Direct Connect

Best Practices

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Contents

1 Direct Connect Best Practices

Direct Connect establishes high-speed, low-latency, stable, and secure dedicated network connections that connect your on-premises data center to the cloud.

You can use Direct Connect together with other cloud services to set up networks flexibly. You can refer to the best practices provided here for typical networking solutions.

Table 1-1 Scenarios

Solution	Example Scenario	Cloud Services	Description
Connecting an on-premises data center to VPCs in the same region	Using a single Direct Connect connection: • **Connecting an On-Premises Data Center to a VPC over a Single Connection and Using Static Routing to Route Traffic** • **Connecting an On-Premises Data Center to a VPC over a Single Connection and Using BGP Routing to Route Traffic**	• Direct Connect • VPC • ECS	You can use a single connection with a virtual gateway associated to connect an-premises data center to a VPC and leverage the large bandwidth and private connectivity for fast, secure, stable data transmission

Solution	Example Scenario	Cloud Services	Description
	Connecting an On-Premises Data Center to a VPC over Two Connections in Load Balancing Mode (Virtual Gateway)	• Direct Connect • VPC • ECS	To improve the network performance and reliability, you can deploy two connections to connect an on-premises data center to the VPC. The two connections work in load balancing mode. • When both connections work normally, the network transmission capability is greatly improved. • If one connection becomes faulty, the other connection is not a single point of failure, and your on-premises data center can still access the VPCs.
	Connecting an On-Premises Data Center to a VPC over Two Connections in an Active/Standby Pair (Virtual Gateway)	• Direct Connect • VPC • ECS	You want to ensure high reliability of the hybrid cloud network, while enjoying the following benefits: • A more cost-effective connection can be used as the standby one to lower costs. • The outbound connection is specified, which simplifies O&M. You can create two connections that work in an active/standby pair. If the active connection becomes faulty, the standby one will automatically take over, which minimizes service interruptions.
	Connecting an On-Premises Data Center to Multiple VPCs that Do Not Need to Communicate with Each Other	• Direct Connect • VPC • ECS	You can create a single standard connection with multiple virtual gateways associated to access different VPCs. This enables end-to-end route isolation for different services.

Solution	Example Scenario	Cloud Services	Description
	Connecting an On-Premises Data Center to Multiple VPCs in the Same Region Using Direct Connect and VPC Peering	• Direct Connect • VPC • ECS	After you connect an on-premises data center to a VPC using Direct Connect, you can use VPC Peering to peer this VPC with other VPCs in the same region, so that the on-premises data center can access all connected VPCs.
Using a public NAT gateway and Direct Connect to accelerate Internet access	**Using a Public NAT Gateway and Direct Connect to Accelerate Internet Access**	• Direct Connect • VPC • EIP • NAT Gateway	You can use Direct Connect to connect your on-premises data center to the cloud and then buy a public NAT gateway to allow on-premises servers to access the Internet by setting SNAT rules or provide publicly accessible services by setting DNAT rules.

2 Connecting an On-Premises Data Center to a VPC over a Single Connection and Using Static Routing to Route Traffic

Overview

Connect your on-premises network to the cloud over a single connection and use static routing to route traffic between your on-premises network and the VPC.

Prerequisites

- Your on-premises network must use a single-mode fiber with a 1GE, 10GE, 40GE, or 100GE optical module to connect to the access device in the cloud.
- Auto-negotiation for the port has been disabled. Port speed and full duplex mode have been manually configured.
- 802.1Q VLAN encapsulation is supported on your on-premises network.

Typical Topology

Your on-premises network is connected to a VPC over a single connection.

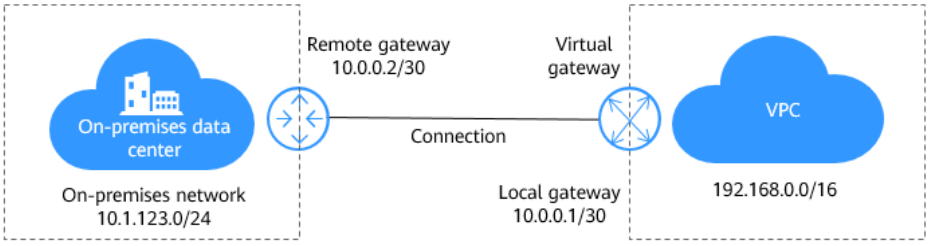
For details on how to create a VPC, see the **Creating a VPC**.

Table 2-1 lists the CIDR blocks used in this example.

Table 2-1 CIDR blocks

Item	CIDR Block
Your on-premises network	10.1.123.0/24
Local and remote gateways (addresses for interconnection)	10.0.0.0/30
VPC	192.168.0.0/16

Figure 2-1 Accessing a VPC over a connection through static routes



Procedure

Step 1 Create a connection.

1. Go to the **Connections** page.
2. In the upper left corner of the page, click and select a region and project.
3. In the upper right corner, click **Create Connection**.
4. On the **Create Connection** page, enter the equipment room details and select the Direct Connect location and port based on **Table 2-2**.

Figure 2-2 Creating a connection

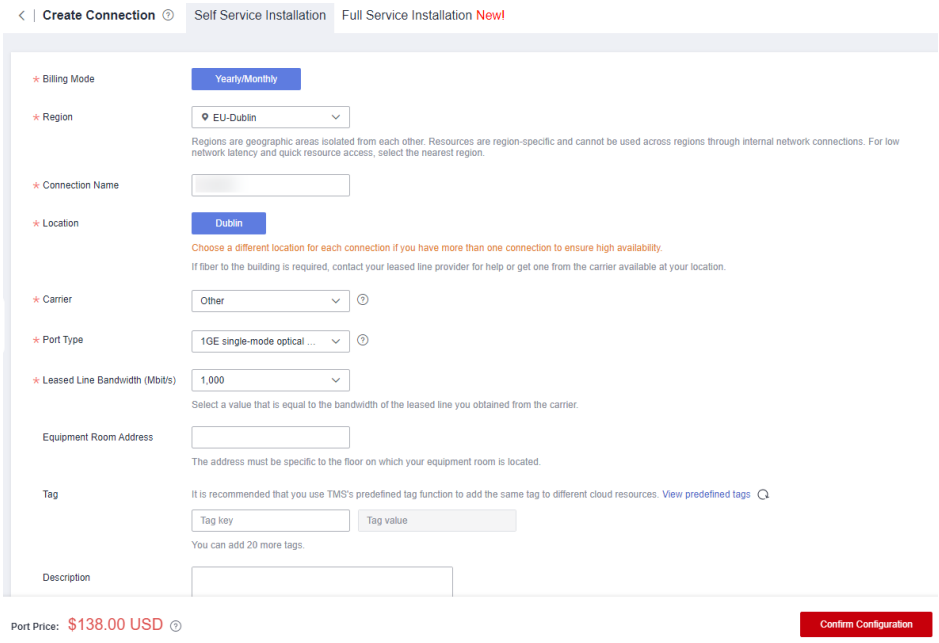


Table 2-2 Parameters for creating a connection

Parameter	Example Value	Description
Billing Mode	Yearly/Monthly	Specifies how you will be billed for the connection. Currently, only **Yearly/Monthly** is supported.

Parameter	Example Value	Description
Region	EU-Dublin	Specifies the region where the connection resides. You can also change the region in the upper left corner of the console.
Connection Name	dc-123	Specifies the name of the connection.
Location	Dublin	Specifies the Direct Connect location where your leased line can be connected to.
Carrier	Other	Specifies the carrier that provides the leased line.
Port Type	1GE single-mode optical port	Specifies the type of the port: 1GE single-mode optical port, 10GE single-mode optical port, 40GE single-mode optical port, or 100GE single-mode optical port.
Leased Line Bandwidth (Mbit/s)	100	Specifies the bandwidth of the line you need to lease from the carrier.
Equipment Room Address	Room xx, xx building, xx road, xx district, xx city	Specifies the address of your equipment room. The address must be specific to the floor your equipment room is on.
Tag	example_key1 example_value1	Adds tags to help you identify your connection. You can change them after the connection is created.
Description	-	Provides supplementary information about the connection.
Required Duration	3 months	Specifies how long the connection will be used for.
Auto-renew	3 months	Specifies whether to automatically renew the subscription to ensure service continuity. For example, if you select this option and the required duration is three months, the system automatically renews the subscription for another three months.
Enterprise Project	default	Specifies the enterprise project by which connections are centrally managed. Select an existing enterprise project.

5. Click **Confirm Configuration**.
6. Confirm the configuration and click **Pay Now**.
7. Confirm the order, select a payment method, and click **Confirm**.
8. After you have paid for the order, a connection ID is allocated to you automatically, and the connection information is displayed on the management console. You will be contacted to confirm the construction plan and relevant information (including your company name, constructor, expected construction time, and construction workers).
9. After having confirmed the construction plan, you can arrange the carrier to deploy the dedicated line and connect it to your equipment room based on your construction plan.
10. In normal cases, Huawei onsite engineers will connect the dedicated line to the Huawei Cloud gateway port within two working days.
11. Verify that the connection is in the **Normal** state, which means that the connection is ready, and the billing starts.

Step 2 Create a virtual gateway.

1. In the navigation pane on the left, choose **Direct Connect** > **Virtual Gateways**.
2. Click **Create Virtual Gateway**.
3. Configure the parameters based on **Table 2-3**.

Figure 2-3 Creating a virtual gateway

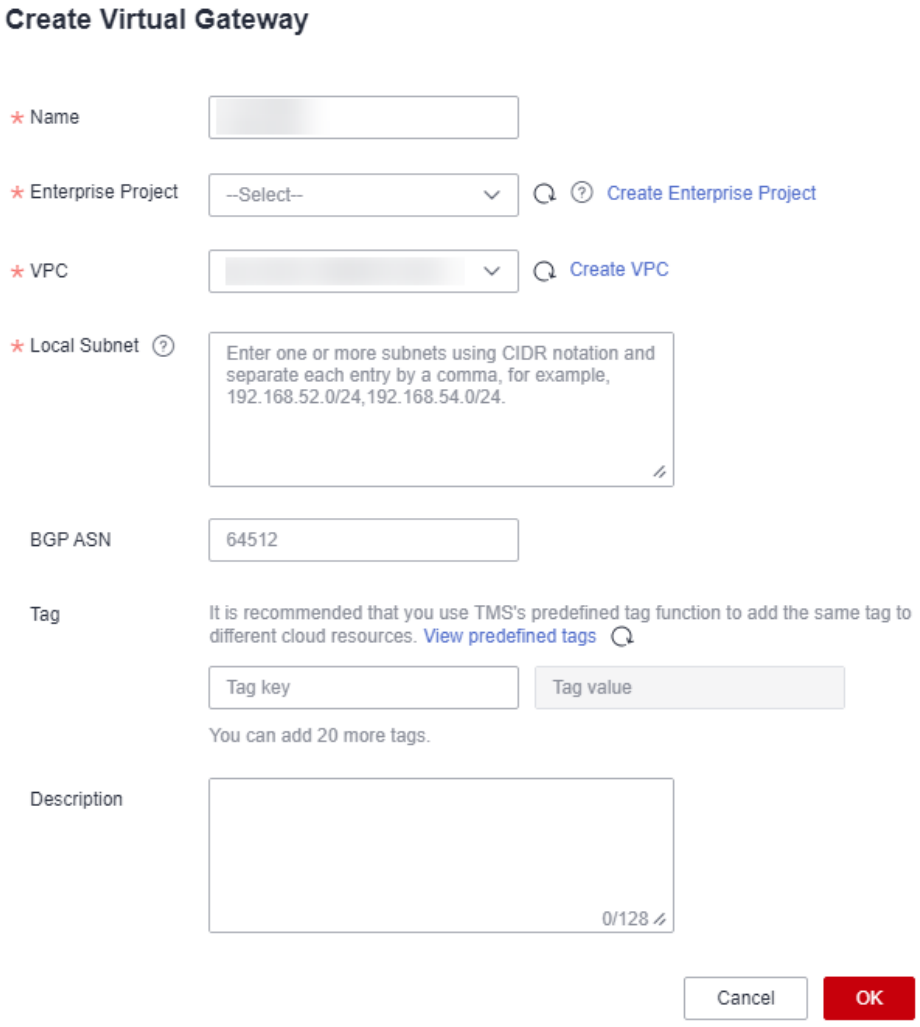


Table 2-3 Parameters required for creating a virtual gateway

Parameter	Example Value	Description
Name	vgw-123	Specifies the virtual gateway name. The name can contain 1 to 64 characters.
Enterprise Project	default	Specifies the enterprise project by which virtual gateways are centrally managed. Select an existing enterprise project.
VPC	VPC-001	Specifies the VPC to be associated with the virtual gateway.

Parameter	Example Value	Description
Local Subnet	192.168.0.0/16	Specifies the CIDR blocks of the subnets in the VPC to be accessed using Direct Connect. You can add one or more CIDR blocks. If there are multiple CIDR blocks, separate every entry with a comma (,).
BGP ASN	64512	Specifies the BGP ASN of the virtual gateway.
Tag	**example_key1** **example_value1**	Adds tags to help you identify your virtual gateway. You can change them after the virtual gateway is created.
Description	-	Provides supplementary information about the virtual gateway.

4. Click **OK**.

Step 3 Create a virtual interface.

1. In the navigation pane on the left, choose **Direct Connect** > **Virtual Interfaces**.
2. In the upper right corner, click **Create Virtual Interface**.
3. Configure the parameters based on **Table 2-4**.

Figure 2-4 Creating a virtual interface for your own account

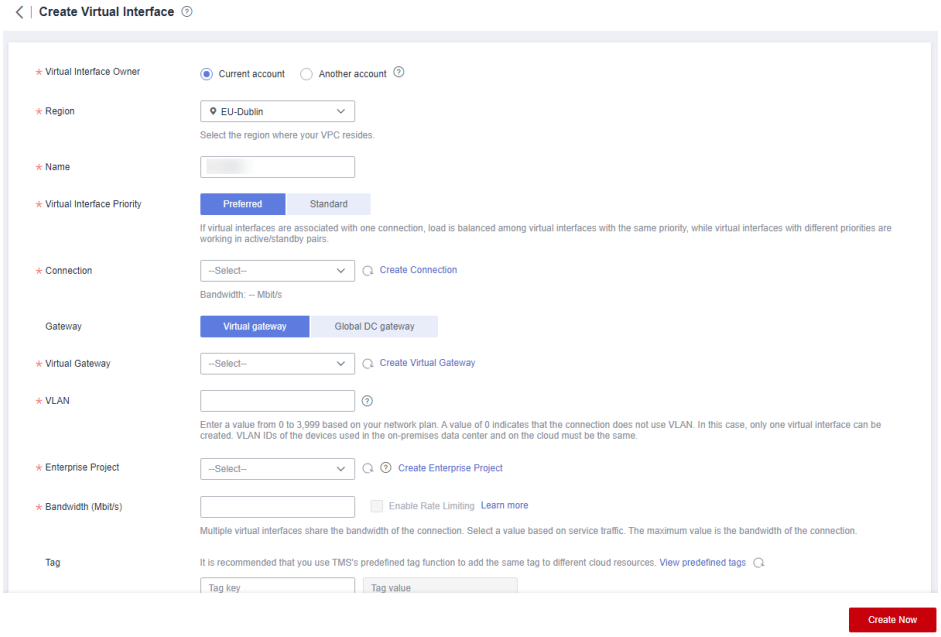


Table 2-4 Parameters for creating a virtual interface

Parameter	Example Value	Description
Virtual Interface Owner	Current account	Specifies the account that this virtual interface will be created for.
Region	EU-Dublin	Specifies the region where the connection resides. You can also change the region in the upper left corner of the console.
Name	vif-test	Specifies the virtual interface name. The name can contain 1 to 64 characters.

