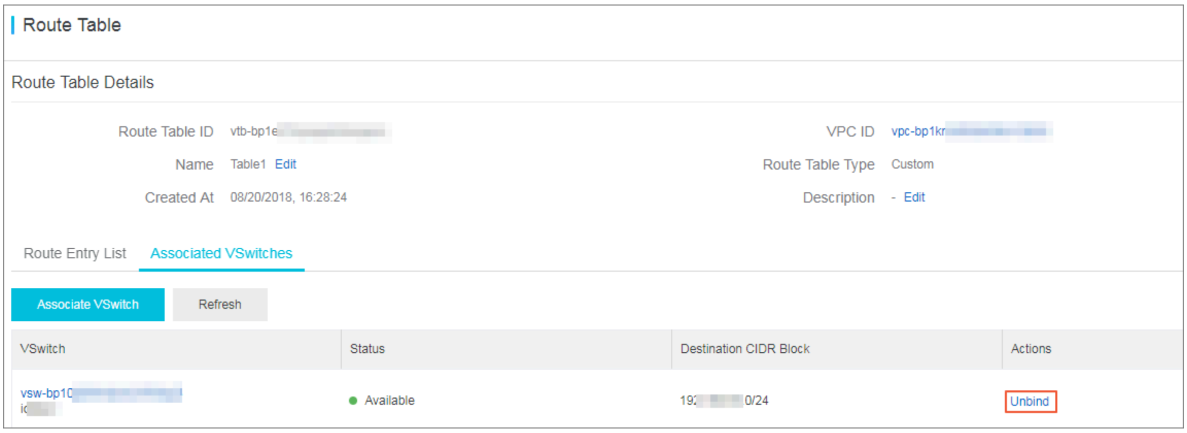
   For more information, see *Add custom route entry*.

Unbind a custom route table from a VSwitch

You can unbind a custom route table with a VSwitch. Then the VSwitch uses the default route table if you do not associate it with another custom route table.

To unbind a custom route table from a VSwitch, complete these steps:

1. Log on to the *VPC console*.
2. In the left-side navigation pane, click Route Tables.
3. On the Route Tables page, click the ID of the target custom route table.
4. On the Associated VSwitches page, locate the target VSwitch.
5. Click Unbind. In the displayed dialog box, click OK.



Route Table

Route Table Details

Route Table ID	vtb-bp1e[redacted]	VPC ID	vpc-bp1kr[redacted]
Name	Table1 Edit	Route Table Type	Custom
Created At	08/20/2018, 16:28:24	Description	- Edit

VSwitch	Status	Destination CIDR Block	Actions
vsw-bp10[redacted] id[redacted]	● Available	19[redacted]0/24	Unbind

Edit the custom route table

To modify the name and description of a custom route table, complete these steps:

1. Log on to the *VPC console*.
2. In the left-side navigation pane, click Route Tables.
3. On the Route Tables page, click the ID of the target custom route table.
4. In the Route Table Details area, modify the name and description accordingly.

Related operations

Add custom route entry

2.2 Routing

Alibaba Cloud automatically creates a default route table and adds system route entries to it after you create a VPC. You cannot create system route entries, nor delete system route entries, but you can create custom route entries to override system route entries, routing the traffic from specific IP address to the specified destination.

You can add custom route entries to both system route tables and custom route tables. For more information about route tables, see *Route table*.

Each entry in the route table is a *route entry*. A route entry defines the next hop of the network traffic destined for a specific IP address. Route entries include system route entries and custom route entries.

System route entries

The following system route entries are added to the route table after you create a VPC.

- A route entry destined for 100.64.0.0/10. It is used for cloud resource communicat ion in the VPC.
- A route entry destined for the IP address range of a VSwitch. It is used for cloud resource communication in the VSwitch.

For example, you have created a VPC with the IP address range of 192.168.0.0/16, and two VSwitches with the IP address ranges of 192.168.1.0/24 and 192.168.0.0/24. The following system route entries are automatically added to the route table of the VPC:

CIDR Block	Next Hop Type	Type
100.64.0.0/10	-	System
192.168.1.0/24	-	System
192.168.0.0/24	-	System

Custom route entries

You can add custom route entries to override system route entries or route traffic destined for specific IP address range to a target destination. You can specify the following next hop types when creating a custom route entry:

- ECS instance: route traffic destined for a specific IP address range to an ECS instance in the VPC.

