

Web 3.0 Node Engine Service (NES)

User Guide

Issue 01
Date 2024-11-28



Copyright © Huawei Cloud Computing Technologies Co., Ltd. 2024. All rights reserved.

No part of this document may be reproduced or transmitted in any form or by any means without prior written consent of Huawei Cloud Computing Technologies Co., Ltd.

Trademarks and Permissions



HUAWEI 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 Overview	1
2 Permissions Management	2
2.1 Creating a User and Granting NES Permissions	2
2.2 Custom Policies	4
3 Dedicated Edition	7
3.1 Dashboard	7
3.2 Network Management	8
3.2.1 Node Creation	8
3.2.2 Node Checking	14
3.2.2.1 Checking a Full Node	14
3.2.2.2 Checking a Staking Node	16
3.2.3 Other Operations	21
3.3 Authentication Credential	22
3.3.1 API Key Creation	23
3.3.2 Other Operations	26
4 Shared Edition	30
4.1 Dashboard	30
4.2 Package Management	31
4.3 DApp Project Management	34
4.3.1 DApp Project Creation	35
4.3.2 DApp Project Viewing	37
4.3.3 Other Operations	39

1 Overview

Web3 Node Engine Service (NES) is a blockchain node engine platform developed by Huawei Cloud. It simplifies blockchain network management, resource management, and authentication, while also providing developers with the ability to connect to mainstream blockchains like Ethereum. NES offers a stable, efficient, and secure infrastructure for Web3 services.

On the page of the [dedicated edition](#) of NES, there are **Dashboard**, **Network Management**, and **Authentication Credential** functions.

On the page of the [shared edition](#) of NES, there are **Dashboard**, **Package Management**, and **DApp Project Management** functions.

NOTE

Currently, only the AP-Singapore region is supported.

2 Permissions Management

2.1 Creating a User and Granting NES Permissions

This topic describes how to use [Identity and Access Management \(IAM\)](#) to implement fine-grained permissions control for your NES resources. With IAM, you can:

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

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

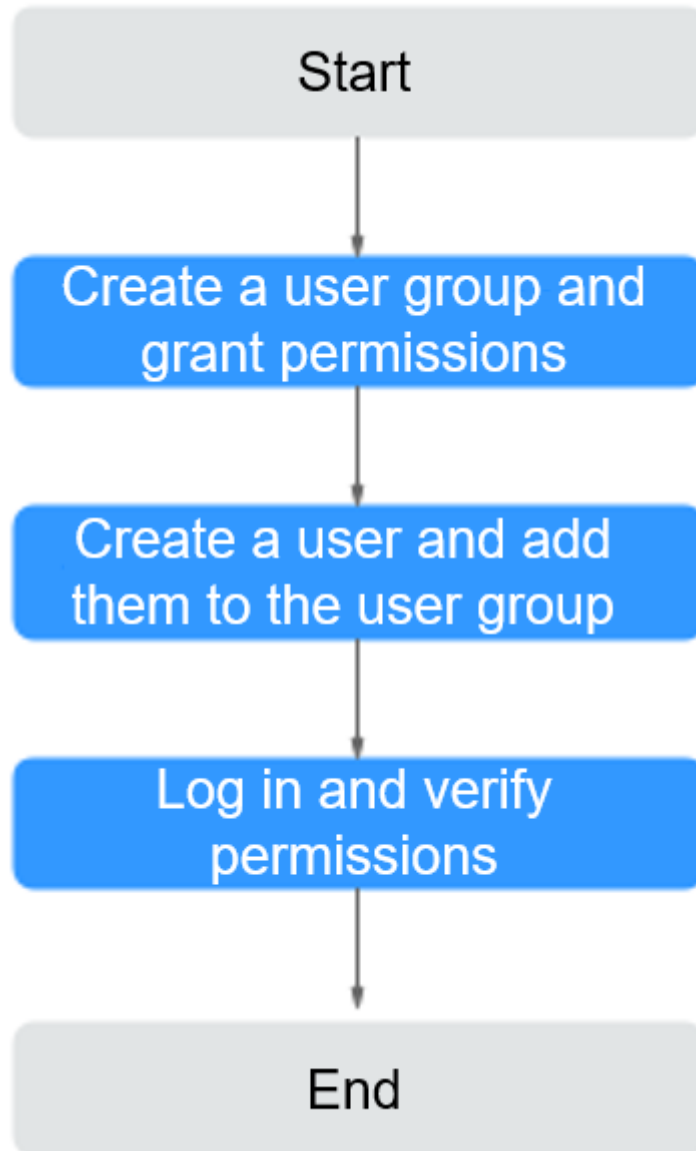
This section describes the procedure for granting user permissions. [Figure 2-1](#) shows the process flow.

Prerequisites

Learn about the permissions (see [Permissions Management](#)) supported by NES and choose policies or roles according to your requirements. For the system permissions of other services, see [System-defined Permissions](#).

Process

Figure 2-1 Process for granting NES permissions



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

Create a user group on the IAM console, and assign the BCS Administrator policy to the group.

NOTE

- If you select BCS Administrator, you also need to select the following dependent permissions: Tenant Guest, Server Administrator, ELB Administrator, SFS Administrator, SWR Admin, APM FullAccess, AOM FullAccess, CCE Administrator, VPC Administrator, EVS Administrator, and CCE Cluster Admin.
- Contact the account administrator to obtain the operation permissions on other services.

2. **Create a user and add them to the user group.**
Create a user on the IAM console and add the user to the user group created in 1.
3. **Log in** and verify permissions.
Log in to the console as the created user, and verify that the user has the NES operating permissions.

2.2 Custom Policies

Custom policies can be created to supplement the system-defined policies of NES.

You can create custom policies in either of the following ways:

- Visual editor: Select cloud services, actions, resources, and request conditions. This does not require knowledge of policy syntax.
- JSON: Create a policy in the JSON format from scratch or based on an existing policy.

For details, see [Creating a Custom Policy](#). The following section contains examples of common NES custom policies.

Step 1 On the management console homepage, click **Identity and Access Management**.

Step 2 In the navigation pane, choose **Permissions > Policies/Roles** and click **Create Custom Policy**.

Step 3 On the **Create Custom Policy** page, set the policy name, view, content, and description, then click **OK**.

- **Policy Name:** Enter a custom policy name, for example, partial NES permissions.
- **Policy View:** Select **JSON**.
- **Policy Content:** Enter the policy content based on the template.

For example, to create a node, query a single node, and obtain node monitoring information, copy the following content:

```
{
  "Version": "1.1",
  "Statement": [
    {
      "Action": [
        "bcs:nesNode:create",
        "bcs:nesNode:get",
        "bcs:nesNode:getMetric"
      ],
      "Effect": "Allow"
    }
  ]
}
```

Table 2-1 Policy content parameters

Parameter	Description	Value
Version	Policy version	Fixed to 1.1 .

Parameter		Description	Value
Statement	Effect	Whether the actions are allowed	<ul style="list-style-type: none"> - Allow - Deny
	Action	Operations to be performed on NES	Each action name is in the format of <i>Service name:Resource type:Operation</i> and cannot be customized. Table 2-2 lists the fine-grained permissions supported by NES. After you set any action, the permissions for the action will be granted to the IAM user.

Table 2-2 Action description

Action	Action Description
bcs:nes:getSummary	Obtaining the Overview Information
bcs:nes:listNetwork	Obtaining the Network Types
bcs:nes:listNetworkFlavor	Obtaining Available Specifications
bcs:nesNode:listFlavor	Obtaining Available Specifications for Node Scaling
bcs:nesNode:list	Obtaining All Nodes on a Specified Network
bcs:nesNode:create	Creating a Node
bcs:nesNode:get	Querying a Node
bcs:nesNode:delete	Deleting a Node
bcs:nesNode:update	Updating a Node
bcs:nesNode:getMetric	Obtaining the Node Monitoring Information
bcs:nesNode:getStatistic	Obtaining the API Calling Information of a Node in a Specified Period
bcs:nesNode:getStatus	Obtaining the Status of a Staking Node in a Specified Period
bcs:nesNode:downloadCert	Downloading Certificates
bcs:nesAPIKey:create	Creating an API Key

Action	Action Description
bcs:nesAPIKey:list	Obtaining All API Keys of a User
bcs:nesAPIKey:delete	Deleting an API Key
bcs:nesAPIKey:update	Updating an API Key
bcs:nesNode:validateRelays	Verifying the Address of Relays
bcs:nesNode:updateRelays	Updating the Address of Relays

----End

3 Dedicated Edition

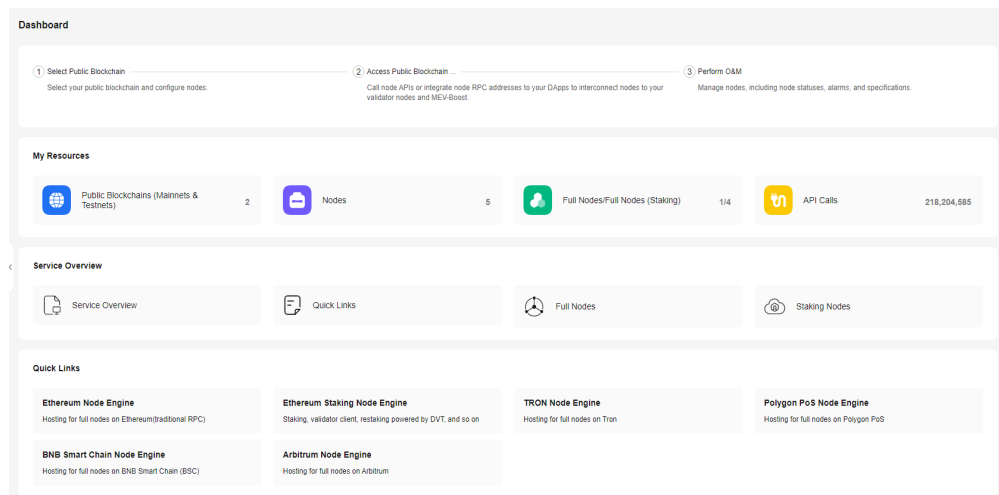
3.1 Dashboard

The **Quick Start** process and **My Resources** are shown on this page.

Procedure

- Step 1** Log in to the NES console.
- Step 2** In the navigation pane on the left, choose **Dedicated > Dashboard**.
- Step 3** Check **Quick Start**, **My Resources**, and **Feature Updates**.

