Alibaba Cloud Express Connect

User Guide

Issue: 20181009

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Generic conventions

Table -1: Style conventions

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

Contents

1 VRouter interface

1.1 Create a router interface

A router interface of Express Connect is a virtual device used to establish a communication channel and control the working status. Express Connect abstracts the process of building an intranet communication channel between two VPCs by creating a router interface on each of the two VRouters respectively and connecting the router interfaces, so that both VRouters can send messages to each other through the channel. You can create router interfaces to connect two VPCs, or connect a VBR with a VPC through physical access to connect an on-premises IDC to the VPC.

Procedure

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, select **VPC Connection** > **Router Interface**.
3. In the upper-right corner of the router interface page, click **Create Router Interface**.
4. Configure the router interface according to the following information, and complete the payment.

Configuration	Description
Billing method	Select a billing method. For more information, see *Billing*.
Scenario	Select the scenario for the router interface: • **VPC Interconnect**: Connect two VPCs. • **Physical Access**: Connect a VPC to the VBR of a leased line.
Router Creation	When two router interfaces are interconnecting, one plays the role of the connection initiator and the other plays the role of the connection receiver. The initiator and receiver are only used to control the process of establishing connections. In actual network communication, the communication link is bidirectional and there is no difference between the initiator and receiver. For VPC interconnection or physical access under the same account, select **Create Initiator and Receiver**.

Configuration	Description
	For VPC interconnection or physical access under different accounts, select **Create Initiator** or **Create Receiver** as needed. In the scenario of physical access, the VBR can act only as the initiator.
Local Region	Select the region where the VPC or VBR is located.
VPC ID	Select the VPC to be connected. **Note:** In the scenario of **Create Initiator and Receiver**, the local VPC is the connection initiating end.
Access Point	Select the access point of the leased line associated with the VBR. **Note:** This option is only applicable to physical access.
VBR ID	Select the VBR to be connected. **Note:** This option is only applicable to physical access.
Peer Region	Select the region where the peer VPC is located.
Peer VPC ID	Select the ID of the Peer VPC.
Specification	Select the specification of the initiator router interface as needed and the receiver router interface will automatically use the same specification as the initiator.

1.2 Add peer router interfaces

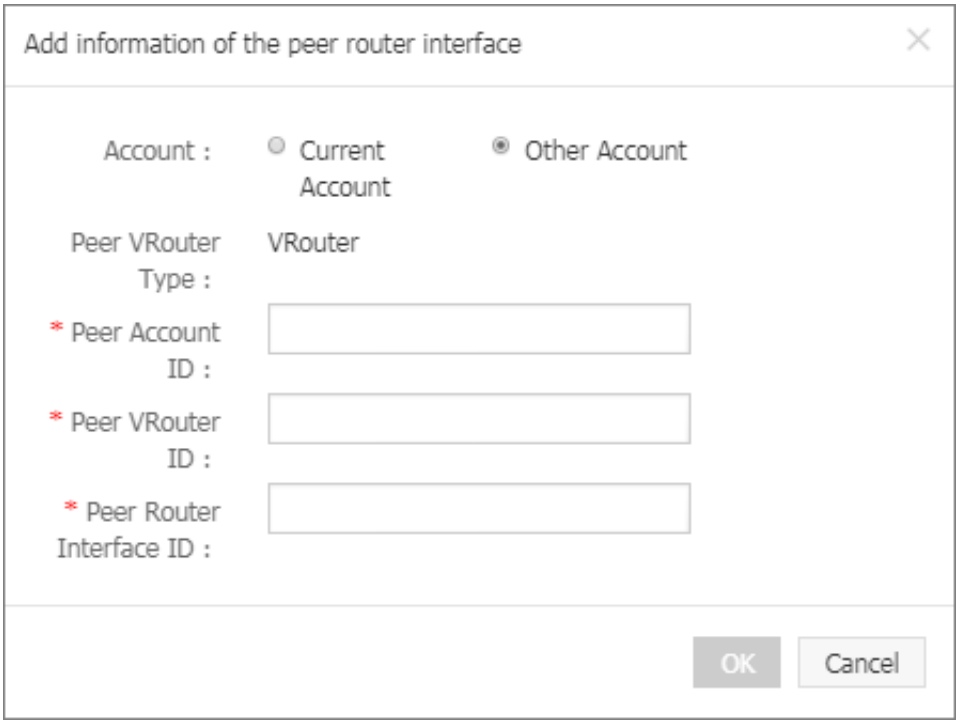
When connecting two router interfaces under different accounts, you need to add peer interface for each router interface respectively.

Prerequisites

You have obtained the router interface ID, account ID and VRouter ID of each router interface.

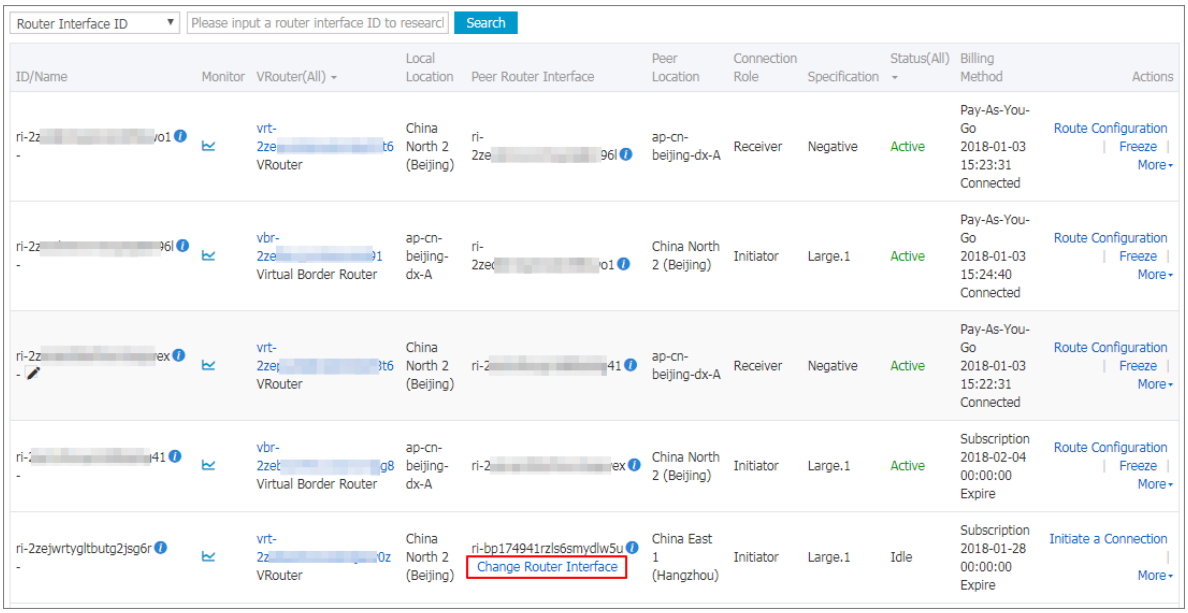
Procedure

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, select **VPC Connection** > **Router Interface**.
3. Click **Add** in the **Peer Router Interface** of the target router interface.
4. In the displayed dialog box, configure the peer router interface as follows:
   a) **Account**: Select **Other Account**.
   b) Enter **Peer Account ID**, **Peer VRouter ID**, and **Peer Router Interface ID** according to the obtained information.