  Select this type when you want to access the Internet through the application deployed on the ECS instance.
- VPN Gateway: Route traffic destined for a specific IP address range to a VPN Gateway.

  Select this type when you want to connect to a VPC or a local IDC through the VPN Gateway.
- Router Interface (To VPC): Route traffic destined for a specific IP address range to a VPC.

  Select this type when you want to connect two VPCs through router interfaces of Express Connect.
- Router Interface (To VBR): Route traffic destined for a specific IP address range to a VBR.

  Select this type when you want to connect to a local IDC through a dedicated connection of Express Connect.
- Secondary ENI: Route traffic destined for a specific IP address range to a secondary ENI.

Routing rules

The longest prefix match algorithm is used to route traffic when more than one route entries match the destination IP address range. The route entry with the longest subnet mask (the most specific route) is used.

Here is an example of a route table of a VPC.

Destination CIDR block	Next hop type	Next hop	Type
100.64.0.0/10	-	-	System
192.168.0.0/24	-	-	System
0.0.0.0/0	ECS instance	i-12345678	Custom
10.0.0.0/24	ECS instance	i-87654321	Custom

The route entries with the destination of `100.64.0.0/10` and `192.168.0.0/24` are system route entries. The route entries with the destination of`0.0.0.0/0` and `10.0.`

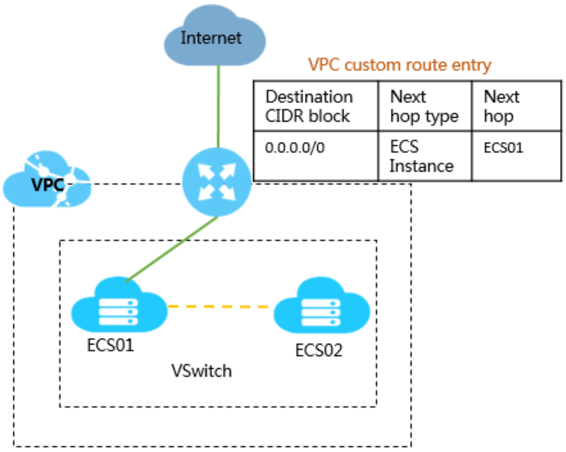
`0.0/24` are custom route entries. Traffic destined for `0.0.0.0/0` will be routed to the ECS instance `i-12345678`, and traffic destined for `10.0.0.0/24` will be routed to the ECS instance `i-87654321`. According to the longest prefix match algorithm, traffic destined for `10.0.0.1` will be routed to the ECS instance `i-87654321`, while traffic destined for `10.0.1.1` will be routed to the ECS instance `i-12345678`.

Routing examples

- Routing within a VPC

  As shown in the following figure, a self-built NAT gateway is deployed on an ECS instance (ECS01), add the following route entry to the route table if you want other ECS instances to access the Internet through this ECS instance:

Destination CIDR block	Next hop type	Next hop type
0.0.0.0/0	ECS instance	ECS01



VPC custom route entry

Destination CIDR block	Next hop type	Next hop
0.0.0.0/0	ECS Instance	ECS01

- VPC interconnection (Express Connect)

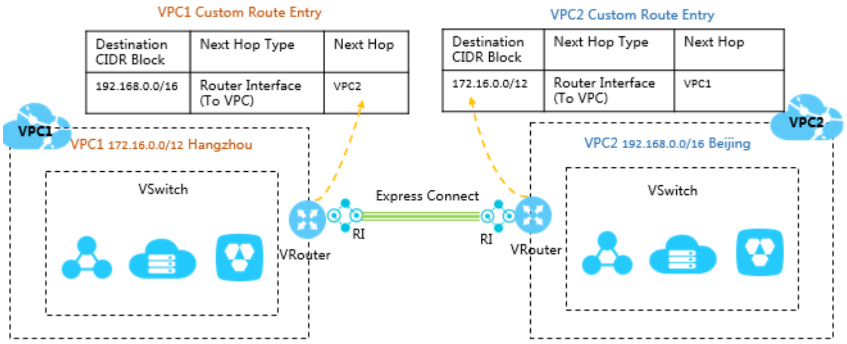
  As shown in the following figure, when using Express Connect to connect VPC 1 (172.16.0.0/12) and VPC 2 (192.168.0.0/16), you must add the following route entries in the VPC after creating route interfaces:

  - Custom route entry added in VPC1

Destination CIDR block	Next hop type	Next hop
192.168.0.0/16	Router interface (To VPC)	VPC 2

  - Custom route entry added in VPC2

Destination CIDR block	Next hop type	Next hop
172.16.0.0/12	Router interface (To VPC)	VPC 1



VPC1 Custom Route Entry

Destination CIDR Block	Next Hop Type	Next Hop
192.168.0.0/16	Router Interface (To VPC)	VPC2

VPC2 Custom Route Entry

Destination CIDR Block	Next Hop Type	Next Hop
172.16.0.0/12	Router Interface (To VPC)	VPC1

- VPC interconnection (VPN Gateway)

  As shown in the following figure, when using Express Connect to connect VPC 1 (172.16.0.0/12) and VPC 2 (10.0.0.0/8), you must add the following route entries in the VPC after configuring VPN Gateway:

  - Custom route entry added in VPC 1

Destination CIDR block	Next hop type	Next hop
10.0.0.0/8	VPN metric reference	VPN Gateway 1

  - Custom route entry added in VPC 2

Destination CIDR block	Next hop type	Next hop
172.16.0.0/12	VPN metric reference	VPN Gateway 2

- Local IDC connection (Express Connect)

  As shown in the following figure, when using Express Connect to connect a VPC to a local network, you must add the following route entries after configuring the leased line and the VBR:

  - Custom route entry added in VPC

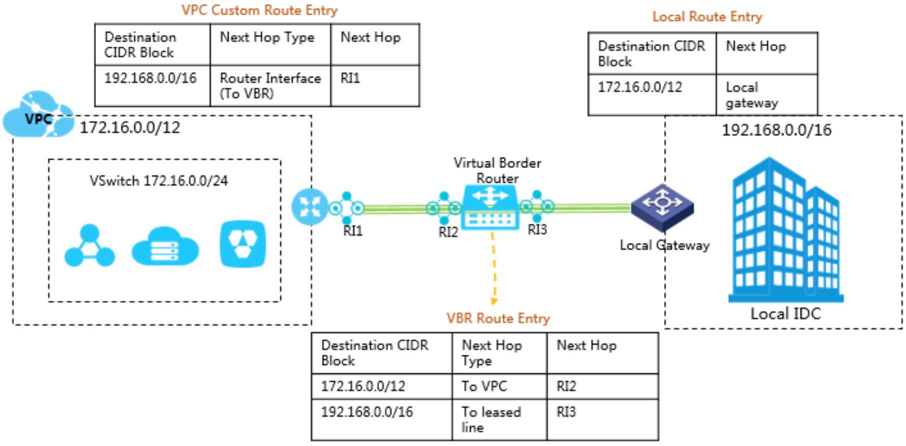
Destination CIDR block	Next hop type	Next hop
192.168.0.0/16	Router interface (To VBR /General Routing)	Router interface (RI 1)

  - Custom route entry added in VBR

Destination CIDR block	Next hop type	Next hop
192.168.0.0/16	To leased line	Router interface (RI 3)
172.16.0.0/12	To VPC	Router interface (RI 2)

  - Custom route entry added in the local network

Destination CIDR block	Next hop type	Next hop
172.16.0.0/12	—	Local gateway



VPC Custom Route Entry

Destination CIDR Block	Next Hop Type	Next Hop
192.168.0.0/16	Router Interface (To VBR)	RI1

