Virtual Private Network

Service Overview

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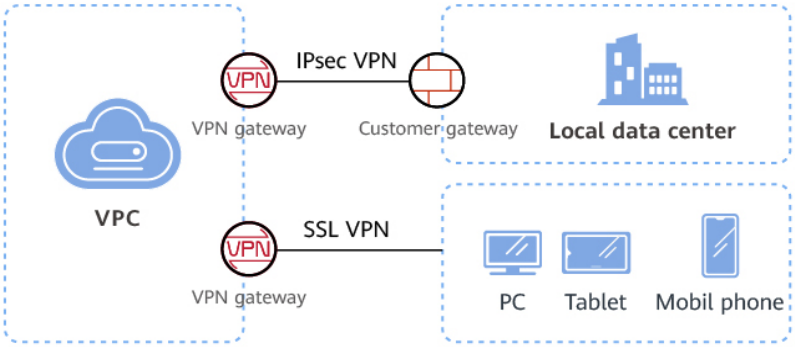
1 VPN Infographic

Getting to Know Huawei Cloud VPN

Secure, flexible,
and convenient communications over
easy-to-use encrypted connections

What Is Virtual Private Network?

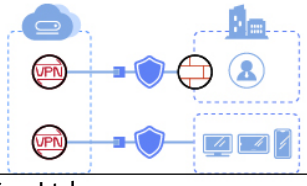
A Virtual Private Network (VPN) establishes secure, reliable, and cost-effective encrypted connections between your local network, data center, or terminals and a Huawei Cloud VPC.



Why Huawei Cloud VPN?

High Security

Data is encrypted using IKE/IPsec or SSL, and there are dedicated gateways for enhanced security.



High Availability

2 What Is VPN?

Overview

Virtual Private Network (VPN) establishes secure, reliable, and cost-effective encrypted connections between your on-premises network or data center and a virtual network on the cloud.

NOTE

Inter-border VPN connections cannot be established between the Chinese mainland and other regions. Before using the VPN service in Egypt, **Submit a service ticket** for application.

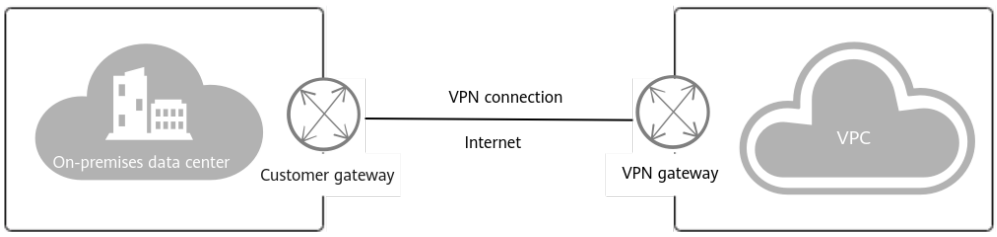
VPN falls into two categories: Site-to-Cloud VPN (S2C VPN) and Point-to-Cloud VPN (P2C VPN), which apply to different scenarios. S2C VPN uses the Internet Protocol Security (IPsec) protocol, and P2C VPN uses the Secure Sockets Layer (SSL) protocol.

S2C VPN involves three key components: VPN gateway, customer gateway, and VPN connection.

- A VPN gateway provides an Internet egress for a Virtual Private Cloud (VPC) to connect to a customer gateway in your on-premises data center.
- A VPN connection connects a VPN gateway to a customer gateway through encrypted tunnels, enabling communication between a VPC and your on-premises data center. This helps quickly establish a secure hybrid cloud environment.

Figure 2-1 shows the S2C VPN networking.

Figure 2-1 S2C VPN networking

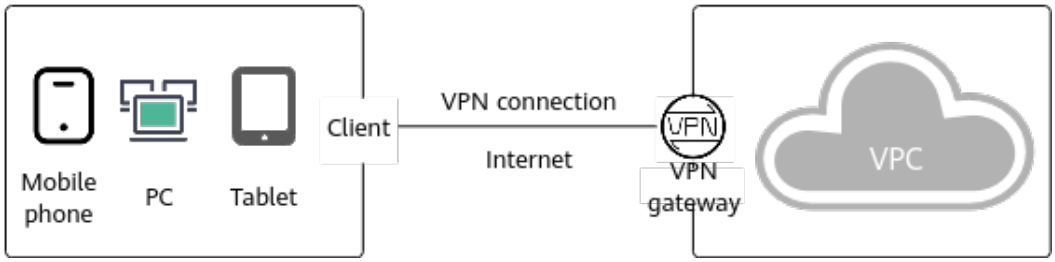


P2C VPN involves three key components: VPN gateway, server, and client.

- A VPN gateway provides an Internet egress for a VPC and is bound to a server.
- A server encapsulates and decapsulates data packets, and defines the port, encryption algorithm, and CIDR blocks for communicating with clients.
- A client establishes a VPN connection with a server to remotely access cloud resources or services.

Figure 2-2 shows the P2C VPN networking.

Figure 2-2 P2C VPN networking



Components

S2C VPN

- **VPN gateway**: a virtual gateway of VPN on the cloud. It establishes secure private connections with a customer gateway in your on-premises network or data center.
- **Customer gateway**: a resource that provides information to the cloud about your customer gateway device. It can be a physical device or software application in your on-premises data center.
- **VPN connection**: a secure channel between a VPN gateway and a customer gateway. VPN connections use the Internet Key Exchange (IKE) and IPsec protocols to encrypt the transmitted data.

P2C VPN

- **VPN gateway**: a virtual gateway of VPN on the cloud. It establishes secure private connections with clients.
- **Server**: a functional module of a virtual gateway. It provides SSL services for configuration management and client connection authentication.
- **Client**: VPN client software deployed on user terminals.

Accessing the VPN Service

You can access the VPN service through the web-based management console.

- If you have registered an account, log in to the management console and choose **Networking** > **Virtual Private Network** to log in to the VPN console.
- If you do not have an account, register one first by referring to "Signing up for a HUAWEI ID and Enabling Huawei Cloud Services" in **Preparations**.

3 Product Advantages

Enterprise Edition VPN has the following advantages:

- **High security**
  - Data is encrypted using IKE/IPsec or SSL, ensuring high data security.
  - A VPN gateway is exclusive to a tenant, isolating tenants from each other.
  - Multiple encryption algorithms such as AES and SM series algorithms are supported, meeting a range of security requirements.
  - Multiple authentication modes are supported, including certificate authentication, password authentication, Identity and Access Management (IAM) authentication, and federated authentication.
- **High availability**
  - A VPN gateway provides two IP addresses to establish dual independent VPN connections with a customer gateway. If one VPN connection fails, traffic can be quickly switched to the other VPN connection.
  - Active-active gateways are deployed in different availability zones (AZs) to ensure AZ-level high availability.
  - Active/Standby mode: In normal cases, a VPN gateway communicates with a customer gateway through the active connection. If the active connection fails, traffic is automatically switched to the standby VPN connection. After the fault is rectified, traffic is switched back to the active VPN connection.
  - High availability (HA) mode: S2C VPN supports active/standby and active-active modes. P2C VPN supports the active/standby mode.
- **Cost-effectiveness**
  - IPsec connections over the Internet provide a cost-effective alternative to Direct Connect.
  - A VPN gateway can be bound to elastic IP addresses (EIPs) that share bandwidth, reducing bandwidth costs.
  - The bandwidth can be adjusted when an EIP instance is created.
  - Access via non-fixed IP addresses reduces access costs in typical scenarios.
- **Easy to use**

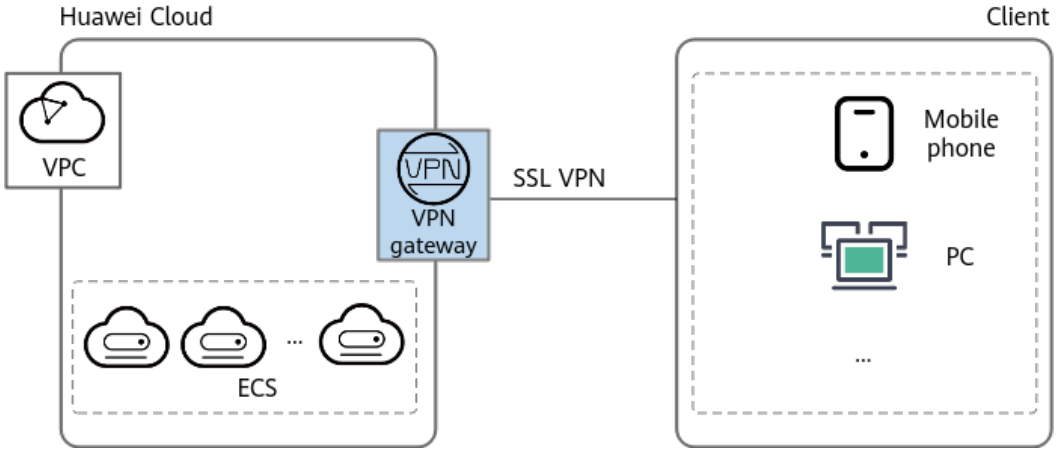
- A VPN gateway supports multiple connection modes, including policy-based, static routing, and BGP routing, to meet different access requirements of customer gateways.
- A VPN gateway on the cloud can function as a VPN hub, enabling on-premises branch sites to access each other.
- A VPN connection can be created in a few simple steps on the VPN device in an on-premises data center and on the VPN console, and is ready to use immediately after being created.
- VPN can be used together with the enterprise router service, allowing enterprises to build more flexible cloud-based networks.
- Backup between VPN and Direct Connect is supported, and automatic failover is supported.
- Private VPN gateways are supported to encrypt traffic transmitted over Direct Connect connections, improving data transmission security.
- Terminals running different operating systems, including Windows, macOS, Linux, Android, and iOS, can access the cloud network to implement mobile office.
- Access via DNS domain names is supported, allowing users to use domain names to access cloud services.
- VPN users can be imported and deleted in batches, maximizing efficiency.
- In P2C VPN, you can manage and proactively disconnect connections.
- In S2C VPN, you can flexibly enable or disable branch interconnection to implement interconnection or isolation between customer gateways, respectively.
- S2C VPN supports self-service VPN connection reset, improving operational efficiency.
- In P2C VPN, server certificates can be automatically generated.
- You can upgrade VPN gateways as required.

4 Application Scenarios

Access from Terminals to a VPC

You can use client software on terminals such as PCs and mobile phones to remotely access resources in a VPC, as shown in **Figure 4-1**.

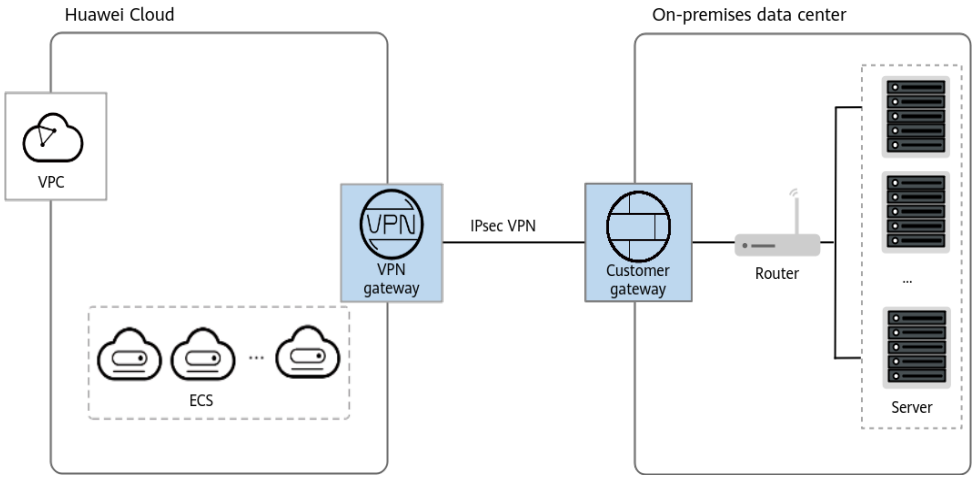
Figure 4-1 Remote access from terminals to a VPC



Hybrid Cloud Deployment

You can use a VPN to connect your on-premises data center to a VPC and use the elastic and fast scaling capabilities of the cloud to expand application computing capabilities. **Figure 4-2** shows the hybrid cloud deployment.