Figure 3-1 Dashboard



----End

Quick Start

- Step 1** Select a public blockchain.
Select your public blockchain and configure nodes.

Step 2 Access a public blockchain network.

Call node APIs or integrate node RPC addresses to your DApps to interconnect nodes to your validator nodes and MEV-Boost.

Step 3 Perform O&M.

Manage nodes, including node statuses, alarms, and specifications.

----End

My Resources

Public Blockchains (Mainnets & Testnets), Nodes, Full Nodes/Full Nodes (Staking), and API Calls are shown.

- **Public Blockchains (Mainnets & Testnets)**: the number of created public blockchains
- **Nodes**: the number of nodes under your account
- **Full Nodes/Full Nodes (Staking)**: the numbers of full nodes and staking nodes
- **API Calls**: the total number of API calls under your account

3.2 Network Management

Nodes of different public blockchains can be configured and managed on this page.

3.2.1 Node Creation

To create a node, you need to configure the **Public Blockchain, Mainnet & Testnet, Node Type, Node Specifications, and Nodes**.

Prerequisites

You have registered with Huawei Cloud.

Procedure

Step 1 Log in to the NES console.

Step 2 Choose **Dedicated > Network Management** and click **Join Public Blockchain**.

Step 3 Configure parameters.

Figure 3-2 Joining a public blockchain

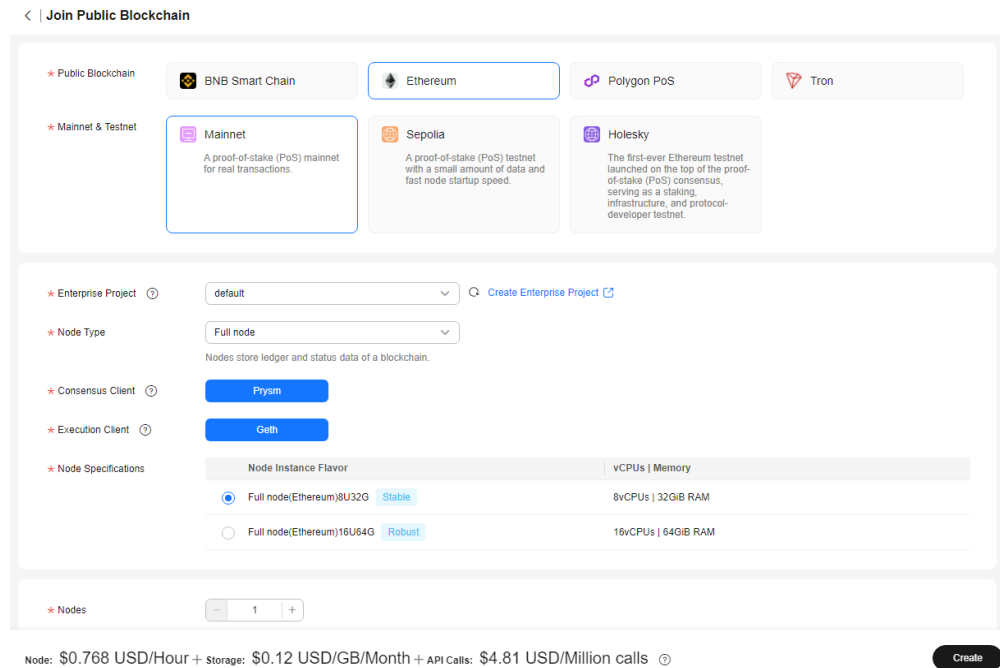


Table 3-1 Node parameters

Parameter	Description
Public Blockchain	<p>There are BNB Smart Chain, Ethereum, Polygon PoS, and TRON.</p> <ul style="list-style-type: none"> ● BNB Smart Chain: an EVM-compatible blockchain. It contains consensus layers and hubs to multiple blockchains. As a leading blockchain, BNB Smart Chain serves as an essential infrastructure, offers low-cost transactions and fast processing, and prioritizes privacy. ● Ethereum: an open-source, blockchain-based computing platform featuring smart contract functionality ● Polygon PoS: an L2 solution or a side chain, with its PoS Chains interconnected and communicating with the Ethereum mainnet ● TRON: a blockchain-based, decentralized operating system

Parameter	Description
Mainnet & Testnet	<p>For BNB Smart Chain, there are Mainnet and Chapel.</p> <ul style="list-style-type: none"> • Mainnet: an EVM-compatible, Proof of Staked Authority (PoSA) mainnet, with shorter block time and lower fees. <p>NOTE This function will be available soon.</p> <ul style="list-style-type: none"> • Chapel: a replica of mainnet. Chapel allows you to develop, test, and deploy your DApps. <p>For Ethereum, there are Mainnet, Sepolia, Goerli, and Holesky.</p> <ul style="list-style-type: none"> • Mainnet: a proof-of-stake (PoS) mainnet for real transactions • Sepolia: a PoS testnet with a small amount of data and fast node startup speed • Goerli: a PoS testnet with a large amount of data for complex services • Holesky: The first-ever Ethereum testnet launched on the top of the PoS consensus, serving as a staking, infrastructure, and protocol-developer testnet. <p>For Polygon PoS, there are Mainnet and Mumbai.</p> <ul style="list-style-type: none"> • Mainnet: The PoS mechanism and compatibility with EVMs make mainnet the preferred choice for fast transactions and low costs. • Mumbai: a replica of mainnet. Mumbai allows you to develop, test, and deploy your DApps. <p>For TRON, there are Mainnet and Nile.</p> <ul style="list-style-type: none"> • Mainnet: a dedicated proof-of-stake (DPoS) mainnet for real transactions • Nile: a DPoS testnet with a small amount of data and fast node startup speed
Enterprise Project	<p>Select an existing enterprise project, for example, default. If the Enterprise Management service is not enabled, this parameter is unavailable.</p>
Node Type	<p>For Ethereum, there are Full node and Full node (Staking supported)</p> <ul style="list-style-type: none"> • Full node: It stores blockchain ledger data and status data and is suitable for DApp development and on-chain data requests. • Full node (Staking supported)

Parameter	Description
Consensus Client	<p>It implements the proof-of-stake consensus algorithm, which enables the network to achieve agreement based on validated data from the execution client.</p> <ul style="list-style-type: none"> • If the Public Blockchain is Ethereum and the Node Type is Full node, you can set Prysm as the consensus client. • If the Public Blockchain is Ethereum and the Node Type is Full node (Staking supported), you can set Prysm (default) or Lighthouse as the consensus client. • If the Public Blockchain is Polygon PoS and the Node Type is Full node, you can set Heimdall as the consensus client. <p>NOTE Prysm 5.0.2 is provided for you to use Prysm validators of version 5.0.0 and later. Lighthouse 5.2.0 is provided for you to use Lighthouse validators of version 5.0.0 and later. Heimdall 1.1.0 is provided for you.</p>
Execution Client	<p>It listens to new transactions broadcasted in the network, executes them in EVM, and holds the latest state and database of all current data on the Ethereum network.</p>
Node Specifications	<ul style="list-style-type: none"> • If the Public Blockchain is BNB Smart Chain and the Node Type is Full node, the 2U8G and 16U64G (Robust) flavor is supported. • If the Public Blockchain is Ethereum and the Node Type is Full node, the following flavors are supported: 4U16G (Recommended), 8U32G (Stable), and 16U64G (Robust). • If the Public Blockchain is TRON and the Node Type is Full node, the 16U32G (Stable) flavor is supported. • If the Node Type is Full node (Staking supported), the 8U32G (Stable) flavor is supported. • If the Public Blockchain is Polygon PoS, the following flavors are supported: 8U32G (Stable) and 16U64G (Robust).
Nodes	<p>You can create multiple nodes at the same time as required.</p>

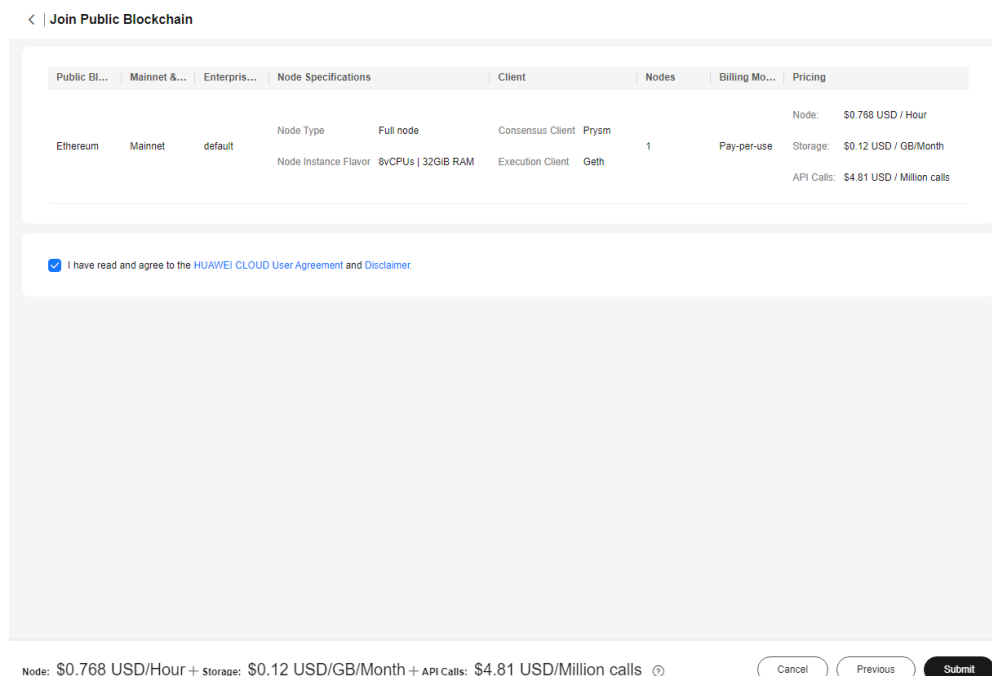
Parameter	Description
Connect to MEV-Boost Relays	<p>This is displayed if the Node Type is Full node (Staking supported), and is enabled by default. Click Edit to use the default MEV-Boost relays or add new ones.</p> <p>The following mainstream MEV-Boost relays are connected by default.</p> <ul style="list-style-type: none"> • https://0xa15b52576bcbf1072f4a011c0f99f9fb6c66f3e1ff321f11f461d15e31b1cb359caa092c71bbded0bae5b5ea401aab7e@aestus.live • https://0xa7ab7a996c8584251c8f925da3170bdfd6ebc75d50f5ddc4050a6fdc77f2a3b5fce2cc750d0865e05d7228af97d69561@agnostic-relay.net • https://0x8b5d2e73e2a3a55c6c87b8b6eb92e0149a125c852751db1422fa951e42a09b82c142c3ea98d0d9930b056a3bc9896b8f@bloxroute.max-profit.blxrbdn.com • https://0xb0b07cd0abef743db4260b0ed50619cf6ad4d82064cb4fbec9d3ec530f7c5e6793d9f286c4e082c0244ffb9f2658fe88@bloxroute.regulated.blxrbdn.com • https://0xb3ee7afcf27f1f1259ac1787876318c6584ee353097a50ed84f51a1f21a323b3736f271a895c7ce918c038e4265918be@relay.edennetwork.io • https://0xac6e77dfe25ecd6110b8e780608cce0dab71fdd5ebea22a16c0205200f2f8e2e3ad3b71d3499c54ad14d6c21b41a37ae@boost-relay.flashbots.net • https://0x98650451ba02064f7b000f5768cf0cf4d4e492317d82871bdc87ef841a0743f69f0f1eea11168503240ac35d101c9135@mainnet-relay.securerpc.com • https://0xa1559ace749633b997cb3fdacffb890aeebdb0f5a3b6aaa7eeaf1a38af0a8fe88b9e4b1f61f236d2e64d95733327a62@relay.ultarasound.money • https://0x8c7d33605ecef85403f8b7289c8058f440cbb6bf72b055dfe2f3e2c6695b6a1ea5a9cd0eb3a7982927a463feb4c3dae2@relay.wemerge.com <p>Click  Add MEV-Boost Relay Address to add relays in the following format:</p> <p><code>http://{Protocol prefix}{Public key}@{Relay domain name}</code> or <code>https://{Protocol prefix}{Public key}@{Relay domain name}</code></p>

