Virtual Private Network

Administrator Guide

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1 S2C Enterprise Edition VPN

1.1 Interconnection with an AR Router of Huawei (Active-Active Connections)

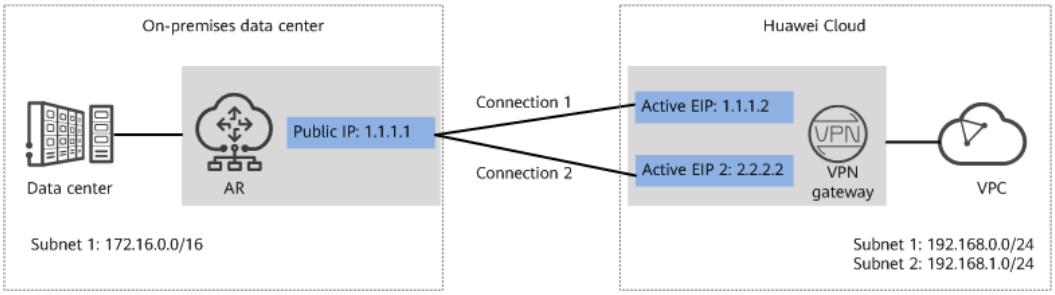
1.1.1 Static Routing Mode

1.1.1.1 Operation Guide

Scenario

Figure 1-1 shows the typical networking where a VPN gateway connects to an access router (AR) of Huawei in static routing mode.

Figure 1-1 Typical networking diagram



In this scenario, the AR router has only one IP address, and the VPN gateway uses the active-active mode. A VPN connection is created between each of the two active EIPs of the VPN gateway and the IP address of the AR router.

Limitations and Constraints

VPN and AR routers support different authentication and encryption algorithms. When creating connections, ensure that the policy settings at both ends are the same.

Data Plan

Table 1-1 Data plan

Category	Item	Example Value for the AR Router	Example Value for the Huawei Cloud Side
VPC	Subnet	172.16.0.0/16	• 192.168.0.0/24 • 192.168.1.0/24
VPN gateway	Gateway IP address	1.1.1.1 (IP address of the uplink public network interface GE0/0/8 on the AR router)	• Active EIP: 1.1.1.2 • Active EIP 2: 2.2.2.2
	Interconnection subnet	-	192.168.2.0/24
VPN connection	Tunnel interface address	• Tunnel 1: 169.254.70.1/30 • Tunnel 2: 169.254.71.1/30	• Tunnel 1: 169.254.70.2/30 • Tunnel 2: 169.254.71.2/30
	IKE policy	• IKE version: IKEv2 • Authentication algorithm: SHA2-256 • Encryption algorithm: AES-128 • DH algorithm: group 14 • Lifetime (s): 86400 • Local ID: IP address • Peer ID: IP address	
	IPsec policy	• Authentication algorithm: SHA2-256 • Encryption algorithm: AES-128 • PFS: DH group 14 • Transfer protocol: ESP • Lifetime (s): 3600	

Operation Process

Figure 1-2 shows the process of using the VPN service to enable communication between the data center and VPC.

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Figure 1-2 Operation process

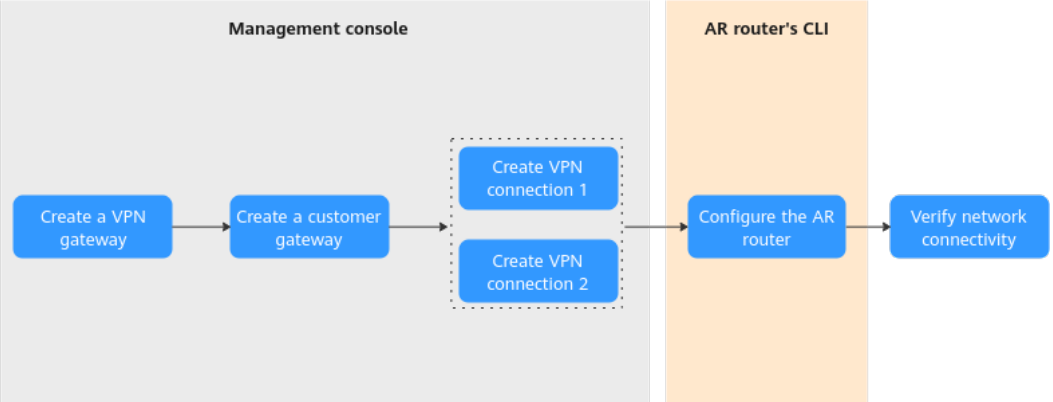

Table 1-2 Operation process description

No.	Configuration Interface	Step	Description
1	Management console	**Create a VPN gateway.**	Bind two EIPs to the VPN gateway. If you have purchased EIPs, you can directly bind them to the VPN gateway.
2		**Create a customer gateway.**	Configure the AR router as the customer gateway.
3		**Create VPN connection 1.**	Create a VPN connection between the active EIP of the VPN gateway and the customer gateway.
4		**Create VPN connection 2.**	Create a VPN connection between active EIP 2 of the VPN gateway and the customer gateway. It is recommended that the connection mode, PSK, IKE policy, and IPsec policy settings of the two VPN connections be the same.
5	Command-line interface (CLI) of the AR router	**Configure the AR router.**	• The local and remote tunnel interface addresses configured on the AR router must be the same as the customer and local tunnel interface addresses configured on the VPN console, respectively. • The connection mode, PSK, IKE policy, and IPsec policy settings on the AR router must be same as those of VPN connections.
6	-	**Verify network connectivity.**	Run the **ping** command to verify network connectivity.

1.1.1.2 Configuration on the Cloud Console

Prerequisites

A VPC and its subnets have been created on the management console.

Procedure

Step 1 Log in to Huawei Cloud management console.

Step 2 Choose **Networking** > **Virtual Private Network**.

Step 3 Configure a VPN gateway.

1. Choose **Virtual Private Network** > **Enterprise – VPN Gateways**. On the **S2C VPN Gateways** tab page, click **Buy S2C VPN Gateway**.
2. Set parameters as prompted.

   Table 1-3 describes the parameters for creating a VPN gateway.

Table 1-3 Parameters for creating a VPN gateway

Parameter	Description	Value
Name	Name of a VPN gateway.	vpngw-001
Associate With	Select **VPC**.	VPC
VPC	Huawei Cloud VPC that the on-premises data center needs to access.	vpc-001(192.168.0.0/16)
Interconnection Subnet	Subnet used for communication between the VPN gateway and the VPC of the on-premises data center. Ensure that the selected interconnection subnet has four or more assignable IP addresses.	192.168.2.0/24
Local Subnet	Huawei Cloud VPC subnet that needs to communicate with the VPC of the on-premises data center.	192.168.0.0/24 192.168.1.0/24
BGP ASN	BGP AS number.	64512
HA Mode	Working mode of the VPN gateway.	Active-active
Active EIP	EIP 1 used by the VPN gateway to communicate with the on-premises data center.	1.1.1.2
Active EIP 2	EIP 2 used by the VPN gateway to communicate with the on-premises data center.	2.2.2.2

Step 4 Configure a customer gateway.

1. Choose **Virtual Private Network** > **Enterprise – Customer Gateways**, and click **Create Customer Gateway**.
2. Set parameters as prompted.

   Table 1-4 describes the parameters for creating a customer gateway.

   Table 1-4 Parameters for creating a customer gateway

Parameter	Description	Value
Name	Name of a customer gateway.	cgw-ar
Identifier	Select **IP Address**, and enter the public IP address of the AR router.	IP Address 1.1.1.1
BGP ASN	ASN of your on-premises data center or private network. The value must be different from the BGP ASN of the VPN gateway.	65000

Step 5 Configure VPN connections.

In this scenario, a VPN connection is created between the AR router and each of the active EIP and active EIP 2 of the VPN gateway.

1. Choose **Virtual Private Network** > **Enterprise – VPN Connections**, and click **Create VPN Connection**.
1. Create VPN connection 1.

   Table 1-5 describes the parameters for creating a VPN connection.

   Table 1-5 Parameter settings for VPN connection 1

Parameter	Description	Value
Name	Name of a VPN connection.	vpn-001
VPN Gateway	VPN gateway for which the VPN connection is created.	vpngw-001
Gateway IP Address	Active EIP bound to the VPN gateway.	1.1.1.2
Customer Gateway	Name of a customer gateway.	cgw-ar
VPN Type	Select **Static routing**.	Static routing

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Parameter	Description	Value
Customer Subnet	Subnet in the on-premises data center that needs to access the VPC on Huawei Cloud. – A customer subnet cannot be included in any local subnet or any subnet of the VPC to which the VPN gateway is attached. – Reserved VPC CIDR blocks such as 100.64.0.0/10 and 214.0.0.0/8 cannot be used as customer subnets.	172.16.0.0/16
Interface IP Address Assignment	– Manually specify In this example, **Manually specify** is selected. – Automatically assign	Manually specify
Local Tunnel Interface Address	Tunnel IP address of the VPN gateway.	169.254.70.2/30
Customer Tunnel Interface Address	Tunnel IP address of the customer gateway.	169.254.70.1/30
Link Detection	Whether to enable route reachability detection in multi-link scenarios. When NQA is enabled, ICMP packets are sent for detection and your device needs to respond to these ICMP packets. The VPN gateway can automatically perform NQA detection on the peer interface address that has been configured on the customer gateway.	**NQA** enabled
PSK, Confirm PSK	The value must be the same as the PSK of the connection configured on the customer gateway device.	*Set this parameter based on the site requirements.*

Parameter	Description	Value
Policy Settings	The policy settings must be the same as those on the firewall.	– IKE Policy ▪ Version: v2 ▪ Authentication Algorithm: SHA2-256 ▪ Encryption Algorithm: AES-128 ▪ DH Algorithm: Group 14 ▪ Lifetime (s): 86400 ▪ Local ID: IP Address ▪ Customer ID: IP Address – IPsec Policy ▪ Authentication Algorithm: SHA2-256 ▪ Encryption Algorithm: AES-128 ▪ PFS: DH group 14 ▪ Transfer Protocol: ESP ▪ Lifetime (s): 3600

2. Create VPN connection 2.

NOTE

For VPN connection 2, you are advised to use the same parameter settings as VPN connection 1, except the parameters listed in the following table.

Table 1-6 Parameter settings for VPN connection 2

Parameter	Description	Value
Name	Name of a VPN connection.	vpn-002
Gateway IP Address	Active EIP 2 bound to the VPN gateway.	2.2.2.2
Local Tunnel Interface Address	Tunnel IP address of the VPN gateway.	169.254.71.2/30
Customer Tunnel Interface Address	Tunnel IP address of the customer gateway.	169.254.71.1/30

----End

1.1.1.3 Configuration on the AR Router

Procedure

Step 1 Log in to the AR router.

Step 2 Enter the system view.

```
<AR651>system-view
```

Step 3 Configure an IP address for the WAN interface.

```
[AR651]interface GigabitEthernet 0/0/8
[AR651-GigabitEthernet0/0/8]ip address 1.1.1.1 255.255.255.0
[AR651-GigabitEthernet0/0/8]quit
```

Step 4 Configure a default route.

```
[AR651]ip route-static 0.0.0.0 0.0.0.0 1.1.1.254
```

In this command, 1.1.1.254 is the gateway address for the AR router's public IP address. Replace it with the actual gateway address.

