NAT Gateway

User Guide

Issue 01

Date 2024-12-24

HUAWEI

HUAWEI CLOUD COMPUTING TECHNOLOGIES CO., LTD.

Trademarks and Permissions


and other Huawei trademarks are the property of Huawei Technologies Co., Ltd.
All other trademarks and trade names mentioned in this document are the property of their respective holders.

Notice

The purchased products, services and features are stipulated by the contract made between Huawei Cloud and the customer. All or part of the products, services and features described in this document may not be within the purchase scope or the usage scope. Unless otherwise specified in the contract, all statements, information, and recommendations in this document are provided "AS IS" without warranties, guarantees or representations of any kind, either express or implied.

The information in this document is subject to change without notice. Every effort has been made in the preparation of this document to ensure accuracy of the contents, but all statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.

Contents

1 Public NAT Gateways

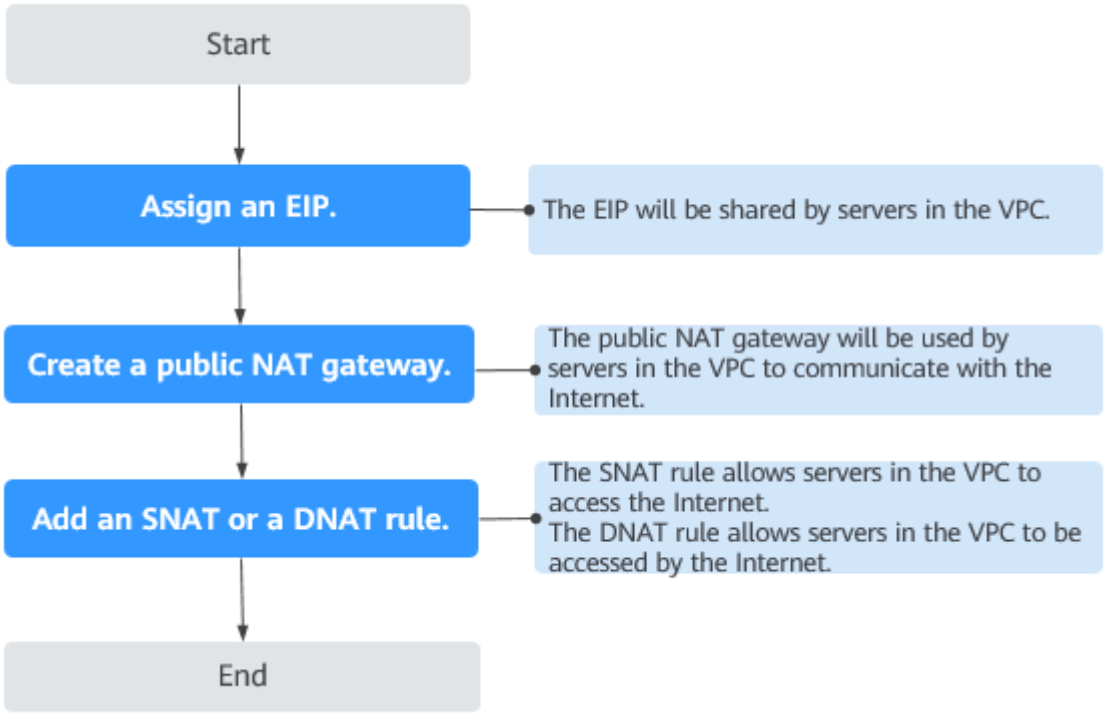
1.1 Overview of Public NAT Gateways

Public NAT gateways provide network address translation (NAT) with 20 Gbit/s of bandwidth for servers in a VPC or for servers in on-premises data centers that connect to a VPC through Direct Connect or VPN.

Public NAT gateways allow multiple servers to share EIPs to access the Internet or to provide services accessible from the Internet.

The process of using a public NAT gateway is as follows.

Figure 1-1 Process of using a public NAT gateway



1.2 Buying a Public NAT Gateway

Scenarios

Buy a public NAT gateway to enable your servers to access the Internet or provide services accessible from the Internet.

Notes and Constraints

- Rules on one public NAT gateway can use the same EIP, but rules on different NAT gateways must use different EIPs.
- Each VPC can be associated with multiple public NAT gateways.
- SNAT and DNAT rules can use the same EIP to save resources. However, when **Port Type** of a DNAT rule is set to **All ports**, the resource in the DNAT rule will preferentially use all ports of the EIP. So an SNAT rule cannot share an EIP with such a DNAT rule.
- The public NAT gateway does not translate IP addresses for Enterprise Edition VPN.
- If both an EIP and a public NAT gateway are configured for a server, data will be forwarded through the EIP.
- Some carriers will block the following ports for security reasons. It is recommended that you do not use the following ports.

Protocol	Port
TCP	42 135 137 138 139 444 445 593 1025 1068 1434 3127 3128 3129 3130 4444 4789 4790 5554 5800 5900 9996
UDP	135~139 1026 1027 1028 1068 1433 1434 4789 4790 5554 9996

Prerequisites

- The VPC and subnet where your public NAT gateway will be deployed are available.
- To allow traffic to pass through the public NAT gateway, a route to the public NAT gateway in the VPC is required. When you buy a public NAT gateway, a default route 0.0.0.0/0 to the public NAT gateway is automatically added to the default route table of the VPC. If the default route 0.0.0.0/0 already exists in the default route table of the VPC before you buy the public NAT gateway, the default route that points to the public NAT gateway will fail to be added automatically. In this case, perform the following operations after the public NAT gateway is successfully created: Manually add a different route that points to the gateway or create a default route 0.0.0.0/0 pointing to the gateway in the new routing table.

Procedure

1. Go to the **Buy Public NAT Gateway** page.
2. Configure required parameters. For details, see **Table 1-1**.

Table 1-1 Descriptions of public NAT gateway parameters

Parameter	Description
Region	The region where the public NAT gateway is located.
Billing Mode	Public NAT gateways are billed on a pay-per-use or yearly/monthly basis.
Specifications	The specifications of the public NAT gateway. The value can be **Small**, **Medium**, **Large**, or **Extra-large**. You can click **Learn more** on the page to view details of each specification.
Name	The name of the public NAT gateway. Enter up to 64 characters. Only letters, digits, underscores (_), hyphens (-), and periods (.) are allowed.
VPC	The VPC that the public NAT gateway belongs to. The selected VPC cannot be changed after the public NAT gateway is purchased. **NOTE** To allow traffic to pass through the public NAT gateway, a route to the public NAT gateway in the VPC is required. When you buy a public NAT gateway, a default route 0.0.0.0/0 to the public NAT gateway is automatically added to the default route table of the VPC. If the default route 0.0.0.0/0 already exists in the default route table of the VPC before you buy the public NAT gateway, the default route that points to the public NAT gateway will fail to be added automatically. In this case, perform the following operations after the public NAT gateway is successfully bought: Manually add a different route that points to the gateway or create a default route 0.0.0.0/0 pointing to the gateway in the new routing table.
Subnet	The subnet that the public NAT gateway belongs to. The subnet must have at least one available IP address. The selected subnet cannot be changed after the public NAT gateway is purchased. The NAT gateway will be deployed in the selected subnet. The NAT gateway works for the entire VPC where it is deployed. To enable communications over the Internet, add SNAT or DNAT rules.

Parameter	Description
Enterprise Project	The enterprise project that the public NAT gateway belongs to. If an enterprise project has been configured, select the enterprise project. If you have not configured any enterprise project, select the **default** enterprise project.
Advanced Settings (Optional)	Click the drop-down arrow to configure advanced parameters of the public NAT gateway, such as **Description**.
SNAT Connection TCP Timeout (s)	The timeout period of a TCP connection established using the SNAT rule. If no data is exchanged within this period, the TCP connection will be closed. Value range: 40 to 7200
SNAT Connection UDP Timeout (s)	The timeout period of a UDP connection established using the SNAT rule. If no data is exchanged within this period, the UDP connection will be closed. Value range: 40 to 7200
SNAT Connection ICMP Timeout (s)	The timeout period of an ICMP connection established using the SNAT rule. If no data is exchanged within this period, the ICMP connection will be closed. Value range: 10 to 7200
TCP TIME_WAIT (s)	How long the side that actively closed the TCP connection is in the **TIME_WAIT** state. Value range: 0 to 1800
Description	Supplementary information about the public NAT gateway. Enter up to 255 characters. Angle brackets (<>) are not allowed.
Tag	The identifier of the public NAT gateway. A tag is a key-value pair. You can add up to 20 tags to each transit IP address. If you have configured tag policies for public NAT gateways, you need to add tags to your public NAT gateways based on the tag policies. If you add a tag that does not comply with the tag policies, public NAT gateways may fail to be created. Contact your administrator to learn more about tag policies. The tag key and value must meet the requirements listed in **Table 1-2**.

Table 1-2 Tag requirements

Parameter	Requirement
Key	• Cannot be left blank. • Must be unique for each NAT gateway. • Can contain a maximum of 36 characters. • Cannot contain equal signs (=), asterisks (*), left angle brackets (<), right angle brackets (>), backslashes (\), commas (,), vertical bars (|), and slashes (/), and the first and last characters cannot be spaces.
Value	• Can contain a maximum of 43 characters. • Cannot contain equal signs (=), asterisks (*), left angle brackets (<), right angle brackets (>), backslashes (\), commas (,), vertical bars (|), and slashes (/), and the first and last characters cannot be spaces.

3. Click **Next**. On the page displayed, confirm the public NAT gateway specifications.
4. Click **Submit**.

   It takes 1 to 5 minutes to create a public NAT gateway.
5. In the public NAT gateway list, you can see the gateway status.

NOTE

After the public NAT gateway is created, check whether a default route (0.0.0.0/0) that points to the public NAT gateway exists in the default route table of the VPC where the public NAT gateway is. If no, add a route pointing to the public NAT gateway to the default route table, alternatively, create a custom route table and add the default route 0.0.0.0/0 pointing to the public NAT gateway to the table. For details, see **Adding Routes to a Route Table**.

FAQ

What Should I Do If the Number of NAT Gateway Connections Exceeds the Upper Limit?

- If the number of requests exceeds the maximum allowed connections of a public NAT gateway, services will be adversely affected. To avoid this situation, create alarm rules on the Cloud Eye console to monitor the number of SNAT connections.
- If the number of requests exceeds the maximum allowed connections of a NAT gateway, you are advised to update the NAT gateway by referring to **Modifying a Public NAT Gateway**.