Parameter	Example Value	Description
Virtual Interface Priority	Preferred	Specifies whether the virtual interface will be preferentially used over other virtual interfaces. There are two options: **Preferred** and **Standard**. If multiple virtual interfaces are associated with one Direct Connect device, the load is balanced among virtual interfaces with the same priority, while virtual interfaces with different priorities are working in active/standby pairs.
Connection	dc-test12	Specifies the connection you can use to connect your on-premises network to Huawei Cloud.
Gateway	Virtual gateway	Specifies the type of the gateway that the virtual interface connects to. You can select a virtual gateway or global DC gateway. In this example, select a virtual gateway.
Virtual Gateway	vgw-123	This parameter is mandatory when **Gateway** is set to **Virtual gateway**. Specifies the virtual gateway that the virtual interface connects to.
Global DC Gateway	dgw-123	This parameter is mandatory when **Gateway** is set to **Global DC gateway**. Specifies the global DC gateway that the virtual interface connects to.

Parameter	Example Value	Description
VLAN	30	Specifies the ID of the VLAN for the virtual interface. – Standard connections: You need to configure the VLAN. – Hosted connections: The VLAN will be allocated by the partner. You do not need to configure the VLAN.
Bandwidth (Mbit/s)	1,000	Specifies the bandwidth that can be used by the virtual interface. The bandwidth cannot exceed that of the connection.
Enable Rate Limiting	Not enabled	Limits the highest bandwidth that can be used by the virtual interface. If this option is enabled, the rate limit gradients are as follows: – If the bandwidth is less than or equal to 100 Mbit/s, the rate limit gradient is 10 Mbit/s. – If the bandwidth is greater than 100 Mbit/s but is less than or equal to 1,000 Mbit/s, the rate limit gradient is 100 Mbit/s. – If the bandwidth is greater than 1,000 Mbit/s but is less than or equal to 100 Gbit/s, the rate limit gradient is 1 Gbit/s. – If the bandwidth is greater than 100 Gbit/s, the rate limit gradient is 10 Gbit/s. For example, if the bandwidth is 52 Mbit/s, the actual rate limit is 60 Mbit/s. If the bandwidth is 115 Mbit/s, the actual rate limit is 200 Mbit/s.

Parameter	Example Value	Description
Enterprise Project	default	Specifies the enterprise project by which virtual interfaces are centrally managed. Select an existing enterprise project.
Tag	-	Adds tags to help you identify your virtual interface. You can change them after the virtual interface is created.
IP Address Family	**IPv4**	Specifies the address type of the virtual interface. **IPv4** is selected by default.
Local Gateway	10.0.0.1/30	Specifies the IP address used by Huawei Cloud to connect to your on-premises network. After you configure **Local Gateway** on the console, the configuration will be automatically delivered to the gateway used by Huawei Cloud.
Remote Gateway	**10.0.0.2/30**	Specifies the IP address used by the on-premises data center to connect to Huawei Cloud. After you configure **Remote Gateway** on the console, you need to configure the IP address on the interface of the on-premises device. **CAUTION** The IP addresses of the local gateway and remote gateway must be in the same IP address range. Generally, an IP address range with a 30-bit mask is used. The IP addresses you plan cannot conflict with IP addresses used on your on-premises network. Plan an IP address range that will be used at both ends of the connection for network communication between your on-premises data center and the cloud.

Parameter	Example Value	Description
Remote Subnet	10.1.123.0/24	Specifies the subnets and masks of your on-premises network. If there are multiple subnets, use commas (,) to separate them.
Routing Mode	Static	Specifies whether static routing or dynamic routing is used to route traffic between your on-premises network and the cloud network. If there are or will be two or more connections, select BGP routing for higher availability.
BGP ASN	-	Specifies the ASN of the BGP peer. This parameter is required when BGP routing is selected.
BGP MD5 Authentication Key	-	Specifies the password used to authenticate the BGP peer using MD5. This parameter can be set when BGP routing is selected, and the parameter values on both gateways must be the same. The key contains 8 to 255 characters and must contain at least two types of the following characters: – Uppercase letters – Lowercase letters – Digits – Special characters ~!,.:;-_"(){}[]/@#$%^&*+|=
Description	-	Provides supplementary information about the virtual interface.

4. Click **Create Now**.

> **NOTE**
>
> The default security group rule denies all the inbound traffic. Ensure that security group rules in both directions are correctly configured to ensure normal communications.

Step 4 Wait for route delivery from the cloud.

Direct Connect automatically delivers the routes after a connection is established between your on-premises network and the cloud network.

Step 5 Configure routes on your on-premises network device.

Example route (A Huawei-developed device is used an example.)

```
ip route-static 192.168.0.0 255.255.0.0 10.0.0.1
```

----End

3 Connecting an On-Premises Data Center to a VPC over a Single Connection and Using BGP Routing to Route Traffic

Overview

Connect your on-premises network to the cloud network and use BGP routes to route traffic between your on-premises network and the VPC.

Prerequisites

- Your on-premises network must use a single-mode fiber with a 1GE, 10GE, 40GE, or 100GE optical module to connect to the access device in the cloud.
- Auto-negotiation for the port must be disabled. Port speed and full-duplex mode must be manually configured.
- 802.1Q VLAN encapsulation is supported on your on-premises network.
- On-premises devices must support BGP and cannot use ASN 64512, which is used by Huawei Cloud.

Typical Topology

Your on-premises network is connected to a VPC over a single connection.

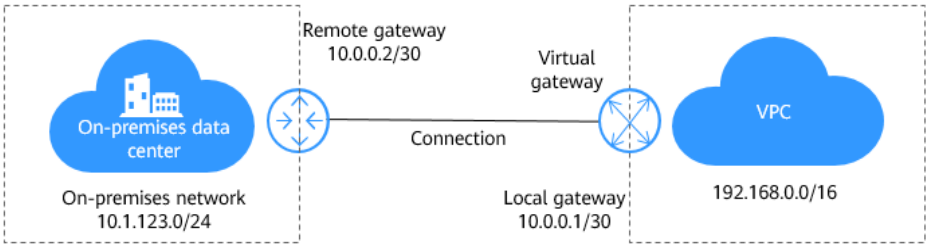
For details on how to create a VPC, see the **Creating a VPC**.

The following table lists the CIDR blocks used in this example:

Table 3-1 CIDR blocks

Item	CIDR Block
Your on-premises network	10.1.123.0/24
Local and remote gateways (addresses for interconnection)	10.0.0.0/30
VPC	192.168.0.0/16

Figure 3-1 Accessing a VPC over a connection though BGP routes



Procedure

Step 1 Create a connection.

1. Go to the **Connections** page.
2. In the upper left corner of the page, click and select a region and project.
3. In the upper right corner, click **Create Connection**.
4. On the **Create Connection** page, enter the equipment room details and select the Direct Connect location and port based on **Table 3-2**.

Figure 3-2 Creating a connection

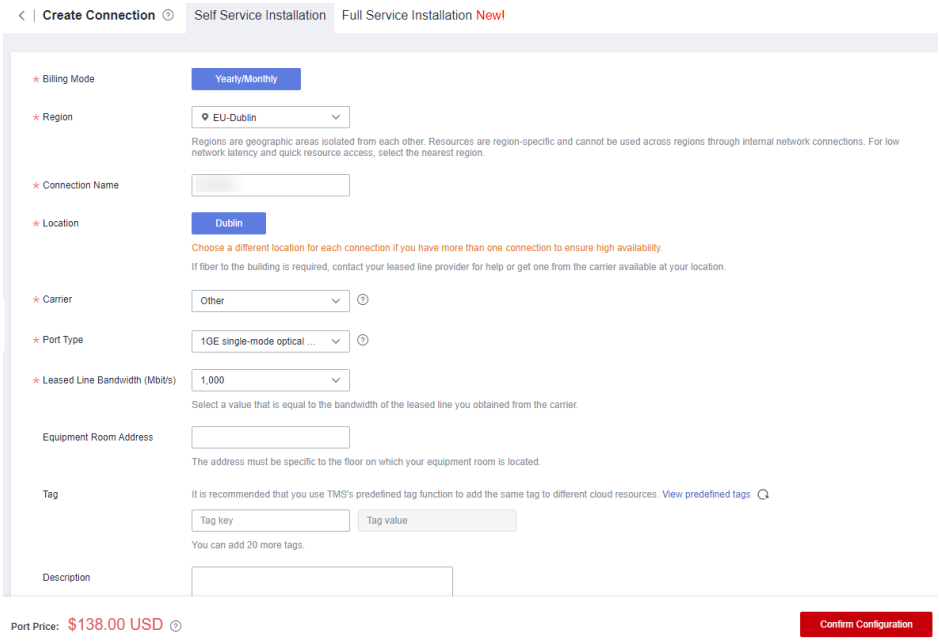


Table 3-2 Parameters for creating a connection

Parameter	Example Value	Description
Billing Mode	Yearly/Monthly	Specifies how you will be billed for the connection. Currently, only **Yearly/Monthly** is supported.

Parameter	Example Value	Description
Region	EU-Dublin	Specifies the region where the connection resides. You can also change the region in the upper left corner of the console.
Connection Name	dc-123	Specifies the name of the connection.
Location	Dublin	Specifies the Direct Connect location where your leased line can be connected to.
Carrier	Other	Specifies the carrier that provides the leased line.
Port Type	1GE single-mode optical port	Specifies the type of the port: 1GE single-mode optical port, 10GE single-mode optical port, 40GE single-mode optical port, or 100GE single-mode optical port.
Leased Line Bandwidth (Mbit/s)	100	Specifies the bandwidth of the line you need to lease from the carrier.
Equipment Room Address	Room xx, xx building, xx road, xx district, xx city	Specifies the address of your equipment room. The address must be specific to the floor your equipment room is on.
Tag	example_key1 example_value1	Adds tags to help you identify your connection. You can change them after the connection is created.
Description	-	Provides supplementary information about the connection.
Required Duration	3 months	Specifies how long the connection will be used for.
Auto-renew	3 months	Specifies whether to automatically renew the subscription to ensure service continuity. For example, if you select this option and the required duration is three months, the system automatically renews the subscription for another three months.
Enterprise Project	default	Specifies the enterprise project by which connections are centrally managed. Select an existing enterprise project.

5. Click **Confirm Configuration**.
6. Confirm the configuration and click **Pay Now**.
7. Confirm the order, select a payment method, and click **Confirm**.
8. After you have paid for the order, a connection ID is allocated to you automatically, and the connection information is displayed on the management console. You will be contacted to confirm the construction plan and relevant information (including your company name, constructor, expected construction time, and construction workers).
9. After having confirmed the construction plan, you can arrange the carrier to deploy the dedicated line and connect it to your equipment room based on your construction plan.
10. In normal cases, Huawei onsite engineers will connect the dedicated line to the Huawei Cloud gateway port within two working days.
11. Verify that the connection is in the **Normal** state, which means that the connection is ready, and the billing starts.

Step 2 Create a virtual gateway.

1. In the navigation pane on the left, choose **Direct Connect** > **Virtual Gateways**.
2. Click **Create Virtual Gateway**.
3. Configure the parameters based on **Table 3-3**.

Figure 3-3 Creating a virtual gateway

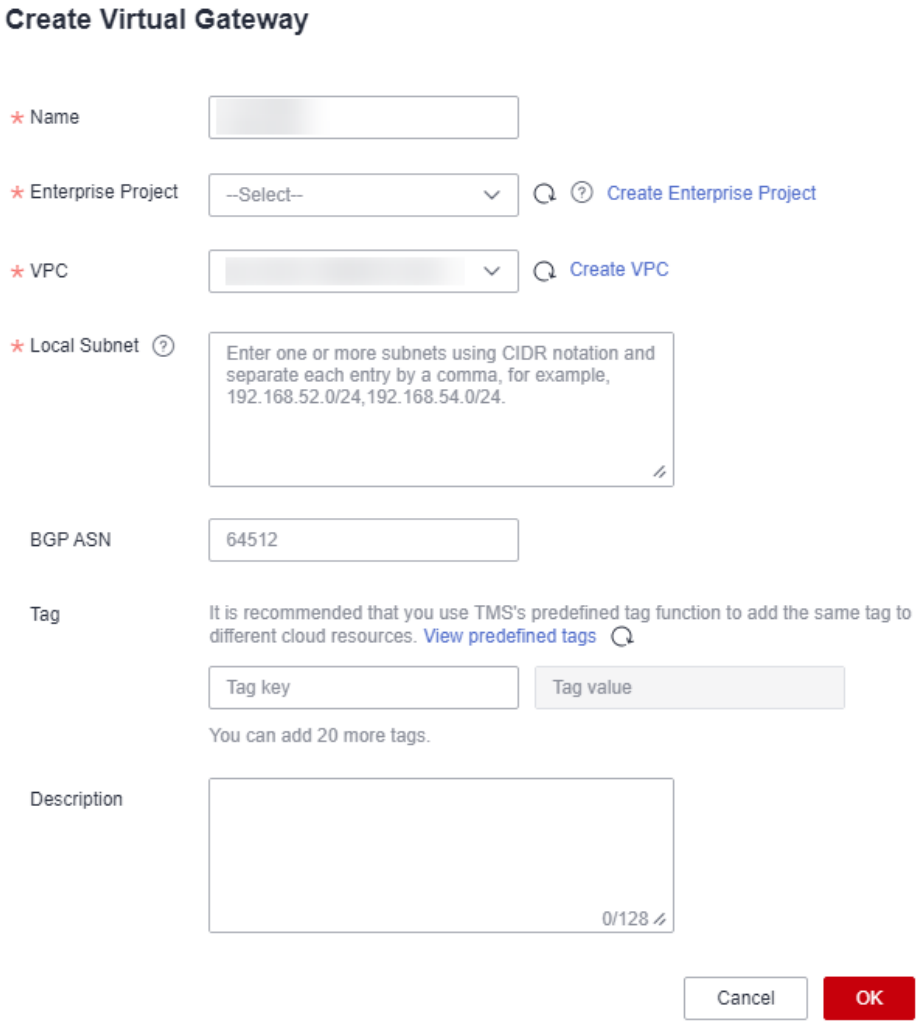


Table 3-3 Parameters required for creating a virtual gateway

Parameter	Example Value	Description
Name	vgw-123	Specifies the virtual gateway name. The name can contain 1 to 64 characters.
Enterprise Project	default	Specifies the enterprise project by which virtual gateways are centrally managed. Select an existing enterprise project.
VPC	VPC-001	Specifies the VPC to be associated with the virtual gateway.

Parameter	Example Value	Description
Local Subnet	192.168.0.0/16	Specifies the CIDR blocks of the subnets in the VPC to be accessed using Direct Connect. You can add one or more CIDR blocks. If there are multiple CIDR blocks, separate every entry with a comma (,).
BGP ASN	64512	Specifies the BGP ASN of the virtual gateway.
Tag	**example_key1** **example_value1**	Adds tags to help you identify your virtual gateway. You can change them after the virtual gateway is created.
Description	-	Provides supplementary information about the virtual gateway.