Local Route Entry

Destination CIDR Block	Next Hop
172.16.0.0/12	Local gateway

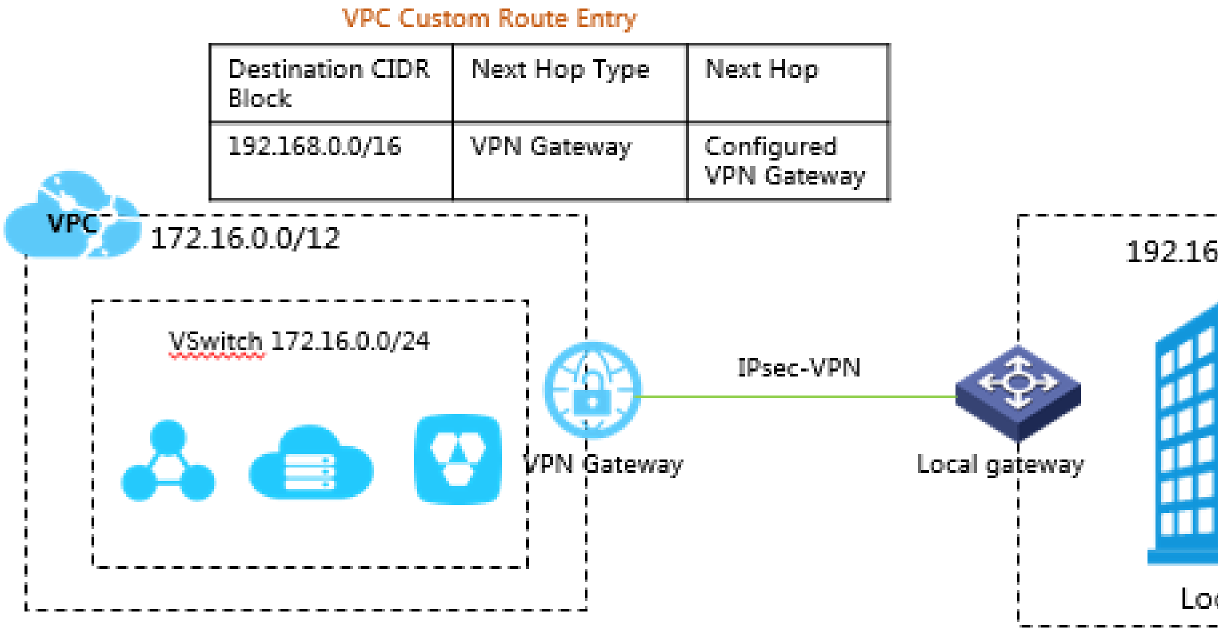
VBR Route Entry

Destination CIDR Block	Next Hop Type	Next Hop
172.16.0.0/12	To VPC	RI2
192.168.0.0/16	To leased line	RI3

- Local connection (VPN Gateway)

  As shown in the following figure, when using a VPN Gateway to connect a VPC (172.16.0.0/12) to a local network (92.168.0.0/16), you must add the following custom route entries:

Destination CIDR block	Next hop type	Next hop
192.168.0.0/16	VPN metric reference	VPN Gateway



VPC Custom Route Entry

Destination CIDR Block	Next Hop Type	Next Hop
192.168.0.0/16	VPN Gateway	Configured VPN Gateway

Add custom route entry

To add a custom route entry, complete these steps:

1. Log on to the *VPC console*.
2. Select the region of the VPC.
3. In the left-side navigation pane, click Route Tables.
4. Click the ID of the target route table, and then click the Route Entry List tab.
5. Click Add Route Entry.

6. In the displayed dialog box, configure the route entry according to the following information and click OK.

Configuration	Description
Destination CIDR Block	The traffic from which IP address range to route.

Configuration	Description
Next hop type and next hop	Select the next hop type and the corresponding next hop: · ECS Instance: Route the traffic destined for the specified IP address range to the selected ECS instance. Applicable to the scenario where traffic destined for the specified network is routed to an ECS instance for unified traffic forwarding and management. For example , configure an ECS instance as an Internet gateway to control the Internet access for other ECS instances. · VPN Gateway: Route the traffic destined for the specified IP address range to the selected VPN Gateway. · Secondary ENI: Route the traffic destined for the specified IP address range to the selected secondary ENI. · Router Interface (To VPC): Route the traffic destined for the specified IP address range to the selected VPC. Applicable to the scenario where Express Connect is used to connect VPCs. · Router Interface (To VBR): Route the traffic destined for the specified IP address range to the selected router interface of which the peer router interface is a VBR. Applicable to the scenario where Express Connect is used to connect a VPC to a local IDC. You need to further select a routing method when this type is selected: - General Routing: Route the traffic to the specified route interface. - Active/Standby Routing: Choose two router interfaces as the next hop. The weight for the active route entry is 100 and for the standby route entry is 0. The standby route entry takes over traffic routing when the health check for the active route entry fails. - Load Balancing Routing: Choose at least two router interfaces or four router interfaces at most as the next hop. Set a weight value between 1 and 255 for each added route interface. The default value is 100. The weights must be identical. Therefore, the system will distribute the traffic evenly among these router

3 Access control

3.1 Access control

VPC does not comes with an independent access control policy. Access control in the VPC relies on the access control capabilities of each cloud product. For example, ECS instances use security groups to achieve access control, while SLB and RDS use whitelists to achieve access control.

