

Alibaba Cloud Express Connect Virtual Border Router

Issue: 20190806

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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.	 Notice: Take the necessary precautions to save exported data containing sensitive information.
	This indicates supplemental instructions, best practices, tips, and other content that is good to know for the user.	 Note: You can use Ctrl + A to select all files.
>	Multi-level menu cascade.	Settings > Network > Set network type
Bold	It is used for buttons, menus, page names, and other UI elements.	Click OK .
Courier font	It is used for commands.	Run the <code>cd / d C :/ windows</code> command to enter the Windows system folder.
<i>Italics</i>	It is used for parameters and variables.	<code>bae log list --instanceid Instance_ID</code>
[] or [a b]	It indicates that it is an optional value, and only one item can be selected.	<code>ipconfig [-all -t]</code>

Style	Description	Example
{ } or {a b}	It indicates that it is a required value, and only one item can be selected.	<code>swich {stand slave}</code>

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1 What is a Virtual Border Router?

Alibaba Cloud isolates the physical connection ports of its customers and abstracts these ports into Virtual Border Routers (VBRs) based on the three-layer overlay and switch virtualization technology of the Software Defined Network (SDN) architecture. A VBR is a router between the Customer-Premises Equipment (CPE) and the VPC, and functions as a data forwarding bridge from the VPC to the on-premises data center.

Similar to the VRouter in a VPC, a VBR also has a route table. You can configure route entries in the route table to forward VBR traffic.

Functions

VBR provides the following functions:

- Exchanges data packets between the VPC and the on-premises data center as an intermediate router.
- Attaches or identifies Virtual Local Area Network (VLAN) tags in Layer-3 sub-interface mode.
- Decides the port mode of the physical connection: Layer-3 route interface or VLAN-based Layer-3 sub-interface.
- Supports Border Gateway Protocol (BGP).

BGP is a dynamic routing protocol based on Transmission Control Protocol (TCP). It is mainly used to exchange routing information and network accessibility information among autonomous systems. You can use BGP to implement intranet connection between the on-premises data center and VBR for physical connections. BGP can help you build hybrid clouds in a more efficient, flexible, and reliable manner.

Limits

- Source address-based policy routing is not supported.
- Each VBR has only one route table.
- Each route table supports 48 custom route entries.
- VBR can establish BGP peers only with the peered on-premises data center of a physical connection. Static routing is still needed between the VBR and the VPC.
- The supported BGP version is BGP4.
- VBR supports IPv4 BGP, 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 Autonomous System Number (ASN) of Alibaba Cloud is 45104. It supports the transmission of 2-byte or 4-byte ASNs from the customer side.**

2 Create a VBR

After you establish a physical connection, you need to create a Virtual Border Router (VBR), which works as a forwarding bridge for data from the VPC to your on-premises data center.

Context

VBR is a router between the VPC and the Custom-Premises Equipment (CPE) in your on-premises data center. The VBR has a route table. You can configure route entries in the route table to manage traffic forwarding in the VBR. VBR provides the following functions:

- Exchanges data packets as an intermediate router between the VPC and the on-premises data center.
- Decides the port mode of the physical connection: Layer-3 route interface mode or VLAN-based Layer-3 sub-interface mode.
- Attaches or identifies VLAN tags in Layer-3 sub-interface mode.
- Supports BGP dynamic routing.

Procedure

1. Log on to the [Express Connect](#) console.
2. In the left-side navigation pane, choose Physical Connections > Virtual Border Routers (VBRs).
3. Click Create VBR.
4. Configure the VBR, and then click OK.

Configuration	Description
Account	Select whether to create a VBR for the current account or for a different account.
Account	If you create a VBR for a different account, enter the ID of the account.