4. Click **OK**.

Step 3 Create a virtual interface.

1. In the navigation pane on the left, choose **Direct Connect** > **Virtual Interfaces**.
2. In the upper right corner, click **Create Virtual Interface**.
3. Configure the parameters based on **Table 3-4**.

Figure 3-4 Creating a virtual interface for your own account

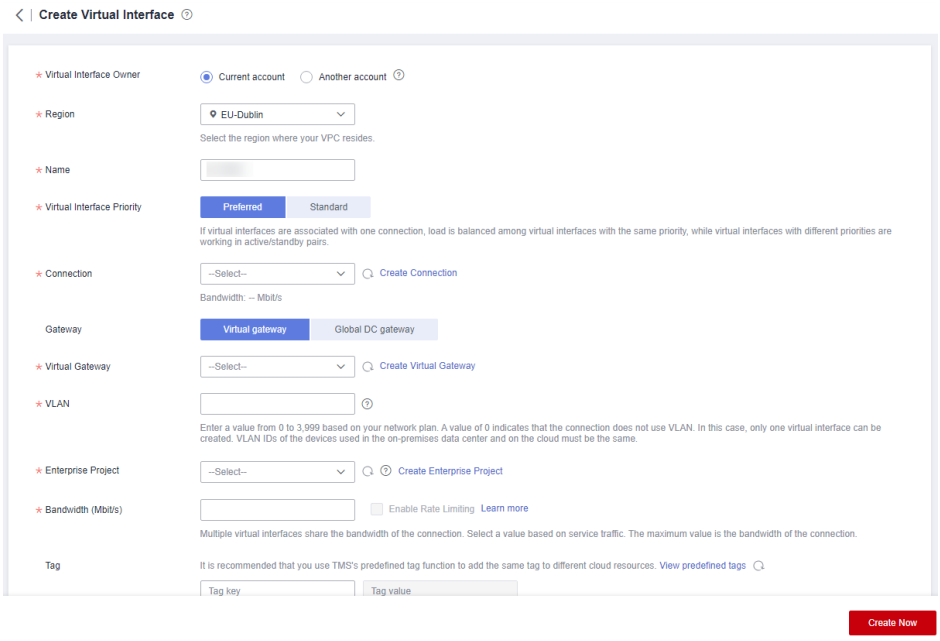


Table 3-4 Parameters for creating a virtual interface

Parameter	Example Value	Description
Virtual Interface Owner	Current account	Specifies the account that this virtual interface will be created for.
Region	EU-Dublin	Specifies the region where the connection resides. You can also change the region in the upper left corner of the console.
Name	vif-test	Specifies the virtual interface name. The name can contain 1 to 64 characters.
Virtual Interface Priority	Preferred	Specifies whether the virtual interface will be preferentially used over other virtual interfaces. There are two options: **Preferred** and **Standard**. If multiple virtual interfaces are associated with one Direct Connect device, the load is balanced among virtual interfaces with the same priority, while virtual interfaces with different priorities are working in active/standby pairs.
Connection	dc-test12	Specifies the connection you can use to connect your on-premises network to Huawei Cloud.
Gateway	vgw-test	Specifies the type of the gateway that the virtual interface connects to. You can select a virtual gateway or global DC gateway. In this example, select a virtual gateway.

Parameter	Example Value	Description
VLAN	30	Specifies the ID of the VLAN for the virtual interface. – Standard connections: You need to configure the VLAN. – Hosted connections: The VLAN will be allocated by the partner. You do not need to configure the VLAN.
Bandwidth (Mbit/s)	1,000	Specifies the bandwidth that can be used by the virtual interface. The bandwidth cannot exceed that of the connection.
Enable Rate Limiting	Not enabled	Limits the highest bandwidth that can be used by the virtual interface. If this option is enabled, the rate limit gradients are as follows: – If the bandwidth is less than or equal to 100 Mbit/s, the rate limit gradient is 10 Mbit/s. – If the bandwidth is greater than 100 Mbit/s but is less than or equal to 1,000 Mbit/s, the rate limit gradient is 100 Mbit/s. – If the bandwidth is greater than 1,000 Mbit/s but is less than or equal to 100 Gbit/s, the rate limit gradient is 1 Gbit/s. – If the bandwidth is greater than 100 Gbit/s, the rate limit gradient is 10 Gbit/s. For example, if the bandwidth is 52 Mbit/s, the actual rate limit is 60 Mbit/s. If the bandwidth is 115 Mbit/s, the actual rate limit is 200 Mbit/s.

Parameter	Example Value	Description
Enterprise Project	default	Specifies the enterprise project by which virtual interfaces are centrally managed. Select an existing enterprise project.
Tag	**example_key1** **example_value1**	Adds tags to help you identify your virtual interface. You can change them after the virtual interface is created.
IP Address Family	**IPv4**	Specifies the address type of the virtual interface. **IPv4** is selected by default.
Local Gateway	10.0.0.1/30	Specifies the IP address used by Huawei Cloud to connect to your on-premises network. After you configure **Local Gateway** on the console, the configuration will be automatically delivered to the gateway used by Huawei Cloud.
Remote Gateway	10.0.0.2/30	Specifies the IP address used by the on-premises data center to connect to Huawei Cloud. After you configure **Remote Gateway** on the console, you need to configure the IP address on the interface of the on-premises device. **CAUTION** The IP addresses of the local gateway and remote gateway must be in the same IP address range. Generally, an IP address range with a 30-bit mask is used. The IP addresses you plan cannot conflict with IP addresses used on your on-premises network. Plan an IP address range that will be used at both ends of the connection for network communication between your on-premises data center and the cloud.

Parameter	Example Value	Description
Remote Subnet	10.1.123.0/24	Specifies the subnets and masks of your on-premises network. If there are multiple subnets, use commas (,) to separate them.
Routing Mode	BGP	Specifies whether static routing or dynamic routing is used to route traffic between your on-premises network and the cloud network. If there are or will be two or more connections, select BGP routing for higher availability.
BGP ASN	64510	Specifies the ASN of the BGP peer. This parameter is required when BGP routing is selected.
BGP MD5 Authentication Key	**Qaz12345678**	Specifies the password used to authenticate the BGP peer using MD5. This parameter can be set when BGP routing is selected, and the parameter values on both gateways must be the same. The key contains 8 to 255 characters and must contain at least two types of the following characters: – Uppercase letters – Lowercase letters – Digits – Special characters ~!,.:;-_"(){}[]/@#$%^&*+|=
Description	-	Provides supplementary information about the virtual interface.

4. Click **Create Now**.

> **NOTE**
>
> The default security group rule denies all the inbound traffic. Ensure that security group rules in both directions are correctly configured to ensure normal communications.

Step 4 Wait for route advertisement from the cloud.

Direct Connect automatically delivers the routes after a connection is established between your on-premises network and the cloud network.

Step 5 Configure routes on your on-premises network device.

Example route (A Huawei-developed device is used an example.)

```
bgp 64510
peer 10.0.0.1 as-number 64512
peer 10.0.0.1 password simple 1234567
network 10.1.123.0 255.255.255.0
```

----End

4 Connecting an On-Premises Data Center to a VPC over Two Connections in Load Balancing Mode (Virtual Gateway)

Solution Overview

Scenario

Connect your on-premises network to the cloud over two connections that are terminated at different locations in the same region and work in load balancing mode. Use either static or BGP routes to route traffic between your on-premises network and the VPC you want to access.

Solution Architecture

Your on-premises network is connected to the VPC over two connections, with one is terminated at A and the other one terminated at B.

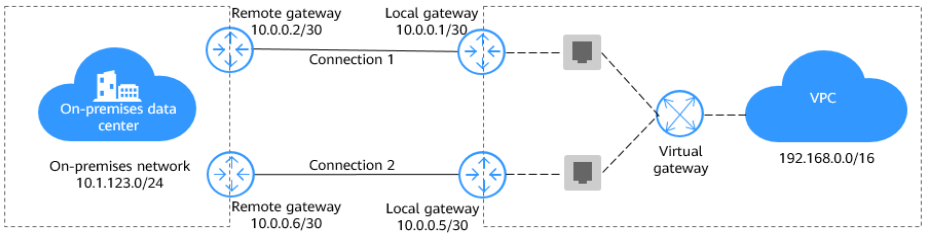
For details on how to create a VPC, see the **Creating a VPC**.

The following table lists the CIDR blocks used in this example.

Table 4-1 CIDR blocks

Item	CIDR Block
Your on-premises network	10.1.123.0/24
Local and remote gateways (addresses for interconnection)	10.0.0.0/30 and 10.0.0.4/30
VPC	192.168.0.0/16

Figure 4-1 Accessing a VPC using two connections that are terminated at two locations and work in load balancing mode



Advantages

- Multi-cloud architecture: You can access the cloud from any location that is closer to your on-premises data center or the third-party cloud and use Direct Connect to connect different clouds for backup.
- Secure and reliable: Computing is performed on the clouds with minimum data transmitted over the dedicated network connection, and your core data is still stored in your on-premises data center.

Constraints

- Your on-premises network must use a single-mode fiber with a 1GE, 10GE, 40GE, or 100GE optical module to connect to the access device in the cloud.
- Auto-negotiation for the port must be disabled. Port speed and full duplex mode have been manually configured.
- 802.1Q VLAN encapsulation must be supported on your on-premises network.
- If BGP routing is used, on-premises devices must support BGP and cannot use 64512 as the ASN (which has been used by Huawei Cloud).

Resource Planning

The following table describes the resources required for connecting an on-premises data center to a VPC using two connections that are terminated at different locations and working in load balancing mode.

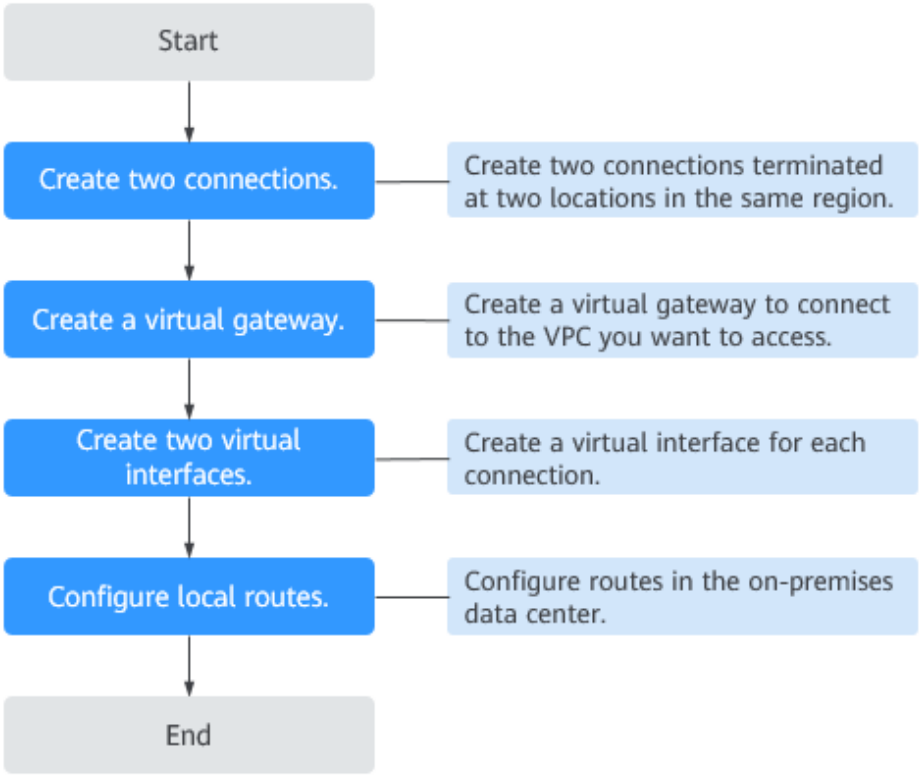
Table 4-2 Resource planning

Region	Resource	Description	Quantity	Price
EU-Dublin	VPC	VPC CIDR block: 192.168.0.0/16	1	Free

Region	Resource	Description	Quantity	Price
	Connection	Connection **dc-connect1** is associated with virtual gateway **vgw-test** and virtual interface **vif-test1**. • Local subnet of virtual gateway **vgw-test**: 192.168.0.0/16 • Local gateway of virtual interface **vif-test1**: 10.0.0.1/30 • Remote gateway of virtual interface **vif-test1**: 10.0.0.2/30 • Remote subnet of virtual interface **vif-test1**: 10.1.123.0/24	2	For details, see **Direct Connect Pricing Details**.
		Connection **dc-connect2** is associated with virtual gateway **vgw-test** and virtual interface **vif-test2**. • Local subnet of virtual gateway **vgw-test**: 192.168.0.0/16 • Local gateway of virtual interface **vif-test2**: 10.0.0.5/30 • Remote gateway of virtual interface **vif-test2**: 10.0.0.6/30 • Remote subnet of virtual interface **vif-test2**: 10.1.123.0/24		

Process Flowchart

In this solution, your on-premises network connects to the cloud over two connections that are terminated at two locations in the same region, and either static or BGP routes are used to route traffic between your on-premises network and the VPC.



Procedure

Step 1 Create two connections: **dc-connect1** and **dc-connect2**.

1. Go to the **Connections** page.
2. In the upper left corner of the page, click and select a region and project.
3. In the upper right corner, click **Create Connection**.
4. On the **Create Connection** page, enter the equipment room details and select the Direct Connect location and port based on **Table 4-3**.

Figure 4-2 Creating a connection

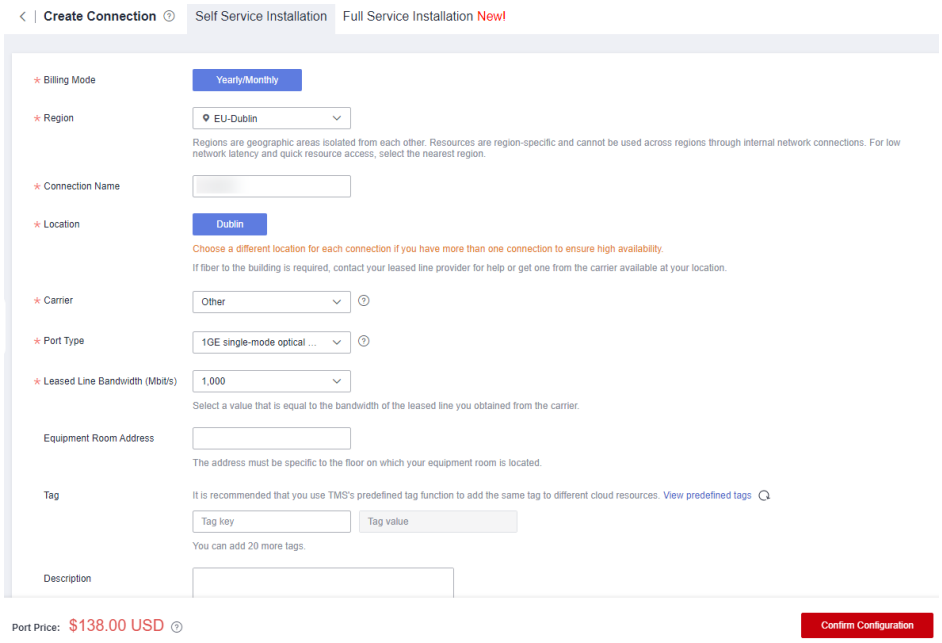


Table 4-3 Parameters for creating a connection

Parameter	Example Value	Description
Billing Mode	Yearly/Monthly	Specifies how you will be billed for the connection. Currently, only **Yearly/Monthly** is supported.
Region	EU-Dublin	Specifies the region where the connection resides. You can also change the region in the upper left corner of the console.
Connection Name	dc-123	Specifies the name of your connection.
Location	Dublin	Specifies the Direct Connect location where your leased line can be connected to.
Carrier	Other	Specifies the carrier that provides the leased line.
Port Type	1GE	Specifies the type of the port that the leased line is connected to: 1GE, 10GE, 40GE, and 100GE.