Does Changing NAT Gateway Specifications Interrupt Services?

Using a public NAT gateway of more robust specifications does not affect services, but if you switch to a public NAT gateway of less robust specifications, ensure that its capacity can still be enough to meet your service requirements.

1.3 Managing Public NAT Gateways

1.3.1 Modifying a Public NAT Gateway

Scenarios

Modify the name, specifications, or description of a public NAT gateway.

Using a public NAT gateway of more robust specifications does not affect services, but if you switch to a public NAT gateway of less robust specifications, ensure that its capacity can still be enough to meet your service requirements.

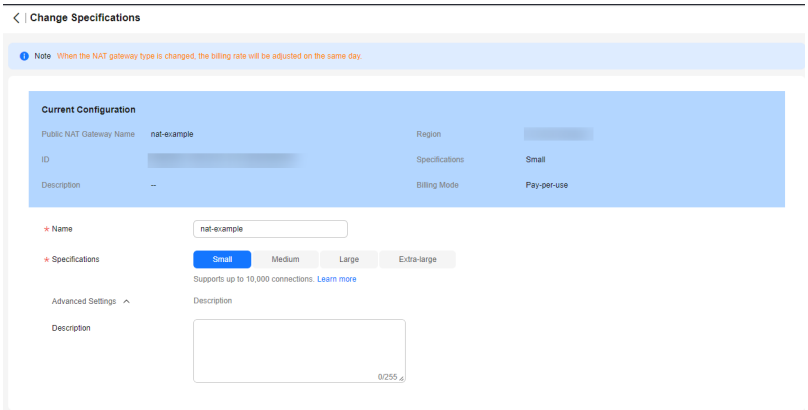
NOTE

- If you downgrade a NAT gateway, make sure that the new specification can meet your service requirements.
- Upgrading a NAT gateway does not affect services.

Modifying a Public NAT Gateway

1. Go to the **public NAT gateway list** page.
2. Click  in the upper left corner and select the desired region and project.
3. Locate the row that contains the public NAT gateway you want to modify and click **Modify** in the **Operation** column.
4. Modify the name, specifications, or description of the public NAT gateway.

Figure 1-2 Modify NAT Gateway



5. Click **OK**.

1.3.2 Deleting or Unsubscribing from a Public NAT Gateway

Scenarios

Delete or unsubscribe from public NAT gateways that are no longer required to release resources and reduce costs.

NOTE

- To unsubscribe from a pay-per-use public NAT gateway, you need to **delete the NAT gateway**.

Prerequisites

- All SNAT and DNAT rules created on the public NAT gateway have been deleted. For details about how to delete SNAT and DNAT rules, see **Deleting an SNAT Rule** and **Deleting a DNAT Rule**.

Procedure

1. Go to the **public NAT gateway list** page.
2. Click  in the upper left corner and select the desired region and project.
3. On the displayed page, locate the public NAT gateway that you want to delete and click **Delete** in the **Operation** column.
4. In the displayed dialog box, enter **DELETE**.
5. Click **OK**.

1.4 Managing SNAT Rules

1.4.1 Adding an SNAT Rule

Scenarios

After a public NAT gateway is created, add an SNAT rule, so that servers in a VPC subnet or servers that are connected to a VPC through Direct Connect or Cloud Connect can access the Internet by sharing an EIP.

One SNAT rule takes effect for only one subnet. If there are multiple subnets in a VPC, create multiple SNAT rules to allow servers in them to share EIPs.

Notes and Constraints

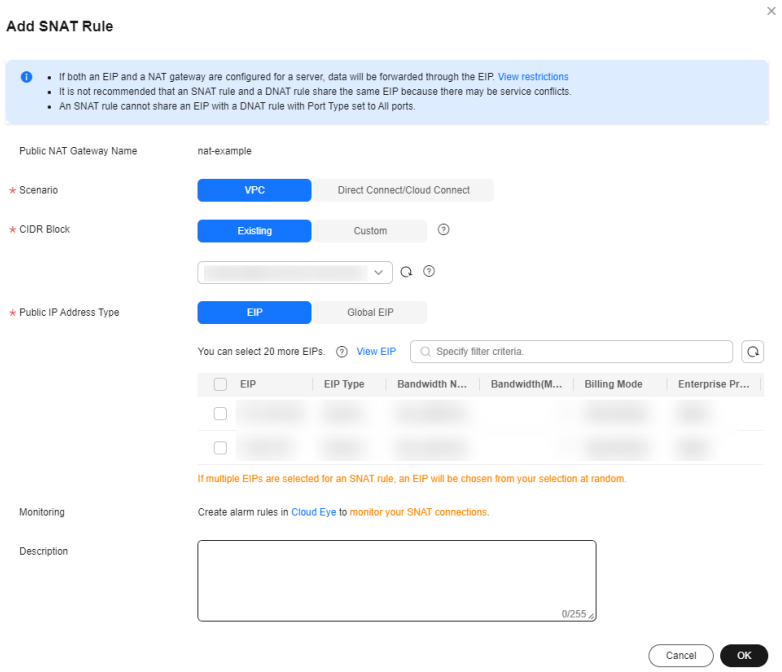
- Only one SNAT rule can be added for each VPC subnet.
- When you add an SNAT rule in the VPC scenario, the custom CIDR block must be a subset of the NAT gateway's VPC subnets.
- If an SNAT rule is used in the Direct Connect scenario, the custom CIDR block must be a CIDR block of a Direct Connect connection and cannot overlap with the NAT gateway's VPC subnets.
- There is no limit on the number of SNAT rules that can be added on a public NAT gateway.

Adding an SNAT Rule

1. Go to the **public NAT gateway list** page.
2. Click  in the upper left corner and select the desired region and project.

3. On the displayed page, click the name of the public NAT gateway on which you need to add an SNAT rule.
4. On the **SNAT Rules** tab, click **Add SNAT Rule**.

Figure 1-3 Add SNAT Rule



5. Configure required parameters. For details, see **Table 1-3**.

Table 1-3 Descriptions of SNAT rule parameters

Parameter	Description
Scenario	The scenarios where the SNAT rule is used Select **VPC** if your servers in a VPC need to access the Internet. Select **Direct Connect/Cloud Connect** if servers in your on-premises data center or in another VPC need to access the Internet.
CIDR Block	In a VPC scenario, specify a VPC subnet to enable servers in that subnet to access the Internet using the SNAT rule. In a Direct Connect/Cloud Connect scenario, specify a CIDR block of your data center or your VPC to enable your servers to access the Internet using the SNAT rule.

Parameter	Description
Public IP Address Type	The type of the public IP address used for accessing the Internet **EIP**: You can select an EIP that has not been bound to any resource or has been bound to an SNAT rule in the current VPC. **Global EIP**: You can select an unused global EIP or a global EIP that is in use by an SNAT rule of the current NAT gateway.
Monitoring	You can create alarm rules on the Cloud Eye console to monitor your SNAT connections and keep informed of any changes in a timely manner.
Description	Provides supplementary information about the SNAT rule. Enter up to 255 characters. Angle brackets (<>) are not allowed.

6. Click **OK**.

   NOTE

   - You can add multiple SNAT rules for a public NAT gateway to suite your service requirements.
   - Only one SNAT rule can be added for each VPC subnet.

1.4.2 Viewing an SNAT Rule

Scenarios

View details of an SNAT rule.

Prerequisites

An SNAT rule has been added.

Procedure

1. Log in to the management console.
2. Click in the upper left corner and select the desired region and project.
3. In the upper left corner of the page, click to expand the service list and choose **Networking** > **NAT Gateway**.

   The **Public NAT Gateways** page is displayed.
4. Click the name of the public NAT gateway.
5. In the SNAT rule list, view details of the SNAT rule.

1.4.3 Modifying an SNAT Rule

Scenarios

Modify an SNAT rule.

Note that modifying an SNAT rule may interrupt your services.

Prerequisites

An SNAT rule has been added.

Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select the desired region and project.
3. In the upper left corner of the page, click  to expand the service list and choose **Networking** > **NAT Gateway**.

   The **Public NAT Gateways** page is displayed.
4. Click the name of the public NAT gateway.
5. On the **SNAT Rules** tab, locate the SNAT rule you want to modify.
6. Click **Modify** in the **Operation** column.
7. In the displayed dialog box, modify parameters as needed.
8. Click **OK**.

1.4.4 Deleting an SNAT Rule

Scenarios

Delete an SNAT rule that you no longer need.

Prerequisites

An SNAT rule has been added.

Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select the desired region and project.
3. In the upper left corner of the page, click  to expand the service list and choose **Networking** > **NAT Gateway**.

   The **Public NAT Gateways** page is displayed.
4. Click the name of the public NAT gateway.
5. In the SNAT rule list, locate the row that contains the SNAT rule you want to delete and click **Delete** in the **Operation** column.
6. Enter **DELETE** in the displayed dialog box and click **OK**.

1.5 Managing DNAT Rules

1.5.1 Adding a DNAT Rule

Scenarios

After a public NAT gateway is created, add DNAT rules to allow servers in your VPC to provide services accessible from the Internet.

Only one DNAT rule can be configured for each port on a server. One port can be mapped to only one EIP. If multiple servers need to provide services accessible from the Internet, create multiple DNAT rules.