Parameter	Description
	<p>Click Delete in the Operation column to delete unnecessary relays.</p> <p>NOTE Invalid relays can be added but will not be used in transactions.</p>
Display APIs for Full Node	<p>Disabled by default. For details about common APIs for full nodes, see Common Ethereum APIs.</p> <p>Displaying these APIs will trigger the traffic control policy for your full nodes (staking supported) and might affect the validator efficiency. It is recommended to use full nodes to view these APIs.</p>
VPC Endpoint (VPCEP)	<p>If it is enabled, NES will create interface VPC endpoints for your staking nodes. After your staking nodes are connected, traffic from these nodes and validator staking will be forwarded through a private network.</p>

Step 4 Click **Create**.

Step 5 Select **I have read and agree to the HUAWEI CLOUD User Agreement and Disclaimer.** and click **Submit**.

Figure 3-3 Node information



NOTE

It takes about 5 to 8 seconds to complete the process.

----End

3.2.2 Node Checking

3.2.2.1 Checking a Full Node

Procedure

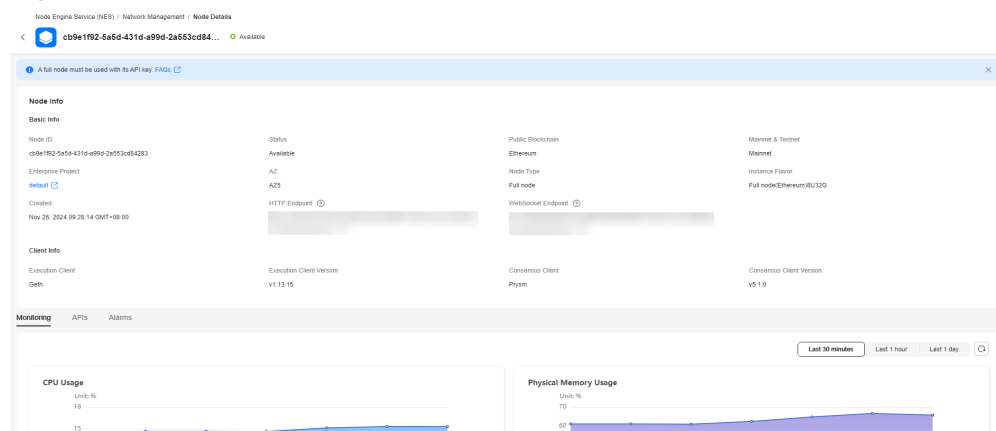
- Step 1** Log in to the NES console.
- Step 2** Choose **Dedicated** > **Network Management**.
- Step 3** Click a node ID.

Figure 3-4 Checking a full node

Node ID	Status	Node Type	Client	Specifications	AZ	Enterpr...	Created	Operatio
2b936c9b-451b-4187-8f30-6d90242e355a	Available	Full node (Staking supported)	Consensus layer: Pr Execution layer: Gc	8vCPUs 32GiB	AZ3	default	Apr 28, 202...	Scale
eeaf902d-f8c3-450e-bda3-9971cb2df42	Available	Full node (Staking supported)	Consensus layer: Pr Execution layer: Gc	8vCPUs 32GiB	AZ3	default	Apr 28, 202...	Scale
446e1527f5c44cae-a9f3-d6107ee97779	Available	Full node	Consensus layer: Pr Execution layer: Gc	8vCPUs 32GiB	AZ3	default	Apr 28, 202...	Scale

- Step 4** Check the node details, including the data of **Basic Settings**, **Monitoring**, **APIs**, and **Alarms**.

Figure 3-5 Node details

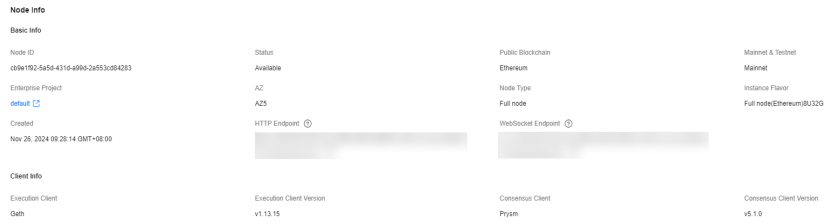


----End

Node Information

Here shows the node ID, public blockchain name, node status, mainnet and testnet types, node type, HTTP endpoint, WebSocket endpoint, blockchain instance flavor, creation time, availability zone (AZ), execution client, execution client version, consensus client, and consensus client version.

Figure 3-6 Basic settings



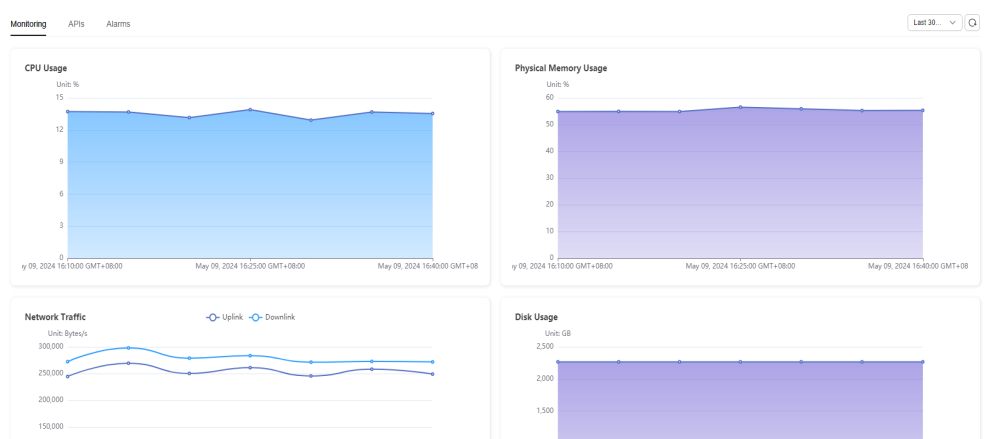
NOTE

An AZ is a physical region where resources use independent power supplies and networks. Your public blockchain nodes are automatically allocated to different AZs. To ensure application availability when deleting nodes, it is recommended to avoid leaving the remaining nodes in the same AZ. Currently, **AZ1** and **AZ3** are supported.

Monitoring

Here shows the CPU usage, physical memory usage, network traffic, and disk usage.

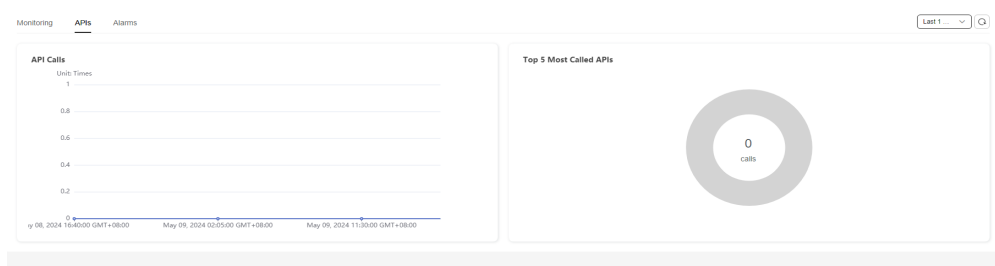
Figure 3-7 Monitoring



APIs

Here shows the total number of API calls and the top 5 most called APIs.

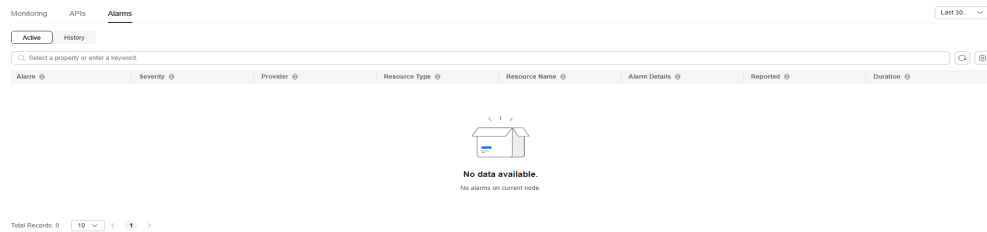
Figure 3-8 APIs



Alarms

Here shows the active and history alarms of the current node.

