Enterprise Router

Getting Started

Issue 01

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Contents

1 Selecting a Networking Scheme

You can use enterprise routers to build a central network and to simplify the network architecture. There are two typical schemes to use Enterprise Router together with Direct Connect to allow an on-premises data center to access multiple VPCs.

Figure 1-1 Networking for allowing an on-premises data center to access two service VPCs directly (scheme 2)
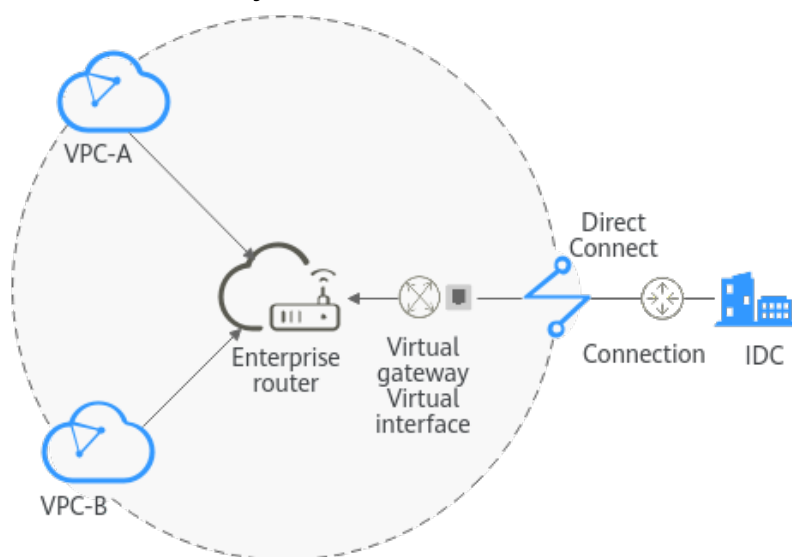
Figure 1-2 Networking for allowing an on-premises data center to access two service VPCs over a transit VPC (scheme 2)
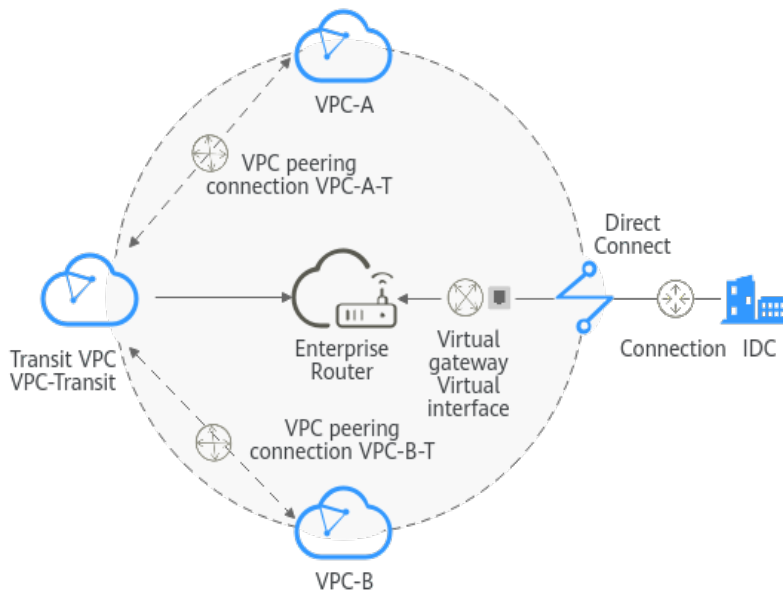
Table 1-1 Comparison between the two schemes

Scheme	Networking Architecture	Network Path Description	Configuration Guide	Remarks
Scheme 1	As shown in **Figure 1-1**: Two service VPCs (VPC-A and VPC-B) and the Direct Connect virtual gateway are attached to an enterprise router.	● The enterprise router enables the two VPCs to communicate with each other. ● Direct Connect enables the on-premises data center to access the cloud, and the enterprise router connects the on-premises data center to both VPCs.	● Connectivity between VPCs: **Using an Enterprise Router to Enable Communications Between VPCs in the Same Region** ● Connectivity between VPCs and an on-premises data center: **Using Enterprise Router and Direct Connect to Allow Communications Between an On-Premises Data Center and VPCs**	For details, see **How Do I Select a Networking Scheme?**.

