DNS Policies

The following topics explain DNS policies, DNS rules, and how to deploy DNS policies to managed devices.

DNS Policy Overview

DNS-based Security Intelligence allows you to block traffic based on the domain name requested by a client, using a Security Intelligence Block list. Cisco provides domain name intelligence you can use to filter your traffic; you can also configure custom lists and feeds of domain names tailored to your deployment.

Traffic on a DNS policy Block list is immediately blocked and therefore is not subject to any further inspection—not for intrusions, exploits, malware, and so on, but also not for network discovery. You can use a Security Intelligence Do Not Block list to override a Block list and force access control rule evaluation, and, recommended in passive deployments, you can use a "monitor-only" setting for Security Intelligence filtering. This allows the system to analyze connections that would have been blocked by a Block list, but also logs the match to the Block list and generates an end-of-connection Security Intelligence event.

Note DNS-based Security Intelligence may not work as intended for a domain name unless the DNS server deletes a domain cache entry due to expiration, or a client's DNS cache or the local DNS server's cache is cleared or expires.

You configure DNS-based Security Intelligence using a DNS policy and associated DNS rules. To deploy it to your devices, you must associate your DNS policy with an access control policy, then deploy your configuration to managed devices.

DNS Policy Components

A DNS policy allows you to block connections based on domain name, using a Block list, or exempt such connections from this type of blocking using a Do Not Block list. The following list describes the configurations you can change after creating a DNS policy.

Name and Description

Each DNS policy must have a unique name. A description is optional.

In a multidomain deployment, policy names must be unique within the domain hierarchy. The system may identify a conflict with the name of a policy you cannot view in your current domain.

Rules

Rules provide a granular method of handling network traffic based on the domain name. Rules in a DNS policy are numbered, starting at 1. The system matches traffic to DNS rules in top-down order by ascending rule number.

When you create a DNS policy, the system populates it with a default Global Do-Not-Block List for DNS rule and a default Global Block List for DNS rule. Both rules are fixed to the first position in their respective categories. You cannot modify these rules, but you can disable them.

In a multidomain deployment, the system also adds Descendant DNS Do-Not-Block Lists and Descendant DNS Block Lists rules to DNS policies in ancestor domains. These rules are fixed to the second position in their respective categories.

Note If multitenancy is enabled for your FMC, the system is organized into a hierarchy of domains, including ancestor and descendant domains. These domains are distinct and separate from the domain names used in DNS management.

A descendant list contains the domains on the Block or Do Not Block lists of system subdomain users. From an ancestor domain, you cannot view the contents of descendant lists. If you do not want subdomain users to add domains to a Block or Do Not Block list:

- disable the descendant list rules, and
- enforce Security Intelligence using the access control policy inheritance settings

The system evaluates rules in the following order:

- Global Do-Not-Block List for DNS rule (if enabled)
- Descendant DNS Do-Not-Block Lists rule (if enabled)
- Rules with a Do Not Block action
- Global Block List for DNS rule (if enabled)
- Descendant DNS Block Lists rule (if enabled)
- Rules with an action other than Do Not Block

Usually, the system handles DN-based network traffic according to the *first* DNS rule where *all* the rule's conditions match the traffic. If no DNS rules match the traffic, the system continues evaluating the traffic based on the associated access control policy's rules. DNS rule conditions can be simple or complex.

License Requirements for DNS Policies

FTD License

Threat

Classic License

Protection

Requirements and Prerequisites for DNS Policies

Model Support

Any

Supported Domains

Any

User Roles

- Admin
- Access Admin
- Network Admin

Important You must apply the Network Discovery policy on the device for a successful DNS validation on the traffic.

Managing DNS Policies

Use the DNS Policy page (**Policies** > **Access Control** > **DNS**) to manage custom DNS policies. In addition to custom policies that you create, the system provides the Default DNS Policy, which uses the default Block list and Do Not Block list. You can edit and use this system-provided custom policy. In a multidomain deployment, this default policy uses the default Global DNS Block List, Global DNS Do Not Block List, Descendant DNS Block lists, and Descendant DNS Do Not Block lists, and can only be edited in the Global domain.

In a multidomain deployment, the system displays policies created in the current domain, which you can edit. It also displays policies created in ancestor domains, which you cannot edit. To view and edit policies created in a lower domain, switch to that domain.

Procedure

Step 1 Choose **Policies** > **Access Control** > **DNS**.