5. Click **OK** to complete the adding.

Note:
If you want to change peer interface information, click **Change Router Interface** or click **More** > **Edit Peer Interface**.



1.3 Initiate a connection

The initiator router interface can initiate the connection between two router interfaces. You only need to initiate a connection in the scenario of multi-tenant router interface interconnection, such as multi-tenant VPC interconnection and multi-tenant physical access.

Procedure

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, select **VPC Connection** > **Router Interface**.
3. Click **Initiate a Connection** in the **Actions** column of the router interface.
4. In the displayed dialog box, click **OK**.

1.4 Configure a route

After creating router interfaces, you need to configure a route for the VRouter.

Procedure

1. Log on to the *Express Connect console*.
2. Enter the **Router Interface** page.
3. Click **Route Configuration** next to the target router interface.
4. Click **Add Route Entry**.
5. In the displayed dialog box, configure the following information:
   - **Destination CIDR Block**: The VSwitch CIDR block of the peer VPC.

- **Next Hop Type**: Select **Router Interface**.
- **Router Interface**: If you have not applied a redundant leased line, select **General Routing**. If you have applied a redundant leased line, select **ECMP Routing**. In the drop-down list, select the exit for data packets, that is, select the local router interface.

> **Note:**
> Between two VPCs, only one pair of router interfaces are allowed to be successfully connected, therefore, the two interfaces are each other's peer interfaces by default. You only need to select the local router interface, then data packets will be automatically routed to the peer router interface.

6. Click **OK**.

1.5 Manage a router interface

Edit router interface information

You can edit the name and description of the router interface.

Procedure

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, select **VPC Connection** > **Router Interface**.
3. Click **More** > **Edit Local Interface** in the **Actions** column of the target router interface.
4. In the displayed dialog box, enter the name and description of the router interface, and click **OK**.

Freeze a router interface

You can freeze a router interface in the Active status and data will not pass through the frozen router interface any more.

Procedure

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, select **VPC Connection** > **Router Interface**.
3. Click **Freeze** in the **Actions** column of the target router interface.
4. In the displayed dialog box, click **Confirm**.

Activate a router interface

You can activate a router interface in the Frozen status. After being activated, the router interface will restore data forwarding.

Procedure

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, select **VPC Connection** > **Router Interface**.
3. Click **Activate** in the **Actions** column of the target router interface.
4. In the displayed dialog box, click **Confirm**.

Deletes a router interface

You can delete a router interface in the Not Connected or Frozen status.

Procedure

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, select **VPC Connection** > **Router Interface**.
3. Click **Delete** in the **Actions** column of the target router interface.
4. In the displayed dialog box, click **Confirm**.

1.6 Renew a Subscription router interface

The service will not be stopped immediately after a bill is overdue. Renew your service in time to avoid service interruption.

Context

After a router interface bill is overdue:

- If you recharge your account within 24 hours after the bill is overdue, the router interface will not be affected.
- When the router interface is overdue for more than 24 hours, the interface will stop forwarding data and be locked. The service will be restarted immediately after you recharge your account.
- If you do not recharge your overdue bill within 7 days after the service is stopped, the router interface will be released and cannot be recovered.

Procedure

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, click **VPC Connection** > **Router Interface**.

3. Select the region where the target initiator router interface is located.
4. Locate the target router interface, and then click **More** > **Renew**.

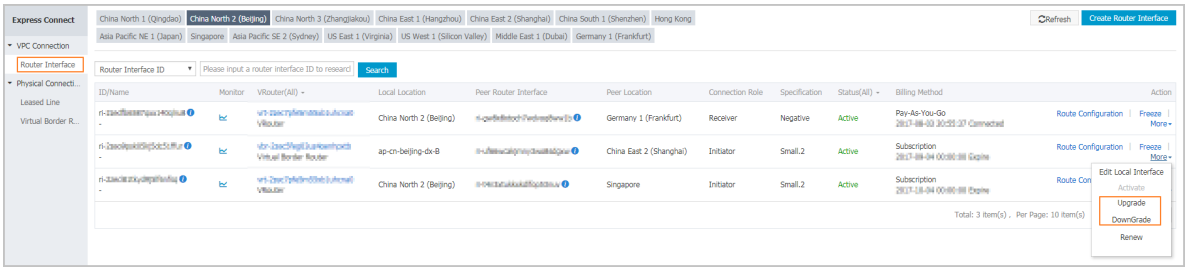
5. Select a renewal period and complete the payment.

1.7 Upgrade a Subscription router interface

You can upgrade the specification of a router interface to meet your business requirements. After you modify the configuration of the initiator router interface, the receiver router interface is automatically changed.

Procedure

1. Log on to the *Express Connect*.
2. In the left-side navigation pane, select **VPC Connection** > **Router Interface**.
3. Select the region where the target initiator router interface is located.
4. Locate the target router interface, and then click **More** > **Upgrade**.



5. Select a new specification and complete the payment.

2 Physical line

2.1 Apply for leased line access

Overview

A leased line is the abstraction of the network line established between an access point of Alibaba Cloud and a local data center. You must use a leased line of the carrier to connect the local data center to the Alibaba Cloud access point to set up the physical connection.

阿里云高速通道提供合作伙伴和自主申请两种专线接入方式，建议您通过合作伙伴完成专线接入。

Limits

- Physical Connection does not support interfaces of SDH 155M CPOS, V.35 or G.703.
- Alibaba Cloud provides one or more access points in each accessible region. Different access points have different carrier restrictions. Before applying for leased line access, open a ticket to obtain the access point and carrier restriction information.

合作伙伴申请

您可以在高速通道管理控制台查看合作伙伴的联系方式：

1. 登录##########。
2. 在左侧导航栏，单击物理专线连接 > 物理专线。
3. 单击右上角的申请专线接入。
4. 在合作伙伴申请页面，选择一个阿里云的合作伙伴帮助您完成物理专线接入。

Procedure

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, select **Physical Connection** > **Leased Line**.
3. In the upper-right corner, click **Apply for Leased Line Access**.
4. Configure the following information on the self application page:

Configuration	Description
Leased Line Name	Enter the name of the leased line.
Access Point	Select the region where your local data center is located. Access points are Alibaba Cloud data centers in different regions. There is one or more access points in each region. Different access points have different

Configuration	Description
	locations and different access capabilities. Open a ticket to obtain access point information to select the optional access point.
Carrier	Select the carrier that provides the leased line for you. **ap-cn-beijing-cp-A** only supports China Telecom. **ap-cn-beijing-dx-B** only supports China Unicom. **ap-cn-shanghai-bs-A**, **ap-cn-shanghai-pd-A**, and **ap-cn-shanghai-pd-B** only support China Telecom, and **ap-cn-shanghai-bs-B** only supports China Unicom. **ap-cn-shenzhen-lh-A** only supports China Telecom. Open a ticket for detailed information.
Access Port Type	Select according to your actual needs.
Bandwidth for Access	Select according to your actual needs.
Peer Address of Leased Line	Enter the location of your local data center.
Redundant Leased Line	Select a previously applied leased line to form redundancy with the leased line.