Parameter	Example Value	Description
Leased Line Bandwidth (Mbit/s)	100	Specifies the bandwidth of the leased line. This is the bandwidth of the leased line you have purchased from the carrier.
Equipment Room Address	Room xx, xx building, xx road, xx district, xx city	Specifies the address of your equipment room. The address must be specific to the floor your equipment room is on.
Tag	example_key1 example_value1	Adds tags to help you identify your connection. You can change them after the connection is created.
Description	-	Provides supplementary information about the connection.
Required Duration	3 months	Specifies how long the connection will be used for.
Auto-renew	3 months	Specifies whether to automatically renew the subscription to ensure service continuity. For example, if you select this option and the required duration is three months, the system automatically renews the subscription for another three months.
Enterprise Project	default	Specifies the enterprise project by which connections are centrally managed. Select an existing enterprise project.

5. Click **Confirm Configuration**.
6. Confirm the configuration and click **Pay Now**.
7. Confirm the order, select a payment method, and click **Confirm**.
8. After you have paid for the order, a connection ID is allocated to you automatically, and the connection information is displayed on the management console. You will be contacted to confirm the construction plan and relevant information (including your company name, constructor, expected construction time, and construction workers).

9. After having confirmed the construction plan, you can arrange the carrier to deploy the dedicated line and connect it to your equipment room based on your construction plan.
10. In normal cases, Huawei onsite engineers will connect the dedicated line to the Huawei Cloud gateway port within two working days.
11. Verify that the connection is in the **Normal** state, which means that the connection is ready, and the billing starts.
12. Repeat the preceding steps to create connection **dc-connect2**.

Step 2 Create a virtual gateway.

1. In the navigation pane on the left, choose **Direct Connect** > **Virtual Gateways**.
2. Click **Create Virtual Gateway**.
3. Configure the parameters based on **Table 4-4**.

Figure 4-3 Creating a virtual gateway

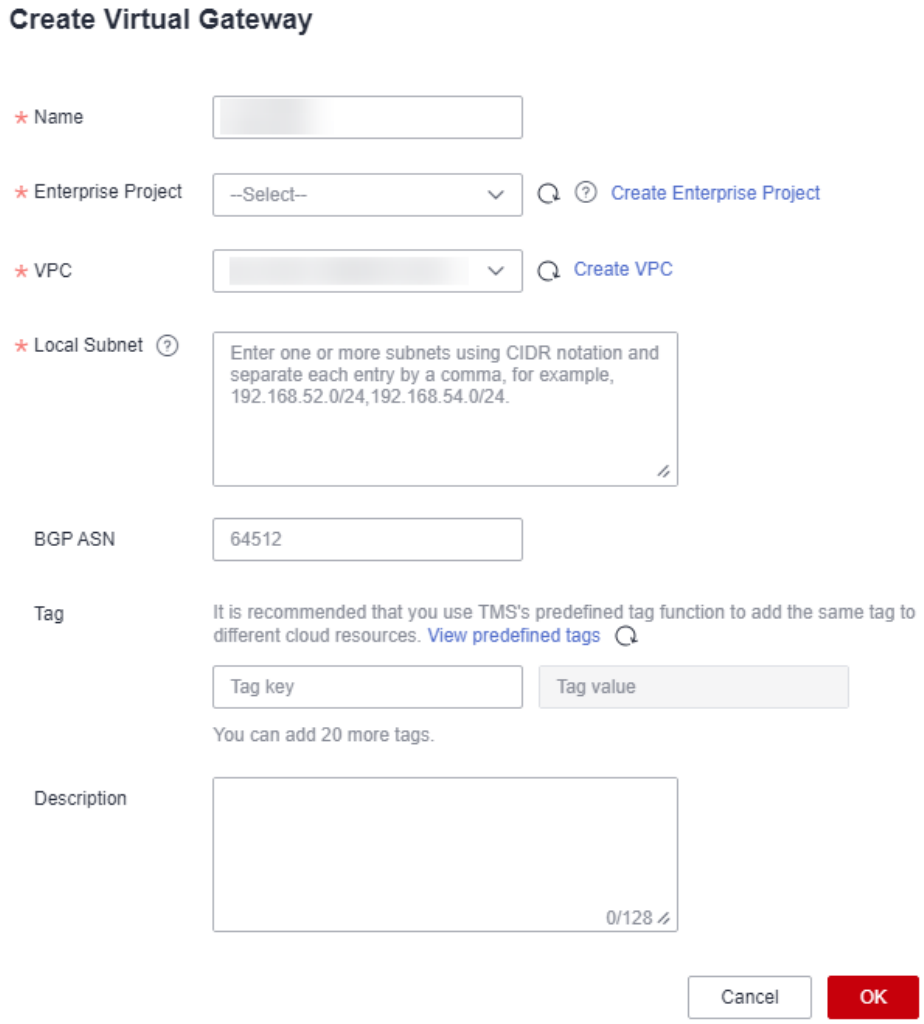


Table 4-4 Parameters required for creating a virtual gateway

Parameter	Example Value	Description
Name	vgw-123	Specifies the virtual gateway name. The name can contain 1 to 64 characters.
Enterprise Project	default	Specifies the enterprise project by which virtual gateways are centrally managed. Select an existing enterprise project.
VPC	VPC-001	Specifies the VPC to be associated with the virtual gateway.
Local Subnet	192.168.0.0/16	Specifies the CIDR blocks of the subnets in the VPC to be accessed using Direct Connect. You can add one or more CIDR blocks. If there are multiple CIDR blocks, separate every entry with a comma (,).
BGP ASN	64512	Specifies the BGP ASN of the virtual gateway.
Tag	example_key1 **example_value1**	Adds tags to help you identify your virtual gateway. You can change them after the virtual gateway is created.
Description	-	Provides supplementary information about the virtual gateway.

4. Click **OK**.

Step 3 Create two virtual interfaces: **vif-test1** and **vif-test2**.

Use virtual interface **vif-test1** to connect virtual gateway **vgw-test** and connection **dc-connect1** and connect virtual interface **vif-test2** to connect virtual gateway **vgw-test** and connection **dc-connect2**.

1. In the navigation pane on the left, choose **Direct Connect** > **Virtual Interfaces**.
2. In the upper right corner, click **Create Virtual Interface**.
3. Configure the parameters based on **Table 4-5**.

Figure 4-4 Creating a virtual interface for your own account

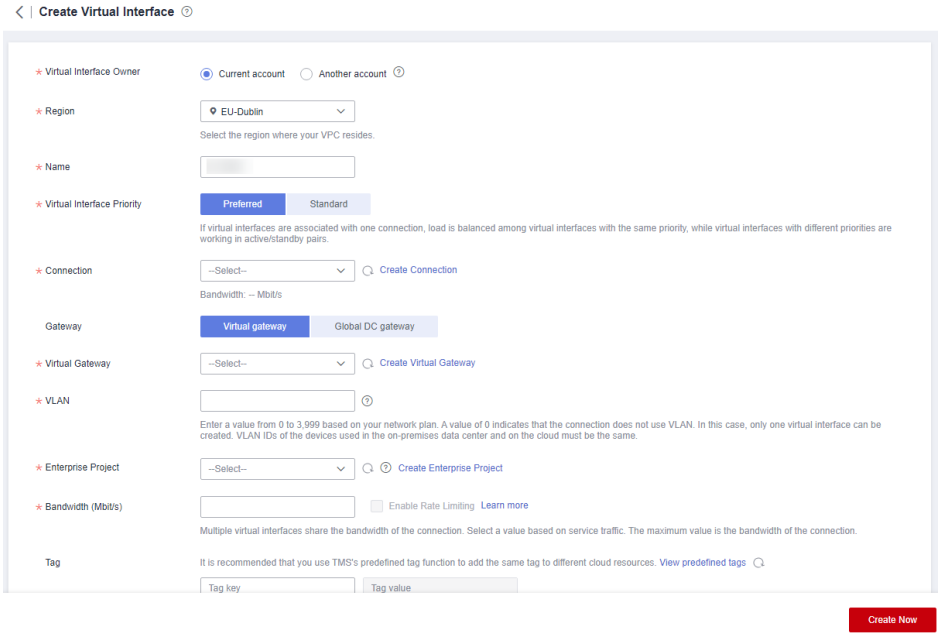


Table 4-5 Parameters for creating a virtual interface

Parameter	Example Value	Description
Virtual Interface Owner	Current account	Specifies the account that this virtual interface will be created for.
Region	EU-Dublin	Specifies the region where the connection resides. You can also change the region in the upper left corner of the console.
Name	vif-test1	Specifies the virtual interface name. The name can contain 1 to 64 characters.

Parameter	Example Value	Description
Virtual Interface Priority	Preferred	Specifies whether the virtual interface will be preferentially used over other virtual interfaces. There are two options: **Preferred** and **Standard**. If multiple virtual interfaces are associated with one Direct Connect device, the load is balanced among virtual interfaces with the same priority, while virtual interfaces with different priorities are working in active/standby pairs. Select **Preferred** for both virtual interfaces. For details about the solution using a pair of active/standby connections, see **Connecting an On-Premises Data Center to a VPC over Two Connections in an Active/Standby Pair (Virtual Gateway)**.
Connection	dc-connect1	Specifies the connection you can use to connect your on-premises network to Huawei Cloud.
Gateway	Virtual gateway	Specifies the type of the gateway that the virtual interface connects to. You can select a virtual gateway or global DC gateway. In this example, select a virtual gateway.
Virtual Gateway	vgw-123	This parameter is mandatory when **Gateway** is set to **Virtual gateway**. Specifies the virtual gateway that the virtual interface connects to.

Parameter	Example Value	Description
Global DC Gateway	dgw-123	This parameter is mandatory when **Gateway** is set to **Global DC gateway**. Specifies the global DC gateway that the virtual interface connects to.
VLAN	30	Specifies the ID of the VLAN for the virtual interface. You need to configure the VLAN if you create a standard connection. The VLAN for a hosted connection will be allocated by the partner. You do not need to configure the VLAN.
Bandwidth (Mbit/s)	1,000	Specifies the bandwidth that can be used by the virtual interface. The bandwidth cannot exceed that of the connection or LAG.

Parameter	Example Value	Description
Enable Rate Limiting	Not enabled	Limits the highest bandwidth that can be used by the virtual interface. If this option is enabled, the rate limit gradients are as follows: – If the bandwidth is less than or equal to 100 Mbit/s, the rate limit gradient is 10 Mbit/s. – If the bandwidth is greater than 100 Mbit/s but is less than or equal to 1,000 Mbit/s, the rate limit gradient is 100 Mbit/s. – If the bandwidth is greater than 1,000 Mbit/s but is less than or equal to 100 Gbit/s, the rate limit gradient is 1 Gbit/s. – If the bandwidth is greater than 100 Gbit/s, the rate limit gradient is 10 Gbit/s. For example, if the bandwidth is 52 Mbit/s, the actual rate limit is 60 Mbit/s. If the bandwidth is 115 Mbit/s, the actual rate limit is 200 Mbit/s.
Enterprise Project	default	Specifies the enterprise project by which virtual interfaces are centrally managed. Select an existing enterprise project.
Tag	example_key1 **example_value1**	Adds tags to help you identify your virtual interface. You can change them after the virtual interface is created.
IP Address Family	**IPv4**	Specifies the address type of the virtual interface. **IPv4** is selected by default.

Parameter	Example Value	Description
Local Gateway	10.0.0.1/30	Specifies the IP address used by Huawei Cloud to connect to your on-premises network. After you configure **Local Gateway** on the console, the configuration will be automatically delivered to the gateway used by Huawei Cloud.
Remote Gateway	**10.0.0.2/30**	Specifies the IP address used by the on-premises data center to connect to Huawei Cloud. After you configure **Remote Gateway** on the console, you need to configure the IP address on the interface of the on-premises device. **CAUTION** The IP addresses of the local gateway and remote gateway must be in the same IP address range. Generally, an IP address range with a 30-bit mask is used. The IP addresses you plan cannot conflict with IP addresses used on your on-premises network. Plan an IP address range that will be used at both ends of the connection for network communication between your on-premises data center and the cloud.
Remote Subnet	10.1.123.0/24	Specifies the subnets and masks of your on-premises network. If there are multiple subnets, use commas (,) to separate them.
Routing Mode	BGP	Specifies whether static routing or dynamic routing is used to route traffic between your on-premises network and the cloud network.

Parameter	Example Value	Description
BGP ASN	64510	Specifies the ASN of the BGP peer. This parameter is required when BGP routing is selected.
BGP MD5 Authentication Key	Qaz12345678	Specifies the password used to authenticate the BGP peer using MD5. This parameter can be set when BGP routing is selected, and the parameter values on both gateways must be the same. The key contains 8 to 255 characters and must contain at least two types of the following characters: – Uppercase letters – Lowercase letters – Digits – Special characters ~!,.:;-_"(){}[]/@#$%^&*+|=
Description	-	Provides supplementary information about the virtual interface.

4. Click **Create Now**.
5. Repeat **Step 3.1** to **Step 3.4** to create virtual interface **vif-test2**.

   NOTE

   - When you create virtual interface **vif-test2**, select connection **dc-connect2**, and set **Local Gateway** to **10.0.0.5/30** and **Remote Gateway** to **10.0.0.6/30**.
   - Set different BGP ASNs and BGP MD5 authentication keys for the two virtual interfaces.
   - The default security group rule denies all the inbound traffic. Ensure that security group rules in both directions are correctly configured to ensure normal communications.

Step 4 Wait for route delivery from the cloud.

Direct Connect automatically delivers the routes after a connection is established between your on-premises network and the cloud network.

Step 5 Configure routes on your on-premises network device.