Sc he m e	Networking Architecture	Network Path Description	Configuration Guide	Remarks
Sc he m e 2	As shown in **Figure 1-2**: The two service VPCs (VPC-A and VPC-B) are not attached to the enterprise router. Instead, a transit VPC (VPC-Transit) is used. The transit VPC and the Direct Connect virtual gateway are attached to the enterprise router.	• Each service VPC is connected to the transit VPC over a VPC peering connection. • Direct Connect enables the on-premises data center to access the cloud, and the enterprise router connects the on-premises data center to the two service VPCs.	**Using Enterprise Router and a Transit VPC to Allow an On-premises Data Center to Access Service VPCs**	

How Do I Select a Networking Scheme?

In scheme 1, the service VPCs are directly attached to the enterprise router. In scheme 2, a transit VPC is used and attached to the enterprise router. Each service VPC is connected to the transit VPC over a VPC peering connection. Compared with scheme 1, scheme 2 costs less and eliminates some constraints, as detailed below:

● Scheme 2 uses less traffic and fewer attachments.

  – Traffic between service VPCs is routed through VPC peering connections instead of enterprise routers, reducing traffic costs.

  – Only the transit VPC is attached to the enterprise router. You can pay less for the attachments.

● Scheme 2 frees you from the following constraints that scheme 1 has on attaching service VPCs to an enterprise router:

  – If a service VPC is used by ELB, VPC Endpoint, NAT Gateway (private NAT gateways), or DCS, contact customer service to confirm the service compatibility and preferentially use a transit VPC for networking.

  – Traffic cannot be forwarded from a VPC to the enterprise router if you set the destination of a route in the VPC route table to 0.0.0.0/0 and:

    ▪ An ECS in the VPC has an EIP bound.

■ The VPC is being used by ELB, NAT Gateway, VPC Endpoint, or DCS.

– If a VPC attached to an enterprise router has a NAT gateway associated and **Scenario** of the SNAT or DNAT rules is set to **Direct Connect**, the network from the on-premises data center to the VPC is disconnected.

NOTICE

If you still want to use scheme 1 to attach service VPCs to an enterprise router, contact customer service to evaluate the feasibility.

2 Preparations

Registering a HUAWEI ID and Completing Real-Name Authentication

If you already have a HUAWEI ID, skip this topic. If you do not have one, proceed as follows:

1. Visit https://www.huaweicloud.com/eu/ and click **Sign Up**.
2. On the displayed page, register an account as prompted.

   After the registration is completed, you will be redirected to your account information page.
3. Complete real-name authentication by following the instructions in **Individual Real-Name Authentication**.

Learning About Enterprise Router Pricing

For details, see **Pricing Details**.

3 Using an Enterprise Router to Enable Communications Between VPCs in the Same Region

3.1 Overview

Background

Four VPCs are created in region A on Huawei Cloud and they need to communicate with each other.

You can create an enterprise router in region A and attach the four VPCs to the enterprise router. The enterprise router can route traffic among the VPCs so that they can communicate with each other.

**Figure 3-1** Communications among VPCs in the same region
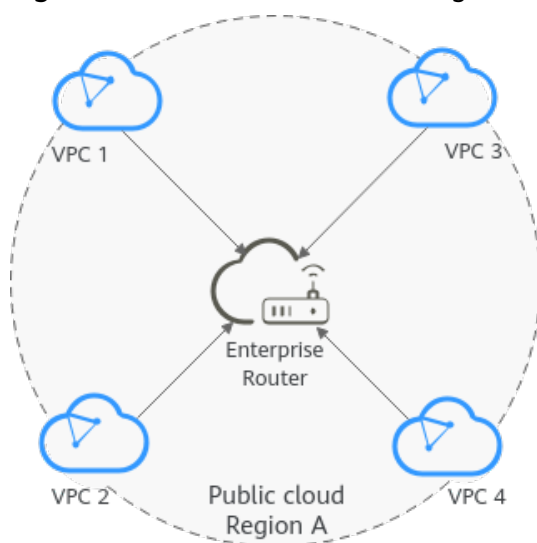
 NOTE

This document describes how to use an enterprise router to quickly allow multiple VPCs in the same region to communicate with each other.

You can **share an enterprise router** with different accounts to attach VPCs of these accounts to the same enterprise router for communication.

Procedure

Figure 3-2 shows the procedure for using an enterprise router to allow multiple VPCs in the same region to communicate with each other.