5. After you finish self application, the leased line status is **Application in Progress**. Alibaba Cloud will contact you to verify the application within two workdays.
6. After the application is approved, the leased line status changes to **Approved**. Now click **Pay Access Fee** to complete the payment.
7. After you make the payment, the leased line status changes to **Allocating Resources**. After another three minutes, the status of the leased line changes to **Access Construction in Progress**. Now click **View** on the right side to view information about leased line construction. Inform your carrier of the port information and ask the carrier to connect the leased line. After completing investigation, the carrier will provide you a file containing names of personnel dispatched to the data center of the access point and related information, time of on-site construction, leased line ID and so on. At this time, you need to open a ticket to inform Alibaba Cloud aftersales personnel of information about leased line laying by construction personnel of the carrier.

8. After the construction is completed, the leased line status changes to **Awaiting Confirmation**. Click **Confirm** and the leased line status changes to **Normal**.

> **Note:**
> After the leased line access is completed, the leased line status changes to Normal, and the connection is established. If the leased line status is **Rejected**, you need to apply again.

2.2 Manage a leased line

Cancel access

You can cancel leased line access when the leased line access is not completed (that is, the leased line is in the status of Application in Progress, Approved, or Access Construction in Progress).

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, select **Physical Connection** > **Leased Line**.
3. Click **Cancel Access** in the **Actions** column of the target leased line, and click **OK** in the displayed dialog box.

Terminate access

You can terminate a successfully accessed (in the Normal status) leased line. Before terminating the access, you need to delete route entries, router interfaces, and VBRs associated with the leased line. For more information, see *Remove a physical connection*.

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, select **Physical Connection** > **Leased Line**.
3. Click **Terminate Access** in the **Actions** column of the target leased line, and click **OK** in the displayed dialog box.

Delete a leased line

You can delete a leased line in the Canceled, Terminated or Rejected status.

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, select **Physical Connection** > **Leased Line**.
3. Click **Delete** in the **Actions** column of the target leased line, and click **Confirm** in the displayed dialog box.

Modify access information

You can modify the name and peer address of a leased line to facilitate maintenance.

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, select **Physical Connection** > **Leased Line**.
3. Click **Modify Info** in the **Actions** column of the target leased line.
4. Enter the **Leased Line Name** and **Peer Address of Leased Line** in the displayed dialog box and click **OK**.

Check access status

You can view information about leased line construction, such as data center location, network cabinet location, and port information.

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, select **Physical Connection** > **Leased Line**.
3. Click **View** in the **Actions** column of the target leased line.

3 VBR

3.1 Create a virtual border router

What is Virtual Border Router?

Virtual Border Router (VBR) is the mapping of your leased line in VPC. It can be regarded as a VRouter between Customer Premise Equipment (CPE) and VPC, and acts as the forwarding bridge between a local data center and a VPC.

VBR includes a route table. You can manage traffic forwarding in VBR through configuring route entries in VBR. VBR provides the following functions:

- Exchange data packets as the intermediate VRouter between VPC and the local data center.
- Decide the interface mode of the leased line: Layer-3 router interface mode or VLAN-based layer-3 subinterface mode.
- Recognize or attach VLAN tags in layer-3 subinterface mode.
- Support BGP dynamic routing.

Limits

- Each route table supports up to 48 custom route entries.
- Source address based policy routing is not supported.

Procedure

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, click **Physical Connection** > **Virtual Border Router**.
3. In the upper-right corner, click **Create VBR**. Configure the VBR according to the following information and click **Confirm Creation**.

Configuration	Description
Object	• If you want to create a VBR for the leased line under another account, select **Other Account**. • If you want to create a VBR for the leased line under this account, select **This Account**.
Name	Enter the name of the VBR.
Description	Enter the description of the VBR.

Configuration	Description
Leased Line	Select the leased line to be connected to the VBR.
VLAN ID	Enter the VLAN ID of the VBR, in the range of 0-2999. • VLAN When the VLAN ID is 0, the physical switch port of the VBR uses the layer-3 router interface mode instead of the VLAN mode. In the layer-3 router interface mode , each leased line corresponds to a VBR. • When the VLAN ID is [1-2999], the physical switch port of the VBR uses the VLAN-based layer-3 subinterface mode. In the layer-3 subinterface mode, each VLAN ID corresponds to a VBR. In this mode, the leased line of the VBR can connect VPCs under multiple accounts. VBRs of different VLANs are isolated from one another. For example, a company has multiple subdivisions or subsidiaries. Each subdivision or subsidiary has an independent Alibaba Cloud account, and each account has an independent VPC . If the company applies for a leased line, it needs to plan a VLAN ID for each subdivision or subsidiary. When creating router interfaces, the company uses VLAN IDs to identify the subsidiaries or subdivisions to use the leased line.
Circuit Code	The carrier that builds the leased line for you will provide a circuit code for your leased line. Enter the circuit code to facilitate maintenanc e.
IP Address	• **Alibaba Cloud-Side**: Enter the IP address used as the gateway to connect to the local data center.

Configuration	Description
	• **Customer-Side**: Enter the IP address used as the gateway to connect to VPC. • **Subnet Mask**: The subnet mask of the Alibaba Cloud-side IP address and the customer-side IP address. Because only two IP addresses are required, you can enter a long subnet mask.