Figure 3-9 Alarms

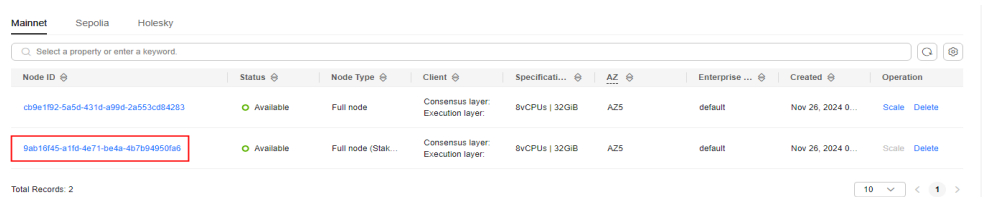


3.2.2.2 Checking a Staking Node

Procedure

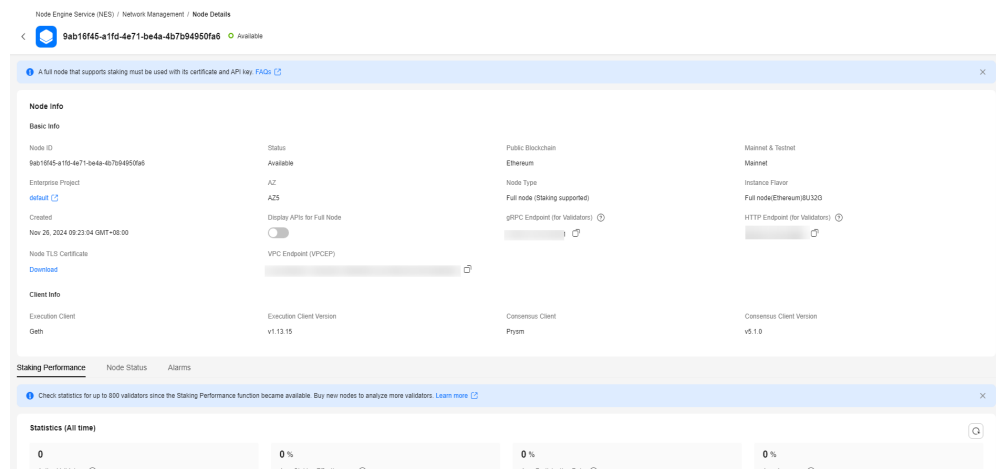
- Step 1** Log in to the NES console.
- Step 2** Choose **Dedicated > Network Management**.
- Step 3** Click a node ID.

Figure 3-10 Checking a staking node



- Step 4** Check the node details, including the data of **Basic Settings**, **Monitoring**, **Node Status**, and **Alarms**.

Figure 3-11 Node details

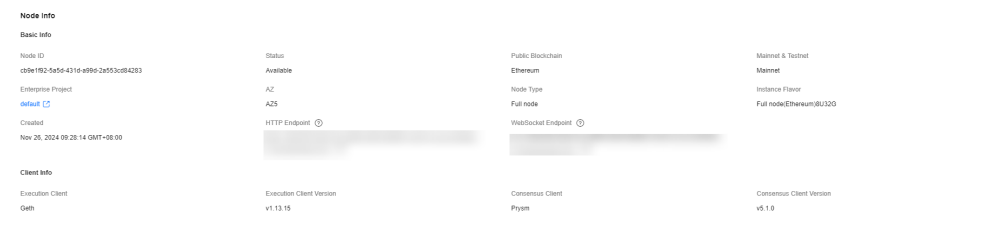


----End

Node Information

Here shows the node ID, public blockchain name, node status, mainnet and testnet types, node type, gRPC endpoint, node TLS certificate, blockchain instance flavor, creation time, AZ, APIs for full nodes, WebSocket endpoint, HTTP endpoint (for validators), gRPC endpoint (for validators), execution client, execution client version, consensus client, and consensus client version. If **Display APIs for Full Node** is enabled, HTTP and WebSocket endpoints are displayed. If **VPC Endpoint (VPCEP)** is enabled, the VPC endpoint is displayed.

Figure 3-12 Basic settings



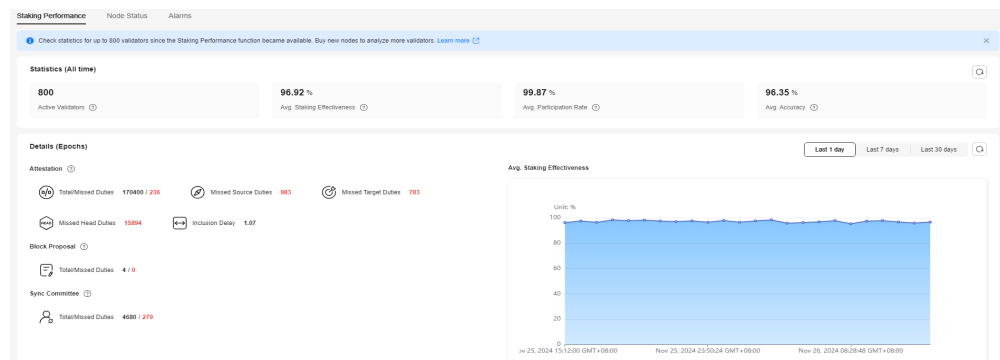
NOTE

- **Connect to MEV-Boost Relays** is displayed only if you enabled this function when creating staking nodes.
- An AZ is a physical region where resources use independent power supplies and networks. Your public blockchain nodes are automatically allocated to different AZs. To ensure application availability when deleting nodes, it is recommended to avoid leaving the remaining nodes in the same AZ. Currently, **AZ1** and **AZ3** are supported.

Staking Performance

You can check statistics for up to 800 validators since the **Staking Performance** function became available. Buy new nodes to analyze more validators. This function helps you analyze the validator performance, including their online status, effectiveness, participation, and accuracy.

Figure 3-13 Staking performance



Statistics (All Time) shows the overall staking performance and **Details (by Epoch)** shows details.

- **Statistics (All Time)**

The following data is displayed.

- a. **Active Validators**

The number of active validators in the current network.

- b. **Avg. Staking Effectiveness**

Validators performance in their attestation, block proposal, and sync committee duties.

- 84.4% of validators' rewards come from attestations (attestation_effectiveness), greatly affecting the staking performance. Formula: $\text{attestation_effectiveness} = \text{actual_reward} / \text{ideal_reward}$
- 12.5% of validators' rewards come from block proposals (proposer_effectiveness). If the validator did not propose any block, the effectiveness is 1. Formula:
 $\text{proposer_effectiveness} = \text{proposed_blocks} / \text{total_blocks}$
- 3.1% of validators' rewards come from sync committee duties (sync_effectiveness). Formula:
 $\text{sync_effectiveness} = \text{executed_sync} / (\text{scheduled_sync} - \text{missed_blocks})$

Avg. Staking Effectiveness is the weighted average of attestation_effectiveness, proposer_effectiveness, and sync_effectiveness. Formula: $\text{effectiveness} = 54/64 \times \text{attestation_effectiveness} \times 8/64 \times \text{proposer_effectiveness} + 2/64 \times \text{sync_effectiveness}$

Effectiveness calculation excludes tasks in which the validators did not participate. The following lists some possible scenarios.

- Participating only in attestation duties:
 $\text{effectiveness} = 1 \times \text{attestation_effectiveness}$
- Participating in attestation and proposal duties:
 $\text{effectiveness} = ((56/64 \times \text{attestation_effectiveness}) + (8/64 \times \text{proposer_effectiveness}))$
- Participating in attestation and sync committee duties:
 $\text{effectiveness} = ((62/64 \times \text{attestation_effectiveness}) + (2/64 \times \text{sync_effectiveness}))$

- c. **Avg. Participation Rate**

The number of epochs a validator's attestation was included on the blockchain. Formula:

$\text{participation_rate} = \text{included_attestations} / \text{active_epochs}$

- d. **Avg. Accuracy**

This measures the correctness of attestations submitted by validators, including source votes, target votes, and head votes. Formula:

$\text{correctness_rate} = (\text{source_vote_correctness} + \text{target_vote_correctness} + \text{head_vote_correctness}) / 3$

- **Details (by Epoch)**

You can filter data by specifying the time range, for example, last day, last 7 days, or last 30 days. Detailed data of attestation, block proposal, and sync committee duties are shown in graphs and tables to help you evaluate the validator performance by day, week, or month.

- a. **Attestations:** An active validator is expected to create, sign, and broadcast an attestation every epoch.

Figure 3-14 Attestations



- **Total:** the total attestations submitted by validators
 - **Missed Duties:** the total attestations that were failed or incorrectly submitted
 - **Missed Source Duties**
 - **Missed Target Duties**
 - **Missed Head Duties**
 - **Inclusion Delay:** the difference between the time when the validator's attestation is actually included in the blockchain and the expected time. The lower the inclusion delay, the greater the validator's contributions to the network's consensus and stability. The optimal inclusion delay is 1.
- b. **Block Proposal:** New blocks are proposed, created, and broadcast by random validators in their respective slots.

Figure 3-15 Block proposal

Block Proposal



- c. **Sync Committee:** A group of validators (randomly chosen every 27 hours) that sign valid block headers. This group enables light clients to trace the blockchain status and keep the blockchain synchronized without accessing the entire set of validators.

Figure 3-16 Sync committee



- d. **Avg. Staking Effectiveness:** Trends in the last 1 day, 7 days, and 30 days are displayed to help you evaluate the validator performance.

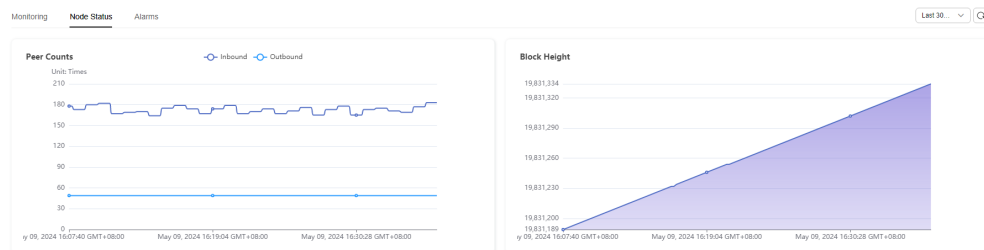
Figure 3-17 Avg. staking effectiveness



Node Status

Here shows the trends of the peer quantity and block height.