ECS security group

A security group is a virtual firewall that provides the stateful packet inspection feature. A security group is a virtual firewall that provides the stateful inspection packet filtration feature. Security groups are used to set network access control for one or more ECS instances. As an important measure to isolate networks, security groups are used to divide security domains in the cloud.

When you create an ECS instance of the VPC network, you can use the default security group rule provided by the system. You can change the security rules in the default security group but you cannot delete the default security group.

RDS whitelist

You can use the whitelist feature of ApsaraDB for RDS to set IP addresses that are allowed to access the RDS instances. Access from other IP addresses are denied. When using RDS in a VPC, add the IP address of the ECS instance to the whitelist of the RDS so that the ECS instance can access the RDS instance.

SLB whitelist

SLB is a traffic distribution control service that distributes access traffic to multiple backend ECS instances based on forwarding rules. You can configure whitelists for Server Load Balancer listeners thereby only the IP addresses in the whitelists can access the listeners. It is useful when the application only allows access from certain IP addresses.

3.2 ECS security group configurations

When creating an ECS instance of the VPC network, you can use the default security group or other security groups of the VPC. A security group is a virtual firewall to control the inbound and outbound traffic through the ECS instances.

This document lists some common security group scenarios for the ECS instances of the VPC network.

Case 1: Intranet communication

Communication between ECS instances of the VPC network includes the following two kinds:

- Within the same VPC, ECS instances in the same security group can communicate with each other by default.
- Two ECS instances in different VPCs cannot communicate with each other. To achieve communication between the two ECS instances in different VPCs, use Express Connect or VPN Gateway to connect them and make sure that security group rules for the ECS instances allow mutual access, as shown in the following table.

Security group rules	Rule direct	Autho ion policy	Protocol type and port range	Authoriz ion type	Authorization object
Security group configurations for the ECS instance in VPC 1	Inbound	Allow	Windows: RDP 3389/3389	Address field access	Enter the private IP address to access the ECS instance. To allow the access of any ECS instance, enter 0.0.0.0/0.
	Inbound	Allow	Linux: SSH 22/22	Address field access	
	Inbound	Allow	Custom TCP Custom	Address field access	
Security group configurations for the ECS instance in VPC 2	Inbound	Allow	Windows: RDP 3389/3389	Address field access	Enter the private IP address to access the ECS instance. To allow the access of any ECS instance, enter 0.0.0.0/0.
	Inbound	Allow	Linux: SSH 22/22	Address field access	

Security group rules	Rule direct	Autho ion policy	Protocol type and port range	Authoriza ion type	Authorization object
	Inbound	Allow	Custom TCP Custom	Address field access	

Case 2: Deny access of specific IPs or ports

You can configure security groups to deny the access of specific IPs or ports to the ECS instance in a VPC.

Security group rules	Rule direct	Autho ion policy	Protocol type and port range	Authoriza ion type	Authorization object
Deny access of a specific IP address range to all ports of the ECS instance	Inbound	Drop	All -1	Address field access	Enter the IP address range to block, in the form of CIDR block, such as 10.0.0.1/32.
Deny access of a specific IP address range to port 22 of the ECS instance	Inbound	Drop	SSH (22) 22/22	Address field access	Enter the IP address range to block, in the form of CIDR block, such as 10.0.0.1/32.

Case 3: Allow access of a specific IP

If you have configured a public IP for the ECS instance in a VPC, you can add the following security group rules to allow Windows remote logon or Linux SSH logon.

Security group rules	Rule direct	Autho ion policy	Protocol type and port range	Authoriza ion type	Authorization object
Allow Windows remote logon	Inbound	Allow	RDP 3389/3389	Address field access	To allow the logon of any public IP address, enter 0.0.0.0/0. To allow only the remote logon of a specific IP address, enter the IP address.

Security group rules	Rule direct	Authorization policy	Protocol type and port range	Authorization type	Authorization object
Allow Linux SSH logon	Inbound	Allow	SSH 22/22	Address field access	To allow the logon of any public IP address, enter 0.0.0.0/0. To allow only the remote logon of a specific IP address, enter the IP address.