Step 2 Manage your DNS policy:

- Compare—To compare DNS policies, click **Compare Policies** and proceed as described in Compare Policies.
- Copy—To copy a DNS policy, click **Copy** ( ) and proceed as described in Editing DNS Policies, on page 4.
- Create—To create a new DNS policy, click **Add DNS Policy** and proceed as described in Creating Basic DNS Policies, on page 4.
- Delete—To delete a DNS policy, click **Delete** ( ), then confirm you want to delete the policy.
- Edit—To modify an existing DNS policy, click **Edit** ( )) and proceed as described in Editing DNS Policies, on page 4.

Creating Basic DNS Policies

When you create a new DNS policy, it contains default settings. You must then edit it to customize the behavior.

Procedure

Step 1 Choose **Policies** > **Access Control** > **DNS**.

Step 2 Click **Add DNS Policy**.

Step 3 Give the policy a unique **Name** and, optionally, a **Description**.

Step 4 Click **Save**.

What to do next

Configure the policy. See Editing DNS Policies, on page 4.

Editing DNS Policies

Only one person should edit a DNS policy at a time, using a single browser window. If multiple users attempt to save the same policy, only the first set of saved changes are retained.

To protect the privacy of your session, after thirty minutes of inactivity on the policy editor, a warning appears. After sixty minutes, the system discards your changes.

Procedure

Step 1 Choose **Policies** > **Access Control** > **DNS**.

Step 2 Click **Edit** ( ) next to the DNS policy you want to edit.

If **View** ( ) appears instead, the configuration belongs to an ancestor domain, or you do not have permission to modify the configuration.

Step 3 Edit your DNS policy:

- Name and Description—To change the name or description, click the field and type the new information.
- Rules—To add, categorize, enable, disable, or otherwise manage DNS rules, click **Rules** and proceed as described in Creating and Editing DNS Rules, on page 6.

Step 4 Click **Save**.

What to do next

- Optionally, further configure the new policy as described in *Logging Connections with Security Intelligence* in the Firepower Management Center Administration Guide.
- Deploy configuration changes; see Deploy Configuration Changes.

DNS Rules

DNS rules handle traffic based on the domain name requested by a host. As part of Security Intelligence, this evaluation happens after any traffic decryption, and before access control evaluation.

The system matches traffic to DNS rules in the order you specify. In most cases, the system handles network traffic according to the *first* DNS rule where *all* the rule's conditions match the traffic.

In addition to its unique name, each DNS rule has the following basic components:

State

By default, rules are enabled. If you disable a rule, the system does not use it to evaluate network traffic, and stops generating warnings and errors for that rule.

Position

Rules in a DNS policy are numbered, starting at 1. The system matches traffic to rules in top-down order by ascending rule number. With the exception of Monitor rules, the first rule that traffic matches is the rule that handles that traffic.

Conditions

Conditions specify the specific traffic the rule handles. A DNS rule must contain a DNS feed or list condition, and can also match traffic by security zone, network, or VLAN.

Action

A rule's action determines how the system handles matching traffic:

- Traffic with a **Do Not Block** action is allowed, subject to further access control inspection.

- Monitored traffic is subject to further evaluation by remaining rules on the DNS Block list. If the traffic does not match a DNS Block list rule, it is inspected with access control rules. The system logs a Security Intelligence event for the traffic.
- Traffic on a Block list is dropped without further inspection. You can also return a Domain Not Found response, or redirect the DNS query to a sinkhole server.

Related Topics

About Security Intelligence

Creating and Editing DNS Rules

In a DNS policy, you can add up to a total of 32767 DNS lists to the Block list and Do Not Block list rules; that is, the number of lists in the DNS policy cannot exceed 32767.

Procedure

Step 1 In the DNS policy editor, you have the following options:

- To add a new rule, click **Add DNS Rule**.
- To edit an existing rule, click **Edit** ( ).

Step 2 Enter a **Name**.

Step 3 Configure the rule components, or accept the defaults:

- Action—Choose a rule **Action**; see DNS Rule Actions, on page 8.
- Conditions—Configure the rule's conditions; see DNS Rule Conditions, on page 9.
- Enabled—Specify whether the rule is **Enabled**.

Step 4 Click **Save**.

What to do next

- Deploy configuration changes; see Deploy Configuration Changes.

DNS Rule Management

The **Rules** tab of the DNS policy editor allows you to add, edit, move, enable, disable, delete, and otherwise manage DNS rules within your policy.

For each rule, the policy editor displays its name, a summary of its conditions, and the rule action. Other icons represent **Warning** ( ), **Error** ( ), and other important **Information** ( ). Disabled rules are dimmed and marked `(disabled)` beneath the rule name.