Step 5 Configure routes to the active EIP and active EIP 2 of the VPN gateway.

```
[AR651]ip route-static 1.1.1.2 255.255.255.255 1.1.1.254
[AR651]ip route-static 2.2.2.2 255.255.255.255 1.1.1.254
```

- 1.1.1.2 and 2.2.2.2 are the active EIP and active EIP 2 of the VPN gateway, respectively.
- 1.1.1.254 is the gateway address for the AR router's public IP address.

Step 6 Enable the SHA-2 algorithm to be compatible with the standard RFC algorithms.

```
[AR651]IPsec authentication sha2 compatible enable
```

Step 7 Configure an IPsec proposal.

```
[AR651]IPsec proposal hwproposal1
[AR651-IPsec-proposal-hwproposal1]esp authentication-algorithm sha2-256
[AR651-IPsec-proposal-hwproposal1]esp encryption-algorithm aes-128
[AR651-IPsec-proposal-hwproposal1]quit
```

Step 8 Configure an IKE proposal.

```
[AR651]ike proposal 2
[AR651-ike-proposal-2]encryption-algorithm aes-128
[AR651-ike-proposal-2]dh Group14
[AR651-ike-proposal-2]authentication-algorithm sha2-256
[AR651-ike-proposal-2]authentication-method pre-share
[AR651-ike-proposal-2]integrity-algorithm hmac-sha2-256
[AR651-ike-proposal-2]prf hmac-sha2-256
[AR651-ike-proposal-2]quit
```

Step 9 Configure IKE peers.

```
[AR651]ike peer hwpeer1
[AR651-ike-peer-hwpeer1]undo version 1
[AR651-ike-peer-hwpeer1]pre-shared-key cipher Test@123
[AR651-ike-peer-hwpeer1]ike-proposal 2
[AR651-ike-peer-hwpeer1]local-address 1.1.1.1
[AR651-ike-peer-hwpeer1]remote-address 1.1.1.2
[AR651-ike-peer-hwpeer1]rsa encryption-padding oaep
[AR651-ike-peer-hwpeer1]rsa signature-padding pss
[AR651-ike-peer-hwpeer1]ikev2 authentication sign-hash sha2-256
[AR651-ike-peer-hwpeer1]quit
#
[AR651]ike peer hwpeer2
[AR651-ike-peer-hwpeer2]undo version 1
[AR651-ike-peer-hwpeer2]pre-shared-key cipher Test@123
[AR651-ike-peer-hwpeer2]ike-proposal 2
[AR651-ike-peer-hwpeer2]local-address 1.1.1.1
[AR651-ike-peer-hwpeer2]remote-address 2.2.2.2
[AR651-ike-peer-hwpeer2]rsa encryption-padding oaep
```

```
[AR651-ike-peer-hwpeer2]rsa signature-padding pss
[AR651-ike-peer-hwpeer2]ikev2 authentication sign-hash sha2-256
[AR651-ike-peer-hwpeer2]quit
```

The commands are described as follows:

- **ike peer hwpeer1** and **ike peer hwpeer2**: correspond to two VPN connections.
- **pre-shared-key cipher**: specifies a pre-shared key.
- **local-address**: specifies the public IP address of the AR router.
- **remote-address**: specifies the active EIP or active EIP 2 of the VPN gateway.

Step 10 Configure an IPsec profile.

```
[AR651]IPsec profile hwpro1
[AR651-IPsec-profile-hwpro1]ike-peer hwpeer1
[AR651-IPsec-profile-hwpro1]proposal hwproposal1
[AR651-IPsec-profile-hwpro1]pfs dh-Group14
[AR651-IPsec-profile-hwpro1]quit
#
[AR651]IPsec profile hwpro2
[AR651-IPsec-profile-hwpro2]ike-peer hwpeer2
[AR651-IPsec-profile-hwpro2]proposal hwproposal1
[AR651-IPsec-profile-hwpro2]pfs dh-Group14
[AR651-IPsec-profile-hwpro2]quit
```

Step 11 Configure virtual tunnel interfaces.

```
[AR651]interface Tunnel0/0/1
[AR651-Tunnel0/0/1]mtu 1400
[AR651-Tunnel0/0/1]ip address 169.254.70.1 255.255.255.252
[AR651-Tunnel0/0/1]tunnel-protocol IPsec
[AR651-Tunnel0/0/1]source 1.1.1.1
[AR651-Tunnel0/0/1]destination 1.1.1.2
[AR651-Tunnel0/0/1]IPsec profile hwpro1
[AR651-Tunnel0/0/1]quit
#
[AR651]interface Tunnel0/0/2
[AR651-Tunnel0/0/2]mtu 1400
[AR651-Tunnel0/0/2]ip address 169.254.71.1 255.255.255.252
```

```
[AR651-Tunnel0/0/2]tunnel-protocol IPsec
[AR651-Tunnel0/0/2]source 1.1.1.1
[AR651-Tunnel0/0/2]destination 2.2.2.2
[AR651-Tunnel0/0/2]IPsec profile hwpro2
[AR651-Tunnel0/0/2]quit
```

The commands are described as follows:

- **interface Tunnel0/0/1** and **interface Tunnel0/0/2**: indicate the tunnel interfaces corresponding to the two VPN connections.

  In this example, Tunnel0/0/1 establishes a VPN connection with the active EIP of the VPN gateway, and Tunnel0/0/2 establishes a VPN connection with active EIP 2 of the VPN gateway.
- **ip address**: configures an IP address for a tunnel interface on the AR router.
- **source**: specifies the public IP address of the AR router.
- **destination**: specifies the active EIP or active EIP 2 of the VPN gateway.

Step 12 Configure NQA.

```
[AR651]nqa test-instance IPsec_nqa1 IPsec_nqa1
[AR651-nqa-IPsec_nqa1-IPsec_nqa1]test-type icmp
[AR651-nqa-IPsec_nqa1-IPsec_nqa1]destination-address ipv4 169.254.70.2
[AR651-nqa-IPsec_nqa1-IPsec_nqa1]source-address ipv4 169.254.70.1
[AR651-nqa-IPsec_nqa1-IPsec_nqa1]frequency 15
[AR651-nqa-IPsec_nqa1-IPsec_nqa1]ttl 255
[AR651-nqa-IPsec_nqa1-IPsec_nqa1]start now
[AR651-nqa-IPsec_nqa1-IPsec_nqa1]quit
#
[AR651]nqa test-instance IPsec_nqa2 IPsec_nqa2
[AR651-nqa-IPsec_nqa2-IPsec_nqa2]test-type icmp
[AR651-nqa-IPsec_nqa2-IPsec_nqa2]destination-address ipv4 169.254.71.2
[AR651-nqa-IPsec_nqa2-IPsec_nqa2]source-address ipv4 169.254.71.1
[AR651-nqa-IPsec_nqa2-IPsec_nqa2]frequency 15
[AR651-nqa-IPsec_nqa2-IPsec_nqa2]ttl 255
[AR651-nqa-IPsec_nqa2-IPsec_nqa2]start now
[AR651-nqa-IPsec_nqa2-IPsec_nqa2]quit
```

The commands are described as follows:

- **nqa test-instance IPsec_nqa1 IPsec_nqa1** and **nqa test-instance IPsec_nqa2 IPsec_nqa2**: configure two NQA test instances named **IPsec_nqa1** and **IPsec_nqa2**.

In this example, the test instance **IPsec_nqa1** is created for the VPN connection to which the active EIP of the VPN gateway belongs; the test instance **IPsec_nqa2** is created for the VPN connection to which active EIP 2 of the VPN gateway belongs.

- **destination-address**: specifies the tunnel interface address of the VPN gateway.
- **source-address**: specifies the tunnel interface address of the AR router.

Step 13 Configure association between the static route and NQA.

```
[AR651]ip route-static 192.168.0.0 255.255.255.0 Tunnel0/0/1 track nqa IPsec_nqa1 IPsec_nqa1
[AR651]ip route-static 192.168.1.0 255.255.255.0 Tunnel0/0/1 track nqa IPsec_nqa1 IPsec_nqa1
[AR651]ip route-static 192.168.0.0 255.255.255.0 Tunnel0/0/2 preference 100 track nqa IPsec_nqa2 IPsec_nqa2
[AR651]ip route-static 192.168.1.0 255.255.255.0 Tunnel0/0/2 preference 100 track nqa IPsec_nqa2 IPsec_nqa2
```

The parameters are described as follows:

- **192.168.0.0** and **192.168.1.0**: indicate VPC subnets.
  - Association between the static route and NQA needs to be configured for each subnet.
  - **Tunnel***x* and **IPsec_nqa***x* in the same command correspond to the same VPN connection.
- **preference 100** indicates the route preference. If this parameter is not specified, the default value 60 is used.

  In this example, the two VPN connections work in active-active mode, and traffic is preferentially transmitted through the VPN connection to which the active EIP of the VPN gateway belongs.

  To load balance traffic between the two VPN connections, delete **preference 100** from the preceding configuration.

----End

1.1.1.4 Verification

- About 5 minutes later, check states of the VPN connections.
  - Cloud console

    Choose **Virtual Private Network** > **Enterprise – VPN Connections**. The states of the two VPN connections are both **Normal**.
  - AR router

    Choose **Advanced** > **VPN** > **IPSec** > **IPSec Policy Management**. The states of the two VPN connections are both **READY|STAYLIVE**.
- Verify that servers in the on-premises data center and ECSs in the VPC subnet can ping each other.

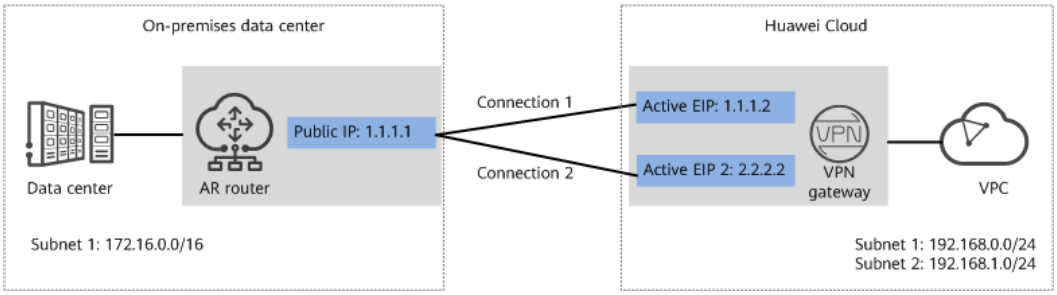
1.1.2 BGP Routing Mode

1.1.2.1 Operation Guide

Scenario

Figure 1-3 shows the typical networking where a VPN gateway connects to the Huawei AR router in an on-premises data center in BGP routing mode.

Figure 1-3 Typical networking diagram



In this scenario, the AR router has only one IP address, and the VPN gateway uses the active-active mode. A VPN connection is created between each of the two active EIPs of the VPN gateway and the IP address of the AR router.

Limitations and Constraints

VPN and AR routers support different authentication and encryption algorithms. When creating connections, ensure that the policy settings at both ends are the same.

Data Plan

Table 1-7 Data plan

Category	Item	Example Value for the AR Router	Example Value for the Huawei Cloud Side
VPC	Subnet	172.16.0.0/16	192.168.0.0/24 192.168.1.0/24
VPN gateway	Gateway IP address	1.1.1.1 (IP address of the uplink public network interface GE0/0/8 on the AR router)	Active EIP: 1.1.1.2 Active EIP 2: 2.2.2.2
	Interconnection subnet	-	192.168.2.0/24
	BGP ASN	64515	64512

Category	Item	Example Value for the AR Router	Example Value for the Huawei Cloud Side
VPN connection	Tunnel interface address	• Tunnel 1: 169.254.70.1/30 • Tunnel 2: 169.254.71.1/30	• Tunnel 1: 169.254.70.2/30 • Tunnel 2: 169.254.71.2/30
	IKE policy	• IKE version: IKEv2 • Authentication algorithm: SHA2-256 • Encryption algorithm: AES-128 • DH algorithm: group 14 • Lifetime (s): 86400 • Local ID: IP address • Peer ID: IP address	
	IPsec policy	• Authentication algorithm: SHA2-256 • Encryption algorithm: AES-128 • PFS: DH group 14 • Transfer protocol: ESP • Lifetime (s): 3600	

Operation Process

Figure 1-4 shows the process of using the VPN service to enable communication between the data center and VPC.

