Web Application Firewall (WAF)

User Guide

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1 Service Overview

1.1 What Is WAF?

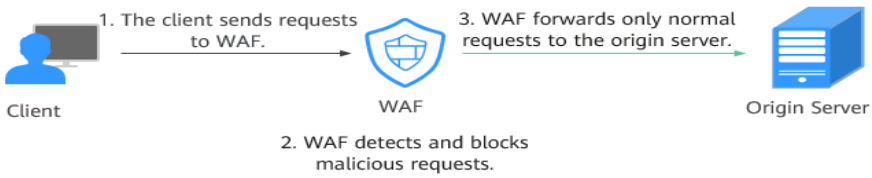
Web Application Firewall (WAF) keeps web services stable and secure. It examines all HTTP and HTTPS requests to detect and block the following attacks: Structured Query Language (SQL) injection, cross-site scripting (XSS), web shells, command and code injections, file inclusion, sensitive file access, third-party vulnerability exploits, Challenge Collapsar (CC) attacks, malicious crawlers, and cross-site request forgery (CSRF).

After you enable a WAF instance, add your website domain to the WAF instance on the WAF console. All public network traffic for your website then goes to WAF first. WAF identifies and filters out the illegitimate traffic, and routes only the legitimate traffic to your origin server to ensure site security.

How WAF Works

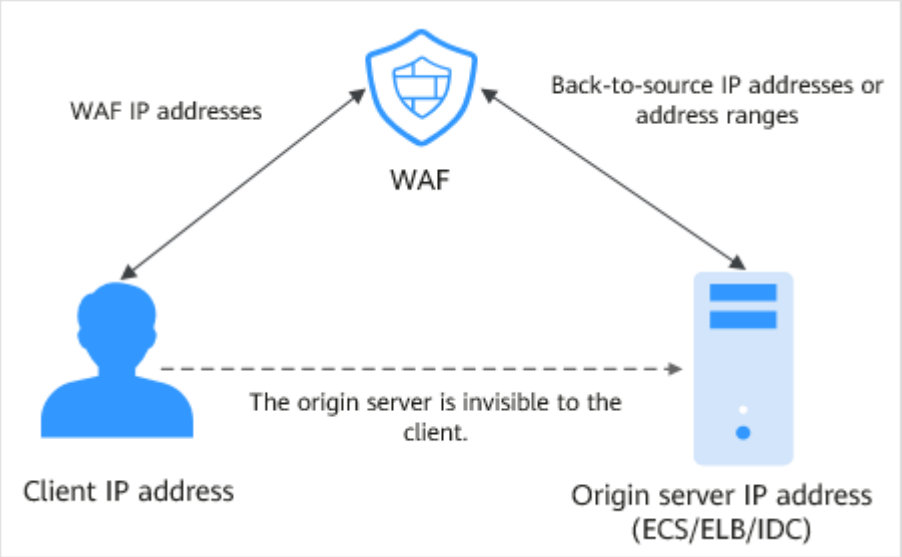
After applying for WAF, add the website to WAF on the WAF console. After a website is connected to WAF, all website access requests are forwarded to WAF first. WAF detects and filters out malicious attack traffic, and returns normal traffic to the origin server to ensure that the origin server is secure, stable, and available.

Figure 1-1 How WAF Works



The process of forwarding traffic from WAF to origin servers is called back-to-source. WAF uses back-to-source IP addresses to send client requests to the origin server. When a website is connected to WAF, the destination IP addresses to the client are the IP addresses of WAF, so that the origin server IP address is invisible to the client.

Figure 1-2 Back-to-source IP address



What WAF Protects

WAF offers the cloud and dedicated modes to protect websites. You can add either domain names or IP addresses to WAF. Before you start, get familiar with the following differences:

- Cloud mode: protects your cloud and on-premises web applications as long as they have domain names.
- Dedicated mode: domain names or IP addresses (public or private IP addresses) for web services on the cloud

1.2 Edition Differences

WAF provides cloud and dedicated modes for you to deploy WAF instances. For more details, see **Cloud and Dedicated WAF Modes**.

Cloud and Dedicated WAF Modes

You can select the cloud WAF and/or dedicated WAF instances to meet your business needs. For their differences, see **Table 1-1**. **Figure 1-3** shows deployment architectures.

Figure 1-3 Cloud and dedicated WAF deployment architectures

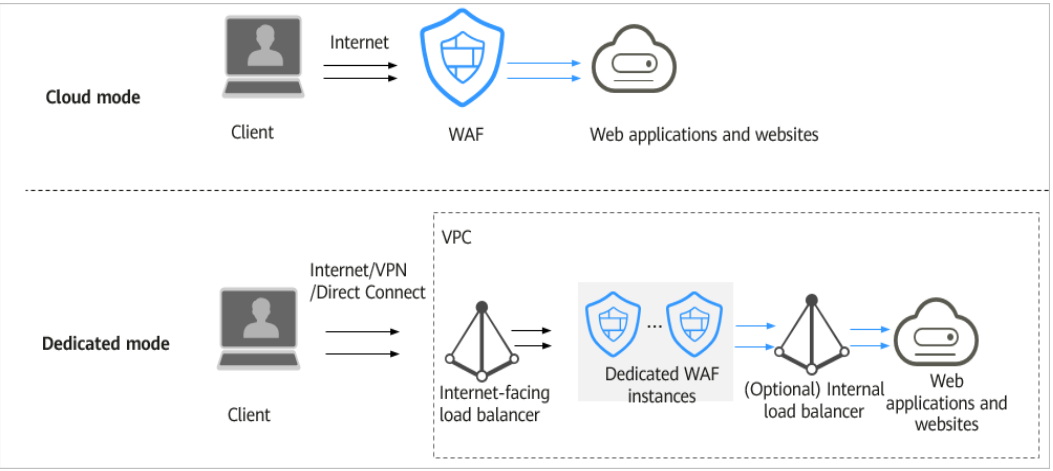


Table 1-1 Description of how to use different modes of WAF instances

Item	Cloud Mode	Dedicated mode
Billing mode	Pay-per-use	Pay-per-use
Application scenarios	Service servers are deployed on a cloud or in on-premises data centers.	Service servers are deployed on the cloud. Dedicated WAF instances are suitable large enterprise websites that have a large service scale and have customized security requirements.
Protected objects	Domain names	• Domain names • IP addresses
Advantages	• Protection capability scaling by upgrading specifications • Protection for cloud and on-premises web services	• Flexible deployment • Exclusive use of WAF instances • Protection against large-scale traffic attacks • Low network latency with dedicated WAF instances being deployed in a VPC

Specifications Supported by Each Edition

Table 1-2 lists the specifications of cloud WAF and a dedicated WAF instance.

Table 1-2 Applicable service scale

Service Scale	Cloud Mode	Dedicated Mode
Peak rate of normal service requests	-	The following lists the specifications of a single instance. • Specifications: WI-500. Estimated performance: – HTTP services: 5,000 QPS (recommended) – HTTPS services: 4,000 QPS (recommended) – WebSocket service - Maximum concurrent connections: 5,000 – Maximum WAF-to-server persistent connections: 60,000 • Specifications: WI-100. Estimated performance: – HTTP services: 1,000 QPS (recommended) – HTTPS services: 800 QPS (recommended) – WebSocket service - Maximum concurrent connections: 1,000 – Maximum WAF-to-server persistent connections: 60,000 **NOTICE** Maximum QPS values are for reference only. They may vary depending on your businesses. The real-world QPS is related to the request size and the type and quantity of protection rules you customize.
Service bandwidth threshold (Origin servers are deployed on the cloud.)	-	• Specifications: WI-500. Estimated performance: Throughput: 500 Mbit/s • Specifications: WI-100. Estimated performance: Throughput: 100 Mbit/s
Number of domain names	30 (Supports three top-level domain names.)	2,000 (Supports 2,000 top-level domain names)

Service Scale	Cloud Mode	Dedicated Mode
Back-to-source IP address quantity (the number of WAF back-to-source IP addresses that can be allowed by a protected domain name)	20	N/A
Quantity of supported ports	N/A	• Standard ports: 80 and 443 • Non-standard ports: Unlimited
Peak rate of CC attack protection	N/A	• Specifications: WI-500. Estimated performance: Maximum QPS: 20,000 • Specifications: WI-100. Estimated performance: Maximum QPS: 4,000
CC attack protection rules	200	100
Precise protection rules	1,000	100
Reference table rules	1,000	100
IP address blacklist and whitelist rules	2,000	100
Geolocation access control rules	200	100
Web tamper protection rules	200	100
Information leakage prevention rules	200	100
Global protection whitelist rules	2,000	1,000
Data masking rules	200	100

1.3 Functions

WAF helps you protect services from various web security risks. The following table lists the functions of WAF.

Function		Description
Service configuration	Protection for IP addresses and domain names (wildcard, top-level, and second-level domain names)	WAF offers the cloud and dedicated modes to protect websites. You can add either domain names or IP addresses to WAF. Before you start, get familiar with the following differences: • Cloud mode: protects your cloud and on-premises web applications as long as they have domain names. • Dedicated mode: domain names or IP addresses (public or private IP addresses) for web services on the cloud
	HTTP/HTTPS service protection	WAF can protect HTTP and HTTPS traffic for a website.
	WebSocket	WAF can check WebSocket requests. This feature is enabled by default.
	Non-standard port protection	In addition to standard ports 80 and 443, WAF also supports non-standard ports.

Function		Description
Web application security protection	Basic Web Protection	With an extensive preset reputation database, WAF defends against Open Web Application Security Project (OWASP) top 10 threats, vulnerability exploits, web shells, and other threats. • General Check WAF defends against attacks such as SQL injections, XSS, file inclusions, Bash vulnerabilities, remote command execution, directory traversal, sensitive file access, and command/code injections. • Web shell detection WAF protects against web shells from upload interface. • Precise identification – WAF uses built-in semantic analysis engine and regex engine and supports configuring of blacklist/whitelist rules, which reduces false positives. – WAF supports anti-escape and automatic restoration of common codes, which improves the capability of recognizing deformation web attacks. WAF can decode the following types of code: url_encode, Unicode, XML, OCT, hexadecimal, HTML escape, and base64 code, case confusion, JavaScript, shell, and PHP concatenation confusion • Deep inspection WAF identifies and blocks evasion attacks, such as the ones that use homomorphic character obfuscation, command injection with deformed wildcard characters, UTF7, data URI scheme, and other techniques. • Header detection WAF detects all header fields in the requests.
	CC attack protection rules	WAF can restrict access to a specific URL on your website based on a unique IP address, cookie, or referer field, mitigating CC attacks.

Function		Description
	Precise protection rules	WAF enables you to combine common HTTP fields (such as IP, path, referer, user agent, and params) to configure powerful and precise access control policies. You can configure precision protection rules to protect workloads from hotlinking and block requests with empty fields.
	Blacklist and whitelist rules	You can configure blacklist and whitelist rules to block, log only, or allow access requests from specified IP addresses.
	Geolocation access control rules	You can customize these rules to allow or block requests from a specific country or region.
	Web tamper protection rules	You can configure these rules to prevent a static web page from being tampered with.
	Website anti-crawler protection	WAF dynamically analyzes your website service models and accurately identifies crawler behavior based on data risk control and bot identification systems.
	Information leakage prevention rules	You can add two types of information leakage prevention rules. • Sensitive information filtering: prevents disclosure of sensitive information (such as ID numbers, phone numbers, and email addresses). • Response code interception: blocks the specified HTTP status codes.
	Global protection whitelist rules	This function ignores certain attack detection rules for specific requests.
	Data masking rules	You can configure data masking rules to prevent sensitive data such as passwords from being displayed in event logs.
Advanced settings	PCI DSS/PCI 3DS compliance certification and TLS checks	• TLS has three versions (TLS v1.0, TLS v1.1, and TLS v1.2) and seven cipher suites. You can select the one best fits your business needs. • WAF supports PCI DSS and PCI 3DS compliance certification check.

Function		Description
	Configuring a traffic identifier for a known attack source	WAF allows you to configure traffic identifiers by IP address, session, or user tag to block possibly malicious requests from known attack sources based on **IP address**, **Cookie**, or **Params**.
	Configuring connection timeout	• The default timeout for connections from a browser to WAF is 120 seconds. The value varies depending on your browser settings and cannot be changed on the WAF console. • The default timeout for the connection between WAF and an origin server is 30 seconds. You can manually set the timeout on the WAF console.
Event management		• WAF allows you to view and handle false alarms for blocked or logged events. • You can download events data over the past five days. • You can use Log Tank Service (LTS) to record all WAF logs, including attack and access logs.
Notifications		This topic describes how to enable notifications for attack logs. Once this function is enabled, WAF sends you SMS or email notifications if an attack is detected. You can configure certificate expiration reminders. When a certificate is about to expire, WAF notifies you by the way you configure, such as email or SMS.

Function	Description
GUI-based security data	WAF provides a GUI-based interface for you to monitor attack information and event logs in real time. • Centralized policy configuration On the WAF console, you can configure policies applicable to multiple protected domain names in a centralized manner so that the policies can be quickly delivered and take effect. • Traffic and event statistics WAF displays the number of requests, the number and types of security events, and log information in real time.
High flexibility and reliability	WAF can be deployed on multiple clusters in multiple regions based on the load balancing principle. This can prevent single points of failure (SPOFs) and ensure online smooth capacity expansion, maximizing service stability.

1.4 Product Advantages

WAF examines web traffic from multiple dimensions to accurately identify malicious requests and filter attacks, reducing the risks of data being tampered with or stolen.

Precisely and Efficiently Identify Threats

- WAF uses rule and AI dual engines and integrates our latest security rules and best practices.
- You can configure enterprise-grade policies to protect your website more precisely, including custom alarm pages, combining multiple conditions in a CC attack protection rule, and blacklisting or whitelisting a large number of IP addresses.

Strong Protection for User Data Privacy

- Sensitive information, such as accounts and passwords, in attack logs can be anonymized.
- PCI-DSS checks for SSL encryption are available.
- The minimum TLS protocol version and cipher suite can be configured.

1.5 Application Scenarios

Common protection

WAF helps you defend against common web attacks, such as command injection and sensitive file access.

Protection for online shopping mall promotion activities

Countless malicious requests may be sent to service interfaces during online promotions. WAF allows configurable rate limiting policies to defend against CC attacks. This prevents services from breaking down due to many concurrent requests, ensuring response to legitimate requests.

Protection against zero-day vulnerabilities

Services cannot recover quickly from impact of zero-day vulnerabilities in third-party web frameworks and plug-ins. WAF updates the preset protection rules immediately to add an additional protection layer to such web frameworks and plug-ins, and this layer can react faster than fixing the vulnerabilities.

Data leakage prevention

WAF prevents malicious actors from using methods such as SQL injection and web shells to bypass application security and gain remote access to web databases. You can configure anti-data leakage rules on WAF to provide the following functions:

- Precise identification

  WAF uses semantic analysis & regex to examine traffic from different dimensions, precisely detecting malicious traffic.

- Distortion attack detection

  WAF detects a wide range of distortion attack patterns with 7 decoding methods to prevent bypass attempts.

Web page tampering prevention

WAF ensures that attackers cannot leave backdoors on your web servers or tamper with your web page content, preventing damage to your credibility. You can configure web tamper protection rules on WAF to provide the following functions:

- Website malicious code detection

  You can configure WAF to detect malicious code injected into web servers and ensure secure visits to web pages.

- Web page tampering prevention

  WAF prevents attackers from tampering with web page content or publishing inappropriate information that can damage your reputation.

1.6 About Billing

WAF instances are billed on a pay-per-use basis, which is postpaid.

Billing Items

You are billed for WAF instances you select based on the billing items.

Table 1-3 Billing items

Mode	Billing Mode	Billing Item	Billing Description
Cloud mode	Pay-per-use	• Number of domains • Number of customized rules • Number of requests	• Number of domain names: Billed on an hourly basis. Once a domain name is added during the billing period, it will be billed no matter when it is deleted. • Number of customized rules: Billed on a daily basis. The billing is calculated at 00:00:00 every day. • Number of requests: Billed on a monthly basis.
Dedicated mode	Pay-per-use	Number of instances	Billed for what you use

Billing Modes

Pay-per-use billing: In this billing mode, you can enable or disable a WAF instance anytime you want.

- For a pay-per-use cloud WAF instance, you are billed for the number of added domain names, number of customized rules, and number of used requests.
- For a pay-per-use dedicated WAF instance, you are billed for the required duration (accurate to second), which starts when the instance is created and ends when the instance is deleted.

1.7 Personal Data Protection Mechanism

To ensure that website visitors' personal data, such as the username, password, and mobile phone number, will not be obtained by unauthorized or unauthenticated entities or people and to prevent data leakage, WAF encrypts your personal data before storing it to control access to the data and records logs for operations performed on the data.

Personal Data to Be Collected

WAF records requests that trigger attack alarms in event logs. **Table 1-4** provides the personal data collected and generated by WAF.

Table 1-4 Personal data

Type	Collection Method	Can Be Modified	Mandatory
Request source IP address	Attacker IP address that is blocked or recorded by WAF when the domain name is attacked.	No	Yes
URL	Attacked URL of the protected domain name, or URL of the protected domain name that is blocked or recorded by WAF.	No	Yes
HTTP/HTTPS header information (including the cookie)	Cookie value and header value entered on the configuration page when you configure a CC attack or precise protection rule.	No	No If the configured cookie and header fields do not contain users' personal information, the requests recorded by WAF will not collect or generate such personal data.
Request parameters (Get and Post)	Request details recorded by WAF in protection logs.	No	No If request parameters do not contain users' personal information, the requests recorded by WAF will not collect or generate such personal data.

Storage Mode

The values of sensitive fields are saved after being anonymized, and the values of other fields are saved in plaintext in logs.

Access Control

Users can view only logs related to their own services.

1.8 WAF Permissions Management

If you need to assign different permissions to employees in your enterprise to access your WAF resources, IAM is a good choice for fine-grained permissions management. IAM provides identity authentication, permissions management, and access control, helping you secure access to your resources.

With IAM, you can use your account to create IAM users, and assign permissions to the users to control their access to specific resources. For example, some software developers in your enterprise need to use WAF resources but must not delete them or perform any high-risk operations. To achieve this result, you can create IAM users for the software developers and grant them only the permissions required for using WAF resources.

If your account does not need individual IAM users for permissions management, then you may skip over this chapter.

WAF Permissions

By default, new IAM users do not have any permissions assigned. You need to add a user to one or more groups, and attach permissions policies or roles to these groups. Users inherit permissions from the groups to which they are added and can perform specified operations on cloud services based on the permissions.

WAF is a project-level service deployed and accessed in specific physical regions. To assign WAF permissions to a user group, specify the scope as region-specific projects and select projects for the permissions to take effect. If **All projects** is selected, the permissions will take effect for the user group in all region-specific projects. When accessing WAF, the users need to switch to a region where they have been authorized to use the WAF service.

You can grant users permissions by using roles and policies.

- Roles: A type of coarse-grained authorization mechanism that defines permissions related to user responsibilities. Only a limited number of service-level roles for authorization are available. You need to also assign other dependent roles for the permission control to take effect. Roles are not ideal for fine-grained authorization and secure access control.
- Policies: A fine-grained authorization mechanism that defines permissions required to perform operations on specific cloud resources under certain conditions. This mechanism allows for more flexible policy-based authorization and meets secure access control requirements. For example, you can grant WAF users only the permissions for managing a certain type of resources. Most policies define permissions based on APIs. For the API actions supported by WAF, see **WAF Permissions and Supported Actions**.

Table 1-5 lists all the system roles supported by WAF.

Table 1-5 System policies supported by WAF

Role/Policy Name	Description	Category	Dependencies
WAF Administrator	Administrator permissions for WAF	System-defined role	Dependent on the **Tenant Guest** and **Server Administrator** roles. • **Tenant Guest**: A global role, which must be assigned in the global project. • **Server Administrator**: A project-level role, which must be assigned in the same project.
WAF FullAccess	All permissions for WAF	System-defined policy	None.
WAF ReadOnlyAccess	Read-only permissions for WAF.	System-defined policy	

1.9 WAF and Other Services

This topic describes WAF and other cloud services.

CTS

Cloud Trace Service (CTS) records all WAF operations for you to query, audit, and backtrack.

ELB

You can add your WAF instances to a load balancer so that your website traffic is distributed by the load balancer across WAF instances for detection and then forwarded by WAF to the origin server. In this way, website traffic will be protected even if one of your WAF instances becomes faulty.

IAM

Identity and Access Management (IAM) provides the permission management function for WAF. Only users granted WAF Administrator permissions can use WAF. To obtain this permission, contact the users who have the Security Administrator permissions.

LTS

Log Tank Service (LTS) collects log data from hosts and cloud services. WAF allows you to transfer WAF attack logs and access logs to LTS so that you can handle with logs in real time.

SMN

Simple Message Notification (SMN) service provides the notification function. After you enable the notification function in WAF, alarm information will be sent to you as configured once your domain name is attacked.

2 WAF Operation Guide

After you enable the WAF service, you need to connect your website domain name to WAF so that all access requests are forwarded to WAF for protection.

Procedure for Using WAF

Figure 2-1 shows the procedure. **Table 2-1** describes the procedure.

Figure 2-1 Process of using WAF

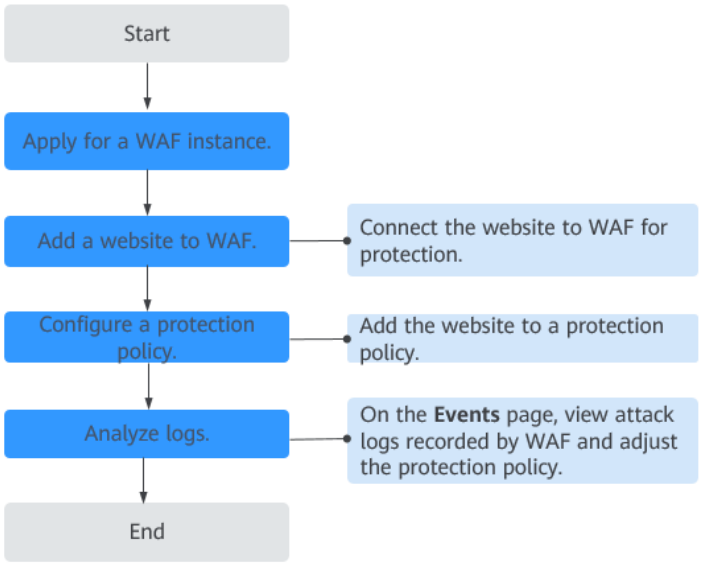


Table 2-1 Procedure for using WAF

Operation	Description
Apply for a WAF Instance	Apply for a WAF instance to enable WAF protection.

Operation	Description
Add a website to WAF.	Add websites you want to protect to your WAF instance. • Cloud mode: See **Step 1: Add a Domain Name to WAF (Cloud Mode)**. • Dedicated mode: See **Step 1: Add Your Website to WAF (Dedicated Mode)**. **NOTE** • Using WAF does not affect your web server performance because the WAF engine is not running on your web server. • After your domain name is connected to WAF, there will be a latency of tens of milliseconds, which might be raised based on the size of the requested page or number of incoming requests.
Configure a protection policy.	A policy is a combination of rules, such as basic web protection, blacklist, whitelist, and precise protection rules. A policy can be applied to multiple domain names, but only one policy can be used for a domain name.
Analyze logs.	WAF displays blocked or logged-only attacks on the **Events** page. You can view and analyze protection logs to adjust your website protection policies or mask false alarms.
(Optional) Enable alarm notifications.	Enable this function to receive an alarm notification the instant an attack is detected.

Related Functions

Beyond functions in **Procedure for Using WAF**, WAF also provides the following functions for you to improve your website security performance.

Table 2-2 Related functions

Function	Description
Viewing the Dashboard	You can view protection data of yesterday, today, last 3 days, last 7 days, or last 30 days.
Configuring PCI DSS/3DS Certification Check and Configuring the Minimum TLS Version and Cipher Suite	TLS v1.0 and the cipher suite 1 are configured by default in WAF for general security. To protect your websites better, set the minimum TLS version to a later version and select a more secure cipher suite.

Function	Description
Enabling the HTTP/2 Protocol	HTTP/2 can be used only for access between the client and WAF on the condition that at least one origin server has HTTPS used for **Client Protocol**. HTTP/2 is automatically enabled for dedicated WAF instances.
Configuring Connection Timeout	• The default timeout for connections from a browser to WAF is 120 seconds. The value varies depending on your browser settings and cannot be changed on the WAF console. • The default timeout for the connection between WAF and an origin server is 30 seconds. You can manually set the timeout on the WAF console.
Configuring a Traffic Identifier for a Known Attack Source	WAF allows you to configure traffic identifiers by IP address, session, or user tag to block possibly malicious requests from known attack sources based on **IP address**, **Cookie**, or **Params**.
Editing Response Page for Blocked Requests	If a visitor is blocked by WAF, the **Default** block page of WAF is returned by default. You can also configure **Custom** or **Redirection** for the block page to be returned as required.
Forwarding Custom Header Fields	You can use WAF to add additional header information, for example, $request_id, to associate requests on the entire link. You can follow this topic to let WAF insert additional fields into a header and forward requests to origin servers.
Managing Certificates	If you upload a certificate to WAF, you can directly select the certificate when adding a website to WAF.
Managing IP Address Blacklist and Whitelist Groups	With IP address groups, you can quickly add IP addresses or IP address ranges to a blacklist or whitelist rule.
Managing Dedicated Engines	This topic describes how to manage your dedicated WAF instances (or engines). You can view instance information, view instance monitoring configurations, upgrade the edition of an instance, and delete an instance.
Viewing Product Details	On the **Product Details** page, you can view information about all your WAF instances, including the edition, domain quotas, and specifications.

3 Enabling WAF

Before using WAF, enable a WAF instance.

This topic walks you through how to apply for a cloud WAF instance. A cloud WAF instance can protect your web servers either on the cloud or on premises.

If your service servers are deployed on the cloud, you can buy dedicated WAF instances (or dedicated WAF engines) to protect important web applications and services as long as they are accessible through domain names or IP addresses.

Prerequisites

- You have obtained management console login credentials for an account with the **WAF Administrator** and **WAF FullAccess** permissions.
- You have applied for a VPC before applying for a dedicated WAF instance.
- You have created resource sets.

Applying for a Cloud WAF Instance

Step 1 Log in to the management console.

Step 2 Click  in the upper left corner of the management console and select a region or project.

Step 3 Click  in the upper left corner and choose **Security** > **Web Application Firewall** to go to the **Dashboard** page.

Step 4 In the upper right corner of the page, click **Create WAF**.

Step 5 Select **Cloud Mode**.

Step 6 On the displayed page, select a region.

Step 7 In the lower right corner of the page, click **Next**.

Step 8 Click **Back to Website Settings** and add domain names of websites to be protected to WAF.

----End

Applying for a Dedicated WAF Instance

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner and choose **Security** > **Web Application Firewall** to go to the **Dashboard** page.

Step 4 In the upper right corner of the page, click **Create WAF**.

Step 5 On the **Buy Web Application Firewall** page, select **Dedicated Mode** for **WAF Mode**.

Step 6 Configure instance parameters by referring to **Table 3-1**.

Table 3-1 Parameters of a dedicated WAF instance

Parameter	Description
Billing Mode	Dedicated WAF instances are billed on a pay-per-use basis. You are billed for the required duration by the second, which starts when the instance is created and ends when the instance is deleted.
Region	Generally, a WAF instance you apply for in any region can protect web services in all regions. To make a WAF instance forward your website traffic faster, select the region nearest to your services.
AZ	Select an AZ in the selected region.
Instance Name Prefix	Set a prefix of the dedicated WAF instance name. If you apply for multiple instances at a time, the prefix to each instance name is the same.
Quantity	Set the number of WAF instances you want to apply for. To ensure the SLA and prevent single points of failure (SPOFs), apply for at least two WAF instances for your workloads.
Specifications	Select specifications for your instance. WAF offers 500 Mbit/s and 100 Mbit/s specifications.
WAF Instance Type	ECS Your WAF instance will be created on your ECS. You can view details of the ECS on the ECS console.
CPU Architecture	Select CPU architecture for your instance.
CPU Specifications	Select CPU specifications for your instance.
ECS Specifications	Select ECS specifications for your instance.

Parameter	Description
VPC	Select the VPC to which the origin server belongs.
Subnet	Select a subnet configured in the VPC.
Security Group	Select a security group in the region or click **Manage Security Group** to go to the VPC console and create a security group. After you select a security group, the WAF instance will be protected by the access rules of the security group. **NOTICE** • You can configure your security group as follows: – Inbound rules Add an inbound rule to allow incoming network traffic to pass through over a specified port based on your service requirements. For example, if you want to allow access from port 80, you can add a rule that allows **TCP** and port **80**. – Outbound rules The value is **Default**. All outgoing network traffic is allowed by default. • If your dedicated WAF instance and origin server are not in the same VPC, enable communications between the instance and the subnet of the origin server in the security group.

Step 7 In the lower right corner of the page, click **Next**.

Step 8 Confirm the configuration and click **Apply Now**.

Step 9 Click **Back to Dedicated Engine List**. On the **Dedicated Engine** page, view the instance status.

----End

4 Creating a User Group and Granting Permissions

With **IAM**, you can:

- Create IAM users for employees based on the organizational structure of your enterprise. Each IAM user has their own security credentials, providing access to WAF resources.
- Grant only the permissions required for users to perform a task.
- Entrust an account or cloud service to perform professional and efficient O&M on your WAF resources.

If your account does not require individual IAM users, skip this chapter.

This topic describes the procedure for granting permissions (see **Figure 4-1**).

Prerequisites

Learn about the permissions supported by WAF in **Table 4-1** and choose policies or roles based on your requirements. For the system policies of other services, see **System Permissions**.

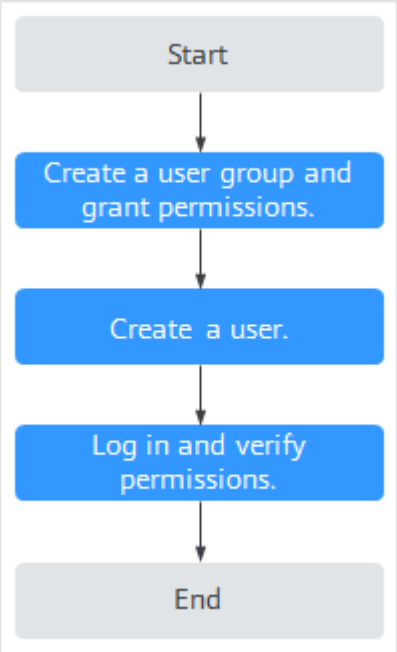
Table 4-1 System policies supported by WAF

Role/Policy Name	Description	Category	Dependencies
WAF Administrator	Administrator permissions for WAF	System-defined role	Dependent on the **Tenant Guest** and **Server Administrator** roles. • **Tenant Guest**: A global role, which must be assigned in the global project. • **Server Administrator**: A project-level role, which must be assigned in the same project.

Role/Policy Name	Description	Category	Dependencies
WAF FullAccess	All permissions for WAF	System-defined policy	None.
WAF ReadOnlyAccess	Read-only permissions for WAF.	System-defined policy	

Process Flow

Figure 4-1 Process for granting permissions



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

   Create a user group on the IAM console, and attach the **WAF Administrator** permission to the group.

2. **Create a user and add the user to the user group**.

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

3. **Log in to the management console as the created user** and verify the permissions.

   Log in to the WAF console by using the newly created user, and verify that the user only has **WAF Administrator** permissions for WAF.

   Choose any other service in Service List. If a message appears indicating that you have insufficient permissions to access the service, the **WAF Administrator** policy has already taken effect.

5 Connecting a Website to WAF

5.1 Connecting Your Website to WAF (Cloud Mode)

5.1.1 Website Connecting Process (Cloud Mode)

This topic describes how to connect a domain name of a website to WAF in CNAME access mode so that the access traffic destined for the website can be forwarded to WAF for protection.

Constraints

- In CNAME access method, WAF can protect web applications and websites deployed on a cloud or on-premises data center as long as they are accessible through domain names.
- After your website is connected to WAF, you can upload a file no larger than 10 GB each time.

Prerequisites

The following describes how WAF works when there is a proxy used or no proxy used in front of WAF:

- Proxy used

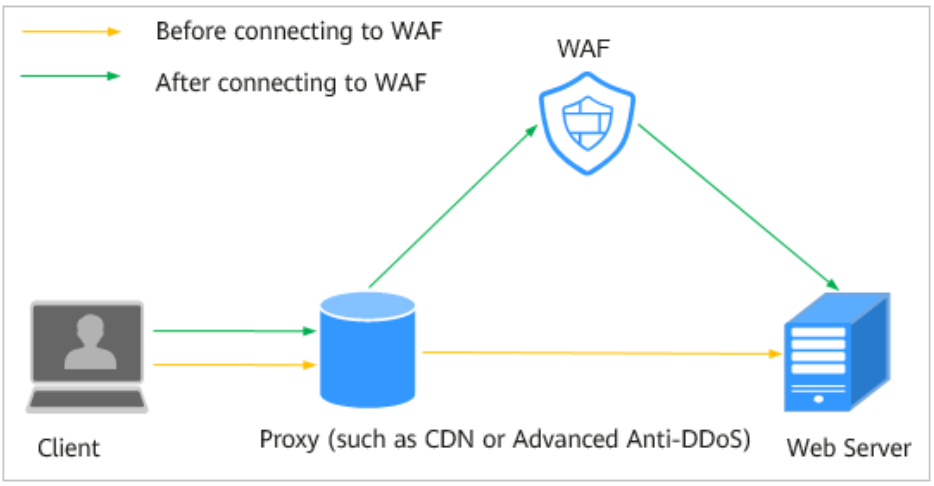
  If your website has used proxies, such as anti-DDoS, Content Delivery Network (CDN), or cloud acceleration, **Figure 5-1** shows how WAF works.

  - DNS resolves the domain name to the proxy IP address before your website is connected to WAF. In this case, the traffic passes through the proxy and then the proxy routes the traffic back to the origin server.
  - After you connect your website to WAF, change the back-to-source address of the proxy to the **CNAME** record of WAF. In this way, the proxy forwards the traffic to WAF. WAF then filters out illegitimate traffic and only routes legitimate traffic back to the origin server.

    i. Change the back-to-source IP address of the proxy to the CNAME record of WAF.

ii. (Optional) Add a WAF subdomain name and TXT record at your DNS provider.

Figure 5-1 WAF configuration when a proxy is used



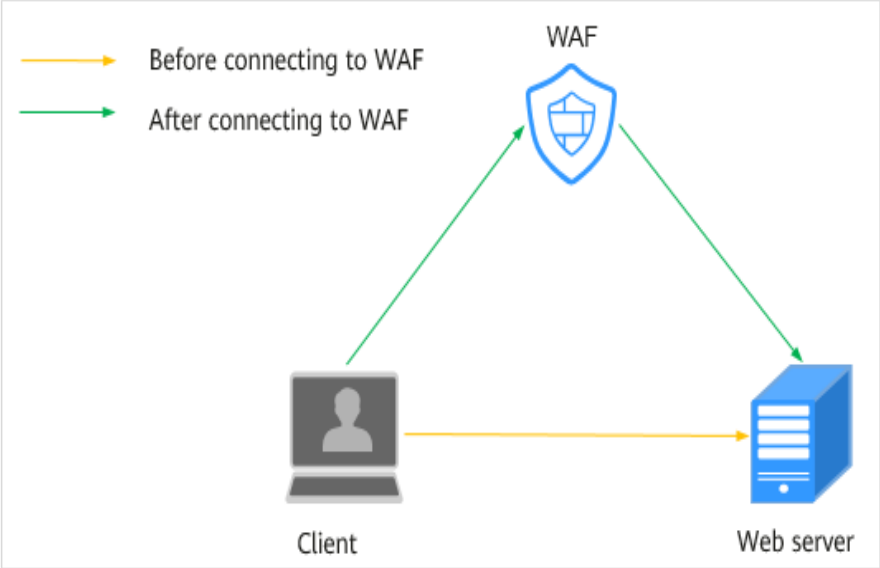
- No proxy used

  If no proxy is used before the website is connected to WAF, **Figure 5-2** shows how WAF works.

  – DNS resolves your domain name to the origin server IP address before your website is connected to WAF. Therefore, web visitors can directly access the server.

  – After your website is connected to WAF, DNS resolves your domain name to the CNAME record of WAF. In this way, the traffic passes through WAF. WAF then filters out illegitimate traffic and only routes legitimate traffic back to the origin server.

Figure 5-2 No proxy used



Processes of Connecting a Website to WAF

After purchasing a cloud WAF instance, complete the required configurations by following the process shown in **Figure 5-3**.

Figure 5-3 Process of connecting a website to WAF - Cloud Mode (CNAME Access)

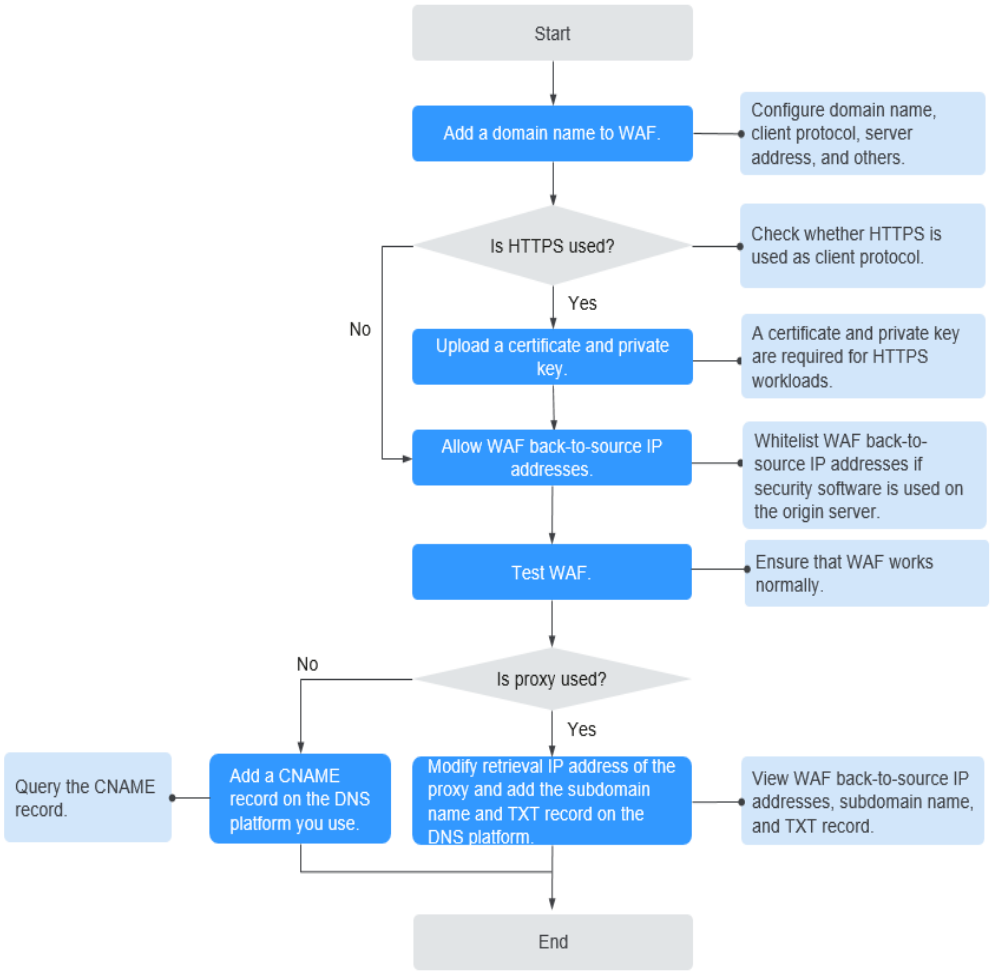


Table 5-1 Process of connecting your website domain name to WAF

Procedure	Description
Step 1: Add a Domain Name to WAF (Cloud Mode)	Configure basic information, such as the domain name, protocol, and origin server.
Step 2: Whitelist WAF Back-to-Source IP Addresses	If other security software or firewalls are installed on your origin server, whitelist only requests from WAF. This ensures normal access and protects the origin server from hacking.

Procedure	Description
Step 3: Test WAF	To ensure that your WAF instance forwards website traffic normally, test the WAF instance locally and then route traffic destined for the website domain name to WAF by modifying DNS record.
Step 4: Modify the DNS Records of the Domain Name	• No proxy used Configure a CNAME record for the protected domain name on the DNS platform you use. • Proxy (such as advanced anti-DDoS and CDN) used Change the back-to-source IP address of the used proxy, such as advanced anti-DDoS and CDN, to the copied CNAME record.

After you connect a domain name to WAF, WAF works as a reverse proxy between the client and the server. The real IP address of the origin server is hidden and only the IP address of WAF is visible to web visitors.

Collecting Domain Name Details

Before adding a domain name, obtain the information listed in **Table 5-2**.

Table 5-2 Domain name information required

Information	Parameter	Description	Example
Whether a proxy is used for the domain name	Proxy Configured	If your website has used proxies, such as anti-DDoS, Content Delivery Network (CDN), or cloud acceleration, this parameter must be set to **Yes**.	-
Parameters	Domain Name	The domain name is used by visitors to access your website. A domain name consists of letters separated by dots (.). It is a human readable address that maps to the machine-readable IP address of your server.	www.example.com

Information	Parameter	Description	Example
	Protected Port	The service port corresponding to the domain name of the website you want to protect. • Standard Ports – 80: default port when the client protocol is HTTP – 443: default port when the client protocol is HTTPS • Non-standard ports Ports other than ports 80 and 443 **NOTICE** If your website uses a non-standard port, check whether the WAF edition you plan to buy can protect the non-standard port before you make a purchase. For details, see **Which Non-Standard Ports Can WAF Protect?**	80
	Client Protocol	Protocol used by a client (for example, a browser) to access the website. WAF supports HTTP and HTTPS.	HTTP
	Server Protocol	Protocol used by WAF to forward requests from the client (such as a browser). The options are **HTTP** and **HTTPS**.	HTTP
	Server Address	Public IP address or domain name of the origin server for a client (such as a browser) to access. Generally, a public IP address maps to the A record of the domain name configured on the DNS, and a domain name to the CNAME record.	XXX.XXX.1.1
(Optional) Certificate	Certificate Name	If you set **Client Protocol** to **HTTPS**, you are required to configure a certificate on WAF and associate the certificate with the domain name. **NOTICE** Only .pem certificates can be used in WAF. If a certificate is not in .pem, convert it by referring to **How Do I Convert a Certificate into PEM Format?**	-

Fixing Inaccessible Websites

If a domain name fails to be connected to WAF, its access status is **Inaccessible**. To fix this issue, see **Why Is My Domain Name or IP Address Inaccessible?**

5.1.2 Step 1: Add a Domain Name to WAF (Cloud Mode)

This topic describes how to add a domain name to WAF in CNAME access mode so that the website traffic can pass through WAF. After you connect a website domain name to your WAF instance, WAF works as a reverse proxy between the client and the server. The real IP address of the server is hidden and only the IP address of WAF is visible to web visitors.

Prerequisites

You have applied for a cloud WAF instance.

Constraints

- Domain names added by an IAM user can be viewed by the account that creates the IAM user, but domain names added by an account cannot be viewed by IAM users created under the account.
- A domain name can only be added to WAF once in cloud mode.

  Each combination of a domain name and a non-standard port is counted towards the domain name quota of the WAF edition you are using. For example, www.example.com:8080 and www.example.com:8081 use two domain names of the quota. If you want to protect web services over multiple ports with the same domain name, add the domain name and each port to WAF.
- You can enter a multi-level single domain name (for example, top-level domain name example.com and level-2 domain name www.example.com) or a wildcard domain name (*.example.com).

  NOTICE

  - WAF does not support wildcard domain names containing underscores (_).
  - The following are the rules for adding wildcards to domain names:
    - If the server IP address of each subdomain name is the same, enter a wildcard domain name. For example, if the subdomain names a.example.com, b.example.com, and c.example.com have the same server IP address, you can add the wildcard domain name *.example.com to WAF to protect all three.
    - If the server IP addresses of subdomain names are different, add subdomain names as single domain names one by one.
- WAF does not support user-defined HTTP headers for protected domain names.
- A CNAME record is generated based on the domain name. For the same domain name, the CNAME records are the same.
- Only .pem certificates can be used in WAF.

- WAF supports the WebSocket protocol, which is enabled by default.

Specification Limitations

After your website is connected to WAF, you can upload a file no larger than 10 GB each time.

Impact on the System

If a non-standard port is configured, the visitors need to add the non-standard port to the end of the website address when they access the website.

Procedure

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner and choose **Web Application Firewall** under **Security**.

Step 4 In the navigation pane on the left, choose **Website Settings**.

Step 5 In the upper left corner of the website list, click **Add Website**.

Step 6 Select **Cloud** and click **OK**.

Step 7 Provide the domain name details.

- **Website Name**: (Optional) You can customize the website name.
- **Domain Name**: Enter the domain name you want WAF to protect. You can enter a top-level single domain name, like example.com, a second-level domain name, like www.example.com, or a wildcard domain name, like *.example.com.
- **Website Remarks**: (Optional) You can provide remarks about your website if you want.

Step 8 Configure the origin server. **Table 5-3** describes the parameters. **Figure 5-4** shows an example.

Figure 5-4 Origin Server Settings

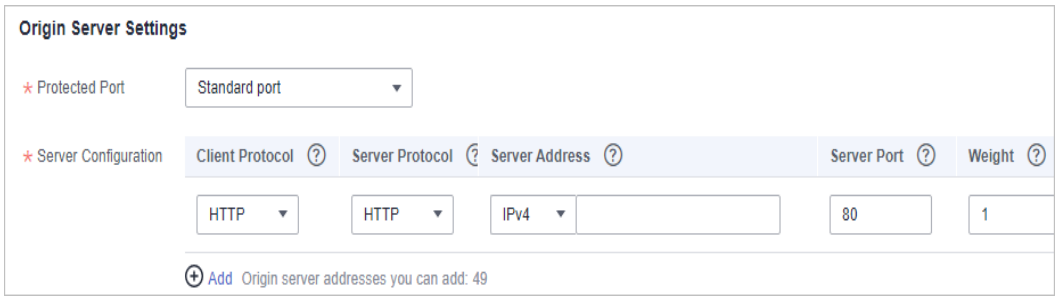


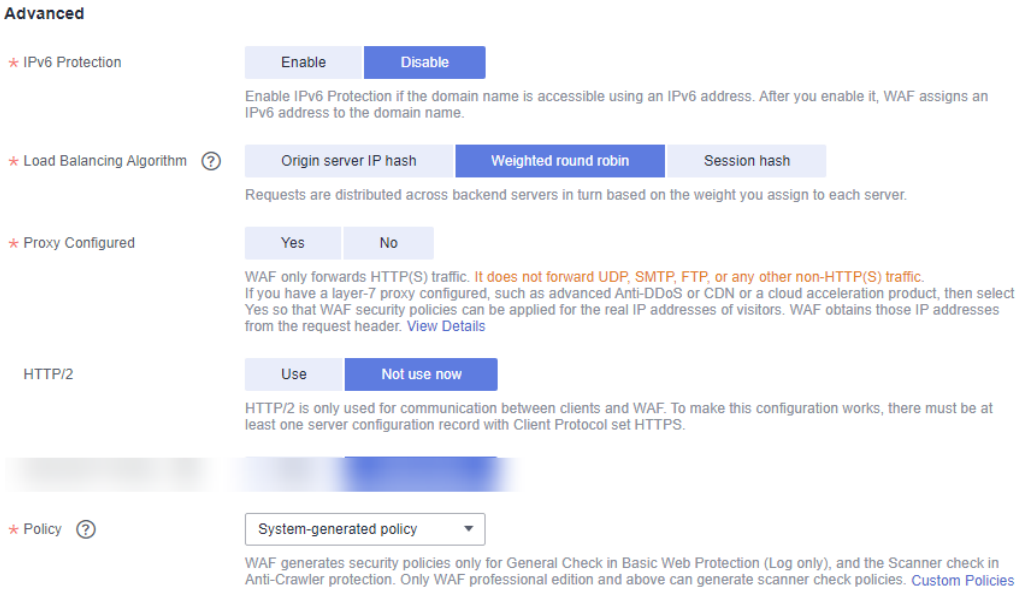
Table 5-3 Parameter description

Parameter	Description	Example Value
Protected Port	Select the port type that you want WAF to protect from the drop-down list. To protect port 80 or 443, select **Standard port** from the drop-down list. **NOTE** If a port other than 80 or 443 is configured, the visitors need to add the non-standard port to the end of the website address when they access the website.	81
Server Configuration	Configurations of your web server address. You need to configure the client protocol, server protocol, server address, and server port. • **Client Protocol**: protocol used by a client to access a server. The options are **HTTP** and **HTTPS**. If you set **Client Protocol** to **HTTPS**, **HTTP/2** can be enabled. For details, see **Enabling HTTP/2**. • **Server Protocol**: protocol used by WAF to forward client requests. The options are **HTTP** and **HTTPS**. **NOTE** – For details about configuring **Client Protocol** and **Server Protocol**, see **Example 4: Configuring Protocols for Different Access Methods**. – WAF can check WebSocket and WebSockets request, which is enabled by default. • **Server Address**: public IP address (generally corresponding to the A record of the domain name configured on the DNS) or domain name (generally corresponding to the CNAME of the domain name configured on the DNS) of the web server that a client accesses. • **Server Port**: service port over which the WAF instance forwards client requests to the origin server.	**Client Protocol**: **HTTP** **Server Protocol**: **HTTP** **Server Address**: XXX.XXX.1.1 **Server Port**: **80**

Parameter	Description	Example Value
Certificate Name	If you set **Client Protocol** to **HTTPS**, an SSL certificate is required. You can select a created certificate or import a certificate. For details about how to import a certificate, see **Importing a New Certificate**. The imported certificates are listed on the **Certificates** page. For more details, see **Uploading a Certificate to WAF**. **NOTICE** • Only .pem certificates can be used in WAF. If the certificate is not in .pem format, convert it into .pem by referring to **Table 5-5** before uploading the certificate. • If your website certificate is about to expire, purchase a new certificate before the expiration date and update the certificate associated with the website in WAF. WAF can send notifications if a certificate expires. You can configure such notifications on the **Notifications** page. • Each domain name must have a certificate associated. A wildcard domain name can only use a wildcard domain certificate. If you only have single-domain certificates, add domain names one by one in WAF.	--

Step 9 Complete advanced settings. **Figure 5-5** shows an example.

Figure 5-5 Advanced Settings



- **Load Balancing Algorithm**: Select an algorithm.
  - **Origin server IP hash**: Requests from the same IP address are routed to the same backend server.
  - Weighted round robin: All requests are distributed across origin servers in turn based on weights set to each origin server. The origin server with a larger weight receives more requests than others.
  - **Session hash**: Requests with the same session tag are routed to the same origin server. To enable this algorithm, **configure traffic identifiers for known attack sources**, or Session hash algorithm cannot take effect.
- **Proxy Configured**: Select **Yes** if your website is using a web proxy, such as anti-DDoS, CDN, or cloud acceleration products.

  If your website uses a layer-4 web proxy, such as advanced Anti-DDoS, set **Proxy Configured** to **Yes**. To ensure that WAF protection policies works on real source IP addresses, after **Step 4: Modify the DNS Records of the Domain Name** is complete, change **Proxy Configured** to **No** on the **Basic Information** page of the domain name.

  NOTICE

  If a proxy is deployed before WAF on your website, the WAF working mode cannot be switched to **Bypassed**. For details about how to switch the working mode, see **Changing the Protection Mode**.

- **HTTP/2**: If your website is accessible over HTTP and HTTPS, use HTTP/2.

  HTTP/2 can be used only for access between the client and WAF on the condition that at least one origin server has **HTTPS** used for **Client Protocol**.

  NOTICE

  - To make **Server Configuration** works, there must be at least one server configuration record with **Client Protocol** set to **HTTPS**.
  - HTTP/2 can work only when the client supports TLS 1.2 or earlier versions.

- Specify **Policy**. By default, **system-generated policy** is selected. You can select custom rules. For details, see **Table 5-4**.

  You can select a policy you configured. You can also customize rules after the domain name is connected to WAF.

Table 5-4 System-generated policies

Policy	Description
Basic web protection (**Log only** mode and common checks)	The basic web protection defends against attacks such as SQL injections, XSS, remote overflow vulnerabilities, file inclusions, Bash vulnerabilities, remote command execution, directory traversal, sensitive file access, and command/code injections.
Basic web protection (**Log only** mode and common checks)	The basic web protection defends against attacks such as SQL injections, XSS, remote overflow vulnerabilities, file inclusions, Bash vulnerabilities, remote command execution, directory traversal, sensitive file access, and command/code injections.
Anti-crawler (**Log only** mode and **Scanner** feature)	WAF only logs web scanning tasks, such as vulnerability scanning and virus scanning, such as crawling behavior of OpenVAS and Nmap.

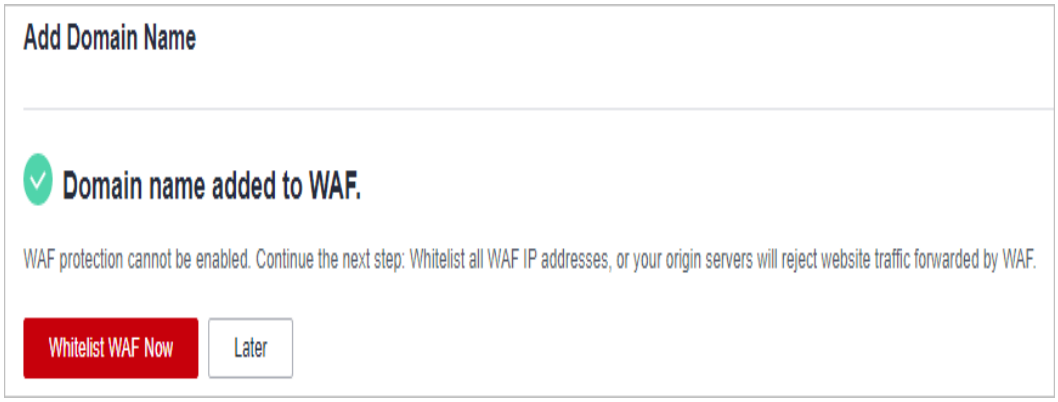
NOTE

Log only: WAF only logs detected attacks instead of blocking them.

Step 10 Click **OK**.

To enable WAF protection, there are three more steps, whitelisting WAF back-to-source IP addresses, testing WAF, and routing your website traffic to WAF. You can click **Later** in this step. Then, finish those steps by referring to **Step 2: Whitelist WAF Back-to-Source IP Addresses**, **Step 3: Test WAF**, and **Step 4: Modify the DNS Records of the Domain Name**.

Figure 5-6 Domain name added to WAF.



----End

Verification

- By default, WAF checks the **Access Progress** of each protected domain name on an hourly basis.
- Generally, if you have added a domain to WAF and **Access Progress** for the domain is **Accessible**, the domain name is connected to WAF.

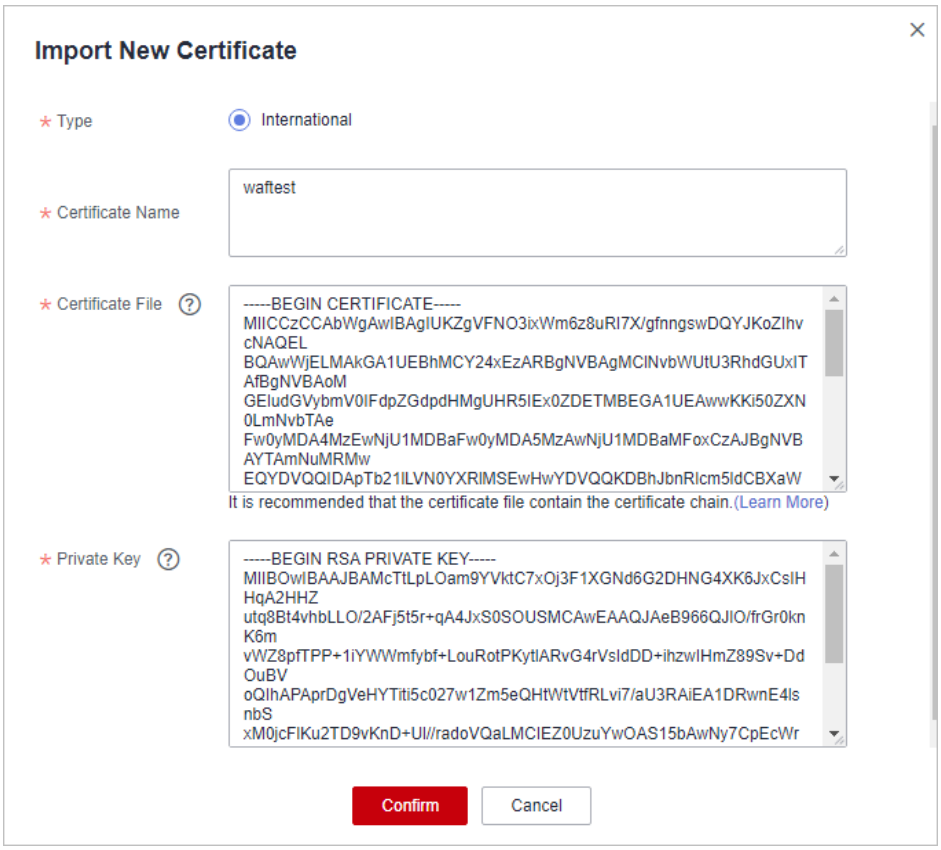
  If you have connected a domain name to WAF but its **Access Progress** column still displays **Inaccessible**, click to refresh. If **Access Progress** is still **Inaccessible**, connect the domain name to WAF again by referring to **Step 4: Modify the DNS Records of the Domain Name**.

Importing a New Certificate

If you set **Client Protocol** to **HTTPS**, an SSL certificate is required. You can perform the following steps to import a new certificate.

1. Click **Import New Certificate**. In the displayed **Import New Certificate** dialog box, enter the certificate name and paste the certificate file and private key to the corresponding text boxes.

Figure 5-7 Import New Certificate



NOTE

WAF encrypts and saves the private key to keep it safe.

Only .pem certificates can be used in WAF. If the certificate is not in .pem format, convert it into .pem locally by referring to **Table 5-5** before uploading it.

Table 5-5 Certificate conversion commands

Format	Conversion Method
CER/CRT	Rename the **cert.crt** certificate file to **cert.pem**.
PFX	• Obtain a private key. For example, run the following command to convert **cert.pfx** into **key.pem**: **openssl pkcs12 -in cert.pfx -nocerts -out key.pem -nodes** • Obtain a certificate. For example, run the following command to convert **cert.pfx** into **cert.pem**: **openssl pkcs12 -in cert.pfx -nokeys -out cert.pem**
P7B	1. Convert a certificate. For example, run the following command to convert **cert.p7b** into **cert.cer**: **openssl pkcs7 -print_certs -in cert.p7b -out cert.cer** 2. Rename certificate file **cert.cer** to **cert.pem**.

Format	Conversion Method
DER	• Obtain a private key. For example, run the following command to convert **privatekey.der** into **privatekey.pem**: **openssl rsa -inform DER -outform PEM -in privatekey.der -out privatekey.pem** • Obtain a certificate. For example, run the following command to convert **cert.cer** into **cert.pem**: **openssl x509 -inform der -in cert.cer -out cert.pem**

NOTE

- Before running an OpenSSL command, ensure that the **OpenSSL** tool has been installed on the local host.
- If your local PC runs a Windows operating system, go to the command line interface (CLI) and then run the certificate conversion command.

2. Click **Confirm**.

Example Configuration

There are some configuration examples provided for your reference in **Configuration Example: Adding a Domain Name to WAF**.

5.1.3 Step 2: Whitelist WAF Back-to-Source IP Addresses

To let WAF take effect in cloud mode, configure ACL rules on the origin server to trust only the back-to-source IP addresses of WAF. This prevents hackers from attacking the origin server through the server IP addresses.

NOTICE

ACL rules must be configured on the origin server to whitelist WAF back-to-source IP addresses. Otherwise, your website visitors will frequently receive 502 or 504 error code when your website is connected to WAF.

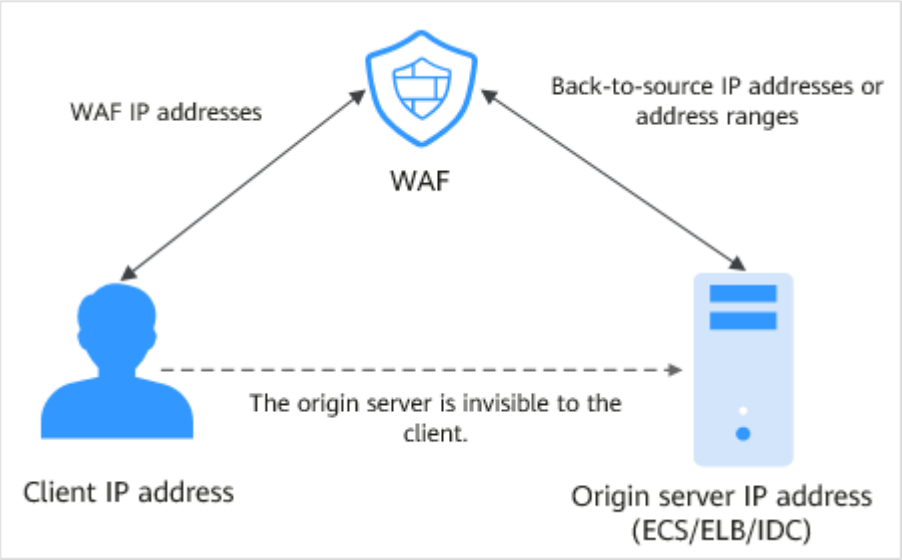
What Are Back-to-Source IP Addresses?

From the perspective of a server, all web requests originate from WAF. The IP addresses used by WAF forwarding are back-to-source IP addresses of WAF. The real client IP address is written into the X-Forwarded-For (XFF) HTTP header field.

NOTE

- There will be more WAF back-to-source IP addresses due to scale-out or new clusters. For your legacy domain names, WAF back-to-source IP addresses usually fall into several class C IP addresses (192.0.0.0 to 223.255.255.255) of two to four clusters.
- Generally, these IP addresses do not change unless clusters in use are changed due to disaster recovery switchovers or other scheduling switchovers. Even when WAF cluster is switched over on the WAF background, WAF will check the security group configuration on the origin server to prevent service interruptions.

Figure 5-8 Back-to-source IP address



WAF Back-to-Source IP Address Check Mechanism

A back-to-source IP address is randomly allocated from the back-to-source IP address range. When WAF forwards requests to the origin server, WAF will check the IP address status. If the IP address is abnormal, WAF will remove it and randomly allocate a normal one to receive or send requests.

Why Do I Need to Whitelist the WAF Back-to-Source IP Address Ranges?

All web requests originate from a limited quantity of WAF IP addresses. The security software on the origin server may most likely regard these IP addresses as malicious and block them. Once WAF back-to-source IP addresses are blocked, the website may fail to be accessed or it opens extremely slowly. To fix this, add the WAF back-to-source IP addresses to the whitelist of the security software.

NOTE

After you connect your website to WAF, uninstall other security software from the origin server or allow only the requests from WAF to access your origin server. This ensures normal access and protects the origin server from hacking.

Procedure

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

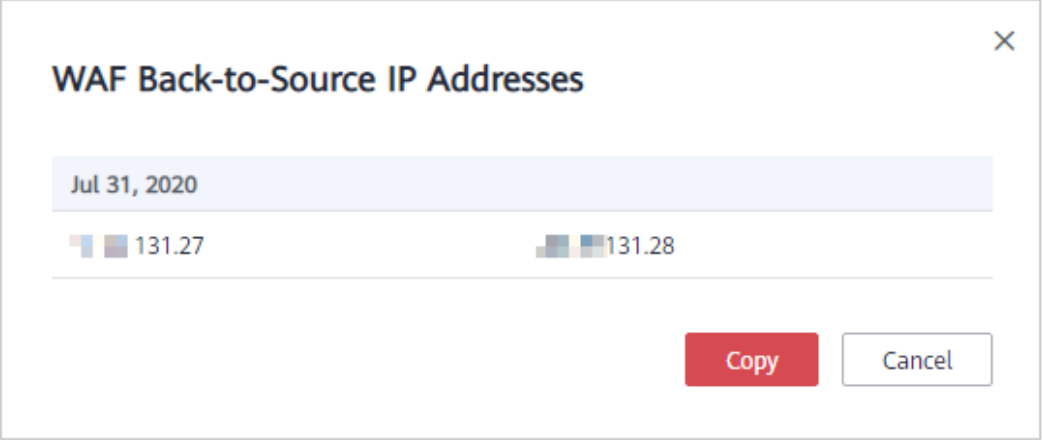
Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Website Settings**.

Step 5 Above the website list, click **WAF Back-to-Source IP Addresses**.

Step 6 In the displayed dialog box, click **Copy** to copy all the addresses.

Figure 5-9 WAF Back-to-Source IP Addresses dialog box



Step 7 Open the security software on the origin server and add the copied IP addresses to the whitelist.

----End

5.1.4 Step 3: Test WAF

To ensure that WAF can forward your website requests normally, test WAF locally after you add the domain to WAF.

Before testing WAF, ensure that the protocol, address, and port used by the origin server (for example, **www.example5.com**) are correct. If **Client Protocol** is set to **HTTPS**, ensure that the uploaded certificate and private key are correct.

Background

You can configure local DNS records for domain name resolution by modifying local hosts file. To test connection between WAF and your website locally, you need to resolve the website domain name to WAF IP addresses on a local computer. In this way, you can access the protected domain name from the local computer to verify whether the domain name is accessible after it has been added to WAF, preventing website access exceptions caused by abnormal domain name configurations.

Prerequisites

You have **added your domain name to WAF**.

Constraints

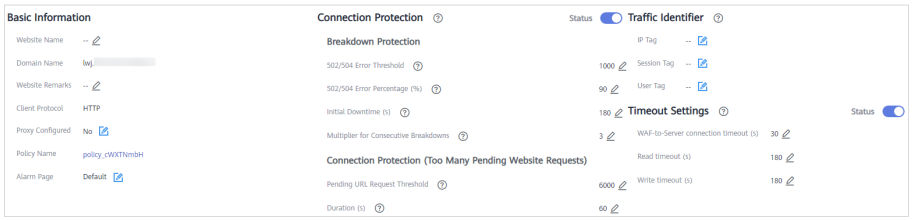
A CNAME record is generated based on the domain name. For the same domain name, the CNAME records are the same.

Connecting a Domain Name to WAF Locally

Step 1 Obtain the CNAME record.

1. Click in the upper left corner of the management console and select a region or project.
2. Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.
3. In the navigation pane on the left, choose **Website Settings**.
4. In the **Domain Name** column, click the target domain name to go to the **Basic Information** page.

   Figure 5-10 Basic Information

5. In the **CNAME** row, click to copy the CNAME record.

Step 2 Ping the CNAME record and record the corresponding IP address.

Open the CLI and run the **ping** *CNAME* command to obtain the WAF access IP address. The WAF access IP address is returned.

NOTE

If no WAF access IP addresses are returned after you ping the CNAME record, your network may be unstable. You can ping the CNAME record again when your network is stable.

Step 3 Add the domain name and WAF access IP addresses pointed to CNAME to the **hosts** file.

1. Use a text editor to edit the hosts file. In Windows, the location of the hosts file is as follows:
   - Windows: **C:\Windows\System32\drivers\etc**
   - Linux: **/etc/hosts**
2. Add a record for the WAF access IP address obtained in **Step 2** and protected domain name to the **hosts** file.

Figure 5-11 Adding a record

```
# Copyright (c) 1993-2009 Microsoft Corp.
# This is a sample HOSTS file used by Microsoft TCP/IP for Windows.
#
# This file contains the mappings of IP addresses to host names. Each
# entry should be kept on an individual line. The IP address should
# be placed in the first column followed by the corresponding host name.
# The IP address and the host name should be separated by at least one
# space.
# Additionally, comments (such as these) may be inserted on individual
# lines or following the machine name denoted by a '#' symbol.
#
#      [redacted]                    # source server
#      [redacted]                    # x client host

# localhost name resolution is handled within DNS itself.
#       [redacted]       localhost
#       ::1              localhost

[redacted]24.11 www.example5.com
```

3. Save the **hosts** file and ping the protected domain name on the local PC.

Figure 5-12 Pinging the domain name

```
C:\Users\[redacted]6>ping www.example5.com

Pinging www.example5.com [[redacted]24.11] with 32 bytes of data:
```

It is expected that the resolved IP address is the WAF back-to-source IP address obtained in **2**. If the origin server address is returned, refresh the local DNS cache. (Run **ipconfig/flushdns** in Windows cmd or **systemd-resolved** in Linux Bash.)

----End

Checking Whether WAF Forwarding Is Normal

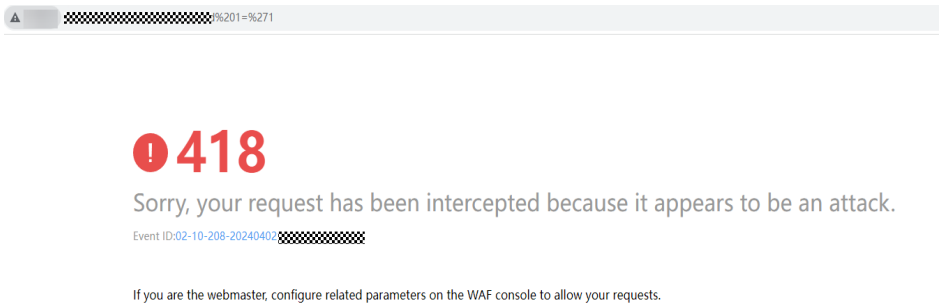
Step 1 Clear the browser cache and enter the domain name in the address bar to check whether the website is accessible.

If the domain name has been resolved to WAF back-to-source IP addresses and WAF configurations are correct, the website is accessible.

Step 2 Simulate simple web attack commands.

1. Set the mode of **Basic Web Protection** to **Block**. For details, see **Enabling Basic Web Protection**.
2. Clear the browser cache, enter the test domain name in the address bar, and check whether WAF blocks the simulated SQL injection attack against the domain name. **Figure 5-13** shows an example.

Figure 5-13 Request blocked



3. In the navigation pane on the left, choose **Events** to view test data.

----End

5.1.5 Step 4: Modify the DNS Records of the Domain Name

After a domain name is connected to WAF, WAF functions as a reverse proxy between the client and server. The real IP address of the server is hidden, and only the IP address of WAF is visible to web visitors. You must point the DNS resolution of the domain name to the CNAME record provided by WAF. In this way, access requests can be resolved to WAF.

To ensure that your WAF instance works properly, test it according to the instructions in **Step 3: Test WAF** before routing your business traffic to WAF.

Prerequisites

- You have added the domain name you want to protect to the cloud WAF instance you have in CNAME access mode. For details, see **Step 1: Add a Domain Name to WAF (Cloud Mode)**.
- You have the permission to modify domain name resolution settings on the DNS platform hosting your domain name.
- You have **whitelisted WAF back-to-source IP addresses** on your origin servers.
- (Optional) You have **tested your website connectivity** to ensure that WAF can forward requests.