Example static route (A Huawei-developed network device is used as an example.)

```
ip route-static 192.168.0.0 255.255.0.0 10.0.0.1
```



```
ip route-static 192.168.0.0 255.255.0.0 10.0.0.5
```

Example BGP route (A Huawei-developed network device is used as an example.)

```
bgp 64510
peer 10.0.0.1 as-number 64512
peer 10.0.0.1 password simple Qaz12345678
peer 10.0.0.5 as-number 64512
peer 10.0.0.5 password simple Qaz12345678
network 10.1.123.0 255.255.255.0
```

----End

Helpful Links

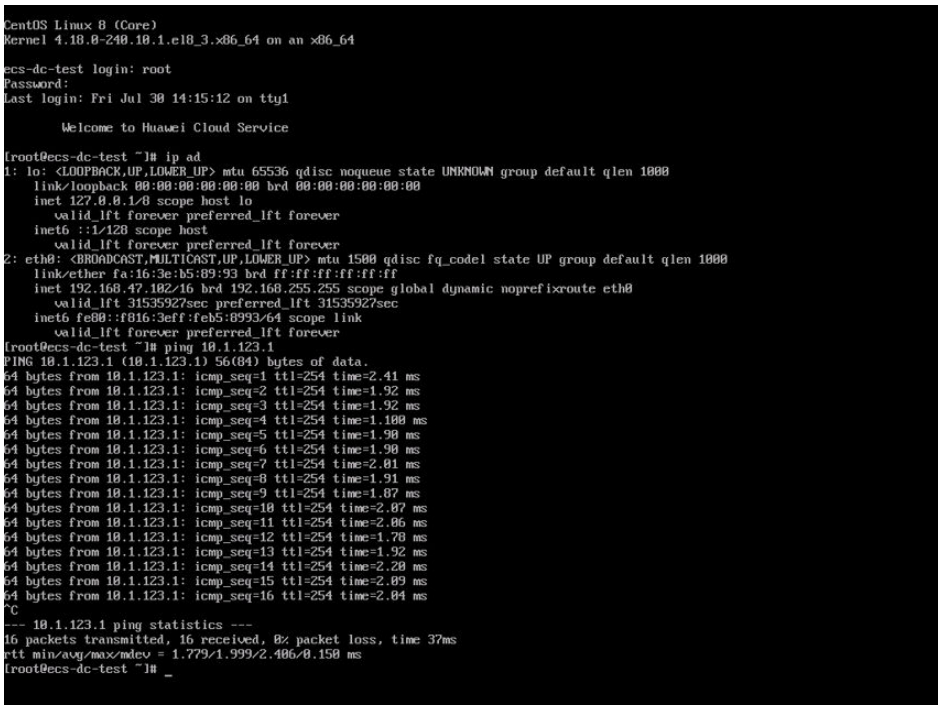
- For details about how to troubleshoot connection faults, see **Network and Connectivity** and **Routing**.
- For common problems about establishing network connectivity using Direct Connect, see **Leased Line**.
- For common problems about Direct Connect interconnection, see **Interconnection with Cloud**.

Connectivity Verification

Ping an on-premises server from an ECS to verify that they can communicate with each other.

Disable the port for any connection and run the ping command again. If the ECS can still communicate with the on-premises server normally, the on-premises data center can access the cloud privately.

To view the specific path of a route, run the **tracert** command. The command varies according to the device type. For details, contact the device vendor.



5 Connecting an On-Premises Data Center to a VPC over Two Connections in an Active/Standby Pair (Virtual Gateway)

Solution Overview

Scenario

You need two connections that are terminated at different Direct Connect locations in the same region to access the same VPC. The two connections work in an active/standby pair.

In this case, it is recommended that you use BGP routing. For the connections from the cloud, you can make them to work in an active/standby pair by setting the virtual interface priority. For the active/standby connections to the cloud, you can set their **Local_Pref** on your on-premises device.

Solution Architecture

Your on-premises network is connected to the VPC over two connections, with one is terminated at A and the other one terminated at B.

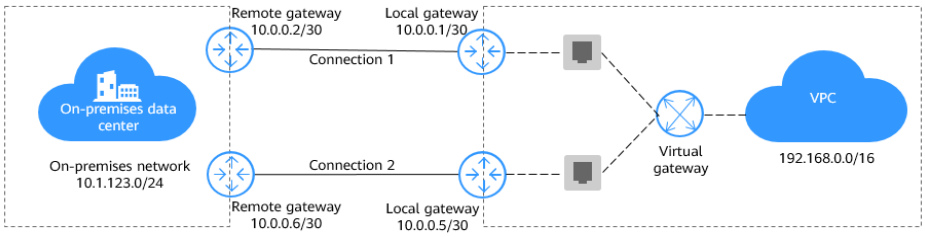
For details on how to create a VPC, see the **Creating a VPC**.

The following table lists the CIDR blocks used in this example.

Table 5-1 CIDR blocks

Item	CIDR Block
Your on-premises network	10.1.123.0/24
Local and remote gateways (addresses for interconnection)	10.0.0.0/30 and 10.0.0.4/30
VPC	192.168.0.0/16

Figure 5-1 Accessing a VPC using two connections that are terminated at two locations and work in an active/standby pair



Advantages

Multi-cloud architecture: You can access the cloud from any location that is closer to your on-premises data center or the third-party cloud and use Direct Connect to connect different clouds for backup.

Secure and reliable: Computing is performed on the clouds with minimum data transmitted over the dedicated network connection, and your core data is still stored in your on-premises data center.

Constraints

- Your on-premises network must use a single-mode fiber with a 1GE, 10GE, 40GE, or 100GE optical module to connect to the access device in the cloud.
- Auto-negotiation for the port must be disabled. Port speed and full duplex mode have been manually configured.
- 802.1Q VLAN encapsulation must be supported on your on-premises network.
- On-premises devices must support BGP and cannot use ASN 64512, which is used by Huawei Cloud.

Resource Planning

The following table describes the resources required for connecting an on-premises data center to a VPC using two connections that are terminated at different locations and working in active/standby pair.

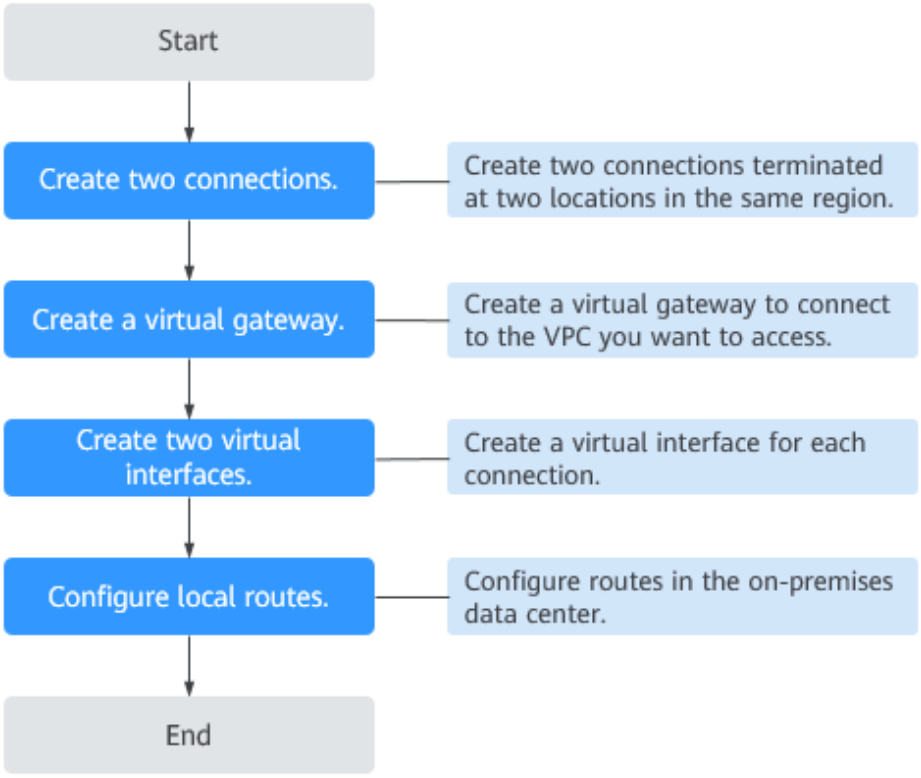
Table 5-2 Resource planning

Region	Resource	Description	Quantity	Price
EU-Dublin	VPC	VPC CIDR block: 192.168.0.0/16	1	Free

Region	Resource	Description	Quantity	Price
	Connection	Connection **dc-connect1** is associated with virtual gateway **vgw-test** and virtual interface **vif-test1**. Local subnet of virtual gateway **vgw-test**: 192.168.0.0/16 Local gateway of virtual interface **vif-test1**: 10.0.0.1/30 Remote gateway of virtual interface **vif-test1**: 10.0.0.2/30 Remote subnet of virtual interface **vif-test1**: 10.1.123.0/24	2	For details, see **Direct Connect Pricing Details**.
		Connection **dc-connect2** is associated with virtual gateway **vgw-test** and virtual interface **vif-test2**. Local subnet of virtual gateway **vgw-test**: 192.168.0.0/16 Local gateway of virtual interface **vif-test2**: 10.0.0.5/30 Remote gateway of virtual interface **vif-test2**: 10.0.0.6/30 Remote subnet of virtual interface **vif-test2**: 10.1.123.0/24		

Process Flowchart

In this scenario, your on-premises network connects to the cloud over two connections that are terminated at two locations in the same region, and BGP routes are used to route traffic between your on-premises network and the VPC.



Procedure

Step 1 Create two connections: **dc-connect1** and **dc-connect2**.

1. Go to the **Connections** page.
2. In the upper left corner of the page, click and select a region and project.
3. In the upper right corner, click **Create Connection**.
4. On the **Create Connection** page, enter the equipment room details and select the Direct Connect location and port based on **Table 5-3**.

Figure 5-2 Creating a connection

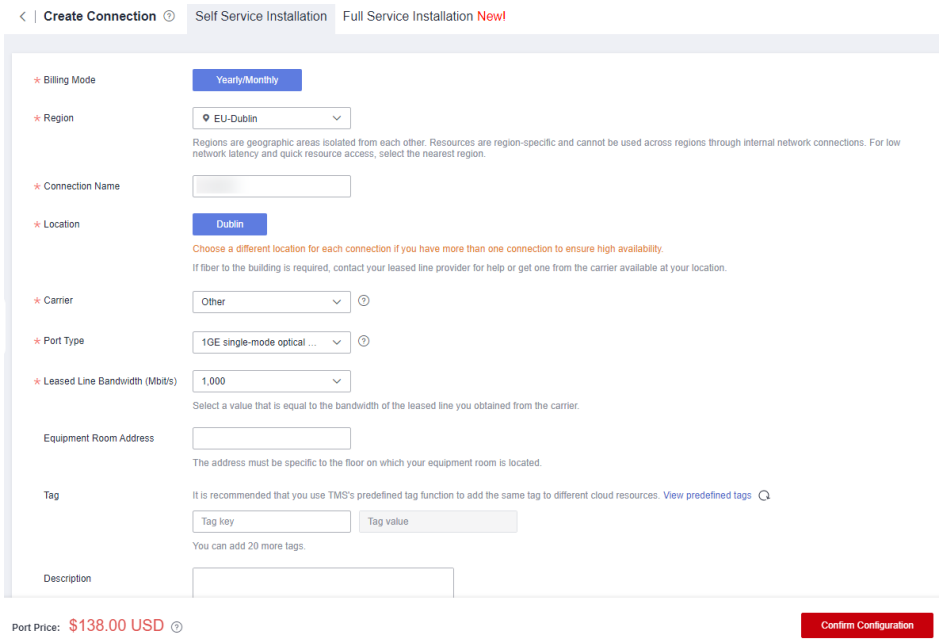


Table 5-3 Parameters for creating a connection

Parameter	Example Value	Description
Billing Mode	Yearly/Monthly	Specifies how you will be billed for the connection. Currently, only **Yearly/Monthly** is supported.
Region	EU-Dublin	Specifies the region where the connection resides. You can also change the region in the upper left corner of the console.
Connection Name	dc-123	Specifies the name of your connection.
Location	Dublin	Specifies the Direct Connect location where your leased line can be connected to.
Carrier	Other	Specifies the carrier that provides the leased line.
Port Type	1GE	Specifies the type of the port that the leased line is connected to: 1GE, 10GE, 40GE, and 100GE.

Parameter	Example Value	Description
Leased Line Bandwidth (Mbit/s)	100	Specifies the bandwidth of the leased line. This is the bandwidth of the leased line you have purchased from the carrier.
Equipment Room Address	Room xx, xx building, xx road, xx district, xx city	Specifies the address of your equipment room. The address must be specific to the floor your equipment room is on.
Tag	example_key1 example_value1	Adds tags to help you identify your connection. You can change them after the connection is created.
Description	-	Provides supplementary information about the connection.
Required Duration	3 months	Specifies how long the connection will be used for.
Auto-renew	3 months	Specifies whether to automatically renew the subscription to ensure service continuity. For example, if you select this option and the required duration is three months, the system automatically renews the subscription for another three months.
Enterprise Project	default	Specifies the enterprise project by which connections are centrally managed. Select an existing enterprise project.

5. Click **Confirm Configuration**.
6. Confirm the configuration and click **Pay Now**.
7. Confirm the order, select a payment method, and click **Confirm**.
8. After you have paid for the order, a connection ID is allocated to you automatically, and the connection information is displayed on the management console. You will be contacted to confirm the construction plan and relevant information (including your company name, constructor, expected construction time, and construction workers).

9. After having confirmed the construction plan, you can arrange the carrier to deploy the dedicated line and connect it to your equipment room based on your construction plan.
10. In normal cases, Huawei onsite engineers will connect the dedicated line to the Huawei Cloud gateway port within two working days.
11. Verify that the connection is in the **Normal** state, which means that the connection is ready, and the billing starts.
12. Repeat the preceding steps to create connection **dc-connect2**.

Step 2 Create a virtual gateway.

1. In the navigation pane on the left, choose **Direct Connect** > **Virtual Gateways**.
2. Click **Create Virtual Gateway**.
3. Configure the parameters based on **Table 5-4**.

Figure 5-3 Creating a virtual gateway

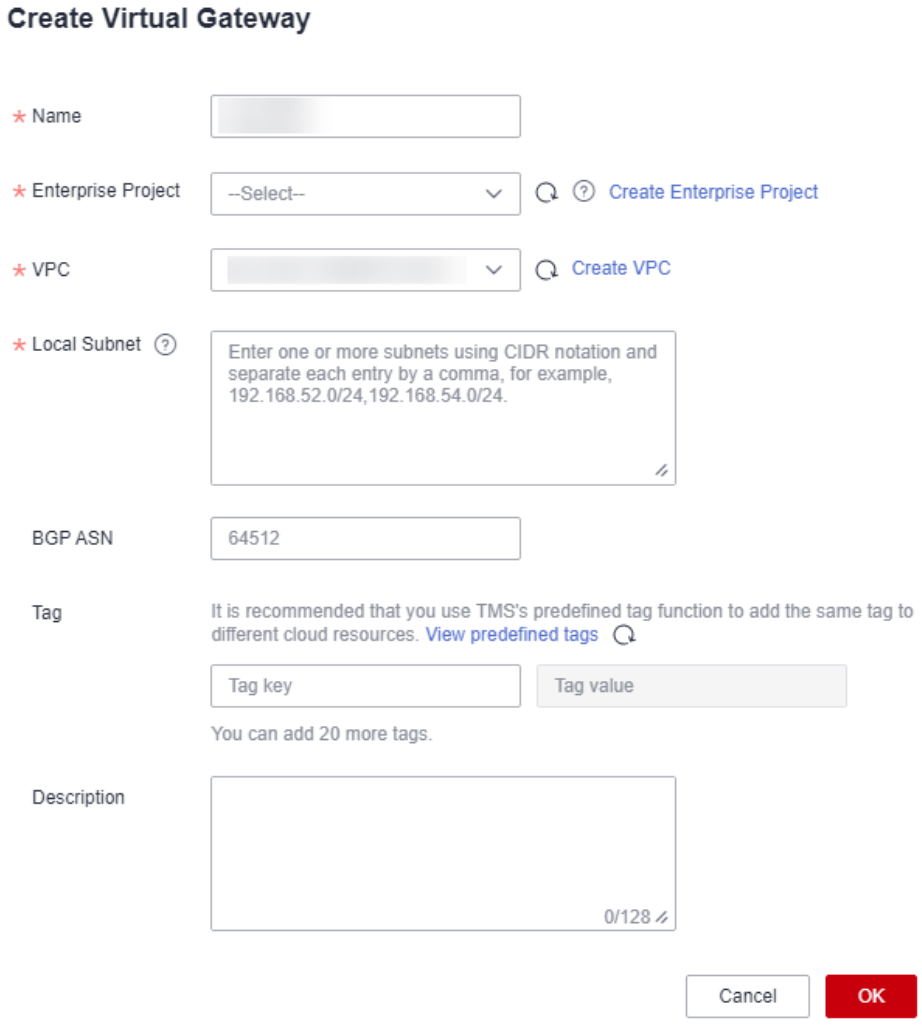


Table 5-4 Parameters required for creating a virtual gateway

Parameter	Example Value	Description
Name	vgw-123	Specifies the virtual gateway name. The name can contain 1 to 64 characters.
Enterprise Project	default	Specifies the enterprise project by which virtual gateways are centrally managed. Select an existing enterprise project.
VPC	VPC-001	Specifies the VPC to be associated with the virtual gateway.
Local Subnet	192.168.0.0/16	Specifies the CIDR blocks of the subnets in the VPC to be accessed using Direct Connect. You can add one or more CIDR blocks. If there are multiple CIDR blocks, separate every entry with a comma (,).
BGP ASN	64512	Specifies the BGP ASN of the virtual gateway.
Tag	example_key1 **example_value1**	Adds tags to help you identify your virtual gateway. You can change them after the virtual gateway is created.
Description	-	Provides supplementary information about the virtual gateway.