Case 4: Allow access from the Internet to the HTTP/HTTPS service deployed on the ECS instance

If you have deployed a website on the ECS instance in a VPC and configured an EIP or NAT gateway to provide services, configure the following security group rules to allow access from the Internet.

Security group rules	Rule direct	Authorization policy	Protocol type and port range	Authorization type	Authorization object
Allow access to port 80	Inbound	Allow	HTTP 80/80	Address field access	0.0.0.0/0
Allow access to port 443	Inbound	Allow	HTTPS 443/443	Address field access	0.0.0.0/0
Allow access to port 80	Inbound	Allow	TCP 80/80	Address field access	0.0.0.0

4 Flow logs

VPC provides you with the flow log function to capture the IP traffic going to and from Elastic Network Interfaces (ENI) in your VPC. With flow logs, you can check access control rules, monitor network traffic, and troubleshoot networking problems.

Note:

The flow log function is only available in the Indonesia (Jakarta) region.

Introduction to flow logs

You can capture IP traffic information for an ENI, a VSwitch or a VPC. If you create a flow log for VSwitch or VPC, all the Elastic Network Interfaces, including the newly created Elastic Network Interfaces, are monitored.

Flow log data is stored in Log Service. You can view and analyze IP traffic information in Log Service. Flow log is free of charge in the test phase. But corresponding storage and indexing fees are billed when using Log Service. For more information, see *Billing method*.

The traffic information captured by the flow log function is recorded as flow log records. Each record captures the network flow for a specific 5-tuple in a specific capture window. The capture window is about 10 minutes. During the capture window, Log Service aggregates data and it takes about 5 minutes, then publishes flow log records.

The following table lists recorded fields of flow log records.

Field	Description
version	The version of the flow log.
vswitch-id	The ID of the VSwitch that the ENI belongs to.
vm-id	The ID of the ECS instance that the ENI is bound to.
vpc-id	The ID of the VPC that the ENI belongs to.
account-id	The ID of the account.
eni-id	The ID of the ENI.
srcaddr	The private IP address of the Elastic Network Interface.
srcport	The source port of the traffic.

Field	Description
dstaddr	The destination IP address.
dstport	The destination port of the traffic.
protocol	The IANA protocol number of the traffic. For more information, see *Assigned Internet Protocol Numbers*.
direction	The direction of the traffic: · in: traffic goes to the ENI · out: traffic goes from the ENI
packets	The number of packets in the capture window.
bytes	The number of bytes in the capture window.
start	The start time of the capture window.
end	The end time of the capture window.
log-status	The logging status of the flow log: · OK: Data is normally recorded. · NODATA: There is no traffic to or from the ENI during the capture window. · SKIPDATA: Some flow log records were skipped during the capture window.
action	The action associated with the traffic: · ACCEPT: The traffic that security groups allow to record · REJECT: The traffic that security groups do not allow to record

Create a flow log

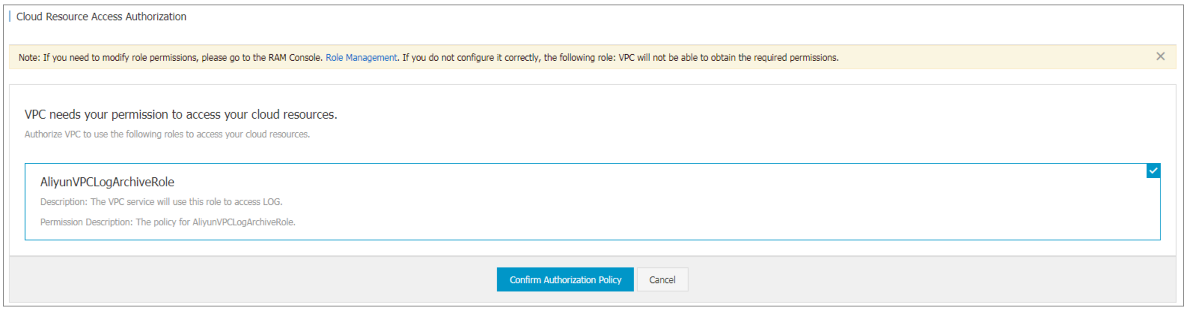
> ⓘ Notice:
>
> Before creating a flow log, make sure that Log Service is activated.

To create a flow log, complete these steps:

1. Log on to the *VPC console*.
2. In the left-side navigation pane, click Flow Logs.
3. If it is the first using flow logs, click Confirm Authorization Policy to authorize VPC to write data to your LogStore.