Figure 1-4 Operation process

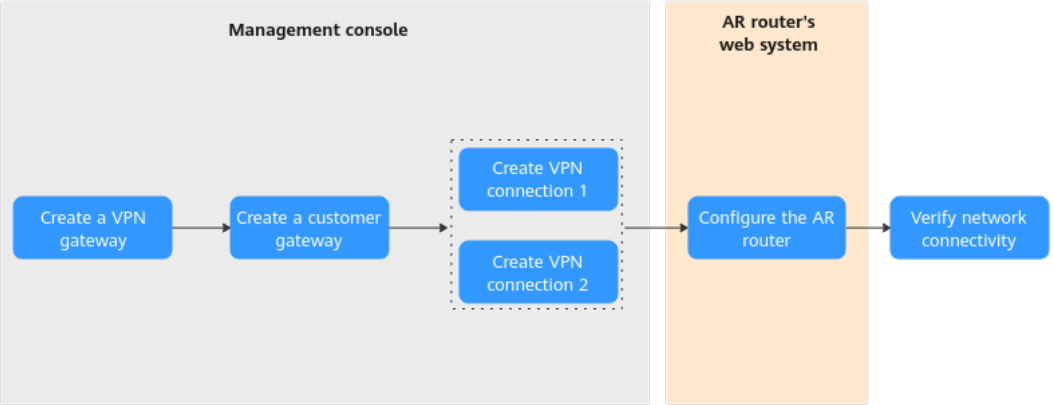


Table 1-8 Operation process description

No.	Configuration Interface	Step	Description
1	Management console	**Create a VPN gateway.**	Bind two EIPs to the VPN gateway. If you have purchased EIPs, you can directly bind them to the VPN gateway.
2		**Create a customer gateway.**	Configure the AR router as the customer gateway.
3		**Create VPN connection 1.**	Create a VPN connection between the active EIP of the VPN gateway and the customer gateway.
4		**Create VPN connection 2.**	Create a VPN connection between active EIP 2 of the VPN gateway and the customer gateway. It is recommended that the connection mode, PSK, IKE policy, and IPsec policy settings of the two VPN connections be the same.
5	CLI of the AR router	**Configure the AR router.**	• The local and remote tunnel interface addresses configured on the AR router must be the same as the customer and local tunnel interface addresses configured on the VPN console, respectively. • The connection mode, PSK, IKE policy, and IPsec policy settings on the AR router must be same as those of VPN connections.
6	-	**Verify network connectivity.**	Run the **ping** command to verify network connectivity.

1.1.2.2 Configuration on the Cloud Console

Prerequisites

A VPC and its subnets have been created on the management console.

Procedure

Step 1 Log in to Huawei Cloud management console.

Step 2 Choose **Networking** > **Virtual Private Network**.

Step 3 Configure a VPN gateway.

1. Choose **Virtual Private Network** > **Enterprise – VPN Gateways**. On the **S2C VPN Gateways** tab page, click **Buy S2C VPN Gateway**.
2. Set parameters as prompted and click **Buy Now**.

   Table 1-9 only describes the key parameters for creating a VPN gateway. For other parameters, use their default settings.

Table 1-9 Key parameters for creating a VPN gateway

Parameter	Description	Value
Name	Name of a VPN gateway.	vpngw-001
Associate With	Select **VPC**.	VPC
VPC	Huawei Cloud VPC that the on-premises data center needs to access.	vpc-001(192.168.0.0/16)
Interconnection Subnet	Subnet used for communication between the VPN gateway and the VPC of the on-premises data center. Ensure that the selected interconnection subnet has four or more assignable IP addresses.	192.168.2.0/24
Local Subnet	Huawei Cloud VPC subnet that needs to communicate with the VPC of the on-premises data center.	192.168.0.0/24 192.168.1.0/24
BGP ASN	BGP AS number.	64512
HA Mode	Working mode of the VPN gateway.	Active-active
Active EIP	EIP 1 used by the VPN gateway to communicate with the on-premises data center.	1.1.1.2
Active EIP 2	EIP 2 used by the VPN gateway to communicate with the on-premises data center.	2.2.2.2

Step 4 Configure a customer gateway.

1. Choose **Virtual Private Network** > **Enterprise – Customer Gateways**, and click **Create Customer Gateway**.
2. Set parameters as prompted.

   Table 1-10 describes the parameters for creating a customer gateway.

Table 1-10 Parameters for creating a customer gateway

Parameter	Description	Value
Name	Name of a customer gateway.	cgw-ar

Parameter	Description	Value
Identifier	Select **IP Address**, and enter the public IP address of the AR router.	IP Address 1.1.1.1
BGP ASN	BGP AS number of the AR router.	65000

Step 5 Configure VPN connections.

In this scenario, a VPN connection is created between the AR router and each of the active EIP and active EIP 2 of the VPN gateway.

1. Choose **Virtual Private Network** > **Enterprise – VPN Connections**, and click **Create VPN Connection**.

1. Create VPN connection 1.

   Table 1-11 describes the parameters for creating a VPN connection.

Table 1-11 Parameter settings for VPN connection 1

Parameter	Description	Value
Name	Name of a VPN connection.	vpn-001
VPN Gateway	VPN gateway for which the VPN connection is created.	vpngw-001
Gateway IP Address	Active EIP bound to the VPN gateway.	1.1.1.2
Customer Gateway	Name of a customer gateway.	cgw-ar
VPN Type	Select **BGP routing**.	BGP routing
Customer Subnet	Subnet in the on-premises data center that needs to access the VPC on Huawei Cloud. – A customer subnet cannot be included in any local subnet or any subnet of the VPC to which the VPN gateway is attached. – Reserved VPC CIDR blocks such as 100.64.0.0/10 and 214.0.0.0/8 cannot be used as customer subnets.	172.16.0.0/16
Interface IP Address Assignment	– Manually specify In this example, **Manually specify** is selected. – Automatically assign	Manually specify

Parameter	Description	Value
Local Tunnel Interface Address	Tunnel IP address of the VPN gateway.	169.254.70.2/30
Customer Tunnel Interface Address	Tunnel IP address of the customer gateway.	169.254.70.1/30
PSK, Confirm PSK	The value must be the same as the PSK of the connection configured on the firewall.	*Set this parameter based on the site requirements.*
Policy Settings	The policy settings must be the same as those on the firewall.	– IKE Policy ▪ Version: v2 ▪ Authentication Algorithm: SHA2-256 ▪ Encryption Algorithm: AES-128 ▪ DH Algorithm: Group 14 ▪ Lifetime (s): 86400 ▪ Local ID: IP Address ▪ Customer ID: IP Address – IPsec Policy ▪ Authentication Algorithm: SHA2-256 ▪ Encryption Algorithm: AES-128 ▪ PFS: DH group 14 ▪ Transfer Protocol: ESP ▪ Lifetime (s): 3600

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2. Create VPN connection 2.

NOTE

For VPN connection 2, you are advised to use the same parameter settings as VPN connection 1, except the parameters listed in the following table.

Table 1-12 Parameter settings for VPN connection 2

Parameter	Description	Value
Name	Name of a VPN connection.	vpn-002
Gateway IP Address	Active EIP 2 bound to the VPN gateway.	2.2.2.2
Local Tunnel Interface Address	Tunnel IP address of the VPN gateway.	169.254.71.2/30
Customer Tunnel Interface Address	Tunnel IP address of the customer gateway.	169.254.71.1/30

----End

1.1.2.3 Configuration on the AR Router

Prerequisites

- The uplink public network interface GE0/0/8 of the AR router has been configured. Assume that the public IP address of the interface is 1.1.1.1.
- The downlink private network interface GE0/0/1 of the AR router has been configured. Assume that the private IP address of the interface is 172.16.0.1.

Procedure

Step 1 Log in to the web system of the AR router.

An AR651 running V300R019C13SPC200 is used as an example. The web system may vary according to the device model and software version.

Step 2 Complete basic settings.

Choose **Advanced** > **IP** > **Routing** > **Static Route Configuration**. In the **IPv4 Static Route** area, configure static routes to the active EIP and active EIP 2 of the VPN gateway, and click **Add**, as shown in **Figure 1-5**.

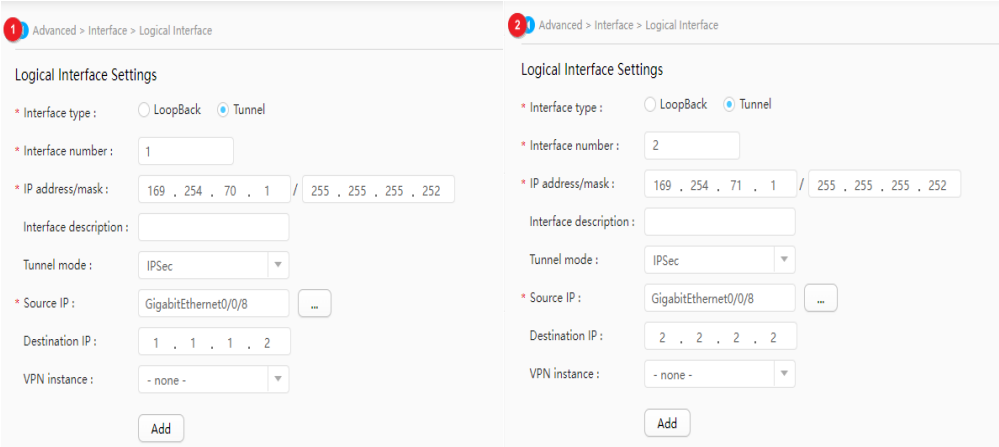
Figure 1-5 Configuring static routes

Step 3 Configure tunnel interfaces.

1. Choose **Advanced** > **Interface** > **Logical Interface**.
2. Configure two tunnel interfaces and click **Add**.

   Figure 1-6 shows the key parameter settings.

Figure 1-6 Configuring tunnel interfaces



Step 4 Configure VPN connections.

1. Choose **Advanced** > **VPN** > **IPSec** > **IPSec Policy Management**.
2. Configure the IKE and IPsec policies for the two tunnels, as shown in **Figure 1-7** and **Figure 1-8**.

NOTE

- When IKEv1 is used for IPsec negotiation, if the traffic hard lifetime is set to 0 on either device, both the local and remote devices disable the traffic timeout function.
- When IKEv2 is used for IPsec negotiation, if the traffic hard lifetime is set to 0 on a device, this device disables the traffic timeout function.