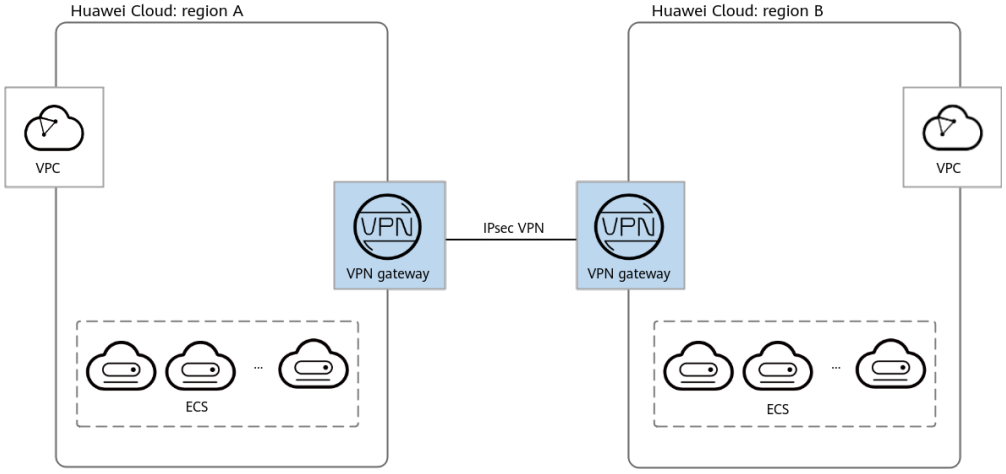
Figure 4-2 Hybrid cloud deployment



Inter-Region Interconnection Between VPCs

With VPNs, you can connect VPCs in different regions to enable connectivity between user services in these regions, as shown in **Figure 4-3**.

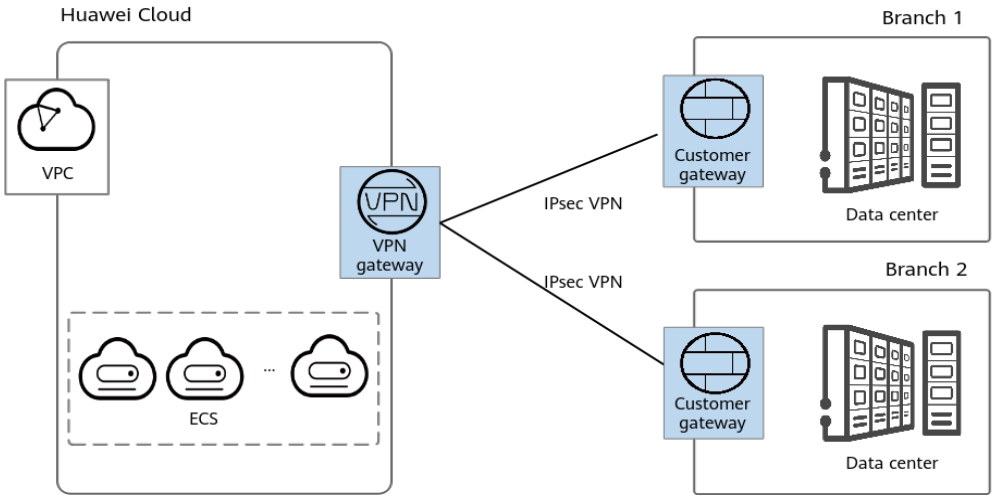
Figure 4-3 Inter-region interconnection between VPCs



Enterprise Branch Interconnection

A VPN gateway functions as a VPN hub to connect enterprise branches, as shown in **Figure 4-4**. This eliminates the need to configure VPN connections between every two branches.

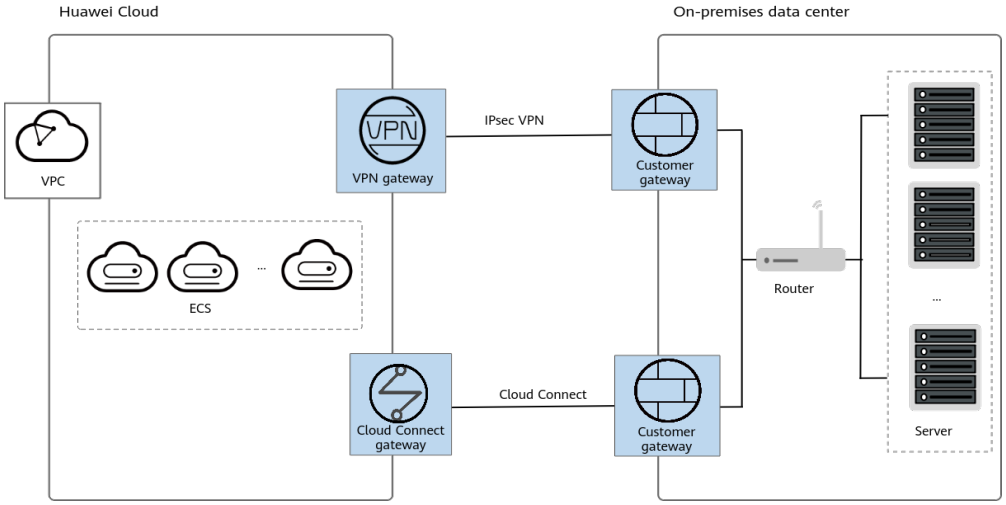
Figure 4-4 Enterprise branch interconnection



Backup Between VPN and Direct Connect

For high reliability purposes, you can connect your on-premises data center to a VPC on the cloud through Direct Connect and VPN that back up each other, as shown in **Figure 4-5**.

Figure 4-5 Backup between VPN and Direct Connect



5 Functions

S2C VPN

S2C VPN provides various functions for you to establish VPN connections and build diversified networks flexibly. **Table 5-1** describes the functions in detail.

Table 5-1 S2C VPN functions

Function	Description	Applicable Region	Reference Link
VPN over Direct Connect	VPN over Direct Connect allows you to use a VPN link to back up a Direct Connect link. Traffic is automatically switched to the VPN link if the Direct Connect link fails.	The applicable regions are subject to those available on the console.	**Allowing Direct Connect and VPN to Work in Active and Standby Mode to Link a Data Center to the Cloud**
VPN hub	A VPN gateway on the cloud can function as a VPN hub. On-premises sites can communicate with each other through a VPN hub, eliminating the need to configure VPN connections between every two sites.		**Connecting Multiple On-premises Branch Networks Through a VPN Hub**
Encryption for data transmitted over Direct Connect lines	When an on-premises data center connects to the cloud through Direct Connect lines, VPN can be used to encrypt the data leaving and entering the cloud.		**Using VPN to Encrypt Data over Direct Connect Lines**

Function	Description	Applicable Region	Reference Link
Access through two Internet lines	An on-premises data center can use two public IP addresses to connect to a VPN gateway, so that it connects to the cloud through two Internet lines.		Using VPN to Connect to the Cloud Through Two Internet Lines

P2C VPN

P2C VPN provides various functions that enable secure and encrypted access to enterprise internal network resources. Table 5-2 describes the functions in detail.

Table 5-2 P2C VPN functions

Function	Description	Applicable Region	Reference Link
Certificate authentication	Clients can use the certificates issued by a CA to connect to a VPN gateway for access to a VPC.	The applicable regions are subject to those available on the console.	Configuring Enterprise Edition P2C VPN to Connect Mobile Terminals to a VPC (Certificate Authentication)

6 Product Specifications

6.1 S2C VPN

NOTE

- The maximum forwarding bandwidth provided in this section is measured under the following conditions. The actual forwarding bandwidth may vary according to various factors such as the conditions of the customer network and the Internet.

  In the IKE policy, the IKE version is IKEv2, the authentication algorithm is MD5, the encryption algorithm is AES128-GCM, the DH algorithm is group 15, and the local and customer IDs are IP addresses.

Table 6-1 S2C VPN specifications

Item	Basic	Professional 1	Professional 1: Supporting Access via Non-fixed IP Addresses	Professional 2	Professional 2: Supporting Access via Non-fixed IP Addresses	GM	Professional 3	Professional 3: Supporting Access via Non-fixed IP Addresses
Exclusive gateway resources	Supported	Supported	Supported	Supported	Supported	Supported	Supported	Supported
Dual connections	Supported	Supported	Supported	Supported	Supported	Supported	Supported	Supported

Item	Basic	Professional 1	Professional 1: Supporting Access via Non-fixed IP Addresses	Professional 2	Professional 2: Supporting Access via Non-fixed IP Addresses	GM	Professional 3	Professional 3: Supporting Access via Non-fixed IP Addresses
Active-active gateways	Supported	Supported	Supported	Supported	Supported	Supported	Supported	Supported
Active/Standby gateways	Supported	Supported	Supported	Supported	Supported	Supported	Supported	Supported
Policy-based mode	Supported	Supported	Supported	Supported	Supported	Supported	Supported	Supported
Routing mode: static routing	Supported	Supported	Supported	Supported	Supported	Supported	Supported	Supported
Routing mode: BGP routing	Supported	Supported	Supported	Supported	Supported	Supported	Supported	Supported
Policy template mode	Not supported	Not supported	Supported	Not supported	Supported	Not supported	Not supported	Supported
Maximum forwarding bandwidth	100 Mbit/s	300 Mbit/s	300 Mbit/s	1 Gbit/s	1 Gbit/s	500 Mbit/s	5 Gbit/s	5 Gbit/s

Item	Basic	Professional 1	Professional 1: Supporting Access via Non-fixed IP Addresses	Professional 2	Professional 2: Supporting Access via Non-fixed IP Addresses	GM	Professional 3	Professional 3: Supporting Access via Non-fixed IP Addresses
Maximum number of VPN connection groups	10	100	100	100	100	100	200	200
Interconnection with an enterprise router	Not supported	Supported	Supported	Supported	Supported	Supported	Supported	Supported
Private network	Not supported	Supported	Not supported	Supported	Not supported	Supported	Supported	Not supported
Access via non-fixed IP addresses	Not supported	Not supported	Supported	Not supported	Supported	Not supported	Not supported	Supported

Item	Basic	Professional 1	Professional 1: Supporting Access via Non-fixed IP Addresses	Professional 2	Professional 2: Supporting Access via Non-fixed IP Addresses	GM	Professional 3	Professional 3: Supporting Access via Non-fixed IP Addresses
Supported regions	Subject to the regions available on the management console	Subject to the regions available on the management console	Subject to the regions available on the management console	Subject to the regions available on the management console	Subject to the regions available on the management console	Subject to the regions available on the management console	Subject to the regions available on the management console	Subject to the regions available on the management console

6.2 P2C VPN

Table 6-2 P2C VPN specifications

Item	Professional 1
Exclusive gateway resources	Supported
Maximum forwarding bandwidth	300 Mbit/s
Maximum number of VPN connections	500
Supported regions	Subject to the regions available on the management console

7 Quotas and Constraints

7.1 S2C VPN

VPN Gateway

Table 7-1 Constraints on VPN gateways

VPN Type	Resource	Default Quota	How to Increase Quota
Enterprise Edition VPN	VPN gateways per tenant in each region	50 • If you have only one VPC, you can create a maximum of 50 VPN gateways for the VPC. • If you have multiple VPCs, you can create a maximum of 50 VPN gateways for all these VPCs.	**Submit a service ticket**.