> ⓘ Notice:

The authorization is required only when the primary account uses the flow log function for the first time.



Cloud Resource Access Authorization

Note: If you need to modify role permissions, please go to the RAM Console. Role Management. If you do not configure it correctly, the following role: VPC will not be able to obtain the required permissions.

VPC needs your permission to access your cloud resources.

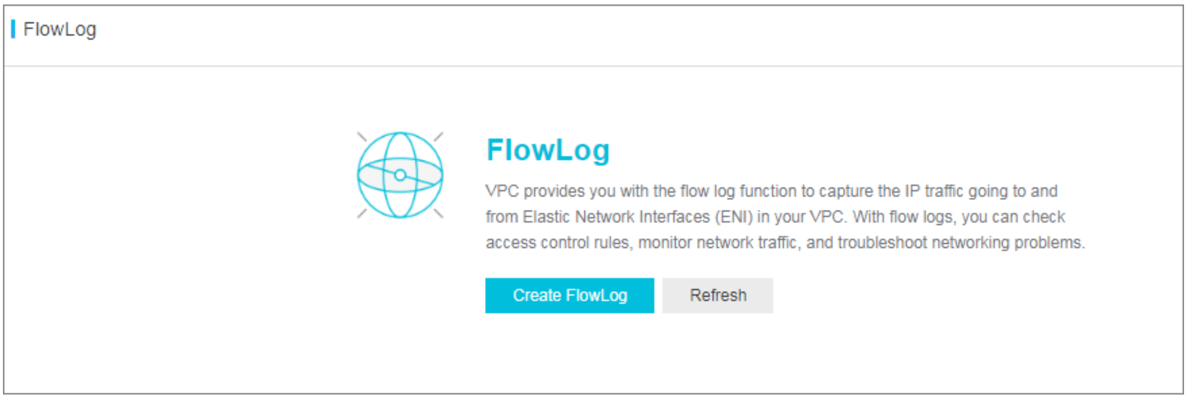
Authorize VPC to use the following roles to access your cloud resources.

☑ AliyunVPCLogArchiveRole

Description: The VPC service will use this role to access LOG.

Permission Description: The policy for AliyunVPCLogArchiveRole.

4. Select a region and then click Create Flow Log.



FlowLog

FlowLog

VPC provides you with the flow log function to capture the IP traffic going to and from Elastic Network Interfaces (ENI) in your VPC. With flow logs, you can check access control rules, monitor network traffic, and troubleshoot networking problems.

5. On the Create Flow Log page, configure the flow log according to the following information and then click OK.

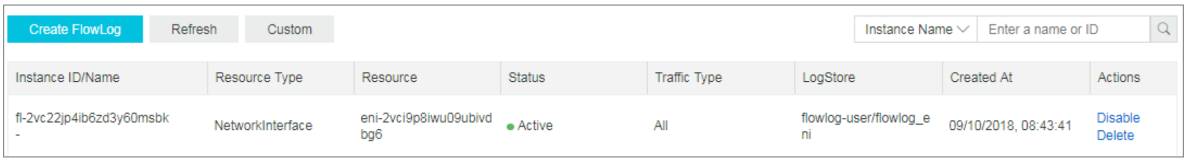
Configuration	Description
Name	Enter a name for the flow log.
Resource type	Select the resource where a flow log is created: · `ENI`: Capture IP traffic for the selected ENI. · `VSwitch`: Capture IP traffic for all the ENIs in the selected VSwitch. · `VPC`: Capture IP traffic for all the ENIs in the selected VPC.
Traffic Type	Select the traffic to capture: · `All`: All traffic is captured. · `Allow`: Only capture the traffic that is allowed by the security group rules. · `Drop`: Only capture the traffic that is not allowed by the security group rules.
LogStore	Select the LogStore to store the captured traffic information.

Configuration	Description
Turn on FlowLog Analysis Report Function	After this option is selected, the LogSearch/Analytics (index) function will be automatically enabled and a dashboard will be created for the selected LogStore, allowing you to analyze the collected data. You will be billed according to the indexing traffic. For more information, see *Log Service Billing*. Note: This option is available only when the index function of the selected LogStore is not enabled.
Description	Enter a description for the flow log.