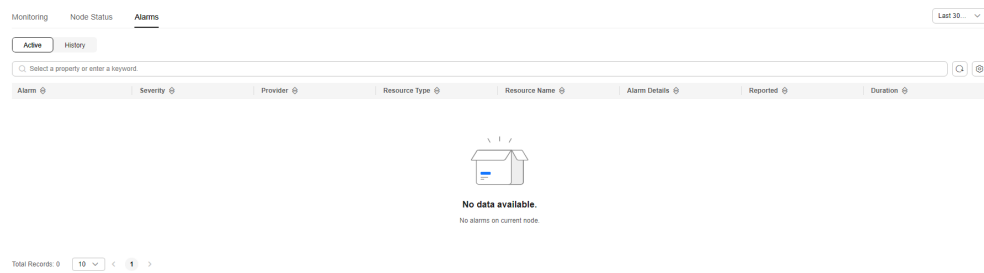
Figure 3-18 Node status



Alarms

Here shows the active and history alarms of the current node.

Figure 3-19 Alarms

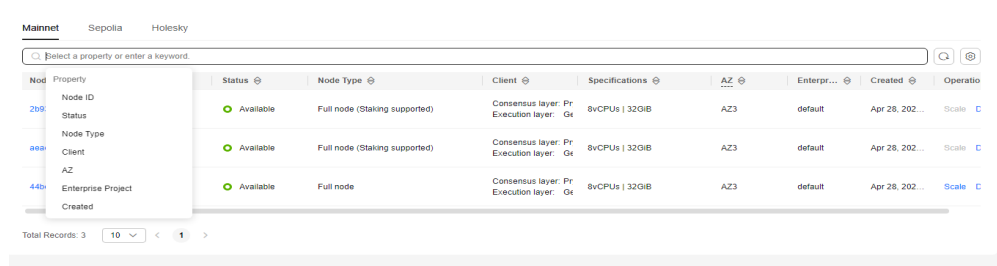


3.2.3 Other Operations

Searching for a Node

- Step 1** Log in to the NES console.
- Step 2** Choose **Dedicated > Network Management**.
- Step 3** In the search box, select a property or enter a keyword, and press **Enter** to search for a node.

Figure 3-20 Searching for a node

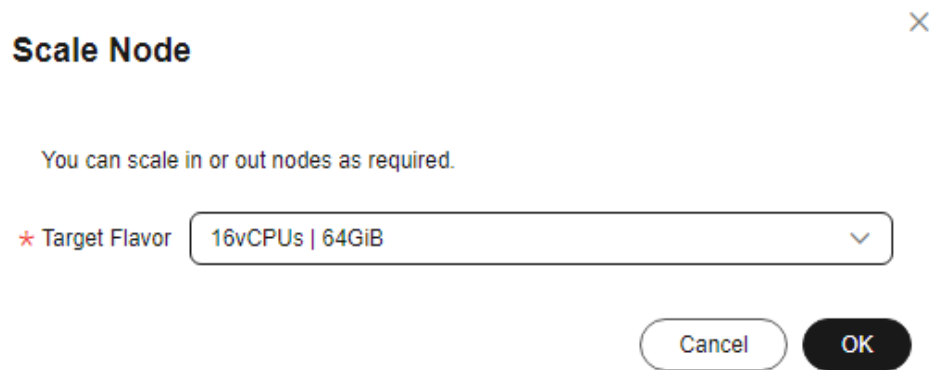


----End

Scaling a Node

- Step 1** Log in to the NES console.
- Step 2** Choose **Dedicated > Network Management**.
- Step 3** Click **Scale** in the **Operation** column of a node.
- Step 4** Select a target flavor and click **OK**.

Figure 3-21 Scaling a node

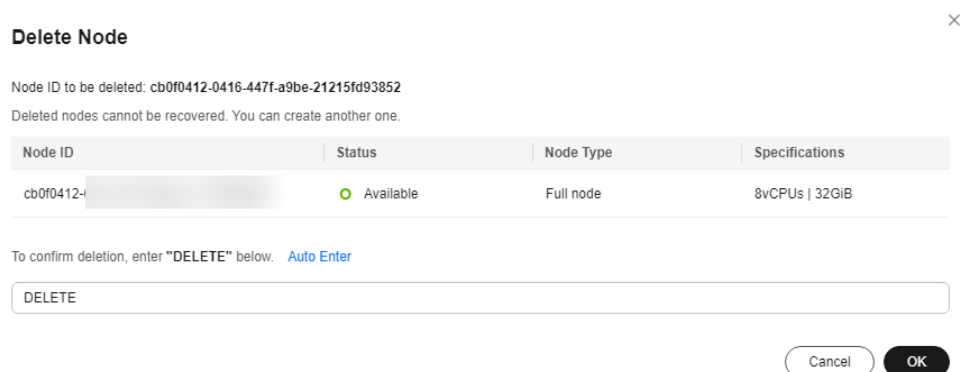


----End

Deleting a Node

- Step 1** Log in to the NES console.
- Step 2** Choose **Dedicated > Network Management**.
- Step 3** Click **Delete** in the **Operation** column of a node.
- Step 4** Enter **DELETE** to confirm the deletion.

Figure 3-22 Deleting a node



----End

3.3 Authentication Credential

Authentication credentials are used for security authentication and key operations on public blockchain nodes.

For full nodes: Each credential can be attached to the end of the node address as a request parameter for quick interconnection. This is recommended for node interconnection tests. For actual business, use Huawei Cloud tokens.

For staking nodes: Credentials are the parameter values used to start staking nodes.

3.3.1 API Key Creation

Prerequisites

You have created a public blockchain node.

Procedure

Step 1 Log in to the NES console.

Step 2 Choose **Dedicated** > **API Keys**, then click **Create API Key**.

Step 3 Describe the API key and set the access policy.

Figure 3-23 Creating an API key

Create API Key ×

Each API key can be attached to the end of the node address as a request parameter for quick interconnection. This is recommended for node interconnection tests. For actual business, use Huawei Cloud tokens. Each API key can be downloaded only once. Change the API key periodically for security.

* Enterprise Project [Create Enterprise Project](#)

Description 0/1,000

Access Policy ^

Target Nodes ?

Access Policy Type

Your DApp can only send requests to or receive requests from the whitelist.
Note: Set one access policy type for each API key.

Whitelist

Whitelist	Access Control By	Operation
<input type="button" value="Add Whitelist"/>		

NOTE

Access policies are not applicable to staking nodes.

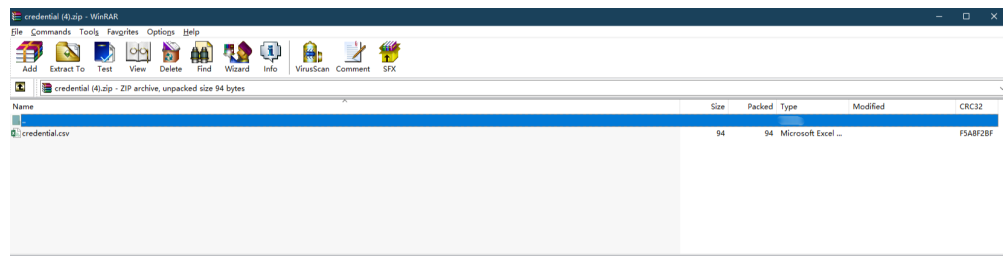
Table 3-2 Parameter description

Item	Parameter	Description
-	Enterprise Project	Select an existing enterprise project, for example, default . If the Enterprise Management service is not enabled, this parameter is unavailable.
-	Description	The description of an API key, which can contain up to 1000 characters
Access Policy	Target Nodes	Nodes to be authenticated. By default, no node is selected, and the credentials take effect on all nodes of the tenant. If you select some nodes, the credentials and access policies take effect only on selected nodes.

Item	Parameter	Description
	Access Policy Type	<p>Options:</p> <ul style="list-style-type: none"> • Disabled (default): The access policy is disabled. • Whitelist: Your DApp can only send requests to or receive requests from the whitelist. <p>Click Add Whitelist and configure whitelist information as prompted.</p> <p>Options of Access Control By:</p> <ul style="list-style-type: none"> - Blockchain Address: Your DApp can only send query requests to the whitelisted addresses. - User-Agent: Your DApp can only receive requests sent by the whitelisted user-agents. - IP Address: Your DApp can only receive requests sent by the whitelisted IP addresses. - HTTP Origin: Your DApp can only receive requests sent by the whitelisted URLs. <p>Content:</p> <ul style="list-style-type: none"> - Blockchain Address: Enter an account or contract address. For example: 0xed10421561cc4ee07e3a9b32ce6829b7ac902490 - User-Agent: Enter user-agent information. For example: mobileDapp - IP Address: Enter an IP address. For example: 123.123.123.123 - HTTP Origin: Enter a URL. For example: https://www.huawei.com/en/ <ul style="list-style-type: none"> • Blacklist: Your DApp cannot send requests to or receive requests from the blacklist. <p>Click Add Blacklist and configure blacklist information as prompted.</p> <p>Options of Access Control By:</p> <ul style="list-style-type: none"> - Blockchain Address: Your DApp cannot send query requests to the blacklisted addresses. - User-Agent: Your DApp cannot receive requests sent by the blacklisted user-agents. - IP Address: Your DApp cannot receive requests sent by the blacklisted IP addresses. - HTTP Origin: Your DApp cannot receive requests sent by the blacklisted URLs. <p>Content:</p> <ul style="list-style-type: none"> - Blockchain Address: Enter an account or contract address. For example: 0xed10421561cc4ee07e3a9b32ce6829b7ac902490

Item	Parameter	Description
		<ul style="list-style-type: none"> - User-Agent: Enter user-agent information. For example: mobileDapp - IP Address: Enter an IP address. For example: 123.123.123.123 - HTTP Origin: Enter a URL. For example: https://www.huawei.com/en/ <p>NOTE Set one access policy type for each API key.</p>

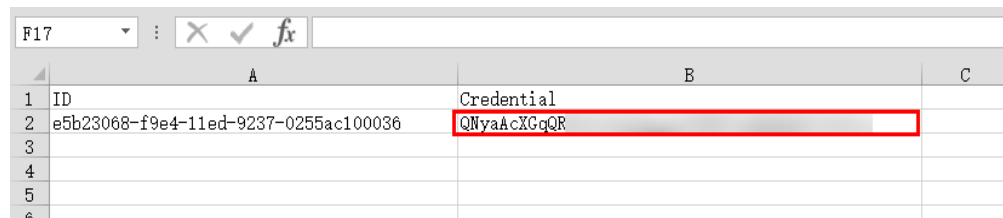
Step 4 Click **OK**. The API key is created and then automatically downloaded as a ZIP package.