Constraints

WAF protection takes effect only for real client IP addresses where requests originate. To ensure that WAF obtains real client IP addresses, if your website has layer-7 proxies such as CDN and cloud acceleration products deployed in front of WAF, **Yes** must be selected for **Proxy Configured**.

Specification Limitations

After your website is connected to WAF, you can upload a file no larger than 10 GB each time.

How WAF Works

- No proxies used

  DNS resolves your domain name to the origin server IP address before the website is connected to WAF. DNS resolves your domain name to the CNAME of WAF after the website is connected to WAF. Then WAF inspects the incoming traffic and filters out malicious traffic.

- A proxy (such as anti-DDoS service) used

  If a proxy such as anti-DDoS service is used on your website before it is connected to WAF, DNS resolves the website domain name to the anti-DDoS IP address. The traffic goes to the anti-DDoS service and the anti-DDoS service then routes the traffic back to the origin server. After you connect your website to WAF, change the back-to-source address of the proxy (such as anti-DDoS service) to the CNAME of WAF. In this way, the proxy forwards the traffic to WAF. WAF then filters out illegitimate traffic and only routes legitimate traffic back to the origin server.

  NOTE

  - To ensure that WAF can properly forward requests, test WAF by referring to **Testing WAF** before modifying the DNS configuration.
  - To prevent other users from configuring your domain name on WAF before you add it to WAF (this will cause interference on your domain name protection), add the subdomain name and TXT record on your DNS management platform. WAF will determine which user owns the domain name based on the subdomain name and TXT record.

Procedure

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Website Settings**.

Step 5 In the row containing the desired domain name, click the domain name to go to the **Basic Information** page.

Step 6 In the **CNAME** row, click to copy the CNAME record.

If the message "CNAME copied successfully" is displayed in the upper right corner of the page, the CNAME record is copied successfully.

Step 7 Connect the domain name to WAF.

- No proxy used

  Configure the CNAME record at your DNS provider. For details, contact your DNS provider.

- Proxy used

  Change the back-to-source IP address of the used proxy, such as anti-DDoS and CDN services, to the copied CNAME record.

NOTE

To prevent other users from configuring your domain names on WAF in advance (this will cause interference on your domain name protection), add the subdomain name and TXT record on your DNS management platform.

1. Obtain **Subdomain Name** and **TXT Record**: In the row of **Access Status**, click **How to Access**. In the **Access Guide** dialog box, copy **Subdomain Name** and **TXT Record**.
2. Add **Subdomain Name** at the DNS provider and configure **TXT Record** for the subdomain name.

WAF determines which user owns the domain name based on the configured **Subdomain Name** and **TXT Record**.

Step 8 Verify that the CNAME of the domain name has been configured.

1. In Windows, choose **Start** > **Run**. Then enter **cmd** and press **Enter**.
2. Run a **nslookup** command to query the CNAME record.

   If the configured CNAME is returned, the configuration is successful.

   Example command:

   ```
   nslookup www.example.com
   ```

----End

Follow-up Procedure

- If your server uses other network firewalls, disable these network firewalls or add the WAF IP address range to the IP address whitelist of these network firewalls. Otherwise, these firewalls may regard the WAF IP address as a malicious IP address.
- If your web server is using personal security software, replace it with enterprise security software and whitelist the WAF IP address ranges.

Verification

- By default, WAF checks the **Access Progress** of each protected domain name on an hourly basis.
- Generally, if you have added a domain to WAF and **Access Progress** for the domain is **Accessible**, the domain name is connected to WAF.

5.1.6 Configuration Example: Adding a Domain Name to WAF

When adding a domain name to WAF, the configurations are slightly different based on the service scenarios.

- **Example 1: Protecting Traffic to the Same Standard Port with Different Origin Server IP Addresses Assigned**
- **Example 2: Protecting Traffic to a Non-Standard Port with Different Origin Server IP Addresses Assigned**
- **Example 3: Protecting Different Service Ports**
- **Example 4: Configuring Protocols for Different Access Methods**

Example 1: Protecting Traffic to the Same Standard Port with Different Origin Server IP Addresses Assigned

1. Select **Standard port** from the **Protected Port** drop-down list.
2. Select **HTTP** or **HTTPS** for **Client Protocol**. Figure 5-14 and Figure 5-15 show standard port configurations when the client protocol is HTTP or HTTPS.

Figure 5-14 Port 80

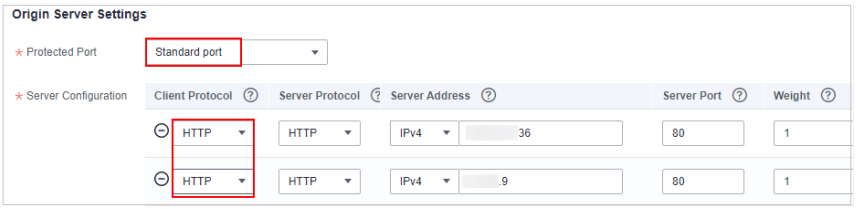
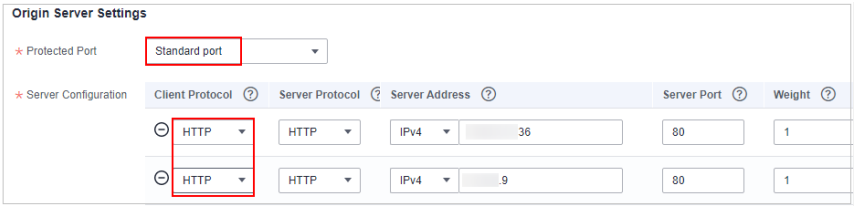


Figure 5-15 Port 443



NOTE

If **Client Protocol** is set to **HTTPS**, a certificate is required.

3. Your website visitors can access the website without adding a port to the end of the domain name. For example, enter **http://www.example.com** in the address box of the browser to access the website.

Example 2: Protecting Traffic to a Non-Standard Port with Different Origin Server IP Addresses Assigned

1. In the **Protected Port** drop-down list, select a non-standard port you want to protect.
2. Select **HTTP** or **HTTPS** for **Client Protocol** for all server ports. Figure 5-16 and Figure 5-17 show the configuration of non-standard HTTP or HTTPS port, respectively.

Figure 5-16 Other HTTP port besides port 80

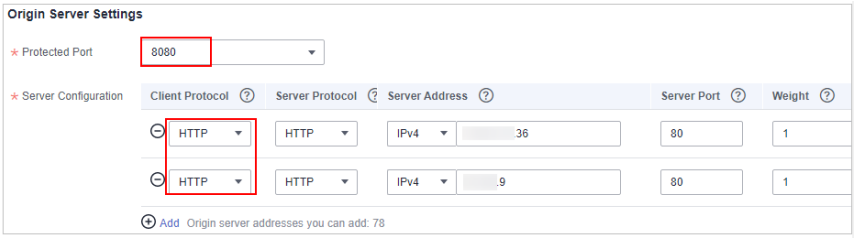
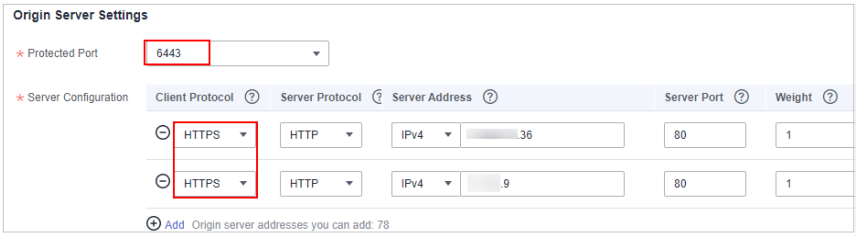


Figure 5-17 Other HTTPS port besides port 443



NOTE

If **Client Protocol** is set to **HTTPS**, a certificate is required.

3. Visitors must add the configured non-standard port to the domain name when they access your website. Otherwise, error 404 is returned. If the non-standard port is 8080, enter *http://www.example.com:8080* in the address box of the browser.

Example 3: Protecting Different Service Ports

If the service ports to be protected are different, configure the ports separately. For example, to protect ports 8080 and 6443 for your site **www.example.com**, add the domain separately for each port, as shown in **Figure 5-18** and **Figure 5-19**.

Figure 5-18 Protecting port 8080

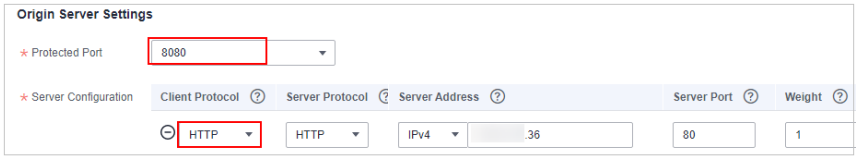
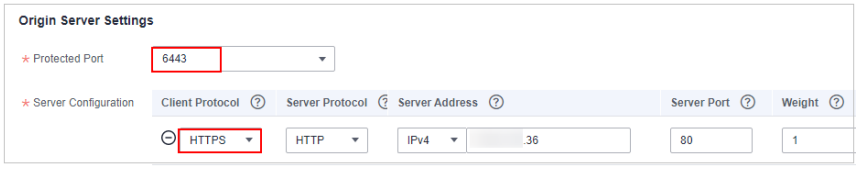


Figure 5-19 Protecting port 6443

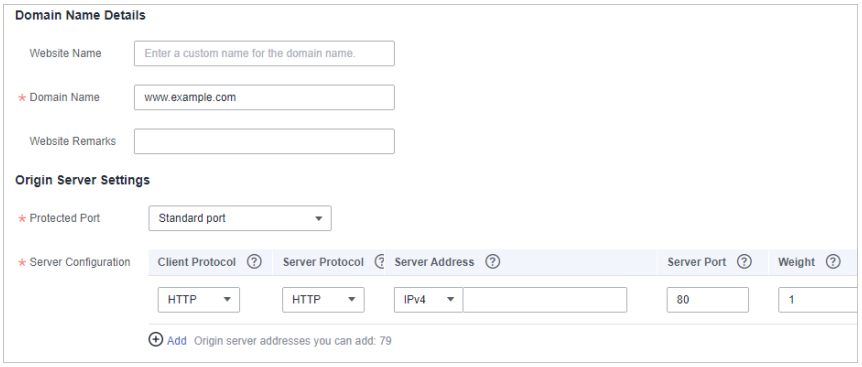


Example 4: Configuring Protocols for Different Access Methods

WAF provides various protocol types. If your website is www.example.com, WAF provides the following four access modes:

- HTTP mode

Figure 5-20 HTTP mode

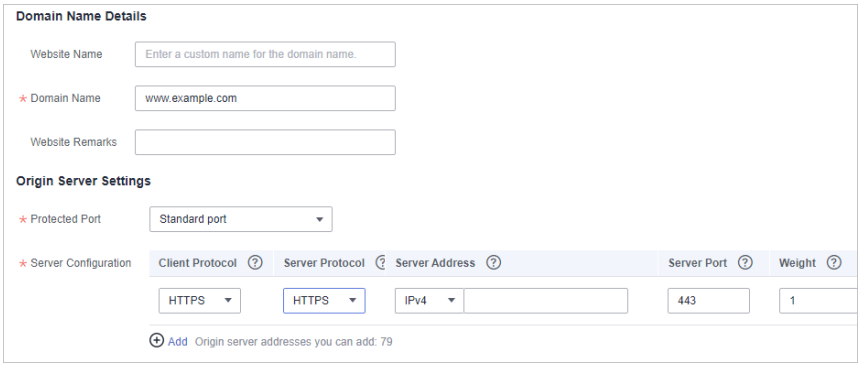


NOTICE

This configuration allows web visitors to access http://www.example.com over HTTP only. If they access it over HTTPS, they will receive the 302 Found code and be redirected to http://www.example.com.

- HTTPS method. This configuration allows web visitors to access your website over HTTPS only. If they access it over HTTP, they are redirected to the HTTPS URL.

Figure 5-21 HTTPS redirection

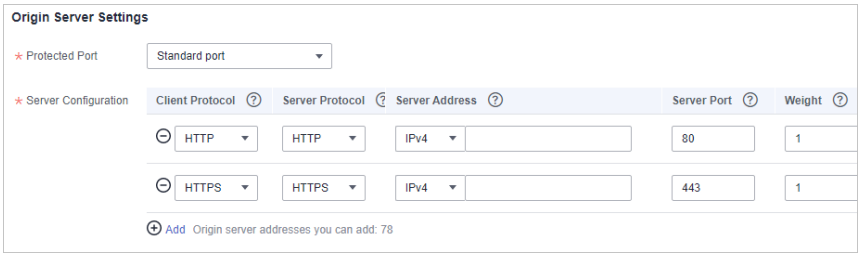


NOTICE

- If web visitors access your website over HTTPS, the website returns a successful response.
- If web visitors access http://www.example.com over HTTP, they will receive the 301 Found code and are directed to https://www.example.com.

- HTTP/HTTPS forwarding method

Figure 5-22 HTTP and HTTPS forwarding

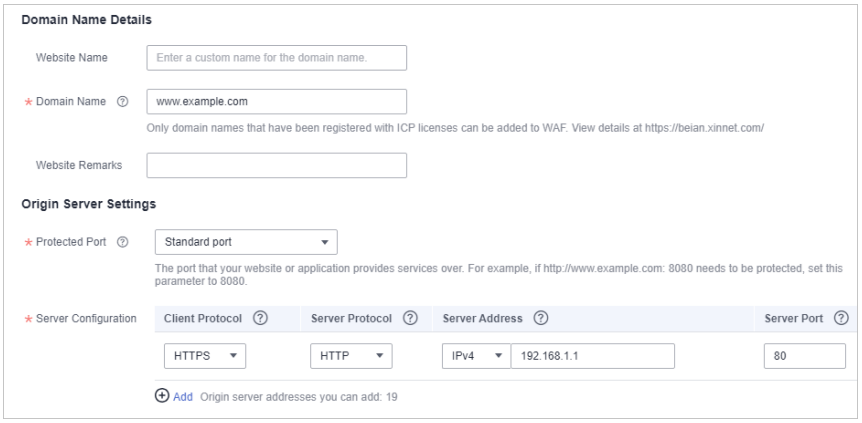


NOTICE

- If web visitors access your website over HTTP, the website returns a successful response but no communication between the browser and website is encrypted.
- If web visitors access your website over HTTPS, the website returns a successful response and all communications between the browser and website are encrypted.

- HTTPS offloading by WAF

Figure 5-23 HTTPS offloading



NOTICE

If web visitors access your website over HTTPS, WAF forwards the requests to your origin server over HTTP.

5.2 Connecting Your Website to WAF (Dedicated Mode)

5.2.1 Website Connection Process (Dedicated Mode)

To let a dedicated WAF instance protect your website, the domain name of the website must be connected to the dedicated WAF instance so that the website incoming traffic can go to WAF first.

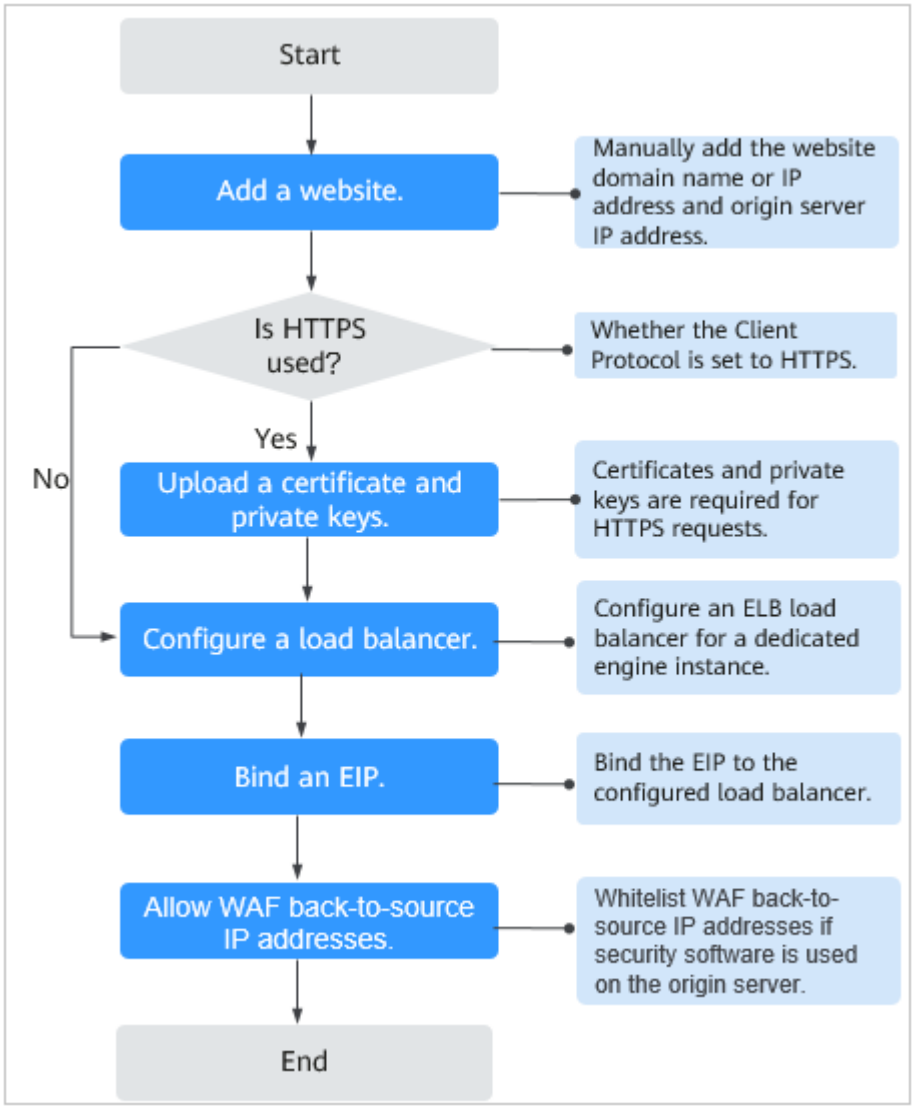
Application Scenarios

Dedicated WAF instances can protect only web applications and websites that are accessible through domain names or IP addresses.

Processes of Connecting a Website to WAF

After you apply for a dedicated WAF instance, complete the required configurations by following the process shown in **Figure 5-24**.

Figure 5-24 Process of connecting a website to a dedicated WAF instance



Collecting Domain Name/IP Address Details

Before adding a domain name or IP address to WAF, obtain the information listed in **Table 5-6**.

Table 5-6 Domain name or IP address details required

Information	Parameter	Description	Example
Parameters	Protected Object	• Domain name: used by visitors to access your website. A domain name consists of letters separated by dots (.). It is a human readable address that maps to the machine-readable IP address of your server. • IP: IP address of the website.	www.example.com
	Protected Port	The service port corresponding to the domain name of the website you want to protect. • Standard ports – 80: default port when the client protocol is HTTP – 443: default port when the client protocol is HTTPS • Non-standard ports Ports other than ports 80 and 443 **NOTICE** If your website uses a non-standard port, check whether the WAF edition you plan to use can protect the non-standard port. For details, see **Which Non-Standard Ports Can WAF Protect?**	80
	Client Protocol	Protocol used by a client (for example, a browser) to access the website. WAF supports HTTP and HTTPS.	HTTP
	Server Protocol	Protocol used by WAF to forward requests from the client (such as a browser). The options are **HTTP** and **HTTPS**.	HTTP
	VPC	Select the VPC that the dedicated WAF instance you apply for belongs to.	vpc-default

Information	Parameter	Description	Example
	Server Address	Private IP address of the website server. Log in to the ECS or ELB console and view the private IP address of the server in the instance list. **NOTE** The origin server address cannot be the same as that of the protected object.	192.168.1.1
(Optional) Certificate	Certificate Name	If you set **Client Protocol** to **HTTPS**, you are required to configure a certificate on WAF and associate the certificate with the domain name. **NOTICE** Only .pem certificates can be used in WAF. If your certificate is not in PEM format, convert the certificate format by referring to **How Do I Convert a Non-PEM Certificate to a PEM One?**	-

Fixing Inaccessible Websites

If a domain name fails to be connected to WAF, its access status is **Inaccessible**. To fix this issue, see **Why Is My Domain Name or IP Address Inaccessible?**

5.2.2 Step 1: Add Your Website to WAF (Dedicated Mode)

If your service servers are deployed on the cloud, you can add the domain name or IP address of the website to WAF so that the website traffic is forwarded to WAF for inspection.

Prerequisites

You have applied for a dedicated WAF instance.

Constraints

- You have applied for a dedicated load balancer in Elastic Load Balance (ELB).
- If your website has no layer-7 proxy server such as CDN and cloud acceleration service deployed in front of WAF and uses only layer-4 load balancers (or NAT), set **Proxy Configured** to **No**. Otherwise, **Proxy Configured** must be set to **Yes**. This ensures that WAF obtains real IP addresses of website visitors and takes protective actions configured in protection policies.

Procedure

Step 1 Log in to the management console.

Step 2 Click ☰ in the upper left corner and choose **Web Application Firewall** under **Security**.

Step 3 In the navigation pane on the left, choose **Website Settings**.

Step 4 In the upper left corner of the website list, click **Add Website**.

Step 5 Select **Dedicated Mode** and click **OK**.

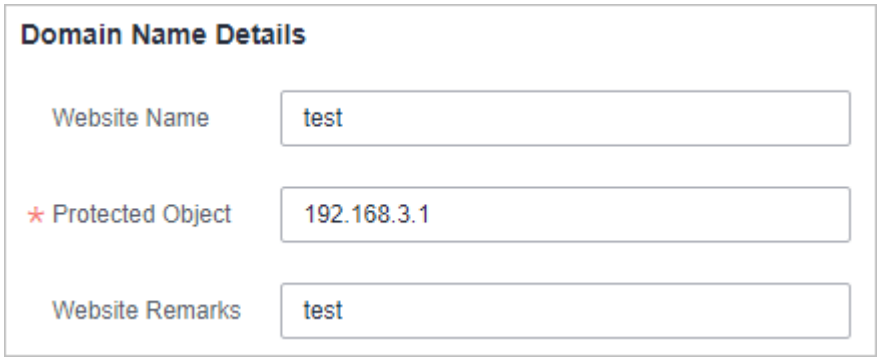
Step 6 Provide the domain name details. **Figure 5-25** shows an example.

- **Website Name**: (Optional) You can customize the website name.
- **Protected Object**: Enter the domain name of a website you want WAF to protect. You can enter a single domain name or a wildcard domain name.

  NOTE

  - The wildcard * can be added to WAF to let WAF protect any domain names. If wildcard (*) is added to WAF, only non-standard ports other than 80 and 443 can be protected.
  - If the server IP address of each subdomain name is the same, enter a wildcard domain name. For example, if the subdomain names ***a.example.com***, ***b.example.com***, and ***c.example.com*** have the same server IP address, you can add the wildcard domain name ****.example.com*** to WAF to protect all three.
  - If the server IP addresses of subdomain names are different, add subdomain names as single domain names one by one.
- **Website Remarks**: (Optional) You can provide remarks about your website if you want.

Figure 5-25 Configuring domain name details



Step 7 Configure the origin server by referring to **Table 5-7**. **Figure 5-26** shows an example.

Figure 5-26 Origin Server Settings

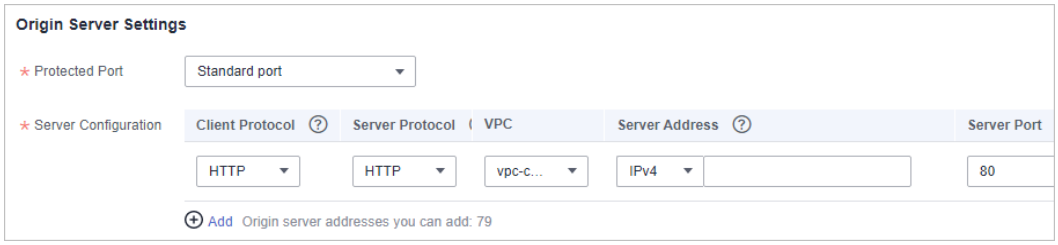


Table 5-7 Parameter description

Parameter	Description	Example Value
Protected Port	Select the port you want WAF to protect from the drop-down list. To protect port 80 or 443, select **Standard port** from the drop-down list.	81
Server Configuration	Address of the web server. The configuration contains the **Client Protocol**, **Server protocol**, VPC, **Server Address,** and **Server Port**. • **Client Protocol**: protocol used by a client to access a server. The options are **HTTP** and **HTTPS**. • **Server Protocol**: protocol used by WAF to forward client requests. The options are **HTTP** and **HTTPS**. **NOTE** WAF can check WebSocket and WebSockets requests, which is enabled by default. • **VPC**: Select the VPC to which the dedicated WAF instance belongs. **NOTE** To implement active-active services and prevent single points of failure (SPOFs), you can apply for at least two WAF instances and provision them in the same VPC. • **Server Address**: private IP address of the website server. Log in to the ECS or ELB console and view the private IP address of the server in the instance list. **NOTE** The origin server address cannot be the same as that of the protected object. • **Server Port**: service port of the server to which the dedicated WAF instance forwards client requests.	**Client Protocol**: **HTTP** **Server Protocol**: **HTTP** **Server Address**: XXX.XXX.1.1 **Server Port**: **80**

Parameter	Description	Example Value
Certificate Name	If you set **Client Protocol** to **HTTPS**, an SSL certificate is required. You can select an existing certificate or import an external certificate. For details about how to import a certificate, see **Importing a New Certificate**. The newly imported certificates will be listed on the **Certificates** page. For more details, see **Uploading a Certificate to WAF**. **NOTICE** • Only .pem certificates can be used in WAF. If the certificate is not in .pem format, convert it into .pem by referring to **Importing a New Certificate** before uploading the certificate. • If your website certificate is about to expire, purchase a new certificate before the expiration date and update the certificate associated with the website in WAF. WAF can send notifications if a certificate expires. You can configure such notifications on the **Notifications** page. For details, see **Enabling Alarm Notifications**. • Each domain name must have a certificate associated. A wildcard domain name can only use a wildcard domain certificate. If you only have single-domain certificates, add domain names one by one in WAF.	--

Step 8 Configure the advanced settings.

- **Proxy Configured**: WAF security policies work only for real client IP addresses where the requests initiate. To ensure that WAF obtains real client IP addresses, if your website has layer-7 proxy servers such as CDN and cloud acceleration products deployed in front of WAF, select **Yes** for **Proxy Configured**.
- **Policy**: The **System-generated policy** is selected by default. You can select a policy you configured before. You can also customize rules after the domain name is connected to WAF.

  System-generated policies include:

  – Basic web protection (**Log only** mode and common checks)

  The basic web protection defends against attacks such as SQL injections, XSS, remote overflow vulnerabilities, file inclusions, Bash vulnerabilities, remote command execution, directory traversal, sensitive file access, and command/code injections.

  – Anti-crawler (**Log only** mode and **Scanner** feature)

  WAF only logs web scanning tasks, such as vulnerability scanning and virus scanning, such as crawling behavior of OpenVAS and Nmap.

  NOTE

  Log only: WAF only logs detected attack events instead of blocking them.

Step 9 Click **OK**.

To enable WAF protection, there are still several steps, including configuring a load balancer, binding an EIP to the load balancer, and whitelisting back-to-source IP addresses of your dedicated instance. You can click **Later** in this step. Then, follow the instructions and finish those steps by referring to **Step 2: Configure a Load Balancer for WAF**, **Step 3: Bind an EIP to a Load Balancer**, and **Step 4: Whitelist Back-to-Source IP Addresses of Dedicated WAF Instances**.

----End

Verification

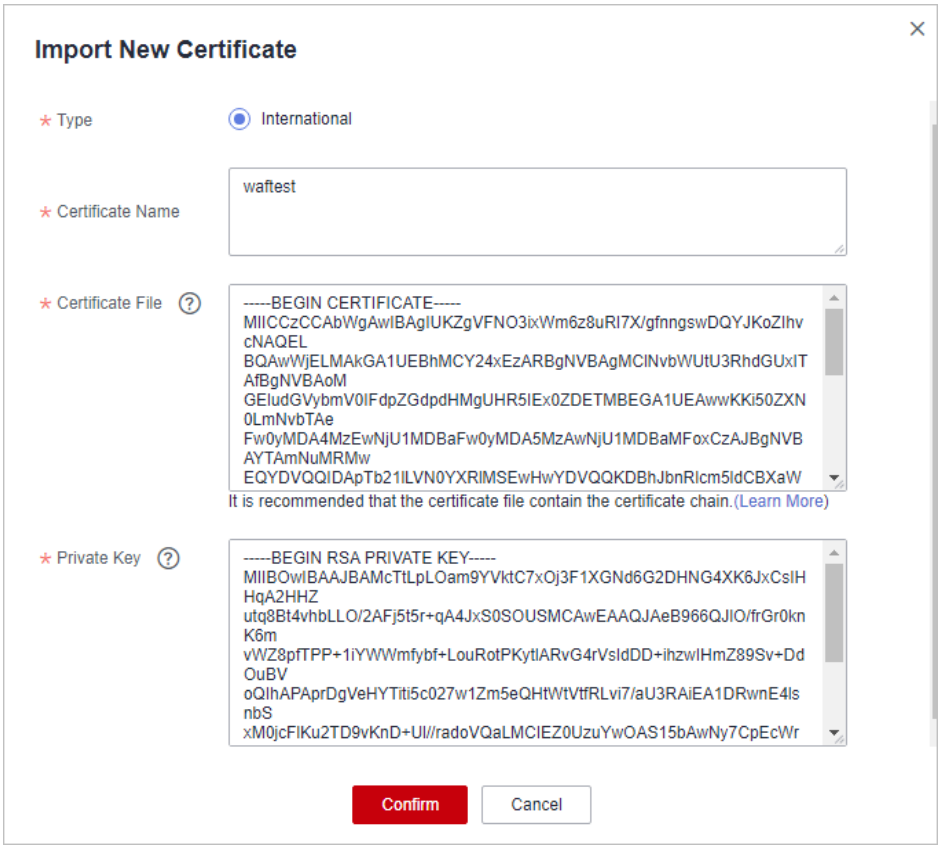
The initial **Access Status** of a website is **Inaccessible**. After you configure a load balancer and bind an EIP to the load balancer for your website, when a request reaches the WAF dedicated instance, the access status automatically changes to **Accessible**.

Importing a New Certificate

If you set **Client Protocol** to **HTTPS**, an SSL certificate is required. You can perform the following steps to import a new certificate.

1. Click **Import New Certificate**. In the displayed dialog box, enter a certificate name, and copy and paste the certificate file and private key to the corresponding text boxes.

Figure 5-27 Import New Certificate



NOTE

WAF encrypts and saves the private key to keep it safe.

Only .pem certificates can be used in WAF. If the certificate is not in .pem format, convert it into .pem locally by referring to **Table 5-8** before uploading it.

Table 5-8 Certificate conversion commands

Format	Conversion Method
CER/CRT	Rename the **cert.crt** certificate file to **cert.pem**.
PFX	• Obtain a private key. For example, run the following command to convert **cert.pfx** into **key.pem**: **openssl pkcs12 -in cert.pfx -nocerts -out key.pem -nodes** • Obtain a certificate. For example, run the following command to convert **cert.pfx** into **cert.pem**: **openssl pkcs12 -in cert.pfx -nokeys -out cert.pem**
P7B	1. Convert a certificate. For example, run the following command to convert **cert.p7b** into **cert.cer**: **openssl pkcs7 -print_certs -in cert.p7b -out cert.cer** 2. Rename certificate file **cert.cer** to **cert.pem**.
DER	• Obtain a private key. For example, run the following command to convert **privatekey.der** into **privatekey.pem**: **openssl rsa -inform DER -outform PEM -in privatekey.der -out privatekey.pem** • Obtain a certificate. For example, run the following command to convert **cert.cer** into **cert.pem**: **openssl x509 -inform der -in cert.cer -out cert.pem**

NOTE

- Before running an OpenSSL command, ensure that the **OpenSSL** tool has been installed on the local host.
- If your local PC runs a Windows operating system, go to the command line interface (CLI) and then run the certificate conversion command.

2. Click **Confirm**.

5.2.3 Step 2: Configure a Load Balancer for WAF

To ensure your dedicated WAF instance reliability, after you add a website to it, use Elastic Load Balance (ELB) to configure a load balancer and a health check for the dedicated WAF instance.

Prerequisites

- You have added a website to a dedicated WAF instance.
- You have created a load balancer.
- Related ports have been enabled in the security group to which the dedicated WAF instance belongs.

  You can configure your security group as follows:

  - Inbound rules

    Add an inbound rule to allow incoming network traffic to pass through over a specified port based on your service requirements. For example, if you want to allow access from port 80, add a rule that allows **TCP** and port **80**.
  - Outbound rules

    Retain the default settings. All outgoing network traffic is allowed by default.

Constraints

- If **Health Check** is configured, the health check result of the dedicated instance must be **Healthy**, or the website requests cannot be pointed to WAF.
- The **Backend Port** for the backend server must be the same as the service port protected by the dedicated WAF instance. The service port is the protected port set in **Step 1: Add Your Website to WAF (Dedicated Mode)**.
- WAF works as a layer-7 proxy. When configuring a listener, you can only select HTTP or HTTPS as the frontend protocol.

Impact on the System

If you select **Weighted round robin** for **Load Balancing Algorithm**, disable **Sticky Session**. If you enable **Sticky Session**, the same requests will be forwarded to the same dedicated WAF instance. If this instance becomes faulty, an error will occur when the requests come to it next time.

Procedure

Step 1 Log in to the management console.

Step 2 Click  in the upper left corner of the management console and select a region or project.

Step 3 Click  in the upper left corner of the page and choose **Elastic Load Balance** under **Network** to go to the **Load Balancers** page.

Step 4 Click the name of the load balancer in the **Name** column to go to the **Basic Information** page.

Step 5 Locate the **IP as a Backend** row, enable the function. In the displayed dialog box, click **OK**.

Step 6 Click the **Listeners** tab, click **Add Listener**, and configure the listener name, frontend protocol, and port.

Step 7 Click **Next: Configure Request Routing Policy**.

NOTICE

If you select **Weighted round robin** for **Load Balancing Algorithm**, disable **Sticky Session**. If you enable **Sticky Session**, the same requests will be forwarded to the same dedicated WAF instance. If this instance becomes faulty, an error will occur when the requests come to it next time.

Step 8 Click **Next: Add Backend Server**. Then, select the **IP as Backend Servers** tab.

NOTICE

In the health check configuration, **Protocol** can only be set to **TCP**, or the health check will fail and ELB will not forward traffic to the backend WAF.

Step 9 Click **Add IP as Backend Server**. In the displayed dialog box, configure **IP Address** and **Backend Port**.

- **IP Address**: Enter the IP address of the dedicated WAF engine, which you can obtain from the dedicated engine list.
- **Backend Port**: Use the same one you configured in **Step 1: Add Your Website to WAF (Dedicated Mode)**. If you configure a standard port for the website, set the HTTP listening port to **80** and HTTPS listening port to **443**.

Step 10 Click **OK**.

Step 11 Click **Next: Confirm**, confirm the information, and click **Submit**.

----End

Verification

If the **Health Check Result** is **Healthy**, the load balancer is configured.

5.2.4 Step 3: Bind an EIP to a Load Balancer

If you configure a load balancer for your dedicated WAF instance, unbind the EIP from the origin server and then bind this EIP to the load balancer you configured. For details, see **Configuring a Load Balancer**. The request traffic then goes to the dedicated WAF instance for attack detection first and then go to the origin server, ensuring the security, stability, and availability of the origin server.

This topic describes how to unbind an EIP from your origin server and bind the EIP to a load balancer configured for a dedicated WAF instance.

Prerequisites

You have configured **a load balancer** for a dedicated WAF instance.

Procedure

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Elastic Load Balance** under **Network** to go to the ELB console.

Step 4 On the **Load Balancers** page, unbind the EIP from the origin server.

- Unbinding an IPv4 EIP: Locate the row that contains the load balancer configured for the origin server. Then, in the **Operation** column, click **More** > **Unbind IPv4 EIP**.
- Unbinding an IPv6 EIP: Locate the row that contains the load balancer configured for the origin server. Then, in the **Operation** column, click **More** > **Unbind IPv6 Address**.

Step 5 In the displayed dialog box, click **Yes**.

Step 6 On the **Load Balancers** page, locate the load balancer configured for the dedicated WAF instance and bind the EIP unbound from the origin server to the load balancer.

- Binding an IPv4 EIP: Locate the row that contains the load balancer configured for the dedicated WAF instance, click **More** in the **Operation** column, and select **Bind IPv4 EIP**.
- Binding an IPv6 EIP: Locate the row that contains the load balancer configured for the dedicated WAF instance, click **More** in the **Operation** column, and select **Bind IPv6 Address**.

Step 7 In the displayed dialog box, select the EIP unbound in **Step 4** and click **OK**.

----End

5.2.5 Step 4: Whitelist Back-to-Source IP Addresses of Dedicated WAF Instances

To let your dedicated WAF instances take effect, configure ACL rules on the origin server to trust only the back-to-source IP addresses of all your dedicated WAF instances. This prevents hackers from attacking the origin server through the server IP addresses.

NOTICE

ACL rules must be configured on the origin server to whitelist WAF back-to-source IP addresses. Otherwise, your website visitors will frequently receive 502 or 504 error code after your website is connected to WAF.

Why Do I Need to Whitelist the WAF Back-to-Source IP Addresses?

In dedicated mode, website traffic is pointed to the load balancer configured for your dedicated WAF instances and then to dedicated WAF instances. The latter

will filter out malicious traffic and route only normal traffic to the origin server. In this way, the origin server only communicates with WAF back-to-source IP addresses. By doing so, WAF protects the origin server IP address from being attacked. In dedicated mode, the WAF back-to-source IP addresses are the subnet IP addresses of the dedicated WAF instances.

The security software on the origin server may most likely regard WAF back-to-source IP addresses as malicious and block them. Once they are blocked, the origin server will deny all WAF requests. Your website may become unavailable or respond very slowly. So, you need to configure ACL rules on the origin server to trust only the subnet IP addresses of your dedicated WAF instances.

Prerequisites

Your website has been connected to your dedicated WAF instances.

Pointing Traffic to an ECS Hosting Your Website

If your origin servers are deployed on ECSs, perform the following steps to configure a security group rule to allow only the back-to-source IP address of the dedicated instance to access the origin servers.

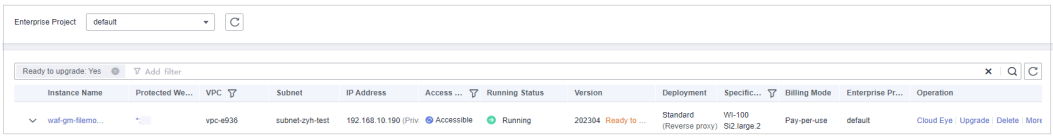
Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Instance Management** > **Dedicated Engine** to go to the dedicated WAF instance page.

Figure 5-28 Dedicated engine list



Step 5 In the **IP Address** column, obtain the IP address of each dedicated WAF instance under your account.

Step 6 Click in the upper left corner of the page and choose **Compute** > **Elastic Cloud Server**.

Step 7 Locate the row containing the ECS housing your website. In the **Name/ID** column, click the ECS name to go to the ECS details page.

Step 8 Click the **Security Groups** tab. Then, click **Change Security Group**.

Step 9 In the **Change Security Group** dialog box displayed, select a security group or create a security group and click **OK**.

Step 10 Click the security group ID and view the details.

Step 11 Click the **Inbound Rules** tab and click **Add Rule**. Then, specify parameters in the **Add Inbound Rule** dialog box. For details, see **Table 5-9**.

Figure 5-29 Add Inbound Rule

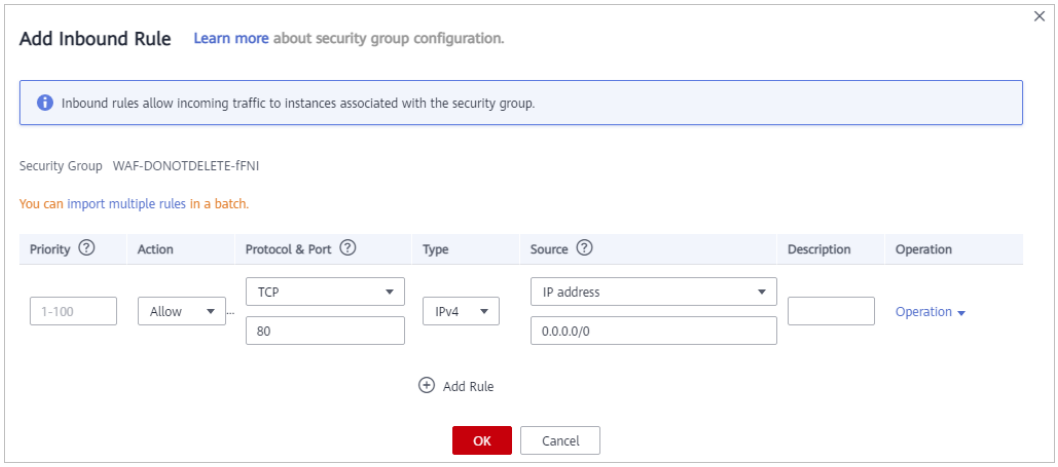


Table 5-9 Inbound rule parameters

Parameter	Description
Protocol & Port	Protocol and port for which the security group rule takes effect. If you select **TCP (Custom ports)**, enter the origin server port number in the text box below the TCP box.
Source	Subnet IP address of each dedicated WAF instance you obtain in **Step 5**. Configure an inbound rule for each IP address. **NOTE** One inbound rule can contain only one IP address. To configure an inbound rule for each IP address, click **Add Rule** to add more rules. A maximum of 10 rules can be configured.

Step 12 Click **OK**.

Now, the security group allows all inbound traffic from the back-to-source IP addresses of all your dedicated WAF instances.

To check whether the configuration takes effect, use the Telnet tool to check whether a connection to the origin server service port bound to the IP address protected by WAF is established.

For example, run the following command to check whether the connection to the origin server service port 443 bound to the IP address protected by WAF is established. If the connection cannot be established over the service port but the website is still accessible, the security group inbound rules take effect.

Telnet *Origin server IP address* **443**

----End

Pointing Traffic to a Load Balancer

If your origin server uses ELB to distribute traffic, perform the following steps to configure an access control policy to allow only the IP addresses of the dedicated WAF instances to access the origin server:

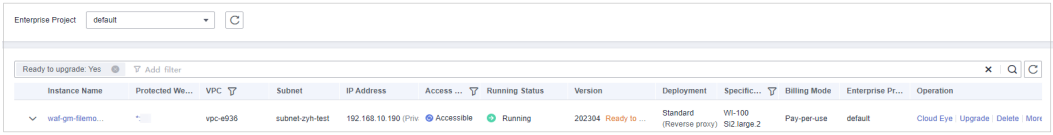
Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Instance Management** > **Dedicated Engine** to go to the dedicated WAF instance page.

Figure 5-30 Dedicated engine list



Step 5 In the **IP Address** column, obtain the IP address of each dedicated WAF instance under your account.

Step 6 Click in the upper left corner of the page and choose **Networking** > **Elastic Load Balance**.

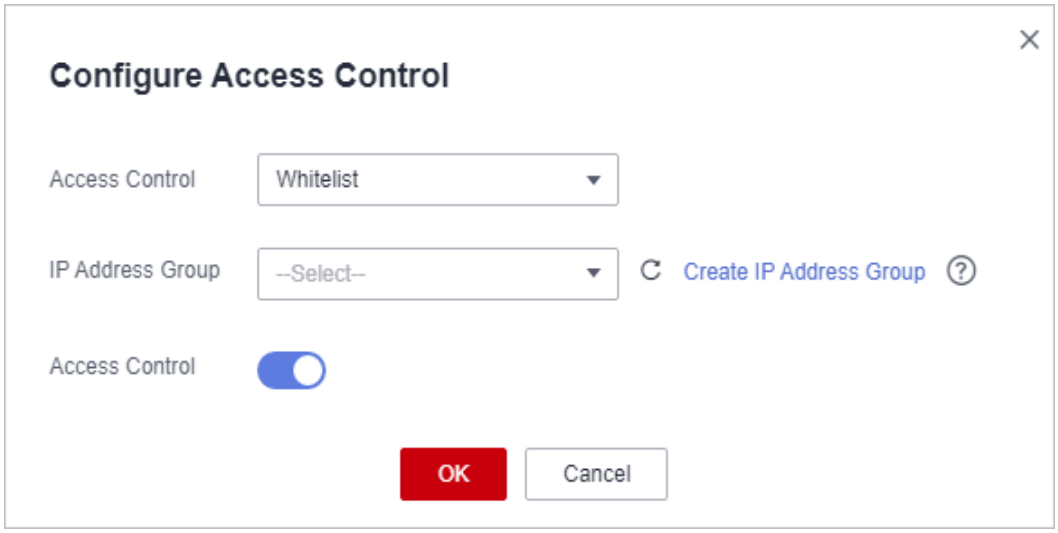
Step 7 Locate the row containing the load balancer configured for your dedicated WAF instance and click the load balancer name in the **Name** column.

Step 8 In the **Access Control** row of the target listener, click **Configure**.

Step 9 In the displayed dialog box, select **Whitelist** for **Access Control**.

1. Click **Create IP Address Group** and add the dedicated WAF instance access IP addresses obtained in **Step 5** to the group being created.
2. Select the IP address group created in **Step 9.1** from the **IP Address Group** drop-down list.

Figure 5-31 Configure Access Control



Step 10 Click **OK**.

Now, the access control policy allows all inbound traffic from the back-to-source IP addresses of your dedicated WAF instances.

To check whether the configuration takes effect, use the Telnet tool to check whether a connection to the origin server service port bound to the IP address protected by WAF is established.

For example, run the following command to check whether the connection to the origin server service port 443 bound to the IP address protected by WAF is established. If the connection cannot be established over the service port but the website is still accessible, the security group inbound rules take effect.

Telnet *Origin server IP address* **443**

----End

5.2.6 Step 5: Test Dedicated WAF Instances

To ensure that WAF can forward your website requests normally, test WAF locally after you add a website to WAF.

Prerequisites

You have performed operations in **Step 1: Add Your Website to WAF (Dedicated Mode)** to **Step 4: Whitelist Back-to-Source IP Addresses of Dedicated WAF Instances**.

(Optional) Testing a Dedicated WAF Instance

Step 1 Create an ECS that is in the same VPC as the dedicated WAF instance for sending requests.

Step 2 Send requests to the dedicated WAF through the ECS created in **Step 1**.

- Forwarding test
  curl -kv -H "Host: {protection object added to WAF}"{Client protocol in server configuration}://{IP address of the dedicated WAF instance}:{protection port}

For example:

```
curl -kv -H "Host: a.example.com" http://192.168.0.1
```

If the response code is 200, the request has been forwarded.

- Attack blocking test

  a. Ensure that the block mode for basic web protection has been enabled in the policy used for the protected website.

  Figure 5-32 Enabling Basic Web Protection

  b. Run the following command:

  ```
  curl -kv -H "Host: {protection object added to WAF}"{Client protocol in server configuration}://{IP address of the dedicated WAF instance}:{protection port}--data "id=1 and 1='1'"
  ```

  Example:

  ```
  curl -kv -H "Host: a.example.com" http:// 192.168.X.X --data "id=1 and 1='1'"
  ```

  If the response code is 418, the request has been blocked, indicating that the dedicated WAF works properly.

----End

Testing the Dedicated WAF Instance and Dedicated ELB Load Balancer

- Forwarding test

  ```
  curl -kv -H "Host: { protection object added to WAF}"{ELB external protocol}://{Private IP address bound to the load balancer}:{ELB listening port}
  ```

  If an EIP has been assigned to the load balancer, any publicly accessible servers can be used for testing.

  ```
  curl -kv -H "Host: {Protected object added to WAF}" {ELB external protocol}://{EIP bound to the load balancer}:{ELB listening port}
  ```

  Example:

  ```
  curl -kv -H "Host: a.example.com" http://192.168.X.Y
  curl -kv -H "Host: a.example.com" http://100.10.X.X
  ```

  If the response code is 200, the request has been forwarded.

  If the dedicated WAF instance works but the request fails to be forwarded, check the load balancer settings first. If the load balancer health check result is unhealthy, disable health check and perform the preceding operations again.

- Attack blocking test

  a. Ensure that the block mode for basic web protection has been enabled in the policy used for the protected website.

  Figure 5-33 Enabling Basic Web Protection

  b. Run the following command:

  ```
  curl -kv -H "Host: { protection object added to WAF}"{ELB external protocol}://{Private IP address bound to the load balancer}:{ELB listening port}--data "id=1 and 1='1'"
  ```


If an EIP has been bound to the load balancer, any publicly accessible servers can be used for testing.

```
curl -kv -H "Host: { protection object added to WAF}"{ELB external protocol}://{EIP bound to the load balancer}:{ELB listening port}--data "id=1 and 1='1"
```

Example:

```
curl -kv -H "Host: a.example.com" http:// 192.168.0.2 --data "id=1 and 1='1"
curl -kv -H "Host: a.example.com" http:// 100.10.X.X --data "id=1 and 1='1"
```

If the response code is 418, the request has been blocked, indicating that both dedicated WAF instance and ELB load balancer work properly.

5.3 Ports Supported by WAF

WAF can protect standard and non-standard ports. When you add a website to WAF, you need to specify protection port, which is your service port. WAF will then forward and protect traffic over this port. This section describes the standard and non-standard ports WAF can protect.

Table 5-10 lists the ports that can be protected by WAF.

Table 5-10 Ports supported by WAF

Deployment Mode	Port Type	HTTP	HTTPS	Port Limit
Cloud mode	Standard ports	80	443	Unlimited
	Non-standard ports (**86** in total)	81, 82, 83, 84, 86, 87, 88, 89, 800, 808, 5000, 8000, 8001, 8002, 8003, 8008, 8009, 8010, 8020, 8021, 8022, 8025, 8026, 8077, 8078, 8080, 8085, 8086, 8087, 8088, 8089, 8090, 8091, 8092, 8093, 8094, 8095, 8096, 8097, 8098, 8106, 8118, 8181, 8334, 8336, 8800, 8686, 8888, 8889, 8999, 8011, 8012, 8013, 8014, 8015, 8016, 8017, and 8070	4443, 5443, 6443, 7443, 8081, 8082, 8083, 8084, 8443, 8843, 9443, 8553, 8663, 9553, 9663, 18110, 18381, 18980, 28443, 18443, 8033, 18000, 19000, 7072, 7073, 8803, 8804, and 8805	**20**
Dedicated mode	Standard ports	80	443	Unlimited

Deployment Mode	Port Type	HTTP	HTTPS	Port Limit
	Non-standard ports (**182** in total)	9945, 9770, 81, 82, 83, 84, 88, 89, 800, 808, 1000, 1090, 3128, 3333, 3501, 3601, 4444, 5000, 5222, 5555, 5601, 6001, 6666, 6788, 6789, 6842, 6868, 7000, 7001, 7002, 7003, 7004, 7005, 7006, 7009, 7010, 7011, 7012, 7013, 7014, 7015, 7016, 7018, 7019, 7020, 7021, 7022, 7023, 7024, 7025, 7026, 7070, 7081, 7082, 7083, 7088, 7097, 7777, 7800, 7979, 8000, 8001, 8002, 8003, 8008, 8009, 8010, 8020, 8021, 8022, 8025, 8026, 8077, 8078, 8080, 8085, 8086, 8087, 8088, 8089, 8090, 8091, 8092, 8093, 8094, 8095, 8096, 8097, 8098, 8106, 8118, 8181, 8334, 8336, 8800, 8686, 8888, 8889, 8989, 8999, 9000, 9001, 9002, 9003, 9080, 9200, 9802, 10000, 10001, 10080, 12601, 86, 9021, 9023, 9027, 9037, 9081, 9082, 9201, 9205, 9207, 9208, 9209, 9210, 9211, 9212, 9213, 48800, 87, 97, 7510, 9180, 9898, 9908, 9916, 9918, 9919, 9928, 9929, 9939, 28080, 33702, 8011, 8012, 8013, 8014,	8750, 8445, 18010, 4443, 5443, 6443, 7443, 8081, 8082, 8083, 8084, 8443, 8843, 9443, 8553, 8663, 9553, 9663, 18110, 18381, 18980, 28443, 18443, 8033, 18000, 19000, 7072, 7073, 8803, 8804, 8805, and 9999	Unlimited

Deployment Mode	Port Type	HTTP	HTTPS	Port Limit
		8015, 8016, 8017, and 8070		

6 Viewing Protection Events

6.1 Querying Protection Events

WAF sorts out the attacks, the ten websites attacked the most, ten attack source IP addresses that launched the most attacks, and the ten URLs attacked the most for a selected time range. You can view the blocked or logged events on the **Events** page. You can view details of events generated by WAF, including the occurrence time, attack source IP address, geographic location of the attack source IP address, malicious load, and hit rule for an event.

Constraints

- On the WAF console, you can view the event data for all protected domain names over the last 30 days. You can authorize LTS to log WAF activities so that you can view attack and access logs and store all logs for a long time. For more details, see **Using LTS to Log WAF Activities**.
- If you switch the WAF working mode for a website to **Suspended**, WAF only forwards all requests to the website without inspection. It does not log any attack events neither.
- If the security software installed on your server blocks the event file from being downloaded, close the software and download the file again.

Viewing Protection Event Logs

Step 1 Log in to the management console.

Step 2 Click  in the upper left corner of the management console and select a region or project.

Step 3 Click  in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, click **Events**.

----End

6.2 Handling False Alarms

If you confirm that an attack event on the **Events** page is a false alarm, you can handle the event as false alarm by ignoring the URL and rule ID in basic web protection, or by deleting or disabling the corresponding protection rule you configured. After an attack event is handled as a false alarm, the event will not be displayed on the **Events** page anymore. You will no longer receive any alarm notifications about the events of this kind.

WAF detects attacks by using built-in basic web protection rules, built-in features in anti-crawler protection, and custom rules you configured (such as CC attack protection, precise access protection, blacklist, whitelist, and geolocation access control rules). WAF will respond to detected attacks based on the protective actions (such as **Block** and **Log only**) defined in the rules and display attack events on the **Events** page.

Prerequisites

There is at least one false alarm event in the event list.

Constraints

- Only attack events blocked or recorded by built-in basic web protection rules and features in anti-crawler protection can be handled as false alarms.
- For events generated based on custom rules (such as a CC attack protection rule, precise protection rule, blacklist rule, whitelist rule, or geolocation access control rule), they cannot be handled as false alarms. To ignore such an event, delete or disable the custom rule hit by the event.
- An attack event can only be handled as a false alarm once.
- After an attack event is handled as a false alarm, the attack event will not be displayed on the **Events** page. You will no longer receive any alarm notifications about the events of this kind.
- Dedicated WAF instances earlier than June 2022 do not support **All protection** for **Ignore WAF Protection**. Only **Basic web protection** can be selected.

Application Scenarios

Sometimes normal service requests may be blocked by WAF. For example, suppose you deploy a web application on ECSs and then add the public domain name associated with that application to WAF. If you enable basic web protection for that application, WAF may block the access requests that match the basic web protection rules. If the website is inaccessible over its domain name but accessible over its IP address, you can handle the false alarms to allow normal access requests to the application.

Handling False Alarms

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

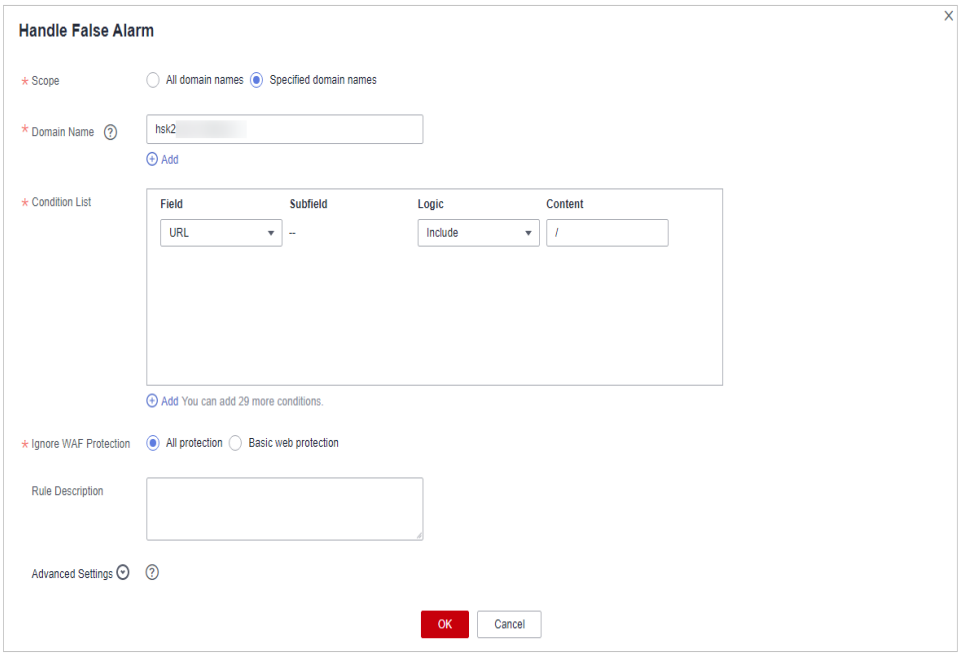
Step 4 In the navigation pane on the left, choose **Events**.

Step 5 Click the **Search** tab. In the website or instance drop-down list, select a website to view corresponding event logs. The query time can be **Yesterday**, **Today**, **Past 3 days**, **Past 7 days**, **Past 30 days**, or a time range you configure.

Step 6 In the event list, handle events.

- If you confirm that an event is a false alarm, locate the row containing the event. In the **Operation** column, click **Handle** > **Handle as False Alarm** and handle the hit rule.

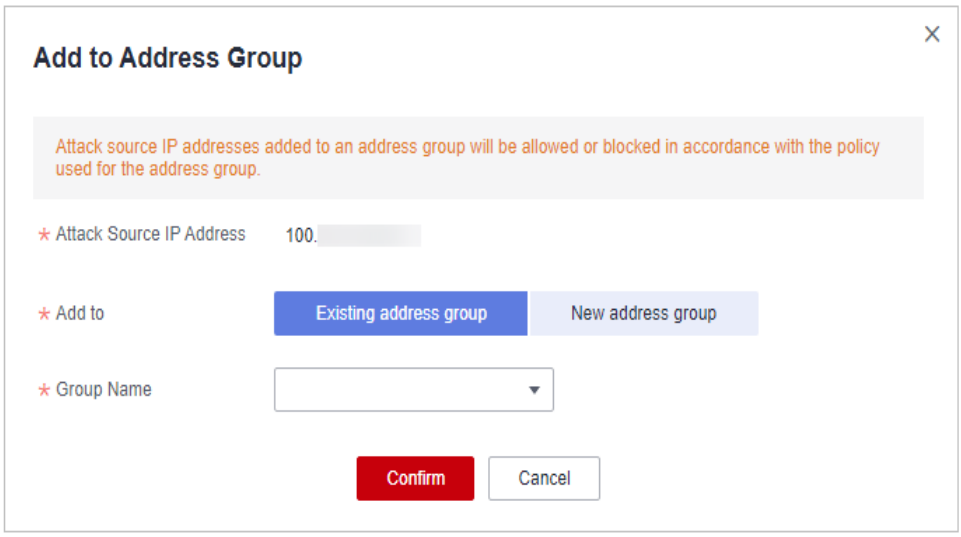
  Figure 6-1 Handling a false alarm



- Add the source IP address to an address group. Locate the row containing the desired event, in the **Operation** column, click **Handle** > **Add to Address Group**. The source IP address triggering the event will be blocked or allowed based on the policy used for the address group.

  Add to: You can select an existing address group or create an address group.

Figure 6-2 Add to Address Group



- Add the source IP address to a blacklist or whitelist rule of the corresponding protected domain name. Locate the row containing the desired event. In the **Operation** column, click **Handle** > **Add to Blacklist/Whitelist**. Then, the source IP address will be blocked or allowed based on the protective action configured in the blacklist or whitelist rule.

Figure 6-3 Add to Blacklist/Whitelist

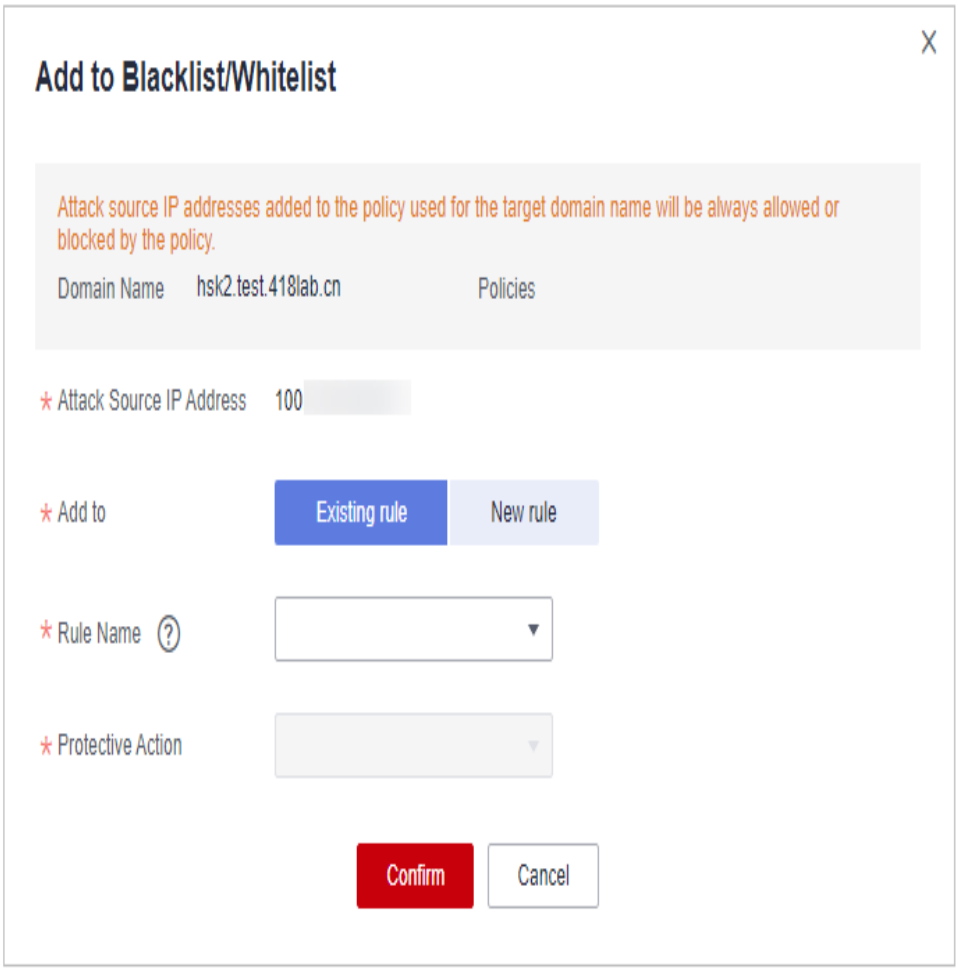


Table 6-1 Parameter descriptions

Parameter	Description
Add to	– Existing rule – New rule
Rule Name	– If you select **Existing rule** for **Add to**, select a rule name from the drop-down list. – If you select **New rule** for **Add to**, customize a blacklist or whitelist rule.
IP Address/Range/ Group	This parameter is mandatory when you select **New rule** for **Add to**. You can select **IP address/Range** or **Address Group** to add IP addresses a blacklist or whitelist rule.
Group Name	This parameter is mandatory when you select **Address group** for **IP Address/Range/Group**. Select an address group from the drop-down list.

Parameter	Description
Protective Action	– **Block**: Select **Block** if you want to blacklist an IP address or IP address range. – **Allow**: Select **Allow** if you want to whitelist an IP address or IP address range. – **Log only**: Select **Log only** if you want to observe an IP address or IP address range.
Known Attack Source	If you select **Block** for **Protective Action**, you can select a blocking type of a known attack source rule. WAF will block requests matching the configured IP address, Cookie, or Params for a length of time configured as part of the rule.
Rule Description	A brief description of the rule. This parameter is optional.

----End

Verification

A false alarm will be deleted within about a minute after the handling configuration is done. It will no longer be displayed in the attack event details list. You can refresh the browser cache and access the page for which the global whitelist rule is configured again to check whether the configuration is successful.

Related Operations

If an event is handled as a false alarm, the rule hit will be added to the global protection whitelist rule list. You can go to the **Policies** page and then switch to the **Global Protection Whitelist** page to manage the rule, including querying, disabling, deleting, and modifying the rule. For details, see **Configuring a Global Protection Whitelist Rule**.

6.3 Downloading Events Data

This topic describes how to download events (logged and blocked events) data for the last five days. One or more CSV files containing the event data of the current day will be generated at the beginning of the next day.

Prerequisites

- **You have connected the website you want to protect to WAF.**
- An event file has been generated.

Specification Limitations

- Each file can include a maximum of 5,000 events. If there are more than 5,000 events, another file is generated.

- Only event data for the last five days can be downloaded through the WAF console.

Downloading Events Data

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Events**.

Step 5 Click the **Downloads** tab and download the desired protection data. **Table 6-2** describes the parameters.

Table 6-2 Parameter description

Parameter	Description
File Name	The format is *file-name*.**csv**.
Number of Events	Total number of blocked and logged events **NOTE** Each file can include a maximum of 5,000 events. If there are more than 5,000 events, another file is generated.

Step 6 In the **Operation** column, click **Download** to download data to the local PC.

----End

Fields in a Protection Event Data File

Field	Description	Example Value
action	Protective action taken in response to the event	Block
attack	Attack type	SQL Injection
body	Request content of the attack	N/A
cookie	Cookie of the attacker	N/A
headers	Header of the attacker	N/A
host	Domain name or IP address of the protected website	www.example.com

Field	Description	Example Value
id	ID of the event.	02-11-16-20201121060347-feb42002
payload	The part of the attack that causes damage to the protected website	python-requests/2.20.1
payload_location	The location of the attack that causes damage or the number of times that the URL is accessed by the attacker	user-agent
policyid	Policy ID.	d5580c8f6cd4403ebbf85892d4bbb8e4
request_line	Request line of the attack	GET /
rule	ID of the rule against which the event is generated.	81066
sip	Public IP address of the web visitor/attacker	N/A
time	When the event occurred.	2020/11/21 0:20:44
url	URL of the protected domain name	N/A

6.4 Using LTS to Log WAF Activities

After you authorize WAF to access Log Tank Service (LTS), you can use the WAF logs recorded by LTS for quick and efficient real-time analysis, device O&M management, and analysis of service trends.

LTS analyzes and processes a large number of logs. It enables you to process logs in real-time, efficiently, and securely. Logs can be stored in LTS for seven days by default but you can configure LTS for up to 30 days if needed. Logs earlier than 30 days are automatically deleted. However, you can configure LTS to dump those logs to an Object Storage Service (OBS) bucket or enable Data Ingestion Service (DIS) for long-term storage.

Prerequisites

- You have applied for your WAF.
- **You have connected the website you want to protect to WAF.**

Impact on the System

Enabling LTS for WAF does not affect WAF performance.

Enabling LTS for WAF Protection Event Logging

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner and choose **Web Application Firewall (Dedicated)** under **Security**.

Step 4 In the navigation pane on the left, choose **Events**.

Step 5 Click the **Configure Logs** or **Log Settings** tab, enable LTS ( ), and select a log group and log stream. **Table 6-3** describes the parameters.

Figure 6-4 Log settings

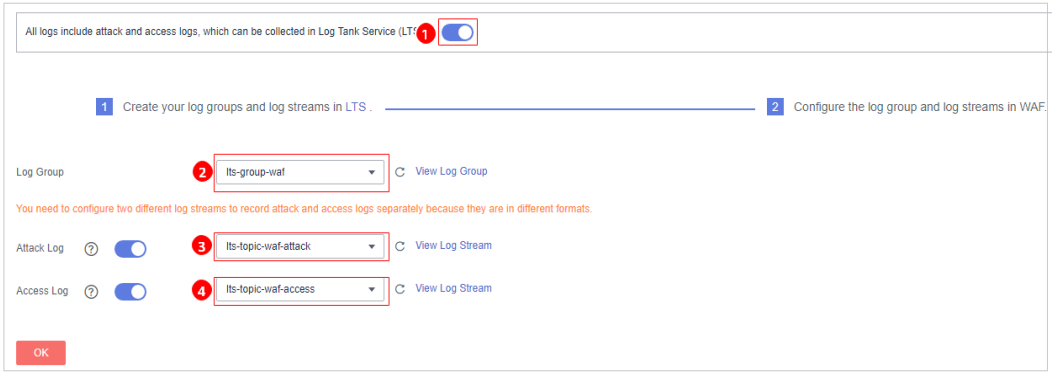


Table 6-3 Log configuration

Parameter	Description	Example Value
Log Group	Select a log group or click **View Log Group** to go to the LTS console and create a log group.	lts-group-waf
Attack Log	Select a log stream or click **View Log Stream** to go to the LTS console and create a log stream. An attack log includes information about event type, protective action, and attack source IP address of each attack.	lts-topic-waf-attack

Parameter	Description	Example Value
Access Log	Select a log stream or click **View Log Stream** to go to the LTS console and create a log stream. An access log includes key information about access time, client IP address, and resource URL of each HTTP access requests.	lts-topic-waf-access

Step 6 Click **OK**.

You can view WAF protection event logs on the LTS console.

----End

Checking and Downloading WAF Protection Event Logs on LTS

After enabling LTS, you can go to the LTS console and check, analyze, and download WAF logs.

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Management & Deployment** > **Log Tank Service**.

Step 4 In the log group list, click to expand the WAF log group (for example, **lts-group-waf**).

Step 5 In the log stream list, click the log stream name to go to the log stream log page. Then, you can check and analyze logs.

----End

WAF access_log Field Description

Field	Type	Field Description	Description
access_log.requestid	string	Random ID	The value is the same as the last eight characters of the **req_id** field in the attack log.
access_log.time	string	Access time	GMT time a log is generated.

Field	Type	Field Description	Description
access_log.connection_requests	string	Sequence number of the request over the connection	-
access_log.eng_ip	string	IP address of the WAF engine	-
access_log.pid	string	The engine that processes the request	Engine (worker PID).
access_log.hostid	string	Domain name identifier of the access request.	Protected domain name ID (upstream_id).
access_log.tenantid	string	Account ID	Each account corresponds to a tenant ID.
access_log.projectid	string	ID of the project the protected domain name belongs to	Project ID of a user in a specific region.
access_log.remote_ip	string	Remote IP address of the request at layer 4	IP address from which a client request originates. **NOTICE** If a layer-7 proxy is deployed in front of WAF, this field indicates the IP address of the proxy node closest to WAF. The real IP address of the visitor is specified by the **x-forwarded-for** and **x_real_ip** fields.
access_log.remote_port	string	Remote port of the request at layer 4	Port used by the IP address from which a client request originates
access_log.sip	string	IP address of the client that sends the request	For example, XFF.