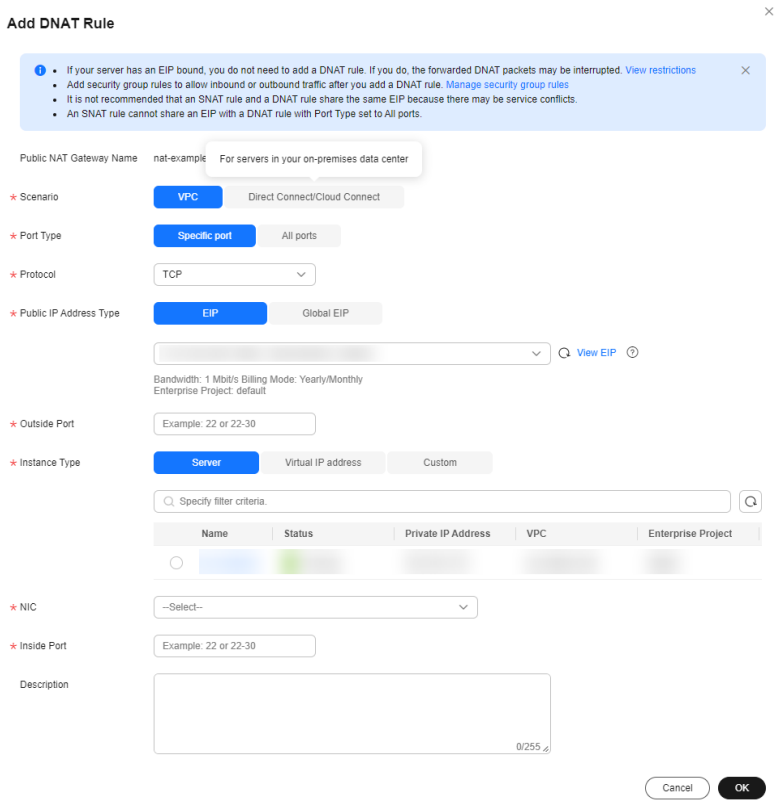
Restrictions and Limitations

- Only one DNAT rule can be configured for each port on a server. One port can be mapped to only one EIP.
- A maximum of 200 DNAT rules can be added on a public NAT gateway.

Procedure

1. Go to the **public NAT gateway list** page.
2. Click  in the upper left corner and select the desired region and project.
3. On the displayed page, click the name of the public NAT gateway on which you need to add a DNAT rule.
4. On the public NAT gateway details page, click the **DNAT Rules** tab.
5. Click **Add DNAT Rule**.

Figure 1-4 Add DNAT Rule



6. Configure required parameters. For details, see **Table 1-4**.

Table 1-4 Descriptions of DNAT rule parameters

Parameter	Description
Scenario	Select **VPC** if your servers in a VPC will use the DNAT rule to share the same EIP to provide services accessible from the Internet. **Direct Connect/Cloud Connect**: Select this scenario if your on-premises servers or servers in another VPC will use the DNAT rule to provide services accessible from the Internet.
Port Type	The port type • **All ports**: All requests received by the gateway through all ports over any protocol will be forwarded to the private IP address of your server. • **Specific port**: Only requests received from a specified port over a specified protocol will be forwarded to the specified port on the server.
Protocol	The protocol can be TCP or UDP. This parameter is available if you select **Specific port** for **Port Type**. If you select **All ports**, the value of this parameter is **All** by default.

Parameter	Description
Public IP Address Type	The type of the public IP address used for accessing the Internet **EIP**: You can select an EIP that has not been bound to any resource or has been bound to a DNAT rule in the current VPC. **Global EIP**: You can select an unused global EIP or a global EIP that is in use by a DNAT rule of the current NAT gateway.
Outside Port	The port of the EIP used by the NAT gateway for external communications This parameter is only available if you select **Specific port** for **Port Type**. Range: 1 to 65535 You can enter a specific port number or a port range, for example, 80 or 80-100.
Instance Type	The type of the instance that will be providing services accessible from the Internet. Possible values are: ● **Server** ● **Virtual IP address** ● **Custom**
NIC	The NIC of the server. This parameter is available if you set **Instance Type** to **Server**.
Private IP Address	● In a VPC scenario, set this parameter to the private IP address of a server in the NAT gateway's VPC. The server will provide services accessible from the Internet through DNAT. ● In a Direct Connect/Cloud Connect scenario, set this parameter to IP address of the server in your on-premises data center or your private IP address. This IP address is used by on-premises servers that are connected to a VPC through Direct Connect or servers in another VPC to provide services accessible from the Internet through DNAT. ● Configure the port of **Private IP Address** if you select **Specific port** for **Port Type**.
Inside Port	The port of the server over which the originating requests will be forwarded This parameter is only available if you select **Specific port** for **Port Type**. Range: 1 to 65535 You can enter a specific port number or a port range, for example, 80 or 80-100.

Parameter	Description
Description	Provides supplementary information about the DNAT rule. Enter up to 255 characters. Angle brackets (<>) are not allowed.

7. Click **OK**.
   Once the rule is created, its status changes to **Running**.

NOTICE

After you add a DNAT rule, add rules to the security group associated with the servers to allow inbound or outbound traffic. Otherwise, the DNAT rule does not take effect.

1.5.2 Viewing a DNAT Rule

Scenarios

View details oft a DNAT rule.

Prerequisites

A DNAT rule has been added.

Procedure

1. Log in to the management console.
2. Click in the upper left corner and select the desired region and project.
3. In the upper left corner of the page, click to expand the service list and choose **Networking** > **NAT Gateway**.
   The **Public NAT Gateways** page is displayed.
4. Click the name of the public NAT gateway.
5. On the public NAT gateway details page, click the **DNAT Rules** tab.
6. In the DNAT rule list, view details of the DNAT rule.

1.5.3 Modifying a DNAT Rule

Scenarios

Modify a DNAT rule.

Note that modifying a DNAT rule may interrupt your services.

Prerequisites

A DNAT rule has been added.

Procedure

1. Log in to the management console.
2. Click in the upper left corner and select the desired region and project.
3. In the upper left corner of the page, click to expand the service list and choose **Networking** > **NAT Gateway**.

   The **Public NAT Gateways** page is displayed.
4. Click the name of the public NAT gateway.
5. On the public NAT gateway details page, click the **DNAT Rules** tab.
6. In the DNAT rule list, locate the row that contains the DNAT rule you want to modify and click **Modify** in the **Operation** column.
7. In the displayed dialog box, modify parameters as needed.
8. Click **OK**.

1.5.4 Deleting a DNAT Rule

Scenarios

Delete a DNAT rule that you no longer need.

Prerequisites

A DNAT rule has been added.

Procedure

1. Log in to the management console.
2. Click in the upper left corner and select the desired region and project.
3. In the upper left corner of the page, click to expand the service list and choose **Networking** > **NAT Gateway**.

   The **Public NAT Gateways** page is displayed.
4. Click the name of the public NAT gateway.
5. On the public NAT gateway details page, click the **DNAT Rules** tab.
6. In the DNAT rule list, locate the row that contains the DNAT rule you want to delete and click **Delete** in the **Operation** column.
7. Enter **DELETE** in the displayed dialog box and click **OK**.

1.5.5 Deleting DNAT Rules in Batches

Scenarios

Delete DNAT rules that you no longer need.

Prerequisites

DNAT rules have been added.

Procedure

1. Log in to the management console.
2. Click in the upper left corner and select the desired region and project.
3. In the upper left corner of the page, click to expand the service list and choose **Networking** > **NAT Gateway**.

   The **Public NAT Gateways** page is displayed.
4. Click the name of the public NAT gateway.
5. On the public NAT gateway details page, click the **DNAT Rules** tab.
6. In the DNAT rule list, select DNAT rules that you no longer need and click **Delete DNAT Rule**.
7. In the displayed dialog box, click **OK**.

1.5.6 Importing DNAT Rules by Using a Template and Exporting DNAT Rules

Scenarios

When adding DNAT rules in different environments or migrating DNAT rules between NAT gateways, you can import and export DNAT rules to simplify and accelerate the DNAT rule configuration.

Importing DNAT Rules

1. Log in to the management console.
2. Click in the upper left corner and select the desired region and project.
3. In the upper left corner of the page, click to expand the service list and choose **Networking** > **NAT Gateway**.

   The **Public NAT Gateways** page is displayed.
4. On the displayed page, click the name of the public NAT gateway to which you want to import DNAT rules.
5. On the public NAT gateway details page, click the **DNAT Rules** tab.
6. On the displayed page, click **Import**. In the displayed **Import Rule** dialog box, click **Download Template**.
7. Fill in DNAT rule parameters based on the table heading in the template. For details, see **Table 1-5**.

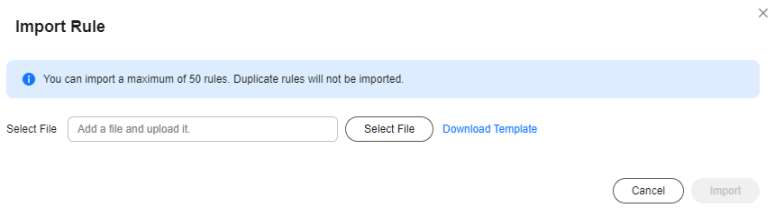
Table 1-5 Descriptions of DNAT rule parameters

Parameter	Description
Scenario	The following two scenarios are available: • **VPC**: The servers in a VPC will share an EIP to provide services accessible from the Internet through the DNAT rule. • **Direct Connect/Cloud Connect**: Select this scenario if your on-premises servers or servers in another VPC will use the DNAT rule to provide services accessible from the Internet.
Protocol	The value can be **TCP**, **UDP**, or **All**.
EIP	The EIP that will be used by the server to provide publicly accessible services Only EIPs that have not been bound or that have been bound to a DNAT rule in the current VPC are available for selection.
Global EIP	You can select an unused global EIP or a global EIP that is in use by a DNAT rule of the current NAT gateway.
Outside Port	The EIP port This parameter is only available if **Specific port** is selected for **Port Type**. You can enter a specific port number or a port range, for example, 80 or 80-100.
Private IP Address	• In a VPC scenario, set this parameter to the private IP address of a server in the NAT gateway's VPC. The server will provide services accessible from the Internet through DNAT. • In a Direct Connect/Cloud Connect scenario, set this parameter to IP address of the server in your on-premises data center or your private IP address. This IP address is used by on-premises servers that are connected to a VPC through Direct Connect or servers in another VPC to provide services accessible from the Internet through DNAT. • Configure the private IP address port if **Protocol** is set to **TCP** or **UDP**.
Inside Port	• In a VPC scenario, set this parameter to the port of the server in a VPC. • In a Direct Connect/Cloud Connect scenario, set this parameter to the port of the server in the on-premises data center or the user's private port. • This parameter is only available if **Specific port** is selected for **Port Type**. The number of inside and outside ports must match.

Parameter	Description
Description	Provides supplementary information about the DNAT rule. Enter up to 255 characters. Angle brackets (<>) are not allowed.

8. After filling in the template, click **Select File**, select the local template, and click **Import**.

   Figure 1-5 Import Rule

9. View the imported DNAT rules.

   If their **Status** is **Running**, the DNAT rules have been added.