VPN Type	Resource	Default Quota	How to Increase Quota
	VPN connection groups per VPN gateway	100 • VPN gateway of the Basic specification: 10 • VPN gateway of the Professional 3 specification: 200 • VPN gateway of other specifications: 100	This quota cannot be increased.
	Local subnets per VPN gateway	50	This quota cannot be increased.
	Number of BGP routes that can be accepted by VPN gateways of different specifications	100 • VPN gateway of the Basic or GM specification: 100 • VPN gateway of the Professional 1 specification: 200 • VPN gateway of the Professional 2 specification: 300 • VPN gateway of the Professional 3 specification: 500	This quota cannot be increased.
	Maximum number of routes supported by a VPN gateway	10000	This quota cannot be increased.

VPN Type	Resource	Default Quota	How to Increase Quota
	Maximum number of ACL rules supported by VPN gateways of different specifications	300 • Professional 3: A maximum of 1000 ACL rules are supported for each IP address of a VPN gateway. • Other specifications: A maximum of 300 ACL rules are supported for each IP address of a VPN gateway.	This quota cannot be increased.
Classic VPN	VPN gateways per tenant in each region	2 Only one VPN gateway can be created for a VPC.	**Submit a service ticket**.

- By default, the maximum length of TCP packets supported by a VPN gateway is 1300 bytes.

Customer Gateway

Table 7-2 Constraints on customer gateways

VPN Type	Resource	Default Quota	How to Increase Quota
Enterprise Edition VPN	Customer gateways per tenant in each region	100	**Submit a service ticket**.

- Enable NAT traversal on the customer gateway based on the networking.
  - If the customer gateway is connected to the Internet through a NAT device, enable NAT traversal on the customer gateway.
  - If the customer gateway is directly connected to the Internet, you do not need to enabled NAT traversal on the customer gateway.
- Dead Peer Detection (DPD) must be enabled on a customer gateway.

- A customer gateway must support IPsec tunnel interfaces and be configured with a corresponding security policy.
- When Network Quality Analysis (NQA) is enabled for a connection in static routing mode, the IPsec tunnel interface of a customer gateway must have an IP address and be able to respond to ICMP requests.
- It is recommended that the maximum segment size (MSS) of TCP packets be set to a value less than 1399 on a customer gateway, so as to prevent fragmentation caused by addition of an IPsec header.

VPN Connection

Table 7-3 Constraints on VPN connections

VPN Type	Resource	Default Quota	How to Increase Quota
Enterprise Edition VPN	Policy rules per VPN connection	5	The quotas cannot be increased.
	Customer subnets per VPN connection	50	
Classic VPN	VPN connections per tenant in each region	12	This quota cannot be increased.

- In multi-subnet scenarios, you are advised to use VPN connections in routing mode. For a VPN connection in policy-based or policy template mode, a VPN gateway creates a communications tunnel for each pair of the local and customer subnets by default. If there are multiple local or customer subnets for a VPN connection in policy-based or policy template mode, multiple communications tunnels are created.

  For a VPN gateway of the Basic, GM, Professional 1 or Professional 2 specification, a single IP address can be used to establish a maximum of 300 communications tunnels with customer gateways. For a VPN gateway of the Professional 3 specification, a single IP address can be used to establish a maximum of 1000 communications tunnels with customer gateways.

  - In routing mode, each VPN connection occupies only one communications tunnel of the corresponding VPN gateway IP address.
  - In policy-based or policy template mode, each VPN connection occupies *M* x *N* communications tunnels of the corresponding VPN gateway IP address. *M* indicates the number of local subnets, and *N* indicates the number of customer subnets.

    For a VPN gateway of the Basic, GM, Professional 1 or Professional 2 specification, a maximum of 300 source and destination subnet pairs are supported for each IP address used to establish connections with customer gateways. For a VPN gateway of the Professional 3 specification, a maximum of 1000 source and destination subnet pairs are supported for each IP address used to establish connections with customer gateways.

If the number of communications tunnels occupied by all VPN connections in different modes established by a single gateway IP address exceeds 100, excess VPN connections will fail to be created.

If the number of communications tunnels occupied by VPN connections in different modes established by a single IP address of a VPN gateway of the Professional 1 or Professional 2 specification exceeds 300, excess VPN connections will fail to be created.

- When creating a VPN connection in policy-based mode and adding multiple policy rules, ensure that the source and destination CIDR blocks in different policy rules do not overlap. Otherwise, data flows may be incorrectly matched or IPsec tunnels may flap.

7.2 P2C VPN

P2C VPN Gateway

Table 7-4 Constraints on P2C VPN gateways

VPN Type	Resource	Default Quota	How to Increase Quota
Enterprise Edition VPN	VPN gateways per tenant in each region	50	The quotas cannot be increased.
	Servers associated with a single VPN gateway	1	

P2C VPN gateways support only EIPs with dedicated bandwidth, but not EIPs with shared bandwidth.

P2C VPN Server

Table 7-5 Constraints on P2C VPN servers

VPN Type	Resource	Default Quota	How to Increase Quota
Enterprise Edition VPN	Client CA certificates per server	10	The quotas cannot be increased.
	Local CIDR blocks per server	20	

- If you modify the protocol, port, authentication algorithm, or encryption algorithm, you need to download the client configuration again.

- The local subnet cannot be set to 0.0.0.0.
- The local CIDR block cannot overlap or conflict with the following special CIDR blocks: 0.0.0.0/8, 224.0.0.0/4, 240.0.0.0/4, and 127.0.0.0/8.
- The client CIDR block cannot overlap with the destination CIDR block in the VPC to be accessed, and cannot contain reserved CIDR blocks such as 100.64.0.0/10, 100.64.0.0/12, and 214.0.0.0/8. The reserved CIDR blocks vary according to regions and are subject to those displayed on the console.

  If you need to use 100.64.0.0/10 or 100.64.0.0/12, **submit a service ticket**.
- Each user can establish a maximum of five connections.
- A maximum of 500 users can be created on a VPN gateway.
- The maximum number of users that can be configured is the maximum number of connections of the gateway.
- A maximum of 50 user groups are supported.
- A maximum of 10 destination CIDR blocks can be configured in a single policy.

  A maximum of 100 access policies are supported.
- Only when a VPN gateway is in a normal state, its connections can be torn down. If a VPN gateway is in faulty, updating, deleting, or frozen state, its connections cannot be torn down.
- Currently, only identity providers for virtual user single sign-on (SSO) via the Security Assertion Markup Language (SAML) protocol can be created.

  When you configure or modify an identity conversion rule by editing a JSON file, the username cannot contain only spaces.

P2C VPN Client

In the Windows operating system, the reconnection time of the OpenVPN GUI client is longer than that of the OpenVPN Connect client in exception scenarios. Therefore, the OpenVPN Connect client is recommended.

8 Reference Standards and Protocols

The following standards and protocols are associated with VPN:

- RFC 2403: The Use of HMAC-MD5-96 within ESP and AH
- RFC 2404: The Use of HMAC-SHA-1-96 within ESP and AH
- RFC 2409: The Internet Key Exchange (IKE)
- RFC 2451: The ESP CBC-Mode Cipher Algorithms
- RFC 3526: More Modular Exponential (MODP) Diffie-Hellman groups for Internet Key Exchange (IKE)
- RFC 3566: The AES-XCBC-MAC-96 Algorithm and Its Use With IPsec
- RFC 3602: The AES-CBC Cipher Algorithm and Its Use with IPsec
- RFC 3664: The AES-XCBC-PRF-128 Algorithm for the Internet Key Exchange Protocol (IKE)
- RFC 4106: The Use of Galois/Counter Mode (GCM) in IPsec Encapsulating Security Payload (ESP)
- RFC 4109: Algorithms for Internet Key Exchange version 1 (IKEv1)
- RFC 4434: The AES-XCBC-PRF-128 Algorithm for the Internet Key Exchange Protocol (IKE)
- RFC 4868: Using HMAC-SHA-256, HMAC-SHA-384, and HMAC-SHA-512 with IPsec
- RFC 4301: Security Architecture for the Internet Protocol
- RFC 4302: IP Authentication Header
- RFC 4303: IP Encapsulating Security Payload (ESP)
- RFC 4305: Cryptographic Algorithm Implementation Requirements for Encapsulating Security Payload (ESP) and Authentication Header (AH)
- RFC 4306: Internet Key Exchange (IKEv2)Protocol
- RFC 4307: Cryptographic Algorithms for Use in the Internet Key Exchange Version 2 (IKEv2)
- RFC 4308: Cryptographic Suites for IPsec
- RFC 5282: Using Authenticated Encryption Algorithms with the Encrypted Payload of the Internet Key Exchange version 2 (IKEv2) Protocol
- RFC 6989: Additional Diffie-Hellman Tests for the Internet Key Exchange Protocol Version 2 (IKEv2)

- RFC 7296: Internet Key Exchange Protocol Version 2 (IKEv2)
- RFC 7321: Cryptographic Algorithm Implementation Requirements and Usage Guidance for Encapsulating Security Payload (ESP) and Authentication Header (AH)
- RFC 8247: Algorithm Implementation Requirements and Usage Guidance for the Internet Key Exchange Protocol Version 2 (IKEv2)
- RFC 3947: Negotiation of NAT-Traversal in the IKE
- RFC 3948: UDP Encapsulation of IPsec ESP Packets
- RFC 3706: A Traffic-Based Method of Detecting Dead Internet Key Exchange (IKE) Peers
- RFC 4271: A Border Gateway Protocol 4 (BGP-4)
- RFC 8446: The Transport Layer Security (TLS) Protocol Version 1.3
- RFC 5280: Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile
- RFC 5116: An Interface and Algorithms for Authenticated Encryption
- GM/T 0022-2014: IPSec VPN Specification
- GB/T 36968-2018: Information Security Technology —Technical Specification for IPSec VPN

9 Differences between S2C Enterprise Edition VPN and Classic VPN

Table 9-1 Differences between Enterprise Edition VPN and Classic VPN

Category	Item	Enterprise Edition VPN	Classic VPN
Tenant isolation	Tenant-exclusive gateway	Supported	Not supported
Features	Policy-based mode	Supported	Supported
	Routing mode	Static routing and BGP routing	Not supported
	VPN hub	Supported	Not supported
	Enterprise router	Supported	Not supported
	Network type	Public network and private network	Public network
Capacity	Number of subnets	• Route-based mode: 50 • Policy-based mode: 5	Policy-based mode: 5
	For more information, see **Table 6-1**.		
Reliability	Gateway protection mode	Active/Standby or active-active	-
	Cross-AZ gateway deployment	Supported	Not supported
	Active-active VPN connections	Supported	Not supported
	Backup with Direct Connect	Supported	Not supported

10 Security

10.1 Shared Responsibility

Huawei Cloud guarantees that its commitment to cyber security will never be outweighed by the consideration of commercial interests. To address emerging challenges to cloud security and pervasive cloud security threats and attacks, Huawei Cloud builds a comprehensive security system that is compliant with laws, regulations, and industry standards for cloud services in different regions and industries, by leveraging Huawei's security ecosystem and unique advantages in software and hardware.