Field	Type	Field Description	Description
access_log.scheme	string	Request protocol	Protocols that can be used in the request: • HTTP • HTTPS
access_log.response_code	string	Response code	Response status code returned by the origin server to WAF.
access_log.method	string	Request method.	Request type in a request line. Generally, the value is **GET** or **POST**.
access_log.http_host	string	Domain name of the requested server.	Address, domain name, or IP address entered in the address bar of a browser.
access_log.url	string	Request URL.	Path in a URL (excluding the domain name).
access_log.request_length	string	Request length.	The request length includes the access request address, HTTP request header, and number of bytes in the request body.
access_log.bytes_send	string	Total number of bytes sent to the client.	Number of bytes sent by WAF to the client.
access_log.body_bytes_sent	string	Total number of bytes of the response body sent to the client	Number of bytes of the response body sent by WAF to the client
access_log.upstream_addr	string	Address of the backend server.	IP address of the origin server for which a request is destined. For example, if WAF forwards requests to an ECS, the IP address of the ECS is returned to this parameter.
access_log.request_time	string	Request processing time	Processing time starts when the first byte of the client is read (unit: s).
access_log.upstream_response_time	string	Backend server response time	Time the backend server responds to the WAF request (unit: s).

Field	Type	Field Description	Description
access_log.upstream_status	string	Backend server response code	Response status code returned by the backend server to WAF.
access_log.upstream_connect_time	string	Time for the origin server to establish a connection to its backend services. Unit: second.	When SSL is used, the time for the handshake process is also recorded. Time used for establishing a connection for a request. Use commas (,) to separate the time used for each request.
access_log.upstream_header_time	string	Time used by the backend server to receive the first byte of the response header. Unit: second	Response time for multiple requests. Use commas (,) to separate the time used for each response.
access_log.bind_ip	string	WAF engine back-to-source IP address.	The IP address of the NIC used by the engine for forwarding requests to the origin server. This value is not the EIP bound to the engine even if the engine forwards requests over the EIP.
access_log.group_id	string	LTS log group ID	ID of the log group for interconnecting WAF with LTS.
access_log.access_stream_id	string	Log stream ID.	ID of **access_stream** of the user in the log group identified by the **group_id** field.
access_log.engine_id	string	WAF engine ID	Unique ID of the WAF engine.
access_log.time_iso8601	string	ISO 8601 time format of logs.	-
access_log.sni	string	Domain name requested through SNI.	-

Field	Type	Field Description	Description
access_log.tls_version	string	Protocol versioning an SSL connection.	TLS version used in the request.
access_log.ssl_curves	string	Curve group list supported by the client.	-
access_log.ssl_session_reused	string	SSL session reuse	Whether the SSL session can be reused **r**: Yes **.**: No
access_log.process_time	string	Engine attack detection duration (unit: ms)	-
access_log.args	string	The parameter data in the URL	-
access_log.x_forwarded_for	string	IP address chain for a proxy when the proxy is deployed in front of WAF.	The sting includes one or more IP addresses. The leftmost IP address is the originating IP address of the client. Each time the proxy server receives a request, it adds the source IP address of the request to the right of the originating IP address.
access_log.cdn_src_ip	string	Client IP address identified by CDN when CDN is deployed in front of WAF	This field specifies the real IP address of the client if CDN is deployed in front of WAF. **NOTICE** Some CDN vendors may use other fields. WAF records only the most common fields.

Field	Type	Field Description	Description
access_log.x_real_ip	string	Real IP address of the client when a proxy is deployed in front of WAF.	Real IP address of the client, which is identified by the proxy.
access_log.intel_crawler	string	Used for intelligence anti-crawler analysis.	-
access_log.ssl_ciphers_md5	string	MD5 value of the SSL cipher (ssl_ciphers).	-
access_log.ssl_cipher	string	SSL cipher used.	-
access_log.web_tag	string	Website name.	-
access_log.user_agent	string	User agent in the request header.	-
access_log.upstream_response_length	string	Backend server response size.	-
access_log.region_id	string	Region where the request is received.	-
access_log.enterprise_project_id	string	ID of the enterprise project that the requested domain name belongs to.	-

Field	Type	Field Description	Description
access_log.referer	string	Referer content in the request header.	The value can contain a maximum of 128 characters. Characters over 128 characters will be truncated.
access_log.rule	string	Protection rule that the request matched.	If multiple rules are matched, only one rule is displayed.
access_log.category	string	Log category matched by the request.	-
access_log.waf_time	string	Time an access request is received.	-
access_log.geo	string	Mark of geographical location.	• **c**: Country name • **r**: name of a specific geographical location.

WAF attack_log Field Description

Field	Type	Field Description	Description
attack_log.category	string	Log category	The value is **attack**.
attack_log.time	string	Log time	-
attack_log.time_iso8601	string	ISO 8601 time format of logs.	-
attack_log.policy_id	string	Policy ID	-
attack_log.level	string	Protection level	Protection level of a built-in rule in basic web protection • **1**: Low • **2**: Medium • **3**: High

Field	Type	Field Description	Description
attack_log.attack	string	Type of attack	Attack type. This parameter is listed in attack logs only. • **default**: default attacks • **sqli**: SQL injections • **xss**: cross-site scripting (XSS) attacks • **webshell**: web shells • **robot**: malicious crawlers • **cmdi**: command injections • **rfi**: remote file inclusion attacks • **lfi**: local file inclusion attacks • **illegal**: unauthorized requests • **vuln**: exploits • **cc**: attacks that hit the CC protection rules • **custom_custom**: attacks that hit a precise protection rule • **custom_whiteblackip**: attacks that hit an IP address blacklist or whitelist rule • **custom_geoip**: attacks that hit a geolocation access control rule • **antitamper**: attacks that hit a web tamper protection rule • **anticrawler**: attacks that hit the JS challenge anti-crawler rule • **leakage**: vulnerabilities that hit an information leakage prevention rule • **antiscan_high_freq_scan**: Attacks that hit malicious scanning rules. • **followed_action**: The source is marked as a known attack source.
attack_log.action	string	Protective action	WAF defense action. • **block**: WAF blocks attacks. • **log**: WAF only logs detected attacks. • **captcha**: Verification code

Field	Type	Field Description	Description
attack_log.sub_type	string	Crawler types	When **attack** is set to **robot**, this parameter cannot be left blank. • **script_tool**: Script tools • **search_engine**: Search engines • **scanner:** Scanning tools • **uncategorized**: Other crawlers
attack_log.rule	string	ID of the triggered rule or the description of the custom policy type.	-
attack_log.rule_name	string	Description of a custom rule type.	This field is empty when a basic protection rule is matched.
attack_log.location	string	Location triggering the malicious load	-
attack_log.req_body	sting	Request body.	-
attack_log.resp_headers	string	Response header	-
attack_log.hit_data	string	String triggering the malicious load	-
attack_log.resp_body	string	Response body	-
attack_log.backend.protocol	string	Backend protocol.	-
attack_log.backend.alive	string	Backend server status.	-
attack_log.backend.port	string	Backend server port.	-
attack_log.backend.host	string	Backend server host value.	-
attack_log.backend.type	string	Backend server type.	IP address or domain name.

Field	Type	Field Description	Description
attack_log.backend.weight	number	Backend server weight.	-
attack_log.status	string	Response status code	-
attack_log.upstream_status	string	Origin server response code.	-
attack_log.reqid	string	Random ID	The value consists of the engine IP address suffix, request timestamp, and request ID allocated by Nginx.
attack_log.requestid	string	Unique ID of the request.	Request ID allocated by Nginx.
attack_log.id	string	Attack ID	ID of the attack
attack_log.method	string	Request method	-
attack_log.sip	string	Client request IP address	-
attack_log.sport	string	Client request port	-
attack_log.host	string	Requested domain name	-
attack_log.http_host	string	Domain name of the requested server.	-
attack_log.hport	string	Port of the requested server.	-
attack_log.uri	string	Request URL.	The domain is excluded.

Field	Type	Field Description	Description
attack_log.header	A JSON string. A JSON table is obtained after the string is decoded.	Request header	-
attack_log.mutipart	A JSON string. A JSON table is obtained after the string is decoded.	Request multipart header	This parameter is used to upload files.
attack_log.cookie	A JSON string. A JSON table is obtained after the string is decoded.	Cookie of the request	-

Field	Type	Field Description	Description
attack_log.params	A JSON string. A JSON table is obtained after the string is decoded.	Params value following the request URI.	-
attack_log.body_bytes_sent	string	Total number of bytes of the response body sent to the client.	Total number of bytes of the response body sent by WAF to the client.
attack_log.upstream_response_time	string	Time elapsed since the backend server received the response content from the upstream service. Unit: second.	Response time for multiple requests. Use commas (,) to separate the time used for each response.
attack_log.engine_id	string	Unique ID of the engine	-
attack_log.region_id	string	ID of the region where the engine is located.	-
attack_log.engine_ip	string	Engine IP address.	-
attack_log.process_time	string	Detection duration	-
attack_log.remote_ip	string	Layer-4 IP address of the client that sends the request.	-

Field	Type	Field Description	Description
attack_log.x_forwarded_for	string	Content of **X-Forwarded-For** in the request header.	-
attack_log.cdn_src_ip	string	Content of **Cdn-Src-Ip** in the request header.	-
attack_log.x_real_ip	string	Content of **X-Real-IP** in the request header.	-
attack_log.group_id	string	Log group ID	LTS log group ID
attack_log.attack_stream_id	string	Log stream ID	ID of **access_stream** of the user in the log group identified by the **group_id** field.
attack_log.hostid	string	Protected domain name ID (upstream_id).	-
attack_log.tenantid	string	Account ID	-
attack_log.projectid	string	ID of the project the protected domain name belongs to	-
attack_log.enterprise_project_id	string	ID of the enterprise project that the requested domain name belongs to.	-
attack_log.web_tag	string	Website name.	-
attack_log.req_body	string	Request body. (If the request body larger than 1 KB, it will be truncated.)	-

7 Configuring Protection Policies

7.1 Protection Configuration Overview

This topic walks you through how to configure WAF protection policies, how WAF engine works, and protection rule priorities.

Protection Rule Overview

After your website is connected to WAF, you need to configure a protection policy for it.

Table 7-1 Configurable protection rules

Protection Rule	Description	Reference
Basic web protection rules	With an extensive reputation database, WAF defends against Open Web Application Security Project (OWASP) top 10 threats, and detects and blocks threats, such as malicious scanners, IP addresses, and web shells.	**Configuring Basic Web Protection to Defend Against Common Web Attacks**
CC attack protection rules	CC attack protection rules can be customized to restrict access to a specific URL on your website based on a unique IP address, cookie, or referer field, mitigating CC attacks.	**Configuring CC Attack Protection Rules to Defend Against CC Attacks**
Precise protection rules	You can customize protection rules by combining HTTP headers, cookies, URLs, request parameters, and client IP addresses.	**Configuring Custom Precise Protection Rules**

Protection Rule	Description	Reference
Blacklist and whitelist rules	You can configure blacklist and whitelist rules to block, log only, or allow access requests from specified IP addresses.	**Configuring IP Address Blacklist and Whitelist Rules to Block or Allow Specified IP Addresses**
Geolocation access control rules	You can customize these rules to allow or block requests from a specific country or region.	**Configuring Geolocation Access Control Rules to Block or Allow Requests from Specific Locations**
Web tamper protection rules	You can configure these rules to prevent a static web page from being tampered with.	**Configuring Web Tamper Protection Rules to Prevent Static Web Pages from Being Tampered With**
Website anti-crawler protection	This function dynamically analyzes website service models and accurately identifies crawler behavior based on data risk control and bot identification systems, such as JS Challenge.	**Configuring Anti-Crawler Rules**
Information leakage prevention rules	You can add two types of information leakage prevention rules. • Sensitive information filtering: prevents disclosure of sensitive information (such as ID numbers, phone numbers, and email addresses). • Response code interception: blocks the specified HTTP status codes.	**Configuring Information Leakage Prevention Rules to Protect Sensitive Information from Leakage**
Global protection whitelist rules	You can configure these rules to let WAF ignore certain rules for specific requests.	**Configuring a Global Protection Whitelist Rule to Ignore False Alarms**
Data masking rules	You can configure data masking rules to prevent sensitive data such as passwords from being displayed in event logs.	**Configuring Data Masking Rules to Prevent Privacy Information Leakage**

WAF Rule Priorities

The built-in protection rules of WAF help you defend against common web application attacks, including XSS attacks, SQL injection, crawlers, and web shells. You can customize protection rules to let WAF better protect your website services using these custom rules. **Figure 7-1** shows how WAF engine built-in protection rules work. **Figure 7-2** shows the detection sequence of rules you configured.

NOTE

On the protection configuration page, select **Sort by check sequence**. All protection rules will be displayed by the WAF check sequence.

Figure 7-1 WAF engine work process

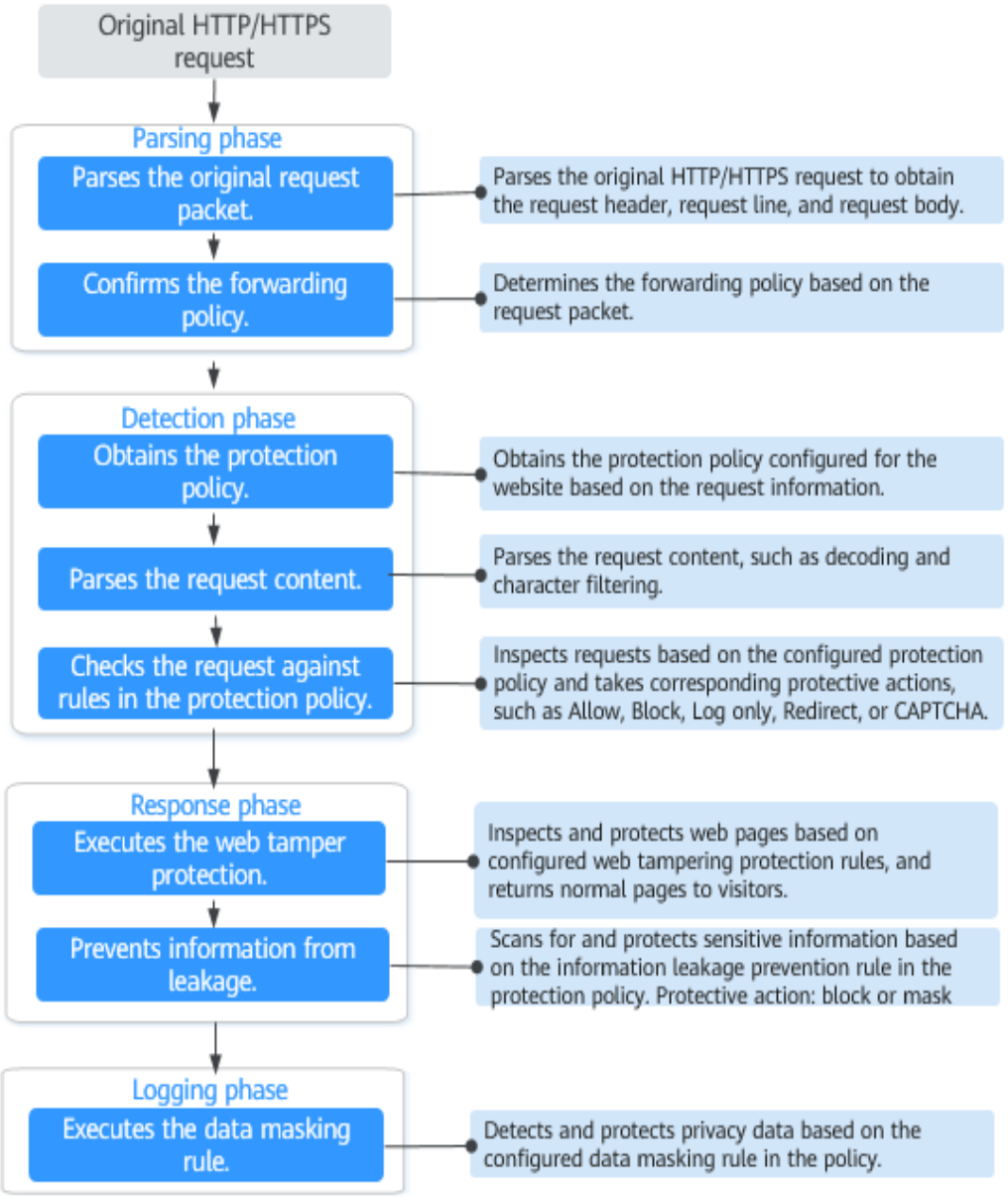
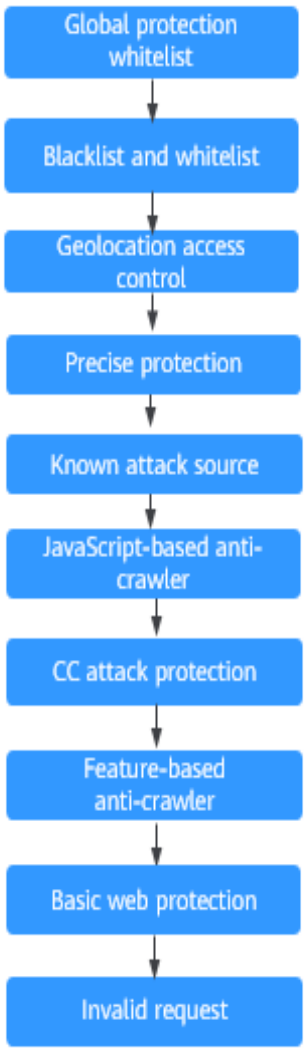


Figure 7-2 Priorities of protection rules



Response actions

- Pass: The current request is unconditionally permitted after a protection rule is matched.
- Block: The current request is blocked after a rule is matched.
- CAPTCHA: The system will perform human-machine verification after a rule is matched.
- Redirect: The system will notify you to redirect the request after a rule is matched.
- Log: Only attack information is recorded when a rule is matched.
- Mask: The system will anonymize sensitive information after a rule is matched.

7.2 Configuring Basic Web Protection to Defend Against Common Web Attacks

After this function is enabled, WAF can defend against common web attacks, such as SQL injections, XSS, remote overflow vulnerabilities, file inclusions, Bash vulnerabilities, remote command execution, directory traversal, sensitive file access, and command/code injections. You can also enable other checks in basic web protection, such as web shell detection, deep inspection against evasion attacks, and header inspection.

Prerequisites

You have added the website you want to protect to WAF.

Constraints

- Basic web protection has two modes: **Block** and **Log only**.
- If you select **Block** for **Basic Web Protection**, you can **configure access control criteria for a known attack source**. WAF will block requests matching the configured IP address, cookie, or params for a length of time configured as part of the rule.
- Currently, Shiro decryption detection is not available in regions CN East-Qingdao and AP-Manila.

Enabling Basic Web Protection Rules

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, click **Policies**.

Step 5 Click the name of the target policy to go to the protection configuration page.

Step 6 In the **Basic Web Protection** configuration area, change **Status** and **Mode** as needed by referring to **Table 7-2**.

Figure 7-3 Basic Web Protection configuration area

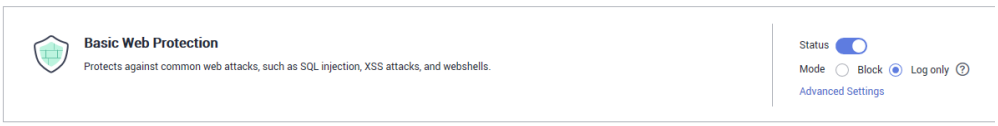


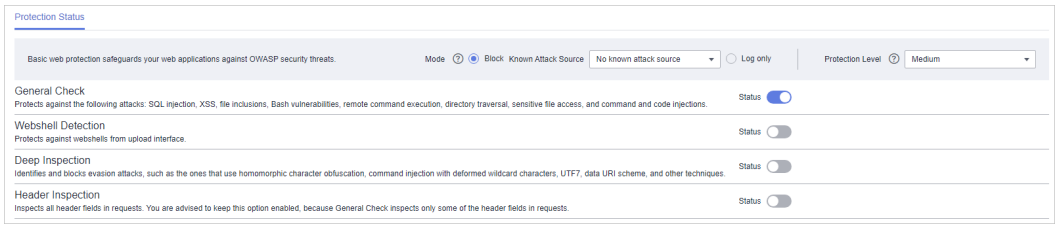
Table 7-2 Parameter description

Parameter	Description
Status	Status of Basic Web Protection • : enabled. • : disabled.
Mode	• **Block**: WAF blocks and logs detected attacks. • **Log only**: WAF only logs detected attacks.

Step 7 In the **Basic Web Protection** configuration area, click **Advanced Settings**.

Step 8 Click the **Protection Status** tab, and enable protection types one by one by referring to **Table 7-4**.

Figure 7-4 Basic web protection



1. Set the protective action.
   - **Block**: WAF blocks and logs detected attacks.

     If you select **Block**, you can select a known attack source rule to let WAF block requests accordingly. For details, see **Configuring a Known Attack Source Rule to Block Specific Visitors for a Specified Duration**.
   - **Log only**: WAF only logs detected attacks.
2. Set the protection level.

   In the upper part of the page, set **Protection Level** to **Low**, **Medium**, or **High**. The default value is **Medium**.

   Table 7-3 Protection levels

Protection Level	Description
Low	WAF only blocks the requests with obvious attack signatures. If a large number of false alarms are reported, **Low** is recommended.
Medium	The default level is **Medium**, which meets a majority of web protection requirements.

Protection Level	Description
High	At this level, WAF provides the finest granular protection and can intercept attacks with complex bypass features, such as Jolokia cyber attacks, common gateway interface (CGI) vulnerability detection, and Druid SQL injection attacks. To let WAF defend against more attacks but make minimum effect on normal requests, observe your workloads for a period of time first. Then, configure a global protection whitelist rule and select **High**.

3. Set the protection type.

NOTICE

By default, **General Check** is enabled. You can enable other protection types by referring to **Table 7-4**.

Table 7-4 Protection types

Type	Description
General Check	Defends against attacks such as SQL injections, XSS, remote overflow vulnerabilities, file inclusions, Bash vulnerabilities, remote command execution, directory traversal, sensitive file access, and command/code injections. SQL injection attacks are mainly detected based on semantics. **NOTE** If you enable **General Check**, WAF checks your websites based on the built-in rules.
Webshell Detection	Protects against web shells from upload interface. **NOTE** If you enable **Webshell Detection**, WAF detects web page Trojan horses inserted through the upload interface.
Deep Inspection	Identifies and blocks evasion attacks, such as the ones that use homomorphic character obfuscation, command injection with deformed wildcard characters, UTF7, data URI scheme, and other techniques. **NOTE** If you enable **Deep Inspection**, WAF detects and defends against evasion attacks in depth.

Type	Description
Header Inspection	This function is disabled by default. When it is disabled, General Check will check some of the header fields, such as User-Agent, Content-type, Accept-Language, and Cookie. **NOTE** If you enable this function, WAF checks all header fields in the requests.

----End

Suggestions

- If you are not clear about your service traffic characteristics, you are advised to switch to the **Log only** mode first and observe the WAF protection for a period of time. Generally, you need to observe service running for one to two weeks, and then analyze the attack logs.
  - If no record of blocking legitimate requests is found, switch to the **Block** mode.
  - If legitimate requests are blocked, adjust the protection level or configure global protection whitelist rules to prevent legitimate requests from being blocked.
- Note the following points in your operations:
  - Do not transfer the original SQL statement or JavaScript code in a legitimate HTTP request.
  - Do not use special keywords (such as UPDATE and SET) in a legitimate URL. For example, **https://www.example.com/abc/update/mod.php?set=1**.
  - Use Object Storage Service (OBS) or other secure methods to upload files that exceed 50 MB rather than via a web browser.

Protection Effect

If **General Check** is enabled and **Mode** is set to **Block** for your domain name, to verify WAF is protecting your website (**www.example.com**) against general check items:

Step 1 Clear the browser cache and enter the domain name in the address bar to check whether the website is accessible.

- If the website is inaccessible, connect the website domain name to WAF by following the instructions in **Website Settings**.
- If the website is accessible, go to **Step 2**.

Step 2 Clear the browser cache and enter **http://www.example.com?id=1%27%20or%201=1** in the address box of the browser to simulate an SQL injection attack.

Step 3 Return to the WAF console. In the navigation pane on the left, click **Events**. On the displayed page, view the event log.

----End

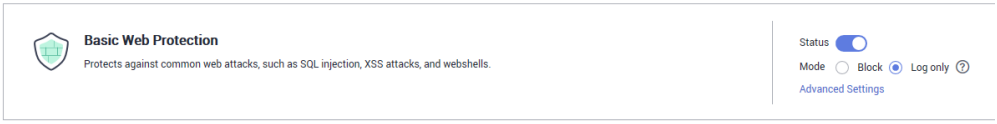
Example - Blocking SQL Injection Attacks

If domain name **www.example.com** has been connected to WAF, perform the following steps to verify that WAF can block SQL injection attacks.

Step 1 Enable **General Check** in **Basic Web Protection** and set the protection mode to **Block**.

Step 2 Enable WAF basic web protection.

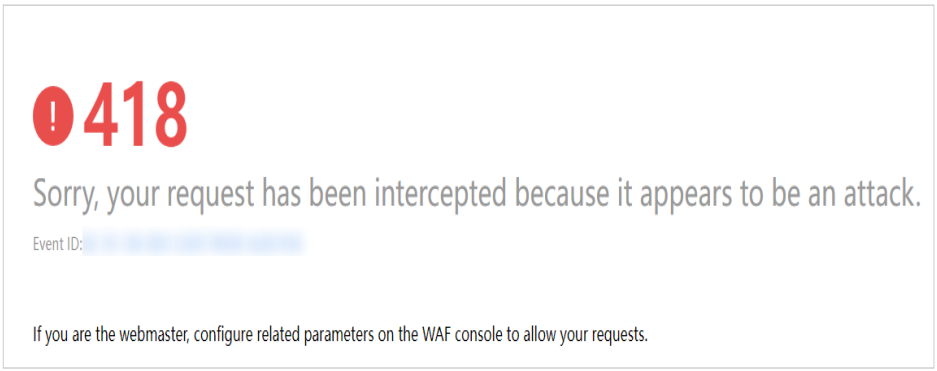
Figure 7-5 Basic Web Protection configuration area



Step 3 Clear the browser cache and enter a simulated SQL injection (for example, http://www.example.com?id=' or 1=1) in the address box.

WAF blocks the access request. **Figure 7-6** shows an example block page.

Figure 7-6 Block page



Step 4 Go to the WAF console. In the navigation pane on the left, choose **Events**. View the event on the **Events** page.

----End

7.3 Configuring CC Attack Protection Rules to Defend Against CC Attacks

CC attack protection can limit the access to a protected website based on a single IP address, cookie, or referer. To use this protection, ensure that you have toggled on **CC Attack Protection**.

A reference table can be added to a CC attack protection rule. The reference table takes effect for all protected domain names.

Prerequisites

You have added the website you want to protect to WAF.

Constraints

- If you set **Logic** to **Include any value**, **Exclude any value**, **Equal to any value**, **Not equal to any value**, **Prefix is any value**, **Prefix is not any of them**, **Suffix is any value**, or **Suffix is not any of them**, select an existing reference table. For details, see **Creating a Reference Table to Configure Protection Metrics in Batches**.
- It takes several minutes for a new rule to take effect. After a rule takes effect, protection events triggered by the rule will be displayed on the **Events** page.

Configuring a CC Attack Protection Rule

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

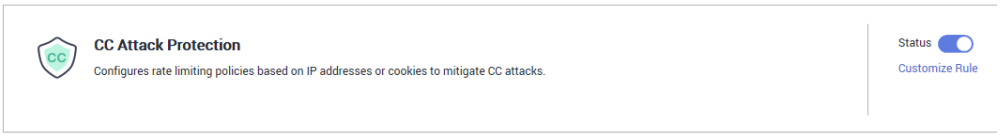
Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, click **Policies**.

Step 5 Click the name of the target policy to go to the protection configuration page.

Step 6 In the **CC Attack Protection** configuration area, change **Status** if needed and click **Customize Rule** to go to the **CC Attack Protection** page.

Figure 7-7 CC Attack Protection configuration area



Step 7 In the upper left corner above the **CC Attack Protection** rule list, click **Add Rule**.

Step 8 In the displayed dialog box, configure a CC attack protection rule by referring to **Table 7-5**.

Figure 7-8 Adding a CC attack protection rule

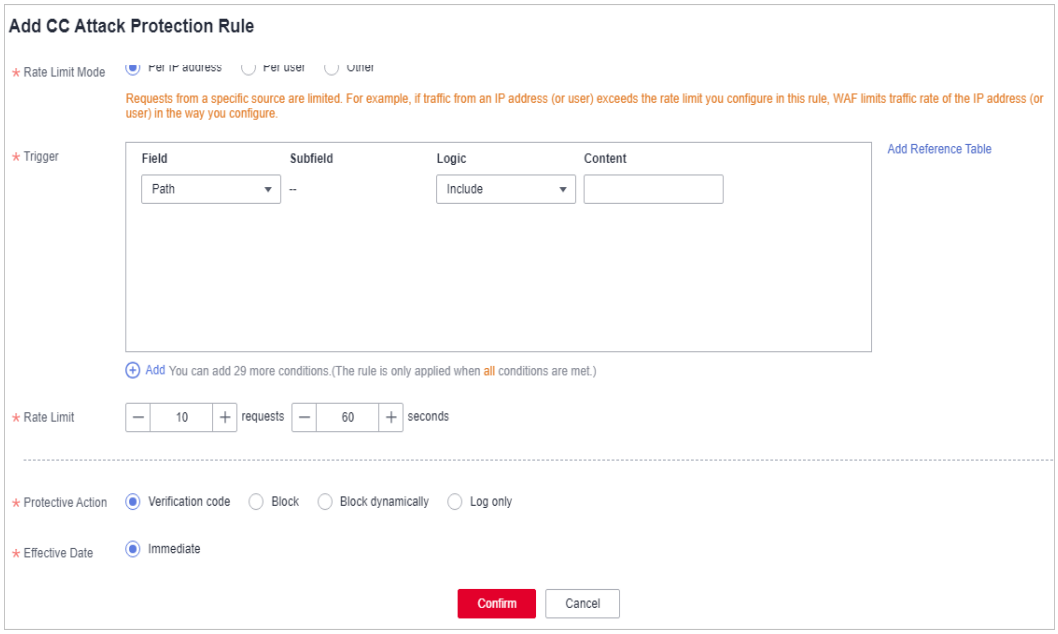


Table 7-5 Rule parameters

Parameter	Description	Example Value
Rule Description	A brief description of the rule. This parameter is optional.	--
Rate Limit Mode	• **Per IP address**: A website visitor is identified by the IP address. • **Per user**: A website visitor is identified by the key value of **Cookie** or **Header**. • **Other**: A website visitor is identified by the Referer field (user-defined request source). **NOTE** If you set **Rate Limit Mode** to **Other**, set **Content** of **Referer** to a complete URL containing the domain name. The **Content** field supports prefix match and exact match only, but cannot contain two or more consecutive slashes, for example, **///admin**. If you enter **///admin**, WAF will convert it to **/admin**. For example, if you do not want visitors to access www.test.com, set **Referer** to **http://www.test.com**.	--

Parameter	Description	Example Value
User Identifier	This parameter is mandatory when you select **Per user** for **Rate Limit Mode**. • **Cookie**: A cookie field name. You need to configure an attribute variable name in the cookie that can uniquely identify a web visitor based on your website requirements. This field does not support regular expressions. Only complete matches are supported. For example, if a website uses the **name** field in the cookie to uniquely identify a web visitor, enter **name**. • **Header**: Set the user-defined HTTP header you want to protect. You need to configure the HTTP header that can identify web visitors based on your website requirements.	name

Parameter	Description	Example Value
Trigger	Click **Add Condition** to add conditions. At least one condition is required, but up to 30 conditions are allowed. If you add more than one condition, the rule will only take effect if all of the conditions are met. Condition parameters: • **Field**: For details, see **Condition Field Description**. • **Subfield**: Configure this field only when **IPv4**, **Cookie**, **Header**, or **Params** is selected for **Field**. **NOTICE** A subfield cannot exceed 2,048 characters. • **Logic**: Select a logical relationship from the drop-down list. **NOTE** If you set **Logic** to **Include any value**, **Exclude any value**, **Equal to any value**, **Not equal to any value**, **Prefix is any value**, **Prefix is not any of them**, **Suffix is any value**, or **Suffix is not any of them**, select an existing reference table. For details, see **Creating a Reference Table to Configure Protection Metrics in Batches**. • **Content**: Enter or select the content that matches the condition. If you enable this, the system matches the case-sensitive content. It helps the system precisely identify requests and respond to them accurately, making protection policies work better.	**Path Include / admin**
Rate Limit	The number of requests allowed from a website visitor in the rate limit period. If the number of requests exceeds the rate limit, WAF takes the action you configure for **Protective Action**.	**10** requests allowed in **60** seconds

Parameter	Description	Example Value
Protective Action	The action that WAF will take if the number of requests exceeds **Rate Limit** you configured. The options are as follows: • **Verification code**: WAF allows requests that trigger the rule as long as your website visitors complete the required verification. • **Block**: WAF blocks requests that trigger **Rate Limit** set in the rule. • **Block dynamically**: WAF blocks requests that trigger the rule based on **Allowable Frequency**, which you configure after the first rate limit period is over. • **Log only**: WAF only logs requests that trigger **Rate Limit** set in the rule.	Block
Allowable Frequency	This parameter can be set if you select **Block dynamically** for **Protective Action**. WAF blocks requests that trigger the rule based on **Rate Limit** first. Then, in the following rate limit period, WAF blocks requests that trigger the rule based on **Allowable Frequency** you configure. **Allowable Frequency** cannot be larger than **Rate Limit**. **NOTE** If you set **Allowable Frequency** to **0**, WAF blocks all requests that trigger the rule in the next rate limit period.	**8** requests allowed in **60** seconds
Block Duration	Period of time for which to block the item when you set **Protective Action** to **Block**.	**600** seconds
Block Page	The page displayed if the request limit has been reached. This parameter is configured only when **Protective Action** is set to **Block**. • If you select **Default settings**, the default block page is displayed. • If you select **Custom**, you can write a custom error message, so that WAF will return this message to website visitors when their requests are blocked.	Custom

Parameter	Description	Example Value
Block Page Type	If you select **Custom** for **Block Page**, select a type of the block page among options **application/json**, **text/html**, and **text/xml**.	text/html
Page Content	If you select **Custom** for **Block Page**, configure the content to be returned.	Page content styles corresponding to different page types are as follows: • **text/html**: <html><body>Forbidden</body></html> • **application/json**: {"msg": "Forbidden"} • **text/xml**: <?xml version="1.0" encoding="utf-8"?><error><msg>Forbidden</msg></error>

Step 9 Click **Confirm**. You can then view the added CC attack protection rule in the CC rule list.

- After the configuration is complete, you can view the added rule in the protection rule list. **Rule Status** is **Enabled** by default.
- If you do not want the rule to take effect, click **Disable** in the **Operation** column of the rule.
- You can also click **Delete** or **Modify** in the **Operation** column of the rule to delete or modify the rule.

----End

Protection Effect

If you have configured a CC attack protection rule like **Figure 7-8** (with **Protective Action** set to **Block**) for your domain name **www.example.com**, take the following steps to verify the protection effect:

Step 1 Clear the browser cache and enter the domain name in the address bar to check whether the website is accessible.

- If the website is inaccessible, connect the website domain name to WAF by referring to **Website Settings**.
- If the website is accessible, go to **2**.

Step 2 Clear the browser cache, enter **http://www.example.com/admin** in the address bar, and refresh the page 10 times within 60 seconds. In normal cases, the custom

block page will be displayed the eleventh time you refresh the page, and the requested page will be accessible when you refresh the page 60 seconds later.

If you select **Verification code** for protective action, a verification code is required for visitors to continue the access if they exceed the configured rate limit.

Step 3 Return to the WAF console. In the navigation pane on the left, choose **Events**. On the displayed page, view the event log.

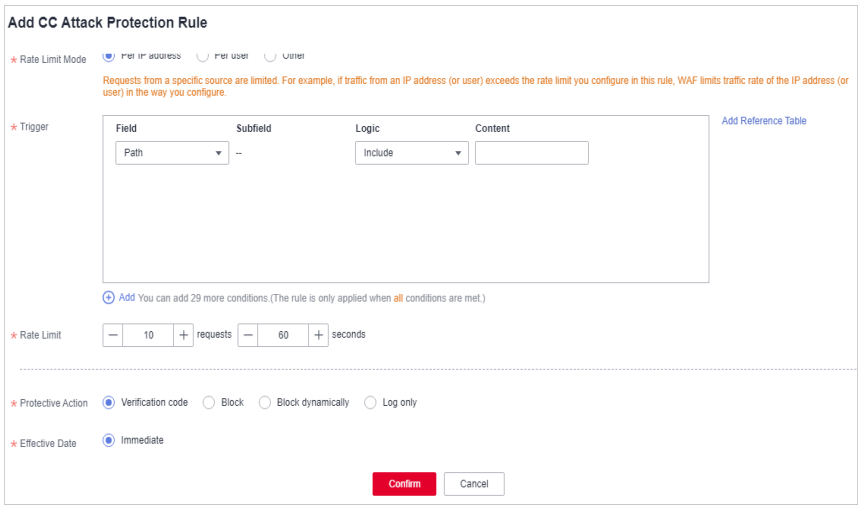
----End

Configuration Example - Verification Code

If domain name **www.example.com** has been connected to WAF, perform the following steps to verify that WAF CAPTCHA verification is enabled.

Step 1 Add a CC attack protection rule with **Protection Action** set to **Verification code**.

Figure 7-9 Verification code



Step 2 Enable CC attack protection.

Step 3 Clear the browser cache and access http://www.example.com/admin/.

If you access the page 10 times within 60 seconds, a verification code is required when you attempt to access the page for the eleventh time. You need to enter the verification code to continue the access.

Step 4 Go to the WAF console. In the navigation pane on the left, choose **Events**. View the event on the **Events** page.

----End

7.4 Configuring Custom Precise Protection Rules

You can combine common HTTP fields, such as **IP**, **Path**, **Referer**, **User Agent**, and **Params** in a protection rule to let WAF allow, block, or only log the requests that match the combined conditions.

A reference table can be added to a precise protection rule. The reference table takes effect for all protected domain names.

Prerequisites

You have added the website you want to protect to WAF.

Constraints

- If you configure **Protective Action** to **Block** for a precise protection rule, you can configure a known attack source rule by referring to **Configuring a Known Attack Source Rule to Block Specific Visitors for a Specified Duration**. WAF will block requests matching the configured IP address, Cookie, or Params for a length of time configured as part of the rule.
- The path content cannot contain the following special characters: (<>*)
- It takes several minutes for a new rule to take effect. After the rule takes effect, protection events triggered by the rule will be displayed on the **Events** page.

Application Scenarios

Precise protection rules are used for anti-leeching and website management background protection.

Configuring a Precise Protection Rule

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

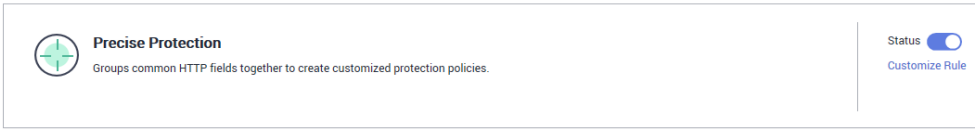
Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, click **Policies**.

Step 5 Click the name of the target policy to go to the protection configuration page.

Step 6 In the **Precise Protection** configuration area, change **Status** as needed and click **Customize Rule** to go to the **Precise Protection** page.

Figure 7-10 Precise Protection configuration area



Step 7 On the **Precise Protection** page, set **Detection Mode**.

Two detection modes are available:

- **Instant detection**: If a request matches a configured precise protection rule, WAF immediately ends threat detection and blocks the request.

- **Full detection**: If a request matches a configured precise protection rule, WAF finishes its scan first and then blocks all requests that match the configured precise protection rule.

Step 8 In the upper left corner above the **Precise Protection** rule list, click **Add Rule**.

Step 9 In the displayed dialog box, add a rule by referring to **Table 7-6**.

The settings shown in **Figure 7-11** are used as an example. If a visitor tries to access a URL containing **/admin**, WAF will block the request.

NOTICE

To ensure that WAF blocks only attack requests, configure **Protective Action** to **Log only** first and check whether normal requests are blocked on the **Events** page. If no normal requests are blocked, configure **Protective Action** to **Block**.

Figure 7-11 Add Precise Protection Rule

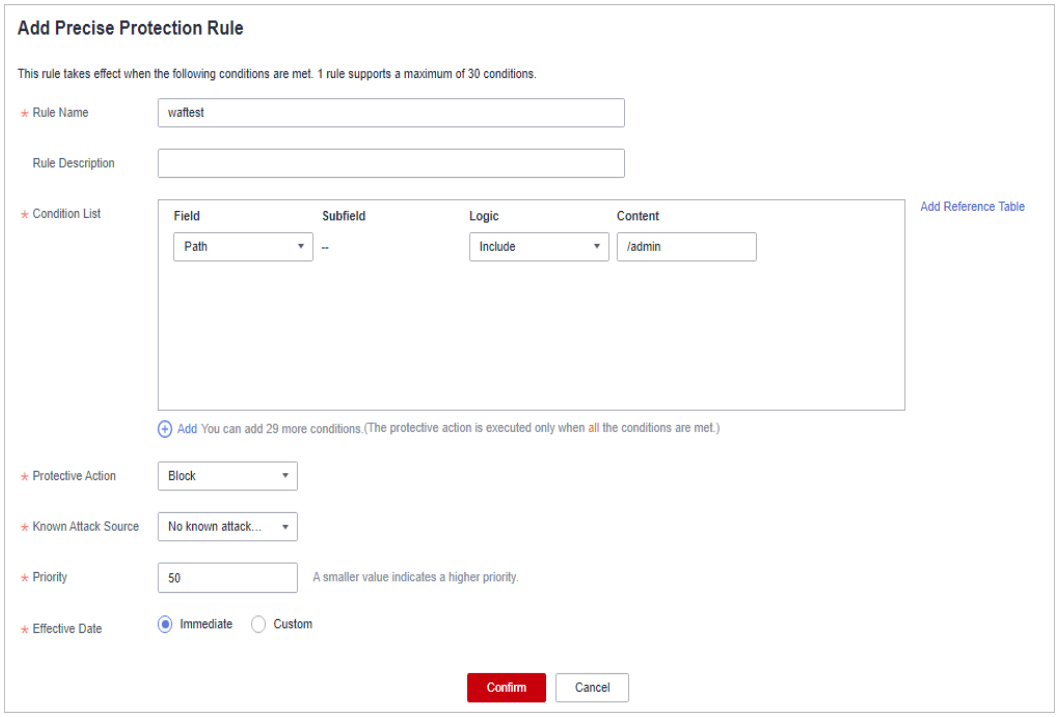


Table 7-6 Rule parameters

Parameter	Description	Example Value
Rule Name	Name of the rule.	waftest
Rule Description	A brief description of the rule. This parameter is optional.	None

Parameter	Description	Example Value
Condition List	Click **Add** and add conditions. At least one condition is required for a rule, but up to 30 conditions are allowed. If you add more than one condition, the rule will only take effect when all conditions are met. Parameters for configuring a condition are described as follows: • **Field** • **Subfield**: Configure this field only when **Params**, **Cookie**, or **Header** is selected for **Field**. • **Logic**: Select a logical relationship from the drop-down list. **NOTE** – If **Include any value**, **Exclude any value**, **Equal to any value**, **Not equal to any value**, **Prefix is any value**, **Prefix is not any of them**, **Suffix is any value**, or **Suffix is not any of them** is selected, select an existing reference table in the **Content** drop-down list. For details, see **Creating a Reference Table to Configure Protection Metrics in Batches**. – **Exclude any value**, **Not equal to any value**, **Prefix is not any of them**, and **Suffix is not any of them** indicates, respectively, that WAF performs the protection action (block, allow, or log only) when the field in the access request does not contain, is not equal to, or the prefix or suffix is not any value set in the reference table. For example, assume that **Path** field is set to **Exclude any value** and the **test** reference table is selected. If *test1*, *test2*, and *test3* are set in the **test** reference table, WAF performs the protection action when the path of the access request does not contain *test1*, *test2*, or *test3*. • **Content**: Enter or select the content of condition matching. **NOTE** For more details about the configurations in general, see **Table 7-17**.	• **Path Include /admin** • **User Agent Prefix is not mozilla/5.0** • **IP Equal to 192.168.2.3** • **Cookie key1 Prefix is not jsessionid**

Parameter	Description	Example Value
Protective Action	• **Block**: The request that hit the rule will be blocked and a block response page is returned to the client that initiates the request. By default, WAF uses a unified block response page. You can also customize this page. • **Allow**: Requests that hit the rule are forwarded to backend servers. • **Log only**: Requests that hit the rule are not blocked, but will be logged. You can use WAF logs to query requests that hit the current rule and analyze the protection results of the rule. For example, check whether there are requests that are blocked mistakenly.	**Block**
Known Attack Source	If you set **Protective Action** to **Block**, you can select a blocking type for a known attack source rule. Then, WAF blocks requests matching the configured **IP**, **Cookie**, or **Params** for a length of time that depends on the selected blocking type.	**Long-term IP address blocking**
Priority	Rule priority. If you have added multiple rules, rules are matched by priority. The smaller the value you set, the higher the priority. **NOTICE** If multiple precise access control rules have the same priority, WAF matches the rules in the sequence of time the rules are added.	**5**
Application Schedule	Select **Immediate** to enable the rule immediately, or select **Custom** to configure when you wish the rule to be enabled.	**Immediate**

Step 10 Click **Confirm**. You can then view the added precise protection rule in the protection rule list.

- To disable a rule, click **Disable** in the **Operation** column of the rule. The default **Rule Status** is **Enabled**.
- To modify a rule, click **Modify** in the row containing the rule.
- To delete a rule, click **Delete** in the row containing the rule.

----End

Protection Effect

To verify WAF is protecting your website (**www.example.com**) against the rule as shown in **Figure 7-11**:

Step 1 Clear the browser cache and enter the domain name in the address bar to check whether the website is accessible.

- If the website is inaccessible, connect the website domain name to WAF by following the instructions in **Website Settings**.
- If the website is accessible, go to **Step 2**.

Step 2 Clear the browser cache and enter **http://www.example.com/admin** (or any page containing **/admin**) in the address bar. Normally, WAF blocks the requests that meet the conditions and returns the block page.

Step 3 Return to the WAF console. In the navigation pane on the left, choose **Events**. On the displayed page, view the event log.

----End

Configuration Example - Blocking a Certain Type of Attack Requests

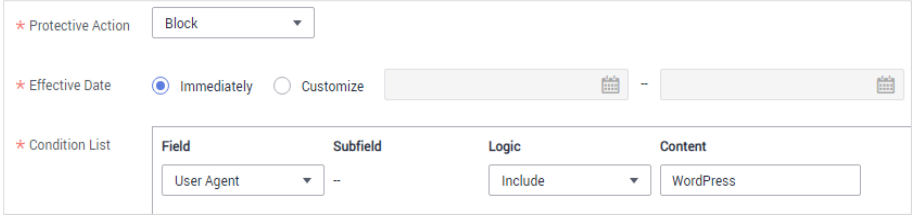
Analysis of a specific type of WordPress pingback attack shows that the **User Agent** field contains WordPress.

Figure 7-12 WordPress pingback attack

UA
WordPress/4.2.10; http://[redacted]s.vn; verifying pingback from [redacted] 249.54
WordPress/4.0.1; http://[redacted]90; verifying pingback from [redacted].249.54
WordPress/4.6.1; https:/[redacted]sabt.com; verifying pingback from [redacted].249.54
WordPress/4.5.3; http://[redacted].lib.umd.edu; verifying pingback from [redacted]9.54
WordPress/3.5.1; http://[redacted]o.com
WordPress/4.2.4; http://[redacted]t.tw; verifying pingback from [redacted] 249.54
WordPress/4.6.1; http:/[redacted]om; verifying pingback from [redacted].249.54

A precise rule as shown in the figure can block this type of attack.

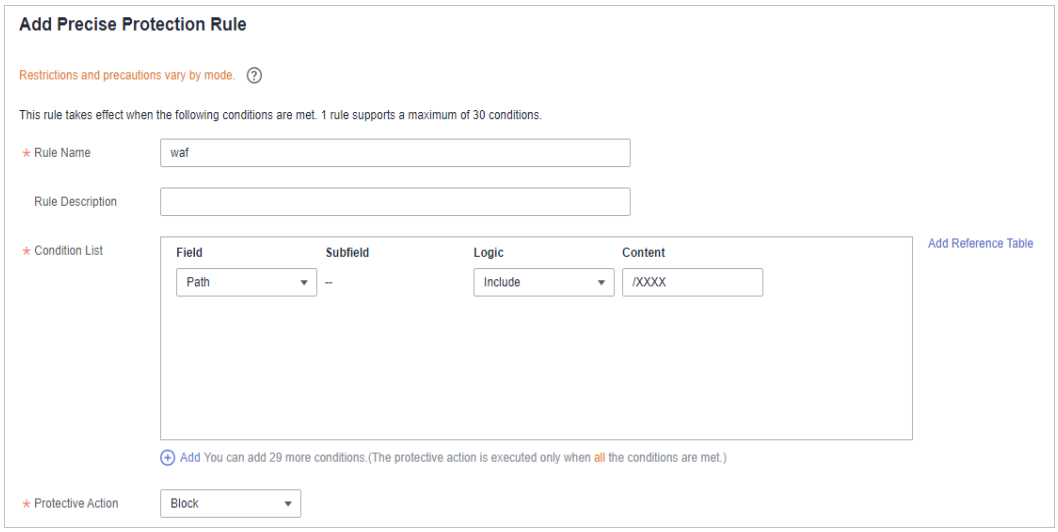
Figure 7-13 User Agent configuration



Configuration Example - Blocking Requests to a Certain URL

If a large number of IP addresses are accessing a URL that does not exist, configure the following protection rule to block such requests to reduce resource usage on the origin server. **Figure 7-14** shows an example.

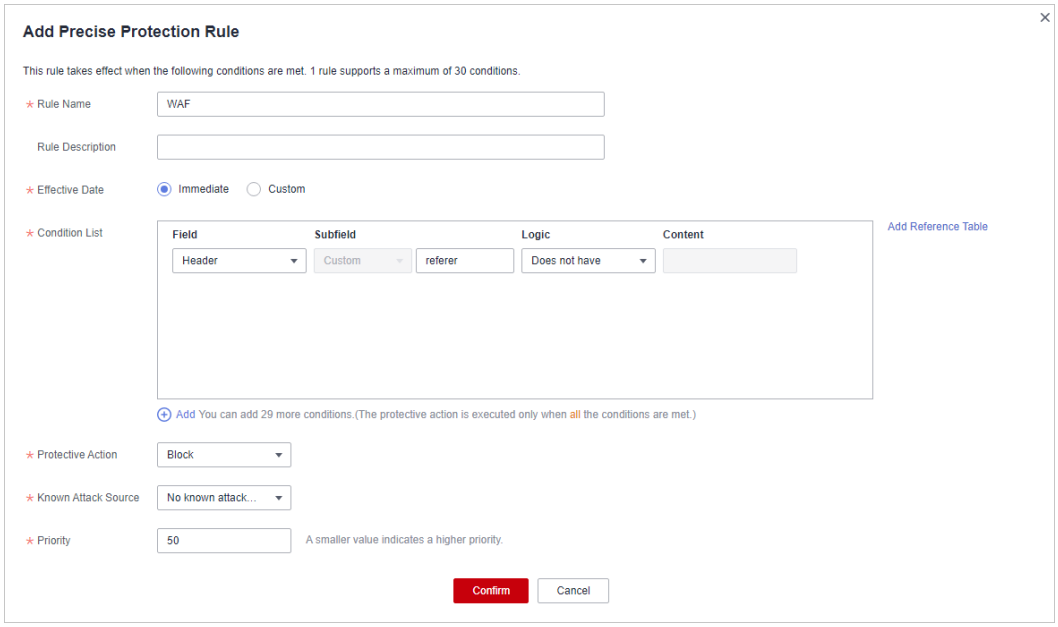
Figure 7-14 Blocking requests to a specific URL



Configuration Example - Blocking Requests with null Fields

You can configure precise protection rules to block requests having null fields. **Figure 7-15** shows an example.

Figure 7-15 Blocking requests with empty Referer

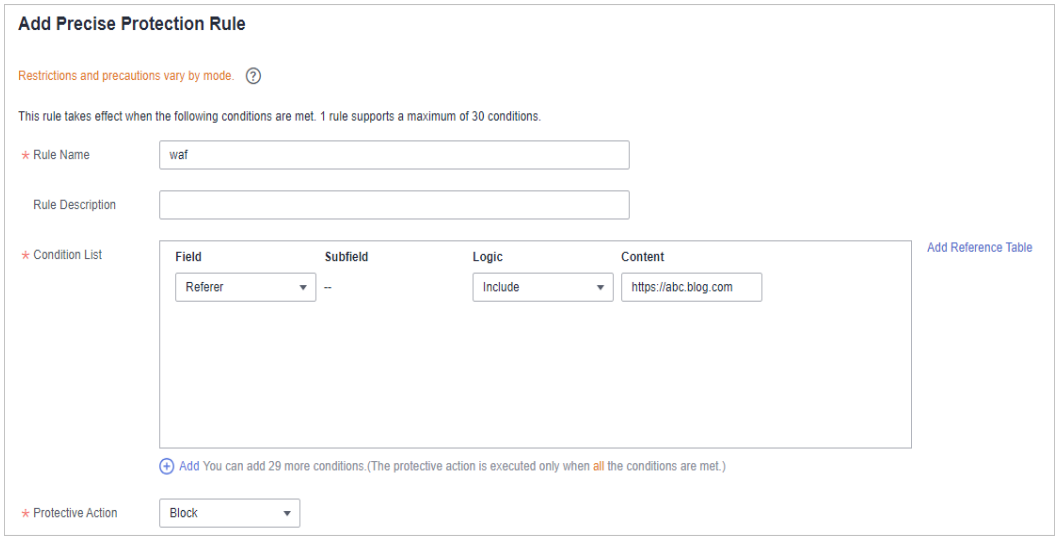


Configuration Example - Blocking Specified File Types (ZIP, TAR, and DOCX)

You can configure file types that match the path field to block specific files of certain types. For example, if you want to block .zip files, you can configure a

precise protection rule as shown in **Figure 7-16** to block access requests of .zip files.

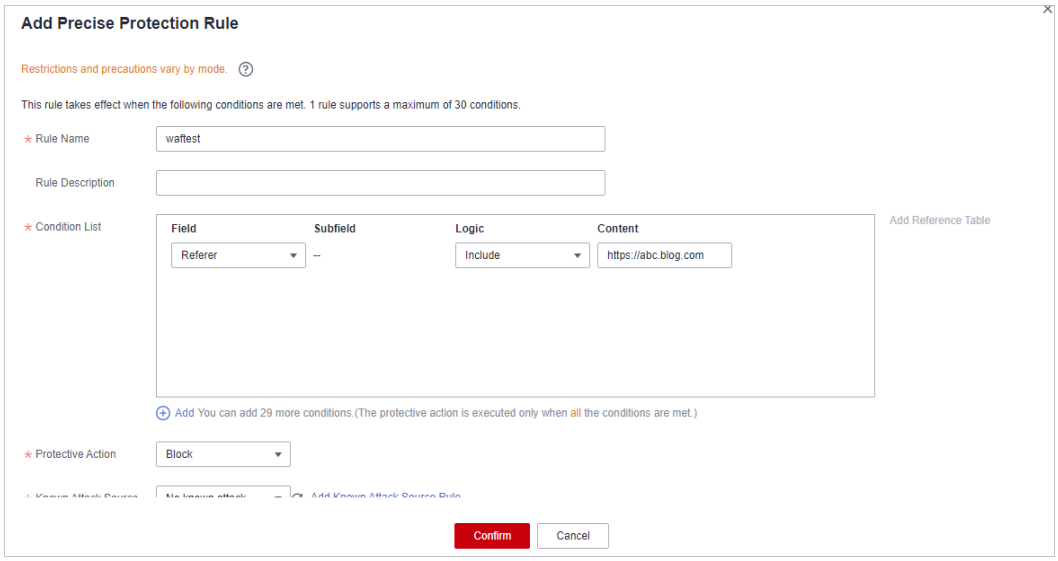
Figure 7-16 Blocking requests of specific file types



Configuration Example - Preventing Hotlinking

You can configure a protection rule based on the Referer field to enable WAF to block hotlinking from a specific website. If you find out that, for example, requests from **https://abc.blog.com** are stealing images from your site, you can configure a rule to block such requests.

Figure 7-17 Preventing hotlinking



Configuration Example - Allowing a Specified IP Address to Access Your Website

You can configure two precise protection rules, one to block all requests, as shown in **Figure 7-18**, but then another one to allow the access from a specific IP address, as shown in **Figure 7-19**.

Figure 7-18 Blocking all requests

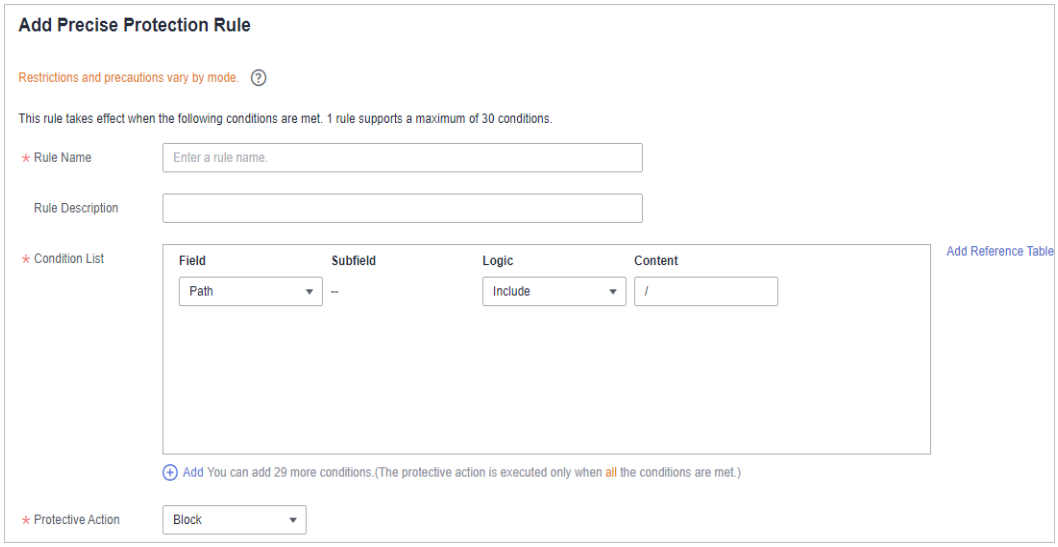
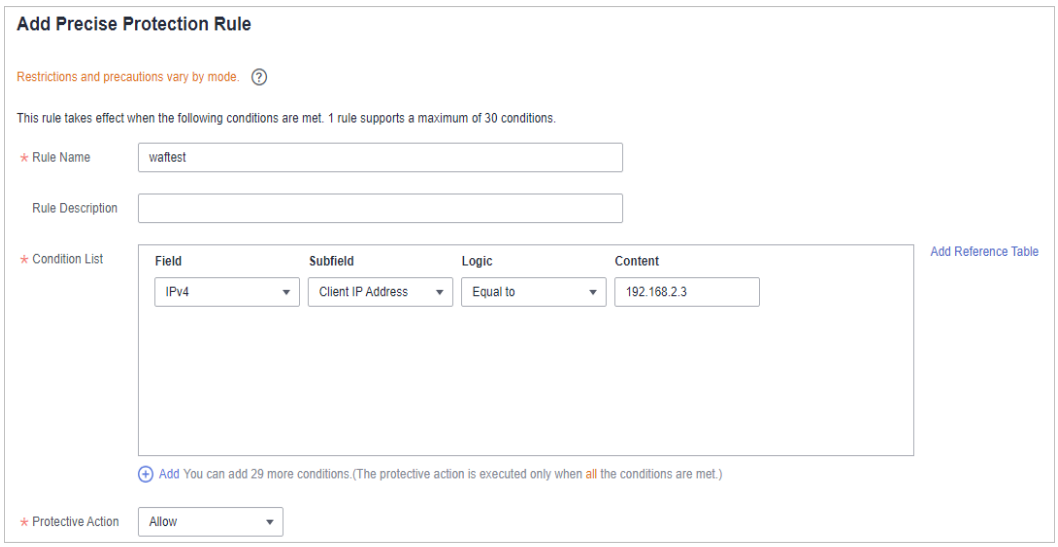


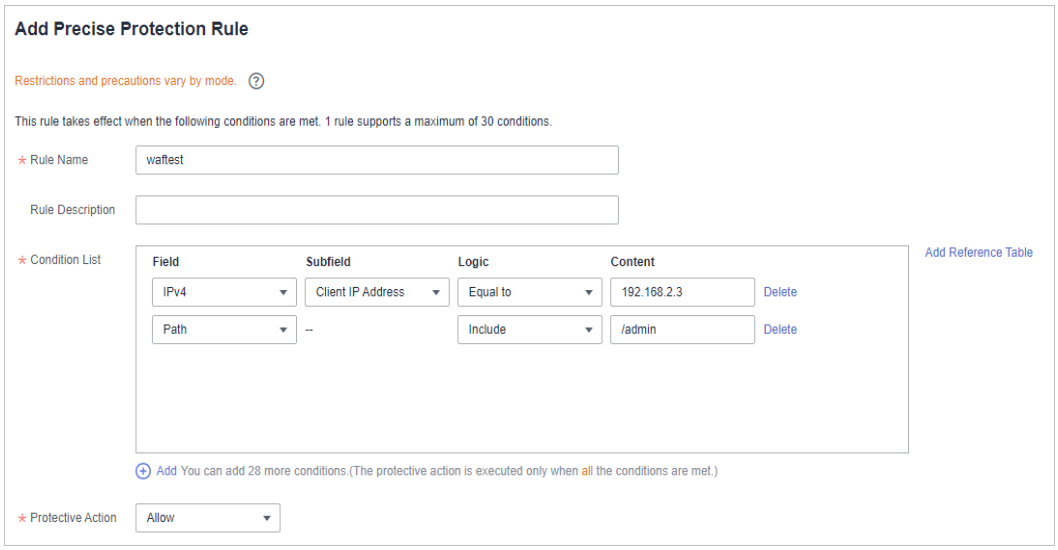
Figure 7-19 Allowing the access of a specified IP address



Configuration Example - Allowing a Specific IP Address to Access a Certain URL

You can configure multiple conditions in the **Condition List** field. If an access request meets the conditions in the list, WAF will allow the request from a specific IP address to access a specified URL.

Figure 7-20 Allowing specific IP addresses to access specified URLs



7.5 Configuring IP Address Blacklist and Whitelist Rules to Block or Allow Specified IP Addresses

You can configure blacklist and whitelist rules to block, log only, or allow access requests from specific IP addresses or IP address ranges. Whitelist rules have a higher priority than blacklist rules. You can add a single IP address or import an IP address group to the blacklist or whitelist.

Prerequisites

You have added the website you want to protect to WAF.

Constraints

- WAF supports batch import of IP address blacklists and whitelists. You can use address groups to add multiple IP addresses/ranges quickly to a blacklist or whitelist rule. For details, see **Adding an IP Address Group**.
- The address 0.0.0.0/0 cannot be added to a WAF IP address blacklist or whitelist, and if a whitelist conflicts with a blacklist, the whitelist rule takes priority. If you want to allow only a specific IP address within a range of blocked addresses, add a blacklist rule to block the range and then add a whitelist rule to allow the individual address you wish to allow.
- If you set **Protective Action** to **Block** for a blacklist or whitelist rule, you can **set a known attack source** to block the visitor for a certain period of time; however, the known attack source with **Long-term IP address blocking** or **Short-term IP address blocking** configured cannot be set for a blacklist or whitelist rule. WAF will block requests matching the configured Cookie or Params for a block duration you specify.
- It takes several minutes for a new rule to take effect. After the rule takes effect, protection events triggered by the rule will be displayed on the **Events** page.

Impact on the System

If an IP address is added to a blacklist or whitelist, WAF blocks or allows requests from that IP address without checking whether the requests are malicious.

Configuring an IP Address Blacklist or Whitelist Rule

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

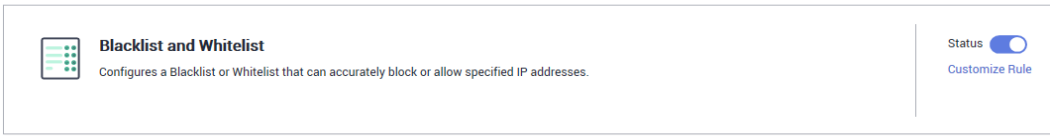
Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, click **Policies**.

Step 5 Click the name of the target policy to go to the protection configuration page.

Step 6 In the **Blacklist and Whitelist** configuration area, change **Status** as needed and click **Customize Rule**.

Figure 7-21 Blacklist and Whitelist configuration area



Step 7 In the upper left corner above the **Blacklist and Whitelist** list, click **Add Rule**.

Step 8 In the **Add Blacklist/Whitelist Rule** dialog box, add a blacklist or whitelist rule. For details about the parameters, see **Table 7-7**.

NOTE

- If you select **Log only** for **Protective Action** for an IP address, WAF only identifies and logs requests from the IP address.
- Other IP addresses are evaluated based on other configured WAF protection rules.

Figure 7-22 Adding a blacklist or whitelist rule

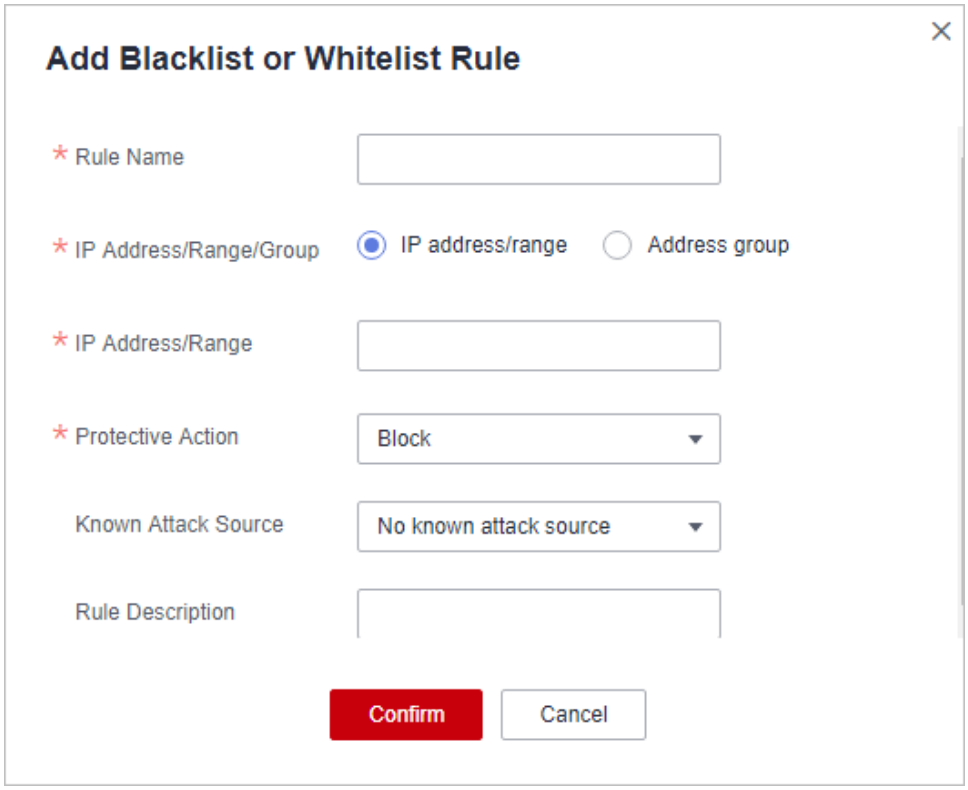


Table 7-7 Rule parameters

Parameter	Description	Example Value
Rule Name	Enter the name of the blacklist or whitelist rule.	waf
Rule Description (Optional)	Enter remarks for the blacklist or whitelist rule.	None
IP Address/ Range/Group	You can select **IP address/ Range** or **Address Group** to add IP addresses a blacklist or whitelist rule.	IP Address/Range

Parameter	Description	Example Value
IP Address/ Range	This parameter is mandatory if you select **IP address/range** for **IP Address/Range/Group**. IP addresses or IP address ranges are supported. • IP address: IP address to be added to the blacklist or whitelist • IP address range: IP address and subnet mask defining a network segment	XXX.XXX.2.3
Select Address Group	This parameter is mandatory if you select **Address group** for IP **Address/Range/Group**. Select an IP address group from the drop-down list. You can also click **Add Address Group** to create an address group. For details, see **Adding an IP Address Group**.	groupwaf
Protective Action	• **Block**: Select **Block** if you want to blacklist an IP address or IP address range. • **Allow**: Select **Allow** if you want to whitelist an IP address or IP address range. • **Log only**: Select **Log only** if you want to observe an IP address or IP address range. Then, WAF determines whether the IP address or IP address range are blacklisted or whitelisted based on the events data.	Block

Parameter	Description	Example Value
Known Attack Source	If you select **Block** for **Protective Action**, you can select a blocking type of a known attack source rule. WAF will block requests matching the configured Cookie or Params for a length of time configured as part of the rule. **NOTE** Do not select the **Long-term IP address blocking** for a long time or **Short-term IP address blocking** for **Blocking Type**.	**Long-term Cookie blocking**

Step 9 Click **Confirm**. You can then view the added rule in the list of blacklist and whitelist rules.

- To disable a rule, click **Disable** in the **Operation** column of the rule. The default **Rule Status** is **Enabled**.
- To modify a rule, click **Modify** in the row containing the rule.
- To delete a rule, click **Delete** in the row containing the rule.

----End

Protection Effect

To verify WAF is protecting your website (**www.example.com**) against a rule:

Step 1 Clear the browser cache and enter the domain name in the address bar to check whether the website is accessible.

- If the website is inaccessible, connect the website domain name to WAF by referring to **Website Settings**.
- If the website is accessible, go to **Step 2**.

Step 2 Blacklist the IP address of a client according to the instructions in **Configuring an IP Address Blacklist or Whitelist Rule**.

Step 3 Clear the browser cache and access **http://www.example.com**. Normally, WAF blocks such requests and returns the block page.

Step 4 Return to the WAF console. In the navigation pane on the left, click **Events**. On the displayed page, view the event log.

----End

Example Configuration - Allowing a Specified IP Addresses

If domain name *www.example.com* has been connected to WAF, you can perform the following steps to verify the rule takes effect:

Step 1 Add a rule to block all source IP addresses.

- **Method 1**: Add the following two blacklist rules to block all source IP addresses, as shown in **Figure 7-23** and **Figure 7-24**.