Figure 3-2 Flowchart for connecting VPCs in the same region
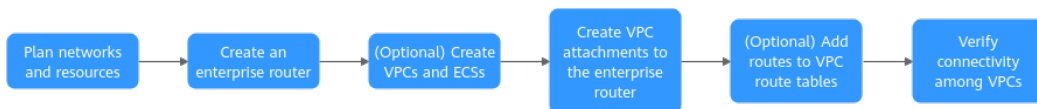
Table 3-1 Steps for connecting VPCs in the same region

No.	Step	Description
1	**Step 1: Plan Networks and Resources**	Plan CIDR blocks and the number of resources.
2	**Step 2: Create an Enterprise Router**	Create one enterprise router for connecting VPCs in the same region.
3	**Step 3: (Optional) Create VPCs and ECSs**	Create four VPCs and four ECSs. You can change the resource quantity and specifications as needed. If you already have these resources, skip this step.
4	**Step 4: Create VPC Attachments to the Enterprise Router**	Attach the four VPCs to the enterprise router.

No.	Step	Description
5	**Step 5: (Optional) Add Routes to VPC Route Tables**	Add routes to the route tables of the VPCs for communication with the enterprise router. • If you enable **Auto Add Routes** when creating a VPC attachment, you do not need to manually add static routes to the VPC route table. Instead, the system automatically adds routes (with this enterprise router as the next hop and 10.0.0.0/8, 172.16.0.0/12, and 192.168.0.0/16 as the destinations) to all route tables of the VPC. • If an existing route in the VPC route tables has a destination to 10.0.0.0/8, 172.16.0.0/12, or 192.168.0.0/16, the routes will fail to be added. In this case, do not need to enable **Auto Add Routes**. After the attachment is created, manually add routes.
6	**Step 6: Verify Connectivity Among VPCs**	Log in to the ECS and run the **ping** command to verify the connectivity among VPCs.

3.2 Step 1: Plan Networks and Resources

To use an enterprise router to connect VPCs in the same region, you need to:

- **Network Planning**: Plan CIDR blocks of VPCs and subnets, and route tables of VPCs and the enterprise router.
- **Resource Planning**: Plan the quantity, names, and parameters of cloud resources, including VPCs, ECSs, and the enterprise router.

Network Planning

Figure 3-3 and **Table 3-3** show the network planning and its description for communications among VPCs in the same region.

Figure 3-3 Network planning for communications among VPCs in the same region
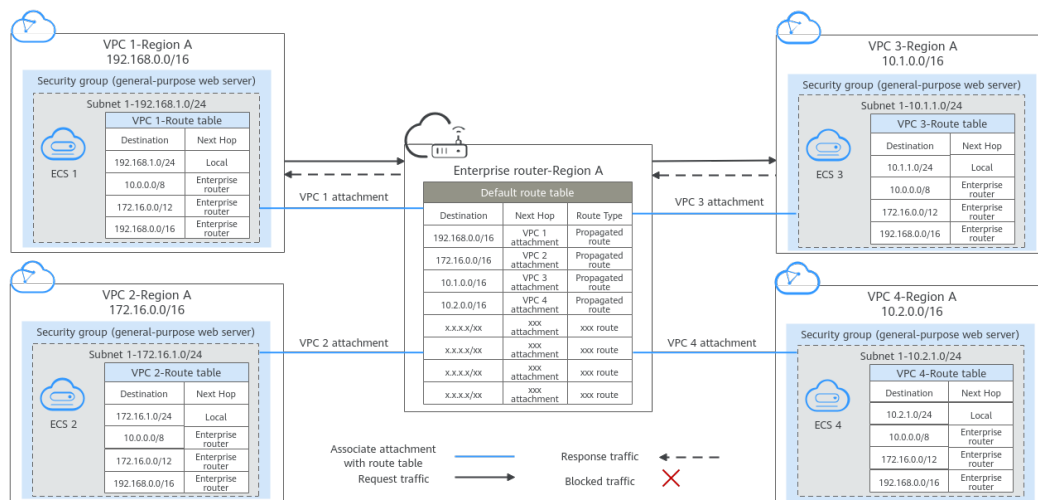
Table 3-2 Network traffic flows

Scenario	Description
Request from VPC 1 to VPC 3	1. The route table of VPC 1 has a route with next hop set to the enterprise router to forward traffic from VPC 1 to the enterprise router. 2. The route table of the enterprise router has a propagated route with next hop set to the VPC 3 attachment to forward traffic from the enterprise router to VPC 3.
Response from VPC 3 to VPC 1	1. The route table of VPC 3 has a route with next hop set to the enterprise router to forward traffic from VPC 3 to the enterprise router. 2. The route table of the enterprise router has a propagated route with next hop set to the VPC 1 attachment to forward traffic from the enterprise router to VPC 1.