4. Click **OK**.

Step 3 Create two virtual interfaces: **vif-test1** and **vif-test2**.

Use virtual interface **vif-test1** to connect virtual gateway **vgw-test** and connection **dc-connect1** and virtual interface **vif-test2** to connect virtual gateway **vgw-test** and connection **dc-connect2**. Set different priorities for the two virtual interfaces so the two connections can work in an active/standby pair.

1. In the navigation pane on the left, choose **Direct Connect** > **Virtual Interfaces**.
2. In the upper right corner, click **Create Virtual Interface**.

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

Figure 5-4 Creating a virtual interface for your own account

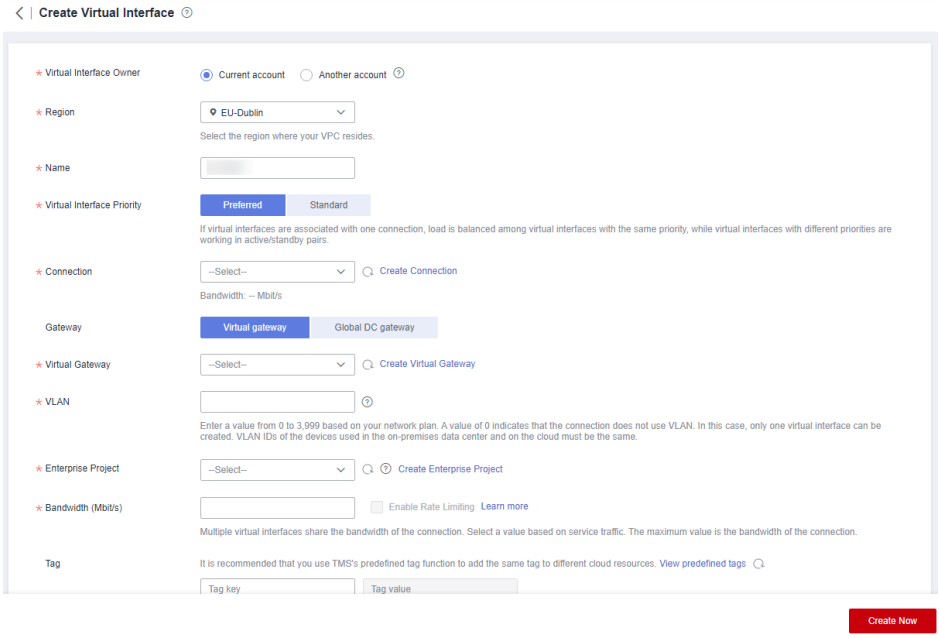


Table 5-5 Parameters for creating a virtual interface

Parameter	Example Value	Description
Virtual Interface Owner	Current account	Specifies the account that this virtual interface will be created for.
Region	EU-Dublin	Specifies the region where the connection resides. You can also change the region in the upper left corner of the console.
Name	vif-test1	Specifies the virtual interface name. The name can contain 1 to 64 characters.

Parameter	Example Value	Description
Virtual Interface Priority	Preferred	Specifies whether the virtual interface will be preferentially used over other virtual interfaces. There are two options: **Preferred** and **Standard**. Virtual interfaces with different priorities are working in active/standby pairs. – Select **Preferred** for the virtual interface associated with the active connection. – Select **Standard** for the virtual interface associated with the standby connection.
Connection	dc-connect1	Specifies the connection you can use to connect your on-premises network to Huawei Cloud.
Gateway	Virtual gateway	Specifies the type of the gateway that the virtual interface connects to. You can select a virtual gateway or global DC gateway. In this example, select a virtual gateway.
Virtual Gateway	vgw-123	This parameter is mandatory when **Gateway** is set to **Virtual gateway**. Specifies the virtual gateway that the virtual interface connects to.
Global DC Gateway	dgw-123	This parameter is mandatory when **Gateway** is set to **Global DC gateway**. Specifies the global DC gateway that the virtual interface connects to.

Parameter	Example Value	Description
VLAN	30	Specifies the ID of the VLAN for the virtual interface. You need to configure the VLAN if you create a standard connection. The VLAN for a hosted connection will be allocated by the partner. You do not need to configure the VLAN.
Bandwidth (Mbit/s)	1,000	Specifies the bandwidth that can be used by the virtual interface. The bandwidth cannot exceed that of the connection or LAG.
Enable Rate Limiting	Not enabled	Limits the highest bandwidth that can be used by the virtual interface. If this option is enabled, the rate limit gradients are as follows: – If the bandwidth is less than or equal to 100 Mbit/s, the rate limit gradient is 10 Mbit/s. – If the bandwidth is greater than 100 Mbit/s but is less than or equal to 1,000 Mbit/s, the rate limit gradient is 100 Mbit/s. – If the bandwidth is greater than 1,000 Mbit/s but is less than or equal to 100 Gbit/s, the rate limit gradient is 1 Gbit/s. – If the bandwidth is greater than 100 Gbit/s, the rate limit gradient is 10 Gbit/s. For example, if the bandwidth is 52 Mbit/s, the actual rate limit is 60 Mbit/s. If the bandwidth is 115 Mbit/s, the actual rate limit is 200 Mbit/s.

Parameter	Example Value	Description
Enterprise Project	default	Specifies the enterprise project by which virtual interfaces are centrally managed. Select an existing enterprise project.
Tag	**example_key1** **example_value1**	Adds tags to help you identify your virtual interface. You can change them after the virtual interface is created.
IP Address Family	**IPv4**	Specifies the address type of the virtual interface. **IPv4** is selected by default.
Local Gateway	10.0.0.1/30	Specifies the IP address used by Huawei Cloud to connect to your on-premises network. After you configure **Local Gateway** on the console, the configuration will be automatically delivered to the gateway used by Huawei Cloud.
Remote Gateway	**10.0.0.2/30**	Specifies the IP address used by the on-premises data center to connect to Huawei Cloud. After you configure **Remote Gateway** on the console, you need to configure the IP address on the interface of the on-premises device. **CAUTION** The IP addresses of the local gateway and remote gateway must be in the same IP address range. Generally, an IP address range with a 30-bit mask is used. The IP addresses you plan cannot conflict with IP addresses used on your on-premises network. Plan an IP address range that will be used at both ends of the connection for network communication between your on-premises data center and the cloud.

Parameter	Example Value	Description
Remote Subnet	10.1.123.0/24	Specifies the subnets and masks of your on-premises network. If there are multiple subnets, use commas (,) to separate them.
Routing Mode	BGP	Specifies whether static routing or dynamic routing is used to route traffic between your on-premises network and the cloud network. If there are or will be two or more connections, select BGP routing for higher availability.
BGP ASN	64510	Specifies the ASN of the BGP peer. This parameter is required when BGP routing is selected.
BGP MD5 Authentication Key	Qaz12345678	Specifies the password used to authenticate the BGP peer using MD5. This parameter can be set when BGP routing is selected, and the parameter values on both gateways must be the same. The key contains 8 to 255 characters and must contain at least two types of the following characters: – Uppercase letters – Lowercase letters – Digits – Special characters ~!,.:;-_"(){}[]/@#$%^&*+|=
Description	-	Provides supplementary information about the virtual interface.

4. Click **Create Now**.
5. Repeat steps **3.1** to **3.4** to create virtual interface **vif-test2**.

NOTE

- When you create virtual interface **vif-test2**, select connection **dc-connect2**, and set **Local Gateway** to **10.0.0.5/30** and **Remote Gateway** to **10.0.0.6/30**.
- Set different BGP ASNs and BGP MD5 authentication keys for the two virtual interfaces.
- The default security group rule denies all the inbound traffic. Ensure that security group rules in both directions are correctly configured to ensure normal communications.

Step 4 Wait for route delivery from the cloud.

Direct Connect automatically delivers the routes, and the active connection from the cloud has been specified through the priority of the associated virtual interface.

Step 5 Configure routes on your on-premises network device.

Suppose you want the connection terminated at A to serve as the active connection to access the cloud, you can set **Local_Pref** to lower the priority of the BGP routes for the connection terminated at Langfang-Huawei.

Example BGP route (A Huawei-developed network device is used as an example.)

```
bgp 64510
peer 10.0.0.1 as-number 64512
peer 10.0.0.1 password simple Qaz12345678
peer 10.0.0.5 as-number 64512
peer 10.0.0.5 password simple Qaz12345678
peer 10.0.0.5 route-policy slave_direct_in import
network 10.1.123.0 255.255.255.0
route-policy  slave_direct_in  permit node 10
apply local-preference 90
```

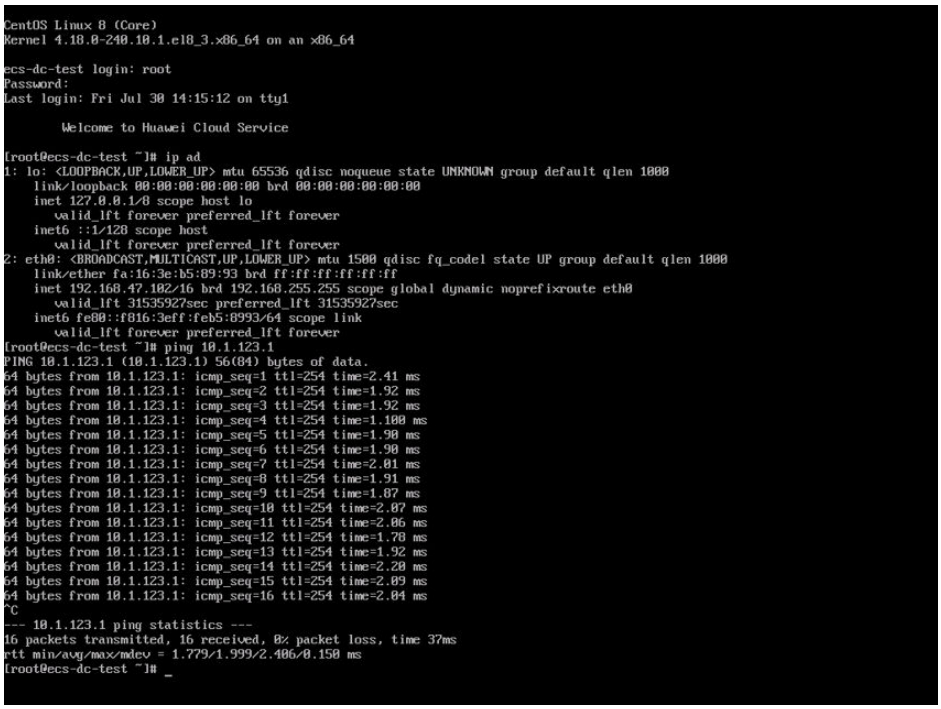
----End

Connectivity Verification

Ping an on-premises server from an ECS to verify that the ECS can communicate with the on-premises server normally.

Disable the port for any connection and run the ping command again. If the ECS can still communicate with the on-premises server normally, the on-premises data center can access the cloud privately.

To view the specific path of a route, run the **tracert** command. The command varies according to the device type. For details, contact the device vendor.



Helpful Links

- For details about how to troubleshoot connection faults, see **Network and Connectivity** and **Routing**.
- For common problems about establishing network connectivity using Direct Connect, see **Leased Line**.
- For common problems about Direct Connect interconnection, see **Interconnection with Cloud**.

6 Connecting an On-Premises Data Center to Multiple VPCs that Do Not Need to Communicate with Each Other

Scenario

Connect your on-premises network to two or more VPCs over one connection and use static routes to route traffic between your on-premises network and the VPCs. These VPCs do not need to communicate with each other. In this example, there are two VPCs.

NOTE

Standard connections are used to provide dedicated ports for exclusive use.

Prerequisites

- Your on-premises network must use a single-mode fiber with a 1GE, 10GE, 40GE, or 100GE optical module to connect to the access device in the cloud.
- Auto-negotiation for the port must be disabled. Port speed and full-duplex mode must be manually configured.
- 802.1Q VLAN encapsulation is supported on your on-premises network.

Typical Topology

Your on-premises network is connected to two VPCs over a single connection.

For details on how to create a VPC, see the **Creating a VPC**.

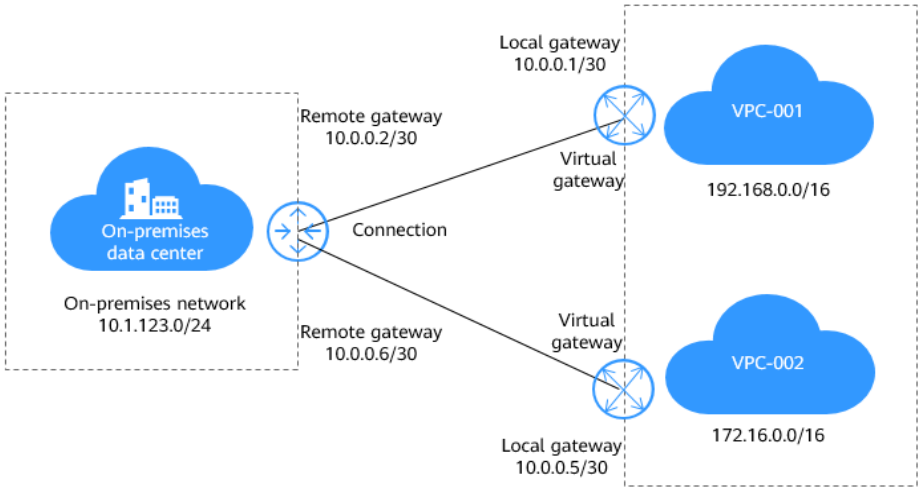
The following table lists the CIDR blocks used in this example.