  Figure 7-23 Blocking IP address range 1.0.0.0/1

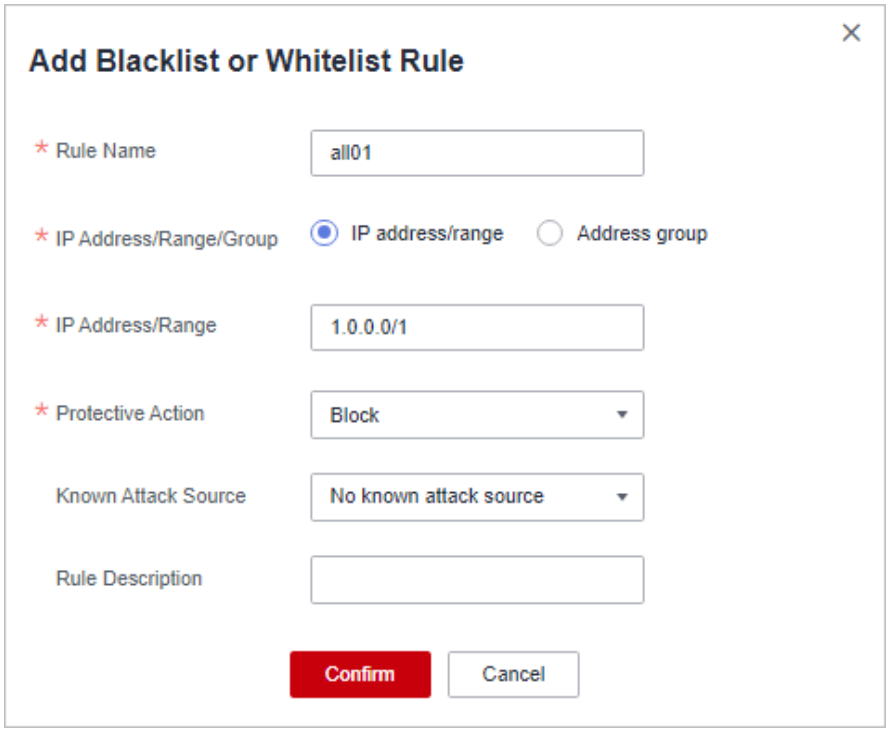
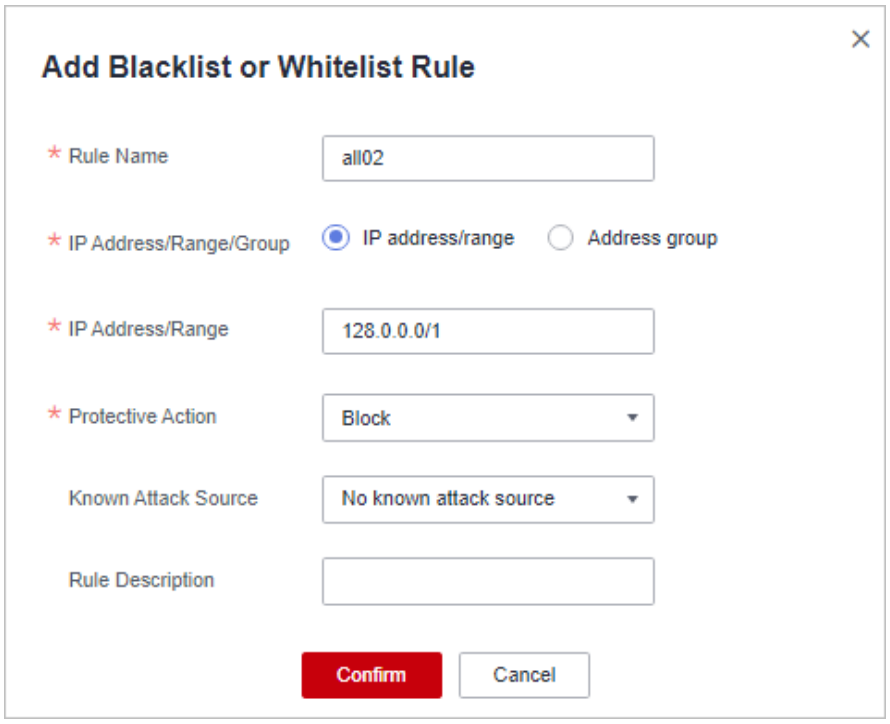
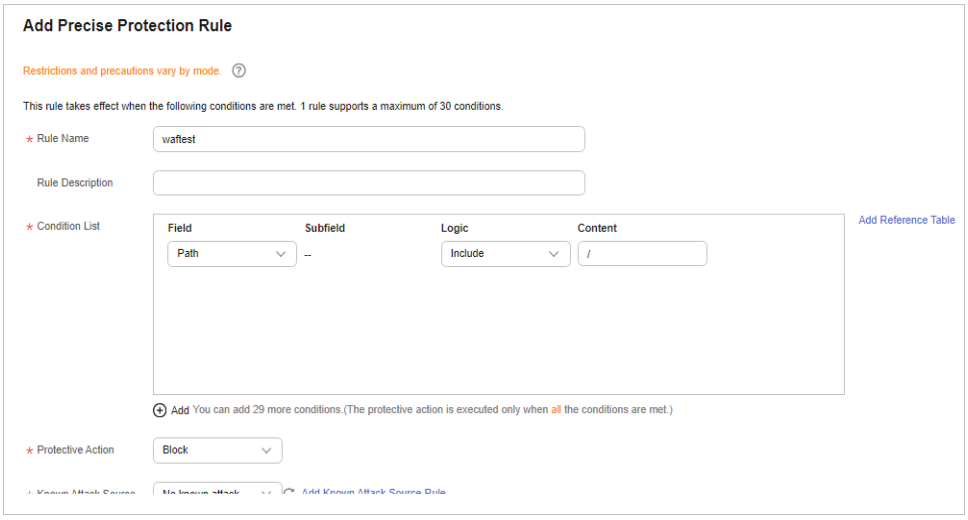
  

  Figure 7-24 Blocking IP address range 128.0.0.0/1

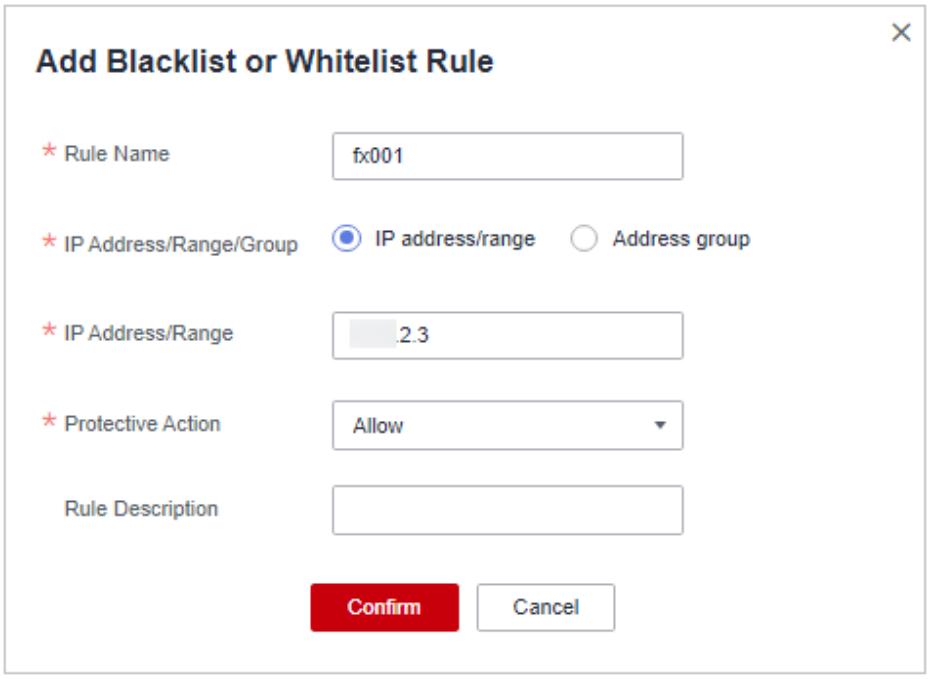
- **Method 2**: Add a precise protection rule to block all access requests, as shown in **Figure 7-25**.

Figure 7-25 Blocking all access requests



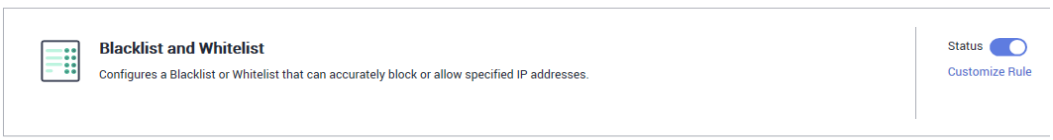
Step 2 Refer to **Figure 7-26** and add a whitelist rule to allow a specified IP address, for example, *192.168.2.3*.

Figure 7-26 Allowing the access of a specified IP address



Step 3 Enable the white and blacklist protection.

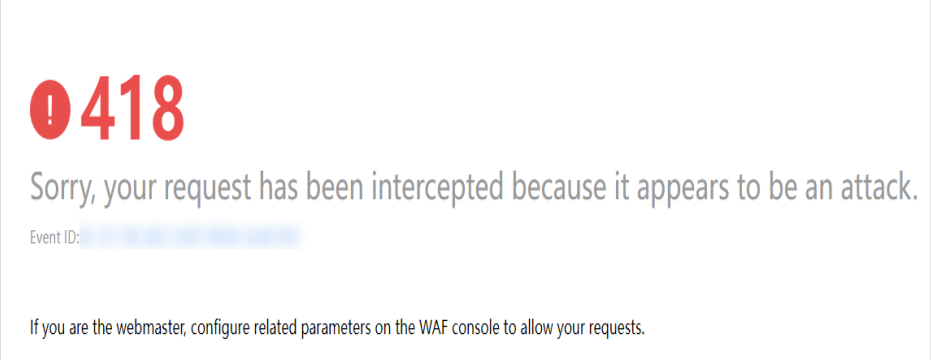
Figure 7-27 Blacklist and Whitelist configuration area



Step 4 Clear the browser cache and access http://www.example.com.

If the IP address of a visitor is not the one specified in **Step 2**, WAF blocks the access request. **Figure 7-28** shows an example of the block page.

Figure 7-28 Block page



Step 5 Go to the WAF console. In the navigation pane on the left, choose **Events**. View the event on the **Events** page.

----End

7.6 Configuring Geolocation Access Control Rules to Block or Allow Requests from Specific Locations

WAF can identify where a request originates. You can set geolocation access control rules in just a few clicks and let WAF block or allow requests from a certain region. A geolocation access control rule allows you to allow or block requests from IP addresses from specified countries or regions.

Prerequisites

You have added the website you want to protect to WAF.

Constraints

- One region can be configured in only one geolocation access control rule.
- It takes several minutes for a new rule to take effect. After the rule takes effect, protection events triggered by the rule will be displayed on the **Events** page.

Configuring a Geolocation Access Control Rule

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

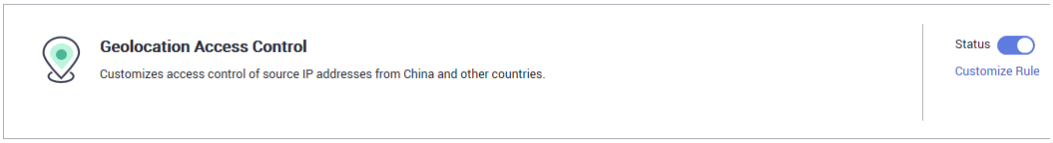
Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, click **Policies**.

Step 5 Click the name of the target policy to go to the protection configuration page.

Step 6 In the **Geolocation Access Control** configuration area, change **Status** if needed and click **Customize Rule**.

Figure 7-29 Geolocation Access Control configuration area



Step 7 In the upper left corner above the **Geolocation Access Control** list, click **Add Rule**.

Step 8 In the displayed dialog box, add a geolocation access control rule by referring to .

Table 7-8 Rule parameters

Parameter	Description	Example Value
Rule Name	Rule name you configured	-
Rule Description	A brief description of the rule. This parameter is optional.	waf
Geolocation	Geographical scope of the IP address.	-
Protective Action	Action WAF will take if the rule is hit. You can select **Block**, **Allow**, or **Log only**.	**Block**

Step 9 Click **Confirm**. You can then view the added rule in the list of the geolocation access control rules.

- To disable a rule, click **Disable** in the **Operation** column of the rule. The default **Rule Status** is **Enabled**.
- To modify a rule, click **Modify** in the row containing the rule.
- To delete a rule, click **Delete** in the row containing the rule.

----End

Protection Effect

To verify WAF is protecting your website (**www.example.com**) against a rule:

Step 1 Clear the browser cache and enter the domain name in the address bar to check whether the website is accessible.

- If the website is inaccessible, connect the website domain name to WAF by referring to **Website Settings**.
- If the website is accessible, go to **2**.

Step 2 Add a geolocation access control rule by referring to **Configuring a Geolocation Access Control Rule**.

Step 3 Clear the browser cache and access **http://www.example.com**. Normally, WAF blocks such requests and returns the block page.

Step 4 Return to the WAF console. In the navigation pane on the left, click **Events**. On the displayed page, view the event log.

----End

7.7 Configuring Web Tamper Protection Rules to Prevent Static Web Pages from Being Tampered With

You can set web tamper protection rules to protect specific website pages (such as the ones contain important content) from being tampered with. If a web page protected with such a rule is requested, WAF returns the origin page it has cached based on the rule so that visitors always receive the authenticate web pages.

How It Works

- Return directly the cached web page to the normal web visitor to accelerate request response.
- Return the cached original web pages to visitors if an attacker has tampered with the static web pages. This ensures that your website visitors always get the right web pages.
- Protect all resources in the web page path. For example, if a web tamper protection rule is configured for a static page pointed to *www.example.com/index.html*, WAF protects the web page pointed to */index.html* and related resources associated with the web page.

  So, if the URL in the **Referer** header field is the same as the configured anti-tamper path, for example, **/index.html**, all resources (resources ending with png, jpg, jpeg, gif, bmp, css or js) matching the request are also cached.

Prerequisites

You have added the website you want to protect to WAF or **added a new protection policy**.

Constraints

- It takes several minutes for a new rule to take effect. After the rule takes effect, protection events triggered by the rule will be displayed on the **Events** page.
- Ensure that the origin server response contains the **Content-Type** response header, or WAF may fail to cache the origin server response.

Application Scenarios

- Quicker response to requests

  After a web tamper protection rule is configured, WAF caches static web pages on the server. When receiving a request from a web visitor, WAF directly returns the cached web page to the web visitor.
- Web tamper protection

If an attacker modifies a static web page on the server, WAF still returns the cached original web page to visitors. Visitors never see the pages that were tampered with.

WAF randomly extracts requests from a visitor to compare the page they received with the page on the server. If WAF detects that the page has been tampered with, it notifies you by SMS or email, depending on what you configure. For more details, see **Enabling Alarm Notifications**.

Configuring a Web Tamper Protection Rule

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

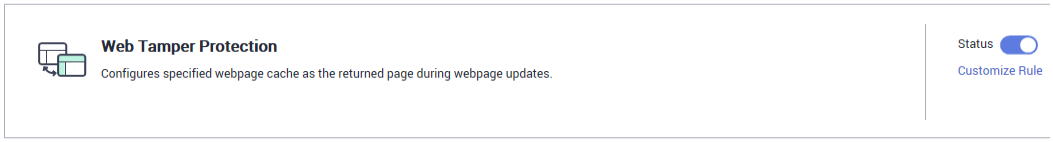
Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, click **Policies**.

Step 5 Click the name of the target policy to go to the protection configuration page.

Step 6 In the **Web Tamper Protection** configuration area, change **Status** if needed and click **Customize Rule** to go to the **Web Tamper Protection** page.

Figure 7-30 Web Tamper Protection configuration area



Step 7 In the upper left corner above the **Web Tamper Protection** rule list, click **Add Rule**.

Step 8 In the displayed dialog box, specify the parameters by referring to **Table 7-9**.

Figure 7-31 Adding a web tamper protection rule

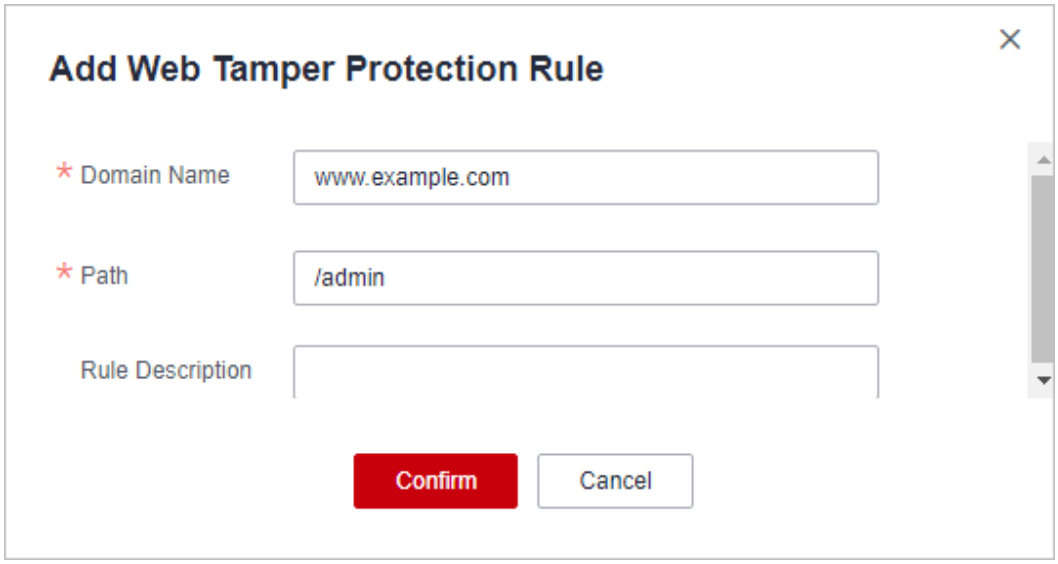


Table 7-9 Rule parameters

Parameter	Description	Example Value
Domain Name	Domain name of the website to be protected	**www.example.com**
Path	A part of the URL, not including the domain name A URL is used to define the address of a web page. The basic URL format is as follows: Protocol name://Domain name or IP address[:Port]/[Path/.../File name]. For example, if the URL is **http://www.example.com/admin**, set **Path** to **/admin**. **NOTE** • The path does not support regular expressions. • The path cannot contain two or more consecutive slashes. For example, **///admin**. If you enter **///admin**, WAF converts **///** to **/**.	**/admin**
Rule Description	A brief description of the rule. This parameter is optional.	None

Step 9 Click **Confirm**. You can view the rule in the list of web tamper protection rules.

----End

Related Operations

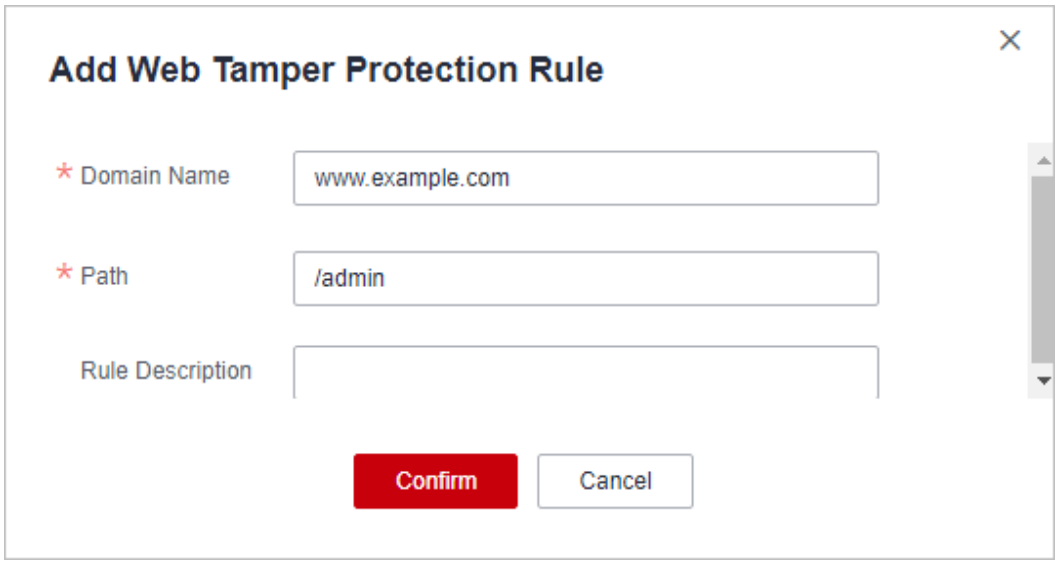
- To disable a rule, click **Disable** in the **Operation** column of the rule. The default **Rule Status** is **Enabled**.
- To update cache of a protected web page, click **Update Cache** in the row containing the corresponding web tamper protection rule. If the rule fails to be updated, WAF will return the recently cached page but not the latest page.
- To delete a rule, click **Delete** in the row containing the rule.

Configuration Example - Static Web Page Tamper Prevention

To verify WAF is protecting a static page **/admin** on your website **www.example.com** from being tampered with:

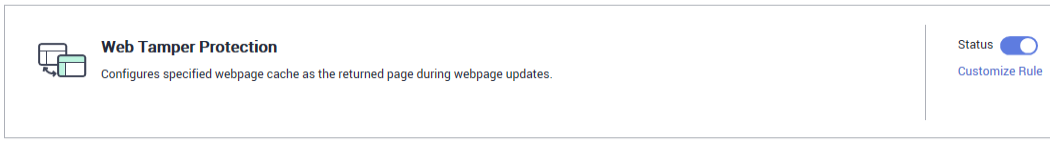
Step 1 Add a web tamper prevention rule to WAF.

Figure 7-32 Adding a web tamper protection rule



Step 2 Enable WTP.

Figure 7-33 Web Tamper Protection configuration area



Step 3 Simulate the attack to tamper with the **http://www.example.com/admin** web page.

Step 4 Use a browser to access **http://www.example.com/admin**. WAF will cache the page.

Step 5 Access **http://www.example.com/admin** again.

The intact page is returned.

----End

7.8 Configuring Anti-Crawler Rules

You can configure website anti-crawler protection rules to protect against search engines, scanners, script tools, and other crawlers, and use JavaScript to create custom anti-crawler protection rules.

Prerequisites

You have added the website you want to protect to WAF.

Constraints

- Cookies must be enabled and JavaScript supported by any browser used to access a website protected by anti-crawler protection rules.

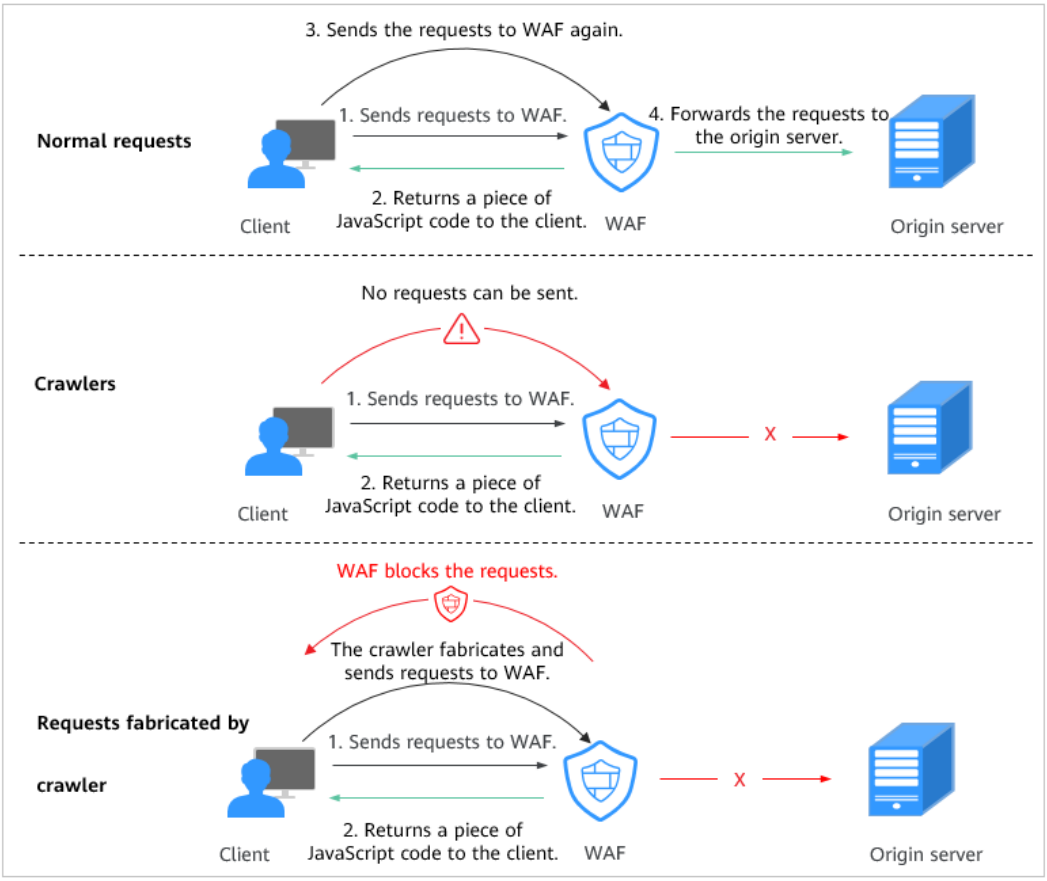
- If your service is connected to CDN, exercise caution when using the JS anti-crawler function.

  CDN caching may impact JS anti-crawler performance and page accessibility.
- WAF only logs JavaScript challenge and JavaScript authentication events. No other protective actions can be configured for JavaScript challenge and authentication.
- WAF JavaScript-based anti-crawler rules only check GET requests and do not check POST requests.

How JavaScript Anti-Crawler Protection Works

Figure 7-34 shows how JavaScript anti-crawler detection works, which includes JavaScript challenges (step 1 and step 2) and JavaScript authentication (step 3).

Figure 7-34 JavaScript Anti-Crawler protection process



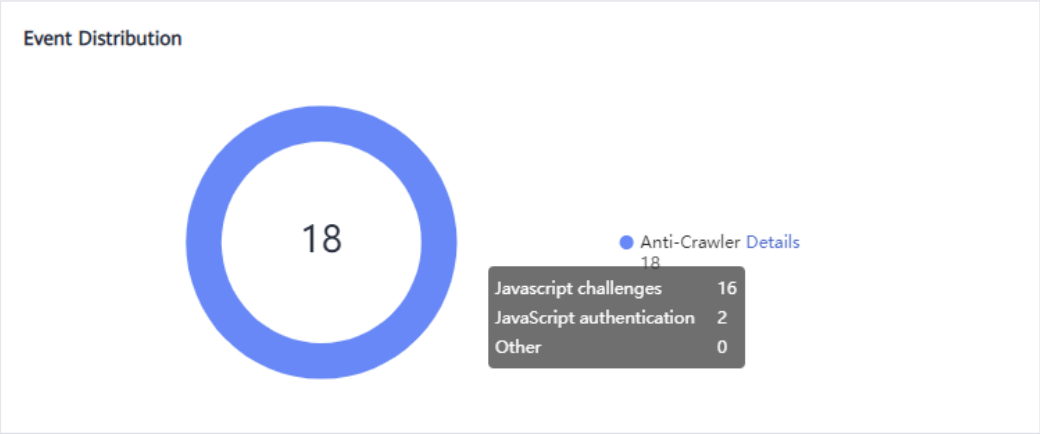
If JavaScript anti-crawler is enabled when a client sends a request, WAF returns a piece of JavaScript code to the client.

- If the client sends a normal request to the website, triggered by the received JavaScript code, the client will automatically send the request to WAF again. WAF then forwards the request to the origin server. This process is called JavaScript verification.
- If the client is a crawler, it cannot be triggered by the received JavaScript code and will not send a request to WAF again. The client fails JavaScript authentication.

- If a client crawler fabricates a WAF authentication request and sends the request to WAF, the WAF will block the request. The client fails JavaScript authentication.

By collecting statistics on the number of JavaScript challenges and authentication responses, the system calculates how many requests the JavaScript anti-crawler defends. In **Figure 7-35**, the JavaScript anti-crawler has logged 18 events, 16 of which are JavaScript challenge responses, and 2 of which are JavaScript authentication responses. **Other** indicates the number of WAF authentication requests fabricated by the crawler.

Figure 7-35 Parameters of a JavaScript anti-crawler protection rule



NOTICE

WAF only logs JavaScript challenge and JavaScript authentication events. No other protective actions can be configured for JavaScript challenge and authentication.

Configuring an Anti-Crawler Rule

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, click **Policies**.

Step 5 Click the name of the target policy to go to the protection configuration page.

Step 6 In the **Anti-Crawler** configuration area, toggle on the function if needed. Then, click **Configure Bot Mitigation**.

Figure 7-36 Anti-Crawler configuration area

Step 7 Select the **Feature Library** tab and enable the protection by referring to **Table 7-10**. **Figure 7-37** shows an example.

A feature-based anti-crawler rule has two protective actions:

- **Block**

  WAF blocks and logs detected attacks.

  CAUTION

  Enabling this feature may have the following impacts:

  – Blocking requests of search engines may affect your website SEO.

  – Blocking scripts may block some applications because those applications may trigger anti-crawler rules if their user-agent field is not modified.

- **Log only**

  Detected attacks are logged only. This is the default protective action.

Scanner is enabled by default, but you can enable other protection types if needed.

Figure 7-37 Feature Library

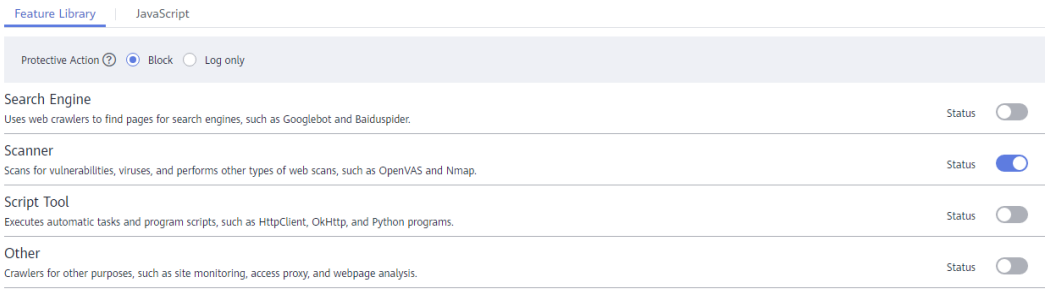


Table 7-10 Anti-crawler detection features

Type	Description	Remarks
Search Engine	This rule is used to block web crawlers, such as Googlebot and Baiduspider, from collecting content from your site.	If you enable this rule, WAF detects and blocks search engine crawlers. **NOTE** If **Search Engine** is not enabled, WAF does not block POST requests from Googlebot or Baiduspider. If you want to block POST requests from Baiduspider, use the configuration described in **Configuration Example - Search Engine**.
Scanner	This rule is used to block scanners, such as OpenVAS and Nmap. A scanner scans for vulnerabilities, viruses, and other jobs.	After you enable this rule, WAF detects and blocks scanner crawlers.
Script Tool	This rule is used to block script tools. A script tool is often used to execute automatic tasks and program scripts, such as HttpClient, OkHttp, and Python programs.	If you enable this rule, WAF detects and blocks the execution of automatic tasks and program scripts. **NOTE** If your application uses scripts such as HttpClient, OkHttp, and Python, disable **Script Tool**. Otherwise, WAF will identify such script tools as crawlers and block the application.
Other	This rule is used to block crawlers used for other purposes, such as site monitoring, using access proxies, and web page analysis. **NOTE** To avoid being blocked by WAF, crawlers may use a large number of IP address proxies.	If you enable this rule, WAF detects and blocks crawlers that are used for various purposes.

Step 8 Select the **JavaScript** tab and change **Status** if needed.

JavaScript anti-crawler is disabled by default. To enable it, click  and then click **OK** in the displayed dialog box to toggle on  .

NOTICE

- Cookies must be enabled and JavaScript supported by any browser used to access a website protected by anti-crawler protection rules.
- If your service is connected to CDN, exercise caution when using the JS anti-crawler function.

  CDN caching may impact JS anti-crawler performance and page accessibility.

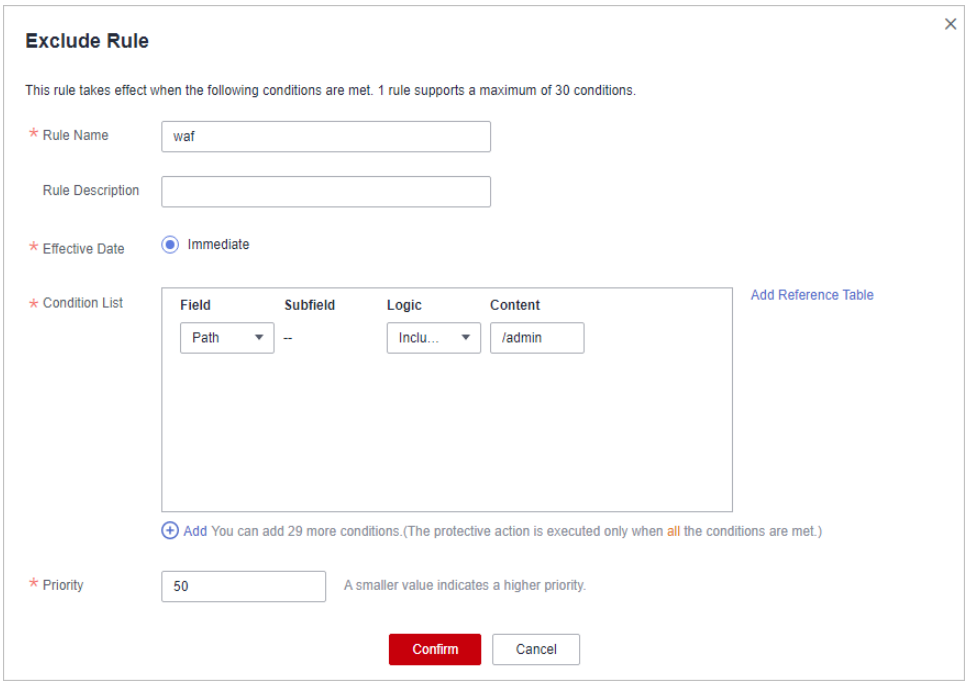
Step 9 Configure a JavaScript-based anti-crawler rule by referring to **Table 7-11**.

Two protective actions are provided: **Protect all requests** and **Protect specified requests**.

- To protect all requests except requests that hit a specified rule

  Set **Protection Mode** to **Protect all requests**. Then, click **Exclude Rule**, configure the request exclusion rule, and click **Confirm**.

  Figure 7-38 Exclude Rule



- To protect a specified request only

  Set **Protection Mode** to **Protect specified requests**, click **Add Rule**, configure the request rule, and click **Confirm**.

Figure 7-39 Add Rule

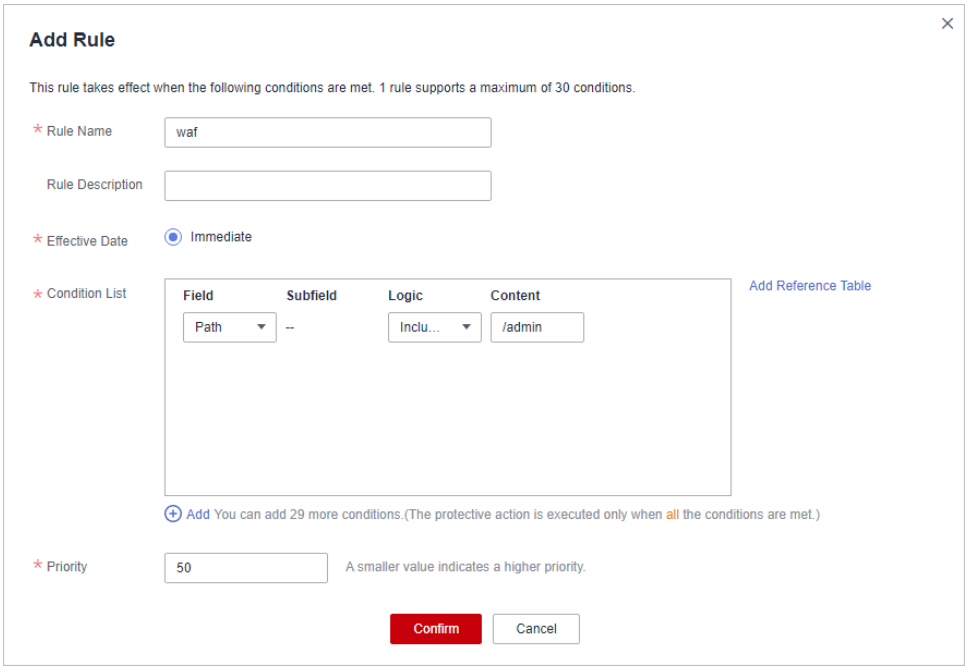


Table 7-11 Parameters of a JavaScript-based anti-crawler protection rule

Parameter	Description	Example Value
Rule Name	Name of the rule	waf
Rule Description	A brief description of the rule. This parameter is optional.	-
Effective Date	Time the rule takes effect.	Immediate

Parameter	Description	Example Value
Condition List	Parameters for configuring a condition are as follows: • **Field**: Select the field you want to protect from the drop-down list. Currently, only **Path** and **User Agent** are included. • **Subfield** • **Logic**: Select a logical relationship from the drop-down list. **NOTE** If you set **Logic** to **Include any value**, **Exclude any value**, **Equal to any value**, **Not equal to any value**, **Prefix is any value**, **Prefix is not any of them**, **Suffix is any value**, or **Suffix is not any of them**, you need to select a reference table. • **Content**: Enter or select the content that matches the condition.	**Path Include /admin**
Priority	Rule priority. If you have added multiple rules, rules are matched by priority. The smaller the value you set, the higher the priority.	5

----End

Related Operations

- To disable a rule, click **Disable** in the **Operation** column of the rule. The default **Rule Status** is **Enabled**.
- To modify a rule, click **Modify** in the row containing the rule.
- To delete a rule, click **Delete** in the row containing the rule.

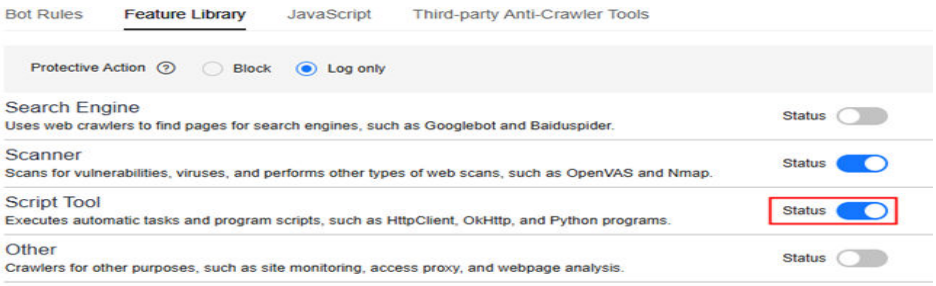
Configuration Example - Logging Script Crawlers Only

To verify that WAF is protecting domain name **www.example.com** against an anti-crawler rule:

Step 1 Execute a JavaScript tool to crawl web page content.

Step 2 On the **Feature Library** tab, enable **Script Tool** and select **Log only** for **Protective Action**. (If WAF detects an attack, it logs the attack only.)

Figure 7-40 Enabling Script Tool



Step 3 Enable anti-crawler protection.

Step 4 In the navigation pane on the left, choose **Events** to go to the **Events** page.

----End

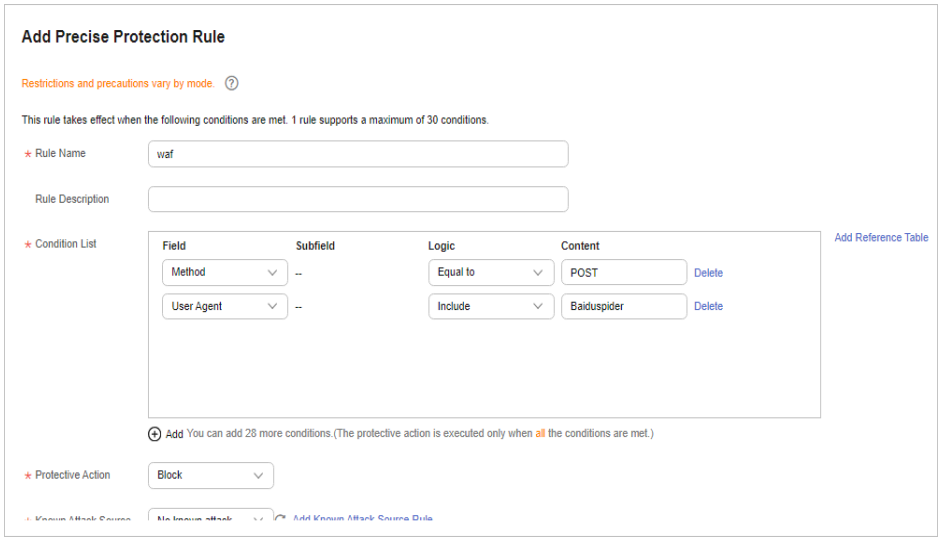
Configuration Example - Search Engine

To allow the search engine of Baidu or Google and block the POST request of Baidu:

Step 1 Set **Status** of **Search Engine** to  by referring to the instructions in **Step 7**.

Step 2 Configure a precise protection rule by referring to **Configuring Custom Precise Protection Rules**.

Figure 7-41 Blocking POST requests



----End

7.9 Configuring Information Leakage Prevention Rules to Protect Sensitive Information from Leakage

You can add two types of information leakage prevention rules.

- Sensitive information filtering: prevents disclosure of sensitive information, such as ID numbers, phone numbers, and email addresses.
- Response code interception: blocks the specified HTTP status codes.

Prerequisites

You have added the website you want to protect to WAF or **added a new protection policy**.

Constraints

- It takes several minutes for a new rule to take effect. After the rule takes effect, protection events triggered by the rule will be displayed on the **Events** page.

Configuring an Information Leakage Prevention Rule

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

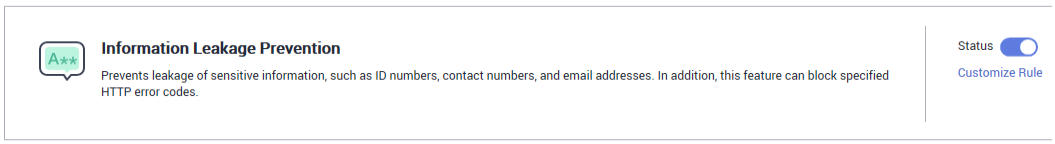
Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, click **Policies**.

Step 5 Click the name of the target policy to go to the protection configuration page.

Step 6 In the **Information Leakage Prevention** configuration area, change **Status** if needed and click **Customize Rule**.

Figure 7-42 Information Leakage Prevention configuration area



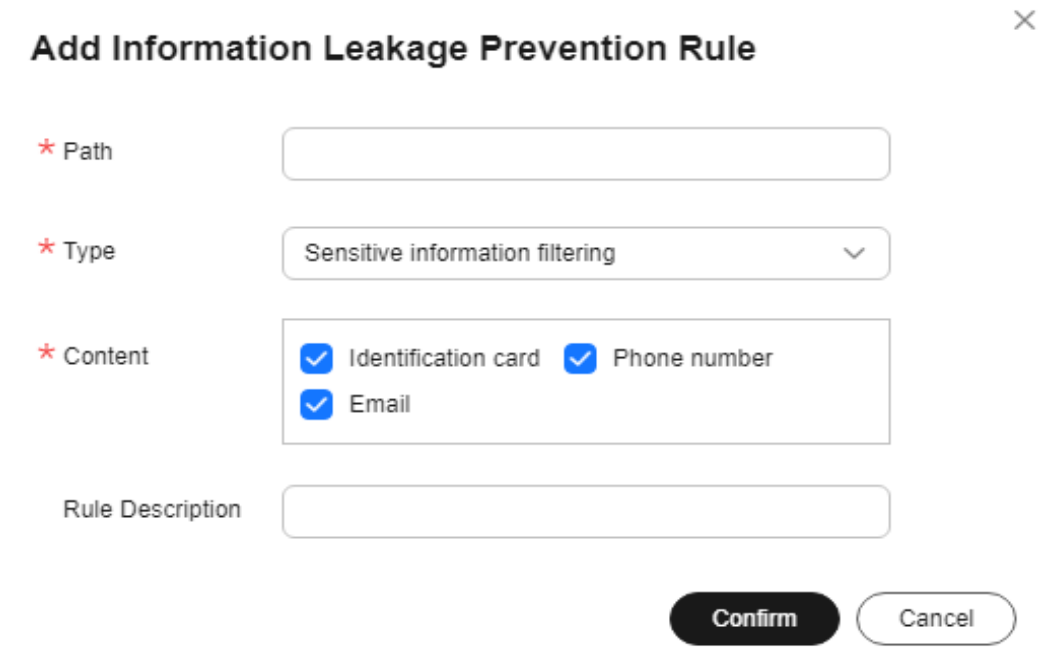
Step 7 In the upper left corner above the **Information Leakage Prevention** rule list, click **Add Rule**.

Step 8 In the dialog box displayed, add an information leakage prevention rule by referring to **Table 7-12**. **Figure 7-43** and **Figure 7-44** show the examples.

Information leakage prevention rules prevent sensitive information (such as ID numbers, phone numbers, and email addresses) from being disclosed. This type of rule can also block specified HTTP status codes.

Sensitive information filtering: Configure rules to mask sensitive information, such as phone numbers and ID numbers, from web pages. For example, you can set the following protection rules to mask sensitive information, such as ID numbers, phone numbers, and email addresses:

Figure 7-43 Sensitive information leakage



Response code interception: An error page of a specific HTTP response code may contain sensitive information. You can configure rules to block such error pages to prevent such information from being leaked out. For example, you can set the following rule to block error pages of specified HTTP response codes 404, 502, and 503.

Figure 7-44 Blocking response codes

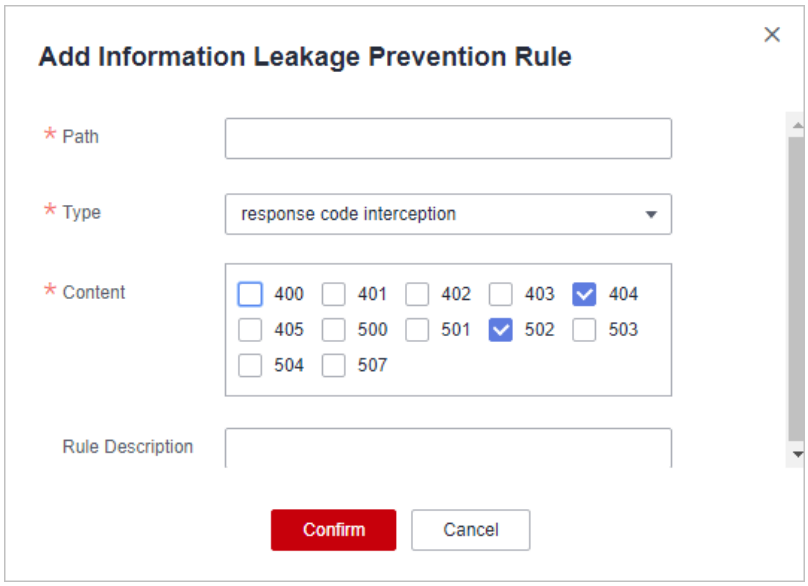


Table 7-12 Rule parameters

Parameter	Description	Example Value
Path	A part of the URL that does not include the domain name. The URL can contain sensitive information (such as ID numbers, phone numbers, and email addresses) or a blocked error code. • Prefix match: Only the prefix of the path to be entered must match that of the path to be protected. If the path to be protected is **/admin**, set **Path** to **/admin***. • Exact match: The path to be entered must match the path to be protected. If the path to be protected is **/admin**, set **Path** to **/admin**. **NOTE** – The path supports prefix and exact matches only. Regular expressions are not supported. – The path cannot contain two or more consecutive slashes. For example, **///admin**. If you enter **///admin**, the WAF engine converts /// to /.	**/admin***
Type	• **Sensitive information filtering** • **Response code interception**: Enable WAF to block the specified HTTP response code page.	**Sensitive information filtering**
Content	Information to be protected. Options are **Identification card**, **Phone number**, and **Email**.	**Identification card**
Rule Description	A brief description of the rule. This parameter is optional.	None

Step 9 Click **Confirm**. The added information leakage prevention rule is displayed in the list of information leakage prevention rules.

----End

Related Operations

- To disable a rule, click **Disable** in the **Operation** column of the rule. The default **Rule Status** is **Enabled**.
- To modify a rule, click **Modify** in the row containing the rule.
- To delete a rule, click **Delete** in the row containing the rule.

7.10 Configuring a Global Protection Whitelist Rule to Ignore False Alarms

Once an attack hits a WAF basic web protection rule or a feature-library anti-crawler rule, WAF will respond to the attack immediately according to the protective action (**Log only** or **Block**) you configured for the rule and display an event on the **Events** page.

You can add false alarm masking rules to let WAF ignore certain rule IDs or event types (for example, skip XSS checks for a specific URL).

- If you select **All protection** for **Ignore WAF Protection**, all WAF rules do not take effect, and WAF allows all request traffic to the domain names in the rule.
- If you select **Basic Web Protection** for **Ignore WAF Protection**, you can ignore basic web protection by rule ID, attack type, or all built-in rules. For example, if XSS check is not required for a URL, you can whitelist XSS rule.

Prerequisites

You have added the website you want to protect to WAF.

Constraints

- If you select **All protection** for **Ignore WAF Protection**, all WAF rules do not take effect, and WAF allows all request traffic to the domain names in the rule.
- If you select **Basic web protection** for **Ignore WAF Protection**, global protection whitelist rules take effect only for events triggered against WAF built-in rules in **Basic Web Protection** and anti-crawler rules under **Feature Library**.
  - Basic web protection rules

    Basic web protection defends against common web attacks, such as SQL injection, XSS attacks, remote buffer overflow attacks, file inclusion, Bash vulnerability exploits, remote command execution, directory traversal, sensitive file access, and command and code injections. Basic web protection also detects web shells and evasion attacks.
  - Feature-based anti-crawler protection

    Feature-based anti-crawler identifies and blocks crawler behavior from search engines, scanners, script tools, and other crawlers.
- You can configure a global protection whitelist rule by referring to **Handling False Alarms**. After handling a false alarm, you can view the rule in the global protection whitelist rule list.
- It takes several minutes for a new rule to take effect. After the rule takes effect, protection events triggered by the rule will be displayed on the **Events** page.

Configuring a Global Protection Whitelist

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

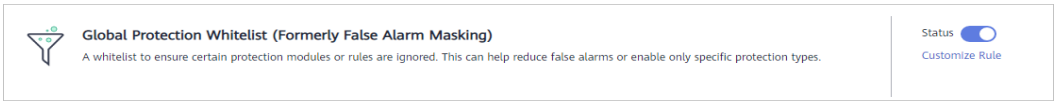
Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, click **Policies**.

Step 5 Click the name of the target policy to go to the protection configuration page.

Step 6 In the **Global Protection Whitelist** configuration area, change **Status** if needed and click **Customize Rule**.

Figure 7-45 Global Protection Whitelist configuration area



Step 7 In the upper left corner above the **Global Protection Whitelist** rule list, click **Add Rule**.

Step 8 Add a global whitelist rule by referring to **Table 7-13**.

Figure 7-46 Add Global Protection Whitelist Rule

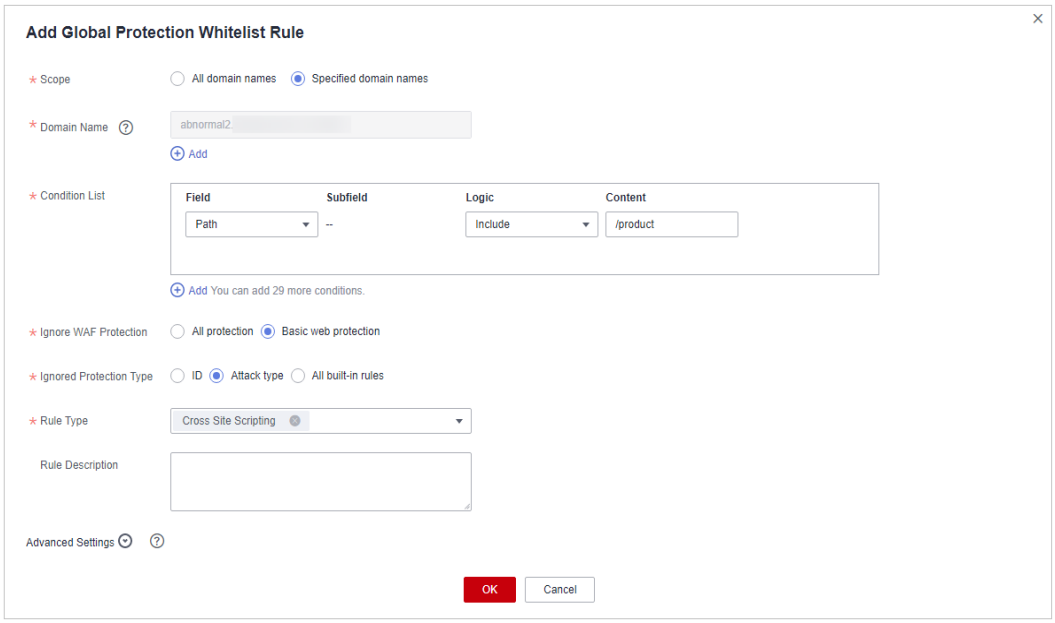


Table 7-13 Parameters

Parameter	Description	Example Value
Scope	• **All domain names**: By default, this rule will be applied to all domain names that are protected by the current policy. • **Specified domain names**: Specify a domain name range this rule applies to.	Specified domain names
Domain Name	This parameter is mandatory when you select **Specified domain names** for **Scope**. Enter a single domain name that matches the wildcard domain name being protected by the current policy.	www.example.com
Condition List	Click **Add** to add conditions. At least one condition needs to be added. You can add up to 30 conditions to a protection rule. If more than one condition is added, all of the conditions must be met for the rule to be applied. A condition includes the following parameters: Parameters for configuring a condition are described as follows: • **Field** • **Subfield**: Configure this field only when **Params**, **Cookie**, or **Header** is selected for **Field**. **NOTICE** The length of a subfield cannot exceed 2,048 characters. Only digits, letters, underscores (_), and hyphens (-) are allowed. • **Logic**: Select a logical relationship from the drop-down list. • **Content**: Enter or select the content that matches the condition.	Path, Include, / product

Parameter	Description	Example Value
Ignore WAF Protection	• **All protection**: All WAF rules do not take effect, and WAF allows all request traffic to the domain names in the rule. • **Basic web protection**: You can ignore basic web protection by rule ID, attack type, or all built-in rules. For example, if XSS check is not required for a URL, you can whitelist XSS rule.	Basic web protection
Ignored Protection Type	If you select **Basic web protection** for **Ignored WAF Protection**, select one of the following for **Ignored Protection Type**: • **ID**: Configure the rule by event ID. • **Attack type**: Configure the rule by attack type, such as XSS and SQL injection. One type contains one or more rule IDs. • **All built-in rules**: all checks enabled in **Basic Web Protection**.	Attack type
Rule ID	This parameter is mandatory when you select **ID** for **Ignored Protection Type**. Rule ID of a misreported event in **Events** whose type is not **Custom**. You are advised to handle false alarms on the **Events** page.	041046
Rule Type	This parameter is mandatory when you select **Attack type** for **Ignored Protection Type**. Select an attack type from the drop-down list box. WAF can defend against XSS attacks, web shells, SQL injection attacks, malicious crawlers, remote file inclusions, local file inclusions, command injection attacks, and other attacks.	SQL injection
Rule Description	A brief description of the rule. This parameter is optional.	SQL injection attacks are not intercepted.

Parameter	Description	Example Value
Ignore Field	To ignore attacks of a specific field, specify the field in the **Advanced Settings** area. After you add the rule, WAF will stop blocking attacks matching the specified field. Select a target field from the first drop-down list box on the left. The following fields are supported: **Params**, **Cookie**, **Header**, **Body**, and **Multipart**. • If you select **Params**, **Cookie**, or **Header**, you can select **All** or **Field** to configure a subfield. • If you select **Body** or **Multipart**, you can select **All**. • If you select **Cookie**, the **Domain Name** box for the rule can be empty. **NOTE** If **All** is selected, WAF will not block all attack events of the selected field.	Params All

Step 9 Click **OK**.

----End

Related Operations

- To disable a rule, click **Disable** in the **Operation** column of the rule. The default **Rule Status** is **Enabled**.
- To modify a rule, click **Modify** in the row containing the rule.
- To delete a rule, click **Delete** in the row containing the rule.

7.11 Configuring Data Masking Rules to Prevent Privacy Information Leakage

This topic describes how to configure data masking rules. You can configure data masking rules to prevent sensitive data such as passwords from being displayed in event logs.

Prerequisites

You have added the website you want to protect to WAF.

Constraints

It takes several minutes for a new rule to take effect. After the rule takes effect, protection events triggered by the rule will be displayed on the **Events** page.

Impact on the System

Sensitive data in the events will be masked to protect your website visitor's privacy.

Configuring a Data Masking Rule

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

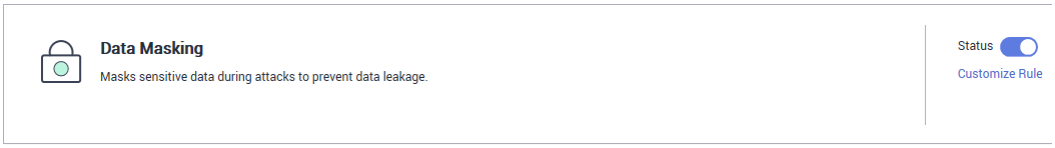
Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, click **Policies**.

Step 5 Click the name of the target policy to go to the protection configuration page.

Step 6 In the **Data Masking** configuration area, change **Status** if needed and click **Customize Rule**.

Figure 7-47 Data Masking configuration area



Step 7 In the upper left corner above the **Data Masking** rule list, click **Add Rule**.

Step 8 In the displayed dialog box, specify the parameters described in **Table 7-14**.

Figure 7-48 Adding a data masking rule

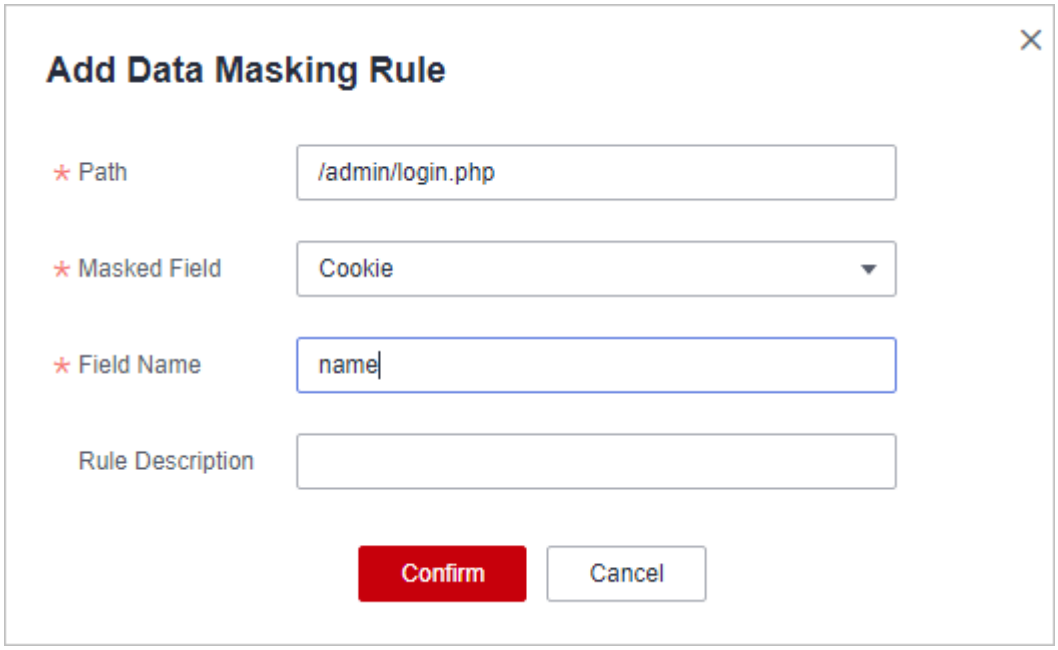


Table 7-14 Rule parameters

Parameter	Description	Example Value
Path	Part of the URL that does not include the domain name. • Prefix match: The path ending with * indicates that the path is used as a prefix. For example, if the path to be protected is **/admin/test.php** or **/adminabc**, set **Path** to **/admin***. • Exact match: The path to be entered must match the path to be protected. If the path to be protected is **/admin**, set **Path** to **/admin**. **NOTE** • The path supports prefix and exact matches only and does not support regular expressions. • The path cannot contain two or more consecutive slashes. For example, **///admin**. If you enter **///admin**, WAF converts /// to /.	/admin/login.php For example, if the URL to be protected is **http://www.example.com/admin/login.php**, set **Path** to **/admin/login.php**.

Parameter	Description	Example Value
Masked Field	A field set to be masked • **Params**: A request parameter • **Cookie**: A small piece of data to identify web visitors • **Header**: A user-defined HTTP header • **Form**: A form parameter	• If **Masked Field** is **Params** and **Field Name** is **id**, content that matches **id** is masked. • If **Masked Field** is **Cookie** and **Field Name** is **name**, content that matches **name** is masked.
Field Name	Set the parameter based on **Masked Field**. The masked field will not be displayed in logs.	
Rule Description	A brief description of the rule. This parameter is optional.	None

Step 9 Click **Confirm**. The added data masking rule is displayed in the list of data masking rules.

----End

Related Operations

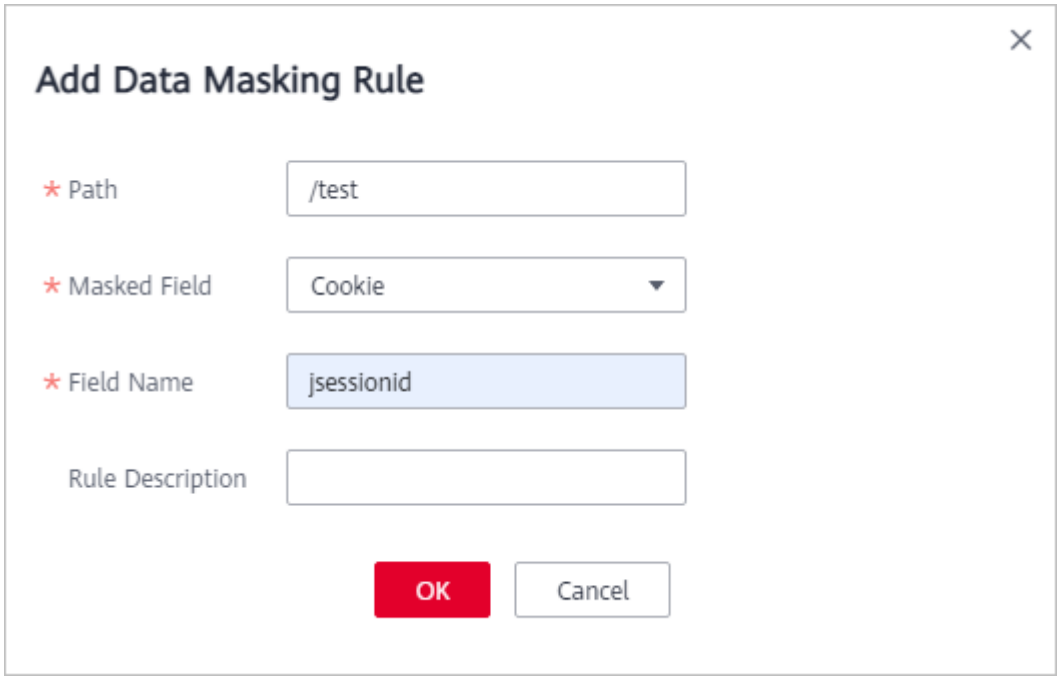
- To disable a rule, click **Disable** in the **Operation** column of the rule. The default **Rule Status** is **Enabled**.
- To modify a rule, click **Modify** in the row containing the rule.
- To delete a rule, click **Delete** in the row containing the rule.

Configuration Example - Masking the Cookie Field

To verify that WAF is protecting your domain name *www.example.com* against a data masking rule (with **Cookie** selected for **Masked Field** and **jsessionid** entered in **Field Name**):

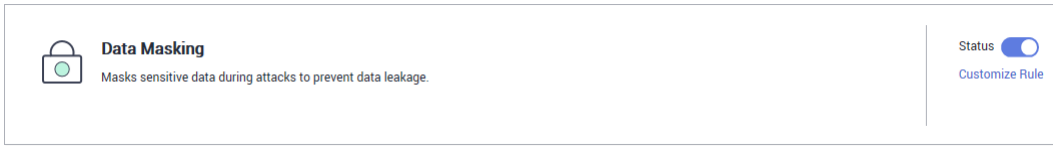
Step 1 Add a data masking rule.

Figure 7-49 Select **Cookie** for **Masked Field** and enter **jsessionid** in **Field Name**.



Step 2 Enable data masking.

Figure 7-50 Data Masking configuration area

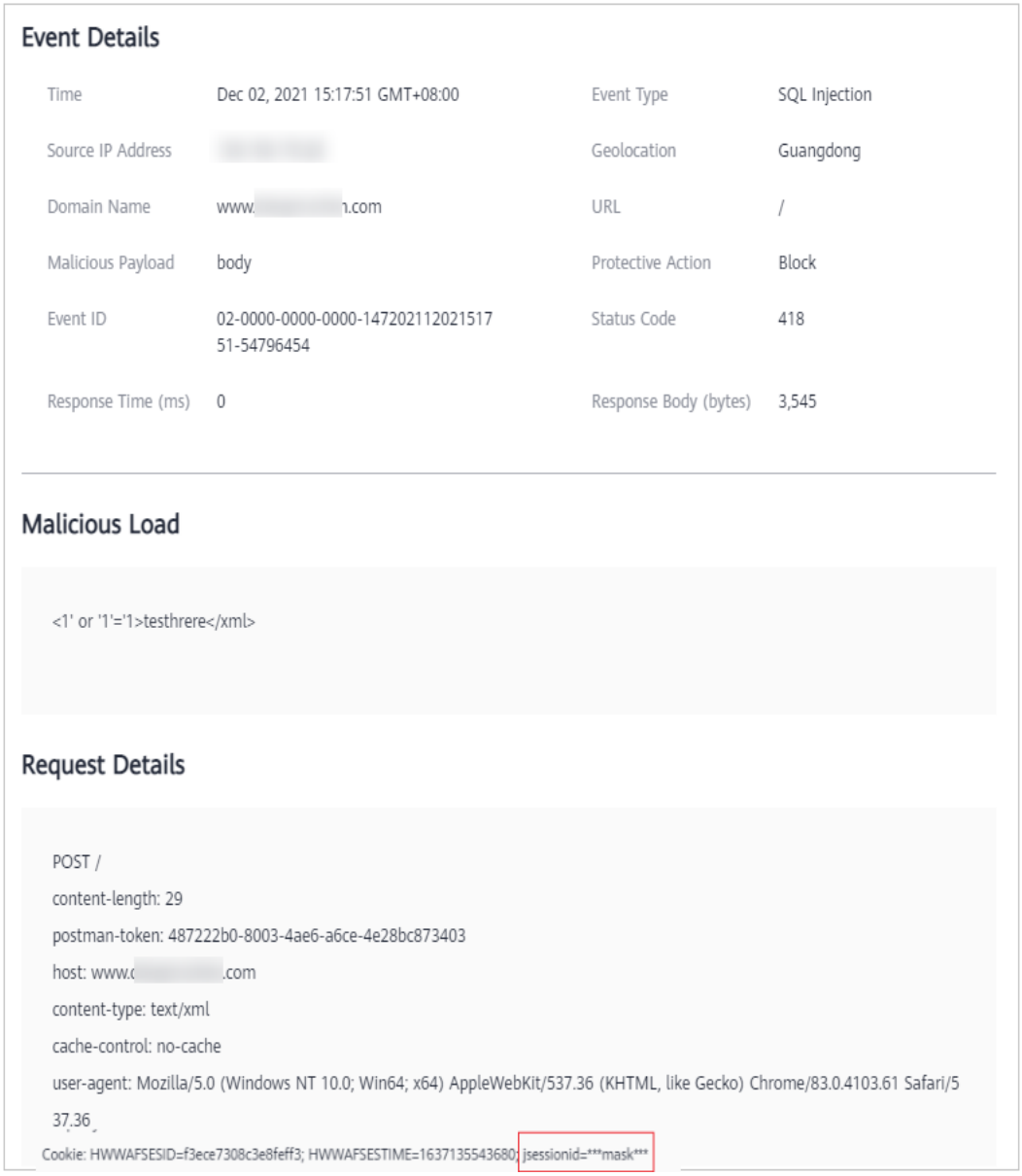


Step 3 In the navigation pane on the left, choose **Events**.

Step 4 In the row containing the event hit the rule, click **Details** in the **Operation** column and view the event details.

Data in the **jsessionid** cookie field is masked.

Figure 7-51 Viewing events - privacy data masking



----End

7.12 Creating a Reference Table to Configure Protection Metrics in Batches

This topic describes how to create a reference table to batch configure protection metrics of a single type, such as **Path**, **User Agent**, **IP**, **Params**, **Cookie**, **Referer**, and **Header**. A reference table can be referenced by CC attack protection rules and precise protection rules.

When you configure a CC attack protection rule or precise protection rule, if the **Logic** field in the **Trigger** list is set to **Include any value**, **Exclude any value**, **Equal to any value**, **Not equal to any value**, **Prefix is any value**, **Prefix is not**

any value, **Suffix is any value**, or **Suffix is not any value**, you can select an appropriate reference table from the **Content** drop-down list.

Prerequisites

You have added the website you want to protect to WAF.

Application Scenarios

Reference tables can be used for configuring multiple protection fields in CC attack protection and precise protection rules.

Creating a Reference Table

Step 1 Log in to the management console.

Step 2 Click  in the upper left corner of the management console and select a region or project.

Step 3 Click  in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, click **Policies**.

Step 5 Click the name of the target policy to go to the protection configuration page.

Step 6 In the **CC Attack Protection** or **Precise Protection** area, click **Customize Rule**.

Step 7 Click **Reference Table Management** in the upper left corner of the list.

Step 8 On the **Reference Table Management** page, click **Add Reference Table**.

Step 9 In the **Add Reference Table** dialog box, specify the parameters by referring to **Table 7-15**.