NOTE

Each API key can be downloaded only once. Change the API key periodically for security.

Step 5 Decompress the package and open the **credential.csv** file to obtain the API key.



----End

3.3.2 Other Operations

Checking an API Key

Step 1 Log in to the NES console.

Step 2 In the navigation pane, choose **Dedicated > API Keys**.

Step 3 Check the credentials.

Figure 3-24 Credentials

API Key ID	Enterprise Project	Description	Used	Created	Operation
3164564e-9539-471e-ae66-87f1f453d3	default		Apr 29, 2024 15:55:36 GMT+08:00	Apr 28, 2024 23:09:48 GMT+08:00	Edit Delete
23a07293-771c-4973-b3c5-e8fca566f4e4	default		Apr 28, 2024 22:33:01 GMT+08:00	Apr 28, 2024 22:33:01 GMT+08:00	Edit Delete
6a263361-c402-46d2-e110-3610ee70bc05	default		Apr 28, 2024 15:18:51 GMT+08:00	Apr 28, 2024 15:17:56 GMT+08:00	Edit Delete
7bb4e196-d220-4693-b718-b00409e0005	default		Apr 26, 2024 11:00:01 GMT+08:00	Apr 25, 2024 22:50:38 GMT+08:00	Edit Delete
e4e807c-97a-4028-9811-088db440a5ca	default		Apr 25, 2024 18:43:00 GMT+08:00	Apr 25, 2024 18:43:00 GMT+08:00	Edit Delete
f11c3c68-11b4-4366-b015-44f39372341	default		Apr 17, 2024 11:28:17 GMT+08:00	Apr 17, 2024 11:27:40 GMT+08:00	Edit Delete
1195b135-9901-4189-911e-b7e6b6cfa47	default		Apr 15, 2024 19:46:37 GMT+08:00	Apr 15, 2024 19:46:37 GMT+08:00	Edit Delete
8aa021a6-bc19-4005-8cfa-9e0b94494957	default		Apr 10, 2024 14:27:28 GMT+08:00	Apr 10, 2024 11:33:58 GMT+08:00	Edit Delete
4d485132-d7b-453b-ba66-6820c74cc1cc	default		Apr 11, 2024 21:01:26 GMT+08:00	Apr 10, 2024 09:53:50 GMT+08:00	Edit Delete
a6c980c1-1a64-4b64-8282-99a48da3591	default		Apr 02, 2024 21:19:31 GMT+08:00	Apr 02, 2024 21:19:31 GMT+08:00	Edit Delete

Table 3-3 API key information

Parameter	Description
API Key ID	ID of an API key, which is automatically generated
Enterprise Project	The selected enterprise project
Description	The description of an API key
Used	Last time when an API key was used
Created	Time when an API key is created
Operation	Click Edit to add a description and configure an access policy. You can click Delete to delete an API key.

----End

Searching for an API Key

Step 1 In the navigation pane, choose **Dedicated > API Keys**.

Step 2 In the search box, select a property or enter a keyword, and press **Enter** to search for an API key.

Figure 3-25 Searching for an API key

API Property	Enterprise Project	Description	Used	Created	Operation
316 API Key ID	default		Apr 29, 2024 15:55:36 GMT+08:00	Apr 28, 2024 23:09:48 GMT+08:00	Edit Delete
23a Enterprise Project	default		Apr 28, 2024 22:33:01 GMT+08:00	Apr 28, 2024 22:33:01 GMT+08:00	Edit Delete
6a2 Description	default		Apr 28, 2024 15:18:51 GMT+08:00	Apr 28, 2024 15:17:56 GMT+08:00	Edit Delete
7bb Used	default		Apr 26, 2024 11:00:01 GMT+08:00	Apr 25, 2024 22:50:38 GMT+08:00	Edit Delete
Created	default		Apr 25, 2024 18:43:00 GMT+08:00	Apr 25, 2024 18:43:00 GMT+08:00	Edit Delete
e4e807c-97a-4028-9811-088db440a5ca	default		Apr 25, 2024 18:43:00 GMT+08:00	Apr 25, 2024 18:43:00 GMT+08:00	Edit Delete
f11c3c68-11b4-4366-b015-44f39372341	default		Apr 17, 2024 11:28:17 GMT+08:00	Apr 17, 2024 11:27:40 GMT+08:00	Edit Delete

----End

Editing an API Key

Step 1 In the navigation pane, choose **Dedicated > API Keys**.

Step 2 Click **Edit** in the **Operation** column of an API key.

Step 3 Edit the API key information. For details about the parameters, see [Table 3-2](#).

Edit ×

Each API key can be attached to the end of the node address as a request parameter for quick interconnection. This is recommended for node interconnection tests. For actual business, use Huawei Cloud tokens. Each API key can be downloaded only once. Change the API key periodically for security.

★ Enterprise Project 🔍 Create Enterprise Project [↗](#)

Description 19/1,000

Access Policy ^

Target Nodes ?

Access Policy Type Disabled Whitelist Blacklist

Note: Set one access policy type for each API key.

Step 4 Click **OK**.

----End

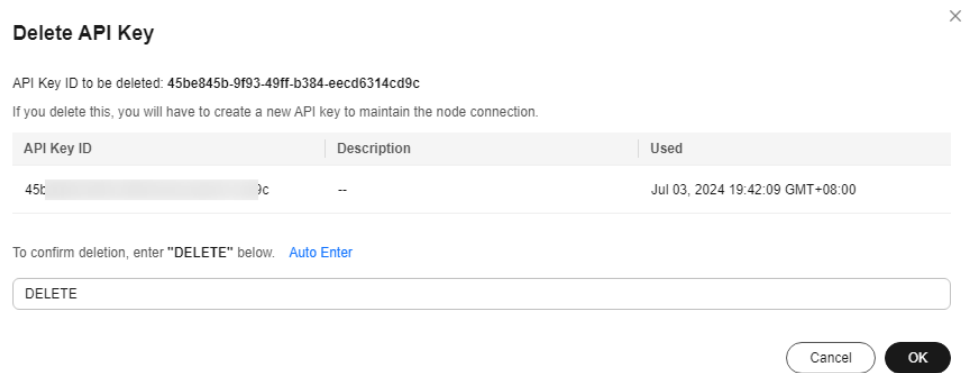
Deleting an API Key

Step 1 In the navigation pane, choose **Dedicated > API Keys**.

Step 2 Click **Delete** in the **Operation** column of an API key.

Step 3 Click **OK**.

Figure 3-26 Deleting an API key



----End

4 Shared Edition

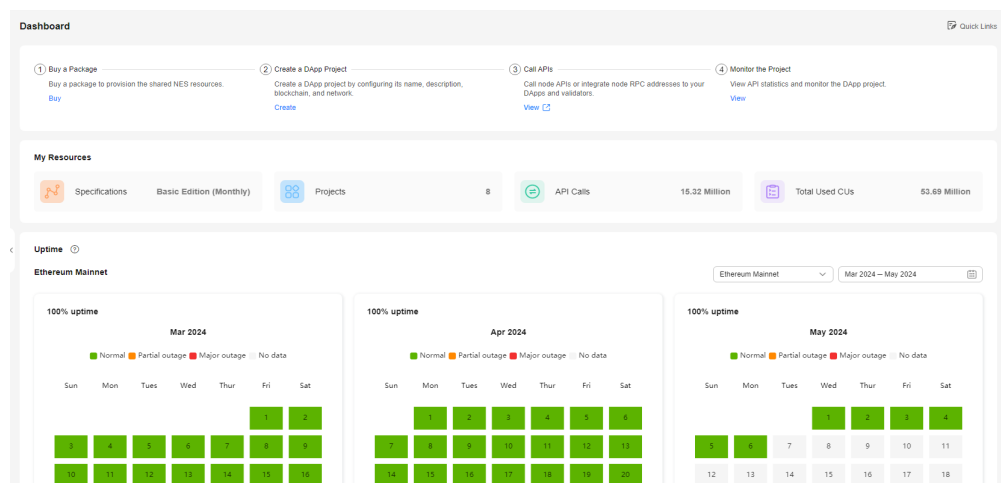
4.1 Dashboard

The **Quick Start** process, **My Resources**, and **Uptime** are shown on this page.

Viewing the Dashboard

- Step 1** Log in to the NES console.
- Step 2** In the navigation pane, choose **Shared > Dashboard**.
- Step 3** Check **Quick Start**, **My Resources**, and **Uptime**.

Figure 4-1 Dashboard



----End

Getting Started

- Step 1** Select a package.
Buy a package to provision the shared NES resources.

Step 2 Create a project.

Create a DApp project by configuring its name, description, blockchain, and network.

Step 3 Call APIs.

Call node APIs or integrate node RPC addresses to your DApps to interconnect nodes to your validator nodes and MEV-Boost.

Step 4 Monitor the project.

View API statistics and monitor the DApp project.

----End

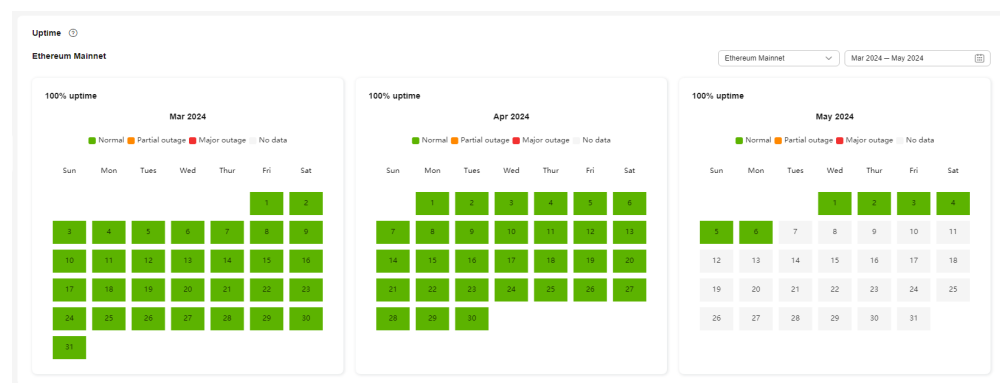
Viewing My Resources

The package specifications and numbers of projects and API calls are shown.