Enabling and Disabling DNS Rules

When you create a DNS rule, it is enabled by default. If you disable a rule, the system does not use it to evaluate network traffic and stops generating warnings and errors for that rule. When viewing the list of rules

in a DNS policy, disabled rules are dimmed, although you can still modify them. Note that you can also enable or disable a DNS rule using the DNS rule editor.

Procedure

Step 1 In the DNS policy editor, right-click the rule and choose a rule state.

Step 2 Click **Save**.

What to do next

- Deploy configuration changes; see Deploy Configuration Changes.

DNS Rule Order Evaluation

Rules in a DNS policy are numbered, starting at 1. The system matches traffic to DNS rules in top-down order by ascending rule number. In most cases, the system handles network traffic according to the *first* DNS rule where *all* the rule's conditions match the traffic:

- For Monitor rules, the system logs the traffic, then continues evaluating traffic against lower-priority DNS Block list rules.
- For non-Monitor rules, the system does **not** continue to evaluate traffic against additional, lower-priority DNS rules after that traffic matches a rule.

Note the following regarding rule order:

- The Global Do-Not-Block List for DNS is always first, and takes precedence over all other rules.
- The Descendant DNS Do-Not-Block Lists rule only appears in multidomain deployments, in non-leaf domains. It is always second, and takes precedence over all other rules except the Global Do-Not-Block List for DNS.
- The Do-Not-Block List section precedes the Block List section; Do-Not-Block List rules always take precedence over other rules.
- The Global Block List for DNS is always first in the Block List section, and takes precedence over all other Monitor and Block list rules.
- The Descendant DNS Block Lists rule only appears in multidomain deployments, in non-leaf domains. It is always second in the Block List section, and takes precedence over all other Monitor and Block list rules except the Global Block List.
- The Block List section contains Monitor and Block list rules.
- When you first create a DNS rule, the system positions it last in the Do-Not-Block List section if you assign a **Do Not Block** action, or last in the Block List section if you assign any other action.

You can drag and drop rules to reorder them.

DNS Rule Actions

Every DNS rule has an *action* that determines the following for matching traffic:

- handling—foremost, the rule action governs whether the system will block, not block, or monitor traffic that matches the rule's conditions, based on a Block or Do Not Block list
- logging—the rule action determines when and how you can log details about matching traffic

If configured, TID also impacts action prioritization. For more information, see TID-FMC Action Prioritization.

Do Not Block Action

The **Do Not Block** action allows traffic to pass to the next phase of inspection, which is access control rules.

The system does not log Do Not Block list matches. Logging of these connections depends on their eventual disposition.

Monitor Action

The **Monitor** action is designed to force connection logging; matching traffic is neither immediately allowed nor blocked. Rather, traffic is matched against additional rules to determine whether to permit or deny it. The first non-Monitor DNS rule matched determines whether the system blocks the traffic. If there are no additional matching rules, the traffic is subject to access control evaluation.

For connections monitored by a DNS policy, the system logs end-of-connection Security Intelligence and connection events to the FMC database.

Block Actions

These actions block traffic without further inspection of any kind:

- The **Drop** action drops the traffic.
- The **Domain Not Found** action returns a non-existent internet domain response to the DNS query, which prevents the client from resolving the DNS request.
- The **Sinkhole** action returns a sinkhole object's IPv4 or IPv6 address in response to the DNS query (A and AAAA records only). The sinkhole server can log, or log and block, follow-on connections to the IP address. If you configure a **Sinkhole** action, you must also configure a sinkhole object.

For a connection blocked based on the **Drop** or **Domain Not Found** actions, the system logs beginning-of-connection Security Intelligence and connection events. Because blocked traffic is immediately denied without further inspection, there is no unique end of connection to log.

For a connection blocked based on the **Sinkhole** action, logging depends on the sinkhole object configuration. If you configure your sinkhole object to only log sinkhole connections, the system logs end-of-connection connection events for the follow-on connection. If you configure your sinkhole object to log and block sinkhole connections, the system logs beginning-of-connection connection events for the follow-on connection, then blocks that connection.

DNS Rule Conditions

A DNS rule's conditions identify the type of traffic that rule handles. Conditions can be simple or complex. You must define a DNS feed or list condition within a DNS rule. You can also optionally control traffic by security zone, network, or VLAN.