Table 6-1 CIDR blocks

Item	CIDR Block
Your on-premises network	10.1.123.0/24

Item	CIDR Block
Local and remote gateways (addresses for interconnection)	10.0.0.0/30 and 10.0.0.4/30
VPCs	VPC-001: 192.168.0.0/16 VPC-002: 172.16.0.0/16

Figure 6-1 Accessing multiple VPCs over one connection



Procedure

Step 1 Create a connection.

For details, see **Connecting an On-Premises Data Center to a VPC over a Single Connection and Using Static Routing to Route Traffic**.

Step 2 Create two virtual gateways.

Associate one virtual gateway with **VPC-001** and the other one with **VPC-002**.

Figure 6-2 Creating a virtual gateway

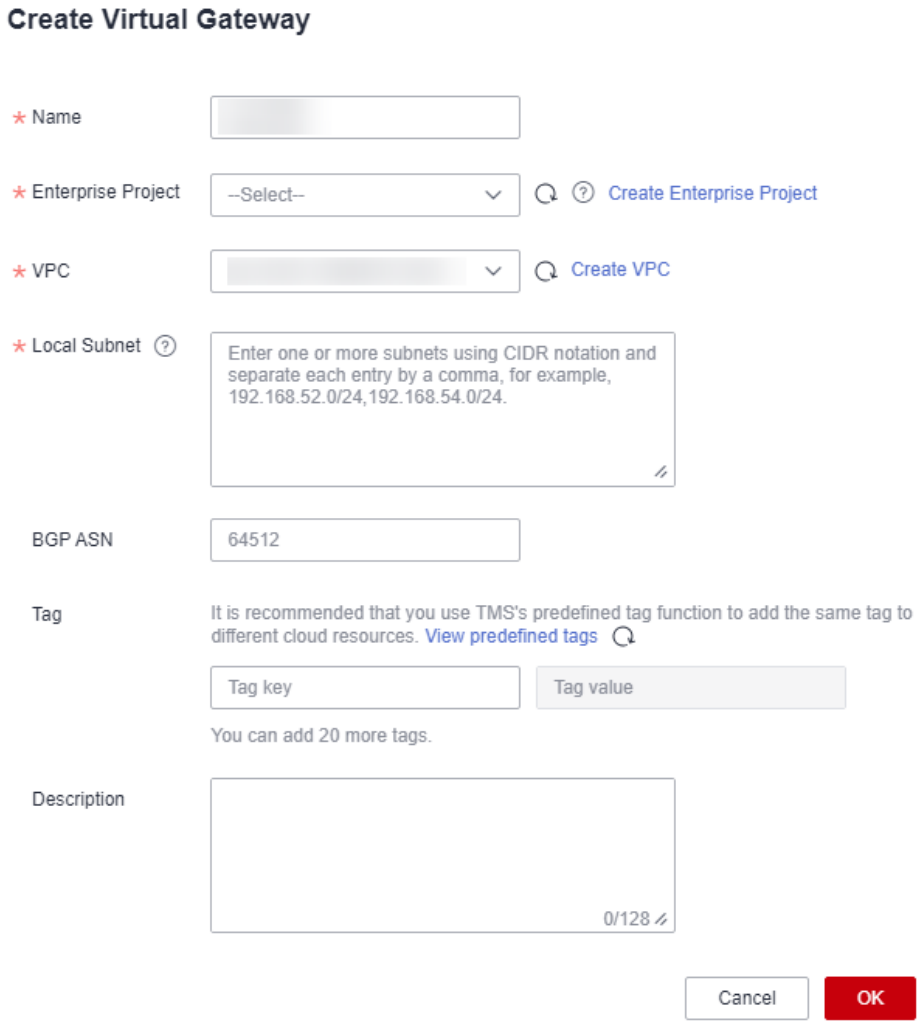


Table 6-2 Parameters required for creating virtual gateway 1

Parameter	Example Value	Description
Name	vgw-test	Specifies the virtual gateway name. The name can contain 1 to 64 characters.
Enterprise Project	default	Specifies the enterprise project by which virtual gateways are centrally managed. Select an existing enterprise project.
VPC	VPC-001	Specifies the VPC to be associated with the virtual gateway.

Parameter	Example Value	Description
Local Subnet	192.168.0.0/16	Specifies the CIDR blocks of the subnets in the VPC to be accessed using Direct Connect. You can add one or more CIDR blocks. If there are multiple CIDR blocks, separate every entry with a comma (,).
BGP ASN	64512	Specifies the BGP ASN of the virtual gateway.
Tag	**example_key1** **example_value1**	Adds tags to help you identify your virtual gateway. You can change them after the virtual gateway is created.
Description	-	Provides supplementary information about the virtual gateway.

Figure 6-3 Creating a virtual gateway

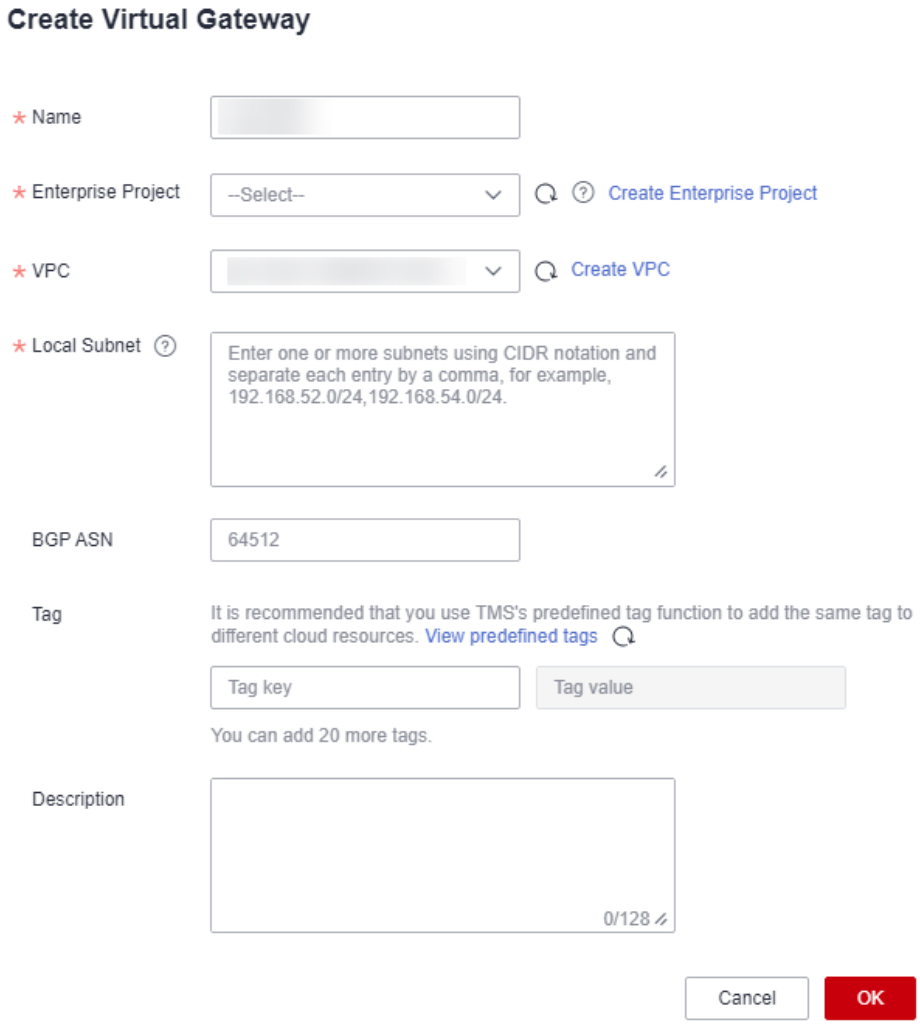


Table 6-3 Parameters required for creating virtual gateway 2

Parameter	Example Value	Description
Name	vgw-c413	Specifies the virtual gateway name. The name can contain 1 to 64 characters.
Enterprise Project	default	Specifies the enterprise project by which virtual gateways are centrally managed. Select an existing enterprise project.
VPC	VPC-001	Specifies the VPC to be associated with the virtual gateway.
Local Subnet	172.16.0.0/16	Specifies the CIDR blocks of the subnets in the VPC to be accessed using Direct Connect. You can add one or more CIDR blocks. If there are multiple CIDR blocks, separate every entry with a comma (,).
BGP ASN	64512	Specifies the BGP ASN of the virtual gateway.
Tag	**example_key2** **example_value2**	Adds tags to help you identify your virtual gateway. You can change them after the virtual gateway is created.
Description	-	Provides supplementary information about the virtual gateway.

Step 3 Create two virtual interfaces.

Connect each virtual interface with a virtual gateway associated so that your on-premises network can access **VPC-001** through 10.0.0.0/30 and **VPC-002** through 10.0.0.4/30.

Figure 6-4 Creating a virtual interface for your own account

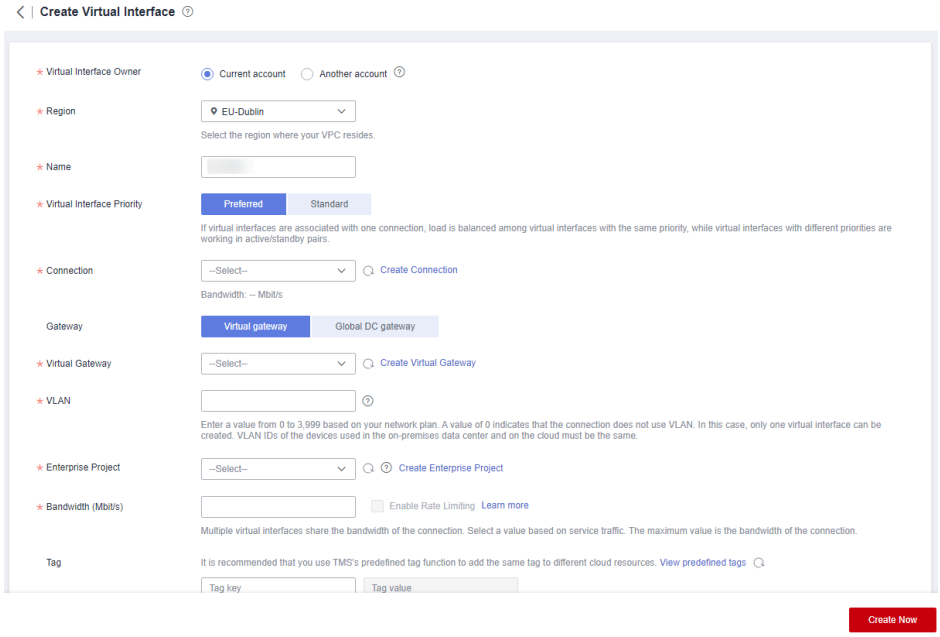


Table 6-4 Parameters required for creating virtual interface 1

Parameter	Example Value	Description
Virtual Interface Owner	Current account	Specifies the account that this virtual interface will be created for.
Region	EU-Dublin	Specifies the region where the connection resides. You can also change the region in the upper left corner of the console.
Name	vif-test	Specifies the virtual interface name. The name can contain 1 to 64 characters.
Virtual Interface Priority	Preferred	Specifies whether the virtual interface will be preferentially used over other virtual interfaces. There are two options: **Preferred** and **Standard**. If multiple virtual interfaces are associated with one Direct Connect device, the load is balanced among virtual interfaces with the same priority, while virtual interfaces with different priorities are working in active/standby pairs.
Connection	dc-test12	Specifies the connection you can use to connect your on-premises network to Huawei Cloud.

Parameter	Example Value	Description
Gateway	Virtual gateway	Specifies the type of the gateway that the virtual interface connects to. You can select a virtual gateway or global DC gateway. In this example, select a virtual gateway.
Virtual Gateway	vgw-123	Specifies the virtual gateway that the virtual interface connects to. This parameter is mandatory when **Gateway** is set to **Virtual gateway**.
Global DC Gateway	dgw-123	Specifies the global DC gateway that the virtual interface connects to. This parameter is mandatory when **Gateway** is set to **Global DC gateway**.
VLAN	30	Specifies the ID of the VLAN for the virtual interface. • Standard connections: You need to configure the VLAN. • Hosted connections: The VLAN will be allocated by the partner. You do not need to configure the VLAN.
Bandwidth (Mbit/s)	500	Specifies the bandwidth that can be used by the virtual interface. The bandwidth cannot exceed that of the connection.

Parameter	Example Value	Description
Enable Rate Limiting	Not enabled	Limits the highest bandwidth that can be used by the virtual interface. If this option is enabled, the rate limit gradients are as follows: • If the bandwidth is less than or equal to 100 Mbit/s, the rate limit gradient is 10 Mbit/s. • If the bandwidth is greater than 100 Mbit/s but is less than or equal to 1,000 Mbit/s, the rate limit gradient is 100 Mbit/s. • If the bandwidth is greater than 1,000 Mbit/s but is less than or equal to 100 Gbit/s, the rate limit gradient is 1 Gbit/s. • If the bandwidth is greater than 100 Gbit/s, the rate limit gradient is 10 Gbit/s. For example, if the bandwidth is 52 Mbit/s, the actual rate limit is 60 Mbit/s. If the bandwidth is 115 Mbit/s, the actual rate limit is 200 Mbit/s.
Enterprise Project	default	Specifies the enterprise project by which virtual interfaces are centrally managed. Select an existing enterprise project.
Tag	**example_key1** **example_value1**	Adds tags to help you identify your virtual interface. You can change them after the virtual interface is created.
IP Address Family	**IPv4**	Specifies the address type of the virtual interface. **IPv4** is selected by default.
Local Gateway	10.0.0.1/30	Specifies the IP address used by Huawei Cloud to connect to your on-premises network. After you configure **Local Gateway** on the console, the configuration will be automatically delivered to the gateway used by Huawei Cloud.

Parameter	Example Value	Description
Remote Gateway	10.0.0.2/30	Specifies the IP address used by the on-premises data center to connect to Huawei Cloud. After you configure **Remote Gateway** on the console, you need to configure the IP address on the interface of the on-premises device. **CAUTION** The IP addresses of the local gateway and remote gateway must be in the same IP address range. Generally, an IP address range with a 30-bit mask is used. The IP addresses you plan cannot conflict with IP addresses used on your on-premises network. Plan an IP address range that will be used at both ends of the connection for network communication between your on-premises data center and the cloud.
Remote Subnet	10.1.123.0/24	Specifies the subnets and masks of your on-premises network. If there are multiple subnets, use commas (,) to separate them.
Routing Mode	Static	Specifies whether static routing or dynamic routing is used to route traffic between your on-premises network and the cloud network. If there are or will be two or more connections, select BGP routing for higher availability.
BGP ASN	-	Specifies the ASN of the BGP peer. This parameter is required when BGP routing is selected.
BGP MD5 Authentication Key	-	Specifies the password used to authenticate the BGP peer using MD5. This parameter can be set when BGP routing is selected, and the parameter values on both gateways must be the same. The key contains 8 to 255 characters and must contain at least two types of the following characters: • Uppercase letters • Lowercase letters • Digits • Special characters ~!,.:;-_"(){}[]/@#$ %^&*+|=

Parameter	Example Value	Description
Description	-	Provides supplementary information about the virtual interface.