Figure 7-52 Adding a reference table

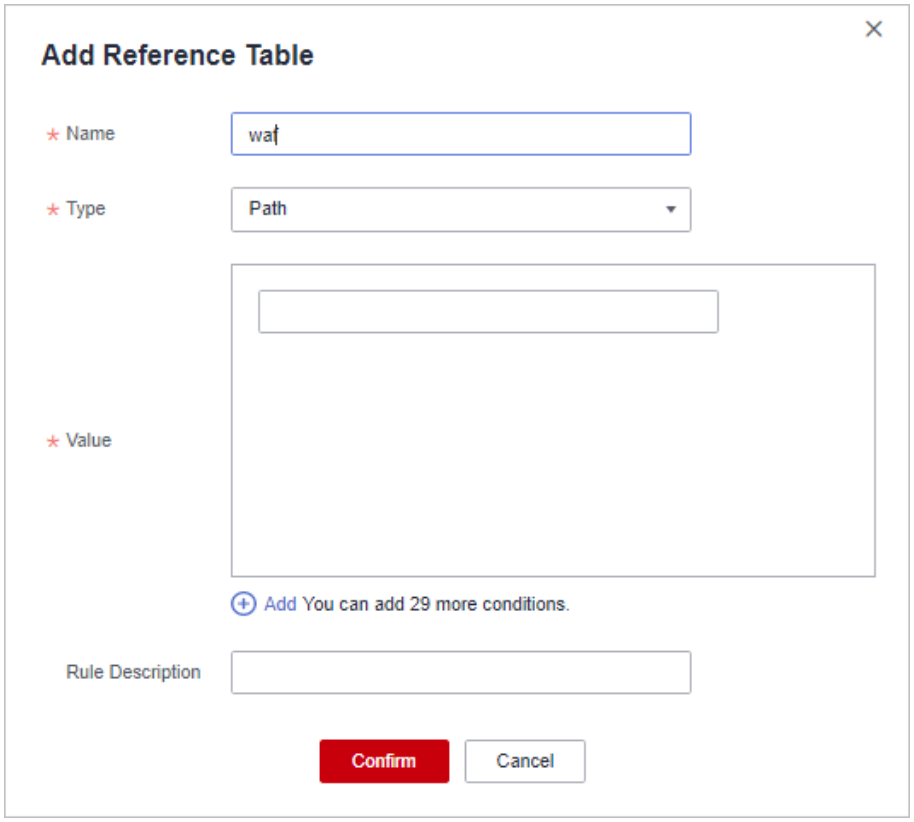


Table 7-15 Parameter description

Parameter	Description	Example Value
Name	Table name you entered	test

Parameter	Description	Example Value
Type	• **Path**: A URL to be protected, excluding a domain name • **User Agent**: A user agent of the scanner to be protected • **IP**: An IP address of the visitor to be protected. • **Params**: A request parameter to be protected • **Cookie**: A small piece of data to identify web visitors • **Referer**: A user-defined request resource For example, if the protected path is **/admin/xxx** and you do not want visitors to be able to access it from *www.test.com*, set **Value** to **http://www.test.com**. • **Header**: A user-defined HTTP header.	Path
Value	Value of the corresponding **Type**. Wildcards are not allowed. **NOTE** Click **Add** to add more than one value.	**/buy/phone/**
Rule Description	Description of the rule.	-

Step 10 Click **Confirm**. You can then view the added reference table in the reference table list.

----End

Related Operations

- To modify a reference table, click **Modify** in the row containing the reference table.
- To delete a reference table, click **Delete** in the row containing the reference table.

7.13 Configuring a Known Attack Source Rule to Block Specific Visitors for a Specified Duration

If WAF blocks a malicious request by IP address, Cookie, or Params, you can configure a known attack source rule to let WAF automatically block all requests from the attack source for a blocking duration set in the known attack source rule. For example, if a blocked malicious request originates from an IP address and you set the blocking duration to 500 seconds, WAF will block the IP address for 500 seconds after the known attack source rule takes effect.

Known attack source rules can be used by basic web protection, CC attack protection, precise protection, IP address blacklist, IP address whitelist, and other rules. You can use known attack source rules in basic web protection, CC attack protection, precise protection, and IP blacklist or whitelist rules as long as you set **Protective Action** to **Block** for these rules.

Prerequisites

You have added the website you want to protect to WAF.

Constraints

- For a known attack source rule to take effect, it must be enabled when you configure basic web protection, precise protection, blacklist, or whitelist protection rules.

  NOTICE

  For blacklist and whitelist rules, a known attack source with **Long-term IP address blocking** or **Short-term IP address blocking** configured cannot be selected.

- Before adding a known attack source rule for malicious requests blocked by Cookie or Params, a traffic identifier must be configured for the corresponding domain name. For more details, see **Configuring a Traffic Identifier for a Known Attack Source**.
- It takes several minutes for a new rule to take effect. After the rule takes effect, protection events triggered by the rule will be displayed on the **Events** page.

Specification Limitations

- You can configure up to six blocking types. Each type can have one known attack source rule configured.
- The maximum blocking duration can be 30 minutes.

Configuring a Known Attack Source Rule

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, click **Policies**.

Step 5 Click the name of the target policy to go to the protection configuration page.

Step 6 In the **Known Attack Source** configuration area, change **Status** if needed and click **Customize Rule** to go to the **Known Attack Source** page.

Figure 7-53 Known Attack Source configuration

Step 7 In the upper left corner above the known attack source rules, click **Add Known Attack Source Rule**.

Step 8 In the displayed dialog box, specify the parameters by referring to **Table 7-16**.

Figure 7-54 Add Known Attack Source Rule

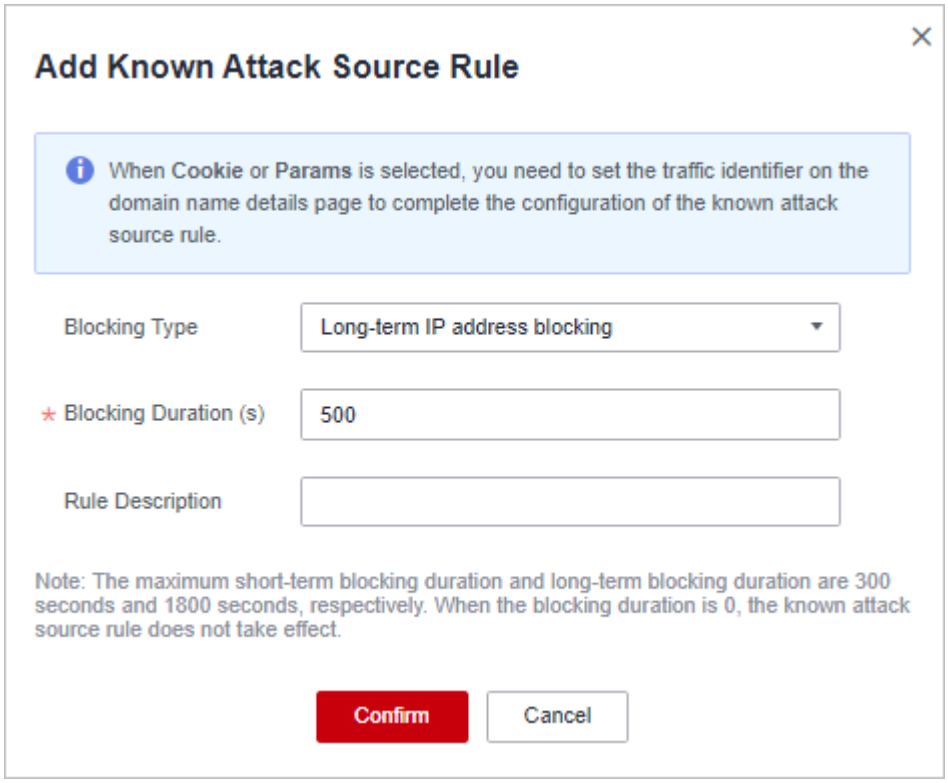


Table 7-16 Known attack source parameters

Parameter	Description	Example Value
Blocking Type	The blocking type for the rule. The options are: • **Long-term IP address blocking** • **Short-term IP address blocking** • **Long-term Cookie blocking** • **Short-term Cookie blocking** • **Long-term Params blocking** • **Short-term Params blocking** **NOTICE** For blacklist and whitelist rules, a known attack source with **Long-term IP address blocking** or **Short-term IP address blocking** configured cannot be selected.	**Long-term IP address blocking**
Blocking Duration (s)	The blocking duration must be an integer and range from: • (300, 1800] for long-term blocking • (0, 300] for short-term blocking	500
Rule Description	A brief description of the rule. This parameter is optional.	-

Step 9 Click **Confirm**. You can then view the added known attack source rule in the list.

----End

Related Operations

- To modify a rule, click **Modify** in row containing the rule.
- To delete a rule, click **Delete** in the row containing the rule.

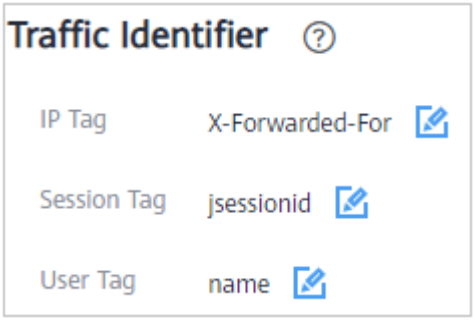
Configuration Example - Blocking Known Attack Source Identified by Cookie

Assume that domain name *www.example.com* has been connected to WAF and a visitor has sent one or more malicious requests through IP address *XXX.XXX.248.195*. You want to block access requests from this IP address and whose cookie is **jsessionid** for 10 minutes. Refer to the following steps to configure a rule and verify its effect.

Step 1 On the **Website Settings** page, click *www.example.com* to go to its basic information page.

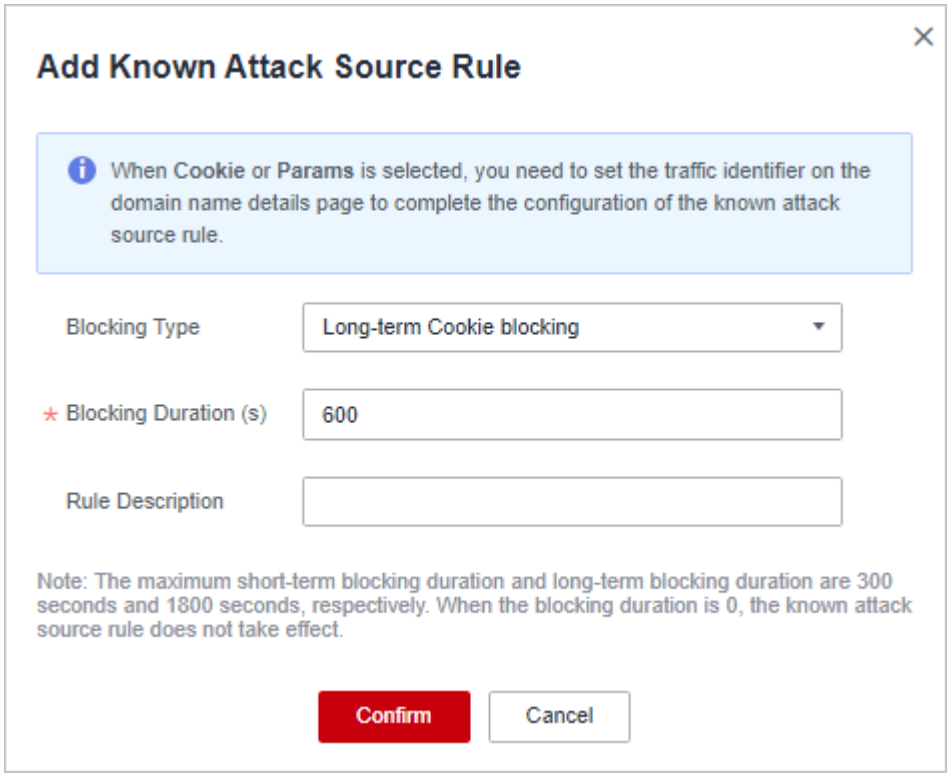
Step 2 In the **Traffic Identifier** area, configure the cookie in the **Session Tag** field.

Figure 7-55 Traffic Identifier



Step 3 Add a known attack source, select **Long-term Cookie blocking** for **Blocking Type**, and set block duration to 600 seconds.

Figure 7-56 Adding a Cookie-based known attack source rule

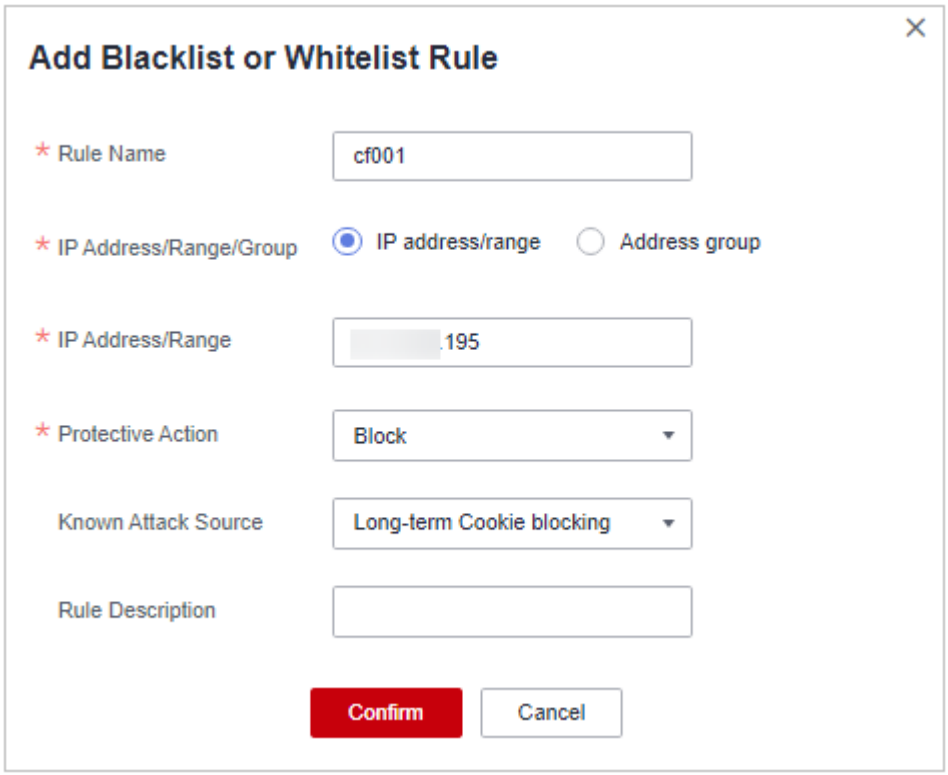


Step 4 Enable the known attack source protection.

Figure 7-57 Known Attack Source configuration

Step 5 Add a blacklist and whitelist rule to block *XXX.XXX.248.195*. Select **Long-term Cookie blocking** for **Known Attack Source**.

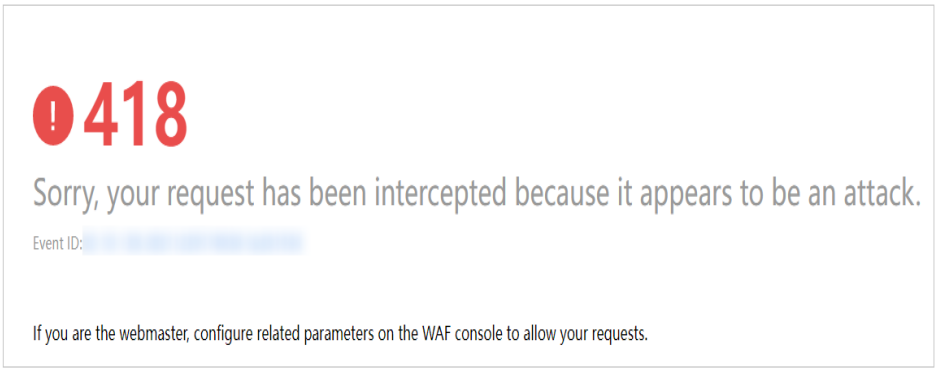
Figure 7-58 Specifying a known attack source rule



Step 6 Clear the browser cache and access http://www.example.com.

When a request from IP address *XXX.XXX.248.195*, WAF blocks the access. When WAF detects that the cookie of the access request from the IP address is **jsessionid**, WAF blocks the access request for 10 minutes.

Figure 7-59 Block page



Step 7 Go to the WAF console. In the navigation pane on the left, choose **Events**. View the event on the **Events** page.

----End

7.14 Condition Field Description

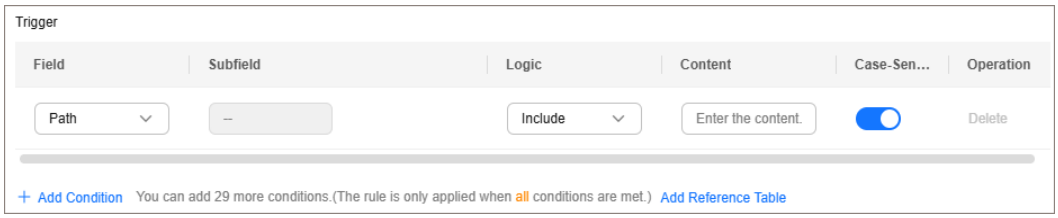
When setting a precise access, CC attack protection, or global protection whitelist rule, there are some fields in the **Condition List** or **Trigger** area. These fields

together are used to define the request attributes to trigger the rule. This topic describes the fields that you can specify in conditions to trigger a rule.

What Is a Condition Field?

A condition field specifies the request attribute WAF checks against protection rules. When configuring a **precise access protection rule**, **CC attack protection rule**, or **global protection whitelist**, you can define condition fields to specify request attributes to trigger the rule. If a request meets the conditions set in a rule, the request matches the rule. WAF handles the request based on the action (for example, allow, block, or log only) set in the rule.

Figure 7-60 Condition field



A condition field consists of the field, subfield, logic, and content. Example:

- Example 1: If **Field** is set to **Path**, **logic** to **Include**, and **Content** to **/admin**, a request matches the rule when the requested path contains /admin.
- Example 2: Set **Field** to **IPv4**, **Subfield** to **Client IP Address**, **Logic** to **Equal to**, and **Content** to **192.XX.XX.3**. When the client IP address is 192.XX.XX.3, the request hits the rule.

Supported Condition Fields

Table 7-17 Condition list configurations

Field	Subfield	Logic	Content (Example)
Path: part of a URL that does not include a domain name. This value supports exact matches only, so that the path to be protected must be the same as the path you specify for this parameter. For example, if the path to be protected is **/admin**, **Path** must be set to **/admin**.	--	Select the desired logical relationship from the **Logic** drop-down list.	*/buy/phone/* **NOTICE** • If **Path** is set to **/**, all paths of the website are protected. • The path content cannot contain the following special characters: (<>*)

Field	Subfield	Logic	Content (Example)
User Agent: a user agent of the scanner to be protected	--		*Mozilla/5.0 (Windows NT 6.1)*
IP: An IP address of the visitor.	--		XXX.XXX.1.1
Params: the request parameter to be protected	• All fields • Any subfield • Custom		201901150929
Referer: the user-defined request resource For example, if the protected path is **/admin/xxx** and you do not want visitors to access the page from **www.test.com**, set **Content** for **Referer** to **http://www.test.com**.	--		http://www.test.com
Cookie: a small piece of data to identify web visitors	• All fields • Any subfield • Custom		jsessionid
Header: the user-defined HTTP header	• All fields • Any subfield • Custom		*text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,image/apng,*/*;q=0.8*
Method: the user-defined request method.	--		**GET**, **POST**, **PUT**, **DELETE**, and **PATCH**
Request Line: the length of a user-defined request line.	--		50

Field	Subfield	Logic	Content (Example)
Request: the length of a user-defined request. It includes the request header, request line, and request body.	--		--
Protocol: The protocol of the request.	--		http

8 Viewing the Dashboard

If you have connected websites to WAF, you can have a glance at their security on the **Dashboard** page. You will learn of protection overview and the security statistics of protected websites and instances you have for up to 30 days. You can also check top event source statistics and bot protection statistics.

Prerequisites

- You have connected the website you want to protect to WAF. For details, see **Connecting a Website to WAF**.
- At least one protection rule has been configured for the domain name. For details, see **Configuring Protection Policies**.

Specification Limitations

You can view the protection data of a maximum of 30 days.

How to Calculate QPS

The QPS calculation method varies depending on the time range. For details, see **Table 8-1**.

Table 8-1 QPS calculation

Time Range	Average QPS Description	Peak QPS Description
Yesterday or **Today**	The QPS curve is made with the average QPS in every minute.	The QPS curve is made with each peak QPS in every minute.
Past 3 days	The QPS curve is made with the average QPS in every five minutes.	The QPS curve is made with each peak QPS in every five minutes.
Past 7 days	The QPS curve is made with the maximum value among the average QPS in every five minutes at a 10-minute interval.	The QPS curve is made with each peak QPS in every 10 minutes.

Time Range	Average QPS Description	Peak QPS Description
Past 30 days	The QPS curve is made with the maximum value among the average QPS in every five minutes at a one-hour interval.	The QPS curve is made with the peak QPS in every hour.

NOTE

Queries Per Second (QPS) indicates the number of requests per second. For example, an HTTP GET request is also called a query. The number of requests is the total number of requests in a specific time range.

Checking the Overview Information

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

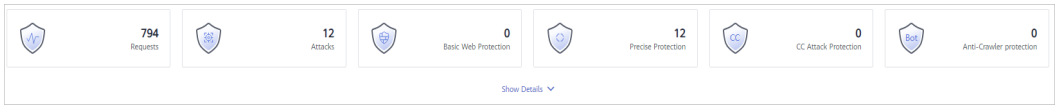
Step 4 In the upper part of the page, specify the website, instance, and time range for your query.

- By default, the information about all websites you add to WAF in all enterprise projects are displayed.
- **Domain Names**: shows information about websites added to the WAF instance. Click **View** to go to the **Website Settings** page and view details about domain names of protected websites.
- Query time: You can select **Yesterday**, **Today**, **Past 3 days**, **Past 7 days**, or **Past 30 days**.

Step 5 View how many requests, attacks, and attacked pages by attack type over the specified time range.

- **Requests**: shows the page views of the website, making it easy for you to view the total number of pages accessed by visitors in a certain period of time.
- **Attacks**: shows how many times the website are attacked.
- You can view how many pages are attacked by a certain type of attack within a certain period of time.
- You can click **Show Details** to view the details of the 10 domain names with the most requests, attacks, and basic web protection, precise protection, CC attack protection, and anti-crawler protection actions.

Figure 8-1 Protection action statistics



Step 6 Query security data in the **Security Event Statistics** area.

By day: You can select this option to view the data gathered by the day. If you leave this option unselected, you have the following options:

- **Yesterday** and **Today**: Security data is gathered every minute.
- **Past 3 days**: Security data is gathered every 5 minutes.
- **Past 7 days**: Security data is gathered every 10 minutes.
- **Past 30 days**: Security data is gathered every hour.

Figure 8-2 Security Event Statistics

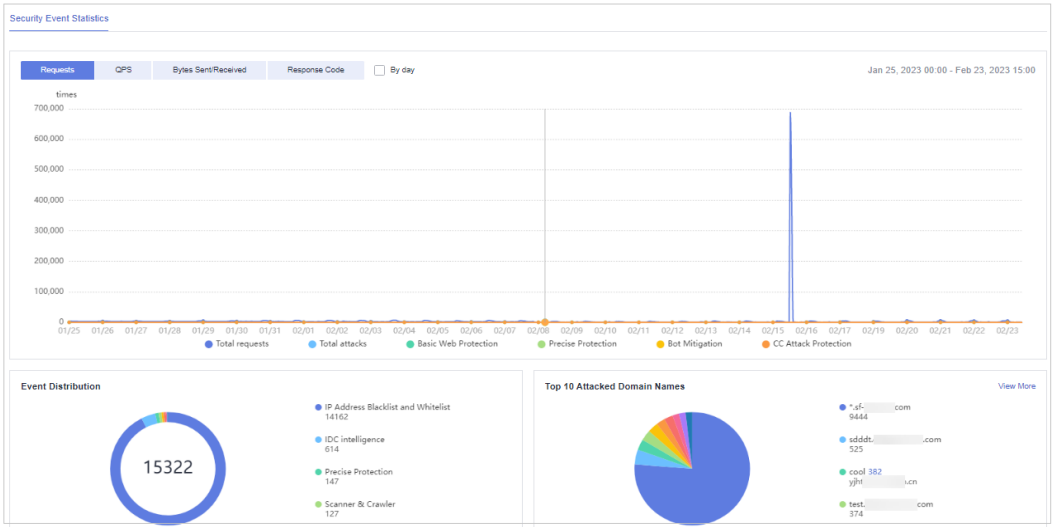


Table 8-2 Parameters in Event Source Statistics

Parameter	Description
Requests	You can view how many requests to your website as well as total attacks and attacks of each attack type.
QPS	Average number of requests per second for the domain name. For details about QPS, see **How to Calculate QPS**. Queries Per Second (QPS) indicates the number of requests per second. For example, an HTTP GET request is also called a query.
Bytes Sent/Received	Bandwidth usage. The value of sent and received bytes is calculated by adding the values of **request_length** and **upstream_bytes_received** by time, so the value is different from the network bandwidth monitored on the EIP. This value is also affected by web page compression, connection reuse, and TCP retransmission.

Parameter	Description
Response Code	Response codes returned by WAF to the client or returned by the origin server to WAF along with the corresponding number of responses. You can click **WAF to Client** or **Origin Server to WAF** to view the corresponding information. The number of response codes is accumulated based on the sequence of response codes (from left to right) in the lower part of the chart. The number of response codes is the difference between two lines. If the value of a response code is 0, the line of the response code overlaps that of the previous response code.
Event Distribution	Types of attack events. You can click an area in the **Event Distribution** area to view the type, number, and proportion of an attack.
Top 10 Attacked Domain Names	The ten most attacked domain names and the number of attacks on each domain name. You can click **View More** to go to the **Events** page and view more protection details.
Top 10 Attack Source IP Addresses	The ten source IP addresses with the most attacks and the number of attacks from each source IP address. You can click **View More** to go to the **Events** page and view more protection details.
Top 10 Attacked URLs	The ten most attacked URLs and the number of attacks on each URL. You can click **View More** to go to the **Events** page and view more protection details.

----End

9 Website Settings

9.1 Recommended Configurations After Website Connection

9.1.1 Configuring PCI DSS/3DS Compliance Check and TLS

Transport Layer Security (TLS) provides confidentiality and ensures data integrity for data sent between applications over the Internet. HTTPS is a network protocol constructed based on TLS and HTTP and can be used for encrypted transmission and identity authentication. If you set **Client Protocol** to **HTTPS**, set the minimum TLS version and cipher suite for your domain name, so that WAF can block requests that use a TLS version earlier than the one you configure. A cipher suite is a set of multiple cryptographic algorithms.

TLS v1.0 and the cipher suite 1 are configured by default in WAF for general security. To protect your websites better, set the minimum TLS version to a later version and select a more secure cipher suite.

Prerequisites

- The website to be protected has been added to WAF.
- Your website uses HTTPS as the client protocol.

Constraints

- If **Client Protocol** for the website you want to protect is set to **HTTP**, TLS is not required, and you can skip this topic.
- If you configure multiple combinations of server information, PCI DSS and PCI 3DS compliance certification checks can be set only when **Client Protocol** is set to **HTTPS** in all of those combinations.
- If PCI DSS/3DS compliance check is enabled, the client protocol cannot be changed, and no servers can be added.

Application Scenarios

By default, the minimum TLS version configured for WAF is **TLS v1.0**. To ensure website security, configure the right TLS version for your service requirements. **Table 9-1** lists the minimum TLS versions supported for different scenarios.

Table 9-1 Minimum TLS versions supported

Scenario	Minimum TLS Version (Recommended)	Protection Effect
Websites that handle critical business data, such as sites used in banking, finance, securities, and e-commerce.	TLS v1.2	WAF automatically blocks website access requests that use TLS v1.0 or TLS v1.1.
Websites with basic security requirements, for example, small and medium-sized enterprise websites.	TLS v1.1	WAF automatically blocks website access requests that use TLS v1.0.
Client applications with no special security requirements	TLS v1.0	Requests using any TLS protocols can access the website.

NOTE

Before you configure TLS, **check the TLS version of your website**.

The recommended cipher suite in WAF is **Cipher suite 1**. Cipher suite 1 offers a good mix of browser compatibility and security. For details about each cipher suite, see **Table 9-2**.

Table 9-2 Description of cipher suites

Cipher Suite Name	Cryptographic Algorithm Supported	Cryptographic Algorithm Not Supported	Description
Default cipher suite **NOTE** By default, **Cipher suite 1** is configured for websites. However, if the request does not carry the server name indication (SNI), WAF uses the **Default cipher suite**.	• ECDHE-RSA-AES256-SHA384 • AES256-SHA256 • RC4 • HIGH	• MD5 • aNULL • eNULL • NULL • DH • EDH • AESGCM	• Compatibility: Good. A wide range of browsers are supported. • Security: Average
Cipher suite 1	• ECDHE-ECDSA-AES256-GCM-SHA384 • HIGH	• MEDIUM • LOW • aNULL • eNULL • DES • MD5 • PSK • RC4 • kRSA • 3DES • DSS • EXP • CAMELLIA	Recommended configuration. • Compatibility: Good. A wide range of browsers are supported. • Security: Good

Cipher Suite Name	Cryptographic Algorithm Supported	Cryptographic Algorithm Not Supported	Description
Cipher suite 2	• EECDH+AESGCM • EDH+AESGCM	-	• Compatibility: Average. Strict compliance with forward secrecy requirements of PCI DSS and excellent protection, but browsers of earlier versions may be unable to access the website. • Security: Excellent
Cipher suite 3	• ECDHE-RSA-AES128-GCM-SHA256 • ECDHE-RSA-AES256-GCM-SHA384 • ECDHE-RSA-AES256-SHA384 • RC4 • HIGH	• MD5 • aNULL • eNULL • NULL • DH • EDH	• Compatibility: Average. Earlier versions of browsers may be unable to access the website. • Security: Excellent. Multiple algorithms, such as ECDHE, DHE-GCM, and RSA-AES-GCM, are supported.
Cipher suite 4	• ECDHE-RSA-AES256-GCM-SHA384 • ECDHE-RSA-AES128-GCM-SHA256 • ECDHE-RSA-AES256-SHA384 • AES256-SHA256 • RC4 • HIGH	• MD5 • aNULL • eNULL • NULL • EDH	• Compatibility: Good. A wide range of browsers are supported. • Security: Average. The GCM algorithm is supported.

Cipher Suite Name	Cryptographic Algorithm Supported	Cryptographic Algorithm Not Supported	Description
Cipher suite 5	• AES128-SHA:AES256-SHA • AES128-SHA256:AES256-SHA256 • HIGH	• MEDIUM • LOW • aNULL • eNULL • EXPORT • DES • MD5 • PSK • RC4 • DHE	Supported algorithms: RSA-AES-CBC only
Cipher suite 6	• ECDHE-ECDSA-AES256-GCM-SHA384 • ECDHE-RSA-AES256-GCM-SHA384 • ECDHE-ECDSA-AES128-GCM-SHA256 • ECDHE-RSA-AES128-GCM-SHA256 • ECDHE-ECDSA-AES256-SHA384 • ECDHE-RSA-AES256-SHA384 • ECDHE-ECDSA-AES128-SHA256 • ECDHE-RSA-AES128-SHA256	-	• Compatibility: Average • Security: Good

The TLS cipher suites in WAF are compatible with all browsers and clients of later versions but are incompatible with some browsers of earlier versions. **Table 9-3** lists the incompatible browsers and clients if the TLS v1.0 protocol is used.

NOTICE

It is recommended that compatibility tests should be carried out on the service environment to ensure service stability.

Table 9-3 Incompatible browsers and clients for cipher suites under TLS v1.0

Browser/Client	Default Cipher Suite	Cipher Suite 1	Cipher Suite 2	Cipher Suite 3	Cipher Suite 4	Cipher suite 5	Cipher suite 6
Google Chrome 63 /macOS High Sierra 10.13.2	Not compatible	Compatible	Compatible	Compatible	Not compatible	Compatible	√
Google Chrome 49/ Windows XP SP3	Not compatible	Not compatible	Not compatible	Not compatible	Not compatible	Compatible	Compatible
Internet Explorer 6 /Windows XP	Not compatible	Not compatible	Not compatible	Not compatible	Not compatible	Not compatible	Not compatible
Internet Explorer 8 /Windows XP	Not compatible	Not compatible	Not compatible	Not compatible	Not compatible	Not compatible	Not compatible
Safari 6/iOS 6.0.1	Compatible	Compatible	Not compatible	Compatible	Compatible	Compatible	Compatible
Safari 7/iOS 7.1	Compatible	Compatible	Not compatible	Compatible	Compatible	Compatible	Compatible
Safari 7/OS X 10.9	Compatible	Compatible	Not compatible	Compatible	Compatible	Compatible	Compatible
Safari 8/iOS 8.4	Compatible	Compatible	Not compatible	Compatible	Compatible	Compatible	Compatible
Safari 8/OS X 10.10	Compatible	Compatible	Not compatible	Compatible	Compatible	Compatible	Compatible
Internet Explorer 7/Windows Vista	Compatible	Compatible	Not compatible	Compatible	Compatible	Not compatible	√
Internet Explorer 8, 9, or 10 /Windows 7	Compatible	Compatible	Not compatible	Compatible	Compatible	Not compatible	√
Internet Explorer 10 /Windows Phone 8.0	Compatible	Compatible	Not compatible	Compatible	Compatible	Not compatible	√

Browser/Client	Default Cipher Suite	Cipher Suite 1	Cipher Suite 2	Cipher Suite 3	Cipher Suite 4	Cipher suite 5	Cipher suite 6
Java 7u25	Compatible	Compatible	Not compatible	Compatible	Compatible	Not compatible	√
OpenSSL 0.9.8y	Not compatible	Not compatible	Not compatible	Not compatible	Not compatible	Not compatible	Not compatible
Safari 5.1.9/OS X 10.6.8	Compatible	Compatible	Not compatible	Compatible	Compatible	Not compatible	√
Safari 6.0.4/OS X 10.8.4	Compatible	Compatible	Not compatible	Compatible	Compatible	Not compatible	√

Impact on the System

- If you enable the PCI DSS certification check:
  - The minimum TLS version and cypher suite are automatically set to **TLS v1.2** and **EECDH+AESGCM:EDH+AESGCM**, respectively, and cannot be changed.
  - To change the minimum TLS version and cipher suite, disable the check.
- If you enable the PCI 3DS certification check:
  - The minimum TLS version is automatically set to **TLS v1.2** and cannot be changed.
  - The check cannot be disabled.

Configuring PCI DSS/3DS Compliance Check and TLS

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

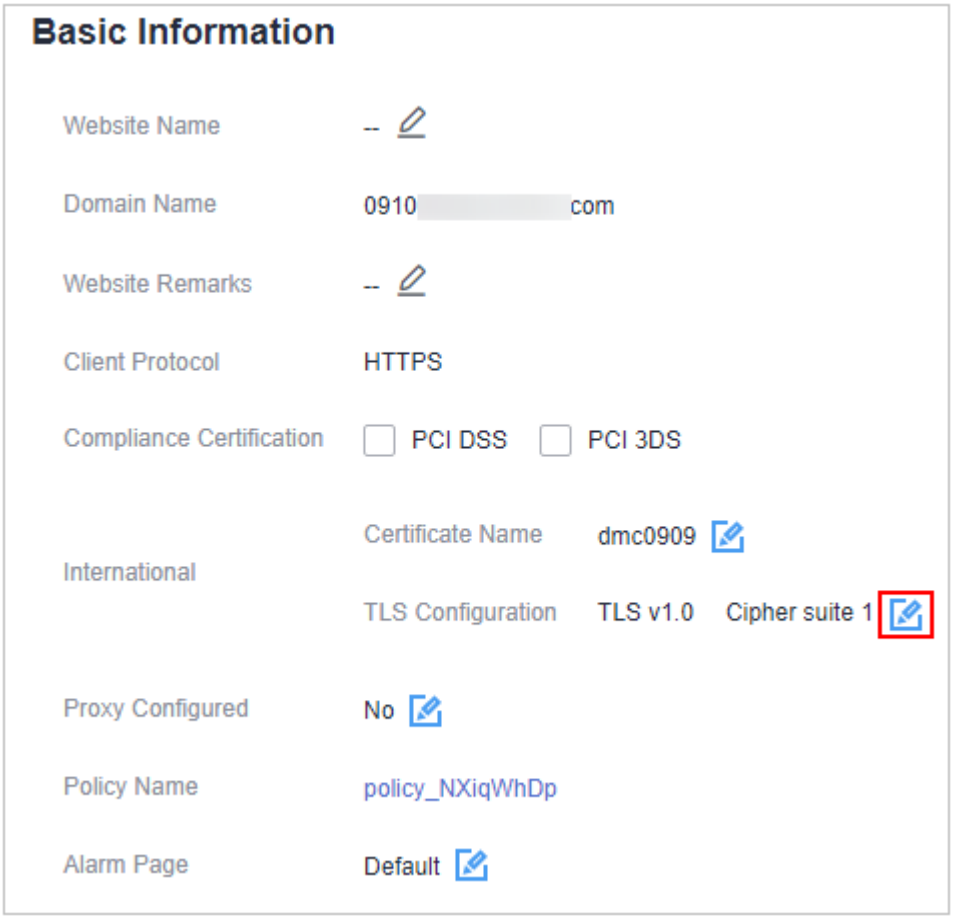
Step 4 In the navigation pane on the left, choose **Website Settings**.

Step 5 In the **Domain Name** column, click the domain name of the website to go to the basic information page.

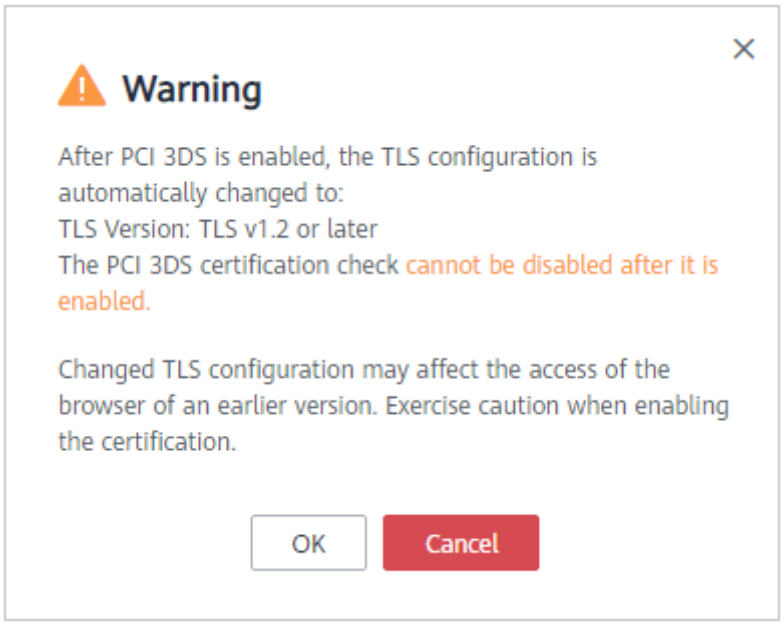
Step 6 In the **Compliance Certification** row, you can select **PCI DSS** and/or **PCI 3DS** to allow WAF to check your website for the corresponding PCI certification

compliance. In the **TLS Configuration** row, click to complete TLS configuration.

Figure 9-1 TLS configuration modification



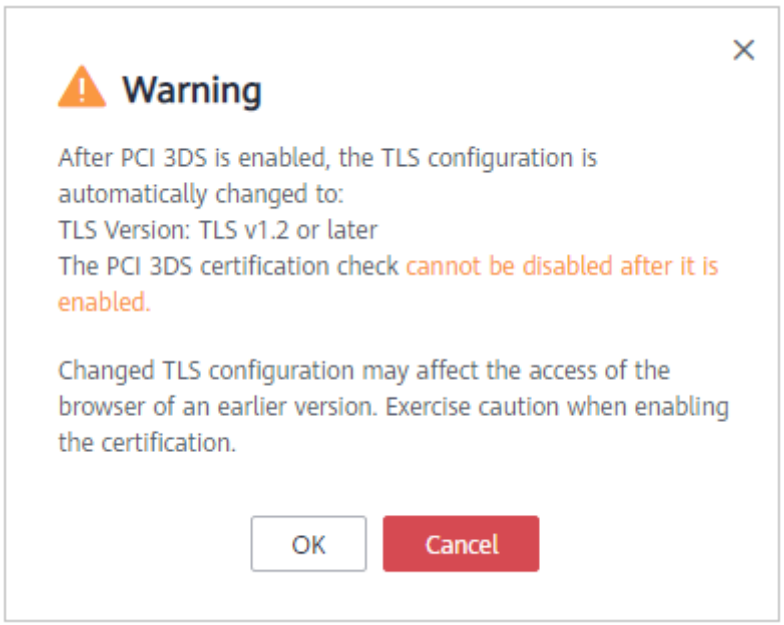
- Select **PCI DSS**. In the displayed **Warning** dialog box, click **OK** to enable the PCI DSS certification check.



NOTICE

If PCI DSS certification check is enabled, the minimum TLS version and cypher suite cannot be changed.

- Select **PCI 3DS**. In the displayed **Warning** dialog box, click **OK** to enable the PCI 3DS certification check.

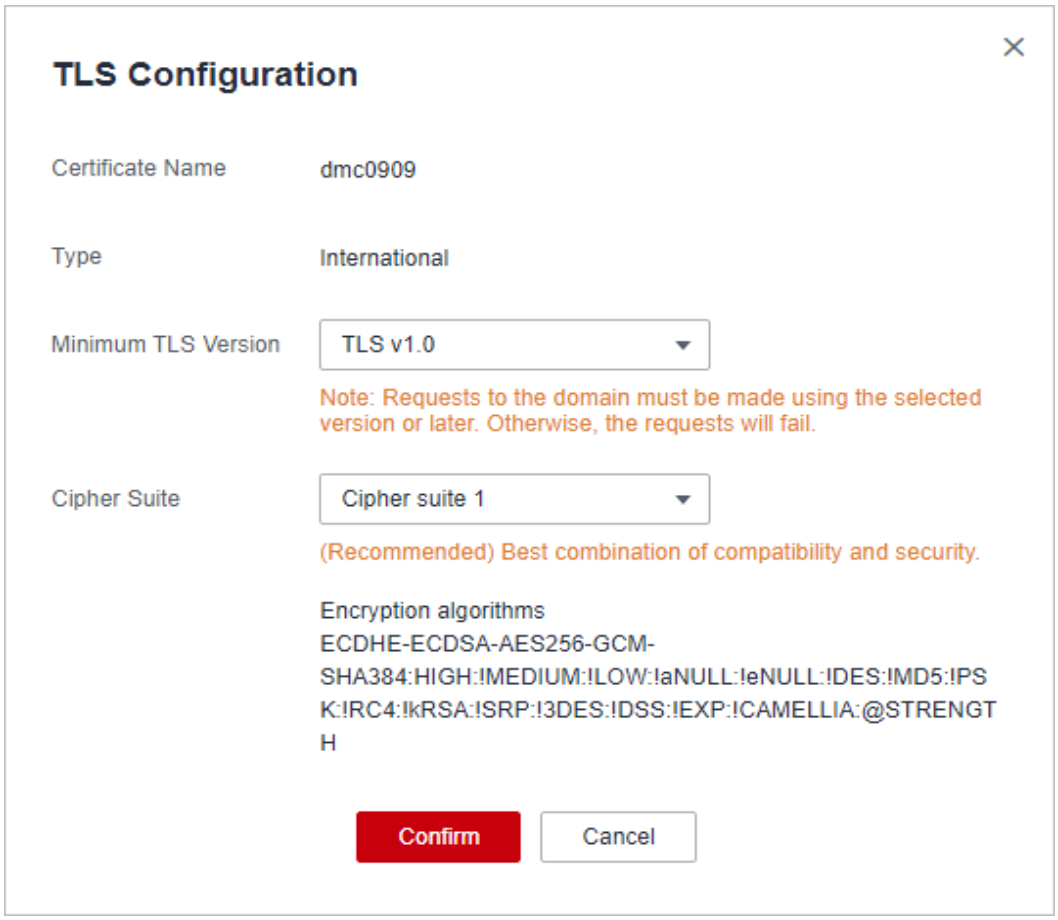


NOTICE

- If PCI 3DS certification check is enabled, the minimum TLS version cannot be changed.
- Once enabled, the PCI 3DS certification check cannot be disabled.

Step 7 In the displayed **TLS Configuration** dialog box, select the minimum TLS version and cipher suite.

Figure 9-2 TLS Configuration



Select the minimum TLS version you need. The options are as follows:

- **TLS v1.0**: the default version. Requests using TLS v1.0 or later can access the domain name.
- **TLS v1.1**: Only requests using TLS v1.1 or later can access the domain name.
- **TLS v1.2**: Only requests using TLS v1.2 or later can access the domain name.

Step 8 Click **Confirm**.

----End

Verification

If the **Minimum TLS Version** is set to **TLS v1.2**, the website can be accessed over connections secured by TLS v1.2 or later, but cannot be accessed over connections secured by TLS v1.1 or earlier.

9.1.2 Enabling the HTTP/2 Protocol

If your website is accessible over the HTTP/2 protocol, enable HTTP/2 in WAF. The HTTP/2 protocol can be used only for access between the client and WAF on the condition that at least one origin server has **HTTPS** used for **Client Protocol**.

Prerequisites

You have **added the website to WAF** and selected HTTPS for **Client Protocol**.

Constraints

You have selected **Cloud mode** for your website deployment.

Enabling the HTTP/2 Protocol

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Website Settings**.

Step 5 In the **Domain Name** column, click the domain name of the website to go to the basic information page.

Step 6 In the **HTTP/2 Used** row, click . Then, select **Yes** and click **OK**.

----End

9.1.3 Configuring Header Forwarding

This topic describes how to use WAF to insert additional header fields into website requests. For example, you can insert the **$request_id** field into the request header to identify the request throughout the entire link.

Prerequisites

The website to be protected has been added to WAF.

Constraints

- You can configure up to eight key/value pairs.
- The key value can be set to any value other than keys in native Nginx fields.

- Dots (.) cannot be specified in the request header for forwarding.
- The value can be set to a custom string or a variable starting with $. Variables starting with $ support only the following fields:

```
$time_local
$request_id
$connection_requests
$tenant_id
$project_id
$remote_addr
$remote_port
$scheme
$request_method
$http_host
$origin_uri
$request_length
$ssl_server_name
$ssl_protocol
$ssl_curves
$ssl_session_reused
```

Configuring Header Forwarding

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner and choose **Web Application Firewall** under **Security**.

Step 4 In the navigation pane on the left, choose **Website Settings**.

Step 5 On the **Website Settings** page, click the target website domain name to go to its basic information page.

Step 6 In the **Advanced Settings** area, click next to **Forward Field**.

Step 7 In the displayed dialog box, enter a key/value pair and click **Add** to add multiple fields.

Step 8 After the fields are added, click **Confirm**.

----End

9.1.4 Modifying the Alarm Page

If a visitor is blocked by WAF, the **Default** block page of WAF is returned by default. You can also configure **Custom** or **Redirection** for the block page to be returned as required.

Prerequisites

You have connected the website you want to protect to WAF.

Constraints

- The content of the text/html, text/xml, and application/json pages can be configured on the **Custom** block page to be returned.

- The root domain name of the redirection address must be the same as the currently protected domain name (including a wildcard domain name). For example, if the protected domain name is **www.example.com** and the port is 8080, the redirection URL can be set to **http://www.example.com:8080/error.html**.

Editing Response Page for Blocked Requests

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner and choose **Security** > **Web Application Firewall**.

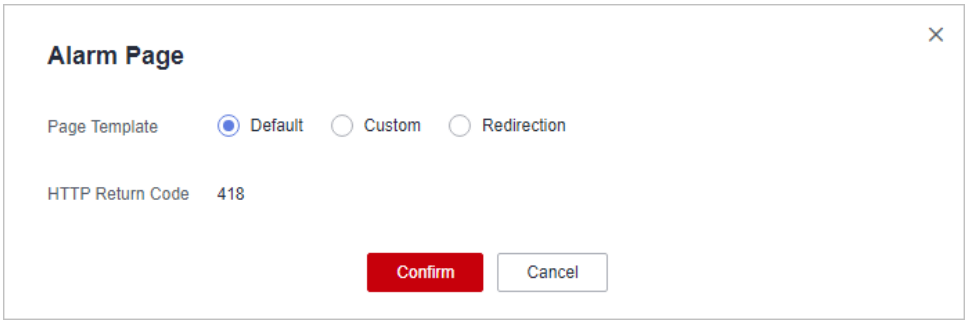
Step 4 In the navigation pane on the left, choose **Website Settings**.

Step 5 In the **Domain Name** column, click the domain name of the website to go to the basic information page.

Step 6 Click next to the page template name in the row of **Alarm Page**. In the displayed **Alarm Page** dialog box, specify **Page Template**.

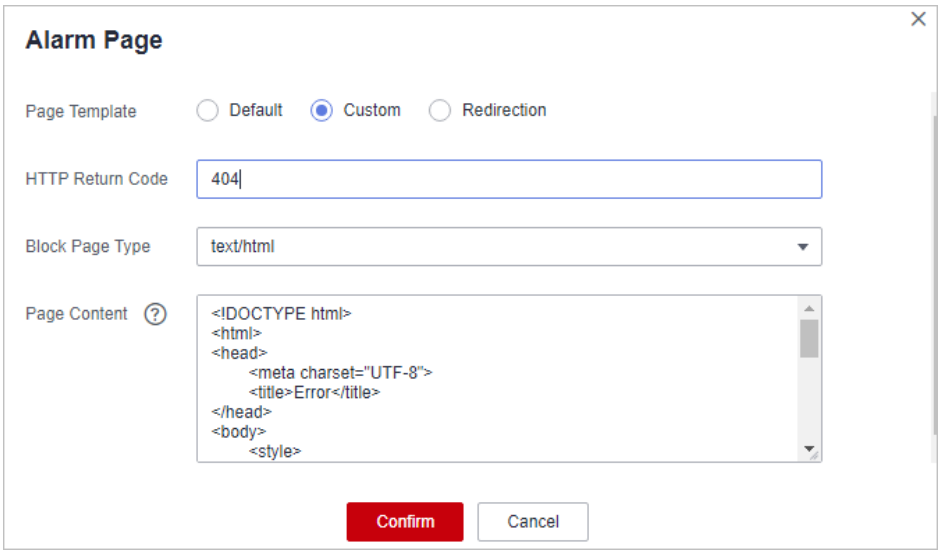
- To use the built-in page, select **Default**. An HTTP code 418 is returned.

  Figure 9-3 Default alarm page

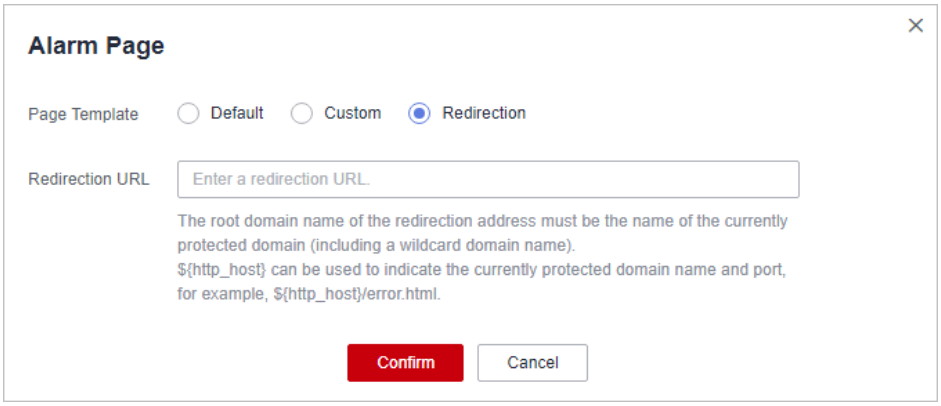
- To customize the alarm page, select **Custom** and configure following parameters. **Figure 9-4** shows an example.
  - **HTTP Return Code**: return code configured on a custom page.
  - **Response Header**: Click **Add Response Header Field** and configure response header parameters.
  - **Block Page Type**: The options are **text/html**, **text/xml**, and **application/json**.
  - **Page Content**: Configure the page content based on the selected value for **Block Page Type**.

Figure 9-4 Custom alarm page



- To configure a redirection URL, select **Redirection**.

Figure 9-5 Redirection alarm page



The root domain name of the redirection URL must be the same as the currently protected domain name (including a wildcard domain name). For example, if the protected domain name is **www.example.com** and the port is 8080, the redirection URL can be set to **http://www.example.com:8080/error.html**.

Step 7 Click **Confirm**.

----End

9.1.5 Switching the Load Balancing Algorithm

If you configure one or more origin server addresses, you can use a load balancing algorithm to distribute traffic across these origin servers. WAF supports the following algorithms:

- **Origin server IP hash**: Requests from the same IP address are routed to the same backend server.

- Weighted round robin: All requests are distributed across origin servers in turn based on weights set to each origin server. The origin server with a larger weight receives more requests than others.
- **Session hash**: Requests with the same session tag are routed to the same origin server. To enable this algorithm, **configure traffic identifiers for known attack sources**, or Session hash algorithm cannot take effect.

Prerequisites

The website you want to protect has been connected to WAF.

Switching the Load Balancing Algorithm

Step 1 Log in to the management console.

Step 2 Click  in the upper left corner of the management console and select a region or project.

Step 3 Click  in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Website Settings**.

Step 5 In the **Domain Name** column, click the domain name of the website to go to the basic information page.

Step 6 In the **Load Balancing Algorithm** field, click  . In the dialog box displayed, select a load balancing algorithm and click **Confirm**.

----End

9.1.6 Configuring a Traffic Identifier for a Known Attack Source

WAF allows you to configure traffic identifiers by IP address, session, or user tag to block possibly malicious requests from known attack sources based on **IP address**, **Cookie**, or **Params**.

Prerequisites

You have connected the website you want to protect to WAF.

Constraints

- If the IP address tag is configured, ensure that the protected website has a layer-7 proxy configured in front of WAF and that **Proxy Configured** is set to **Yes** for the protected website.

  If the IP address tag is not configured, WAF identifies the client IP address by default.
- Before enabling cookie- or params-based known attack source rules, configure a session or user tag for the corresponding website domain name.

Traffic identifier for a known attack source

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Website Settings**.

Step 5 In the **Domain Name** column, click the domain name of the target website to go to the basic information page.

Step 6 In the **Traffic Identifier** area, click next to **IP Tag**, **Session Tag**, or **User Tag** and configure a traffic identifier by referring to **Table 9-4**.

Figure 9-6 Traffic Identifier

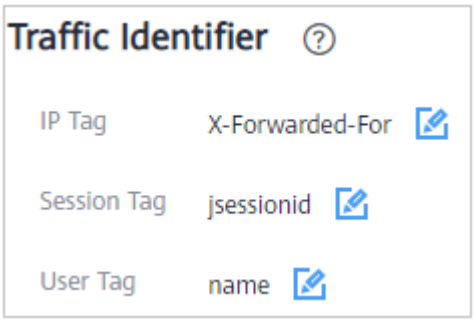


Table 9-4 Traffic identifier parameters

Tag	Description	Example Value
IP Tag	HTTP request header field of the original client IP address. Ensure that the protected website has a layer-7 proxy configured in front of WAF and that **Proxy Configured** under the website basic information settings is set to **Yes** for this parameter to take effect. This field is used to store the real IP address of the client. You can customize the field name and configure multiple fields (separated by commas). After the configuration, WAF preferentially reads the configured field to obtain the real IP address of the client. If multiple fields are configured, WAF reads the IP address from left to right. **NOTICE** • If you want to use a TCP connection IP address as the client IP address, set **IP Tag** to **$remote_addr**. • If WAF does not obtain the real IP address of a client from fields you configure, WAF reads the **cdn-src-ip**, **x-real-ip**, **x-forwarded-for**, and **$remote_addr** fields in sequence to read the client IP address.	X-Forwarded-For
Session Tag	This tag is used to block possibly malicious requests based on the cookie attributes of an attack source. Configure this parameter to block requests based on cookie attributes.	jssessionid

Tag	Description	Example Value
User Tag	This tag is used to block possibly malicious requests based on the Params attribute of an attack source. Configure this parameter to block requests based on the Params attributes.	name

Step 7 Click **Confirm**.

----End

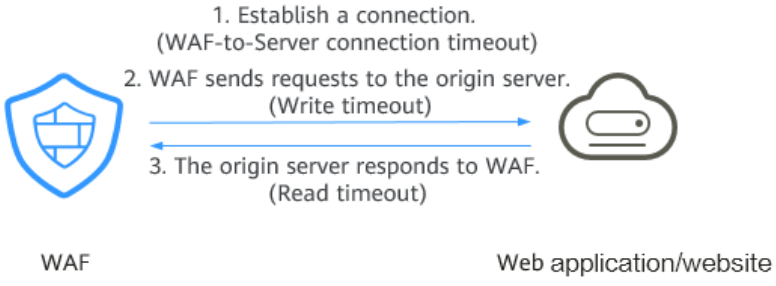
9.1.7 Configuring a Timeout for Connections Between WAF and a Website Server

If you want to set a timeout duration for each request between your WAF instance and origin server, enable **Timeout Settings** and specify **WAF-to-Server connection timeout (s)**, **Read timeout (s)**, and **Write timeout (s)**. This function cannot be disabled once it is enabled.

- **WAF-to-Server Connection Timeout**: timeout for WAF and the origin server to establish a TCP connection.
- **Write Timeout**: Timeout set for WAF to send a request to the origin server. If the origin server does not receive a request within the specified write timeout, the connection times out.
- **Read Timeout**: Timeout set for WAF to read responses from the origin server. If WAF does not receive any response from the origin server within the specified read timeout, the connection times out.

Figure 9-7 shows the three steps for WAF to forward requests to an origin server.

Figure 9-7 WAF forwarding requests to origin servers.



NOTE

- The timeout for connections from a browser to WAF is 120 seconds. The value varies depending on your browser settings and cannot be changed on the WAF console.
- The default timeout duration for the connection between WAF and an origin server is 30 seconds. This topic walks you through how to customize the timeout duration.

Prerequisites

You have connected the website you want to protect to WAF.

Constraints

- The timeout duration for connections between a browser and WAF cannot be modified. Only timeout duration for connections between WAF and your origin server can be modified.
- This function cannot be disabled once it is enabled.

Configuring a Timeout for Connections Between WAF and a Website Server

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Website Settings**.

Step 5 In the **Domain Name** column, click the website domain name to go to the basic information page.

Step 6 In the **Timeout Settings** row, toggle on if needed.

Step 7 Click , specify **WAF-to-Server connection timeout (s)**, **Read timeout (s)**, and **Write timeout (s)**, and click to save settings.

----End

9.2 Managing Websites

9.2.1 Viewing Basic Information of a Website

This topic describes how to view client protocol, policy name, alarm page, CNAME record, and CNAME IP address configured for a protected domain name.

Prerequisites

You have connected the website you want to protect to WAF.

Viewing Basic Information of a Website

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click ☰ in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Website Settings**.

Step 5 View the protected website list. For details about parameters, see **Table 9-5**.

Figure 9-8 Website list

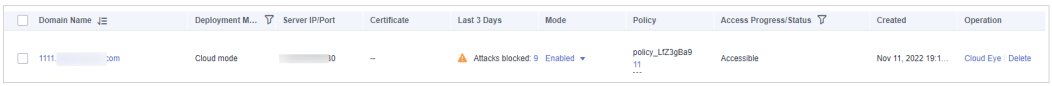


Table 9-5 Parameters

Parameter	Parameter
Domain Name	Protected domain name or IP address.
Access Progress	The progress of connecting your website to WAF or the website access status. • **Inaccessible**: The website has not been connected to WAF yet or failed to connect to WAF. • **Accessible**: The website has been connected to WAF.
Protection	WAF instance protection configured for your website. The options are **Cloud** and **Dedicated**.
Server IP/Port	Public IP address of the website server accessed by the client and the service port used by WAF to forward client requests to the server.
Certificate	Certificate associated with the domain name. You can click the certificate name to go to the **Certificates** page.
Last 3 Days	Protection status of the domain name over the past three days.

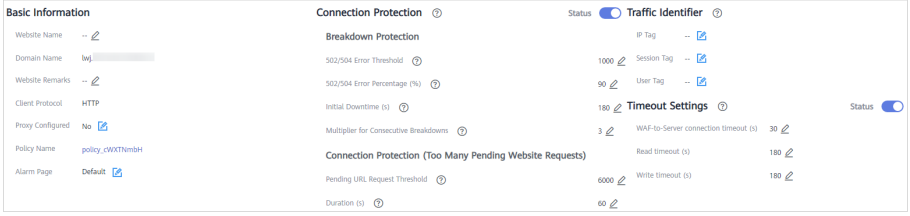
Parameter	Parameter
Mode	WAF mode of the protected domain name. You can click ▼ to select one of the following protection modes: • **Enabled**: WAF is enabled. • **Suspended**: WAF is disabled. If a large number of normal requests are blocked, for example, status code 418 is frequently returned, then you can switch the mode to **Suspended**. In this mode, your website is not protected because WAF only forwards requests. It does not scan for attacks. This mode is risky. You are advised to use the global protection whitelist rules to reduce false alarms. • **Bypassed**: In this mode, requests are directly sent to the backend servers without passing through WAF. **NOTE** The working mode can be switched to **Bypassed** only if the website is protected in **Cloud** mode and the following conditions are met: – Website services need to be restored to the status when the domain is not connected to WAF. – You need to investigate website errors, such as 502, 504, or other incompatibility issues. – No proxies are configured between the client and WAF. For details, see **Changing the Protection Mode**.
Policy	Number of types of WAF protection enabled for the domain name. You can click the number to go to the rule configuration page and configure specific protection rules. For details, see **Configuring Protection Policies**.
Created	Time the website was added to WAF.

Step 6 In the **Domain Name** column, click the domain name of the website to go to the basic information page.

Step 7 View the basic information about the domain name of the protected website.

To modify a parameter, locate the row that contains the target parameter and click the edit icon.

Figure 9-9 Basic Information



----End

9.2.2 Changing the Protection Mode

You can change the WAF protection mode for your website. You can enable, suspend, and bypass WAF protection.

Prerequisites

You have connected the website you want to protect to WAF.

Constraints

- WAF protection can be bypassed only when **Protection** is set to **Cloud**.
- Before bypassing WAF protection, ensure that the service port of the origin server has been enabled.
- If you connect a domain name to WAF with different protection ports configured, bypassing WAF protection is not supported for the domain name.
- If you bypass WAF protection, requests to the domain name are sent to the backend server directly and do not pass through WAF. Your domain name may become inaccessible if any of the following happens:
  - In the website server configuration, settings for **Client Protocol** and **Server Protocol** are inconsistent.
  - Different ports are set for **Protected Port** and **Server Port**.

Application Scenarios

- Enable WAF: WAF protects your website against attacks based on the protection policy you configure for it.
- Suspend WAF: If a large number of normal requests are blocked, for example, status code 418 is frequently returned, you can suspend WAF. In this mode, WAF only forwards requests to origin servers. It does not scan for or log attacks. This is risky. Global protection whitelist rules are recommended to reduce false alarms.
- Bypass WAF: If you bypass WAF protection for a domain name, requests are directly sent to backend origin servers without passing through WAF. Before bypassing WAF, enable the service port of origin servers so that requests can go to origin servers. Bypassing WAF is recommended only when one of the following conditions is met:
  - Website services need to be restored to the status when the website is not connected to WAF.
  - You need to investigate website errors, such as 502, 504, or other incompatibility issues.
  - No proxies are configured between the client and WAF.

Impact on the System

If you suspend WAF protection, WAF does not scan for attacks and only forwards requests to origin servers. This is risky. To avoid normal requests from being blocked, configure global protection whitelist rules, instead of suspending WAF protection.

Changing the Protection Mode (Enabling/Suspending WAF Protection)

Step 1 Log in to the management console.

Step 2 Click  in the upper left corner of the management console and select a region or project.

Step 3 Click  in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Website Settings**.

Step 5 In the row containing the target domain name, click  in the **Mode** column and select a mode you want.

----End

9.2.3 Updating the Certificate Used for a Website

If you set **Client Protocol** to **HTTPS** when you add a website to WAF, upload a certificate and use it for your website.

- If your website certificate is about to expire, purchase a new certificate before the expiration date and update the certificate associated with the website in WAF.

  WAF can send notifications if a certificate expires. You can configure such notifications on the **Notifications** page. For details, see **Enabling Alarm Notifications**.
- If you plan to update the certificate associated with the website, associate a new certificate with your website on the WAF console.

Prerequisites

- The website to be protected has been added to WAF.
- Your website uses HTTPS as the client protocol.

Constraints

- Each domain name must have a certificate associated. A wildcard domain name can only use a wildcard domain certificate. If you only have single-domain certificates, add domain names one by one in WAF.
- Only .pem certificates can be used in WAF. If the certificate is not in .pem, before uploading it, convert it to .pem by referring to **Step 6**.

Impact on the System

- It is recommended that you update the certificate before it expires. Otherwise, all WAF protection rules will fail to take effect, and there can be massive impacts on the origin server, even more severe than a crashed host or website access failures.
- Updating certificates does not affect services. The old certificate still works during the certificate replacement. The new certificate will take over the job once it has been uploaded and successfully associated with the domain name.

Updating the Certificate Used for a Website

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Website Settings**.

Step 5 In the **Domain Name** column, click the domain name of the website to go to the basic information page.

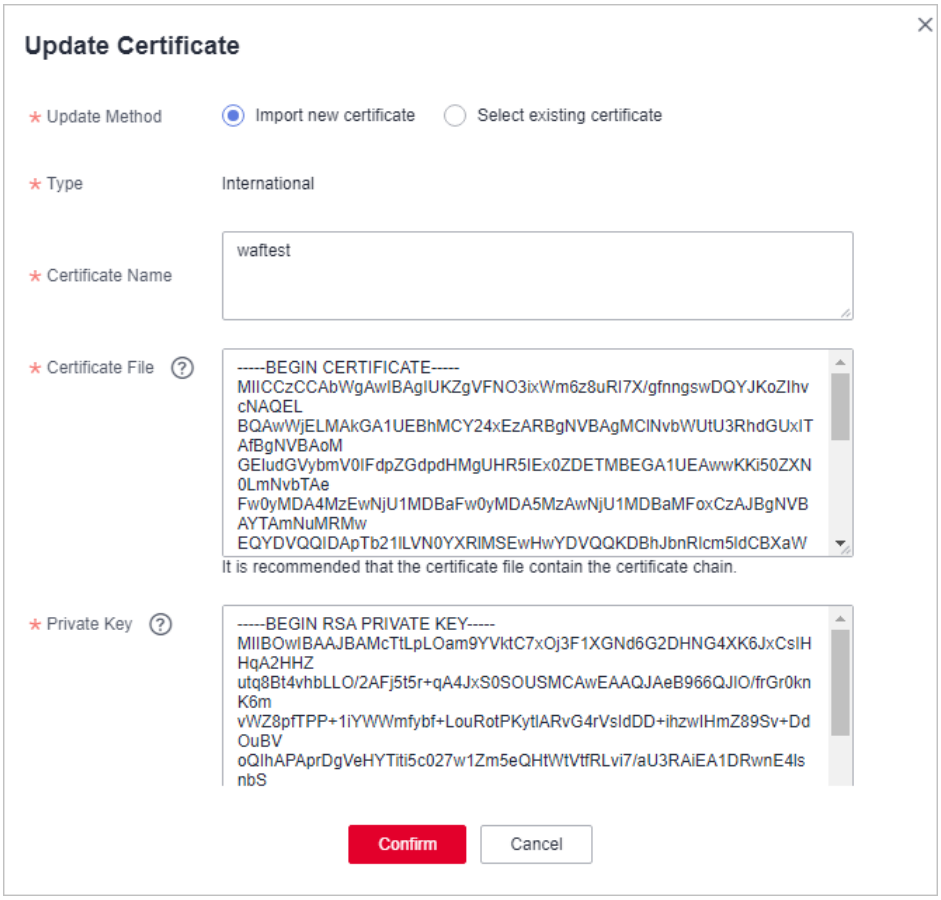
Step 6 Click next to the certificate name. In the **Update Certificate** dialog box, import a new certificate or select an existing certificate.

- If you select **Import new certificate** for **Update Method**, enter a certificate name, and copy and paste the certificate file and private key into the corresponding text boxes.

  NOTE

  WAF encrypts and saves the private key to keep it safe.

Figure 9-10 Update Certificate



Only .pem certificates can be used in WAF. If the certificate is not in .pem format, convert it into .pem locally by referring to **Table 9-6** before uploading it.

Table 9-6 Certificate conversion commands

Format	Conversion Method
CER/CRT	Rename the **cert.crt** certificate file to **cert.pem**.
PFX	– Obtain a private key. For example, run the following command to convert **cert.pfx** into **key.pem**: **openssl pkcs12 -in cert.pfx -nocerts -out key.pem -nodes** – Obtain a certificate. For example, run the following command to convert **cert.pfx** into **cert.pem**: **openssl pkcs12 -in cert.pfx -nokeys -out cert.pem**
P7B	1. Convert a certificate. For example, run the following command to convert **cert.p7b** into **cert.cer**: **openssl pkcs7 -print_certs -in cert.p7b -out cert.cer** 2. Rename certificate file **cert.cer** to **cert.pem**.
DER	– Obtain a private key. For example, run the following command to convert **privatekey.der** into **privatekey.pem**: **openssl rsa -inform DER -outform PEM -in privatekey.der -out privatekey.pem** – Obtain a certificate. For example, run the following command to convert **cert.cer** into **cert.pem**: **openssl x509 -inform der -in cert.cer -out cert.pem**

NOTE

- Before running an OpenSSL command, ensure that the **OpenSSL** tool has been installed on the local host.
- If your local PC runs a Windows operating system, go to the command line interface (CLI) and then run the certificate conversion command.

- If you select **Select existing certificate** for **Update Method**, select an existing certificate from the **Certificate** drop-down list.

Step 7 Click **Confirm**.

----End

9.2.4 Editing Server Information

If you select **Cloud** or **Dedicated** when adding a website to WAF, you can edit the server information of your website.

Applicable scenarios:

- Edit server information.

  - Cloud mode: You can modify configurations for **Client Protocol**, **Server Protocol**, **Server Address**, and **Server Port**.
  - Dedicated mode: You can modify configurations for **Client Protocol**, **Server Protocol**, **Server Address**, **VPC**, and **Server Port**.
- Add server configurations.
- Update a certificate by referring to **Updating the Certificate Used for a Website**.

Prerequisites

You have connected the website you want to protect to WAF.

Constraints

If PCI DSS/3DS compliance check is enabled, the client protocol cannot be changed, and no origin server addresses can be added.

Impact on the System

Modifying the server configuration does not affect services.

Modifying Server Information of One Website

Step 1 Log in to the management console.

Step 2 Click  in the upper left corner of the management console and select a region or project.

Step 3 Click  in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Website Settings**.

Step 5 In the **Domain Name** column, click the domain name of the website to go to the basic information page.

Step 6 In the **Server Information** area, click  .

Step 7 In the **Edit Server Information** dialog box, edit the server configurations and associated certificates as needed.

- For details about certificate, see **Updating the Certificate Used for a Website**.
- WAF supports configuring of multiple backend servers. To add a backend server, click **Add**.

Step 8 Click **Confirm**.

----End

9.2.5 Viewing Protection Information About a Protected Website on Cloud Eye

You can go to Cloud Eye to view protection details about your websites protected with WAF.

Prerequisites

You have connected the website you want to protect to WAF.

Viewing Protection Details About a Protected Website on Cloud Eye

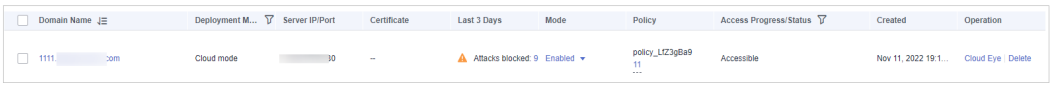
Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Website Settings**.

Figure 9-11 Website list



Step 5 In the row containing the protected domain name, click **Cloud Eye** in the **Operation** column to go to the Cloud Eye console and view the monitoring information.

----End

9.2.6 Deleting a Protected Website from WAF

This topic describes how to remove a website from WAF if you no longer need to protect it.

In cloud CNAME access mode, before removing a website from WAF, you need to resolve your domain name to the IP address of the origin server, or the traffic to your domain name cannot be routed to the origin server.

Prerequisites

You have connected the website you want to protect to WAF.