Figure 1-7 Configuring VPN connection 1

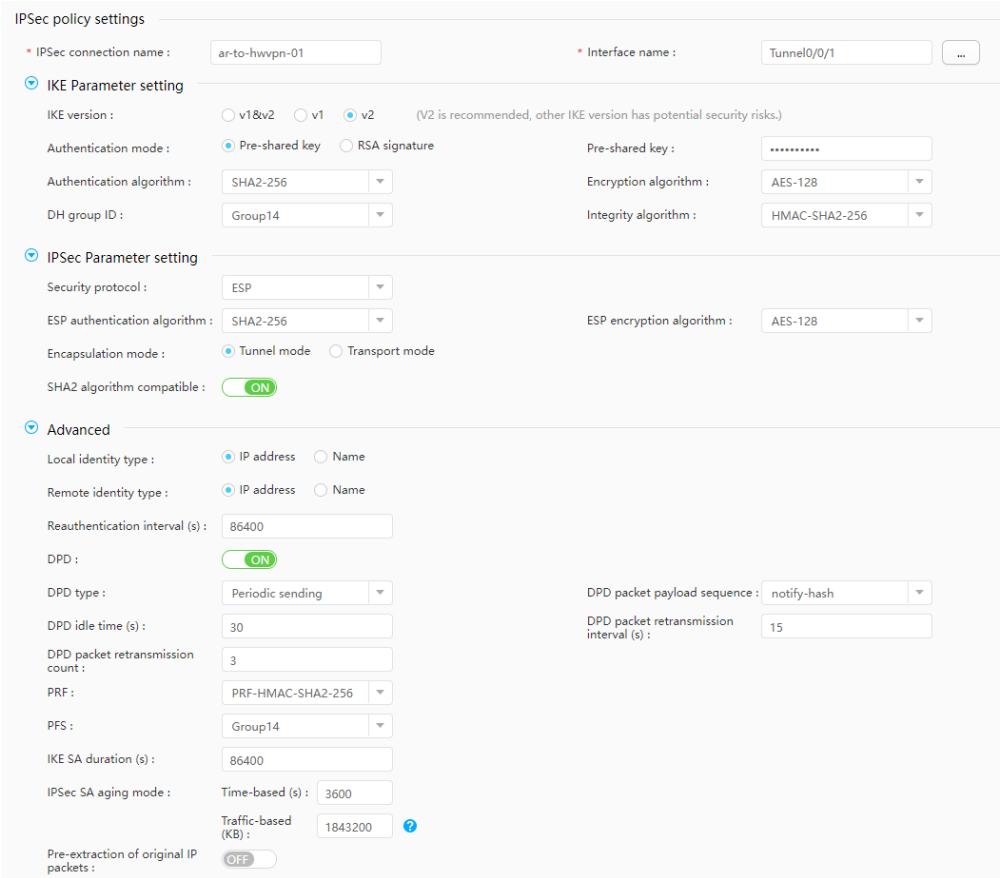
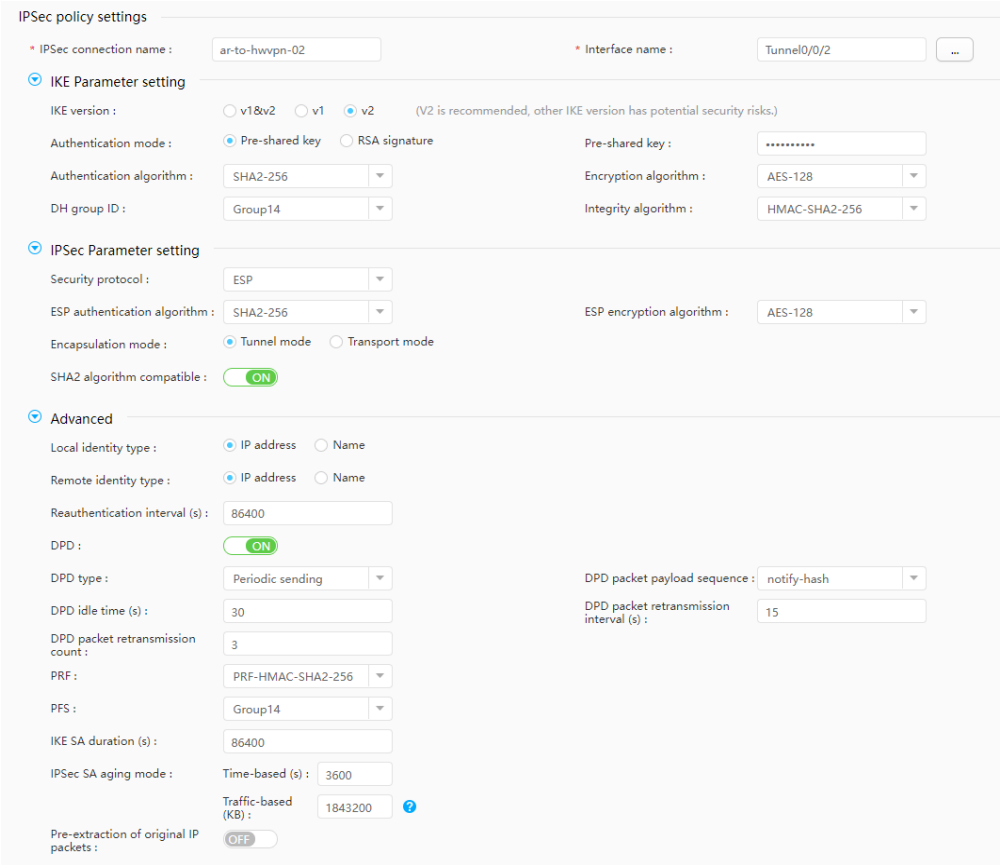


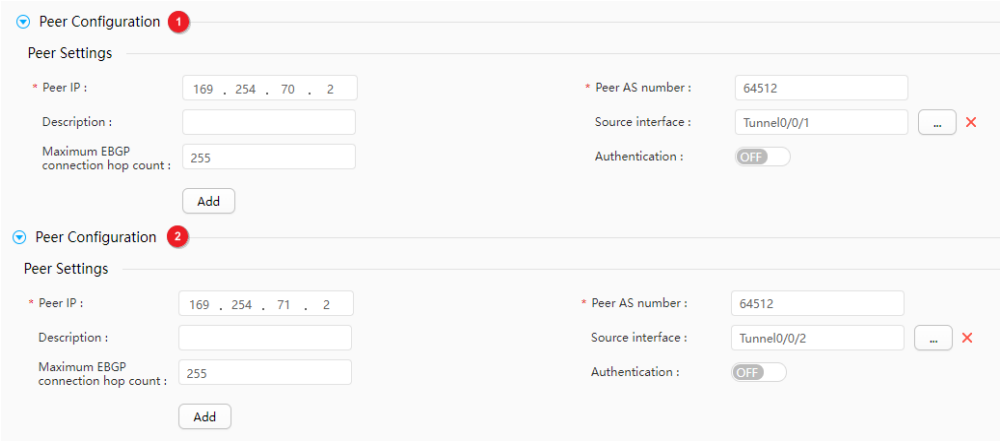
Figure 1-8 Configuring VPN connection 2



Step 5 Configure BGP.

1. Choose **Advanced** > **IP** > **Routing** > **Dynamic Route Configuration** > **BGP**.
2. Toggle on **Enable BGP**, set **AS Number** to the BGP ASN of the AR router, set **Router ID** to the gateway address of the downlink private network interface on the AR router, and click **Apply**.
3. Configure BGP peers, as shown in **Figure 1-9**.

Figure 1-9 Configuring BGP peers



4. In the **Route Import Configuration** area, set **Protocol type** to **Direct**.

----End

1.1.2.4 Verification

- About 5 minutes later, check states of the VPN connections.
  - Huawei Cloud

    Choose **Virtual Private Network** > **Enterprise – VPN Connections**. The states of the two VPN connections are both **Normal**.
  - AR router

    Choose **Advanced** > **VPN** > **IPSec** > **IPSec Policy Management**. The states of the two VPN connections are both **READY|STAYLIVE**.
- Verify that servers in the on-premises data center and ECSs in the Huawei Cloud VPC subnets can ping each other.

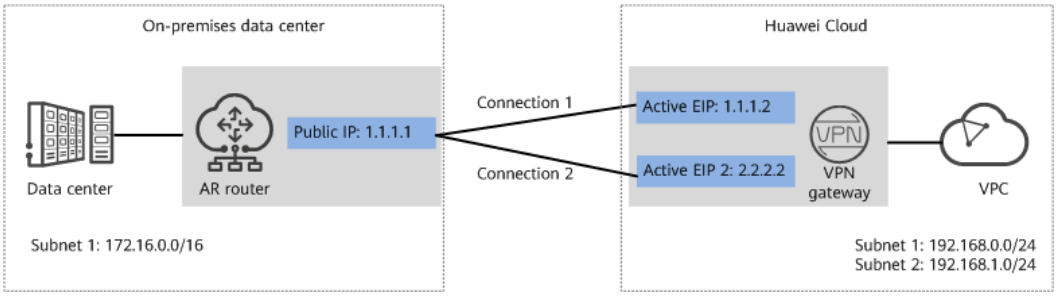
1.1.3 Policy-based Mode

1.1.3.1 Operation Guide

Scenario

Figure 1-10 shows the typical networking where a VPN gateway connects to the Huawei AR router in an on-premises data center in policy-based mode.

Figure 1-10 Typical networking diagram



In this scenario, the AR router has only one IP address, and the VPN gateway uses the active-active mode. A VPN connection is created between each of the two active EIPs of the VPN gateway and the IP address of the AR router.

Limitations and Constraints

VPN and AR routers support different authentication and encryption algorithms. When creating connections, ensure that the policy settings at both ends are the same.

Data Plan

Table 1-13 Data plan

Category	Item	Example Value for the AR Router	Example Value for the Huawei Cloud Side
VPC	Subnet	172.16.0.0/16	• 192.168.0.0/24 • 192.168.1.0/24
VPN gateway	Gateway IP address	1.1.1.1 (IP address of the uplink public network interface GE0/0/8 on the AR router)	• Active EIP: 1.1.1.2 • Active EIP 2: 2.2.2.2
	Interconnection subnet	-	192.168.2.0/24
VPN connection	IKE policy	• IKE version: IKEv2 • Authentication algorithm: SHA2-256 • Encryption algorithm: AES-128 • DH algorithm: group 14 • Lifetime (s): 86400 • Local ID: IP address • Peer ID: IP address	
	IPsec policy	• Authentication algorithm: SHA2-256 • Encryption algorithm: AES-128 • PFS: DH group 14 • Transfer protocol: ESP • Lifetime (s): 3600	

Operation Process

Figure 1-11 shows the process of using the VPN service to enable communication between the data center and VPC.

Figure 1-11 Operation process

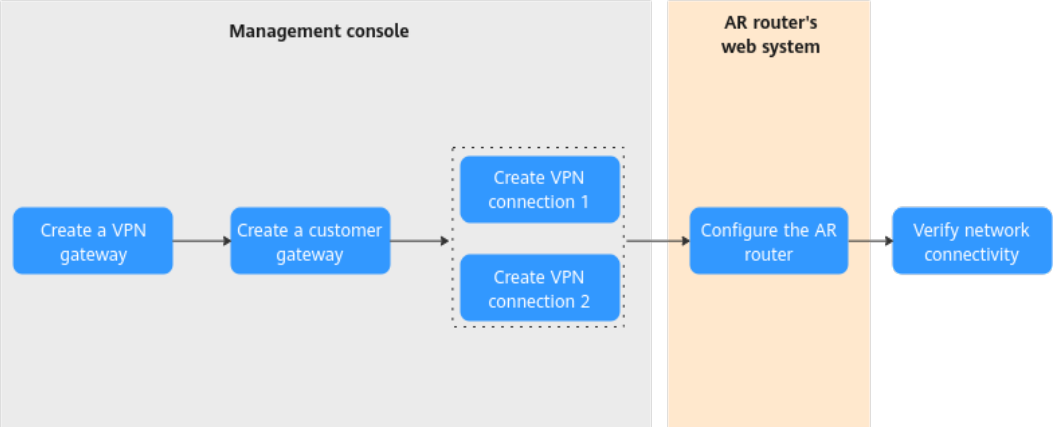


Table 1-14 Operation process description

No.	Configuration Interface	Step	Description
1	Management console	**Create a VPN gateway.**	Bind two EIPs to the VPN gateway. If you have purchased EIPs, you can directly bind them to the VPN gateway.
2		**Create a customer gateway.**	Configure the AR router as the customer gateway.
3		**Create VPN connection 1.**	Create a VPN connection between the active EIP of the VPN gateway and the customer gateway.
4		**Create VPN connection 2.**	Create a VPN connection between active EIP 2 of the VPN gateway and the customer gateway. It is recommended that the connection mode, PSK, IKE policy, and IPsec policy settings of the two VPN connections be the same.
5	CLI of the AR router	**Configure the AR router.**	• The local and remote tunnel interface addresses configured on the AR router must be the same as the customer and local tunnel interface addresses configured on the VPN console, respectively. • The connection mode, PSK, IKE policy, and IPsec policy settings on the AR router must be same as those of VPN connections.
6	-	**Verify network connectivity.**	Run the **ping** command to verify network connectivity.