Exporting DNAT Rules

1. Log in to the management console.
2. Click in the upper left corner and select the desired region and project.
3. In the upper left corner of the page, click to expand the service list and choose **Networking** > **NAT Gateway**.

   The **Public NAT Gateways** page is displayed.
4. On the displayed page, click the name of the public NAT gateway from which you want to export DNAT rules.
5. On the public NAT gateway details page, click the **DNAT Rules** tab.
6. In the DNAT rule list, select the rules to be exported and click **Export**.
   a. **Export all data to an XLSX file**: The system automatically exports the basic information of all the DNAT rules in the current region as an Excel file to a local directory.
   b. **Export selected data to an XLSX file**: The system automatically exports the basic information of the selected DNAT rules in the current region as an Excel file to a local directory.

2 Private NAT Gateways

2.1 Overview of Private NAT Gateways

Private NAT Gateways

Private NAT gateways provide private address translation services for ECSs and BMSs in a VPC. You can configure SNAT and DNAT rules to translate the source and destination IP addresses into transit IP addresses, so that servers in the VPC can communicate with other VPCs or on-premises data centers.

Specifically:

- SNAT enables servers in a VPC, regardless of if they are in the same AZ, to share a transit IP address to access on-premises data centers or other VPCs.
- DNAT enables servers in a VPC, regardless of if they are in the same AZ, to share a transit IP address to provide services accessible from on-premises data centers or other VPCs.

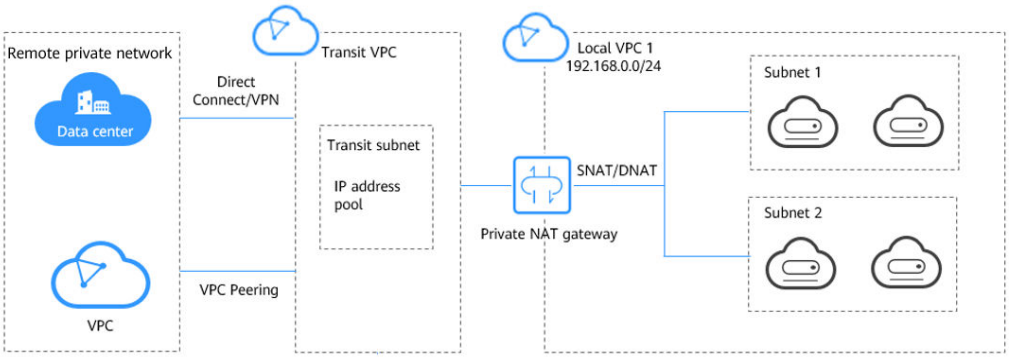
Transit Subnet

A transit subnet functions as a transit network. You can configure a transit IP address for the transit subnet so that servers in a local VPC can share the transit IP address to access on-premises data centers or other VPCs.

Transit VPC

The transit VPC is the VPC that the transit subnet is a part of.

Figure 2-1 Private NAT gateway



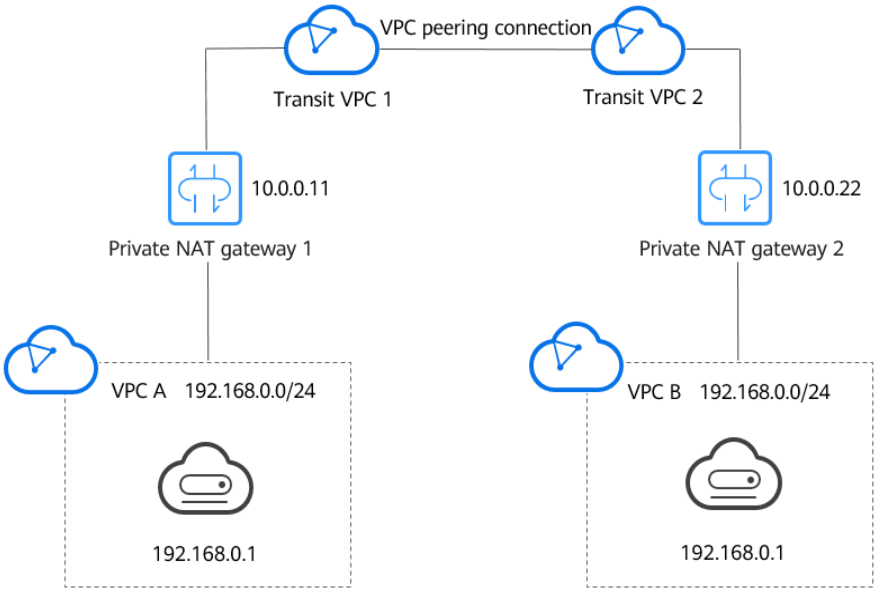
Application Scenarios

- Connecting VPCs with overlapping CIDR blocks

  You can configure two private NAT gateways for two VPCs with overlapping CIDR blocks. Then, add SNAT and DNAT rules on the two private NAT gateways to enable servers in the two VPCs to use the transit IP addresses to communicate with each other.

  In the following figure, there are two transit VPCs and two private NAT gateways. Address 192.168.0.1 in VPC A is translated to 10.0.0.11, and the IP address 192.168.0.1 in VPC B is translated to 10.0.0.22. A VPC peering connection can then be established between the two transit VPCs to enable communication between them.

  Figure 2-2 Connecting VPCs with overlapping CIDR blocks



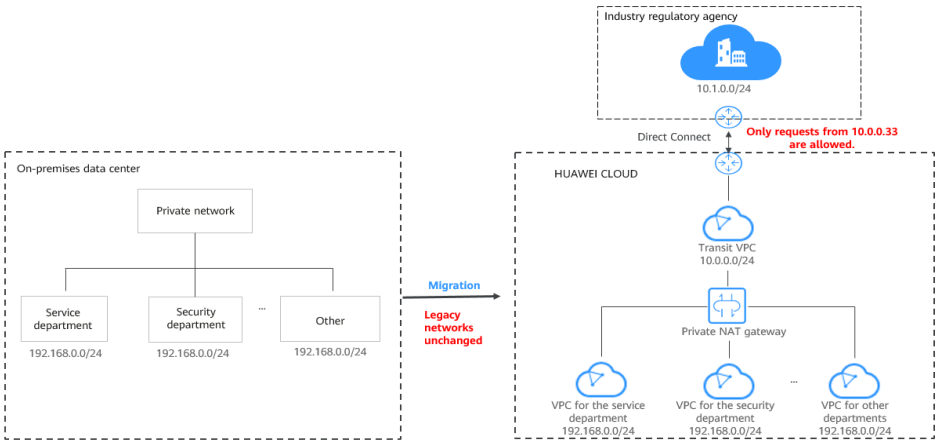
- Migrating workloads to the cloud without changing the network topology or accessing regulatory agencies from specific IP addresses

  Organizations may want to migrate their workloads to the cloud without making any changes to their existing network topology. They may also have

to access regulatory agencies from specific IP addresses as required by these agencies. A private NAT gateway is a good choice.

The following figure represents an enterprise network where the subnets of different departments overlap. A private NAT gateway allows the enterprise to keep the existing network topology unchanged while migrating their workloads to the cloud. In this example, the private NAT gateway maps the IP address of each department to 10.0.0.33 so that each department can use 10.0.0.33 to securely access the regulatory agency.

Figure 2-3 Migrating workloads to the cloud without changing the network topology or accessing regulatory agencies from specific IP addresses



Differences Between Public and Private NAT Gateways

Public NAT gateways use SNAT rules to map private IP addresses to EIPs, so that servers in a VPC can share an EIP to access the Internet. DNAT rules enable the servers to share an EIP to provide services accessible from the Internet.

Private NAT gateways use SNAT rules to map private IP addresses to transit IP addresses, so that servers in a VPC can access on-premises data centers or other VPCs. DNAT rules enable the servers to share the transit IP address to provide services accessible from the private network.

Table 2-1 describes the differences between public and private NAT gateways.

Table 2-1 Differences between public and private NAT gateways

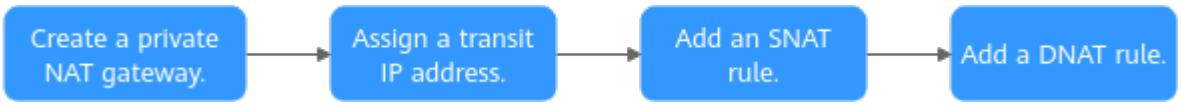
Item	Public NAT Gateway	Private NAT Gateway
Function	Connects a private network to the Internet	Connects private networks
SNAT	Enables access to the Internet	Enables access to on-premises data centers or other VPCs
DNAT	Allows servers to provide services accessible from the Internet	Allows servers to provide services accessible from on-premises data centers or other VPCs in private networks

Item	Public NAT Gateway	Private NAT Gateway
IP type for communication	EIP	Transit IP address

Process for Deploying a Private NAT Gateway

The process for deploying a private NAT gateway is as follows:

Figure 2-4 Process for deploying a private NAT gateway



If you want to use a private NAT gateway to connect your VPC to on-premises data centers or other VPCs, refer to **Accessing On-premises Data Centers or Other VPCs**.

2.2 Buying a Private NAT Gateway

Scenarios

You need a private NAT gateway to enable servers in your VPC to access or provide services accessible from on-premises data centers and other VPCs.

Notes and Constraints

- Manually add routes in a VPC to connect it to a remote private network through a VPC peering connection, Direct Connect, or VPN connection.
- SNAT and DNAT rules cannot share a transit IP address.
- The total number of DNAT and SNAT rules that can be added on a private NAT gateway varies with the private NAT gateway specifications.
  - Small: 20 or less
  - Medium: 50 or less
  - Large: 200 or less
  - Extra-large: 500 or less

CAUTION

When you buy a private NAT gateway, you must specify its VPC, subnet, and specifications.

Procedure

1. Go to the **Buy Private NAT Gateway** page.
2. Configure required parameters. For details, see **Table 2-2**.

Table 2-2 Descriptions of private NAT gateway parameters

Parameter	Description
Billing Mode	Private NAT gateways can be billed on a pay-per-use basis.
Region	The region where the private NAT gateway is located.
Name	The name of the private NAT gateway. Enter up to 64 characters. Only digits, letters, underscores (_), hyphens (-), and periods (.) are allowed.
VPC	The VPC that the private NAT gateway belongs to. The selected VPC cannot be changed after the private NAT gateway is purchased.
Subnet	The subnet that the private NAT gateway belongs to. The subnet must have at least one available IP address. The selected subnet cannot be changed after the private NAT gateway is purchased.
Specifications	The specifications of the private NAT gateway. The value can be **Extra-large**, **Large**, **Medium**, or **Small**. For details about specifications, see **NAT Gateway Specifications**.
Enterprise Project	The enterprise project that the private NAT gateway belongs to. If an enterprise project has been configured, select the enterprise project. If you have not configured any enterprise project, select the **default** enterprise project.