Table 3-3 Network planning for communications among VPCs in the same region

Resource	Description

VPC	• The CIDR blocks of the VPCs to be connected cannot overlap with each other.
	In this example, the CIDR blocks of the VPCs are propagated to the enterprise router route table as the destination in routes. The CIDR blocks cannot be modified and overlapping CIDR blocks may cause route conflicts.
	
	If your existing VPCs have overlapping CIDR blocks, do not use propagated routes. Instead, you need to manually add static routes to the route table of the enterprise router. The destination can be VPC subnet CIDR blocks or smaller ones.
	• Each VPC has a default route table.
	• Routes in the default route table can be:
	  – Local: a system route for communications between subnets in a VPC.
	  – Enterprise router: custom routes with 10.0.0.0/8, 172.16.0.0/12, and 192.168.0.0/16 as the destinations for routing traffic from a VPC subnet to the enterprise router. See **Table 3-4** for route details.

Enterprise router	After **Default Route Table Association** and **Default Route Table Propagation** are enabled and a VPC attachment is created, the system will automatically: • Associate VPC attachments with the default route table of the enterprise router. • Propagate VPC attachments with the default route table of the enterprise router. The route table automatically learns the VPC CIDR block as the destination of routes. For details, see **Table 3-5**.
ECS	The four ECSs are in different VPCs. If the ECSs are associated with different security groups, add rules to their security groups to allow access to each other.

Table 3-4 VPC route table

Destination	Next Hop	Route Type
10.0.0.0/8	Enterprise router	Static route: Custom
172.16.0.0/12	Enterprise Router	Static route: Custom
192.168.0.0/16	Enterprise Router	Static route: Custom

◫ **NOTE**

- If you enable **Auto Add Routes** when creating a VPC attachment, you do not need to manually add static routes to the VPC route table. Instead, the system automatically adds routes (with this enterprise router as the next hop and 10.0.0.0/8, 172.16.0.0/12, and 192.168.0.0/16 as the destinations) to all route tables of the VPC.
- If an existing route in the VPC route tables has a destination to 10.0.0.0/8, 172.16.0.0/12, or 192.168.0.0/16, the routes will fail to be added. In this case, do not to enable **Auto Add Routes**. After the attachment is created, manually add routes.
- Do not set the destination of a route (with an enterprise router as the next hop) to 0.0.0.0/0 in the VPC route table. If an ECS in the VPC has an EIP bound, the VPC route table will have a policy-based route with 0.0.0.0/0 as the destination, which has a higher priority than the route with the enterprise router as the next hop. In this case, traffic is forwarded to the EIP and cannot reach the enterprise router.

Table 3-5 Enterprise router route table

Destination	Next Hop	Route Type
VPC 1 CIDR block: 192.168.0.0/16	VPC 1 attachment: er-attach-01	Propagated route
VPC 2 CIDR block: 172.16.0.0/16	VPC 2 attachment: er-attach-02	Propagated route
VPC 3 CIDR block: 10.1.0.0/16	VPC 3 attachment: er-attach-03	Propagated route
VPC 4 CIDR block: 10.2.0.0/16	VPC 4 attachment: er-attach-04	Propagated route

Resource Planning

The enterprise router, VPCs, and ECSs must be in the same region. You can select any AZ within the region.

◫ **NOTE**

The following resource details are only examples. You can modify them as required.

- One enterprise router.

Table 3-6 Enterprise router details

Enterprise Router Name	ASN	Default Route Table Association	Default Route Table Propagation	Association Route Table	Propagation Route Table	Attachment
er-test-01	64512	Enable	Enable	Default route table	Default route table	er-attach-01
						er-attach-02

Enterprise Router Name	ASN	Default Route Table Association	Default Route Table Propagation	Association Route Table	Propagation Route Table	Attachment
						er-attach-03
						er-attach-04

- Four VPCs, each with a unique CIDR block.