Unlike traditional on-premises data centers, cloud computing separates operators from users. This approach not only enhances flexibility and control for users but also greatly reduces their operational workload. For this reason, cloud security cannot be fully ensured by one party. Cloud security requires joint efforts of Huawei Cloud and you, as shown in **Figure 10-1**.

- **Huawei Cloud**: Huawei Cloud is responsible for infrastructure security, including security and compliance, regardless of cloud service categories. The infrastructure consists of physical data centers, which house compute, storage, and network resources, virtualization platforms, and cloud services Huawei Cloud provides for you. In PaaS and SaaS scenarios, Huawei Cloud is responsible for security settings, vulnerability remediation, security controls, and detecting any intrusions into the network where your services or Huawei Cloud components are deployed.
- **Customer**: As our customer, your ownership of and control over your data assets will not be transferred under any cloud service category. Without your explicit authorization, Huawei Cloud will not use or monetize your data, but you are responsible for protecting your data and managing identities and access. This includes ensuring the legal compliance of your data on the cloud, using secure credentials (such as strong passwords and multi-factor authentication), and properly managing those credentials, as well as monitoring and managing content security, looking out for abnormal account behavior, and responding to it, when discovered, in a timely manner.

Figure 10-1 Shared responsibility model of Huawei Cloud

Cloud security responsibilities are determined by control, visibility, and availability. When you migrate services to the cloud, assets, such as devices, hardware, software, media, VMs, OSs, and data, are controlled by both you and Huawei Cloud. This means that your responsibilities depend on the cloud services you select. As shown in **Figure 10-1**, customers can select different cloud service types (such as IaaS, PaaS, and SaaS services) based on their service requirements. As control over components varies across different cloud service categories, the responsibilities are shared differently.

- In on-premises scenarios, customers have full control over assets such as hardware, software, and data, so they are responsible for the security of all components.
- In IaaS scenarios, customers have control over all components except the underlying infrastructure. As such, they are responsible for securing these components. This includes ensuring the legal compliance of the applications, maintaining development and design security, and managing vulnerability remediation, configuration security, and security controls for related components such as middleware, databases, and operating systems.
- In PaaS scenarios, customers are responsible for the applications they deploy, as well as the security settings and policies of the middleware, database, and network access under their control.
- In SaaS scenarios, customers have control over their content, accounts, and permissions. They need to protect their content, and properly configure and protect their accounts and permissions in compliance with laws and regulations.

10.2 Identity Authentication and Access Control

An S2C VPN connection supports authentication of a customer gateway using a pre-shared key (PSK).

The identity authentication succeeds and the VPN connection can be set up only when the PSK configured on the customer gateway is the same as that configured for the VPN connection.

Figure 10-2 Identity and access management

Reference link:

PSK

10.3 Data Protection Technologies

- S2C VPN is a tunneling technology that provides IP-layer security using the IKE/IPsec protocol suite. It ensures confidentiality and integrity of IP data packets and prevents them from being intercepted, disclosed, or tampered with on insecure networks (such as the Internet).
- When creating an S2C VPN connection, you can configure data encryption and authentication algorithms in a policy.

  Table 10-1 lists the algorithms recommended for S2C VPN in descending order of security.

  Table 10-1 Parameters for configuring an S2C VPN policy

Parameter		Description
IKE Policy	Version	• v2 • v1 (IKEv1 has low security. If the device supports IKEv2, IKEv2 is recommended. For VPN connections set up using SM series cryptographic algorithms, only IKEv1 is supported.) The default value is **v2**.

Parameter		Description
	Authentication Algorithm	Hash algorithm used for authentication. The following algorithms are supported: ● SHA2-512 ● SHA2-384 ● SHA2-256 ● MD5(Insecure. Not recommended.) ● SHA1(Insecure. Not recommended.) By default, the SHA2-256 algorithm is used.
	Encryption Algorithm	The following encryption algorithms are supported: ● AES-256-GCM-16 (supported only by Enterprise Edition VPN) ● AES-128-GCM-16 (supported only by Enterprise Edition VPN) ● AES-256(Insecure. Not recommended.) ● AES-192(Insecure. Not recommended.) ● AES-128(Insecure. Not recommended.) ● 3DES(Insecure. Not recommended.) The default value is **AES-128**.
	DH Algorithm	The following algorithms are supported: ● Group 21 ● Group 20 ● Group 19 ● Group 16 ● Group 15 ● Group 14(Insecure. Not recommended.) ● Group 5(Insecure. Not recommended.) ● Group 2(Insecure. Not recommended.) ● Group 1(Insecure. Not recommended.) By default, Group 15 is used.

Parameter		Description
IPsec Policy	Authentication Algorithm	Hash algorithm used for authentication. The following algorithms are supported: • SHA2-512 • SHA2-384 • SHA2-256 • MD5(Insecure. Not recommended.) • SHA1(Insecure. Not recommended.) By default, the SHA2-256 algorithm is used.
	Encryption Algorithm	The following encryption algorithms are supported: • AES-256-GCM-16 • AES-128-GCM-16 • AES-256(Insecure. Not recommended.) • AES-192(Insecure. Not recommended.) • AES-128(Insecure. Not recommended.) • 3DES(Insecure. Not recommended.) The default value is **AES-128**.

- P2C VPN uses the SSL/TLS protocol for encryption to ensure data confidentiality and integrity and prevent the data from being intercepted, disclosed, or tampered with on insecure networks (such as the Internet).

  Table 10-2 lists the commercial cryptographic algorithms supported by P2C VPN.

  Table 10-2 Parameters for configuring algorithms used in P2C VPN

Parameter	Description
Authentication Algorithm	• SHA2-384 • SHA384
Encryption Algorithm	• AES-256-GCM-16 • AES-128-GCM-16

PFS

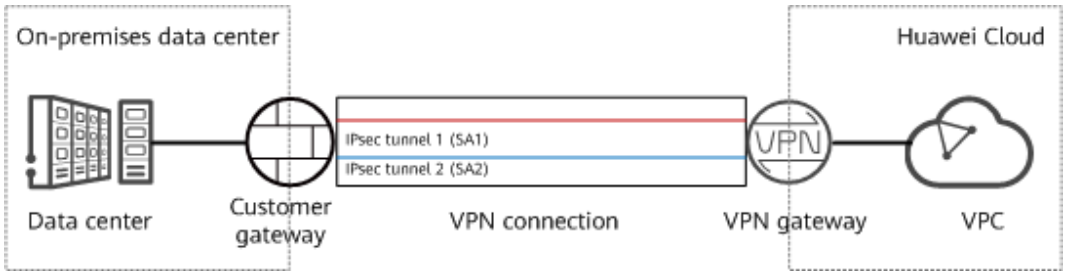
Perfect Forward Secrecy (PFS) ensures that the compromise of the keys of an IPsec tunnel does not affect the security of other tunnels by leveraging that the keys of these tunnels are irrelevant to each other. By default, the PFS function is enabled for S2C VPN.

Each IPsec VPN connection consists of at least one IPsec tunnel, each of which uses an independent set of keys to protect user traffic.

S2C VPN supports the following algorithms:

- DH group 1 (This algorithm is insecure. Exercise caution when using it.)
- DH group 2 (This algorithm is insecure. Exercise caution when using it.)
- DH group 5 (This algorithm is insecure. Exercise caution when using it.)
- DH group 14
- DH group 15
- DH group 16
- DH group 19
- DH group 20
- DH group 21

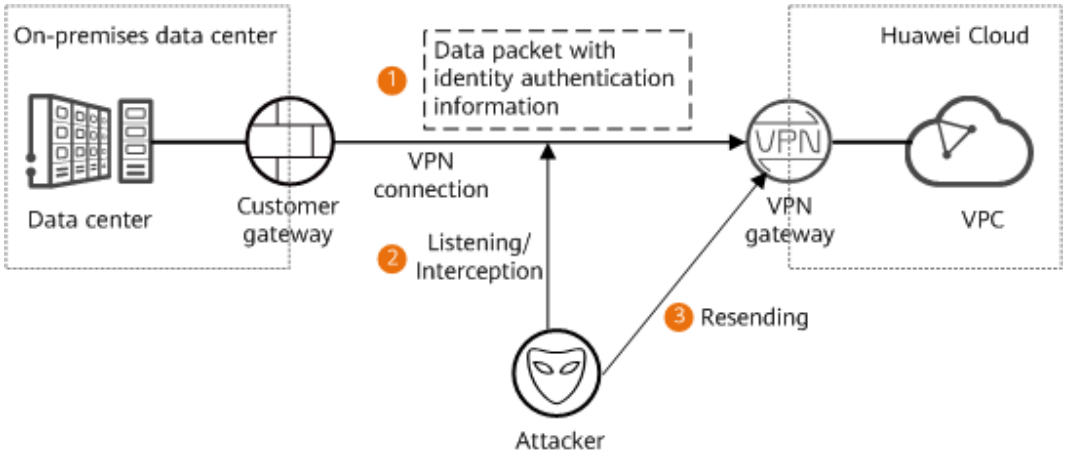
Figure 10-3 PFS



Anti-replay

Anti-replay uses sequence numbers to protect IPsec encrypted packets against replay attacks, which are initiated by repeatedly sending intercepted data packets. By default, the anti-replay function is enabled for the VPN service.

Figure 10-4 Replay attack

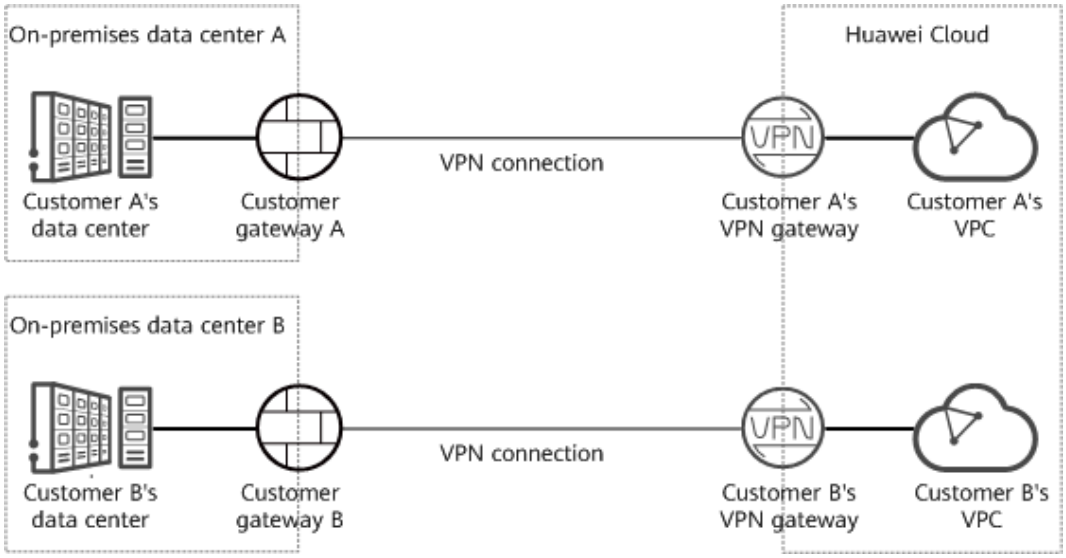


Resource Isolation

A VPN gateway is exclusive to a tenant. As such, tenants are isolated from each, ensuring tenant data security.