When adding conditions to a DNS rule:

- If you do not configure a particular condition for a rule, the system does not match traffic based on that criterion.
- You can configure multiple conditions per rule. Traffic must match **all** the conditions in the rule for the rule to apply to traffic. For example, a rule with a DNS feed or list condition and network condition but no VLAN tag condition evaluates traffic based on the domain name and source or destination, regardless of any VLAN tagging in the session.
- For each condition in a rule, you can add up to 50 criteria. Traffic that matches **any** of a condition's criteria satisfies the condition. For example, you can use a single rule to block traffic based on up to 50 DNS lists and feeds.

Related Topics

Security Zone Rule Conditions, on page 9
Network Rule Conditions
VLAN Tags Rule Conditions
DNS Rule Conditions, on page 11

Security Zone Rule Conditions

Security zones segment your network to help you manage and classify traffic flow by grouping interfaces across multiple devices.

Zone rule conditions control traffic by its source and destination security zones. If you add both source and destination zones to a zone condition, matching traffic must originate from an interface in one of the source zones and leave through an interface in one of the destination zones.

Just as all interfaces in a zone must be of the same type (all inline, passive, switched, or routed), all zones used in a zone condition must be of the same type. Because devices deployed passively do not transmit traffic, you cannot use a zone with passive interfaces as a destination zone.

Leave matching criteria empty whenever possible, especially those for security zones, network objects, and port objects. When you specify multiple criteria, the system must match against every combination of the contents of the criteria you specify.

Tip Constraining rules by zone is one of the best ways to improve system performance. If a rule does not apply to traffic through any of device's interfaces, that rule does not affect that device's performance.

Security Zone Conditions and Multitenancy

In a multidomain deployment, a zone created in an ancestor domain can contain interfaces that reside on devices in different domains. When you configure a zone condition in an descendant domain, your configurations apply to only the interfaces you can see.

Network Rule Conditions

Network rule conditions control traffic by its source and destination IP address, using inner headers. Tunnel rules, which use outer headers, have tunnel endpoint conditions instead of network conditions.

You can use predefined objects to build network conditions, or manually specify individual IP addresses or address blocks.

Note You *cannot* use FDQN network objects in identity rules.

Note The system builds a separate network map for each leaf domain. In a multidomain deployment, using literal IP addresses to constrain this configuration can have unexpected results. Using override-enabled objects allows descendant domain administrators to tailor Global configurations to their local environments.

Leave matching criteria empty whenever possible, especially those for security zones, network objects, and port objects. When you specify multiple criteria, the system must match against every combination of the contents of the criteria you specify.

VLAN Tags Rule Conditions

Note VLAN tags in access rules only apply to inline sets. Access rules with VLAN tags do not match traffic on firewall interfaces.

VLAN rule conditions control VLAN-tagged traffic, including Q-in-Q (stacked VLAN) traffic. The system uses the innermost VLAN tag to filter VLAN traffic, with the exception of the prefilter policy, which uses the outermost VLAN tag in its rules.

Note the following Q-in-Q support:

- FTD on Firepower 4100/9300—Does not support Q-in-Q (supports only one VLAN tag).
- FTD on all other models:
  - Inline sets and passive interfaces—Supports Q-in-Q, up to 2 VLAN tags.
  - Firewall interfaces—Does not support Q-in-Q (supports only one VLAN tag).

You can use predefined objects to build VLAN conditions, or manually enter any VLAN tag from 1 to 4094. Use a hyphen to specify a range of VLAN tags.

You can specify a maximum of 50 VLAN conditions.

In a cluster, if you encounter problems with VLAN matching, edit the access control policy advanced options, Transport/Network Preprocessor Settings, and select the **Ignore the VLAN header when tracking connections** option.

Note The system builds a separate network map for each leaf domain. In a multidomain deployment, using literal VLAN tags to constrain this configuration can have unexpected results. Using override-enabled objects allows descendant domain administrators to tailor Global configurations to their local environments.

DNS Rule Conditions

DNS conditions in DNS rules allow you to control traffic if a DNS list, feed, or category contains the domain name requested by the client. You must define a DNS condition in a DNS rule.

Regardless of whether you add a global or custom Block or Do Not Block list to a DNS condition, the system applies the configured rule action to the traffic. For example, if you add the Global Do Not Block List to a rule, and configure a **Drop** action, the system blocks all traffic that should have been allowed to pass to the next phase of inspection.

How to Create DNS Rules

The following topics discuss how to create DNS rules.

Related Topics

Controlling Traffic Based on DNS and Security Zone, on page 11
Controlling Traffic Based on DNS and Network, on page 12
Controlling Traffic Based on DNS and VLAN, on page 12
Controlling Traffic Based on DNS List or Feed, on page 13

Controlling Traffic Based on DNS and Security Zone

Zone conditions in DNS rules allow you to control traffic by its source security zone. A *security zone* is a grouping of one or more interfaces, which may be located across multiple devices.