Configuration	Description
VLAN ID	<p>Enter the VLAN ID of the VBR. Value range: 0 to 2999.</p> <ul style="list-style-type: none"> · If the VLAN ID is 0, it indicates that the switch port of the VBR uses Layer-3 route interface mode instead of VLAN mode. In Layer-3 route interface mode, each physical connection corresponds to a VBR. · If the VLAN ID is a value from 1 to 2999, it indicates that the switch port of the VBR uses VLAN-based Layer-3 sub-interface mode. In Layer-3 sub-interface mode, each VLAN ID corresponds to a VBR. In this mode, the physical connection of the VBR can connect the VPCs under multiple accounts. The VBRs of different VLANs are isolated from one another by the Layer-2 network. <p>For example, a company has multiple subdivisions or subsidiaries. Each has an independent Alibaba Cloud account, and each account has an independent VPC. If the company applies for a physical connection, 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 that use the physical connection, isolating them from each other by using the Layer-2 network.</p>
Gateway IP Address on Alibaba Cloud Side	Enter the IP address of the gateway from the VPC to your on-premises data center.
Gateway IP Address on Customer Side	Enter the IP address of the gateway from your on-premises data center to the VPC.
Subnet Mask	Enter the subnet mask of the gateway IP address on the Alibaba Cloud side and the gateway IP address on the customer side. Only two IP addresses are required. Therefore, you can enter a longer subnet mask.

3 Configure BGP

You can establish Border Gateway Protocol (BGP) routing between an on-premises data center and a Virtual Border Router (VBR). To do so, you only need to add BGP peers that communicate with the VBR to the corresponding BGP group, and then advertise the BGP CIDR blocks in the VBR.



Note:

Express Connect allows you to establish BGP routing only between a VBR and an on-premises data center. When you create a physical connection, you still need to add a route entry destined for the physical connection and a route entry destined for the VPC in the VBR. For more information, see [Add route entries](#).

BGP overview

BGP is a dynamic routing protocol based on TCP. It is mainly used to exchange routing and network accessibility information among Autonomous Systems (ASs). When you create a physical connection, you can use BGP to implement an intranet connection between the on-premises data center and the VBR. BGP can be used to build hybrid clouds in a more efficient, flexible, and reliable manner.

Before configuring BGP, you need to create a BGP group. BGP groups are used to simplify BGP configurations. Combining repeated configurations into a BGP group can make configurations easier. You only need to create a BGP group according to the Autonomous System Number (ASN) and add qualified BGP peers to the group. The added BGP peers will inherit the configurations of the BGP group. You do not need to configure the BGP peers separately.

Limits

BGP has the following limits:

- VBR can only establish BGP peers with the peer on-premises data center. Static routing is still required between the VBR and the VPC.
- BGP only supports the BGP4 version.
- VBR supports IPv4 BGP, but does not support IPv6 BGP.
- The number of BGP peers created under each VBR cannot exceed 8.

- The number of dynamic route entries that are added to a BGP peer cannot exceed 100.
- The ASN of Alibaba Cloud is 45104. It supports the transmission of 2-byte or 4-byte ASNs from the customer side.

Step 1: Create a BGP Group

Before configuring BGP routing, you need to create a BGP group based on the requested ASN.

To create a BGP group, follow these steps:

1. Log on to the [Express Connect](#) console.
2. In the left-side navigation pane, choose Physical Connections > Virtual Border Routers (VBRs).
3. Select a region and click the ID of the target VBR.
4. Click the BGP Groups tab, and then click Create BGP Group.
5. Configure the BGP group, and then click OK.

Configuration	Description
Name	Enter a name for the BGP group to be created.
Peer ASN	Enter the ASN of the on-premises data center network.
BGP Key	Enter the key of the BGP group.
Description	Enter a description of the BGP group.

Step 2: Add a BGP peer

To add a BGP peer, follow these steps:

1. Log on to the [Express Connect](#) console.
2. In the left-side navigation pane, choose Physical Connections > Virtual Border Routers (VBRs).
3. Select a region and click the ID of the target VBR.
4. Click the BGP Peers tab, and then click Create BGP Peer.