This feature is supported only by Enterprise Edition VPN.

Figure 10-5 Data isolation

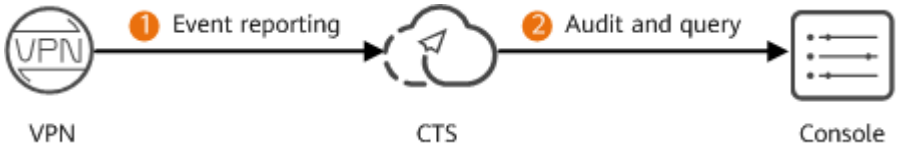


As shown in the figure, a failure of customer A's VPN gateway has no impact on customer B's VPN gateway.

10.4 Audit and Logs

VPN records the create, delete, and modify operations performed on all resources initiated by your account, and sends the records to Cloud Trace Service (CTS) in log files for query, audit, and source tracing.

Figure 10-6 Audit and logs



Reference link:

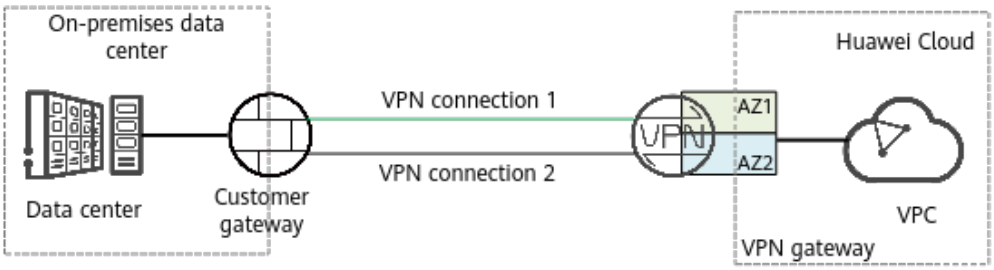
For details about how to view audit logs, see **Querying Real-Time Traces**.

10.5 Service Resilience

VPN provides the dual-AZ disaster recovery function. You can create a VPN gateway in two AZs in the same region, and create a VPN connection between the customer gateway and each AZ.

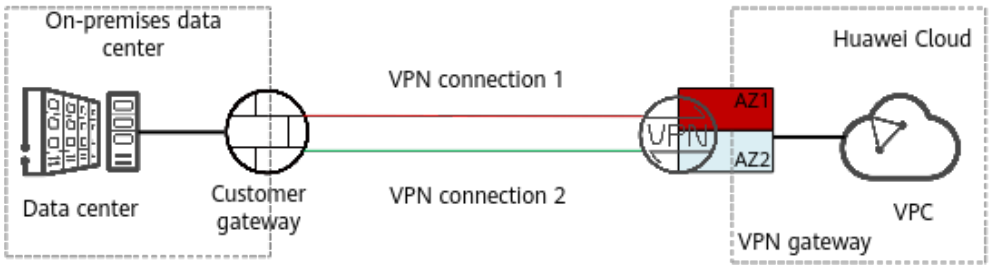
Dual-AZ disaster recovery is supported only by Enterprise Edition VPN, but not Classic VPN.

Figure 10-7 Scenario where services are running properly



If the VPN gateway or VPN connection in an AZ is faulty, traffic is automatically switched to the other VPN connection, ensuring normal service running.

Figure 10-8 Failover scenario



11 Permissions Management

11.1 IAM-based Permissions Management

If you need to assign different permissions to personnel in your enterprise to access your VPN resources purchased on Huawei Cloud, Identity and Access Management (IAM) is a good choice for fine-grained permissions management. IAM provides identity authentication, permissions management, and access control, helping you securely manage access to your resources.

With IAM, you can use your account to create IAM users, and assign permissions to the users to control their access to specific Huawei Cloud resources. For example, some software developers in your enterprise need to use VPN resources but should not be allowed to delete them or perform any high-risk operations. In this scenario, you can create IAM users for the software developers and grant them only the permissions required for using VPN resources.

If your HUAWEI ID does not need individual IAM users for permissions management, skip this section, which has no impact on using functions of VPN.

IAM is a free service. You only pay for the resources in your account.

For more information about IAM, see **IAM Service Overview**.

VPN Permissions

New IAM users do not have any permissions assigned by default. You need to first add them to one or more groups and attach policies or roles to these groups. The users then inherit permissions from the groups and can perform specified operations on cloud services based on the permissions they have been assigned.

VPN is a project-level service deployed for specific regions. When you set **Scope** to **Region-specific projects** and select the specified projects (for example, ap-southeast-2) in the specified regions (for example, AP-Bangkok), the users only have permissions for VPN in the selected projects. If you set **Scope** to **All resources**, users have permissions for VPN in all region-specific projects. When accessing VPN, the users need to switch to the authorized region.

You can grant permissions by using roles or policies.

- Roles: A type of coarse-grained authorization mechanism that defines permissions related to user responsibilities. There are only a limited number of roles for granting permissions to users. Some roles depend other roles to take effect. When you assign such roles to users, remember to assign the roles they depend on. However, roles are not an ideal choice for fine-grained authorization and secure access control.
- Policies: a type of fine-grained authorization mechanism that defines permissions required to perform operations on specific cloud resources under certain conditions. This mechanism allows for more flexible policy-based authorization, meeting requirements for secure access control. For example, administrators can grant IAM users only permissions to manage VPN resources of a certain type.

Table 11-1 lists all system-defined permissions for VPN.

Table 11-1 System-defined permissions for VPN

System Role/ Policy Name	Description	Dependency
VPN Administrator (not recommended)	Administrator permissions for VPN. Users with these permissions can perform all operations on VPN. This role must be used together with the **Tenant Guest** and **VPC Administrator** roles in the same project. • **VPC Administrator**: project-level policy, which is selected in the same project as **VPN Administrator**. • **Tenant Guest**: project-level policy, which is selected in the same project as **VPN Administrator**.	-

System Role/ Policy Name	Description	Dependency
VPN FullAccess (recommended)	Full permissions for VPN. **NOTE** All actions that are used to query list information do not support authorization based on enterprise projects. You need to configure actions in the IAM view separately.	The actions of global services and the region-level actions cannot be configured in the same policy. As such, the following global actions are added: • "tms:predefineTags:list" • "scm:cert:list" • "scm:cert:get" • "scm:cert:download" • "iam:identityProviders:getIdentityProvider" • "iam:identityProviders:listProtocols" • "iam:identityProviders:listIdentityProviders"
VPN ReadOnlyAccess	Read-only permissions on VPN resources. Users who have these permissions can only view information about VPN resources. **NOTE** All actions that are used to query list information do not support authorization based on enterprise projects. You need to configure actions in the IAM view separately.	The actions of global services and the region-level actions cannot be configured in the same policy. As such, the following global actions are added: • "tms:predefineTags:list" • "scm:cert:list" • "scm:cert:get" • "iam:identityProviders:listProtocols"

Table 11-2 lists the common operations supported by system-defined permissions for S2C VPN.

Table 11-2 Common operations supported by system-defined permissions for S2C VPN

Operation	VPN Administrator (Not Recommended)	VPN FullAccess (Recommended)	VPN ReadOnlyAccess
Creating a VPN gateway	√	• Enterprise Edition VPN: √ • Classic VPN: ×	×
Viewing a VPN gateway	√	√	√
Querying the VPN gateway list	√	√	√
Updating a VPN gateway	√	• Enterprise Edition VPN: √ • Classic VPN: ×	×
Deleting a VPN gateway	√	• Enterprise Edition VPN: √ • Classic VPN: ×	×
Creating a VPN connection	√	• Enterprise Edition VPN: √ • Classic VPN: √	×
Viewing a VPN connection	√	√	√
Querying the VPN connection list	√	√	√
Updating a VPN connection	√	• Enterprise Edition VPN: √ • Classic VPN: √	×
Deleting a VPN connection	√	• Enterprise Edition VPN: √ • Classic VPN: √	×
Creating a customer gateway	√	• Enterprise Edition VPN: √ • Classic VPN: N/A	×
Viewing a customer gateway	√	• Enterprise Edition VPN: √ • Classic VPN: N/A	√

Operation	VPN Administrator (Not Recommended)	VPN FullAccess (Recommended)	VPN ReadOnlyAccess
Querying the customer gateway list	√	• Enterprise Edition VPN: √ • Classic VPN: N/A	√
Updating a customer gateway	√	• Enterprise Edition VPN: √ • Classic VPN: N/A	×
Deleting a customer gateway	√	• Enterprise Edition VPN: √ • Classic VPN: N/A	×
Creating a VPN connection monitor	√	• Enterprise Edition VPN: √ • Classic VPN: ×	×
Querying a VPN connection monitor	√	• Enterprise Edition VPN: √ • Classic VPN: ×	√
Querying the VPN connection monitor list	√	• Enterprise Edition VPN: √ • Classic VPN: ×	√
Deleting a VPN connection monitor	√	• Enterprise Edition VPN: √ • Classic VPN: ×	×
Querying VPN connection logs	√	• Enterprise Edition VPN: √ • Classic VPN: ×	√
Querying the route table of a VPN gateway	√	• Enterprise Edition VPN: √ • Classic VPN: ×	√
Resetting a VPN connection	√	• Enterprise Edition VPN: √ • Classic VPN: ×	×
Upgrading an S2C VPN gateway	√	• Enterprise Edition VPN: √ • Classic VPN: ×	×

lists the common operations supported by system-defined permissions for P2C VPN.