Procedure

Step 1 In the DNS rule editor, click **Zones**.

Step 2 Find and select the zones you want to add from the **Available Zones**. To search for zones to add, click the **Search by name** prompt above the **Available Zones** list, then type a zone name. The list updates as you type to display matching zones.

Step 3 Click to select a zone, or right-click and then select **Select All**.

Step 4 Click **Add to Source**, or drag and drop.

Step 5 Save or continue editing the rule.

What to do next

- Deploy configuration changes; see Deploy Configuration Changes.

Controlling Traffic Based on DNS and Network

Network conditions in DNS rules allow you to control traffic by its source IP address. You can explicitly specify the source IP addresses for the traffic you want to control.

Procedure

Step 1 In the DNS rule editor, click **Networks**.

Step 2 Find and select the networks you want to add from the **Available Networks**, as follows:

- To add a network object on the fly, which you can then add to the condition, click **Add** (+) above the **Available Networks** list and proceed as described in Creating Network Objects.
- To search for network objects to add, click the **Search by name or value** prompt above the **Available Networks** list, then type an object name or the value of one of the object's components. The list updates as you type to display matching objects.

Step 3 Click **Add to Source**, or drag and drop.

Step 4 Add any source IP addresses or address blocks that you want to specify manually. Click the **Enter an IP address** prompt below the **Source Networks** list; then type an IP address or address block and click **Add**.

The system builds a separate network map for each leaf domain. In a multidomain deployment, using literal IP addresses to constrain this configuration can have unexpected results. Using override-enabled objects allows descendant domain administrators to tailor Global configurations to their local environments.

Step 5 Save or continue editing the rule.

What to do next

- Deploy configuration changes; see Deploy Configuration Changes.

Controlling Traffic Based on DNS and VLAN

VLAN conditions in DNS rules allow you to control VLAN-tagged traffic. The system uses the innermost VLAN tag to identify a packet by VLAN.

When you build a VLAN-based DNS rule condition, you can manually specify VLAN tags. Alternately, you can configure VLAN conditions with VLAN tag *objects*, which are reusable and associate a name with one or more VLAN tags.

Procedure

Step 1 In the DNS rule editor, select **VLAN Tags**.

Step 2 Find and select the VLANs you want to add from the **Available VLAN Tags**, as follows:

- To add a VLAN tag object on the fly, which you can then add to the condition, click **Add** (+) above the Available VLAN Tags list and proceed as described in Creating VLAN Tag Objects.

- To search for VLAN tag objects and groups to add, click the **Search by name or value** prompt above the **Available VLAN Tags** list, then type either the name of the object, or the value of a VLAN tag in the object. The list updates as you type to display matching objects.

Step 3 Click **Add to Rule**, or drag and drop.

Step 4 Add any VLAN tags that you want to specify manually. Click the **Enter a VLAN Tag** prompt below the **Selected VLAN Tags** list; then type a VLAN tag or range and click **Add**. You can specify any VLAN tag from 1 to 4094; use a hyphen to specify a range of VLAN tags.

The system builds a separate network map for each leaf domain. In a multidomain deployment, using literal VLAN tags to constrain this configuration can have unexpected results. Using override-enabled objects allows descendant domain administrators to tailor Global configurations to their local environments.

Step 5 Save or continue editing the rule.

What to do next

- Deploy configuration changes; see Deploy Configuration Changes.

Controlling Traffic Based on DNS List or Feed

Procedure

Step 1 In the DNS rule editor, click **DNS**.

Step 2 Find and select the DNS lists and feeds you want to add from the **DNS Lists and Feeds**, as follows:

- To add a DNS list or feed on the fly, which you can then add to the condition, click **Add** (+) above the **DNS Lists and Feeds** list and proceed as described in Creating Security Intelligence Feeds .
- To search for DNS lists, feeds, or categories to add, click the **Search by name or value** prompt above the **DNS Lists and Feeds** list, then type an object name or the value of one of the object's components. The list updates as you type to display matching objects.
- For descriptions of the system-provided threat categories, see Security Intelligence Categories.

Step 3 Click **Add to Rule**, or drag and drop.

Step 4 Save or continue editing the rule.

What to do next

- Deploy configuration changes; see Deploy Configuration Changes.

DNS Policy Deploy

After you finish updating your DNS policy configuration, you must deploy it as part of access control configuration.

- Associate your DNS policy with an access control policy, as described in Configure Security Intelligence.
- Deploy configuration changes; see Deploy Configuration Changes.