1.1.3.2 Configuration on the Cloud Console

Prerequisites

A VPC and its subnets have been created on the management console.

Procedure

Step 1 Log in to Huawei Cloud management console.

Step 2 Choose **Networking** > **Virtual Private Network**.

Step 3 Configure a VPN gateway.

1. Choose **Virtual Private Network** > **Enterprise – VPN Gateways**. On the **S2C VPN Gateways** tab page, click **Buy S2C VPN Gateway**.
2. Set parameters as prompted and click **Buy Now**.

   Table 1-15 only describes the key parameters for configuring a VPN gateway. For other parameters, use their default settings.

Table 1-15 Key parameters for creating a VPN gateway

Parameter	Description	Value
Name	Name of a VPN gateway.	vpngw-001
Associate With	Select **VPC**.	VPC
VPC	Huawei Cloud VPC that the on-premises data center needs to access.	vpc-001(192.168.0.0/16)
Interconnection Subnet	Subnet used for communication between the VPN gateway and the VPC of the on-premises data center. Ensure that the selected interconnection subnet has four or more assignable IP addresses.	192.168.2.0/24
Local Subnet	Huawei Cloud VPC subnet that needs to communicate with the VPC of the on-premises data center.	192.168.0.0/24 192.168.1.0/24
BGP ASN	BGP AS number.	64512
HA Mode	Working mode of the VPN gateway.	Active-active
Active EIP	EIP 1 used by the VPN gateway to communicate with the on-premises data center.	1.1.1.2

Parameter	Description	Value
Standby EIP	EIP 2 used by the VPN gateway to communicate with the on-premises data center.	2.2.2.2

Step 4 Configure a customer gateway.

1. Choose **Virtual Private Network** > **Enterprise – Customer Gateways**, and click **Create Customer Gateway**.
2. Set parameters as prompted.

   Table 1-16 describes the parameters for creating a customer gateway.

Table 1-16 Parameters for creating a customer gateway

Parameter	Description	Value
Name	Name of a customer gateway.	cgw-ar
Identifier	Select **IP Address**, and enter the public IP address of the AR router.	IP Address 1.1.1.1
BGP ASN	BGP AS number of the AR router.	65000

Step 5 Configure VPN connections.

In this scenario, a VPN connection is created between the AR router and each of the active EIP and active EIP 2 of the VPN gateway.

1. Choose **Virtual Private Network** > **Enterprise – VPN Connections**, and click **Buy VPN Connection**.
2. Create VPN connection 1.

   Table 1-17 describes the parameters for creating a VPN connection.

Table 1-17 Parameter settings for VPN connection 1

Parameter	Description	Value
Name	Name of a VPN connection.	vpn-001
VPN Gateway	VPN gateway for which the VPN connection is created.	vpngw-001
Gateway IP Address	Active EIP bound to the VPN gateway.	1.1.1.2
Customer Gateway	Name of a customer gateway.	cgw-ar
VPN Type	Select **Policy-based**.	Policy-based

Parameter	Description	Value
Customer Subnet	Subnet in the on-premises data center that needs to access the VPC on Huawei Cloud. – A customer subnet cannot be included in any local subnet or any subnet of the VPC to which the VPN gateway is attached. – Reserved VPC CIDR blocks such as 100.64.0.0/10 and 214.0.0.0/8 cannot be used as customer subnets.	172.16.0.0/16
PSK, Confirm PSK	The value must be the same as the PSK of the connection configured on the customer gateway device.	*Set this parameter based on the site requirements.*
Policy	A policy rule defines the data flow that enters the encrypted VPN connection between the local and customer subnets. You need to configure the source and destination CIDR blocks in each policy rule. – Source CIDR Block The source CIDR block must contain some local subnets. 0.0.0.0/0 indicates any address. – Destination CIDR Block The destination CIDR block must contain all customer subnets.	– Source CIDR block 1: 192.168.0.0/24 – Destination CIDR block 1: 172.16.0.0/16 – Source CIDR block 2: 192.168.1.0/24 – Destination CIDR block 2: 172.16.0.0/16

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Parameter	Description	Value
Policy Settings	The policy settings must be the same as those on the firewall.	– IKE Policy ▪ Version: v2 ▪ Authentication Algorithm: SHA2-256 ▪ Encryption Algorithm: AES-128 ▪ DH Algorithm: Group 14 ▪ Lifetime (s): 86400 ▪ Local ID: IP Address ▪ Customer ID: IP Address – IPsec Policy ▪ Authentication Algorithm: SHA2-256 ▪ Encryption Algorithm: AES-128 ▪ PFS: DH group 14 ▪ Transfer Protocol: ESP ▪ Lifetime (s): 3600

3. Create VPN connection 2.

NOTE

For VPN connection 2, you are advised to use the same parameter settings as VPN connection 1, except the parameters listed in the following table.

Table 1-18 Parameter settings for VPN connection 2

Parameter	Description	Value
Name	Name of a VPN connection.	vpn-002
Gateway IP Address	Active EIP 2 bound to the VPN gateway.	2.2.2.2

----End

1.1.3.3 Configuration on the AR Router

Prerequisites

- The WAN interface GE0/0/8 on the AR router has been configured. Assume that the public IP address of the WAN interface is 1.1.1.1.
- The LAN interface GE0/0/1 on the AR router has been configured. Assume that the public IP address of the LAN interface is 172.16.0.1.

Procedure

Step 1 Log in to the web system of the AR router.

An AR651 running V300R019C13SPC200 is used as an example. The web system may vary according to the device model and software version.

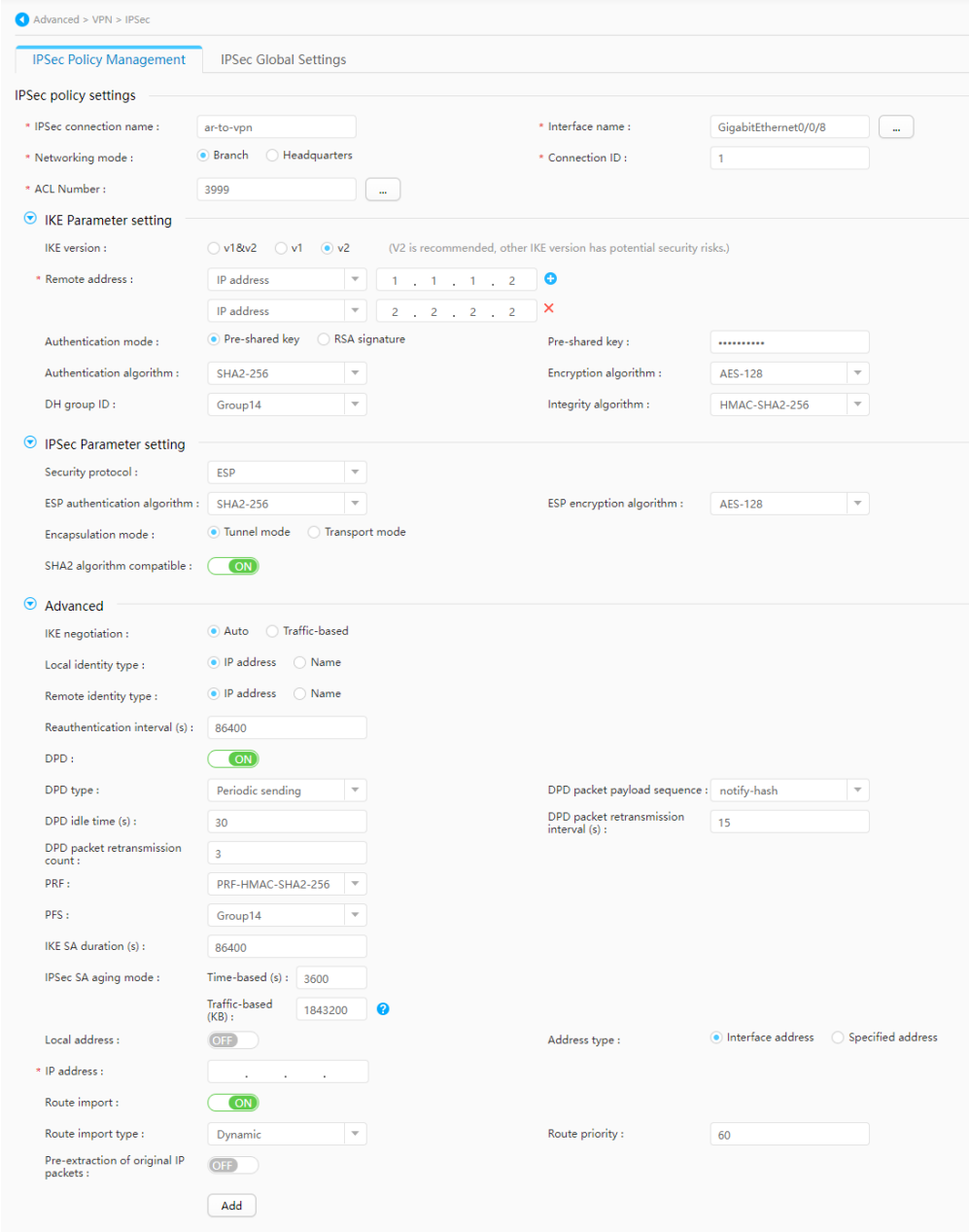
Step 2 Configure VPN connections.

1. Choose **Advanced** > **VPN** > **IPSec** > **IPSec Policy Management**.
2. Configure the IKE and IPsec policies, as shown in **Figure 1-12**.

NOTE

- When IKEv1 is used for IPsec negotiation, if the traffic hard lifetime is set to 0 on either device, both the local and remote devices disable the traffic timeout function.
- When IKEv2 is used for IPsec negotiation, if the traffic hard lifetime is set to 0 on a device, this device disables the traffic timeout function.
- If the AR router uses a non-fixed IP address to connect to the VPN gateway, click **Advanced**, set **Local identity type** to **Name**, and enter the customer gateway identifier configured on the cloud in the **Local name** text box.

