# Alibaba Cloud

Express Connect Product Introduction

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C-J Alibaba Cloud

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### **Document conventions**

Style	Description	Example
A Danger	A danger notice 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.
O Warning	A warning notice 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 restart an instance.
☐) Notice	A caution notice indicates warning information, supplementary instructions, and other content that the user must understand.	Notice: If the weight is set to 0, the server no longer receives new requests.
⑦ Note	A note indicates supplemental instructions, best practices, tips, and other content.	Onte: You can use Ctrl + A to select all files.
>	Closing angle brackets are used to indicate a multi-level menu cascade.	Click Settings> Network> Set network type.
Bold	Bold formatting is used for buttons , menus, page names, and other UI elements.	Click OK.
Courier font	Courier font is used for commands	Run the cd /d C:/window command to enter the Windows system folder.
Italic	Italic formatting is used for parameters and variables.	bae log listinstanceid Instance_ID
[] or [a b]	This format is used for an optional value, where only one item can be selected.	ipconfig [-all -t]
{} or {a b}	This format is used for a required value, where only one item can be selected.	switch {active stand}

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### 1.What is Express Connect?

Express Connect helps you establish a fast, stable, secure, and private connection between your data center and a virtual private cloud (VPC). Express Connect circuits ensure secure data transmission, prevent network jitters, and reduce the potential for data breaches.

### Network topology

The following figure shows an Express Connect circuit that connects a data center to an access point of Alibaba Cloud. One end of the Express Connect circuit is connected to the gateway device in the data center, and the other end is connected to a virtual border router (VBR) on Alibaba Cloud. Data is exchanged through secure, reliable, and high-speed connections with low network latency.

To access resources in a VPC, you must attach the VBR and the VPC to a Cloud Enterprise Network (CEN) instance. Then, your data center can access all resources in the VPC, such as Elastic Compute Service (ECS) instances, pods, Server Load Balancer (SLB) instances, and ApsaraDB services. For more information about CEN, see What is CEN?.



### Components

• Connection over an Express Connect circuit: a private connection established between a data center and an access point of Alibaba Cloud by using Express Connect.

You can create the following types of connections over Express Connect circuits:

Dedicated connection

You can lease an Express Connect circuit to connect your data center to an access point of Alibaba Cloud. The Express Connect circuit is dedicated to you. Before you create a dedicated connection, you must apply for an Express Connect circuit in the Express Connect console. For more information, see Create a dedicated connection over an Express Connect circuit.

• Hosted connection

The access points of Express Connect partners are already connected to the access points of Alibaba Cloud. Therefore, you need only to connect your data center to the access point of an Express Connect partner. The Express Connect circuit used by a hosted connection is shared among multiple tenants. For more information, see Overview.

• A VBR is a router between the customer-premises equipment (CPE) in a data center and an access point of Alibaba Cloud. After you connect your data center to an access point of Alibaba Cloud, you can create a VBR to exchange data between your data center and Alibaba Cloud.

### Benefits

• High-speed connections

Powered by the network virtualization technology of Alibaba Cloud, Express Connect allows networks to communicate with each other through direct, private, and high-speed connections. Network traffic does not traverse the Internet. Express Connect circuits ensure low network latency, low packet loss rate, and high throughput even if data is transmitted over a long distance.

• Stability and reliability

Built on the high-quality infrastructure of Alibaba Cloud, Express Connect ensures stable and reliable communication between networks.

• Security

Express Connect enables communication at the network virtualization layer. Data transmission among different tenants is isolated. This reduces the risks of data breaches.

• On-demand purchase

Express Connect circuits are provided with different bandwidth limits. You can specify a proper bandwidth limit to meet your business requirements.

### Differences between connections over Express Connect circuits and VPN connections

You can use both Express Connect circuits and VPN to connect your data center to Alibaba Cloud. Compared with VPN connections, connections over Express Connect circuits offer better network conditions, higher security, and larger bandwidth. The following table describes the differences between connections over Express Connect circuits and VPN connections.

ltem	Connection over Express Connect circuit	VPN connection
Network conditions	When you use an Express Connect circuit to connect to Alibaba Cloud, data is transmitted through a private connection with low network latency and packet loss.	VPN connections are established over the Internet and are subject to network latency and packet loss.
Security	Express Connect circuits are dedicated to users. This prevents data breaches and ensures high security. Connections over Express Connect circuits are best suited for users in the finance industry and enterprises in the public service sector that have high security requirements.	VPN connections are encrypted Internet connections and are suitable for users that have basic security requirements.
Bandwidth	The bandwidth of a connection over an Express Connect circuit can reach 100 Gbit/s for handling a large number of requests. You can also configure equal-cost multi- path routing (ECMP) with multiple Express Connect circuits. This ensures service availability and also aggregates the bandwidth to Tbit/s.	The bandwidth of a VPN connection is limited by the bandwidth limit of the public IP address.