Table 3-7 VPC details

VPC Name	VPC CIDR Block	Subnet Name	Subnet CIDR Block	Association Route Table
vpc-demo-01	192.168.0.0/16	subnet-demo-01	192.168.1.0/24	Default route table
vpc-demo-02	172.16.0.0/16	subnet-demo-02	172.16.1.0/24	Default route table
vpc-demo-03	10.1.0.0/16	subnet-demo-03	10.1.1.0/24	Default route table
vpc-demo-04	10.2.0.0/16	subnet-demo-04	10.2.1.0/24	Default route table

- Four ECSs in four different VPCs.

Table 3-8 ECS details

ECS	Image	VPC	Subnet	Security Group	Private IP Address
ecs-demo-01	Public image: EulerOS 2.5 6	vpc-demo-01	subnet-demo-01	sg-demo (general-purpose web server)	192.168.1.12
ecs-demo-02		vpc-demo-02	subnet-demo-02		172.16.1.189
ecs-demo-03		vpc-demo-03	subnet-demo-03		10.1.1.105
ecs-demo-04		vpc-demo-04	subnet-demo-04		10.2.1.83

3.3 Step 2: Create an Enterprise Router

Scenarios

This section describes how to create an enterprise router.

Procedure

Step 1 Log in to the management console.

Step 2 Click ⊙ in the upper left corner and select the desired region and project.

Step 3 Click **Service List** and choose **Networking** > **Enterprise Router**.

The **Enterprise Router** homepage is displayed.

Step 4 Click **Create Enterprise Router** in the upper right corner.

The **Create Enterprise Router** page is displayed.

Figure 3-4 Create Enterprise Router

Step 5 Configure the parameters based on **Table 3-9**.

Table 3-9 Parameters for creating an enterprise router

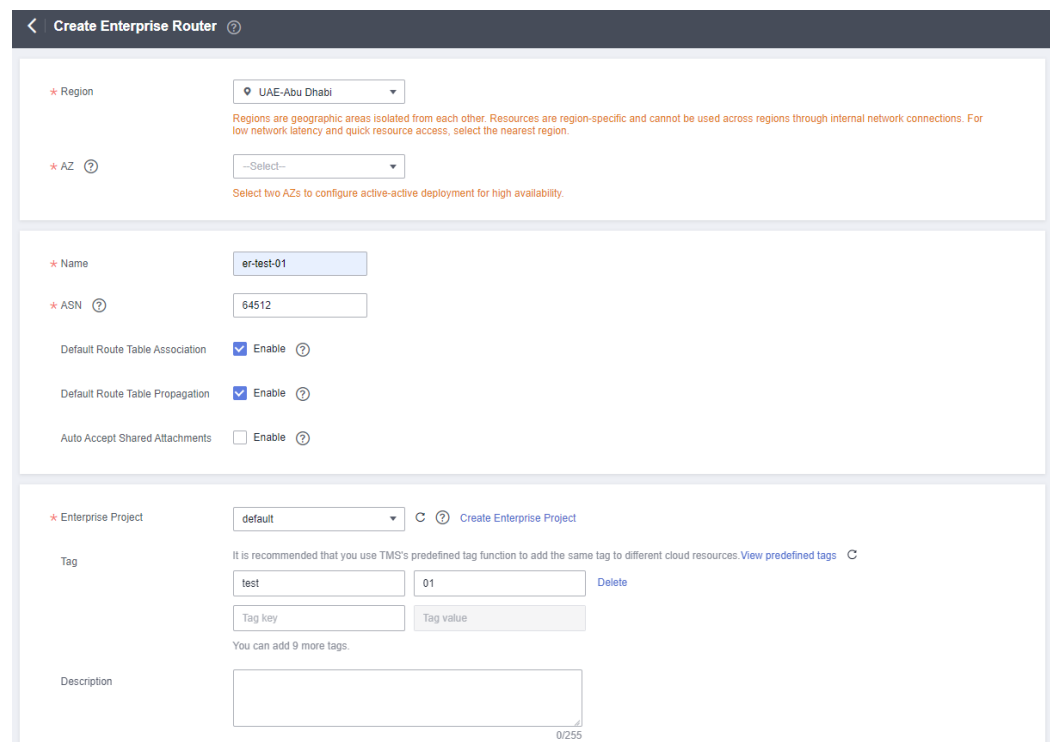| Parameter	Setting	Example Value
Region	Select the region nearest to your target users. Once the enterprise router is created, the region cannot be changed.	-
AZ	Select two AZs to deploy your enterprise router. You can change them after the enterprise router is created.	AZ1 AZ2
Name	Specify the enterprise router name. You can change it after the enterprise router is created.	er-test-01
ASN	Enter an ASN based on your network plan. It cannot be changed after the enterprise router is created.	64512
Default Route Table Association	If you select this option, you do not need to create route tables or associations. You can change your option after the enterprise router is created.	Enable
Default Route Table Propagation	If you select this option, you do not need to create route tables, propagations, or routes. You can change your option after the enterprise router is created.	Enable
Auto Accept Shared Attachments	If you do not select this option, you must accept the requests for creating attachments to this enterprise router from other users with whom this enterprise router is shared.	Disable
Enterprise Project	Select an enterprise project for the enterprise router. You can change it after the enterprise router is created.	default
Tag	Add tags to help you identify your enterprise router. You can change them after the enterprise router is created.	**Tag key**: test **Tag value**: 01
Description	Provide supplementary information about the enterprise router. You can change it after the enterprise router is created.	-