Table 11-3 Common operations supported by system-defined permissions for P2C VPN

Operation	VPN Administrator (Not Recommended)	VPN FullAccess (Recommended)	VPN ReadOnlyAccess
Subscribing to a yearly/monthly P2C VPN gateway	√	√	×
Changing the specification of a yearly/monthly P2C VPN gateway	√	√	×
Updating a P2C VPN gateway	√	√	×
Querying details about a P2C VPN gateway	√	√	√
Querying the P2C VPN gateway list	√	√	√
Querying the P2C VPN connection list	√	√	√
Creating a VPN server	√	× The actions of global services and the region-level actions cannot be configured in the same policy. As such, the following global actions are added: scm:cert:get scm:cert:list scm:cert:download	×
Querying server information on a gateway	√	√	√

Operation	VPN Administrator (Not Recommended)	VPN FullAccess (Recommended)	VPN ReadOnlyAccess
Updating server information on a specified gateway	√	× The actions of global services and the region-level actions cannot be configured in the same policy. As such, the following global actions are added: scm:cert:get scm:cert:list scm:cert:download	×
Exporting the client configuration information corresponding to a server	√	√	×
Verifying the validity of CA certificates	√	√	√
Importing a client CA certificate	√	√	×
Modifying a client CA certificate	√	√	×
Querying a client CA certificate	√	√	√
Deleting a client CA certificate	√	√	×
Querying information about all servers of a tenant	√	√	√
Creating a VPN user	√	√	×
Querying the VPN user list	√	√	√

Operation	VPN Administrator (Not Recommended)	VPN FullAccess (Recommended)	VPN ReadOnlyAccess
Modifying a VPN user	√	√	×
Querying a VPN user	√	√	√
Deleting a VPN user	√	√	×
Changing the password of a VPN user	√	√	×
Resetting the password of a VPN user	√	√	×
Creating a VPN user group	√	√	×
Querying the VPN user group list	√	√	√
Modifying a VPN user group	√	√	×
Querying a VPN user group	√	√	√
Deleting a VPN user group	√	√	×
Adding VPN users to a group	√	√	×
Deleting VPN users from a group	√	√	×
Querying VPN users in a group	√	√	√
Creating a VPN access policy	√	√	×
Querying the VPN access policy list	√	√	√
Modifying a VPN access policy	√	√	×

Operation	VPN Administrator (Not Recommended)	VPN FullAccess (Recommended)	VPN ReadOnlyAccess
Querying a VPN access policy	√	√	√
Deleting a VPN access policy	√	√	×
Querying the AZs of P2C VPN gateways	√	√	√
Adding resource tags in batches	√	√	×
Deleting resource tags in batches	√	√	×
Querying resource instances by resource tag	√	√	√
Querying the number of resource instances	√	√	√
Querying resource tags by resource instance	√	√	√
Querying the resource tag list	√	√	√
Querying the VPN connection log configuration	√	√	√
Querying the VPN connection log configuration	√	√	√
Updating the VPN connection log configuration	√	√	×
Logging in to a P2C VPN gateway in SSO mode	√	√	×

Helpful Links

- IAM Service Overview

- **Creating a User and Granting VPN Permissions**

11.2 Actions Supported by S2C VPN

11.2.1 VPN Gateway

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Creating a VPN gateway	POST /v5/{project_id}/vpn-gateways	vpn:vpnGateways:create	• er:instances:list • er:instances:get • vpc:vpcs:list • vpc:vpcs:get • vpc:subnets:get • vpc:subnets:list • vpc:subnets:create • vpc:subnets:delete • vpc:subNetworkInterfaces:update • vpc:publicIps:create • vpc:publicIps:delete • vpc:publicIps:update • vpc:publicIps:get • vpc:publicIps:list • vpc:ports:create • vpc:quotas:list • vpc:bandwidths:list • vpc:ports:get • vpc:ports:delete • vpc:routeTables:update • vpc:routeTables:get	√	√

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
			• vpc:bandwidths:get		
Querying a VPN gateway	GET /v5/{project_id}/vpn-gateways/{vgw_id}	vpn:vpnGateways:get	• vpc:publicIps:get • vpc:publicIps:list • vpc:bandwidths:list • er:instances:list • er:instances:get • vpc:vpcs:list • vpc:vpcs:get • vpc:subnets:get • vpc:subnets:list	√	√
Querying the VPN gateway list	GET /v5/{project_id}/vpn-gateways	vpn:vpnGateways:list	• vpc:publicIps:get • vpc:publicIps:list • vpc:bandwidths:list • er:instances:list • er:instances:get • vpc:vpcs:list • vpc:vpcs:get • vpc:subnets:get • vpc:subnets:list	√	×

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Updating a VPN gateway	PUT /v5/{project_id}/vpn-gateways/{vgw_id}	vpn:vpnGateways:update	• er:instances:list • er:instances:get • vpc:vpcs:list • vpc:vpcs:get • vpc:subnets:get • vpc:subnets:list • vpc:subnets:delete • vpc:subNetworkInterfaces:update • vpc:publicIps:delete • vpc:publicIps:update • vpc:publicIps:get • vpc:publicIps:list • vpc:bandwidths:list • vpc:ports:get • vpc:routeTables:update • vpc:routeTables:get	√	√

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Deleting a VPN gateway	DELETE /v5/{project_id}/vpn-gateways/{vgw_id}	vpn:vpnGateways:delete	• er:instances:list • er:instances:get • vpc:vpcs:list • vpc:vpcs:get • vpc:subnets:get • vpc:subnets:delete • vpc:subNetworkInterfaces:update • vpc:publicIps:delete • vpc:publicIps:update • vpc:publicIps:get • vpc:publicIps:list • vpc:bandwidths:list • vpc:ports:get • vpc:ports:delete • vpc:routeTables:update • vpc:routeTables:get	√	√
Querying the AZs of VPN gateways (V5)	GET /v5/{project_id}/vpn-gateways/availability-zones	vpn:vpnGatewayAvailabilityZone:list	-	√	×

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Querying the AZs of VPN gateways (V5.1)	GET /v5.1/{project_id}/vpn-gateways/availability-zones	vpn:vpnGatewayAvailabilityZone:list	-	√	×
Importing certificates for a VPN gateway	POST /v5/{project_id}/vpn-gateways/{vgw_id}/certificate	vpn:vpnGateways:importCertificate	-	√	√
Querying certificates of a VPN gateway	GET /v5/{project_id}/vpn-gateways/{vgw_id}/certificate	vpn:vpnGateways:getCertificate	-	√	√
Updating certificates of a VPN gateway	PUT /v5/{project_id}/vpn-gateways/{vgw_id}/certificate/{certificate_id}	vpn:vpnGateways:updateCertificate	-	√	√
Querying the route table of a VPN gateway	GET /v5/{project_id}/vpn-gateways/{vgw_id}/routing-table	vpn:vpnGateways:getRoutingTable	-	√	√

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Changing the specification of a pay-per-use VPN gateway	POST /v5/{project_id}/vpn-gateways/{vgw_id}/update-specification	vpn:vpnGateways:updatePostpaidSpecification	• er:instances:list • er:instances:get • vpc:vpcs:list • vpc:vpcs:get • vpc:subnets:get • vpc:subnets:list • vpc:subnets:delete • vpc:subNetworkInterfaces:update • vpc:publicIps:delete • vpc:publicIps:update • vpc:publicIps:get • vpc:publicIps:list • vpc:bandwidths:list • vpc:ports:ge • vpc:routeTables:update • vpc:routeTables:get	√	√
Upgrading an S2C VPN gateway	POST /v5/{project_id}/vpn-gateways/{vpn_gateway_id}/upgrade	vpn:vpnGateways:upgrade	-	√	√

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Querying the S2C VPN gateway task list	GET /v5/{project_id}/vpn-gateways/jobs	vpn:vpnGateways:listResourceJobs	-	√	×
Deleting an S2C VPN gateway task	DELETE /v5/{project_id}/vpn-gateways/jobs/{job_id}	vpn:vpnGateways:deleteResourceJobs	-	√	×

11.2.2 Customer Gateway

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Creating a customer gateway	POST /v5/{project_id}/customer-gateways	vpn:customerGateways:create	-	√	×
Querying a specified customer gateway	GET /v5/{project_id}/customer-gateways/{customer_gateway_id}	vpn:customerGateways:get	-	√	×
Querying the customer gateway list	GET /v5/{project_id}/customer-gateways	vpn:customerGateways:list	-	√	×

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Updating a customer gateway	PUT /v5/{project_id}/customer-gateways/{customer_gateway_id}	vpn:customerGateways:update	-	√	×
Deleting a customer gateway	DELETE /v5/{project_id}/customer-gateways/{customer_gateway_id}	vpn:customerGateways:delete	-	√	×

11.2.3 VPN Connection

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Creating a VPN connection	POST /v5/{project_id}/vpn-connection	vpn:vpnConnections:create	• ces:metricData:list • ces:currentRegionSupportedMetrics:list • vpc:vpcs:list • vpc:vpcs:get • vpc:subnets:get • vpc:subnets:list • vpc:subNetworkInterfaces:update • vpc:publicIps:get • vpc:publicIps:list • vpc:bandwidths:list • vpc:ports:get • vpc:routeTables:update • vpc:routeTables:get	√	√

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Querying the VPN connection list	GET /v5/{project_id}/vpn-connection	vpn:vpnConnections:list	• vpc:publicIps:get • vpc:publicIps:list • vpc:bandwidths:list • er:instances:list • er:instances:get • vpc:vpcs:list • vpc:vpcs:get • vpc:subnets:get • vpc:subnets:list	√	×
Querying a specified VPN connection	GET /v5/{project_id}/vpn-connection/{vpn_connection_id}	vpn:vpnConnections:get	• vpc:publicIps:get • vpc:publicIps:list • vpc:bandwidths:list • er:instances:list • er:instances:get • vpc:vpcs:list • vpc:vpcs:get • vpc:subnets:get • vpc:subnets:list	√	√

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Updating a VPN connection	PUT /v5/{project_id}/vpn-connection/{vpn_connection_id}	vpn:vpnConnections:update	• vpc:vpcs:list • vpc:vpcs:get • vpc:subnets:get • vpc:subnets:list • vpc:subNetworkInterfaces:update • vpc:publicIps:get • vpc:publicIps:list • vpc:bandwidths:list • vpc:ports:get • vpc:routeTables:update • vpc:routeTables:get	√	√

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Deleting a VPN connection	DELETE /v5/{project_id}/vpn-connection/{vpn_connection_id}	vpn:vpnConnections:delete	• ces:metricData:list • ces:currentRegionSupportedMetrics:list • vpc:vpcs:list • vpc:vpcs:get • vpc:subnets:get • vpc:subNetworkInterfaces:update • vpc:publicIps:get • vpc:publicIps:list • vpc:bandwidths:list • vpc:ports:get • vpc:routeTables:update • vpc:routeTables:get	√	√

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Creating VPN connections in batches	POST /v5/{project_id}/vpn-connections/batch-create	vpn:vpnConnections:batchCreate	• ces:metricData:list • ces:currentRegionSupportedMetrics:list • vpc:vpcs:list • vpc:vpcs:get • vpc:subnets:get • vpc:subnets:list • vpc:subNetworkInterfaces:update • vpc:publicIps:get • vpc:publicIps:list • vpc:bandwidths:list • vpc:ports:get • vpc:routeTables:update • vpc:routeTables:get	√	√
Querying VPN connection logs	GET /v5/{project_id}/vpn-connection/{vpn_connection_id}/log	vpn:vpnConnections:getLog	-	√	√
Resetting a VPN connection	POST /v5/{project_id}/vpn-connection/{vpn_connection_id}/reset	vpn:vpnConnections:reset	-	√	√

11.2.4 VPN Connection Monitor

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Creating a VPN connection monitor	POST /v5/{project_id}/connection-monitors	vpn:connectionMonitors:create	-	√	√
Querying the VPN connection monitor list	GET /v5/{project_id}/connection-monitors	vpn:connectionMonitors:list	-	√	x
Deleting a VPN connection monitor	DELETE /v5/{project_id}/connection-monitors/{connection_monitor_id}	vpn:connectionMonitors:delete	-	√	√
Querying a VPN connection monitor	GET /v5/{project_id}/connection-monitors/{connection_monitor_id}	vpn:connectionMonitors:get	-	√	√

11.3 Actions Supported by P2C VPN

11.3.1 VPN Gateway

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Subscribing to a yearly/monthly P2C VPN gateway	-	vpn:p2cVpnGateway:subscribe	• vpn:system:listAvailabilityZones • vpc:vpcs:list • vpc:subnets:get • vpc:bandwidths:list • vpc:publicIps:create • vpc:publicIps:delete • vpc:publicIps:update • vpc:publicIps:list • vpc:quotas:list	√	×
Changing the specification of a yearly/monthly VPN gateway	-	vpn:p2cVpnGateway:updateSpecification	-	√	×
Updating a P2C VPN gateway	PUT /v5/{project_id}/p2c-vpn-gateways/{p2c_vgw_id}	vpn:p2cVpnGateway:update	• vpc:publicIps:create • vpc:publicIps:delete • vpc:publicIps:update • vpc:publicIps:get • vpc:publicIps:list • vpc:bandwidths:list	√	×