### 2.Physical connection solutions

To use a physical connection to access Alibaba Cloud, you can use an exclusive physical connection, a shared physical connection, or Cloud Hosting.

#### Overview

Alibaba Cloud supports the following physical connection solutions:

• Exclusive physical connections

The following figure shows a physical connection solution. The solution uses an Alibaba Cloud physical port and a leased line provided by a third-party service provider to connect an on-premises data center to an Alibaba Cloud access point. You can apply for a physical connection interface by using the Express Connect console. For more information, see Create a dedicated connection over an Express Connect circuit.



• Shared physical connections

The following figure shows a physical connection solution. The solution uses a leased line and the network provided by a third-party service provider to connect an on-premises data center to Alibaba Cloud. In this solution, the third-party service provider establishes the link between their access point and an Alibaba Cloud access point that can be shared by multiple tenants. For more information, see Overview.



• Cloud Hosting

Cloud Hosting is an end-to-end hybrid cloud service provided by Alibaba Cloud. You can use one or two multimode LC to LC OM3 fiber patch cables to connect to the aggregation switch in the Alibaba Cloud data center. This way, you can access VPCs in the cloud.



### Comparison of the physical connection solutions

ltem	Exclusive physical connection	Shared physical connection	Cloud Hosting
Recomme nded bandwidt h	1 GE to 100 GE	<1 GE	50 Mbit/s to10 GE
Overall constructi on period	Two to three months	One month	Two months
User experienc e	<ul> <li>Multiple parties and complex operations are involved.</li> <li>You must purchase a physical connection interface in the Alibaba Cloud console.</li> <li>You must contact the service provider and require the service provider to connect the on-premises data center to the Alibaba Cloud data center by using a leased line.</li> <li>You must debug the connection devices.</li> <li>You must configure the connection in the cloud.</li> </ul>	<ul> <li>Two parties and simple operations are involved.</li> <li>You must contact the service provider and require the service provider to connect the on-premises data center to its network by using a leased line.</li> <li>You must debug the connection devices.</li> <li>You must configure the connection to the cloud.</li> </ul>	An end-to-end solution is implemented to connect the on- premises data center to the cloud.
Port type	Exclusive	Shared	Shared

ltem	Exclusive physical connection	Shared physical connection	Cloud Hosting
Billing	An initial installation fee (one-time charge) and a resource occupation fee (on a monthly basis) are charged by Alibaba Cloud. The Alibaba Cloud data center provider charges fees generated for indoor cable installation in the Alibaba Cloud data center. The on-premises data center provider charges fees generated for indoor cable installation in the on-premises data center. The service provider charges other cable installation fees and bandwidth rental fees. For more information, see Billing.	You do not need to pay a one-time initial installation fee and a resource occupation fee for the port that you use. The on-premises data center provider charges fees generated for indoor cable installation in the on-premises data center. The service provider charges other cable installation fees and bandwidth rental fees.	Contact your Alibaba Cloud account manager.

### Product Introduction Physical connection solutions

ltem	Exclusive physical connection	Shared physical connection	Cloud Hosting
Cable installatio n limits at the Alibaba Cloud side	<ul> <li>If you need optical modules with 40 GE or 100 GE ports, you must provide the optical modules yourself.</li> <li>If you need optical modules with 1 GE or 10 GE ports, and a transmission distance within 10 km, Alibaba Cloud provides the optical modules free of charge. If you need optical modules with a transmission distance longer than 10 km, you must purchase the optical modules yourself.</li> <li>If you purchase optical ports, ensure that the service provider uses optical fibers to access Alibaba Cloud ports. Otherwise, the cables cannot be connected to the ports.</li> <li>If you purchase copper ports, ensure that the service provider uses copper cables to access Alibaba Cloud ports. Otherwise, the cables cannot be connected to the ports.</li> <li>If you purchase copper ports, ensure that the service provider uses copper cables to access Alibaba Cloud ports. Otherwise, the cables cannot be connected to the ports.</li> <li>Alibaba Cloud data centers do not host any fiber optical transceivers.</li> <li>During lockdown periods of Alibaba Cloud data centers (such as Double 11, Double 12, and the Chinese New Year), you must apply for approval before your cable installation company can go to Alibaba Cloud data centers for cable installation.</li> </ul>	N/A	N/A