5. Configure the BGP peer, and then click OK.

Configuration	Description
BGP Group	Select the BGP group to which you want to add the BGP peer.
BGP peer IP Address	Enter the IP address of the BGP peer.

BGP Peer	BGP Group	BGP Peer IP Address	BGP Key	Peer ASN	BGP Peer Status	Actions
bgp-██████████	bgrp-██████████	11.11.11.1		234	● Connect	Delete

A BGP peer can be in the following states:

- **Idle:** Indicates that BGP is in the idle state, which is the first state that a newly added BGP peer enters. In the Idle state, BGP waits for a start event. After the

- start event appears, BGP initializes resources, resets the ConnectRetry timer, initiates a TCP connection, and then enters the Connect state.
- **Connect:** In the Connect state, BGP initiates the first TCP connection. If the ConnectRetry timer depletes before the TCP connection is established, a new TCP connection is initiated and the BGP peer remains in the Connect state.
 - If the new TCP connection is successful, the BGP peer enters the OpenSent state.
 - If the new TCP connection fails, the BGP peer enters the Active state.
 - **Active:** In the Active state, BGP starts a new TCP connection. If the ConnectRetry timer depletes, the state moves to Connect.
 - If the TCP connection is successful, the BGP peer enters the OpenSent state.
 - If the TCP connection fails, the BGP peer remains in the Active state and a new TCP connection is initiated.
 - **OpenSent:** In this state, an Open message has been sent. BGP is awaiting for an Open message from the peer. After the OPEN message is received from the peer, BGP checks both OPEN messages for errors.
 - If an error occurs, the system sends an error message and BGP returns to the Idle state.
 - If the Open messages do not have any errors, BGP sends a Keepalive message and resets the Keepalive timer. The connection state is moved to OpenConfirm.
 - **OpenConfirm:** In this state, BGP waits for a Keepalive packet.
 - If BGP receives a Keepalive packet, the state changes to Established, which indicates that the BGP neighbor relationship is established.
 - If the TCP connection is interrupted, the BGP peer returns to the Idle state.
 - **Established:** In this state, the BGP neighbor relationship is established. BGP peers exchange routes via Update messages. The Hold Timer is reset.
 - **UnEstablished:** Indicates that the neighbor relationship is not established.

Step 3: Advertise the BGP CIDR block

After configuring the BGP peer, you need to advertise the CIDR block of the on-premises data center. After BGP configuration is completed, the VBR automatically learns the CIDR block of the on-premises data center.

To advertise the CIDR block of the on-premises data center, follow these steps:

1. Log on to the [Express Connect](#) console.
2. In the left-side navigation pane, choose Physical Connections > Virtual Border Routers (VBRs).
3. Select a region and click the ID of the target VBR.
4. Click the Advertised BGP Subnets tab, and then click Advertise BGP Subnet.
5. Enter the CIDR block to be advertised, and then click OK.

4 Add route entries

VBR has a route table. You can configure route entries in the route table to forward traffic.

Context

In the VBR, you must add one route entry directed to the physical connection and another route entry directed to the VPC to forward the traffic between the VPC and the on-premises data center. VBR allows you to configure BGP routing for the on-premises data center. For more information, see [Configure BGP](#).

When you manage the route entries of VBR, pay attention to the following restrictions:

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

Procedure

1. Log on to the [Express Connect](#) console.
2. In the left-side navigation pane, choose Physical Connections > Virtual Border Routers (VBRs).
3. Select the region of the VBR and then click the VBR ID.
4. Click the Routes tab and then click Add Route.
5. Configure the route entry and then click OK.

Configuration	Description
Destination Subnet	Enter the destination CIDR block.
Next Hop Type	Select the type of the next hop: <ul style="list-style-type: none">· VPC: Forwards data to the selected VPC.· Physical Connection Interface: Forwards data to the selected physical connection interface.
Next Hop	Select the next hop instance that receives the data, based on the next hop type.