Figure 6-5 Creating a virtual interface for your own account

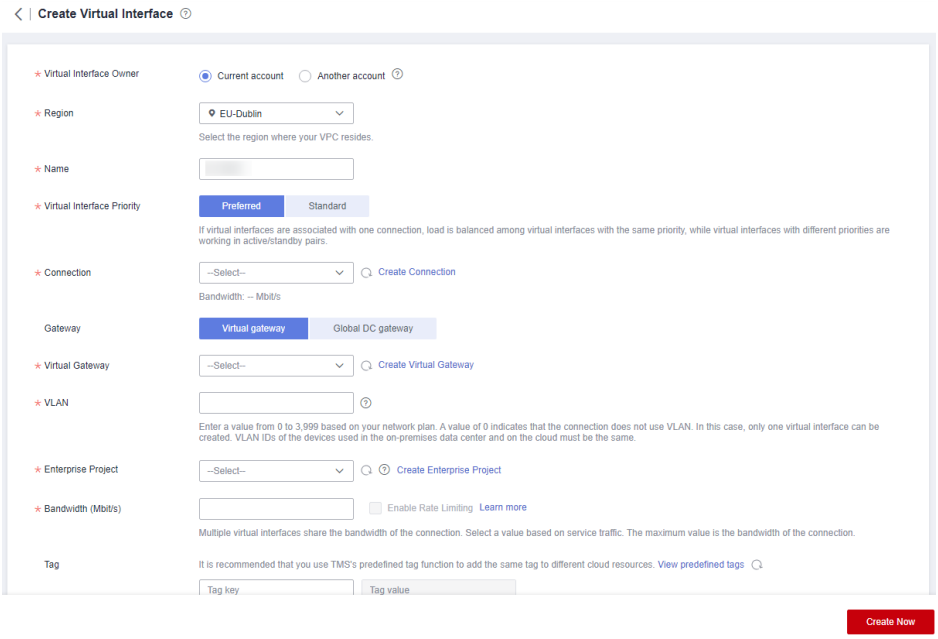


Table 6-5 Parameters required for creating virtual interface 2

Parameter	Example Value	Description
Virtual Interface Owner	Current account	Specifies the account that this virtual interface will be created for.
Region	EU-Dublin	Specifies the region where the connection resides. You can also change the region in the upper left corner of the console.
Name	vif-c413	Specifies the virtual interface name. The name can contain 1 to 64 characters.

Parameter	Example Value	Description
Virtual Interface Priority	Preferred	Specifies whether the virtual interface will be preferentially used over other virtual interfaces. There are two options: **Preferred** and **Standard**. If multiple virtual interfaces are associated with one Direct Connect device, the load is balanced among virtual interfaces with the same priority, while virtual interfaces with different priorities are working in active/standby pairs.
Connection	dc-test12	Specifies the connection you can use to connect your on-premises network to Huawei Cloud.
Gateway	Virtual gateway	Specifies the type of the gateway that the virtual interface connects to. You can select a virtual gateway or global DC gateway. In this example, select a virtual gateway.
Virtual Gateway	vgw-123	This parameter is mandatory when **Gateway** is set to **Virtual gateway**. Specifies the virtual gateway that the virtual interface connects to.
Global DC Gateway	dgw-123	Specifies the global DC gateway that the virtual interface connects to. This parameter is mandatory when **Gateway** is set to **Global DC gateway**.
VLAN	31	Specifies the ID of the VLAN for the virtual interface. • Standard connections: You need to configure the VLAN. • Hosted connections: The VLAN will be allocated by the partner. You do not need to configure the VLAN.
Bandwidth (Mbit/s)	500	Specifies the bandwidth that can be used by the virtual interface. The bandwidth cannot exceed that of the connection.

Parameter	Example Value	Description
Enable Rate Limiting	Not enabled	Limits the highest bandwidth that can be used by the virtual interface. If this option is enabled, the rate limit gradients are as follows: • If the bandwidth is less than or equal to 100 Mbit/s, the rate limit gradient is 10 Mbit/s. • If the bandwidth is greater than 100 Mbit/s but is less than or equal to 1,000 Mbit/s, the rate limit gradient is 100 Mbit/s. • If the bandwidth is greater than 1,000 Mbit/s but is less than or equal to 100 Gbit/s, the rate limit gradient is 1 Gbit/s. • If the bandwidth is greater than 100 Gbit/s, the rate limit gradient is 10 Gbit/s. For example, if the bandwidth is 52 Mbit/s, the actual rate limit is 60 Mbit/s. If the bandwidth is 115 Mbit/s, the actual rate limit is 200 Mbit/s.
Enterprise Project	default	Specifies the enterprise project by which virtual interfaces are centrally managed. Select an existing enterprise project.
Tag	**example_key2** **example_value2**	Adds tags to help you identify your virtual interface. You can change them after the virtual interface is created.
IP Address Family	**IPv4**	Specifies the address type of the virtual interface. **IPv4** is selected by default.
Local Gateway	10.0.0.5/30	Specifies the IP address used by Huawei Cloud to connect to your on-premises network. After you configure **Local Gateway** on the console, the configuration will be automatically delivered to the gateway used by Huawei Cloud.

Parameter	Example Value	Description
Remote Gateway	10.0.0.6/30	Specifies the IP address used by the on-premises data center to connect to Huawei Cloud. After you configure **Remote Gateway** on the console, you need to configure the IP address on the interface of the on-premises device. **CAUTION** The IP addresses of the local gateway and remote gateway must be in the same IP address range. Generally, an IP address range with a 30-bit mask is used. The IP addresses you plan cannot conflict with IP addresses used on your on-premises network. Plan an IP address range that will be used at both ends of the connection for network communication between your on-premises data center and the cloud.
Remote Subnet	10.1.123.0/24	Specifies the subnets and masks of your on-premises network. If there are multiple subnets, use commas (,) to separate them.
Routing Mode	Static	Specifies whether static routing or dynamic routing is used to route traffic between your on-premises network and the cloud network. If there are or will be two or more connections, select BGP routing for higher availability.
BGP ASN	-	Specifies the ASN of the BGP peer. This parameter is required when BGP routing is selected.
BGP MD5 Authentication Key	-	Specifies the password used to authenticate the BGP peer using MD5. This parameter can be set when BGP routing is selected, and the parameter values on both gateways must be the same. The key contains 8 to 255 characters and must contain at least two types of the following characters: • Uppercase letters • Lowercase letters • Digits • Special characters ~!,.:;-_"(){}[]/@#$ %^&*+|=
Description	-	Provides supplementary information about the virtual interface.

> **NOTE**
>
> The default security group rule denies all the inbound traffic. Ensure that security group rules in both directions are correctly configured to ensure normal communications.

Step 4 Wait for route delivery from the cloud.

Direct Connect automatically delivers the routes after a connection is established between your on-premises network and the cloud network.

Step 5 Configure routes on your on-premises network device.

Example route (A Huawei-developed device is used an example.)

```
ip route-static 192.168.0.0 255.255.0.0 10.0.0.1
ip route-static 172.16.0.0 255.255.0.0 10.0.0.5
```

----End

7 Connecting an On-Premises Data Center to Multiple VPCs in the Same Region Using Direct Connect and VPC Peering

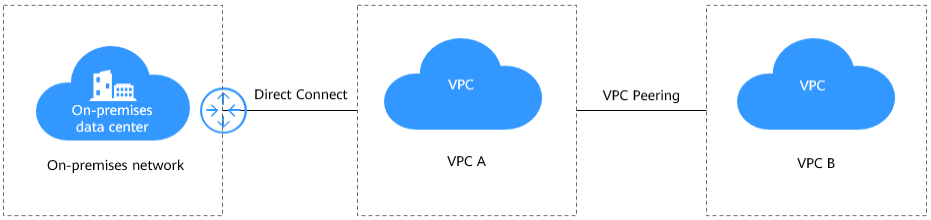
Scenario

Connect your on-premises network to the cloud and use VPC Peering to connect the VPCs in the same region so that your on-premises network can access all these VPCs.

CAUTION

The CIDR block of each VPC must be unique.

Typical Topology



Procedure

Step 1 Configure Direct Connect to connect your on-premises data center to **VPC A**.

1. **Create a connection.**
2. **Create a virtual gateway.**

   When creating the virtual gateway, select VPC A and add the CIDR block of VPC B to the local subnet.
3. **Create a virtual interface.**

Step 2 Create a VPC peering connection between VPC A and VPC B.

1. Log in to the management console.
2. On the console homepage, click  in the upper left corner and select the desired region and project.
3. Click  to display **Service List** and choose **Networking** > **Virtual Private Cloud**.
4. In the navigation pane on the left, click **VPC Peering Connections**.
5. Click **Create VPC Peering Connection**.
6. Configure the parameters based on **Table 7-1**.

Figure 7-1 Creating a VPC peering connection

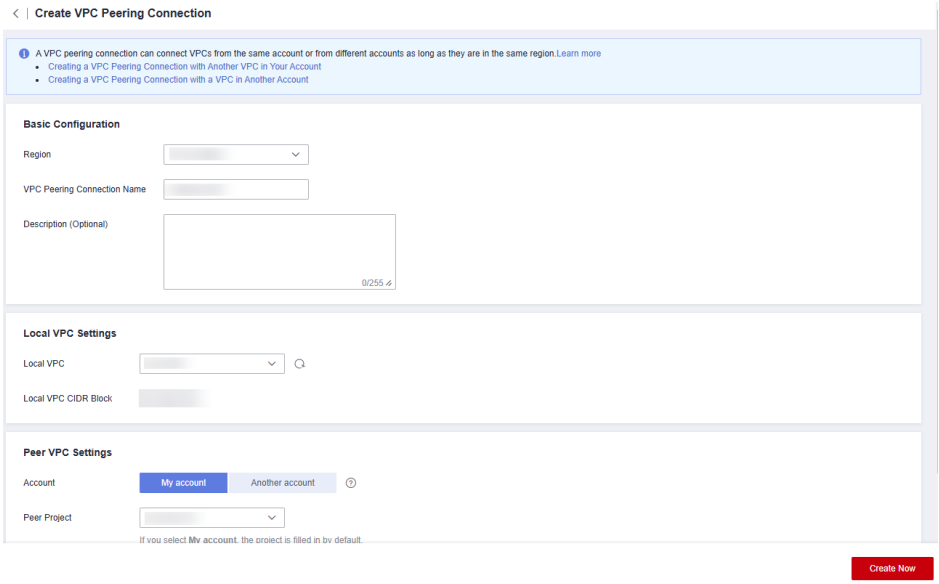


Table 7-1 Parameters required for creating a VPC peering connection

Parameter	Example Value	Description
Region	EU-Dublin	Region where the VPC peering connection will be used. Region where the supplementary network interface will be created. Select the region nearest to you to ensure the lowest latency possible.

Parameter	Example Value	Description
VPC Peering Connection Name	peering-001	Specifies the name of the VPC peering connection. The name contains a maximum of 64 characters, which consist of letters, digits, hyphens (-), and underscores (_).
Description	-	Provides supplementary information about the VPC peering connection.
Local VPC	VPC B	Specifies the local VPC. Select **VPC B** from the drop-down list.
Local VPC CIDR Block	192.168.2.0/24	Specifies the CIDR block of the local VPC.
Account	My account	Specifies whether the VPC to peer with is from your account or another user's account. – **My account**: The VPC peering connection will connect two VPCs in your account. – **Another account**: The VPC peering connection will connect your VPC to another VPC in another account.
Peer Project	eu-west-101	The project is selected in by default if **Account** is set to **My account**. In this example, VPC A and VPC B are created in region A, and the corresponding project of the account in region A is selected by default.
Peer VPC	VPC A	Specifies the peer VPC. Select **VPC A** from the drop-down list.

Parameter	Example Value	Description
Peer VPC CIDR Block	192.168.10.0/24	Specifies the CIDR block of the peer VPC. The local and peer VPCs cannot have matching or overlapping CIDR blocks. Otherwise, the routes added for the VPC peering connection may not take effect.

7. Click **OK**.

Step 3 Add routes for the VPC peering connection.

1. Under **Networking**, click **Virtual Private Cloud**.
2. In the navigation pane on the left, click **VPC Peering Connections**.
3. Locate the VPC peering connection in the connection list.
4. Click the name of the VPC peering connection to switch to the page showing details about the connection.
5. Click the **Local Routes** tab.
6. Add routes in the default route table. For details about the parameters, see **Table 7-2**.

Table 7-2 Parameters required for adding routes for a VPC peering connection

Parameter	Example Value	Description
VPC	VPC B	Specifies a VPC that is connected by the VPC peering connection.

Parameter	Example Value	Description
Route Table	rtb-VPC-B (default)	Specifies the route table of the VPC. The routes will be added to this route table. Each VPC comes with a default route table to control the outbound traffic from the subnets in the VPC. In addition to the default route table, you can also create a custom route table and associate it with the subnets in the VPC. Then, the custom route table controls outbound traffic of the subnets. – If there is only the default route table in the drop-down list, select the default route table. – If there are both default and custom route tables in drop-down list, select the route table associated with the subnet connected by the VPC peering connection.
Destination	VPC A CIDR block: 192.168.10.0/24	Specifies the CIDR block of the peer VPC, a subnet, or the private IP address of an ECS in the peer VPC. For details, see **VPC Peering Connection Examples**.
Next Hop	peering-001	The default value is the current VPC peering connection. You do not need to specify this parameter.
Description	-	(Optional) Provides supplementary information about the route. Enter up to 255 characters. Angle brackets (< or >) are not allowed.

Parameter	Example Value	Description
Add a route for the other VPC	Selected	If you select this option, you can also add a route for the other VPC connected by the VPC peering connection. To enable communications between VPCs connected by a VPC peering connection, you need to add forward and return routes to the route tables of the VPCs.
VPC	VPC A	By default, the other VPC connected by the VPC peering connection is selected. You do not need to specify this parameter.
Route Table	rtb-VPC-A (default)	Specifies the route table of the VPC. The routes will be added to this route table. Each VPC comes with a default route table to control the outbound traffic from the subnets in the VPC. In addition to the default route table, you can also create a custom route table and associate it with the subnets in the VPC. Then, the custom route table controls outbound traffic of the subnets. – If there is only the default route table in the drop-down list, select the default route table. – If there are both default and custom route tables in drop-down list, select the route table associated with the subnet connected by the VPC peering connection.
Destination	VPC B CIDR block: 192.168.2.0/24	IP address in the VPC at the other end of the VPC peering connection. The value can be VPC CIDR block, subnet CIDR block, or ECS IP address.

Parameter	Example Value	Description
Next Hop	peering-001	The default value is the current VPC peering connection. You do not need to specify this parameter.
Description	-	(Optional) Provides supplementary information about the route. Enter up to 255 characters. Angle brackets (< or >) are not allowed.

7. Click **OK**.
   You can view the route in the route list.

----End

8 Using a Public NAT Gateway and Direct Connect to Accelerate Internet Access

You can use Direct Connect to connect your on-premises data center to the cloud and then buy a public NAT gateway to allow on-premises servers to access the Internet or provide publicly accessible services. Use SNAT rules to allow on-premises servers to send outbound traffic to the Internet, while preventing the Internet from establishing connections to the servers. Use DNAT rules to allow a service in the on-premises network to be publicly accessible. This is widely used in scenarios such as gaming, e-commerce, and finance.

For details, see **Using a Public NAT Gateway and Direct Connect to Accelerate Internet Access**.