Parameter	Description
Tag	The private NAT gateway tag. A tag is a key-value pair. You can add up to 20 tags to each private NAT gateway. If you have configured tag policies for private NAT gateways, add tags to your private NAT gateways based on the tag policies. If you add a tag that does not comply with the tag policies, private NAT gateways may fail to be created. Contact your administrator to learn more about tag policies. The tag key and value must meet the requirements listed in **Table 2-3**.
Description	Supplementary information about the private NAT gateway. Enter up to 255 characters. Angle brackets (<>) are not allowed.

Table 2-3 Tag requirements

Parameter	Requirement
Key	• Cannot be left blank. • Must be unique for each NAT gateway. • Can contain a maximum of 36 characters. • Cannot contain equal signs (=), asterisks (*), left angle brackets (<), right angle brackets (>), backslashes (\), commas (,), vertical bars (|), and slashes (/), and the first and last characters cannot be spaces.
Value	• Can contain a maximum of 43 characters. • Cannot contain equal signs (=), asterisks (*), left angle brackets (<), right angle brackets (>), backslashes (\), commas (,), vertical bars (|), and slashes (/), and the first and last characters cannot be spaces.

3. Click **Buy Now**.

Other Operations

- **Assigning a Transit IP Address**
- **Adding an SNAT Rule**
- **Adding a DNAT Rule**
- **Managing Private NAT Gateways**

2.3 Managing Private NAT Gateways

After a private NAT gateway is created, you can manage it in a unified manner, including modifying and deleting the private NAT gateway.

Modifying a Private NAT Gateway

Modify the name, specifications, or description of a private NAT gateway.

1. Go to the **private NAT gateway list** page.
2. On the displayed page, locate the row that contains the private NAT gateway you want to modify and click **Modify** in the **Operation** column.
3. Modify the name, specifications, or description of the private NAT gateway.
4. Click **Next**.
5. Confirm the modification and click **Submit**.

Deleting a Private NAT Gateway

Delete private NAT gateways that are no longer required to release resources and reduce costs.

NOTE

All SNAT and DNAT rules created on the private NAT gateway have been deleted. For details about how to delete SNAT and DNAT rules, see **Deleting an SNAT Rule** and **Deleting a DNAT Rule**.

1. Go to the **private NAT gateway list** page.
2. On the **Private NAT Gateways** page, locate the private NAT gateway that you want to delete and click **Delete** in the **Operation** column.
3. In the displayed dialog box, enter **DELETE**.
4. Click **OK**.

2.4 Managing SNAT Rules

2.4.1 Adding an SNAT Rule

Scenarios

After the private NAT gateway is created, add an SNAT rule so that some or all servers in a VPC subnet can share a transit IP address to access on-premises data centers or other VPCs.

Notes and Constraints

Only one SNAT rule can be added for each VPC subnet.

Prerequisites

- A private NAT gateway is available.
- A transit IP address is available.
- A Direct Connect connection has been created with the VPC CIDR block set to **0.0.0.0/0**. For details, see **Create a Virtual Gateway**.

Procedure

1. Go to the **private NAT gateway list** page.
2. On the **Private NAT Gateways** page, click the name of the private NAT gateway on which you need to add an SNAT rule.
3. On the **SNAT Rules** tab, click **Add SNAT Rule**.
4. Configure required parameters. For details, see **Table 2-4**.

   Table 2-4 Parameter descriptions of an SNAT rule

Parameter	Description
Subnet	The subnet type of the SNAT rule. Select **Existing** or **Custom**. Select a subnet where IP address translation is required in the service VPC.
Monitoring	You can create alarm rules using Cloud Eye after your SNAT connection has been created.
Transit IP Address	Select the created transit IP address.
Description	Provides supplementary information about the SNAT rule. Enter up to 255 characters. Angle brackets (<>) are not allowed.

5. Click **OK**.

   NOTE

   You can add multiple SNAT rules for a private NAT gateway to suite your service requirements.

Helpful Links

Managing SNAT Rules

2.4.2 Modifying an SNAT Rule

Scenarios

Modify an SNAT rule.

Note that modifying an SNAT rule may interrupt your services.

Prerequisites

An SNAT rule has been added.

Procedure

1. Go to the **private NAT gateway list** page.
2. On the **Private NAT Gateways** page, click the name of the private NAT gateway.
3. On the **SNAT Rules** tab, locate the SNAT rule you want to modify.
4. Click **Modify** in the **Operation** column.
5. In the displayed dialog box, modify parameters as needed.
6. Click **OK**.

2.4.3 Deleting an SNAT Rule

Scenarios

Delete an SNAT rule that you no longer need.

Prerequisites

An SNAT rule has been added.

Procedure

1. Go to the **private NAT gateway list** page.
2. On the **Private NAT Gateways** page, click the name of the private NAT gateway.
3. In the SNAT rule list, locate the row that contains the SNAT rule you want to delete and click **Delete** in the **Operation** column.
4. In the displayed dialog box, click **OK**.

2.5 Managing DNAT Rules

2.5.1 Adding a DNAT Rule

Scenarios

After a private NAT gateway is created, you can add DNAT rules to allow servers in your VPC to provide services accessible from on-premises servers or other VPCs.

A DNAT rule needs to be configured for each port on a server that needs to be made accessible. If multiple ports on a server or multiple servers need to provide services accessible from on-premises servers or other VPCs, multiple DNAT rules need to be configured.

Notes and Constraints

A DNAT rule with **Port Type** set to **All ports** cannot share a transit IP address with a DNAT rule with **Port Type** set to **Specific port**.

Prerequisites

- A private NAT gateway is available.
- A transit IP address is available.

Procedure

1. Go to the **private NAT gateway list** page.
2. On the **Private NAT Gateways** page, click the name of the private NAT gateway on which you need to add a DNAT rule.
3. On the private NAT gateway details page, click the **DNAT Rules** tab.
4. Click **Add DNAT Rule**.

NOTICE

After you add a DNAT rule, add rules to the security group associated with the servers to allow inbound or outbound traffic. Otherwise, the DNAT rule does not take effect.

5. Configure required parameters. For details, see **Table 2-5**.

Table 2-5 Descriptions of DNAT rule parameters

Parameter	Description
Local Network	
Port Type	The port type The type can be: • **Specific port**: The private NAT gateway only forwards requests to your servers from the outside port and to the inside port configured here, and only if they use the right protocol. • **All ports**: All requests received by the gateway through all ports over any protocol will be forwarded to the private IP address of your server.
Protocol	The protocol can be TCP or UDP If you select **All ports**, the value of this parameter is **All** by default. This parameter is only available if you select **Specific port** for **Port Type**.

Parameter	Description
Instance Type	The type of instance that will provide services accessible from on-premises data centers or other VPCs Possible types are: • **Server** • **Virtual IP address** • **Load balancer** • **Custom**
NIC	The NIC of the server This parameter is only available if you set **Instance Type** to **Server**.
IP Address	The IP address of the server that will provide services accessible from on-premises data centers or other VPCs. This parameter is only available if you set **Instance Type** to **Custom**.
Internal Port	The port of the instance Range: 1 to 65535 This parameter is only available if you select **Specific port** for **Port Type**.
Transit Network	
Transit IP Address	The transit IP address used to access on-premises data centers or other VPCs You can select a transit IP address that is not bound to any resource, has been bound to a DNAT rule for the current private NAT gateway where **Port Type** is set to **Specific port**, or has been bound to an SNAT rule of the current private NAT gateway.
Transit IP Address Port	The port of the transit IP address Supported range: 1 to 65535 This parameter is only available if you select **Specific port** for **Port Type**.
Description	Provides supplementary information about the DNAT rule. Enter up to 255 characters. Angle brackets (<>) are not allowed.

6. Click **OK**.
   Once the rule is created, its status changes to **Running**.

Helpful Links

Managing DNAT Rules

2.5.2 Modifying a DNAT Rule

Scenarios

Modify a DNAT rule.

Note that modifying an SNAT rule may interrupt your services.

Prerequisites

A DNAT rule has been added.

Procedure

1. Go to the **private NAT gateway list** page.
2. On the **Private NAT Gateways** page, click the name of the private NAT gateway.
3. On the private NAT gateway details page, click the **DNAT Rules** tab.
4. In the DNAT rule list, locate the row that contains the DNAT rule you want to modify and click **Modify** in the **Operation** column.
5. In the displayed dialog box, modify parameters as needed.
6. Click **OK**.

2.5.3 Deleting a DNAT Rule

Scenarios

Delete a DNAT rule that you no longer need.

Prerequisites

A DNAT rule has been added.

Procedure

1. Go to the **private NAT gateway list** page.
2. On the **Private NAT Gateways** page, click the name of the private NAT gateway.
3. On the private NAT gateway details page, click the **DNAT Rules** tab.
4. In the DNAT rule list, locate the row that contains the DNAT rule you want to delete and click **Delete** in the **Operation** column.
5. In the displayed dialog box, click **OK**.

2.6 Managing Transit IP Addresses

2.6.1 Assigning a Transit IP Address

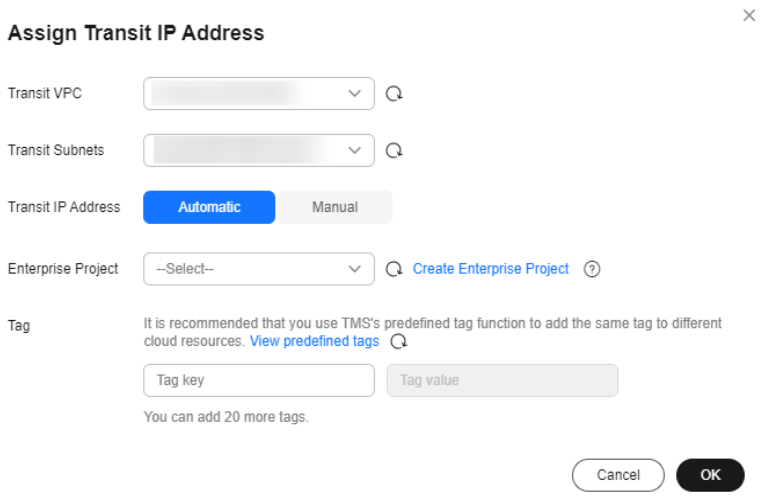
Scenarios

Servers in a VPC can use the same transit IP address to access or provide services accessible from on-premises data centers or other VPCs.