Impact on the System

- In cloud mode, before removing a website from WAF, you need to resolve the domain name to the origin server IP address on the DNS platform, or the traffic to your domain name cannot be routed to the origin server.
- If you select **Forcible delete the WAF CNAME record.**, WAF will not check your domain name resolution and delete WAF CNAME record immediately.

Before enabling this option, make sure you have resolved the domain name to the origin server, or your website will become inaccessible.

NOTE

If you do not select **Forcibly delete the WAF CNAME record**, WAF will retain the CNAME record of the domain name for about 30 days before deleting it.

- It takes about a minute to remove a website from WAF, but once this action is started, it cannot be cancelled. Exercise caution when removing a website from WAF.

Deleting a Protected Website from WAF

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

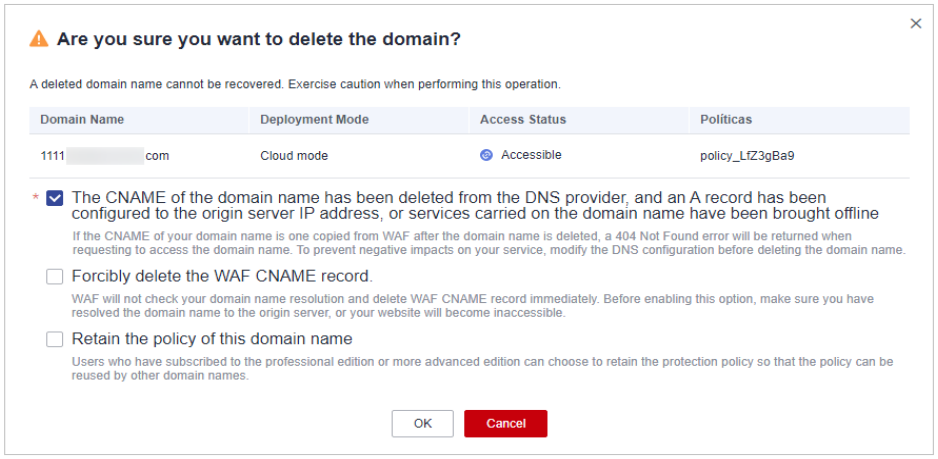
Step 4 In the navigation pane on the left, choose **Website Settings**.

Step 5 Locate the row of the target domain name. In the **Operation**, click **Delete**.

Step 6 In the displayed confirmation dialog box, confirm the deletion.

- Cloud mode
  - No proxy used

Figure 9-12 Deleting a protected domain name (no proxy used)

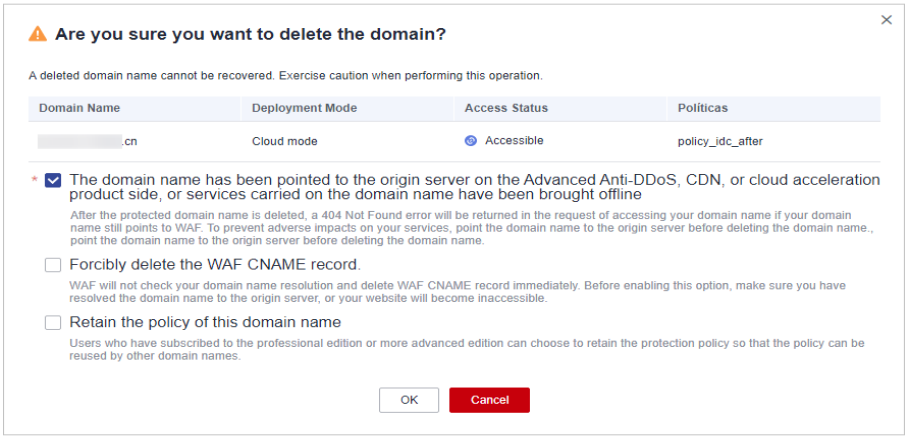


NOTE

- Ensure that related configurations are completed and select **The CNAME of the domain name has been deleted from the DNS provider, and an A record has been configured to the origin server IP address, or services carried on the domain name have been brought offline**.
- If you select **Forcible delete the WAF CNAME record.**, WAF will not check your domain name resolution and delete WAF CNAME record immediately. Before enabling this option, make sure you have resolved the domain name to the origin server, or your website will become inaccessible.
- If you want to retain the policy bound to the domain name, select **Retain the policy of this domain name**.

– Proxy used

Figure 9-13 Deleting a protected domain name (proxy used)



NOTE

- Ensure that related configurations are completed and select **The domain name has been pointed to the origin server on the Advanced Anti-DDoS, CDN, or cloud acceleration product side, or services carried on the domain name have been brought offline**.
- If you select **Forcible delete the WAF CNAME record.**, WAF will not check your domain name resolution and delete WAF CNAME record immediately. Before enabling this option, make sure you have resolved the domain name to the origin server, or your website will become inaccessible.
- If you want to retain the policy bound to the domain name, select **Retain the policy of this domain name**.

- Dedicated mode

  If you want to retain the policy bound to the domain name, select **Retain the policy of this domain name**.

Step 7 Click **OK**. If **Domain name deleted successfully** is displayed in the upper right corner, the domain name of the website was deleted.

----End

10 Policy Management

10.1 Creating a Protection Policy

A policy is a combination of rules, such as basic web protection, blacklist, whitelist, and precise protection rules. A policy can be applied to multiple domain names, but only one policy can be used for a domain name. This topic describes how to add a policy for your WAF instance.

Constraints

A protected website domain name can use only one policy.

Procedure

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Policies**.

Step 5 In the upper left corner, click **Add Policy**.

Step 6 In the displayed dialog box, enter the policy name and click **Confirm**. The added policy will be displayed in the policy list.

Step 7 In the **Policy Name** column, click the policy name. On the displayed page, add rules to the policy by referring to **Rule Configurations**.

----End

Related Operations

- To modify a policy name, click next to the policy name. In the dialog box displayed, enter a new policy name.

- To delete a rule, locate the row containing the rule. In the **Operation** column, click **Delete**.

10.2 Adding a Domain Name to a Policy

You can add a domain name to a new policy you think applicable. Then, the original policy applied to the domain name stops working on this domain name.

Adding a Domain Name to a Policy

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Policies**.

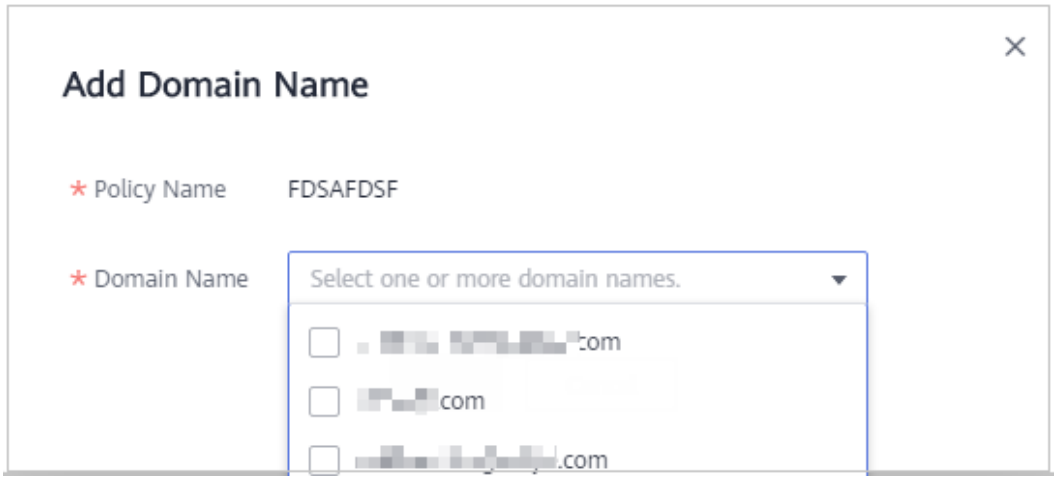
Step 5 In the row containing the target policy, click **Add Domain Name** in the **Operation** column.

Step 6 Select one or more domain names from the **Domain Name** drop-down list.

NOTICE

- A protected domain name can use only one policy, but one policy can be applied to multiple domain names.
- To delete a policy that has been applied to domain names, add these domain names to other policies first. Then, click **Delete** in the **Operation** column of the policy you want to delete.

Figure 10-1 Selecting one or more domain names



Step 7 Click **Confirm**.

----End

10.3 Adding Rules to One or More Policies

This topic describes how to add rules to one or more policies.

Adding Rules to One or More Policies

Step 1 Log in to the management console.

Step 2 Click  in the upper left corner of the management console and select a region or project.

Step 3 Click  in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

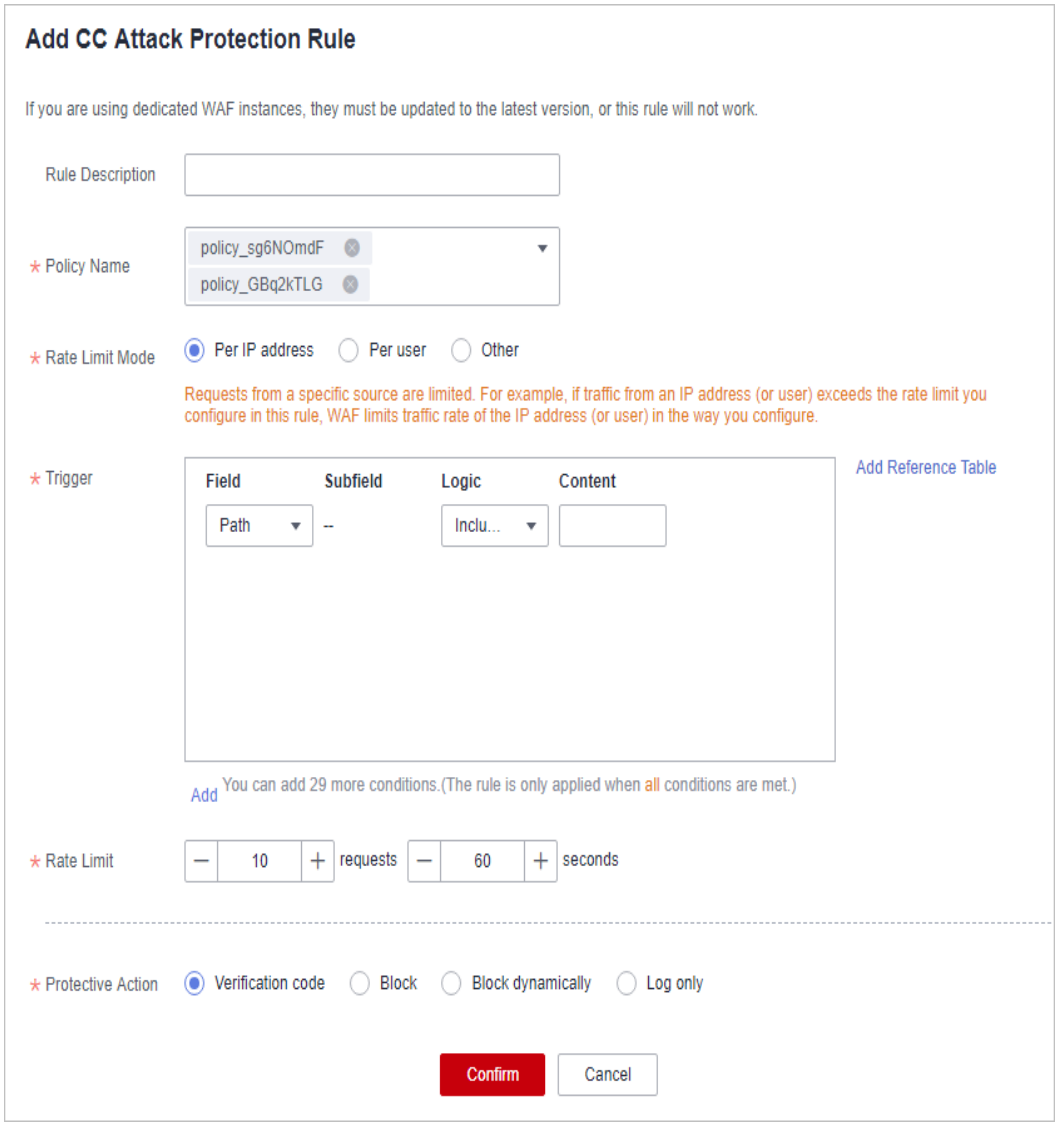
Step 4 In the navigation pane on the left, click **Policies**.

Step 5 In the upper left corner of the policy list, click **View Rules**.

Step 6 In the upper left corner above a list of a type of rule, click **Add Rule**.

Step 7 Select one or more policies from the **Policy Name** drop-down list.

Figure 10-2 Adding a rule to one or more policies



Step 8 Set other parameters in addition to **Policy Name**.

- To add a CC attack protection rule, see **Table 7-5**.
- To add a precise protection rule, see **Table 7-6**.
- To add a blacklist or whitelist rule, see **Table 7-7**.
- To add a geolocation access control rule, see **Table 7-8**.
- To add a WTP rule, see **Table 7-9**.
- To add an information leakage prevention rule, see **Table 7-12**.
- To add a global protection whitelist rule, see **Table 7-13**.
- To add a data masking rule, see **Table 7-14**.

Step 9 Click **Confirm**.

----End

11 Object Management

11.1 Certificate Management

11.1.1 Uploading a Certificate to WAF

If you select **HTTPS** for **Client Protocol** when you add a website to WAF, a certificate must be associated with the website.

If you upload a certificate to WAF, you can directly select the certificate when adding a website to WAF.

Prerequisites

You have obtained the certificate file and certificate private key.

Specification Limitations

You can upload as many certificates in WAF as the number of domain names that can be protected by your WAF instances in the same account.

Constraints

If you import a new certificate when adding a protected website or updating a certificate, the certificate is added to the certificate list on the **Certificates** page, and the imported certificate is also counted towards your total certificate quota.

Application Scenario

If you select **HTTPS** for **Client Protocol**, a certificate is required.

Uploading a Certificate to WAF

Step 1 Log in to the management console.

Step 2 Click  in the upper left corner of the management console and select a region or project.

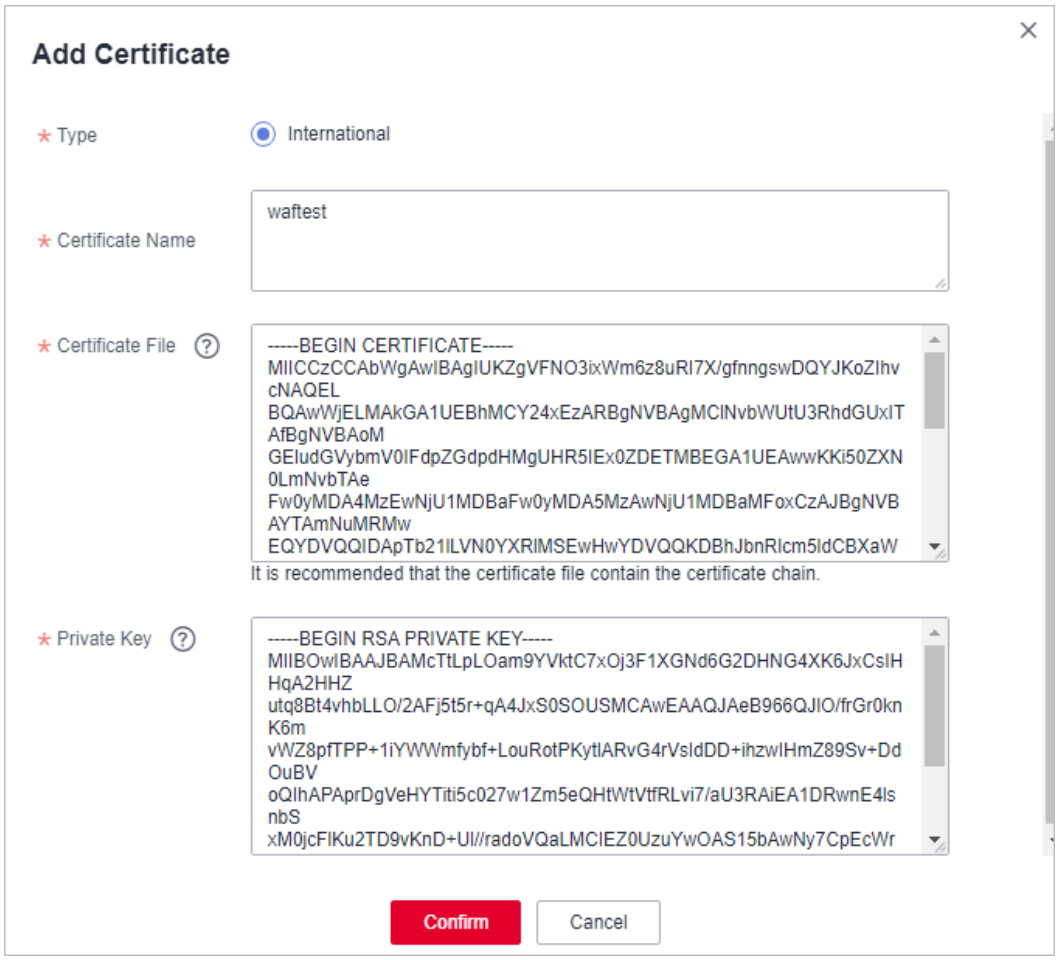
Step 3 Click ☰ in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Objects** > **Certificates**.

Step 5 Click **Add Certificate**.

Step 6 In the displayed dialog box, enter a certificate name, and copy and paste the certificate file and private key to the corresponding text boxes.

Figure 11-1 Uploading an international certificate



Only .pem certificates can be used in WAF. If the certificate is not in .pem format, convert it into .pem locally by referring to **Table 11-1** before uploading it.

Table 11-1 Certificate conversion commands

Format	Conversion Method
CER/CRT	Rename the **cert.crt** certificate file to **cert.pem**.

Format	Conversion Method
PFX	• Obtain a private key. For example, run the following command to convert **cert.pfx** into **key.pem**: **openssl pkcs12 -in cert.pfx -nocerts -out key.pem -nodes** • Obtain a certificate. For example, run the following command to convert **cert.pfx** into **cert.pem**: **openssl pkcs12 -in cert.pfx -nokeys -out cert.pem**
P7B	1. Convert a certificate. For example, run the following command to convert **cert.p7b** into **cert.cer**: **openssl pkcs7 -print_certs -in cert.p7b -out cert.cer** 2. Rename certificate file **cert.cer** to **cert.pem**.
DER	• Obtain a private key. For example, run the following command to convert **privatekey.der** into **privatekey.pem**: **openssl rsa -inform DER -outform PEM -in privatekey.der -out privatekey.pem** • Obtain a certificate. For example, run the following command to convert **cert.cer** into **cert.pem**: **openssl x509 -inform der -in cert.cer -out cert.pem**

NOTE

- Before running an OpenSSL command, ensure that the **OpenSSL** tool has been installed on the local host.
- If your local PC runs a Windows operating system, go to the command line interface (CLI) and then run the certificate conversion command.

Step 7 Click **Confirm**.

----End

Verification

The certificate you created is displayed in the certificate list.

Related Operations

- To change the certificate name, move the cursor over the name of the certificate, click , and enter a certificate name.

  NOTICE

  If the certificate is in use, unbind the certificate from the domain name first. Otherwise, the certificate name cannot be changed.

- To view details about a certificate, click **View** in the **Operation** column of the certificate.

- In the row containing the certificate you want, click **Use** in the **Operation** column to use the certificate to the corresponding domain name.
- To delete a certificate, locate the row of the certificate and click **More** > **Delete** in the **Operation** column.
- To update a certificate, locate the row of the certificate and click **More** > **Update** in the **Operation** column.

11.1.2 Using a Certificate for a Protected Website in WAF

If you configure **Client Protocol** to **HTTPS** for your website, the website needs an SSL certificate. This topic describes how to bind an SSL certificate that you have uploaded to WAF to a website.

Prerequisites

- Your certificate is still valid.
- Your website uses HTTPS as the client protocol.

Constraints

- An SSL certificate can be used for multiple protected websites.
- A protected website can use only one SSL certificate.

Application Scenario

If you configure **Client Protocol** to **HTTPS**, a certificate is required.

Using a Certificate for a Protected Website in WAF

Step 1 Log in to the management console.

Step 2 Click  in the upper left corner of the management console and select a region or project.

Step 3 Click  in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Objects** > **Certificates**.

Step 5 In the row containing the certificate you want to use, click **Use** in the **Operation** column.

Step 6 In the displayed **Domain Name** dialog box, select the website you want to use the certificate to.

Step 7 Click **Confirm**.

----End

Verification

The protected website is listed in the **Domain Name** column of the certificate.

Related Operations

- To change the certificate name, move the cursor over the name of the certificate, click , and enter a certificate name.

  NOTICE

  If the certificate is in use, unbind the certificate from the domain name first. Otherwise, the certificate name cannot be changed.

- To view details about a certificate, click **View** in the **Operation** column of the certificate.
- To delete a certificate, locate the row of the certificate and click **More** > **Delete** in the **Operation** column.
- To update a certificate, locate the row of the certificate and click **More** > **Update** in the **Operation** column.

11.1.3 Viewing Certificate Information

This topic describes how to view certificate details, including the certificate name, domain name a certificate is used for, and expiration time.

Prerequisites

You have **uploaded certificates** to WAF.

Checking Certificate Details

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Objects** > **Certificates**.

Step 5 View the certificate information. For details about related parameters, see **Table 11-2**.

Table 11-2 Certificate parameters

Parameter	Description
Name	Certificate name.
Type	**International** certificates are supported.

Parameter	Description
Expires	Certificate expiration time. It is recommended that you update the certificate before it expires. Otherwise, all WAF protection rules will be unable to take effect, and there can be massive impacts on the origin server, even more severe than a crashed host or website access failures. For more details, see **Updating the Certificate Used for a Website**.
Domain Name	The domain names protected by the certificate. Each domain name must be bound to a certificate. One certificate can be used for multiple domain names.

----End

Related Operations

- To change the certificate name, move the cursor over the name of the certificate, click  , and enter a certificate name.

  NOTICE

  If the certificate is in use, unbind the certificate from the domain name first. Otherwise, the certificate name cannot be changed.

- To view details about a certificate, click **View** in the **Operation** column of the certificate.
- In the row containing the certificate you want, click **Use** in the **Operation** column to use the certificate to the corresponding domain name.
- To delete a certificate, locate the row of the certificate and click **More** > **Delete** in the **Operation** column.
- To update a certificate, locate the row of the certificate and click **More** > **Update** in the **Operation** column.

11.1.4 Deleting a Certificate from WAF

This topic describes how to delete an expired or invalid certificate.

Prerequisites

The certificate you want to delete is not bound to a protected website.

Constraints

If a certificate to be deleted is bound to a website, unbind it from the website before deletion.

Impact on the System

- Deleting certificates does not affect services.
- Deleted certificates cannot be recovered. Exercise caution when performing this operation.

Deleting a Certificate from WAF

Step 1 Log in to the management console.

Step 2 Click  in the upper left corner of the management console and select a region or project.

Step 3 Click  in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Objects** > **Certificates**.

Step 5 In the row of the certificate, click **More** > **Delete** in the **Operation** column.

Step 6 In the displayed dialog box, click **Confirm**.

----End

Related Operations

If a certificate to be deleted is bound to a website, unbind it from the website before deletion.

To unbind a certificate from a website domain name, perform the following steps:

Step 1 In the **Domain Name** column of the row containing the desired certificate, click the domain name to go to the basic information page.

Step 2 Click  next to the certificate name. In the displayed dialog box, upload a new certificate or select an existing certificate.

----End

11.2 Managing IP Address Blacklist and Whitelist Groups

11.2.1 Adding an IP Address Group

With IP address groups, you can quickly add IP addresses or IP address ranges to a blacklist or whitelist rule.

Prerequisites

You have applied for a WAF instance.

Adding a Blacklist or Whitelist IP Address Group

Step 1 Log in to the management console.

Step 2 Click  in the upper left corner of the management console and select a region or project.

Step 3 Click  in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Objects** > **Address Groups**.

Step 5 On the upper left of the address group list, click **Add Address Group**.

Step 6 In the displayed **Add Address Group** dialog box, enter an address group name and provide IP addresses/IP address ranges.

Step 7 Click **Confirm**.

----End

11.2.2 Modifying or Deleting a Blacklist or Whitelist IP Address Group

This topic describes how to modify or delete an IP address group.

Constraints

Only address groups not used by any rules can be deleted. Before you delete an address group that is being used by a blacklist or whitelist rule, remove the address group from the rule first.

Modifying or Deleting a Blacklist or Whitelist IP Address Group

Step 1 Log in to the management console.

Step 2 Click  in the upper left corner of the management console and select a region or project.

Step 3 Click  in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Objects** > **Address Groups**.

Step 5 In the address group list, view the address group information.

Table 11-3 Parameter description

Parameter	Description
Group Name	Address group name you configured.
IP Address/ Range	IP addresses or IP address ranges added to the address group.

Parameter	Description
Rule	Rules that are using the address group.
Remarks	Supplementary information about the address group.

Step 6 Modify or delete an IP address group.

- Modify an address group.

  In the row containing the address group you want to modify, click **Modify** in the **Operation** column. In the **Modify Address Group** dialog box, change the group name or IP address/IP address range, and click **Confirm**.

- Delete an address group.

  In the row containing the address group you want to delete, click **Delete** in the **Operation** column. In the displayed dialog box, click **OK**.

----End

12 Instance Management

12.1 Managing Dedicated WAF Engines

This topic describes how to manage your dedicated WAF instances (or engines). You can view instance information, view instance monitoring configurations, upgrade the edition of an instance, and delete an instance.

Prerequisites

- You have applied for a dedicated WAF instance.
- Your login account has the **IAM ReadOnly** permission.

Viewing Information About a Dedicated WAF Instance

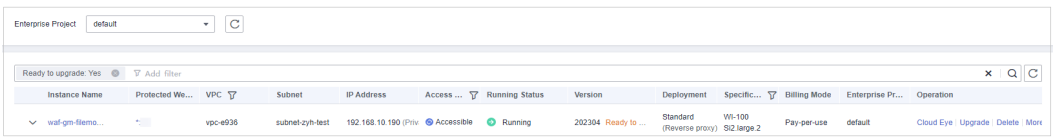
Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Instance Management** > **Dedicated Engine** to go to the dedicated WAF instance page.

Figure 12-1 Dedicated engine list



Step 5 View information about a dedicated WAF instance. **Table 12-1** describes parameters.

Table 12-1 Key parameters of dedicated WAF instances

Parameter	Description	Example Value
Instance Name	Name automatically generated when an instance is created.	None
Protected Website	Domain name of the website protected by the instance.	www.example.com
VPC	VPC where the instance resides	vpc-waf
Subnet	Subnet where an instance resides	subnet-62bb
IP Address	IP address of the subnet in the VPC where the WAF instance is deployed.	192.168.0.186
Access Status	Connection status of the instance.	Accessible
Running Status	Status of the instance.	Running
Version	Dedicated WAF version.	202304
Deployment	How the instance is deployed.	Standard mode (reverse proxy)
Specifications	Specifications of resources hosting the instance.	WI-500 (specifications of dedicated engine instances) x1.8u.32g (Specifications of the ECS housing the dedicated engine. Specifications: x86: 8 vCPUs | 32 GB)

----End

Viewing Metrics of a Dedicated WAF Instance

When a WAF instance is in the **Running** status, you can view the monitored metrics about the instance.

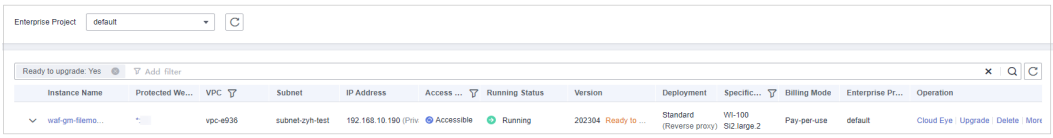
Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Instance Management** > **Dedicated Engine** to go to the dedicated WAF instance page.

Figure 12-2 Dedicated engine list



Step 5 In the row of the instance, click **Cloud Eye** in the **Operation** column to go to the Cloud Eye console and view the monitoring information, such as CPU, memory, and bandwidth.

----End

Upgrading a Dedicated WAF Instance

Only dedicated WAF instances in the **Running** status can be upgraded to the latest version.

NOTICE

- It takes about 20 minutes for upgrading an instance. During the upgrade, the instance is not available and cannot protect your domain names connected to it. To prevent service interruptions, use either of the following solutions:
  - **Solution 1**: Deploy multiple dedicated WAF instances for your domain name, add them to a backend server group of your load balancer, and enable the health check policy for the load balancer. In this way, if one dedicated WAF instance is not available, WAF automatically distributes the traffic to other healthy instances. There is almost no impact on your services except that website requests might be intermittently interrupted for few seconds.
  - **Solution 2**: If you deploy only one dedicated WAF instance, configure a load balancer before you start to let website traffic bypass WAF during the upgrade. After the upgrade is complete, configure the load balancer to distribute traffic to WAF.
- If you are using the latest version of WAF, the **Upgrade** button is grayed out.

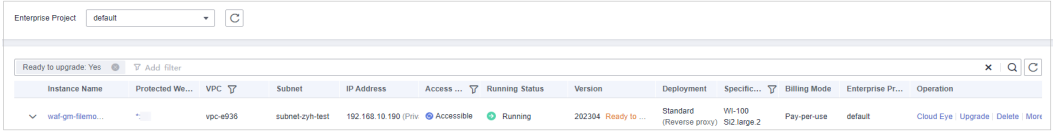
Step 1 Log in to the management console.

Step 2 Click  in the upper left corner of the management console and select a region or project.

Step 3 Click  in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Instance Management** > **Dedicated Engine** to go to the dedicated WAF instance page.

Figure 12-3 Dedicated engine list



Step 5 In the row containing the instance you want to upgrade, click **Upgrade** in the **Operation** column.

Step 6 Confirm the upgrade conditions and click **Confirm**.

Click **View Details** to view details of all dedicated WAF instance versions.

----End

Change Security Group for a Dedicated WAF Instance

If you select **Network Interface** for **Instance Type**, you can change the security group to which your dedicated instance belongs. After you select a security group, the WAF instance will be protected by the access rules of the security group.

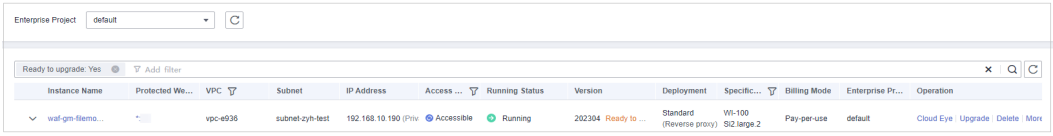
Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Instance Management** > **Dedicated Engine** to go to the dedicated WAF instance page.

Figure 12-4 Dedicated engine list



Step 5 In the row containing the instance, choose **More** > **Change Security Group** in the **Operation** column.

Step 6 In the dialog box displayed, select the new security group and click **Confirm**.

----End

Deleting a Dedicated WAF Instance

You can delete a dedicated WAF instance anytime. A deleted dedicated WAF instance will no longer protect the website added to it.

NOTICE

Resources on deleted instance are released and cannot be restored. Exercise caution when performing this operation.

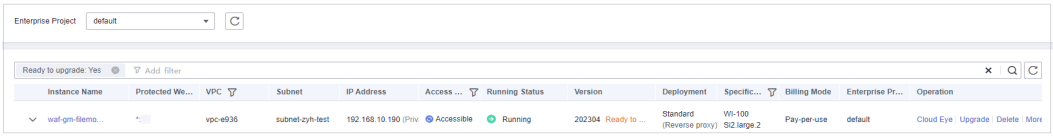
Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click ☰ in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Instance Management** > **Dedicated Engine** to go to the dedicated WAF instance page.

Figure 12-5 Dedicated engine list



Step 5 In the row containing the instance, click **More** > **Delete** in the **Operation** column.

NOTE

You can also select multiple dedicated instances and click **Delete** in the upper left corner above the list to delete them all at once.

Step 6 In the displayed dialog box, enter **DELETE** and click **Confirm**.

----End

12.2 Viewing Product Details

On the **Product Details** page, you can view information about all your WAF instances, including the edition, domain quotas, and specifications.

Prerequisites

You have applied for a WAF instance.

Viewing Product Details

Step 1 Log in to the management console.

Step 2 Click 📍 in the upper left corner of the management console and select a region or project.

Step 3 Click ☰ in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Instance Management** > **Product Details**.

Step 5 On the **Product Details** page, view the WAF edition you are using, specifications, and expiration time.

- To disable a cloud WAF instance billed on a pay-per-use basis, click **Disable Pay-Per-Use Billing** for it and finish operations as prompted.

----End

12.3 Enabling Alarm Notifications

This topic describes how to enable notifications for attack logs. Once this function is enabled, WAF sends you SMS or email notifications if an attack is detected.

You can configure certificate expiration reminders. When a certificate is about to expire, WAF notifies you by the way you configure, such as email or SMS.

Constraints

- Certificate notifications are available only for the **cloud mode CNAME** access mode of professional and enterprise editions and the **dedicated** access mode.
- Alarm notifications are sent if the number of attacks reaches the threshold you configure.

Enabling Alarm Notifications

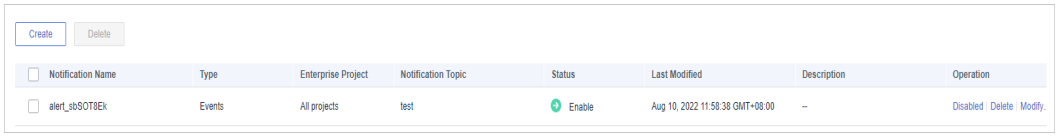
Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Instance Management** > **Notifications**.

Figure 12-6 Notifications



Step 5 Click **Create** and configure alarm notification parameters. **Table 12-2** lists the parameters.

Figure 12-7 Create Notification

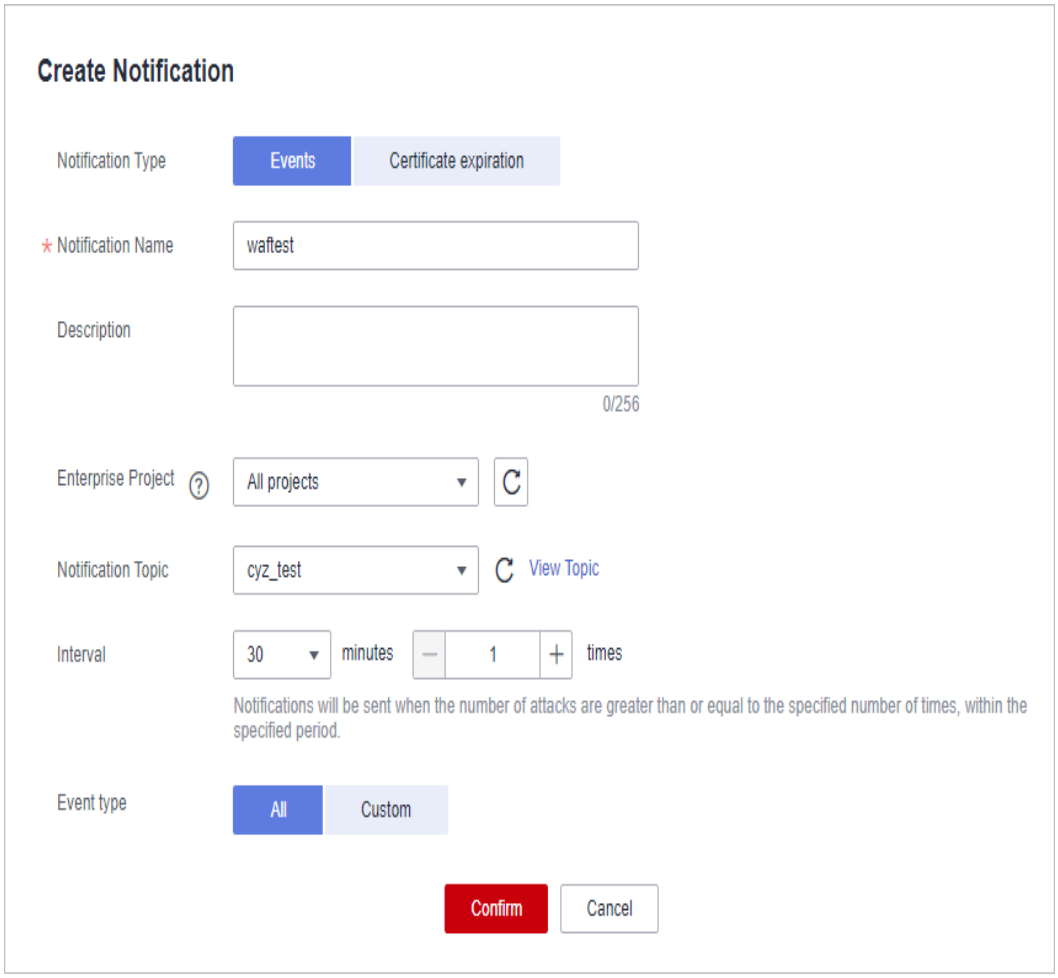


Table 12-2 Description of notification setting parameters

Parameter	Description
Notification Type	Select a notification type. • **Events**: WAF sends attack logs to you in the way you configure (such as SMS or email) once it detects log-only or blocked events. • **Certificate expiration**: When a certificate is about to expire, WAF notifies you by the way you configure, such as email or SMS.
Notification Name	Name of the alarm notification.
Description	(Optional) A description of the purposes of the alarm.
Enterprise Project	Select an enterprise project from the drop-down list. The notification takes effect in the selected enterprise project.

Parameter	Description
Notification Topic	Select a topic from the drop-down list. For details about topics and subscriptions, see the *Simple Message Notification User Guide*.
Interval	If you select **Events** for **Notification Type**, **Interval** must be configured. **NOTE** Alarm notifications are sent if the number of attacks reaches the threshold configured for a certain period.
Event Type	If you select **Events** for **Notification Type**, **Event Type** must be configured. By default, **All** is selected. To specify event types, click **Custom**.
Notification Before Expiration	This parameter must be configured if you select **Certificate expiration** for **Notification Type**. Select how long before a certificate expire WAF can send notifications. You can select **1 week**, **1 month**, or **2 months**. For example, if you select **1 week**, WAF will send you an SMS message or email one week before the certificate expires.
Interval	This parameter must be configured if you select **Certificate expiration** for **Notification Type**. How often WAF sends certificate expiration notifications to you. You can select **Weekly** or **Daily**.

Step 6 Click **Confirm**.

- To disable a notification, locate the row containing the notification and click **Disable** in the **Operation** column.
- To delete a notification, locate the row containing the notification and click **Delete** in the **Operation** column.
- To modify a notification, locate the row containing the notification and click **Modify** in the **Operation** column.

----End

13 Permissions Management

13.1 IAM Permissions Management

13.1.1 WAF Custom Policies

If the system-defined policies of WAF cannot meet your needs, you can create custom policies. For details about the actions supported by custom policies, see **WAF Permissions and Supported Actions**.

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: Edit JSON policies from scratch or based on an existing policy.

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

WAF Example Custom Policies

- Example 1: Allowing users to query the protected domain list

```
{
    "Version": "1.1",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "waf:instance:list"
                        ]
        }
    ]
}
```

- Example 2: Denying the user request of deleting web tamper protection rules

  A deny policy 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 **WAF FullAccess** policy to a user but also forbid the user from deleting web

tamper protection rules (**waf:antiTamperRule:delete**). Create a custom policy with the action to delete web tamper protection rules, set its **Effect** to **Deny**, and assign both this policy and the **WAF FullAccess** policy to the group the user belongs to. Then the user can perform all operations on WAF except deleting web tamper protection rules. The following is a policy for denying web tamper protection rule deletion.

```
{
    "Version": "1.1",
    "Statement": [
        {
            "Effect": "Deny",
            "Action": [
                "waf:antiTamperRule:delete"
            ]
        },
    ]
}
```

- Multi-action policy

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

```
{
    "Version": "1.1",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "waf:instance:get",
                "waf:certificate:get"
            ]
        },
        {
            "Effect": "Allow",
            "Action": [
                "hss:hosts:switchVersion",
                "hss:hosts:manualDetect",
                "hss:manualDetectStatus:get"
            ]
        }
    ]
}
```

13.1.2 WAF Permissions and Supported Actions

This topic describes fine-grained permissions management for your WAF instances. If your account does not need individual IAM users, then you may skip over this topic.

By default, new IAM users do not have any permissions assigned. You need to add a user to one or more groups, and assign permissions policies to these groups. Users inherit permissions from the groups to which they are added and can perform specified operations on cloud services based on the permissions.

You can grant users permissions by using roles and policies. Roles are provided by IAM to define service-based permissions depending on user's job responsibilities. Policies: A type of fine-grained authorization mechanism that defines permissions required to perform operations on specific cloud resources under certain conditions.

Supported Actions

WAF provides system-defined policies that can be directly used in IAM. You can also create custom policies and use them to supplement system-defined policies, implementing more refined access control.

- Permission: A statement in a policy that allows or denies certain operations.
- Action: Specific operations that are allowed or denied.

Permission	Action
Querying the list of protected domain names	waf:host:list
Adding a domain name to WAF	waf:host:create
Querying a protected domain name	waf:host:get
Modifying a protected domain name	waf:host:put
Deleting a protected domain from WAF	waf:host:delete
Querying an information leakage prevention rule	waf:antiLeakageRule:get
Querying a web tamper protection rule	waf:antiTamperRule:get
Querying a CC attack protection rule	waf:ccRule:get
Querying a precise protection rule	waf:preciseProtectionRule:get
Querying a global protection whitelist rule	waf:falseAlarmMaskRule:get
Querying a data masking rule	waf:privacyRule:get
Querying a blacklist or whitelist rule	waf:whiteBlackIpRule:get
Querying a geolocation access control rule	waf:geoIpRule:get
Querying a certificate	waf:certificate:get
Modifying WAF certificates	waf:certificate:put
Querying a protection event	waf:event:get
Querying a protected domain	waf:instance:get
Querying a protection policy	waf:policy:get

Permission	Action
Querying quota package information	waf:bundle:get
Querying the protection event download link	waf:dumpEventLink:get
Querying configurations	waf:consoleConfig:get
Querying the back-to-source IP address segment	waf:sourceIp:get
Updating an information leakage prevention rule	waf:antiLeakageRule:put
Updating a web tamper protection rule	waf:antiTamperRule:put
Updating a CC attack protection rule	waf:ccRuleRule:put
Updating a precise protection rule	waf:preciseProtectionRule:put
Updating a global protection whitelist rule	waf:falseAlarmMaskRule:put
Updating a data masking rule	waf:privacyRule:put
Updating an IP address blacklist or whitelist rule	waf:whiteBlackIpRule:put
Updating a geolocation access control rule	waf:geoIpRule:put
Updating a protected domain	waf:instance:put
Updating a protection policy	waf:policy:put
Deleting an information leakage prevention rule	waf:antiLeakageRule:delete
Deleting a web tamper protection rule	waf:antiTamperRule:delete
Deleting a CC attack protection rule	waf:ccRule:delete
Configuring a precise protection rule	waf:preciseProtectionRule:delete
Deleting a global protection whitelist rule	waf:falseAlarmMaskRule:delete
Deleting a data masking rule	waf:privacyRule:delete
Deleting a blacklist or whitelist rule	waf:whiteBlackIpRule:delete

Permission	Action
Deleting a geolocation access control rule	waf:geoIpRule:delete
Deleting a protected domain from WAF	waf:instance:delete
Deleting a protection policy	waf:policy:delete
Adding an information leakage prevention rule	waf:antiLeakageRule:create
Adding a web tamper protection rule	waf:antiTamperRule:create
Adding a CC attack protection rules	waf:ccRule:create
Adding a precise protection rule	waf:preciseProtectionRule:create
Querying bot rules	waf:anticrawlerRule:list
Updating configuration of bot rules	waf:anticrawlerRule:put
Creating a global protection whitelist rule	waf:falseAlarmMaskRule:create
Adding a data masking rule	waf:privacyRule:create
Adding a blacklist or whitelist rule	waf:whiteBlackIpRule:create
Adding a geolocation access control rule	waf:geoIpRule:create
Adding a certificate	waf:certificate:create
Adding a domain	waf:instance:create
Adding a policy	waf:policy:create
Querying information leakage prevention rules	waf:antiLeakageRule:list
Querying web tamper protection rules	waf:antiTamperRule:list
Querying CC attack protection rules	waf:ccRuleRule:list
Querying precise protection rules	waf:preciseProtectionRule:list
Querying the global protection whitelist rule list	waf:falseAlarmMaskRule:list

Permission	Action
Querying data masking rules	waf:privacyRule:list
Querying blacklist and whitelist rules	waf:whiteBlackIpRule:list
Querying geolocation access control rules	waf:geoIpRule:list
Querying the protection domains	waf:instance:list
Querying protection policies	waf:policy:list
Querying alarm notification configuration	waf:alert:get
Updating alarm notification configuration	waf:alert:put
Enabling the pay-per-use billing for a WAF cloud-mode instance	waf:postpaid:create
Disabling the pay-per-use billing for a WAF cloud-mode instance	waf:postpaid:delete

14 Monitoring and Auditing

14.1 Using Cloud Eye to Monitor WAF

14.1.1 WAF Monitored Metrics

Function Description

This topic describes metrics reported by WAF to Cloud Eye as well as their namespaces and dimensions. You can use APIs provided by Cloud Eye to query the metrics of the monitored object and alarms generated for WAF. You can also query them on the Cloud Eye console.

namespaces

SYS.WAF

NOTE

A namespace is an abstract collection of resources and objects. Multiple namespaces can be created in a single cluster with the data isolated from each other. This enables namespaces to share the same cluster services without affecting each other.

Monitored Metrics for Protected Domain Names

Table 14-1 Monitored metrics for domain names protected with WAF

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Minute)
requests	Number of Requests	Number of requests returned by WAF in the last 5 minutes Collection method: The total number of requests for the domain name are collected.	≥0 Value type: Float	Count	N/A	Protected domain dame	5 minutes
waf_http_2xx	WAF Status Code (2XX)	Number of 2XX status codes returned by WAF in the last 5 minutes Collection method: Number of 2XX status codes returned	≥0 Value type: Float	Count	N/A	Protected domain dame	5
waf_http_3xx	WAF Status Code (3XX)	Number of 3XX status codes returned by WAF in the last 5 minutes Collection method: Number of 3XX status codes returned	≥0 Value type: Float	Count	N/A	Protected domain dame	5

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Minute)
waf_http_4xx	WAF Status Code (4XX)	Number of 4XX status codes returned by WAF in the last 5 minutes Collection method: Number of 4XX status codes returned	≥0 Value type: Float	Count	N/A	Protected domain dame	5
waf_http_5xx	WAF Status Code (5XX)	Number of 5XX status codes returned by WAF in the last 5 minutes Collection method: Number of 5XX status codes returned	≥0 Value type: Float	Count	N/A	Protected domain dame	5
waf_fused_counts	WAF Traffic Threshold	Number of requests destined for the website in the last 5 minutes during breakdown protection duration Collection method: Number of requests to the protected domain name while the website was down	≥0 Value type: Float	Count	N/A	Protected domain dame	5

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Minute)
inbound_traffic	Total Inbound Traffic	Total inbound traffic in the last 5 minutes Collection method: Total inbound traffic in the last 5 minutes	≥0 Mbit Value type: Float	Mbit	1000	Protected domain dame	5
outbound_traffic	Total Outbound Traffic	Total outbound traffic in the last 5 minutes Collection method: Total outbound traffic in the last 5 minutes	≥0 Mbit Value type: Float	Mbit	1000	Protected domain dame	5
waf_process_time_0	WAF Latency [0-10) ms	This metric is used to collect how many requests are processed by WAF at latencies from 0 ms (included) to 10 ms (excluded) in the last 5 minutes. Collection method: The number of requests processed by WAF at latencies from 0 ms (included) to 10 ms (excluded) in the last 5 minutes are collected.	≥0 Value type: Float	Count	N/A	Protected domain dame	5 minutes

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Minute)
waf_process_time_10	WAF Latency [10-20) ms	This metric is used to collect how many requests are processed by WAF at latencies in the 10 ms to less than 20 ms range in the last 5 minutes. Collection method: The number of requests processed by WAF at latencies in the 10 ms to less than 20 ms range in the last 5 minutes are collected.	≥0 Value type: Float	Count	N/A	Protected domain dame	5 minutes

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Minute)
waf_process_time_20	WAF Latency [20-50) ms	This metric is used to collect how many requests are processed by WAF at latencies from 20 ms (included) to 50 ms (excluded) in the last 5 minutes. Collection method: The number of requests processed by WAF at latencies from 20 ms (included) to 50 ms (excluded) in the last 5 minutes are collected.	≥0 Value type: Float	Count	N/A	Protected domain dame	5 minutes

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Minute)
waf_process_time_50	WAF Latency [50-100) ms	This metric is used to collect how many requests are processed by WAF at latencies from 50 ms (included) to 100 ms (excluded) in the last 5 minutes. Collection method: The number of requests processed by WAF at latencies from 50 ms (included) to 100 ms (excluded) in the last 5 minutes are collected.	≥0 Value type: Float	Count	N/A	Protected domain dame	5 minutes

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Minute)
waf_process_time_100	WAF Latency [100, 1,000) ms	This metric is used to collect how many requests are processed by WAF at latencies in the 100 ms to less than 1,000 ms range in the last 5 minutes. Collection method: The number of requests processed by WAF at latencies in the 100 ms to less than 1000 ms range in the last 5 minutes are collected.	≥0 Value type: Float	Count	N/A	Protected domain dame	5 minutes
waf_process_time_1000	WAF Latency [1,000, above) ms	This metric is used to collect how many requests are processed by WAF at latencies above 1000 ms in the last 5 minutes. Collection method: The number of requests processed by WAF at latencies above 1000 ms in the last 5 minutes are collected.	≥0 Value type: Float	Count	N/A	Protected domain dame	5 minutes

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Minute)
qps_peak	Peak QPS	This metric is used to collect the peak QPS of the domain name in the last 5 minutes. Collection method: The peak QPS of the domain name in the last 5 minutes is collected.	≥0 Value type: Float	Count	N/A	Protected domain dame	5 minutes
qps_mean	Average QPS	This metric is used to collect the average QPS of the domain name in the last 5 minutes. Collection method: The average QPS of the domain name in the last 5 minutes is collected.	≥0 Value type: Float	Count	N/A	Protected domain dame	5 minutes

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Minute)
waf_http_0	No WAF Status Code	This metric is used to collect how many requests with no status code returned by WAF in the last 5 minutes. Collection method: The number of requests with no WAF status code returned in the last 5 minutes is collected.	≥0 Value type: Float	Count	N/A	Protected domain dame	5 minutes
upstream_code_2xx	Status Code Returned to the Client (2XX)	This metric is used to collect how many requests with *2XX* status code are returned by the origin server in the last 5 minutes. Collection method: The number of requests with *2XX* status code returned by the origin server in the last 5 minutes is collected.	≥0 Value type: Float	Count	N/A	Protected domain dame	5 minutes

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Minute)
upstream_code_3xx	Status Code Returned by the Origin Server (3XX)	This metric is used to collect how many requests with *3XX* status code are returned by the origin server in the last 5 minutes. Collection method: The number of requests with *3XX* status code returned by the origin server in the last 5 minutes is collected.	≥0 Value type: Float	Count	N/A	Protected domain dame	5 minutes
upstream_code_4xx	Status Code Returned by the Origin Server (4XX)	This metric is used to collect how many requests with *4XX* status code are returned by the origin server in the last 5 minutes. Collection method: The number of requests with *4XX* status code returned by the origin server in the last 5 minutes is collected.	≥0 Value type: Float	Count	N/A	Protected domain dame	5 minutes

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Minute)
upstream_code_5xx	Status Code Returned by the Origin Server (5XX)	This metric is used to collect how many requests with *5XX* status code are returned by the origin server in the last 5 minutes. Collection method: The number of requests with *5XX* status code returned by the origin server in the last 5 minutes is collected.	≥0 Value type: Float	Count	N/A	Protected domain dame	5 minutes
upstream_code_0	No Origin Server Status Code	This metric is used to collect how many requests with no status code returned by the origin server in the last 5 minutes. Collection method: The number of requests with no status code returned by the origin server in the last 5 minutes is collected.	≥0 Value type: Float	Count	N/A	Protected domain dame	5 minutes

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Minute)
inbound_traffic_peak	Peak Inbound Bandwidth	This metric is used to collect the peak inbound bandwidth to the domain name in the last 5 minutes. Collection method: The peak inbound bandwidth to the domain name in the last 5 minutes is collected.	≥0 Value type: Float	Mbit/s	1000	Protected domain dame	5 minutes
inbound_traffic_mean	Average Inbound Bandwidth	This metric is used to collect the average inbound bandwidth to the domain name in the last 5 minutes. Collection method: The average inbound bandwidth to the domain name in the last 5 minutes is collected.	≥0 Value type: Float	Mbit/s	1000	Protected domain dame	5 minutes

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Minute)
outbound_traffic_peak	Peak Outbound Bandwidth	This metric is used to collect the peak outbound bandwidth from the domain name in the last 5 minutes. Collection method: The peak outbound bandwidth from the domain name in the last 5 minutes is collected.	≥0 Value type: Float	Mbit/s	1000	Protected domain dame	5 minutes
outbound_traffic_mean	Average Outbound Bandwidth	This metric is used to collect the average outbound bandwidth from the domain name in the last 5 minutes. Collection method: The average outbound bandwidth from the domain name in the last 5 minutes is collected.	≥0 Value type: Float	Mbit/s	1000	Protected domain dame	5

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Minute)
attacks	Number of Attack Requests	This metric is used to collect the total number of attacks against the domain name in the last 5 minutes. Collection method: The system collects the number of attacks against the domain name in the last 5 minutes.	≥0 Value type: Float	Count	N/A	Protected domain dame	5 minutes
crawlers	Crawler Requests	This metric is used to collect the crawler attacks against the domain name in the last 5 minutes. Collection method: The system collects the number of crawler attacks against the domain name in the last 5 minutes.	≥0 Value type: Float	Count	N/A	Protected domain dame	5 minutes

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Minute)
base_protection_counts	Basic Web Protection Actions	This metric is used to collect the number of attacks defended by basic web protection rules over the last 5 minutes. Collection method: The system collects the number of attacks hit basic web protection rules over the last 5 minutes.	≥0 Value type: Float	Count	N/A	Protected domain dame	5 minutes
precise_protection_counts	Precise Protection Actions	This metric is used to collect the number of attacks defended by precise protection rules over the last 5 minutes. Collection method: The system collects the number of attacks hit precise protection rules over the last 5 minutes.	≥0 Value type: Float	Count	N/A	Protected domain dame	5 minutes

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Minute)
cc_protection_counts	CC Attacks Blocked	This metric is used to collect the number of attacks blocked by CC attack protection rules over the last 5 minutes. Collection method: The system collects the number of attacks hit CC attack protection rules over the last 5 minutes.	≥0 Value type: Float	Count	N/A	Protected domain name	5 minutes

Metrics for Dedicated WAF Instances

Table 14-2 Metrics for dedicated waf instances

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Raw Data)
cpu_util	CPU Usage	CPU consumed by the monitored object Collection method: 100% minus idle CPU usage percentage	0–100 Value type: Float	%	N/A	Dedicated WAF instances	1

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Raw Data)
mem_util	Memory Usage	Memory usage of the monitored object Collection method: 100% minus idle memory percentage	0–100 Value type: Float	%	N/A	Dedicated WAF instances	1
disk_util	Disk Usage	Disk usage of the monitored object Collection method: 100% minus idle disk space percentage	0–100 Value type: Float	%	N/A	Dedicated WAF instances	1
disk_avail_size	Available Disk Space	Available disk space of the monitored object Collection mode: size of free disk space	≥0 Value type: Float	Byte, KB, MB, GB, TB, and PB	1024	Dedicated WAF instances	1
disk_read_bytes_rate	Disk Read Rate	Number of bytes the monitored object reads from the disk per second Collection mode: number of bytes read from the disk per second	≥0 Value type: Float	Byte/s, KB/s, MB/s, and GB/s	1024	Dedicated WAF instances	1

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Raw Data)
disk_write_bytes_rate	Disk Write Rate	Number of bytes the monitored object writes into the disk per second Collection mode: number of bytes written into the disk per second	≥0 Value type: Float	Byte/s, KB/s, MB/s, and GB/s	1024	Dedicated WAF instances	1
disk_read_requests_rate	Disk Read Requests	Number of requests the monitored object reads from the disk per second Collection mode: number of read requests processed by the disk per second	≥0 Value type: Float	request/s	N/A	Dedicated WAF instances	1
disk_write_requests_rate	Disk Write Requests	Number of requests the monitored object writes into the disk per second Collection method: Number of write requests processed by the disk per second	≥0 Value type: Float	request/s	N/A	Dedicated WAF instances	1

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Raw Data)
network_incoming_bytes_rate	Incoming Traffic	Incoming traffic per second on the monitored object Collection method: Incoming traffic over the NIC per second	≥0 Value type: Float	Byte/s, KB/s, MB/s, and GB/s	1024	Dedicated WAF instances	1
network_outgoing_bytes_rate	Outgoing Traffic	Outgoing traffic per second on the monitored object Collection method: Outgoing traffic over the NIC per second	≥0 Value type: Float	Byte/s, KB/s, MB/s, and GB/s	1024	Dedicated WAF instances	1
network_incoming_packets_rate	Incoming Packet Rate	Incoming packets per second on the monitored object Collection method: Incoming packets over the NIC per second	≥0 Value type: Int	Packet/s	N/A	Dedicated WAF instances	1
network_outgoing_packets_rate	Outgoing Packet Rate	Outgoing packets per second on the monitored object Collection method: Outgoing packets over the NIC per second	≥0 Value type: Int	Packet/s	N/A	Dedicated WAF instances	1

Metric ID	Metric Name	Description	Value Range	Unit	Number System	Monitored Object (Dimension)	Monitoring Interval (Raw Data)
concurrent_connections	Concurrent Connections	Number of concurrent connections being processed Collection method: Number of concurrent connections in the system	≥0 Value type: Int	Count	N/A	Dedicated WAF instances	1
active_connections	Active Connections	Number of active connections Collection method: Number of active connections in the system	≥0 Value type: Int	Count	N/A	Dedicated WAF instances	1
latest_policy_sync_time	Latest Rule Synchronization	Time elapsed for the WAF to synchronize the latest custom rules Collection method: Time elapsed for synchronizing to the last policies	≥0 Value type: Int	ms	N/A	Dedicated WAF instances	1

Dimensions

Key	Value
instance_id	ID of the dedicated WAF instance
waf_instance_id	ID of the website protected with WAF

Example of Raw Data Format of Monitored Metrics

```
[
   {
      "metric": {
          // Namespace
         "namespace": "SYS.WAF",
         "dimensions": [
            {
               // Dimension name, for example, protected website
               "name": "waf_instance_id",
               // ID of the monitored object in this dimension, for example, ID of the protected website
               "value": "082db2f542e0438aa520035b3e99cd99"
            }
         ],
        //Metric ID
         "metric_name": "waf_http_2xx"
      },
// Time to live, which is predefined for the metric
      "ttl": 172800,
       // Metric value
      "value": 0.0,
     // Metric unit
      "unit": "Count",
       // Metric value type
      "type": "float",
      // Collection time for the metric
      "collect_time": 1637677359778
   }
]
```

14.1.2 Configuring Alarm Monitoring Rules

You can set WAF alarm rules to customize the monitored objects and notification policies, and set parameters such as the alarm rule name, monitored object, metric, threshold, monitoring scope, and whether to send notifications. This helps you learn the WAF protection status in a timely manner.

Prerequisites

You have connected the website you want to protect to WAF.

Configuring Alarm Monitoring Rules

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Management & Deployment** > **Cloud Eye**.

Step 4 In the navigation pane on the left, choose **Alarm Management** > **Alarm Rules**.

Step 5 In the upper right corner of the page, click **Create Alarm Rule**.

Step 6 Configure related parameters.

- **Name**: Enter a name.
- **Alarm Type**: Select **Metric**.

- **Cloud product**: Select **Web Application Firewall - Dedicated WAF Instance** or **Web Application Firewall - Domains**.
  - For dedicated instance metrics, select **Web Application Firewall - Dedicated WAF Instance** as the monitored metric.
  - For protected domain names, select **Web Application Firewall - Domains**.
- **Monitoring Scope**: Select **All resources**.
- **Method**: Select **Associated template** or create a custom template.
- **Alarm Notification**: If you want to receive alarms in real time, enable this option and select a notification mode.
- Other parameters: Set them based on site requirements.

Step 7 Click **Create**. In the displayed dialog box, click **OK**.

----End

14.1.3 Viewing Monitored Metrics

You can view WAF metrics on the Cloud Eye console. You will learn about the WAF protection status in a timely manner and set protection policies based on the metrics.

Prerequisites

WAF alarm rules have been configured in Cloud Eye. For more details, see **Configuring Alarm Monitoring Rules**.

Viewing Monitored Metrics

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Management & Deployment** > **Cloud Eye**.

Step 4 In the navigation pane on the left, choose **Cloud Service Monitoring** > **Web Application Firewall**.

Step 5 In the row containing the dedicated instance or protected domain name, click **View Metric** in the **Operation** column.

NOTE

To view the monitoring information about a specific website, you can go to the **Website Settings** page, locate the row containing the target domain name and click **Cloud Eye** in the **Operation** column.

----End

14.2 Using CTS to Audit WAF

14.2.1 WAF Operations Recorded by CTS

CTS provides records of operations on WAF. With CTS, you can query, audit, and backtrack these operations. For details, see the *Cloud Trace Service User Guide*.

Table 14-3 WAF Operations Recorded by CTS

Operation	Resource Type	Trace Name
Creating a WAF instance	instance	createInstance
Deleting a WAF instance	instance	deleteInstance
Modifying a WAF instance	instance	alterInstanceName
Modifying the protection status of a WAF instance	instance	modifyProtectStatus
Modifying the connection status of a WAF instance	instance	modifyAccessStatus
Creating a WAF policy	policy	createPolicy
Applying a WAF policy	policy	applyToHost
Modifying a policy	policy	modifyPolicy
Deleting a WAF policy	policy	deletePolicy
Modifying alarm notification settings	alertNoticeConfig	modifyAlertNotice-Config
Uploading a certificate	certificate	createCertificate
Changing the name of a certificate	certificate	modifyCertificate
Deleting a certificate from WAF	certificate	deleteCertificate
Adding a CC attack protection rule	policy	createCc
Modifying a CC attack protection rule	policy	modifyCc
Deleting a CC attack protection rule	policy	deleteCc
Adding a precise protection rule	policy	createCustom
Modifying a precise protection rule	policy	modifyCustom
Deleting a precise protection rule	policy	deleteCustom
Adding an IP address blacklist or whitelist rule	policy	createWhiteblackip

Operation	Resource Type	Trace Name
Modifying an IP address blacklist or whitelist rule	policy	modifyWhiteblackip
Deleting an IP address blacklist or whitelist rule	policy	deleteWhiteblackip
Creating/updating a web tamper protection rule	policy	createAntitamper
Deleting a web tamper protection rule	policy	deleteAntitamper
Creating a global protection whitelist rule	policy	createIgnore
Deleting a global protection whitelist rule	policy	deleteIgnore
Adding a data masking rule	policy	createPrivacy
Modifying a data masking rule	policy	modifyPrivacy
Deleting a data masking rule	policy	deletePrivacy

14.2.2 Viewing CTS Traces in the Trace List

Scenarios

After you enable CTS and the management tracker is created, CTS starts recording operations on cloud resources. After a data tracker is created, the system starts recording operations on data in Object Storage Service (OBS) buckets. Cloud Trace Service (CTS) stores operation records (traces) generated in the last seven90 days.

This section describes how to query or export operation records of the last seven90 days on the CTS console.

- **Viewing Real-Time Traces in the Trace List of the New Edition**
- **Viewing Real-Time Traces in the Trace List of the Old Edition**

Constraints

- You can only query operation records of the last seven90 days on the CTS console. To store operation records for longer than seven90 days, you must configure transfer to OBS or Log Tank Service (LTS) so that you can view them in OBS buckets or LTS log groups.
- After performing operations on the cloud, you can query management traces on the CTS console one minute later and query data traces five minutes later.
- Data traces are not displayed in the trace list of the new version. To view them, you need to go to the old version.
- These operation records are retained for seven90 days on the CTS console and are automatically deleted upon expiration. Manual deletion is not supported.

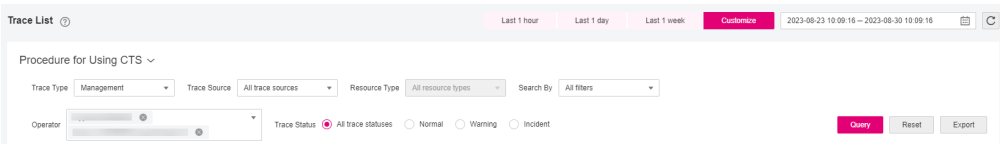
Viewing Real-Time Traces in the Trace List of the New Edition

1. Log in to the management console.
2. Click  in the upper left corner and choose **Management & Deployment** > **Cloud Trace Service**. The CTS console is displayed.
3. Choose **Trace List** in the navigation pane on the left.
4. On the **Trace List** page, use advanced search to query traces. You can combine one or more filters.
   - **Trace Name**: Enter a trace name.
   - **Trace ID**: Enter a trace ID.
   - **Resource Name**: Enter a resource name. If the cloud resource involved in the trace does not have a resource name or the corresponding API operation does not involve the resource name parameter, leave this field empty.
   - **Resource ID**: Enter a resource ID. Leave this field empty if the resource has no resource ID or if resource creation failed.
   - **Trace Source**: Select a cloud service name from the drop-down list.
   - **Resource Type**: Select a resource type from the drop-down list.
   - **Operator**: Select one or more operators from the drop-down list.
   - **Trace Status**: Select **normal**, **warning**, or **incident**.
     - **normal**: The operation succeeded.
     - **warning**: The operation failed.
     - **incident**: The operation caused a fault that is more serious than the operation failure, for example, causing other faults.
   - Time range: Select **Last 1 hour**, **Last 1 day**, or **Last 1 week**, or specify a custom time range within the last seven90 days.
5. On the **Trace List** page, you can also export and refresh the trace list, and customize columns to display.
   - Enter any keyword in the search box and press **Enter** to filter desired traces.
   - Click **Export** to export all traces in the query result as an .xlsx file. The file can contain up to 5,000 records.
   - Click  to view the latest information about traces.
   - Click  to customize the information to be displayed in the trace list. If **Auto wrapping** is enabled (), excess text will move down to the next line; otherwise, the text will be truncated. By default, this function is disabled.
6. For details about key fields in the trace structure, see section "Trace References" > "Trace Structure" and section "Trace References" > "Example Traces".
7. (Optional) On the **Trace List** page of the new edition, click **Go to Old Edition** in the upper right corner to switch to the **Trace List** page of the old edition.

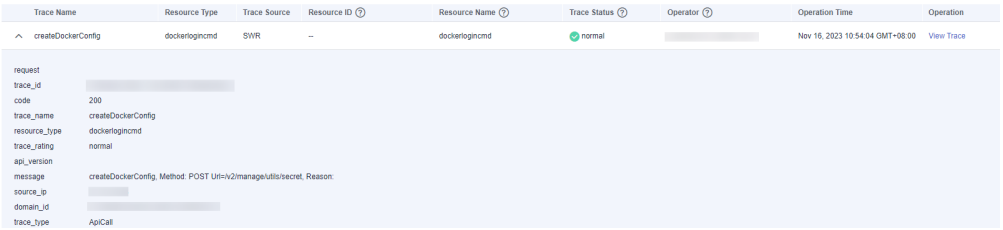
Viewing Real-Time Traces in the Trace List of the Old Edition

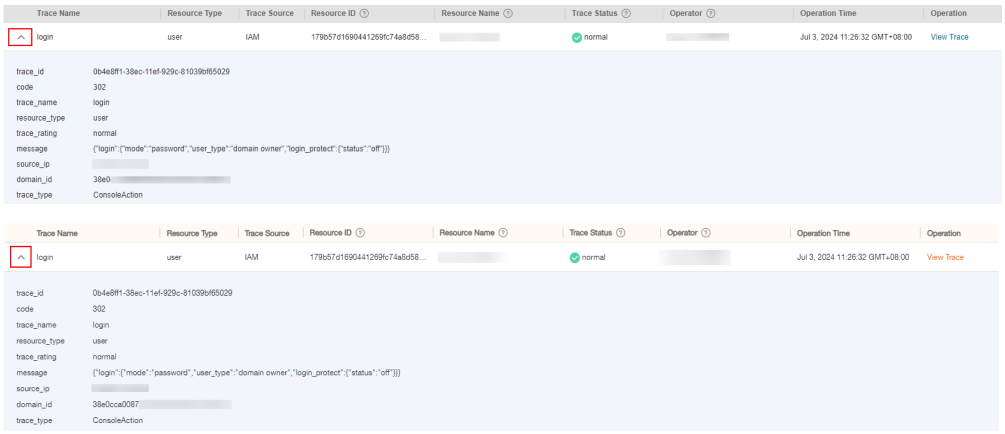
1. Log in to the management console.
2. Click in the upper left corner and choose **Management & Deployment** > **Cloud Trace Service**. The CTS console is displayed.
3. Choose **Trace List** in the navigation pane on the left.
4. Each time you log in to the CTS console, the new edition is displayed by default. Click **Go to Old Edition** in the upper right corner to switch to the trace list of the old edition.
5. Set filters to search for your desired traces, as shown in **Figure 14-1**. The following filters are available.

   Figure 14-1 Filters

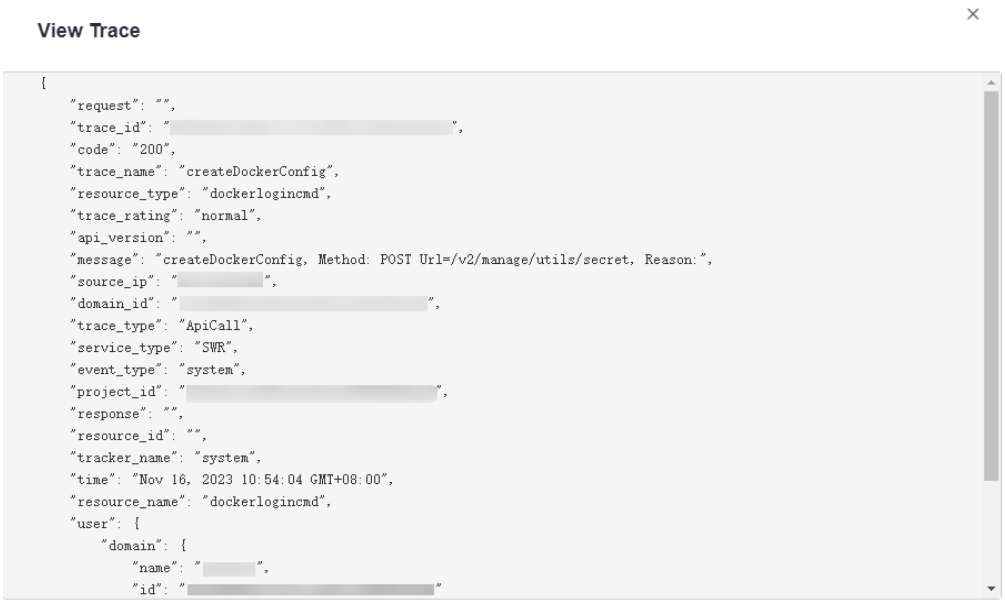
   

   - **Trace Type**, **Trace Source**, **Resource Type**, and **Search By**: Select a filter from the drop-down list.
     - If you select **Resource ID** for **Search By**, specify a resource ID.
     - If you select **Trace name** for **Search By**, specify a trace name.
     - If you select **Resource name** for **Search By**, specify a resource name.
   - **Operator**: Select a user.
   - **Trace Status**: Select **All trace statuses**, **Normal**, **Warning**, or **Incident**.
   - Time range: Select **Last 1 hour**, **Last 1 day**, or **Last 1 week**, or specify a custom time range within the last seven90 days.
6. Click **Query**.
7. On the **Trace List** page, you can also export and refresh the trace list.
   - Click **Export** to export all traces in the query result as a CSV file. The file can contain up to 5,000 records.
   - Click to view the latest information about traces.
8. Click on the left of a trace to expand its details.