Step 6 Click **Create Now**.

Step 7 Confirm the enterprise router configurations and click **Submit**.

The enterprise router list is displayed.

Step 8 Check the enterprise router status.

If the status changes from **Creating** to **Normal**, the enterprise router is successfully created.

----End

3.4 Step 3: (Optional) Create VPCs and ECSs

Scenarios

This section describes how to create VPCs and ECSs.

If you already have VPCs and ECS, skip this section.

Notes and Constraints

- The CIDR blocks of the VPCs to be connected cannot overlap with each other.

  In this example, the CIDR blocks of the VPCs are propagated to the enterprise router route table as the destination in routes. The CIDR blocks cannot be modified and overlapping CIDR blocks may cause route conflicts.

  If your existing VPCs have overlapping CIDR blocks, do not use propagated routes. Instead, you need to manually add static routes to the route table of the enterprise router. The destination can be VPC subnet CIDR blocks or smaller ones.

- Four ECSs must be in the same security group. If your ECSs are in different security groups, add rules to their security groups to allow access to each other. For details, see **Adding a Security Group Rule**.

Procedure

Step 1 Create four VPCs with subnets.

For details, see **Creating a VPC**.

For VPC and subnet details in this example, see **Table 3-7**.

Step 2 Create four ECSs.

For details, see **Methods of Purchasing ECSs**.

For ECS details in this example, see **Table 3-8**.

----End

3.5 Step 4: Create VPC Attachments to the Enterprise Router

Scenarios

This section describes how to attach the four VPCs to the enterprise router.

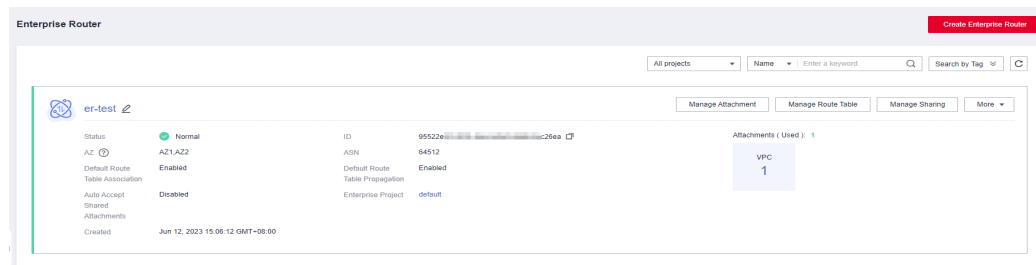## Procedure

Step 1 Log in to the management console.

Step 2 Click ⊙ in the upper left corner and select the desired region and project.

Step 3 Click **Service List** and choose **Networking** > **Enterprise Router**.

The **Enterprise Router** homepage is displayed.

Step 4 Search for the target enterprise router by name.

Figure 3-5 Searching for an enterprise router

Step 5 Go to the **Attachments** tab using either of the following methods:
- In the upper right corner of the enterprise router, click **Manage Attachment**.
- Click the enterprise router name and click **Attachments**.

Step 6 On the **Attachments** tab, click **Create Attachment**.

The **Create Attachment** dialog box is displayed.

Step 7 Configure the parameters based on **Table 3-10**.