3.2 Add a route entry

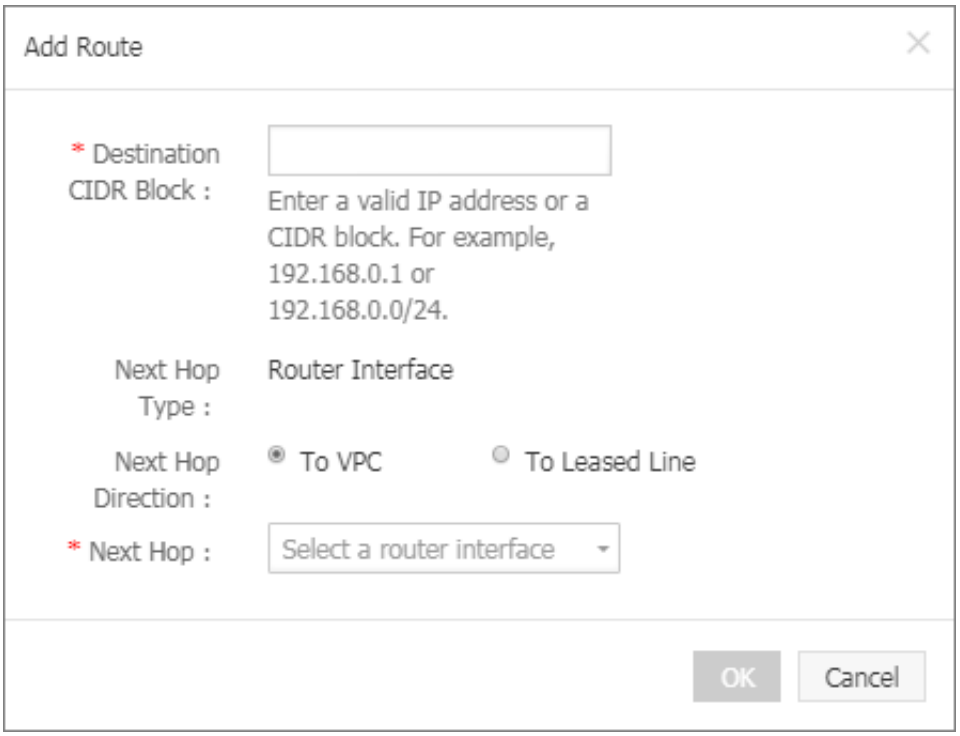
You need to perform this operation twice. Add one route entry directing to the VPC and add one route entry directing to the local data center, so that the local data center can communicate with the VPC through the VBR.

Context

After configuring the route on the VBR according to this tutorial, you also need to configure the route on the local data center. Configure a route pointing to the VPC CIDR block on the physical access device of the on-premises IDC. You can configure a static route or BGP dynamic routing to forward data from the local data center to the VBR:

Procedure

1. Log on to *Express Connect console*.
2. In the left-side navigation pane, select **Virtual Border Router**.
3. Select the target VBR in the VBR list.
4. Click **Manage**.
5. In the page of VBR details, click **Add Route Entry**.
6. In the displayed dialog box, enter the following information:
   - **Destination CIDR Block**: The CIDR block cannot include any public IP.
   - **Next Hop Direction**: To forward data to VPC, select **To VPC**. To forward data to the leased line, select **Leased Line**.
   - **Next Hop**: To forward data to VPC, select the data exit on the VBR, namely, a router interface of the VBR.
7. Click **OK**.



3.3 Manage a virtual border router

Modify a VBR

You can modify the name, circuit code and description of a VBR to facilitate maintenance.

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, select **Physical Connection** > **Virtual Border Router**.
3. Click **Manage** in the **Actions** column of the target VBR.
4. In **Basic Information** on the page of VBR details, click **Modify Info**.
5. Enter the **VRouter Name**, **Circuit Code**, and **VRouter Description** of the VBR, and click **OK**.

Modify IP addresses

You can modify the IP addresses of a VBR according to your network design.

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, select **Physical Connection** > **Virtual Border Router**.
3. Click **Manage** in the **Actions** column of the target VBR.
4. Find the target leased line in **Physical Connection Info** on the page of VBR details, and click **Modify Info** in the **Actions** column of the target leased line.
5. In the displayed dialog box, modify the IP addresses of the VBR according to the following information, and click **OK**.

- **Alibaba Cloud-Side**: Enter the IP address used as the gateway to connect to the local data center.
- **Customer-Side**: Enter the IP address used as the gateway to connect to the VPC.
- **Subnet Mask**: The subnet mask of the Alibaba Cloud-side IP address and the customer-side IP address. Because only two IP addresses are required, you can enter a long subnet mask.

Delete a VBR

Before deleting a leased line, you need to delete VBRs associated with the leased line. Before this operation, you also need to delete corresponding route entries and router interfaces. For more information, see *Remove a physical connection*.

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, select **Physical Connection** > **Virtual Border Router**.
3. Click **Delete** in the **Actions** column of the target VBR, and then click **Confirm** in the displayed dialog box.

Note:

如果所删除的边界路由器由您的接入合作伙伴创建，当需要再次创建该边界路由器时仍需由其为您创建。

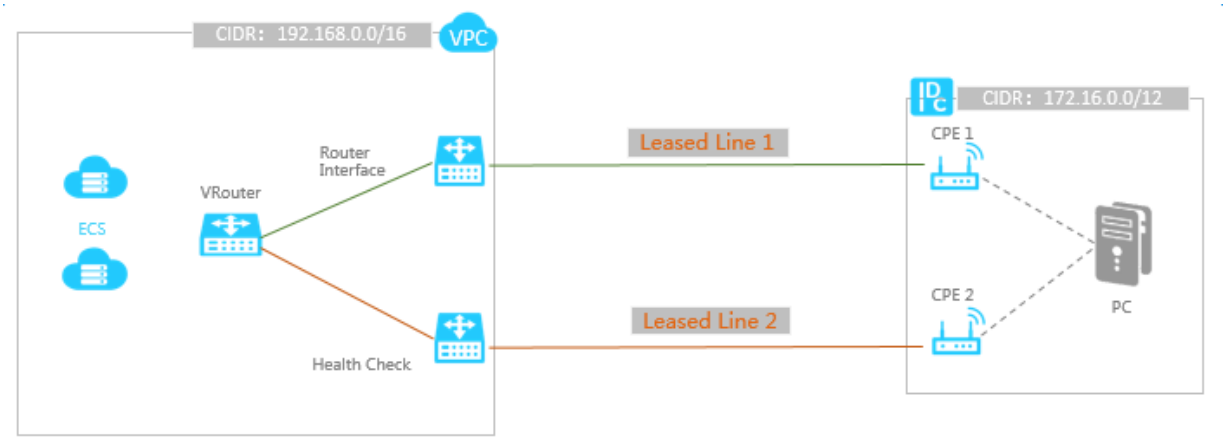
4 Redundant leased line access

You can use redundant leased lines to connect your local data center to your VPC. Redundant physical connection provides intranet communication featuring high quality and high reliability. Alibaba Cloud supports up to four leased lines to achieve ECMP.

Scenarios

This tutorial uses the following scenario to illustrate how to connect a local data center to a VPC on Alibaba Cloud by using redundant leased lines:

A company has a local data center (CIDR block: 172.16.0.0/12) in Beijing, and has a VPC (CIDR block: 192.168.0.0/16) in the region of China (Hangzhou) (CIDR block: 192.168.0.0/16). To solve single point of failure (SPOF), the company plans to apply for two leased lines provided by two different carriers separately to connect the local data center to the access point of Alibaba Cloud in Beijing.



Step 1 Apply for the first physical line

Follow these steps to apply for the first leased line:

1. Log on to *Express Connect console*.
2. In the left-side navigation pane, select **Physical Connection** > **Leased Line**.
3. Click **Apply for Leased Line Access**.
4. Configure the leased line. The following are configurations used in this tutorial. For more information, see *Apply for leased line access*.
   - **Leased Line Name**: Enter a name for the leased line. In this tutorial, Beijing_Local_1 is entered.