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Querying a specified P2C VPN gateway	GET /v5/{project_id}/p2c-vpn-gateways/{p2c_vgw_id}	vpn:p2cVpnGateway:get	vpc:publicIps:get	√	×
Querying the P2C VPN gateway list	GET /v5/{project_id}/p2c-vpn-gateways	vpn:p2cVpnGateway:list	vpc:publicIps:get	√	×
Querying the P2C VPN connection list	GET /v5/{project_id}/p2c-vpn-gateways/{p2c_vgw_id}/connections	vpn:p2cVpnGateway:listConnections	-	√	×
Disconnecting a connection of a P2C VPN gateway	POST /v5/{project_id}/p2c-vpn-gateways/{p2c_vgw_id}/connections/{connection_id}/disconnect	vpn:p2cVpnGateway:disconnectConnection	-	√	×
Upgrading a P2C VPN gateway	POST /v5/{project_id}/p2c-vpn-gateways/{vpn_gateway_id}/upgrade	vpn:p2cVpnGateway:upgrade	-	√	×
Querying the P2C VPN gateway task list	GET /v5/{project_id}/p2c-vpn-gateways/jobs	vpn:p2cVpnGateway:listResourceJobs	-	√	×

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Deleting a P2C VPN gateway task	DELETE /v5/{project_id}/p2c-vpn-gateways/jobs/{job_id}	vpn:p2cVpnGateway:deleteResourceJobs	-	√	×

11.3.2 Server

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Creating a P2C VPN server	POST /v5/{project_id}/p2c-vpn-gateways/{p2c_vgw_id}/vpn-servers	vpn:p2cVpnGateway:createServer	• scm:cert:get • scm:cert:list • scm:cert:download • vpc:publicIps:get • vpc:routeTables:update • vpc:subnets:get • vpc:quotas:list • iam:identityProviders:getIdentityProvider • iam:identityProviders:listProtocols • iam:identityProviders:listIdentityProviders	√	x

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Querying server information on a gateway	GET /v5/{project_id}/p2c-vpn-gateways/{p2c_vgw_id}/vpn-servers	vpn:p2cVpnGateway:listServers	-	√	x
Updating server information on a specified gateway	PUT /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}	vpn:p2cVpnGateway:updateServer	• scm:cert:get • scm:cert:list • scm:cert:download • vpc:publicIps:get • vpc:routeTables:update • vpc:subnets:get • iam:identityProviders:getIdentityProvider • iam:identityProviders:listProtocols • iam:identityProviders:listIdentityProviders	√	x
Exporting the client configuration information corresponding to a server	POST /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/client-config/export	vpn:p2cVpnGateway:exportClientConfig	-	√	x

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Verifying the validity of CA certificates	POST /v5/{project_id}/p2c-vpn-gateways/vpn-servers/client-ca-certificates/check	vpn:system:checkClientCaCertificate	-	√	x
Importing client CA certificates	POST /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/client-ca-certificates	vpn:p2cVpnGateway:importClientCa	-	√	x
Modifying a client CA certificate	PUT /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/client-ca-certificates/{client_ca_certificate_id}	vpn:p2cVpnGateway:updateClientCa	-	√	x
Querying a client CA certificate	GET /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/client-ca-certificates/{client_ca_certificate_id}	vpn:p2cVpnGateway:getClientCa	-	√	x
Deleting a client CA certificate	DELETE /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/client-ca-certificates/{client_ca_certificate_id}	vpn:p2cVpnGateway:deleteClientCa	-	√	x
Querying information about all servers of a tenant	GET /v5/{project_id}/vpn-servers	vpn:p2cVpnGateway:listAllServers	-	√	x

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Disconnecting connections of a P2C VPN gateway	POST /v5/{project_id}/p2c-vpn-gateways/{p2c_vgw_id}/connections/{connection_id}/disconnect	vpn:p2cVpnGateway:disconnectConnection	-	√	x
Updating the P2C VPN connection log configuration	PUT /v5/{project_id}/p2c-vpn-gateways/{p2c_vgw_id}/log-config	vpn:p2cVpnGateway:updateConnectionsLogConfig	• lts:logGroup:listLogGroup • lts:logStream:listLogStream	√	×
Querying the P2C VPN connection log configuration	GET /v5/{project_id}/p2c-vpn-gateways/{p2c_vgw_id}/log-config	vpn:p2cVpnGateway:getConnectionsLogConfig	-	√	×
Deleting the P2C VPN connection log configuration	DELETE /v5/{project_id}/p2c-vpn-gateways/{p2c_vgw_id}/log-config	vpn:p2cVpnGateway:deleteConnectionsLogConfig	-	√	×

11.3.3 User Management

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Creating a VPN user	POST /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/users	vpn:p2cVpnUser:create	-	√	x
Creating VPN users in batches	POST /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/users/batch-create	vpn:p2cVpnUser:batchCreate	-	√	x
Querying the VPN user list	GET /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/users	vpn:p2cVpnUser:list	-	√	x
Modifying a VPN user	PUT /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/users/{user_id}	vpn:p2cVpnUser:update	-	√	x
Querying a VPN user	GET /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/users/{user_id}	vpn:p2cVpnUser:get	-	√	x
Deleting a VPN user	DELETE /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/users/{user_id}	vpn:p2cVpnUser:delete	-	√	x
Deleting VPN users in batches	POST /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/users/batch-delete	vpn:p2cVpnUser:batchDelete	-	√	x

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Changing the password of a VPN user	PUT /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/users/{user_id}/password	vpn:p2cVpnUser:updatePassword	-	√	x
Resetting the password of a VPN user	POST /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/users/{user_id}/reset-password	vpn:p2cVpnUser:resetPassword	-	√	x
Creating a VPN user group	POST /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/groups	vpn:p2cVpnGateway:createUserGroup	-	√	x
Querying the VPN user group list	GET /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/groups	vpn:p2cVpnGateway:listUserGroup	-	√	x
Modifying a VPN user group	PUT /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/groups/{group_id}	vpn:p2cVpnGateway:updateUserGroup	-	√	x
Querying a VPN user group	GET /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/groups/{group_id}	vpn:p2cVpnGateway:getUserGroup	-	√	x
Deleting a VPN user group	DELETE /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/groups/{group_id}	vpn:p2cVpnGateway:deleteUserGroup	-	√	x

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Adding VPN users to a group	POST /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/groups/{group_id}/add-users	vpn:p2cVpnGateway:addUsers	-	√	x
Removing VPN users from a group	POST /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/groups/{group_id}/remove-users	vpn:p2cVpnGateway:removeUsers	-	√	x
Querying VPN users in a group	GET /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/groups/{group_id}/users	vpn:p2cVpnGateway:listUsersInGroup	-	√	x

11.3.4 Access Policy

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Creating a VPN access policy	POST /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/access-policies	vpn:p2cVpnGateway:createAccessPolicy	-	√	x
Querying the VPN access policy list	GET /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/access-policies	vpn:p2cVpnGateway:listAccessPolicies	-	√	x

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Modifying a VPN access policy	PUT /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/access-policies/{policy_id}	vpn:p2cVpnGateway:updateAccessPolicy	-	√	x
Querying a VPN access policy	GET /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/access-policies/{policy_id}	vpn:p2cVpnGateway:getAccessPolicy	-	√	x
Deleting a VPN access policy	DELETE /v5/{project_id}/p2c-vpn-gateways/vpn-servers/{vpn_server_id}/access-policies/{policy_id}	vpn:p2cVpnGateway:deleteAccessPolicy	-	√	x

11.4 Actions Supported by Public Service APIs

11.4.1 VPN Quota

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Querying VPN quotas	GET /v5/{project_id}/vpn/quotas	vpn:quota:list	-	√	×

11.4.2 VPN Tag

Permission	API	Action	Dependencies	IAM Project	Enterprise Project
Creating a resource tag	POST /v5/{project_id}/{resource_type}/{resource_id}/tags/create	vpn:resourceInstanceTags:create	-	√	√
Deleting tags of a resource	POST /v5/{project_id}/{resource_type}/{resource_id}/tags/delete	vpn:resourceInstanceTags:delete	-	√	√
Querying the list of tags for a specific type of resources	GET /v5/{project_id}/{resource_type}/tags	vpn:resourceTypeTags:list	-	√	×
Querying the resource instance list	POST /v5/{project_id}/{resource_type}/resource-instances/filter	vpn:resourceInstances:list	-	√	×
Querying the resource tag list	GET /v5/{project_id}/{resource_type}/{resource_id}/tags	vpn:resourceInstanceTags:list	-	√	√
Querying the number of resource instances	POST /v5/{project_id}/{resource_type}/resource-instances/count	vpn:resourceInstances:count	-	√	×

12 VPN and Other Services

Figure 12-1 shows VPN-related services.