Table 3-10 Parameter description

Parameter	Setting	Example Value
Name	Specify the name of the VPC attachment. You can change it after the attachment is created.	er-attach-01
Attachment Type	Select **VPC**. The type cannot be changed after the attachment is created.	VPC
Attached Resource	1. Select the VPC to be attached to the enterprise router from the drop-down list. The VPC cannot be changed after the attachment is created. 2. Select the subnet to be attached to the enterprise router from the drop-down list. The subnet cannot be changed after the attachment is created.	• VPC: vpc-demo-01 • Subnet: subnet-demo-01

Parameter	Setting	Example Value
Auto Add Routes	• If you enable **Auto Add Routes** when creating a VPC attachment, you do not need to manually add static routes to the VPC route table. Instead, the system automatically adds routes (with this enterprise router as the next hop and 10.0.0.0/8, 172.16.0.0/12, and 192.168.0.0/16 as the destinations) to all route tables of the VPC. • If an existing route in the VPC route tables has a destination to 10.0.0.0/8, 172.16.0.0/12, or 192.168.0.0/16, the routes will fail to be added. In this case, do not to enable **Auto Add Routes**. After the attachment is created, manually add routes. • Do not set the destination of a route (with an enterprise router as the next hop) to 0.0.0.0/0 in the VPC route table. If an ECS in the VPC has an EIP bound, the VPC route table will have a policy-based route with 0.0.0.0/0 as the destination, which has a higher priority than the route with the enterprise router as the next hop. In this case, traffic is forwarded to the EIP and cannot reach the enterprise router.	Enable
Description	Provide supplementary description about the attachment. You can change it after the attachment is created.	-
Tag	Add tags to help you identify your attachment. You can change them after the attachment is created.	**Tag key**: test **Tag value**: 01

Step 8 Click **OK**.

The attachment list is displayed.

Step 9 Check the attachment status.

If the status changes from **Creating** to **Normal**, the attachment is successfully created.

Step 10 Repeat **Step 5** to **Step 9** to attach the other three VPCs to the enterprise router.

> **NOTICE**
>
> In the example given, **Default Route Table Association** and **Default Route Table Propagation** are enabled when you create the enterprise router. After the VPCs are attached to the enterprise router, the system will automatically:
>
> - Associate VPC attachments with the route table of the enterprise router.
>
> - Propagate VPC attachments to the route table of the enterprise router. The CIDR blocks of the VPCs are propagated to the route table.

----End

3.6 Step 5: (Optional) Add Routes to VPC Route Tables

Scenarios

This section describes how to add routes to VPC route tables for traffic to route through the enterprise router.

> **NOTE**
>
> - If you enable **Auto Add Routes** when creating a VPC attachment, you do not need to manually add static routes to the VPC route table. Instead, the system automatically adds routes (with this enterprise router as the next hop and 10.0.0.0/8, 172.16.0.0/12, and 192.168.0.0/16 as the destinations) to all route tables of the VPC.
>
> - If an existing route in the VPC route tables has a destination to 10.0.0.0/8, 172.16.0.0/12, or 192.168.0.0/16, the routes will fail to be added. In this case, do not need to enable **Auto Add Routes**. After the attachment is created, manually add routes.

Notes and Constraints

- If your VPC only has a default route table, all subnets in it are associated with the default route table. You only need to add routes to the default route table for traffic to route through the enterprise router.

- If your VPC has multiple custom route tables and different subnets in the VPC are associated with different route tables, you need to add routes to each route table associated with the subnets for traffic to route through the enterprise router.
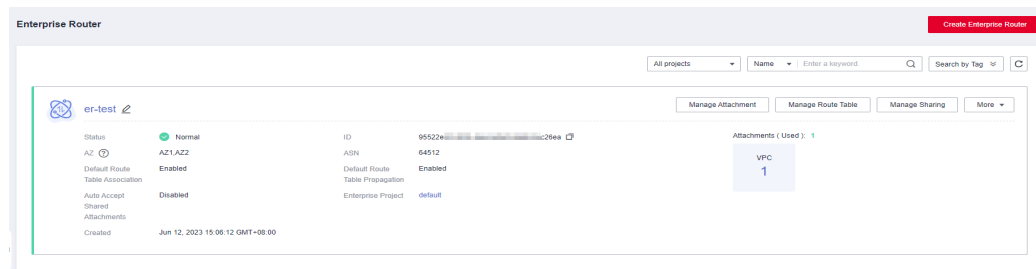
Procedure

Step 1 Log in to the management console.

Step 2 Click ⊚ in the upper left corner and select the desired region and project.

Step 3 Click **Service List** and choose **Networking** > **Enterprise Router**.

The **Enterprise Router** homepage is displayed.

Step 4 Search for the target enterprise router by name.