- **Access Point**: Select the access point closest to the local data center. In this tutorial, select **China North 2 (Beijing)** > **ap-cn-beijing-dx-A**.
- **Carrier**: Select the carrier that provides the leased line. In this tutorial, **Other (China)** is selected.
- **Access Port Type**: Select a port used by the leased line. In this tutorial, **100Base-LR-10G Single-Mode Optical Port (10km)** is selected.
- **Bandwidth for Access**: Select a bandwidth for the leased line. In this tutorial, **100** is entered.
- **Peer Address of Leased Line**: Enter the address of your local data center. For example, No. XX, XX Street, XX District, Beijing.
- **Redundant Leased Line**: You do not need to select because this is the first leased line.

5. Click **Apply**. On the **Leased Line** page, the status of the leased line is **Application in Progress**.

   Alibaba Cloud will examine and approve your application, which is generally approved the next workday. After the application is approved, the leased line status changes to **Approved**.
6. After the application is approved, click **Pay Access Fee**. Then the system automatically assigns you a port and a leased line ID. In this tutorial, the leased line ID is “pc- 123xyz”.

Step 2 Apply for the second leased line

Follow these steps to apply for the second leased line:

1. Log on to *Express Connect console*.
2. In the left-side navigation pane, select **Physical Connection** > **Leased Line**.
3. Click **Apply for L eased Line Access**.
4. Configure the second leased line. The following are configurations used in this tutorial. For more information, see *Apply for leased line access*.

   - **Leased Line Name**: Enter a name for the leased line. In this tutorial, Beijing_Local_2 is entered.
   - **Access Point**: Select the access point closest to the local data center. In this tutorial, select **China North 2 (Beijing)** > **ap-cn-beijing-dx-A**.
   - **Carrier**: Select the carrier that provides the leased line. In this tutorial, **Other (China)** is selected.
   - **Access Port Type**: Select a port used by the leased line. In this tutorial, **100Base-LR-10G Single-Mode Optical Port (10km)** is selected.

- **Bandwidth for Access**: Select a bandwidth for the leased line. In this tutorial, **100** is entered.
- **Peer Address of Leased Line**: Enter the address of your local data center. For example, No. XX, XX Street, XX District, Beijing.
- **Redundant Leased Line**:

> **Note:**
> You can select any access point in the same region as the first leased line. If you select the same access point as the first leased line, select the first leased line as the redundant leased line (Make sure that the installation fee of the first leased line has been paid); If you select an access point different from that of the first leased line, the two lines are naturally redundant and you do not need to select the **Redundant Leased Line**.

5. Next, complete the application and wait for approval, just as for the first line. After the approval , pay the fee to receive the port location.

Step 3 Complete leased line construction

Follow these steps to complete the construction of the two leased lines:

1. After the system complete port allocation and the status of the leased lines change to **Access Construction in Progress**, click **View** on the right side to view information about leased line construction, such has data center location, network cabinet location, and port information.
2. Inform your carrier of the port information and ask the carrier to connect the leased line. After completing investigation, the carrier will provide you a file containing names of personnel dispatched to the data center of the access point and related information, time of on-site construction, leased line ID and so on. At this time, you need to submit a ticket to inform Alibaba Cloud aftersales personnel of information about leased line laying by the construction personnel of the carrier.

   In the following workday, Alibaba Cloud after sales staff will schedule an appointment at the data center for the carrier staff, and inform you of the contact information of the reception personnel in the data center on that day. Inform the carrier of the appointment information. After the carrier completes deployment in the Alibaba Cloud data center, Alibaba Cloud after sales staff changes the leased line status to **Awaiting Confirmation**.
3. Click **Confirm** when the carrier informs you that the leased line construction has been completed. The leased line access is completed when the leased line status changes to **Normal**.

Step 4 Create a VBR for each leased line

Complete these steps to create a VBR for each leased line:

1. Log on to *Express Connect console*.
2. In the left-side navigation pane, select **Physical Connection** > **Virtual Border Router**.
3. Click **Create VBR**.
4. Create a VBR for the first leased line. The following configurations are used in this tutorial. For more information, see *Create a virtual border router*.

   VBR 1:

   - **Object**: Select **This Account**.
   - **Name**: VBR_1
   - **Description**: Leased_Line_1
   - **Leased Line**: Select the first leased line. In this tutorial, select **pc-123xyz**.
   - **VLAN ID**: 0 (0 indicates that layer-3 router interfaces are directly used)
   - **Circuit Code**: Enter the circuit code provided by the carrier.
   - **IP Address**: Set according to the following information:

     Alibaba Cloud-Side: Enter the IP address used as the gateway to connect to the local data center. In this tutorial, enter 10.100.0.1.

     Customer-Side: Enter the IP address used as the gateway to connect to the VPC. In this tutorial, enter 10.100.0.10.

     Subnet Mask: The subnet mask for the Alibaba-side IP address and the customer-side IP address. In this tutorial, enter 255.255.255.0.
5. Repeat the preceding steps to create a VBR for the second leased line, namely “VBR_2”.

Step 5 Create router interfaces

To achieve redundant leased line access, you need to create a pair of router interfaces between each pair of VBR and VPC, so that the VPC and the VBR can forward messages to each other through the router interfaces. Follow these steps to create router interfaces:

1. Log on to *Express Connect console*.
2. In the left-side navigation pane, click **VPC Connection** > **Router Interface**.
3. Click **Create Router Interface**.

4. Create a router interface for VBR_1 and the VPC according to the following information. For more information, see *Create a router interface*.
   - **Billing Method**: Select a billing method. In this tutorial, select **Pay-As-You-Go**
   - **Scenario**: Select **Physical Access**.
   - **Router Creation**: Select **Create Initiator and Receiver**. The system sets the router interface of the local side as the initiator, and automatically connects the initiator to the receiver.
   - **Local Region**: Select the region where the access point of the leased line is located. In this tutorial, select **China (Beijing)**.
   - **Access Point**: Select the access point of the leased line. In this tutorial, select **Beijing-Daxing-A**.
   - **VBR ID**: Select VBR_1.
   - **Peer Region**: Select the region where your VPC is located. In this tutorial, select **China (Hangzhou)**.
   - **Peer VPC ID**: Select your VPC.

After the router interface is created, the system creates a router interface for the VRouter of the VPC and VBR_1 respectively and initiates the connection.

Repeat the preceding steps to create a router interface for VBR_2 and the VRouter of the VPC respectively.

Step 6 Configure IP addresses for health check

The strategy for health check of redundant leased lines is: Alibaba Cloud sends a ping message from each source IP address to the customer-side IP address of each VBR every two seconds. If eight ping packets on one leased line consecutively fail to receive response, the traffic will be forwarded to the other leased line. Complete these steps to configure the source IP address for health check in the router interface of VPC.

1. Log on to *Express Connect console*.
2. In the left-side navigation pane, click **VPC Connection** > **Router Interface**.
3. Find the router interface of VPC created in step 4. Click **More** > **Health Check** in the **Actions** column.
4. Click **Configuration**, configure the following information in the displayed dialog box, and click **OK**.
   - **SourceIp**: Enter a free IP address of the VPC as the health check IP address.