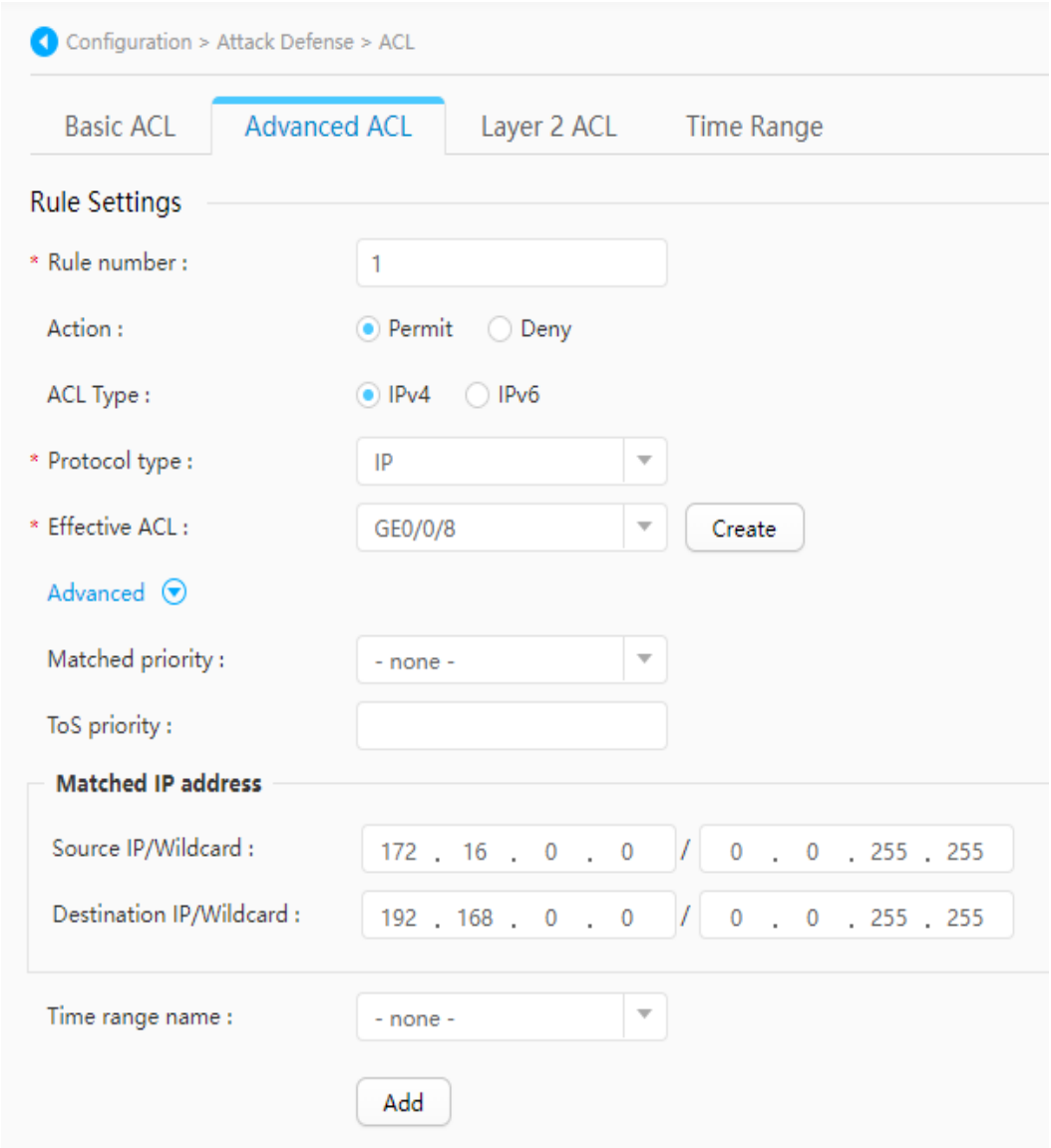
Figure 1-12 Configuring VPN connections



Step 3 Configure a VPN security policy.

Choose **Configuration** > **Attack Defense** > **ACL** > **Advanced ACL**, configure an advanced ACL, and click **Add**. **Figure 1-13** shows the key parameter settings.

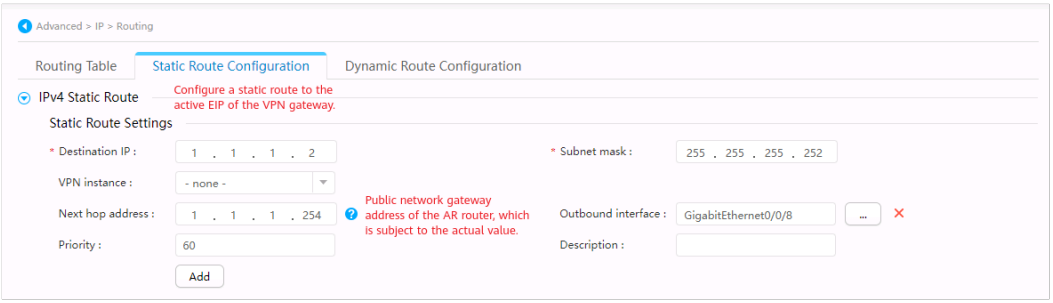
Figure 1-13 Configuring an advance ACL

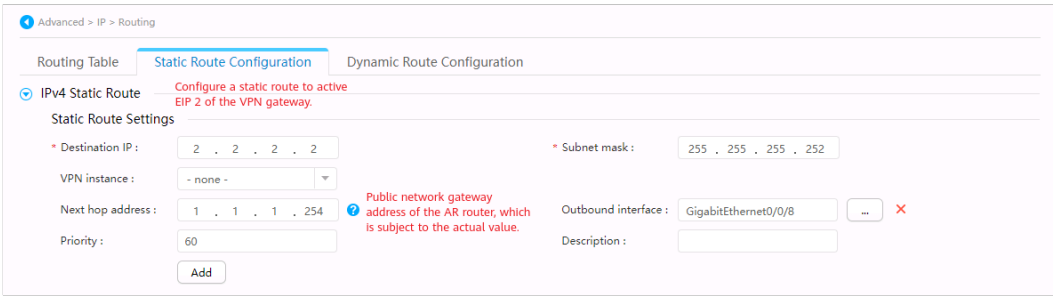


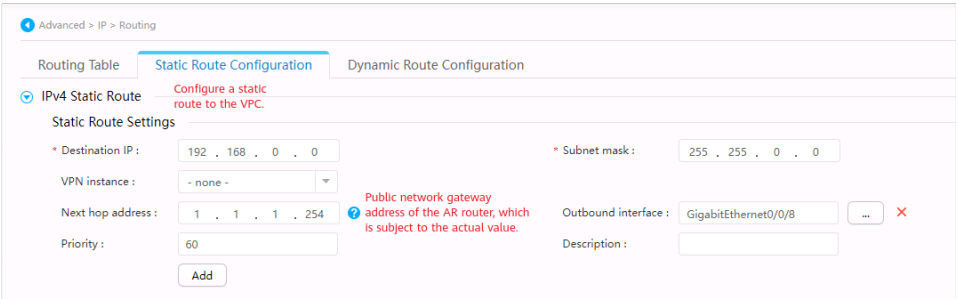
Step 4 Configure service routes.

Choose **Advanced** > **IP** > **Routing** > **Static Route Configuration**. In the **IPv4 Static Route** area, configure static routes to the active EIP and active EIP 2 of the VPN gateway and a static route to the VPC, and click **Add**. **Figure 1-14** shows the key parameter settings.

Figure 1-14 Configuring service routes







----End

1.1.3.4 Verification

NOTE

In policy-based mode, an AR router uses one interface to establish two VPN connections. Due to the specification limit of the AR router, only one VPN connection can be established at a time.

- About 5 minutes later, check states of the VPN connections.
  - Management console of the cloud

    Choose **Virtual Private Network** > **Enterprise – VPN Connections**. Only one VPN connection is in **Normal** state.
  - AR router

    Choose **Advanced** > **VPN** > **IPSec** > **IPSec Policy Management**. Only one VPN connection is in **READY|STAYLIVE** state.
- Verify that servers in the on-premises data center and ECSs in the VPC subnet can ping each other.

2 P2C VPN

2.1 Using the CCM to Manage a Server Certificate

Procedure

Step 1 Log in to the management console.

Step 2 Click in the upper left corner and select the desired region and project.

Step 3 Click in the upper left corner of the page, and choose **Networking** > **Virtual Private Network**.

Step 4 In the navigation pane on the left, choose **Virtual Private Network** > **Enterprise – VPN Gateways**.

Step 5 Click the **P2C VPN Gateways** tab. In the P2C VPN gateway list, locate the target P2C VPN gateway, and click **Configure Server** in the **Operation** column.

Step 6 On the **Server** tab page, click **Upload** in the **Server Certificate** drop-down list box. The **Cloud Certificate Manager** page is displayed.

Step 7 On the **SSL Certificate Manager** page, click the **Hosted Certificates** tab, click **Upload Certificate**, and enter related information as prompted.

Table 2-1 describes the parameters for uploading a certificate.

Table 2-1 Parameters for uploading an international standard certificate

Parameter	Description
Certificate standard	Select **International**.
Certificate Name	User-defined name of a certificate.
Enterprise Project	Select the enterprise project to which the SSL certificate is to be added.

Parameter	Description
Certificate File	Use a text editor (such as Notepad++) to open the certificate file in CER or CRT format to be uploaded, and copy the certificate content to this text box. You need to upload a combined certificate file that contains both the server certificate content and CA certificate content. The CA certificate content must be pasted below the server certificate content. **NOTE** If you do not have a certificate, you can generate a self-issued certificate and upload it. For details, see Using Easy-RSA to Issue Certificates (Server and Client Sharing a CA Certificate). For the format of the certificate file content to be uploaded, see **Figure 2-1**.
Private Key	Use a text editor (such as Notepad++) to open the certificate file in KEY format to be uploaded, and copy the private key content to this text box. You only need to upload the private key of the server certificate. For the format of the private key content to be uploaded, see **Figure 2-1**.

Figure 2-1 Format of the certificate content to be uploaded

NOTE

The common name (CN) of a server certificate must be in the domain name format.

Step 8 Click **Submit**. The certificate is uploaded.

Step 9 In the certificate list, verify that the certificate status is **Hosted**.

----End

2.2 Using Easy-RSA to Issue Certificates (Server and Client Sharing a CA Certificate)

Scenario

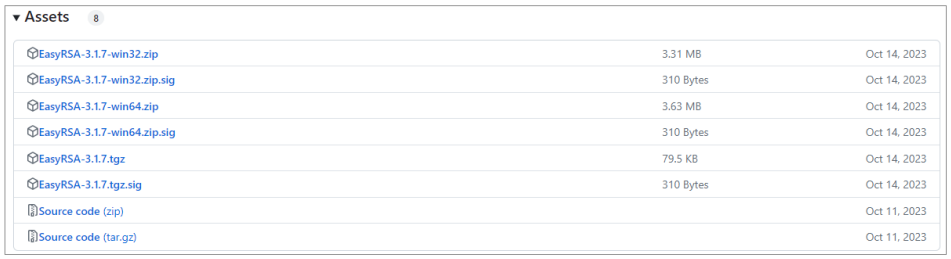
Easy-RSA is an open-source certificate management tool used to generate and manage digital certificates.

This example describes how to use Easy-RSA to issue certificates on the Windows operating system in the scenario where the server and client share a CA certificate. In this example, Easy-RSA 3.1.7 is used. For other software versions, visit the official website for the corresponding operation guide.

Procedure

1. Download an Easy-RSA installation package to the **D:** directory based on your Windows operating system.
   - 32-bit Windows operating system: Download **EasyRSA-3.1.7-win32.zip**.
   - 64-bit Windows operating system: Download **EasyRSA-3.1.7-win64.zip**.

   In this example, **EasyRSA-3.1.7-win64** is downloaded.