Figure 3-6 Searching for an enterprise router

Step 5 Go to the **Attachments** tab using either of the following methods:

- In the upper right corner of the enterprise router, click **Manage Attachment**.
- Click the enterprise router name and click **Attachments**.

Step 6 Locate the target attachment and click the VPC in the **Attached Resource** column.

The VPC basic information page is displayed.

Figure 3-7 VPC information
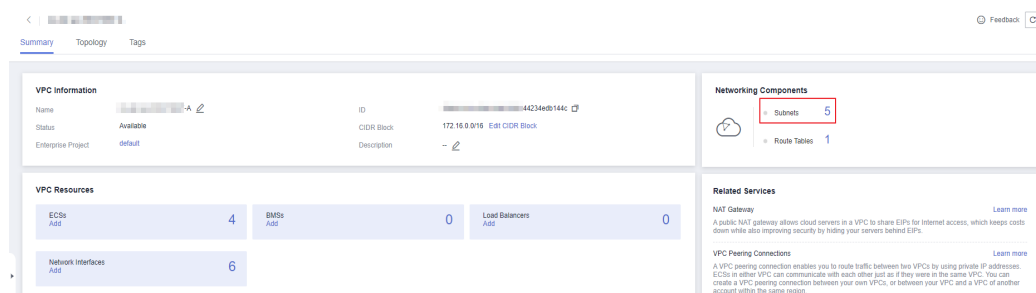
Step 7 In the **Networking Components** area, click the number next to **Subnets**.

The **Subnets** page is displayed.

Step 8 Locate the target subnet and click the route table name in the **Route Table** column.

The route table details page is displayed.

Step 9 Under **Routes**, click **Add Route**.

The **Add Route** dialog box is displayed.

Step 10 Configure the parameters based on **Table 3-11**.

Table 3-11 Parameter description

Parameter	Setting	Example Value
Destination	The destination is used to route traffic from this VPC to other VPCs attached to the enterprise router. You can change it after the route is created. ● Set the destination to the CIDR blocks of VPCs or their subnets that your VPC need to communicate with. ● Do not set the destination of a route (with an enterprise router as the next hop) to 0.0.0.0/0 in the VPC route table. If an ECS in the VPC has an EIP bound, the VPC route table will have a policy-based route with 0.0.0.0/0 as the destination, which has a higher priority than the route with the enterprise router as the next hop. In this case, traffic is forwarded to the EIP and cannot reach the enterprise router.	10.0.0.0/8
Next Hop Type	Select **Enterprise Router**. You can change it after the route is created.	Enterprise Router
Next Hop	Select the target enterprise router. You can change it after the route is created.	er-test-01
Description	Provide supplementary information about the route. You can change the route after it is created.	-

Step 11 Click **OK**.

You can view the route in the route list.

Step 12 Repeat **Step 6** to **Step 11** to add routes to route tables of other VPCs.

----End

3.7 Step 6: Verify Connectivity Among VPCs

Scenarios

This section describes how to log in to ECSs and verify the connectivity between VPCs.

Procedure

Step 1 Log in to the ECS.

Multiple methods are available for logging in to an ECS. For details, see **Logging In to an ECS**.

In this example, use VNC provided on the management console to log in to an ECS.

Step 2 Run the following command on the ECS:

ping *IP address of the ECS*

If you log in to ecs-demo-01 to verify the connectivity between vpc-demo-01 and vpc-demo-02, run the following command:

ping 10.1.1.105

If information similar to the following is displayed, the two VPCs can communicate with each other.

```
[root@ecs-demo-01 ~]# ping 10.1.1.105
PING 10.1.1.105 (10.1.1.105) 56(84) bytes of data.
64 bytes from 10.1.1.105: icmp_seq=1 ttl=64 time=1.14 ms
64 bytes from 10.1.1.105: icmp_seq=2 ttl=64 time=0.644 ms
64 bytes from 10.1.1.105: icmp_seq=3 ttl=64 time=0.599 ms
64 bytes from 10.1.1.105: icmp_seq=4 ttl=64 time=0.639 ms
^C
--- 10.1.1.105 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3004ms
rtt min/avg/max/mdev = 0.599/0.756/1.142/0.223 ms
[root@ecs-demo-01 ~]#
```

Step 3 Repeat **Step 1** to **Step 2** to verify the connectivity between other VPCs.

----End

A Change History

Released On	Description
2024-01-15	This issue is the first official release.