Procedure

1. Go to the **private NAT gateway list** page.
2. On the **Private NAT Gateways** page, click **Transit IP Addresses**.

Figure 2-5 Assign Transit IP Address



3. Configure required parameters. For details, see **Table 2-6**.

Table 2-6 Parameter descriptions of a transit IP address

Parameter	Description
Transit VPC	VPC to which the transit IP address is located.
Transit Subnets	A transit subnet is a transit network and is the subnet to which the transit IP address belongs. The subnet must have at least one available IP address.
Transit IP Address	The transit IP address can be assigned in either of the following ways: **Automatic**: The system automatically assigns a transit IP address. **Manual**: You need to manually assign a transit IP address.

Parameter	Description
IP Address	This parameter is only available when you set **Transit IP Address** to **Manual**. Click **View In-Use IP Address** to view in-use IP addresses in the selected subnet.
Enterprise Project	The enterprise project to which the transit IP address belongs.
Tag	The private NAT gateway tag. A tag is a key-value pair. You can add up to 20 tags to each private NAT gateway.

4. Click **OK**.

2.6.2 Viewing a Transit IP Address

Scenarios

View details of the transit IP address assigned to you.

Procedure

1. Go to the **private NAT gateway list** page.
2. Click the **Transit IP Addresses** tab and then click the transit IP address.
3. On the page displayed, view details of the assigned transit IP address.

   You can view the transit VPC, transit subnet, and private NAT gateway associated with the transit IP address.

2.6.3 Releasing a Transit IP Address

Scenarios

Release a transit IP address that you no longer need.

Procedure

1. Go to the **private NAT gateway list** page.
2. In the **Transit IP Addresses** tab, locate the transit IP address you want to release and click **Release** in the **Operation** column.
3. Click **OK**.

   NOTE

   If a transit IP address has been associated with an SNAT or DNAT rule, it cannot be released. To release such a transit IP address, delete all rules associated with it first.

2.7 Accessing On-Premises Data Centers or Other VPCs

Accessing On-Premises Data Centers

You can use Direct Connect or VPN to connect the transit VPC to your on-premises data centers.

For a higher quality connection, use Direct Connect. For details, see **Overview**.

For more cost-effective connectivity, use VPN. For details, see **Overview.**

Accessing Other VPCs

You can use VPC Peering to connect the transit VPC to other VPCs.

For details, see **VPC Peering Connection Overview**.

3 Permissions Management

3.1 Creating a User and Granting NAT Gateway Permissions

This section describes how to use **IAM** to implement fine-grained permissions control for your NAT Gateway resources. With IAM, you can:

- Create IAM users for employees based on your enterprise's organizational structure. Each IAM user will have their own security credentials for accessing NAT Gateway resources.
- Grant only the permissions required for users to perform a specific task.
- Entrust a Huawei Cloud account or a cloud service to perform efficient O&M on your NAT Gateway resources.

If your Huawei Cloud account does not require individual IAM users, skip this section.

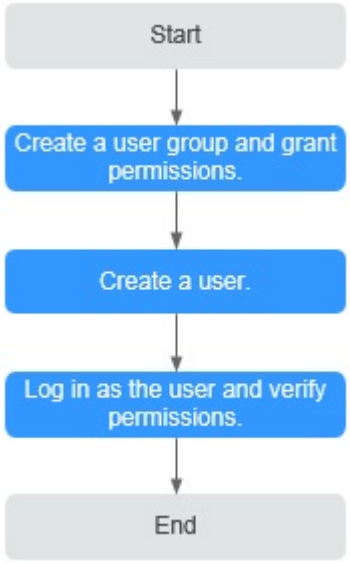
This section describes the procedure for granting permissions (see **Figure 3-1**).

Prerequisites

Learn about the permissions supported by NAT Gateway and choose policies or roles according to your requirements. For details, see **Permissions**. For the permissions of other services, see **System-defined Permissions**.

Process Flow

Figure 3-1 Process for granting NAT Gateway permissions



1. **Create a user group and assign permissions**.

   Create a user group on the IAM console and attach the **NATReadOnlyAccess** policy to the group.

2. **Create an IAM user and add it to a user group.**

   Create a user on the IAM console and add the user to the group created in **1**.

3. **Log in** and verify permissions.

   Log in to the management console as the created user. Switch to the authorized region and verify the permissions.

   - Choose **Service List** > **NAT Gateway**. Then click **Buy NAT Gateway**. If a message appears indicating that you have insufficient permissions to perform the operation, the **NATReadOnlyAccess** policy has already taken effect.
   - Choose any other service in **Service List**. If a message appears indicating that you have insufficient permissions to access the service, the **NATReadOnlyAccess** policy has already taken effect.

3.2 NAT Gateway Custom Policies

You can create custom policies to supplement system-defined policies of NAT Gateway. For the actions that can be added to custom policies, see **Permissions Policies and Supported Actions**.

To create a custom policy, choose either visual editor or JSON.

- Visual editor: Select cloud services, actions, resources, and request conditions. This does not require knowledge of policy syntax.
- JSON: Create a JSON policy or edit an existing one.

For operation details, see **Creating a Custom Policy**. The following section contains examples of common NAT Gateway custom policies.

Example Policies

- Example 1: Grant permissions to create and delete a NAT gateway.

```
{
    "Version": "1.1",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "nat:natGateways:create",
                "nat:natGateways:delete"
            ]
        }
    ]
}
```

- Example 2: Grant permissions to deny NAT gateway deletion.

  A policy with only "Deny" permissions must be used together with other policies. If the permissions assigned to a user contain both "Allow" and "Deny", the "Deny" permissions take precedence over the "Allow" permissions.

  The following method can be used if you need to assign permissions of the NAT Gateway **FullAccess** policy to a user but also forbid the user from deleting NAT gateways. Create a custom policy for denying NAT gateway deletion and attach both policies to the group to which the user belongs. Then the user can perform all operations on NAT gateways except deleting NAT gateways. The following is an example of a deny policy:

```
{
    "Version": "1.1",
    "Statement": [
        {
            "Action": [
                "nat:natGateways:delete"
            ],
            "Effect": "Deny"
        }
    ]
}
```

- Example 3: Defining permissions for multiple services in a policy

  A custom policy can contain actions of multiple services that are of the global or project-level type. The following is an example policy containing actions of multiple services:

```
{
  "Version": "1.1",
  "Statement": [
    {
      "Action": [
        "nat:natGateways:update",
        "nat:natGateways:create"
      ],
      "Effect": "Allow"
    },
    {
      "Action": [
        "vpc:vpcs:update"
      ],
      "Effect": "Allow"
    }
  ]
}
```


4 Tag Management

Scenarios

A NAT gateway tag identifies the NAT gateway. Tags can be added to NAT gateways to ease NAT gateway identification and administration. You can add a tag to a NAT gateway when creating the NAT gateway. Alternatively, you can add a tag to a created NAT gateway on the NAT gateway details page. A maximum of 20 tags can be added to each NAT gateway.

If you have configured tag policies for public NAT gateways, you need to add tags to your public NAT gateways based on the tag policies. If you add a tag that does not comply with the tag policies, public NAT gateways may fail to be created. Contact your administrator to learn more about tag policies.

A tag consists of a key and value pair. **Table 4-1** lists the tag key and value requirements.

Table 4-1 Tag requirements

Parameter	Requirement
Key	• Cannot be left blank. • Must be unique for each NAT gateway. • Can contain a maximum of 36 characters. • Cannot contain equal signs (=), asterisks (*), left angle brackets (<), right angle brackets (>), backslashes (\), commas (,), vertical bars (|), and slashes (/), and the first and last characters cannot be spaces.
Value	• Can contain a maximum of 43 characters. • Cannot contain equal signs (=), asterisks (*), left angle brackets (<), right angle brackets (>), backslashes (\), commas (,), vertical bars (|), and slashes (/), and the first and last characters cannot be spaces.

Managing NAT Gateway Tags

You can manage tags for NAT gateways in either of the following ways:

- Add tags when you create a NAT gateway.

  For detailed operations, see **Buying a Public NAT Gateway** and **Buying a Private NAT Gateway**.
- Modify tags for an existing NAT gateway.

  a. Go to the **NAT gateway list page**.

  b. In the public or private NAT gateway list, click the target NAT gateway.

  c. Under **Tags**, click **Edit Tag**.

  d. The **Edit Tag** dialog box is displayed.

  i. Adding a tag: On the **Edit Tag** page, click **Add Tag** and enter a tag key and tag value.

  ii. Modifying a tag: On the **Edit Tag** page, locate the target tag and enter a new value.

  e. Click **OK**.

  NOTE

  - A maximum of 20 tags can be added to a NAT gateway.
  - Each tag is a key-value pair, and the tag key is unique.

Managing Transit IP Address Tags

You can manage tags for transit IP addresses in either of the following ways:

- Add tags when you assign a transit IP address.

  For details, see **Assigning a Transit IP Address**.
- Modify tags for an existing transit IP address.

  a. Go to the **transit IP address list** page.

  b. In the transit IP address list of the private NAT gateway, click the target transit IP address.

  c. Click **Edit Tag**.

  d. The **Edit Tag** dialog box is displayed.

  i. Adding a tag: On the **Edit Tag** page, click **Add Tag** and enter a tag key and tag value.

  ii. Modifying a tag: On the **Edit Tag** page, locate the target tag and enter a new value.

  e. Click **OK**.

  NOTE

  - A maximum of 20 tags can be added to a transit IP address.
  - Each tag is a key-value pair, and the tag key is unique.

5 Managing Quotas

What Is the Quota?

Quotas are enforced for service resources on the platform to prevent unforeseen spikes in resource usage. Quotas can limit the number or amount of resources available to users. For example, the quota can limit the maximum number of EIPs that can be associated with an SNAT rule. You can apply for increasing quotas if necessary.