- **Specifications:** The edition of your package, which can be the basic edition (monthly), professional edition (monthly), enterprise edition (monthly), or enterprise edition (yearly).
- **Projects:** the total number of the created DApp projects under your account
- **API Calls:** the total number of API calls under your account
- **Total Used CUs:** the total number of compute units (CUs) used by DApps under your account

Checking Service Uptime

Here displays the network availability.

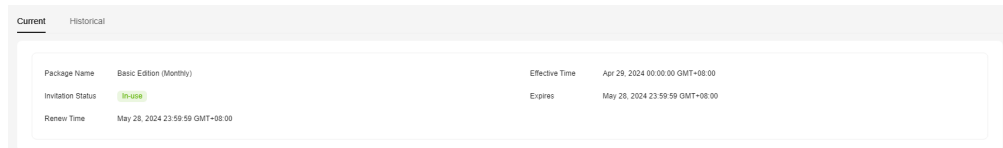


4.2 Package Management

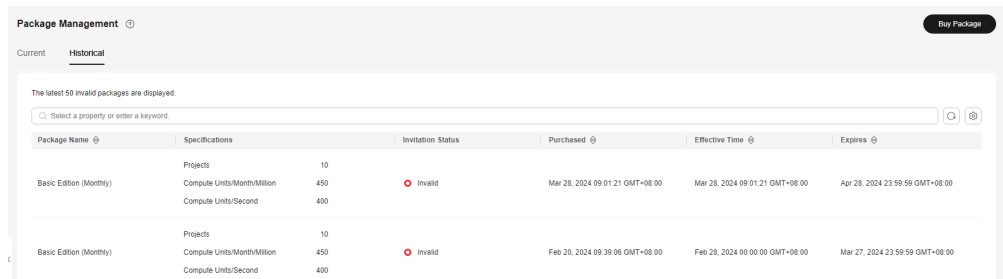
Here you can view package details and check DApp statistics in a specified period.

Viewing Package Usage

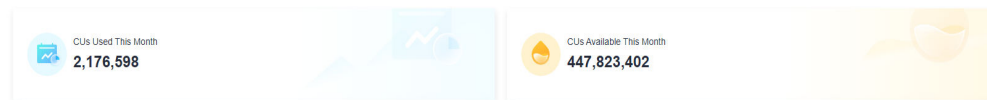
- **Current:** Here displays the package name, status, renew time, purchase time, and expiration time.



- **Historical:** The latest 50 invalid packages are displayed.

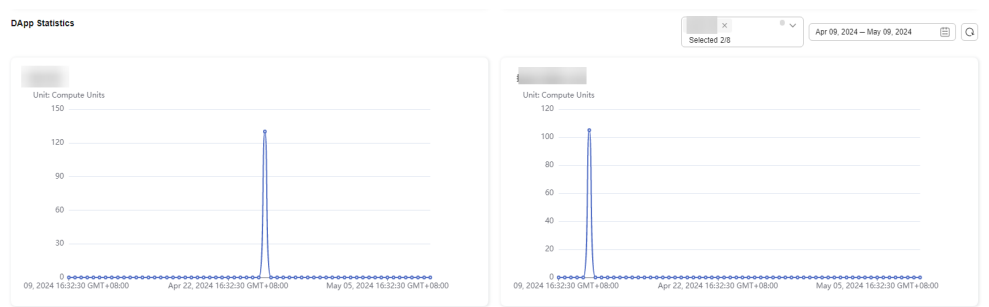


- Here shows the **CU's Used This Month** and **CU's Available This Month**.



Viewing DApp Statistics

Here shows the usage statistics of all DApps. You can filter the charts with specified DApp name and time.



NOTE

The statistics of a maximum of four DApps are shown.

Buying a Package

- Step 1** Log in to the NES console.
- Step 2** Choose **Shared** > **Package Management** and click **Buy Package**.
- Step 3** Configure parameters.

Figure 4-2 Buying a package

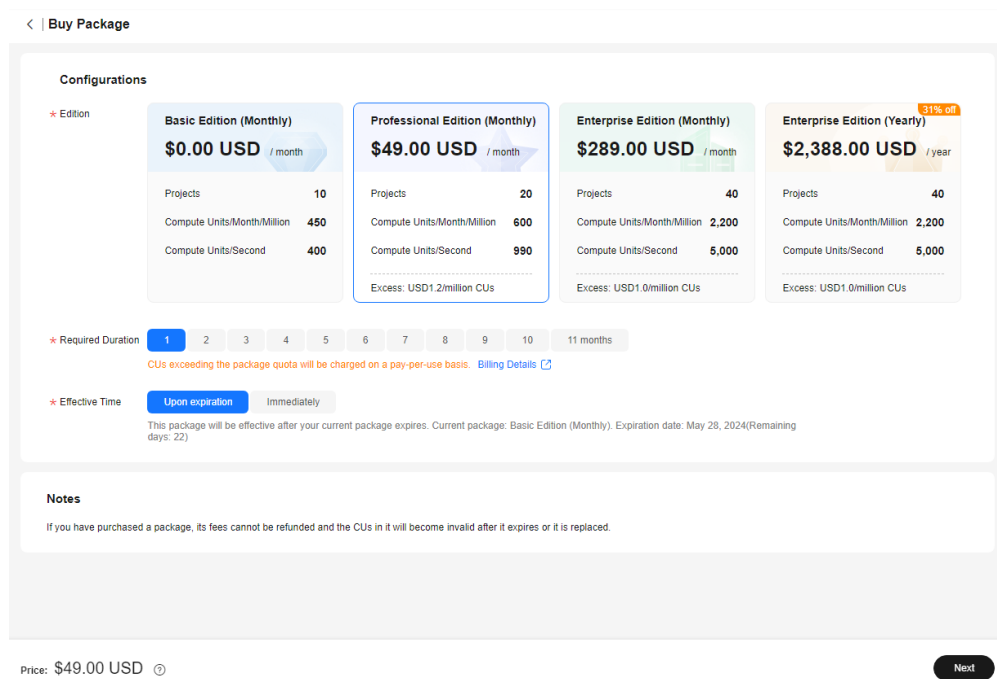


Table 4-1 Package parameters

Parameter	Description
Billing Mode	Packages can be billed in the Yearly/Monthly mode.

Parameter	Description
Edition	<ul style="list-style-type: none"> • Basic Edition (Monthly) Number of projects: 10 CUs per month: 450 million CUs per second: 400 • Professional Edition (Monthly) Number of projects: 20 CUs per month: 600 million CUs per second: 990 NOTE Excess: USD1.2/million CUs • Enterprise Edition (Monthly) Number of projects: 40 CUs per month: 2.2 billion CUs per second: 5,000 NOTE Excess: USD1.0/million CUs • Enterprise Edition (Yearly) Number of projects: 40 CUs per month: 2.2 billion CUs per second: 5,000 NOTE Excess: USD1.0/million CUs
Duration	<p>Select whether to buy the package for months or for a year.</p> <p>NOTE The basic edition can be used free of charge for one month. After it expires, you can buy it again or buy other packages.</p>
Effective Time	<p>Time when the package takes effect, which can be Upon expiration or Immediately.</p> <ul style="list-style-type: none"> • Upon expiration: The package will be effective after your current package expires. • Immediately: The package will be effective immediately.

 **NOTE**

If you have purchased a package, its fees cannot be refunded and the CUs in it will become invalid after it expires or it is replaced.

Step 4 Click **Next**. Confirm the configurations, confirm that you have read and agree to the agreement and disclaimer, and click **Submit**.

----End

4.3 DApp Project Management

4.3.1 DApp Project Creation

You need to create a DApp project by selecting a specified network and setting a whitelist.

Prerequisites

- You have registered with Huawei Cloud.
- You have purchased a package.

Procedure

Step 1 Log in to the NES console.

Step 2 Choose **Shared > DApp Project Management** and click **Create DApp Project**.

Step 3 Configure parameters.

Figure 4-3 Creating a DApp project

The screenshot shows the 'Create DApp Project' interface. It features several sections: 'DApp Name' with a text input field; 'Public Blockchain' with buttons for Ethereum, Tron, Polygon PoS, Arbitrum, and BNB Smart Chain; 'Mainnet & Testnet' with buttons for Mainnet (described as a proof-of-stake (PoS) mainnet for real transactions) and Sepolia (described as a proof-of-stake (PoS) testnet with a small amount of data and fast node startup speed); 'Description' with a text area and a 0/300 character count; 'Advanced Settings' with a dropdown arrow; and 'Access Policy' with an 'Add Whitelist' button, a search input for properties or keywords, and three tabs: 'Content', 'Access Control By', and 'Operation'. A 'Create' button is located at the bottom right of the form.

Table 4-2 DApp parameters

Parameter	Description
DApp Name	Enter 1 to 10 letters and digits.

Parameter	Description
Public Blockchain	<p>There are Ethereum, TRON, Polygon PoS, Arbitrum, and BNB Smart Chain.</p> <ul style="list-style-type: none"> • Ethereum: an open-source, blockchain-based computing platform featuring smart contract functionality • TRON: a blockchain-based, decentralized operating system • Polygon PoS: an L2 solution or a side chain, with its PoS Chains interconnected and communicating with the Ethereum mainnet • Arbitrum: a layer 2 scaling solution for the Ethereum blockchain. It aims to enhance scalability and reduce network congestion and transaction fees while maintaining the compatibility and security of the Ethereum Virtual Machine (EVM). • BNB Smart Chain: an EVM-compatible blockchain. It contains consensus layers and hubs to multiple blockchains. As a leading blockchain, BNB Smart Chain serves as an essential infrastructure, offers low-cost transactions and fast processing, and prioritizes privacy.
Mainnet & Testnet	<p>For Ethereum, there are Mainnet and Sepolia.</p> <ul style="list-style-type: none"> • Mainnet: a PoS mainnet for real transactions • Sepolia: a PoS testnet with a small amount of data and fast node startup speed <p>For TRON, there are Mainnet and Nile.</p> <ul style="list-style-type: none"> • Mainnet: a DPoS mainnet for real transactions • Nile: a DPoS testnet with a small amount of data and fast node startup speed <p>For Polygon PoS, there are Mainnet and Mumbai.</p> <ul style="list-style-type: none"> • Mainnet: The PoS mechanism and compatibility with EVMs make mainnet the preferred choice for fast transactions and low costs. • Mumbai: a replica of mainnet. Mumbai allows you to develop, test, and deploy your DApps. <p>For Arbitrum, there are One and Goerli.</p> <ul style="list-style-type: none"> • One: an optimistic rollup chain that supports EVMs and lets you efficiently perform transactions at low costs • Goerli: a replica of mainnet. Goerli allows you to develop, test, and deploy your DApps <p>For BNB Smart Chain, there are Mainnet and Chapel.</p> <ul style="list-style-type: none"> • Mainnet: an EVM-compatible, PoSA mainnet, with shorter block time and lower fees. • Chapel: a replica of mainnet. Chapel allows you to develop, test, and deploy your DApps.
Description	Describe your project in 300 characters.