ltem	Exclusive physical connection	Shared physical connection	Cloud Hosting
Cable installatio n limits at the service provider side	Only the Hangzhou-Yuhang-A access point and the access points in the China (Zhangjiakou) region are operated by Alibaba Cloud. Access points that are located in other data centers are operated by service providers or third-party data center providers. Some China Telecom branches may require a permit before your cable installation company can go to data centers for cable installation. To obtain such permits, you must contact the data center providers yourself. Some China Telecom branches may require you to have an authorization letter that is acknowledged and stamped by your company and by Alibaba Cloud. To have the letter stamped by Alibaba Cloud, submit a ticket.	N/A	N/A
Site survey	After your application is approved, Alibaba Cloud will help the engineers perform the site survey within two workdays.	N/A	N/A
Service Level Agreemen t (SLA) provided by Alibaba Cloud for fiber pigtail installatio n	<ul> <li>Data centers within mainland China: two workdays.</li> <li>Data centers outside mainland China: two workdays to four workdays.</li> <li>During lockdown periods of Alibaba Cloud data centers: eight workdays.</li> </ul>	N/A	N/A

### 3.Common scenarios

Express Connect enables reliable, secure, and high-speed communication between on-premises data centers and VPCs. You can use Express Connect in the following scenarios to facilitate communication in different network architectures.

# Scenario 1: Implement disaster recovery for large and medium-sized enterprises

You can establish multiple physical connections between different access points and a VPC to ensure high availability for your services. This prevents service downtime caused by severed fiber cables, device faults, or access point malfunctions.

You can use an exclusive physical connection of Alibaba Cloud or use a shared physical connection of an Alibaba Cloud partner in this scenario.



# Scenario 2: Build scalable and high-availability architectures for large enterprises

When you deploy services on the cloud to provide better support for fast-growing workloads together with on-premises solutions, you can use the equal-cost multi-path routing (ECMP) feature of Express Connect to offer substantial increases in bandwidth that handles terabytes of data. This prevents service downtime caused by device faults, leased line failures, or access point malfunctions.

You can only use an exclusive physical connection of Alibaba Cloud in this scenario.



# Scenario 3: Establish a basic network architecture for non-critical services

For services that do not require scalability or high availability, such as running tests in a testing environment on the cloud, we recommend that you use Express Connect to directly connect your data center to Alibaba Cloud. This ensures security and reliability of communication between your data center and Alibaba Cloud.

You can use an exclusive physical connection of Alibaba Cloud or use a shared physical connection of an Alibaba Cloud partner in this scenario.



### 4.Terms

This topic describes the terms commonly used in Express Connect.

The following figure shows the network topology for using physical connections to connect onpremises data centers to Alibaba Cloud.



**Note** Alibaba Cloud provides multiple physical connection solutions. For more information, see Physical connection solutions.

Term	Description
Express Connect	An Alibaba Cloud service that helps you build private network communication channels between VPCs or between VPCs and data centers. It provides better flexibility for your network topology and enhances the performance and security of cross-network communication.
Virtual Private Cloud (VPC)	A custom private network created on Alibaba Cloud. VPCs are logically isolated from each other. You can create and manage your cloud instances, such as Elastic Compute Service (ECS) instances, ApsaraDB instances, and Server Load Balancer (SLB) instances in your VPC.
Virtual Border Router (VBR)	A router between the customer-premises equipment (CPE) and a VPC. It serves as a bridge for data exchange between your data center and the VPC.
VRouter	A hub that connects all vSwitches in a VPC and serves as a gateway to connect the VPC with other networks.
Cloud Enterprise Network (CEN)	A network that helps you build private network communication channels between VPCs or between VPCs and data centers. It features automatic route distribution and learning, faster convergence, and improved quality and security of cross-network communication. CEN allows you to connect all your network resources to build a network with enterprise-level communication capabilities. By using CEN, you do not need to configure routes for VPCs, which simplifies network operation and maintenance. For more information, see What is CEN?.