- **TargetIp**: Enter the customer-side IP address of the local data center.

5. Repeat the preceding steps to configure the health check IP address for the other router interface.

> **Note:**
> In multi-VPC scenarios, you must configure health check IP addresses for router interfaces of all VPCs connected to redundant leased lines to guarantee smooth switch between the redundant leased lines.

Step 7 Configure routes

After creating the router interfaces, you need to configure a route pointing to the on-premises IDC for the router interfaces newly created on the VPC, and configure routes pointing to the VPC and the corresponding leased line respectively for each newly created router interface on the two VBRs. At last you need to add a route pointing to the VPC on the access device of the on-premises IDC. Therefore, the interconnection between the on-premises IDC and the VPC is achieved.

Configure the route on the VPC

Follow these steps to forward traffic destined for on-premises IDC (CIDR block: 172.16.0.0/12) to the VBR:

1. Log on to *Express Connect console*.
2. Select the region where the VPC is located.
3. Click **Route Configuration** in the **Actions** column of the target router interface. Click **Add Route Entry** on the page of VBR details.
4. In the displayed dialog box, configure the route according to the following information. For more information, see *Add a route entry*.
   - **Destination CIDR Block**: The CIDR Block of the local data center. In this example, enter 172.16.0.0/12.
   - **Next Hop Type**: Select **Router Interface (To VBR)**.
   - **Route Type**: Select **ECMP Routing**.
   - **Router Interface**: Select the two router interfaces created on the VPC in step 4.
5. Click **OK**.

Configure routes on the VBR

Add a route pointing to the leased line

Follow these steps to route the traffic destined for the IDC (CIDR Block: 172.16.0.0/12) to the leased line:

1. Log on to *Express Connect console*.
2. In the left-side navigation pane, click **Physical Connection** > **Virtual Border Router**.
3. Select the region where the VBR is located.
4. Click **Manage** in the **Actions** column of VBR_1 to enter the page of VBR details. Click **Add Route Entry**.
5. In the displayed dialog box, configure the route entry according to the following information. For more information, see *Add a route entry*.
   - **Destination CIDR Block**: The CIDR Block of the local data center. In this tutorial, enter 172.16.0.0/12.
   - **Next Hop Direction**: Select **To Leased Line**.
   - **Next Hop**: Select the router interface pointing to the local data center created in step 4.
6. Click **OK** to complete the configuration. Then you can access the Alibaba-side IP address 10.100.0.1 from the local data center.

Add a route entry pointing to the VPC

Follow these steps to route the traffic destined for the VPC (CIDR Block: 192.168.0.0/16) to the VPC:

1. Log on to *Express Connect console*.
2. In the left-side navigation pane, click **Physical Connection** > **Virtual Border Router**.
3. Select the region where the VBR is located.
4. Click **Manage** in the **Actions** column of VBR_1 to enter the page of VBR details. Click **Add Route Entry**.
5. In the displayed dialog box, configure the route entry according to the following information. For more information, see *Add a route entry*.
   - **Destination CIDR Block**: The CIDR Block of the VPC. In this tutorial, enter 192.168.0.0/16.
   - **Next Hop Direction**: Select **To VPC**.
   - **Next Hop**: Select the router interface pointing to the VPC created in step 4.

Repeat the preceding steps to configure routes pointing to the VPC and the local data center respectively for VBR_2.

Configure the route on the local data center

Till now, the route configuration on Alibaba Cloud has been completed. However, to establish the connection from the IDC to the VPC, you must add a route entry for the gateway of you IDC to route traffic destined for the VPC to the IP address of the Alibaba Cloud side. You can configure a static route or BGP dynamic routing to forward data in the local data center to VBR:

- Static routes

  Example:

  ```
  ip route 192.168.0.0/16 10.100.0.1
  ip route 192.168.0.0/16 10.100.1.1
  ```

- Dynamic routes

  You can also use BGP to connect the VBR and the local data center.

  1. Create a BGP peer group, see *Create BGP peer groups*.
  2. Add BGP peers to the BGP group, see *Create BGP peers*.
  3. Advertise the BGP network in the VBR, see *Advertise BGP network*.

  > **Note:**
  > Ensure the destination CIDR block of the BGP route entry is the static route that you have configured. In this tutorial, it is 192.168.0.0/16.

Step 8 Test the performance

After the VPC is connected to the local data center, test the speed of the leased lines to ensure that they can meet service needs. For more information, see *Test the network performance of a physical connection*.

5 Remove a connection between VPCs

When you do not need to use Express Connect to connect two VPCs (VPC-A and VPC-B are used in this tutorial), you can delete the route interfaces used for interconnecting the two VPCs to remove the interconnection.

Step 1: Delete route entries

Follow these steps to delete the route entry pointing to the other VPC in each VPC:

1. Log on to the *Express Connect console*.
2. Select the region where VPC-A is located.
3. Click **Manage** in the **Actions** column of VPC-A.
4. In the left-side navigation pane, click **VRouters**.
5. Find the route entry of which the destination CIDR block is the CIDR block of VPC-B and the next hop type is router interface and click **Delete** in the **Actions** column. Click **Confirm** in the displayed dialog box.
6. Repeat the preceding steps to delete the route entry of VPC-B used to connect to VPC-A.

Step 2: Freeze and delete router interfaces

Follow these steps to freeze and delete two interconnected router interfaces:

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, click Router Interface.
3. Select the region where VPC-A is located.
4. Find the router interface of VPC-A used to connect to VPC-B, and click **Freeze** in the **Actions** column.
5. When the status of the router interface changes from **Activated** to **Frozen**, click **More** > **Delete** in the **Actions** column. Click **Confirm** in the displayed dialog box.
6. Repeat the preceding steps to delete the router interface of VPC-B used to connect to VPC-A.

Note:

- A frozen router interface will still be billed. A router interface will not be billed only when it is deleted.
- If there still is any route entry pointing to the router interface, the router interface cannot be deleted.

6 Remove a physical connection

To delete a leased line between a local data center and a VPC, you must delete the following resources and configurations in sequence:

1. Delete related route entries in the VRouter of the VPC and the VBR.
2. If you have used BGP dynamic routing, delete BGP peers and BGP groups associated with the VBR.
3. Delete the router interfaces for achieving the leased line communication on the VPC and the VBR.
4. Delete all VBRs on the leased line.
5. Delete the leased line.

Note:

You must follow the deleting order, otherwise the leased line cannot be deleted successfully.

Step 1: Delete route entries in the VRouter of the VPC

Follow these steps to delete route entries pointing to the local data center in the VPC:

1. Log on to the VPC console.
2. Select the region where the VPC is located.
3. Click **Manage** in the **Actions** column of the target VPC.
4. In the left-side navigation pane, click **VRouters**.
5. Find a route entry of which the destination CIDR block is the CIDR block of the local data center and the next hop type is router interface, and click **Delete** in the **Actions** column. Then, click **Confirm** in the displayed dialog box.
6. Repeat step 5 to delete all route entries pointing to the on-premises IDC.