9. Click **View Trace** in the **Operation** column. The trace details are displayed.



10. For details about key fields in the trace structure, see section "Trace References" > "Trace Structure" and section "Trace References" > "Example Traces" in the *CTS User Guide*.
11. (Optional) On the **Trace List** page of the old edition, click **New Edition** in the upper right corner to switch to the **Trace List** page of the new edition.

15 FAQs

15.1 About WAF

15.1.1 WAF Basics

If you are a beginner for WAF, here are some useful FAQs.

Is WAF a Hardware Firewall or a Software Firewall?

WAF is a software firewall.

For more details, see **Website Settings**.

Does WAF Affect My Existing Workloads and Server Running?

Enabling WAF does not interrupt your existing workloads or affect the running status of your origin servers. No additional operation (such as shutdown or restart) on the origin servers is required.

Can a WAF Instance Be Deployed in the VPC?

Yes. You can deploy dedicated engine WAF instances in a VPC.

Does a Dedicated WAF Instance Support Cross-VPC Protection?

Dedicated WAF instances cannot protect origin servers in the VPCs that are different from where those WAF instances locate. To protect such origin servers, apply for dedicated WAF instances in the same VPC as that for the origin servers.

Which OSs Does WAF Support?

WAF is deployed on the cloud, which is irrelevant to an OS. Therefore, WAF supports any OS. A domain name server on any OS can be connected to WAF for protection.

Which Layers Does WAF Provide Protection At?

WAF provides protection at seven layers, namely, the physical layer, data link layer, network layer, transport layer, session layer, presentation layer, and application layer.

How Does WAF Block Requests?

WAF checks both the request header and body. For example, WAF detects the request body, such as form, XML, and JSON data, and blocks requests that do not comply with protection rules.

Does WAF Support File Caching?

WAF caches only static web pages that are configured with web tamper protection and sends the cached web pages that are not tampered with to web visitors.

Does WAF Cache Website Data?

WAF protects user data on the application layer. It supports cache configuration on static web pages. When a user accesses a web page, the system returns a cached page to the user and randomly checks whether the page has been tampered with.

Can I Use WAF to Check Health Status of Servers?

No. If you want to check health status of servers, the combination of ELB and WAF is recommended for your workloads. After you configure a load balancer in ELB, you can enable health checks for servers and use the EIP of the load balancer as the server IP address to establish connections between servers and WAF.

Does WAF Support Two-Way SSL Authentication?

No. You can configure a one-way SSL certificate on WAF.

NOTE

If you set **Client Protocol** to **HTTPS** when adding a website to WAF, you will be required to upload a certificate and use it for your website.

Does WAF Support Application Layer Protocol- and Content-Based Access Control?

WAF supports access control over content at the application layer. HTTP and HTTPS are both application layer protocols.

Can WAF Check the Body I Add to a POST Request?

The built-in detection of WAF checks POST data, and web shells are the files submitted in POST requests. WAF checks all data, such as forms and JSON files in POST requests based on the default protection policies.

You can configure a precise protection rule to check the body added to POST requests.

Can WAF Limit the Access Speed of a Domain Name?

No. However, you can customize a CC attack protection rule to restrict access to a specific URL on your website based on an IP address, cookie, or Referer, mitigating CC attacks.

Can WAF Block URL Requests That Contain Special Characters?

No. WAF can only detect and restrict source IP addresses.

Can WAF Block Spam and Malicious User Registrations?

WAF cannot block business-related attacks, such as spam and malicious user registrations. To prevent these attacks, configure the registration verification mechanism on your website.

WAF is designed to keep web applications stable and secure. It examines all HTTP and HTTPS requests to detect for and block suspicious network attacks, such as Structure Query Language (SQL) injections, cross-site scripting (XSS) attacks, web shell upload, command or code injections, file inclusion, unauthorized sensitive file access, third-party vulnerability exploits, Challenge Collapsar (CC) attacks, malicious crawlers, and cross-site request forgery (CSRF).

Can WAF Block Requests for Calling Other APIs from Web Pages?

If the request data for calling other APIs on the web page is included in the domain names protected by WAF, the request data passes through WAF. WAF checks the request data and blocks it if it is an attack.

If the request data for calling other APIs on the web page is not included in the domain names protected by WAF, the request data does not pass through WAF. WAF cannot block the request data.

Can WAF Limit Access Through Domain Names?

No. WAF supports the blacklist and whitelist rules to block, log only, or permit access requests from specified IP addresses or IP address segments.

You can configure blacklist and whitelist rules to block, log only, or permit access requests from the IP addresses or IP address segments corresponding to the domain names.

Does WAF Have the IPS Module?

Unlike the traditional firewalls, WAF does not have an Intrusion Prevention System (IPS). WAF supports intrusion detection of only HTTP/HTTPS requests.

Is There Any Impact on Origin Servers If I Enable HTTP/2 in WAF?

Yes. HTTP/2 is not supported between WAF and the origin server. This means if you enable HTTP/2 in WAF, WAF can process HTTP/2 requests from clients, but WAF can only forward the requests to origin server using HTTP 1.0/1.1. In this situation, the origin server request traffic may rise as multiplexing in HTTP/2 may become invalid for origin servers.

Does WAF Affect Email Ports or Email Receiving and Sending?

WAF protects web application pages. After your website is connected to WAF, there is no impact on your email port or email sending or receiving.

What Are Concurrent Requests?

The number of concurrent requests refers to the number of requests that the system can process simultaneously. When it comes to a website, concurrent requests refer to the requests from the visitors at the same time.

Can WAF Block Requests When a Certificate Is Mounted on ELB?

If the certificate is mounted on ELB, all requests sent through WAF are encrypted. For HTTPS services, you must upload the certificate to WAF so that WAF can detect the decrypted request and determine whether to block the request.

Do I Need to Make Some Changes in WAF If the Security Group for Origin Server (Address) Is Changed?

No modifications are required in WAF, but you are required to whitelist WAF back-to-source IP addresses on the origin servers.

Can WAF Protect Multiple Domain Names That Point to the Same Origin Server?

Yes. If there are multiple domain names pointing to the same origin server, you can connect these domain names to WAF for protection.

WAF protects websites over domain names or IP addresses. If multiple domain names use the same EIP to provide services, all these domain names must be connected to WAF.

What Is a Protection IP Address?

A protection IP address in WAF is the IP address of a website you use WAF to protect.

Will the CNAME Record Be Changed If the IP Address of the Origin Server Has Been Changed?

If you are using a cloud WAF instance, the CNAME record will not be changed when origin server IP addresses have been changed.

Do I Need to Add the Domain Name to WAF Again If the Domain Name IP Address Has Been Changed?

If the IP address of the website does not change, you do not need to reconfigure it in WAF. If the website resolves a new IP address, you need to add it in WAF again.

Do I Need to Bind an EIP to WAF?

No EIPs are required for cloud WAF instances. Dedicated WAF instances need to work with layer-7 dedicated load balancers. These load balancers need to use EIPs as service addresses.

Does WAF Support Vulnerability Detection?

WAF enables customizable anti-crawler rules to detect and block threats such as third-party security tool vulnerability attacks. If you enable the scanner item when configuring anti-crawler rules, WAF detects scanners and crawlers, such as OpenVAS and Nmap.

Does WAF Support Protocols Used in MS Exchange?

WAF supports HTTP and HTTPS for logging in to Exchange on the web, but does not support mail-related protocols such as Simple Mail Transfer Protocol (SMTP), Post Office Protocol version 3 (POP3), or Internet Message Access Protocol (IMAP) used by MS Exchange.

Can WAF Defend Against XOR Injection Attacks?

Yes. WAF can defend against XOR injection attacks.

What Is the bind_ip Parameter in WAF Logs?

After your website is connected to WAF, WAF functions as a reverse proxy between the client and the origin server. WAF examines traffic to your website, filters out malicious traffic, and forwards health traffic to your origin servers. **bind_ip** indicates the WAF back-to-source IP addresses used by WAF to forward healthy traffic.

Can WAF Protect All Domain Names Mapped to My Website IP Address If I Have Connected the IP Address to WAF?

No.

In dedicated mode, the origin server IP address can be connected to WAF, and the IP address can be a private or internal IP address. WAF protects only the traffic accessed through the IP address but cannot protect the traffic to the domain name mapped to the IP address. To protect a domain name, connect the domain name to WAF.

Can WAF Protect Websites in the C/S Architecture?

In the C/S architecture, WAF can protect only websites that use the layer-7 HTTP/HTTPS protocol.

Where Can I Query the Service QPS of the Current WAF Service?

You can query the inbound bandwidth or QPS quota usage of the origin server IP address on the origin server.

Can WAF Block Data Packets in multipart/form-data Format?

Yes.

The multipart/form-data indicates that the browser uses a form to upload files. For example, if an attachment is added to an email, the attachment is usually uploaded to the server in multipart/form-data format.

Which CVE Vulnerabilities Can WAF Defend Against?

WAF can defend against the following CVE vulnerabilities: CVE-2017-7525, CVE-2019-17571, CVE-2018-1270, CVE-2016-1000027, CVE-2022-22965, CVE-2022-22968, and CVE-2018-20318.

How Do I Configure WAF If a Reverse Proxy Server Is Deployed for My Website?

In this case, the reverse proxy server will not be affected after the website is connected to WAF.

Can I Change the Domain Name That Has Been Added to WAF?

After a domain name is added to WAF, you cannot change its name. If you want to change the protected domain name, you are advised to delete the original one and add the domain name you want to protect.

Can I Configure Multiple Load Balancers for a Dedicated WAF Instance?

Yes. You can add a dedicated WAF instance to backend server groups of more than one load balancers.

15.1.2 Can WAF Protect an IP Address?

A WAF instance can protect IP addresses.

Cloud Mode

In this mode, only website domain names can be added to WAF for protection.

The origin server IP address configured in WAF can only be a public IP address.

To reduce the number of public IP addresses, you can use an Elastic Load Balance (ELB) load balancer to work as a proxy of backend private IP addresses. Then, you need to set the EIP (public IP address) bound to the load balancer as the origin server IP address.

Dedicated Mode

A dedicated or load balancing WAF instance can protect websites through either domain names or IP addresses.

The origin server IP address configured in WAF can be a public IP address or internal IP address.

15.1.3 What Objects Does WAF Protect?

Web Application Firewall (WAF) examines all HTTP and HTTPS requests to detect and block the following attacks: Structured Query Language (SQL) injection, cross-site scripting (XSS), web shells, command and code injections, file inclusion, sensitive file access, third-party vulnerability exploits, Challenge Collapsar (CC) attacks, malicious crawlers, and cross-site request forgery (CSRF).

WAF can protect websites through domain names or IP addresses.

- In cloud CNAME access mode, only website domain names can be added to WAF.

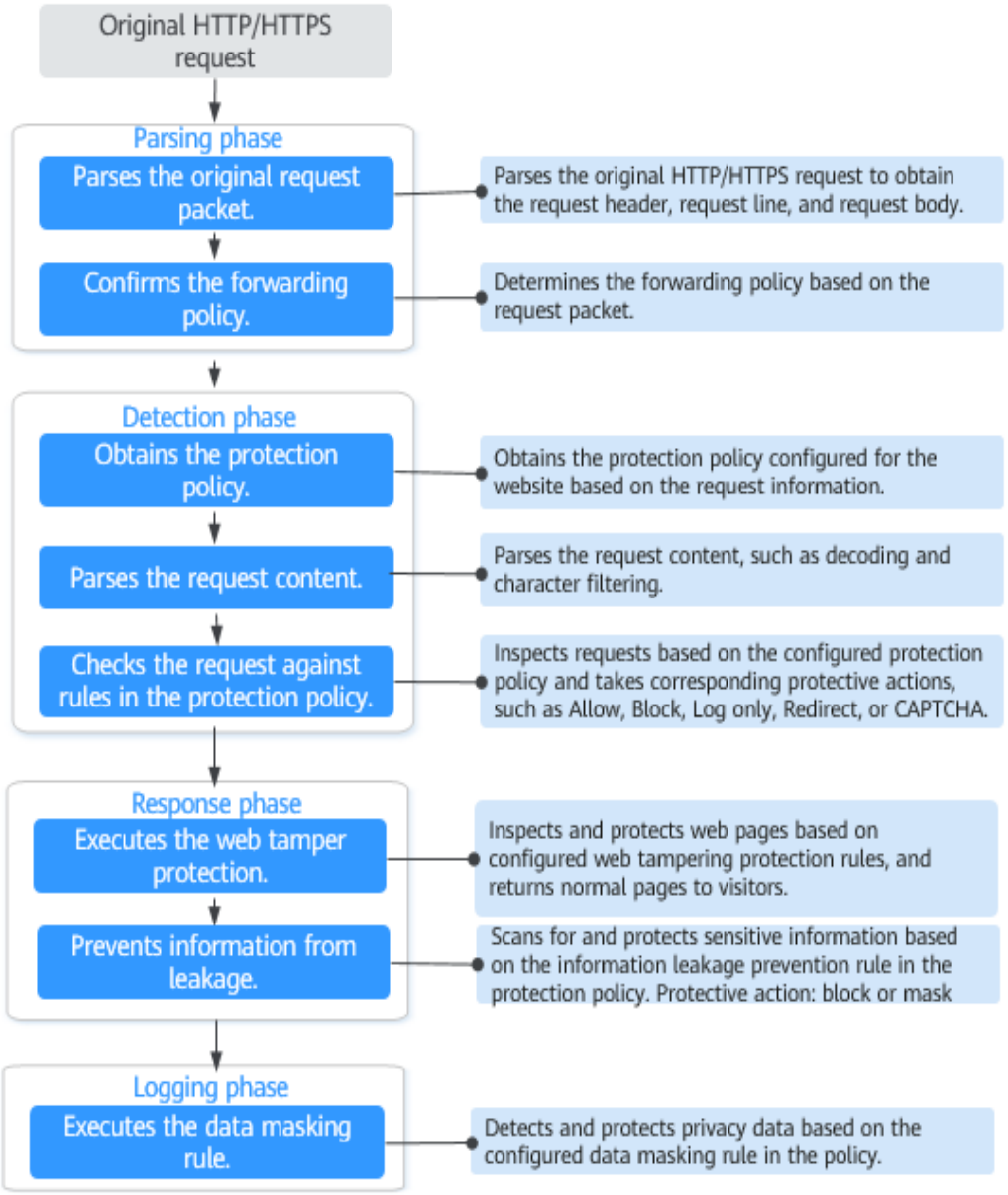
  Your origin server IP address configured in WAF must a public IP address. For example, if an Elastic Load Balance (ELB) load balancer is configured for origin servers, a cloud WAF instance can protect origin servers as long as the load balancer has a public IP address bound.
- In dedicated mode, you can add website domain names or IP addresses to WAF.

15.1.4 Does WAF Block Customized POST Requests?

No. WAF does not block user-defined POST requests.

Figure 15-1 shows the detection process of the WAF built-in protection rules for original HTTP/HTTPS requests.

Figure 15-1 WAF engine work process



15.1.5 What Are the Differences Between the Web Tamper Protection Functions of WAF and HSS?

The web tamper protection function of HSS monitors website directories in real time, backs up files, and restores tampered files using the backup, protecting websites from tampering. This function is helpful for governments, educational institutions, and enterprises.

WAF protects user data on the application layer. It supports cache configuration on static web pages. When a user accesses a web page, the system returns a cached page to the user and randomly checks whether the page has been tampered with.

Differences Between the Web Tamper Protection Functions of HSS and WTP

Table 15-1 describes the differences

Table 15-1 Differences between the web tamper protection functions of HSS and WTP

Item	HSS	WAF
Static web page protection	Locks files in driver and web file directories to prevent attackers from tampering with them.	Caches static web pages on servers.
Dynamic web page protection	• Dynamic WTP Protects your data while Tomcat is running, detecting dynamic data tampering in databases. • Privileged process management Allows privileged processes to modify web pages.	No
Backup and restoration	• Active backup and restoration If WTP detects that a file in the protection directory is tampered with, it immediately uses the backup file on the local host to restore the file. • Remote backup and restoration If a file directory or backup directory on the local server becomes invalid, you can use the remote backup service to restore the tampered web page.	No
Suitable for	Websites that have high security requirements and difficult to be manually recovered	Websites that only require application-layer protection

Purchase Suggestion

Website	Service
Common websites	WAF web tamper protection + HSS enterprise edition
Websites that require strong protection and anti-tampering capabilities	WAF web tamper protection + HSS WTP

15.1.6 Which Web Service Framework Protocols Does WAF Support?

WAF is deployed on the cloud.

Web Application Firewall (WAF) keeps web services stable and secure. It examines all HTTP and HTTPS requests to detect and block the following attacks: Structured Query Language (SQL) injection, cross-site scripting (XSS), web shells, command and code injections, file inclusion, sensitive file access, third-party vulnerability exploits, Challenge Collapsar (CC) attacks, malicious crawlers, and cross-site request forgery (CSRF).

WAF checks HTTP and HTTPS requests.

WAF can examine requests forwarded over the following protocols:

- WebSocket (enabled by default)
- HTTP/HTTPS

15.1.7 Can WAF Protect Websites Accessed Through HSTS or NTLM Authentication?

Yes. WAF can protect HTTP and HTTPS applications.

- If a website uses the HTTP Strict Transport Security (HSTS) policy, the client (such as a browser) is forced to use HTTPS to communicate with the website. This reduces the risk of session hijacking. Websites configured with HSTS policy use the HTTPS protocol. So, WAF can protect these websites.
- Windows New Technology LAN Manager (NTLM) is an authentication method over HTTP. NTLM uses a three-way handshake to authenticate a connection. NTLM authenticates a client (such as a browser) the same way the Windows remote login authentication does.

  WAF can protect applications that use NTLM to authenticate connection between a server and client, such as a browser.

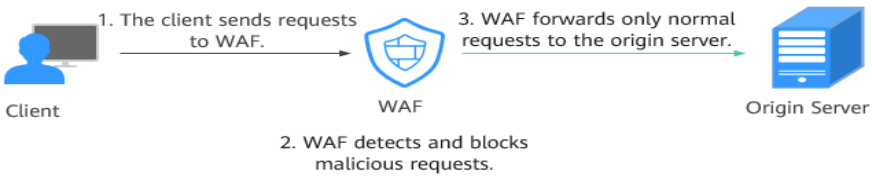
15.1.8 What Are the Differences Between WAF Forwarding and Nginx Forwarding?

Nginx directly forwards access requests to the origin server, while WAF detects and filters out malicious traffic and then forwards only the normal access requests to the origin server. The details are as follows:

- WAF forwarding

  After a website is connected to WAF, all access requests pass through WAF. WAF detects HTTP(S) requests to identify and block a wide range of attacks, such as SQL injection, cross-site scripting attacks, web shell uploads, command/code injection, file inclusion, sensitive file access, third-party application vulnerability attacks, CC attacks, malicious crawlers, cross-site request forgery (CSRF) attacks. Then, WAF sends normal traffic to the origin server. In this way, security, stability, and availability of your web applications are assured.

Figure 15-2 How WAF Works

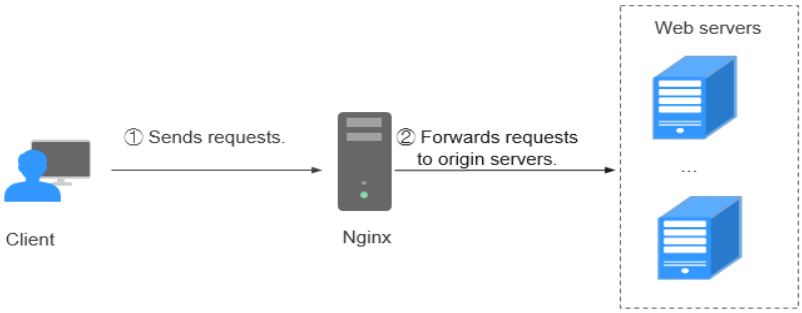


- Nginx forwarding

  Nginx works as a reverse proxy server. After receiving the access request from the client, the reverse proxy server directly forwards the access request to the web server and returns the result obtained from the web server to the client. The reverse proxy server is installed in the website equipment room. It functions as a proxy for the web server to receive and forward access requests.

  The reverse proxy server prevents malicious attacks from the Internet to intranet servers, caches data to reduce workloads on the intranet servers, and implements access security control and load balancing.

  Figure 15-3 How Nginx Works



15.1.9 Can I Configure Session Cookies in WAF?

No. WAF does not support session cookies.

WAF allows you to configure CC attack protection rules to limit the access frequency of a specific path (URL) in a single cookie field, accurately identify CC attacks, and effectively mitigate CC attacks. For example, if a user whose cookie ID is **name** accesses the **/admin*** page under the protected domain name for more than 10 times within 60 seconds, you can configure a CC attack protection rule to forbid the user from accessing the domain name for 600 seconds.

What Are Cookies?

Cookies are data (usually encrypted) stored on the local terminal of a user by a website to identify the user and trace sessions. Cookies are sent by a web server to a browser to record personal information of the user.

A cookie consists of a name, a value, and several optional attributes that control the cookie validity period, security, and usage scope. Cookies are classified into session cookies and persistent cookies. The details are as follows:

- Session cookie

  A session cookie exists only in temporary memory while the user navigates the website. It does not have an expiration date. When the browser is closed, session cookies are deleted.

- Persistent cookie

  A persistent cookie has an expiration date and is stored in disks. Persistent cookies will be deleted after a specific length of time.

15.1.10 How Does WAF Detect SQL Injection, XSS, and PHP Injection Attacks?

A Structured Query Language (SQL) injection is a common web attack. The attacker injects malicious SQL commands into database query strings to deceive the server into executing commands. By exploiting these commands, the attacker can obtain sensitive information, add users, export files, or even gain the highest permissions to the database or system.

XSS attacks exploit vulnerabilities left during web page development to inject malicious instruction code into web pages so that attackers can trick visitors into loading and executing malicious web page programs attackers fabricated. These malicious web page programs are usually JavaScript, but they can also include Java, VBScript, ActiveX, Flash, or even common HTML. After an attack succeeds, the attacker may obtain various content, including but not limited to higher permissions (for example, permissions for certain operations), private content, sessions, and cookies.

How Does WAF Detect SQL Injection Attacks?

WAF detects and matches SQL keywords, special characters, operators, and comment symbols.

- SQL keywords: union, Select, from, as, asc, desc, order by, sort, and, or, load, delete, update, execute, count, top, between, declare, distinct, distinctrow, sleep, waitfor, delay, having, sysdate, when, dba_user, case, delay, and the like
- Special characters: ',; ()
- Mathematical operators: **±**, *****, **/**, **%**, and **|**
- Operators: **=**, **>**, **<**, **>=**, **<=**, **!=**, **+=**, and **-=**
- Comment symbols: **–** or **/******/**

How Does WAF Detect XSS Attacks?

WAF checks HTML script tags, event processors, script protocols, and styles to prevent malicious users from injecting malicious XSS statements through client requests.

- XSS keywords (such as **javascript**, **script**, **object**, **style**, **iframe**, **body**, **input**, **form**, **onerror**, and **alert**)

- Special characters (<, >, ', and ")
- External links (href="http://xxx/",src="http://xxx/attack.js")

NOTE

Rich text can be uploaded using multipart upload instead of body. In multipart upload, rich text is stored in forms and can be decoded even if it is encoded using Base64. Analyze your services and do not use quotation marks and angle brackets as far as possible.

How Does WAF Detect PHP Injection Attacks?

If a request contains keywords similar to "system(xx)", the keywords may cause PHP injection attacks. WAF will then block such requests.

15.1.11 Can WAF Defend Against the Apache Struts2 Remote Code Execution Vulnerability (CVE-2021-31805)?

Yes. WAF basic web protection rules can defend against the Apache Struts2 remote code execution vulnerability (CVE-2021-31805).

Follow the procedure below to complete the configuration.

Configuration Procedure

Step 1 **Enable WAF**.

Step 2 Add the website domain name to WAF and connect it to WAF. For details, see **Connecting Your Website to WAF (Dedicated Mode)**.

Step 3 In the **Basic Web Protection** configuration area, set **Mode** to **Block**. For details, see **Configuring Basic Web Protection to Defend Against Common Web Attacks**.

----End

15.1.12 Why Does the Vulnerability Scanning Tool Report Disabled Non-standard Ports for My WAF-Protected Website?

Symptom

When a third-party vulnerability scanning tool scans the website whose domain name has been connected to WAF, the scan result shows that some standard ports (for example, 443) and non-standard ports (for example, 8000 and 8443) are vulnerable.

Possible Cause

WAF uses the same non-standard port engine for all WAF users. So, if a third-party vulnerability scanning tool performs a scan for your website, the enabled non-standard ports in WAF are reported. This means such port vulnerabilities in scan results do not affect your origin server security. WAF will safeguard your website after you point origin server IP address to WAF engine IP address through the CNAME record.

Handling Suggestions

No action is required.

15.1.13 Will Traffic Be Permitted After WAF Is Switched to the Bypassed Mode?

For cloud WAF instances, if you switch the instance protection mode to **Bypassed**, requests are directly sent to the original backend server without passing through WAF.

The **Bypassed** mode can be enabled only when one of the following conditions is met:

- Website services need to be restored to the status when the website is not connected to WAF.
- You need to investigate website errors, such as 502, 504, or other incompatibility issues.
- No proxies are configured between the client and WAF.

Effective Time of WAF Bypassed Working Mode

After you switch the protection mode to **Bypassed**, it takes 3 to 5 minutes for the switch to work.

Procedure for WAF Working Mechanism Switchover

Step 1 Log in to the management console.

Step 2 Click  in the upper left corner of the management console and select a region or project.

Step 3 Click  in the upper left corner and choose **Web Application Firewall** under **Security**.

Step 4 In the navigation pane on the left, choose **Website Settings**.

Step 5 In the row containing the target domain name, click in the **Mode** column and select a mode you want.

----End

15.1.14 What Are Local File Inclusion and Remote File Inclusion?

You can view security events such as file inclusion in WAF protection events to quickly locate attack sources or analyze attack events.

Program developers write repeatedly used functions into a single file. When such functions need to be used, the file is directly invoked. The file invoking process is called file inclusion. File inclusion vulnerabilities are classified into two categories, based on whether the file is a remotely hosted file or a local file available on the web server:

- Local file inclusion
- Remote file inclusion

A file inclusion vulnerability allows an attacker to access unauthorized or sensitive files available on the web server or to execute malicious files on the web server by using such a file. This vulnerability is mainly due to a bad input validation mechanism, wherein the user's input that is passed to the file include commands without proper validation. The impact of this vulnerability can lead to malicious code execution on the server or reveal data present in sensitive files.

15.1.15 What Is the Difference Between QPS and the Number of Requests?

Queries Per Second (QPS) indicates the number of requests per second. For example, an HTTP GET request is also called a query. The number of requests is the total number of requests in a specific time range.

Queries Per Second (QPS) is the number of requests a server can handle per second.

NOTE

QPS is used to measure the number of queries, or requests, per second.

For details about QPS on the **Dashboard** page, see **Table 15-2**.

Table 15-2 QPS calculation

Time Range	Average QPS Description	Peak QPS Description
Yesterday or **Today**	The QPS curve is made with the average QPS in every minute.	The QPS curve is made with each peak QPS in every minute.
Past 3 days	The QPS curve is made with the average QPS in every five minutes.	The QPS curve is made with each peak QPS in every five minutes.
Past 7 days	The QPS curve is made with the maximum value among the average QPS in every five minutes at a 10-minute interval.	The QPS curve is made with each peak QPS in every 10 minutes.
Past 30 days	The QPS curve is made with the maximum value among the average QPS in every five minutes at a one-hour interval.	The QPS curve is made with the peak QPS in every hour.

15.1.16 Does WAF Support Custom Authorization Policies?

WAF supports custom authorization policies. With IAM, you can:

- Create IAM users for employees based on the organizational structure of your enterprise. Each IAM user has their own security credentials, providing access to WAF resources.
- Grant only the permissions required for users to perform a task.
- Entrust an account or cloud service to perform professional and efficient O&M on your WAF resources.

15.1.17 Why Do Cookies Contain the HWWAFSESID or HWWAFSESTIME field?

HWWAFSESID indicates the session ID, and **HWWAFSESTIME** indicates the session timestamp. These two fields are used to mark the request, for example, they can be used to count the requests for a CC protection rule.

After a domain name or IP address is connected to WAF, WAF inserts fields such as **HWWAFSESID** (session ID) and **HWWAFSESTIME** (session timestamp) into the cookie of your customer request. These fields are used by WAF to implement some functions, such as counting requests and monitoring request duration. If these fields are not inserted, some rules may be unable to work, such as CC attack protection rules with verification code configured, known attack source rules, and dynamic anti-crawler rules.

NOTE

In the following configurations, WAF does not insert HWWAFSESID (session ID) and HWWAFSESTIME (session timestamp) fields into your customer request cookies:

- **Protection Action** is set to **Allow**.
- In global whitelist protection rules, **All protection** is selected for **Ignore WAF Protection**.
- The protection mode is **Suspended**.
- Basic web protection is disabled.

15.1.18 Can I Switch Between the WAF Cloud Mode and Dedicated Mode?

Direct switchover is not supported, but you can complete required configurations then use the WAF mode you want. When adding a domain name or IP address to WAF, you can select cloud mode or dedicated mode to meet different needs. Once you select a WAF mode and connect the domain name to WAF, the WAF mode cannot be changed directly.

If you want to use another WAF mode for the domain name, deploy your services in the WAF mode you want first. Then, remove the domain name or IP address from the current WAF instance. After that, you can add the website in the mode you want to the WAF instance. For example, you are using a cloud WAF instance to protect domain name www.example.com. If you want to use a dedicated WAF instance to protect www.example.com, ensure that your current services are supported by WAF dedicated mode. Then, you can apply for a dedicated WAF instance and remove protected domain name www.example.com from the cloud WAF instance. Then, add www.example.com to the dedicated WAF instance.

15.2 Website Connect Issues

15.2.1 How Does a Dedicated WAF Instance Protect Non-Standard Ports That Are Not Supported by the Dedicated Instance?

To use a dedicated WAF instance to protect a non-standard port that is not supported by dedicated instance, configure an ELB load balancer to distribute traffic to any non-standard port that is supported by the dedicated instance. For supported non-standard ports, see **Ports Supported by WAF**

For example, a client sends requests over HTTP to the dedicated WAF instance, and you protect the website whose domain name is www.example.com:1234. The dedicated instance cannot protect non-standard port 1234. In this case, you can configure a load balancer to distribute traffic to any other non-standard port (for example, port 81) that can be protected by the dedicated instance. In this way, traffic designated to non-standard port 1234 will be checked by WAF.

NOTICE

To ensure that the configuration takes effect, a wildcard domain name corresponding to the protected domain name is recommended for the **Domain Name** field. For example, if you want to protect www.example.com:1234, set **Domain Name** to ***.example.com**.

Perform the following steps:

Step 1 Log in to the management console.

Step 2 Add the domain name of the website you want to protect on the WAF console.

1. Click ☰ in the upper left corner and choose **Web Application Firewall** under **Security**.
2. In the navigation pane on the left, choose **Website Settings**.
3. In the upper left corner of the website list, click **Add Website**. On the displayed page, select **Dedicated mode**, enter the wildcard domain name ***.example.com** corresponding to **www.example.com:1234** in the **Domain Name** text box, and select a port (for example, 81) from the **Protected Port** drop-down list.
4. Select **Yes** for **Proxy Configured** and click **Confirm**.
5. Close the dialog box displayed.

   You can view the added websites in the protected website list.

Step 3 Configure a load balancer on the ELB console.

1. Click ☰ in the upper left corner of the page and choose **Elastic Load Balance** under **Network** to go to the **Load Balancers** page.

2. Click the name of the load balancer you want in the **Name** column to go to the **Basic Information** page.
3. Locate the **IP as a Backend** row, enable the function. In the displayed dialog box, click **OK**.
4. Select the **Listeners** tab, click **Add Listener**, and configure the listener port to **1234**.
5. Click **Next: Configure Request Routing Policy**.
6. Click **Next: Add Backend Server**. Then, select the **IP as Backend Servers** tab.
7. Click **Add IP as Backend Server**. In the displayed dialog box, configure **Backend Server IP Address** and **Backend Port**.
   - **Backend Server IP Address**: Enter the IP address of the dedicated WAF engine, which you can obtain from the dedicated engine list.
   - **Backend Port**: 81, which is the same as the port you configured in **Step 2.3**.
8. Click **OK**.
9. Click **Next: Confirm**, confirm the information, and click **Submit**.

Step 4 Unbind an elastic IP address (EIP) from the origin server and bind the EIP to the load balancer configured for the dedicated WAF instance.

----End

15.2.2 How Do I Configure Domain Names to Be Protected When Adding Domain Names?

Before using WAF, you need to add domain names to be protected to WAF based on your web service protection requirements. WAF supports addition of single domain names and wildcard domain names. This section describes how to configure domain names to be protected.

Basic Concepts

- Wildcard domain name

  A wildcard domain name is a domain name that contains the wildcard * and starts with ***.**.

  For example, ***.example.com** is a correct wildcard domain name, but ***.*.example.com** is not.

  NOTE

  A wildcard domain name counts as one domain name.

- Single domain name

  A single domain name is also called a common domain name and is a specific domain name (a non-wildcard domain name).

  For example, **www.example.com** or **example.com** is a single domain name.

  NOTE

  For example, **www.example.com** counts as a domain name and so does **a.www.example.com**.

Selecting a Domain Name Type

WAF supports single domain names and wildcard domain names.

The domain name purchased from the DNS service provider is a single domain name (example.com). The domain name added to WAF can be example.com, a subdomain name (for example, a.example.com), or wildcard domain name (*.example.com). You can select a domain name type based on the following scenarios:

- If services of a domain name to be protected are the same, enter a single domain name. For example, if all the services of www.example.com to be protected are services on port 8080, set **Domain Name** to a single domain name **www.example.com**.
- If the server IP address of each subdomain name is the same, enter a wildcard domain name to be protected. For example, if the server IP addresses corresponding to a.example.com, b.example.com, and c.example.com are the same, **Domain Name** can be set to a wildcard domain name ***.example.com**.
- If the server IP addresses of subdomain names are different, add subdomain names as single domain names one by one.

NOTE

You are advised to set the added domain name to be protected to be the same as the domain name that is set at the DNS provider.

If A Single Domain Name and A Wildcard Domain Name Are Added To WAF at The Same Time, Which Domain Name Will WAF Check First?

WAF first checks the domain name that points to a specific page. For example, if www.example.com, *.a.example.com, and *.example.com are added to WAF, WAF checks them in the following sequence: www.example.com > *.a.example.com > *.example.com.

15.2.3 Do I Have to Configure the Same Port as That of the Origin Server When Adding a Website to WAF?

No. When you add a domain name to WAF, configure the server port to the port of the protected website. The origin server port is the service port used by WAF to forward your website requests. More details about port configuration are described as follows:

- If **Client Protocol** is **HTTP**, WAF protects services on the standard port 80 by default. If **Client Protocol** is **HTTPS**, WAF protects services on the standard port 443 by default.
- To configure a port other than ports 80 and 443, select a non-standard port from the **Protected Port** drop-down list.

15.2.4 How Do I Whitelist Back-to-Source IP Addresses of Cloud WAF?

To let WAF take effect in cloud mode, configure ACL rules on the origin server to trust only the back-to-source IP addresses of WAF. This prevents hackers from attacking the origin server through the server IP addresses.

NOTICE

ACL rules must be configured on the origin server to whitelist WAF back-to-source IP addresses. Otherwise, your website visitors will frequently receive 502 or 504 error code when your website is connected to WAF.

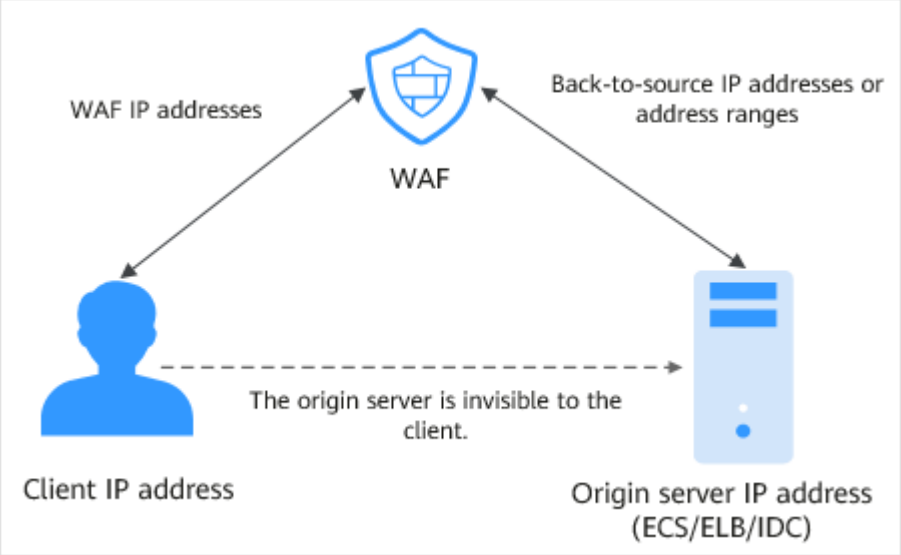
What Are Back-to-Source IP Addresses?

From the perspective of a server, all web requests originate from WAF. The IP addresses used by WAF forwarding are back-to-source IP addresses of WAF. The real client IP address is written into the X-Forwarded-For (XFF) HTTP header field.

NOTE

- There will be more WAF back-to-source IP addresses due to scale-out or new clusters. For your legacy domain names, WAF back-to-source IP addresses usually fall into several class C IP addresses (192.0.0.0 to 223.255.255.255) of two to four clusters.
- Generally, these IP addresses do not change unless clusters in use are changed due to disaster recovery switchovers or other scheduling switchovers. Even when WAF cluster is switched over on the WAF background, WAF will check the security group configuration on the origin server to prevent service interruptions.

Figure 15-4 Back-to-source IP address



WAF Back-to-Source IP Address Check Mechanism

A back-to-source IP address is randomly allocated from the back-to-source IP address range. When WAF forwards requests to the origin server, WAF will check the IP address status. If the IP address is abnormal, WAF will remove it and randomly allocate a normal one to receive or send requests.

Why Do I Need to Whitelist the WAF Back-to-Source IP Address Ranges?

All web requests originate from a limited quantity of WAF IP addresses. The security software on the origin server may most likely regard these IP addresses as

malicious and block them. Once WAF back-to-source IP addresses are blocked, the website may fail to be accessed or it opens extremely slowly. To fix this, add the WAF back-to-source IP addresses to the whitelist of the security software.

NOTE

After you connect your website to WAF, uninstall other security software from the origin server or allow only the requests from WAF to access your origin server. This ensures normal access and protects the origin server from hacking.

Procedure

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

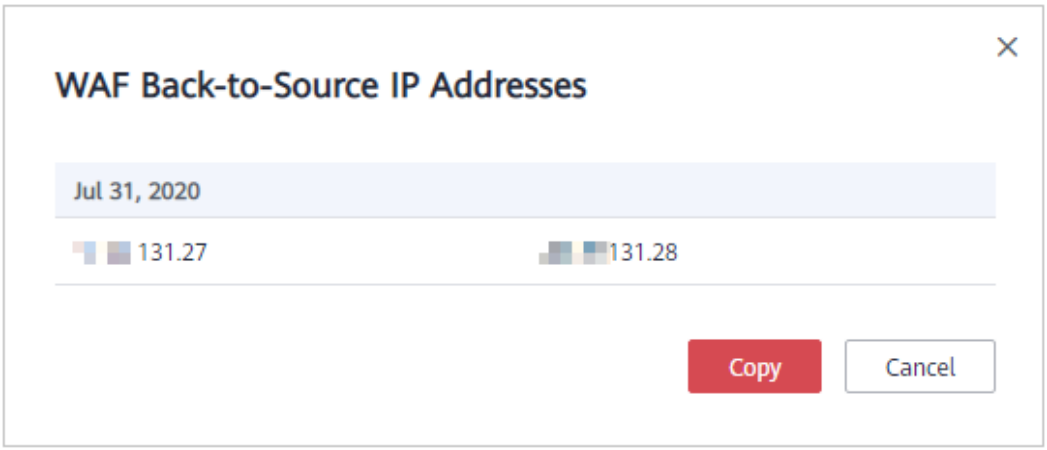
Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 In the navigation pane on the left, choose **Website Settings**.

Step 5 Above the website list, click **WAF Back-to-Source IP Addresses**.

Step 6 In the displayed dialog box, click **Copy** to copy all the addresses.

Figure 15-5 WAF Back-to-Source IP Addresses dialog box



Step 7 Open the security software on the origin server and add the copied IP addresses to the whitelist.

----End

15.2.5 What Are the Precautions for Configuring Multiple Server Addresses for Backend Servers?

- When configuring multiple server addresses for the same domain name, pay attention to the following:
  - For domain names mapping to non-standard ports

The client protocol, server protocol, and server for each piece of server configuration must be the same.

- For domain names mapping to standard ports

  The client protocol, server protocol, and server for each piece of server configuration can be different.

- When a domain name is added, WAF supports addition of multiple server IP addresses. WAF routes legitimate requests back to origin servers in polling mode, reducing the pressure on the servers and protecting the origin servers. For example, two backend server IP addresses (IP-A and IP-B) are added. When there are 10 requests for accessing the domain name, five requests are forwarded by WAF to the server identified by IP-A, and the other five requests are forwarded by WAF to the server identified by IP-B.

15.2.6 Does WAF Support Wildcard Domain Names?

Yes. When adding a domain name to WAF, you can configure a single domain name or a wildcard domain name based on your service requirements. The details are as follows:

- Single domain name

  Configure a single domain name to be protected. For example, www.example.com

- Wildcard domain name

  You can configure a wildcard domain name to let WAF protect multi-level domain names under the wildcard domain name.

  - If the server IP address of each subdomain name is the same, enter a wildcard domain name to be protected. For example, if the subdomain names ***a.example.com***, ***b.example.com***, and ***c.example.com*** have the same server IP address, you can directly add the wildcard domain name ****.example.com*** to WAF for protection.
  - If each subdomain name points to different server IP addresses, add subdomain names as single domain names one by one.

15.2.7 How Does WAF Forward Access Requests When Both a Wildcard Domain Name and a Single Domain Name Are Connected to WAF?

WAF preferentially forwards access requests to the single domain name. If the single domain name cannot be identified, access requests will be forwarded to the wildcard domain name.

For example, if you connect single domain name a.example.com and wildcard domain name *.example.com to WAF, WAF preferentially forwards access requests to single domain name a.example.com.

If you are configuring a wildcard domain name, pay attention to the following:

- If the server IP address of each subdomain name is the same, enter a wildcard domain name. For example, if the subdomain names ***a.example.com***, ***b.example.com***, and ***c.example.com*** have the same server IP address, you can add the wildcard domain name ****.example.com*** to WAF to protect all three.

- If the server IP addresses of subdomain names are different, add subdomain names as single domain names one by one.

15.2.8 Why Am I Seeing the "Someone else has already added this domain name. Please confirm that the domain name belongs to you" Error Message?

Background

Someone else has already added this domain name. You need to confirm that the domain name belongs to you. If the domain name belongs to you, contact technical support.

Causes

Your domain name might have been added to WAF under another account. A domain name can only be added to WAF once.

Solution

If you want to add it to WAF under the current account, delete it from another account first.

15.2.9 Why Cannot I Select a Client Protocol When Adding a Domain Name?

The non-standard port you configured is not supported by the client protocol (HTTP/HTTPS). The non-standard port you will configure must be supported by the client protocol (HTTP/HTTPS).

15.2.10 Can I Set the Origin Server Address to a CNAME Record If I Use Cloud WAF?

Yes. If the IP address of the origin server is set to a CNAME record, additional DNS resolution is performed after a domain name is added. That is, the CNAME is resolved to an IP address first. DNS resolution increases the delay. Therefore, a public network IP address is recommended for the origin server.

15.2.11 Can I Access a Website Using an IP Address After a Domain Name Is Connected to WAF?

After a domain name is connected to WAF, you can enter the origin server IP address in the address bar of the browser to access the website. However, your origin server IP address is easily exposed. As a result, attackers can bypass WAF and attack your origin server.

Web Application Firewall (WAF) keeps web services stable and secure. It examines all HTTP and HTTPS requests to detect and block the following attacks: Structured Query Language (SQL) injection, cross-site scripting (XSS), web shells, command and code injections, file inclusion, sensitive file access, third-party vulnerability

exploits, Challenge Collapsar (CC) attacks, malicious crawlers, and cross-site request forgery (CSRF).

After you enable a WAF instance, add your website domain to the WAF instance on the WAF console. All public network traffic for your website then goes to WAF first. WAF identifies and filters out the illegitimate traffic, and routes only the legitimate traffic to your origin server to ensure site security.

15.2.12 How Can I Forward Requests Directly to the Origin Server Without Passing Through WAF?

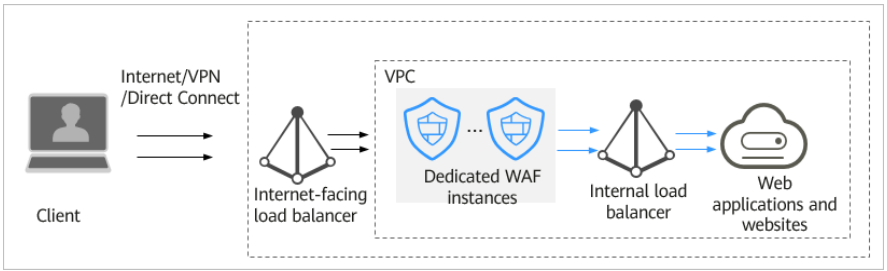
If you select **Cloud** for **Protection**, take the following steps to route your website traffic to origin servers.

- Cloud

  Switch the WAF protection mode to **Bypassed**. Then, your website requests directly go to the origin servers without passing through WAF. It takes about 3 to 5 minutes for WAF bypass to take effect.

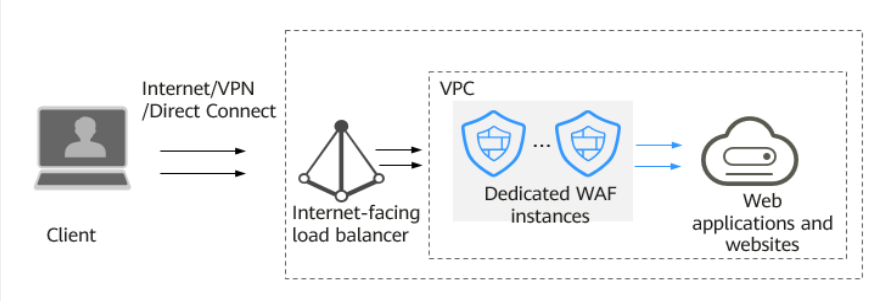
- Dedicated mode
  - If your website has a private network load balancer deployed behind the dedicated WAF instance, as shown in **Figure 15-6**, unbind the EIP from the internet-facing load balancer and then bind the EIP to the private load balancer. In doing so, your website traffic will bypass WAF and directly go to the origin server.

    Figure 15-6 Dedicated WAF instance deployment architecture (private network load balancers deployed behind dedicated WAF instances)

  - If your website has no private network load balancer deployed behind the dedicated WAF instance, as shown in **Figure 15-7**, unbind the EIP from the dedicated WAF instance and then bind the EIP to the origin server. In doing so, your website traffic will bypass WAF and directly go to the origin server.

    Figure 15-7 Dedicated WAF instance deployment architecture (no private network load balancer deployed behind dedicated WAF instances)

15.3 Protection Rules

15.3.1 Which Protection Levels Can Be Set for Basic Web Protection?

Basic Web Protection has three protection levels. The default protection level is **Medium**. For details, see **Table 15-3**.

Table 15-3 Protection levels

Protection Level	Description
Low	WAF only blocks the requests with obvious attack signatures. If a large number of false alarms are reported, **Low** is recommended.
Medium	The default level is **Medium**, which meets a majority of web protection requirements.
High	At this level, WAF provides the finest granular protection and can intercept attacks with complex bypass features, such as Jolokia cyber attacks, common gateway interface (CGI) vulnerability detection, and Druid SQL injection attacks. To let WAF defend against more attacks but make minimum effect on normal requests, observe your workloads for a period of time first. Then, configure a global protection whitelist rule and select **High**.

15.3.2 What Is the Peak Rate of CC Attack Protection?

It depends on the WAF edition you are using. For details, see **Table 15-4**.

Table 15-4 Applicable service scales

Service Scale	Dedicated Mode
Peak rate of normal service requests	The following lists the specifications of a single instance. • Specifications: WI-500. Estimated performance: – HTTP services: 5,000 QPS (recommended) – HTTPS services: 4,000 QPS (recommended) – WebSocket service - Maximum concurrent connections: 5,000 – Maximum WAF-to-server persistent connections: 60,000 • Specifications: WI-100. Estimated performance: – HTTP services: 1,000 QPS (recommended) – HTTPS services: 800 QPS (recommended) – WebSocket service - Maximum concurrent connections: 1,000 – Maximum WAF-to-server persistent connections: 60,000 **NOTICE** Maximum limits are based on test and for reference only. They may vary depending on your services. The real-world QPS is related to the request size and the type and quantity of protection rules you customize.
Peak rate of CC attack protection	• Specifications: WI-500. Estimated performance: Maximum QPS: 20,000 • Specifications: WI-100. Estimated performance: Maximum QPS: 4,000

15.3.3 When Is Cookie Used to Identify Users?

During the configuration of a CC attack protection rule, if IP addresses cannot identify users precisely, for example, when many users share an egress IP address, use Cookie to identify users.

If the cookie contains key values, such as the session value, of users, the key value can be used as the basis for identifying users.

15.3.4 What Are the Differences Between Rate Limit and Allowable Frequency in a CC Rule?

In a CC attack protection rule, **Rate Limit** specifies the maximum requests that a website visitor can initiate within the configured period. If the configured rate limit has been reached, WAF will respond according to the protective action configured. For example, if you configure **Rate Limit** to **10 requests** within **60 seconds** and **Protective Action** to **Block**, a maximum of 10 requests are allowed within 60 seconds. Once the website visitor initiates more than 10 requests within 60 seconds, WAF directly blocks the visitor from accessing the requested URL.

If you select **Advanced** for **Mode** and **Block dynamically** for **Protective Action**, configure **Rate Limit** and **Allowable Frequency**.

WAF blocks requests that trigger the rule based on **Rate Limit** first. Then, in the following rate limit period, WAF blocks requests that trigger the rule based on **Allowable Frequency** you configured. If blocking is triggered and **Allowable Frequency** is **0**, all requests that meet the rule conditions in the next period are blocked.

Differences

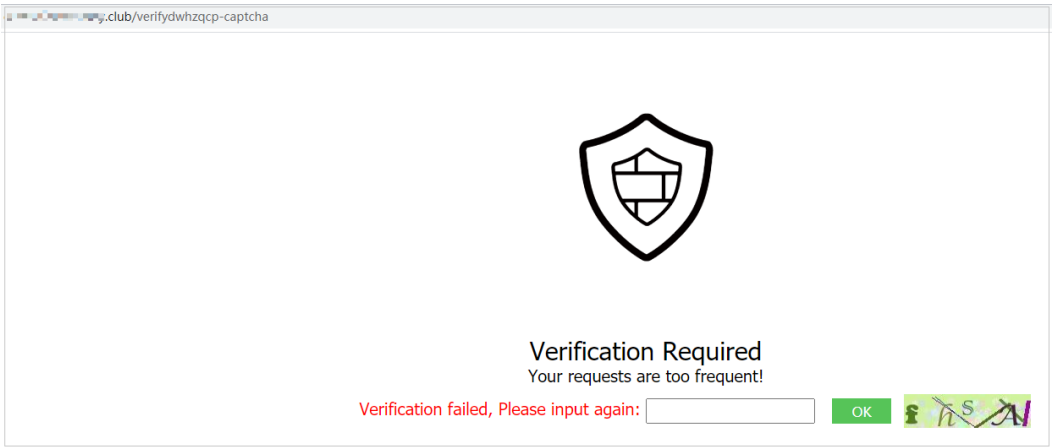
- The rate limit period of **Allowable Frequency** is the same as that of **Rate Limit**.
- **Allowable Frequency** is lower than or equal to **Rate Limit**, and **Allowable Frequency** can be **0**.

15.3.5 Why Cannot the Verification Code Be Refreshed When Verification Code Is Configured in a CC Attack Protection Rule?

Symptom

After you add a CC attack rule with **Protective Action** set to **Verification code** on WAF, the verification code cannot be refreshed and the verification fails when the website is requested. **Figure 15-8** shows an example.

Figure 15-8 Verification failed



After **Verification code** is configured, a verification code is required when the number of requests exceeds the maximum limit within a specified period. Upon completing the verification, the access limit is lifted.

For details, see **Configuring CC Attack Protection Rules**.

Possible Causes

When a domain name is connected to both WAF and Content Delivery Network (CDN), and the value for **Path** of the CC attack protection rule contains a static page, the static page is cached by CDN. As a result, the verification code cannot be refreshed and the verification fails.

Handling Suggestions

In CDN, configure cache policies to bypass the cache for static URLs.

NOTICE

After the configuration is complete, it takes 3 to 5 minutes for the configured cache policies to take effect.

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Content Delivery & Edge Computing** > **Content Delivery Network**.

Step 4 In the navigation pane on the left, choose **Domains**.

Step 5 In the **Domain Name** column, click the name of the target domain name.

Step 6 Click the **Cache Settings** tab and click **Edit**.

Step 7 In the displayed **Configure Cache Policy** dialog box, click **Add** below the policy list and add two cache policy rules by referring to **Table 15-5**. **Figure 15-9** shows an example.

Figure 15-9 Configure Cache Policy

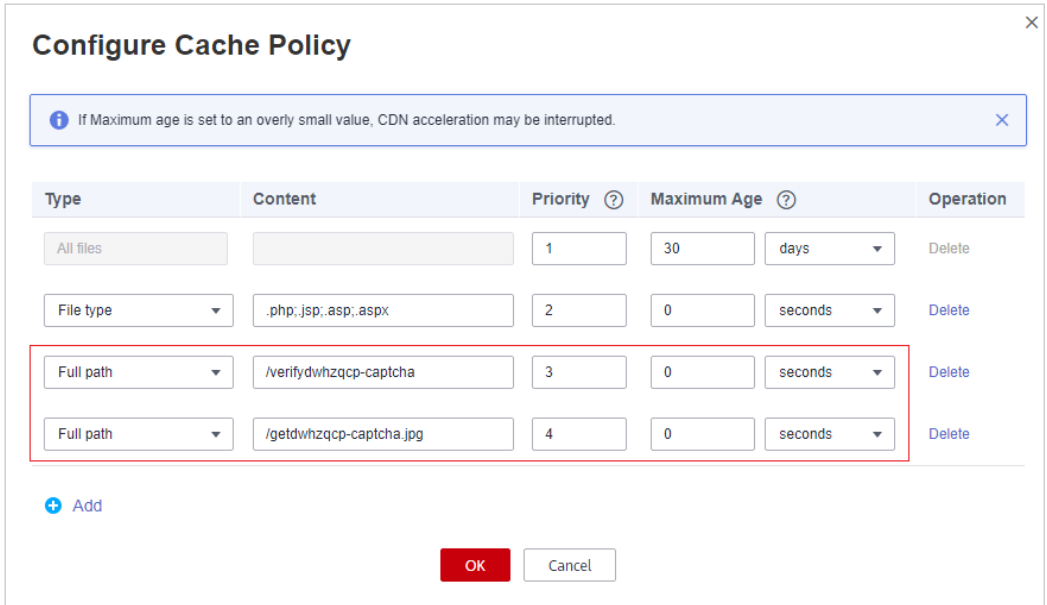
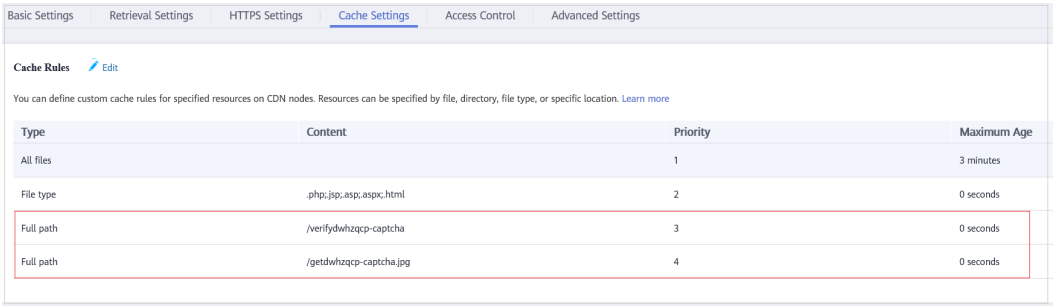


Table 15-5 Parameters for configuring static URL cache policy

Parameter	Configuration Description
Type	Select **Full path**.
Content	The content of the two policies to be added are as follows: • **/verifydwhzqcp-captcha** • **/getdwhzqcp-captcha.jpg**
Priority	Set the two policies to the highest priority.
Maximum Age	Set this parameter to **0 seconds**, indicating that static URLs are not cached.

Step 8 Click **OK**. **Figure 15-10** shows an example.

Figure 15-10 Configured cache policies



After the configuration is complete, it takes 3 to 5 minutes for the configured cache policies to take effect.

----End

15.3.6 Can I Batch Add IP Addresses to a Blacklist or Whitelist Rule?

Yes. You can select an address group when configuring a whitelist or blacklist rule. In this way, requests from those IP addresses included in the address group will be blocked, allowed, or logged only. You can also configure a blacklist or whitelist rule for each IP address or IP address range.

With IP address groups, you can quickly add IP addresses or IP address ranges to a blacklist or whitelist rule.

For details, see **Adding a Blacklist or Whitelist IP Address Group**.

15.3.7 Can I Import or Export a Blacklist or Whitelist into or from WAF?

WAF supports importing of IP address blacklist or whitelist. To do so, select **Address group** for **IP Address/Range/Group** when you are adding a blacklist or

whitelist rule. WAF does not support exporting of IP address blacklists and whitelists.

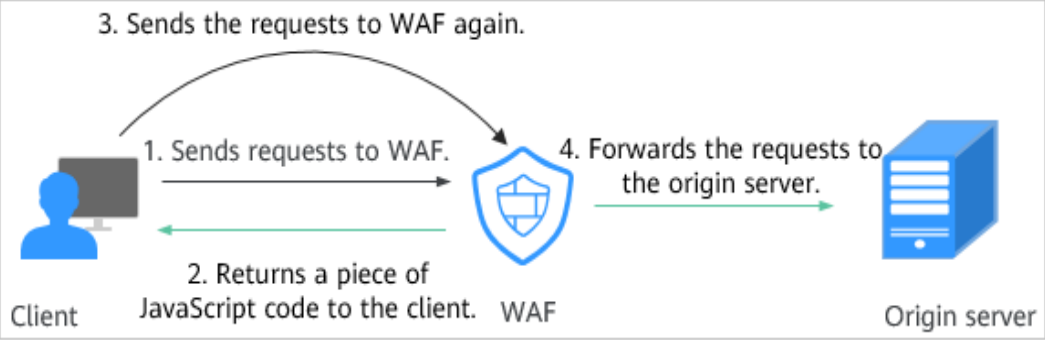
With IP address groups, you can quickly add IP addresses or IP address ranges to a blacklist or whitelist rule.

For details, see **Adding a Blacklist or Whitelist IP Address Group**.

15.3.8 Why Does a Requested Page Fail to Respond to the Client After the JavaScript-based Anti-Crawler Is Enabled?

After JavaScript anti-crawler is enabled, WAF returns a piece of JavaScript code to the client when the client sends a request. If the client sends a normal request to the website, triggered by the received JavaScript code, the client will automatically send the request to WAF again. WAF then forwards the request to the origin server. This process is called JavaScript verification. **Figure 15-11** shows how JavaScript verification works.

Figure 15-11 JavaScript anti-crawler detection process



NOTICE

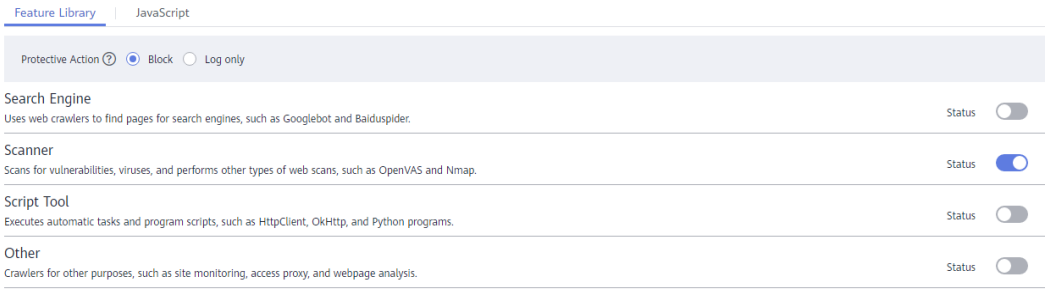
- To enable the JavaScript anti-crawler protection, the browser on the client must have JavaScript and cookies enabled.
- If the client does not meet the preceding requirements, only steps 1 and 2 can be performed. In this case, the client request fails to obtain the page.

Check your services. If your website can be accessed by other means except for a browser, disable JavaScript anti-crawler protection.

15.3.9 Is There Any Impact on Website Loading Speed If Other Crawler Check in Anti-Crawler Is Enabled?

If you have enabled **Other** when you configure **Feature Library** of anti-crawler protection, WAF detects crawlers for various purposes, such as website monitoring, access proxy, and web page analysis. Enabling this option does not affect web page visits or the web page browsing speed.

Figure 15-12 Enabling **Other**

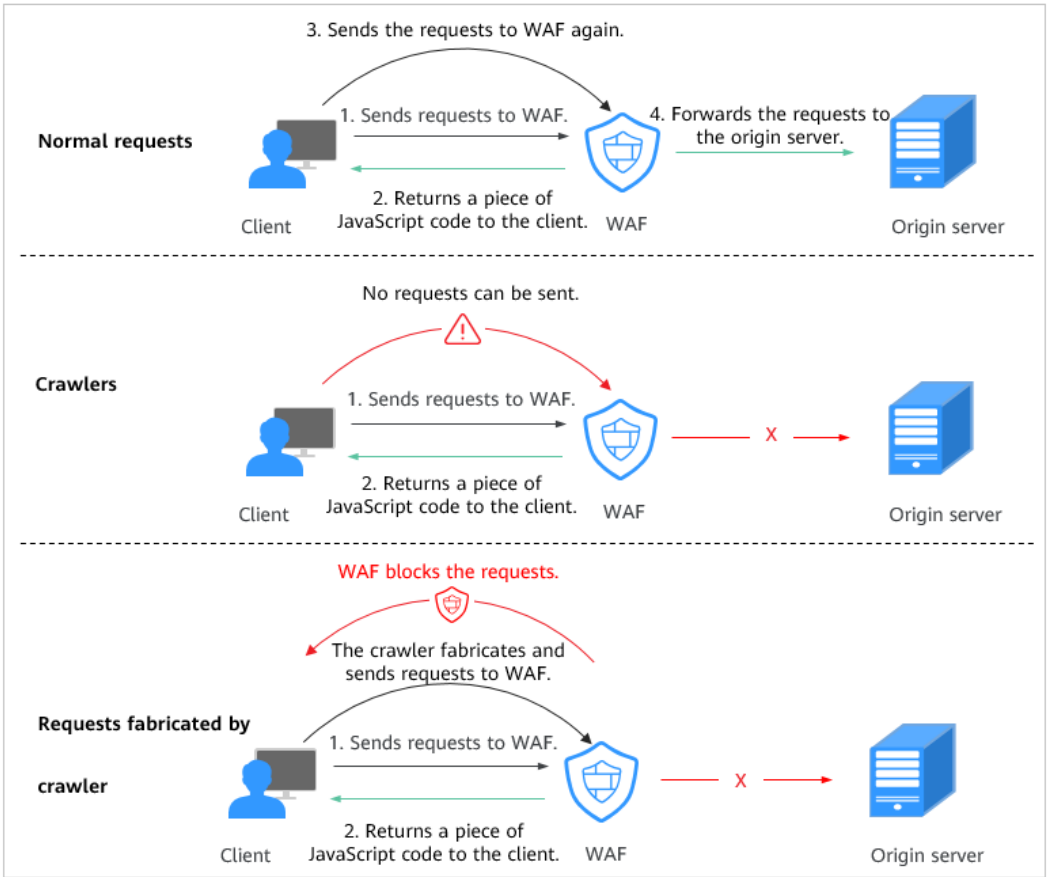


For details, see **Configuring Anti-Crawler Rules**.

15.3.10 How Does JavaScript Anti-Crawler Detection Work?

Figure 15-13 shows how JavaScript anti-crawler detection works, which includes JavaScript challenges (step 1 and step 2) and JavaScript authentication (step 3).

Figure 15-13 JavaScript Anti-Crawler protection process



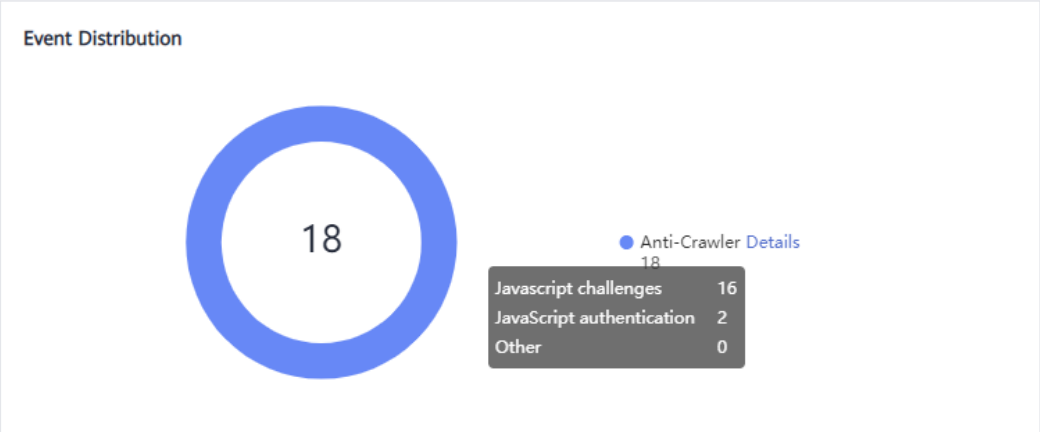
After JavaScript anti-crawler is enabled, WAF returns a piece of JavaScript code to the client when the client sends a request.

- If the client sends a normal request to the website, triggered by the received JavaScript code, the client will automatically send the request to WAF again. WAF then forwards the request to the origin server. This process is called JavaScript verification.

- If the client is a crawler, it cannot be triggered by the received JavaScript code and will not send a request to WAF again. The client fails JavaScript authentication.
- If a client crawler fabricates a WAF authentication request and sends the request to WAF, the WAF will block the request. The client fails JavaScript authentication.

By collecting statistics on the number of JavaScript challenge and authentication responses, the system calculates how many requests the JavaScript anti-crawler defends. As shown in **Figure 15-14**, the JavaScript anti-crawler logs 18 events, 16 of which are JavaScript challenge responses, 2 of which are JavaScript authentication responses. The number of **Other** is the WAF authentication requests fabricated by the crawler.

Figure 15-14 Parameters of a JavaScript anti-crawler protection rule



NOTICE

WAF only logs JavaScript challenge and JavaScript authentication events. No other protective actions can be configured for JavaScript challenge and authentication.

15.3.11 In Which Situations Will the WAF Policies Fail?

Normally, all requests destined for your site will pass through WAF. However, if your site is using CDN and WAF, the WAF policy targeted at the requests for caching static content will not take effect because CDN directly returns these requests to the client.

15.3.12 How Do I Allow Only Specified IP Addresses to Access Protected Websites?

After you add the website to WAF, configure blacklist and whitelist rules or precise protection rules to allow only specified IP addresses to access the website. WAF then blocks all source IP addresses except the specified ones.

Configuring IP Address Blacklist and Whitelist Rules to Block All Source IP Addresses Except the Specified Ones

Step 1 Log in to the management console.

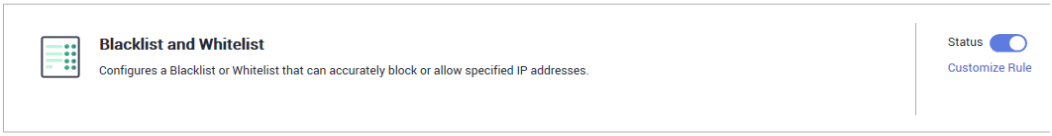
Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 Click the name of the target policy to go to the protection configuration page.

Step 5 In the **Blacklist and Whitelist** configuration area, enable the protection.

Figure 15-15 Blacklist and Whitelist configuration area



Step 6 Click **Customize Rule**.

Step 7 In the upper left corner of the **Blacklist and Whitelist** page, click **Add Rule**.

Step 8 In the **Add Blacklist or Whitelist Rule** dialog box, add two blacklist rules to block all source IP addresses. **Figure 15-16** and **Figure 15-17** show two examples.