View logs

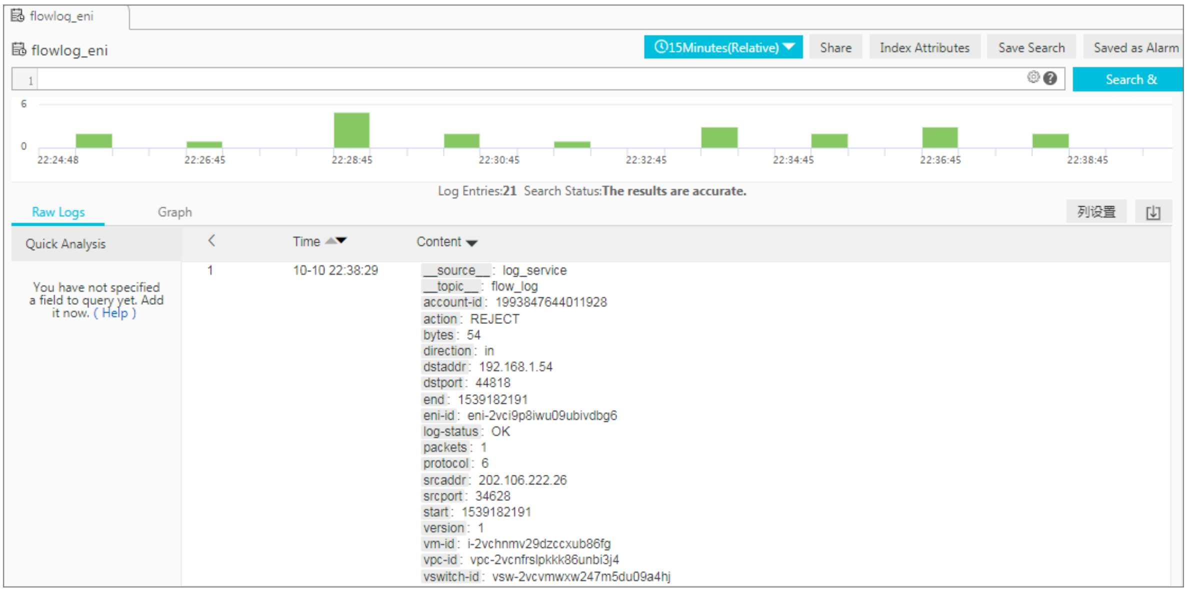
To view the captured traffic information, complete these steps:

1. Log on to the *VPC console*.
2. In the left-side navigation pane, click Flow Log.
3. Select a region, and then click the LogStore link of the flow log.



Instance ID/Name	Resource Type	Resource	Status	Traffic Type	LogStore	Created At	Actions
fl-2vc22jp4ib6zd3y60msbk -	NetworkInterface	eni-2vci9p8iwu09ubivdbg6	● Active	All	flowlog-user/flowlog_eni	09/10/2018, 08:43:41	Disable Delete

4. On the Log Service console, click Search.
5. View the captured traffic information.



Log Entries:**21** Search Status:**The results are accurate.**

You have not specified a field to query yet. Add it now. (Help)

```
1    10-10 22:38:29    __source__: log_service
                       __topic__: flow_log
                       account-id: 1993847644011928
                       action: REJECT
                       bytes: 54
                       direction: in
                       dstaddr: 192.168.1.54
                       dstport: 44818
                       end: 1539182191
                       eni-id: eni-2vci9p8iwu09ubivdbg6
                       log-status: OK
                       packets: 1
                       protocol: 6
                       srcaddr: 202.106.222.26
                       srcport: 34628
                       start: 1539182191
                       version: 1
                       vm-id: i-2vchnmv29dzccxub86fg
                       vpc-id: vpc-2vcnfrslpkkk86unbi3j4
                       vswitch-id: vsw-2vcvmwxw247m5du09a4hj
```

Disable a flow log

You can disable a flow log if you do not want to capture the traffic information.

To disable a flow log, complete these steps:

1. Log on to the *VPC console*.
2. In the left-side navigation pane, click Flow Log.
3. Select a region, and find the target flow log and then click Disable.

Limits

Note the following when you use the flow log function:

- The object where a flow log is created: ENI
- Resource types that support creating flow logs: VPC, VSwitch and ENI
- The number of flow log instances that can be created per region: 10

  If you need to create more flow log instances, open a ticket.