2. Decompress **EasyRSA-3.1.7-win64.zip** to a specified directory, for example, **D:\EasyRSA-3.1.7**.
3. Go to the **D:\EasyRSA-3.1.7** directory.
4. Enter **cmd** in the address bar and press **Enter** to open the CLI.
5. Run the **.\EasyRSA-Start.bat** command to start Easy-RSA.

   Information similar to the following is displayed:

   ```
   Welcome to the EasyRSA 3 Shell for Windows.
   Easy-RSA 3 is available under a GNU GPLv2 license.

   Invoke './easyrsa' to call the program. Without commands, help is displayed.

   EasyRSA Shell
   #
   ```

6. Run the **./easyrsa init-pki** command to initialize the PKI environment.

   Information similar to the following is displayed:

   ```
   Notice
   ------
   'init-pki' complete; you may now create a CA or requests.

   Your newly created PKI dir is:
   * D:/EasyRSA-3.1.7/pki

   Using Easy-RSA configuration:
   ```

```
* undefined


EasyRSA Shell
#
```

After the command is executed, the **pki** folder is automatically generated in the **D:\EasyRSA-3.1.7** directory.

7. Set parameters.
   a. Copy the **vars.example** file in **D:\EasyRSA-3.1.7** to the **D:\EasyRSA-3.1.7\pki** directory.
   b. Rename **vars.example** in the **D:\EasyRSA-3.1.7\pki** directory to **vars**.

   NOTE

   By default, the **vars** file uses the same parameter settings as the **vars.example** file. You can also set parameters in the **vars** file as required.

8. Run the **./easyrsa build-ca nopass** command to generate a CA certificate.

   Information similar to the following is displayed:

```
Using Easy-RSA 'vars' configuration:
* D:/EasyRSA-3.1.7/pki/vars

Using SSL:
* openssl OpenSSL 3.1.2 1 Aug 2023 (Library: OpenSSL 3.1.2 1 Aug 2023)
.....+..+.............+......+........+...+...+....++++++++++++++++++++++++++++++++++++++++++
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You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Common Name (eg: your user, host, or server name) [Easy-RSA CA]:p2cvpn.com    //Set a name for
the CA certificate.

Notice
------
CA creation complete. Your new CA certificate is at:
* D:/EasyRSA-3.1.7/pki/ca.crt


EasyRSA Shell
#
```

9. View the CA certificate and private key.
   – By default, the generated CA certificate is stored in the **D:\EasyRSA-3.1.7\pki** directory.

     In this example, the certificate **ca.crt** is generated.
   – By default, the generated CA private key is stored in the **D:\EasyRSA-3.1.7\pki\private** directory.

     In this example, the private key **ca.key** is generated.

10. Run the **./easyrsa build-server-full** *p2cserver.com* **nopass** command to generate a server certificate and private key.

    In this command, ***p2cserver.com*** is the common name (CN) of the server certificate. Replace it with the actual CN. The CN must be in the domain

name format; otherwise, the certificate cannot be managed by the Cloud Certificate Manager (CCM).

Information similar to the following is displayed:

```
Using Easy-RSA 'vars' configuration:
* D:/EasyRSA-3.1.7/pki/vars

Using SSL:
* openssl OpenSSL 3.1.2 1 Aug 2023 (Library: OpenSSL 3.1.2 1 Aug 2023)
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Notice
------
Private-Key and Public-Certificate-Request files created.
Your files are:
* req: D:/EasyRSA-3.1.7/pki/reqs/p2cserver.com.req
* key: D:/EasyRSA-3.1.7/pki/private/p2cserver.com.key

You are about to sign the following certificate:
Request subject, to be signed as a server certificate
for '825' days:

subject=
    commonName                = p2cserver.com

Type the word 'yes' to continue, or any other input to abort.
  Confirm request details: yes    //Enter yes to continue.

Using configuration from D:/EasyRSA-3.1.7/pki/openssl-easyrsa.cnf
Check that the request matches the signature
Signature ok
The Subject's Distinguished Name is as follows
commonName            :ASN.1 12:'p2cserver.com'
Certificate is to be certified until Sep 22 09:56:54 2026 GMT (825 days)

Write out database with 1 new entries
Database updated

Notice
------
Certificate created at:
* D:/EasyRSA-3.1.7/pki/issued/p2cserver.com.crt

Notice
------
Inline file created:
* D:/EasyRSA-3.1.7/pki/inline/p2cserver.com.inline


EasyRSA Shell
#
```

11. View the server certificate and private key.

– By default, the generated server certificate is stored in the **D:\EasyRSA-3.1.7\pki\issued** directory.

  In this example, the server certificate **p2cserver.com.crt** is generated.

– By default, the generated server private key is stored in the **D:\EasyRSA-3.1.7\pki\private** directory.

  In this example, the server private key **p2cserver.com.key** is generated.

12. Run the **./easyrsa build-client-full** *p2cclient.com* **nopass** command to generate a client certificate and private key.

    In this command, the client certificate name (for example, ***p2cclient.com***) must be different from the server certificate name (for example, ***p2cserver.com***).

    Information similar to the following is displayed:

```
Using Easy-RSA 'vars' configuration:
* D:/EasyRSA-3.1.7/pki/vars

Using SSL:
* openssl OpenSSL 3.1.2 1 Aug 2023 (Library: OpenSSL 3.1.2 1 Aug 2023)
.......+++++++++++++++++++++++++++++++++++++++++*...+...+...+.....+...+....+......+......+........+.+.....+............++++
++++++++++++++++++++++++++++++++++++
+*.+.....+.+.....+.........+.......+..+...+.......+...+..+......+.+......+........+....+...+...+..+.......+......+.....+...........+...........+....+......+.....+
.........+......+.+..+...+.........+........+......+....+......+...........+.......+.....+.............+..+.+...........+..........+...+..+.........+......+.+........
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...........+.....+.............+.+.......+.......+.....+....+.........+..+.............+..........+...+...+..++++++
..+.....+.......+.....+.........+....+++++++++++++++++++++++++++++++++++++++++*.....+......+..+++++++++++++++
++++++++++++++++++++++
+*.......+.+.....+....+.........+...+.....+.........+...+...............+...+....+.....+.+...+......+.....+...+.........+..+...+.....
.............+......+.....+.+...+...+.........+.....+..................+...+...+......+.+..+......+.+......+.....+...+...........+..+............+.......+.........+.....
+......+.+..+............+................+..+...+....+......+.....+...+....+..+......+.........+.........++++++
-----

Notice
------
Private-Key and Public-Certificate-Request files created.
Your files are:
* req: D:/EasyRSA-3.1.7/pki/reqs/p2cclient.com.req
* key: D:/EasyRSA-3.1.7/pki/private/p2cclient.com.key

You are about to sign the following certificate:
Request subject, to be signed as a client certificate
for '825' days:

subject=
    commonName                = p2cclient.com

Type the word 'yes' to continue, or any other input to abort.
  Confirm request details: yes    //Enter yes to continue.

Using configuration from D:/EasyRSA-3.1.7/pki/openssl-easyrsa.cnf
Check that the request matches the signature
Signature ok
The Subject's Distinguished Name is as follows
commonName            :ASN.1 12:'p2cclient.com'
Certificate is to be certified until Sep 22 09:58:26 2026 GMT (825 days)

Write out database with 1 new entries
Database updated

Notice
------
Certificate created at:
* D:/EasyRSA-3.1.7/pki/issued/p2cclient.com.crt

Notice
```

```
------
Inline file created:
* D:/EasyRSA-3.1.7/pki/inline/p2cclient.com.inline


EasyRSA Shell
#
```

13. View the client certificate and private key.
    - By default, the generated client certificate is stored in the **D:\EasyRSA-3.1.7\pki\issued** directory.

      In this example, the client certificate **p2cclient.com.crt** is generated.
    - By default, the generated client private key is stored in the **D:\EasyRSA-3.1.7\pki\private** directory.

      In this example, the client private key **p2cclient.com.key** is generated.

2.3 Using Easy-RSA to Issue Certificates (Server and Client Using Different CA Certificates)

Scenario

Easy-RSA is an open-source certificate management tool used to generate and manage digital certificates.

This example describes how to use Easy-RSA to issue certificates on the Windows operating system in the scenario where the server and client use different CA certificates. In this example, Easy-RSA 3.1.7 is used. For other software versions, visit the official website for the corresponding operation guide.

Procedure

1. Download an Easy-RSA installation package to the **D:** directory based on your Windows operating system.
   - 32-bit Windows operating system: Download **EasyRSA-3.1.7-win32.zip**.
   - 64-bit Windows operating system: Download **EasyRSA-3.1.7-win64.zip**.

   In this example, **EasyRSA-3.1.7-win64** is downloaded.

   ▾ Assets 8

EasyRSA-3.1.7-win32.zip	3.31 MB	Oct 14, 2023
EasyRSA-3.1.7-win32.zip.sig	310 Bytes	Oct 14, 2023
EasyRSA-3.1.7-win64.zip	3.63 MB	Oct 14, 2023
EasyRSA-3.1.7-win64.zip.sig	310 Bytes	Oct 14, 2023
EasyRSA-3.1.7.tgz	79.5 KB	Oct 14, 2023
EasyRSA-3.1.7.tgz.sig	310 Bytes	Oct 14, 2023
Source code (zip)		Oct 11, 2023
Source code (tar.gz)		Oct 11, 2023

2. Decompress **EasyRSA-3.1.7-win64.zip** to a specified directory, for example, **D:\EasyRSA-3.1.7**.
3. Go to the **D:\EasyRSA-3.1.7** directory.
4. Enter **cmd** in the address bar and press **Enter** to open the CLI.
5. Run the **.\EasyRSA-Start.bat** command to start Easy-RSA.

   Information similar to the following is displayed:

```
Welcome to the EasyRSA 3 Shell for Windows.
Easy-RSA 3 is available under a GNU GPLv2 license.

Invoke './easyrsa' to call the program. Without commands, help is displayed.

EasyRSA Shell
#
```

6. Run the **./easyrsa init-pki** command to initialize the PKI environment.

   Information similar to the following is displayed:

```
Notice
------
'init-pki' complete; you may now create a CA or requests.

Your newly created PKI dir is:
* D:/EasyRSA-3.1.7/pki

Using Easy-RSA configuration:
* undefined


EasyRSA Shell
#
```

   After the command is executed, the **pki** folder is automatically generated in the **D:\EasyRSA-3.1.7** directory.

7. Set parameters.
   a. Copy the **vars.example** file in **D:\EasyRSA-3.1.7** to the **D:\EasyRSA-3.1.7\pki** directory.
   b. Rename **vars.example** in the **D:\EasyRSA-3.1.7\pki** directory to **vars**.

      NOTE

      By default, the **vars** file uses the same parameter settings as the **vars.example** file. You can also set parameters in the **vars** file as required.

8. Generate a server CA certificate and private key.
   a. Copy the decompressed **EasyRSA-3.1.7** folder to the **D:** directory, and rename the folder, for example, **EasyRSA-3.1.7 - server**.
   b. Go to the **D:\EasyRSA-3.1.7 - server** directory.
   c. In the address bar of the **D:\EasyRSA-3.1.7 - server** folder, enter **cmd** and press **Enter** to open the CLI.
   d. Run the **.\EasyRSA-Start.bat** command to start Easy-RSA.

      Information similar to the following is displayed:

```
Welcome to the EasyRSA 3 Shell for Windows.
Easy-RSA 3 is available under a GNU GPLv2 license.

Invoke './easyrsa' to call the program. Without commands, help is displayed.

EasyRSA Shell
#
```

   e. Run the **./easyrsa build-ca nopass** command to generate a server CA certificate.