#### The following table describes basic terms of physical connections.

#### Express Connect

Term	Description
Physical connection interface	A physical interface that is used by a leased line to access an Alibaba Cloud access point.
Access point	A geographical location where a physical connection is connected to Alibaba Cloud. Two access devices are deployed in each access point. Each region has one or more access points to enable communication between local data centers and VPCs.
Border Gateway Protocol (BGP)	A routing protocol designed to exchange routing and reachability information among gateways, Internet, or autonomous systems.
Equal-cost multi-path (ECMP) link aggregation	A mechanism that is used to increase the bandwidth of physical connections by using ECMP routing, or in other words, by connecting multiple leased lines to the same device and associating multiple physical connections with the same VBR.
Exclusive physical connection	A physical connection that uses a physical port and requires a physical leased line of a third-party service provider to connect a data center to an Alibaba Cloud access point.
Shared physical connection	A physical connection solution where uses a physical connection and the network provided by a third-party service provider to connect an on-premises data center to Alibaba Cloud. In this solution, the third-party service provider establishes the link between their access point and an Alibaba Cloud access point that can be shared by multiple tenants.

## 5.Limits

This topic describes the limits of Express Connect that you must take note of before you get started.

### Limits on resources

ltem	Limit	Adjustable
The number of Express Connect circuits that can be connected to an access point by each account	2	You can navigate to the Quota Management page to request a quota increase. For more information, see Manage resource quotas.
The number of virtual border routers (VBRs) that can be associated with an Express Connect circuit whose port specification is <b>1G and below</b>	10	
The number of VBRs that can be created for an Express Connect circuit whose port specification is <b>10G</b>	20	You can to request a quota increase.
The number of Border Gateway Protocol (BGP) routes supported by each VBR	110	
The number of VBRs that can be created for each Express Connect circuit after you enable billing for outbound data transfer	10	You can to request a quota increase.
The number of free VBRs that can be created for an Express Connect circuit before you enable outbound data transfer billing	5	You can to request a quota increase. You can create at most five VBRs for an Express Connect circuit free of charge. VBRs that exceed the quota are charged.
The number of routes that can be added to each VBR	48	
The number of BGP routes that can be advertised from each VBR	10	N/A
The number of VBRs that can be associated with a shared port	1	

**Note** By default, VBRs that belong to your account cannot be attached to a Cloud Enterprise Network (CEN) instance that belongs to another account. To use this feature, to acquire the permissions.

#### Limits on networks

To connect a data center to Alibaba Cloud over an Express Connect circuit, make sure that the CIDR blocks of services on Alibaba Cloud and the CIDR blocks of the data center do not conflict with each other. You must also make sure that the data center meets the following requirements:

- If you use optical fiber cables, you must use one of the following types of single-mode optical transceiver modules to connect to the access device of Alibaba Cloud. The configurations of the optical transceiver modules must be the same on both ends of the connection.
  - 1000 Base-LX single-mode optical transceiver module
  - 10 GBase-LR single-mode optical transceiver module
  - 40 GBase-LR single-mode optical transceiver module
  - 100 GBase-LR single-mode optical transceiver module
- You must disable auto-negotiation for the port. Then, specify the port rate and set the duplex mode to full-duplex.
- All devices used to establish the connection must support 802.1Q VLAN encapsulation, including the intermediary devices in data centers.
- The gateway device in your data center must support BGP and MD5 authentication or static routing.
- To use a redundant Express Connect circuit, you must set route weights on your gateway device.
- The physical-layer maximum transmission unit (MTU) is 1,522 bytes, including the 14-byte Ethernet header, 4-byte VLAN flag, 1,500-byte IP datagram, and 4-byte frame check sequence (FCS).

Recommended value: 1500.

- We recommend that you use private IP addresses to establish the connection between your data center and Alibaba Cloud. In addition, the CIDR blocks specified for the connection must not conflict with each other.
- You must not set the CIDR block of the data center to 100.64.0.0/12 in case it conflicts with the CIDR blocks of the services on Alibaba Cloud.
- You must not specify 100.64.0.0/12 as the peer CIDR block for the VBR on Alibaba Cloud or the gateway device in the data center.
- The gateway device in the data center be able to receive more than 500 Internet Control Message Protocol (ICMP) echo requests per second. Otherwise, the gateway device cannot promptly respond to probe packets sent for health checks and consequently network jitter occurs.

### Limits on transmission rates (Alibaba Cloud side)

Data transmission between a VPC and a data center is throttled when you use or an Express Connect circuit. In addition, the communication between a VPC and a data center is throttled due to the following reasons:

- Object Storage Service (OSS) supports a maximum read/write speed of 5 Gbit/s.
- To improve reliability, the transfer of individual hashed traffic flows from a VPC to a VBR is throttled. The transmission rate is throttled to 1/12, 1/4, 1/8, or 1/16 of the bandwidth limit that you specify when you create the peering connection. For example, if the bandwidth limit of the peering connection between the VPC and the VBR is set to 1 Gbit/s, the transfer of individual hashed traffic flows from the VPC to the VBR is throttled to 85 Mbit/s.