Figure 15-16 Blocking IP address range 1.0.0.0/1

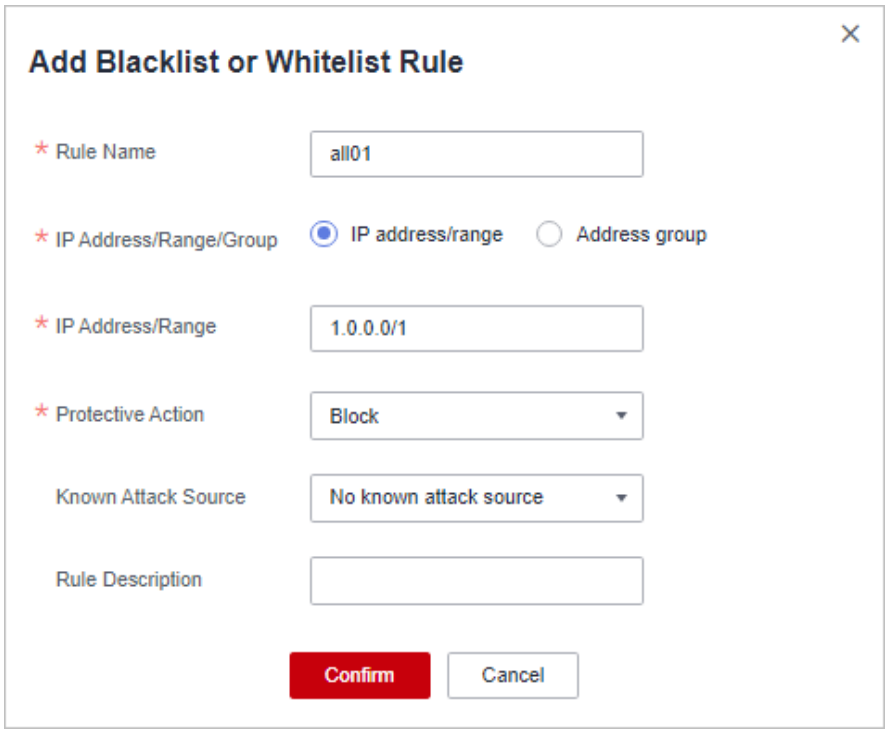
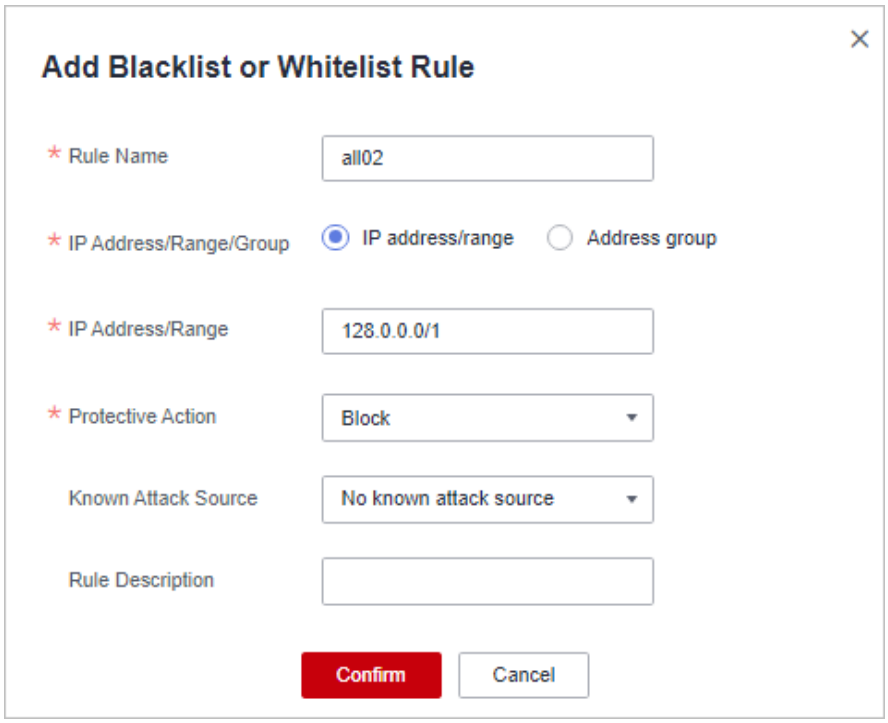


Figure 15-17 Blocking IP address range 128.0.0.0/1



Step 9 Click **Add Rule**. In the displayed **Add Blacklist or Whitelist Rule** dialog box, add a rule for the specified IP address or IP address range.

----End

Configuring a Precise Protection Rule to Block All Source IP Addresses Except the Specified Ones

Step 1 Log in to the management console.

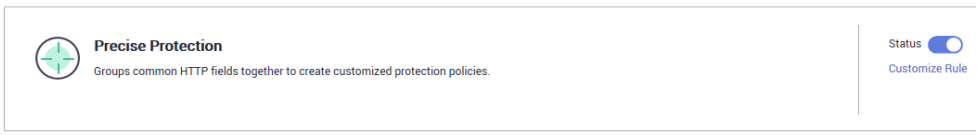
Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 Click the name of the target policy to go to the protection configuration page.

Step 5 In the **Precise Protection** configuration area, enable the protection.

Figure 15-18 Precise Protection configuration area



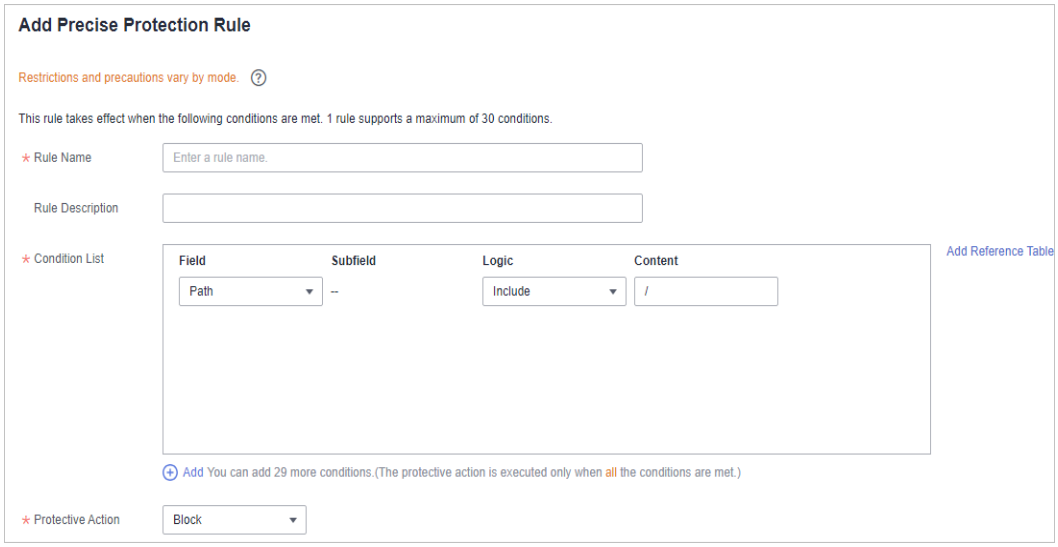
Step 6 Click **Customize Rule**. In the upper left corner of the displayed page, click **Add Rule**.

Step 7 In the displayed **Add Precise Protection Rule** dialog box, add a protection rule as shown in **Figure 15-19** to block all requests.

CAUTION

The priority value here must be greater than that configured in **Step 8** because allowing access has a higher priority than blocking access and a smaller priority value indicates a higher priority.

Figure 15-19 Blocking all requests



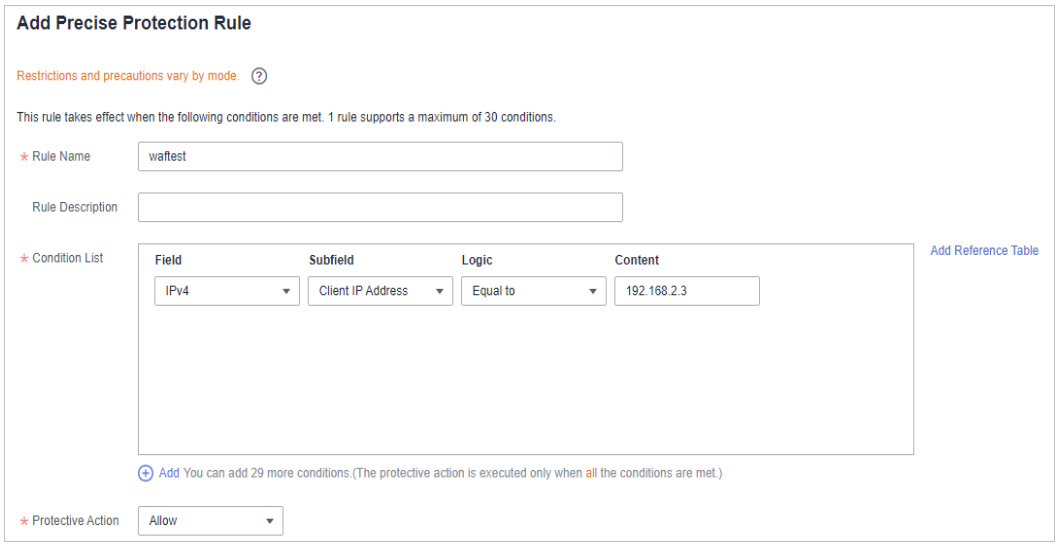
Step 8 Click **Add Rule**. In the displayed **Add Precise Protection Rule** dialog box, add a rule for the specified IP address.

For example, if you want to allow 192.168.2.3 to access the website, add a protection rule as shown in **Figure 15-20**.

CAUTION

The priority value here must be smaller than that configured in **Step 7** because allowing access has a higher priority than blocking access and a smaller priority value indicates a higher priority.

Figure 15-20 Allowing the access of a specified IP address



----End

15.3.13 Which Protection Rules Are Included in the System-Generated Policy?

When you add a website to WAF, you can select an existing policy you have created or the system-generated policy. For details, see **Table 15-6**.

NOTICE

If you are using WAF standard edition, only **System-generated policy** can be selected.

You can also tailor your protection rules after the domain name is connected to WAF.

Table 15-6 System-generated policies

Edition	Policy	Description
Cloud mode	Basic web protection (**Log only** mode and common checks)	The basic web protection defends against attacks such as SQL injections, XSS, remote overflow vulnerabilities, file inclusions, Bash vulnerabilities, remote command execution, directory traversal, sensitive file access, and command/code injections.

Edition	Policy	Description
Dedicated mode	Basic web protection (**Log only** mode and common checks)	The basic web protection defends against attacks such as SQL injections, XSS, remote overflow vulnerabilities, file inclusions, Bash vulnerabilities, remote command execution, directory traversal, sensitive file access, and command/code injections.
	Anti-crawler (**Log only** mode and **Scanner** feature)	WAF only logs web scanning tasks, such as vulnerability scanning and virus scanning, such as crawling behavior of OpenVAS and Nmap.

NOTE

Log only: WAF only logs detected attack events instead of blocking them.

15.3.14 Why Does the Page Fail to Be Refreshed After WTP Is Enabled?

Web Tamper Protection (WTP) supports only caching of static web pages. Perform the following steps to fix this issue:

Step 1 Log in to the management console.

Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 Click the name of the target policy to go to the protection configuration page.

Step 5 In the **Web Tamper Protection** configuration area, check whether this function is enabled.

- If this function is enabled ( ), go to **Step 6**.
- If this function is disabled ( ), click to enable the function. Refresh the page several minutes later.

Step 6 Click **Customize Rule**. On the displayed page, check whether the domain name and path are correct.

- If they are correct, go to **Step 7**.
- If they are incorrect, click **Delete** in the **Operation** column to delete the rule. Then, click **Add Rule** above the rule list and configure another rule.

  After the rule is added successfully, refresh the page several minutes later. Then, access the page again.

Step 7 In the row containing the web tamper protection rule, click **Update Cache** in the **Operation** column.

If the content of a protected page is modified, you must update the cache. Otherwise, WAF always returns the most recently cached content.

After updating the cache, refresh the page and access the page again. If the page is still not updated, contact technical support.

----End

15.3.15 What Are the Differences Between Blacklist/Whitelist Rules and Precise Protection Rules on Blocking Access Requests from Specified IP Addresses?

Both of them can block access requests from specified IP addresses. **Table 15-7** describes the differences between the two types of rules.

Table 15-7 Differences between blacklist and whitelist rules and precise protection rules

Protection Rules	Protection	WAF Inspection Sequence
Blacklist and whitelist rules	This type or rules can block, log only, or allow access requests from a specified IP address or IP address range.	Blacklist and whitelist rules have the highest priority. WAF checks access requests based on the protection rules and the triggering sequence.
Precise protection rules	You can combine common HTTP fields, such as **IP**, **Path**, **Referer**, **User Agent**, and **Params** in a protection rule to let WAF allow or block the requests that match the combined conditions.	Precise protection rules have lower priority compared with blacklist and whitelist rules.

15.3.16 What Do I Do If a Scanner, such as AppScan, Detects that the Cookie Is Missing Secure or HttpOnly?

Cookies are inserted by back-end web servers and can be implemented through framework configuration or set-cookie. Secure and HttpOnly in cookies help

defend against attacks, such as XSS attacks to obtain cookies, and help defend against cookie hijacking.

If the AppScan scanner detects that the customer site does not insert security configuration fields, such as HttpOnly and Secure, into the cookie of the scan request, it records them as security threats.

15.4 Certificate Management

This topic lists some frequently asked questions (FAQs) about how to use a certificate.

How Do I Select a Certificate When Configuring a Wildcard Domain Name?

Each domain name must correspond to a certificate. A wildcard domain name can only be used for a wildcard domain certificate. If you only have single-domain certificates, you need to add domain names one by one in WAF.

Do I Need to Import the Certificates That Have Been Uploaded to ELB to WAF?

You can select a created certificate or import a new certificate. You need to import the certificate that has been uploaded to ELB to WAF.

How Do I Convert a Certificate into PEM Format?

Only .pem certificates can be used in WAF. If the certificate is not in .pem format, convert it into .pem locally by referring to **Table 15-8** before uploading it.

Table 15-8 Certificate conversion commands

Format	Conversion Method
CER/CRT	Rename the **cert.crt** certificate file to **cert.pem**.
PFX	• Obtain a private key. For example, run the following command to convert **cert.pfx** into **key.pem**: **openssl pkcs12 -in cert.pfx -nocerts -out key.pem -nodes** • Obtain a certificate. For example, run the following command to convert **cert.pfx** into **cert.pem**: **openssl pkcs12 -in cert.pfx -nokeys -out cert.pem**
P7B	1. Convert a certificate. For example, run the following command to convert **cert.p7b** into **cert.cer**: **openssl pkcs7 -print_certs -in cert.p7b -out cert.cer** 2. Rename certificate file **cert.cer** to **cert.pem**.

Format	Conversion Method
DER	• Obtain a private key. For example, run the following command to convert **privatekey.der** into **privatekey.pem**: **openssl rsa -inform DER -outform PEM -in privatekey.der -out privatekey.pem** • Obtain a certificate. For example, run the following command to convert **cert.cer** into **cert.pem**: **openssl x509 -inform der -in cert.cer -out cert.pem**

NOTE

- Before running an OpenSSL command, ensure that the **OpenSSL** tool has been installed on the local host.
- If your local PC runs a Windows operating system, go to the command line interface (CLI) and then run the certificate conversion command.

15.5 Protection Event Logs

15.5.1 Can WAF Log Protection Events?

WAF stores protection event logs generated over the last 30 days for free. You can check them on the WAF console.

If you want to store WAF protection logs for a long time, enable Log Tank Service (LTS) at additional costs and authorize it for WAF logging. Logs can be stored in LTS for seven days by default but you can configure LTS for up to 30 days if needed. Logs earlier than 30 days are automatically deleted. However, you can configure LTS to dump those logs to an Object Storage Service (OBS) bucket or enable Data Ingestion Service (DIS) for long-term storage.

For details about how to configure LTS for WAF, see **Using LTS to Log WAF Activities**.

15.5.2 How Do I Obtain Data about Block Actions?

15.5.3 What Does "Mismatch" for "Protective Action" Mean in the Event List?

If an access request matches a web tamper protection rule, information leakage prevention rule, or data masking rule, the protective action is marked as **Mismatch**.

15.5.4 How Long Can WAF Protection Logs Be Stored?

WAF stores protection event logs generated over the last 30 days for free. You can check them on the WAF console.

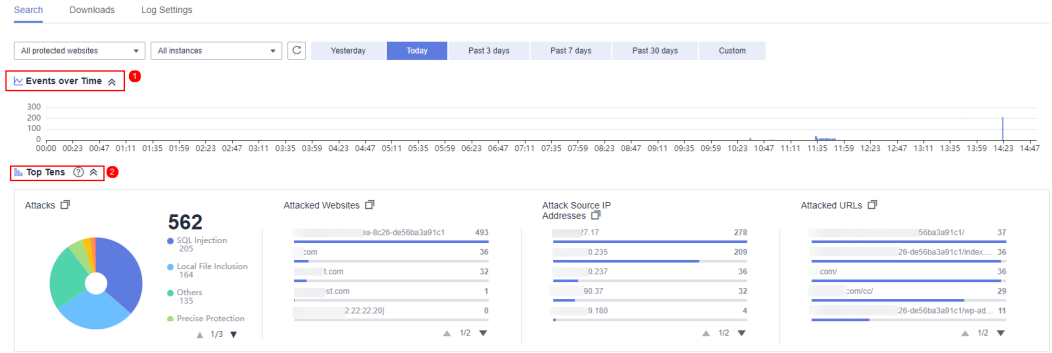
You can use Log Tank Service (LTS), billed separately, to store WAF logs. The storage duration depends on your choices. LTS stores logs for 30 days by default.

You can configure a custom storage duration ranging from 1 to 365 days. Logs earlier than the storage duration you configure will be deleted automatically. If you seek for long-term storage, enable the log transfer function in LTS to dump logs to Object Storage Service (OBS) buckets or enable Data Ingestion Service (DIS).

15.5.5 Can I Query Protection Events of a Batch of Specified IP Addresses at Once?

WAF does not support batch query of protection events of a batch of specified IP addresses at once. On the **Events** page, you can view events by a certain combination of **Event Type**, **Protective Action**, **Source IP Address**, **URL**, and **Event ID**.

Figure 15-21 Events



15.5.6 Will WAF Record Unblocked Events?

No. WAF blocks attack events based on the configured protection rules and records only blocked attack events in protection event logs.

15.5.7 Why Is the Traffic Statistics on WAF Inconsistent with That on the Origin Server?

In any of the following scenarios, the traffic statistics displayed on the WAF **Dashboard** page may be inconsistent with that displayed on the origin server:

- Web page compression

  WAF enables compression by default. The web pages between the client (such as a browser) and WAF may be compressed (depending on the compression option of the browser), but the origin server may not support compression.

- Connection reuse

  WAF reuses socket connections with the origin server, which reduces the bandwidth usage between the origin server and WAF.

- Attack requests

  Attack requests blocked by WAF do not consume the bandwidth of the origin server.

- Other abnormal requests

If the origin server times out or cannot be connected, the bandwidth of the origin server is not consumed.

- TCP retransmission

  WAF collects bandwidth statistics at layer 7, but the network adapter of the origin server collects bandwidth statistics at layer 4. If the network connection is poor, TCP retransmission occurs. The bandwidth measured by the network adapter is calculated repeatedly, but the data transmitted at layer 7 is not calculated repeatedly. In this case, the bandwidth displayed on WAF is lower than that displayed on the origin server.

15.6 Troubleshooting Website Connection Exceptions

15.6.1 Why Is My Domain Name or IP Address Inaccessible?

Symptoms

After a domain name or IP address is added to WAF, the connection between WAF and the domain name or IP address fails to be established.

NOTICE

- WAF automatically checks the access status of protected websites every 30 minutes. If WAF detects that a protected website has received 20 access requests within 5 minutes, it considers that the website has been successfully connected to WAF.
- By default, WAF checks only the access status of domain names added or updated over the last two weeks. If a domain name was added to WAF two weeks ago and has not been modified in the last two weeks, you can click in the **Access Status** column to refresh its status.

Troubleshooting and Solutions for Cloud WAF Instances

Refer to **Figure 15-22** and **Table 15-9** to fix connection failures for websites protected in cloud mode.

Figure 15-22 Troubleshooting for Cloud WAF

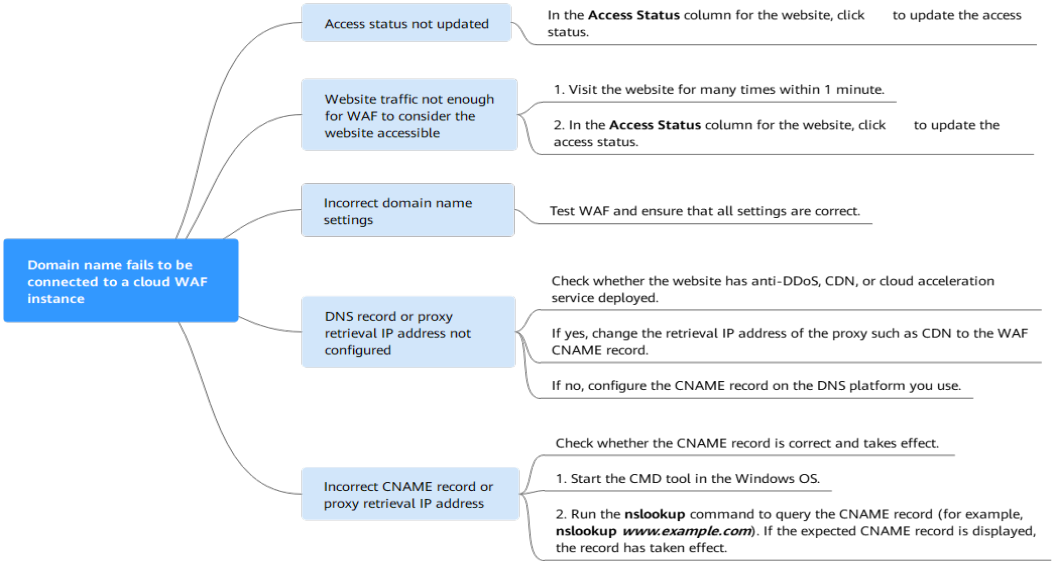


Table 15-9 Solutions for failures of WAF instances

Possible Cause	Solution
Cause 1: **Access Status** of **Protected Website** not updated	In the **Access Status** column for the protected website, click to update the status.
Cause 2: Website access traffic not enough for WAF to consider the website accessible **NOTICE** After you connect a website to WAF, the website is considered accessible only when WAF detects at least 20 requests to the website within 5 minutes.	1. Access the protected website for many times within 1 minute. 2. In the **Access Status** column for the website, click to update the status.

Possible Cause	Solution
Cause 3: Incorrect domain name settings	**NOTICE** WAF can protect the website using the following types of domain names: • Top-level domain names, for example, example.com • Single domain names/Second-level domains, for example, www.example.com • Wildcard domain names, for example, *.example.com Domain names example.com and www.example.com are different. Ensure that correct domain names are added to WAF. Perform the following steps to ensure that the domain name settings are correct. 1. In Windows OSs, choose **Start** > **Run**. Then enter **cmd** and press **Enter**. 2. Ping the CNAME record of the domain name to obtain the WAF IP address. 3. Use a text editor to open the **hosts** file. Generally, the **hosts** file is stored in the **C:\Windows\System32\drivers\etc** directory. 4. Add the following record to the hosts file: ***WAF IP address mapped to the domain name Protected domain name***. 5. Save the **hosts** file after the record is added. In the CLI, run the **ping** *Domain name added to WAF* command, for example, ping www.example.com. If the WAF IP address in **2** is displayed in the command output, the domain name settings are correct. If there are incorrect domain name settings, remove the domain name from WAF and add it to WAF again.

Possible Cause	Solution
Cause 4: DNS record or the back-to-source IP addresses of proxies not configured	Check whether the website connected to WAF uses proxies such as advanced anti-DDoS, CDN, and cloud acceleration service. • **Yes** – Change the back-to-source IP address of the proxy such as CDN to the CNAME record of WAF. – (Optional) Add a WAF subdomain name and TXT record at your DNS provider. • If no, contact your DNS service provider to configure a CNAME record for the domain name.
Cause 5: Incorrect DNS record or proxy back-to-source address	Perform the following steps to check whether the domain name CNAME record takes effect: 1. In Windows OSs, choose **Start** > **Run**. Then enter **cmd** and press **Enter**. 2. Run a **nslookup** command to query the CNAME record. If the command output displays the CNAME record of WAF, the record takes effect. Using www.example.com as an example, the output is as follows: **nslookup** www.example.com

Troubleshooting and Solutions for Dedicated WAF

Refer to **Figure 15-23** and **Table 15-10** to fix connection failures.

Figure 15-23 Troubleshooting for dedicated mode

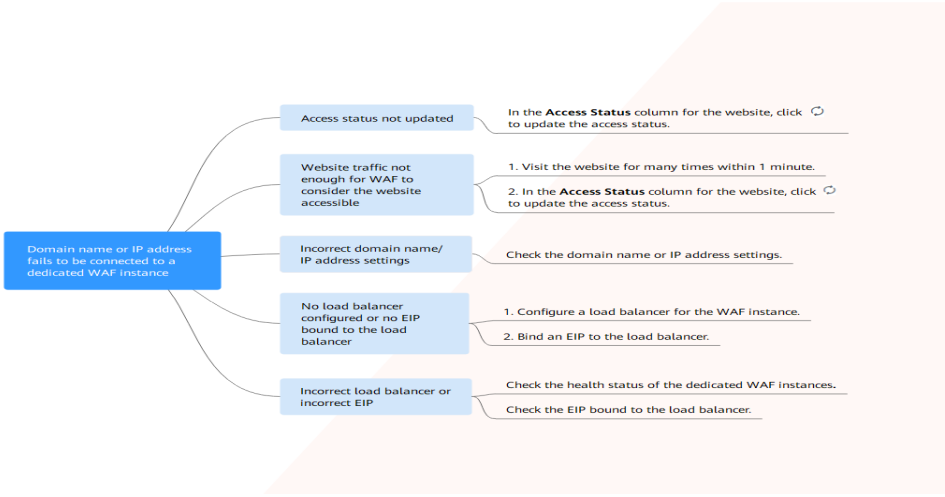


Table 15-10 Solutions for dedicated mode

Possible Cause	Solution
Cause 1: **Access Status** for **Domain Name/IP Address** not updated	In the **Access Status** column for the website, click to update the status.
Cause 2: Website access traffic not enough for WAF to consider the website accessible **NOTICE** After you connect a website to WAF, the website is considered accessible only when WAF detects at least 20 requests to the website within 5 minutes.	1. Access the protected website many times within 1 minute. 2. In the **Access Status** column for the website, click to update the status.
Cause 3: Incorrect domain name or IP address settings	Check domain name or IP address settings. If there are incorrect settings for the domain name or IP address, remove this domain name or IP address from WAF and add it to WAF again.
Cause 4: No load balancer configured for the dedicated WAF instance or no EIP bound to the load balancer configured for the dedicated WAF instance	1. Configure a load balancer for dedicated WAF instances by referring to **Configuring a Load Balancer**. 2. **Binding an EIP to a Load Balancer**.

Possible Cause	Solution
Cause 5: Incorrect load balancer configured or incorrect EIP bound to the load balancer	• After you **configure a load balancer**, ensure that **Health Check Result** for the dedicated WAF instances added to the load balancer is **Healthy**. • After you **bind an EIP to the load balancer**, check the EIP status.

15.6.2 Why Does the Requested Page Respond Slowly After My Website Is Connected to WAF?

Symptom

After a website is connected to WAF, the website becomes slow.

Possible Causes

You may have configured forcible redirection from HTTP to HTTPS at the backend of the server but enabled only forwarding from HTTPS (client protocol) to HTTP (origin server protocol) on WAF. This makes WAF redirects requests, which leads to an infinite loop.

Solution

To address this issue, add HTTP-to-HTTP and HTTPS-to-HTTPS forwarding rules. The procedure is as follows:

Step 1 Log in to the WAF console.

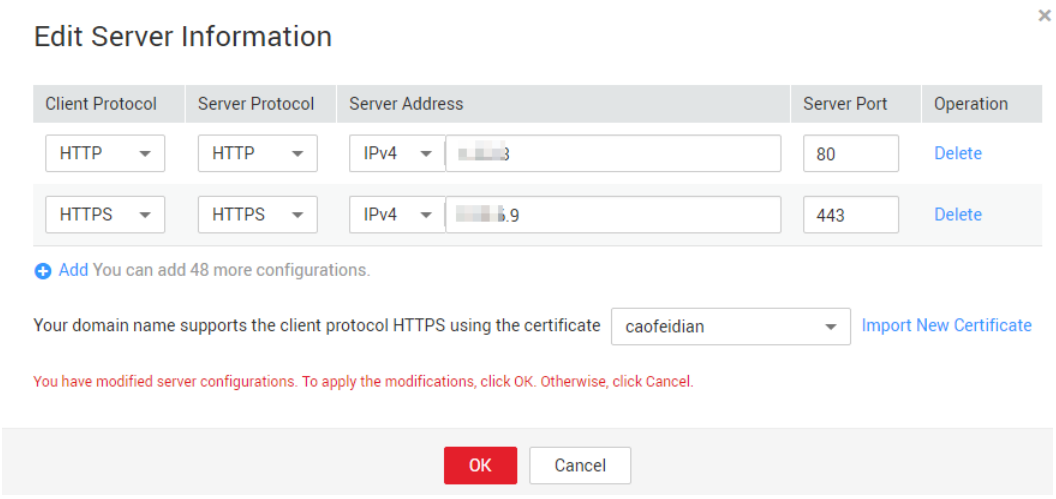
Step 2 In the navigation pane on the left, choose **Website Settings**.

Step 3 In the domain name list, click the target domain name.

Step 4 In the **Server Information** area, click  .

Step 5 In the **Edit Server Information** dialog box, add two forwarding rules, one for HTTP to HTTP and the other for HTTPS to HTTPS.

Figure 15-24 Example configuration



----End

For details about how to configure a forwarding rule, see **Why Was My Website Redirected So Many Times?**

15.6.3 What Can I Do If Files Cannot Be Uploaded After a Website Is Connected to WAF?

After your website is connected to WAF, the size of the file each time you can upload to the website is limited as follows:

- Cloud mode - CNAME access: 1 GB
- Dedicated mode: 10 GB

To upload a file larger than what is allowed, upload the file through any of the following:

- IP address
- Separate web server that is not protected by WAF
- FTP server

15.7 Troubleshooting Certificate and Cipher Suite Issues

15.7.1 How Do I Fix an Incomplete Certificate Chain?

If the certificate provided by the certificate authority is not found in the built-in trust store on your platform and the certificate chain does not have a certificate authority, the certificate is incomplete. If you use the incomplete certificate to access the website corresponding to the protected domain name, the access will fail.

Use either of the following methods to fix it:

- Make a complete certificate chain manually and upload the certificate.
- Upload the correct certificate.

The latest Google Chrome version supports automatic verification of the trust chain. The following describes how to manually create a complete certificate chain:

Step 1 View and export the certificate.

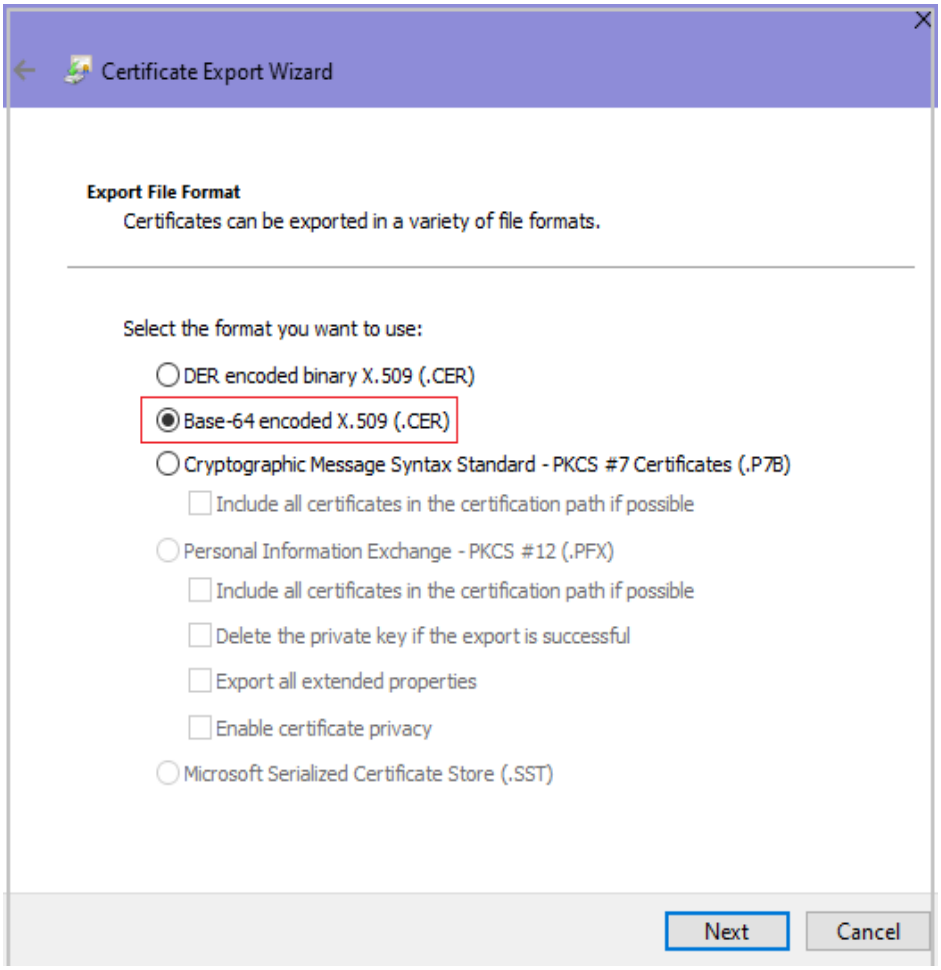
1. Click the padlock in the address bar to view the certificate status.
2. Locate the row that shows **Secure Connection**, click ›, and click **Valid Certificate** in address bar.
3. Click the **Details** tab. In the lower right corner of the page, click **Copy to File...** to export the certificate to the local PC.

Step 2 Check the certificate chain. Open the certificate you export. Select the **Certificate Path** tab and then click the certificate name to view the certificate status.

Step 3 Save the certificates to the local PC one by one.

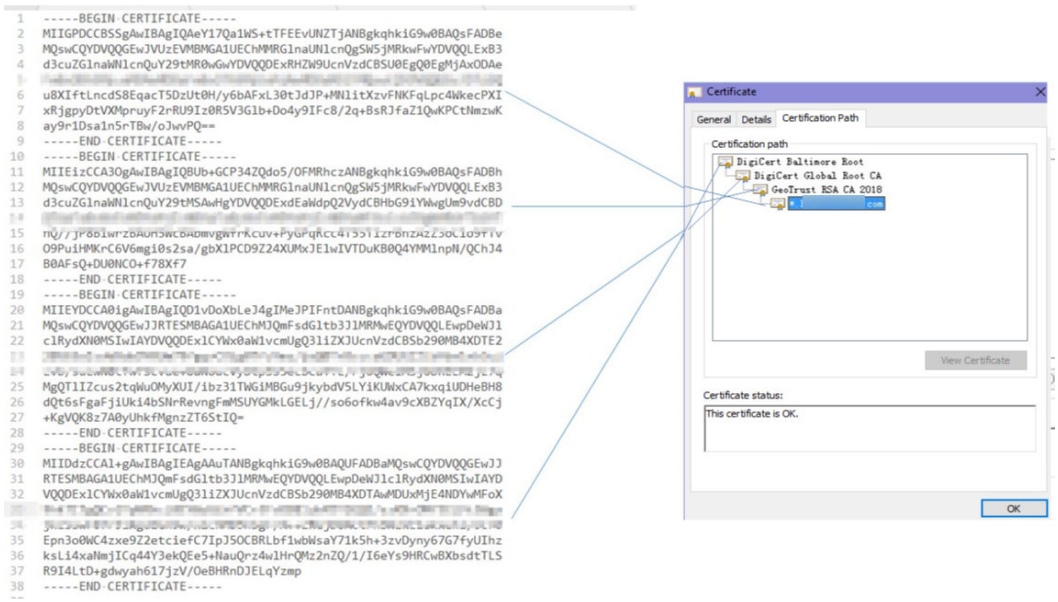
1. Select the certificate name and click the **Details** tab.
2. Click **Copy to File**, and then click **Next** as prompted.
3. Select **Base-64 encoded X.509 (.CER)** and click **Next**. Figure 15-25 shows an example.

Figure 15-25 Certificate Export Wizard



Step 4 Rebuild the certificate. After all certificates are exported to the local PC, open the certificate file in Notepad and rebuild the certificate according to the sequence shown in **Figure 15-26**.

Figure 15-26 Certificate rebuilding



Step 5 Upload the certificate again.

----End

15.7.2 Why Does My Certificate Not Match the Key?

After an HTTPS certificate is uploaded to the AAD or WAF console, a message is displayed indicating that the certificate and key do not match.

Solution

Possible Cause	How to Fix
The uploaded certificate does not match the uploaded private key.	1. Run the following commands to check the MD5 hash values of the certificate and private key file: **openssl x509 -noout -modulus -in** *<certificate file>*|**openssl md5** **openssl rsa -noout -modulus -in** *<private key file>*|**openssl md5** 2. Check whether the MD5 values of the certificate and private key file are the same. If they are different, the certificate file and private key file are associated with different domain names, and the content of the certificate does not match that of the private key file. 3. If the certificate does not match the private key file, upload the correct certificate and private key file.

Possible Cause	How to Fix
Incorrect RSA private key format	1. Run the following command to generate a new private key: **openssl rsa -in** <*private key file*> **-out** <*New private key file*> 2. Upload the private key again.

Related Operations

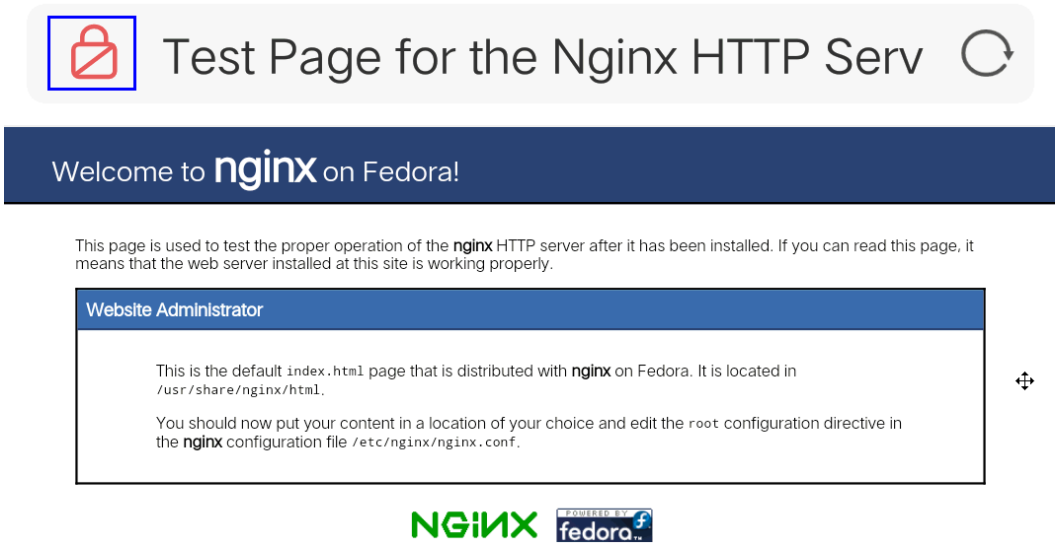
- How Do I Fix an Incomplete Certificate Chain?
- Why Are HTTPS Requests Denied on Some Mobile Phones?

15.7.3 Why Are HTTPS Requests Denied on Some Mobile Phones?

Symptom

Open the browser on the mobile phone and access the protected domain name. If a page similar to Figure 15-27 is displayed, the HTTPS request on the mobile phone is abnormal.

Figure 15-27 Access failed



Causes

The uploaded certificate chain is incomplete.

Solution

Fix the issue by referring to How Do I Fix an Incomplete Certificate Chain?

15.7.4 What Do I Do If the Protocol Is Not Supported and the Client and Server Do Not Support Common SSL Protocol Versions or Cipher Suites?

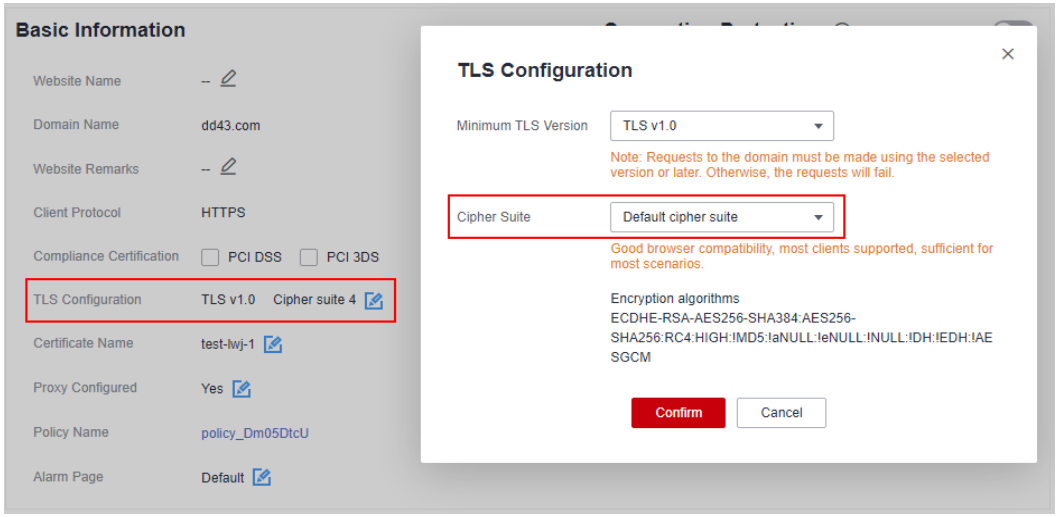
Symptom

After a domain name is connected to WAF, the website cannot be accessed. A message is displayed, indicating that the protocol is not supported. The client and server do not support common SSL protocol versions or cipher suites.

Solution

Select the default cipher suite for **Cipher Suite** in the **TLS Configuration** dialog box. For details, see **Configuring PCI DSS/3DS Compliance Check and TLS**.

Figure 15-28 TLS Configuration



15.7.5 Why Is the Bar Mitzvah Attack on SSL/TLS Detected?

The Bar Mitzvah attack is a cryptographic attack targeting SSL/TLS protocols. The attack exploits a vulnerability in the RC4 cryptographic algorithm. This vulnerability can disclose ciphertext in SSL/TLS encrypted traffic in some cases, such as passwords, credit card data, or other privacy data, to hackers.

Solution

To solve this problem, you can set the minimum TLS version to TLS v1.2 and cipher suite to cipher suite 2.

15.8 Troubleshooting Traffic Forwarding Exceptions

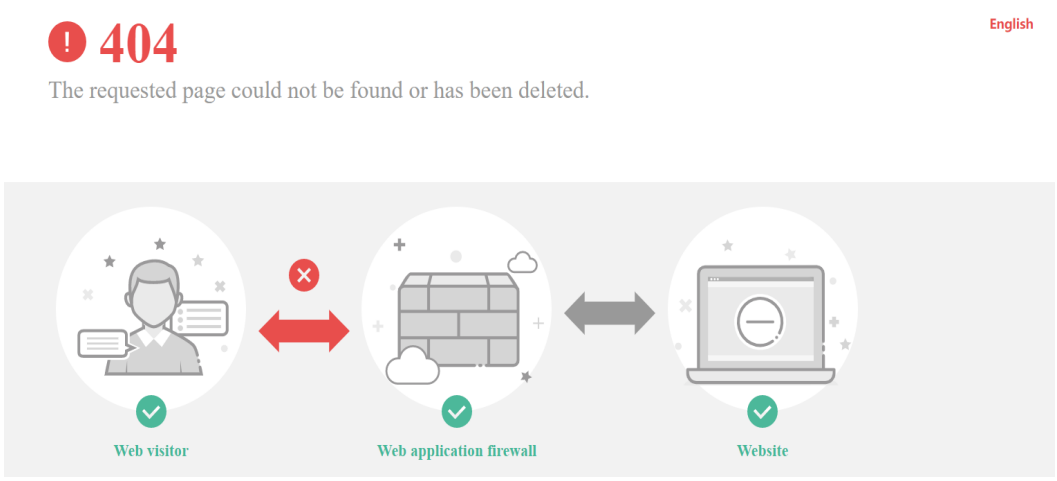
15.8.1 What Is Error Code 404, 502, or 504 Returned to Visitors After My Website or Application Is Connected to WAF?

If an error, such as 404 Not Found, 502 Bad Gateway, or 504 Gateway Timeout, occurs after your website or application is connected to WAF, use the following methods to locate the cause and remove the error:

404 Not Found

Scenario 1: When a visitor accesses your website, the page shown in **Figure 15-29** is displayed.

Figure 15-29 404 page



Cause: The port added to a URL is incorrect.

- A non-standard port is configured when a domain name is connected to WAF. No port is added or the origin server port instead of the non-standard port is used to access the website. For example, use **https://www.example.com** or **https://www.example.com:80** to access the website.

  Solution: Add the non-standard port to the URL and access the origin server again, for example, **https://www.example.com:8080**.

- No non-standard port is configured when a domain name is added to WAF. A non-standard port or the origin server port is used to access the website. For example, use **https://www.example.com:8080** to access the website.

  NOTE

  If no non-standard port is configured, WAF protects services on port 80/443 by default. To protect services on other ports, re-configure domain settings.

  Solution: The domain name needs to be accessed directly. For example, **https://www.example.com**.

Scenario 2: When a visitor accesses your website, another 404 error page is displayed instead of the page shown in **Figure 15-29**.

Cause: The website does not exist or has been deleted.

Solution: Check your website.

502 Bad Gateway

Scenario: Website access is normal after the WAF configuration is complete. However, after a certain period of time, a 502 Bad Gateway error is reported frequently.

NOTE

If your web server is not deployed on the cloud, consult your server provider about whether the server has default block settings. If there are default block settings, ask the service provider to remove them.

Possible causes are as follows:

- **Cause 1**: Your website is using another security protection software. The software considers back-to-source IP addresses of WAF as malicious and blocks the requests forwarded by WAF. As a result, the site becomes inaccessible.
- **Cause 2**: Multiple backend servers are configured. However, one backend server is unreachable.

  Perform the following steps to check whether the origin server configuration is correct:

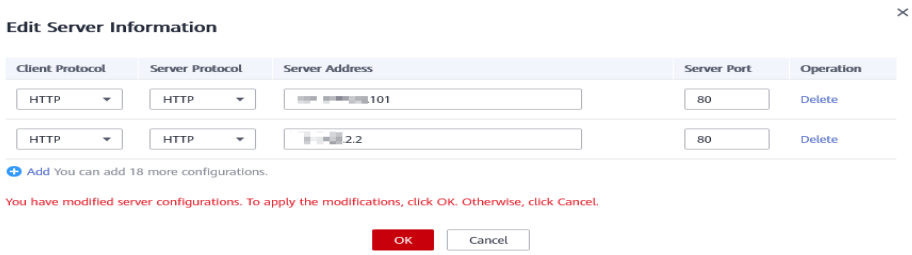
  a. Log in to the management console, click **Service List** in the upper part of the page, and choose **Security** > **Web Application Firewall** to go to the WAF console.

  b. In the navigation pane on the left, choose **Website Settings**.

  c. In the **Domain Name** column, click the domain name. Its information is displayed.

  d. In the **Server Information** area, click . On the displayed page, check whether the client protocol, server protocol, origin server address, and port used by the origin server are correct.

  Figure 15-30 Server configuration

  e. Run the **curl** command on the host to check whether each origin server can be properly accessed.

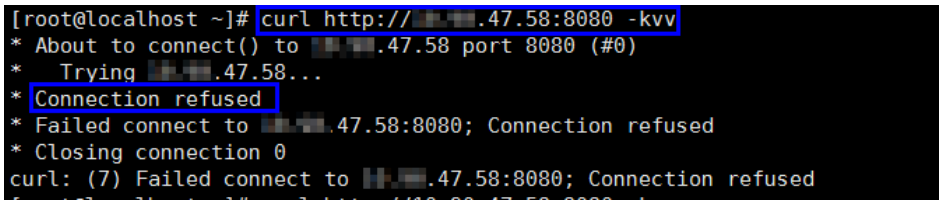
  ```
  curl http://xx.xx.xx.xx:yy -kvv
  ```

  xx.xx.xx.xx indicates the IP address of the origin server. *yy* indicates the port of the origin server. *xx.xx.xx.xx* and *yy* must belong to the same origin server.

NOTE

- The host where the **curl** command can be run must meet the following requirements:
  - The network communication is normal.
  - The **curl** command has been installed. **curl** must be manually installed on the host running a Windows operating system. **curl** is installed along with other operating systems.
- You can also enter **http://*origin server address*:*origin server port*** in the address bar of the browser to check whether the origin server can be properly accessed.

Figure 15-31 Command output



If **connection refused** is displayed, the origin server is unreachable and website cannot be accessed. Perform the following operations:

- Check whether the server is running properly. If it is not, restart the server.
- Add the WAF back-to-source IP address ranges to the whitelist of the firewall (hardware or software), security protection software, and rate limiting module.

- **Cause 3**: Origin server performance

  Solution: Contact your website owner to rectify the fault.

504 Gateway Timeout

Scenario: After the configuration of connecting a domain name to WAF is complete, your website works properly. However, with the increasing traffic volume, the number of 504 errors also increases. If you directly access the IP address of the origin server, the 504 error code is returned sometimes.

The possible causes are as follows:

- **Cause 1**: Backend server performance issues (such as too many connections or high CPU usage)

  Solution:

  a. Optimize the server configuration, including TCP network parameters and ulimit parameters.

  b. To handle large-scale service increase, use method 1 or method 2 to perform the processing.

  Method 1: Add a backend server group to the ELB load balancer.

  Method 2: Create an ELB. Use the EIP of ELB as the IP address of the server to connect to WAF.

i. Log in to the management console, click **Service List** in the upper part of the page, and choose **Security** > **Web Application Firewall** to go to the WAF console.

ii. In the navigation pane on the left, choose **Website Settings**.

iii. In the **Domain Name** column, click the domain name. Its information is displayed.

iv. In the **Server Information** area, click  . On the displayed page, click **Add**.

c. If the **Client Protocol** is **HTTPS**, you can use HTTPS on the WAF side. However, it is recommended that **HTTP** (**Server Protocol**) to forward the requests to your web server, lowering the computational demands on backend servers.

- **Cause 2**: The WAF back-to-source IP addresses are not whitelisted or your origin server port is not enabled.

  Solution: Whitelist the WAF back-to-source IP addresses in the corresponding ECS security groups.

- **Cause 3**: The origin server has a firewall and the firewall blocks the WAF back-to-source IP addresses.

  Solution: Whitelist the WAF back-to-source IP addresses in the corresponding ECS security groups or uninstall the firewall software except WAF.

- **Cause 4**: Connection timeout and read timeout

  Solution

  – Database queries are slow.

    ▪ Tune services to shorten the query duration and improve user experience.

    ▪ Modify the request interaction mode so that the persistent connection can have some data transmitted within 60 seconds, such as ACK packets, heartbeat packets, keep-alive packets, and other packets that can keep the session alive.

  – It takes a long time to upload large files.

    ▪ Tune services to shorten the file upload time.

    ▪ An FTP server is recommended for file upload.

    ▪ Upload the file through an IP address or a domain name that is not protected by WAF.

    ▪ The default timeout for a dedicated WAF instance to respond origin servers is 180s.

  – The origin server is faulty.

    Check whether the origin server works properly.

  – Configure a timeout for connections between WAF and a website Server

    Timeout duration for each request between WAF instance and origin server, include **WAF-to-Server connection timeout (s)**, **Read timeout (s)**, and **Write timeout (s)**. For details, see **Configuring a Timeout for Connections Between WAF and a Website Server**.

- **Cause 5**: The bandwidth of the origin server exceeds the upper limit.

  Solution: Increase the bandwidth of the origin server.

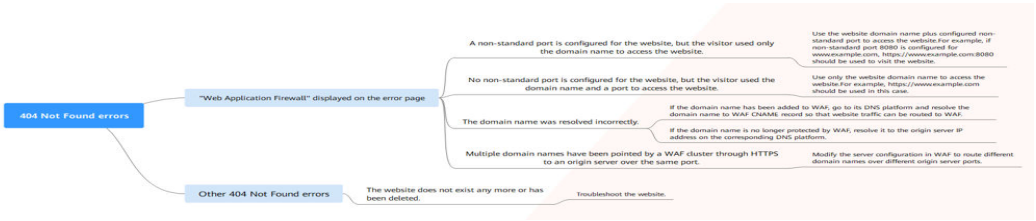
- **Cause 6**: In dedicated mode, the origin server port is not enabled in the security group of the origin server or the origin server subnet is not enabled in network ACLs.

  Solution: Enable the security group ports, such as ports 80 and 443, and configure a network ACL to allow access from the origin server subnet.

404 Not Found Troubleshooting Process and Suggestions

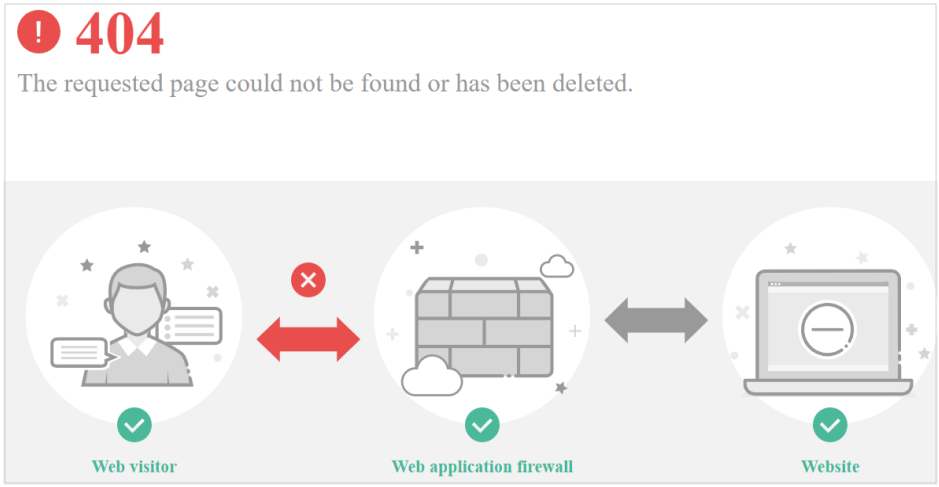
Refer to **Figure 15-32** to fix the 404 Not Found error occurred after your website is connected to WAF.

Figure 15-32 Troubleshooting for 404 Not Found error



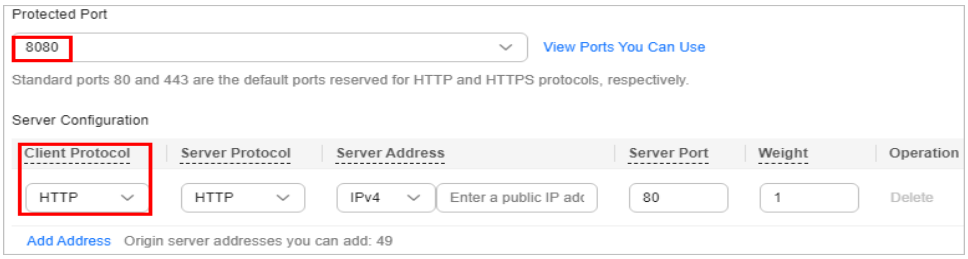
- If the page shown in **Figure 15-33** is displayed, the possible causes and solutions are as follows:

  Figure 15-33 404 page

  Cause 1: A non-standard port is configured when you add the domain name to WAF, but the visitors use the domain name and standard port or use only the domain name to access the website. For example, a non-standard port is configured as shown in **Figure 15-34**. A visitor uses https://www.example.com or https://www.example.com:80 to access the website. As a result, 404 error page is displayed.

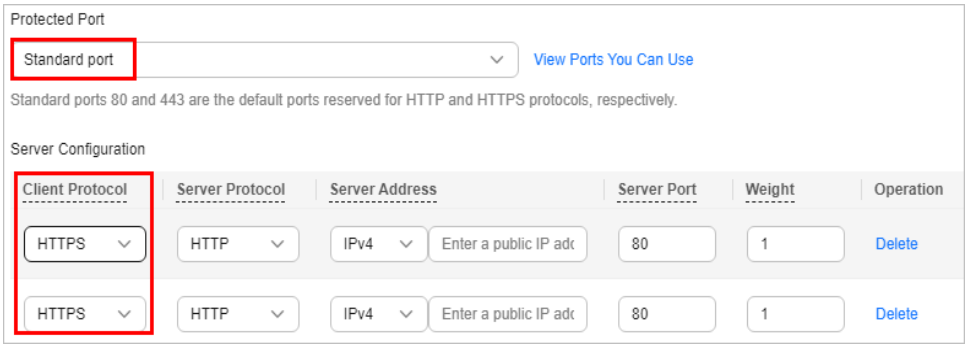
Figure 15-34 Configuration of a non-standard port



Solution: Add the non-standard port to the URL and access the origin server again, for example, **https://www.example.com:8080**.

Cause 2: No non-standard port is configured when the domain name is added to WAF. The visitors use the domain name and a non-standard port or the non-standard port configured for origin server port to access the website. For example, access **http://www.example.com:8080** when the protection service shown in **Figure 15-35** is configured.

Figure 15-35 Non-standard port not configured



NOTE

If no non-standard port is configured, WAF protects services on port 80/443 by default. To protect services on other ports, re-configure domain settings.

Solution: Use only the domain name to access the website. For example, **https://www.example.com**.

Cause 3: The domain name is incorrectly resolved.

Solution:

- If the domain name has been added to WAF, resolve the domain name to WAF by referring to .
- If the domain name is no longer protected by WAF, resolve it to the origin server IP address on the DNS hosting platform.

Cause 4: If a WAF cluster pointed multiple domain names through HTTPS to an origin server over the same port, origin servers cannot tell which domain name a request originated from. This is because WAF uses persistent connections to forward requests to origin servers and Nginx identifies domain names based on Host and SNI. So, there might be a probability that requests destined for domain name A was mistakenly forwarded to domain name B, which causes 404 not found errors.

Solution: Modify the server configuration in WAF to route different domain names over different origin server ports.

- If the response page is not similar the one shown in **Figure 15-33**, the possible causes and solutions are as follows:

  Cause: The website does not exist or has been deleted.

  Solution: Check the website.

15.8.2 Why Am I Seeing Error Code 418?

If the request contains malicious load and is intercepted by WAF, error 418 is reported when you access the domain name protected by WAF. You can view WAF protection logs to view the cause.

- If you confirm that the request is a normal service request, you can handle the false alarm to prevent the recurrence of the protection event.
- If you confirm that the protection event is not a false alarm, your website is attacked and the malicious request is blocked by WAF.

15.8.3 Why Am I Seeing Error Code 523?

If a request goes through WAF over four times, WAF will block the request and return error code 523 to avoid endless loops. If error code 523 is returned for your website requests, check how many WAF instances you are using.

Cause 1: A website is connected to more than four WAF instances.

Error code 523 will return if a website has been connected to different types of WAF instances more than four times.

Solution

Route website traffic to bypass redundant WAF instances.

Step 1 Log in to the WAF management console.

Step 2 In the navigation pane on the left, choose **Website Settings**.

Step 3 Locate the website for which error code 523 is returned, retain one configuration, and delete the website from redundant WAF instances. For details, see **Deleting a Protected Website from WAF**.

To prevent service interruptions due to such deletions, perform the following operations before removing a website from WAF:

Cloud mode: Go to your DNS provider and resolve your domain name to the IP address of the origin server. Otherwise, the traffic to your domain name cannot be routed to the origin server.

Dedicated mode: Remove redundant WAF instances from the backend server group of the load balancer so that no requests are forwarding to those WAF instances.

----End

Cause 2: A Third-party Interface That Uses WAF Was Called

When a request is forwarded to the third-party API, header and cookie are forwarded without being changed. Only the host is modified. This makes WAF count the requests without clearing historical records.

Solution

Modify the header field in the reverse proxy request. The operations are as follows:

NOTICE

This method can be used only when Nginx is deployed after WAF on the user traffic link.

Step 1 Use **proxy_set_header** to redefine the request header sent to the proxy server. Run the following command to open the Nginx configuration file:

(The following command is used when Nginx is installed in the **/opt/nginx/** directory. Change the directory based on your situation.)

vi /opt/nginx/conf/nginx.conf

Step 2 Add **proxy_set_header X-CloudWAF-Traffic-Tag 0** to the Nginx configuration file. The following is an example:

```
location  ^~/test/ {
    ......
    proxy_set_header Host       $proxy_host;
    proxy_set_header X-CloudWAF-Traffic-Tag 0;
    ......
    proxy_pass http://x.x.x.x;
}
```

----End

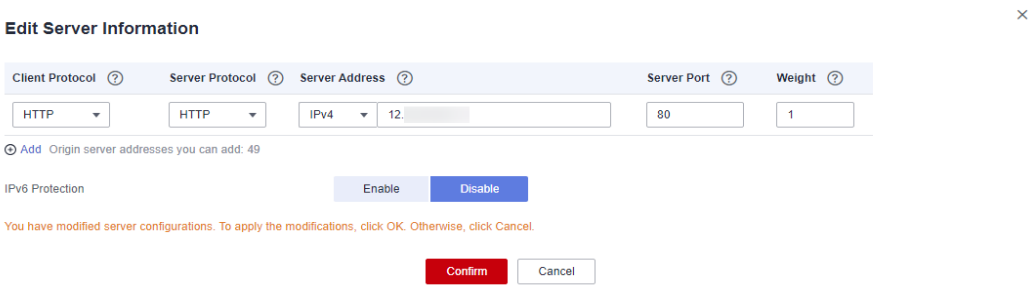
Cause 3: Origin Server IP address Was Mistakenly Set to an IP Address of WAF or A Proxy in Front of WAF

If the origin server address is mistakenly set to the back-to-source IP address of WAF or an IP address of the proxy in front of WAF, the website requests go to an endless loop and error code 523 is returned.

Solution

Check the origin server configurations and enter a correct origin server address.

Figure 15-36 Changing the origin server address

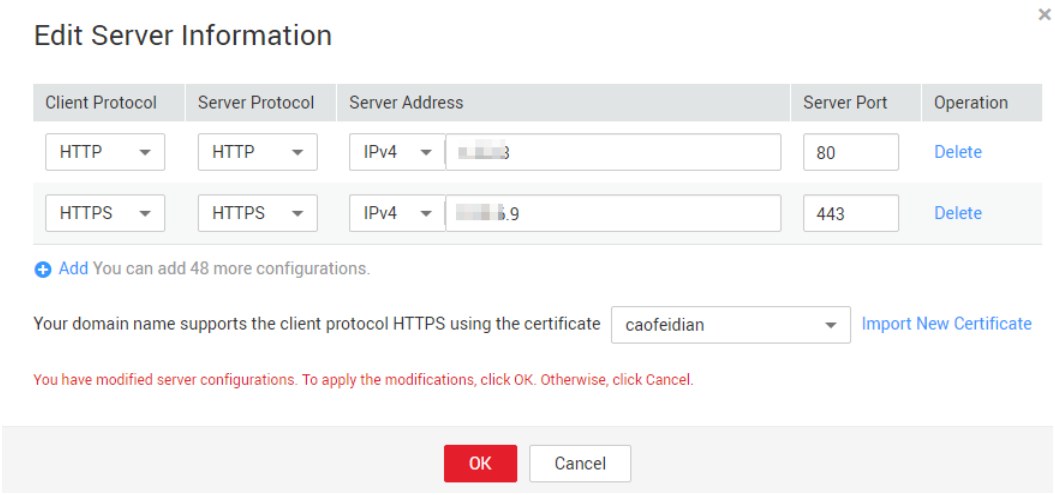


15.8.4 Why Was My Website Redirected So Many Times?

If you configure your web server to redirect HTTP requests to HTTPS, but configure only one piece of server information with client protocol set to HTTPS and server protocol set to HTTP in WAF, there will be an infinite loop.

You can configure two pieces of server information, one from HTTP (client protocol) to HTTP (server protocol), and the other from HTTPS (client protocol) to HTTPS (server protocol). **Figure 15-37** shows the finished server settings.

Figure 15-37 Example configuration

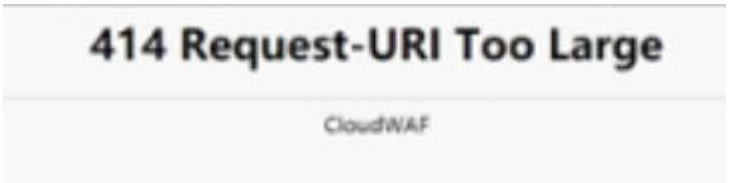


15.8.5 Why Am I Seeing Error Code 414 Request-URI Too Large?

Symptoms

After a protected website is connected to WAF, the website is inaccessible and the error message "414 Request-URI Too Large" is displayed, as shown in **Figure 15-38**.

Figure 15-38 Error Code 414 Request-URI Too Large

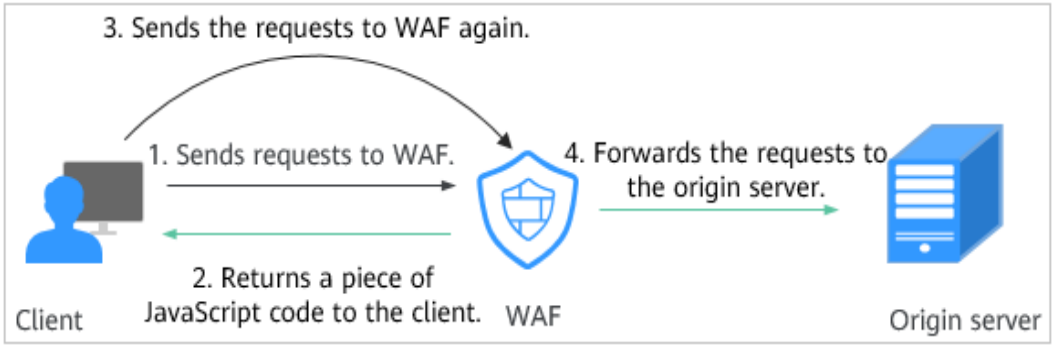


Possible Causes

The client browser cannot parse JavaScript. In this situation, the client browser caches the page that contains the JavaScript code returned by WAF. Each time the protected website is requested, the cached page is accessed. WAF then verifies that the access request is from an invalid browser or crawler. The access request verification fails. As a result, an infinite loop occurs, the URI length exceeds the browser limit, and the website becomes inaccessible.

After JavaScript anti-crawler is enabled, WAF returns a piece of JavaScript code to the client when the client sends a request. If the client sends a normal request to the website, triggered by the received JavaScript code, the client will automatically send the request to WAF again. WAF then forwards the request to the origin server. This process is called JavaScript verification. **Figure 15-39** shows how JavaScript verification works.

Figure 15-39 JavaScript anti-crawler detection process



Handling Suggestions

Disable the JavaScript anti-crawler protection by performing the following steps:

Step 1 Log in to the management console.

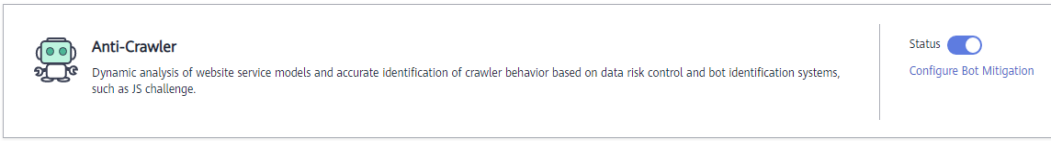
Step 2 Click in the upper left corner of the management console and select a region or project.

Step 3 Click in the upper left corner of the page and choose **Security** > **Web Application Firewall**.

Step 4 Click the name of the target policy to go to the protection configuration page.

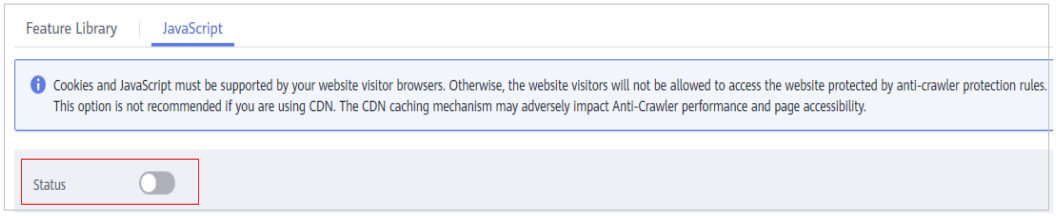
Step 5 In the **Anti-Crawler** configuration area, click **Configure Bot Mitigation**.

Figure 15-40 Anti-Crawler configuration area



Step 6 Click the **JavaScript** tab and disable the JavaScript anti-crawler protection. Its status changes to .

Figure 15-41 Disabling JavaScript anti-crawler protection



----End

15.8.6 What Is the Connection Timeout Duration of WAF? Can I Manually Set the Timeout Duration?

- The default timeout for connections from a browser to WAF is 120 seconds. The value varies depending on your browser settings and cannot be changed on the WAF console.
- The default timeout for connections between WAF and your origin server is 30 seconds. You can customize a timeout on the WAF console.

  On the **Basic Information** page, enable **Timeout Settings** and click . Then, specify **WAF-to-Server connection timeout (s)**, **Read timeout (s)**, and **Write timeout (s)** and click to save settings.

15.9 Checking Whether Normal Requests Are Blocked Mistakenly

15.9.1 How Do I Handle False Alarms as WAF Blocks Normal Requests to My Website?

Once an attack hits a WAF rule, WAF will respond to the attack immediately according to the protective action (**Log only** or **Block**) you configured for the rule and display an event on the **Events** page.

In the row containing the false alarm event, click **Details** in the **Operation** column and view the event details. If you are sure that the event is a false positive, handle it as a false alarm by referring to **Table 15-11**. After an event is handled as a false alarm, WAF stops blocking corresponding type of event. No such type of event will be displayed on the **Events** page and you will no longer receive alarm notifications accordingly.

Table 15-11 Handling false alarms

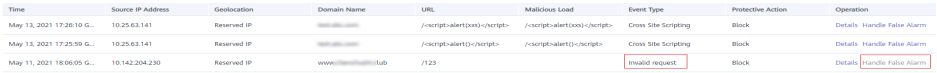
Type of Hit Rule	Hit Rule	Handling Method
WAF built-in protection rules	• Basic web protection rules Basic web protection defends against common web attacks, such as SQL injection, XSS attacks, remote buffer overflow attacks, file inclusion, Bash vulnerability exploits, remote command execution, directory traversal, sensitive file access, and command and code injections. Basic web protection also detects web shells and evasion attacks. • Feature-based anti-crawler protection Feature-based anti-crawler identifies and blocks crawler behavior from search engines, scanners, script tools, and other crawlers.	In the row containing the attack event, click **Handle as False Alarm** in the **Operation** column. For details, see **Handling False Alarms**.
Custom protection rules	• CC attack protection rules • Precise protection rules • Blacklist and whitelist rules • Geolocation access control rules • Web tamper protection rules • JavaScript anti-crawler protection • Information leakage prevention rules • Data masking rules	Go to the page displaying the hit rule and delete it.
Other	Invalid access requests **NOTE** If any of the following cases, WAF blocks the access request as an invalid request: • When **form-data** is used for POST or PUT requests, the number of parameters in a form exceeds 8,192. • The URL contains more than 2,048 parameters. • The number of headers exceeds 512.	The **Handle as False Alarm** button is grayed out for events that are generated against a precise protection rule. To allow the blocked requests, see **Configuring Custom Precise Protection Rules**.

15.9.2 Why Does WAF Block Normal Requests as Invalid Requests?

Symptom

After a website is connected to WAF, a normal access request is blocked by WAF. On the **Events** page, the corresponding **Event Type** reads **Invalid request**, and the **Handle False Alarm** button is grayed out, as shown in **Figure 15-42**.

Figure 15-42 Normal requests blocked by WAF as invalid requests



Possible Cause

If any of the following cases, WAF blocks the access request as an invalid request:

- When **form-data** is used for POST or PUT requests, the number of parameters in a form exceeds 8,192.
- The URL contains more than 2,048 parameters.
- The number of headers exceeds 512.

Solution

If you confirm that a blocked request is a normal request, allow it by referring to **Configuring Custom Precise Protection Rules**.