Step 2: Delete route entries in the VBR

Follow these steps to delete route entries pointing to the VPC or local data center in the VBR.

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, click **Physical Connection** > **Virtual Border Router**.
3. Select the region where the VBR is located.
4. Click **Manage** in the **Actions** column of the VBR.
5. Click **Delete** in the **Actions** column, and click **Confirm** in the displayed dialog box.

6. Repeat step 5 to delete all route entries under the VBR.

Step 3: Delete BGP groups and BGP peers

If you have configured BGP on the VBR, follow these steps to delete all BGP peers and BGP groups in the VBR:

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, click **BGP** > **BGP Peer**.
3. Select the region of a BGP group to which BGP peers belong.
4. Click **Delete** in the **Actions** column of the BGP peer, and click **Confirm** in the displayed dialog box.
5. Repeat step 4 to delete all BGP peers in the BGP group.
6. In the left-side navigation pane, click **BGP** > **BGP Group**.
7. Click **Delete** in the **Actions** column of the BGP group, and click **Confirm** in the displayed dialog box.
8. Repeat Step 7 to remove all BGP groups under VBR.

Step 4: Freeze and delete router interfaces

Follow these steps to freeze and delete router interfaces used for leased line access on the VRouter of the VPC and the VBR:

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, click **Router Interface**.
3. Select the region where the VBR is located.
4. Find the router interface used for leased line access, and click **Freeze** in the **Actions** column.
5. When the status of the router interface changes from **Activated** to **Frozen**, click **More** > **Delete** in the **Actions** column. Then click **Confirm** in the displayed dialog box.
6. Repeat the preceding steps to delete all router interfaces used for leased line access.

Step 5: Delete VBRs

Follow these steps to delete VBRs associated with the target leased line:

1. Log on to the *Express Connect console*.
2. Select the region where a VBR is located.
3. In the left-side navigation pane, click **Physical Connection** > **Virtual Border Router**.
4. Click **Delete** in the **Actions** column of the target VBR, and click **Confirm** in the displayed dialog box.

5. Repeat step 4 to delete all VBRs associated with the target leased line.

Step 6: Delete the leased line

Follow these steps to terminate leased line access and delete the leased line:

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, click **Physical Connection** > **Leased Line**.
3. Click **Terminate Access** in the **Actions** column of the leased line to be deleted, and click **Confirm** in the displayed dialog box.
4. When the status of the leased line changes from **Normal** to **Terminated**, click **Delete** in the **Actions** column. Then click **Confirm** in the displayed dialog box.

7 BGP

7.1 BGP overview

Border Gateway Protocol (BGP), a dynamic routing protocol based on TCP protocol, is designed to exchange routing and reachability information among autonomous systems (AS). During the construction of leased line access, you can use BGP to achieve intranet connection between a local data center and a VBR. BGP can help you build a hybrid cloud in a more efficient, flexible, and reliable way.

BGP groups and BGP peers

BGP groups are used for simplifying BGP configurations. Adding repeated configurations into a BGP group can reduce configuration complexity. You only need to create a BGP group based on the ASN and add BGP peers meeting requirements into the group. Then BGP peers in the BGP group will inherit the configurations of the BGP group, and you do not need to configure the BGP peers separately.

Limits

- VBR only supports building BGP peers with a peer local data center, and still need to use static routing to communication with a VPC.
- The supported BGP version is BGP4.
- VBR supports IPv4 GBP, but does not support IPv6 BGP.
- Up to eight BGP peers can be created under each VBR.
- Up to 100 dynamic route entries can be added to a BGP peer.
- The Alibaba Cloud-side ASN is 45104. The customer side can transmit 2-byte or 4-byte ASN.

7.2 Manage BGP peer groups

Create a BGP peer group

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, click **BGP** > **BGP Group**.
3. Select the region where the target VBR is located.
4. Click **Create BGP Peer Group**.

5. Configure the BGP peer group according to the following information and click **Submit**.

Configuration	Description
Name	The name of the BGP peer group.
Peer AS Number	The AS number of the network of the local data center.
VBR	The VBR to be connected with the local data center.
AuthKey	The authentication key of the BGP peer group .
Description	The description of the BGP peer group.

Delete a BGP peer group

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, click **BGP** > **BGP Group**.
3. Select the region where the target BGP peer group is located.
4. Click **Delete** in the **Actions** column of the target BGP peer group, and click **Confirm** in the displayed dialog box.

Modify a BGP peer group

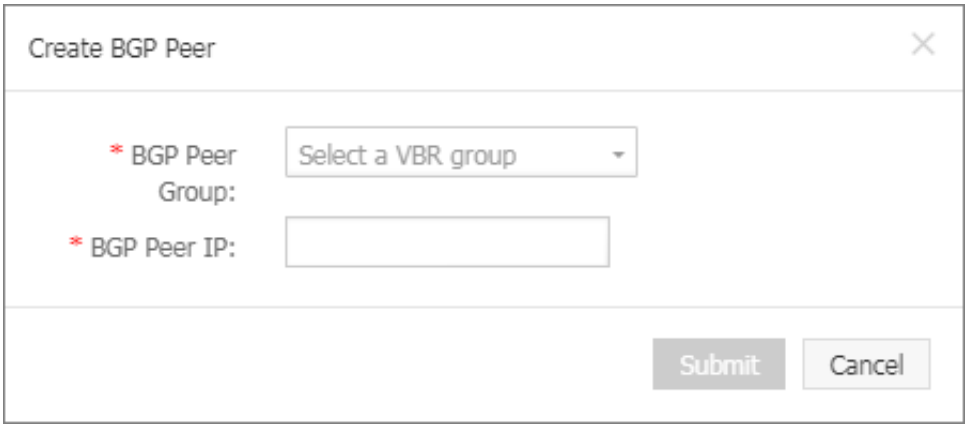
1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, click **BGP** > **BGP Group**.
3. Select the region where the target BGP peer group is located.
4. Click **Edit** in the **Actions** column of the target BGP peer group. Modify configurations of the BGP peer group in the displayed dialog box and click **Submit**.

7.3 Manage BGP peers

Create a BGP peer

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, click **BGP** > **BGP Peer**.

3. Click **Create BGP** peer, select a **BGP Peer Group** in the displayed dialog box, enter **BGP Peer IP**, and click **Submit**.



Note:

Up to 8 BGP peers can be created under each VBR.

Delete a BGP peer

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, click **BGP** > **BGP Peer**.
3. Click **Delete** in the **Actions** column of the target BGP peer, and click **Confirm** in the displayed dialog box.

7.4 Advertise a BGP network

You can use BGP to connect a VBR to a local data center. You only need to add BGP peers that communicate with the VBR to the corresponding BGP group, and advertise the BGP network in the VBR, then BGP dynamic routing can be achieved between the local data center and the VBR.