Figure 12-1 VPN and related services

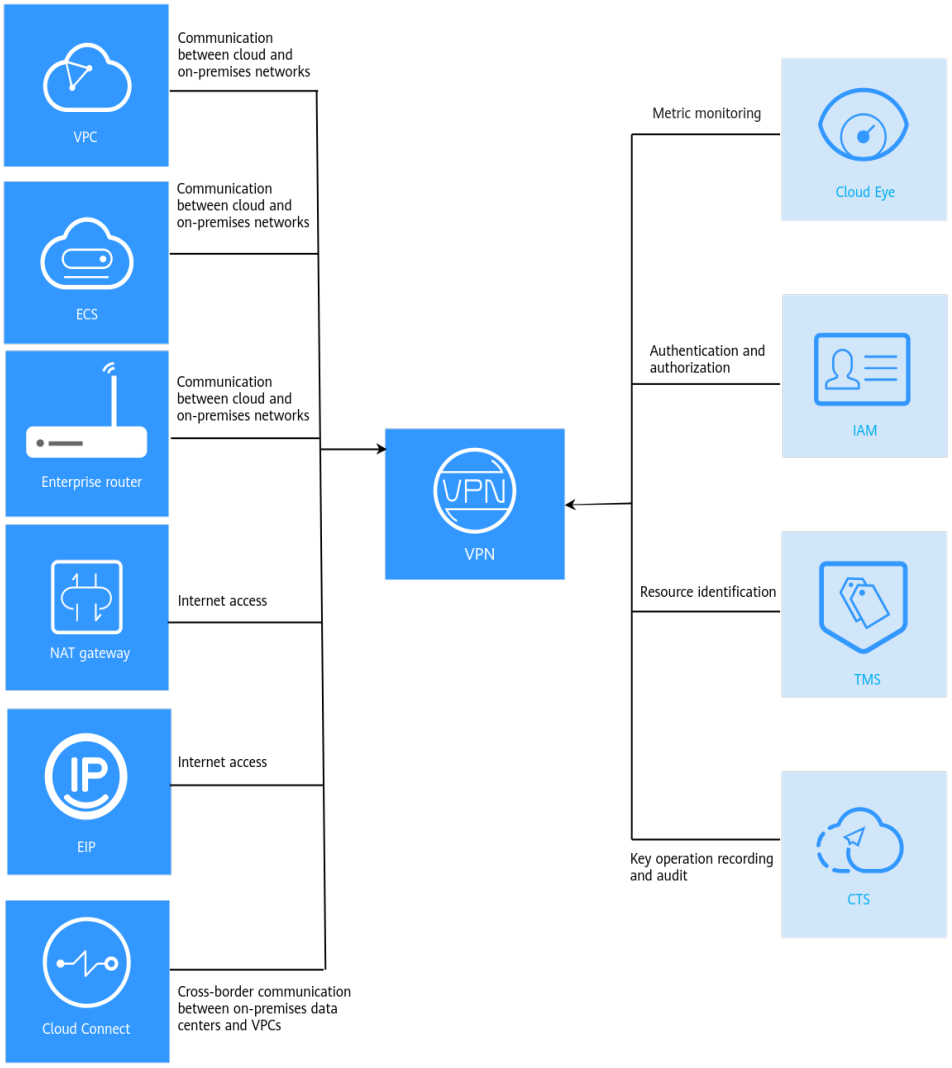


Table 12-1 Related services

Related Service	Function	Reference
Virtual Private Cloud (VPC)	Allows you to create a virtual private cloud to which your on-premises data center is to be connected.	**VPC**
Elastic Cloud Server (ECS)	Allows you to create security groups, add security group rules, and add ECSs to the security groups, improving ECS access security.	**ECS**
Enterprise Router (ER)	Connects an on-premises data center to the cloud through a VPN and Direct Connect that back up each other. This service is supported only by Enterprise Edition VPN gateways, but not Classic VPN gateways.	**Enterprise Router**
Network address translation (NAT) gateway	Allows servers in an on-premises data center to access the Internet or provide services that are accessible from the Internet.	**NAT Gateway**
Elastic IP address (EIP)	Allows a VPN gateway to communicate with a customer gateway through a public network. This service is supported only by Enterprise Edition VPN, but not Classic VPN.	**EIP**
Cloud Connect	Works together with VPN to enable stable network communications between your on-premises data center and VPCs in different regions.	**Cloud Connect**
Cloud Eye	Monitors VPN resources and allows you to view metrics.	**Cloud Eye**

Related Service	Function	Reference
Identity and Access Management (IAM)	Allows you to assign different permissions to different users. It enables fine grained control over your VPN resources.	**Identity and Access Management**
Tag Management Service (TMS)	Identifies VPNs to facilitate classification and search.	**Tag Management Service**
Cloud Trace Service (CTS)	Records operations performed on VPN.	**Cloud Trace Service**

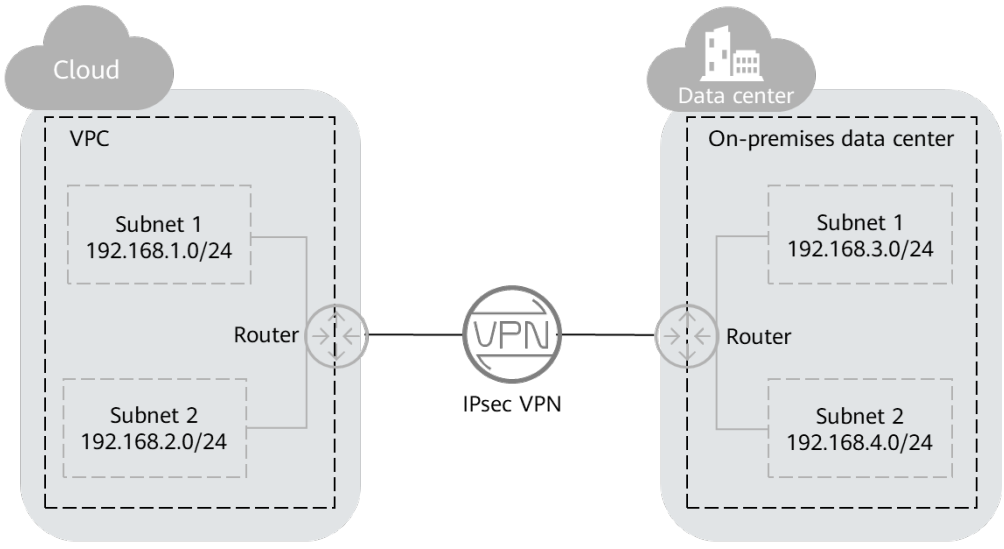
13 Basic Concepts

13.1 IPsec VPN

Internet Protocol Security (IPsec) VPN uses a secure network protocol suite that authenticates and encrypts the packets of data to provide secure encrypted communication between different networks. S2C VPN is an IPsec VPN technology on the cloud. To purchase an S2C VPN gateway, click **Buy Now**.

In the example shown in **Figure 13-1**, assume that you have created a VPC with two subnets (192.168.1.0/24 and 192.168.2.0/24) on the cloud, and the router in your on-premises data center also has two subnets (192.168.3.0/24 and 192.168.4.0/24). In this case, you can create a VPN to connect the VPC subnets and the data center subnets.

Figure 13-1 IPsec VPN



Site-to-site VPN is supported to enable communication between VPC subnets and on-premises data center subnets.

Reference link:

S2C VPN

13.2 SSL VPN

SSL VPN is a virtual private network technology using the SSL protocol. It allows remote users to securely access intranet resources of enterprises through encrypted channels.

P2C VPN is an SSL VPN technology on the cloud. To purchase a P2C VPN gateway, click **Buy Now**.

Reference link:

P2C VPN

13.3 VPN Gateway

A VPN gateway is a virtual gateway of VPN on the cloud. It establishes secure private connections with a customer gateway in your on-premises network or data center. A VPN gateway needs to work with a customer gateway in your on-premises data center.

Reference link:

- **Creating an S2C VPN Gateway**
- **Creating a Classic VPN Gateway**
- **Creating a P2C VPN Gateway**

13.4 VPN Connection

A VPN connection is a secure channel between a VPN gateway and a customer gateway. VPN connections use the IKE and IPsec protocols to encrypt the transmitted data, ensuring data security and reliability.

Reference link:

- **Creating Enterprise Edition VPN Connections**
- **Creating a Classic VPN Connection**
- **What Are a VPC, a VPN Gateway, and a VPN Connection?**

13.5 VPN Gateway Bandwidth

The bandwidth you purchased for a VPN gateway refers to outbound bandwidth, that is, bandwidth for traffic sent from a VPC on the cloud to a customer gateway in an on-premises data center.

- If the purchased bandwidth is 10 Mbit/s or less, the inbound bandwidth is limited to 10 Mbit/s.
- If the purchased bandwidth is greater than 10 Mbit/s, the inbound bandwidth is the same as the EIP bandwidth.

If your VPN gateway is billed by traffic on a pay-per-use basis, the bandwidth size of the VPN gateway does not affect the total price. But it is recommended that you set the bandwidth size based on actual requirements to prevent a large amount of traffic caused by program errors or malicious access.

13.6 Local Subnet

Local subnets are VPC subnets that need to communicate with an on-premises network through VPN. When you buy a VPN gateway, you can set **Local Subnet** to either of the following options:

- **Select subnet**: Select subnets from the drop-down list. This is recommended if all subnets that require VPN communication are in the VPC.
- **Enter CIDR block**: Enter a subnet using CIDR notation (example: 192.168.0.0/16). If multiple subnets are specified, separate them by a comma (,). This is recommended if the CIDR blocks requiring VPN communication are not in the VPC to which the VPN gateway belongs. For example, CIDR blocks (such as 0.0.0.0/0) that are connected using a VPC peering are not in the VPC to which the VPN gateway belongs.

13.7 Customer Gateway

A customer gateway can be a physical device or software application in your on-premises data center. A customer gateway is a resource that provides information on the management console about your customer gateway device.

Reference link:

Creating a Customer Gateway

13.8 Customer Subnet

Customer subnets are subnets in an on-premises data center that access a VPC on the cloud through a VPN.

- You need to enter subnets using CIDR notation (example: 192.168.0.0/16), and with each entry separated by a comma.
- After configuring a customer subnet, you do not need to add a route for it. The VPN service will automatically deliver routes pointing to the customer subnet.

NOTE

A customer subnet cannot be set to a Class D or Class E IP address or an IP address starting with 127.

13.9 PSK

A pre-shared key (PSK) is a key configured for a VPN connection on the cloud. It is used for IKE negotiation between VPN devices at both ends of a VPN connection. Ensure that the PSK configurations at both ends of the VPN connection are the same. Otherwise, the IKE negotiation will fail.

Reference link:

Are a Username and Password Required for Creating an IPsec VPN Connection?

13.10 Region and AZ

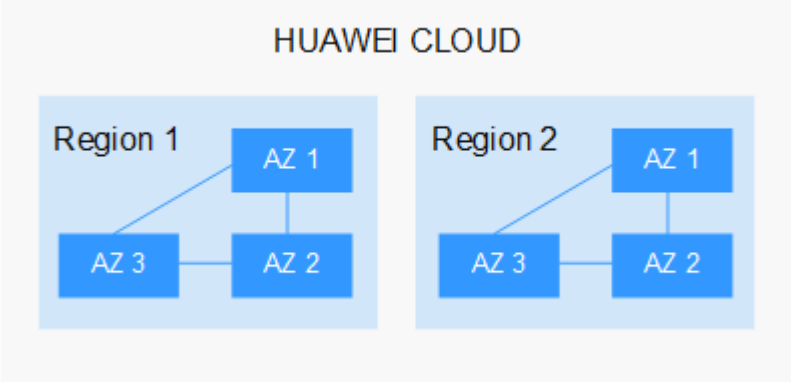
Concepts

Regions and availability zones (AZs) identify the locations of data centers. You can create resources in regions and AZs.

- Regions are divided based on geographical locations and network latency. Public services, such as Elastic Cloud Server (ECS), Elastic Volume Service (EVS), Object Storage Service (OBS), Virtual Private Cloud (VPC), Elastic IP (EIP), and Image Management Service (IMS), are shared within the same region. Regions fall into two types: universal and dedicated. A universal region provides universal cloud services for common tenants. A dedicated region provides services of the same type only or for specific tenants.
- An AZ contains one or more physical data centers. Each AZ has independent cooling, fire extinguishing, moisture-proof, and electricity facilities. Within an AZ, compute, network, storage, and other resources are logically divided into multiple clusters. AZs within a region are interconnected using high-speed optical fibers, allowing you to build inter-AZ high-availability systems.

Figure 13-2 shows the relationship between regions and AZs.

Figure 13-2 Regions and AZs



Currently, Huawei Cloud provides services in many regions around the world. You can select regions and AZs as required. For more information, see **Huawei Cloud Global Regions**.

Selecting a Region

When selecting a region, consider the following:

- Geographical location

  You are advised to select a region close to you or your target users to reduce network latency and improve the access speed.

  - If your target users are in Asia Pacific (excluding the Chinese mainland), select the **CN-Hong Kong**, **AP-Bangkok**, or **AP-Singapore** region.
  - If your target users are in Africa, select the **AF-Johannesburg** region.
  - If your target users are in Latin America, select the **LA-Santiago** region.

    NOTE

    The **LA-Santiago** region is located in Chile.

- Resource price

  Resource prices may vary in different regions. For details, see **Product Pricing Details**.

Selecting an AZ

When selecting a region to deploy resources, consider your applications' requirements on disaster recovery (DR) and network latency.

- For robust DR, deploy resources in different AZs within the same region.
- For a low network latency, deploy resources in the same AZ.

Regions and Endpoints

Before you use an API to call resources, specify its region and endpoint. For more information, see **Regions and Endpoints**.