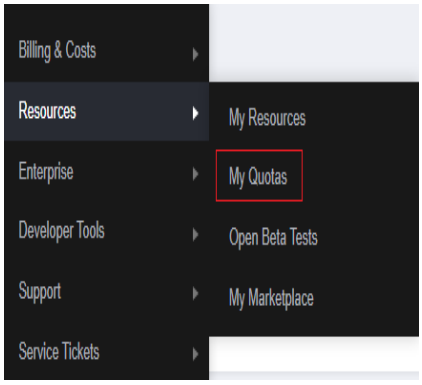
This section describes how to view the used NAT Gateway quota and the total NAT Gateway quota in a specified region.

How Do I View My Quotas?

1. Log in to the management console.
2. Click in the upper left corner and select the desired region and project.
3. In the upper right corner of the page, choose **Resources** > **My Quotas**.

   The **Service Quota** page is displayed.

   Figure 5-1 My Quotas

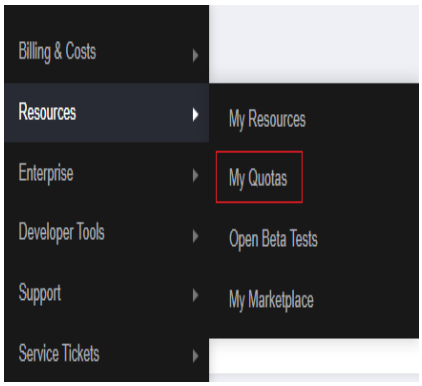
4. View the used and total quota of each type of resources on the displayed page.

   If a quota cannot meet service requirements, apply for a higher quota.

How Do I Apply for a Higher Quota?

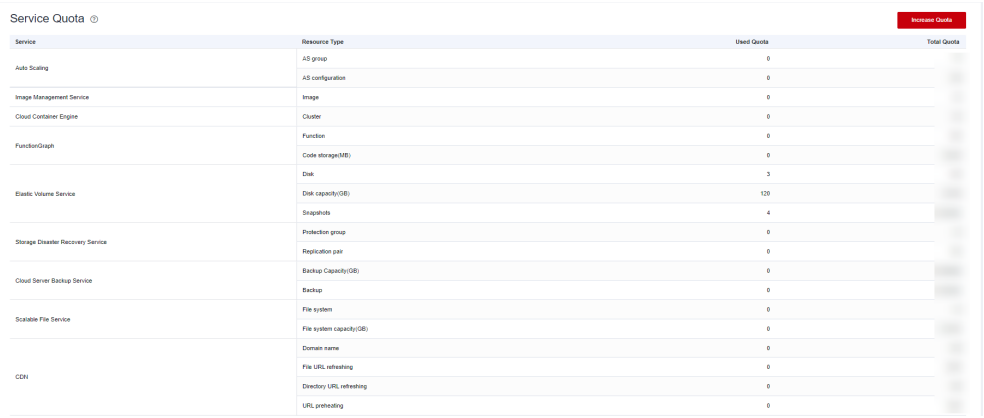
1. Log in to the management console.
2. In the upper right corner of the page, choose **Resources** > **My Quotas**.
   The **Service Quota** page is displayed.

   Figure 5-2 My Quotas



3. Click **Increase Quota** in the upper right corner of the page.

   Figure 5-3 Increasing quota



4. On the **Create Service Ticket** page, configure parameters as required.
   In the **Problem Description** area, fill in the content and reason for adjustment.
5. After all necessary parameters are configured, select **I have read and agree to the Ticket Service Protocol and Privacy Statement** and click **Submit**.

6 Monitoring

6.1 Supported Metrics

Description

This section describes metrics reported by NAT Gateway to Cloud Eye as well as their namespaces, monitoring metrics, and dimensions. You can use the management console or the APIs provided by Cloud Eye to query the metrics generated for NAT Gateway.

Namespace

SYS.NAT

Metrics

Table 6-1 Public NAT gateway metrics

Metric ID	Name	Description	Value Range	Monitored Object	Monitoring Period (Raw Data)
snat_connection	SNAT Connections	Number of SNAT connections of the NAT gateway Unit: count	≥ 0	Public NAT gateway	1 minute
inbound_bandwidth	Inbound Bandwidth	Inbound bandwidth of servers using the SNAT function Unit: bit/s	≥ 0 bits/s	Public NAT gateway	1 minute

Metric ID	Name	Description	Value Range	Monitored Object	Monitoring Period (Raw Data)
outbound_bandwidth	Outbound Bandwidth	Outbound bandwidth of servers using the SNAT function Unit: bit/s	≥ 0 bits/s	Public NAT gateway	1 minute
inbound_pps	Inbound PPS	Inbound PPS of servers using the SNAT function Unit: count	≥ 0	Public NAT gateway	1 minute
outbound_pps	Outbound PPS	Outbound PPS of servers using the SNAT function Unit: count	≥ 0	Public NAT gateway	1 minute
inbound_traffic	Inbound Traffic	Inbound traffic of servers using the SNAT function Unit: byte	≥ 0 bytes	Public NAT gateway	1 minute
outbound_traffic	Outbound Traffic	Outbound traffic of servers using the SNAT function Unit: byte	≥ 0 bytes	Public NAT gateway	1 minute
snat_connection_ratio	SNAT Connection Usage	SNAT connection usage of the NAT gateway The maximum number of connections is the number of connections allowed by NAT gateway specifications. For details, see **NAT Gateway Specifications**. Unit: percent	≥ 0	Public NAT gateway	1 minute

Metric ID	Name	Description	Value Range	Monitored Object	Monitoring Period (Raw Data)
inbound_bandwidth_ratio	Inbound Bandwidth Usage	Inbound bandwidth usage of servers using the SNAT function The maximum bandwidth supported by a public NAT gateway is 20 Gbit/s. Inbound bandwidth usage = Used bandwidth/Maximum bandwidth of the public NAT gateway × 100%. Unit: percent **NOTE** This metric is used to monitor the performance of public NAT gateways instead of the EIP bandwidth.	≥ 0	Public NAT gateway	1 minute
outbound_bandwidth_ratio	Outbound Bandwidth Usage	Outbound bandwidth usage of servers using the SNAT function The maximum bandwidth supported by a public NAT gateway is 20 Gbit/s. Outbound bandwidth usage = Used bandwidth/Maximum bandwidth of the public NAT gateway × 100%. Unit: percent **NOTE** This metric is used to monitor the performance of public NAT gateways instead of the EIP bandwidth.	≥ 0	Public NAT gateway	1 minute

Metric ID	Name	Description	Value Range	Monitored Object	Monitoring Period (Raw Data)
total_inbound_udp_bandwidth	Total Inbound Bandwidth (UDP)	Total bandwidth sent out through the public NAT gateway over UDP from the public network Unit: bit/s	≥ 0 bits/s	Public NAT gateway	1 minute
total_outbound_udp_bandwidth	Total Outbound Bandwidth (UDP)	Total bandwidth sent out through the public NAT gateway over UDP from the VPC Unit: bit/s	≥ 0 bits/s	Public NAT gateway	1 minute
total_inbound_tcp_bandwidth	Total Inbound Bandwidth (TCP)	Total bandwidth sent out through the public NAT gateway over TCP from the public network Unit: bit/s	≥ 0 bits/s	Public NAT gateway	1 minute
total_outbound_tcp_bandwidth	Total Outbound Bandwidth (TCP)	Total bandwidth sent out through the public NAT gateway over TCP from the VPC Unit: bit/s	≥ 0 bits/s	Public NAT gateway	1 minute
packets_drop_count_snat_connection_beyond	Packets Dropped (Excessive SNAT Connections)	Number of packets dropped by the public NAT gateway due to excessive SNAT connections	≥ 0	Public NAT gateway	1 minute
packets_drop_count_pps_beyond	Packets Dropped (Excessive PPS)	Number of packets dropped by the public NAT gateway due to excessive PPS	≥ 0	Public NAT gateway	1 minute

Metric ID	Name	Description	Value Range	Monitored Object	Monitoring Period (Raw Data)
packets_drop_count_eip_port_alloc_beyond	Packets Dropped (When All EIP Ports Allocated)	Number of packets dropped by the public NAT gateway when all EIP ports have been allocated	≥ 0	Public NAT gateway	1 minute

Table 6-2 Private NAT gateway metrics

Metric ID	Name	Description	Value Range	Monitored Object	Monitoring Period (Raw Data)
snat_connection	SNAT Connections	Number of SNAT connections of the NAT gateway Unit: count	≥ 0	Private NAT gateway	1 minute
inbound_bandwidth	Inbound Bandwidth	Inbound bandwidth of servers using the SNAT function Unit: bit/s	≥ 0 bit/s	Private NAT gateway	1 minute
outbound_bandwidth	Outbound Bandwidth	Outbound bandwidth of servers using the SNAT function Unit: bit/s	≥ 0 bit/s	Private NAT gateway	1 minute

Metric ID	Name	Description	Value Range	Monitored Object	Monitoring Period (Raw Data)
inbound_pps	Inbound PPS	Inbound PPS of servers using the SNAT function Unit: count	≥ 0	Private NAT gateway	1 minute
outbound_pps	Outbound PPS	Outbound PPS of servers using the SNAT function Unit: count	≥ 0	Private NAT gateway	1 minute
inbound_traffic	Inbound Traffic	Inbound traffic of servers using the SNAT function Unit: byte	≥ 0 bytes	Private NAT gateway	1 minute
outbound_traffic	Outbound Traffic	Outbound traffic of servers using the SNAT function Unit: byte	≥ 0 bytes	Private NAT gateway	1 minute

Dimensions

Key	Value
nat_gateway_id	Public NAT gateway
vpc_nat_gateway_id	Private NAT gateway

6.2 Creating Alarm Rules

Scenarios

You can set NAT gateway alarm rules to customize the monitored objects and notification policies. Then, you can learn NAT gateway running status in a timely manner.

Procedure

1. Log in to the management console.
2. Click  in the upper left corner and select the desired region and project.
3. Under **Management & Governance**, select **Cloud Eye**.
4. In the left navigation pane, choose **Alarm Management** > **Alarm Rules**.
5. On the **Alarm Rules** page, click **Create Alarm Rule** and set required parameters to create an alarm rule, or modify an existing alarm rule.
6. On the **Create Alarm Rule** page, follow the prompts to configure the parameters.
   a. Set the alarm rule name and description.