A hashed traffic flow is a data stream that is defined by the combination of the source IP address, source port, transport layer protocol, destination IP address, and destination port. For example, 192 .168.1.1 10000 TCP 121.14.XX.XX 80 forms a hashed traffic flow. In this traffic flow, a terminal that is assigned the IP address 192.168.1.1 and port 10000 is connected to a terminal that is assigned the IP address 121.14.XX.XX and port 80 over TCP.

#### Limits on access points

Before you connect a data center to Alibaba Cloud over an Express Connect circuit, you must choose an access point. Take note of the following limits before you choose an access point:

- Each region provides multiple access points located in different zones. The network latency between two access points located in zones of the same region is lower than 5 milliseconds.
- If you want to minimize the network latency, you can for information about the access point nearest to your cloud servers.

#### Limits on Express Connect circuits

- Before you use Express Connect, you must plan the CIDR blocks of the VPC and the data center that you want to connect. Make sure that the CIDR blocks of the VPC and the data center do not overlap with each other.
- Cloud services deployed in VPCs use the 100.64.0.0/10 CIDR block. Therefore, data centers that are connected to VPCs over Express Connect circuits must not use the 100.64.0.0/10 CIDR block.
- Alibaba Cloud provides optical transceiver modules with 1 Gbit/s and 10 Gbit/s ports for you to connect your data center to access points. These optical transceiver modules support a maximum transmission distance of 10 km. If you want to use optical transceiver modules with 40 Gbit/s and 100 Gbit/s ports or optical transceiver modules that support a maximum transmission distance of greater than 10 km, purchase them from a third party.

### Limits on redundant Express Connect circuits

- Alibaba Cloud guarantees service availability for connections over Express Connect circuits only when the Express Connect circuits are connected to different access points. If multiple Express Connect circuits share the same access point or only one Express Connect circuit is used, service availability is not guaranteed.
- If a data center is connected to a VPC over two Express Connect circuits, you must specify source IP addresses and destination IP addresses for health checks. After you configure health checks for the Express Connect circuits, the system checks the status of both Express Connect circuits. If one of the Express Connect circuits is down, network traffic is transmitted through the other Express Connect circuit. We recommend that you configure health checks to detect service disruptions and perform failovers at the earliest opportunity.

#### Limits on hosted connections over Express Connect circuits

- Alibaba Cloud cannot change the port settings to meet your business needs.
- Equal-cost multi-path routing (ECMP) is not supported.
- When you set a bandwidth limit on a hosted connection over an Express Connect circuit, make sure that the sum of all hosted connections does not exceed the bandwidth limit of the Express Connect circuit.

### Limits on installation

• The company in charge of the installation of an Express Connect circuit must follow the construction

rules stipulated by the network carrier and engineers of the Alibaba Cloud data center. Installation is forbidden in case of violation.

- If you purchase optical ports, make sure that the network carrier uses optical fiber cables to connect to the port of Alibaba Cloud.
- If you purchase copper Ethernet ports, make sure that the network carrier uses copper cables to connect to the port of Alibaba Cloud.
- Alibaba Cloud data centers do not support fiber-optic transceivers. The company in charge of the installation cannot install fiber-optic transceivers in data centers of Alibaba Cloud.
- The installation schedule is subject to data center lockdowns required by local authorities and Alibaba Cloud. When the data center is locked down, you can contact your product manager from Alibaba Cloud.
- Data centers where Alibaba Cloud access points are located are leased from network carriers. Therefore, you may be charged by a network carrier for installing the Express Connect circuit in their building and using the indoor cables.

### Time spans for installation

The following table describes the time required for installing Express Connect circuits.

Stage	Time	
Review of the application to enter an Alibaba Cloud data center and perform site surveys for the installation	Two business days	
Review of the application for a Letter of Authorization (LOA)	Two business days	
	<ul> <li>Optical transceiver modules provided by Alibaba Cloud</li> <li>Within mainland China: two business days</li> <li>Outside mainland China: three business days</li> <li><b>Outside</b> If the access point is located in Japan, four business days</li> </ul>	
Fiber pigtail installation	<ul> <li>days are required.</li> <li>Optical transceiver modules from a third party</li> <li>Within mainland China: two business days after Alibaba Cloud receives the optical transceiver modules</li> <li>Outside mainland China: three business days after Alibaba Cloud receives the optical transceiver modules</li> </ul>	
	<b>Note</b> If the access point is located in Japan, four business days are required.	
Review of the application to enter an Alibaba Cloud data center to maintain an Express Connect circuit	Two business days	