Note:

BGP can only be used to achieve dynamic routing between a local data center and a VBR. If you need to connect a local data center to a VPC, you still need to configure a static route for

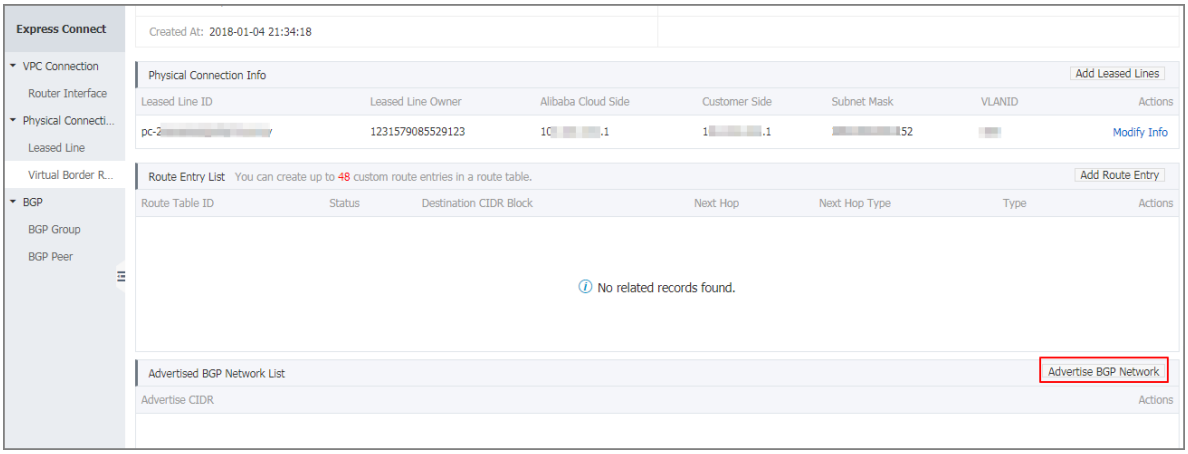
the VBR and the VPC respectively. For more information, see *Access a VPC under the same account through a physical connection*.

Prerequisites

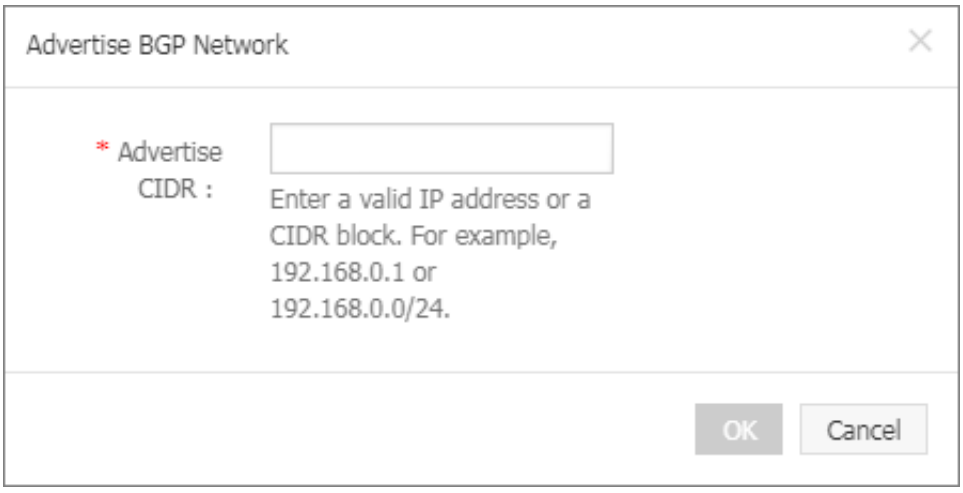
- *Create BGP peer groups*
- *Create BGP peers*
- *Create a VBR*

Procedure

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, click **Physical Connection** > **Virtual Border Router**.
3. Click the ID of the target VBR.
4. Click **Advertise BGP Network** on **VBR Details** page.

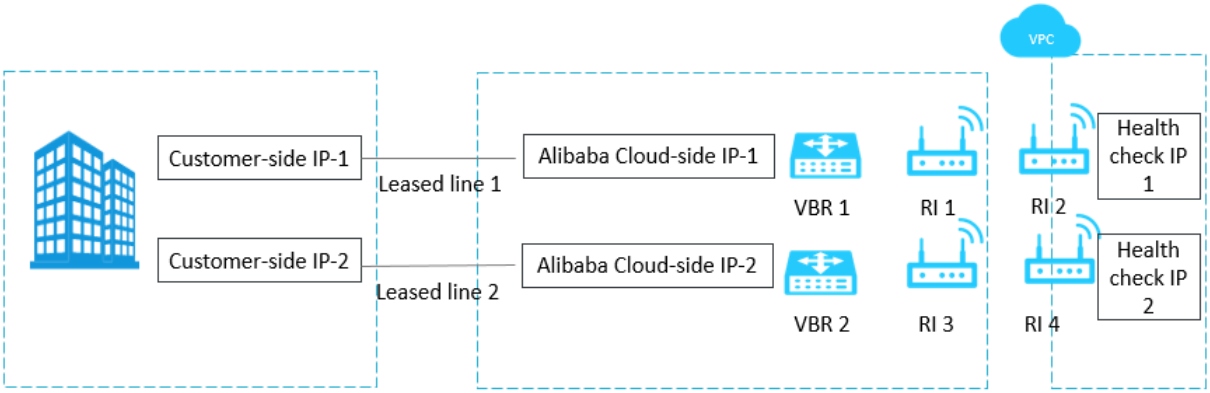


5. Enter the VPC CIDR block or VSwitch CIDR block to be connected with the local data center, and click **OK**.



8 Configure health check

To guarantee smooth switch between two redundant leased lines in case of fault, you must configure the health check. The following figure shows how the health check works:



Alibaba Cloud sends a ping packet to the customer-side IP address of the local data center from each health check IP address every two seconds. If eight successive ping packets on one leased line fail to give response, the traffic is switched to the other leased line.

Prerequisites

You have configured ECMP pointing to the on-premises IDC in the VPC. For more information, see *Redundant physical connection*.

Procedure

Complete these steps to configure health check IP addresses in the router interfaces of the VPC.

> **Note:**
> You only need to configure health check on router interfaces pointing to the VBRs, and do not need to configure health check on router interfaces pointing to the VPCs.

1. Log on to the *Express Connect console*.
2. In the left-side navigation pane, click **VPC Connection** > **Router Interface**.
3. Click **More** > **Health Check** in the **Actions** column of the target router interface.
4. Click **Configuration**, configure the following information in the displayed dialog box, and click **OK**.
   - **SourceIp**: Enter a free IP address of the VPC as the health check IP address.
   - **TargetIp**: Enter the customer-side IP address of the local data center.

5. Repeat the preceding steps to configure the health check IP address for the other router interface.

Note:

In multi-VPC scenarios, you must configure health check IP addresses for router interfaces of all VPCs connected to redundant leased lines to guarantee smooth switch between the redundant leased lines.