Parameter	Description
Advanced Settings	<p>You can set whitelists to restrict access to your DApp.</p> <p>Click Add Whitelist and configure whitelist information as prompted.</p> <ul style="list-style-type: none"> Options of Access Control By: <ul style="list-style-type: none"> Blockchain Address: Your DApp can only send query requests to the whitelisted addresses. User-Agent: Your DApp can only receive requests sent by the whitelisted user-agents. IP Address: Your DApp can only receive requests sent by the whitelisted IP addresses. JSON Web Token (JWT): A JWT is an Internet standard (RFC 7519) that defines a process for secure data exchange between two parties. Your DApp can only receive requests that include the whitelisted JWTs. HTTP Origin: Your DApp can only receive requests sent by the whitelisted domain names and URLs. Content: <ol style="list-style-type: none"> Blockchain Address: Enter an account or contract address. For example: 0xed10421561cc4ee07e3a9b32ce6829b7ac902490 User-Agent: Enter user-agent information. For example: mobileDapp IP Address: Enter an IP address. For example: 123.123.123.123 JSON Web Token (JWT): Enter a public key. For example: -----BEGIN PUBLIC KEY----- -----END PUBLIC KEY----- HTTP Origin: Enter a URL. For example: https:// www.huawei.com/en/

Step 4 Click **Create**.

----End

4.3.2 DApp Project Viewing

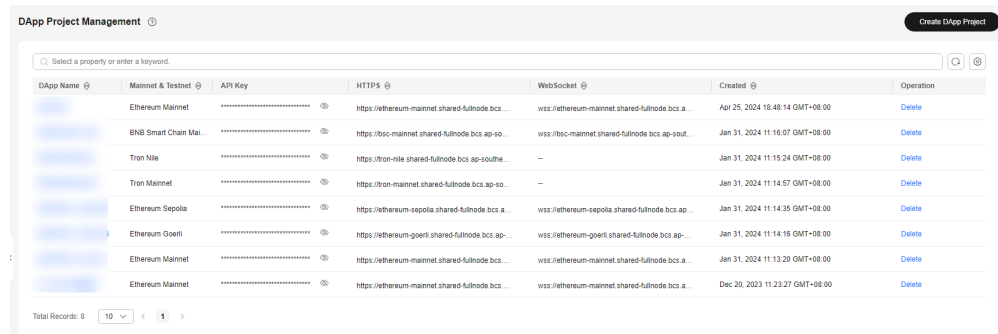
Procedure

Step 1 Log in to the NES console.

Step 2 In the navigation pane, choose **Shared > DApp Project Management**.

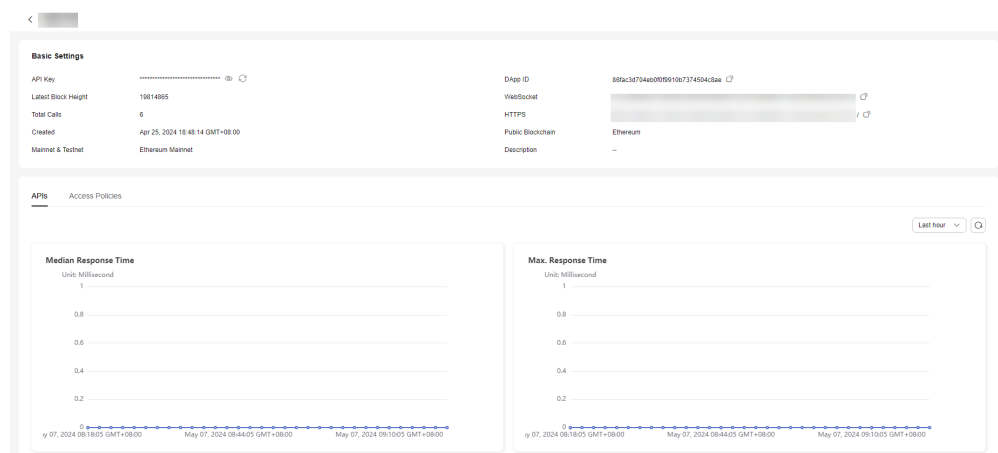
Step 3 Click a DApp to view its details.

Figure 4-4 Viewing a DApp project



Step 4 Check the information of **Basic Settings**, **APIs**, and **Whitelists**.

Figure 4-5 Project details



----End

Checking Basic Settings

Here shows the API key, DApp ID, latest block height, WebSocket, total calls, HTTPS, creation time, public blockchain name, mainnet and testnet types, and description.

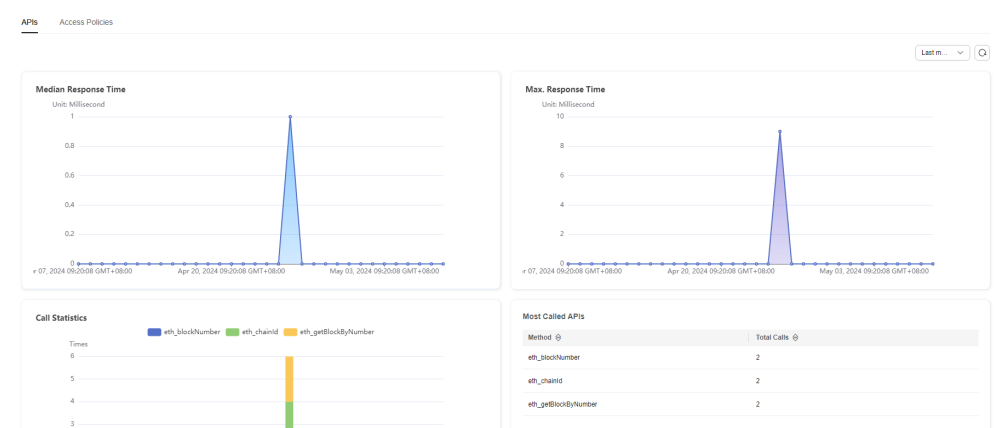
Figure 4-6 Basic Settings



Checking APIs

Here shows the medium and maximum response time and statistical distribution of API calls, and the most called APIs.

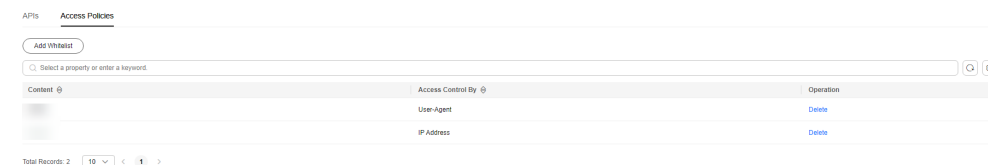
Figure 4-7 APIs



Access Policies

You can [add or delete whitelists](#) here.

Figure 4-8 Whitelists

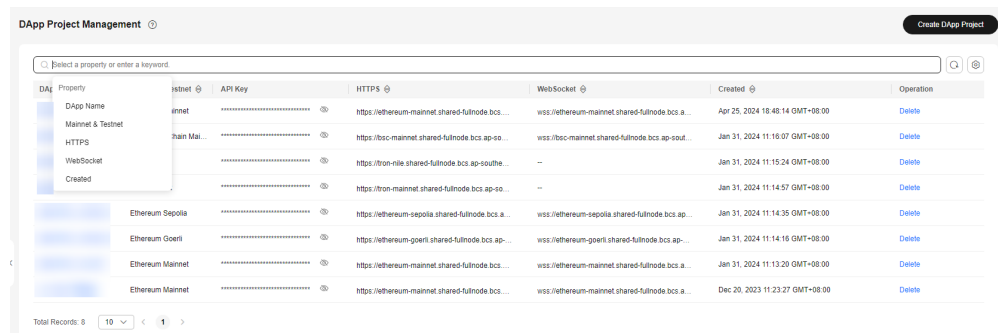


4.3.3 Other Operations

Searching for a DApp Project

- Step 1** Log in to the NES console.
- Step 2** In the navigation pane, choose **Shared > DApp Project Management**.
- Step 3** In the search box, select a property or enter a keyword, and press **Enter** to search for a DApp project.

Figure 4-9 Searching for a project

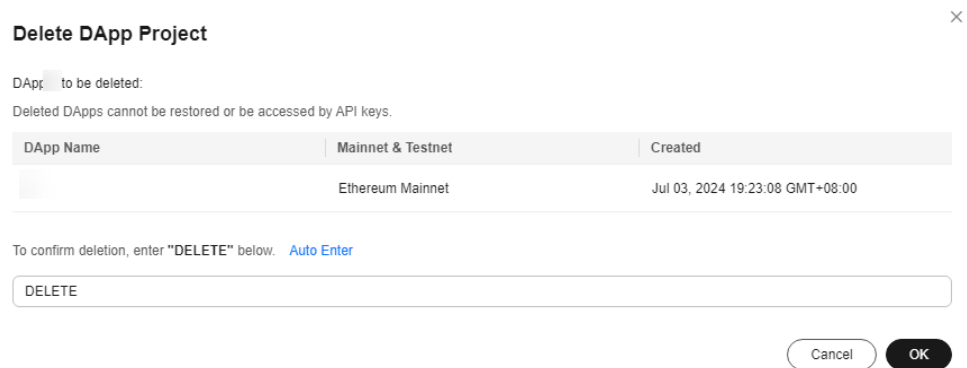


----End

Deleting a DApp Project

- Step 1** Log in to the NES console.
- Step 2** In the navigation pane, choose **Shared > DApp Project Management**.
- Step 3** Click **Delete** in the **Operation** column of a project.
- Step 4** Enter **DELETE** to confirm the deletion.

Figure 4-10 Deleting a project



----End