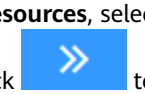
      Table 6-3 Configuring the alarm rule name and description

Parameter	Description
Name	Specifies the alarm rule name. The system generates a random name, which you can modify. Example value: **alarm-b6al**
Description	(Optional) Provides supplementary information about the alarm rule.
Enterprise Project	Specifies the enterprise project the alarm rule belongs to. Only users with the enterprise project permissions can view and manage the alarm rule. To create an enterprise project, see **Creating an Enterprise Project**.

   b. Select an object to be monitored and set alarm rule parameters.

      Table 6-4 Parameters

Parameter	Description	Example Value
Resource Type	Specifies the type of the resource the alarm rule is created for.	NAT Gateway
Dimension	Specifies the metric dimension of the selected resource type.	Public NAT Gateway

Parameter	Description	Example Value
Monitoring Scope	Specifies the monitoring scope the alarm rule applies to. You can select **Resource groups** or **Specific resources**. **NOTE** • If **Resource groups** is selected and any resource in the group meets the alarm policy, an alarm is triggered. • If you select **Specific resources**, select one or more resources and click  to add them to the box on the right.	Specific resources
Method	There are two options: **Use template** or **Create manually**.	Create manually
Template	Specifies the template to be used. You can select a default alarm template or customize a template.	N/A
Alarm Policy	Specifies the policy for triggering an alarm. If you set **Resource Type** to **Website Monitoring**, **Log Monitoring**, **Custom Monitoring**, or a specific cloud service, whether to trigger an alarm depends on whether the metric data in consecutive periods reaches the threshold. For example, Cloud Eye triggers an alarm if the raw data of the SNAT connections of the monitored object is 8000 or more for three consecutive 1-minute periods.	N/A
Alarm Severity	Specifies the alarm severity, which can be **Critical**, **Major**, **Minor**, or **Informational**.	Major

c. Configure the alarm notification.

Table 6-5 Alarm notification parameters

Parameter	Description
Alarm Notification	Specifies whether to notify users when alarms are triggered. Notifications can be sent by email, text message, or HTTP/HTTPS message.

Parameter	Description
Notification Object	Specifies the object to which alarm notifications will be sent. You can select the account contact or a topic. • **Account contact**: Enter the phone number and email address of the registered account. • A topic is used to publish messages and subscribe to notifications. If the required topic is unavailable, create one first and add subscriptions to it. For details, see the **Cloud Eye User Guide**.
Validity Period	Cloud Eye sends notifications only within the validity period specified in the alarm rule. If **Validity Period** is set to **08:00-20:00**, Cloud Eye sends notifications only within the time window.
Trigger Condition	Specifies the condition for triggering the alarm notification. You can select **Generated alarm** (when an alarm is generated), **Cleared alarm** (when an alarm is cleared), or both.

7. After the parameters are set, click **Create**.

   After the alarm rule is set, the system automatically notifies you when an alarm is triggered.

NOTE

For more details, see **Alarm Rules**.

6.3 Viewing Metrics

Prerequisites

- The NAT gateway is running properly and SNAT rules have been created.
- It can take a period of time to obtain and transfer the monitoring data. Therefore, wait for a while and then check the data.

Scenarios

This section describes how to view NAT Gateway metrics.

Procedure

1. Log in to the management console.
2. In the upper left corner, select the target region.
3. Under **Management & Governance**, select **Cloud Eye**.
4. In the navigation pane on the left, choose **Cloud Service Monitoring** > **NAT Gateway**.
5. Locate the row that contains the target metric and click **View Metric** in the **Operation** column to check detailed information.

You can view data from the last 1, 3, 12, or 24 hours or the last 7 days.

Figure 6-1 Viewing metrics

6.4 Viewing Metrics of Resources Using a NAT Gateway

Scenarios

You can view metrics details of resources using a specific NAT gateway. The resources can be ECSs or BMSs.

Procedure

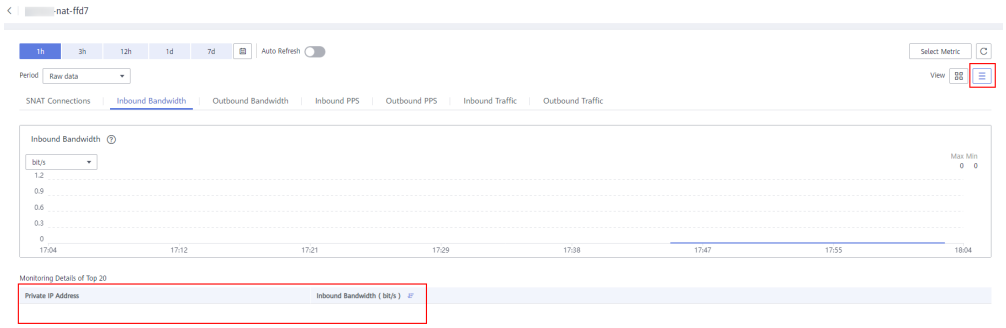
1. Log in to the management console.
2. Click in the upper left corner and select the desired region and project.
3. Click **Service List** in the upper left corner. Under **Networking**, select **NAT Gateway**.

   The NAT Gateway console is displayed.
4. Click the name of the NAT gateway whose metrics you want to view.
5. On the displayed page, choose the **Monitoring** tab and click **View Details**.

   On the Cloud Eye console, view metrics of the NAT Gateway.
6. Configure a time range for metrics to be viewed.
7. Click in the upper right corner of the page to switch the display mode.
8. Select a metric to be viewed and click a specific time point in the displayed graph.

   In the lower part of the page, you can view the metric details of resources at the time point.

Figure 6-2 Viewing metrics



7 Auditing

7.1 Key Operations Recorded by CTS

You can use CTS to record operations on NAT Gateway for query, auditing, and backtracking.

Table 7-1 lists public NAT gateway operations that can be recorded by CTS.

Table 7-2 lists private NAT gateway operations that can be recorded by CTS.

Table 7-1 Public NAT gateway operations

Operation	Resource Type	Trace
Creating a public NAT gateway	natgateway	createNatGateway
Modifying a public NAT gateway	natgateway	updateNatGateway
Deleting a public NAT gateway	natgateway	deleteNatGateway
Creating a DNAT rule	dnatrule	createDnatRule
Modifying a DNAT rule	dnatrule	updateDnatRule
Deleting a DNAT rule	dnatrule	deleteDnatRule
Creating an SNAT rule	snatrule	createSnatRule
Modifying an SNAT rule	snatrule	updateSnatRule
Deleting an SNAT rule	snatrule	deleteSnatRule

Table 7-2 Private NAT gateway operations

Operation	Resource Type	Trace
Creating a private NAT gateway	privateNat	createPrivateNat
Modifying a private NAT gateway	privateNat	updatePrivateNat
Deleting a private NAT gateway	privateNat	deletePrivateNat
Creating a DNAT rule	privateDnatRule	createPrivateDnatRule
Modifying a DNAT rule	privateDnatRule	updatePrivateDnatRule
Deleting a DNAT rule	privateDnatRule	deletePrivateDnatRule
Creating an SNAT rule	privateSnatRule	createPrivateSnatRule
Modifying an SNAT rule	privateSnatRule	updatePrivateSnatRule
Deleting an SNAT rule	privateSnatRule	deletePrivateSnatRule
Creating a transit subnet	transitSubnet	createTransitSubnet
Modifying a transit subnet	transitSubnet	updateTransitSubnet
Deleting a transit subnet	transitSubnet	deleteTransitSubnet
Assigning a transit IP address	transitIp	createTransitIp
Releasing a transit IP address	transitip	deleteTransitIp

7.2 Viewing Traces

Scenarios

CTS records the operations performed on NAT Gateway and allows you to view the operation records of the last seven days on the CTS console. This topic describes how to query these records.

Procedure

1. Log in to the management console.
2. In the upper left corner of the page, click  and select the desired region and project.

3. Under **Management & Governance**, click **Cloud Trace Service**.
4. In the navigation pane on the left, choose **Trace List**.
5. Specify the filters used for querying traces. The following filters are available:
   - **Trace Type**, **Trace Source**, **Resource Type**, and **Search By**

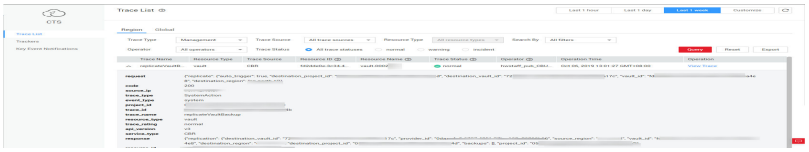
     Select a filter from the drop-down list.

     If you select **Trace name** for **Search By**, select a specific trace name.

     If you select **Resource ID** for **Search By**, select or enter a specific resource ID.

     If you select **Resource name** for **Search By**, select or enter a specific resource name.
   - **Operator**: Select a specific operator (at the user level rather than the tenant level).
   - **Trace Status**: Available options include **All trace statuses**, **normal**, **warning**, and **incident**. You can only select one of them.
   - Time range: You can query traces generated at any time range of the last seven days.
6. Click on the left of the required trace to expand its details.

Figure 7-1 Expanding trace details



7. Click **View Trace** in the **Operation** column to view trace details.

Figure 7-2 View Trace

```
"context": {
    "code": "204",
    "source_ip": "10.45.152.59",
    "trace_type": "ApiCall",
    "event_type": "system",
    "project_id": "0503dda897000fed2f78c00909158a4d",
    "trace_id": "116a2aff-deb8-11e9-95f5-d5c0b02a9b97",
    "trace_name": "deleteMember",
    "resource_type": "member",
    "trace_rating": "normal",
    "api_version": "v2.0",
    "service_type": "ELB",
    "response": "{\"member\": {\"project_id\": \"0503dda897000fed2f78c00909158a4d\", \"name\": \"9646e73b-338c-
    "resource_id": "
    "tracker_name": "system",
    "time": "1569321775225",
    "resource_name": "9646e73b-338c-4d27-a17c-219be532812c",
    "record_time": "1569321775903",
    "user": {
        "domain": {
            "name": "
            "id": "0503dda878000fed0f75c0096d70a960"
        },
```


For details about key fields in the trace, see section "Trace Structure" in ***Cloud Trace Service User Guide***.