      When this command is run, set **[Easy-RSA CA]** to the name of the server CA certificate as prompted, for example, **p2cvpn_server.com**.

      Information similar to the following is displayed:

```
Using Easy-RSA 'vars' configuration:
* D:/EasyRSA-3.1.7 - server/pki/vars
```

```
Using SSL:
* openssl OpenSSL 3.1.2 1 Aug 2023 (Library: OpenSSL 3.1.2 1 Aug 2023)
..+.....+...+..........+..+.......+..+..........+...+...+..+......+.......+...++++++++++++++++++++++++++++++++++++++
++*.+++++++++++++++++++++++++++++++++++++++*..........+...........+...+......++++++
.......+.......+...+......+...+.....+...+...+++++++++++++++++++++++++++++++++++++++
+*......+.....+....+..+....+......+...+......+...+......+.....+.+++++++++++++++++++++++++++++++++++++++
+*.......+......+.......+.............+.+...+.....+....+........+.........+....+..+...........+.+.....+....+...+...+..........+.+..+.+.........+.....+.
..+.................+.......+..+.......+.....+..........+......+..+.+.....+.+.....+....+.....+.......+...+.........+..+......+...+.......+...+.........+...
...+......+..........+....+......+...+..+...+......+...+.+.....+.......+..+.......+...+...+..+............+........+.........+.+.........+........+....+
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.+....+......+......+...........+..+......+...+.......+................+.+......+......+..+.+..........+.........+.........+.+......++++++
-----
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Common Name (eg: your user, host, or server name) [Easy-RSA CA]:p2cvpn_server.com    //Set
a name for the server CA certificate.

Notice
------
CA creation complete. Your new CA certificate is at:
* D:/EasyRSA-3.1.7 - server/pki/ca.crt


EasyRSA Shell
#
```

9. View the server CA certificate and private key.
   - By default, the generated server CA certificate is stored in the **D:\EasyRSA-3.1.7 - server\pki** directory.

     In this example, the server certificate **ca.crt** is generated.
   - By default, the generated server CA private key is stored in the **D:\EasyRSA-3.1.7 - server\pki\private** directory.

     In this example, the server private key **ca.key** is generated.
10. Run the **./easyrsa build-server-full** *p2cserver.com* **nopass** command to generate a server certificate and private key.

    In this command, ***p2cserver.com*** is the common name (CN) of the server certificate. Replace it with the actual CN. The CN must be in the domain name format; otherwise, the certificate cannot be managed by the Cloud Certificate Manager (CCM).

    Information similar to the following is displayed:

```
Using Easy-RSA 'vars' configuration:
* D:/EasyRSA-3.1.7 - server/pki/vars

Using SSL:
* openssl OpenSSL 3.1.2 1 Aug 2023 (Library: OpenSSL 3.1.2 1 Aug 2023)
.+.+......+...+.....+......+...+.......+.....+.+...+..+...+....+.....+......+++++++++++++++++++++++++++++++++++++++
+*....+..+....+++++++++++++++++++++++++++++++++++++++
+*...............+.......+..+.+..+...+......+............+...+...+.........+.......+.........+...+......+.+...+...+........+....+.....+.+...........+.....+...+.
...+..........+....+..+......+............+.........+........+...+.+......+.....+.......+......+.....+.+.....+....+.........+...+..+............+.+.......+.........
+.+..+.........+......+...+....+......+.....+....+......+.....+......+............+...+........+.+.....+.+...................+.......+.....+.+..+.......+...+++
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++++++++++++++++++++++++++++++++++++
+*..+.........+...+.......+......+................+...+...+...........+...+....+........+.........+..........+......+...+..........+.+..+............+.+........+....
+...........+....+...........+......+.............+......+.....++++++
-----

Notice
```

```
------
Private-Key and Public-Certificate-Request files created.
Your files are:
* req: D:/EasyRSA-3.1.7 - server/pki/reqs/p2cserver.com.req
* key: D:/EasyRSA-3.1.7 - server/pki/private/p2cserver.com.key

You are about to sign the following certificate:
Request subject, to be signed as a server certificate
for '825' days:

subject=
    commonName                = p2cserver.com

Type the word 'yes' to continue, or any other input to abort.
  Confirm request details: yes    //Enter yes to continue.

Using configuration from D:/EasyRSA-3.1.7 - server/pki/openssl-easyrsa.cnf
Check that the request matches the signature
Signature ok
The Subject's Distinguished Name is as follows
commonName            :ASN.1 12:'p2cserver.com'
Certificate is to be certified until Oct  6 03:28:14 2026 GMT (825 days)

Write out database with 1 new entries
Database updated

Notice
------
Certificate created at:
* D:/EasyRSA-3.1.7 - server/pki/issued/p2cserver.com.crt

Notice
------
Inline file created:
* D:/EasyRSA-3.1.7 - server/pki/inline/p2cserver.com.inline


EasyRSA Shell
#
```

11. View the server certificate and private key.
    - By default, the generated server certificate is stored in the **D:\EasyRSA-3.1.7 - server\pki\issued** directory.

      In this example, the server certificate **p2cserver.com.crt** is generated.
    - By default, the generated server private key is stored in the **D:\EasyRSA-3.1.7 - server\pki\private** directory.

      In this example, the server private key **p2cserver.com.key** is generated.
12. Generate a client CA certificate and private key.
    a. Copy the decompressed **EasyRSA-3.1.7** folder to the **D:** directory, and rename the folder, for example, **EasyRSA-3.1.7 - client**.
    b. Go to the **EasyRSA-3.1.7 - client** directory.
    c. In the address bar of the **EasyRSA-3.1.7 - client** folder, enter **cmd** and press **Enter** to open the CLI.
    d. Run the **.\EasyRSA-Start.bat** command to start Easy-RSA.

       Information similar to the following is displayed:

```
Welcome to the EasyRSA 3 Shell for Windows.
Easy-RSA 3 is available under a GNU GPLv2 license.

Invoke './easyrsa' to call the program. Without commands, help is displayed.

EasyRSA Shell
#
```

e. Run the **./easyrsa build-ca nopass** command to generate a client CA certificate.

Information similar to the following is displayed:

```
Using Easy-RSA 'vars' configuration:
* D:/EasyRSA-3.1.7 - client/pki/vars

Using SSL:
* openssl OpenSSL 3.1.2 1 Aug 2023 (Library: OpenSSL 3.1.2 1 Aug 2023)
.++++++++++++++++++++++++++++++++++++++++
+*.....+.+..+...+....+.....................+..+...+....+.........+.....+......+.+.....+....+++++++++++++++++++++++++++++++
++++++++*....+...+...+...+............+.........++++++
.+.........+.........+.+......+...........+....+.....+.........+....+..+...+.+.........+......+......+...+.....+......+......+...........++++++++++
++++++++++++++++++++++++++++++*.+.........+......+.++++++++++++++++++++++++++++++++++++++++++++
++*...........+................+..............+.........+.+...+.....................+..+....+.....+...........+...+...+..+.++++++
-----
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Common Name (eg: your user, host, or server name) [Easy-RSA CA]:p2cvpn_client.com    //Set
a name for the client CA certificate.

Notice
------
CA creation complete. Your new CA certificate is at:
* D:/EasyRSA-3.1.7 - client/pki/ca.crt


EasyRSA Shell
#
```

13. View the client CA certificate and private key.
    - By default, the generated client CA certificate is stored in the **D:\EasyRSA-3.1.7 - client\pki** directory.

      In this example, the client certificate **ca.crt** is generated.
    - By default, the generated client CA private key is stored in the **D:\EasyRSA-3.1.7 - client\pki\private** directory.

      In this example, the client private key **ca.key** is generated.
14. Run the **./easyrsa build-client-full** *p2cclient.com* **nopass** command to generate a client certificate and private key.

    In this command, the client certificate name (for example, ***p2cclient.com***) must be different from the server certificate name (for example, ***p2cserver.com***).

    Information similar to the following is displayed:

```
Using Easy-RSA 'vars' configuration:
* D:/EasyRSA-3.1.7 - client/pki/vars

Using SSL:
* openssl OpenSSL 3.1.2 1 Aug 2023 (Library: OpenSSL 3.1.2 1 Aug 2023)
.+++++++++++++++++++++++++++++++++++++++++*.........+.....+...+.+........+.+.....+.........+.+......+.....++++++++++
++++++++++++++++++++++++++++
+*..........+...+...+..+.......+...+..+.+.........+.....+.+..+.+.....................+......+...............+.............+......+..+....+...+......+..+....+.....+..
.......+................+...+...+.....+....+.........++++++
.+..+..........+.........++++++++++++++++++++++++++++++++++++++++*...+..++++++++++++++++++++++++++
++++++++++++*.......+...............+......+.........+.............+....+.....+...+..................+....+...+........+....+.....+.+.....+...............++
++++
-----
```

```
Notice
------
Private-Key and Public-Certificate-Request files created.
Your files are:
* req: D:/EasyRSA-3.1.7 - client/pki/reqs/p2cclient.com.req
* key: D:/EasyRSA-3.1.7 - client/pki/private/p2cclient.com.key

You are about to sign the following certificate:
Request subject, to be signed as a client certificate
for '825' days:

subject=
    commonName                = p2cclient.com

Type the word 'yes' to continue, or any other input to abort.
  Confirm request details: yes

Using configuration from D:/EasyRSA-3.1.7 - client/pki/openssl-easyrsa.cnf
Check that the request matches the signature
Signature ok
The Subject's Distinguished Name is as follows
commonName            :ASN.1 12:'p2cclient.com'
Certificate is to be certified until Oct  7 11:19:52 2026 GMT (825 days)

Write out database with 1 new entries
Database updated

Notice
------
Certificate created at:
* D:/EasyRSA-3.1.7 - client/pki/issued/p2cclient.com.crt

Notice
------
Inline file created:
* D:/EasyRSA-3.1.7 - client/pki/inline/p2cclient.com.inline


EasyRSA Shell
#
```

15. View the client certificate and private key.
    - By default, the generated client certificate is stored in the **D:\EasyRSA-3.1.7 - client\pki\issued** directory.

      In this example, the client certificate **p2cclient.com.crt** is generated.
    - By default, the generated client private key is stored in the **D:\EasyRSA-3.1.7 - client\pki\private** directory.

      In this example, the client private key **p2cclient.com.key** is generated.

2.4 Using the CCM to Purchase Certificates

Context

In addition to purchasing certificates from CAs and issuing certificates by yourselves, you can use the CCM to purchase certificates, including the server and client certificates.

Constraints

If you purchase a server certificate using the CCM, you need to add the server root certificate content to the client configuration file.

Procedure

- Purchasing a server certificate
  a. Log in to the CCM console.
  b. **Purchase an SSL certificate**.
  c. **Apply for an SSL certificate**.
     Certificates purchased from the CCM are automatically hosted.
  d. .
  e. Install the root certificate.
     Open the root certificate using a text editor (for example, Notepad++), and copy the certificate content to the end of the existing CA certificate in the client configuration file. For details, see **How Do I Fix an Incomplete SSL Certificate Chain?**.
     The format is as follows:

```
...
<ca>
-----BEGIN CERTIFICATE-----
Default level-2 CA certificate content of the server
-----END CERTIFICATE-----
-----BEGIN CERTIFICATE-----
Server root certificate content
-----END CERTIFICATE-----
</ca>
...
```

- Purchasing a client certificate
  a. Log in to the CCM console.
  b. **Purchase an SSL certificate**.
  c. **Apply for an SSL certificate**.
  d. .